EA-South west box 5

ENVIRONMENT AGENCY

WATER QUALITY SECTION
CORNWALL AREA

FINAL DRAFT REPORT

LOE POOL URBAN WASTE WATER DIRECTIVE SENSITIVE AREA (EUTROPHIC) DESIGNATION

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COR/97/003
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LOE POOL URBAN WASTE WATER TREATMENT DIRECTIVE SENSITIVE AREA (EUTROPHIC) DESIGNATION

EXECUTIVE SUMMARY

Loe Pool meets the DoE criteria for a eutrophic still water for total phosphorus, chlorophyll a, dissolved oxygen and algal biomass. Adverse effects include regular blue-green algal blooms which have been linked to dog deaths. Helston STW has been identified as the major source of orthophosphate to the system. Modelling suggests that 90 to 100% removal of orthophosphate from Helston STW would ensure DoE criteria for total phosphorus are met within Loe Pool. This would benefit the conservation status of Loe Pool as an SSSI and improve the aesthetic quality and health of one of West Cornwall's most popular areas.

LOE POOL URBAN WASTE WATER TREATMENT DIRECTIVE SENSITIVE AREA (EUTROPHIC) DESIGNATION

1. BACKGROUND

1.1. Location

Loe Pool is 1 km south of Helston, Cornwall. The main input to Loe Pool is the River Cober. Loe Pool outfall's to Mounts Bay. Chemical and biological monitoring points are shown in appendix 1.1.

1.2. Description

Loe Pool is a shallow coastal lake dammed by a shingle bar. The maximum depth is 10 metres with a mean depth of 4 metres. The surface area of Loe Pool is approximately 0.56 km^2. The River Cober, which feeds into Loe Pool, has a drainage area of 53.75 km^2 and is 17.4 km long from source to tidal limit.

<u>Landscape</u>

The source of the River Cober is within the granite upland of Carnmenellis. This has a fabric of small fields, areas of heathland, rough grassland and metalliferous mining remains. Further down the catchment is a more fertile lowland, given over to dairying, early vegetable production and bulb growing. Wooded hedges occur between the fields, although significant tracts of woodland are scarce.

<u>Wildlife and conservation status</u>

The whole of Loe Pool and some surrounding land has been a Site of Special Scientific Interest (SSSI) since 1951 (see Appendix 1.2. for details). It is also an Area of Outstanding Natural Beauty, Heritage Coast and is designated as an Area of Great Scientific Value. Loe Pool is owned by the National Trust and provides scarce habitat not found elsewhere in Cornwall. It provides habitats for many rare higher plant, bryophyte, algal and insect species and the area is also important to wintering birds.

Loe Pool was one of only two native sites for the rare plant species Strapwort, *Corrigiola litoralis*. It became extinct there at around the turn of the century and English Nature is considering the reintroduction of the species to Loe Pool. However, they have identified the eutrophic state of Loe Pool as a factor against a successful reintroduction and support any measures to reduce the eutrophic status of Loe Pool (J. Clitherow, pers. comm. and see reference 1).

Loe Pool was historically famous for its large brown trout considered a unique race. The trout live in Loe Pool and run up the River Cober to spawn. Until the late 1970's good numbers spawned in the River Cober (L. Portlock, pers. comm.) but numbers and size of trout have declined since. They are now seen infrequently (R. Howard, pers. comm.).

Amenity and aesthetic value

The National Trust own and manage Loe Pool and much of the surrounding land. A permissive path has been developed around Loe Pool, which is very popular with tourists year-round. Annual visitor numbers have been estimated to be around 30000 (pers. comm. (National Trust Wardens pers. comm.). Because of this there has been great public awareness of the problems associated with Loe Pool (see Appendix 1.3.).

Geology

The source of the River Cober is in the higher open country with gently rounded summits typical of the Carnmenellis granite. At the edge of the granite mass are large aureoles of thermally metamorphosed country rocks. The rest of the catchment is made up of the Devonian Mylor Slates in which sandstone is more rare.

Crossing the catchment is a belt of hydrothermal metalliferous tin-copper mineralisation. This belt, containing the highest concentration of mineral lodes in the 'Old World', has been exploited since the Bronze Age. The large number of abandoned mines has left behind a legacy of contaminated land.

Hydrogeology

Neither the granite nor the country rock within the catchment can be termed major aquifers. However, usable groundwater is present both in the weathered zone and in fissures in the bedrock. Because of this, the rocks have been classified by the Environment Agency as minor aquifers. Within the catchment, there are a large number of boreholes and wells supporting small local demands. In addition, groundwater is abstracted from adits and disused mine shafts.

Hydrology

The catchment is generally steep and impervious. There is a gauging station at Trenear on the River Cober approximately 8 kilometres upstream of Loe Pool. The gauging station monitors the prescribed flow for the Wendron Water treatment abstraction. Water from Stithians Reservoir (in the Fal catchment) can also be diverted into the River Cober. The maximum recorded instantaneous flow is 3.8 cumecs with a minimum daily flow of 0.01 cumecs (both events were recorded in 1990) and a mean of 0.44 cumecs for the 6 year period of record.

2. DATA ANALYSIS AND PRESENTATION TO DEMONSTRATE THE PROPOSED WATER IS EUTROPHIC

2.1. Chemical data

Methods

Chemical data from January 1994 to October 1996 has been used for this report. Location of sites is shown in appendix 1.1. Sites are sampled twelve times a year except P20A/P/5 which is sampled four times a year. All samples are taken on the same day.

Results

The Department of the Environment (DoE) criteria for eutrophication are set out in appendix 2.12. For still freshwaters standards are set for total phosphorus, while for running freshwaters standards are set for orthophosphate. However, total phosphorus was not analysed for UWWT only Lake Classification purposes. Subsequently, total phosphorus data is unavailable for River Cober upstream of Helston STW (R20A009), Helston STW (WSTW0086FE) and River Cober downstream of Helston STW (R20A004). Helston STW is the only qualifying discharge within the catchment under the UWWT. Therefore, orthophosphate data could only be used for the model (see section 4) and is used in the summary statistics for comparison. Total phosphorus summary statistics are given for the three Loe Pool sites only.

Phosphorus

The impact of Helston STW (WSTW0086FE) is apparent with the 0.1 mg/l orthophosphate standard exceeded at both downstream sites on the River Cober (R20A004 and R20A017) in all years (see Appendix 2.2.). The River Cober upstream of Helston STW (R20A009) easily complies with the standard. Helston STW effluent has high concentrations of orthophosphate and there are no known additional sources in this reach of the River Cober.

The Penrose Stream (R20A018) complies with the orthophosphate standard in all years. This is not surprising as there are no known discharges to the Penrose Stream.

The Carminowe Stream (R20A019) exceeds the orthophosphate standard in all years. Culdrose STW (P20A/P/5) discharges to the stream but no data on orthophosphate is available. Culdrose STW serves the Ministry of Defence base at RNAS Culdrose and until recently was not required to be consented. Because of this and the fact that the discharge is too small to qualify as a UWWT discharge sampling was kept to a minimum. However, it is likely that Culdrose STW is the major source of orthophosphate to the Carminowe Stream.

Consequently the three sites within Loe Pool greatly exceed the 0.05 mg/l total phosphorus standard in all years (see Appendix 2.1.).

Chlorophyll a

All sites on the River Cober, Penrose Stream and Carminowe Stream comply with both the 25 µg/l annual average and 100 µg/l maximum standards for chlorophyll a in all years (see Appendix 2.3.).

The three sites within Loe Pool exceed the 30 µg/l maximum standard for chlorophyll a in all years (see Appendix 2.3.). The percentage of samples exceeding varies with 1994 and 1996 showing greater exceedence than 1995. This indicates the substantial algal biomass within Loe Pool.

Water clarity

The water clarity at the two surface Loe Pool sites (R20A005 and R20A026) was less than the 3.0 metre annual average standard in all years (see Appendix 2.4. - no data for R20A005 for 1994). This was likely to have been a consequence of algal biomass (see section 2.2.).

Dissolved oxygen

Supersaturation of dissolved oxygen occurred at all three sites within Loe Pool through the summer months (see Appendix 2.7.). Only two profiles were carried out and on one occasion depletion of dissolved oxygen occurred at depth (see Appendix 2.8. and 2.9.).

2.2. Biological data

Methods

Algal spot samples were collected every time a chlorophyll a sample was taken (see section 2.1. for sampling strategy). The sample was analysed if the chlorophyll a concentration was more than the threshold level for still waters (30 ug/l). Algae were identified to species level (where possible) and enumeration based upon national guidelines.

Owing to the historical toxic blue green algal problems within Loe Pool routine monthly algal samples were collected in 1995 and 1996. The results from this sampling provided additional data regarding phytoplankton abundance at the three sites within Loe Pool.

Results

Algal succession at R20A026 within Loe Pool for 1995 and 1996 is shown in appendices 2.10. and 2.11.

In 1995, eight samples exceeded the chlorophyll a threshold level at the three Loe Pool sites (see appendix 2.6.). On 27 April 1995 only R20A028 exceeded and could be attributed to the relatively high abundance of the desmid *Staurastrum* and an increase in the diversity of diatoms. The next exceedence was on the 21 July 1995 when all three sites exceeded the chlorophyll a threshold level. The Desmid *Staurastrum* was again present in abundance and would appear to have been the most likely reason for the failures. On 29 August 1995, the three sites again exceeded the chlorophyll a threshold level. Although *Staurastrum* was again common/abundant within each sample, the potentially toxic blue green algae *Microcystis aeruginosa* was also present at a similar level of abundance. The presence of this alga within both the surface and bottom samples showed the extent of this proliferation throughout the full depth of the water column. The final exceedence in 1995 occurred on the 25 September at R20A005. *Staurastrum* was again identified as the principal algal species present. Its abundance was however substantially lower than that observed in the August sample.

In 1995 the monthly routine sampling identified the presence of blue green algae within Loe Pool from May - November. From May - June, *Anabaena spp.* and *Coelosphaerium* *spp.* were present at low abundance levels. In July, *Microcystis aeruginosa* became the dominant species within the phytoplankton assemblage. *Microcystis aeruginosa* continued to be common / abundant within the routine samples until 25 September 1995 and persisted within the water column until the 22 November 1995.

In 1996 there were twelve UWWTD exceedences of the threshold confined to the same three sites within Loe Pool. As anticipated the first failure was because of the spring diatom bloom in April. At this time all three sites were found to have chlorophyll a levels over the threshold level. The diatom *Tabellaria fenestrata* was the phytoplankton species responsible for this exceedence. The next exceedence occurred on the 24 June 1996 at R20A005. The high chlorophyll a level recorded on this date reflected the high abundance of three species, the Diatom *Gomphonema spp.*, the Chlorophyte *Pediastrum spp.* and most notably, a large bloom of the potentially toxic blue green algae *Anabaena flos-aquae*. On the 24 July, 28 August and 24 September 1996 all three sites were found to exceed the chlorophyll a threshold level. On each occasion a diverse range of phytoplankton taxa was present within the samples with the desmid *Staurastrum* being the dominant algae throughout this period. *Microcystis aeruginosa* was present at a low level of abundance in July but became common in September at all sites. *Anabaena spp.* was present at a low level of abundance at all sites in July being largely replaced by another species of blue green algae, *Aphanizomenon flos-aquae* in September. The sampling performed on the 31 October 1996 identified R20A005 and R20A026 exceeding the standard. *Microcystis aeruginosa* and *Staurastrum* were again present but at lower levels of abundance when compared to the September samples. The blue green alga *Coelosphaerium spp.* was also present at R20A026 but again, at a low level of abundance.

The 1996 routine sampling identified the presence of blue green algae in all samples taken between the end of May and end of October. On the 30 May 1996 the blue green alga *Gleocapsa* was present at a low level of abundance. By the end of June the diversity of the phytoplankton assemblage had increased greatly and it was at this time that a bloom of *Anabaena flos-aquae* dominated the micro flora. *Gleocapsa* and *Microcystis aeruginosa* were also present. In July and August, *Microcystis aeruginosa* was found to increase in abundance and on the 24 September 1996, this species was present at bloom levels. *Coelosphaerium spp.* was also present at this time. By the end of October the abundance of all algal species had declined substantially although *Microcystis aeruginosa* was still present.

3. ADVERSE EFFECTS

The *Microcystis aeruginosa* and *Anabaena flos-aquae* blooms of 21 July 1995 and 24 June 1996 respectively exceeded the bloom warning threshold level used by the Environment Agency (six units/ml). Both species of blue green algae are capable of producing toxins. This situation therefore initiated the Environment Agency to send out warning letters to the relevant bodies responsible for public health (see Appendix 3.1.).

Since 1994 only one pollution complaint may be linked to the eutrophic status of Loe Pool (see Appendix 3.2.). On 21 July 1995 workmen reported feeling dizzy when clearing "blanket weed" from Loe Pool. This is coincident with the bloom of *Anabaena flos-aquae*.

There have been several cases of dogs dying after swimming in Loe Pool during blue-green algal blooms (see Appendix 3.3.). The presumption is that the dogs have died due to blue-green algal toxins.

4. NUTRIENT REMOVAL AT QUALIFYING DISCHARGES

4.1. Modelling

Loe Pool is modelled as a single cell, as though it were a stirred tank (volume 1930000 m^3). Monitored orthophosphate data shows that this is justified as the concentrations do not vary greatly either vertically or laterally within Loe Pool. The modelling calculations were performed using the ECOS model.

Orthophosphate was used for the model as no total phosphorus data were available for Helston STW. From the routine data orthophosphate accounts for approximately 55% to 70% of the total phosphorus in Loe Pool. Therefore, the modelled concentrations for Loe Pool are likely to be only 55% to 70 % of the total phosphorus.

The modelled Loe Pool concentration is a consequence of the various input loads, the output load and any losses within Loe Pool. There are three modelled input sources:

- Carminowe Stream
- Penrose Stream
- River Cober

and one modelled outflow point at the south west of Loe Pool.

The input loads for the Carminowe Stream and Penrose Stream are found by multiplying the observed concentrations and estimated flows, at the points where they flow into Loe Pool. The water quality monitoring sites are:

- R20A018 Penrose Stream
- R20A019 Carminowe Stream

The Penrose Stream and Carminowe Stream flows were estimated from the River Cober daily mean flows using the Micro Low Flow mean flow statistics to scale the time series. The MLF means are:

- 0.039 Penrose Stream
- 0.083 Carminowe Stream
- 0.844 River Cober (gauge ref SW63F042)

The River Cober load was calculated slightly differently. There are two ways to find it. One way is as for the Penrose Stream and Carminowe Stream, using the monitoring point at which it flows into Loe Pool:

- R20A017 River Cober

and multiplying it by the flow. Alternatively, the load can be found by summing the STW (Helston) load with the upstream River Cober load and then modifying the resulting load to take account of any losses en route to Loe Pool. The advantage with the second method is that it separates the contributions from the STW and upstream river, allowing the STW load to be varied in the model. The loss factor was estimated by comparing the two methods and the separate load method was then used. The following monitoring sites were used:

- R20A009 River Cober upstream
- WSTW0086FE Helston STW
- R20A017 River Cober downstream

and the Dry Weather Flow, 2821 m^3/day was used for Helston STW.

The output load was found as the product of the summed inflows and the observed Loe Pool concentration. The following monitoring site was used:

- R20A026

There is only one calibration parameter and this is the bulk decay factor which models the net losses within Loe Pool itself. This was found by comparing the modelled and observed concentrations within Loe Pool and adjusting until reasonable agreement resulted. This was done using one years data and then checking with another year.

4.2. Nutrient removal and justification for nutrient stripping at the qualifying works

Appendix 4.1. shows the relative loadings of the principal sources of orthophosphate. In the summer months close to 100% of the orthophosphate loading comes from Helston STW, at a time when algal blooms are most prevalent. Although the Carminowe Stream exceeds the standards for orthophosphate (see section 2.1.) the loading is small in comparison to Helston STW. In the winter months Helston STW is still the biggest load but the River Cober upstream of Helston STW and the Carminowe Stream form a much greater proportion of the orthophosphate loading.

Appendix 4.2. shows the effect of orthophosphate reduction at Helston STW on the predicted concentrations at R20A026 in Loe Pool. The 0.05 mg/l standard for total phosphorus is exceeded at reductions up to 80% removal. Only 90% and 100% removals stay consistently below 0.05 mg/l. As the modelled determinand is orthophosphate, which accounts for 55% to 70% of total phosphorus, it is estimated 90% and preferably 100% removal should ensure compliance with the standard. This would not be dependant on nutrient control anywhere else.

5. GENERAL DISCUSSION

Work by O'Sullivan (Reference 2) using sediment analysis has shown that Loe Pool started to change to a more eutrophic state in the 1930's coincident with the commissioning of Helston STW. Blue green algal blooms have been a regular feature of Loe Pool since at least 1968. Pictures of the *Microcystis aeruginosa* bloom and scum of 1989 are shown in appendix 5.1.

The 1995 and 1996 data have shown that the eutrophic nature of Loe Pool supports several algal taxa at or near bloom levels from May until October. Potentially toxic blue green algae in particular form a major part of the phytoplankton biomass from June until the end of September. This period is when Helston STW is providing close to 100% of the orthophosphate loading. Modelling indicates the complete removal of this source would reduce total phosphorus concentrations to below DoE standards.

The blue-green algal blooms have been coincident with cases of diziness in workmen and several dog deaths. It was presumed that blue-green algal toxins were responsible.

English Nature would welcome nutrient control to enhance Loe Pool as an SSSI and for species reintroduction. Its present eutrophic state is not compatible with their aims.

6. CONCLUSIONS

6.1. Loe Pool meets all the criteria as a eutrophic water for total phosphorus, chlorophyll a, water clarity, dissolved oxygen and algal blooms.

6.2. Dog deaths have been linked with the blue-green algal blooms.

6.3. Modelling indicates Helston STW to be the major source of orthophosphate especially during the summer.

6.4. To meet DoE criteria for total phosphorus in Loe Pool 90% to 100% of the orthophosphate from Helston STW would have to be removed.

7. REFERENCES

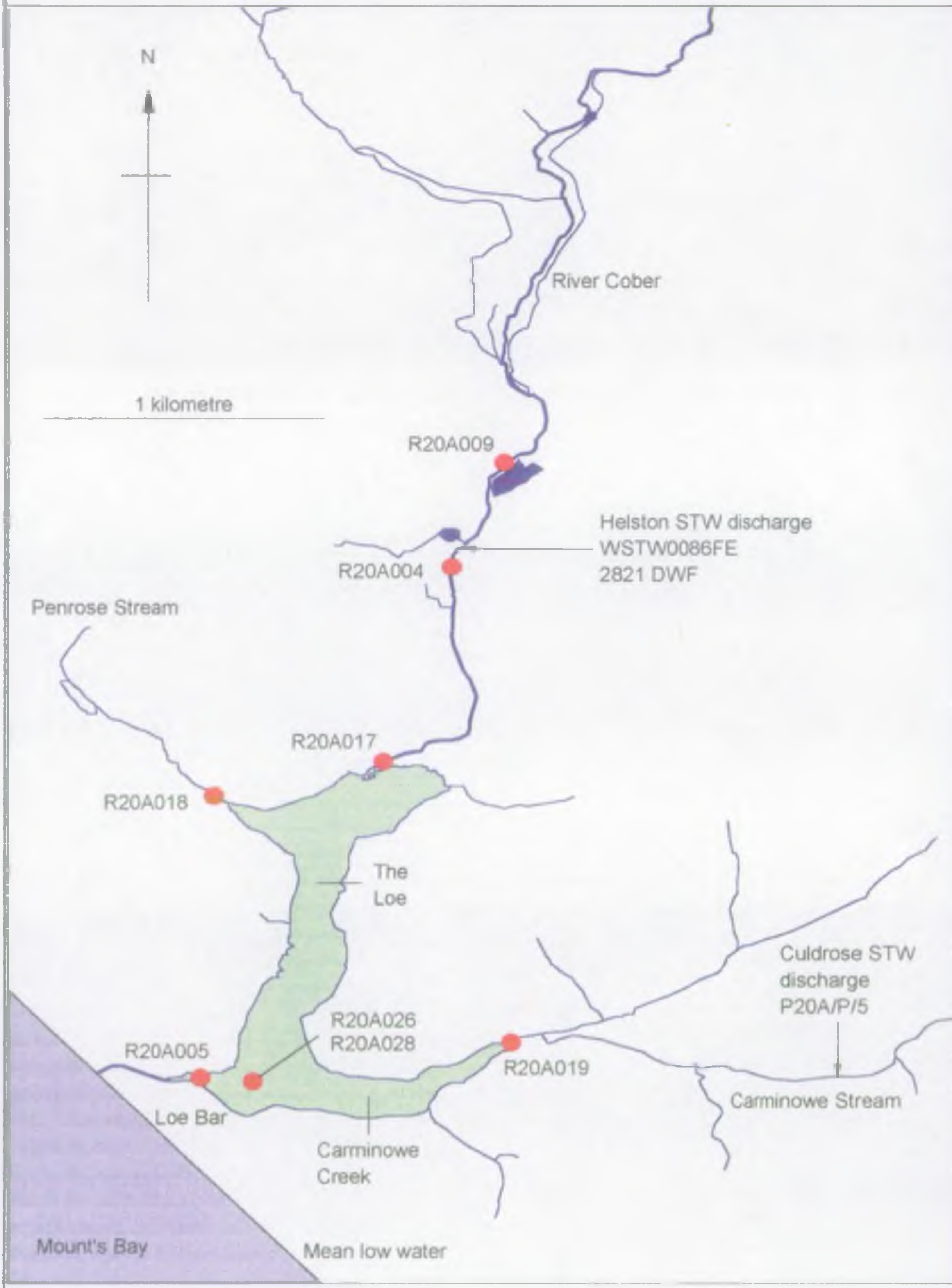
1) Byfield A. (1992) The decline of Strapwort (*Corrigiola litoralis*) from Loe Pool, Cornwall, with Nature Conservation recommendations. Report to English Nature (Species Recovery Programme).

2) O'Sullivan P. (1989) *Microcystis* blooms in the south west - agriculture or sewage? South West Environmental Protection Agency.

8. ACKNOWLEDGEMENTS

Simon Toms (Biologist) wrote the section on algae (section 2.2.). Neil Murdoch (Senior Modelling Officer) constructed and ran the scenarios on the Ecos model (section 4.1.).

Appendix 1.1. Proposed sensitive area (green shading) for Loe Pool showing monitoring sites



Appendix 1.2. Loe Pool SSSI designation

CITATION SHEET

COUNTY: CORNWALL SITE NAME: LOE POOL

DISTRICT: KERRIER

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981 (as amended)

Local Planning Authority: KERRIER DISTRICT COUNCIL; CORNWALL COUNTY COUNCIL

National Grid Reference: SW 647250 Area: 128.7 (ha) 318.0 (ac)

Ordnance Survey Sheet 1:50,000: 203 1:10,000: SW 62 SW SE NW NE

Date Notified (Under 1949 Act): 1951 Date of Last Revision: 1973

Date Notified (Under 1981 Act): 1986 Date of Last Revision:

Other Information: Cornwall Area of Outstanding Natural Beauty and Cornwall Heritage Coast. Site boundary amended by extension and deletion. Mainly National Trust owned.

Description and Reasons for Notification:

Loe Pool, located south of Helston on the South Cornish coast, is the largest freshwater lagoon in Cornwall covering an area of approximately 50 hectares and with maximum depth of 6 metres. The underlying rock is composed of Devonian shales and siltstones, locally overlain by head deposits. Soils developed over the surrounding area are mainly acidic brown earths.

Both the pool and the shingle bar provide scarce habitat not found elsewhere in Cornwall, with rare species of higher plants, bryophytes, and algae, together with many rare and local insect species. The area is also important to wintering birds.

The pool supports several Locally rare aquatic plant species including Six-stamened Waterwort (Elatine hexandra), Perfoliate Pondweed (Potamogeton perfoliatus), Shoreweed (Littorella uniflora), Horned Pondweed (Zannichellia palustris), and Amphibious Bistort (Polygonum amphibium). One noteworthy species of alga, Stonewort Alga (Nitella hyalina), has also been recorded. The shingle bar supports local plant species including Sea Holly (Eryngium maritimum), Sea Fern-grass (Catapodium marinum), Yellow Horned-poppy (Glaucium flavum), Sea Sandwort (Honkenya peploides), Sea Mayweed (Tripleurospermum maritimum), and the very rare Strapwort (Corrigiola litoralis).

At the northern inflow area is an extensive area of willow carr, mainly Grey Willow (Salix cinerea), with Common Reed (Phragmites australis) locally dominant within the willow. There is a wide fringe of Reed around the northern border of the lake. An area of relatively undisturbed ancient oakwood, mainly Pedunculate Oak (Quercus robur), occurs in the west of the site. Areas of maritime grassland occur along the cliff edge with Red Fescue (Festuca rubra) forming an extensive mat. Other species include Thrift (Armeria maritima), Wild Carrot (Daucus carota), Wild Thyme (Thymus drucei), Spring Squill (Scilla verna), and Western Clover (Trifolium occidentale).

Loe Pool is the only known site in Britain for the Cornish subspecies of the Sandhill Rustic Moth (Luperina nickerlii leechi), which feeds on Sand Couch Grass (Agropyron junceiforme). Nine species of Odonata, including the Keeled Skimmer (Orthetrum coerulescens) have been recorded here. The nutrient rich status of the pool has encouraged an abundance of benthic invertebrates, and there are also many rare or local species of Coleoptera and Hymenoptera. Loe Pool has the only recent record in Cornwall of the rare woodlouse, Porcellio dilatatus.

Loe Pool supports nearly 80 species of wintering birds with up to 1,200 wildfowl. Numbers of Shoveler (Anas clypeata) can reach nationally important levels and regionally important counts of Teal (Anas crecca) are not unusual.

There are also high counts for Pochard (Aythya ferina), Tufted Duck (Aythya fuligula), Mallard (Anas platyrhynchos), Goldeneye (Bucephala clangula), Gadwall (Anas strepera), and Coot (Fulica atra).

Several rare birds have been recorded here in winter and on autumn migration. There is a breeding colony of about 20 pairs of Sand Martins (Riparia riparia) a species not well represented in Cornwall.

Loe Bar encloses a lagoon occupying part of a former ria, and forms an integral part of a beach system extending from Porthleven to Gunwalloe.

The site is important for coastal geomorphology on two accounts. First, Loe Bar is a classic coastal landform; and second, the beach system is an essential member of a suite of major beaches formed and maintained by predominantly south-west wave regimes. The beach is formed mainly of flint shingles and coarse sand. Current inputs from adjacent cliffs are small, and overall, the beach is in deficit. The Bar itself is washed-over during periods of high wave energy as demonstrated by a series of washover fans. The annually laminated sediments composed of clastic material are unique in Great Britain.

Appendix 1.3. Examples of press cuttings relating to Loe Pool

West Briton 21.9.89

Warning as algae tests continue

TESTS were continuing yesterday to establish whether algae found at Loe Pool, near Helston, and at small reservoirs at Porth (Newquay) and Bussow (St. Ives) is of the same type that led to the deaths of a number of dogs in Leicestershire recently.

...ly-formed National ...ation has already ...safeguards to ...ing near ...water

The NRA have suggested the public a ban on all recreational activities at Loe and have advised people ... swim or handle the water ... let pets go near it. The ... also warned farmers ... their livestock. Warning ... have been erected.

Mr. Martin Weiler, ... for the NRA, said the ... of algae had been f... the different locatio...

And Kerrier ... environmental ser... ment have said, ... Pool is concerne... that this algae ... genus as found ... ...lian region ... has b...

Pollution threat to beauty spot

A Helston beauty spot is being polluted by sewa... and other waste, it was revealed this week.

by **Stephen Ivall**

As notices went up around the National Trust's Penrose Walks at Loe Pool, Helston, warning ...

cattle to drink from the pool, Cornwall's largest natural fresh water lake, ... water has ...

trict council. But some ... their staff claimed the al... was nothing new. Annu... during the hot weathe... ... across the pool ...

POLLUTION HISTORY IN A POOL

West Briton: 22. August '85

...OME years ago I was wading ... the shallows of Loe Pool, ...cording the fauna, which ...cluded large colonies of ...eshwater sponge, harbour... insects and crustaceans of ...ious kinds.

...owever, my investigation was ...short by the warden who said ...as his responsibility to keep ...le out of the water because ...he danger to health from ...tion.

...history of any pollution and ...of which has happened in the ...ounding countryside is ...erved in the layered ...ents of the pool, and these ...ots have been a lon... ...ve study for th... by Martin ...

The cores also reflect the periods of mining in the neighbourhood (mainly on Porkellis Moor) when mine tailings flowed into the catchment area — namely Loe Pool via the Cober River.

Bassett and Grylls of Porkellis United (latterly Jantar) worked the area between 1870 and 1938, and from 1920 until the company stopped work in 1938 there was an

By Stella Turk

intensification ... that the ... di...

have caused a great concentration of nutrients with consequently a great production of algae, as early as July — and 2,000 fish, mainly the Loe Pool trout, died.

Dr. O'Sullivan suggests that the July bloom this year was probably due to the lowering of the water level after the Bar was cut at the end of November 1984. Remains of water fleas have also been identified in the sediments, and the replacement of one dominant species by another, supporting algal evidence that the pool has become richer in nutrients (eutrophic).

There is also evidence of incursion of sea water in the past, favouring the production of brackish-water diatoms. Studies are still being carried out, and ...eper core-borings are enabling ... O'Sullivan and his colleagues ... investigate the earlier history ... Loe Pool, and perhaps date the ... of the present Bar.

... Bar and environs are now ... by the National Trust ...

nature sce...

Loe Pool algae fears dispelled

...research has been going on at Loe Pool for 10 years by scientists from Plymouth Polytechnic who claim the ... never have been ...

The West Briton & Royal Cornwall Gazette. 28.9.89

Algae pollution 'will get worse'

A SENIOR officer of the National Trust said this ...

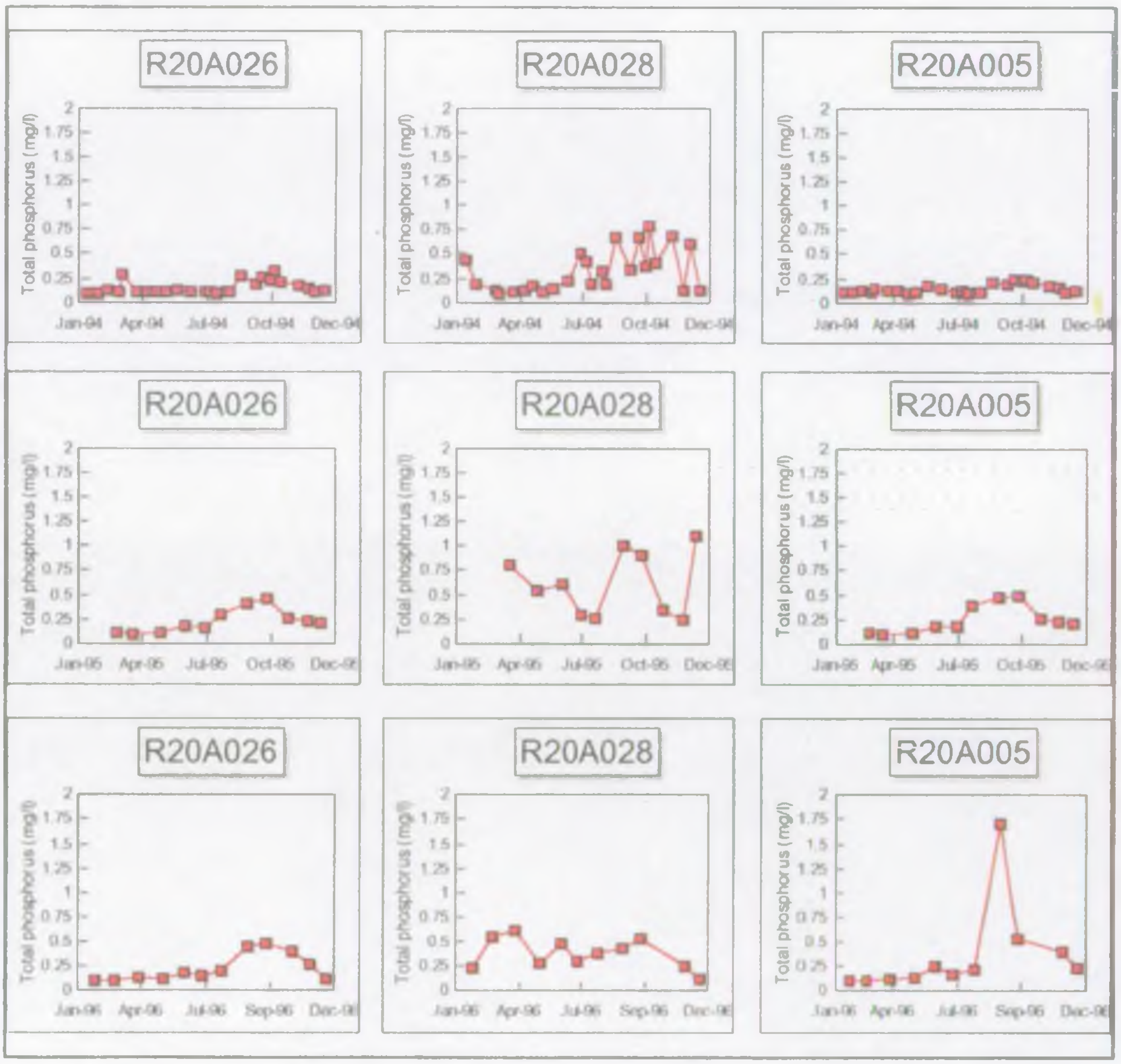
Mr Clotworthy referred to news at the end of last week that ...

...o Loe P... ...ing on ...ytechnic ...lston sew... of the m... said ... ...t needs we... ...aste goes i... without ... proper scre... ...ut 80 per ce... ...s." ... said de... ...een in ... out ... weed h... ...larly b... ...ell. The... to belie... ...w sewa... ...ol. He f... ...ool shou... ...l pollutio... ...been ...ust and ... ...ervanc... time.

... statemen... said the ... studying th... the alg... ...h could b... ...s. It wa...

Appendix 2.1. Total phosphorus (mg/l) summary statistics and temporal trends for Loe Pool sites from 1994 to 1996

Site	Year	Samples taken	Mean value	Standard deviation	Maximum value	Minimum value	DoE standard	Number of samples exceeding standard	Percentage of sample exceeding standard
R20A026	1994	26	0.16	0.06	0.32	0.09	0.05	26	100
R20A028	1994	25	0.33	0.21	0.79	0.09	0.05	25	100
R20A005	1994	26	0.15	0.04	0.25	0.10	0.05	26	100
R20A026	1995	11	0.23	0.11	0.46	0.10	0.05	11	100
R20A028	1995	10	0.61	0.31	1.10	0.24	0.05	10	100
R20A005	1995	11	0.25	0.14	0.49	0.10	0.05	11	100
R20A026	1996	12	0.23	0.13	0.49	0.11	0.05	12	100
R20A028	1996	11	0.38	0.15	0.61	0.12	0.05	11	100
R20A005	1996	12	0.35	0.43	1.70	0.11	0.05	12	100



Appendix 2.2. Orthophosphate (mg/l) summary statistics for 1994 to 1996 (part)

Site	Year	Samples taken	Mean value	Standard deviation	Maximum value	Minimum value	DoE standard	Number of samples exceeding standard	Percentage of samples exceeding standard
R20A009	1994	12	0.03	0.02	0.08	0.02	0.10	0	0
WSTW0086FE	1994	1	5.10	0.00	5.10	5.10			
R20A004	1994	12	0.47	0.66	2.50	0.06	0.10	9	75
R20A017	1994	26	0.26	0.19	0.62	0.02	0.10	17	65
R20A018	1994	26	0.07	0.08	0.46	0.02	0.10	1	4
P20A/P/5	1994	0							
R20A019	1994	26	0.43	0.36	1.70	0.06	0.10	24	92
R20A026	1994	26	0.09	0.03	0.16	0.05	0.05	21	81
R20A028	1994	25	0.10	0.04	0.21	0.04	0.05	24	96
R20A005	1994	26	0.09	0.03	0.14	0.04	0.05	24	92
R20A009	1995	12	0.03	0.01	0.04	0.02	0.10	0	0
WSTW0086FE	1995	17	6.02	2.20	8.90	2.40			
R20A004	1995	12	1.14	0.97	2.60	0.04	0.10	9	75
R20A017	1995	12	0.58	0.42	1.30	0.06	0.10	10	83
R20A018	1995	12	0.06	0.03	0.14	0.02	0.10	1	8
P20A/P/5	1995	0							
R20A019	1995	12	0.57	0.35	1.10	0.02	0.10	10	83
R20A026	1995	12	0.16	0.09	0.36	0.06	0.05	12	100
R20A028	1995	11	0.17	0.09	0.38	0.07	0.05	11	100
R20A005	1995	12	0.15	0.08	0.34	0.06	0.05	12	100
R20A009	1996 (part)	10	0.03	0.01	0.06	0.02	0.10	0	0
WSTW0086FE	1996 (part)	9	6.52	2.16	8.80	2.40			
R20A004	1996 (part)	10	0.86	0.51	1.70	0.07	0.10	9	90
R20A017	1996 (part)	9	0.65	0.53	1.50	0.07	0.10	8	89
R20A018	1996 (part)	9	0.05	0.01	0.07	0.03	0.10	0	0
P20A/P/5	1996 (part)	0							
R20A019	1996 (part)	9	0.54	0.43	1.50	0.10	0.10	8	89
R20A026	1996 (part)	9	0.12	0.06	0.25	0.07	0.05	9	100
R20A028	1996 (part)	9	0.14	0.06	0.25	0.06	0.05	9	100
R20A005	1996 (part)	9	0.11	0.06	0.24	0.05	0.05	8	89

Appendix 2.3. Chlorophyll a (μg/l) summary statistics for 1994 to 1996 (part)

Site	Year	Samples taken	Mean value	Standard deviation	Maximum value	Minimum value	DoE standard	Number of samples exceeding standard	Percentage of samples exceeding standard
R20A009	1994	6	3	2	8	1	100	0	0
WSTW0086FE	1994	0							
R20A004	1994	6	5	5	16	1	100	0	0
R20A017	1994	26	5	6	27	1	100	0	0
R20A018	1994	26	6	17	90	1	100	0	0
P20A/P/5	1994	0							
R20A019	1994	26	4	3	14	1	100	0	0
R20A026	1994	42	39	31	109	1	30	25	60
R20A028	1994	25	29	25	81	1	30	10	40
R20A005	1994	26	26	29	119	1	30	10	38
R20A009	1995	12	2	1	4	1	100	0	0
WSTW0086FE	1995	0							
R20A004	1995	12	3	1	5	1	100	0	0
R20A017	1995	12	4	5	20	1	100	0	0
R20A018	1995	12	5	7	29	1	100	0	0
P20A/P/5	1995	0							
R20A019	1995	12	3	3	10	1	100	0	0
R20A026	1995	11	15	16	62	2	30	1	9
R20A028	1995	11	30	18	68	10	30	3	27
R20A005	1995	12	33	49	169	2	30	3	25
R20A009	1996	10	3	2	6	1	100	0	0
WSTW0086FE	1996	0							
R20A004	1996	10	3	1	5	2	100	0	0
R20A017	1996	9	3	1	5	1	100	0	0
R20A018	1996	9	4	4	13	1	100	0	0
P20A/P/5	1996	0							
R20A019	1996	9	4	3	11	1	100	0	0
R20A026	1996	9	68	83	271	1	30	5	56
R20A028	1996	9	71	86	286	2	30	5	56
R20A005	1996	9	85	86	285	1	30	6	67

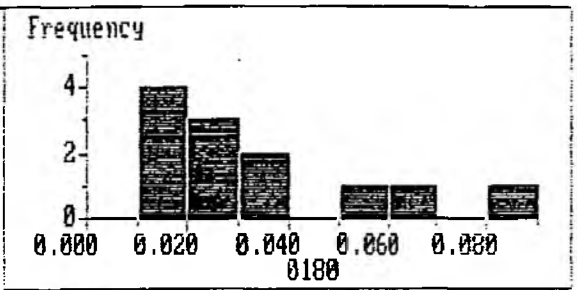
Appendix 2.4. Water clarity (metres - Secchi disc) summary statistics for 1994 to 1996

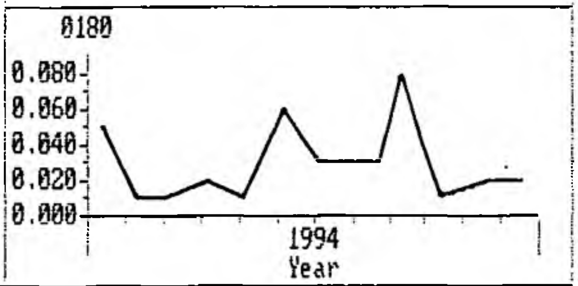
Site	Year	Samples taken	Mean value	Standard deviation	Maximum value	Minimum value	DoE standard	Number of samples exceeding standard	Percentage of sample exceeding standard
R20A026	1994	24	1.72	0.94	4.50	0.60	3	21	88
R20A005	1994	0							
R20A026	1995	11	1.69	0.75	3.50	0.50	3	10	91
R20A005	1995	6	0.47	0.05	0.50	0.40	3	6	100
R20A026	1996	9	1.21	0.78	2.70	0.50	3	9	100
R20A005	1996	8	0.71	0.43	1.50	0.00	3	8	100

Appendix 2.5. Orthophosphate (mg/l) temporal trends 1994 to 1996

R20A009 11-29-1996 0180 12/ 1/94 to 31/12/94

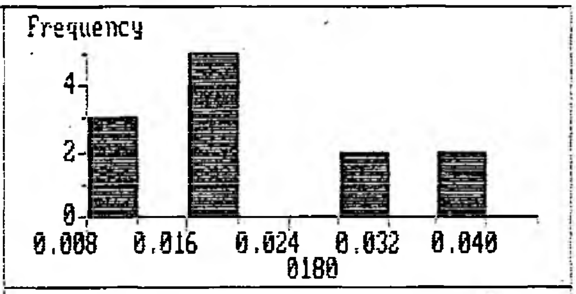
Number of observations	12
Minimum	0.0100
Mean	0.0292
Maximum	0.0800
Standard deviation	0.02275
SDD	0.02520
Non-parametric estimate of:	
10 percentile	0.0100
20 percentile	0.0100
Median	0.0200
80 percentile	0.0540
90 percentile	0.0740

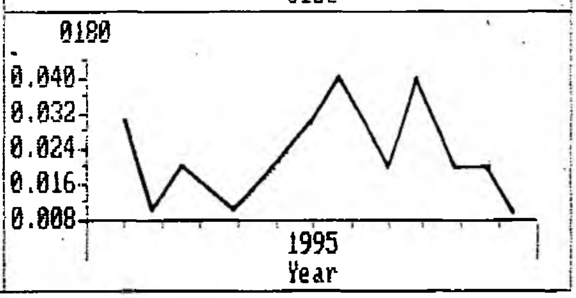




R20A009 11-29-1996 0180 1/ 1/95 to 31/12/95

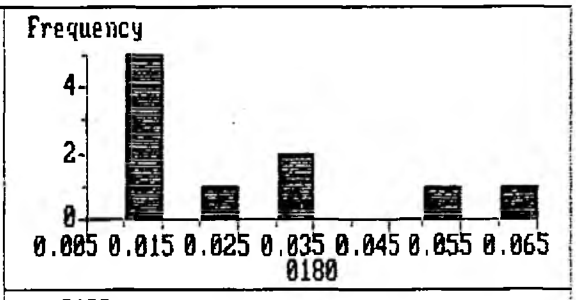
Number of observations	12
Minimum	0.0100
Mean	0.0225
Maximum	0.0400
Standard deviation	0.01055
SDD	0.01000
Non-parametric estimate of:	
10 percentile	0.0100
20 percentile	0.0100
Median	0.0200
80 percentile	0.0340
90 percentile	0.0400

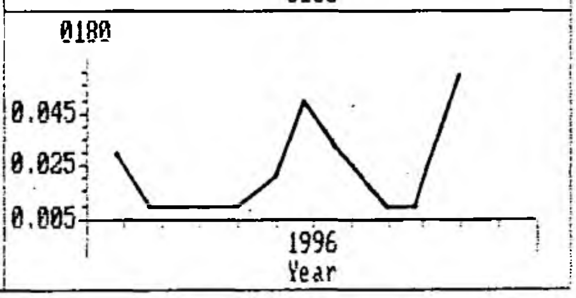




R20A009 11-29-1996 0180 1/ 1/96 to 31/10/96

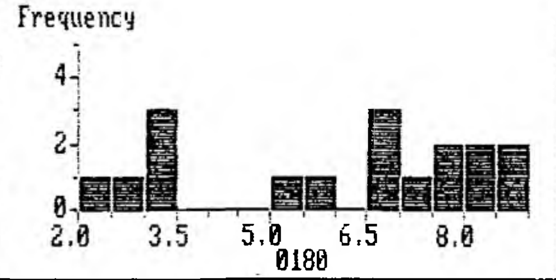
Number of observations	10
Minimum	0.0100
Mean	0.0240
Maximum	0.0600
Standard deviation	0.01838
SDD	0.01714
Non-parametric estimate of:	
10 percentile	0.0100
20 percentile	0.0100
Median	0.0150
80 percentile	0.0460
90 percentile	0.0590

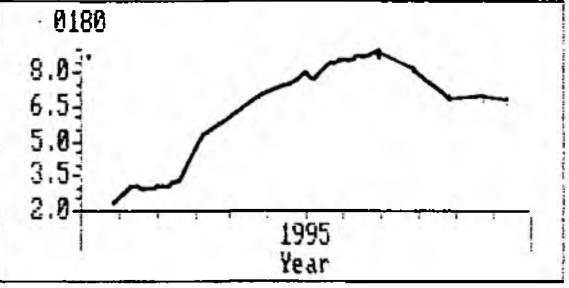




TW0086FE 11-29-1996 0180 1/ 1/95 to 31/12/95

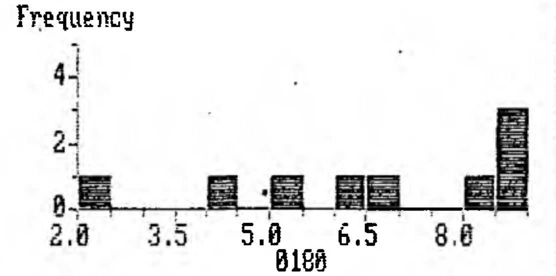
Number of observations	17
Minimum	2.40
Mean	6.02
Maximum	8.90
Standard deviation	2.266
SDD	0.607
Non-parametric estimate of:	
10 percentile	2.64
20 percentile	3.06
Median	6.90
80 percentile	8.08
90 percentile	8.58

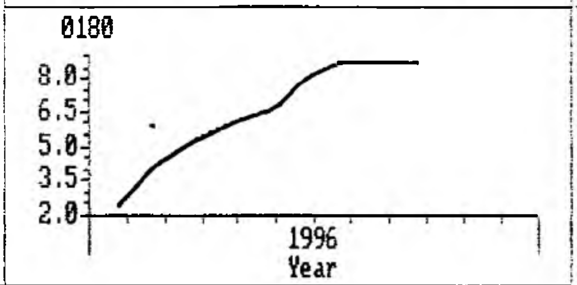




TW0086FE 11-29-1996 0180 1/ 1/96 to 24/ 9/96

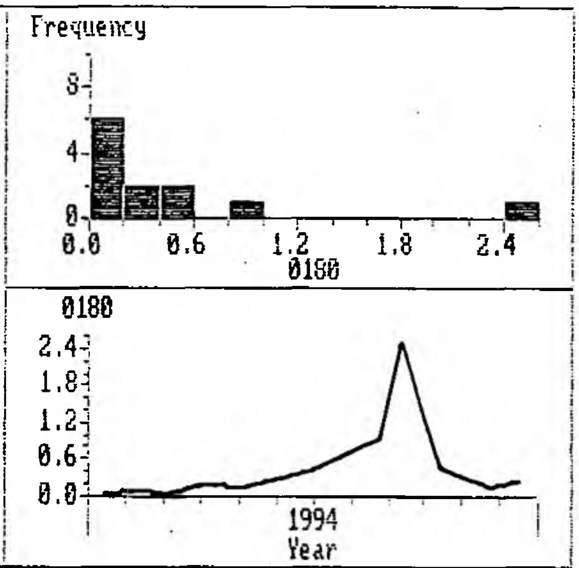
Number of observations	9
Minimum	2.40
Mean	6.52
Maximum	8.80
Standard deviation	2.286
SDD	0.746
Non-parametric estimate of:	
10 percentile	2.40
20 percentile	4.10
Median	6.60
80 percentile	8.70
90 percentile	8.80





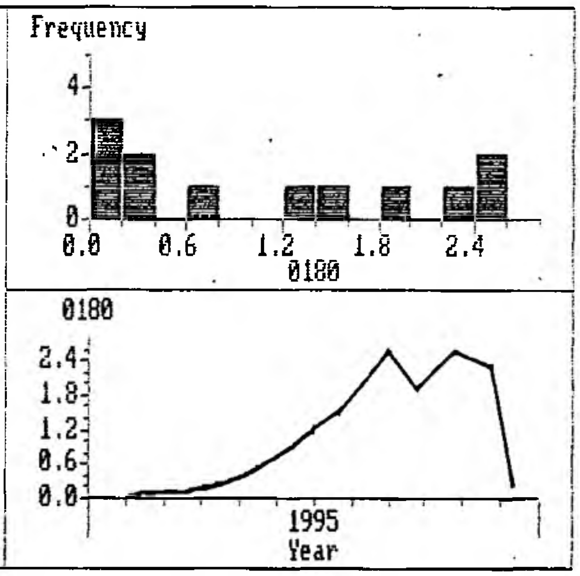
R20A004 11-29-1996 0180 12/ 1/94 to 31/12/94

Number of observations	12
Minimum	0.060
Mean	0.468
Maximum	2.500
Standard deviation	0.6878
SDD	0.5899
Non-parametric estimate of:	
10 percentile	0.060
20 percentile	0.066
Median	0.215
80 percentile	0.662
90 percentile	2.035



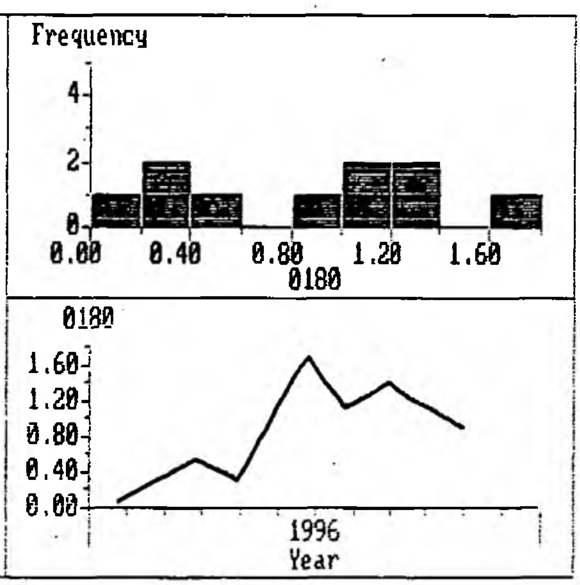
R20A004 11-29-1996 0180 1/ 1/95 to 31/12/95

Number of observations	12
Minimum	0.04
Mean	1.14
Maximum	2.60
Standard deviation	1.014
SDD	0.235
Non-parametric estimate of:	
10 percentile	0.05
20 percentile	0.08
Median	0.96
80 percentile	2.42
90 percentile	2.60



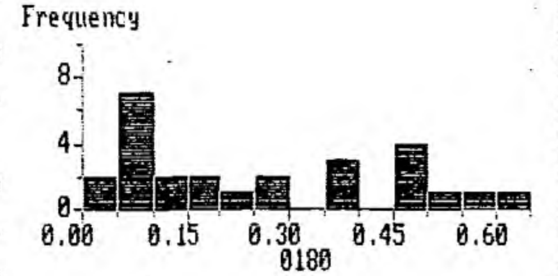
R20A004 11-29-1996 0180 1/ 1/96 to 31/10/96

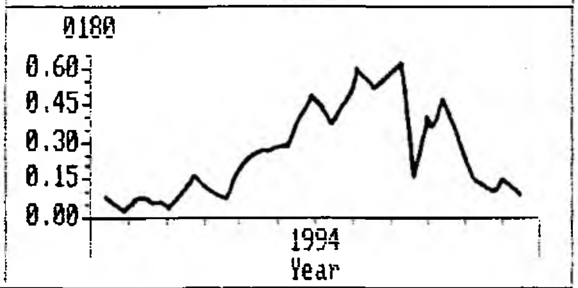
Number of observations	10
Minimum	0.070
Mean	0.860
Maximum	1.700
Standard deviation	0.5370
SDD	0.3287
Non-parametric estimate of:	
10 percentile	0.091
20 percentile	0.286
Median	1.000
80 percentile	1.360
90 percentile	1.670



R20A017 11-29-1996 0180 12/ 1/94 to 31/12/94

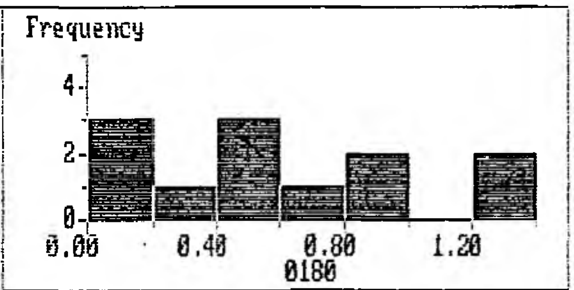
Number of observations	26
Minimum	0.020
Mean	0.264
Maximum	0.620
Standard deviation	0.1918
SDD	0.1061
Non-parametric estimate of:	
5 percentile	0.027
10 percentile	0.054
20 percentile	0.080
Median	0.195
80 percentile	0.486
90 percentile	0.544
95 percentile	0.613

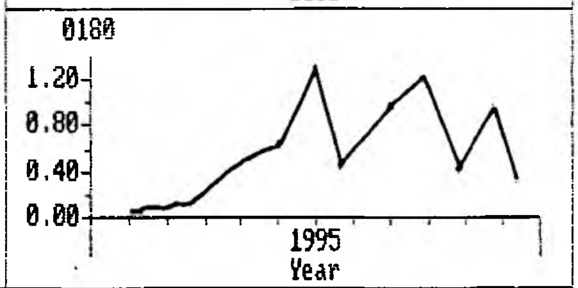




R20A017 11-29-1996 0180 1/ 1/95 to 31/12/95

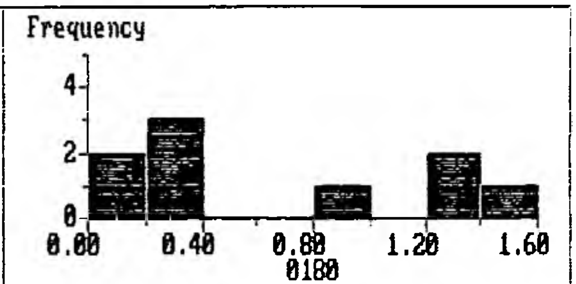
Number of observations	12
Minimum	0.060
Mean	0.582
Maximum	1.300
Standard deviation	0.4343
SDD	0.1617
Non-parametric estimate of:	
10 percentile	0.066
20 percentile	0.098
Median	0.450
80 percentile	1.068
90 percentile	1.270

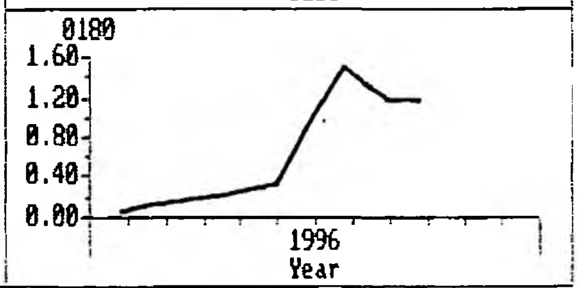




R20A017 11-29-1996 0180 1/ 1/96 to 24/ 9/96

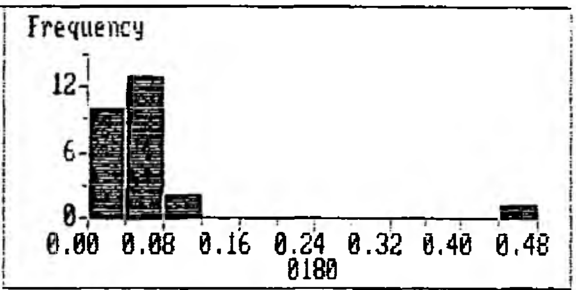
Number of observations	9
Minimum	0.070
Mean	0.646
Maximum	1.500
Standard deviation	0.5577
SDD	0.2413
Non-parametric estimate of:	
10 percentile	0.070
20 percentile	0.130
Median	0.310
80 percentile	1.200
90 percentile	1.500

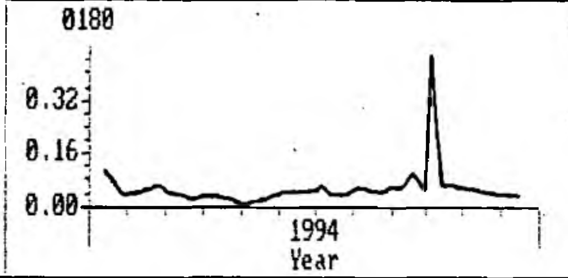




R20A018 11-29-1996 0180 12/ 1/94 to 31/12/94

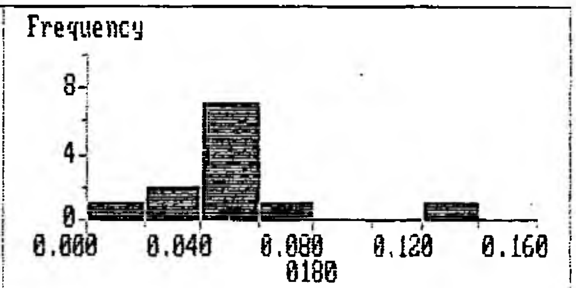
Number of observations	26
Minimum	0.010
Mean	0.067
Maximum	0.460
Standard deviation	0.0826
SDD	0.0833
Non-parametric estimate of:	
5 percentile	0.017
10 percentile	0.030
20 percentile	0.040
Median	0.050
80 percentile	0.070
90 percentile	0.100
95 percentile	0.334

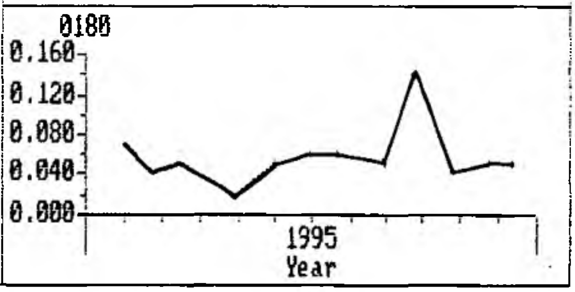




R20A018 11-29-1996 0180 1/ 1/95 to 31/12/95

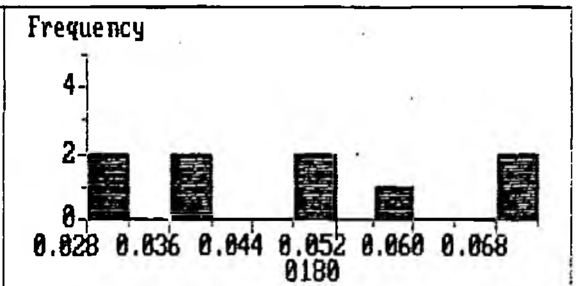
Number of observations	12
Minimum	0.0200
Mean	0.0567
Maximum	0.1400
Standard deviation	0.02902
SDD	0.02160
Non-parametric estimate of:	
10 percentile	0.0260
20 percentile	0.0400
Median	0.0500
80 percentile	0.0640
90 percentile	0.1190

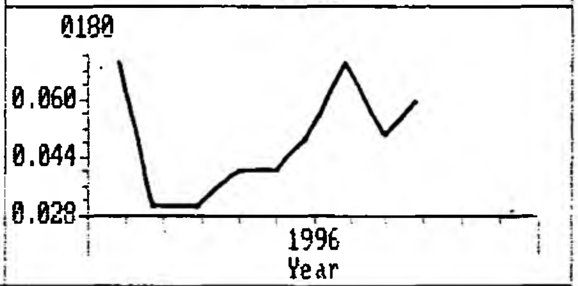




R20A018 11-29-1996 0180 1/ 1/96 to 24/ 9/96

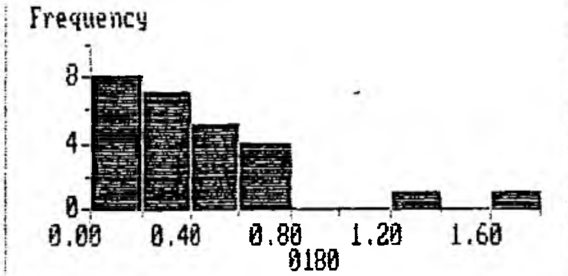
Number of observations	9
Minimum	0.0300
Mean	0.0489
Maximum	0.0700
Standard deviation	0.01537
SDD	0.01389
Non-parametric estimate of:	
10 percentile	0.0300
20 percentile	0.0300
Median	0.0500
80 percentile	0.0700
90 percentile	0.0700

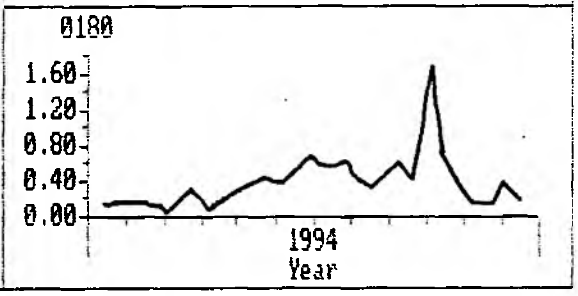




R20A019 11-29-1996 0180 12/ 1/94 to 31/12/94

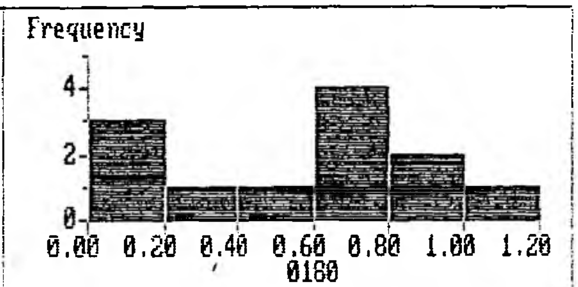
Number of observations	26
Minimum	0.060
Mean	0.426
Maximum	1.700
Standard deviation	0.3668
SDD	0.2393
Non-parametric estimate of:	
5 percentile	0.074
10 percentile	0.114
20 percentile	0.132
Median	0.350
80 percentile	0.612
90 percentile	0.864
95 percentile	1.525

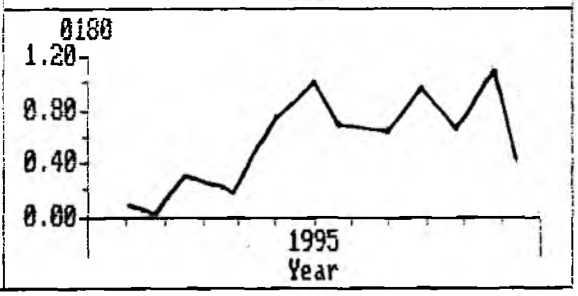




R20A019 11-29-1996 0180- 1/ 1/95 to 31/12/95

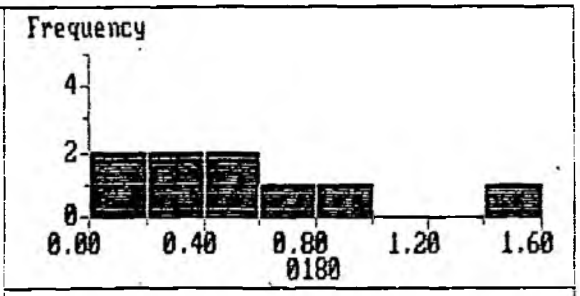
Number of observations	12
Minimum	0.010
Mean	0.569
Maximum	1.100
Standard deviation	0.3655
SDD	0.2737
Non-parametric estimate of:	
10 percentile	0.031
20 percentile	0.146
Median	0.660
80 percentile	0.976
90 percentile	1.070

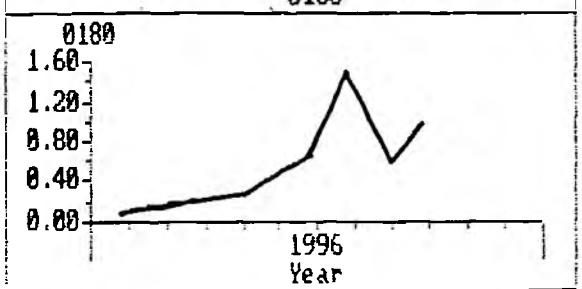




R20A019 11-29-1996 0180 1/ 1/96 to 24/ 9/96

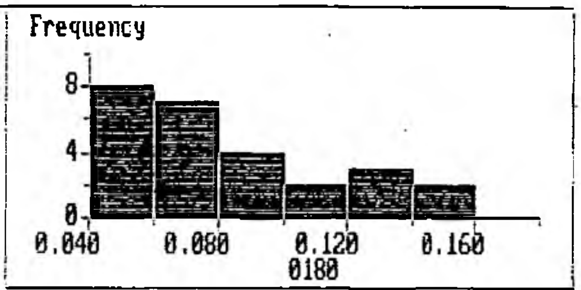
Number of observations	9
Minimum	0.100
Mean	0.541
Maximum	1.500
Standard deviation	0.4588
SDD	0.3661
Non-parametric estimate of:	
10 percentile	0.100
20 percentile	0.140
Median	0.460
80 percentile	0.990
90 percentile	1.500

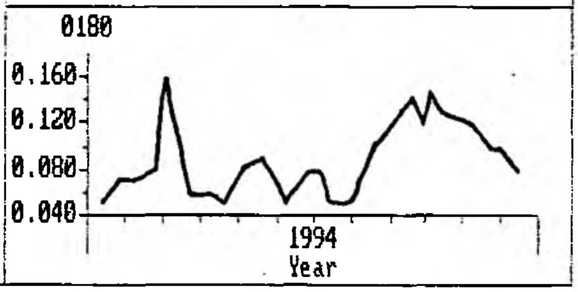




R20A026 11-29-1996 0180 12/ 1/94 to 31/12/94

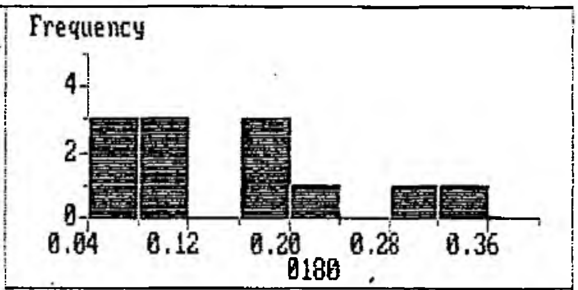
Number of observations	26
Minimum	0.0500
Mean	0.0888
Maximum	0.1600
Standard deviation	0.03362
SDD	0.02454
Non-parametric estimate of:	
5 percentile	0.0500
10 percentile	0.0500
20 percentile	0.0540
Median	0.0800
80 percentile	0.1260
90 percentile	0.1430
95 percentile	0.1565

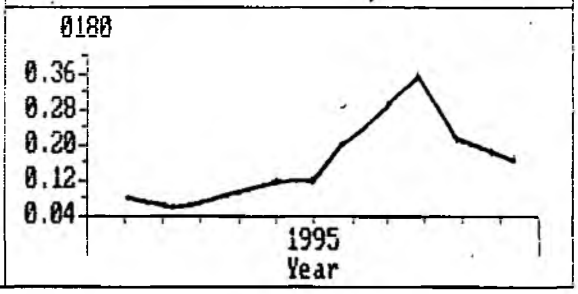




R20A026 11-29-1996 0180 1/ 1/95 to 31/12/95

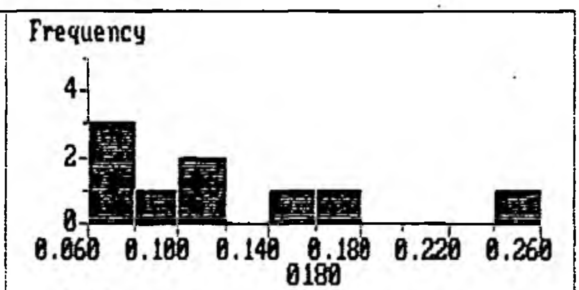
Number of observations	12
Minimum	0.060
Mean	0.162
Maximum	0.360
Standard deviation	0.0925
SDD	0.0190
Non-parametric estimate of:	
10 percentile	0.063
20 percentile	0.076
Median	0.145
80 percentile	0.242
90 percentile	0.339

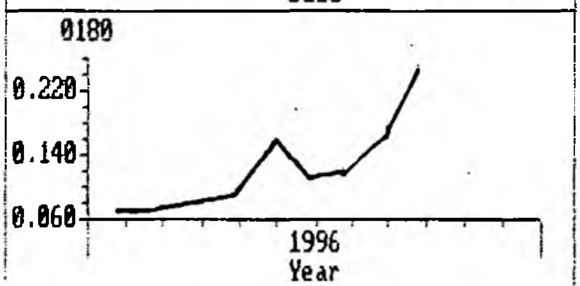




R20A026 11-29-1996 0180 1/ 1/96 to 24/ 9/96

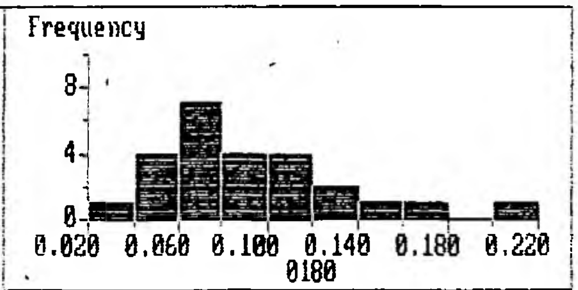
Number of observations	9
Minimum	0.0700
Mean	0.1244
Maximum	0.2500
Standard deviation	0.05961
SDD	0.02775
Non-parametric estimate of:	
10 percentile	0.0700
20 percentile	0.0700
Median	0.1100
80 percentile	0.1700
90 percentile	0.2500

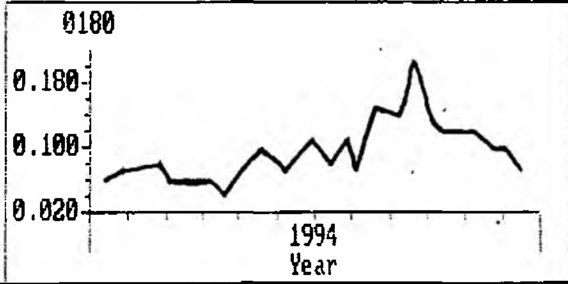




R20A028 11-29-1996 0180 12/ 1/94 to 31/12/94

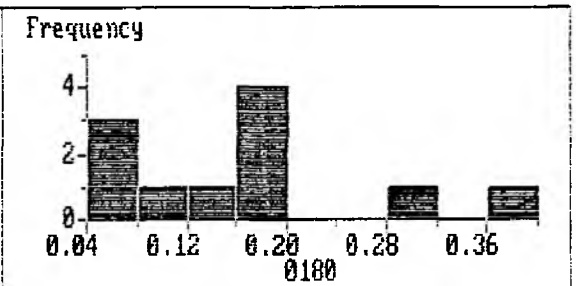
Number of observations	25
Minimum	0.0400
Mean	0.0976
Maximum	0.2100
Standard deviation	0.03992
SDD	0.02345
Non-parametric estimate of:	
5 percentile	0.0460
10 percentile	0.0600
20 percentile	0.0620
Median	0.0900
80 percentile	0.1280
90 percentile	0.1580
95 percentile	0.1980

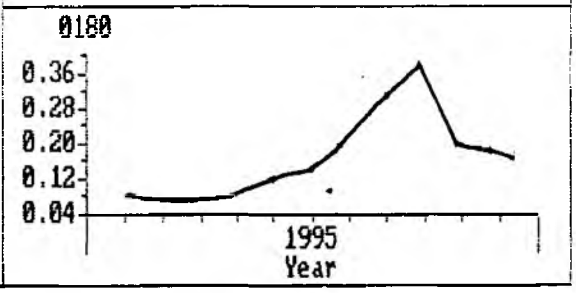




R20A028 11-29-1996 0180 1/ 1/95 to 31/12/95

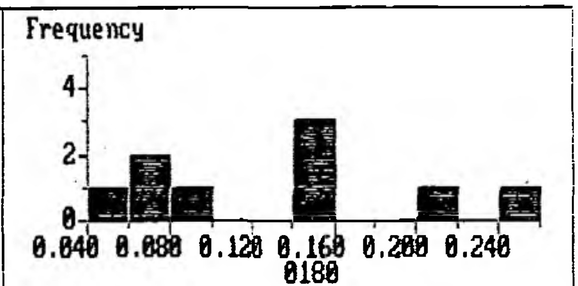
Number of observations	11
Minimum	0.070
Mean	0.175
Maximum	0.380
Standard deviation	0.0972
SDD	0.0191
Non-parametric estimate of:	
10 percentile	0.072
20 percentile	0.080
Median	0.170
80 percentile	0.266
90 percentile	0.366

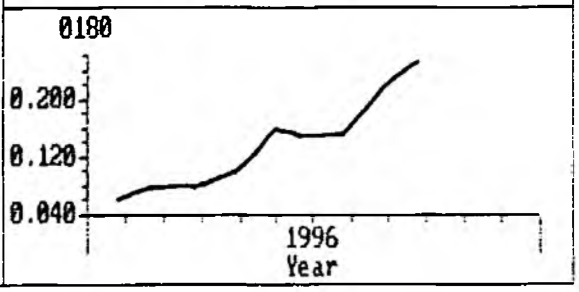




R20A028 11-29-1996 0180 1/ 1/96 to 24/ 9/96

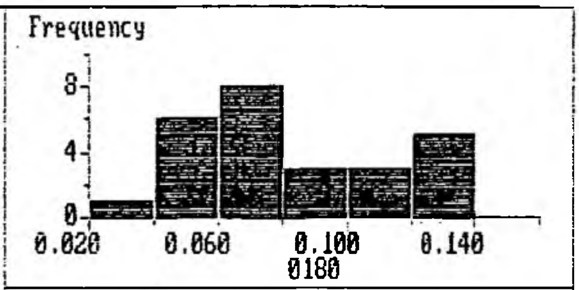
Number of observations	9
Minimum	0.0600
Mean	0.1389
Maximum	0.2500
Standard deviation	0.06547
SDD	0.02712
Non-parametric estimate of:	
10 percentile	0.0600
20 percentile	0.0800
Median	0.1500
80 percentile	0.2200
90 percentile	0.2500

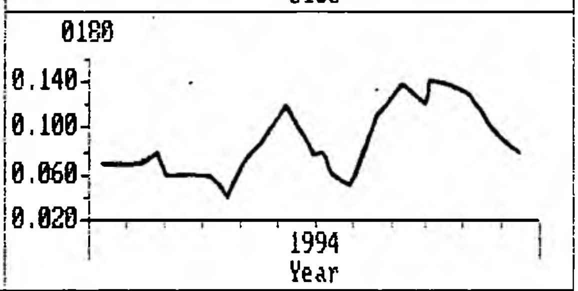




R20A005   11-29-1996   0180   12/ 1/94 to 31/12/94

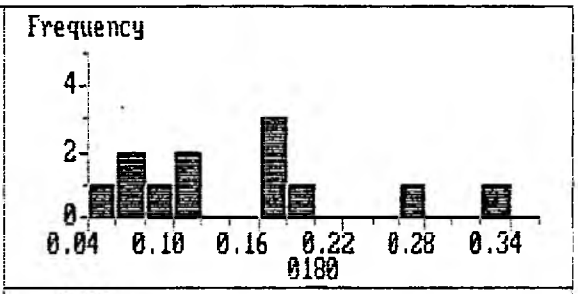
Number of observations	26
Minimum	0.0400
Mean	0.0885
Maximum	0.1400
Standard deviation	0.03068
SDD	0.01479
Non-parametric estimate of:	
5 percentile	0.0435
10 percentile	0.0570
20 percentile	0.0600
Median	0.0800
80 percentile	0.1260
90 percentile	0.1400
95 percentile	0.1400

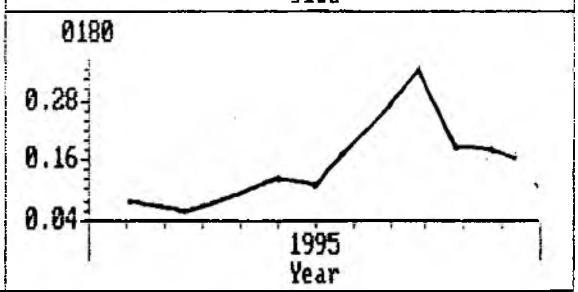




R20A005   11-29-1996   0180   1/ 1/95 to 31/12/95

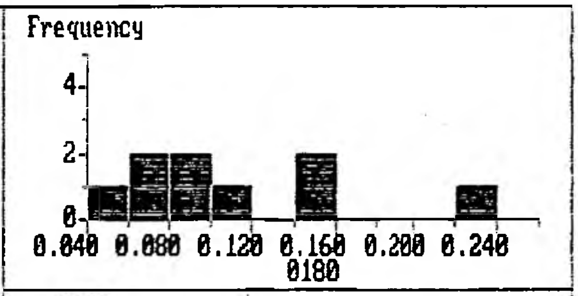
Number of observations	12
Minimum	0.060
Mean	0.154
Maximum	0.340
Standard deviation	0.0848
SDD	0.0294
Non-parametric estimate of:	
10 percentile	0.063
20 percentile	0.076
Median	0.145
80 percentile	0.222
90 percentile	0.319

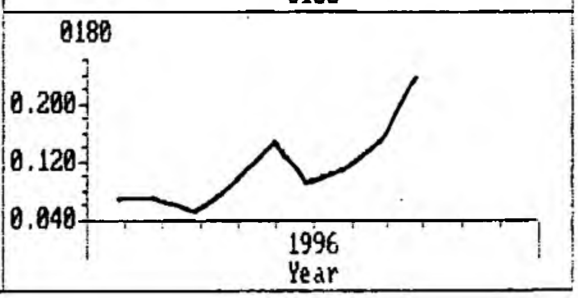




R20A005   11-29-1996   0180   1/ 1/96 to 24/ 9/96

Number of observations	9
Minimum	0.0500
Mean	0.1144
Maximum	0.2400
Standard deviation	0.05961
SDD	0.03635
Non-parametric estimate of:	
10 percentile	0.0500
20 percentile	0.0700
Median	0.0900
80 percentile	0.1600
90 percentile	0.2400

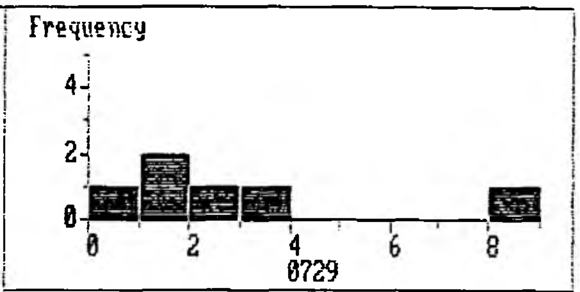


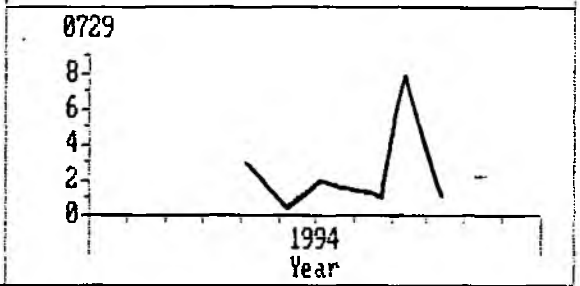


Appendix 2.6. Chlorophyll a (µg/l) temporal trends 1994 to 1996

R20A009 11-29-1996 0729 12/ 1/94 to 31/12/94

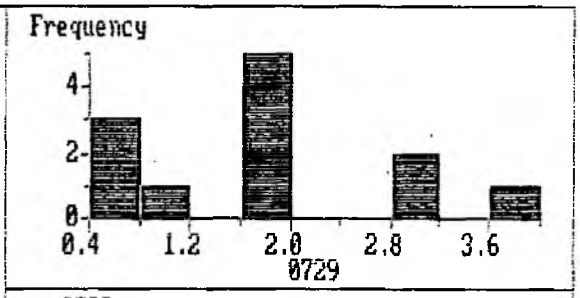
Number of observations	6
Minimum	0.50
Mean	2.58
Maximum	8.00
Standard deviation	2.800
SDD	3.666
Non-parametric estimate of:	
20 percentile	0.70
Median	1.50
80 percentile	6.00

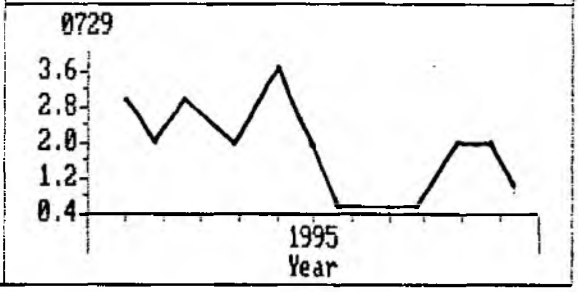




R20A009 11-29-1996 0729 1/ 1/95 to 31/12/95

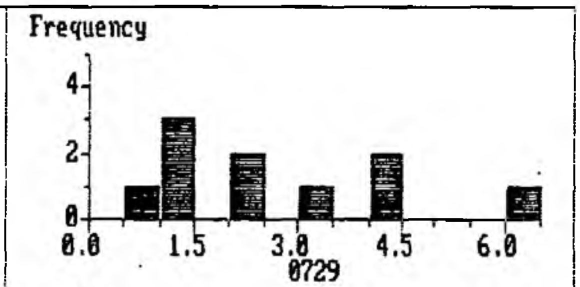
Number of observations	12
Minimum	0.50
Mean	1.85
Maximum	3.70
Standard deviation	1.060
SDD	1.048
Non-parametric estimate of:	
10 percentile	0.50
20 percentile	0.50
Median	2.00
80 percentile	3.00
90 percentile	3.49

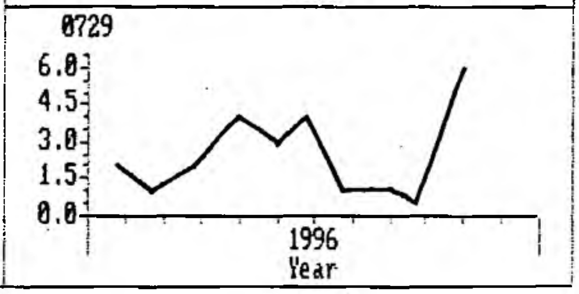




R20A009 11-29-1996 0729 1/ 1/96 to 31/10/96

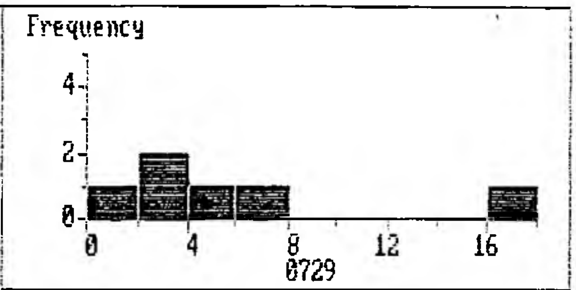
Number of observations	10
Minimum	0.50
Mean	2.45
Maximum	6.00
Standard deviation	1.771
SDD	1.723
Non-parametric estimate of:	
10 percentile	0.55
20 percentile	1.00
Median	2.00
80 percentile	4.00
90 percentile	5.80

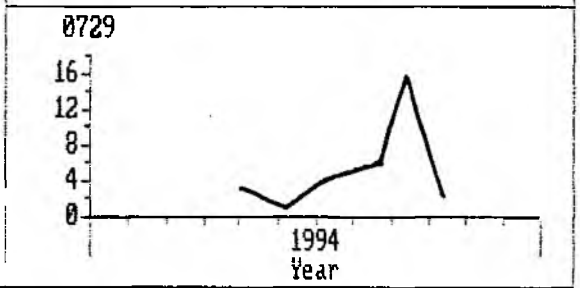




R20A004 11-29-1996 0729 12/ 1/94 to 31/12/94

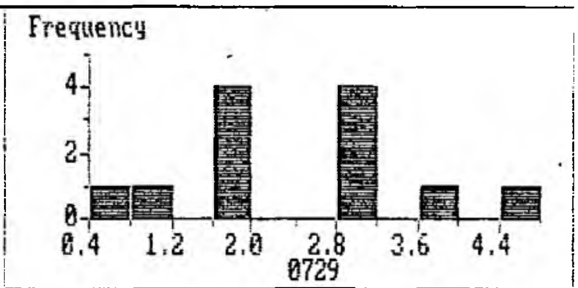
Number of observations	6
Minimum	1.00
Mean	5.33
Maximum	16.00
Standard deviation	5.502
SDD	6.255
Non-parametric estimate of:	
20 percentile	1.40
Median	3.50
80 percentile	12.00

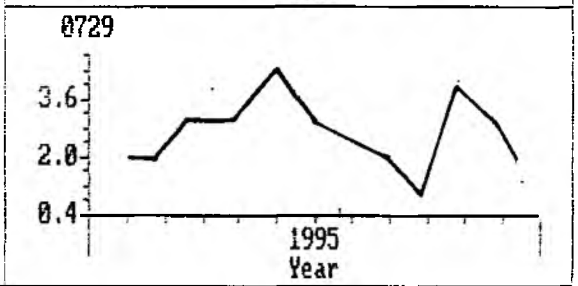




R20A004 11-29-1996 0729 1/ 1/95 to 31/12/95

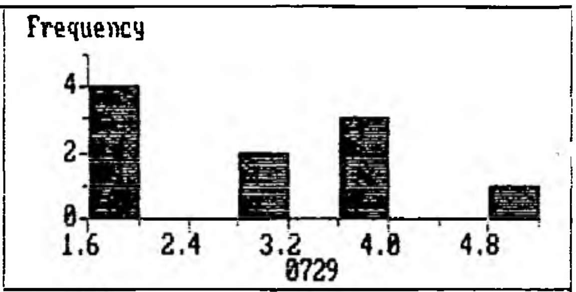
Number of observations	12
Minimum	0.50
Mean	2.50
Maximum	4.50
Standard deviation	1.148
SDD	0.829
Non-parametric estimate of:	
10 percentile	0.65
20 percentile	1.60
Median	2.50
80 percentile	3.40
90 percentile	4.35

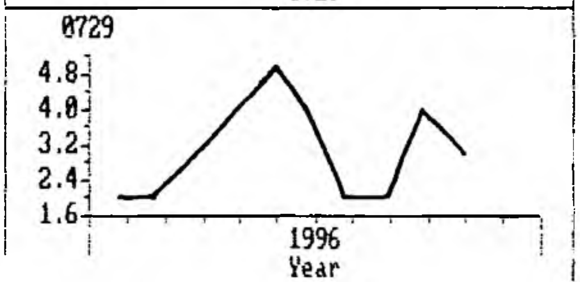




R20A004 11-29-1996 0729 1/ 1/96 to 31/10/96

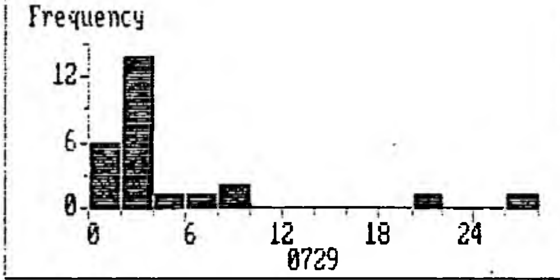
Number of observations	10
Minimum	2.00
Mean	3.10
Maximum	5.00
Standard deviation	1.101
SDD	0.901
Non-parametric estimate of:	
10 percentile	2.00
20 percentile	2.00
Median	3.00
80 percentile	4.00
90 percentile	4.90

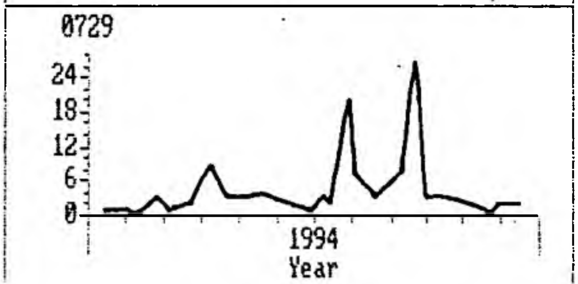




R20A017 11-29-1996 0729 12/ 1/94 to 31/12/94

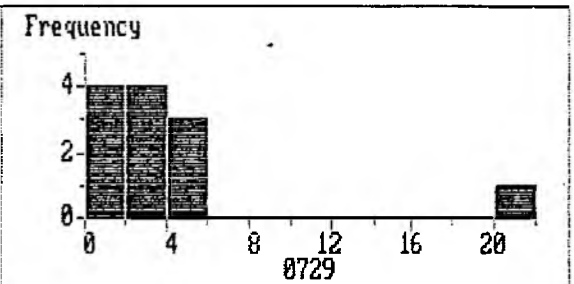
Number of observations	26
Minimum	0.5
Mean	4.5
Maximum	27.0
Standard deviation	6.07
SDD	5.74
Non-parametric estimate of:	
5 percentile	0.5
10 percentile	0.9
20 percentile	1.0
Median	3.0
80 percentile	5.8
90 percentile	12.3
95 percentile	24.5

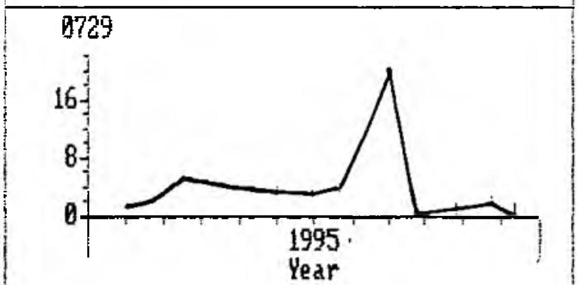




R20A017 11-29-1996 0729 1/ 1/95 to 31/12/95

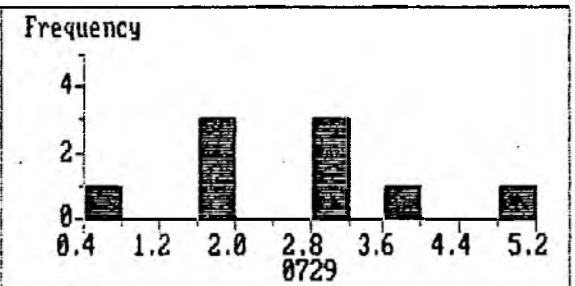
Number of observations	12
Minimum	0.50
Mean	3.91
Maximum	20.00
Standard deviation	5.270
SDD	1.376
Non-parametric estimate of:	
10 percentile	0.65
20 percentile	1.00
Median	2.50
80 percentile	4.40
90 percentile	15.50

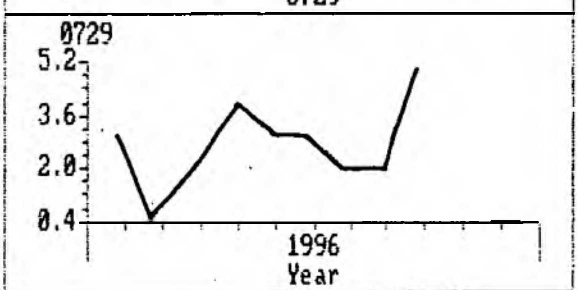




R20A017 11-29-1996 0729 1/ 1/96 to 24/ 9/96

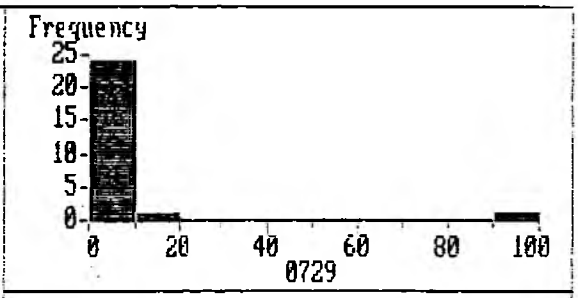
Number of observations	9
Minimum	0.50
Mean	2.72
Maximum	5.00
Standard deviation	1.302
SDD	1.296
Non-parametric estimate of:	
10 percentile	0.50
20 percentile	2.00
Median	3.00
80 percentile	4.00
90 percentile	5.00

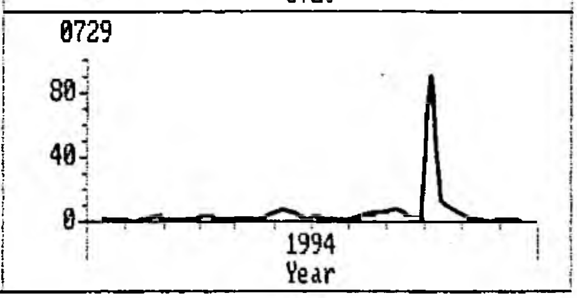




R20A018 11-29-1996 0729 12/ 1/94 to 31/12/94

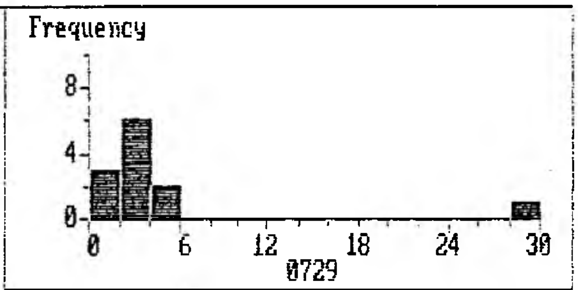
Number of observations	26
Minimum	0.5
Mean	6.1
Maximum	90.0
Standard deviation	17.32
SDD	17.13
Non-parametric estimate of:	
5 percentile	0.5
10 percentile	0.5
20 percentile	1.0
Median	2.0
80 percentile	4.0
90 percentile	9.2
95 percentile	62.7

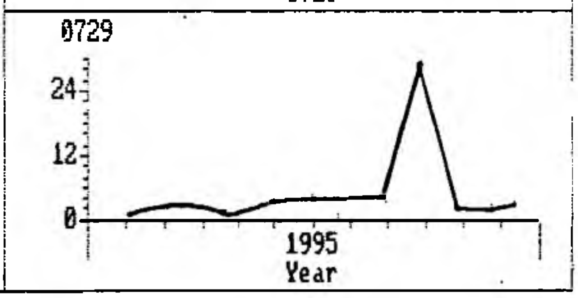




R20A018 11-29-1996 0729 1/ 1/95 to 31/12/95

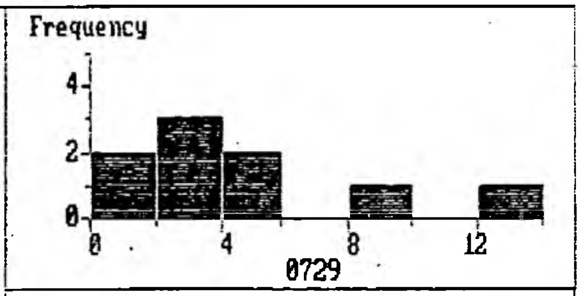
Number of observations	12
Minimum	0.5
Mean	4.6
Maximum	29.0
Standard deviation	7.78
SDD	1.37
Non-parametric estimate of:	
10 percentile	0.7
20 percentile	1.0
Median	2.5
80 percentile	4.0
90 percentile	21.5

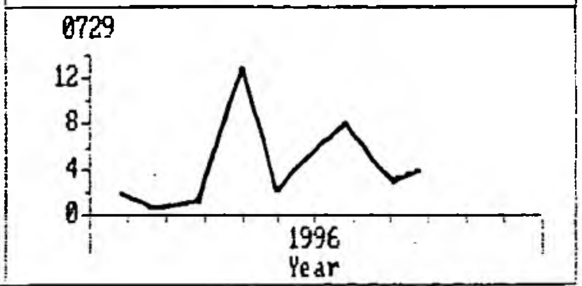




R20A018 11-29-1996 0729 1/ 1/96 to 24/ 9/96

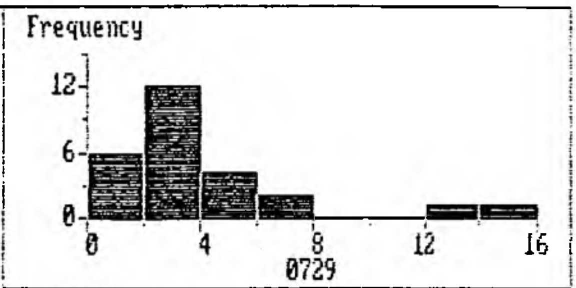
Number of observations	9
Minimum	0.50
Mean	4.28
Maximum	13.00
Standard deviation	3.993
SDD	4.717
Non-parametric estimate of:	
10 percentile	0.50
20 percentile	1.00
Median	3.00
80 percentile	8.00
90 percentile	13.00

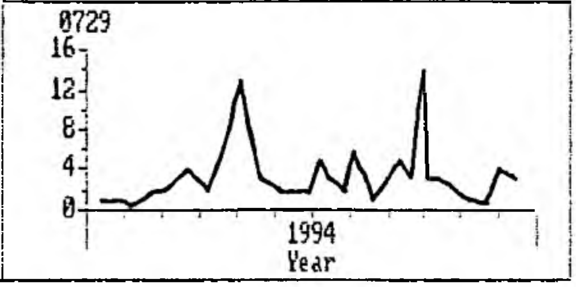




R20A019 11-29-1996 0729 12/ 1/94 to 31/12/94

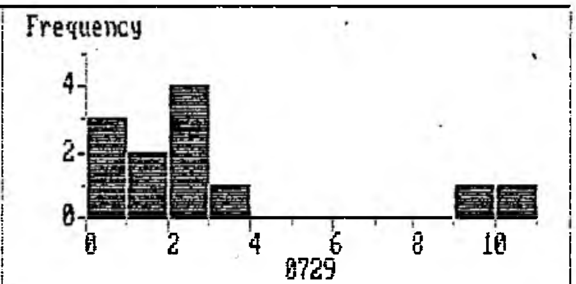
Number of observations	26
Minimum	0.50
Mean	3.54
Maximum	14.00
Standard deviation	3.322
SDD	3.263
Non-parametric estimate of:	
5 percentile	0.50
10 percentile	0.85
20 percentile	1.00
Median	3.00
80 percentile	5.00
90 percentile	8.10
95 percentile	13.65

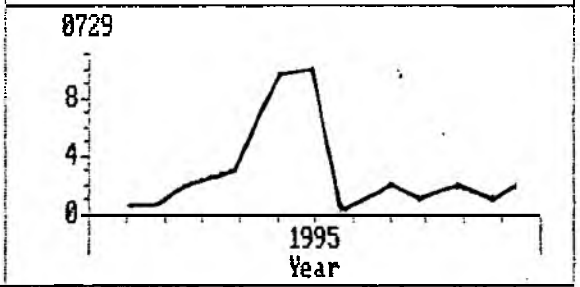




R20A019 11-29-1996 0729 1/ 1/95 to 31/12/95

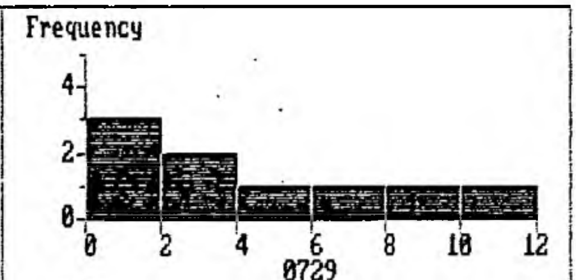
Number of observations	12
Minimum	0.50
Mean	2.83
Maximum	10.00
Standard deviation	3.308
SDD	2.377
Non-parametric estimate of:	
10 percentile	0.50
20 percentile	0.50
Median	2.00
80 percentile	5.56
90 percentile	9.82

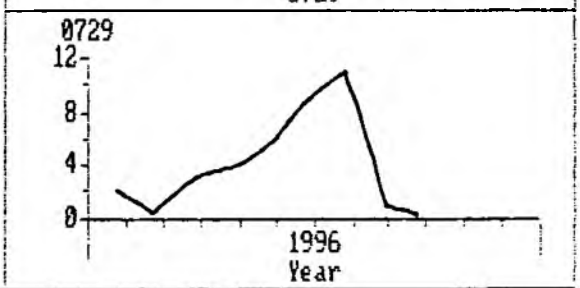




R20A019 11-29-1996 0729 1/ 1/96 to 24/ 9/96

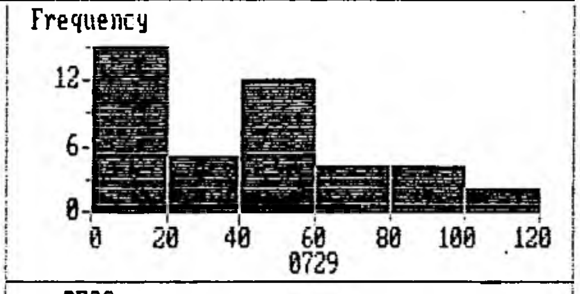
Number of observations	9
Minimum	0.50
Mean	4.11
Maximum	11.00
Standard deviation	3.814
SDD	3.009
Non-parametric estimate of:	
10 percentile	0.50
20 percentile	0.50
Median	3.00
80 percentile	9.00
90 percentile	11.00

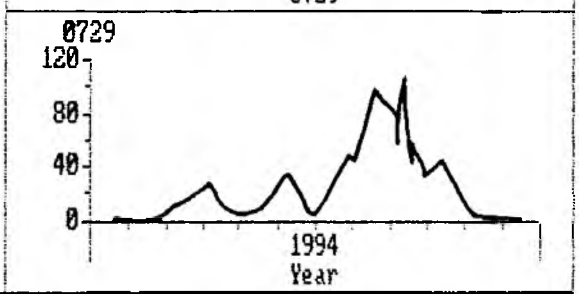




R20A026 11-29-1996 0729 12/ 1/94 to 31/12/94

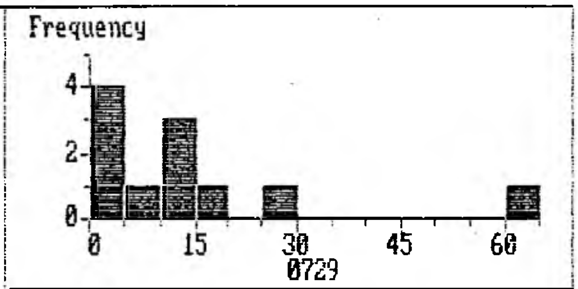
Number of observations	42
Minimum	0.5
Mean	39.0
Maximum	109.0
Standard deviation	31.82
SDD	12.37
Non-parametric estimate of:	
5 percentile	0.6
10 percentile	1.3
20 percentile	4.0
Median	41.5
80 percentile	67.0
90 percentile	88.3
95 percentile	107.3

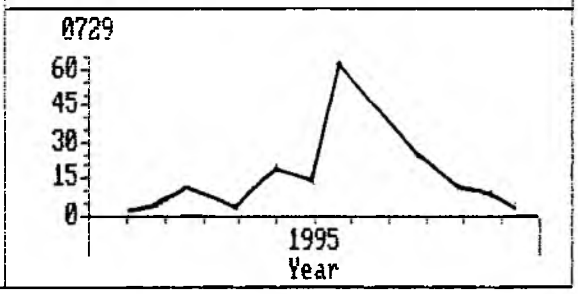




R20A026 11-29-1996 0729 1/ 1/95 to 31/12/95

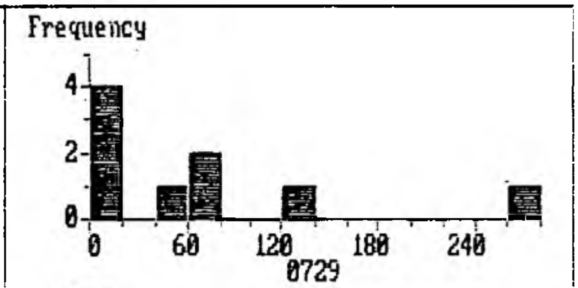
Number of observations	11
Minimum	2.0
Mean	14.9
Maximum	62.0
Standard deviation	17.27
SDD	7.31
Non-parametric estimate of:	
10 percentile	2.2
20 percentile	3.0
Median	12.0
80 percentile	22.6
90 percentile	54.6

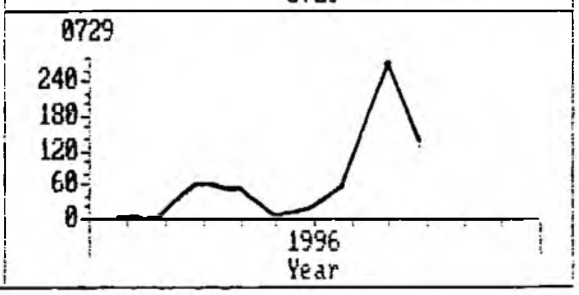




R20A026 11-29-1996 0729 1/ 1/96 to 24/ 9/96

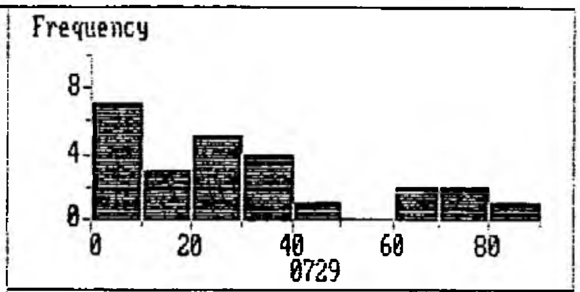
Number of observations	9
Minimum	1.0
Mean	67.8
Maximum	271.0
Standard deviation	87.75
SDD	28.43
Non-parametric estimate of:	
10 percentile	1.0
20 percentile	2.0
Median	57.0
80 percentile	137.0
90 percentile	271.0

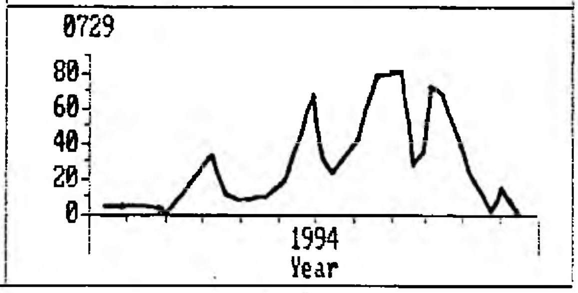




R20A028 11-29-1996 0729 12/ 1/94 to 31/12/94

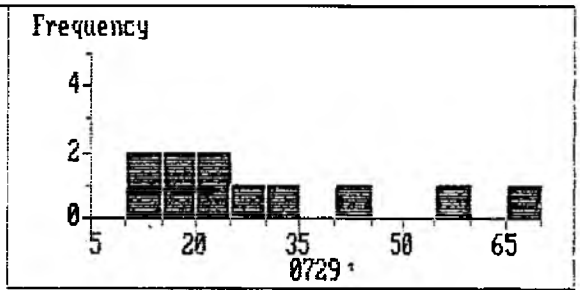
Number of observations	25
Minimum	0.5
Mean	29.0
Maximum	81.0
Standard deviation	25.85
SDD	17.74
Non-parametric estimate of:	
5 percentile	1.0
10 percentile	2.0
20 percentile	5.0
Median	23.0
80 percentile	62.6
90 percentile	74.8
95 percentile	80.4

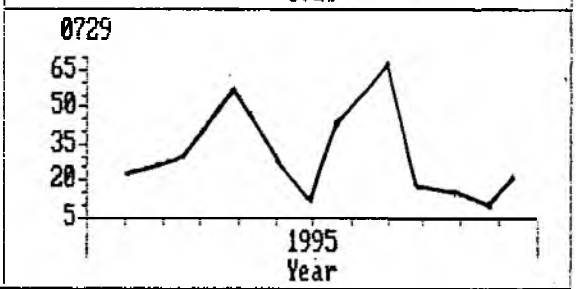




R20A028 11-29-1996 0729 1/ 1/95 to 31/12/95

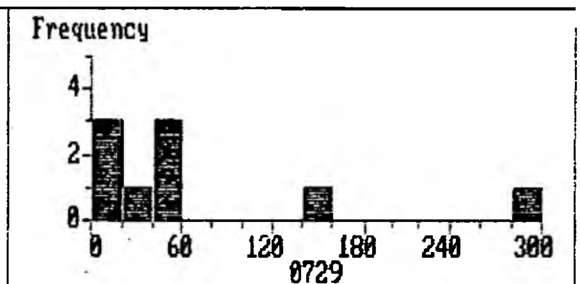
Number of observations	11
Minimum	10.0
Mean	30.1
Maximum	68.0
Standard deviation	19.11
SDD	17.39
Non-parametric estimate of:	
10 percentile	10.6
20 percentile	13.8
Median	23.0
80 percentile	53.0
90 percentile	66.2

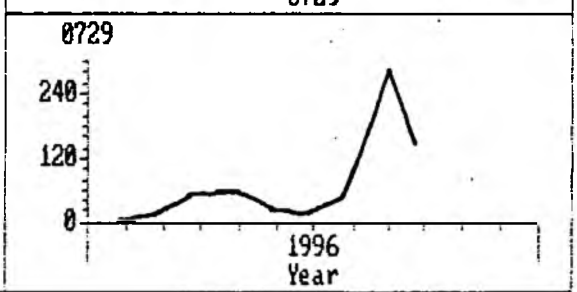




R20A028 11-29-1996 0729 1/ 1/96 to 24/ 9/96

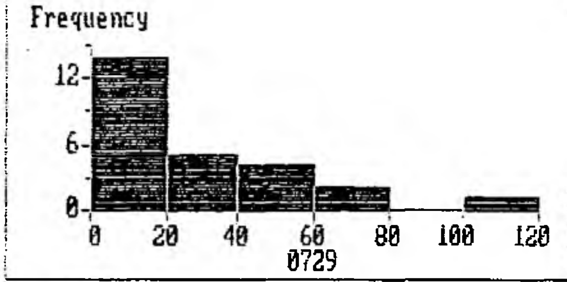
Number of observations	9
Minimum	2.0
Mean	70.9
Maximum	286.0
Standard deviation	91.59
SDD	76.04
Non-parametric estimate of:	
10 percentile	2.0
20 percentile	8.0
Median	46.0
80 percentile	147.0
90 percentile	286.0

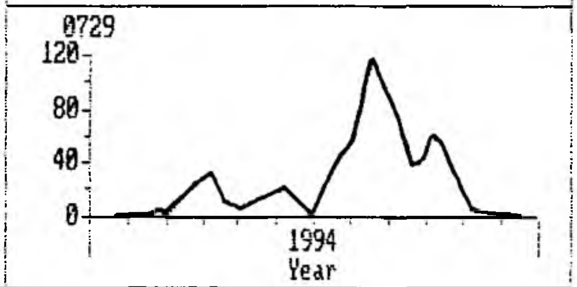




R20A005 11-29-1996 0729 12/ 1/94 to 31/12/94

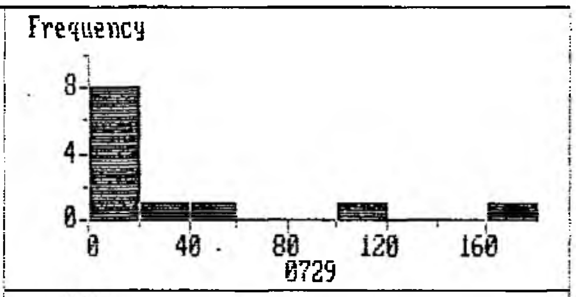
Number of observations	26
Minimum	0.5
Mean	26.3
Maximum	119.0
Standard deviation	29.39
SDD	15.95
Non-parametric estimate of:	
5 percentile	0.5
10 percentile	1.6
20 percentile	2.4
Median	15.0
80 percentile	54.2
90 percentile	64.6
95 percentile	102.9

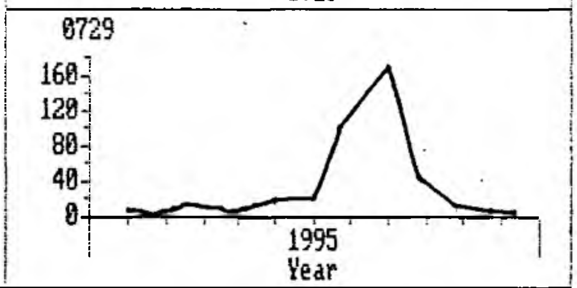




R20A005 11-29-1996 0729 1/ 1/95 to 31/12/95

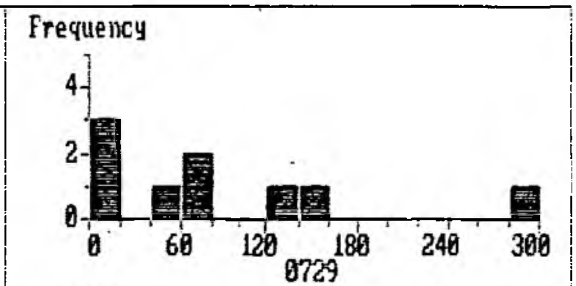
Number of observations	12
Minimum	2.0
Mean	33.3
Maximum	169.0
Standard deviation	50.89
SDD	44.59
Non-parametric estimate of:	
10 percentile	2.3
20 percentile	4.2
Median	12.5
80 percentile	66.8
90 percentile	148.6

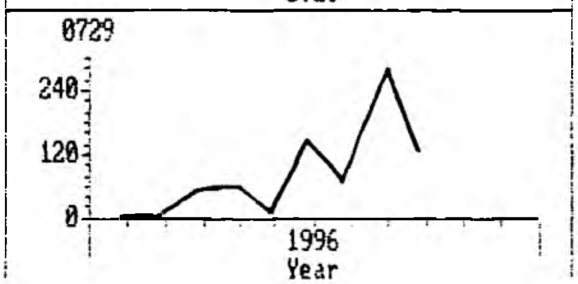




R20A005 11-29-1996 0729 1/ 1/96 to 24/ 9/96

Number of observations	9
Minimum	1.0
Mean	84.6
Maximum	285.0
Standard deviation	91.17
SDD	86.43
Non-parametric estimate of:	
10 percentile	1.0
20 percentile	7.0
Median	61.0
80 percentile	151.0
90 percentile	285.0

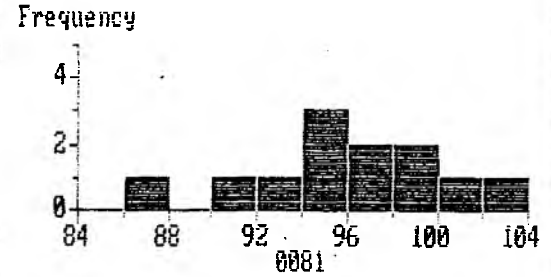


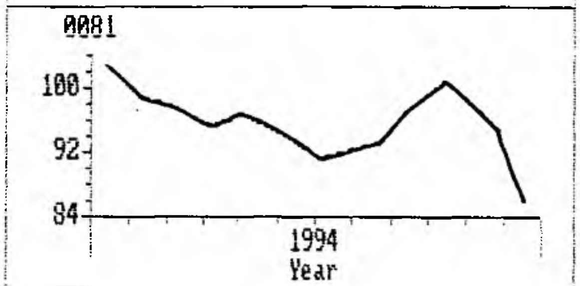


Appendix 2.7. Dissolved oxygen (%) temporal trends 1994 to 1996

R20A009 11-29-1996 0081 12/ 1/94 to 31/12/94

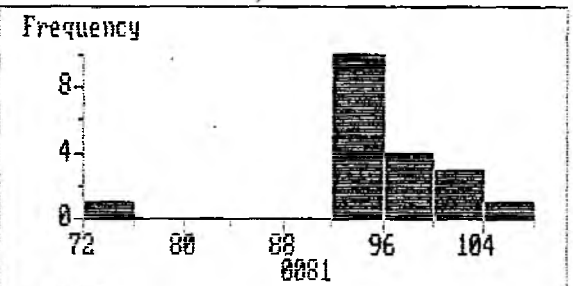
Number of observations	12
Minimum	86.00
Mean	95.75
Maximum	103.00
Standard deviation	4.555
SDD	3.170
Non-parametric estimate of:	
10 percentile	87.50
20 percentile	92.20
Median	96.00
80 percentile	99.80
90 percentile	102.40

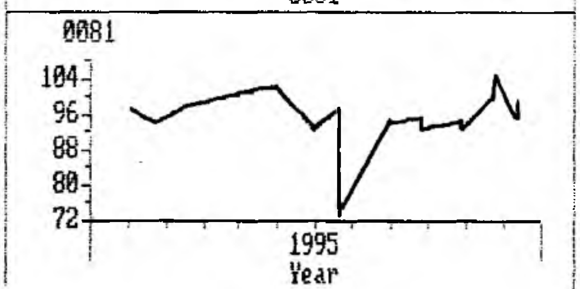




R20A009 11-29-1996 0081 1/ 1/95 to 31/12/95

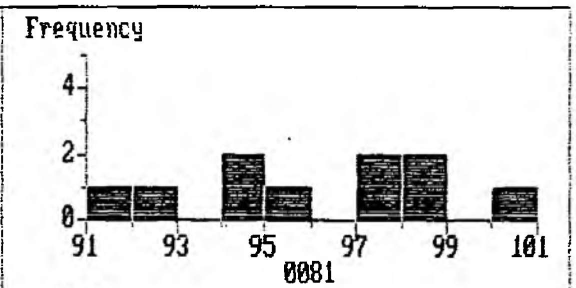
Number of observations	19
Minimum	73.0
Mean	95.2
Maximum	105.0
Standard deviation	6.44
SDD	6.48
Non-parametric estimate of:	
5 percentile	73.0
10 percentile	92.0
20 percentile	92.8
Median	95.0
80 percentile	100.0
90 percentile	102.0
95 percentile	105.0

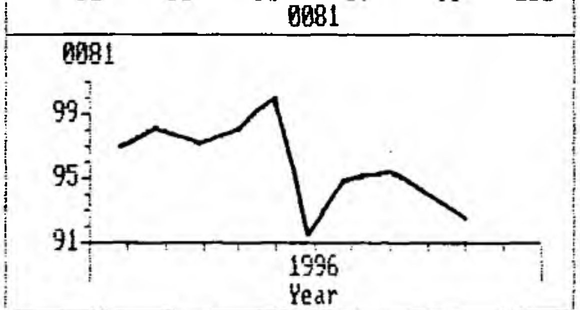




R20A009 11-29-1996 0081 1/ 1/96 to 31/10/96

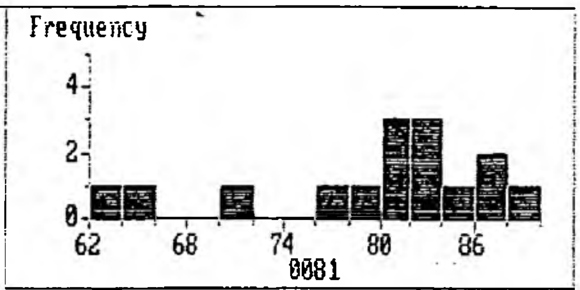
Number of observations	10
Minimum	91.50
Mean	95.88
Maximum	100.00
Standard deviation	2.674
SDD	2.428
Non-parametric estimate of:	
10 percentile	91.60
20 percentile	92.88
Median	96.15
80 percentile	98.16
90 percentile	99.82

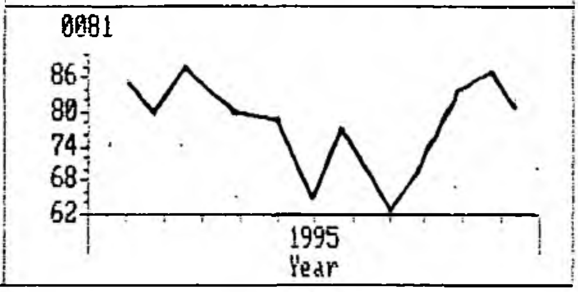




TW0086FE 11-29-1996 0081 1/ 1/95 to 31/12/95

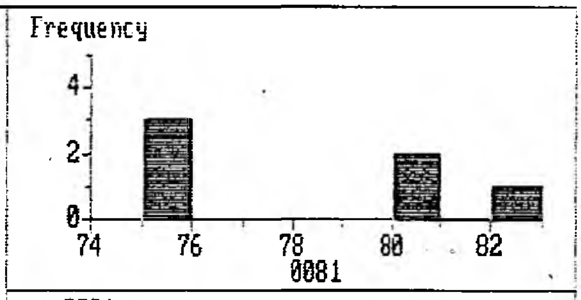
Number of observations	15
Minimum	63.20
Mean	79.33
Maximum	88.00
Standard deviation	7.679
SDD	5.383
Non-parametric estimate of:	
10 percentile	64.28
20 percentile	71.40
Median	80.70
80 percentile	86.68
90 percentile	87.70

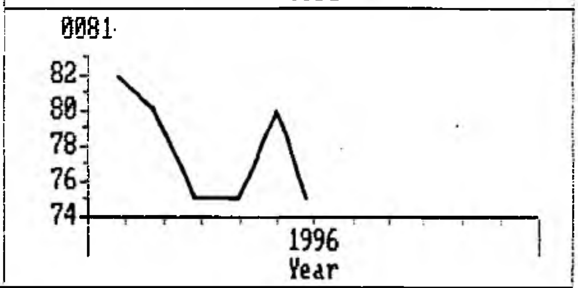




TW0086FE 11-29-1996 0081 1/ 1/96 to 24/ 9/96

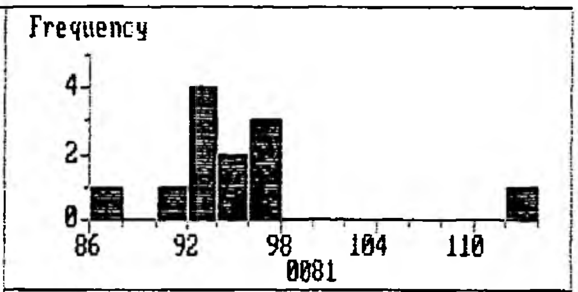
Number of observations	6
Minimum	75.00
Mean	77.83
Maximum	82.00
Standard deviation	3.189
SDD	3.142
Non-parametric estimate of:	
20 percentile	75.00
Median	77.50
80 percentile	81.20

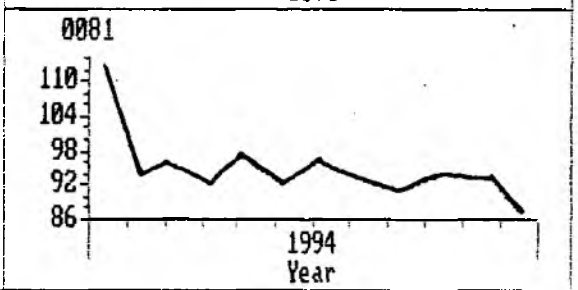




R20A004 11-29-1996 0081 12/ 1/94 to 31/12/94

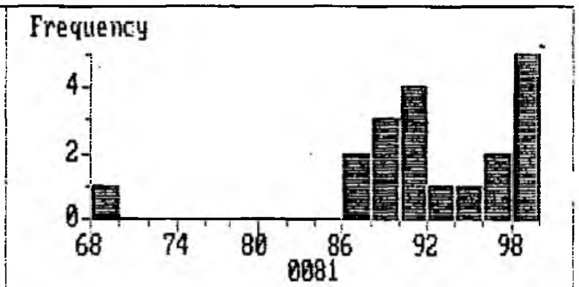
Number of observations	12
Minimum	87.0
Mean	94.7
Maximum	113.0
Standard deviation	6.34
SDD	5.05
Non-parametric estimate of:	
10 percentile	88.2
20 percentile	91.6
Median	93.5
80 percentile	96.4
90 percentile	108.2

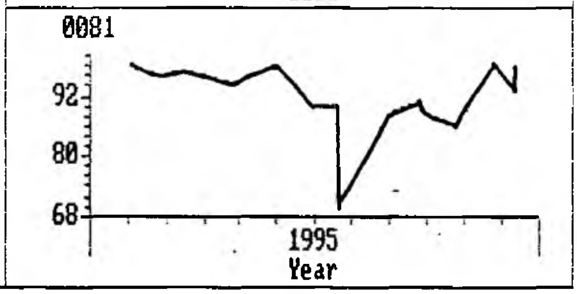




R20A004 11-29-1996 0081 1/ 1/95 to 31/12/95

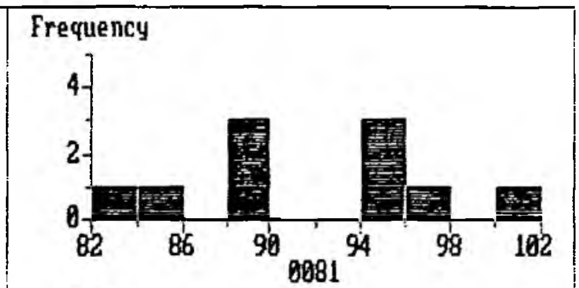
Number of observations	19
Minimum	69.2
Mean	91.6
Maximum	99.0
Standard deviation	6.99
SDD	5.73
Non-parametric estimate of:	
5 percentile	69.2
10 percentile	86.1
20 percentile	88.0
Median	91.0
80 percentile	98.0
90 percentile	98.5
95 percentile	99.0

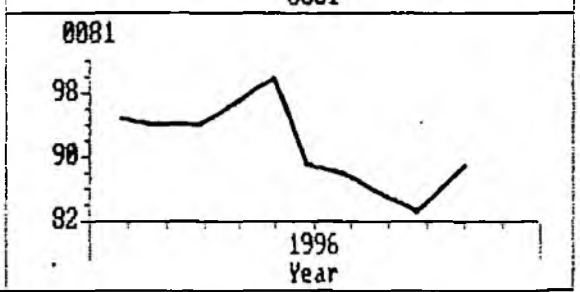




R20A004 11-29-1996 0081 1/ 1/96 to 31/10/96

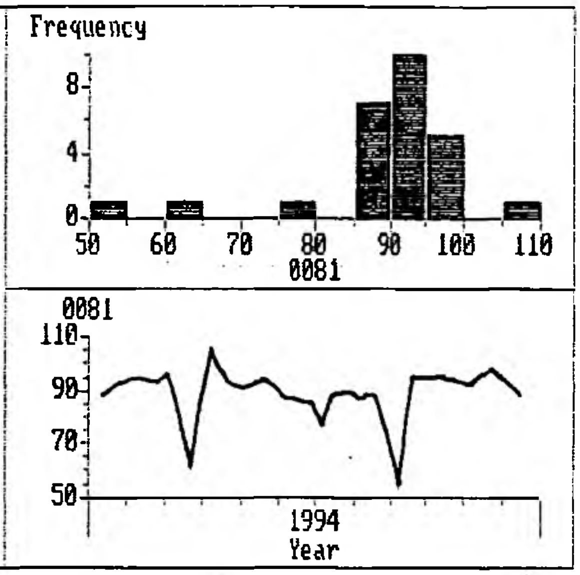
Number of observations	10
Minimum	83.00
Mean	91.42
Maximum	100.00
Standard deviation	5.452
SDD	3.436
Non-parametric estimate of:	
10 percentile	83.20
20 percentile	85.60
Median	91.50
80 percentile	96.60
90 percentile	99.70





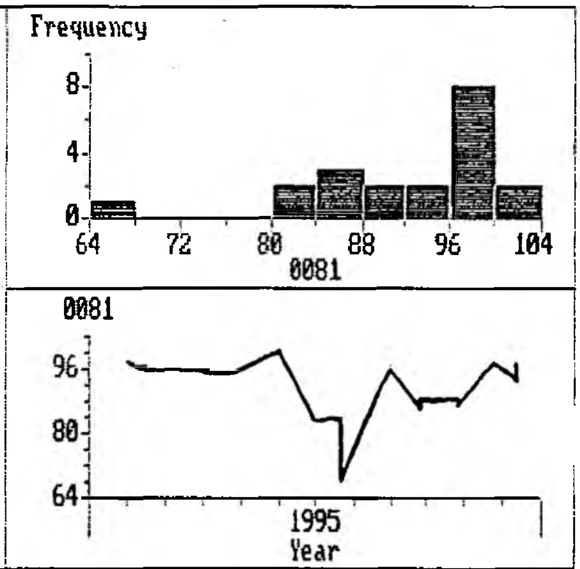
R20A017 11-29-1996 0081 12/ 1/94 to 31/12/94

Number of observations	26
Minimum	53.0
Mean	89.2
Maximum	106.0
Standard deviation	11.05
SDD	12.19
Non-parametric estimate of:	
5 percentile	55.5
10 percentile	71.2
20 percentile	87.0
Median	92.5
80 percentile	95.6
90 percentile	97.3
95 percentile	103.2



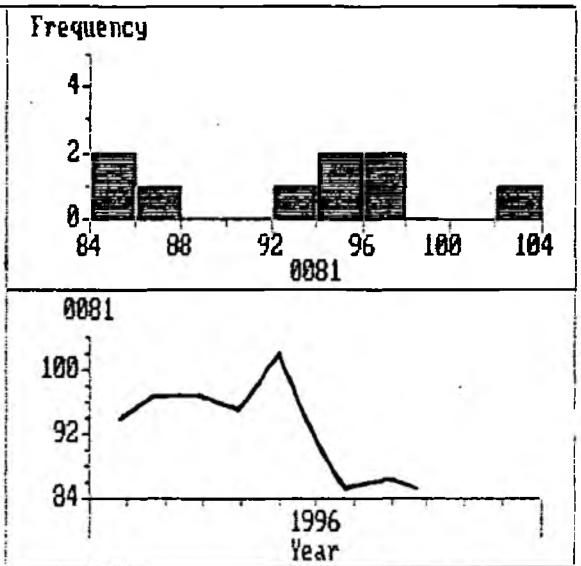
R20A017 11-29-1996 0081 1/ 1/95 to 31/12/95

Number of observations	20
Minimum	67.6
Mean	91.8
Maximum	101.0
Standard deviation	8.19
SDD	6.96
Non-parametric estimate of:	
5 percentile	68.4
10 percentile	83.0
20 percentile	84.5
Median	95.5
80 percentile	98.0
90 percentile	100.7
95 percentile	101.0



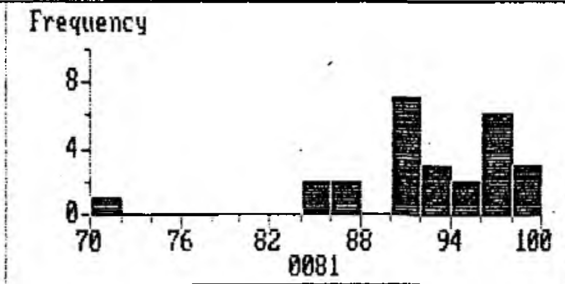
R20A017 11-29-1996 0081 1/ 1/96 to 24/ 9/96

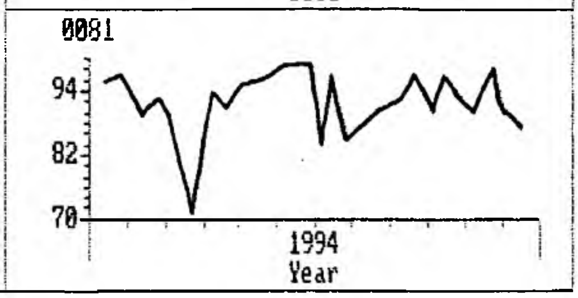
Number of observations	9
Minimum	85.00
Mean	92.69
Maximum	102.00
Standard deviation	6.035
SDD	3.872
Non-parametric estimate of:	
10 percentile	85.00
20 percentile	85.00
Median	94.00
80 percentile	97.00
90 percentile	102.00



R20A018 11-29-1996 0081 12/ 1/94 to 31/12/94

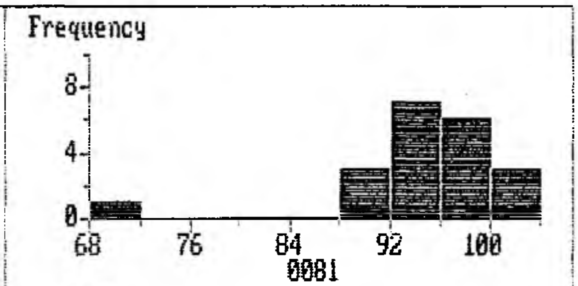
Number of observations	26
Minimum	71.0
Mean	91.8
Maximum	99.0
Standard deviation	6.05
SDD	6.18
Non-parametric estimate of:	
5 percentile	75.6
10 percentile	84.7
20 percentile	88.2
Median	92.0
80 percentile	97.0
90 percentile	98.3
95 percentile	99.0

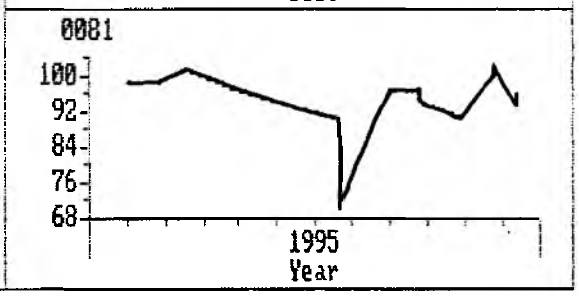




R20A018 11-29-1996 0081 1/ 1/95 to 31/12/95

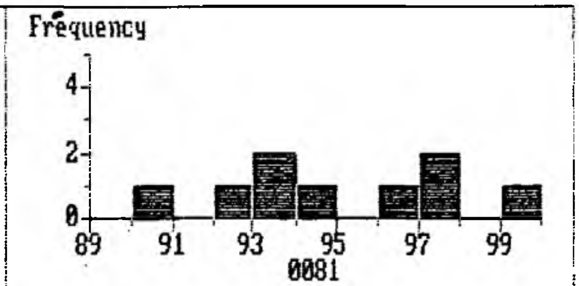
Number of observations	20
Minimum	69.9
Mean	94.1
Maximum	102.4
Standard deviation	6.70
SDD	6.21
Non-parametric estimate of:	
5 percentile	70.9
10 percentile	90.0
20 percentile	91.2
Median	94.7
80 percentile	98.0
90 percentile	100.9
95 percentile	102.3

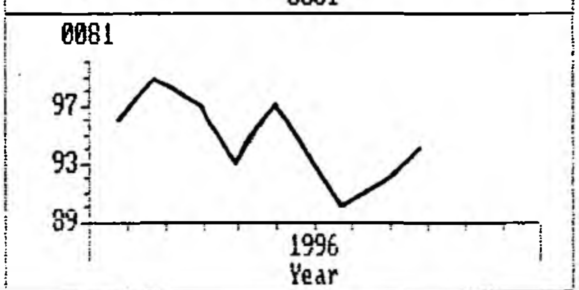




R20A018 11-29-1996 0081 1/ 1/96 to 24/ 9/96

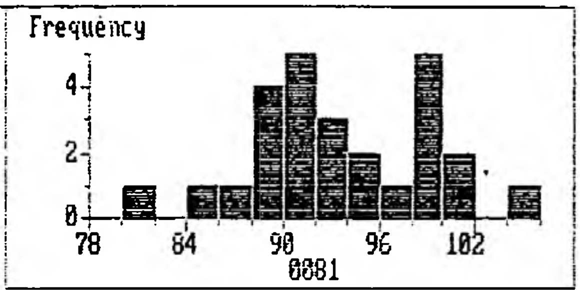
Number of observations	9
Minimum	90.00
Mean	94.67
Maximum	99.00
Standard deviation	2.886
SDD	2.412
Non-parametric estimate of:	
10 percentile	90.00
20 percentile	92.00
Median	94.00
80 percentile	97.20
90 percentile	99.00

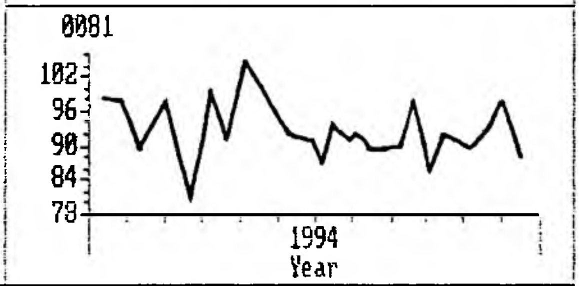




R20A019 11-29-1996 0081 12/ 1/94 to 31/12/94

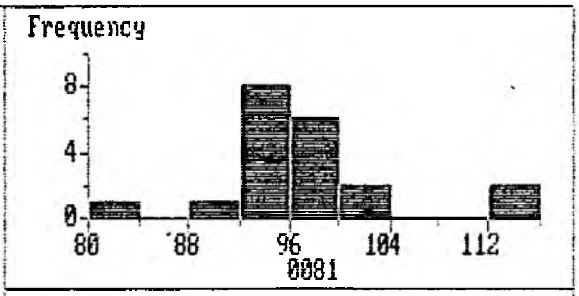
Number of observations	26
Minimum	80.00
Mean	92.85
Maximum	105.00
Standard deviation	5.519
SDD	5.895
Non-parametric estimate of:	
5 percentile	81.75
10 percentile	86.40
20 percentile	88.40
Median	92.00
80 percentile	98.00
90 percentile	100.00
95 percentile	103.25

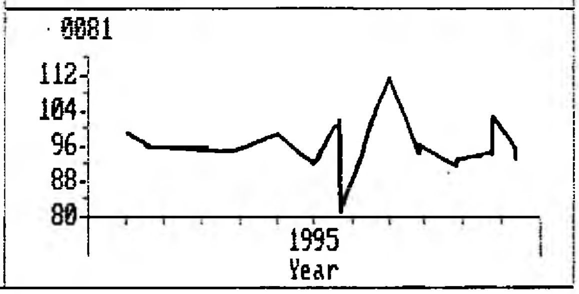




R20A019 11-29-1996 0081 1/ 1/95 to 31/12/95

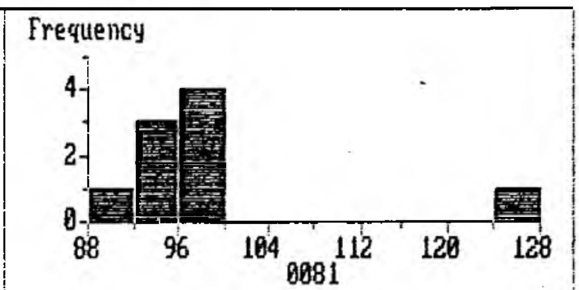
Number of observations	20
Minimum	80.2
Mean	96.7
Maximum	112.0
Standard deviation	7.04
SDD	7.76
Non-parametric estimate of:	
5 percentile	80.8
10 percentile	91.8
20 percentile	92.2
Median	95.7
80 percentile	101.4
90 percentile	111.1
95 percentile	112.0

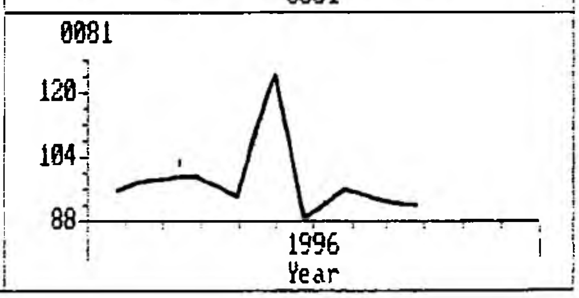




R20A019 11-29-1996 0081 1/ 1/96 to 24/ 9/96

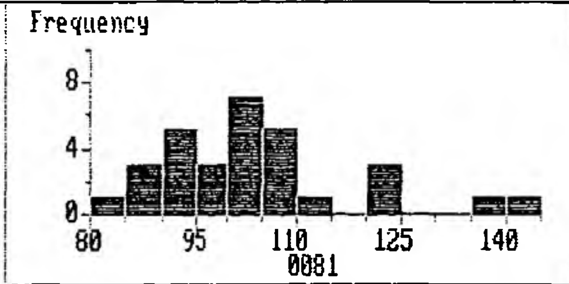
Number of observations	9
Minimum	89.0
Mean	98.0
Maximum	125.0
Standard deviation	10.60
SDD	12.95
Non-parametric estimate of:	
10 percentile	89.0
20 percentile	92.0
Median	96.0
80 percentile	99.0
90 percentile	125.0

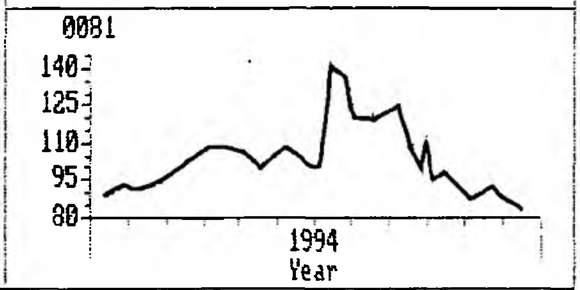




R20A026 01-07-1997 0081 12/ 1/94 to 31/12/94

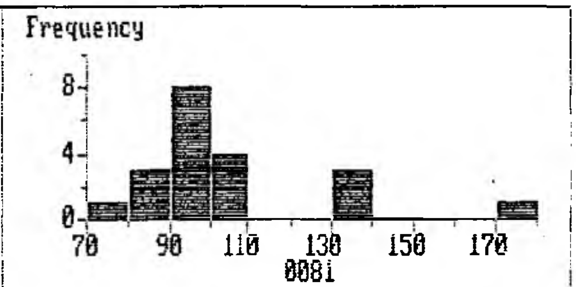
Number of observations	30
Minimum	84.0
Mean	103.7
Maximum	142.0
Standard deviation	13.66
SDD	7.67
Non-parametric estimate of:	
5 percentile	85.7
10 percentile	88.1
20 percentile	93.0
Median	101.0
80 percentile	111.4
90 percentile	123.6
95 percentile	138.1

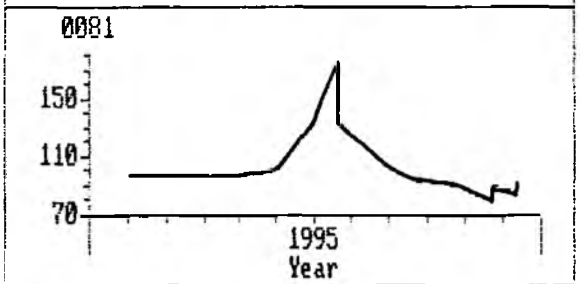




R20A026 01-07-1997 0081 1/ 1/95 to 31/12/95

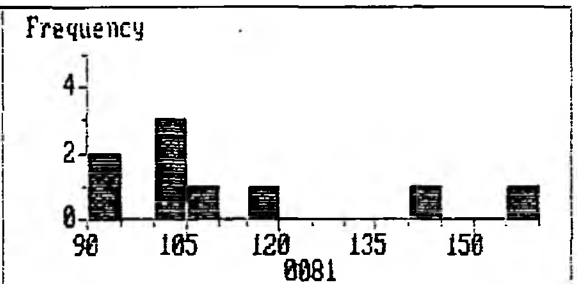
Number of observations	20
Minimum	78.0
Mean	103.2
Maximum	176.0
Standard deviation	22.82
SDD	13.17
Non-parametric estimate of:	
5 percentile	78.4
10 percentile	86.3
20 percentile	89.2
Median	95.0
80 percentile	125.2
90 percentile	132.8
95 percentile	173.8

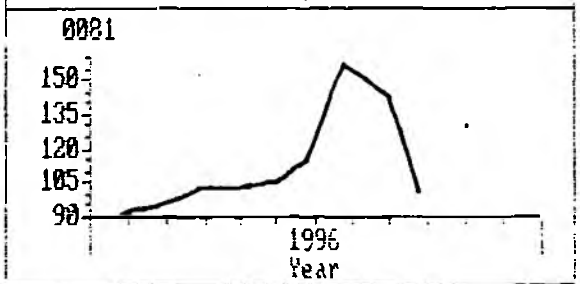




R20A026 01-07-1997 0081 1/ 1/96 to 24/ 9/96

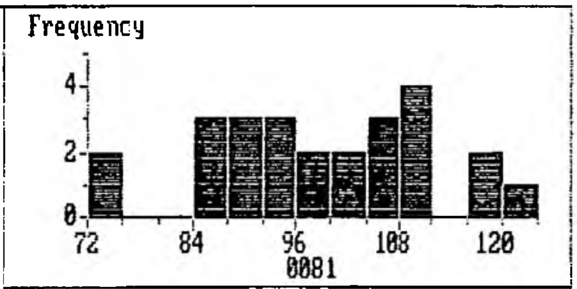
Number of observations	9
Minimum	91.0
Mean	112.1
Maximum	157.0
Standard deviation	22.84
SDD	16.92
Non-parametric estimate of:	
10 percentile	91.0
20 percentile	94.0
Median	102.0
80 percentile	143.3
90 percentile	157.0

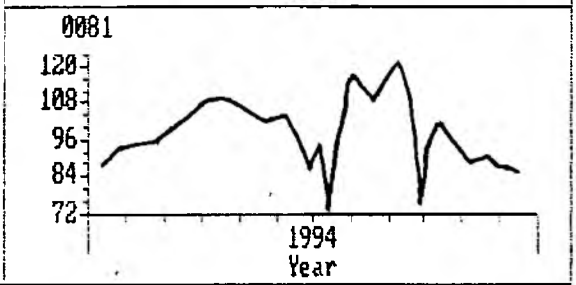




R20A028 11-29-1996 0081 12/ 1/94 to 31/12/94

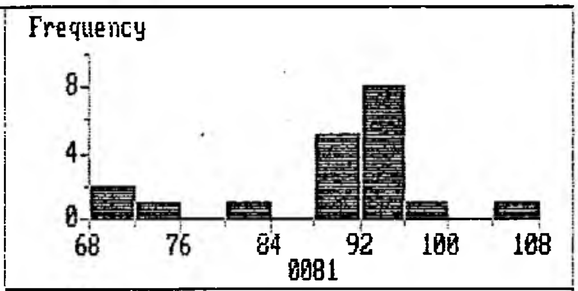
Number of observations	25
Minimum	73.0
Mean	98.5
Maximum	122.0
Standard deviation	12.55
SDD	10.75
Non-parametric estimate of:	
5 percentile	73.6
10 percentile	81.0
20 percentile	87.2
Median	99.0
80 percentile	109.8
90 percentile	116.4
95 percentile	120.5

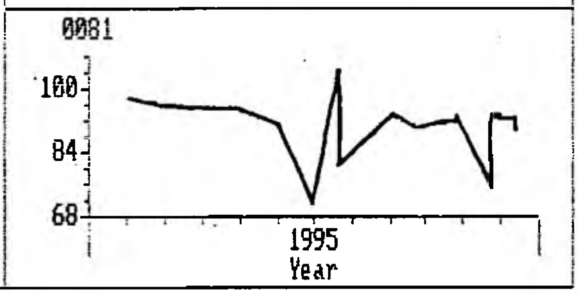




R20A028 11-29-1996 0081 1/ 1/95 to 31/12/95

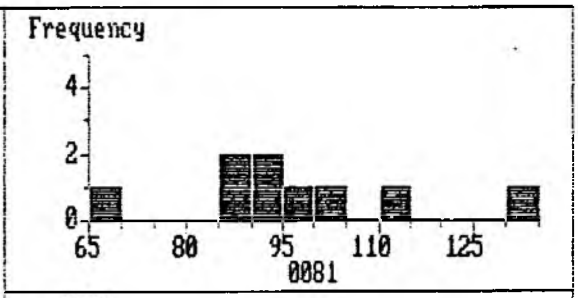
Number of observations	19
Minimum	71.0
Mean	89.6
Maximum	105.0
Standard deviation	8.96
SDD	9.54
Non-parametric estimate of:	
5 percentile	71.0
10 percentile	71.0
20 percentile	80.5
Median	92.3
80 percentile	95.0
90 percentile	98.0
95 percentile	105.0

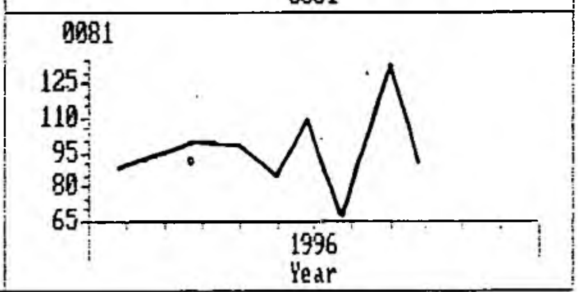




R20A028 11-29-1996 0081 1/ 1/96 to 24/ 9/96

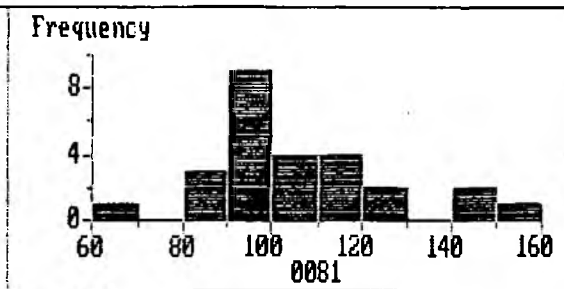
Number of observations	9
Minimum	66.0
Mean	96.0
Maximum	133.2
Standard deviation	18.49
SDD	25.65
Non-parametric estimate of:	
10 percentile	66.0
20 percentile	85.0
Median	93.0
80 percentile	110.0
90 percentile	133.2

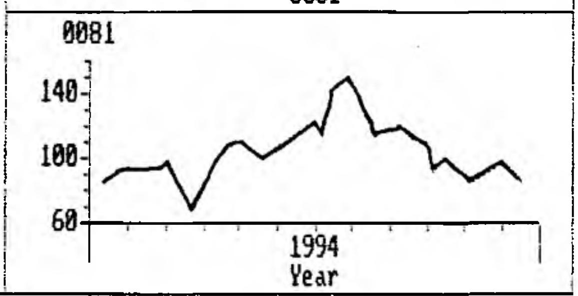




R20A005 11-29-1996 0081 12/ 1/94 to 31/12/94

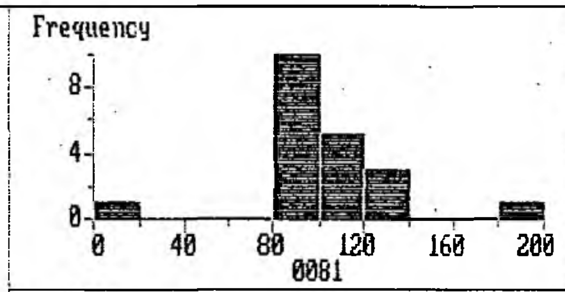
Number of observations	26
Minimum	67.0
Mean	104.9
Maximum	150.0
Standard deviation	19.26
SDD	10.35
Non-parametric estimate of:	
5 percentile	73.3
10 percentile	85.0
20 percentile	92.4
Median	99.5
80 percentile	117.2
90 percentile	142.3
95 percentile	147.6

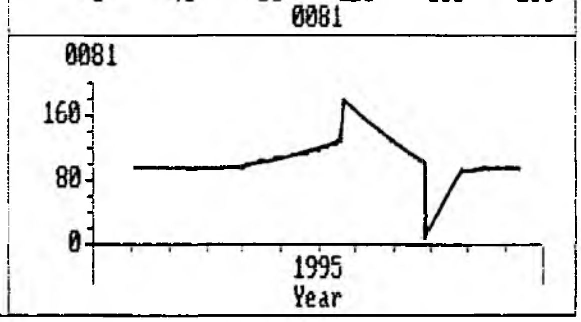




R20A005 11-29-1996 0081 1/ 1/95 to 31/12/95

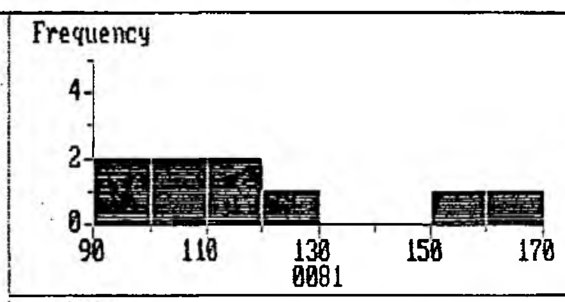
Number of observations	20
Minimum	9.0
Mean	103.6
Maximum	182.0
Standard deviation	30.87
SDD	25.09
Non-parametric estimate of:	
5 percentile	13.1
10 percentile	91.2
20 percentile	94.7
Median	97.0
80 percentile	125.8
90 percentile	130.0
95 percentile	179.4

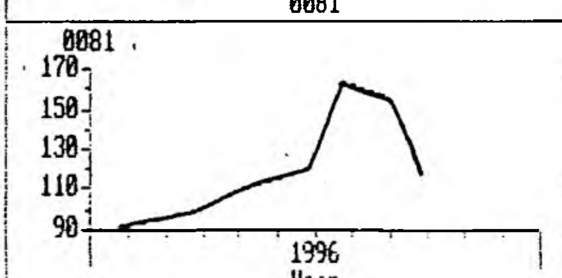




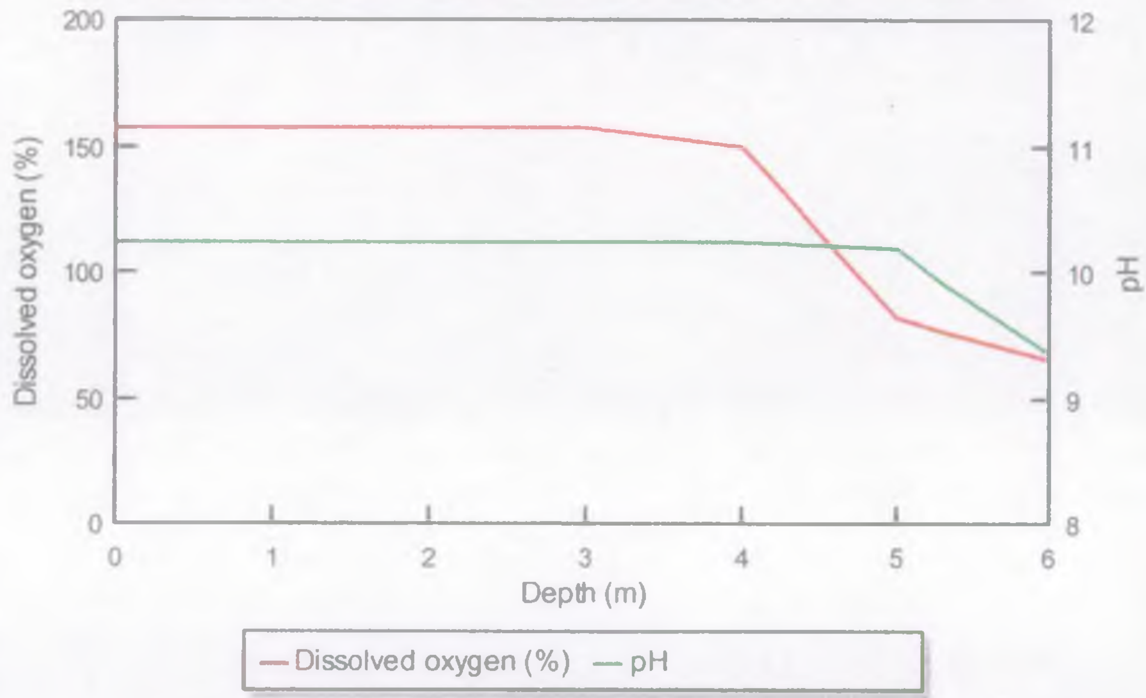
R20A005 11-29-1996 0081 1/ 1/96 to 24/ 9/96

Number of observations	9
Minimum	91.0
Mean	118.5
Maximum	164.0
Standard deviation	25.41
SDD	15.96
Non-parametric estimate of:	
10 percentile	91.0
20 percentile	95.0
Median	114.8
80 percentile	155.0
90 percentile	164.0

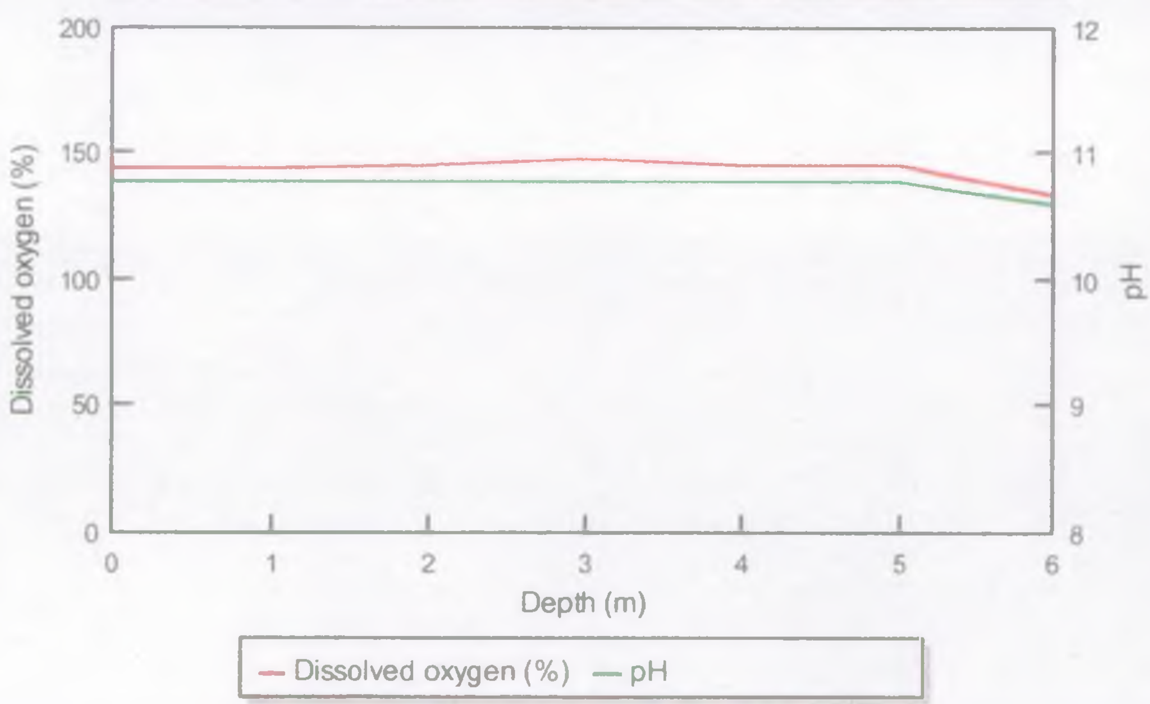




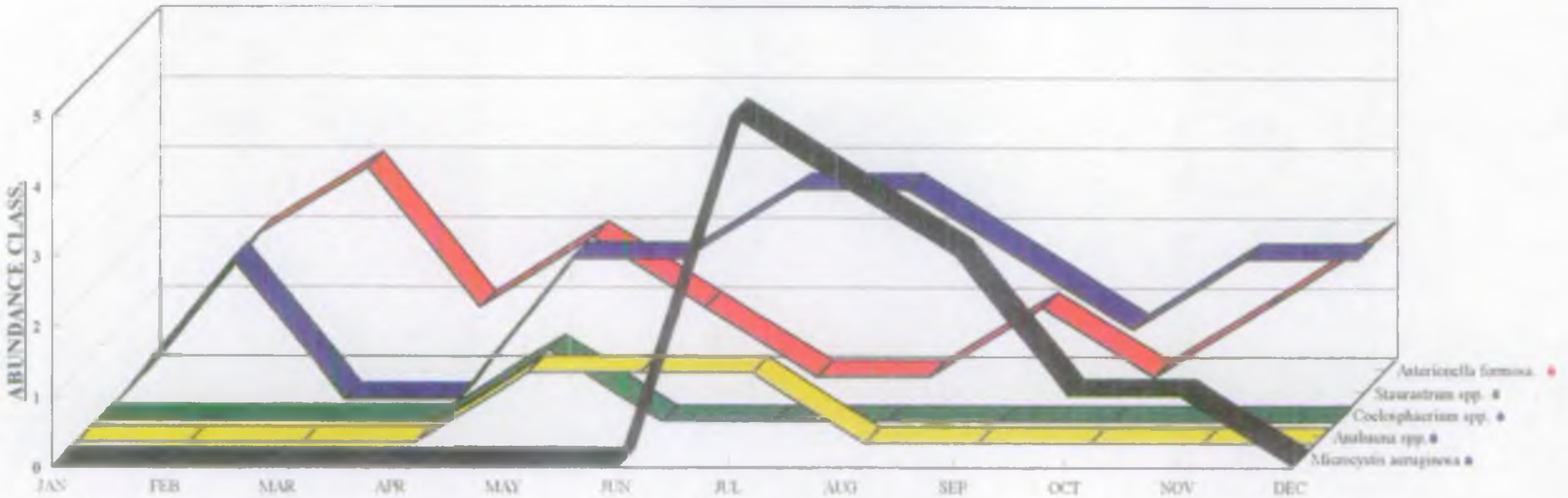
Appendix 2.8. R20A026 profile on 7 July 1996



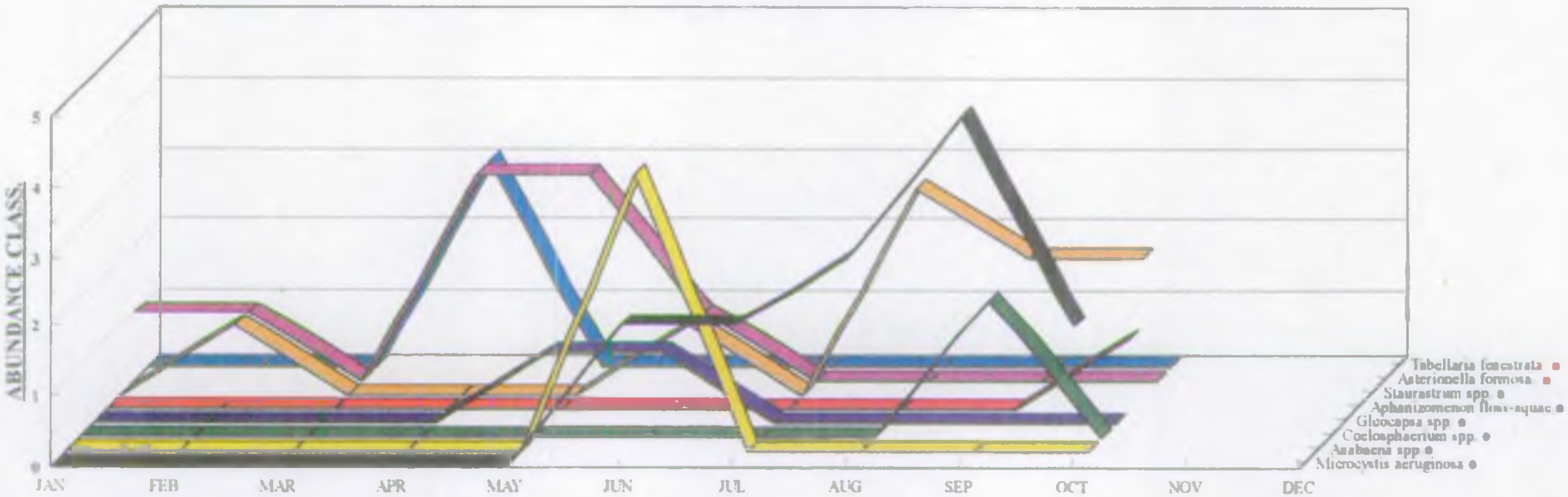
Appendix 2.9. R20A026 profile on 29 August 1996



Appendix 2.10. Algal succession at R20A026 during 1995



Appendix 2.11. Algal succession at R20A026 during 1996



Abundance class: 1) Rare 2) Occasional 3) Common 4) Abundant 5) Super abundant

Key to algal taxa :- Blue green Desmid Diatom

Appendix 2.12. Department of the Environment criteria for eutrophication

CRITERIA FOR WATERS SUBJECT TO EUTROPHICATION

	STILL FRESHWATER	RUNNING FRESHWATER	ESTUARIES/COASTAL WATERS
PHOSPHORUS	> 50 μg/l Total Phosphorus Annual Average (Geometric mean)	> 100 μg/l Orthophosphate as annual average	
NITROGEN			Winter NO_3 -N concentrations enhanced relative to background conc. for defined area, based on salinity
CHLOROPHYLL 'A'	> 30 μg/l Chlorophyll a peak concentration	Planktonic algae: 25 μg/l Chl a (Ann Ave) 100 μg/l Chl a (maxima)	Chlorophyll a concentration of around 10 μg/l in algal blooms.
ALGAL BIOMASS/BLOOMS		Excessive growth of attached algae biomass may reach several hundred g/m^2	Bloom densities of 5 x 10^5 cells/l. Lasts all summer. No nutrient-limited decline.
WATER CLARITY	Secchi disc transparency <3 m ann ave (Geo Mean). Due to algal biomass		
WATER RETENTION TIME		Sufficient time for planktonic algal multiplication (usually >5 days)	
DISSOLVED OXYGEN	Excess supersaturation of surface layers & decreased saturation in hypolimnion	Strong diurnal cycle. Daytime > 150%. Reduced night-time saturation	O_2 concentration decreased at surface & deeper layers due to the decay of plant material.
FAUNA	Decreased diversity & abundance of fish & invertebrates due to nutrient enrichment	Decreased diversity & abundance of fish & invertebrates due to nutrient enrichment	Increase or decrease in benthic biomass. Shifts in species composition /mortality of benthos/fish
MACROFLORA	Subtantial adverse change in macrophyte abundance and diversity	Substantial adverse change in macrophyte abundance & diversity.	Changes in species compostition, eg loss of red algae, growth of *Enteromorpha*. Decrease in photic zone
MICROFLORA	Exceptional increase in biomass leading to blooms, scums, or discolouration	Exceptional increase in biomass leading to blooms, scums, or discolouration	Formation of algal scum on beaches and offshore eg from *Phaeocystis*, *Chaetoceros*
PARALYTIC SHELLFISH POISONING (PSP)			Extension of area and duration of natural occurance of PSP.

Appendix 3.1. Environment Agency warning letters sent out as a result of blue-green algal blooms in1995 and1996

Our Ref: TR/MWM
Your Ref:

Date: 26 July 1995

NRA

National Rivers Authority
South Western Region

The Public Affairs Manager
The National Trust
Cornwall Regional Office
Lanhydrock
Bodmin
Cornwall

Dear Sir

TOXIC BLUE-GREEN ALGAL BLOOMS

The recent sampling of waters in your ownership by the South Western Region of the NRA has shown that the following sites have developed blue-green algae, at levels which have the potential for surface scum formation within the next two or three weeks and which may be toxic.

Experience from monitoring in 1989 and 1990 has shown that, once algal numbers are high, the bloom is likely to persist throughout the season and only decline at the onset of winter weather conditions. The NRA will not therefore be monitoring routinely at your site(s), but if you require further information on blooms or scums please contact this office. For advice on health matters you should contact your local Environmental Health Officer. The sample was taken from the edge of the lake on the down-wind side where the algae are at their highest concentrations.

THIS SAMPLE IS NOT REPRESENTATIVE OF CONDITIONS IN THE WHOLE WATERBODY AND IS LIKELY TO GIVE THE WORST CASE SCENARIO ONLY

You are recommended to make regular inspections of these waters to check for evidence of scum formation.

SITE	DATE SAMPLED	ALGAL GENUS IN ABUNDANCE
Loe Pool, Helston	24.07.95	Microcystis aeruginosa

Such algae occur naturally and during spells of warm weather can multiply sufficiently to discolour the water such that it appears green, blue-green, or greenish-brown. During calm weather the algae can rise to the surface to form a scum which may look like blue-green paint, or jelly, and may form flocks. The scum can be blown around the surface of the water and may this appear at different places at difference times. It may disappear and reappear quickly, and accumulate on the shoreline.

Cont/d...

Mrs Katharine Bryon, Regional General Manager

Sir John Moore House Victoria Square Bodmin Cornwall PL31 1EB Tel No: (01208) 78301 Fax: (01208) 78321

Our Ref: KI/PL
Your Ref:

ENVIRONMENT AGENCY

Date: 27 June 1996

The Public Affairs Manager
The National Trust
Cornwall Regional Office
Lanhydrock
Bodmin
Cornwall

Dear Sir/Madam

TOXIC BLUE-GREEN ALGAL BLOOMS

The recent sampling of waters in your ownership by the South West Region of the Environment Agency has shown that the following site(s) have developed blue-green algae, at levels which have the potential for surface scum formation within the next two or three weeks and which may be toxic.

Experience from monitoring in 1989 and 1990 has shown that, once algal numbers are high, the bloom is likely to persist throughout the season and only decline at the onset of winter weather conditions. The Agency will not therefore be monitoring routinely at your site(s), but if you require further information on blooms or scums please contact this office. For advice on health matters you should contact your local Environmental Health Officer. The sample was taken from the edge of the lake on the down-wind side where the algae are at their highest concentrations.

THIS SAMPLE IS NOT REPRESENTATIVE OF CONDITIONS IN THE WHOLE WATERBODY AND IS LIKELY TO GIVE THE WORST CASE SCENARIO ONLY.

You are recommended to make regular inspections of these waters to check for evidence of scum formation.

SITE	DATE	ALGAL SPECIES IN ABUNDANCE
Loe Pool, Helston	24-06-96	Anabaena flos-aquae

Contd.....

Environment Agency
Sir John Moore House Victoria Square Bodmin Cornwall PL31 1EB
Tel: Bodmin (01208) 78301 Fax: (01208) 78321

Appendix 3.2. Pollution report on 21 July 1995

```
Details for Incident number : F62016255  Date : 21/07/95   Time : 1600
How Received               TELEPHONE
Received By                RECEPTION
Investigating Officer      PORTLOCK L
Reported By                NRA                     Tel.
Address                    TOLGUS
Reported Incident          BLANKET WEED ON  LOE POOL MAKING WORKMEN DIZZY


Source Name                LOE POOL NATURAL
Address
Catchment                  COBER & LOOE POOL
Parish                     SENNEN
NGR                        SW 6430 2430          Samples Taken    YES

Primary Incident Code ZX OTHER
                       D WEATHER
                       9 NATURAL EVENT
                      4Q CHINA CLAY

                       FRESHWATER INCIDENT FURTHER DETAILS

Reference No. F62016255       Date : 21/07/95      Time : 1600

Estimated Volume (m-3)                      Estimated Flow Rate (m-3)
Potable supply affected               NO    Number of Salmonids killed
Industrial supply affected            NO    Number of Cyprinids killed
Agricultural supply affected          NO    Number of Eels killed
Groundwater affected                  NO    Other Fish Species killed          N
Tidal Water affected                  NO    Fisheries affected                YE
Amenity/Conservation affected        YES    Aquatic Life affected              N
River Qual. seriously affected        NO    River Length affected (km)       2.0
                                                               (UNK = Unkno


Closure Details :- Time 1030  Date 24/07/95
  Action Taken     VERBAL WARNING AND REMEDY TO PROBLEM
  Closing Officer  PORTLOCK L   ASSISTANT POLLUTION INSPECTOR (TRURO)

Enter 'Q' - Quit, 'P' Previous Screen or Incident number {         }
                                                TYPE       ONLINE    READY
```

Appendix 3.3. Letter from Head and Head Veterinary Surgeons on dog deaths

HEAD AND HEAD
Veterinary Surgeons

Environment Agency,
Sir John Moore House,
Victoria Square.
Bodmin PL31 1EB.

20.2.97

Dear Mr Geatches,

Further to our conversation on the phone I can confirm that we have seen cases in our surgery of dogs that have died from acute haemorrhagic gastro enteritis subsequent to swimming in Loe Pool.

These incidents are usually associated with periods of hot weather and we have assumed that there has been a link with the presence of Blue Green Algae although this has never been scientifically proved.

Our experiences have led us to advise owners not to let their pets have access to the pool at any time of year since many of cases of gastroenteritis and malaise can be linked to immersion in Loe pool.

I hope this information is of use to you - if we encounter any fresh cases I will try to give you more specific details.

Yours Sincerely

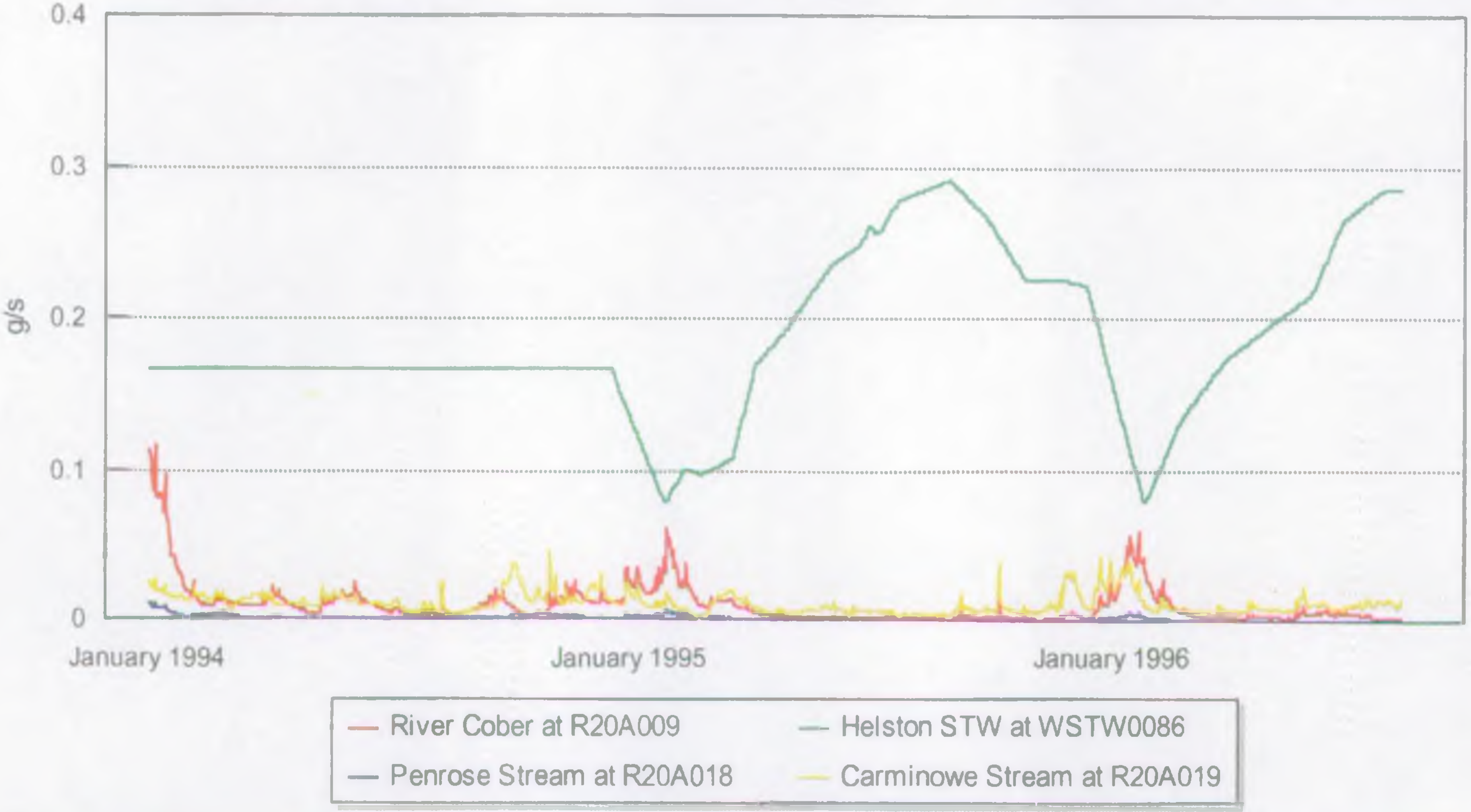
[signature]

H. ANTHONY ROSS BVMS., MRCVS.

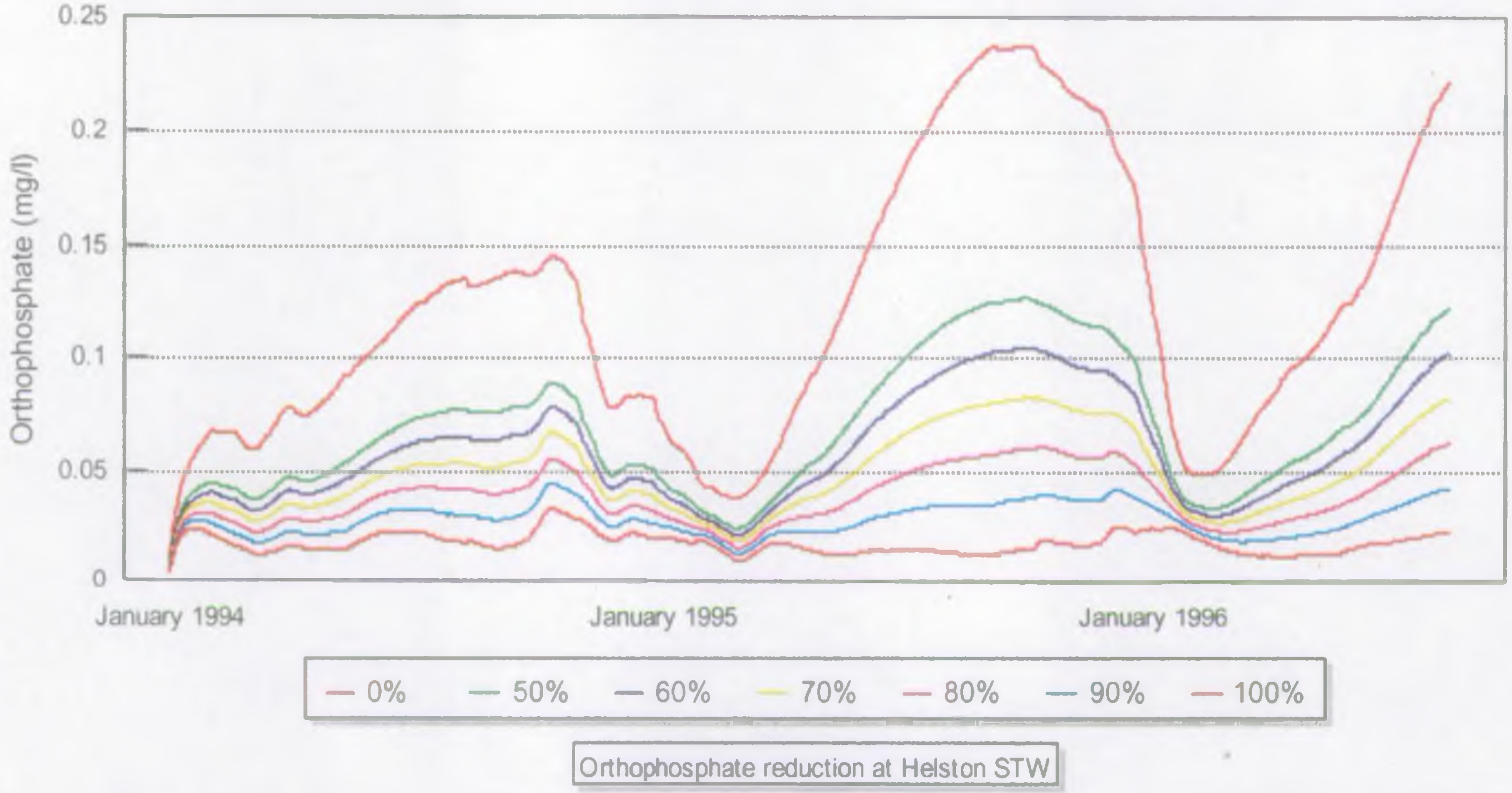
ENVIRONMENT AGENCY - CORNWALL			
AM		ACSCM	
ABSM		[illegible]	✓
AFRCM			
AWM			
REC'D	21 FEB 1997		
FILE REF			
COPIES TO			
PASSED TO			

VETERINARY CENTRE
Water-Ma-Trout
Helston, Cornwall TR13 0LW
Telephone 01326 572216
Farm Office 572215
JCS Head B.Vet.Med., M.R.C.V.S.
HA Ross B.V.M.&S., M.R.C.V.S.
DS Creasey B.Sc., B.V.M.&S., M.R.C.V.S.

Appendix 4.1. Orthophosphate loadings to Loe Pool



Appendix 4.2. Effect of orthophosphate removal at Helston STW on predicted orthophosphate concentrations in Loe Pool at R20A026



Appendix 5.1. *Microcystis aeruginosa* blooms in Loe Pool during 1996