Environmental Protection
Draft Report

REGIONAL RIVER QUALITY MONITORING & SURVEILLANCE

RESULTS OF THE 1990/1991 BIOLOGICAL SURVEY

June 1993
FWS/93/004

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NRA

National Rivers Authority
South West Region

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INTERNAL REPORT No. FWS/93/004

SUMMARY

This report describes the biological river quality monitoring programme undertaken by NRA South West Region, and the results of the 1990/1991 macro-invertebrate survey.

The survey comprised 954 sites covering 4241 km of river and 29 km of canal, and was completed in two years: 502 sites were surveyed during 1990 and 449 in 1991. Two sites were not surveyed. Twenty-two key sites were visited in both years, to assess annual changes. The survey mirrored the routine chemical monitoring programme, but included additional sites so that all reaches which had been assigned River Quality Objectives were included.

Habitat features were mapped at each site using standard symbols based on the NCC river corridor survey methods. These maps are to help interpret changes in the biota in subsequent years, and to provide data for conservation assessment. Photographs were taken at every site. Macrophyte species were recorded in 1991. The results of these aspects of the survey are not reported here.

Macro-invertebrates were sampled three times in the year: in Spring, Summer and Autumn, using the NRA standard sampling protocols (3 minute kick plus 1 minute search with a pond-net, or in deep water, three to five throws of a medium Naturalists' dredge). Stream width, depth, and substrate attributes, were recorded on each visit to enable RIVPACS to be used to predict the macro-invertebrate fauna expected at each site if it was unpolluted.

Biotic indices including BMWP-score, ASPT and number of BMWP-scoring families (N-taxa) were determined from the aggregated data from all three seasons' samples, as were the equivalent observed to RIVPACS-predicted ratios (= Ecological Quality Indices, EQIs) for each biotic index. The overall NRA Biological Classes were determined, as were the classes based on individual EQIs. The derivation and interpretation of the NRA Biological Classification, and EQIs are discussed in this report.

The ecological quality of most rivers in the South West Region in 1990 and 1991 was good: 86% of the river length classified (representing 3630 km of rivers) had an overall NRA Biological Classification of Class A (good quality); 8% (340 km) was moderate quality; 3% (146 km) was poor quality; and 1% (35 km) was very poor quality: 2% of river were not classified. In the reaches that were not of good quality, toxic influences and siltation ascribed to acidic mine drainage or china clay extraction were common, as were the influences of organic pollution from agriculture, agricultural processing industries, sewage treatment works effluents, and storm overflows. The biological classifications of sites in all catchments are discussed in this report, with an emphasis on those which were not good quality. The overall ecological quality indicated by the NRA Biological Classification is shown on catchment based maps.

The analytical quality audit of this survey demonstrated that the data was of good quality.

ACKNOWLEDGEMENTS

This report represents most of the work undertaken by the NRA South West Region's Field Control Biologists in 1990 and 1991. They undertook the initial site reconnaissances, all the sampling, and the sample processing. It also represents a substantial amount of the work undertaken by some members of the Region's Freshwater Science Section, who planned the programme, obtained cartographical site information, proof-checked the data, and produced this report. Data was input into the National Biological database by NRA Thames Region, who also computed the results. The Institute of Freshwater Ecology undertook the quality audits, and put all samples into long-term storage at Wareham.

The data evaluated in Section 3.1.4 was prepared by Moonsoft Ltd.

Especial thanks are due to the biologists of NRA Thames Region who processed 50 samples in 1990.

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1. INTRODUCTION

This report describes the results of NRA South West Region's biological river quality monitoring survey for 1990/1991. Although the whole programme is described, only the results of the macro-invertebrate survey are presented here.

1.1 Biological monitoring in the South West Region

Before the NRA's formation in September 1989, there had been no comprehensive biological survey of the South West Region's rivers since the 1980 National River Quality Survey. The biological component of the 1980 survey covered 174 sites in the South West Region. These were actually sampled in either 1979 or 1980. Although a chemical river quality monitoring programme was being undertaken, there was no equivalent biological programme. In the western part of the Region, comprehensive audit surveys of macro-invertebrate species were undertaken on a catchment basis between 1980 and 1988. In the eastern part of the Region, detailed surveys were undertaken on selected catchments only.

The NRA South West Region's current biological monitoring programme was established in 1990. It is based on nearly 1000 sites representing more than 4000 km of river and approximately 30 km of canal. Apart from 22 key sites which are surveyed every year, each site is surveyed every two years. Macro-invertebrate samples are collected in three seasons, and macrophytes and habitat information are recorded once. The macro-invertebrate surveys are a part of the NRA's National Biological Survey programme.

1.2 Aim of the biological river quality monitoring programme

The aim of the biological monitoring programme was to monitor the ecological quality of running waters in the South West Region. It was to provide information complementing chemical data to enable more effective assessments of overall river quality and the impact of environmental changes to be made. In 1990/1991, biological monitoring was the only form of monitoring undertaken at 87 sites, most of which represented smaller tributaries. The surveys undertaken in 1990 and 1991 were to provide the baseline against which conditions in subsequent surveys could be compared.

The biological surveys undertaken in 1990/1991 represented the South West Region's contribution to the 1990 quinquennial National River Quality Survey, undertaken for the Department of the Environment by the NRA in England and Wales (National Rivers Authority, in prep.), by the Department of the Environment for Northern Ireland (DoE N Ireland, 1993) and the River Purification Boards (RPBs) in Scotland (Scottish Office, 1992).

The macro-invertebrate component of the programme, and the new methods developed for it which are described in this report, may become the basis of the United Kingdom's approach to implementing the forthcoming European Union Council Directive on the ecological quality of water. This directive will require ecological quality targets to be set for watercourses, and target dates for compliance to be specified.

2. METHODS

To ensure comparability between samples within the National Biological Surveys of the NRA, RPBs and DoE N Ireland, considerable effort was made to ensure that the methods were defined precisely.

2.1 Survey design

The NRA's Statutory Water Quality Objective Group recommended that regional biological monitoring surveys of all monitored watercourses should be undertaken, and that these surveys should be completed in one year. Resources available in the South West Region to implement this programme meant that these surveys could only be accomplished over two years. Each site is surveyed every other year, except for 22 key sites representing the main types of watercourses found in the South West, which are investigated every year to provide information on annual changes and the effect of droughts. This monitoring programme continues to be followed.

In 1990, at least one site was investigated on each of the main rivers and larger tributaries, including all the sites surveyed in the 1980 National Survey. In 1991, the intermediate sites on larger watercourses and smaller watercourses not covered in the chemical monitoring programme were sampled. For the 1992/1993 survey, whole catchments were surveyed in one or other of the two years.

In 1990/1991, 951 sites on rivers and 6 sites on canals were surveyed, representing 4241 km of river and 29 km of canal. Five chemically monitored reaches on lakes which form part of a watercourse were not included in the biological survey, because the biological methods were unsuitable for lakes.

2.2 Site location

Each site in the biological river quality monitoring network represented either a reach of river monitored in the routine chemical water quality monitoring programme, or a watercourse not monitored chemically but assigned a Water Quality Objective in the South West Water Asset Management Plan (South West Water Authority, 1989). The number of sites in the programme changes slightly as new sites are added or replaced.

Wherever possible, the biological monitoring sites were located away from artificial influences such as bridges, livestock watering holes and canalized reaches. Each site was chosen so that it was typical of the reach as a whole: if the reach was mainly deep and slow flowing, the site was deep and slow flowing. This was a major departure from previous biological monitoring surveys, where shallow riffles were chosen in preference. It reflected the fact that the programme was designed to monitor ecological quality as opposed to solely water quality, although water quality is a major component of ecological quality, and the different approach taken to dealing with habitat variations when relating the biota to water quality (see Section 2.4.6). Biological monitoring sites were as close as possible to their corresponding chemical monitoring sites, or at the downstream end of watercourses that were not monitored chemically. The precise locations of all the sampling sites were chosen after a field reconnaissance. An additional criterion for the site location was that, wherever possible, the sites were to be the same as those used in the 1980 National River Quality

Survey. We were fortunate in being one of the few NRA Regions that had kept the original biological records from that survey. These records included six-figure National Grid References. Unfortunately these were insufficient to find the precise location of most sites, so all were allocated new codes, and detailed records were made of their location (see Section 2.3) to enable them to be relocated with sufficient precision. The criteria for locating sites are described in more detail in Furse et al. (1986), and a training video (National Rivers Authority, 1990).

2.3 The collection of site data

Basic environmental data was recorded whenever a sample was taken. This was to enable a prediction to be made of the fauna that the site should support, if its environmental quality (including water quality) was good. To do this the River InVertebrate Prediction and Classification System, Version II (RIVPACS II) programme, developed by the Institute of Freshwater Ecology (IFE), was used. Standardised procedures for measurement and recording were used to maintain compatibility with RIVPACS. Stream width was measured to the nearest centimetre: this was the width of the water, not the stream channel. The mean of three readings was recorded. Average depth was measured as the average of quarter, half, and three-quarter distance across the stream. Both stream width and depth were to reflect the predominant conditions at the sampling site. Visual estimates of the composition of the stream bed over the whole sampling site were made. Boulders/cobbles (>64 mm diameter), pebbles/gravel (2-64 mm diameter), sand, and silt/clay were recorded as percentage cover, ignoring bedrock. At sites representing reaches that were not monitored chemically, electrical conductivity was measured also. This information was recorded on standard sample data forms (Figure 2.1). The methods have been described in more detail by Furse et al. (1986), and in a training video (National Rivers Authority, 1990).

A photographic record of the sites was made in each season, to aid re-locating them precisely, and to provide a record of the surroundings. Brief notes were made to enable the sites to be re-located easily, and to warn of parking and access difficulties. The move from recording 6-figure National Grid References to 8-figure was also to ensure that the sites could be re-located accurately: a 10 m error could result in an apparent 10% change in habitat. It was very difficult to find where some samples for the 1980 National Survey had been taken, and a few could not be located at all.

Habitat maps were drawn covering 100 m of river centred on the invertebrate sampling site. The Nature Conservancy Council's (NCC) river corridor survey methods were used, as outlined in Nature Conservancy Council, 1985, although a number of the symbols were altered (see Figure 2.2). From 1992, the standard NRA symbols were used (see National Rivers Authority, 1982b), but with slight modifications to the substrate symbols. These habitat maps were to provide additional data to help interpret changes in biological samples in subsequent years. They were also to be used by the Region's Conservation Section as fixed transects to support their strategic habitat surveys. A single map was drawn each year that the site is visited. An example of one of the habitat maps is shown in Figure 2.3.

An attempt was made to record the presence of macrophyte species in the 100 m

NATIONAL RIVERS AUTHORITY
RIVER QUALITY SURVEY – 1990
BIOLOGY

SOUTH WEST (06)

SAMPLE DATA

Thames use only Sample Reference 0690 ____ 0690 ____ 0690 ____

SAMPLE	SPRING	SUMMER	AUTUMN
Status	01	01	01
Sample Date	__/__/ 1990	__/__/ 1990	__/__/ 1990
Sample Time	__:__	__:__	__:__
Survey	901	902	903

Site Reference NRA06____

Watercourse _____

Location _____

Grid Reference _____

Width	____m	____m	____m
Average Depth	____cm	____cm	____cm
Boulders/Cobbles	____%	____%	____%
Pebbles/Gravel	____%	____%	____%
Sand	____%	____%	____%
Silt/Clay	____%	____%	____%
Sampling Method	____	____	____
Sampler Initials	____	____	____

TAXA DETAILS (see over)

SCORE RESULTS AND PREDICTIONS

Scoring Families	____	____	____
BMWP Score	____	____	____
BMWP ASPT	____.____	____.____	____.____
Predicted BMWP	____	____	____
Predicted ASPT	____.____	____.____	____.____
No of Predicted Taxa	____	____	____
IFE/FBA Group	____	____	____
Method Of Prediction	____	____	____
Suitable for Prediction ?	Y/N	Y/N	Y/N

WATER CHEMISTRY

Chemical Class ____

Chloride ____ mg/l

Alkalinity ____ mg $CaCO_3$ /l

Alternatives to Alkalinity

Hardness ____ mg/l $CaCO_3$

Calcium ____ mg/l

Conductivity ____ uS/cm

COMMENTS

.....

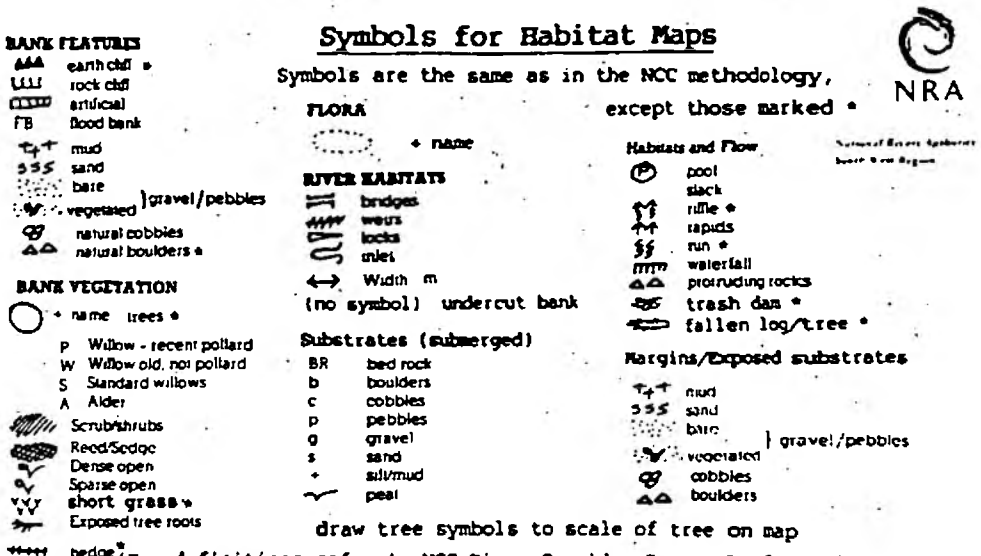
.....

Signed .....

Date .....

Please return to: *NRA Thames Region*
Biology 1990 Survey
Fobney Mead
Rose Kiln Lane
READING
Berks RG2 0SF

Figure 2.1 Standard sample data form used to record field data. Biological data was recorded on the reverse side, see Figure 2.5



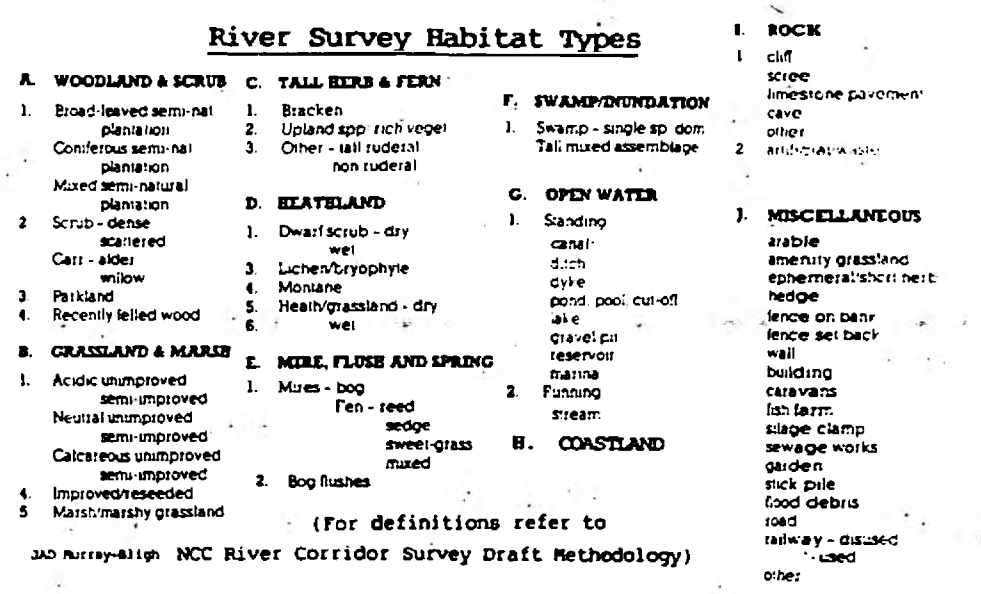


Figure 2.2 Standard symbols used for habitat maps in the routine biological river quality surveys in 1990 and 1991

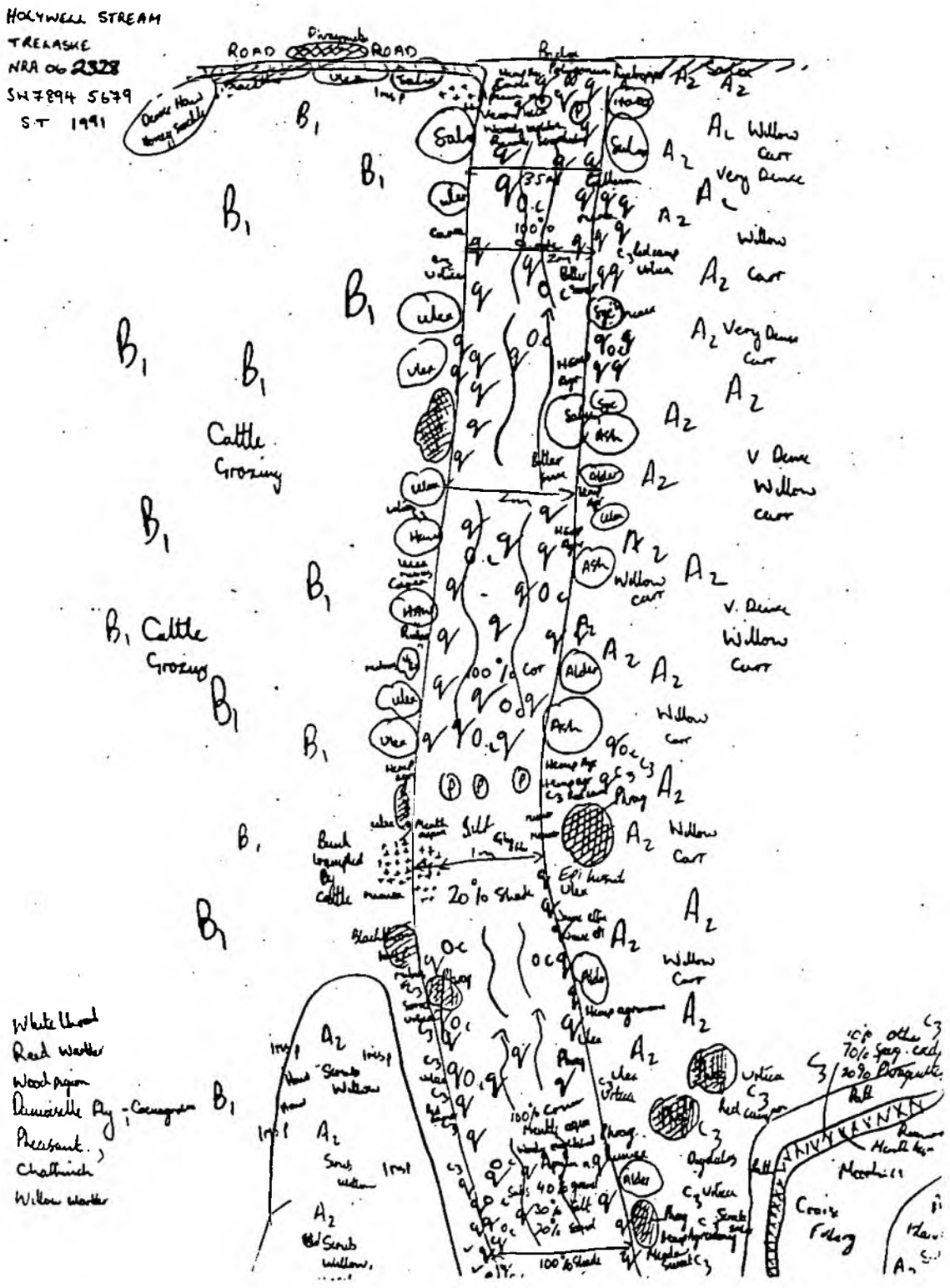


Figure 2.3 An example of a habitat map drawn for the 1990/1991 biological river quality survey

of river covered by the habitat maps; however the introduction of this in addition to the rest of the programme proved to be impractical in 1990. The recording of macrophytes began in earnest in 1991, following further training. In 1991 macrophyte species were recorded in Spring, Summer and Autumn, when the invertebrate samples were taken. From 1992 they were recorded in the Summer only (as recommended in Section B of Standing Committee of Analysts, 1987), and the coverage of mosses was enhanced.

In addition to field environmental data, some cartographical data was required to enable RIVPACS II to be used, including 6-figure Ordnance Survey National Grid Reference (from which longitude, latitude, mean air temperature and mean air temperature range was estimated by RIVPACS II); altitude, to the nearest meter; distance from source, to the nearest 0.01 km; and an estimate of slope to the nearest 0.1 m per km. Mean annual discharge was taken from hydrometric data, and recorded as discharge categories according to Table 2.1. Details of the methods have been described in Furse et al.(1986). This information was recorded on standard site registration forms (Figure 2.4). Note that although only 6-figure grid references were required for the data analysis using RIVPACS, more precise 8-figure grid references were recorded.

Table 2.1 Discharge categories

Discharge Category	mean annual flow (cubic metres per second)
1	$\leq$ 0.31
2	0.31 - 0.62
3	0.62 - 1.25
4	1.25 - 2.50
5	2.50 - 5.00
6	5.00 - 10.00
7	10.00 - 20.00
8	20.00 - 40.00
9	40.00 - 80.00
10	$\geq$ 80.00

2.4 Macro-invertebrate methods

2.4.1 Sample collection

Samples were collected in each of three seasons:

Spring	March-May
Summer	June-August
Autumn	September-November.

The standard NRA sampling methods for invertebrate monitoring surveys were used to ensure compatibility with RIVPACS and comparability between samples. The sampling was qualitative, the aim being to collect representatives of as many of the taxa that were present at the site as possible. At each site, all the invertebrate habitats were sampled in proportion to their cover. This standardisation enabled comparable, albeit coarse, estimates of relative

NATIONAL RIVERS AUTHORITY
RIVER QUALITY SURVEY – 1990
BIOLOGY

SOUTH WEST (06)
SITE REGISTRATION

SITE DETAILS

Site Reference NRA06 : ____
Status 01
Watercourse ____
Location ____
Grid Reference ____ ____ ____
Catchment 06 ____
District 99
ROO ____

Altitude (m) ____
Longitude (Deg:Min E/W) ____ ° ____ ' / ____
Latitude (Deg:Min N) ____ ° ____ ' / N
Distance from source (km) ____ . ____
Slope (m/km) ____ . ____
Discharge Category ____
Air Temperature Range (deg. C) ____ . ____
Mean Air Temperature (deg. C) ____ . ____

REACH DETAILS

Upstream Grid Ref. ____ ____ ____
Downstream Grid Ref. ____ ____ ____
Length of Reach (km) ____ . ____
Chemical point ____

1980 BMWP Score ____
(if known)

COMMENTS

____

____

Signed ..... **Date**

Please return to:

NRA Thames Region
Biology 1990 Survey
Fobney Mead
Rose Kiln Lane
READING
Berks RG2 0SF

Figure 2.4 Standard site registration form used to record site information.

abundances to be made.

At shallow-water sites, samples were obtained by a three minute kick with a pond-net, and a one minute manual search. A standard FBA-pattern long-handled pond net was used, with a flat bottomed 250 x 200 mm aperture, fitted with a 1 mm mesh collecting bag that was at least 270 mm deep. When kick sampling, the net was placed downstream from the sampler's feet, resting on the river bed, and the sampler disturbed the substrate rigorously with the heel of their boot to dislodge the fauna to a depth of about 10 cm. The net was held close enough to the sampler for the invertebrates to flow into the net with the current, but far enough away for most of the stones and gravel to drop out before entering the net.. Where there was insufficient current, the net was swept over the disturbed area to collect the invertebrates. The three minutes included only this active sampling. The net was emptied whenever it became too full or blocked. Animals from marginal areas, including emergent vegetation and tree roots, were collected by actively searching them with the pond net. Animals from the surfaces of large stones were picked-off by hand or with a stiff brush during the manual search, and were added to the rest of the sample.

Deeper water sites were sampled with a medium naturalist's dredge (also known as a rectangular dredge), with a 457 x 200 mm aperture, and fitted with a 1 mm mesh collecting net. The sample comprised from three to five trawls, plus a one minute search in the shallows close to the river banks using a pond net. The number of trawls varied, the aim being to collect a similar sized sample to a 3 minute kick.

Large stones and fragments of vegetation were washed over the collecting net and discarded. The samples were put into standard screw-topped containers or large watertight buckets for transporting them back to the laboratory.

The samples were preserved in 70% alcohol (industrial methylated spirit) to which 5% glycerol was added. The preservative was added either in the field or immediately on return to the laboratory at the end of the day. The strength of alcohol added to the samples was increased to 90% in Summer 1990. This was because some of the earlier samples were preserved inadequately, because the alcohol was diluted by the liquid held in sediment and plant material, and because the samples were not fixed in formaldehyde.

There was a national requirement to fix the samples in formaldehyde before preservation in alcohol to make the specimens more resistant to damage, because the samples were to be deposited in long-term storage. The samples from the South West Region were not fixed in formaldehyde because there were no suitable laboratory facilities. This was the only major deviation from the standard NRA invertebrate sample processing procedures.

2.4.2 Sample processing

The samples were stored in the laboratory prior to sorting and identification. All the samples were sorted in the laboratory.

Before sorting, the samples were washed over 0.5 mm mesh sieves to remove the preservative and silt. Larger stones and fragments of vegetation were discarded. Shallow, flat-bottomed white trays were used for sorting. Large samples were sorted a portion at a time.

Identification was to family, except for oligochaetes and water mites which were not identified further. Logarithmic abundance categories were estimated. The data was recorded on standard sample data sheets (Figure 2.5), on which the abundance categories are defined.

Contrary to the method described in Furse et al. (1986), more than 2 hours was often spent in sorting the samples. This reflected both the richness of the fauna and flora in the South West Region, and the initial inexperience of the mostly newly appointed staff. Sample processing is now much quicker, but sorting still often takes more than two hours.

For the quality audit (see Section 2.4.4), one or two specimens of each invertebrate family were placed in a small vial containing 70% alcohol preservative. When sorting had been completed, the sample and the vial were put into a standard 1.3 litre polythene screw-topped container to which 70% alcohol preservative had been added. The screw-topped jars were placed in standard sized plastic containers (lidded trays) for transporting them to IFE Wareham, for the quality audit and for long-term storage.

To help clear a backlog of samples at the end of 1990, approximately 50 samples were processed by biologists in NRA Thames Region. The backlog was caused by insufficient staff and laboratory resources being available at the start of the survey.

2.4.3 Sample storage

All the invertebrate samples collected in 1990 and 1991 for this survey were placed in long-term storage at IFE Wareham, together with other samples collected throughout the United Kingdom in 1990 for the National Surveys of River Quality.

2.4.4 Analytical quality audit

This and all subsequent biological river quality monitoring surveys have been subject to an independent quality audit. Before 1990, there had been no systematic programme of quality assurance for the Region's biological data.

The need for quality assurance was recognised during the initial discussions about the NRA Routine Biological Monitoring Programmes and the 1990 National Biological Survey. Cost and time did not allow for a full quality control programme to be introduced, which would have involved independent sampling, sorting and analysis. Instead, a quality audit was instigated, covering sample processing, and taxonomic identification. A training video on sample collection was made (National Rivers Authority, 1990), and shown to all staff as a substitute for a quality audit on sample collection, which would have been impractical and too costly.

The audit of the quality of sample sorting and identification involved a small percentage of the samples being re-sorted and identified by IFE. The methods and the results were discussed in Kinley and Ellis (1991).

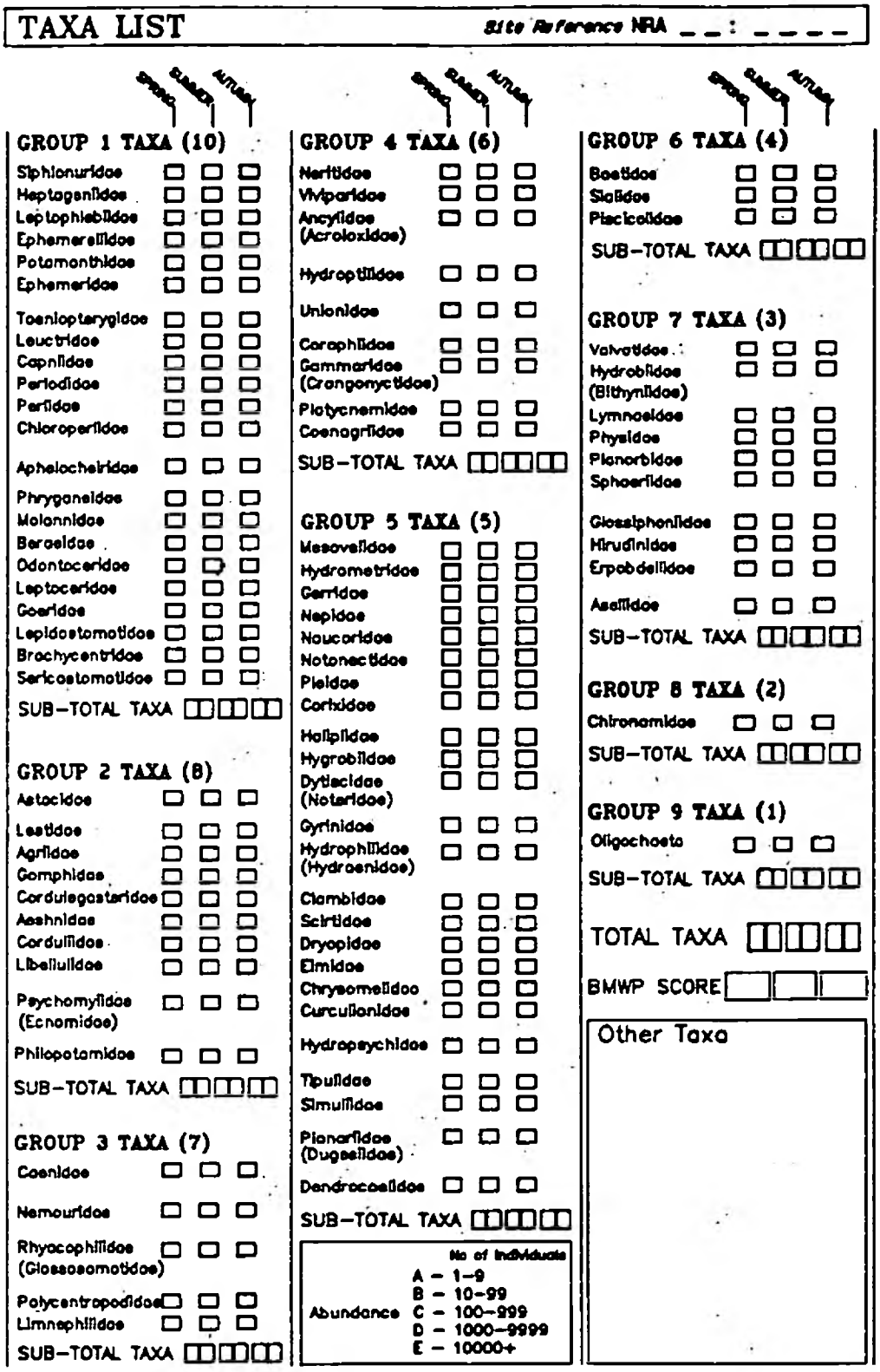


Figure 2.5 Standard sample data form used to record macro-invertebrate sample data, and to calculate BMWP-score, ASPT and N-taxa. Total taxa = N-taxa. Field data was recorded on the reverse of this, see Figure 2.1

2.4.5 Data archiving and analysis

The data from the National Biological River Quality Surveys undertaken in 1990/1991 by the NRA, RPBs and DoE (N Ireland) was analyzed centrally on computer by the Biology Section at NRA Thames Region. They also entered the data onto the National Biological Database, which they managed. The central data processing ensured that all the biological classifications were calculated from the same algorithms. It also enabled the latest version of RIVPACS to be used (RIVPACS II was not completed until early in 1991), and also facilitated the development and testing of the NRA Biological Classification. Having all the biological data on the same database enables it to be compared easily to data collected in other or subsequent surveys, and for developments in RIVPACS and the NRA Biological Classification to be applied retrospectively to it. Central processing was also cheaper.

Manually completed data recording forms were sent to NRA Thames Region, where the data was entered into the computer database. A print-out of the data was returned to Exeter, where it was checked against the original data forms for transcription errors. Following correction, the biotic indices, RIVPACS predictions, Observed : Expected ratios (see below) and the NRA Biological Classification were computed. This took approximately 8 hours, in batch mode, overnight. The results were returned to the Region in dBase and ASCII format on floppy disk, and as hard copy on paper. The data from South West Region was also returned on a copy of the Thames Biologists' System database, which formed the basis of the Region's biological computer archive.

2.4.6 The derivation of the NRA biological classifications of ecological quality based on macro-invertebrates

Biological quality is linked to water quality by biotic indices. The indices used by the NRA are the Biological Monitoring Working Party score (BMWP-score), which is the sum of individual scores for each family, as listed in Figure 2.5; the Average BMWP-score Per Taxon (ASPT); and the number of taxa (N-taxa, only the indicator families used in the BMWP-score system are considered). These indices were developed for the 1980 National Survey. The definitions of the individual taxon scores have been amended to take account of some advances in taxonomic nomenclature (see Figure 2.5).

Different watercourses, and different sites on the same watercourse, will support different macro-invertebrates because of differences in their geography, climate, geology, and the habitats that they provide. The values of biotic indices derived from different sites will therefore vary, even when their water is of similarly good quality. Biotic indices cannot be used to compare the water quality of different sites directly, unless the sites are very similar morphologically and geographically.

To overcome this problem, the NRA biological classifications are based on Observed to Expected ratios (O/E ratios) of the biotic indices. The observed values are those obtained from the pooled samples from three seasons, and the expected values are the values expected if the site had good water quality. The ratios remove the effects of natural differences between the invertebrate communities at different sites, and so place the biotic indices on universally comparable scales. The O/E ratios were originally termed Ecological Quality Indices (EQIs) by Wright et al. (1988). Although the term EQI is no longer favoured by its original authors because it has more

widespread connotations than merely the ability of a site to support its appropriate macro-invertebrate assemblage (Institute of Freshwater Ecology, 1991), it is still used by the NRA because of its simplicity,.

RIVPACS II was used to predict the composition of the fauna (and hence the values of biotic indices) expected at any site under natural, unpolluted conditions, based on its physical and geographical characteristics.

$$\text{EQI ASPT} = \frac{\text{observed ASPT}}{\text{ASPT predicted by RIVPACS}}$$

$$\text{EQI BMWP-score} = \frac{\text{observed BMWP-score}}{\text{BMWP-score predicted by RIVPACS}}$$

$$\text{EQI number of BMWP taxa} = \frac{\text{observed number of BMWP taxa}}{\text{number of BMWP taxa predicted by RIVPACS}}$$

These EQIs represent a major development of biotic indices, because they enable them to be used to compare the conditions at different sites directly. They were made possible by the development of RIVPACS II. The national surveys undertaken by the NRA, RPBs and DoE (N Ireland) in 1990 represented the first large-scale operational use of RIVPACS.

Four biological quality classes are defined in terms of these EQIs (Tables 2.2, 2.3 and 2.5).

The class boundaries were determined from the original data-set on which RIVPACS II was based. For the EQI ASPT, Class A represented the largest 95% of values in the data-set; the ranges of Classes B, and C were the same as the band between EQI = 1, and the lower limit of Class A (see Figure 2.6). The class limits for EQI N-taxa (and originally BMWP-score too) were determined in the same way, except that Class A represented the highest 90% of values in the data-set. The difference was because of the greater sensitivity of N-taxa to sampling variations.

Table 2.2 Descriptions of the biological quality classes based on EQIs

Biological Class	Class Description	observed index in relation to predicted index
A	Good	similar
B	Moderate	moderately poorer
C	Poor	poorer
D	Very Poor	very much poorer

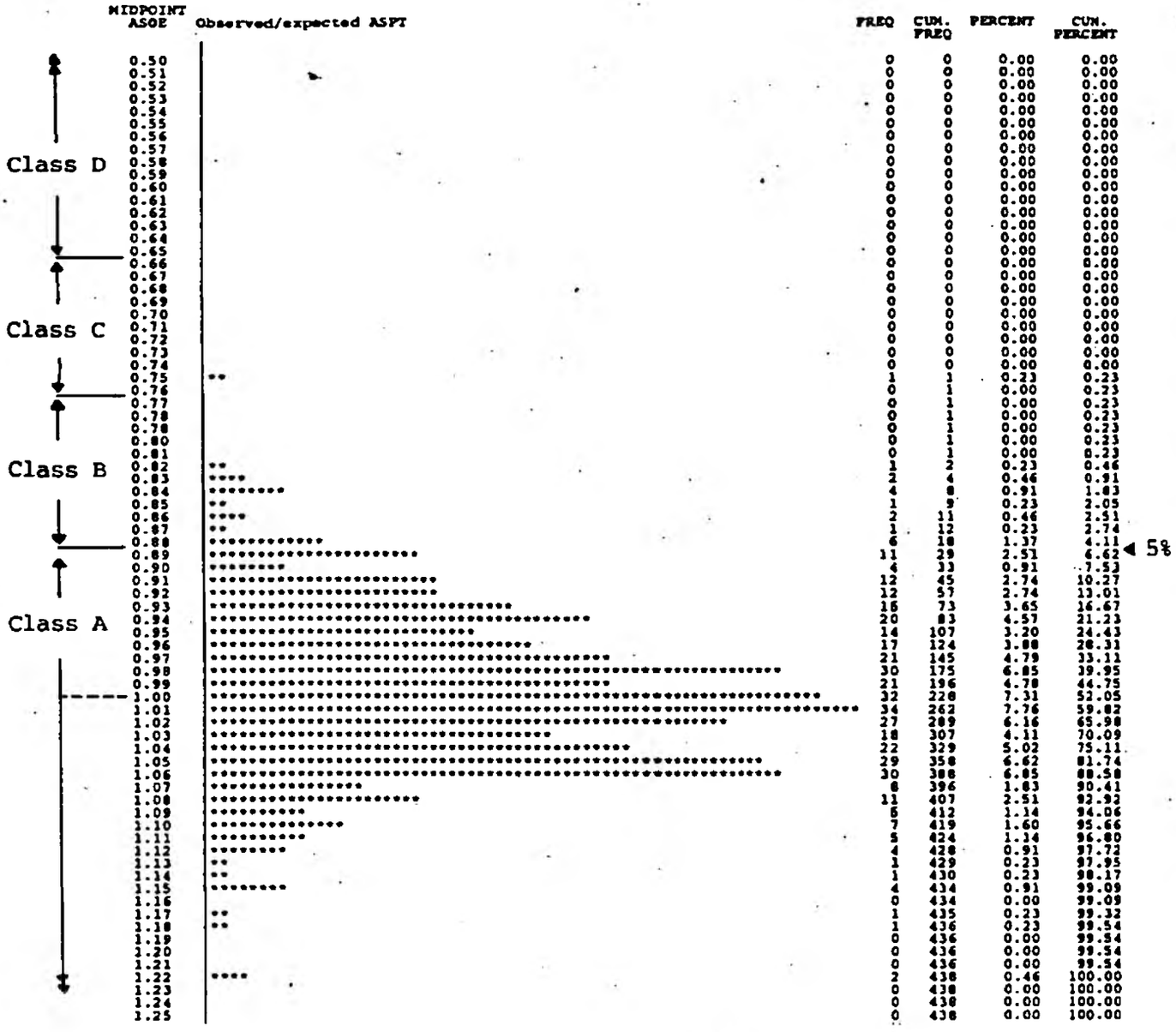


Figure 2.6 The determination of class bands for 3 seasons EQI ASPT. This was based on data from 438 supposedly un-impacted sites throughout Britain, from which RIVPACS II was derived. The first two columns show the EQI ASPT values and their frequency in the data-set. Class A represented the highest 95% of EQI values, and poorer classes the lowest 5% of values. From the location of the 5 percentile cumulative percentage frequency (last column), the EQI value representing the lower boundary of Class A can be read off the first column. The range of values comprising Classes B and C was the same as the range between EQI = 1 and the lower limit of Class A.

Table 2.3 The bands of the EQIs (based on 3 season's data) covering each biological class. See also Table 2.5.

Biological Class	EQI ASPT range	EQI N-taxa range	EQI BMWP-score range
A	≥0.89	≥0.79	≥0.70
B	0.77-0.88	0.58-0.78	0.45-0.69
C	0.66-0.76	0.37-0.57	0.24-0.44
D	≤0.65	≤0.36	≤0.23

The class limits for BMWP-score were originally determined independently from those of ASPT and N-taxa, however they should have been calculated from the class limits of ASPT and N-taxa. This error was revealed by the Region's Freshwater Science Section (see Institute of Freshwater Ecology, 1991). The values used in this report (see Tables 2.3 and 2.5) may differ from values used in older reports. The new and old class bands are shown in Appendix 1.

When there is no difference between the observed and predicted fauna, and therefore between the biotic indices derived from them, the EQIs will approximate unity, and it can be assumed that the water quality is good. When the observed values of biotic indices are much less than the predicted values, it can be assumed that the environmental quality, and in particular the water quality, is degraded.

The number of BMWP-scoring taxa (and EQI N-taxa) is sensitive to toxic pollution as well as to organic pollution. The EQI N-taxa will also respond to other environmental disturbances including the physical degradation of habitats by siltation or channelisation.

The ASPT (and EQI ASPT) relates solely to organic pollution, and the few pollutants with toxic effects related to respiration, such as cyanides. The tolerance of invertebrates to organic pollution is based on their tolerance to respiratory impairment caused by the deoxygenation that accompanies organic pollution. The ASPT is insensitive to other types of toxic pollution, such as acidification and metalliferous discharges, although it is sometimes affected by them, because they reduce its precision (sometimes drastically), by reducing the number of taxa on which it is based.

The BMWP-score (and EQI BMWP-score) responds to both organic and toxic pollution. It is the arithmetical product of ASPT and N-taxa. Being a derivative index, it provides no additional information to that provided by ASPT and N-taxa. The EQI BMWP-score is used in the overall NRA Biological Classification (see below) to prevent a marginally poorer EQI of N-taxa alone from downgrading the overall class.

There is considered to be a 5% chance of misclassification by EQI ASPT, but a 10% chance of misclassification by EQI N-taxa and EQI BMWP-score. This was the basis of the percentiles used to defined Class A. The chances of misclassification are greater when the EQI is near the band limits of the classes. ASPT is less reliable when N-taxa is very small.

An overall NRA Biological Classification has also been derived from the

classifications based on each of the EQIs shown in Tables 2.3 and 2.5. Its value is either the median of the classes indicated by the EQIs of ASPT, N-taxa and BMWP-score, or the class indicated by EQI ASPT if that is the poorest. This is to take account of the greater certainty of poor quality when indicated by the ASPT.

RIVPACS' predictions are most reliable when the site is similar to other sites in the data-set from which it was derived. This is indicated by the suitability codes (Table 2.4), also known as box numbers. RIVPACS does not attempt to predict the faunas of sites that are very different to any of those from which it was derived.

Table 2.4 RIVPACS suitability codes

Suitability codes	Probability that site belongs to any of the 25 different site groups recognised by RIVPACS
1	≥5%
2	<5%
3	<2%
4	<1%
5	<0.1%
7	<1% prediction abandoned
8	<0.1% prediction abandoned
9	unable to predict probability prediction abandoned

The biological classifications are suitable only for permanently flowing watercourses. Streams that usually become dry naturally at some time of the year, such as winterbournes, cannot be classified because RIVPACS II cannot predict their natural fauna. The data-set from which RIVPACS II was derived included only permanent streams. If a stream becomes dry because of over-abstraction, or an unusually bad drought, RIVPACS II can be used, because it will predict the fauna that the site should support under normal conditions.

RIVPACS II is unsuitable for ponds, lakes, reservoirs and canals. Sites in these habitats are inappropriate for the NRA Biological Classification.

The NRA biological classifications relate solely to the quality of the macro-invertebrate communities. They recover from pollution more quickly than fish (over months rather than years), because macro-invertebrates have shorter life-cycles, and their populations can recover by drift from unaffected regions upstream. Invertebrates (at family level and as biotic indices) are less sensitive to eutrophication than either macrophytes or algae.

2.4.7 Biological classification based on less than three seasons' data

RIVPACS II can be used to predict the invertebrates that should be obtained from a site in any single season (Spring, Summer or Autumn); in any combination of two of these seasons; or in all three seasons. Its

predictions are less reliable when based on fewer seasons' data. This reflects the greater sampling error inherent in single samples compared to multiple samples from a site. Because of this, the NRA biological classifications are based on the pooled data from three seasons' samples. Data from two seasons or a single season was only used when unavoidable.

Table 2.5 EQI bands defining the biological classes when derived from single and two seasons combined data. The standard three seasons' bands are shown for comparison.

Index	Biological class	single season's data	two seasons' pooled data	three seasons' pooled data
ASPT	A	≥0.84	≥0.88	≥0.89
	B	0.68–0.83	0.76–0.87	0.77–0.88
	C	0.52–0.67	0.64–0.75	0.66–0.76
	D	≤0.51	≤0.63	≤0.65
N-taxa	A	≥0.67	≥0.77	≥0.79
	B	0.34–0.66	0.54–0.76	0.58–0.78
	C	0.01–0.33	0.31–0.53	0.37–0.57
	D	0.00	≤0.30	≤0.36
BMWP-score	A	≥0.56	≥0.67	≥0.70
	B	0.23–0.55	0.41–0.66	0.45–0.69
	C	0.01–0.22	0.20–0.40	0.24–0.44
	D	0.00	≤0.19	≤0.23

The biological classes are defined by different bands of EQI values when determined from only one or two seasons' data (Table 2.5), to take account of the poorer precision in these circumstances. When these different bands are used, the probability of a good quality site being misclassified as poorer quality is the same as when three seasons' data is used, ie 5% for EQI ASPT, and 10% for EQI N-taxa and EQI BMWP-score. These EQIs must depart further from unity than EQIs for three seasons data, before the disparities between observed and predicted biotic indices can be ascribed to environmental stress, rather than to sampling variation.

Class bands have also been derived for each individual season and each combination of pairs of seasons, to take account of faunal differences between seasons. These have not been adopted by the NRA for evaluating single and two season data, because it was felt that they would make the classification too complex.

2.4.8 Interpreting environmental quality from the biological classification

Although the derivation of the NRA Biological Classification is more complicated than that of other biotic indices, it is actually much simpler to interpret. This is because the NRA Biological Classification is not affected by natural environmental conditions that influence conventional biotic

indices, and which have to be taken into account when interpreting them.

At its simplest, the overall NRA Biological Classification indicates whether the underlying quality of the invertebrate fauna, and therefore the environment which supports it, is good, moderate, poor or very poor throughout the whole year (ignoring transient deteriorations). The classification errs on the side of caution, a good class being assigned unless there is a reasonable certainty of poor quality. There is a relatively small chance of a site being classed as not good when it is good (Type I error).

If more information about the cause of poorer quality is needed, the classes indicated by the EQIs for N-taxa and ASPT can be interpreted. ASPT indicates the degree of organic pollution. N-taxa indicates toxic pollution, or habitat degradation such as siltation. Again, the classification is cautious. Sites are classed as good unless there is a reasonable chance that they are not good. When a site is good, there is a 5% chance of it being classed as not good according to ASPT, and a 10% chance when classed according to N-taxa or BMWP-score. When N-taxa is very low, ASPT is imprecise, because it is based on few taxa. The classes indicated by N-taxa and ASPT can be interpreted separately; however it is better to interpret them together. Table 2.6 is a very simplistic guide to the probable cause of poorer classes (though whenever EQI ASPT is low organic pollution may be present, and vice versa). The table is only a rough guide to the to the most obvious causes, and should be treated with caution, because there are instances when it may not provide the correct interpretation. BMWP-score can be used as a single index relating to both effects, but it gives no indication about the causes of poor quality.

Table 2.6 **Simplistic interpretation of type of pollution indicated by classes based on EQIs for ASPT and N-taxa**

ASPT / N-taxa	GOOD	MODERATE	POOR	VERY POOR
GOOD	good	organic	organic	organic
MODERATE	toxic	organic	organic	organic
POOR	toxic	toxic (+ organic)	toxic (+ organic)	organic (+toxic)
VERY POOR	toxic	toxic (+ organic)	toxic +/or organic	toxic +/or organic

Note: parentheses indicate that this type of pollution may be present as well

Where EQI ASPT is poor, but EQI N-taxa suggests good quality, organic pollution (such as from sewage effluent or farm waste) is the most likely cause of poor ecological quality. Organic pollution is also most probably the cause of poor ecological quality where both EQI ASPT and EQI N-taxa are low, though some form of toxic pollution could also be responsible. Where EQI N-taxa is poor, but EQI ASPT is good, toxic pollution (such as from acidic metalliferous discharges or industrial effluents) or habitat degradation (such as siltation or channelisation) are the most likely causes of poor ecological quality.

More information can be obtained from the taxa lists themselves (although these have not been presented in this report), by considering the tolerance of each taxon to different forms of pollution or disturbance. This information cannot be gained from the biological classifications. The tolerance of each taxon to organic pollution is indicated by its individual BMWP-score. These scores are approximate, for example some chironomids and oligochaetes are very intolerant of organic pollution, although these taxa have been assigned the lowest BMWP-scores. The tolerance of each taxon to other forms of stress such as from acidification, metal pollution, or siltation bear no relationship to their BMWP-scores.

The EQIs and biological classifications based on the combination of three seasons' data indicate the extent to which a site supports its expected range of macro-invertebrate taxa throughout the year. They will not detect variations in quality that occur during the year. They are influenced little by intermittent pollution except where there is insufficient time for full recovery, or by pollution that occurs at only one time of the year (in the South West of England slurry pollution from farm yards is a problem mainly in Winter, from which biotas often recover during the rest of the year). This is a direct result of basing the classifications on data pooled from different seasons. Consider an extreme condition, where a site with good biological quality in one season is lifeless in the other two. The pooled sample would include most of the taxa that were expected at the site, except for the relatively small number that occur naturally only in the two seasons when the river was lifeless. The site is likely to be classed as being of good biological quality because only a few of the taxa expected in the year were absent, despite it being lifeless for much of the time. The following year's classification is likely to be affected, and will represent the degree of recovery achieved that year (when the last sample of the year was collected). Pollution events that cause long-term impacts and which influence subsequent years' classifications, are probably 'more important' than those which have only short-term effects. Most pollution incidents are not this severe, and are unlikely to affect the classification. This is not a shortcoming of the classification, it is merely that the classification has been designed as a measure of overall biological health rather than to measure the severity of individual pollution incidents.

Pollution events and other short-term impacts can be monitored by evaluating individual samples. For this, it is important that biological samples are taken regularly: an advantage of sampling in three seasons each year.

Changes in the biological quality at any site, as opposed to differences between sites, are much better monitored by the actual biotic indices, rather than their EQIs. The EQIs provide baseline target values.

The NRA biological classifications based on combined seasons' data describe

the long term biological quality of rivers. They reflect chronic impacts such as from continuous pollution and channelisation. Where there is regular or frequent intermittent pollution, the biological classifications indicate the state to which the biota recovers moderately quickly (within a year). They represent the state to which the biota is likely to recover from small or moderate pollution incidents that have transient physical or chemical impacts. The overall NRA Biological Classification is a statement of the overall ecological resilience and health of a river, and as such is a useful measure.

2.4.9 Comparing the NRA Biological Classification with chemical classifications

The overall NRA Biological Classification is not meant to mirror the National Water Council (NWC) River Quality Classification (reported in National Rivers Authority, 1991a) or the proposed NRA General River Quality Classification (discussed in National Rivers Authority, 1991b). If the biological and chemical classifications reflected the same environmental factors, and were interchangeable, one or other would be unnecessary.

Two major differences between the biological and chemical classifications arise solely because of the way in which they are derived from the raw data:

(1) Biological classifications based on data pooled from three seasons' samples more closely represent best than worst conditions, as they are statements of the underlying ecological health of the watercourse. In contrast, the chemical classifications are based on 'worst' (95 percentile) conditions to make them compatible with discharge consent conditions. The chemical classifications are therefore influenced by a small number of samples that reflect poor conditions, whereas the biological classifications only respond to long-term conditions;

(2) The chemical classifications relate to conditions during a three year period, whereas the biological classifications relate to conditions in one year only.

Differences between the biological and chemical classifications other than because of the method of derivation include:

(1) The biological classifications are based on a different and much larger set of determinands (the individual taxa): as a result, the biological classifications respond to a much wider range of environmental influences. Physical degradation of the habitat (such as siltation) is the main influence on the overall NRA Biological Classification other than water quality, although it is very often caused by water quality (for example the deposition of ochre is associated with metal contamination, which is itself toxic to invertebrate communities);

(2) Individual biological samples have a greater likelihood of detecting the influence of pollution incidents than chemical samples, especially those that occur intermittently, because biological systems take time to recover from pollution and other impacts. Unlike chemical samples, which usually represent conditions in a

fixed window between 09.00 hrs and 16.00 hrs, biological samples will reflect conditions outside this window. Biological samples will only miss pollution events if the impact is transitory, involves a small volume of pollutant, or occurs a long time before a biological sample is taken;

(3) The chemical classification is based on absolute limits, regardless of the natural state of the watercourse, whereas the biological classification is based on limits relative to what is expected at each site if conditions were good. Some sites may never be capable of achieving a very good chemical class.

Sampling and statistical errors influence the classifications differently:

(1) The classifications have different precision. The errors associated with wrongly downgrading a site to a poorer class have been minimised in the NRA Biological Classification, at the expense of increased errors in wrongly assigning a good class to a poorer quality environment;

(2) Whereas the bands of chemical conditions defining each chemical class are fixed, and the risk of misclassification because of error increases when the number of samples on which it is based is reduced, the bands of biological conditions defining each biological class depend on the number of samples (see Table 2.5), so that the risk of erroneously downgrading is independent of the number of samples.

The biological classes are not equivalent to the chemical classes in terms of the ranges of quality that they represent. NRA Biological Class A ("good ecological quality") covers a much wider band of environmental conditions than NWC-Class 1 ("good river quality"). The conditions represented by the biological classes were determined independently from those of the chemical classifications; they were based purely on the conditions that could be differentiated by the biological methods used.

There will be a greater difference between the NRA Biological Classification and the proposed NRA Chemical Classification (National Rivers Authority, 1991b), which represents sanitary criteria only (biochemical oxygen demand, dissolved oxygen, and ammonia), than with the NWC classification. The NRA Chemical Classification will not respond to acidification, metal pollution, or suspended sediment. A higher proportion of sites will therefore be assigned a good chemical class and a poor biology class.

It is inevitable that the chemical and biological classifications will be compared. This is possible, so long as both classifications are understood. See Section 3.1.4 for a comparison of the NWC (chemical) River Quality Classification and the NRA Biological Classification in the South West Region in 1990.

3. THE ECOLOGICAL QUALITY OF RIVERS IN THE SOUTH WEST REGION 1990/1991

3.1 Overview

3.1.1 Survey overview

In 1990/1991, 943 sites on rivers were surveyed. Three sites were not surveyed because their locations were not found. Of those surveyed, one was sampled but not classified because it was lacustrine, and two were sampled but not classified because they regularly become dry for part of the year. This left 940 sites that were classified in 1990/1991. Six canal sites were also surveyed, but not classified.

3.1.2 Quality audit results

The results of the independent quality audit have been reported in detail by Gunn et al. (1991), and Gunn et al. (1992), and were discussed in Kinley & Ellis, 1991. They are summarised in Table 3.1. BMWP-scoring families found in the sample by the auditors that were not found by NRA biologists were termed 'gains'. Taxa recorded as present by NRA biologists that were not found in the sample by the auditors were termed 'losses'. There were more gains than losses, and this was typical of the audit results from other NRA Regions and RPBs. A small number of recording errors were noted by the auditors, where NRA biologists had recognised the presence of a taxon and placed an example in the vial, but failed to record its presence on the sample data sheets. These errors were termed 'omissions'.

Table 3.1 Summary of the quality audit results

	Total number of samples taken	number of samples audited	mean losses	mean gains	mean omissions
1990	1490	63	0.48	1.83	0.01
1991	1425	60	0.33	1.08	0.03

The audit results for NRA South West Region were good compared to the results from other NRA Regions in 1990 (see Kinley & Ellis, 1991) and RPBs (see Scottish Office, 1992). South West Region was one of three NRA Regions whose audit results in 1990 were considered suitable for defining a proposed target distribution. The South West Region's results improved further in 1991.

Figure 3.1 shows the variations between consecutive samples that were audited. Poorer results early in the programme reflected the lack of experience and training of staff. The results improved quickly as staff gained competence, and this was reflected clearly in the results for individual staff.

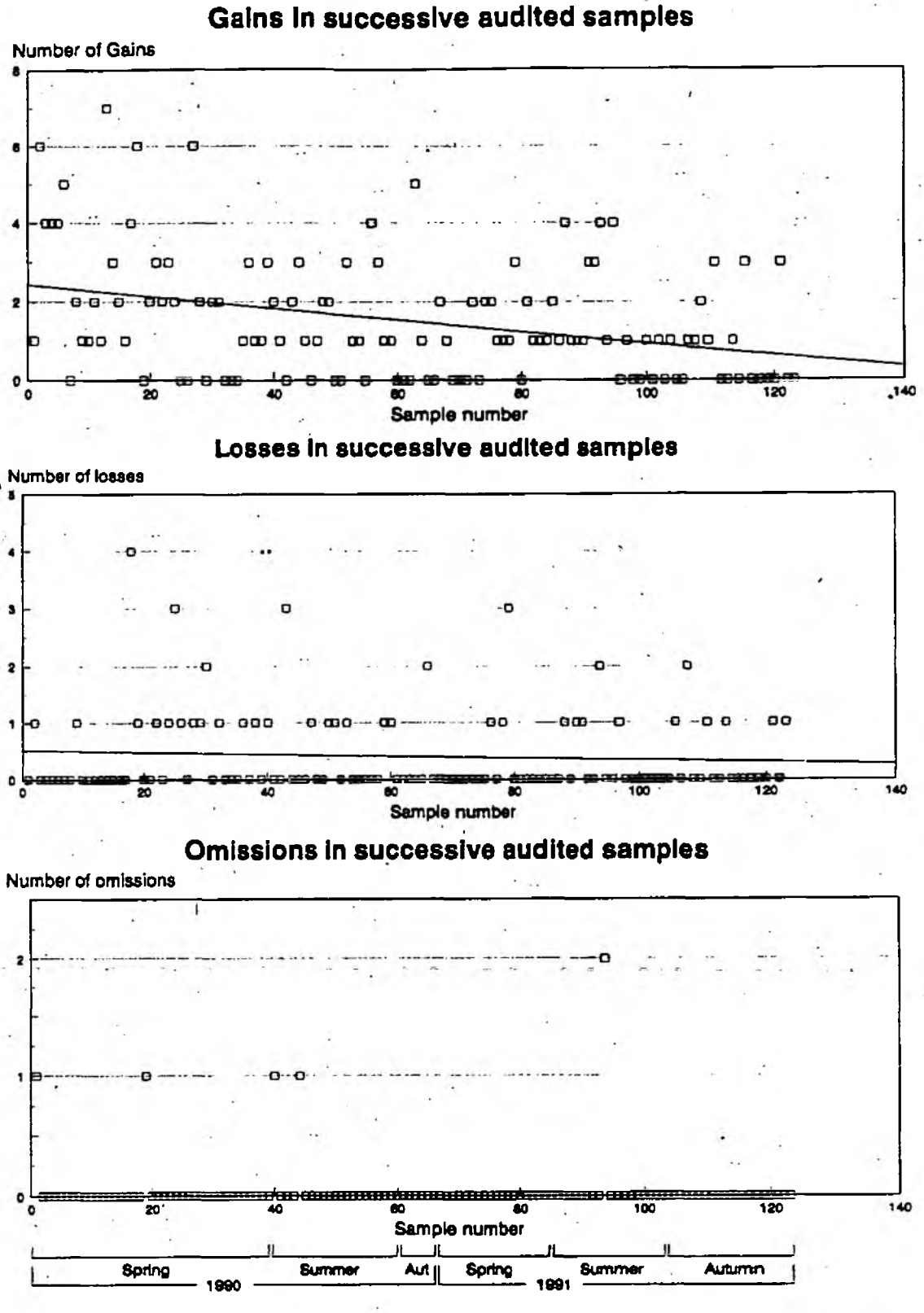


Figure 3.1 Number of 'gains', 'losses' and 'omissions' in successive audited samples. These are in roughly chronological order.

3.1.3 Overview of the ecological quality of the Region's watercourses

The biological quality of streams and rivers in the South West Region, as reflected in their macro-invertebrate communities, was generally good (Figure 3.2). Approximately 87% of the river length classified in 1990/1991 was good quality according to the overall NRA Biological Classification. The high proportion of good quality waters reflected the paucity of heavy industry in the Region, and the fact that most of the larger conurbations were near the coast, with their sewage (representing that of three quarters of the Region's population) being discharged to the sea.

The invertebrate fauna of the Region was particularly rich, reflecting the mild maritime climate. Other biological surveys in the Region indicated that taxonomic richness at the family level was not always translated to richness at the species level.

Agriculture probably had the greatest impact on water quality in the Region. Unfortunately, macro-invertebrate communities (particularly at family level) are relatively insensitive to eutrophication, which is one of the main impacts of agriculture on freshwaters. Agriculture is thought to have contributed to the blue-green algal blooms in many of the Region's lakes and ponds during 1989 and 1990. In 1990 and 1991, more pollution incidents were recorded from farms than from any other identified source in the South West Region (National Rivers Authority, 1992a, 1992c).

Both the china clay extraction industry, and the largely defunct metal ore mining industry had major impacts on the ecological quality of many watercourses, particularly in the western part of the Region. Most of the Region's surface waters were neutral to acidic, and many were influenced by the underlying metalliferous geology.

A severe drought in 1990, following a similar drought the year before, affected many smaller streams in the Autumn, particularly in East Devon and on Dartmoor, although low flows did not substantially affect the NRA Biological Classifications based on pooled seasons' data. Many of the Region's watercourses also suffered from low flows in 1991.

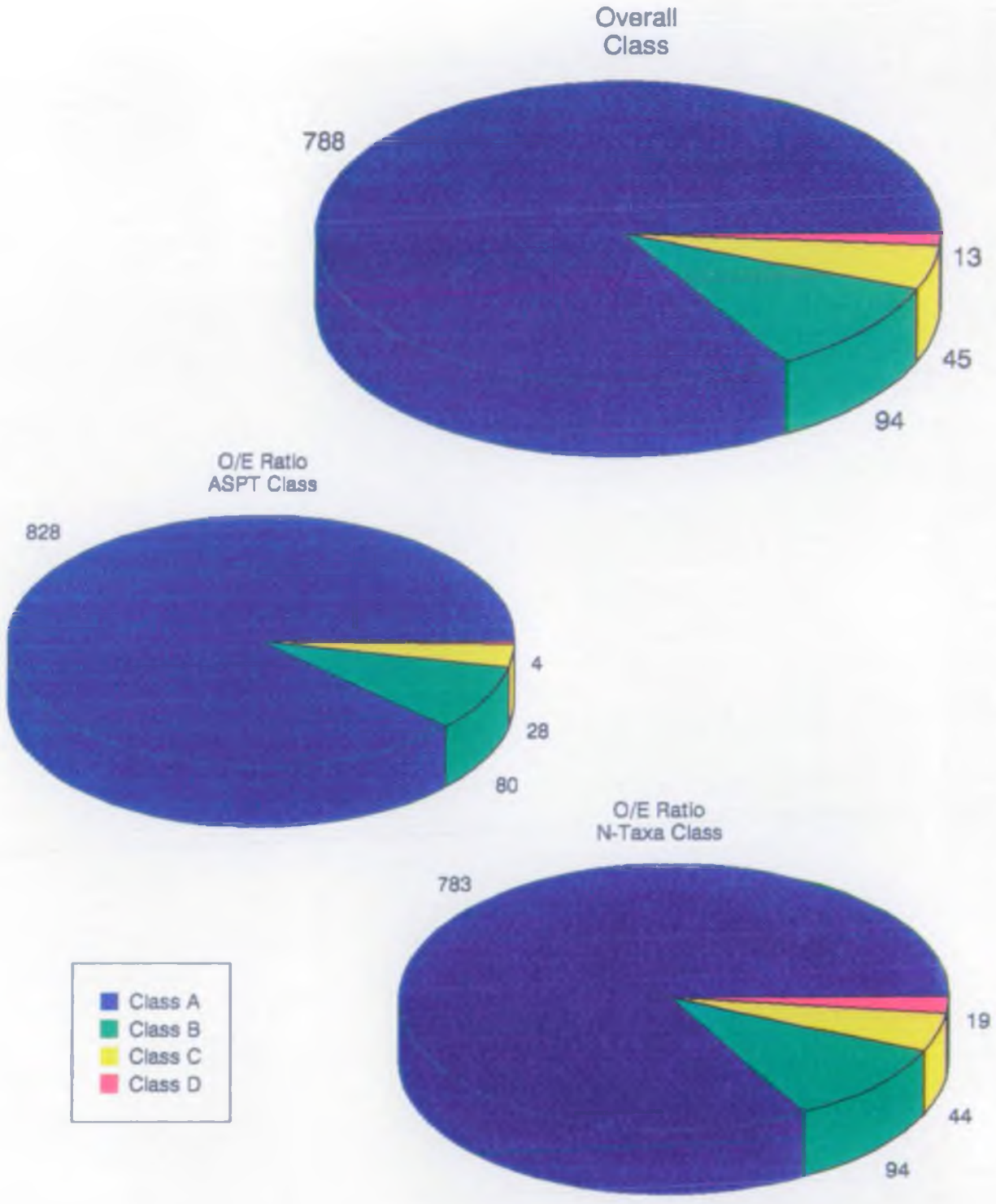


Figure 3.2 Proportion of sites belonging to different biological classes in 1990/1991

3.1.4 The relationship between the NRA Biological Classification and the NWC (chemical) Classification of rivers in the South West Region in 1990

The NRA Biological Classification and the NWC River Quality Classification of rivers in the South West Region in 1990 were very different, and at face value contradictory: the NRA Biological Classification indicated that most rivers were of good quality, whereas the NWC Classification indicated that a much larger proportion were of fair, poor or bad quality (see Table 3.2).

Table 3.2 Number of sites in each NRA Biological Class compared to each NWC (chemical) Class in 1990. Biological classification based on original bands, shown in Appendix 1; NWC-classification based on criteria shown in Appendix 2.

	NRA Biological Class				
NWC-Class	A	B	C	D	Total
1A	56	3	1	0	60
1B	143	10	0	0	153
2	124	14	0	0	147
3	58	17	16	5	96
4	3	0	2	0	5
Total	384	44	27	6	461

Despite the fact that the NRA Biological Classification and the NWC chemical classifications reflect very different aspects of water quality (see Section 2.4.9), there is still concern in some quarters that they do not give identical classifications to the same sites. This is mostly because of a misunderstanding of the NRA Biological Classification (see Section 2.4.8). Before a realistic assessment of the disparities between the NRA Biological and NWC classifications is possible, mismatches owing to differences in their derivation must first be identified, so that they can be discounted.

In the evaluation described below, an attempt was made to estimate the possible extent of differences between the NRA Biological Classification and NWC Classification owing to two differences in their derivation: the duration to which the classification relates (a single year for the biological classification and a three year period for the chemical classification); and that the chemical classification relates to worst (95 percentile) short-term quality whereas the biological classification more closely relates to best long term quality (see Section 2.4.9). Both will cause sites' NRA Biological Class to be better than their NWC Class, but cannot cause the NRA Biological Class to be worse than the NWC Class.

A mismatch because of the different periods to which the classifications relate was considered likely to have occurred when a poor chemical class was assigned to a site where the chemical samples collected in 1990 alone did not indicate such a poor chemical class. To do this, an NWC Classification based on data from 1990 only was calculated for all sites and compared to the NWC Classification based on data for the three year period from 1990 to 1988.

Chemical classifications derived from one year's data are less precise than those based on three years' data, because the number of samples on which they are based is much less. The chances of missing occasional poor quality that defines the 95 percentile conditions is greater with fewer samples, so single year classifications will be biased in favour of better quality. The degree of bias has not been estimated. In many cases the chemical classifications derived from 1990 data alone were based on only 12 samples. It is usual not to determine an NWC-Class when there are less than ten samples, because the precision is considered to be too low. Two sites were not classified on the 1990 data alone, because of this. In the South West Region, the Weibull method is used to estimate 95% percentile values on which the NWC classification is based, and this requires a minimum of 19 samples, see Ellis (1989). When there were less than this number, the highest value observed was used as an estimate of the 95 percentile.

Mismatches because the biological classification reflects only chronic poor quality, whereas the NWC classification reflects the 95 percentile (worst short-term) conditions was considered likely to have occurred when a poor chemical class was assigned, but less than 30% of samples reflected poor quality.

NRA Biological Class A, representing 'good ecological quality', covers a wider range of conditions than NWC-Classes 1A and 1B, which represent 'good [chemical] river quality'. Because of this, two evaluations were undertaken (see Table 3.3). In the first, it was assumed that NRA Biological Class A equated to NWC-Classes 1A and 1B (Assumption 'a'). The biological and chemical classifications were considered to match when a site was classified as either: of good biological quality (Class A) and of good chemical quality (NWC-Class 1A or 1B); or not of good biological quality (Class B, C or D) and not of good chemical quality (NWC-Class 2, 3 or 4). In the second evaluation it was assumed that NRA Biological Class A equated to NWC-Classes 1A, 1B and 2 (Assumption 'b'). The biological and chemical classifications were considered to match when a site was classified as either: of good biological quality (Class A) and of good to fair chemical quality (NWC-Class 1A, 1B or 2); or not of good biological quality (Class B, C or D) and of poor or bad chemical quality (NWC-Class 3 or 4). In reality, NRA Biological Class A probably relates to a range of water quality conditions from NWC-Class 1A to somewhere between NWC-Classes 1B and 2.

The NRA Biological Classification and NWC Classification were in agreement at 57% of sites, assuming biological Class A = NWC-Classes 1A-1B (assumption 'a'), and 79% of sites, assuming biological Class A = NWC Classes 1A-2 (assumption 'b'). The true extent of agreement was probably somewhere between these two values. Mismatches, where the NRA Biological Classification indicated better conditions than the NWC chemical Classification owing to differences in the period that they relate to (three years v one year), accounted for 31% of all mismatches (Assumption 'a') or 28% (Assumption 'b'). Mismatches owing to the chemical classification being based on worst conditions whereas the biological classification is based on longer-term 'best' conditions accounted for 54% (Assumption 'a') or 30% (Assumption 'b') of mismatches. These are over estimates, because some of the mismatches would have been because of real differences, or statistical error.

Table 3.3 **Mismatches between the NRA Biological Classification and the NWC Classification**

Assumption	Matches	Mis-matches	Biol Class worse than NWC Class	Biol Class better than NWC Class	Reason		
					Year	Acute	Other
'a'(A = 1A-1B)	262	199	14	185	62	108	15
'b'(A = 1A-2)	364	97	37	60	27	29	4

Notes:

Assumption 'a' = NRA Biological class A is equivalent to NWC-Classes 1A and 1B

'b' = NRA Biological class A is equivalent to NWC-Classes 1A, 1B and 2.

Matches = number of sites where chemical and biological classifications 'agreed' (see text)

Mismatches = number of sites where the two classifications did not 'agree' (see text)

Reason = reason for the NRA Biological Classification being better than the NWC (chemical) Classification

Year = poor chemistry occurred in 1988 or 1989, not in 1990

Acute = poor chemical quality occurred in a small number of samples (<30%) and therefore did not reflect chronic water quality

Although these estimates are subject to errors (real differences and sampling errors are hidden), and bias in the case of errors owing to year, a substantial proportion of the differences between the two classifications could be explained by differences in the classification procedures. None of the mismatches where the biological classification was worse than the chemical classification could have been caused by these differences in the classification procedures.

The proposed NRA Chemical Classification differs from the NRA Biological Classification because it is based on only three sanitary determinands. Most of the poorer biological quality in the South West was caused by pollution from acidic metalliferous mine drainage and china clay extraction, to which the NRA Chemical classification would not respond.

3.2 The ecological quality of individual catchments

The order in which the quality of each catchment is discussed in this section is that of the catchment codes, shown in Figure 3.3.

3.2.1 Interpreting the tables and maps

The maps in (Figures 3.4-3.45) show the overall NRA Biological Classification for each catchment. Biological classes based on EQI ASPT, EQI N-taxa, EQI BMWP-score and the overall NRA Biological Classification are listed in the tables for each catchment, as are the actual EQIs and the biotic indices observed from the samples. The data is

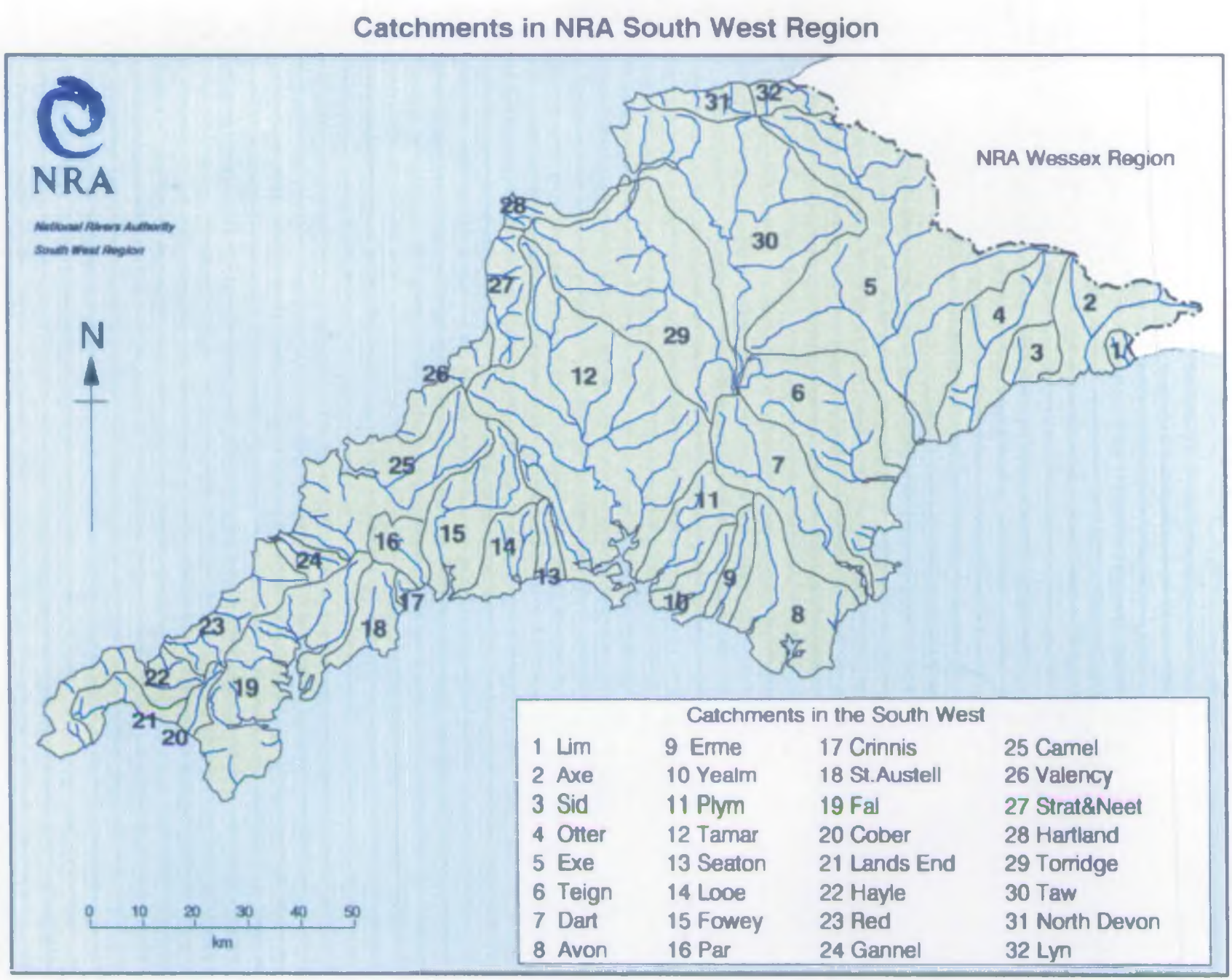


Figure 3.3 Catchments in NRA South West Region

that pooled from samples collected in all seasons. The data therefore reflects the ecological quality achieved during 1990 or 1991, but not variations in quality that may have occurred during the year (see Section 2.4.8) Data from 1991 only is given for sites that were surveyed in both 1990 and 1991.

Sites with a RIVPACS suitability code of 1 (see Table 2.4) are distinguished on the maps from those that were less suitable (suitability codes 2-5). The actual suitability codes are included in the tables. The classification of sites with low RIVPACS suitability is less accurate than those with high suitability, because RIVPACS predictions will be less accurate. It is not possible to quantify the degree of inaccuracy.

The EQI bands that determine the biological classes depend on the number of samples on which they are based (see Section 2.3.7). The seasons in which each site was sampled have been tabulated as codes, defined in Table 3.4.

Both the biological site codes and the chemical site codes (User Reference Numbers, URNs) that are used to archive the data are listed in the tables. It is helpful if these are quoted when requesting further data for the sites. Although not part of the Public Register, biological data collected in monitoring surveys are treated as if they were, in accordance with NRA policy.

Table 3.4 Season codes

Code	Season(s)
1	Spring only
2	Summer only
3	Autumn only
4	Spring and Summer only
5	Spring and Autumn only
6	Summer and Autumn only
7	Spring, Summer and Autumn

3.2.2 River Lim Catchment Catchment-1

Summary

Of 10 km of watercourses in the Lim catchment monitored by 2 sites, 65% were classed as good quality, according to the NRA Biological Classification. The remaining 35% (representing Harcombe Stream) could not be classified because this watercourse becomes dry regularly.

Likely reasons for poorer biological quality

Although Harcombe Stream could not be classified, its fauna indicated that it was of good quality when flowing.

NRA Biological Classification 1990 & 1991

Catchment: River Lim

Corresponding Freelance map filename(s):CATCH1.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Lim	25m u/s br Mill Green	SY 3400 9253	0101	R01A002	1	1990	7	30	5.80	174	0.90	0.93	0.84	A	A	A	A
2	Harcombe Stream	5m u/s br prior to STW	SY 3330 9333	0102			1991	4	24	6.40	153	0.00	0.00	0.00				ø

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ↑ = New site for 1992/1993
ø = Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

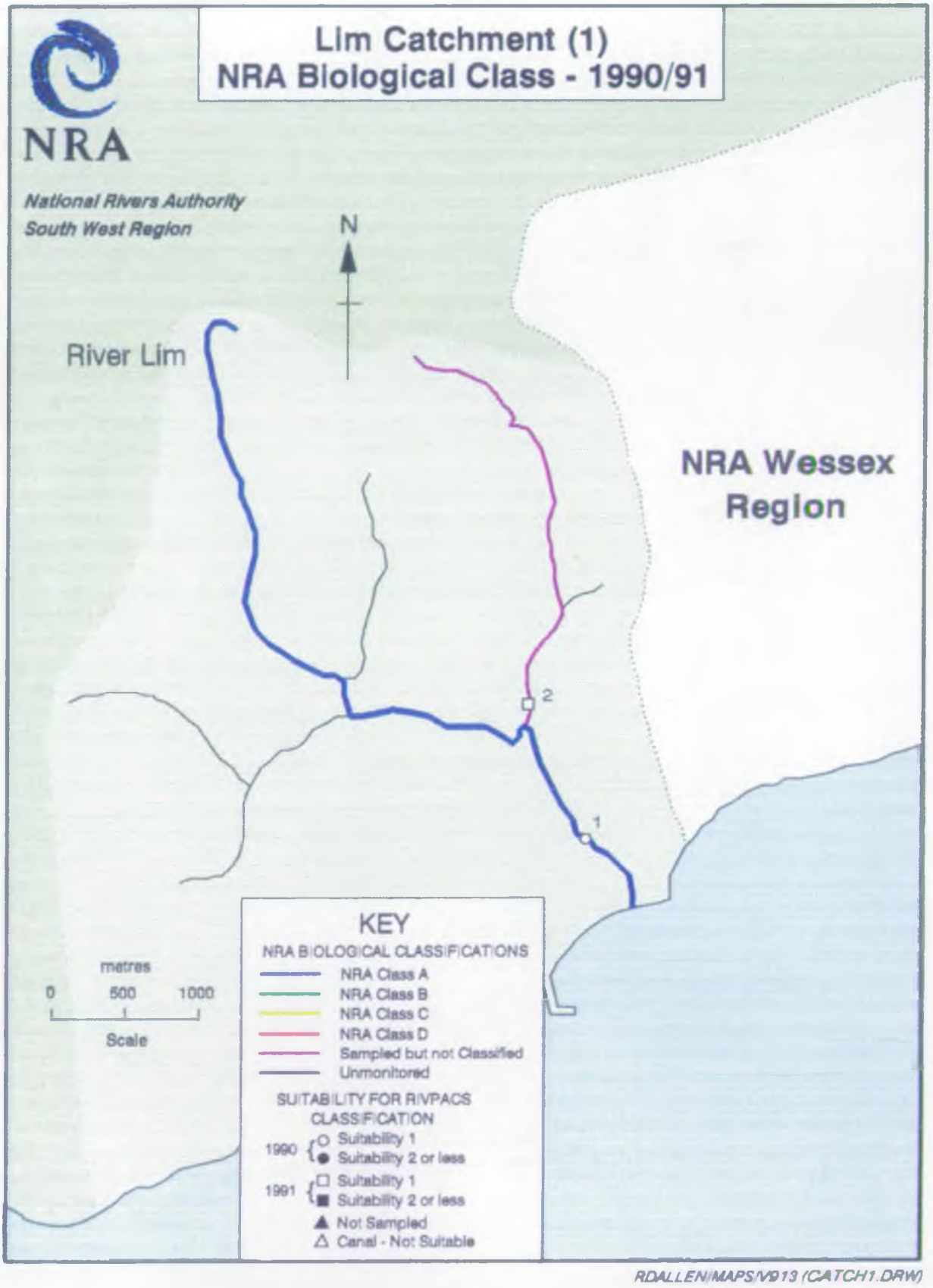


Figure 3.4 Lim Catchment (1) NRA Biological Class - 1990/1991

3.2.3 River Axe Catchment Catchment-2

Summary

Of the 192 km of watercourses monitored by 43 sites in the River Axe catchment, 96% (41 sites) were good, and 4% (2 sites) were moderate quality, according to the NRA Biological Classification. None were classed as poor or very poor quality.

Likely reasons for poorer biological quality

Despite being classed as good quality, the River Axe and many of its tributaries including the River Yarty were known to be suffering from eutrophication. Although not reflected in the biotic indices based on macro-invertebrate communities, eutrophication was thought to have affected the fish and algal communities. There was a permanent bloom of benthic diatoms at Whitford Bridge throughout the year, and large stands of blanket weed (Cladophora) and water crowfoot (Ranunculus) were present in the lower reaches of the Axe during the Summer and Autumn.

The lower reach of Umborne Brook was of only moderate quality in terms of its EQI N-taxa (although its overall NRA Biological Class was good) which suggested either a degraded habitat or toxic pollution, though no potential sources of such pollution were identified other than a sewage treatment works effluent.

Old Park Brook was of moderate quality because of moderately poorer than expected N-taxa. A poor quality sample in Autumn, which had a low ASPT and N-taxa, indicated that the monitoring site was affected by a severe organic pollution incident.

There was insufficient water in Chappelcroft Brook for a sample to be collected in Autumn 1991. This was thought to be an effect of the drought, rather than a regular occurrence, so this watercourse was classified. RIVPACS is unsuitable only for streams which normally dry-up in most years.

The moderate quality of Temple Brook was the result of moderately poorer than expected ASPT. This suggests that it was affected by organic enrichment, which is consistent with the problems from farm discharges that are known to affect this stream. No specific discharges were identified.

Although the lower reach of the Branscombe Stream had an overall NRA Biological Class of A, it was classed as moderate quality according to its EQI N-taxa. This was thought to be a result of dredging at the monitoring site. This monitoring site has since been replaced by another that is not dredged, and which represents the biological quality of the lower Branscombe Stream better.

NRA Biological Classification 1990 & 1991

Catchment: River Axe — Corresponding Freelance map filename(s):CATCH2.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Axe	20m d/s A3066 br Musterton	ST 4568 0525	0232	RO2C001	1	1991	7	40	5.90	238	1.20	1.03	1.23	A	A	A	A
2	Axe	30m d/s Sesborough Bridge	ST 4295 0570	0212	RO2C002	1	1990	7	36	6.00	215	1.09	1.02	1.11	A	A	A	A
3	Axe	Oathill Farm Waycroft	ST 4035 0603	0213	RO2C003	1	1990	7	40	6.10	244	1.20	1.05	1.25	A	A	A	A
4	Axe	60m u/s Forde Bridge	ST 3626 0534	0233	RO2C004	1	1991	7	38	6.00	227	1.10	0.98	1.08	A	A	A	A
5	Axe	25m u/s br Broom	ST 3263 0248	0214	RO2C005	1	1990	7	41	6.00	246	1.20	1.00	1.20	A	A	A	A
6	Axe	75m u/s A358 br Weycroft	ST 3075 0002	0215	RO2C006	1	1990	7	48	6.40	307	1.44	1.05	1.51	A	A	A	A
7	Axe	125m u/s Bow Bridge	SY 2902 9833	0234	RO2C007	1	1991	7	39	5.80	226	1.14	0.95	1.08	A	A	A	A
8	Axe	300m u/s Whitford Bridge	SY 2645 9555	0230	RO2B001	1	1991	7	37	6.00	221	1.10	0.98	1.07	A	A	A	A
9	Axe	100m d/s footbr Nunford Dairy	SY 2611 9463	0202	RO2B002	1	1990	7	37	5.90	217	1.09	0.97	1.05	A	A	A	A
10	Axe	50m u/s Axe Bridge	SY 2593 9265	0203	RO2B002	2	1990	7	42	5.80	243	1.19	1.01	1.20	A	A	A	A
11	Coly	20m u/s Woodbridge	SY 1885 9533	0208	RO2B003	1	1990	7	31	6.00	186	0.93	0.95	0.88	A	A	A	A
12	Coly	75m u/s Brinkley Bridge	SY 2125 9514	0209	RO2B004	1	1990	7	32	6.00	191	0.95	0.95	0.91	A	A	A	A
13	Coly	150m u/s ford (10m u/s footbr) Heathayn	SY 2342 9437	0210	RO2B005	3	1990	7	31	6.00	187	0.98	0.98	0.96	A	A	A	A
14	Coly	60m u/s bridge Colyford	SY 2535 9268	0211	RO2B006	1	1990	7	37	6.30	233	1.08	1.01	1.09	A	A	A	A
15	Umborne Brook	25m u/s Triffords Farm br	SY 2232 9946	0205	RO2B007	1	1990	7	33	6.70	221	0.98	1.06	1.03	A	A	A	A
16	Umborne Brook	75m u/s Coly confluence	SY 2485 9430	0204	RO2B008	1	1990	7	27	6.30	171	0.78	1.02	0.79	B	A	A	A
17	Offwell Brook	100m d/s Offwell footbridge	SY 1930 9874	0206	RO2B009	1	1990	7	35	6.50	229	1.09	1.01	1.11	A	A	A	A
18	Offwell Brook	25m u/s br Road Pitt Farm	SY 2148 9534	0207	RO2B010	1	1990	7	31	5.80	179	0.91	0.92	0.83	A	A	A	A
19	Bulmoor Stream	100m u/s Whitford Bridge	SY 2633 9533	0231		2	1991	7	31	5.30	164	1.19	1.08	1.28	A	A	A	A
20	Yarty	100m u/s Newhaven Bridge	ST 2587 1103	0225	RO2D003	1	1990	7	34	6.40	219	0.99	1.01	1.00	A	A	A	A
21	Yarty	15 u/s Longbridge	ST 2552 0551	0243	RO2D004	1	1991	7	39	6.40	248	1.10	1.01	1.11	A	A	A	A
22	Yarty	100m u/s Beckford br	ST 2650 0158	0227	RO2D005	1	1990	7	34	6.30	213	0.98	0.99	0.97	A	A	A	A
23	Yarty	100m u/s A35 br Gammons Hill	SY 2813 9812	0228	RO2D006	1	1990	7	41	6.10	252	1.27	1.01	1.28	A	A	A	A
24	Corry Brook	40m u/s rd br Rose Farm	ST 2421 0244	0228	RO2D001	1	1990	7	34	6.40	218	1.01	1.01	1.02	A	A	A	A
25	Corry Brook	100m u/s rd br Old Corryton	SY 2684 9908	0229	RO2D002	1	1990	7	38	6.00	227	1.09	0.95	1.03	A	A	A	A
26	Old Park Brook	50m u/s Axe confl	SY 2909 9798	0235		1	1991	7	21	5.60	117	0.63	0.91	0.57	B	A	B	B
27	Mill Brook	20m u/s Axe confl	SY 2965 9921	0236		1	1991	7	35	6.00	211	1.01	0.98	0.98	A	A	A	A
28	Chapplecroft Brook	60m u/s Axe confl	ST 3045 0000	0237		1	1991	4	23	5.80	133	0.74	0.99	0.73	B	A	A	A
29	Smallridge Stream	25m u/s rail br prior to Axe	ST 3088 0037	0238		1	1991	7	38	6.20	236	1.13	0.99	1.12	A	A	A	A
30	Stanmery Stream	50m u/s Axe confl	ST 3202 0100	0239		1	1991	7	37	6.40	236	1.09	1.03	1.11	A	A	A	A
31	Kit Brook	10m u/s br Harfords	ST 2958 0628	0241	RO2C012	1	1991	7	36	6.30	226	1.09	0.99	1.08	A	A	A	A
32	Kit Brook	25m u/s road bridge Axe Farm	ST 3194 0167	0223	RO2C013	1	1990	7	36	6.40	232	1.06	1.03	1.10	A	A	A	A
33	Blackwater River	50m u/s br Buddlewall	ST 3301 0217	0222	RO2C008	1	1990	7	38	6.30	240	1.09	1.01	1.09	A	A	A	A
34	Forton Brook	50m u/s B3162 rd br	ST 3403 0709	0220	RO2C010	1	1990	7	33	5.90	195	0.99	0.99	0.98	A	A	A	A
35	Forton Brook	100m d/s Tatworth STW	ST 3375 0463	0221	RO2C011	1	1990	7	35	5.80	204	1.04	1.01	1.05	A	A	A	A
36	Hewood Stream	40m u/s Axe confl	ST 3462 0498	0240		1	1991	7	41	6.20	254	1.24	1.01	1.26	A	A	A	A
37	Whatley Stream	30m d/s railway bridge Ammerham	ST 3648 0556	0219	RO2C015	1	1990	7	36	6.10	221	1.09	1.07	1.16	A	A	A	A
38	Synderford	20m u/s footbridge Beare Farm	ST 3776 0573	0218	RO2C014	1	1990	7	37	6.30	233	1.08	1.04	1.12	A	A	A	A
39	Temple Brook	20m u/s Oathill br	ST 4072 0587	0242	RO2C018	1	1991	7	27	5.10	137	0.80	0.84	0.67	A	B	B	B
40	Clapton Stream	50m u/s rd br u/s Clapton	ST 4162 0718	0216	RO2C017	1	1990	7	35	6.00	210	1.07	1.05	1.13	A	A	A	A
41	Drimpton Stream	20m u/s Netherhey Ford	ST 4165 0542	0217	RO2C009	1	1990	7	33	6.00	198	0.99	1.01	1.00	A	A	A	A
42	Whatley Stream	25m u/s road bridge Potewll Farm	ST 4469 0493	0224	RO2C016	1	1990	7	36	6.10	220	1.08	1.04	1.12	A	A	A	A
43	Branscombe Stream	25m u/s pylone Branscombe Mouth	SY 2068 8820	0201	RO2A001	2	1990	7	23	6.10	140	0.69	1.03	0.71	B	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor, * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error,

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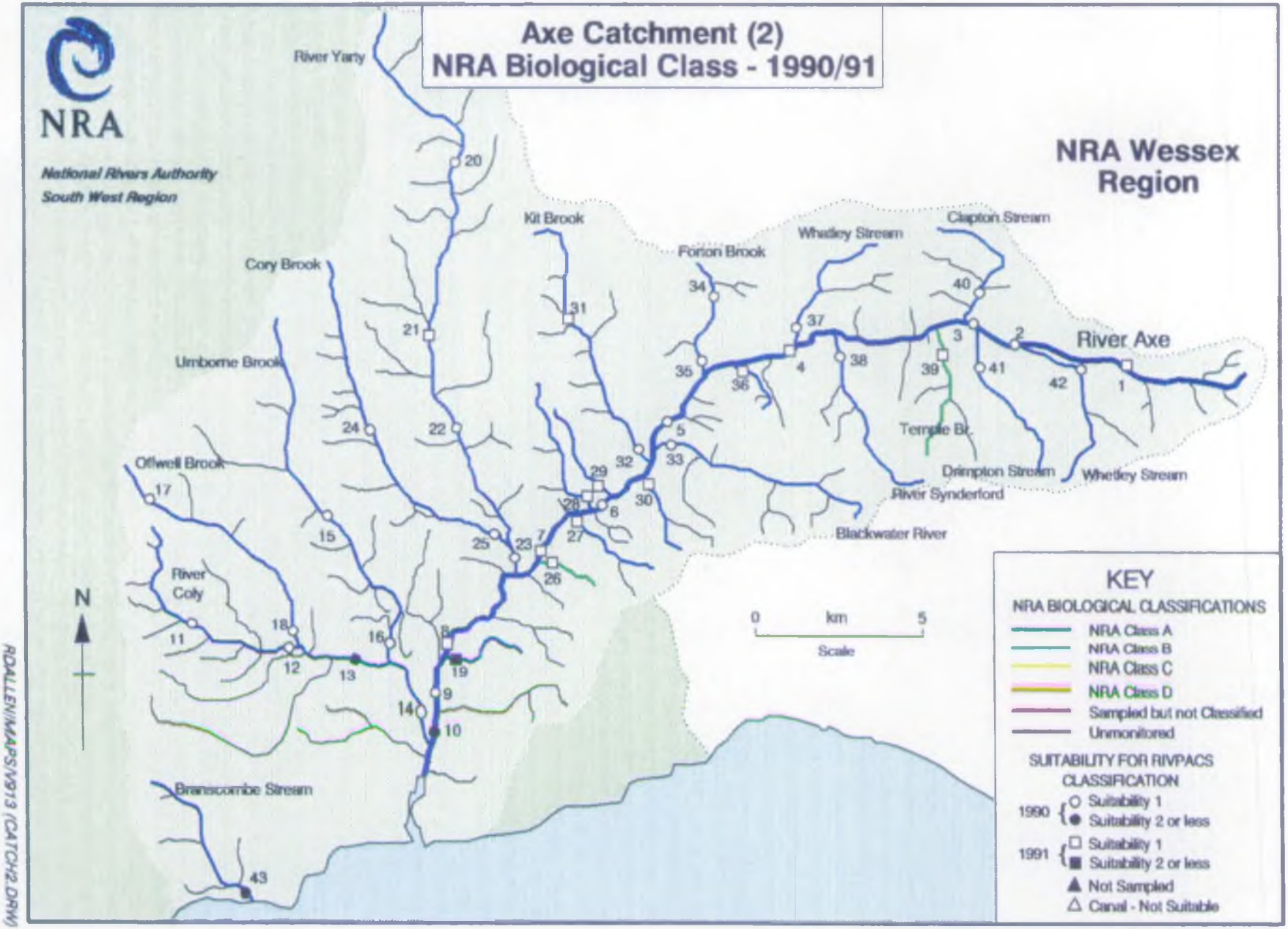

Figure 3.5 Axe Catchment (2) NRA Biological Class - 1990/1991

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3.2.4 River Sid Catchment Catchment-3

Summary

All 15 km of watercourses monitored by 4 sites in the River Sid catchment were classed as good quality, according to the NRA Biological Classification.

Likely reasons for poorer biological quality

N/A

NRA Biological Classification 1990 & 1991

Catchment: River Sid

Corresponding Freelance map filename(s):CATCH3.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Sid	75m u/s Stoney br Sidbury	SY 1402 9168	0303	R03A001	1	1991	7	34	6.00	203	1.02	0.94	0.96	A	A	A	A
2	Sid	20m u/s A3052 br Sidford	SY 1375 8995	0301	R03A002	1	1990	7	34	6.30	213	1.00	1.01	1.01	A	A	A	A
3	Sid	25m u/s footbr Sidmouth 300m u/s chem	SY 1260 8812	0302	R03A003	1	1990	7	27	6.10	165	0.79	0.99	0.79	A	A	A	A
4	Roncombe Stream	15m u/s br Cotford	SY 1425 9222	0304	R03A013	1	1991	7	32	6.40	205	1.00	0.99	0.99	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¦ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error,

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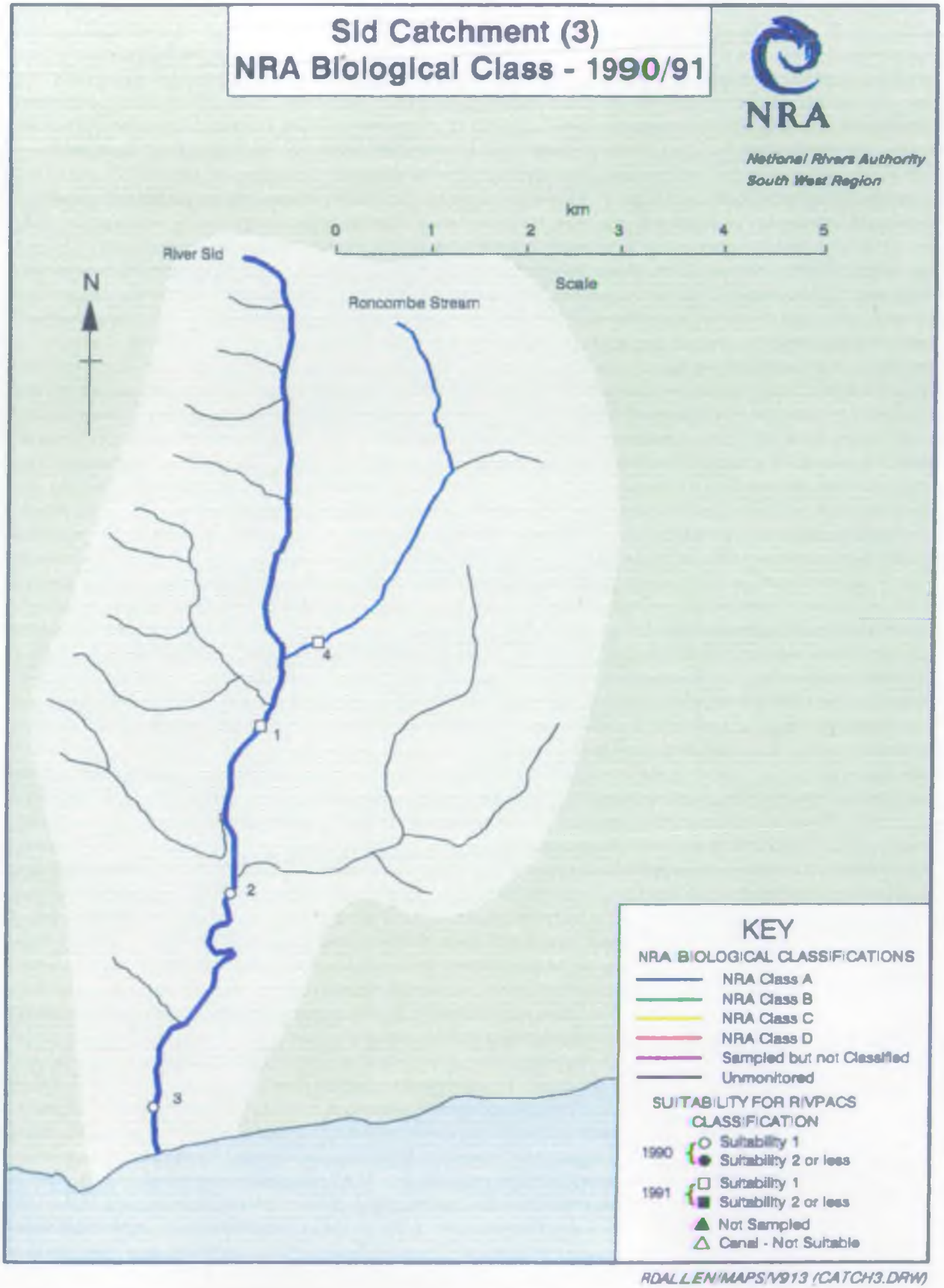

Figure 3.6 Sid Catchment (3) NRA Biological Class – 1990/1991

3.2.5 River Otter Catchment Catchment-4

Summary

Of the 106 km of watercourses monitored by 25 sites in the River Otter catchment, 82% (20 sites) were good, and 18% (5 sites) were moderate quality, according to the NRA Biological Classification. None were classed as poor or very poor quality.

Likely reasons for poorer biological quality

Three of the middle reaches of the River Otter were of only moderate quality because of moderately poorer than expected ASPT. This was ascribed to organic enrichment, most probably from farming activities, although over-abstraction for irrigation may have contributed to the problem.

Gittisham Stream was classed as moderate quality because of a moderately poorer than expected ASPT, which indicates organic pollution. The monitoring site was downstream from a sewage works, which may have caused the organic enrichment.

Coombe Raleigh Stream was classed as moderate quality because of moderately poorer than expected ASPT, which suggests that it was caused by organic pollution. Dead leeches found at this site in the Summer indicated that there had recently been a significant pollution incident. There was a substantial cover of algae at the monitoring site throughout the year, which is also indicative of organic enrichment. Effluents from a sewage works, septic tanks, and farming activities were all thought to have contributed to the low quality of this stream.

NRA Biological Classification 1990 & 1991

Catchment: River Otter

Corresponding Freelance map filename(s):CATCH4.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Otter	50m u/s br Hoemore Farm	ST 2212 1040	0401	R04B001	1	1990	7	37	6.60	246	1.13	1.03	1.16	A	A	A	A
2	Otter	45m u/s footbr Rawridge	ST 1983 0627	0412	R04B042	1	1991	7	36	6.60	237	1.04	1.03	1.07	A	A	A	A
3	Otter	200m u/s Ford Bridge	ST 1850 0310	0402	R04B035	1	1990	7	31	6.60	205	0.90	1.04	0.93	A	A	A	A
4	Otter	70m u/s Clapperlane br	ST 1638 0123	0413	R04B002	1	1991	7	39	6.30	244	1.12	0.98	1.11	A	A	A	A
5	Otter	50m d/s bridge Weston	ST 1422 0006	0403	R04B003	1	1990	7	33	5.80	193	0.98	0.93	0.91	A	A	A	A
6	Otter	150m u/s br Fenny Bridges	ST 1145 9870	0414	R04B019	1	1991	7	33	5.60	184	0.96	0.88	0.84	A	B	A	B
7	Otter	50m u/s br Ottery St Mary	SY 0937 9607	0404	R04B004	1	1990	7	33	5.40	177	0.99	0.86	0.85	A	B	A	B
8	Otter	200m u/s br Tipton St John	SY 0895 9196	0405	R04B005	1	1990	7	29	5.50	159	0.87	0.88	0.76	A	B	A	B
9	Otter	50m u/s footbr Dotton Mill	SY 0873 8853	0415	R04B006	1	1991	7	28	5.80	161	0.85	0.93	0.78	A	A	A	A
10	Otter	25m d/s Otterton br	SY 0790 8524	0406	R04B007	1	1990	7	29	6.00	174	0.87	0.98	0.85	A	A	A	A
11	Budleigh Brook	20m u/s br Yettington	SY 0527 8570	0425	R04B034	1	1991	7	29	6.50	189	0.86	1.04	0.89	A	A	A	A
12	Colaton Raleigh Stm	15m u/s br Pophams	SY 0718 8767	0424	R04B032	1	1991	7	34	6.00	203	1.00	0.96	0.96	A	A	A	A
13	Metcombe Stream	20m u/s br Metcombe	SY 0797 9197	0423	R04B028	1	1991	7	37	6.30	234	1.12	1.00	1.11	A	A	A	A
14	Fluxton Stream	40m u/s br Fluxton	SY 0863 9283	0422	R04B027	1	1991	7	37	6.30	233	1.09	1.01	1.10	A	A	A	A
15	West Mill Stream	25m u/s br Salston Barton	SY 0883 9455	0421	R04B026	1	1991	7	35	5.90	205	1.07	0.91	0.98	A	A	A	A
16	Tale	50m u/s bridge Danes Mill	ST 0755 0335	0410	R04B008	1	1990	7	33	5.90	196	0.96	0.94	0.90	A	A	A	A
17	Tale	25m d/s br Taleford	SY 0895 9689	0411	R04B009	1	1990	7	29	5.70	164	0.82	0.90	0.74	A	A	A	A
18	Vine Water	25m d/s Feniton signpost Feniton	SY 1108 9914	0420	R04B025	1	1991	7	36	5.60	200	1.06	0.93	0.98	A	A	A	A
19	Gittisham Stream	10m d/s top of field d/s Pomeroy	SY 1343 9913	0419	R04B024	1	1991	7	31	5.50	172	0.94	0.88	0.82	A	B	A	B
20	Wolf	30m u/s rd br Winniford	ST 1432 0060	0409	R04B011	1	1990	7	34	5.90	201	0.98	0.95	0.93	A	A	A	A
22	Otter Mill Leat (prov)	20m u/s Otter confluence	ST 1528 0117	0408		1	1990	7	39	5.90	230	1.11	0.95	1.06	A	A	A	A
21	Gissage	prior to River Otter	ST 1520 0114	0428	R04B023				0	0.00	0	0.00	0.00	0.00				!
23	Combe Raleigh Stream	50m u/s farm Ford Longwood	ST 1630 0175	0418	R04B022	1	1991	7	27	5.10	138	0.82	0.81	0.66	A	B	B	B
24	Wick Stream	100m u/s fm br Mill House Nursery	ST 1685 0293	0407	R04B010	1	1990	7	36	6.60	236	1.04	1.03	1.08	A	A	A	A
25	Odle Brook	10m u/s track Spurtham Farm	ST 1925 0640	0417	R04B021	1	1991	7	37	5.60	207	1.20	0.89	1.07	A	A	A	A
26	Fairoak Stream	30m u/s br Upottery	ST 1994 0778	0416	R04B020	1	1991	7	36	6.50	233	1.12	1.00	1.12	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ! = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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Figure 3.7 Otter Catchment (4) NRA Biological Class - 1990/1991

3.2.6 River Exe Catchment Catchment-5

Summary

Of the 583 km of watercourses monitored by 100 sites in the River Exe catchment, 85% (79 sites) were good, 14% (19 sites) were moderate, and 2% (2 sites) were poor quality, according to the NRA Biological Classification. None were classed as very poor quality.

One reach of 3.4 km on the River Culm was not monitored, because the site that was used for the 1980 National Survey could not be located.

26 km of canals were monitored by 3 sites in this catchment.

Likely reasons for poorer biological quality

The main River Exe was of good quality, except for its lowest reach monitored at Trews Weir, which was of only moderate quality because of both moderately poorer than expected ASPT and N-taxa. It was difficult to collect samples from this site, and this is likely to have affected its classification. The monitoring site for this reach was replaced for the 1992/1993 survey.

The moderate quality of the upper reach of the River Kenn was ascribed to organic enrichment, mostly from farming activities. This was confirmed by a detailed investigation by the Region's Freshwater Investigations Team (see National Rivers Authority, 1991c).

The biological monitoring site on Dawlish Water that was sampled in 1990 (Site Code 0507; 20m d/s footbr car park Dawlish; SX 9548 7679) was destroyed by dredging in the Autumn of that year. It was replaced by a new site (05105) which was sampled in 1991, the results from which are reported here.

Most of the sites on the River Clyst, and the lowest reach of its tributary the Cranny Brook, were of only moderate quality owing to organic enrichment, most probably caused by farming activities. The poor quality of the most upstream reach of the Cranny Brook was also likely to have been the result of farming activities, though an industrial discharge has also been suggested as the cause.

Pin Brook was of poor quality owing to poorer than expected ASPT and moderately poorer than expected N-taxa, which suggests organic pollution. Pin Brook was known to suffer from suspended sediment from a quarry, and its lower reaches by storm sewerage overflows.

The lower reach of Alphin Brook, which runs through an industrial estate, is canalised and was subject to dredging; it was of moderate quality owing to moderately poorer than expected ASPT, which indicates that organic enrichment may also affect the watercourse.

The moderate quality of the Northbrook was ascribed to urbanisation and storm-water overflows; the biological data indicated that the contamination was largely organic.

The moderate quality of the River Creedy at Westacott Cottages was caused by moderately poorer than expected ASPT, indicating organic enrichment, which

was ascribed to effluent from Crediton sewage treatment works and to farming activities in the catchment.

Moderate quality in the **River Culm** between Skinners Farm Bridge and Silverton Mill was caused by organic enrichment (as indicated by moderately poorer than expected ASPT but good EQI N-taxa) was ascribed to effluent from a paper mill at Higher Kings Mill, as well as to farming activities.

The lower and middle reaches of **Spratford Stream** were of moderate quality owing organic enrichment, most probably caused by farming activity, sewage works effluent, and in the lowest reach, effluent from a meat processing factory.

The moderate quality of the **River Burn** was caused by its moderately poorer than expected ASPT, which suggests organic enrichment. The profusion of algae at this site indicated that it was eutrophicated. The quality problems may be related to effluent from a fish farm, and to low flow caused by over-abstraction in 1991.

Biological quality of canals

The NRA Biological classification is unsuitable for canals.

The **Exeter Canal** and the Eastern reach of the Great Western Canal were of good biological quality. The Great Western Canal in Tiverton was poor.

NRA Biological Classification 1990 & 1991

Catchment: River Exe

Corresponding Freelance map filename(s):EXEALL.DRW, CATCHSAB.DRW, CATCHSCD.DRW, CATSEFGH.DRW & CATCHSJK.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Exe	10m u/s fm br Court Farm Exford	SS 8573 3806	0591	R05G001	1	1991	7	29	6.30	184	0.89	1.00	0.89	A	A	A	A
2	Exe	75m d/s rope bridge Below Winsford	SS 9150 3387	0547	R05G002	1	1990	7	35	6.80	239	1.05	1.07	1.13	A	A	A	A
3	Exe	25m u/s br Warmore	SS 9347 2601	0592	R05G003	1	1991	7	28	6.60	184	0.86	1.03	0.89	A	A	A	A
4	Exe	150m u/s Exebridge	SS 9310 2448	0535	R05E001	1	1990	7	30	6.80	203	0.95	1.08	1.02	A	A	A	A
5	Exe	150m u/s Halfpenny Bridge	SS 9510 2045	0585	R05E002	1	1991	7	33	6.80	224	1.09	1.08	1.18	A	A	A	A
6	Exe	250m d/s Bolham Intake Lythecourt	SS 9475 1513	0536	R05E003	1	1990	7	29	6.80	197	0.93	1.09	1.01	A	A	A	A
7	Exe	300m u/s Tiverton New Bridge Kennedy	SS 9484 1330	0537	R05E004	1	1990	7	34	6.50	222	1.10	1.05	1.15	A	A	A	A
8	Exe	175m d/s top of field Collipriest	SS 9520 1170	0586	R05E005	1	1991	4	31	6.10	188	1.08	0.98	1.06	A	A	A	A
9	Exe	150m d/s STW Ashley	SS 9528 1003	0538	R05E006	1	1990	7	35	6.00	210	1.11	0.97	1.07	A	A	A	A
10	Exe	25m u/s footbridge Bickleigh Castle	SS 9368 0690	0539	R05D015	1	1990	7	36	6.30	225	1.13	1.01	1.14	A	A	A	A
11	Exe	100m d/s br Thorverton	SS 9353 0155	0530	R05D001	1	1990	7	27	6.30	170	0.83	1.02	0.85	A	A	A	A
12	Exe	90m u/s Stafford Bridge	SX 9223 9621	0582	R05D002	1	1991	7	37	5.80	214	1.07	1.02	1.10	A	A	A	A
13	Exe	50m u/s Exwick Br	SX 9103 9360	0531	R05D003	1	1990	7	42	6.00	253	1.20	1.02	1.23	A	A	A	A
14	Exe	Flood Relief by fish pass Trews Weir	SX 9242 9163	0532	R05D004	1	1990	7	24	4.80	114	0.70	0.84	0.59	B	B	B	B
15	Kenn	A38br Kennford 50m u/s footbr Branton Fm	SX 9117 8663	0502	R05A001	1	1990	7	24	5.10	123	0.71	0.84	0.59	B	B	B	B
16	Kenn	20m u/s A379 br u/s Kenton	SX 9527 8463	0503	R05A002	1	1990	7	34	6.40	219	0.98	1.06	1.04	A	A	A	A
17	Polly Brook	200m d/s A376 br Exton	SX 9836 8627	0566	R05A029	3	1991	7	30	5.30	159	0.90	0.90	0.81	A	A	A	A
18	Clyst	30m u/s bridge Clyst Hydon	ST 0363 0158	0508	R05B001	1	1990	7	22	4.40	96	0.70	0.79	0.55	B	B	B	B
19	Clyst	15m u/s br Clyst St Lawrence	ST 0273 0005	0567	R05B002	1	1991	7	26	4.80	124	0.77	0.82	0.63	B	B	B	B
20	Clyst	50m u/s rd br Ashclyst Farm	SY 0115 9830	0509	R05B003	1	1990	7	32	5.50	175	0.96	0.93	0.90	A	A	A	A
21	Clyst	20m u/s B3181 br Broadclyst	SX 9843 9760	0510	R05B004	1	1990	7	27	4.80	129	0.80	0.87	0.70	A	B	A	B
22	Clyst	100m u/s Withy Bridge	SX 9748 9580	0511	R05B005	1	1990	7	31	4.90	151	0.86	0.86	0.74	A	B	A	B
23	Clyst	150m u/s rd br Clyst Honiton	SX 9860 9357	0512	R05B006	2	1990	7	31	5.10	158	0.91	0.86	0.79	A	B	A	B
24	Clyst	50m u/s field br Clyst St Mary	SX 9728 9165	0568	R05B007	1	1991	7	35	5.00	176	0.98	0.88	0.85	A	B	A	B
25	Grindle Brook	40m d/s weir Winslade Park	SX 9770 9019	0506	R05A028	1	1990	7	37	5.50	204	1.10	0.94	1.03	A	A	A	A
26	Aylesbeare Stream	175m u/s br Dymonds Farm	SX 9883 9260	0569	R05B013	1	1991	7	30	5.70	171	0.90	0.98	0.88	A	A	A	A
27	Pin Brook	15m u/s br Mosshayne	SX 9812 9435	0570	R05B012	1	1991	7	21	4.00	85	0.64	0.72	0.47	B	C	B	C
28	Cranny Brook	50m u/s field br Barnshayes	SY 0382 9710	0513	R05B009	1	1990	7	18	4.10	74	0.54	0.71	0.38	C	C	C	C
29	Cranny Brook	75m u/s bridge Crannaford Crossing	SY 0135 9600	0514	R05B010	1	1990	7	29	5.20	152	0.85	0.90	0.77	A	A	A	A
30	Cranny Brook	100m u/s rd br Wishford Farm	SX 9919 9527	0515	R05B011	1	1990	7	28	5.10	144	0.81	0.88	0.71	A	B	A	B
31	Ford Stream	20m u/s A30 br	SY 0091 9526	0571	R05B014	1	1991	7	32	5.30	170	0.95	0.90	0.86	A	A	A	A
32	Alphin Brook	10m u/s Dymond's Bridge	SX 8671 9288	0565	R05A003	1	1991	7	33	6.30	207	0.96	1.02	0.98	A	A	A	A
33	Alphin Brook	30m d/s footbr Alphington u/s A379 rd·b	SX 9130 9040	0504	R05A004	2	1990	7	36	5.90	213	1.07	1.00	1.07	A	A	A	A
34	Alphin Brook	150m u/s Countess Wear br	SX 9387 8948	0505	R05A005	4	1990	7	30	4.70	142	0.90	0.82	0.74	A	B	A	B
35	Exeter Canal	30m u/s A38 br Countess Wear	SX 9395 8940	0501	R05A006		1990	7	28	5.10	143	0.00	0.00	0.00				*
36	Northbrook	150m u/s rd br Northbrook Park	SX 9403 9080	0500	R05A026	3	1990	7	22	4.60	102	0.66	0.80	0.52	B	B	B	B
37	Creedy	75m u/s Ashridge Bridge	SS 8182 0619	0557	R05J001	1	1991	1	23	6.00	139	0.88	0.94	0.82	A	A	A	A
38	Creedy	75m d/s footbridge Lords Meadow	SS 8485 0070	0558	R05J002	1	1990	7	39	6.10	236	1.11	0.97	1.08	A	A	A	A
39	Creedy	150m u/s field br Westecott Cottages	SX 8545 9997	0594	R05J003	1	1991	7	34	5.50	188	0.99	0.88	0.87	A	B	A	B
40	Creedy	150m u/s br Newton St Cyres	SX 8798 9850	0595	R05J013	1	1991	7	34	5.90	202	0.98	0.95	0.93	A	A	A	A
41	Creedy	100m d/s bridge Oakford Farm	SX 9010 9673	0559	R05J004	1	1990	7	42	6.30	263	1.24	1.01	1.26	A	A	A	A
42	Jackmoor Brook	Langford 120m d/s footbr	SX 8983 9772	0596	R05J018	1	1991	7	36	5.80	210	1.06	0.99	1.05	A	A	A	A
43	Shuttern Brook	prior to Creedy Barton House	SX 8817 9817	0598	R05J021	1	1991	7	35	6.30	220	1.07	0.97	1.04	A	A	A	A
44	Shobrooke Lake	35m d/s black pipe Creedy Barton	SX 8670 9963	0597	R05J017	1	1991	7	29	6.30	183	0.83	1.01	0.84	A	A	A	A
45	Yeo [Creedy]	Binneford 100m u/s ford	SX 7596 9676	0562	R05K003	1	1990	4	24	6.20	149	0.79	0.97	0.76	A	A	A	A
46	Yeo [Creedy]	50m u/s rd br Gunstone Mills	SX 8051 9849	0561	R05K004	3	1990	7	36	6.40	232	1.12	1.02	1.14	A	A	A	A
47	Yeo [Creedy]	300m u/s br Downes Mill	SX 8525 9910	05100	R05K005	1	1991	7	34	6.30	213	0.99	1.00	0.98	A	A	A	A
48	Culvery River	50m u/s bridge Uton	SX 8342 9855	0564	R05K011	1	1990	7	36	5.90	213	1.04	0.94	0.98	A	A	A	A
49	Ford Brook	10m u/s br Ford Farm	SX 7938 9769	05104	R05K010	5	1991	7	31	6.30	195	0.93	0.99	0.92	A	A	A	A
50	Troney	40m u/s br Easterbrook	SX 7228 9703	05101	R05K008	1	1991	7	29	6.70	194	0.83	1.05	0.88	A	A	A	A

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= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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NRA Biological Classification 1990 & 1991

Catchment: River Exe

Corresponding Freelance map filename(s):EXEALL.DRW, CATCH5AB.DRW, CATCH5CD.DRW, CAT5EFGH.DRW & CATCH5JK.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
51	Troney	50m u/s Yeoford Bridge	SX 7830 9900	0563	R05K002	1	1990	7	30	6.20	187	0.86	0.99	0.85	A	A	A	A
52	Cole Brook	75m u/s br Colebrooke	SX 7779 9960	05103	R05K009	1	1991	7	32	5.90	188	0.91	0.95	0.87	A	A	A	A
53	Horwell Stream	55m u/s br Colebrooke	SS 7715 0043	05102		1	1991	7	33	6.20	205	0.96	1.02	0.98	A	A	A	A
54	Holly Water	50m u/s Heath Bridge	SS 8445 0451	0560	R05J015	1	1990	7	34	6.30	213	0.97	0.99	0.96	A	A	A	A
55	Binneford Water	100m u/s confl Ashridge Farm	SS 8198 0618	0599	R05J016	1	1991	7	34	5.90	199	0.97	0.92	0.90	A	A	A	A
56	Culm	50m u/s br Rosemary Lane	ST 1605 1408	0516	R05C002	1	1990	7	37	6.30	232	1.11	0.98	1.09	A	A	A	A
57	Culm	20m u/s br Hemyock	ST 1388 1391	0572	R05C003	1	1991	7	37	6.70	249	1.10	1.05	1.16	A	A	A	A
58	Culm	100m d/s rd br Culmstock	ST 1000 1375	0517	R05C004	1	1990	7	33	6.00	199	0.98	0.95	0.94	A	A	A	A
59	Culm	10m u/s footbr Uffculme	ST 0713 1279	0573	R05C005	1	1991	7	36	6.20	224	1.05	0.98	1.03	A	A	A	A
60	Culm	90m d/s Skinner's Farm br	ST 0418 1014	0518	R05C006	1	1990	7	32	6.40	204	0.95	1.01	0.95	A	A	A	A
61	Culm	225m u/s Higher Upton br	ST 0270 0677	0519	R05C007	1	1990	7	28	5.10	144	0.82	0.83	0.68	A	B	B	B
62	Culm	25m u/s br Westcott	ST 0135 0427	0574	R05C008	1	1991	7	33	5.10	167	0.93	0.81	0.75	A	B	A	B
63	Culm	25m d/s weir u/s mill	SS 9800 0102	0575	R05C009	1	1991	7	34	5.30	181	0.99	0.86	0.85	A	B	A	B
64	Culm	350m d/s br d/s Silverton Mill	SS 9745 0138	0577	R05C011	1	1991	7	32	5.20	167	0.93	0.84	0.78	A	B	A	B
65	Culm	75m d/s Columbjohn br	SX 9575 9970	0520	R05C012				0	0.00	0	0.00	0.00	0.00				$
66	Culm	250m d/s Stoke Canon Bridge	SX 9363 9745	0521	R05C013	1	1990	7	34	5.50	188	0.96	0.89	0.86	A	A	A	A
67	Weaver	40m u/s B3181 br	ST 0137 0392	0580	R05C026	1	1991	7	34	5.70	195	0.99	0.96	0.95	A	A	A	A
68	Spratford Stream	30m u/s Leonard Moor Bridge	ST 0449 1410	0522	R05C015	1	1990	7	36	5.50	198	1.04	0.94	0.98	A	A	A	A
69	Spratford Stream	50m u/s B3391 br Tiverton Junction	ST 0320 1160	0523	R05C016	1	1990	7	28	5.20	145	0.84	0.87	0.72	A	B	A	B
70	Spratford Stream	50m d/s Five Bridges	ST 0265 0953	0524	R05C017	1	1990	7	23	4.70	109	0.69	0.81	0.55	B	B	B	B
71	Heron's Bank Brook	10m u/s br Heron's Bank	ST 0242 0885	0581	R05C027	1	1991	7	32	5.80	187	0.91	0.95	0.86	A	A	A	A
72	Sheldon Stream	20m u/s Shute Farm Bridge	ST 1239 0901	0525	R05C014	1	1990	7	32	6.90	222	0.97	1.08	1.05	A	A	A	A
73	Madford Stream	prior to Dunkeswell confl under pylons	ST 1522 0836	0578	R05C041	1	1991	7	33	6.60	218	1.07	1.03	1.11	A	A	A	A
74	Madford Stream	Dunkeswell Abbey 30m u/s river split	ST 1442 1015	0527	R05C028	1	1990	7	32	7.00	223	0.95	1.09	1.04	A	A	A	A
75	Madford Stream	25m u/s Culm Bridge Hemyock	ST 1435 1352	0526	R05C019	1	1990	7	35	6.90	240	1.02	1.07	1.09	A	A	A	A
76	Dunkeswell Stream	prior to Madford confl	ST 1490 0827	0579	R05C042	1	1991	7	29	6.00	175	0.93	0.94	0.87	A	A	A	A
77	Bolham River	100m u/s Five Bridges	ST 1506 1247	0528	R05C018	1	1990	7	39	6.60	257	1.16	1.03	1.19	A	A	A	A
78	Thorverton Stream	25m u/s br opp Thorverton Church	SS 9251 0220	0584	R05D009	1	1991	7	34	6.10	206	1.01	0.96	0.97	A	A	A	A
79	Burn	50m u/s footbr Burn Mill Farm	SS 9467 0557	0583	R05D008	1	1991	7	29	5.60	161	0.82	0.88	0.73	A	B	A	B
80	Dart [Exe]	50m u/s B3137 br Bradley	SS 8958 1250	0533	R05D006	1	1990	7	34	6.60	223	1.03	1.02	1.05	A	A	A	A
81	Dart [Exe]	75m u/s Dart Bridge Bickleigh	SS 9354 0766	0534	R05D007	1	1990	7	35	6.40	224	1.01	1.01	1.01	A	A	A	A
82	Lowman	60m u/s wood Huntsham Wood	ST 0085 1836	0587	R05E009	1	1991	7	37	6.50	242	1.10	1.03	1.14	A	A	A	A
83	Lowman	40m u/s Chieflowman Bridge	ST 0080 1567	0543	R05E010	1	1990	7	37	6.80	250	1.09	1.08	1.17	A	A	A	A
84	Lowman	25m d/s A373 Bridge Tiverton	SS 9577 1256	0544	R05E011	1	1990	7	29	5.70	165	0.84	0.91	0.76	A	A	A	A
85	Uplowman Stream	75m d/s gate to field Widhayes	SS 9990 1447	0589	R05E021	1	1991	7	30	5.60	168	0.88	0.90	0.79	A	A	A	A
86	Grand Western Canal	30m u/s Fenacre Bridge	ST 0708 1770	0529	R05C021		1990	7	28	5.00	141	0.00	0.00	0.00				*
87	Grand Western Canal	The Basin - Tiverton	SS 9630 1238	0541	R05E013		1990	7	7	3.90	27	0.00	0.00	0.00				*
88	Calverleigh Stream	100m u/s Swinesbridge	SS 9445 1397	0588	R05E020	1	1991	7	33	6.40	212	0.97	1.01	0.98	A	A	A	A
89	Batherm	5m u/s rd br Ranscombe	ST 0043 2678	0590	R05F001	1	1991	7	34	6.90	233	1.05	1.07	1.12	A	A	A	A
90	Batherm	75m u/s Pheasant Fm A361 br Shillingfor	SS 9808 2378	0545	R05F002	1	1990	7	32	6.10	196	0.95	0.97	0.92	A	A	A	A
91	Batherm	500m u/s rd br Bowbierhill under pylons	SS 9530 2126	0546	R05F003	1	1990	7	34	6.50	222	1.01	1.03	1.04	A	A	A	A
92	Iron Mill Stream	40m d/s Iron Mill Bridge Stuckeridge	SS 9177 2082	0542	R05E008	1	1990	7	38	6.80	259	1.15	1.07	1.23	A	A	A	A
93	Brockey River	50m u/s Brocksbridge Cottage bridge	SS 9238 2455	0540	R05E012	1	1990	7	40	6.40	258	1.18	1.01	1.20	A	A	A	A
94	Barle	100m u/s Simonsbath Bridge	SS 7695 3915	0552	R05H001	1	1990	7	30	6.50	195	0.92	1.02	0.94	A	A	A	A
95	Barle	150m u/s ford Tarr Steps	SS 8667 3223	0553	R05H002	1	1990	7	28	7.00	196	0.87	1.10	0.95	A	A	A	A
96	Barle	100m d/s Pixton Hill	SS 9243 2631	0554	R05H003	1	1990	7	32	6.60	211	1.00	1.04	1.04	A	A	A	A

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NRA Biological Classification 1990 & 1991

Catchment: River Exe

Corresponding Freelance map filename(s):EXEALL.DRW, CATCH5AB.DRW, CATCH5CD.DRW, CATSEFGH.DRW & CATCH5JK.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
97	Dane's Brook	30m u/s Hawkridge Bridge	SS 8575 3012	0555	R05H004	4	1990	7	28	7.10	184	0.81	1.11	0.90	A	A	A	A
98	Shardon Water	25m u/s bridge Farny Ball	SS 8025 3540	0556	R05H005	1	1990	7	32	7.00	225	0.99	1.10	1.09	A	A	A	A
99	Haddeo	20m u/s bridge Cuckold's Combe	ST 0014 3077	0548	R05G004	1	1990	7	32	6.50	209	0.99	1.03	1.02	A	A	A	A
100	Haddeo	50m u/s bridge Pixy Copse	SS 9377 2658	0549	R05G005	1	1990	7	36	7.10	254	1.09	1.10	1.20	A	A	A	A
101	Withiel Brook	50m u/s field br u/s Wimbleball	SS 9805 3266	0593		1	1991	7	34	6.40	219	1.05	0.99	1.05	A	A	A	A
102	Pulham	25m u/s bridge prior to Haddeo	SS 9573 3000	0550	R05G009	1	1990	7	33	6.60	217	1.02	1.03	1.05	A	A	A	A
103	Querme	50m d/s footbridge Witheridge Farm	SS 9202 3500	0551	R05G006	1	1990	7	33	7.10	233	0.99	1.12	1.11	A	A	A	A
104	Dawlish Water	30m u/s footbr Brook House	SX 9548 7679	05105	R05A027	1	1991	7	31	5.90	183	0.91	0.97	0.89	A	A	A	A

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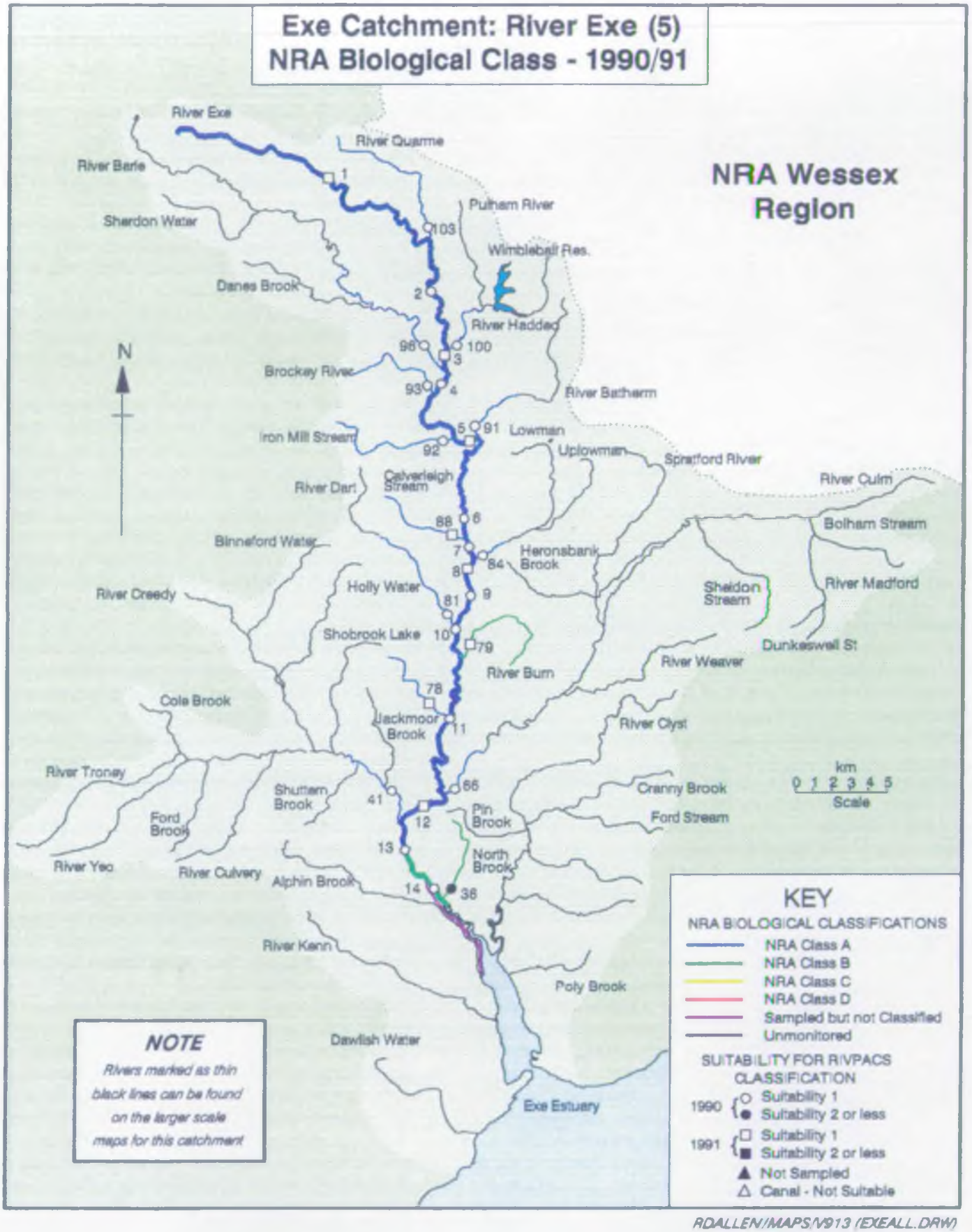
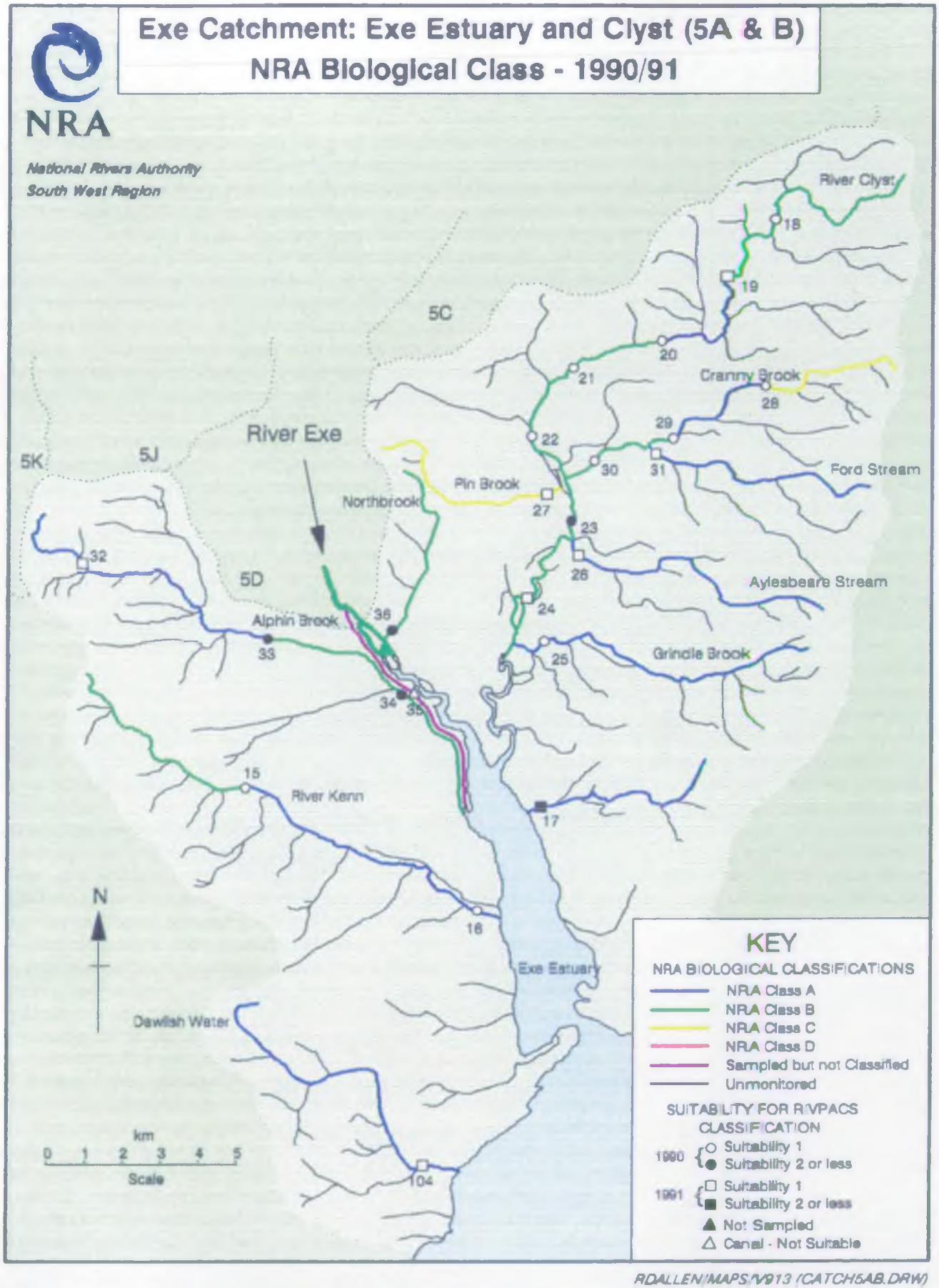


RDALLEN/MAPS/N913 (EXEALL.DRW)

Figure 3.8 Exe Catchment: River Exe (5 in part) NRA Biological Class- 199/1991



RDALLEN/MAPS/V013 (CATCH5AB.DRW)

Figure 3.9 Exe Catchment: Exe Estuary and Clyst (5A & 5B) NRA Biological Class - 1990/1991

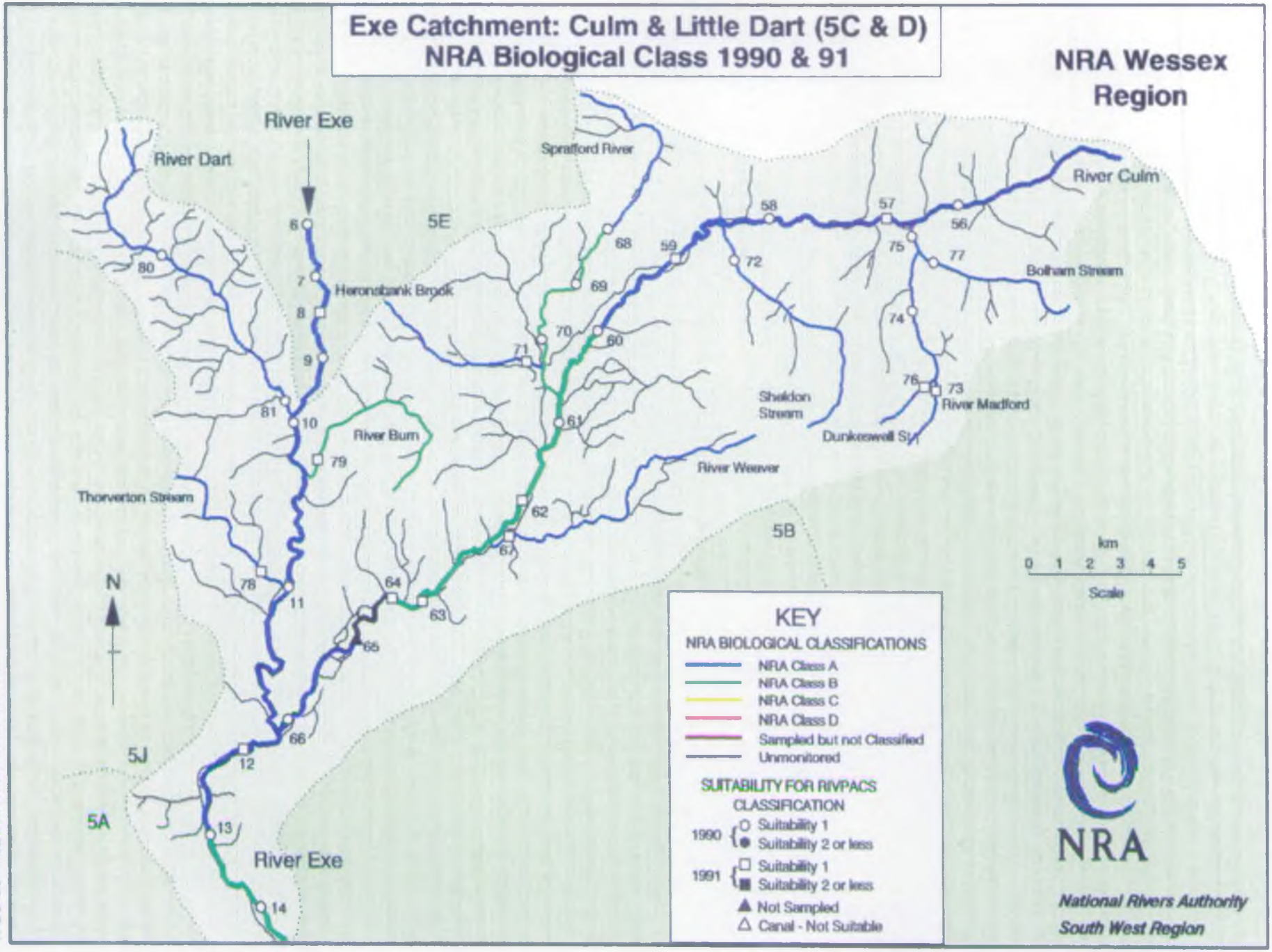
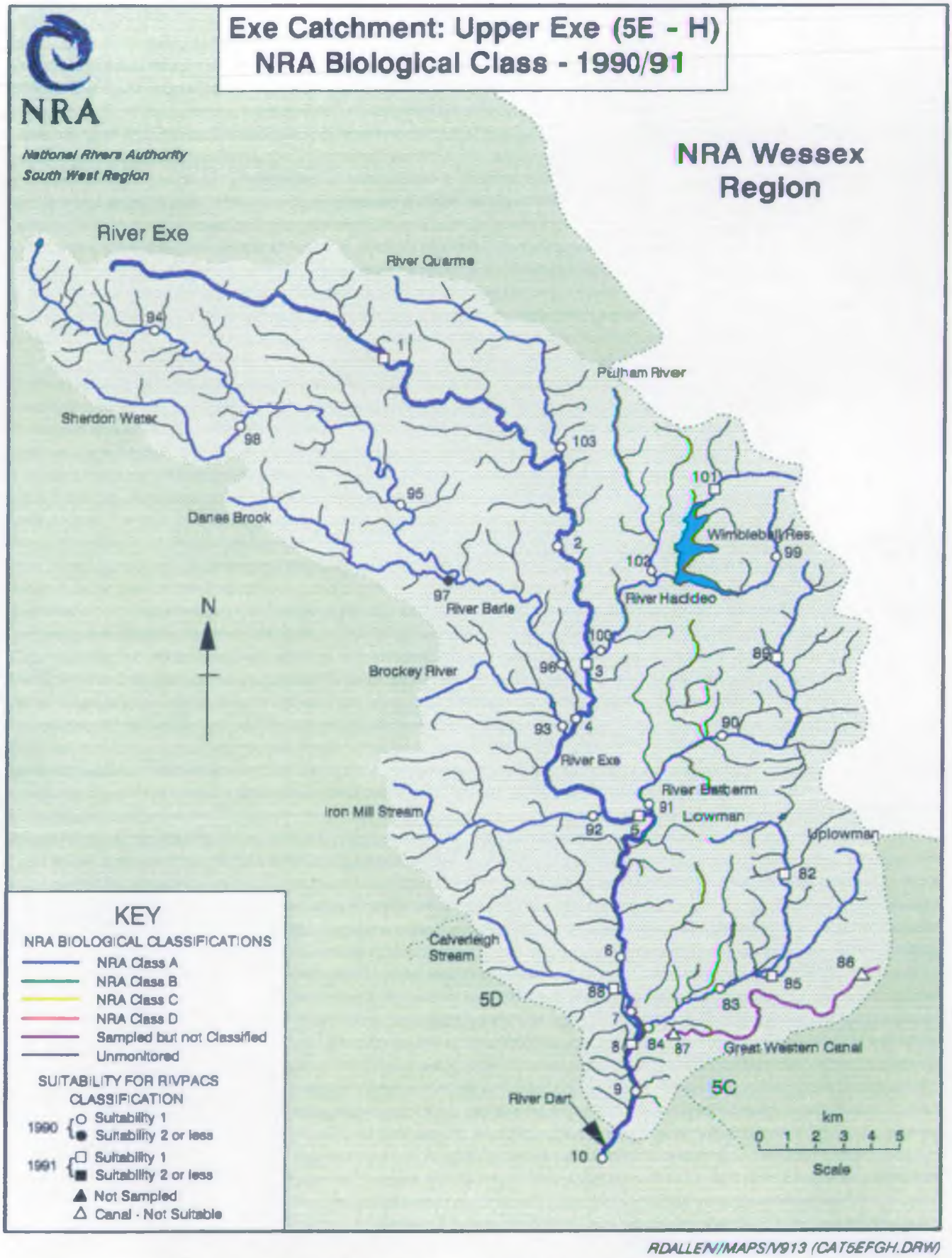


Figure 3.10 Exe Catchment: Culm and Little Dart (5C & 5D) NRA Biological Class - 1990/1991

R:\ALLEN\MAPS\W913 (CATCHSCD.DRW)



RDALLEN//MAPS/N913 (CAT5EFGH.DRW)

Figure 3.11 Exe Catchment: Upper Exe (5E, 5F, 5G & 5H) NRA Biological Class - 1990/1991

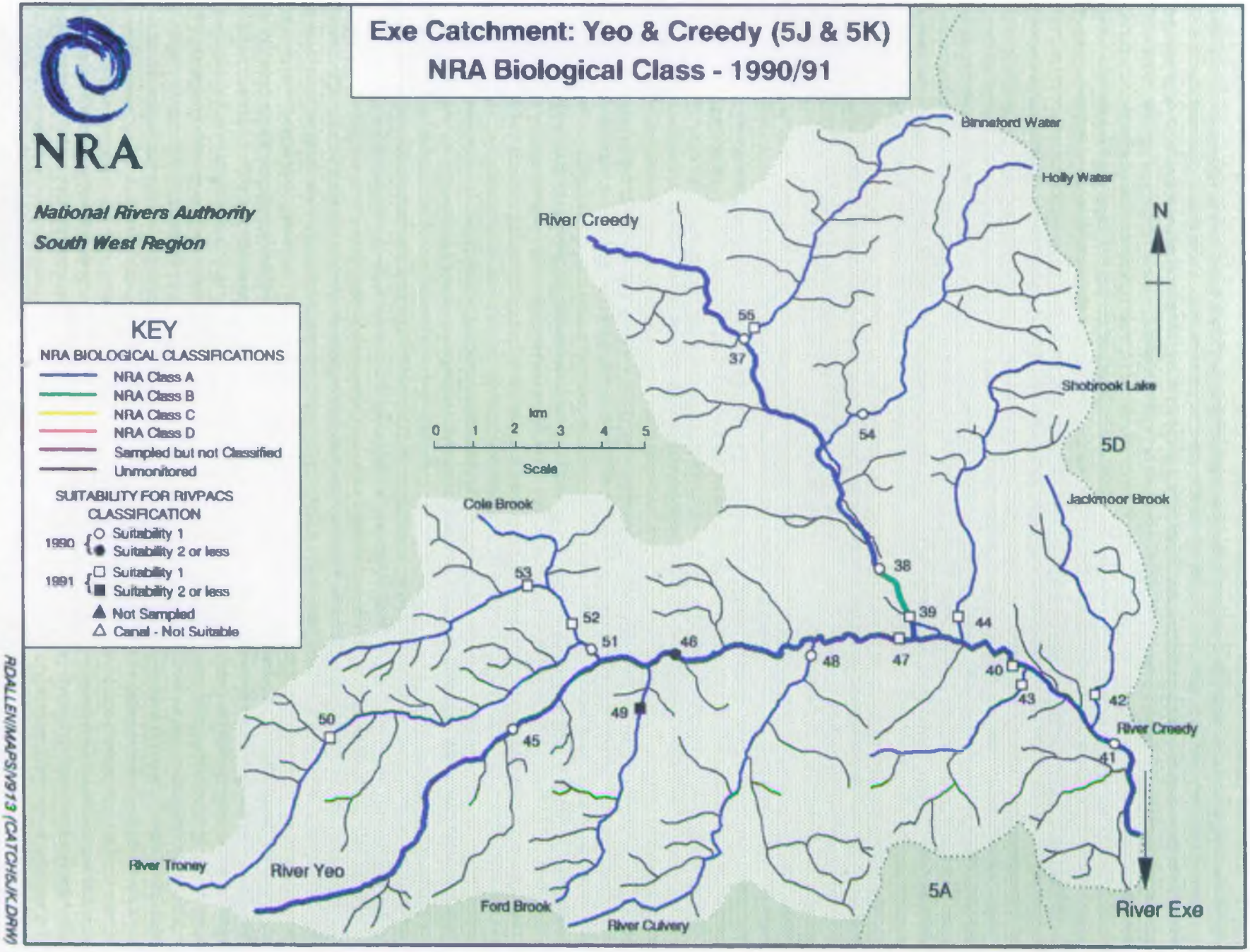


Figure 3.12 Exe Catchment: Yeo and Creedy (5J & 5K) NRA Biological Class- 1990/1991

3.2.7 River Teign Catchment Catchment-6

Summary

Of the 198 km of watercourses monitored by 45 sites in the River Teign catchment, 91% (38 sites) were good, 3% (2 sites) were moderate, 5% (4 sites) were poor, and 2% (1 site) were very poor quality, according to the NRA Biological classification.

Likely reasons for poorer biological quality

Aller Brook was of poor quality because of organic and inorganic pollution, consistent with its very low EQIs for ASPT and N-taxa. Its upper reaches were affected by seepage from a disused landfill site and by pollution from a potato processing factory. The reach monitored at Manor Drive was affected by discharges from an industrial estate and septic tanks. The reach monitored at Aller Orchard was affected by effluent from Kingskerswell Sewage Treatment Works, which was subsequently decommissioned in 1991. The most downstream reach was affected by drainage from two quarries. Aller Brook was surveyed in detail by the Freshwater Investigation Team in 1992 (National Rivers Authority, 1993).

Compton Pool Stream was classed as poor quality owing to a poorer than expected ASPT and moderately poorer than expected N-taxa. The stream was affected by effluent and drainage from a quarry, and chlorine contamination from a service reservoir pipeline (see National Rivers Authority, 1993).

The lower reach of Blatchford Stream was classed as moderate quality owing to moderately poorer than expected ASPT and N-taxa. Such a result is usually associated with organic pollution, however the only influence on water quality identified in this reach was a ball clay effluent which discharged upstream from the monitoring site. This was identified by the field biologists as a cause of the poor biological results, and was also identified as the cause of the reach's non-compliance with its river quality objective (National Rivers Authority, 1992d).

Despite being classed as good quality and not having a substantial impact on the invertebrate fauna at family level, ochre deposits were found on the stream bed at the site monitoring the upper reach of Ugbrooke Stream, which is consistent with the effects of mine drainage. A large pipe upstream from the site drains an old disused quarry. Moderate quality in the lower reach because of moderately poorer than expected N-taxa was ascribed to the effects of discharges from a ball clay works, and to the unstable stream bed.

Although having a good overall NRA Biological Class, the lower reaches of Beadon Brook appeared to be affected by toxic pollution. Slight ochreous deposits were recorded at Hyner Bridge. The most downstream site had moderately poorer than expected N-taxa which, together with the ochreous deposits at the site, is consistent with the effects of mine drainage. Both of these sites were downstream from a disused barytes mine.

NRA Biological Classification 1990 & 1991

Catchment: River Teign

Corresponding Freelance map filename(s):CATCH6.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	South Teign River	75m u/s Leigh Bridge	SX 6828 8760	0615	R06C001	1	1990	7	32	7.10	226	1.41	1.11	1.56	A	A	A	A
2	North Teign	100m u/s Gidleigh Park Hotel Bridge	SX 6772 8783	0616	R06C002	5	1990	7	28	7.00	197	1.25	1.10	1.38	A	A	A	A
3	Teign	50m d/s Rushford Br u/s Chagford	SX 6940 8798	0607	R06C003	3	1990	7	32	6.80	216	1.48	1.06	1.57	A	A	A	A
4	Teign	30m d/s Clifford Bridge	SX 7812 8979	0631	R06C004	1	1991	7	34	6.80	231	1.04	1.06	1.11	A	A	A	A
5	Teign	50 m d/s rd br d/s Bridfordmills Weir	SX 8343 8720	0608	R06C005	1	1990	7	33	6.50	215	1.01	1.03	1.04	A	A	A	A
6	Teign	120m u/s Spara Bridge	SX 8425 8422	0632	R06C037	1	1991	7	35	6.60	231	1.07	1.04	1.11	A	A	A	A
7	Teign	225m u/s Crocombe Bridge opp Knowle Hou	SX 8470 8135	0633	R06C006	1	1991	7	36	6.60	239	1.11	1.06	1.17	A	A	A	A
8	Teign	400m d/s Chudleigh Bridge	SX 8580 7814	0609	R06C007	1	1990	7	34	6.20	210	1.02	0.98	1.00	A	A	A	A
9	Teign	100m u/s New Bridge	SX 8480 7630	0634	R06C008	2	1991	7	28	6.40	178	0.82	1.02	0.83	A	A	A	A
10	Teign	300m u/s Teignbridge	SX 8573 7358	0603	R06B001	1	1990	7	36	6.30	228	1.06	1.02	1.08	A	A	A	A
11	Aller Brook	u/s Edginswell Pumping Stn opp Rougement	SX 8948 6630	0601	R06A001	1	1990	7	15	4.10	61	0.54	0.76	0.41	C	C	C	C
12	Aller Brook	5m d/s hedge bank Manor Drive playing f	SX 8798 6740	0623	R06A002	1	1991	7	14	3.90	55	0.44	0.70	0.31	C	C	C	C
13	Aller Brook	30m d/s footbridge Aller Orchard	SX 8763 6883	0602	R06A003	1	1990	5	15	4.20	63	0.50	0.75	0.37	C	C	C	C
14	Aller Brook	15m u/s fence Plymco Superstore Penninn	SX 8708 7050	0624	R06A004	1	1991	7	14	3.50	49	0.41	0.60	0.25	C	D	C	D
15	Compton Pool Stream	25m u/s rd br Langford Bridge	SX 8719 6908	0625		1	1991	7	20	4.30	87	0.59	0.75	0.44	B	C	C	C
16	Lemon	10m u/s br Bagator Mill	SX 7696 7556	0627	R06B003	1	1991	7	29	6.80	198	1.32	1.07	1.41	A	A	A	A
17	Lemon	250m d/s Sig confl 30m d/s minor trib	SX 7805 7352	0622	R06B004	1	1990	7	30	7.10	213	0.94	1.11	1.05	A	A	A	A
18	Lemon	20m d/s footbr Bradley Park 200m u/s cp	SX 8508 7095	0606	R06B005	1	1990	7	36	6.90	248	1.05	1.11	1.16	A	A	A	A
19	Blatchford Stream	25m d/s rd br 10m u/s footbr Parry Farm	SX 8360 7289	0628	R06B006	2	1991	7	27	5.60	151	1.06	0.98	1.04	A	A	A	A
20	Blatchford Stream	25m d/s rd br Blatchford	SX 8559 7303	0629	R06B007	4	1991	7	22	4.40	97	0.78	0.82	0.64	B	B	B	B
21	Ugbrooke Stream	15m d/s discharge Higher Sandygate	SX 8660 7530	0626	R06B012	1	1991	7	35	5.90	206	1.04	0.98	1.01	A	A	A	A
22	Ugbrooke Stream	approx 55m u/s footbr prior to Teign co	SX 8575 7397	0604	R06B013	1	1991	7	25	5.40	135	0.73	0.91	0.67	B	A	B	B
23	Sandygate Stream	15m u/s rd br New Cross Kingsteignton	SX 8685 7481	0630	R06B010	1	1991	7	37	6.20	228	1.10	1.03	1.13	A	A	A	A
24	Liverton Brook	75m u/s Ventiford Bridge	SX 8470 7475	0605	R06B050	1	1990	7	33	6.10	201	0.95	0.99	0.95	A	A	A	A
25	Bovey	75m d/s Blackaller Bridge	SX 7380 8370	0617	R06D001	1	1990	7	40	6.80	273	1.18	1.07	1.27	A	A	A	A
26	Bovey	30m u/s Drakeford Bridge	SX 7891 8015	0644	R06D002	1	1991	7	28	7.00	196	0.88	1.10	0.94	A	A	A	A
27	Bovey	50m d/s road bridge Little Bovey	SX 8316 7671	0618	R06D003	1	1990	7	31	6.50	203	0.94	1.04	0.97	A	A	A	A
28	Bovey	u/s arm of meander Twinyeo Farm	SX 8427 7611	0619	R06D004	1	1990	7	31	6.50	202	0.92	1.04	0.95	A	A	A	A
29	Wray Brook	75m u/s bridge Caseley Court	SX 7855 8235	0620	R06D008	1	1990	7	34	6.70	228	1.01	1.05	1.07	A	A	A	A
30	Wray Brook	90m u/s bridge Knowle	SX 7885 8025	0645	R06D011	1	1991	7	34	6.30	214	1.02	0.98	1.00	A	A	A	A
31	Becke Brook	100m u/s Newbridge	SX 7573 8003	0621	R06D012	1	1990	7	33	7.00	230	1.35	1.09	1.47	A	A	A	A
32	Kate Brook	45m u/s rd br to Gappa	SX 8592 7852	0635	R06C055	1	1991	7	32	6.10	196	0.97	0.99	0.96	A	A	A	A
33	Haldon Stream	160m u/s footbr Hams Barton	SX 8796 8032	0636		1	1991	7	33	6.10	200	1.01	0.95	0.95	A	A	A	A
34	Bramble Brook	65m u/s Teign conf 15m u/s br	SX 8487 8116	0610	R06C011	1	1990	7	38	6.70	254	1.11	1.08	1.19	A	A	A	A
35	Beadon Brook	50m d/s bridge Tottiford House	SX 8075 8231	0611	R06C009	2	1990	7	25	6.00	151	0.82	0.93	0.77	A	A	A	A
36	Beadon Brook	10m u/s Hyner Bridge	SX 8368 8170	0612	R06C010	2	1990	7	24	6.60	159	0.79	1.04	0.82	A	A	A	A
37	Beadon Brook	40m d/s B3193 br prior to Teign	SX 8433 8169	0637	R06C040	1	1991	7	23	6.90	158	0.67	1.09	0.73	B	A	A	A
38	Rookery Brook	20m u/s footbr u/s barytes mine	SX 8255 8614	0638	R06C013	1	1991	7	32	6.80	216	1.14	1.04	1.18	A	A	A	A
39	Rookery Brook	30m d/s B3193 rd br proir to R Teign	SX 8376 8670	0613	R06C014	1	1990	7	25	7.10	178	0.79	1.13	0.89	A	A	A	A
40	Sowton Brook	150m u/s Sowton Bridge	SX 8343 8755	0614	R06C015	1	1990	5	29	6.10	178	0.92	0.97	0.89	A	A	A	A
41	Reedy Brook	10m d/s Reedy Bridge	SX 8199 8928	0639	R06C054	1	1991	7	31	6.20	193	0.92	0.98	0.90	A	A	A	A
42	Clifford Stream	10m d/s br Clifford Bridge Park	SX 7811 8974	0642		1	1991	7	34	7.10	241	1.09	1.08	1.18	A	A	A	A
43	Scotley Brook	100m u/s br prior to Teign	SX 7769 9016	0651	R06C057				0	0.00	0	0.00	0.00	0.00				I
44	Crockernwell Stream	35m d/s rd br	SX 7617 9267	0640		1	1991	7	37	6.20	229	1.19	0.99	1.18	A	A	A	A
45	Fingle Brook	115m u/s Fingle Bridge 30m u/s sign	SX 7433 9001	0643	R06C053	1	1991	7	39	6.70	263	1.15	1.05	1.21	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor, * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ! = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

NRA Biological Classification 1990 & 1991

Catchment: River Teign

Corresponding Freelance map filename(s):CATCH6.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
46	Blácketon Brook	70m u/s rd br	SX 6783 8901	0641	RO6C052	1	1991	7	34	6.60	224	1.05	1.03	1.08	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¡ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error,

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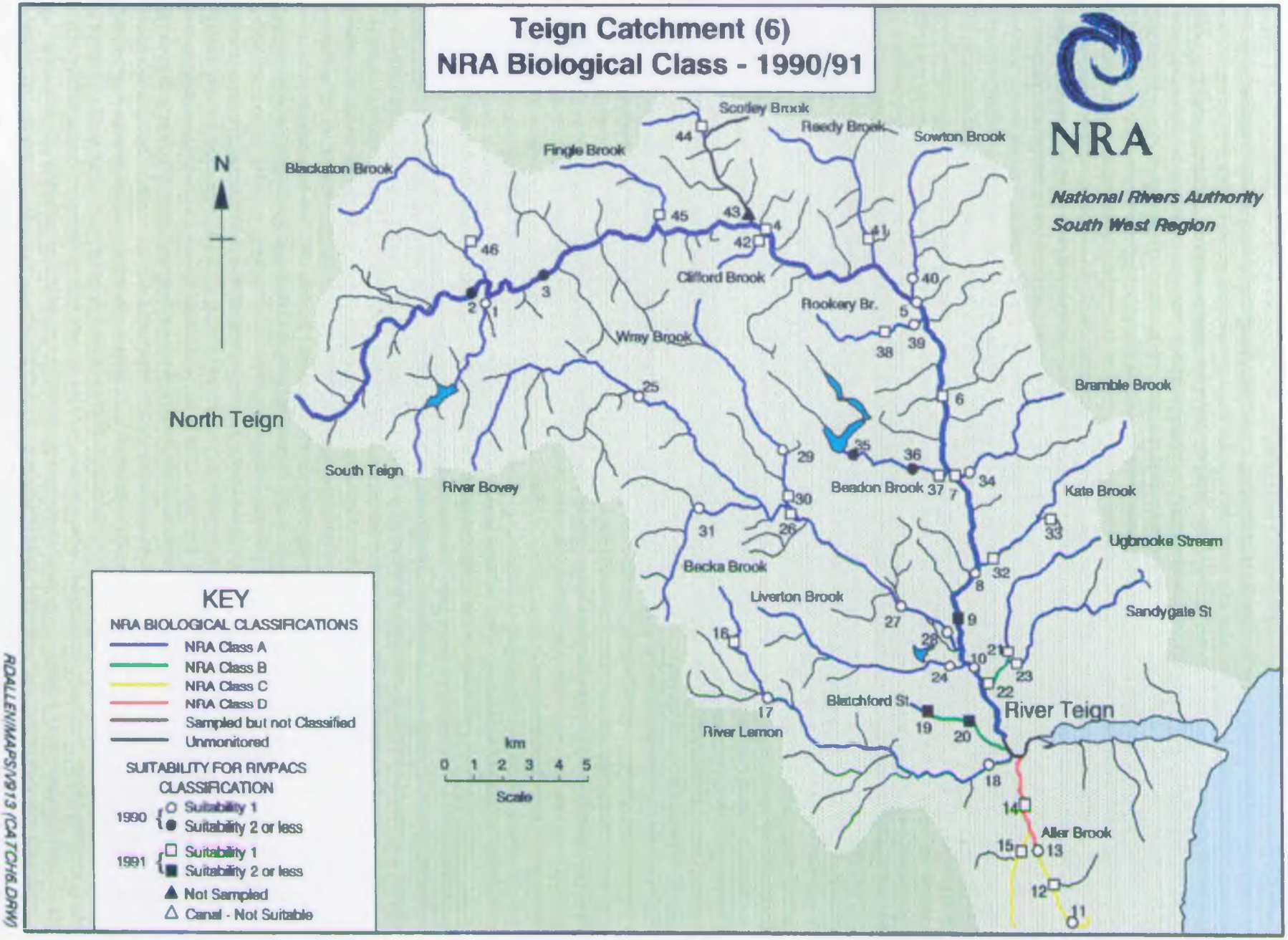

Figure 3.13 Teign Catchment (6) NRA Biological Class - 1990/1991

3.2.8 River Dart Catchment Catchment-7

Summary

Of the 206 km of watercourses monitored by 33 sites in the River Dart catchment, 93% (31 sites) were good, and 7% (3 sites) were moderate quality, according to the NRA Biological Classification. None were classed as poor or very poor quality.

Likely reasons for poorer biological quality

The whole catchment was of good ecological quality, except for the lower reaches of the River Dart.

The EQI N-taxa of the River Dart at Buckfastleigh indicated only moderate quality, though this was not supported by the overall NRA Biological Classification. The site was downstream from a disused metal plating works, which may explain the toxic impact that was observed there. A poorer than expected N-taxa was also evident at the next site downstream, at Riverford Bridge: this was reflected in its overall NRA Biological Classification of moderate quality. This site was downstream from Buckfastleigh STW discharge, which contains low concentrations of pesticides from a wool mill. The biologists reported difficulty sampling at this site, which may have contributed to the poor taxonomic richness of the samples collected there. The most downstream site on the River Dart, at Totnes Weir, was also of moderate quality, but here the EQIs of both ASPT and N-taxa were affected. This reach suffered from eutrophication, which caused algal blooms during the late Summer. It was deep and was sampled by dredge, which gives more variable samples than the pond-net. Moreover, the site had a low RIVPACS suitability (suitability code 4, see Table 2.4) which would have compromised the reliability of its classification.

Although its overall NRA Biological Class was good, the upper reach of the River Hems was of moderate quality according to its EQI N-taxa but not its EQI ASPT. This indicates toxic pollution. The reach was thought to be affected by septic tank discharges and the drought in 1991 (National Rivers Authority, 1992d).

NRA Biological Classification 1990 & 1991

Catchment: River Dart

Corresponding Freelance map filename(s):CATCH7.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	East Dart River	30m u/s rd br Postbridge	SX 6477 7895	0716	R07B001	5	1990	7	30	6.90	207	1.37	1.08	1.48	A	A	A	A
2	East Dart River	75m u/s clapper bridge d/s Badgers Holt	SX 6720 7326	0717	R07B002	5	1990	7	25	6.80	171	1.01	1.06	1.07	A	A	A	A
3	West Dart River	30m u/s road bridge Two Bridges	SX 6080 7505	0719	R07B003	5	1990	7	22	6.40	141	1.02	1.01	1.02	A	A	A	A
4	West Dart River	50m u/s Huccaby Bridge	SX 6590 7293	0720	R07B004	5	1990	7	26	6.70	175	1.05	1.04	1.09	A	A	A	A
5	Dart	20m u/s New Bridge	SX 7113 7087	0707	R07B005	5	1990	7	25	7.00	175	0.94	1.09	1.03	A	A	A	A
6	Dart	30m u/s wood opp Blackmoor Farm	SX 7383 6807	0726	R07B007	2	1991	7	29	6.90	199	0.91	1.08	0.98	A	A	A	A
7	Dart	10m d/s Dart Bridge Buckfastleigh	SX 7449 6670	0708	R07B008	1	1991	7	24	6.50	156	0.77	1.04	0.80	B	A	A	A
8	Dart	500m u/s Riverford Bridge	SX 7682 6398	0709	R07B009	1	1990	7	20	4.90	98	0.62	0.78	0.48	B	B	B	B
9	Dart	25m u/s Totnes Weir	SX 8000 6133	0710	R07B010	4	1990	7	23	4.90	113	0.64	0.81	0.52	B	B	B	B
10	Harbourne River	15m u/s road bridge Harbourneford	SX 7175 6235	0701	R07A001	1	1990	7	36	6.90	250	1.08	1.09	1.18	A	A	A	A
11	Harbourne River	25m u/s Leigh Bridge	SX 7710 5670	0724	R07A002	3	1991	7	33	6.40	212	1.01	1.01	1.02	A	A	A	A
12	Harbourne River	40m d/s road bridge Beenleigh	SX 7978 5660	0702	R07A003	1	1990	7	36	6.50	233	1.10	1.03	1.13	A	A	A	A
13	Wash	50m u/s weir Tuckenhay	SX 8171 5593	0703	R07A004	2	1991	1	27	6.40	173	1.09	1.00	1.09	A	A	A	A
14	Hems	20m d/s rd br Portbridge Cross	SX 7892 6599	0725	R07B011	1	1991	7	27	5.80	156	0.76	0.95	0.74	B	A	A	A
15	Hems	20m d/s bridge u/s Tally-ho	SX 8162 6378	0704	R07B012	1	1990	7	38	6.00	229	1.12	1.02	1.14	A	A	A	A
16	Am Brook	15m u/s Collacombe Bridge	SX 8105 6750	0705	R07B016	1	1990	7	29	6.50	189	0.88	1.09	0.96	A	A	A	A
17	Am Brook	100m u/s Fishacre Bridge	SX 8195 6452	0706	R07B017	1	1990	7	35	6.20	217	1.04	1.07	1.11	A	A	A	A
18	Bidwell Brook	10m u/s rd br Tigley	SX 7572 6087	0727	R07B018	1	1991	7	30	6.70	200	0.91	1.05	0.95	A	A	A	A
19	Bidwell Brook	150m u/s Dartington Lodge	SX 7980 6152	0711	R07B019	2	1990	7	29	5.60	161	0.88	0.95	0.81	A	A	A	A
20	Mardle	40m u/s rail br Buckfastleigh	SX 7462 6613	0712	R07B014	1	1990	7	28	6.10	170	0.81	0.95	0.77	A	A	A	A
21	Dean Burn	35m u/s B3380 bridge	SX 7324 6511	0728	R07B052	1	1991	7	31	6.60	206	0.93	1.04	0.97	A	A	A	A
22	Ashburn Yeo	30m u/s Dart Bridge	SX 7457 6685	0713	R07B050	1	1990	7	35	6.20	217	1.03	0.98	1.01	A	A	A	A
23	Holy Brook	40m u/s rd br Northwood Buckfast	SX 7400 6767	0714	R07B020	1	1990	7	37	7.00	259	1.11	1.10	1.22	A	A	A	A
24	Ruddycleave Water	15m u/s bridge Ruddycleave Cottage	SX 7245 7308	0729		1	1991	7	29	7.00	202	0.94	1.08	1.02	A	A	A	A
25	East Webburn River	50m d/s Cockingford Bridge	SX 7165 7505	0731	R07B036	1	1991	7	34	7.00	238	1.06	1.09	1.16	A	A	A	A
26	Webburn	75m u/s Buckland Bridge	SX 7186 7200	0715	R07B015	2	1990	7	34	7.00	238	1.55	1.10	1.70	A	A	A	A
27	West Webburn River	20m u/s Ponsworthy Bridge	SX 7010 7390	0730	R07B037	2	1991	7	26	6.80	178	0.95	1.07	1.02	A	A	A	A
28	Venford Brook	25m d/s railings d/s WTW	SX 6870 7139	0732		1	1991	7	23	6.60	151	1.07	1.03	1.10	A	A	A	A
29	Walla Brook	300m u/s Babney 40m d/s split	SX 6730 7545	0718	R07B051	5	1990	7	27	6.90	185	1.27	1.07	1.36	A	A	A	A
30	Swincombe	100m d/s bridge prior to West Dart	SX 6466 7323	0721	R07B021	5	1990	7	34	6.70	228	1.54	1.05	1.62	A	A	A	A
31	Cherry Brook	50m u/s Lower Cherrybrook Bridge	SX 6311 7485	0722	R07B032	5	1991	7	26	7.00	183	1.04	1.10	1.15	A	A	A	A
32	Blackbrook	15m u/s bridge Tor Royal	SX 6015 7383	0723	R07B049	1	1990	7	32	6.50	209	1.27	1.02	1.29	A	A	A	A
33	Cowsic River	30m u/s Beardown Farm	SX 6031 7530	0733	R07B057	4	1991	7	20	6.40	126	0.92	1.00	0.92	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¦ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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Figure 3.14 Dart Catchment (7) NRA Biological Class - 1990/1991

3.2.9 River Avon Catchment Catchment-8

Summary

Of the 81 km of watercourses monitored by 20 sites in the River Avon catchment, 77% (15 sites) were good, 10% (3 sites) were moderate, and 13% (2 sites) were poor quality, according to the NRA Biological Classification. None were classed as very poor quality.

Likely reasons for poorer biological quality

The lower reach of **The Gara** was of poor quality overall, reflected in its poorer than expected ASPT and moderately poorer than expected N-taxa, which is usually indicative of organic pollution. In this case, the nature of the habitat probably had a greater influence on the classification than water quality. The monitoring site at Slapton Bridge was in a reed swamp between two lakes on The Gara. The site was almost lentic. RIVPACS is only suitable for rivers and streams and, not surprisingly, the site had a poor suitability code of 4 (see Table 2.4): consequently, the predictions made by RIVPACS and the classifications based on them were not particularly reliable. The site was also difficult to sample, which may also have contributed to the poor result.

Slapton Stream was also of poor overall quality, because of a poorer than expected N-taxa and moderately poorer than expected ASPT. The moderate EQI ASPT suggests organic pollution. Sampling difficulties may have contributed to the poor EQI N-taxa. The site had low RIVPACS suitability (suitability code 4, see Table 2.4), so the classification of this site would have been imprecise.

Chillington Stream was classed as moderate quality by the NRA Biological Classification because of its moderately poorer than expected N-taxa. The stream was disturbed frequently by cattle near to the monitoring site.

Although its overall NRA Biological Class was good, **Churchstowe Stream** had only a moderate N-taxa, suggesting toxic pollution or physical degradation.

The **River Avon** was of good quality, except for its tributary **Bala Brook** which was of moderate quality. Bala Brook's fauna was affected by discharges from a Water Treatment Works: this was confirmed by a special investigation in 1990 (National Rivers Authority, 1990b). Although its overall NRA Biological Class was good, the most upstream site on the River Avon at Shipley Bridge had a moderately poorer than expected N-taxa. This may have reflected the bouldery river bed which was difficult to sample, though it may also have been related to some form of toxic pollution. Poor chemical quality at this site could have been caused by the catchment's geology and the moorland nature of the reach (National Rivers Authority, 1992d)

NRA Biological Classification 1990 & 1991.

Catchment: River Avon Corresponding Freelance map filename(s):CATCH8.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	The Gara	20m u/s Woodford Bridge	SX 7987 5102	0823	R08A002				0	0.00	0	0.00	0.00	0.00					
2	The Gara	200m u/s br 20m u/s split Forder	SX 8105 4906	0801	R08A003	1	1990	7	38	6.60	250	1.13	1.04	1.18	A	A	A	A
3	The Gara	60m u/s br Higher North Mill	SX 8245 4764	0802	R08A004	1	1990	7	33	6.60	217	1.01	1.03	1.04	A	A	A	A
4	The Gara	15m u/s Slapton Bridge	SX 8282 4440	0803	R08A006	4	1990	7	28	4.40	123	0.78	0.71	0.55	B	C	B	C
5	Slapton Stream	Iron Bridge	SX 8205 4413	0805	R08A012	4	1990	7	18	4.70	85	0.53	0.82	0.44	C	B	C	C
6	Ritson Stream	15m u/s rd br Woodford	SX 7978 5097	0814	R08A002	1	1991	7	33	6.50	215	1.00	1.02	1.02	A	A	A	A
7	South Pool Stream	5m u/s crossing point South Pool	SX 7773 4025	0816		4	1991	7	31	5.80	179	0.92	0.97	0.89	A	A	A	A
8	Chillington Stream	15m d/s rd br Chillington	SX 7925 4265	0817		2	1991	7	28	5.20	146	0.85	0.87	0.73	A	B	A	B
9	Small Brook	100m u/s road bridge Bowcombe	SX 7511 4448	0806	R08A013	3	1990	7	31	5.90	184	0.89	0.97	0.87	A	A	A	A
10	West Alvington Str	200m u/s bridge Ticket Wood	SX 7323 4364	0807	R08A014	4	1990	7	23	5.70	130	0.76	0.97	0.74	B	A	A	A
11	Churchstow Stream	25m u/s rd br Redford	SX 7228 4434	0818		1	1991	7	26	5.50	143	0.78	0.91	0.71	B	A	A	A
12	Avon	30m u/s Shipley Bridge	SX 6809 6292	0819	R08B007	4	1991	7	22	6.70	148	0.75	1.05	0.79	B	A	A	A
13	Avon	50m u/s Lydia Bridge	SX 6953 6070	0808	R08B001	4	1990	7	27	6.90	187	0.86	1.08	0.93	A	A	A	A
14	Avon	5m u/s discharge 50m u/s A38 b	SX 6977 5923	0820	R08B008	1	1991	7	28	6.80	190	0.87	1.06	0.92	A	A	A	A
15	Avon	50m u/s bridge Horsebrook	SX 7122 5847	0809	R08B002	1	1990	7	29	6.90	201	0.89	1.08	0.97	A	A	A	A
16	Avon	150m d/s Gara Bridge	SX 7290 5332	0810	R08B003	2	1990	7	39	6.40	250	1.30	1.01	1.31	A	A	A	A
17	Avon	40m d/s br Loddiswell	SX 7268 4825	0821	R08B004	1	1991	7	36	6.60	236	1.11	1.03	1.15	A	A	A	A
18	Avon	150m u/s Hatch Bridge 500m d/s New Brid	SX 7157 4722	0811	R08B005	1	1990	7	36	6.40	231	1.09	1.02	1.12	A	A	A	A
19	Torr Brook	10m d/s rd br The Old Mill	SX 7335 4832	0822	R08B015	1	1991	7	35	6.80	237	1.06	1.06	1.13	A	A	A	A
20	Glaze Brook	opposite mill Higher Turtley	SX 6963 5893	0812	R08B009	1	1990	7	37	6.50	240	1.13	1.02	1.15	A	A	A	A
21	Bala Brook	100m u/s bridge Zeal	SX 6781 6249	0813	R08B011	4	1990	7	16	5.60	90	0.74	0.88	0.66	B	B	B	B

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor, * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
/ = Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error,

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Figure 3.15 Avon Catchment (8) NRA Biological Class - 1990/1991

3.2.10 River Erme Catchment Catchment-9

Summary

All 31 km of watercourses monitored by 9 sites in the River Erme catchment were classed as good quality according to the NRA Biological Classification.

Likely reasons for poorer biological quality

Although their overall NRA Biological Class was good, the upper three reaches of the River Erme had moderately poorer than expected N-taxa. The most upstream site was very bouldery, which made it difficulty to sample. The next site downstream, at the A30 Bridge, was downstream from an outfall pipe (not the storm sewer overflow mentioned in the site's name), as well as a paper mill discharge which occasionally polluted the river.

NRA Biological Classification 1990 & 1991

Catchment: River Erme

Corresponding Freelance map filename(s):CATCH9.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Erme	120m u/s Stowford Weir	SX 6385 5713	0901	R09B001	5	1991	7	25	7.10	177	0.78	1.11	0.87	B	A	A	A
2	Erme	20m u/s A38 bridge u/s storm overflow	SX 6331 5578	0905	R09B012	3	1991	7	25	6.60	165	0.77	1.03	0.80	B	A	A	A
3	Erme	10m u/s br Cleave	SX 6334 5525	0906	R09B002	1	1991	7	23	6.60	151	0.71	1.03	0.73	B	A	A	A
4	Erme	10m u/s bridge Lower Keaton	SX 6403 5449	0902	R09B010	1	1991	7	36	6.30	226	1.11	0.99	1.10	A	A	A	A
5	Erme	30m u/s Fawn's Bridge	SX 6409 5304	0907	R09B011	1	1991	7	35	6.30	220	1.03	0.99	1.03	A	A	A	A
6	Erme	500m u/s Sequer's Bridge	SX 6335 5225	0903	R09B003	1	1991	7	38	6.00	227	1.13	0.95	1.08	A	A	A	A
7	Lud Brook	50m u/s br to fish farm Fawn's Bridge	SX 6413 5308	0904	R09B017	1	1990	7	35	6.00	210	1.33	0.96	1.28	A	A	A	A
8	Left Lake	10m u/s Erme confl u/s weir	SX 6402 6330	0908		4	1991	7	17	5.90	100	0.80	0.93	0.74	A	A	A	A
9	Red Lake	20m u/s Erme confl	SX 6358 6612	0909		4	1991	7	19	5.90	113	0.89	0.93	0.83	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ↑ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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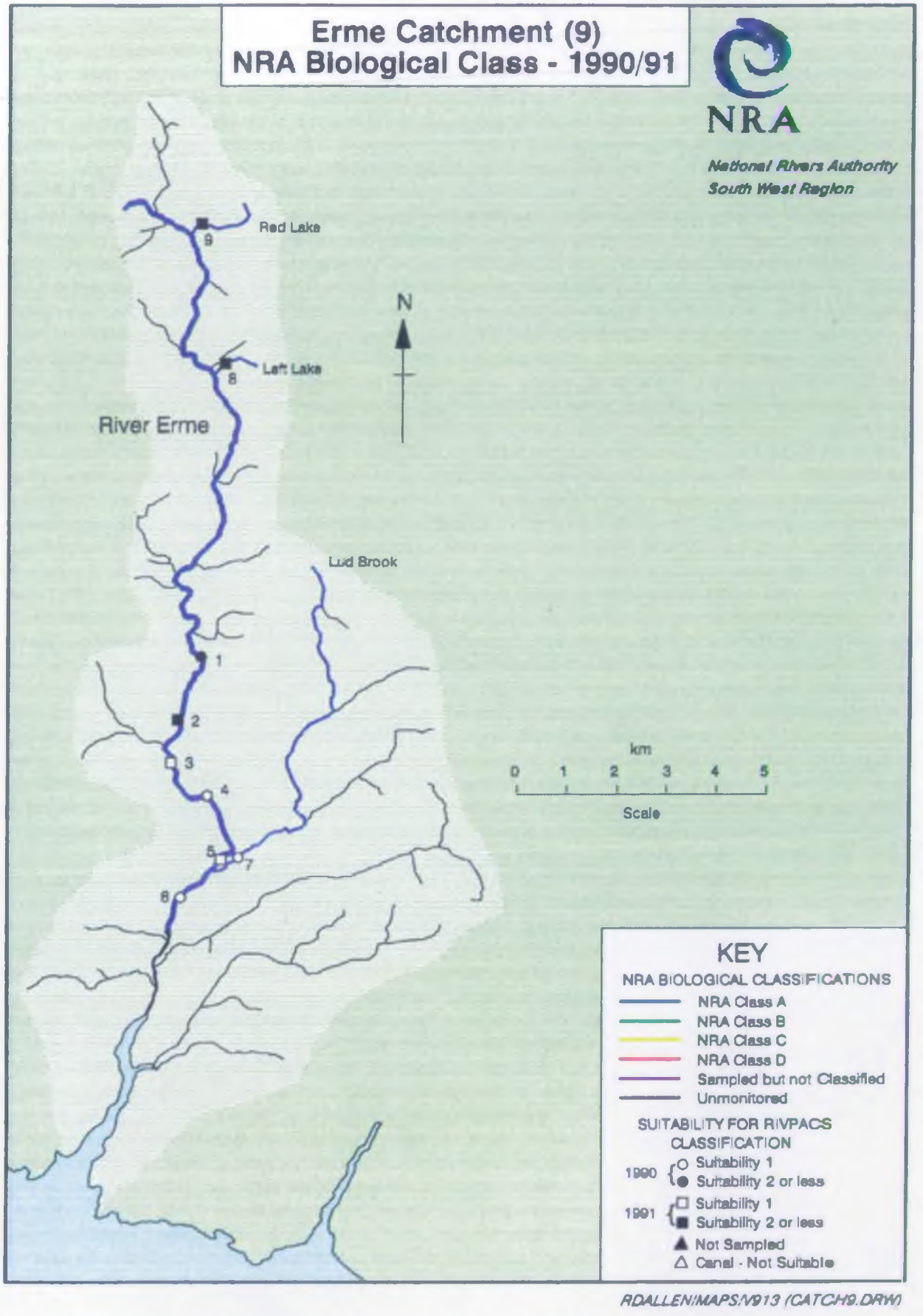

Figure 3.16 Erme Catchment (9) NRA Biological Class - 1990/1991

3.2.11 River Yealm Catchment Catchment-10

Summary

Of the 41 km of watercourses monitored by 16 sites in the River Yealm catchment, 94% (14 sites) were good, 3% (1 site) were moderate, and 3% (1 site) were poor quality, according to the NRA Biological Classification. None were classed as very poor quality.

Likely reasons for poorer biological quality

The upper reach of the **River Piall** was classed as poor quality (reflected in its poorer than expected ASPT and very much poorer than expected N-taxa), and its tributary **Cholwichtown Stream** was of moderate biological quality (owing to poorer than expected N-taxa). Both watercourses were in an area heavily influenced by china clay workings. A 70% cover of ochre was recorded on the river bed at the site on the upper reach of the River Piall, which is consistent with the effects of mining.

Although having a good overall NRA Biological Class, **Broadall Lake** was classed as moderate according to its EQI N-taxa. This may have been a result of the difficulty of sampling from the bouldery stream bed: no water quality problems were identified in Broadall Lake. Although stoneflies were abundant, mayflies, group 1 caddis (see Figure 2.5) and molluscs were absent, which suggests that there may have been acidic and/or toxic metal pollution here.

NRA Biological Classification 1990 & 1991

Catchment: River Yealm

Corresponding Freelance map filename(s):CATCH10.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Yealm	Hele Cross	SX 6144 6090	1008	R10B022	5	1991	7	26	6.80	176	0.98	1.06	1.03	A	A	A	A
2	Yealm	Fardel Mill Farm Bridge	SX 6032 5761	1001	R10B002	1	1990	7	39	6.60	256	1.18	1.03	1.22	A	A	A	A
3	Yealm	u/s Fardel Moor Weir d/s lake	SX 6022 5700	1009	R10B024	4	1991	7	40	6.60	263	1.21	1.03	1.25	A	A	A	A
4	Yealm	Lee Mill Bridge	SX 6001 5580	1010	R10B003	1	1991	7	37	6.70	247	1.12	1.05	1.17	A	A	A	A
5	Yealm	Popple's Bridge	SX 5983 5434	1011	R10B021	1	1991	7	27	6.40	174	0.81	1.01	0.82	A	A	A	A
6	Yealm	Yealm Bridge	SX 5898 5194	1002	R10B004	3	1990	7	37	6.50	241	1.23	1.06	1.29	A	A	A	A
7	Yealm	Puslinch Bridge	SX 5706 5099	1012	R10B005	1	1991	7	30	6.50	195	0.83	1.03	0.86	A	A	A	A
8	Newton Stream	Bridgend	SX 5559 4821	1017	R10B015	2	1991	7	30	5.50	164	0.87	0.91	0.79	A	A	A	A
9	Silverbridge Lake	Brixton	SX 5620 5204	1003	R10B018	4	1990	7	43	6.30	273	1.33	1.06	1.40	A	A	A	A
10	Long Brook	Yealmbridge	SX 5941 5213	1016		1	1991	7	40	6.20	248	1.19	1.02	1.20	A	A	A	A
11	Plall	Mark's Bridge	SX 5998 5770	1005	R10B008	1	1990	7	34	6.70	229	1.00	1.07	1.08	A	A	A	A
12	Plall	Quick Bridge	SX 5897 6082	1004	R10B007	1	1990	7	11	4.40	48	0.37	0.70	0.26	D	C	C	C
13	Cholwichtown	prior to river Plall	SX 5921 6087	1006	R10B006	2	1990	7	21	5.80	121	0.76	0.92	0.69	B	A	B	B
14	Ford Brook	Dendles Green	SX 6137 6180	1013		4	1991	7	23	6.50	150	1.04	1.03	1.07	A	A	A	A
15	Broadall Lake	Dendles Wood Bridge	SX 6138 6184	1014		4	1991	7	17	6.30	107	0.76	0.99	0.75	B	A	A	A
16	Wembury Stream	Wembury	SX 5188 4880	1007	R10A001	1	1991	7	35	6.30	221	1.04	1.02	1.06	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ; = New site for 1992/1993
@ = Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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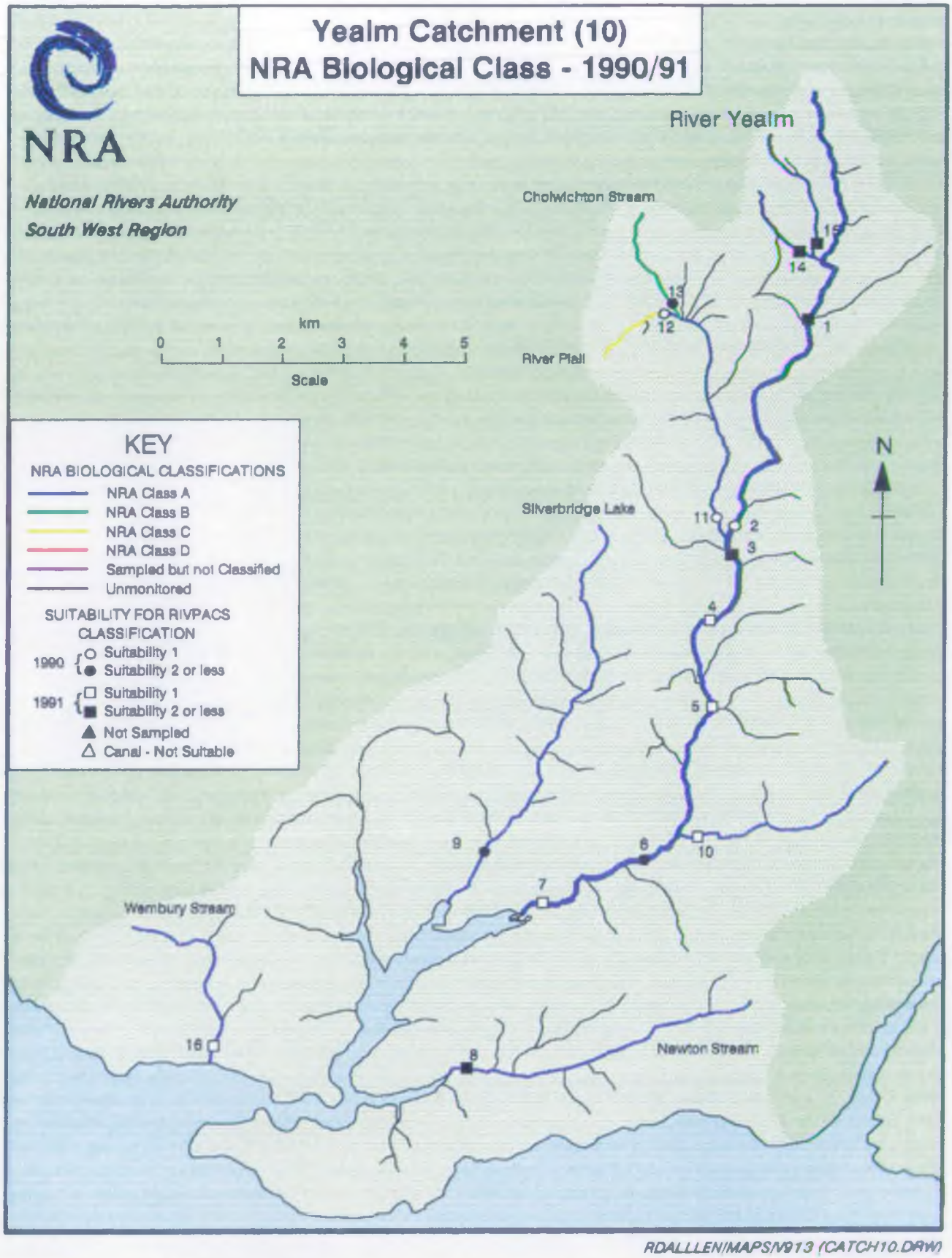

Figure 3.17 Yealm Catchment (10) NRA Biological Class - 1990/1991

NRA Biological Classification 1990 & 1991

Catchment: River Plym

Corresponding Freelance map filename(s):CATCH11.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Plym	u/s Blackabrook	SX 5647 6445	1110	R11B001	5	1991	7	22	6.80	149	0.96	1.06	1.01	A	A	A	A
2	Plym	d/s Blackabrook	SX 5639 6448	1111	R11B002	5	1991	7	25	6.90	172	0.98	1.07	1.05	A	A	A	A
3	Plym	Cadover Bridge	SX 5550 6462	1103	R11B003	5	1990	7	27	6.70	180	1.17	1.04	1.21	A	A	A	A
4	Plym	Shaugh Bridge (Wooden)	SX 5336 6369	1112	R11B004	5	1991	7	23	7.20	166	0.87	1.12	0.97	A	A	A	A
5	Plym	Bickleigh	SX 5270 6181	1113	R11B018	1	1991	7	29	7.10	205	0.90	1.11	1.00	A	A	A	A
6	Plym	Plym Bridge	SX 5196 5860	1104	R11B006	4	1990	7	37	6.70	247	1.06	1.07	1.13	A	A	A	A
7	Tory Brook	Tolchmoor Bridge	SX 5792 6192	1101	R11A001	3	1990	7	13	5.50	71	0.43	0.88	0.38	C	B	C	C
8	Tory Brook	Coleland Bridge	SX 5660 6088	1107	R11A002	3	1991	1	9	4.90	44	0.42	0.78	0.33	B	B	B	B
9	Tory Brook	Portworthy Bridge	SX 5558 6016	1108	R11A003	2	1991	7	21	5.90	136	0.70	0.93	0.65	B	A	B	B
10	Tory Brook	Station Road Plympton	SX 5431 5692	1102	R11A004	1	1990	7	11	5.20	57	0.52	0.83	0.26	D	B	C	C
11	Tory Brook	Marsh Mills Bridge	SX 5281 5658	1109	R11A005	2	1991	7	20	5.70	113	0.56	0.90	0.50	C	A	B	B
12	Meavy	Weir u/s Burrator Reservoir	SX 5675 6827	1114	R11B008	5	1991	7	29	7.20	210	1.29	1.13	1.46	A	A	A	A
13	Meavy	d/s Burrator Reservoir	SX 5515 6790	1105	R11B009	5	1990	7	28	6.50	183	1.28	1.03	1.33	A	A	A	A
14	Meavy	Gratton Ford Bridge	SX 5297 6705	1115	R11B010	1	1991	7	31	6.80	211	0.99	1.07	1.06	A	A	A	A
15	Meavy	Hoo Meavy	SX 5265 6563	1106	R11B011	1	1991	7	38	6.50	246	1.16	1.01	1.18	A	A	A	A
16	Blackabrook	confluence with River Plym	SX 5648 6441	1116	R11B007	4	1991	7	25	6.70	167	1.16	1.05	1.22	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

Figure 3.18 Plym Catchment (11) NRA Biological Class - 1990/1991

3.2.13 River Tavy Catchment Catchment-12B, 12C & 12D

Summary

Of the 96 km of watercourses monitored at 20 sites, 95% (19 sites) were good, and 5% (1 site) were moderate quality, according to the NRA Biological Classification. None were classed as poor or very poor quality.

Likely reasons for poorer biological quality

Tamerton Foliot Stream was classed as moderate quality owing to both moderately poorer than expected ASPT and N-taxa, which is indicative of organic pollution. Storm sewerage overflows and land run-off were postulated causes of its poor chemical quality (National Rivers Authority, 1992d). These are also consistent with the impacts on the biota.

NRA Biological Classification 1990 & 1991

Catchment: River Tavy

Corresponding Freelance map filename(s):CAT12CD.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Tavy	Hill Bridge	SX 5329 8049	1203	R12C001	3	1990	7	28	6.80	191	1.12	1.06	1.19	A	A	A	A
2	Tavy	Harford Bridge	SX 5056 7678	1280	R12C002	2	1991	7	31	6.60	205	1.01	1.03	1.04	A	A	A	A
3	Tavy	Kelly School	SX 4913 7498	1281	R12C015	1	1991	7	33	6.90	228	1.02	1.08	1.10	A	A	A	A
4	Tavy	West Bridge	SX 4774 7383	1204	R12C003	1	1990	7	27	6.40	174	0.85	1.02	0.87	A	A	A	A
5	Tavy	Washford	SX 4699 7106	1282	R12C005	1	1991	7	34	6.40	219	1.08	1.02	1.10	A	A	A	A
6	Tavy	Denham Bridge	SX 4769 6800	1205	R12C006	1	1990	7	28	6.40	179	0.88	1.02	0.91	A	A	A	A
7	Tavy	mid Lopwell Dam	SX 4773 6513	1283	R12C007	5	1991	7	31	5.30	164	1.03	1.04	1.08	A	A	A	A
8	Tamerton Foliot Stream	Tamerton Foliot (d/s trib)	SX 4687 6090	1279	R12B005	5	1991	7	22	5.30	116	0.63	0.85	0.54	B	B	B	B
9	Milton Brook	point d/s Milton Coombe	SX 4829 6479	1202	R12B001	1	1990	7	36	6.60	236	1.10	1.02	1.12	A	A	A	A
10	Walkham	Merrivale Bridge	SX 5510 7512	1212	R12D001	5	1990	4	24	7.00	167	1.19	1.10	1.31	A	A	A	A
11	Walkham	Ward Bridge	SX 5422 7202	1286	R12D002	4	1991	7	30	7.10	212	1.18	1.11	1.30	A	A	A	A
12	Walkham	Bedford Bridge	SX 5044 7035	1287	R12D003	1	1991	7	31	6.80	212	0.96	1.07	1.02	A	A	A	A
13	Walkham	Grenofen Bridge	SX 4890 7101	1213	R12D004	1	1990	4	31	6.50	203	1.05	1.03	1.08	A	A	A	A
14	Lumburn	Rushford Bridge	SX 4495 7633	1284	R12C009	1	1991	7	41	6.70	274	1.26	1.03	1.31	A	A	A	A
15	Lumburn	Shillamill (prior to R. Tavy)	SX 4668 7191	1206	R12C010	1	1991	7	37	6.70	249	1.07	1.06	1.13	A	A	A	A
16	Moortown Brook	Mt House School	SX 4930 7460	1207	R12C021	1	1990	7	33	6.70	222	0.98	1.06	1.04	A	A	A	A
17	Wallabrook	prior to River Tavy	SX 4921 7548	1208	R12C011	1	1990	7	33	6.40	212	1.02	1.00	1.02	A	A	A	A
18	Burn	prior to River Tavy	SX 4980 7618	1209	R12C008	1	1990	7	39	6.90	268	1.16	1.08	1.25	A	A	A	A
19	Colly Brook	Peter Tavy	SX 5146 7765	1210	R12C022	1	1990	7	33	6.80	224	1.05	1.06	1.11	A	A	A	A
20	Cholwell Brook	Brook Tavy	SX 5081 7861	1211	R12C019	1	1990	7	25	6.50	162	0.92	1.02	0.94	A	A	A	A
21	Amicombe Brook	22m u/s confluence Dartmoor	SX 5717 8337	1285		5	1991	7	19	6.60	126	0.88	1.05	0.92	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ; = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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Figure 3.19 Tavy Catchment (12B, 12C & 12D) NRA Biological Class - 1990/1991

3.2.14 River Tamar Catchment Catchment-12E to 12P inclusive

Summary

Of the 468 km of watercourses monitored at 97 sites, 98% (93 sites) were good, 1% (2 sites) were moderate, and 1% (2 sites) were poor quality, according to the NRA Biological Classification. None were classed as very poor quality.

Likely reasons for poorer biological quality

With the exception of a few smaller tributaries, all the watercourses in the Tamar catchment were of good ecological quality.

Blanchdown Stream was of poor overall NRA Biological Class owing to poorer than expected N-taxa and moderately poorer than expected ASPT, which indicated toxic pollution. This, and the complete covering of ochre on the stream bed, was consistent with the effects of metalliferous mine drainage that was known to affect the stream.

Latchley Brook was of poor quality because of poorer than expected N-taxa, which indicates toxic pollution. Run-off from quarrying, and the acidic metalliferous geology of the catchment were thought to be the cause.

The lower reach of the River Luckett was of moderate quality owing to poorer than expected N-taxa, probably as a result of discharges from abandoned mines. There were also some crude sewage discharges to this stream, which were identified and reported by NRA pollution staff (National Rivers Authority, 1992e).

The upper reach of the Small Brook was of moderate quality owing to poorer than expected N-taxa. Land run-off, catchment geology, and metal residues from pig slurry were suggested as the causes of this.

NRA Biological Classification 1990 & 1991

Catchment: River Tamar

Corresponding Freelance map filename(s):TAMARALL.DRW, CAT12PE.DRW, CATC12FG.DRW, CATC12MN.DRW & CA12HJKL.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Tamar	Buses Bridge	SS 2809 1345	12111	R12L001	1	1991	7	34	6.40	216	1.01	1.00	1.00	A	A	A	A
2	Tamar	d/s Lower Tamar Lake	SS 2955 1070	12112	R12L009	1	1991	7	41	5.80	238	1.17	0.91	1.07	A	A	A	A
3	Tamar	Dexbeer Bridge	SS 2957 0894	1247	R12L006	1	1991	7	37	6.10	226	1.06	0.96	1.02	A	A	A	A
4	Tamar	Moreton Mill	SS 2833 0850	12113	R12L016	1	1991	7	41	5.40	221	1.15	0.96	1.08	A	A	A	A
5	Tamar	Tamarstone Bridge	SS 2832 0559	1248	R12L002	1	1991	7	41	6.20	253	1.14	0.97	1.11	A	A	A	A
6	Tamar	Bridgerule	SS 2748 0290	12114	R12L015	1	1991	7	44	6.50	286	1.26	1.02	1.29	A	A	A	A
7	Tamar	Crowford Bridge	SX 2872 9943	12115	R12L003	1	1991	7	42	6.50	272	1.18	1.02	1.18	A	A	A	A
8	Tamar	Tamerton Bridge	SX 3179 9739	1249	R12L004	1	1991	7	37	6.70	247	1.04	1.05	1.10	A	A	A	A
9	Tamar	d/s confluence with River Deer	SX 3190 9726	12116	R12L013	1	1991	7	42	6.30	265	1.16	0.99	1.15	A	A	A	A
10	Tamar	Boyton Bridge	SX 3288 9230	12104	R12J001	1	1991	7	45	6.20	278	1.25	0.98	1.22	A	A	A	A
11	Tamar	Druxton Bridge	SX 3443 8830	12105	R12J002	1	1991	7	42	6.20	261	1.25	0.99	1.24	A	A	A	A
12	Tamar	Netherbridge	SX 3497 8662	1239	R12J003	1	1990	7	40	6.40	257	1.18	1.03	1.21	A	A	A	A
13	Tamar	Polson Bridge	SX 3556 8492	12106	R12J004	1	1991	7	42	6.40	268	1.30	1.03	1.33	A	A	A	A
14	Tamar	Greystone Bridge	SX 3683 8025	1214	R12E001	1	1990	7	38	6.70	253	1.11	1.06	1.18	A	A	A	A
15	Tamar	Horsabridge	SX 4001 7482	1215	R12E002	1	1990	7	43	6.60	284	1.36	1.08	1.46	A	A	A	A
16	Tamar	Gunnislake Bridge	SX 4332 7221	1288	R12E003	1	1991	7	37	6.00	223	1.10	0.98	1.08	A	A	A	A
17	Blanchdown Stream	prior to River Tamar	SX 4325 7290	1293	R12E004	4	1991	7	14	4.70	66	0.54	0.81	0.44	C	B	C	C
18	Portontown Stream	prior to River Tamar weir	SX 4143 7374	1289	R12E034	1	1991	7	32	6.40	205	0.95	1.00	0.96	A	A	A	A
19	Latchley Brook	Latchley	SX 4090 7368	1217	R12E028	1	1990	7	15	5.70	86	0.46	0.92	0.42	C	A	C	C
20	Luckett	Oldmill	SX 3697 7386	1292	R12E016	1	1991	7	35	6.80	238	1.07	1.06	1.13	A	A	A	A
21	Luckett	Luckett Bridge	SX 3882 7367	1220	R12E007	1	1990	7	21	6.90	145	0.63	1.08	0.68	B	A	B	B
22	Damerel Stream	prior to River Tavy	SX 3988 7549	1218	R12E014	1	1990	7	36	6.70	240	1.06	1.05	1.11	A	A	A	A
23	Inny	u/s Davidstow Creamery	SX 1534 8704	12127	R12P001	1	1991	7	33	6.20	206	1.00	0.97	0.97	A	A	A	A
24	Inny	Trewinnow Bridge	SX 1704 8647	12128	R12P002	1	1991	7	36	6.40	229	1.03	1.00	1.03	A	A	A	A
25	Inny	St Clether Bridge	SX 2052 8419	1263	R12P003	1	1990	7	38	6.60	252	1.08	1.04	1.12	A	A	A	A
26	Inny	Gimblett's Mill	SX 2410 8342	12129	R12P012	1	1991	7	42	6.70	283	1.21	1.06	1.28	A	A	A	A
27	Inny	Two Bridges	SX 2700 8180	12130	R12P004	1	1991	7	40	6.70	267	1.19	1.05	1.24	A	A	A	A
28	Inny	Trekelland Bridge	SX 3000 7989	12131	R12P005	1	1991	7	41	6.60	271	1.22	1.04	1.26	A	A	A	A
29	Inny	Trencarrell Bridge	SX 3217 7710	1264	R12P013	2	1990	7	42	6.40	267	1.29	1.01	1.30	A	A	A	A
30	Inny	Bealsmill Bridge	SX 3587 7704	12132	R12P006	1	1991	7	40	6.60	265	1.18	1.04	1.23	A	A	A	A
31	Penpont Water	Trelyn Bridge	SX 2000 8288	1265	R12P010	3	1990	7	37	6.60	246	1.22	1.06	1.29	A	A	A	A
32	Penpont Water	Altarnun Bridge	SX 2228 8125	12133	R12P007	1	1991	7	38	6.80	259	1.18	1.07	1.25	A	A	A	A
33	Penpont Water	Two Bridges	SX 2695 8165	1266	R12P008	1	1990	7	38	6.80	258	1.14	1.06	1.21	A	A	A	A
34	Lowley Brook	Landlake Bridge	SX 3288 8237	1290	R12E005	1	1991	7	30	6.00	179	0.86	0.94	0.81	A	A	A	A
35	Lowley Brook	Landue Bridge	SX 3471 7970	1291	R12E017	1	1991	7	41	6.30	259	1.13	1.00	1.13	A	A	A	A
36	Lowley Brook	Lowleybridge	SX 3589 7878	1219	R12E006	1	1990	7	36	6.50	235	1.01	1.03	1.04	A	A	A	A
37	Lyd	A386 road bridge Lydford	SX 5211 8446	1221	R12F012	3	1990	7	21	6.50	137	0.98	1.03	1.00	A	A	A	A
38	Lyd	Greenlanes Bridge	SX 4443 8321	1222	R12F001	1	1990	7	34	6.80	231	0.98	1.07	1.04	A	A	A	A
39	Lyd	Sydenham Bridge	SX 4291 8388	1294	R12F011	1	1991	7	37	6.80	252	1.09	1.07	1.17	A	A	A	A
40	Lyd	prior to River Thrushel	SX 3922 8497	1295		1	1991	7	28	6.80	190	0.85	1.08	0.92	A	A	A	A
41	Lyd	Lifton Bridge	SX 3893 8477	1223	R12F002	1	1990	7	32	6.80	216	1.02	1.09	1.12	A	A	A	A
42	Thrushel	Rivermead Bridge	SX 4990 9127	1228	R12G001	1	1990	7	34	6.80	231	0.95	1.07	1.01	A	A	A	A
43	Thrushel	Wrixhill Bridge	SX 4654 8987	1297	R12G002	1	1991	4	27	6.50	175	0.81	1.02	0.83	A	A	A	A
44	Thrushel	Stowford Bridge (Townleigh)	SX 4280 8738	1229	R12G003	1	1990	7	40	6.60	262	1.13	1.03	1.16	A	A	A	A
45	Thrushel	Tinhay Bridge	SX 4171 8672	1230	R12G004	1	1990	7	39	6.30	246	1.10	0.99	1.09	A	A	A	A
46	Wolf	Week's Mill Bridge	SX 4464 9425	1233	R12G005	1	1990	7	32	6.80	216	0.98	1.07	1.05	A	A	A	A
47	Wolf	Roadford New Bridge	SX 4188 8979	1298	R12G084	1	1991	7	34	6.20	212	0.96	0.97	0.94	A	A	A	A
48	Wolf	Rexon Bridge	SX 4141 8890	1299	R12G006	1	1991	7	38	6.50	248	1.11	1.02	1.14	A	A	A	A
49	Wolf	prior to River Thrushel	SX 4035 8638	1234	R12G007	1	1990	7	41	6.70	276	1.15	1.06	1.21	A	A	A	A
50	Buddle Brook	Buddle Bridge	SX 4022 8989	12100		1	1991	7	36	6.70	242	1.07	1.05	1.11	A	A	A	A
51	Broadwood Brook	Kellacott Bridge	SX 4065 8800	1235	R12G012	1	1990	7	32	6.70	215	0.90	1.06	0.95	A	A	A	A
52	Breazle Water	prior to River Thrushel	SX 4480 8924	1232	R12G010	1	1990	7	37	6.60	246	1.07	1.04	1.11	A	A	A	A
53	Bratton Brook	Bratton Clovelly	SX 4677 9202	1231	R12G009	1	1990	7	32	6.40	205	0.95	1.00	0.95	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ! = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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NRA Biological Classification 1990 & 1991

Catchment: River Tamar

Corresponding Freelance map filename(s):TAMARALL.DRW, CAT12PE.DRW, CATC12FG.DRW, CATC12MN.DRW & CA12HJKL.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
54	Quither Brook	prior to River Lyd	SX 4268 8393	1224	R12F013	1	1990	7	34	6.40	219	1.00	1.01	1.01	A	A	A	A
55	Chillaton Stream	Chillaton Bridge	SX 4325 8184	1296		1	1991	7	37	6.70	249	1.17	1.03	1.20	A	A	A	A
56	Law	Combebow Bridge	SX 4854 8799	1226	R12F003	1	1990	6	35	6.80	238	1.16	1.09	1.27	A	A	A	A
57	Law	prior to River Lyd	SX 4268 8393	1225	R12F004	1	1990	7	35	6.80	239	1.00	1.07	1.08	A	A	A	A
58	Combebow Stream	access rd culvert nr quarry	SX 4883 8898	1227	R12FD10	1	1990	7	34	6.70	228	0.99	1.05	1.04	A	A	A	A
59	Kensey	Badgall Bridge	SX 2312 8696	1260	R12N003	1	1990	7	36	6.80	243	1.14	1.07	1.22	A	A	A	A
60	Kensey	Badharlick Bridge	SX 2675 8642	12124	R12N001	1	1991	7	42	6.80	285	1.19	1.07	1.27	A	A	A	A
61	Kensey	Truscott Bridge	SX 2984 8498	1261	R12N004	1	1990	7	36	6.50	233	1.04	1.01	1.05	A	A	A	A
62	Kensey	Newport	SX 3262 8512	12125	R12N005	1	1991	7	35	6.70	234	0.98	1.05	1.03	A	A	A	A
63	Kensey	St Leonards Bridge	SX 3523 8485	1262	R12N002	1	1990	7	33	6.50	215	0.94	1.02	0.96	A	A	A	A
64	Tregeare Stream	Red Down Bridge	SX 2672 8629	12126	R12N006	1	1991	7	37	6.60	244	1.08	1.04	1.12	A	A	A	A
65	Carey	Halwill Bridge - Quoditch	SX 4207 9851	12101	R12H006	1	1991	1	29	6.40	186	1.03	1.01	1.04	A	A	A	A
66	Carey	Ashmill Bridge	SX 3937 9537	1236	R12H001	1	1990	7	39	6.40	251	1.12	1.01	1.13	A	A	A	A
67	Carey	Panson	SX 3715 9258	12102	R12H007	1	1991	7	38	6.40	244	1.06	1.01	1.07	A	A	A	A
68	Carey	Boldford Bridge	SX 3645 8824	12103	R12H008	1	1991	7	38	6.50	247	1.06	1.02	1.08	A	A	A	A
69	Carey	Heale Bridge	SX 3589 8617	1237	R12H002	1	1990	7	39	6.30	247	1.10	0.99	1.10	A	A	A	A
70	Henford Water	Henford	SX 3736 9479	1238	R12H005	1	1990	7	35	6.70	235	0.98	1.06	1.04	A	A	A	A
71	Ottery	Otterham Mill	SX 1742 9087	12118	R12M004	1	1991	7	35	6.20	218	1.07	0.97	1.04	A	A	A	A
72	Ottery	Trenguna Bridge	SX 1885 9329	12119	R12M005	1	1991	7	37	6.60	244	1.11	1.03	1.15	A	A	A	A
73	Ottery	Canworthy Water Bridge	SX 2220 9170	1255	R12M001	2	1990	7	38	6.40	244	1.08	1.01	1.09	A	A	A	A
74	Ottery	Hallescott Bridge	SX 2844 8782	1256	R12M002	1	1990	7	39	6.60	257	1.13	1.04	1.17	A	A	A	A
75	Ottery	Yeolmbridge	SX 3178 8737	12120	R12M006	1	1991	7	39	6.40	251	1.14	1.01	1.16	A	A	A	A
76	Ottery	Ham Mill Bridge	SX 3456 8686	1257	R12M007	1	1990	7	40	6.30	252	1.16	1.00	1.16	A	A	A	A
77	Bolasbridge Water	200m d/s Maverino Bridge	SX 2895 8818	1258	R12M012	1	1990	7	31	6.40	197	0.85	1.00	0.85	A	A	A	A
78	Caudworthy Water	Caudworthy Bridge	SX 2469 9267	12122	R12M010	1	1991	7	34	6.30	213	0.95	0.98	0.93	A	A	A	A
79	Caudworthy Water	prior to River Ottery	SX 2672 8890	1259	R12M011	1	1990	7	38	6.50	247	1.04	1.02	1.06	A	A	A	A
80	Canworthy Water	prior to River Ottery	SX 2238 9144	12123	R12M008	1	1991	7	39	6.60	256	1.13	1.03	1.17	A	A	A	A
81	Tala Water	Bridgetown	SX 3410 8913	1240	R12J006	1	1990	7	36	6.50	234	1.01	1.02	1.03	A	A	A	A
82	Lana Lake	Lana Bridge	SX 3412 9592	1241	R12J005	1	1990	7	30	6.30	188	0.86	0.99	0.85	A	A	A	A
83	Claw	Claw Bridge	SS 3742 0068	12107	R12K016	1	1991	7	40	6.30	250	1.11	0.98	1.10	A	A	A	A
84	Claw	Clawton Bridge	SX 3536 9933	12108	R12K001	1	1991	7	42	6.40	269	1.20	1.01	1.20	A	A	A	A
85	Claw	Tetcott Bridge	SX 3279 9696	1242	R12K002	1	1990	7	39	6.30	247	1.07	1.00	1.07	A	A	A	A
86	Hollacombe Stream	Hayne Farm	SS 3728 0255	1243		1	1990	7	31	5.90	184	0.91	0.93	0.85	A	A	A	A
87	Deer	Rydon Bridge	SS 3354 0413	1244	R12K003	1	1990	7	39	6.40	251	1.08	1.01	1.10	A	A	A	A
88	Deer	Winscott Bridge	SS 3385 0144	1245	R12K004	1	1990	7	39	6.30	247	1.08	1.00	1.08	A	A	A	A
89	Deer	Deer Bridge	SX 3192 9734	12109	R12K005	1	1991	7	42	6.60	276	1.17	1.03	1.20	A	A	A	A
90	Colesmill Stream	100m d/s Holsworthy STW	SS 3387 0316	1246	R12K007	1	1990	7	30	5.90	177	0.84	0.94	0.78	A	A	A	A
91	Dunstaple Brook	u/s Coles Mill confluence	SS 3452 0352	12110		1	1991	7	40	6.30	253	1.15	0.99	1.14	A	A	A	A
92	Derrill Water	Dux Bridge	SS 2957 0279	1251	R12L012	1	1990	7	31	6.10	188	0.87	0.96	0.83	A	A	A	A
93	Derrill Water	Dualstone Bridge	SS 3013 0063	1252	R12L005	1	1990	7	33	6.30	208	0.90	1.00	0.90	A	A	A	A
94	Small Brook	Headon Bridge	SS 3101 0730	1253	R12L011	1	1990	7	28	5.80	152	0.71	0.93	0.66	B	A	B	B
95	Small Brook	Youldon Bridge	SS 2997 0530	1254	R12L008	1	1990	7	32	6.30	202	0.88	0.99	0.87	A	A	A	A
96	Lamberal Water	Forda	SS 2774 1116	12117	R12L010	1	1991	7	36	6.40	231	1.09	1.01	1.10	A	A	A	A
97	Lamberal Water	Moreton Pound Bridge	SS 2757 0894	1250	R12L007	1	1990	7	35	6.10	215	0.98	0.97	0.95	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error,

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Figure 3.20 Tamar Catchment: River Tamar (12 in part) NRA Biological Class- 1990/1991

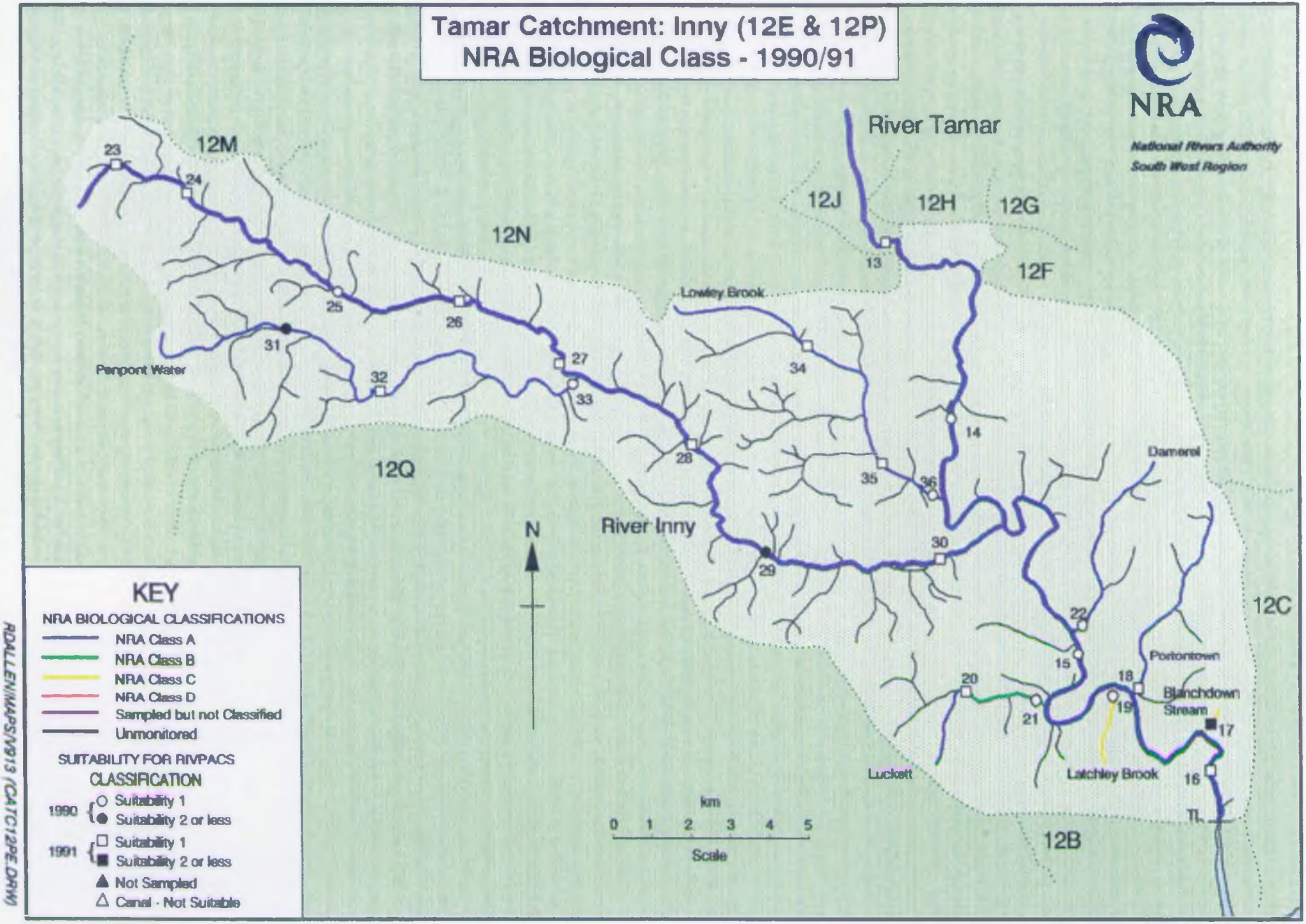


Figure 3.21 Tamar Catchment: Inny (12E & 12P) NRA Biological Class-1990/1991

RDALLEN\MAPS\W913 (CATC12PE.DRW)

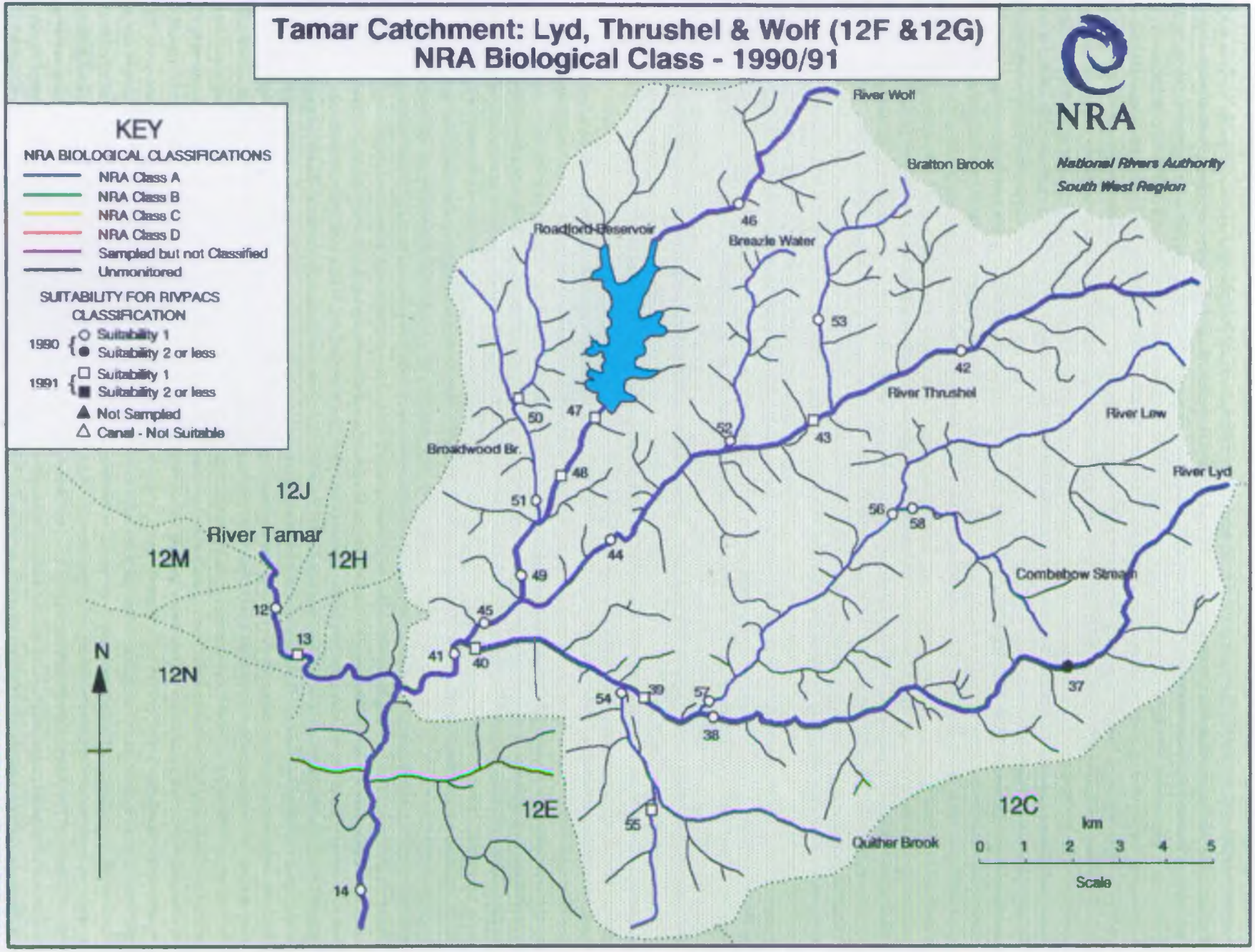
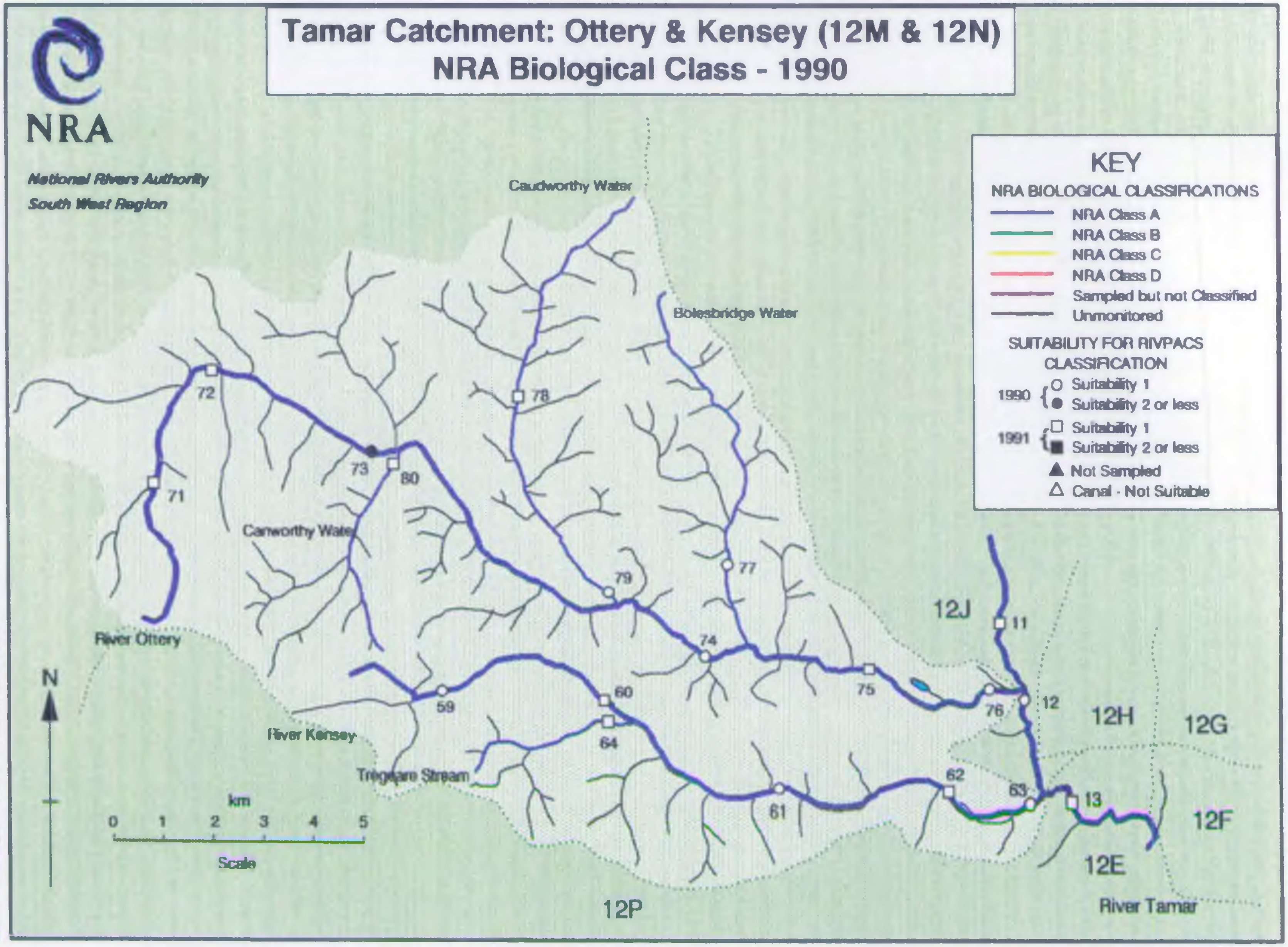


Figure 3.22 Tamar Catchment: Lyd, Thrushel and Wolf (12F & 12G) NRA Biological Class - 1990/1991

R:\ALLEN\MAPS\V913 (CATC12FG.DRW)

Figure 3.23 Tamar Catchment: Upper Tamar (12H, 12J, 12K & 12L) NRA Biological Class - 1990/1991



RDALLEN/MAPS/N913 (CATC12MN.DRW)

Figure 3.24 Tamar Catchment: Ottery & Kensey (12M & 12N) NRA Biological Class - 1990/1991

3.2.15 River Lynher Catchment Catchment-12R & 12Q

Summary

Of the 80 km of watercourses monitored by 20 sites on the River Lynher catchment, 93% (18 sites) were good, and 7% (2 sites) were moderate quality, according to the NRA Biological Classification. None were classed as poor or very poor quality.

Likely reasons for poorer biological quality

The upper reach of **Kelly Stream** was classed as moderate quality overall, owing to its moderately poorer than expected N-taxa. Ochre deposits were observed on the stream bed at the monitoring site. Metal contamination is thought to have been the cause. This is supported by the abundance of stonefly taxa that are tolerant to moderate metal contamination.

Marke Valley Stream was of moderate quality because of poorer than expected N-taxa. The stream bed at the monitoring site was completely covered by ochre. Metalliferous drainage from abandoned ore mines were thought to have caused the moderate quality.

NRA Biological Classification 1990 & 1991

Catchment: River Lynher

Corresponding Freelance map filename(s):CAT12RQ.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Lynher	Trabartha Road Bridge	SX 2629 7782	1267	R12Q001	1	1990	7	38	6.90	264	1.14	1.09	1.24	A	A	A	A
2	Lynher	Berriowbridge	SX 2732 7565	12134	R12Q002	1	1991	7	36	6.60	237	1.11	1.03	1.14	A	A	A	A
3	Lynher	Starabridge	SX 2895 7385	1268	R12Q003	1	1990	7	37	6.80	253	1.12	1.07	1.20	A	A	A	A
4	Lynher	Bicton Mill Bridge	SX 3215 7007	12135	R12Q004	1	1991	7	32	6.80	216	0.97	1.06	1.03	A	A	A	A
5	Lynher	Newbridge	SX 3473 6809	1269	R12Q005	1	1990	7	31	6.50	200	0.93	1.01	0.95	A	A	A	A
6	Lynher	u/s Clapper Bridge	SX 3513 6527	12136	R12Q025	1	1991	7	34	6.60	225	1.02	1.04	1.06	A	A	A	A
7	Lynher	Pillaton	SX 3659 6318	12137	R12Q006	1	1991	7	31	6.90	214	0.95	1.08	1.03	A	A	A	A
8	Lynher	Notter Bridge	SX 3848 6099	1270	R12Q007	1	1990	7	30	6.90	208	0.93	1.12	1.04	A	A	A	A
9	Dean's Brook	Bridge	SX 3824 6235	1273	R12Q029	1	1990	7	36	6.60	238	1.04	1.07	1.11	A	A	A	A
10	Kelly Stream	Haye	SX 3467 7008	12139	R12Q026	1	1991	7	23	6.00	138	0.68	0.95	0.65	B	A	B	B
11	Kelly Stream	Caddapit	SX 3400 6888	1274	R12Q009	1	1990	7	33	6.50	214	1.00	1.01	1.02	A	A	A	A
12	Marke Valley Stream	Upton Cross	SX 2862 7192	1275	R12Q027	2	1990	7	11	5.60	62	0.51	0.89	0.45	C	A	B	B
13	Withey Brook	u/s Bastreet Intake	SX 2436 7636	1271	R12Q010	4	1990	7	30	6.80	204	1.37	1.07	1.47	A	A	A	A
14	Withey Brook	prior to River Lynher	SX 2610 7720	1272	R12Q008	2	1990	7	29	6.80	198	1.11	1.07	1.18	A	A	A	A
15	Rushyford Water	Trewortha Marsh	SX 2322 7603	12138		2	1991	7	28	6.80	190	0.87	1.07	0.94	A	A	A	A
16	Tiddy	u/s Pensilva STW	SX 2900 6890	12140	R12R001	2	1991	7	29	6.50	189	0.89	1.04	0.93	A	A	A	A
17	Tiddy	Butterdon Mill	SX 2952 6625	1276	R12R002	1	1990	7	39	6.80	267	1.15	1.09	1.25	A	A	A	A
18	Tiddy	Tilland Mill Bridge	SX 3285 6188	12141	R12R003	1	1991	7	34	6.40	219	0.99	1.02	1.01	A	A	A	A
19	Tiddy	Tideford Bridge	SX 3451 5964	1277	R12R004	1	1990	7	34	6.70	227	0.96	1.07	1.03	A	A	A	A
20	Trecorme Stream	Tilland Bridge	SX 3320 6200	1278	R12R006	1	1990	7	39	6.80	266	1.15	1.08	1.25	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor, * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¡ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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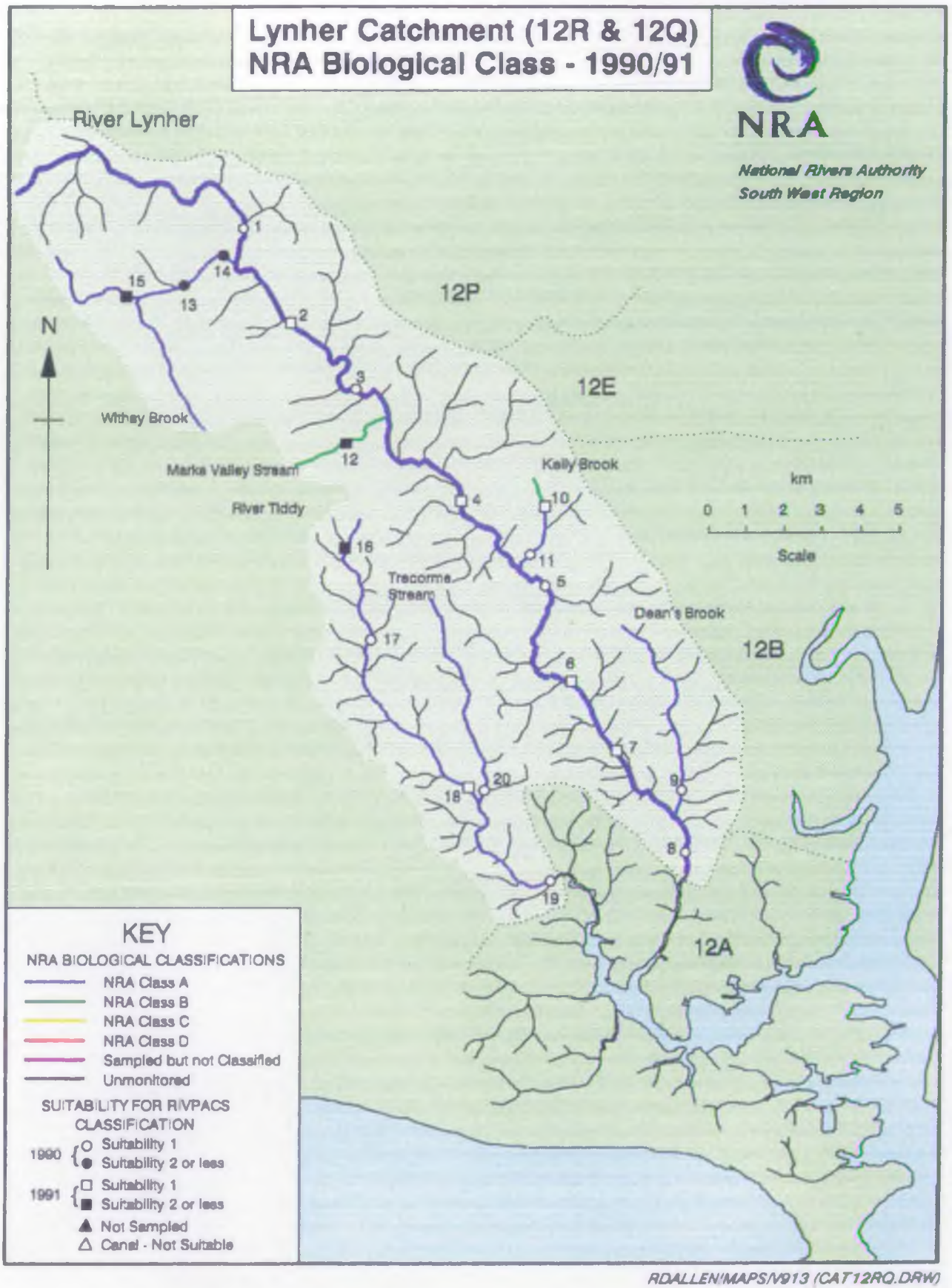

Figure 3.25 Lynher Catchment (12R & 12Q) NRA Biological Class - 1990/1991

3.2.16 River Seaton Catchment Catchment-13

Summary

Of the 24 km of watercourses monitored at 8 sites, 31% (2 sites) were good, 23% (2 sites) were moderate, and 46% (4 sites) were poor quality, according to the NRA Biological Classification. None were classed as very bad quality.

Likely reasons for poorer biological quality

Poor biological quality in the River Seaton was mainly the result of poorer than expected N-taxa, which is indicative of toxic pollution. this was probably caused by toxic drainage from disused mines, urbanisation and road run-off. Poor habitat probably contributed to the poor ecological quality; the river bed at the site at Hendra consisted of flat cobbles which is inhospitable to invertebrates; the site at Hessenford had been channelised; the site at Seaton Beach was slow flowing and deep.

Tremar Stream was classed as moderate by the NRA Biological Classification because of moderately poorer than expected N-taxa, which is consistent with the effects of toxic pollution. Metal contamination was considered to have been the cause of this stream's poor chemical water quality (National Rivers Authority, 1992d). This could have been the cause of the moderate biological quality, although there was an unusual paucity of stoneflies and absence of ochre deposits if this was the case.

NRA Biological Classification 1990 & 1991

Catchment: River Seaton Corresponding Freelance map filename(s):CATCH13.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Seaton	Crow's Nest	SX 2640 6938	1304	R13A001	2	1991	7	11	4.60	51	0.51	0.73	0.37	C	C	C	C
2	Seaton	Hendra Bridge	SX 2650 6565	1301	R13A002	1	1990	7	28	6.60	185	0.84	1.04	0.87	A	A	A	A
3	Seaton	Roseland	SX 2754 6323	1302	R13A006	1	1990	7	14	6.40	90	0.43	1.01	0.43	C	A	C	C
4	Seaton	Courtney's Mill Bridge	SX 2878 6164	1305	R13A003	1	1991	7	24	6.10	146	0.72	0.96	0.69	B	A	B	B
5	Seaton	Messenford	SX 3071 5740	1303	R13A004	1	1990	7	13	6.50	84	0.38	1.03	0.39	C	A	C	C
6	Seaton	Seaton Beach	SX 3033 5450	1306	R13A005	1	1991	7	15	6.10	92	0.42	0.99	0.41	C	A	C	C
7	Manheniot trib.	at factory	SX 2844 6207	1308	R13A009	1	1991	7	37	6.80	251	1.09	1.08	1.18	A	A	A	A
8	Tremar Stream	Rosecraddoc	SX 2646 6758	1307	R13A008	1	1991	7	22	6.10	135	0.67	0.97	0.65	B	A	B	B

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ; = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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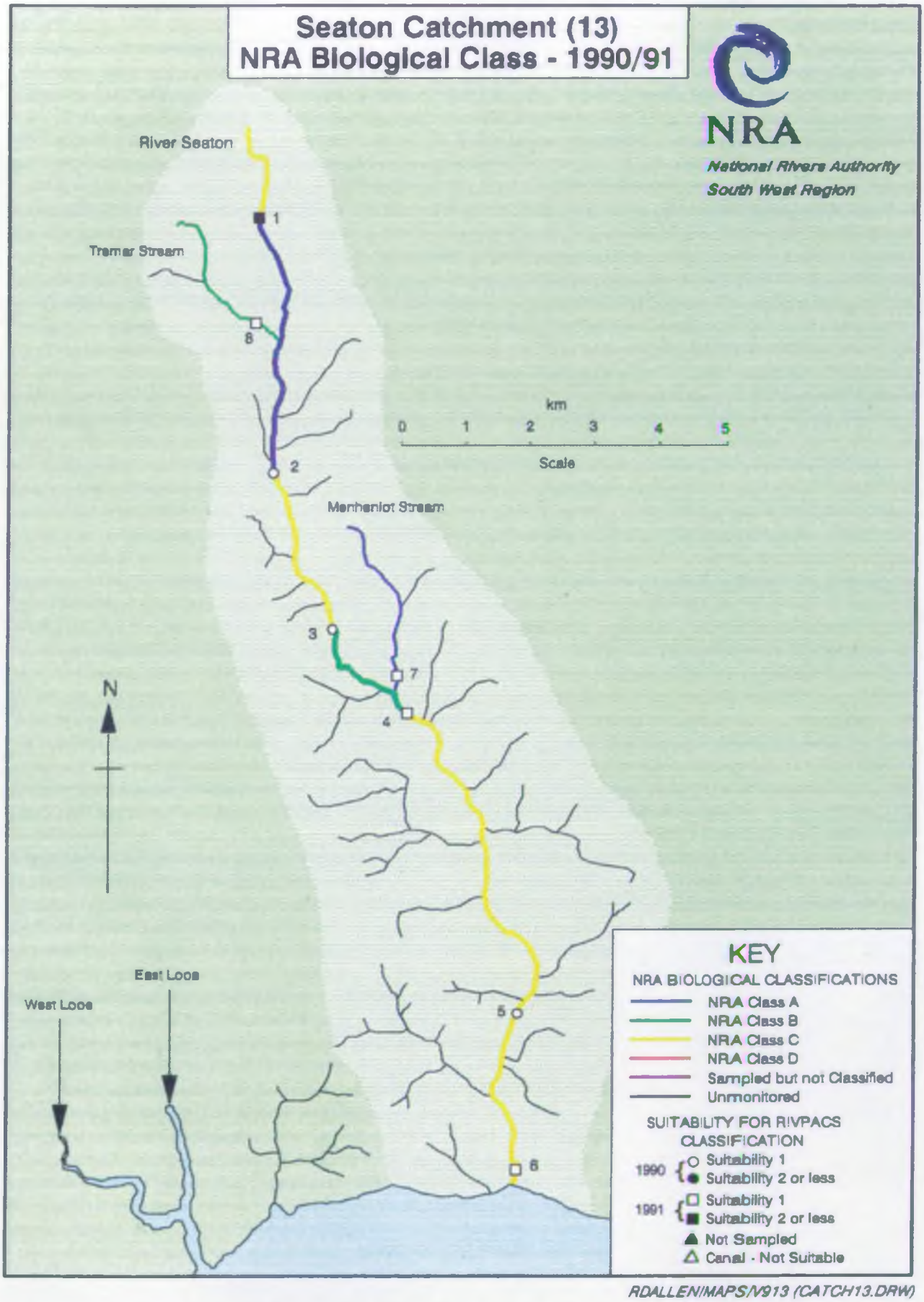

Figure 3.26 Seaton Catchment (13) NRA Biological Class – 1990/1991

3.2.17 River Looe Catchment Catchment-14

Summary

All 43 km of the watercourses monitored by 17 sites in the River Looe catchment were classed as good quality, according to the NRA Biological classification.

Likely reasons for poorer biological quality

Although Connon Tip Stream, a very small tributary of Connon Stream, had a good overall NRA Biological Class, it was of moderate ecological quality according to its EQI N-taxa. Ochre completely covered the stream bed at the monitoring site. According to the Region's pollution inspectors, the stream was contaminated by leachate from an old waste disposal site; the existing tip no longer discharges directly to this stream, but via a woodland irrigation system (which was itself considered to be unsatisfactory). Some leachate may still have been entering the stream from different sources.

NRA Biological Classification 1990 & 1991

Catchment: River Looe

Corresponding Freelance map filename(s):CATCH14.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	East Looe River	Venton Veor Bridge	SX 2325 6574	1411	R14B005	1	1991	7	36	6.90	250	1.05	1.11	1.16	A	A	A	A
2	East Looe River	Looe Mills	SX 2328 6465	1412	R14B001	1	1991	7	37	6.90	254	1.08	1.09	1.17	A	A	A	A
3	East Looe River	Lamellion Mill	SX 2507 6109	1402	R14B002	1	1990	7	31	6.30	194	0.90	1.00	0.90	A	A	A	A
4	East Looe River	Trussel Bridge	SX 2455 6205	1413	R14B003	1	1991	7	29	6.10	177	0.83	0.97	0.81	A	A	A	A
5	East Looe River	Landlooe Bridge	SX 2499 5956	1403	R14B006	1	1990	7	29	6.00	174	0.82	0.97	0.80	A	A	A	A
6	East Looe River	Railway Halt Sandplace	SX 2480 5719	1414	R14B004	3	1991	7	30	6.20	187	0.85	1.00	0.85	A	A	A	A
7	Dobwalls Stream	Tuelmenna Bridge	SX 2329 6574	1415	R14B007	1	1991	7	34	7.00	238	0.99	1.12	1.11	A	A	A	A
8	West Looe River	Bosent Bridge	SX 2127 6353	1404	R14C010	1	1990	7	29	6.30	184	0.85	1.01	0.86	A	A	A	A
9	West Looe River	Scawn Mill Bridge	SX 2160 6216	1405	R14C001	1	1990	7	33	6.80	226	0.96	1.09	1.05	A	A	A	A
10	West Looe River	Churchbridge	SX 2189 5865	1406	R14C002	1	1990	7	38	6.90	263	1.14	1.09	1.24	A	A	A	A
11	West Looe River	Sowden's Bridge	SX 2300 5562	1416	R14C003	1	1991	7	34	7.00	237	0.95	1.11	1.06	A	A	A	A
12	Coldrinnick Stream	Tregarrick Mill Bridge	SX 2060 5711	1407	R14C011	1	1990	7	38	6.60	252	1.12	1.06	1.18	A	A	A	A
13	Connon Stream	d/s Connon Bridge landfill site	SX 1909 6245	1408	R14C005	1	1990	7	28	6.60	185	0.82	1.06	0.87	A	A	A	A
14	Connon Stream	Trevillis Wood	SX 1958 6165	1409	R14C006	1	1990	7	34	6.90	233	1.00	1.09	1.09	A	A	A	A
15	Connon Stream	Herodsfoot Bridge	SX 2145 6049	1417	R14C008	1	1991	7	36	6.80	259	1.17	1.07	1.24	A	A	A	A
16	Connon Tip Stream	Tip discharge	SX 1891 6241	1410		2	1990	7	24	6.00	144	0.73	0.96	0.70	B	A	A	A
17	Polperro River	Polperro	SX 2073 5098	1401	R14A001	1	1990	7	30	6.60	198	0.91	1.03	0.95	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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Figure 3.27 Looe Catchment (14) NRA Biological Class - 1990/1991

3.2.18 River Fowey Catchment Catchment-15

Summary

All 84 km of watercourses monitored by 18 sites in the River Fowey catchment were classed as good quality, according to the NRA Biological classification.

Likely reasons for poorer biological quality

N/A

NRA Biological Classification 1990 & 1991

Catchment: River Fowey

Corresponding Freelance map filename(s):CATCH15.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Fowey	Harrowbridge	SX 2066 7440	1512	R15B001	4	1991	7	29	7.10	205	0.97	1.10	1.07	A	A	A	A
2	Fowey	Lamelgate	SX 2230 7080	1504	R15B024	5	1990	7	36	6.80	246	1.20	1.07	1.28	A	A	A	A
3	Fowey	Draynes Bridge	SX 2281 6898	1513	R15B002	4	1991	7	33	6.80	224	1.02	1.06	1.08	A	A	A	A
4	Fowey	Treverbyn Bridge	SX 2065 6754	1514	R15B003	3	1991	7	35	7.00	245	1.09	1.10	1.19	A	A	A	A
5	Fowey	Bodithiel Bridge	SX 1766 6488	1515	R15B004	1	1991	7	29	7.10	206	0.90	1.11	1.00	A	A	A	A
6	Fowey	Respryn Bridge	SX 0998 6360	1505	R15B025	3	1990	7	32	6.90	220	1.02	1.09	1.11	A	A	A	A
7	Fowey	Restormel	SX 1076 6132	1516	R15B006	2	1991	7	32	6.90	222	0.96	1.09	1.06	A	A	A	A
8	Poht Pill	Trethake Mill - u/s Pont	SX 1561 5315	1501	R15B032	1	1990	7	27	6.00	163	0.79	0.96	0.76	A	A	A	A
9	Trebant Water	East Trencreek u/s Penpoll	SX 1510 5551	1502	R15B031	1	1990	7	40	6.60	264	1.15	1.06	1.22	A	A	A	A
10	Lerryn River	Lerryn	SX 1432 5734	1510	R15A004	4	1991	7	37	6.80	253	1.05	1.10	1.15	A	A	A	A
11	Badelive Stream	Boconnoc	SX 1550 6036	1511	R15B030	1	1991	7	32	6.60	212	0.95	1.05	1.00	A	A	A	A
12	Cardinham Water	Glynnmill	SX 1110 6444	1506	R15B021	1	1990	7	36	6.90	248	1.10	1.08	1.18	A	A	A	A
13	Warleggan River	Panters Bridge	SX 1583 6810	1507	R15B009	4	1990	7	32	7.30	233	0.98	1.14	1.12	A	A	A	A
14	St Neot River	Colliford Bridge	SX 1810 7071	1517	R15B014	4	1991	7	30	6.30	190	1.08	0.99	1.07	A	A	A	A
15	St Neot River	Two Waters Foot	SX 1842 6799	1508	R15B008	1	1990	7	35	6.90	243	1.10	1.09	1.19	A	A	A	A
16	Northwood Brook	Wortha	SX 2063 6988	1518	R15B016	4	1991	7	30	6.70	200	1.33	1.05	1.39	A	A	A	A
17	Northwood Brook	Trenant Bridge	SX 2096 6928	1509	R15B011	4	1990	7	32	7.10	227	1.32	1.11	1.47	A	A	A	A
18	Siblyback Stream	Trekelvesteps	SX 2279 6991	1519	R15B010	2	1991	7	35	6.50	228	1.34	1.02	1.37	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¦ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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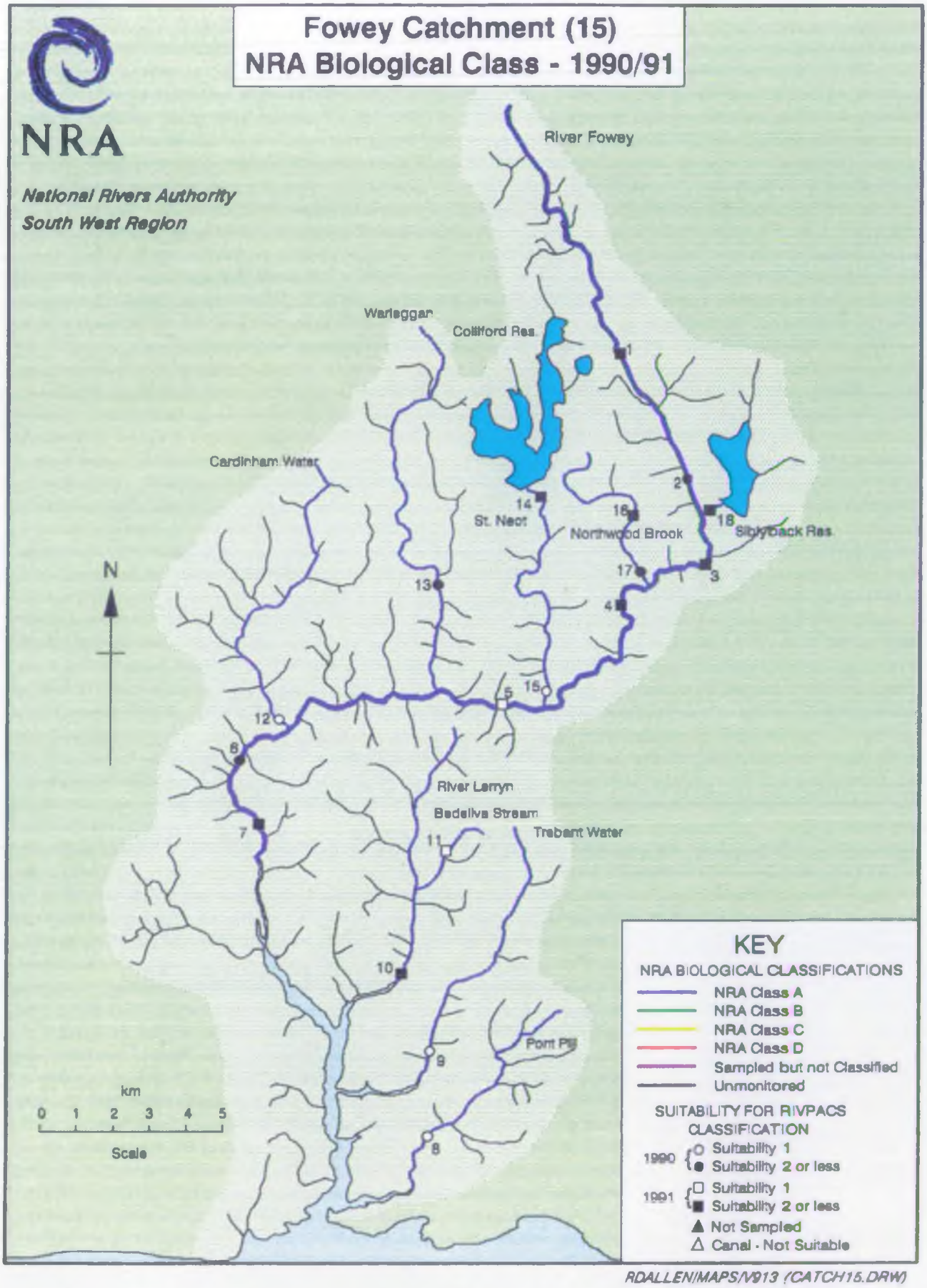

Figure 3.28 Fowey Catchment (15) NRA Biological Class – 1990/1991

3.2.19 Rivers Par and Crinnis Catchments Catchments-16 & 17

Summary

Of the 54 km of watercourses monitored by 22 sites in the Rivers Par and Crinnis catchments, 42% (8 sites) were good, 20% (5 sites) were moderate, and 33% (8 sites) were poor quality, according to the NRA Biological Classification. None were classed as very poor quality.

Likely reasons for poorer biological quality

The upstream reaches of the **River Par** were classed as moderate owing to moderately poorer than expected N-taxa, indicating toxic pollution or physical degradation. This was ascribed to the effects of china clay extraction. Further downstream, at Luxulyan Bridge, the moderate quality was because of moderately poorer than expected ASPT, which indicates organic enrichment. This was ascribed to the effects of a sewage works discharge. This site was also affected by china clay workings.

The poor quality of **Tywardeath Stream** was because of poorer than expected ASPT and moderately poorer than expected N-taxa, suggesting that it was organically polluted. It was also thought to be affected by china clay workings. This stream was channelised. It was very slow flowing and silty at the monitoring site, and there was an abundance of macrophytes which may have entrained organic matter.

In **Treverbyn Stream**, the moderate quality indicated by the overall NRA Biological classification was a result of poorer than expected ASPT and moderately poorer than expected N-taxa, which indicates organic pollution. High BMWP-scoring mayflies (in Group 1, see Figure 2.5) were absent, supporting this conclusion. China clay and metal contamination were known to contaminate the headwaters of this stream, and may also have influenced the fauna at the monitoring site.

Rosevean Stream was one of the few watercourses in the South West Region that was of very poor quality according to the overall NRA Biological Classification. Its EQI N-taxa was classed as very poor, although it had moderately poorer than expected ASPT, which suggests that the quality problem was a result of toxic pollution and/or physical degradation. Ochre completely covered the stream bed at the monitoring site. The effects of china-clay extraction were thought to have been the cause of the very poor quality.

Moderate quality in the lower reach of **Carbis Stream** was a result of its moderately poorer than expected N-taxa and ASPT. The stream was affected by china clay works. The upstream reach of Carbis Stream, downstream from Wheal Prosper Mica Dam, was good quality.

Both reaches on **Molinnis Stream** had a poor NRA Biology Class owing to poorer than expected N-taxa. This was ascribed to the effects of china clay workings.

Roseveath Stream's poor overall quality was the result of poorer than expected N-taxa (although its EQI ASPT was good). This, and the fact that the stream bed was completely covered by ochre, suggested that the poor

quality was the result of acidic mine drainage, which was known to discharge into this stream.

The poor quality of all three reaches of the Crinnis River was the result of poorer than expected (or in the lowest reach very much poorer than expected) N-taxa. The EQI ASPT varied downstream, from poor to good. Ochre was recorded at the sites monitoring the two upper reaches. The most downstream reach was channelised, with caged granite banks. The poor quality was ascribed to china clay extraction.

Bodelva Brook was classed as poor quality (upper reach) and very poor quality (lower reach) because of poorer than expected N-taxa. The stream was channelised, and influenced by china-clay workings. The stream suffered from very low flow in Autumn 1991. There was insufficient water in the stream to obtain a sample, so its classification was based on Spring and Summer samples only.

NRA Biological Classification 1990 & 1991

Catchment: Rivers Par & Crinnis

Corresponding Freelance map filename(s):CATC1617.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Par River	Criggan Moor	SX 0215 6076	1606	R16A007	4	1991	7	25	6.40	160	0.75	1.01	0.75	B	A	A	A
2	Par River	A 391 Bridge	SX 0229 6069	1607	R16A001	1	1991	7	20	5.60	112	0.59	0.88	0.52	B	B	B	B
3	Par River	Higher Menadew	SX 0296 5930	1608	R16A006	2	1991	7	27	5.80	156	0.80	0.91	0.73	A	A	A	A
4	Par River	Lavrean Bridge	SX 0315 5927	1601	R16A002	2	1990	7	25	5.90	148	0.75	0.93	0.70	B	A	A	A
5	Par River	Luxulyan Bridge	SX 0481 5804	1609	R16A003	1	1991	7	28	5.50	153	0.85	0.86	0.73	A	B	A	B
6	Par River	Treffry Bridge	SX 0567 5737	1602	R16A004	1	1990	7	28	5.50	153	0.85	0.86	0.73	A	B	A	B
7	Par River	St Blazey Bridge	SX 0703 5518	1610	R16A005	1	1991	7	28	5.50	153	0.85	0.86	0.73	A	B	A	B
8	Tywardreath Stream	d/s Elmsleigh Pond	SX 0768 5431	1611	R16A017	4	1991	7	22	4.50	100	0.64	0.75	0.48	B	C	B	C
9	Bokiddick Brook	Lowertown Farm	SX 0538 6099	1612	R16A014	2	1991	7	29	6.00	173	0.85	0.94	0.80	A	A	A	A
10	Bokiddick Brook	Luxulyan	SX 0555 5804	1603	R16A009	1	1990	7	27	6.40	172	0.81	1.00	0.81	A	A	A	A
11	Treverbyn Stream	200m u/s Par River confluence	SX 0433 5794	1605	R16A013	1	1990	7	31	5.40	168	0.90	0.86	0.78	A	B	A	B
12	Rescorla Brook	Lestoon Farm	SX 0353 5835	1617		2	1991	7	28	6.20	174	0.81	1.00	0.81	A	A	A	A
13	Rosevean Stream	prior to Par River	SX 0312 5858	1604	R16A012	2	1990	7	9	5.20	47	0.27	0.84	0.22	D	B	D	D
14	Carbis Stream	d/s Wheal Prosper mica dam	SX 0001 5955	1613	R16A018	4	1991	7	24	5.80	140	0.94	0.92	0.86	A	A	A	A
15	Carbis Stream	prior to Par River	SX 0265 5934	1614	R16A011	1	1991	7	23	5.00	116	0.70	0.79	0.55	B	B	B	B
16	Molinnis Stream	Molinnis	SX 0246 5927	1615	R16A016	4	1991	7	16	5.30	85	0.49	0.83	0.41	C	B	C	C
17	Rosevath Stream	Rosevath	SX 0206 6100	1616	R16A008	4	1991	7	15	5.90	88	0.44	0.93	0.41	C	A	C	C
18	Crinnis River	Cuddra Road Bridge (A 390)	SX 0454 5291	1703	R17A002	1	1991	7	19	4.80	91	0.55	0.76	0.42	C	C	C	C
19	Crinnis River	Caryon Bay road bridge	SX 0543 5275	1701	R17A003	1	1990	7	14	4.90	69	0.40	0.79	0.32	C	B	C	C
20	Crinnis River	Crinnis Beach (adit portal)	SX 0611 5230	1702	R17A004	5	1990	7	12	5.70	68	0.36	0.90	0.32	D	A	C	C
21	Bodelva Brook	Bodelva	SX 0548 5323	1704	R17A007	3	1991	4	9	4.80	43	0.30	0.77	0.23	D	C	C	C
22	Bodelva Brook	A 3082 Bridge	SX 0564 5290	*1705	R17A001	2	1991	4	7	4.00	28	0.23	0.64	0.15	D	C	D	D

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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M E M O R A N D U M

To: See circulation

From: Dr JAD Murray-Bligh
Extn: 2324 / 727-4668

Our Ref: JMBM556

Date: 22 April 1994

REGIONAL RIVER QUALITY MONITORING & SURVEILLANCE : RESULTS OF THE 1990/1991 BIOLOGICAL SURVEY

This report is the first and currently the only report of the biological quality of all the rivers and canals in Devon and Cornwall Areas (the former South West Region).

A similar draft report has been drafted for the results of the 1992 survey, covering about half the catchments in Devon and Cornwall. Unfortunately the biological classifications for 1992 need to be re-calculated because of changes in the limit of detection by which alkalinity is reported on the chemical archive. Alkalinity is used by RIVPACS to predict what the biological quality should be if the water quality is good. Hopefully the classification of relatively few sites will be affected, and the 1992 draft report could be revised within a couple of months. This problem has also affected the biological classification of the sites surveyed in 1993.

This report was relatively expensive to produce because of the number of colour pages in it. If at any time you no longer require your own copy, please return it. Copies have been deposited in the Exeter and Bodmin libraries.

JOHN MURRAY-BLIGH
Senior Biologist

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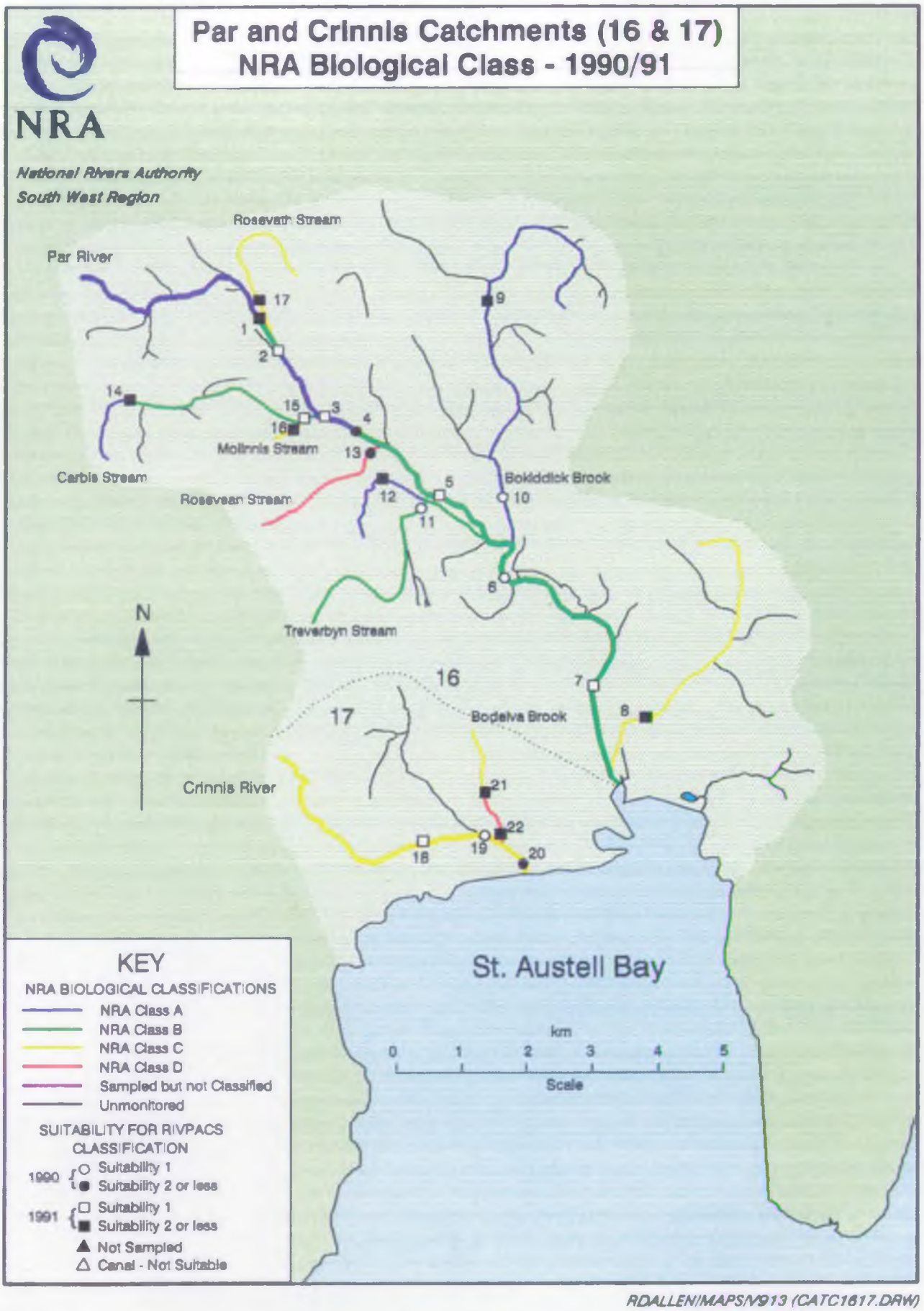

Figure 3.29 Par and Crinnis Catchments (16 & 17) NRA Biological Class-1990/1991

3.2.20 St Austell and South Cornwall Stream Catchments Catchment-18

Summary

Of the 53 km of watercourses monitored by 18 sites in the St Austell and South Cornwall Stream catchments, 41% (7 sites) were good, 40% (7 sites) were moderate, and 2% (2 sites) were poor quality, according to the NRA Biological Classification. None were classed as very poor quality.

Likely reasons for poorer biological quality

The **St Austell River** and its tributary **Gover Stream** were affected by china clay works. The St Austell River and Gover Stream were of poor quality owing to their poorer than expected N-taxa, which is consistent with toxic effects and smothering by fine suspended particles of china clay. The St Austell River at the monitoring site upstream from St Austell sewage treatment works was also channelised.

The upstream reach of **Polgooth Stream** was of moderate overall quality because of moderately poorer than expected ASPT. This suggested that it was affected by organic pollution, although other evidence indicated that it also suffered toxic pollution.

The **Hembal Brook**, although classed as being of moderate quality by the overall NRA Biological Classification, was classed as poor in terms of its EQI N-taxa. High BMWP-scoring mayflies (in Group 1, see Figure 2.5) were absent. The biological quality of this stream was much improved in Spring 1993.

The moderate quality of **Mevagissey Stream** was because of both moderately poorer than expected ASPT and N-taxa, and was ascribed to the effects of urbanisation and channelisation.

The most downstream reach of **Caerhays Stream**, which was of moderate quality overall and poor quality in terms of its EQI N-taxa, was affected by channelisation and possibly also by saline intrusion. This site was sampled by dredge, which is suspected of yielding less reliable results than pond-nets.

Portholland Stream was of moderate ecological quality because of a moderately poorer than expected N-taxa: no causes were ascribed to this. A problem with silage pollution was identified upstream from the monitoring site in Summer 1993.

NRA Biological Classification 1990 & 1991

Catchment: St Austell & South Cornwall Streams Corresponding Freelance map filename(s):CATCH18.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN *	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	St Austell River	Lansalson Bridge	SX 0088 5478	1810	R18A003	5	1991	7	15	5.10	76	0.65	0.80	0.52	B	B	B	B
2	St Austell River	u/s Gover Stream	SX 0124 5355	1801	R18A004	4	1990	7	12	5.30	63	0.38	0.83	0.31	C	B	C	C
3	St Austell River	u/s St Austell STW	SX 0122 5116	1811	R18A006	4	1991	7	16	4.70	75	0.48	0.74	0.36	C	C	C	C
4	St Austell River	Molingey Gauging Station	SX 0074 4955	1802	R18A007	1	1990	7	25	5.60	141	0.74	0.89	0.66	B	A	B	B
5	St Austell River	Pentewan Bridge	SX 0170 4730	1812	R18A008	2	1991	7	28	5.40	151	0.81	0.86	0.69	A	B	B	B
6	Polgooth Stream	Polgooth Bridge	SX 0034 4994	1813	R18A014	1	1991	7	27	5.10	139	0.79	0.82	0.65	A	B	B	B
7	Polgooth Stream	prior to St Austell River	SX 0068 4985	1804	R18A010	1	1990	7	30	6.00	180	0.87	0.96	0.84	A	A	A	A
8	Hembal Brook	u/s Bridge	SW 9893 5205	1818	R18A016	2	1991	7	18	5.50	99	0.56	0.86	0.48	C	B	B	B
9	Gover Stream	prior to St Austell River	SX 0068 5274	1803	R18A005	4	1990	7	13	5.00	65	0.42	0.79	0.33	C	B	C	C
10	Mevagissey Stream	car park Mevagissey	SW 0130 4500	1805	R18A009	1	1990	7	22	5.20	115	0.64	0.84	0.54	B	B	B	B
11	Caerhays Stream	Polmassick Bridge	SW 9719 4558	1814	R18A001	1	1991	7	34	6.40	217	0.99	1.01	1.00	A	A	A	A
12	Caerhays Stream	Tubbs Mill	SW 9610 4334	1806	R18A015	1	1990	7	33	6.50	215	0.96	1.03	0.99	A	A	A	A
13	Caerhays Stream	Caerhays Beach Bridge	SW 9749 4140	1807	R18A002	5	1990	7	17	6.20	106	0.51	0.98	0.50	C	A	B	B
14	Mewas Water	Carlooze Bridge	SW 9679 4730	'1815		1	1991	7	30	6.00	179	0.87	0.95	0.83	A	A	A	A
15	Portholland Stream	Portholland	SW 9568 4180	1808	R18A017	2	1990	7	24	6.30	152	0.70	1.02	0.72	B	A	A	A
16	Carne Stream	Mellinsey Mill	SW 9055 3925	1816	R18A011	1	1991	7	31	6.20	191	0.92	0.98	0.90	A	A	A	A
17	Carne Stream	Pendower Beach	SW 8944 3825	1809	R18A012	4	1990	7	32	6.30	203	0.93	1.03	0.96	A	A	A	A
18	Trengrouse Stream	Trelagossick	SW 9231 4127	1817		4	1991	7	31	6.10	189	0.96	1.01	0.97	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor, * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ; = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error,

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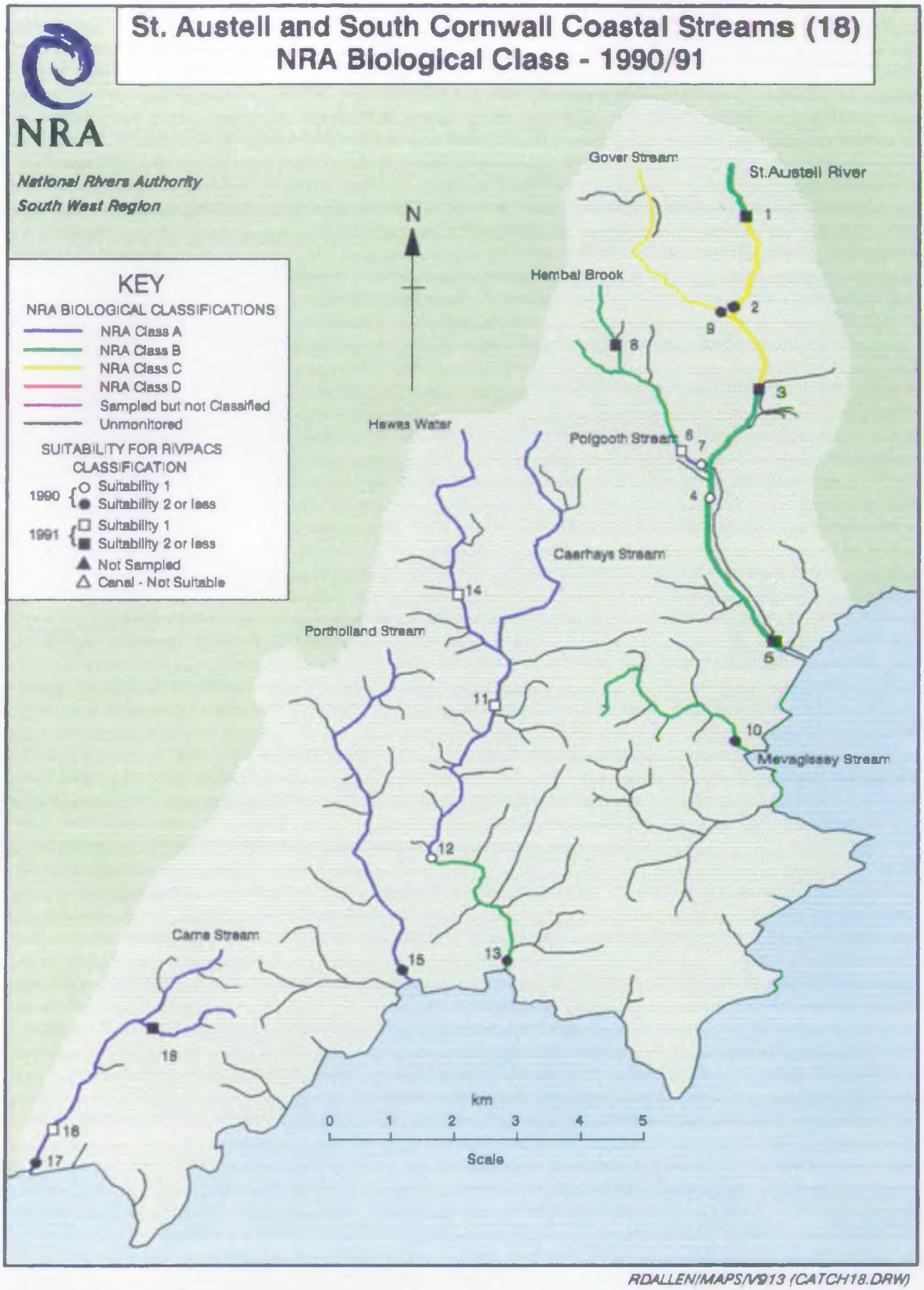

Figure 3.30 St Austell and South Cornwall Coastal Catchments (18) NRA Biological Class - 1990/1991

3.2.21 River Fal Catchment Catchment-19A (part), B, C, D & E

Summary

Of the 191 km of watercourses monitored at 58 sites in the river Fal catchment, 69% (37 sites) were good, 18% (9 sites) were moderate, 10% (8 sites) were poor, and 3% (4 sites) were very poor quality, according to the NRA Biological Classification.

Likely reasons for poorer biological quality

All the sites surveyed on the **River Fal** were of only moderate quality, whilst two tributaries sampled in its upper reaches, **Bodella Brook** was poor quality and **Gwindra Stream**, was moderate or poor quality. This was probably the result of the china clay extraction in the area. Bodella Brook was also influenced by STW's effluent. Unlike the upper reaches, the lower reaches of the River Fal were of moderate quality, not only because of only moderately poorer than expected N-taxa, but also moderately poorer than expected ASPT, which suggests that organic enrichment also affected this reach.

Calenick Stream was of only moderate quality according to its overall NRA Biological Classification because of poorer than expected N-taxa alone, which indicates toxic pollution. This is consistent with the effects of the mining activity that are known to affect the watercourse.

All the sites on the **River Carnon** and its tributaries were of either poor or very poor quality according to their overall NRA Biological Classification. Toxic effects were implicated, as N-taxa was degraded more than ASPT; in **Baldhu Stream** and **Hick's Mill Stream** the EQI N-taxa was classed as very poor. These results are consistent with the severe effects of metalliferous mine waters that were known to drain into these streams.

The **Perranwell Stream** and the most upstream reach of the **River Kennal** were of good overall quality, but of only moderate quality in terms of their EQI N-taxa, the reasons for which were unknown.

The **St Day Stream** was of poor overall quality because of poorer than expected ASPT and moderately poorer than expected N-taxa. Metal pollution was suspected. There was a 60% cover of ochre on the stream bed, and the watercourse contained moderately high concentrations of copper and zinc. The poor ASPT suggests that there was organic pollution also.

Swanpool Stream was classed as poor quality owing to poorer than expected N-taxa and ASPT, which suggests organic pollution. The stream was turbid in spring because of engineering works upstream from the monitoring site. Land run-off, urbanisation, and spates were suspected to be the causes of its poor NWC-Class (National Rivers Authority, 1992d).

NRA Biological Classification 1990 & 1991

Catchment: River Fal

Corresponding Freelance map filename(s):

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Fal	Tregoss Bridge	SW 9663 6009	1958	R19C001	1	1991	7	25	6.20	154	0.76	0.97	0.73	B	A	A	A
2	Fal	Gaverigan Bridge	SW 9373 5881	1921	R19C002	4	1990	7	23	5.70	132	0.68	0.90	0.61	B	A	B	B
3	Fal	Retew Bridge	SW 9262 5700	1959	R19C003	3	1991	7	29	5.80	167	0.87	0.90	0.78	A	A	A	A
4	Fal	Kernick Bridge	SW 9321 5462	1922	R19C011	4	1990	7	23	5.90	136	0.70	0.93	0.65	B	A	B	B
5	Fal	Terras Bridge	SW 9145 5335	1960	R19C004	1	1991	7	25	5.70	143	0.77	0.90	0.69	B	A	B	B
6	Fal	Grampound Bridge	SW 9334 4845	1923	R19C005	4	1990	7	24	5.10	122	0.69	0.81	0.55	B	B	B	B
7	Fal	Tregoney Gauging Station	SW 9215 4486	1924	R19C006	4	1990	7	24	5.10	122	0.66	0.82	0.54	B	B	B	B
8	Penkovil Stream		SW 8706 4198	1981	R19B004	1	1991	7	35	6.80	237	1.01	1.08	1.10	A	A	A	A
9	Lamorran	Lamorran Wood	SW 8806 4228	1929		3	1990	7	32	6.50	208	0.97	1.03	0.99	A	A	A	A
10	Trewithan Stream	Mellingoose	SW 8952 4440	1928	R19C016	1	1990	7	31	6.50	200	0.90	1.04	0.93	A	A	A	A
11	Gwindra Stream	Nanpean Bridge	SW 9641 5585	1961	R19C014	5	1991	7	14	5.60	79	0.52	0.89	0.46	C	A	B	B
12	Gwindra Stream	Goonabarn	SW 9555 5491	1962	R19C017	4	1991	7	14	5.10	72	0.42	0.81	0.34	C	B	C	C
13	Gwindra Stream	Gwindra Bridge	SW 9503 5299	1925	R19C008	2	1990	7	17	4.90	83	0.51	0.76	0.39	C	C	C	C
14	Gwindra Stream	Coombe u/s confl	SW 9512 5175	1963		3	1991	7	24	5.50	132	0.69	0.87	0.61	B	B	B	B
15	Gwindra Stream	Treway Bridge	SW 9409 5088	1926	R19C009	3	1990	7	19	5.20	99	0.57	0.82	0.46	C	B	B	B
16	Coombe Stream	Coombe	SW 9519 5164	1982	R19C021				0	0.00	0	0.00	0.00	0.00				$\|$
17	Bodalla Brook	Carsella	SW 9404 5768	1927	R19C018	4	1990	7	17	5.10	87	0.51	0.82	0.42	C	B	C	C
18	Parcuil River	Lanhoosa	SW 8605 3790	1901	R19A034	1	1990	7	39	6.60	256	1.14	1.06	1.21	A	A	A	A
19	Parcuil River	Trethem Mill	SW 8620 3648	1947	R19A013	2	1991	7	30	6.30	188	0.86	1.01	0.87	A	A	A	A
20	Tresillian River	Trendeal	SW 8866 5282	1964	R19D033	1	1991	7	37	6.80	253	1.10	1.08	1.19	A	A	A	A
21	Tresillian River	Ladock Water Pumping Station	SW 8927 5114	1930	R19D001	1	1990	7	33	6.70	222	0.95	1.07	1.02	A	A	A	A
22	Tresillian River	Tresowgar Bridge	SW 8853 4812	1931	R19D002	1	1990	7	34	6.60	225	0.98	1.05	1.03	A	A	A	A
23	Tresillian River	Tresillian Pumping Station	SW 8709 4706	1966	R19D032	1	1991	7	36	6.70	240	1.04	1.05	1.09	A	A	A	A
24	Tresillian River	d/s Ladock STW	SW 8704 4691	1965	R19D034	4	1991	7	33	6.60	219	0.92	1.05	0.96	A	A	A	A
25	Trevella Stream	Frogmore Bridge	SW 8585 4849	1933	R19D009	1	1990	7	32	6.90	221	0.95	1.10	1.04	A	A	A	A
26	Trevella Stream	Tregurra Bridge	SW 8476 4684	1934	R19D014	3	1990	7	29	6.40	185	0.86	1.01	0.87	A	A	A	A
27	Kestle Stream	Candor Ford	SW 8738 4902	1932	R19D008	1	1990	7	35	6.70	236	1.02	1.07	1.08	A	A	A	A
28	Treworgans Stream	Gunnow	SW 8881 4851	1967		2	1991	7	30	6.40	191	0.89	1.02	0.91	A	A	A	A
29	Brighton Stream	New Mills	SW 9010 5239	1939	R19D005	1	1990	7	35	6.80	238	1.04	1.08	1.12	A	A	A	A
30	Allen	Idless Bridge	SW 8220 4704	1935	R19D018	1	1990	7	41	6.60	270	1.17	1.04	1.23	A	A	A	A
31	Allen	Moresk Laundry	SW 8268 4505	1968	R19D004	2	1991	7	40	6.40	258	1.13	1.02	1.16	A	A	A	A
32	Zelah Brook	Gwarnick Mill	SW 8161 4929	1972	R19D030	1	1991	7	39	6.40	248	1.15	1.01	1.16	A	A	A	A
33	Minnis Stream	Trevellan	SW 8132 4829	1970		1	1991	7	41	6.60	271	1.20	1.06	1.28	A	A	A	A
34	Trispen Stream	Treworgan	SW 8313 4989	1969		2	1991	7	34	6.70	228	1.02	1.06	1.09	A	A	A	A
35	Kenwyn	New Mill	SW 8077 4585	1936	R19D016	1	1990	7	32	6.00	191	0.93	0.95	0.88	A	A	A	A
36	Kenwyn	Bosvigo Bridge	SW 8155 4527	1937	R19D007	2	1990	7	35	6.00	210	1.03	0.96	0.98	A	A	A	A
37	Boscoila Stream	Roseworthy	SW 8000 4709	1973		1	1991	7	38	6.10	231	1.13	0.97	1.09	A	A	A	A
38	Calenick Stream	Hugus	SW 7841 4380	1971	R19D025	1	1991	7	29	6.30	184	0.88	1.00	0.88	A	A	A	A
39	Calenick Stream	Calenick Bridge	SW 8200 4320	1938	R19D006	4	1990	7	20	6.10	122	0.58	0.98	0.57	C	A	B	B
40	Carnon River	Chacewater Viaduct	SW 7443 4521	1974	R19E016	5	1991	7	28	6.10	171	0.83	0.98	0.81	A	A	A	A
41	Carnon River	d/s Chacewater STW	SW 7530 4331	1975	R19E008	1	1991	7	13	5.00	65	0.38	0.80	0.30	C	B	C	C
42	Carnon River	Twelveheads	SW 7615 4206	1940	R19E001	5	1990	7	17	5.00	85	0.50	0.80	0.40	C	B	C	C
43	Carnon River	d/s County and Wallington adits	SW 7695 4150	1976	R19E015	5	1991	7	6	4.30	26	0.22	0.69	0.15	D	C	D	D
44	Carnon River	Bissoe Bridge	SW 7748 4120	1977	R19E003	4	1991	7	6	5.00	30	0.18	0.79	0.14	D	B	D	D
45	Carnon River	Devoran Bridge	SW 7909 3942	1978	R19E004	4	1991	7	8	4.00	32	0.23	0.64	0.15	D	D	D	D
46	Perranwell Stream	Perranwell	SW 7759 3939	1943	R19E020	1	1990	7	26	6.30	163	0.75	1.00	0.76	B	A	A	A
47	Baldhu Stream	Bissoe Bridge	SW 7760 4149	1941	R19E021	2	1990	7	2	5.50	11	0.06	0.88	0.05	D	B	D	D

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error,

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NRA Biological Classification 1990 & 1991

Catchment: River Fal

Corresponding Freelance map filename(s):

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
48	Hick's Mill Stream	Hick's Mill	SW 7676 4113	1942	R19E019	1	1990	7	12	4.60	55	0.36	0.73	0.26	D	C	C	C
49	St Day Stream	Twelve Heads prior to R Carnon	SW 7595 4225	1980	R19E022	5	1991	7	13	4.60	62	0.59	0.75	0.44	B	C	C	C
50	Kennal	Tregolls Bridge	SW 7295 3605	1944	R19E005	4	1990	7	25	6.30	157	0.76	0.99	0.75	B	A	A	A
51	Kennal	Ponsanooth Gauging Station	SW 7562 3795	1945	R19E006	1	1990	7	33	6.60	218	1.00	1.04	1.04	A	A	A	A
52	Kennal	Sticken Bridge	SW 7735 3819	1979	R19E007	2	1991	7	27	6.00	163	0.82	0.95	0.77	A	A	A	A
53	Stithians Stream	Seaureaugh Moor	SW 7343 3747	1946	R19E023	4	1990	7	27	6.50	176	0.83	1.02	0.85	A	A	A	A
54	Mylor Stream	Enys	SW 7899 3649	1948	R19A035	4	1991	7	28	6.60	186	0.82	1.07	0.88	A	A	A	A
55	Mylor Stream	Mylor Bridge	SW 8034 3615	1902	R19A014	4	1990	7	30	6.30	188	0.87	1.01	0.88	A	A	A	A
56	Penryn River	Tremough	SW 7732 3506	1903	R19A037	2	1990	6	26	6.00	157	0.90	0.97	0.87	A	A	A	A
57	Argal Stream	Helland Mill	SW 7538 3199	1904		3	1990	7	30	6.10	183	0.90	0.96	0.86	A	A	A	A
58	Swanpool Stream	u/s Swanpool	SW 8004 3166	1949	R19A009	3	1991	7	17	4.20	72	0.49	0.68	0.34	C	C	C	C
59	Mesnporth Stream	Tregedna Bridge	SW 7881 3029	1950	R19A008	4	1991	7	34	5.70	194	0.98	0.92	0.90	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error,

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Figure 3.31 Fal Catchment (19A in part, 19B, 19C, 19D & 19E) NRA Biological Class - 1990/1991

3.2.22 Helford and Lizard Peninsula Catchments Catchment-19A

Summary

Of the 83 km of watercourses monitored by 21 sites in the Helford and Lizard Peninsula catchments, 77% (17 sites) were good, 9% (2 sites) were moderate, and 14% (2 sites) were classed as poor quality, according to the NRA Biological Classification. None were classed as very poor quality.

Likely reasons for poorer biological quality

Many of the streams in these catchment were small maritime streams, which have low RIVPACS suitability because of the paucity of such streams in the original RIVPACS II data-set. This is being addressed in the development of RIVPACS III.

Although it was classed as good overall quality, **Church Cove Stream** had moderately poorer than expected N-taxa, suggesting toxic pollution or habitat degradation. This stream commonly experiences low flows, and problems with septic tank discharges were also suspected.

Kynance Stream was moderate quality because of moderately poorer than expected N-taxa (but good EQI ASPT), suggesting toxic pollution or habitat degradation. Its poor biological quality was ascribed to the serpentine geology, though difficulties of sampling owing to large boulders and bedrock in this torrential stream may also have reduced the number of taxa collected.

Mullion Stream was of moderate quality owing to moderately poorer than expected ASPT (but good EQI N-taxa), which indicates organic pollution. The monitoring site was overgrown, and visual observations also suggested organic enrichment. Land run-off and sewage works effluent were considered to have been possible causes of chemical water quality problems in this stream (National Rivers Authority, 1991e).

The **Cury River** and the **Gunwalloe Stream** were of poor overall ecological quality owing to both poorer than expected ASPTs and N-taxa. Both sites were subject to dredging, and eutrophication was reported in both streams. Oil and tar were reported at the biological monitoring site on the Cury River.

NRA Biological Classification 1990 & 1991 '

Catchment: Lizard Peninsula Streams & Helford Corresponding Freelance map filename(s):CATCH19A.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Helford River	Mellangoose	SW 6826 2676	1909	R19A029	1	1990	7	27	5.60	152	0.79	0.90	0.71	A	A	A	A
2	Helford River	u/s Gweek Mill	SW 7020 2647	1910	R19A005	3	1990	7	30	6.20	187	0.86	1.00	0.85	A	A	A	A
3	Porth Navas Stream	Tremarth Bridge	SW 7577 2830	1905	R19A001	2	1990	7	31	6.50	202	0.92	1.03	0.95	A	A	A	A
4	Trewince Stream	Porth Navas Bridge	SW 7520 2776	1954	R19A002	5	1991	7	34	6.60	223	1.00	1.06	1.06	A	A	A	A
5	Lestraines River	Polwheveral Bridge	SW 7377 2900	1906	R19A003	4	1990	7	35	6.90	242	1.05	1.09	1.15	A	A	A	A
5	Gweek River	Gweek Bridge	SW 7061 2717	1908	R19A004	4	1990	7	38	6.60	251	1.16	1.04	1.20	A	A	A	A
6	Carvedras Stream	prior to Lestraines River	SW 7365 2913	1915	R19A027	2	1990	7	27	6.90	185	0.80	1.09	0.87	A	A	A	A
7	Gweek River	Mother-umy Mill Bridge	SW 7042 2918	1907	R19A028	4	1990	7	29	7.00	203	0.88	1.11	0.97	A	A	A	A
9	Gweek River	Denetto Bridge	SW 7062 2682	1951	R19A042	4	1991	7	33	6.50	216	0.95	1.05	1.00	A	A	A	A
10	Tolvan Cross Stream	Kestle Dee	SW 7077 2751	1952		2	1991	7	35	6.80	237	1.03	1.08	1.12	A	A	A	A
11	Rosevear River	Ponson Tuel Ford	SW 7033 2551	1953	R19A043	4	1991	7	31	6.20	191	0.92	0.98	0.90	A	A	A	A
12	Rosevear River	Rosevear	SW 7036 2563	1911	R19A006	4	1990	7	27	6.30	169	0.80	1.00	0.80	A	A	A	A
13	Trelowarren Stream	Trelowarren Mill	SW 7177 2478	1916	R19A030	3	1990	7	36	6.50	235	1.05	1.04	1.09	A	A	A	A
14	Manaccan River	Polkanoggo	SW 7557 2210	1912	R19A031	4	1990	7	34	6.70	228	1.02	1.06	1.08	A	A	A	A
15	Manaccan River	Manaccan Road Bridge	SW 7638 2461	1913	R19A021	4	1990	7	34	6.30	214	0.99	1.00	0.99	A	A	A	A
16	Porthallow Stream	Porthallow	SW 7970 2316	1917	R19A032	4	1990	7	28	5.80	162	0.81	0.94	0.77	A	A	A	A
17	St Keverne Stream	Porthoustock Bridge	SW 8047 2182	1914	R19A017	4	1990	7	32	5.80	187	0.94	0.94	0.88	A	A	A	A
18	Poltesco River	Poltesco Bridge	SW 7236 1574	1918	R19A016	4	1990	7	35	6.10	212	1.07	0.95	1.02	A	A	A	A
19	Church Cove Stream	Church Cove	SW 7120 1268	1956	R19A018	5	1991	7	18	5.00	90	0.70	1.04	0.72	B	A	A	A
20	Kynance Stream	Kynance Cove	SW 6840 1340	1957		5	1991	7	23	5.40	124	0.70	0.96	0.67	B	A	B	B
21	Mullion Stream	Mullion Cove	SW 6685 1788	1955	R19A012	5	1991	7	32	5.10	163	0.95	0.83	0.79	A	B	A	B
22	Cury River	u/s Poldhu Beach	SW 6675 2003	1919	R19A011	5	1990	7	16	4.10	66	0.44	0.72	0.32	C	C	C	C
23	Gunwallow Stream	Winnianton Farm	SW 6610 2076	1920	R19A040	5	1990	7	14	4.40	61	0.39	0.77	0.30	C	C	C	C

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor, * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¡ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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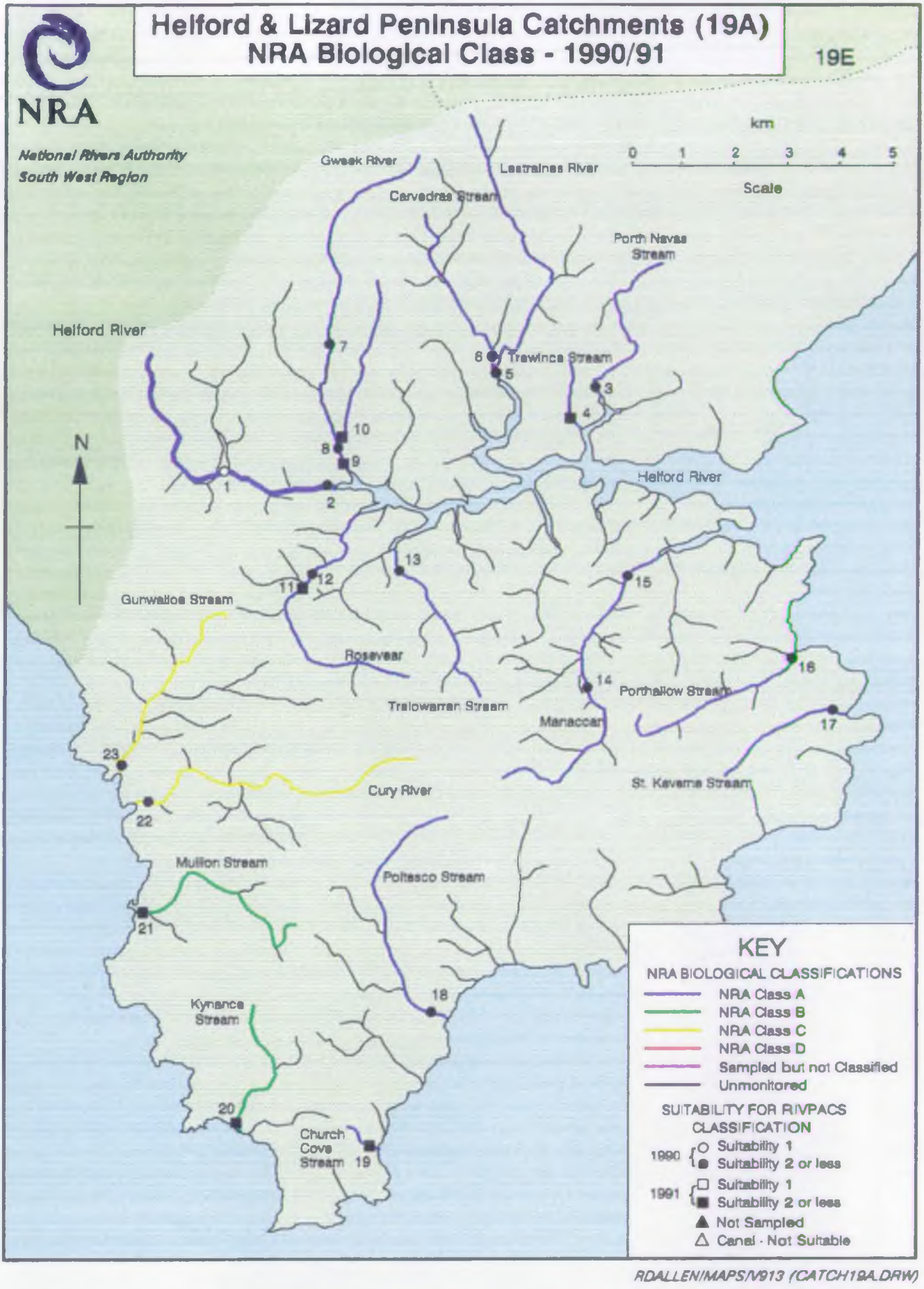

RDALLEN/MAPS/V913 (CATCH19A.DRW)

Figure 3.32 Helford and Lizard Peninsula Catchments (19A) NRA Biological Class - 1990/1991

3.2.23 River Cober Catchment Catchment-20

Summary

Of the 32 km of watercourses monitored by 10 sites in the River Cober catchment, 88% (8 sites) were good, and 12% (1 site) was moderate quality, according to the NRA Biological Classification. None were classed as poor or very poor quality. One site, Loe Pool at Bar outfall was surveyed, but not classified because the site was principally lacustrine, with strong marine influences.

All sites in the River Cober catchment had low RIVPACS suitability (4 or 5, see Table 2.4).

Likely reasons for poorer biological quality

Tolcarne Stream was of moderate quality owing to both moderately poorer than expected ASPT and N-taxa. This suggests organic pollution, but there was evidence of the influence of mining activities which are known to occur in this catchment. The watercourse was dredged upstream from the monitoring site in 1991. The stream also suffered low flows.

NRA Biological Classification 1990 & 1991

Catchment: River Cober

Corresponding Freelance map filename(s):CATCH20.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Cober	Trenear Bridge	SW 6828 3144	2001	R20A001	4	1991	7	26	6.80	177	0.80	1.07	0.85	A	A	A	A
2	Cober	Covereck Bridge	SW 6688 3012	2005	R20A008	5	1991	7	31	6.90	215	0.95	1.09	1.04	A	A	A	A
3	Cober	Lowertown Bridge	SW 6594 2910	2002	R20A003	5	1991	7	33	6.90	229	1.02	1.09	1.11	A	A	A	A
4	Cober	Helston Park	SW 6553 2730	2006	R20A009	4	1991	7	32	6.00	193	0.91	0.96	0.88	A	A	A	A
5	Cober	d/s Helston STW	SW 6524 2679	2007	R20A004	5	1991	7	32	5.80	184	0.90	0.93	0.84	A	A	A	A
6	Cober	Loe Pool at Bar outfall	SW 6430 2428	2003	R20A005		1990	7	20	4.70	94	0.00	0.00	0.00				+
7	Releath Stream	Vellanewson	SW 6625 3270	2010		4	1991	7	27	6.10	164	0.80	0.97	0.77	A	A	A	A
8	Bodilly Stream	Bodilly Mill	SW 6700 3185	2004	R20A002	5	1991	7	27	6.30	171	0.83	1.00	0.83	A	A	A	A
9	Medlyn Stream	Lower Polkellis	SW 6937 3263	2009	R20A006	5	1991	7	29	6.40	186	0.87	1.02	0.89	A	A	A	A
10	Tolcarne Stream	Tolcarne	SW 6876 3470	2008		5	1991	7	22	5.40	119	0.65	0.86	0.56	B	B	B	B

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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Figure 3.33 Cober Catchment (20) NRA Biological Class - 1990/1991

3.2.24 Lands End Catchments Catchment-21

Summary

Of the 61 km of watercourses monitored by 23 sites in the Lands End catchments, 82% (15 sites) were good, 12% (5 sites) were moderate, and 6% (2 sites) were poor quality, according to the NRA Biological Classification. None were classed as very poor quality.

All the sites in these catchment had low RIVPACS suitability, as most were small maritime streams. This is would have affected the accuracy of their classification.

Likely reasons for poorer biological quality

The lower reach of **Porthleven Stream** was of only moderate quality owing to both moderately poorer than expected ASPT and N-taxa. The monitoring site was slow-flowing and silty, and the effects of mining upstream would have contributed to its poor quality. The upstream reach of Porthleven Stream was of poor quality owing to poorer than expected N-taxa (but good EQI ASPT). This is consistent with the effects of toxic pollution known to affect this reach because of metal contaminated mine drainage. The stream bed at the monitoring site was covered by ochre.

Tregilliowe Stream was of only moderate quality because of moderately poorer than expected N-taxa, which suggests either toxic pollution, or poor habitat. The site was deep, slow-flowing and silty, and the reach's failure to comply with its River Quality Objective was though to be possibly because of the influence of drought and mining activities National Rivers Authority (1992d).

Chyandour Brook was classed as being of poor quality, largely on the basis of its EQI ASPT, which suggests organic pollution. This was thought to be from urban wastes; the reach was also channelised. This watercourse was subject to pollution by Tecnazene from a fish and chip shop that was washing potatoes. This discharge has since stopped, as it is now fed to the foul sewer.

The lower three reaches of the **Newlyn River** and both reaches of the **Trereife Stream** were of only moderate quality. Pesticide contamination has been identified in this catchment. The most downstream site, at Newlyn Bridge, may also have been influenced by an industrial estate and general problems associated with urbanisation.

NRA Biological Classification 1990 & 1991

Catchment: Lands End Streams

Corresponding Freelance map filename(s):CATCH21.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Porthleven Stream	Penbro	SW 6284 2826	2112	R21A013	5	1991	7	14	5.80	81	0.41	0.91	0.38	C	A	C	C
2	Porthleven Stream	upstream from harbour	SW 6275 2595	2101	R21A010	4	1990	7	24	5.40	130	0.70	0.87	0.61	B	B	B	B
3	Marazion River	Nancledra	SW 4944 3610	2113	R21A028	4	1991	7	32	6.40	205	0.98	1.01	0.99	A	A	A	A
4	Marazion River	Truthwall Mill Bridge	SW 5247 3257	2102	R21A002	4	1990	7	29	6.20	180	0.82	0.98	0.81	A	A	A	A
5	Tregilliowe Stream	Gwallon	SW 5258 3213	2114	R21A026	5	1991	7	24	5.60	135	0.70	0.93	0.65	B	A	B	B
6	Trevaylor Stream	Trythogga	SW 4764 3183	2103	R21A022	4	1990	7	32	6.30	200	0.97	0.98	0.95	A	A	A	A
7	Rosemorran Stream	A30 Bridge at Chyandour	SW 4812 3113	2104	R21A008	2	1990	7	31	6.50	203	0.90	1.05	0.94	A	A	A	A
8	Rosemorran Stream	Kenegie Cottage	SW 4788 3222	2115	R21A021	4	1991	7	30	6.60	197	0.91	1.03	0.94	A	A	A	A
9	Chyandour Brook	A30 Bridge at Chyandour	SW 4782 3104	2105	R21A006	4	1990	7	23	4.90	112	0.70	0.76	0.53	B	C	B	C
10	Lariggan River	Wharry Town Bridge	SW 4608 2995	2106	R21A007	3	1990	7	29	6.00	174	0.87	0.95	0.82	A	A	A	A
11	Newlyn River	Skimmel Bridge	SW 4332 3020	2107	R21A003	5	1990	7	27	6.30	170	0.84	0.99	0.82	A	A	A	A
12	Newlyn River	Buryas Bridge	SW 4460 2910	2111	R21A004	4	1990	7	24	5.50	132	0.74	0.86	0.64	B	B	B	B
13	Newlyn River	Stable Hobba	SW 4542 2930	2116	R21A027	4	1991	7	30	6.00	181	0.92	0.95	0.87	A	A	A	A
14	Newlyn River	Newlyn Bridge	SW 4609 2914	2108	R21A005	3	1990	7	24	5.80	138	0.73	0.90	0.66	B	A	B	B
15	Treneife Stream	Dennis Place	SW 4457 3008	2117	R21A019	5	1991	7	21	5.40	113	0.63	0.87	0.54	B	B	B	B
16	Treneife stream	prior to Newlyn River	SW 4519 2932	2118	R21A020	4	1991	7	21	5.10	108	0.63	0.81	0.51	B	B	B	B
17	Sancreed Brook	Little Sellan Bridge	SW 4231 2981	2120	R21A017	5	1991	7	27	6.10	164	0.83	0.95	0.79	A	A	A	A
18	Lamorna Stream	Lamorna	SW 4500 2416	2109	R21A011	5	1990	7	30	6.30	190	0.92	0.99	0.91	A	A	A	A
19	Carn Euny Stream	Trewoofe	SW 4390 2520	2110	R21A015	5	1990	7	27	6.40	174	0.83	1.01	0.83	A	A	A	A
20	Fiddlers Brook	Bojewans	SW 4321 2661	2119		4	1991	7	35	6.20	218	1.03	0.99	1.02	A	A	A	A
21	Penberth Stream	Penberth Bridge	SW 4008 2295	2201	R22A009	4	1990	7	32	5.90	190	0.97	0.93	0.91	A	A	A	A
22	Tregeseal Stream	prior to sea	SW 3590 3235	2208	R22A007	5	1991	7	29	6.40	185	0.90	1.00	0.90	A	A	A	A
23	Zennor Stream	Zennor	SW 4540 3846	2209	R22A008	5	1991	7	28	6.20	174	1.03	0.98	1.01	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¡ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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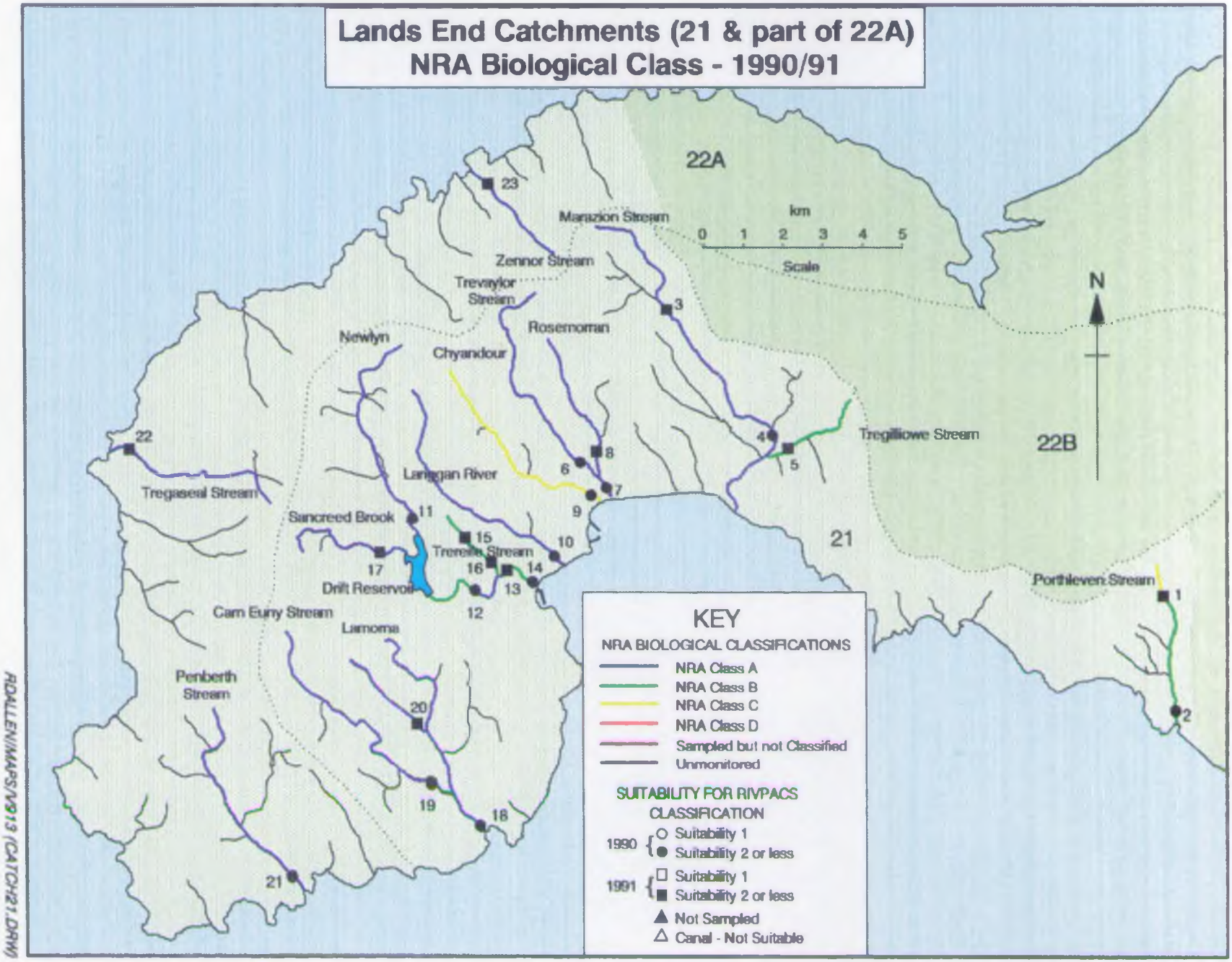

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Figure 3.34 Lands End Catchments (21) NRA Biological Class - 1990/1991

3.2.25 River Hayle Catchment Catchment-22 (part)

Summary

Of the 42 km of watercourses monitored by 14 sites in the Hayle River catchment, 74% (10 sites) were good, 15% (2 sites) were moderate, and 11% (2 sites) were poor quality, according to the NRA Biological Classification. None were classed as very poor quality.

Likely reasons for poorer biological quality

The River Hayle at Godolphin Bridge and Relubbus was of only moderate quality owing to poorer than expected N-taxa. No causes were attributed to this, though the effects of mining were suggested. The low diversity of the fauna was ascribed to the uniformity of the habitat.

Although classed as good quality overall, **Millpool Stream** had a moderately poorer than expected N-taxa. The watercourse was subject to dredging and channelisation, both of which would have affected its taxonomic richness; mine drainage was also thought to have affected it. The stream was dredged before the Spring sample was taken.

Godolphin Stream was classed as poor quality by the overall NRA Biological Classification because of its very much poorer than expected N-taxa (Class D), and poorer than expected ASPT. This stream was known to be severely affected by mining. This was thought to have caused its non-compliance with chemical River Quality Objectives, National Rivers Authority, 1992d), and was probably the cause of the poor biological quality also. There was concern that the stream was also affected by pesticides. Following investigation, it was concluded that any impacts that pesticides may have had on the stream's biota were masked by the effects of mining.

The upper reach of **Angarrack Stream** was of moderate quality, and the lower reach of poor quality, solely because of moderately poorer than expected N-taxa. This is consistent with the effects of urbanisation and channelisation which affected the stream in the vicinity of the downstream monitoring site. The stream was silty, and suffered from low flow during the Summer.

NRA Biological Classification 1990 & 1991

Catchment: River Hayle

Corresponding Freelance map filename(s):CATCH22.ORW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Hayle	B 3303 bridge Crowan	SW 6375 3467	2210	R22B014	4	1991	7	23	6.60	152	0.70	1.05	0.74	B	A	A	A
2	Hayle	Drym Farm	SW 6205 3382	2211	R22B015	2	1991	7	26	5.80	151	0.77	0.92	0.71	B	A	A	A
3	Hayle	Binner Bridge	SW 6115 3277	2212	R22B001	3	1991	7	35	6.30	221	1.03	1.00	1.03	A	A	A	A
4	Hayle	Godolphin Bridge	SW 5969 3246	2204	R22B002	3	1990	7	21	6.10	129	0.60	0.97	0.58	B	A	B	B
5	Hayle	Relubbus	SW 5664 3193	2213	R22B003	2	1991	7	23	6.60	151	0.68	1.03	0.70	B	A	A	A
6	Hayle	St Erth Gauging Station	SW 5493 3507	2205	R22B004	2	1990	7	29	6.00	175	0.81	0.95	0.77	A	A	A	A
7	Nance Stream	Lelant	SW 5407 3647	2203	R22A005	1	1990	7	28	5.60	157	0.82	0.90	0.73	A	A	A	A
8	St Erth Stream	Treloweth	SW 5435 3558	2217	R22B018	5	1991	7	29	5.60	169	0.84	0.94	0.79	A	A	A	A
9	Boswergy Stream	Trannack	SW 5610 3299	2214		4	1991	7	41	6.10	250	1.18	1.00	1.18	A	A	A	A
10	Millpool Stream	Millpool	SW 5715 3138	2206	R22B013	1	1990	7	25	6.20	154	0.72	0.99	0.71	B	A	A	A
11	Godolphin Stream	Gwedna	SW 6043 3208	2215	R22B017	3	1991	7	12	4.80	57	0.35	0.76	0.27	D	C	C	C
12	Nancegollan Stream	Tremwheal	SW 6145 3306	2216	R22B016	1	1991	7	31	6.50	202	0.91	1.04	0.95	A	A	A	A
13	Angarrack Stream	Nanpusker	SW 5885 3734	2207	R22A014	4	1991	7	19	5.70	109	0.56	0.91	0.50	C	A	B	B
14	Angarrack Stream	Phillack - Copperhouse	SW 5699 3834	2202	R22A001	5	1990	7	15	5.20	78	0.44	0.92	0.40	C	A	C	C

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ! = New site for 1992/1993
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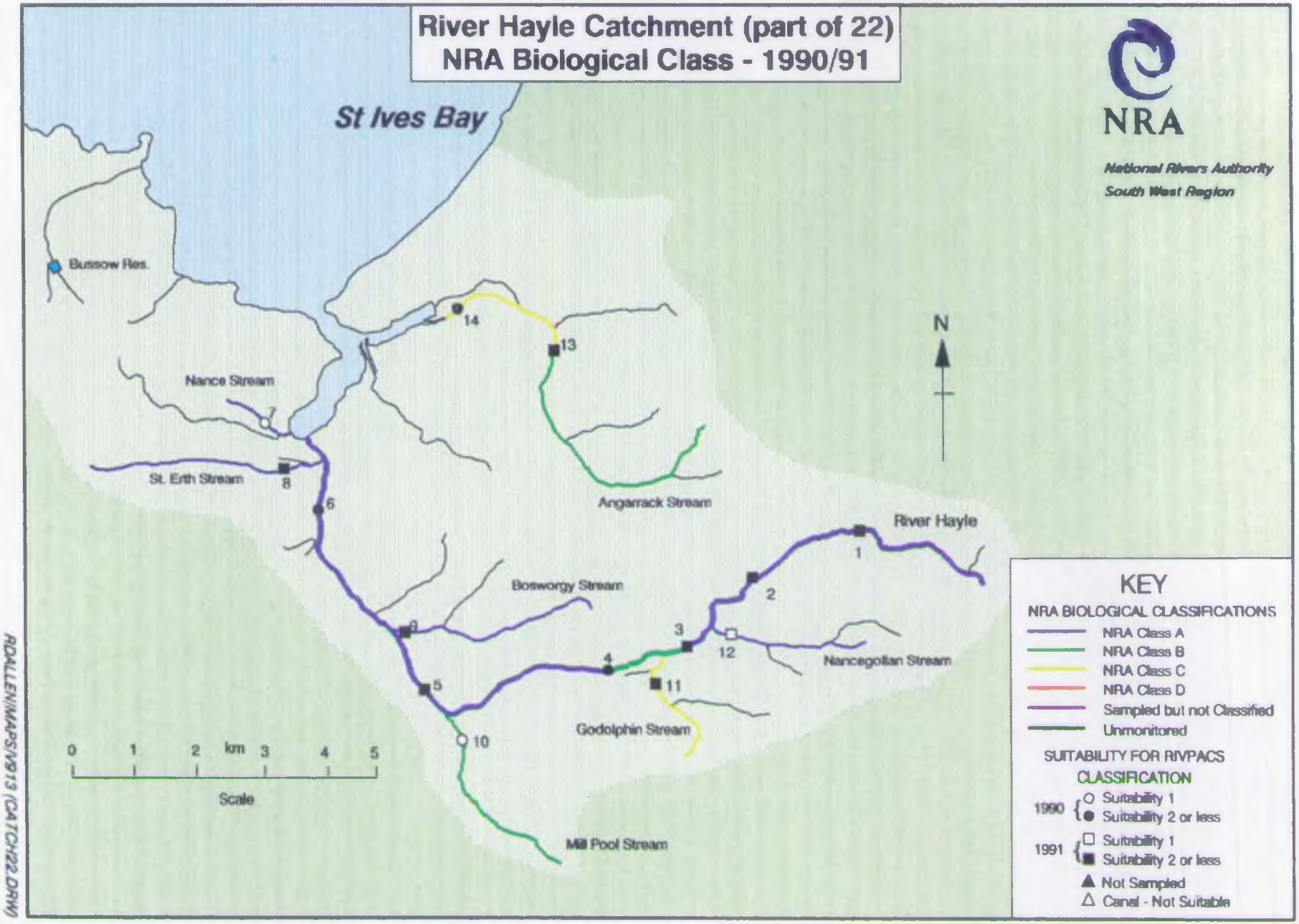

Figure 3.35 Hayle Catchment (22) NRA Biological Class - 1990/1991

3.2.26 Red River, Portreath, Bolingey and Perranporth Catchments Catchment-23

Summary

Of the 111 km of watercourses monitored by 33 sites in the Red River, Portreath, Bolingey and Perranporth catchments, 52% (18 sites) were good, 16% (5 sites) were moderate, 8% (3 sites) were poor, and 23% (6 sites) were very poor quality, according to the NRA Biological Classification. One reach, representing 1% of the watercourses, was unsuitable for classification because it was dry during the Summer.

This catchment included streams with some of the worst biological qualities in the South West Region.

Likely reasons for poorer biological quality

Apart from its most upstream reach, **The Red River** was classed as poor or very poor quality according to the overall NRA Biological Classification. At all sites, the class indicated by the EQI N-taxa was worse than that indicated by the EQI ASPT, suggesting toxic pollution or habitat degradation. This was the result of mine drainage, although the river was also badly affected by storm-water overflows. In the most downstream reach sampled at Gwithian Towans, the very poor quality was the result of both mining and organic pollution (at this site both N-taxa and ASPT were very much poorer than expected).

Although it attained an overall NRA Biological Class of good quality, the lower reaches of **Roseworthy Stream** were classed as only of moderate quality on the basis of their EQI N-taxa, indicating toxic pollution or habitat degradation. The stream was thought to be affected by mining (National Rivers Authority, 1992d).

The lower reach of the **Praze River** was of only moderate overall quality because of moderately poorer than expected ASPT, which indicates that it was organically polluted. The monitoring site at Praze-an-Beeble was very shallow.

Reen Stream was of poor overall quality, largely because of poorer than expected N-taxa which may have been the result of channelisation, or of the mining influences which were considered to have been the cause of this reach's failure to meet its chemical River Quality Objective.

The upper reach of **Tehidy Stream**, monitored at Tolvaddon Bridge, was classed as very poor quality overall because of very much poorer than expected N-taxa. This stream had been channelised, and was overgrown by Japanese Knotweed. The stream flowed underground just upstream from the monitoring site, and again downstream from the site. This may have hampered the dispersion of the invertebrates, however the effects of mine drainage, storm overflows, and land run-off which were considered to have affected the chemical quality of this stream (National Rivers Authority, 1992d) were probably the main causes of the very poor biological quality.

The **Portreath River** was of very poor quality according to its overall NRA Biological Classifications, largely because of very much poorer than

expected N-taxa, though it was also classed as poor quality by its EQI ASPT. The watercourse is known to be affected by metalliferous drainage from disused mines.

Redruth Stream was classed as very poor quality because of both very much poorer than expected N-taxa and ASPT. This was ascribed to the effects of mining, channelisation, and sewage works effluent.

Cambrose Stream was of moderate overall quality owing to moderately poorer than expected N-taxa, although it had a good EQI ASPT, which suggests toxic pollution. A possible, though unconfirmed, source of this was a piggery upstream.

The lower reach of **Porthtowan Stream** was of very poor quality according to its overall NRA Biological Classifications, because of very much poorer than expected N-taxa, though it also had a poorer than expected ASPT. The watercourse is known to be affected by metalliferous drainage from disused mines.

St Agnes Stream was of moderate quality overall, owing to moderately poorer than expected N-taxa and moderately poorer than expected ASPT, which implies that it was subject to organic pollution. The monitoring site was channelised, and contained household rubbish.

The most upstream reach of **Perranporth Stream** was dry in the Summer, which not only had a substantial impact on its biota, but made the stream unsuitable for RIVPACS prediction and hence also unsuitable for classification.

Trevellas Stream was of only moderate overall quality owing to historic metal ore mining. The toxic influence of this on the macro-invertebrate fauna was evident in its moderately poorer than expected N-taxa.

Bolingey Stream was of moderate quality, and was subject to a number of influences including the effects of historic mining activity, dredging, and contaminated run-off from spoil heaps.

NRA Biological Classification 1990 & 1991

Catchment: Red River, Portreath, Bolingey & Perranporth Corresponding Freelance map filename(s):CATCH23.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Red River	u/s Brea Tin Works	SW 6692 3917	2314	R23A001	4	1991	7	25	6.20	156	0.73	1.00	0.73	B	A	A	A
2	Red River	u/s South Crofty Mine	SW 6615 4088	2315	R23A002	4	1991	7	16	5.70	91	0.48	0.90	0.43	C	A	C	C
3	Red River	Rosecroggan Bridge	SW 6498 4197	2301	R23A003	2	1990	7	1	5.00	5	0.03	0.79	0.02	D	B	D	D
4	Red River	Kieve Bridge	SW 6292 4228	2316	R23A005	1	1991	7	8	4.40	35	0.24	0.68	0.17	D	C	D	D
5	Red River	Gwithian Towans	SW 5880 4200	2302	R23A006	5	1990	7	5	3.40	17	0.16	0.55	0.09	D	D	D	D
6	Roseworthy Stream	Botetoe Bridge	SW 6404 3765	2303	R23A038	2	1990	7	28	6.80	191	0.84	1.08	0.90	A	A	A	A
7	Roseworthy Stream	Penponds	SW 6304 3907	2317	R23A008	3	1991	7	26	6.10	159	0.78	0.96	0.75	B	A	A	A
8	Roseworthy Stream	Nancemellin	SW 6064 4097	2304	R23A009	2	1990	7	27	6.10	165	0.75	0.98	0.73	B	A	A	A
9	Praze River	Praze-an-Beeble	SW 6409 3558	2318	R23A045	4	1991	7	28	5.90	165	0.83	0.94	0.78	A	A	A	A
10	Praze River	Barripper	SW 6334 3815	2305	R23A037	2	1990	7	30	5.50	166	0.88	0.87	0.76	A	B	A	B
11	Reen Stream	Ramsgate	SW 6420 3845	2307	R23A007	4	1990	4	12	5.30	63	0.41	0.83	0.34	C	B	C	C
12	Tehidy Stream	Tolvaddon Bridge	SW 6633 4220	2320	R23A042	5	1991	7	9	4.70	42	0.27	0.74	0.20	D	C	D	D
13	Tehidy Stream	Old Marrose	SW 6513 4327	2319	R23A041	2	1991	7	27	5.80	156	0.80	0.91	0.73	A	A	A	A
14	Tehidy Stream	Coombe	SW 6298 4238	2306	R23A017	1	1990	7	28	6.00	168	0.81	0.95	0.77	A	A	A	A
15	Portreath Stream	Bridge	SW 6708 4495	2308	R23A015	1	1990	7	8	4.50	36	0.24	0.70	0.17	D	C	D	D
16	Redruth Stream	North Country Bridge	SW 6899 4379	2330	R23A014	2	1991	7	8	4.00	32	0.24	0.63	0.15	D	D	D	D
17	Cambrose Stream	Pigallie Cambrose	SW 6870 4528	2321		3	1991	7	21	5.60	117	0.62	0.90	0.55	B	A	B	B
18	Mawla Stream	Pigallie Mawla	SW 6873 4529	2322		5	1991	7	28	6.10	172	0.87	1.00	0.86	A	A	A	A
19	Porthtowan Stream	Banns Vale	SW 7141 4795	2331	R23A043	3	1991	7	30	6.50	195	0.89	1.03	0.92	A	A	A	A
20	Porthtowan Stream	Porthtowan Bridge	SW 6954 4740	2309	R23A013	4	1990	7	11	4.50	50	0.33	0.72	0.24	D	C	C	C
21	Managissey Stream	Managissey Bridge	SW 7082 4638	2323	R23A052	1	1991	7	32	6.40	206	0.94	1.02	0.96	A	A	A	A
22	St Agnes Stream	prior to culvert St Agnes	SW 7212 5128	2332	R23A016	4	1991	7	23	5.30	123	0.71	0.83	0.59	B	B	B	B
23	Trevellas Stream	u/s Trevelance Cove	SW 7284 5166	2310	R23A051	1	1990	6	18	6.10	109	0.63	0.97	0.61	B	A	B	B
24	Perranporth Stream	Silverwall	SW 7471 4770	2325	R23A046		1991	1	11	4.50	49	0.00	0.00	0.00				ø
25	Perranporth Stream	Mithlan	SW 7468 5055	2326	R23A047	1	1991	7	37	6.60	246	1.13	1.04	1.18	A	A	A	A
26	Perranporth Stream	Pleasure Gardens Perranporth	SW 7555 5396	2312	R23A012	4	1990	7	31	6.50	200	0.86	1.04	0.90	A	A	A	A
27	Bolingey Stream	Perranwell	SW 7691 5287	2324	R23A048	1	1991	7	28	7.00	195	0.81	1.10	0.89	A	A	A	A
28	Bolingey Stream	Ponsmere Bridge	SW 7604 5432	2311	R23A011	4	1990	7	23	5.10	117	0.64	0.82	0.52	B	B	B	B
29	Penwartha Stream	Penwartha	SW 7583 5226	2327		2	1991	7	38	6.60	249	1.13	1.04	1.17	A	A	A	A
30	Holywell Stream	Treleske	SW 7894 5679	2328	R23A049	2	1991	7	28	5.60	157	0.79	0.90	0.71	A	A	A	A
31	Holywell Stream	Holywell Bay Bridge	SW 7680 5868	2313	R23A010	3	1990	7	32	5.90	190	0.92	0.99	0.91	A	A	A	A
32	Treamble Stream	Trinklet	SW 7842 5606	2329		2	1991	7	41	6.40	263	1.20	1.07	1.28	A	A	A	A
33	Porth Joke Stream	prior to beach	SW 7728 6039	2334	R23A061	4	1991	7	34	5.90	199	0.99	1.01	1.00	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor, * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¡ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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Figure 3.36 Red, Portreath, Bolingey and Perranporth Catchments (23) NRA Biological Class - 1990/1991

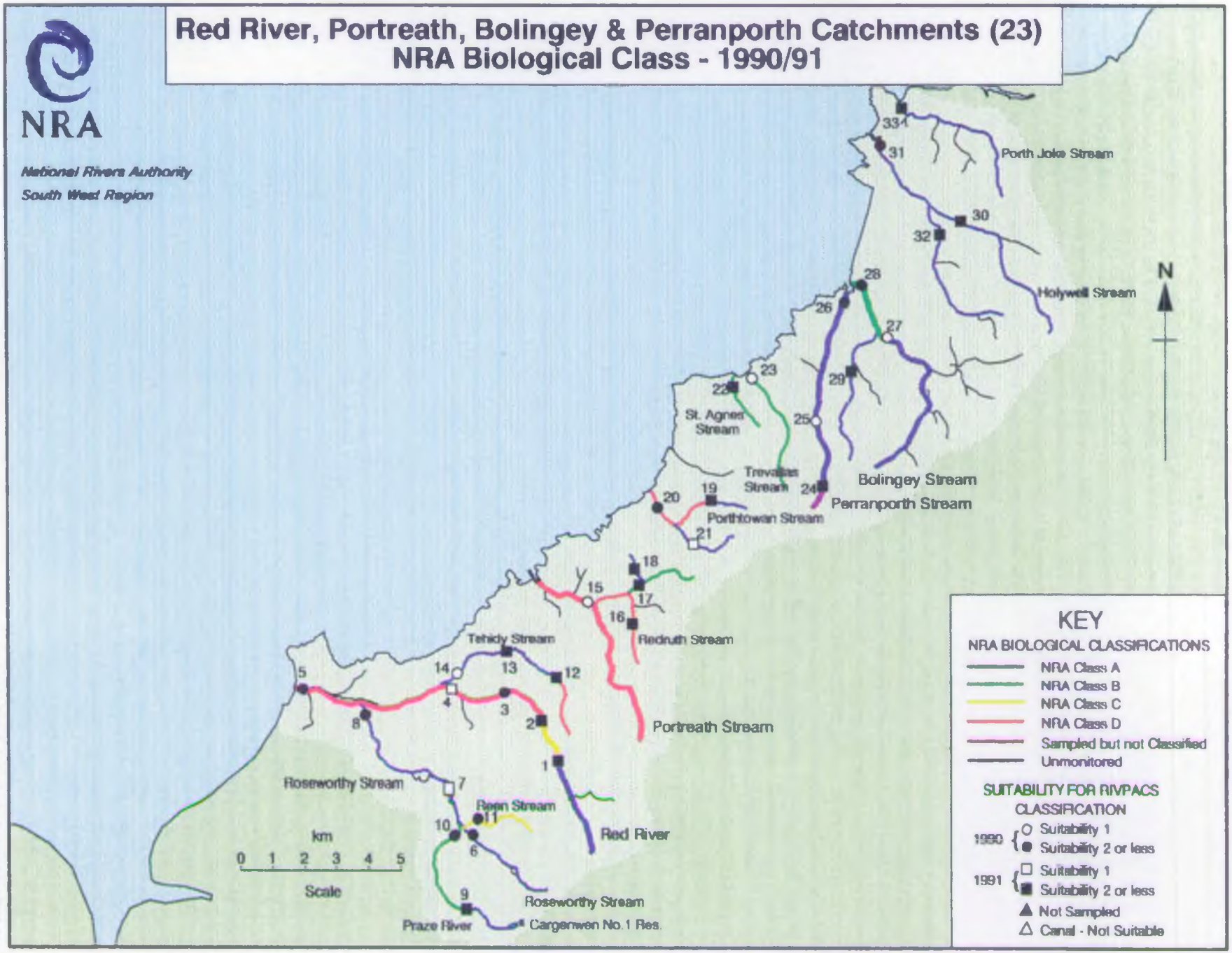

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Figure 3.36 Red, Portreath, Bolingey and Perranporth Catchments (23) NRA Biological Class - 1990/1991

3.2.27 River Gannel Catchment Catchment-24

Summary

Of the 25 km of watercourses monitored by 11 sites in the River Gannel catchment, 94% (10 sites) were good, and 6% (1 site) was moderate quality, according to the NRA Biological Classification. None were classed as poor or very poor quality.

Likely reasons for poorer biological quality

The River Gannel was of good ecological quality.

The middle reach of East Wheal Rose Stream was of moderate quality owing to poorer than expected N-taxa. In common with the upstream reach (which although classed as good quality overall, was classed as moderate according to its EQI N-taxa), the stream bed was covered in ochre. Both the ochre, and the worse than expected N-taxa, indicated metal pollution from mine drainage which is known to affect this stream. The effects of this drainage on the invertebrates was less marked downstream.

Although classed as good quality overall, Treloggan Stream had moderately poorer than expected N-taxa. There has been concern about its water quality for some time, and a number of pollution incidents have been reported. Although measures have been taken to improve its water quality, including the removal of potentially polluting discharges, water quality problems persist.

NRA Biological Classification 1990 & 1991

Catchment: River Gannel

Corresponding Freelance map filename(s):CATCH24.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed			O/E Ratio			O/E Ratio Class			Biol. Class
									M-Fams	ASPT	BMWP	M-Fams	ASPT	BMWP	M-Fams	ASPT	BMWP	
1	Gannel	Perrose	SW 8846 5826	2410	R24A008	1	1991	7	34	6.30	215	0.99	1.00	1.00	A	A	A	A
2	Gannel	Kestle Mill Bridge	SW 8510 5925	2402	R24A005	1	1990	7	39	6.60	257	1.14	1.04	1.16	A	A	A	A
3	Gannel	Gwills Gauging Station	SW 8301 5929	2403	R24A006	1	1990	7	34	6.60	224	0.97	1.04	1.01	A	A	A	A
4	Gannel	Trevemper	SW 8194 5983	2411	R24A009	1	1991	7	36	6.40	231	0.99	1.02	1.01	A	A	A	A
5	Newlyn East Stream	Roseclistan	SW 8171 5877	2405	R24A012	1	1990	7	33	6.70	222	0.98	1.06	1.04	A	A	A	A
6	Benny Stream	Benny Mill Bridge	SW 8421 5739	2406	R24A004	1	1990	7	33	6.40	210	0.97	1.00	0.97	A	A	A	A
7	Benny Stream	Trewerry Mill	SW 8373 5800	2407	R24A010	1	1990	7	37	6.40	237	1.06	1.02	1.08	A	A	A	A
8	East Wheal Rose Str	East Wheal Rose Bridge	SW 8346 5523	2412	R24A001	1	1991	7	26	6.50	168	0.77	1.03	0.80	B	A	A	A
9	East Wheal Rose Str	Matha Bridge	SW 8387 5632	2413	R24A003	1	1991	7	20	5.60	116	0.58	0.93	0.54	C	A	B	B
10	East Wheal Rose Str	Benny Bridge	SW 8377 5712	2408	R24A011	1	1990	7	30	6.40	191	0.87	1.01	0.88	A	A	A	A
11	Treloggan Stream	A3075 roundabout	SW 8196 6007	2404		5	1990	7	19	5.00	95	0.74	0.98	0.72	B	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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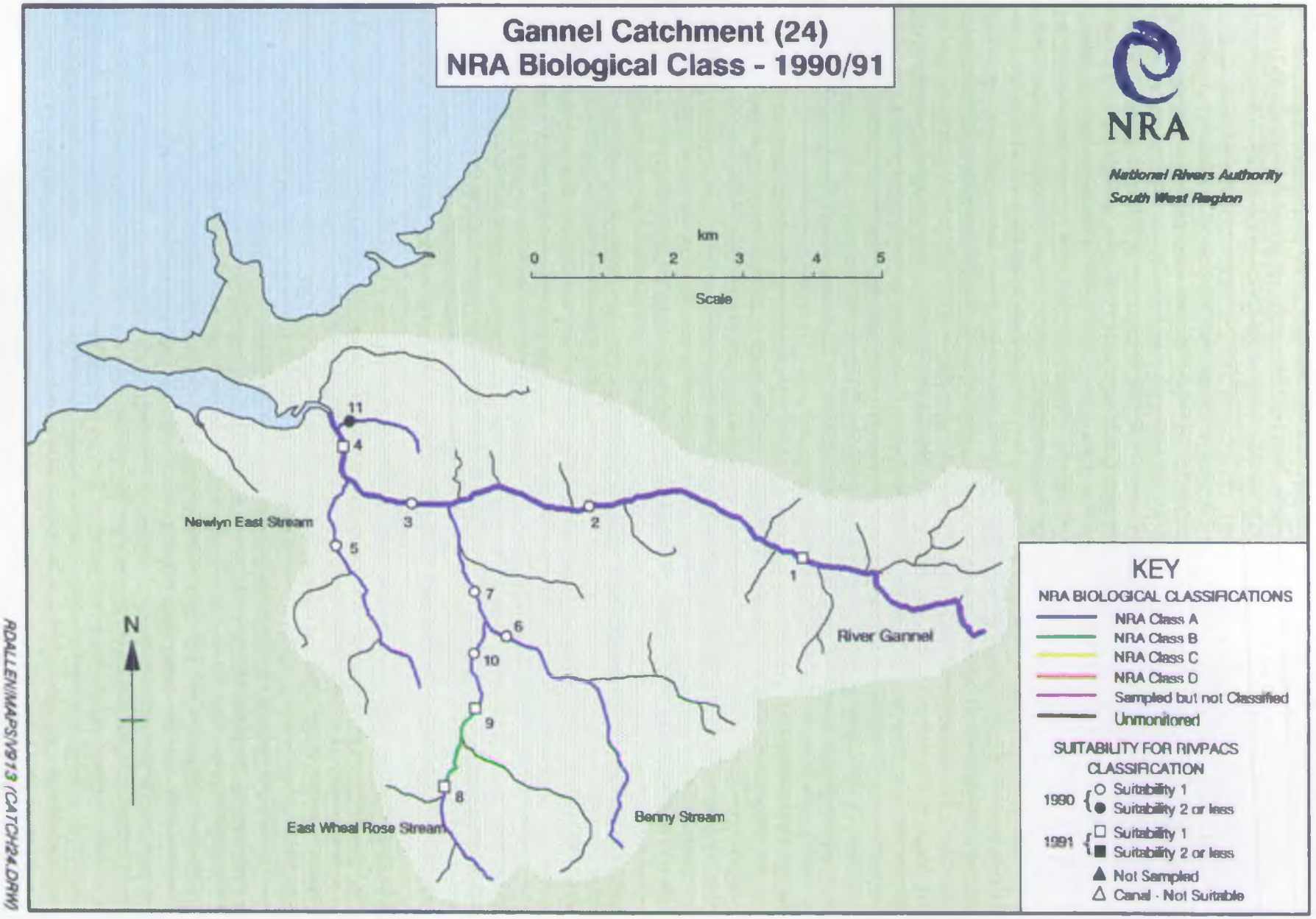

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Figure 3.37 Gannel Catchment (24) NRA Biological Class - 1990/1991

3.2.28 Porth, Gluvian, Menalhyl Catchments Catchment-25A

Summary

Of the 59 km of watercourses monitored by 18 sites in the Porth, Gluvian and Menalhyl catchments, 80% (13 sites) were good, 15% (3 sites) were moderate, and 5% (1 site) was poor quality, according to the NRA Biological classification. None were classed as very poor quality.

Likely reasons for poorer biological quality

St Mawgan Stream was of moderate quality because of both moderately poorer than expected ASPT and N-taxa, which suggests organic pollution. A silty discharge was noticed by the biologists from a campsite upstream from the monitoring site, and this may have been the cause of the pollution. The stream may have been affected by run-off and sewage from an aerodrome.

The most downstream reach of The Menalhyl was classed as poor because of poorer than expected ASPT and moderately poorer than expected N-taxa, which is consistent with the effects of organic pollution. Storm overflows, farming, and sewage effluent were cited as possible causes of chemical water quality problems (National Rivers Authority, 1992d), which together with the deep and silty nature of the stream, could have caused the poor biological quality.

The Reterth Stream was of moderate overall quality because of poorer than expected N-taxa, although it had a good ASPT. This is indicative of toxic pollution or habitat degradation. Metalliferous mine discharges were considered to have been the most likely cause of the poor biological quality. Their effect is consistent with the poor taxonomic richness and considerable amount of ochre recorded on the stream bed.

Harlyn Water, downstream from Harlyn Lake, was of moderate quality owing to both its moderately poorer than expected ASPT and N-taxa, which suggests that organic enrichment was a problem. The reach was affected by the drought (it was almost dry in the Autumn), and by effluent from septic tanks. However, the biological monitoring site was in a reed-bed where the water was barely flowing and which would have been naturally rich in organic detritus. The site had a low RIVPACS suitability (suitability code 4, see Table 2.4), which would have reduced the accuracy of the classification. A new monitoring site was established upstream from Harlyn Lake in 1992.

NRA Biological Classification 1990 & 1991

Catchment: Porth, Gluvian & Menalhyl Corresponding Freelance map filename(s):CATCH25A.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Porth Stream	Tregoose Ford Bridge	SW 8825 6162	2525	R25A004	1	1991	7	36	6.70	242	1.05	1.06	1.10	A	A	A	A
2	Porth Stream	Melancoose	SW 8621 6212	2501	R25A009	1	1990	7	31	6.00	186	0.89	0.95	0.84	A	A	A	A
3	Porth Stream	Rialton Bridge	SW 8478 6231	2502	R25A005	1	1990	7	36	6.20	223	1.01	0.98	0.99	A	A	A	A
4	St Mawgan Stream	Whipsiderry	SW 8373 6338	2526	R25A013	2	1991	7	24	5.00	119	0.69	0.80	0.55	B	B	B	B
5	Mountjoy Stream	Trewassick Bridge	SW 8606 6179	2536	R25A015	3	1991	7	37	6.80	250	1.09	1.09	1.19	A	A	A	A
6	Menalhyl	Tregamere	SW 9266 6451	2527	R25A014	1	1991	7	37	6.60	246	1.12	1.04	1.17	A	A	A	A
7	Menalhyl	St Columb Major Bridge	SW 9145 6398	2528	R25A001	1	1991	7	34	6.40	218	1.03	1.01	1.04	A	A	A	A
8	Menalhyl	d/s St Columb STW	SW 9046 6412	2529	R25A011	1	1991	7	38	6.40	243	1.12	1.01	1.12	A	A	A	A
9	Menalhyl	St Mawgan Bridge	SW 8730 6592	2503	R25A002	2	1990	7	31	6.50	201	0.91	1.02	0.93	A	A	A	A
10	Menalhyl	Mawgan Porth Bridge	SW 8492 6715	2530	R25A003	4	1991	7	23	4.70	107	0.63	0.74	0.47	B	C	B	C
11	Tregatillian Stream	Tregatillian	SW 9269 6323	2531	R25A016	1	1991	7	30	6.20	187	0.89	0.99	0.88	A	A	A	A
12	Retarth Stream	Retarth	SW 9434 6356	2532	R25A017	1	1991	7	16	6.30	113	0.53	1.00	0.53	C	A	B	B
13	Gluvian Stream	Gluvian	SW 8629 6693	2504	R25A018	1	1990	7	36	6.60	236	1.03	1.03	1.06	A	A	A	A
14	Porthcothan Stream	Porthcothan Road Bridge	SW 8597 7206	2505	R25A008	3	1990	7	33	6.10	201	0.92	0.97	0.89	A	A	A	A
15	Penrose Stream	Penrose	SW 8748 7061	2533		1	1991	7	32	6.10	195	0.93	0.98	0.91	A	A	A	A
16	Harlyn Water	Trenearne Bridge	SW 8891 7464	2555	R25A026				0	0.00	0	0.00	0.00	0.00				¡
17	Harlyn Water	Harlyn Bridge	SW 8802 7532	2506	R25A007	4	1990	7	22	5.00	110	0.63	0.88	0.55	B	B	B	B
18	St Merryn Brook	Treveglos	SW 8885 7431	2534		3	1991	7	36	6.00	216	1.07	1.02	1.09	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¡ = New site for 1992/1993
ø = Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error,

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Figure 3.38 Porth, Gluvian and Menalhyl Catchments (25A) NRA Biological Class - 1990/1991

3.2.29 River Camel Catchment Catchment-25B, C & D

Summary

Of the 145 km of watercourses monitored by 37 sites in the River Camel catchment, 99% (36 sites) were good, and 1% (1 site) was moderate quality, according to the NRA Biological Classification. None were classed as poor or very poor quality.

Likely reasons for poorer biological quality

Dunmere Stream was of moderate overall quality. This was because of organic pollution (both N-taxa and ASPT were affected). This was though to have originated from Scarlett's Well STW. Its effluent is now piped directly to the River Camel, where it receives much greater dilution.

NRA Biological Classification 1990 & 1991

Catchment: River Camel

Corresponding Freelance map filename(s):CATCH25B.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Camel	Slaughterbridge	SX 1089 8559	2537	R25B021	1	1991	7	33	6.70	221	1.00	1.05	1.05	A	A	A	A
2	Camel	Camelford Bridge	SX 1067 8343	2510	R25B001	1	1990	7	34	6.40	218	1.04	1.00	1.04	A	A	A	A
3	Camel	Pencarrow	SX 1043 8278	2538	R25B022	1	1991	7	28	6.30	175	0.86	0.98	0.84	A	A	A	A
4	Camel	Trecarne Bridge	SX 0968 8057	2539	R25B002	1	1991	7	34	6.50	220	1.04	1.01	1.05	A	A	A	A
5	Camel	Gam Bridge	SX 0890 7790	2540	R25B003	1	1991	7	33	6.70	221	1.01	1.05	1.06	A	A	A	A
6	Camel	Wenford	SX 0849 7519	2541	R25B023	1	1991	7	40	6.70	267	1.21	1.05	1.26	A	A	A	A
7	Camel	Tresarret Bridge	SX 0882 7317	2542	R25B004	1	1991	7	36	7.00	253	1.10	1.10	1.21	A	A	A	A
8	Camel	Hellandbridge	SX 0650 7150	2543	R25B005	1	1991	7	37	6.90	255	1.13	1.08	1.23	A	A	A	A
9	Camel	Dunmere Bridge	SX 0484 6780	2544	R25B006	1	1991	7	39	7.00	273	1.20	1.11	1.33	A	A	A	A
10	Camel	Nanstallon Bridge	SX 0354 6741	2511	R25B007	1	1990	7	34	6.40	216	1.00	1.00	1.00	A	A	A	A
11	Camel	Grogley	SX 0144 6860	2545	R25B008	1	1991	7	35	6.50	226	1.00	1.02	1.02	A	A	A	A
12	Camel	Polbrock	SX 0145 6940	2546	R25B029	1	1991	7	37	6.80	251	1.08	1.07	1.16	A	A	A	A
13	Issey Brook	Mellingey	SW 9212 7171	2507	R25A024	1	1990	7	34	6.30	214	0.99	1.00	0.99	A	A	A	A
14	Amble	St Kew ford	SX 0211 7678	2535	R25A010	1	1991	7	35	6.50	229	0.99	1.04	1.03	A	A	A	A
15	Amble	Chapel Amble Bridge	SW 9988 7535	2508	R25A006	2	1990	7	32	6.00	193	0.89	0.99	0.89	A	A	A	A
16	Polmorla Stream	Polmorla	SW 9835 7159	2509	R25B053	2	1990	7	37	6.40	238	1.03	1.04	1.07	A	A	A	A
17	Allan	Knightsmill Bridge	SX 0715 8067	2523	R25D001	1	1990	7	41	6.90	284	1.23	1.08	1.33	A	A	A	A
18	Allan	Kellygreen Bridge	SX 0455 7591	2553	R25D002	1	1991	7	42	6.80	284	1.23	1.06	1.30	A	A	A	A
19	Allan	Sladesbridge	SX 0106 7145	2524	R25D003	1	1990	7	38	6.60	249	1.08	1.03	1.11	A	A	A	A
20	Delabole Stream	Newhall Green	SX 0701 8221	2554	R25D009	1	1991	7	32	6.40	206	0.95	1.01	0.96	A	A	A	A
21	Ruthern	Withiel Bridge	SW 9971 6590	2547	R25B027	2	1991	7	39	6.50	253	1.17	1.02	1.19	A	A	A	A
22	Ruthern	Grogley Downs Bridge	SX 0157 6777	2512	R25B028	1	1990	7	39	6.60	265	1.10	1.07	1.17	A	A	A	A
23	Lanivet Stream	Lanivet	SX 0358 6456	2513	R25B014	1	1990	7	29	5.90	171	0.89	0.92	0.82	A	A	A	A
24	Lanivet Stream	Hoopers Bridge	SX 0388 6546	2514	R25B015	1	1990	7	30	5.90	178	0.91	0.93	0.85	A	A	A	A
25	Lanivet Stream	Nanstallon	SX 0355 6730	2548	R25B016	1	1991	7	30	6.50	194	0.86	1.02	0.87	A	A	A	A
26	St Lawrence Stream	A389 Bridge	SX 0525 6586	2515	R25B017	1	1990	7	34	6.50	220	0.97	1.03	1.00	A	A	A	A
27	St Lawrence Stream	u/s St Lawrence STW	SX 0456 6690	2516	R25B040	1	1990	7	31	5.90	184	0.88	0.94	0.83	A	A	A	A
28	St Lawrence Stream	prior to River Camel	SX 0432 6732	2549	R25B038	1	1991	7	30	5.70	170	0.85	0.89	0.76	A	A	A	A
29	Dunmere Stream	Dunmere	SX 0475 6779	2517	R25B026	4	1990	7	21	5.50	115	0.60	0.87	0.52	B	B	B	B
30	Clerkenwater	Clerkenwater	SX 0688 6877	2518	R25B018	1	1990	7	35	6.80	237	1.06	1.07	1.13	A	A	A	A
31	Blisand Stream	Lavathan Mills	SX 0905 7301	2550		1	1991	7	40	6.90	276	1.20	1.08	1.30	A	A	A	A
32	de Lank River	Bradford Bridge	SX 1140 7593	2521	R25C001	5	1990	7	45	6.80	304	1.57	1.05	1.63	A	A	A	A
33	de Lank River	Keybridge	SX 0890 7390	2522	R25C002	4	1990	7	30	7.00	211	0.96	1.10	1.05	A	A	A	A
34	Shallow Water	Jordan	SX 0912 7790	2551		1	1991	7	33	7.00	230	1.02	1.09	1.11	A	A	A	A
35	Stannon Stream	Trecarne	SX 0978 8053	2519	R25B025	4	1990	7	34	6.90	236	1.13	1.08	1.22	A	A	A	A
36	Crowdy Stream	Newhall	SX 1110 8016	2552		1	1991	7	36	6.80	245	1.10	1.07	1.17	A	A	A	A
37	Davidstow Stream	Tregoodwell	SX 1089 8327	2520	R25B024	1	1990	7	39	6.80	267	1.20	1.07	1.29	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
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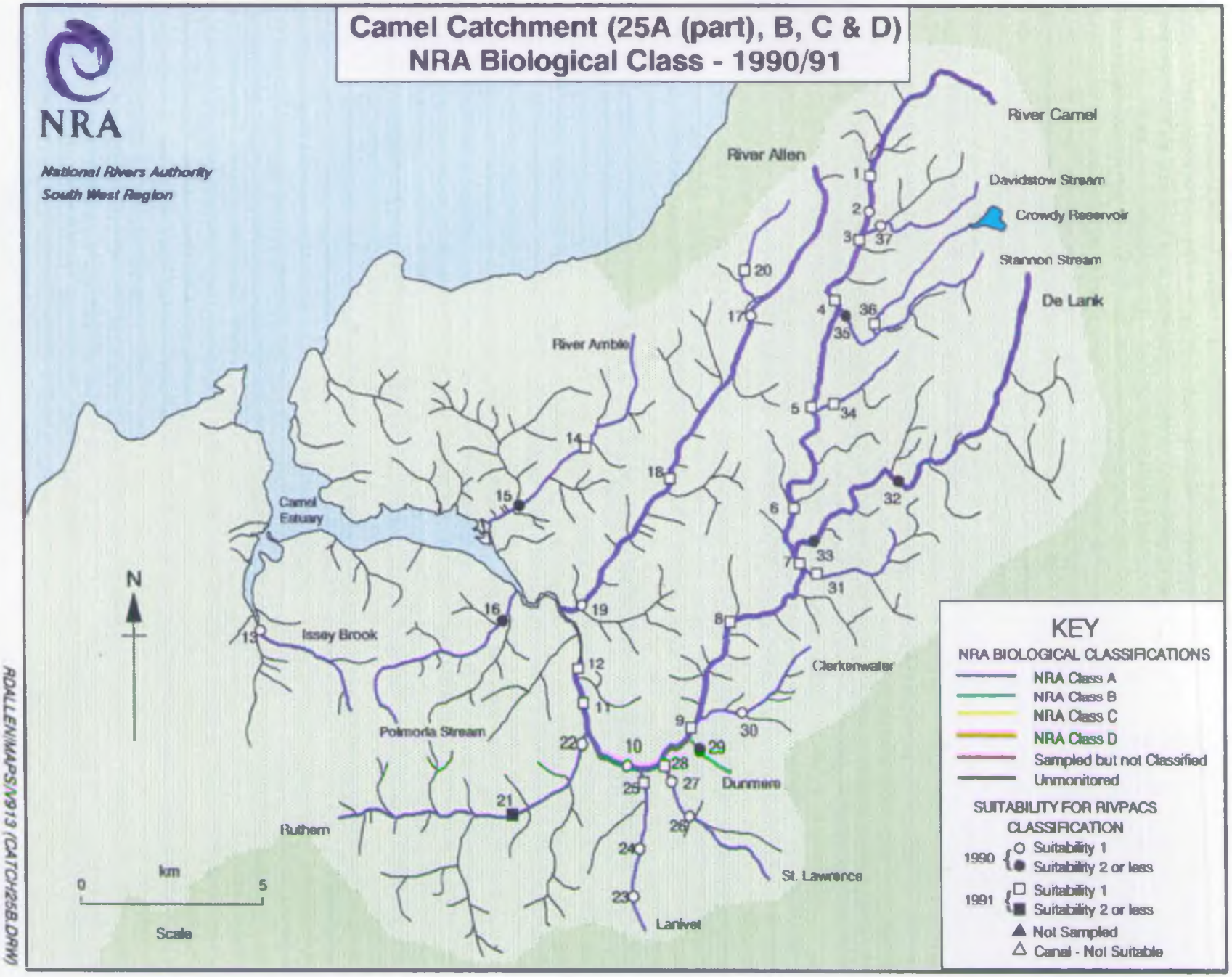

Figure 3.39 Camel Catchment (25B, 25C & 25D) NRA Biological Class-1990/1991

3.2.30 Valency and Crackington Streams Catchments Catchment-26

Summary

All 31 km of watercourses monitored by 7 sites in the Valency and Crackington Streams catchments were good quality, according to the NRA Biological Classification.

Likely reasons for poorer biological quality

N/A

NRA Biological Classification 1990 & 1991

Catchment: Valency & Crackington Streams Corresponding Freelance map filename(s):CATCH26.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Valency	Anderton Ford	SX 1377 9128	2605	R26A006	1	1991	7	37	6.80	252	1.16	1.06	1.23	A	A	A	A
2	Valency	Boscastle Bridge	SX 0988 9128	2601	R26A003	1	1990	7	30	6.80	205	0.90	1.07	0.96	A	A	A	A
3	Lesnewth Stream	Halamilling	SX 1244 9070	2606		1	1991	7	35	7.10	248	1.08	1.10	1.18	A	A	A	A
4	Crackington Stream	Crackington Haven Bridge East	SX 1432 9677	2607	R26A001	3	1991	7	36	6.50	233	1.10	1.00	1.10	A	A	A	A
5	Pengold Stream	Crackington Haven Bridge West	SX 1432 9647	2602	R26A002	1	1990	7	36	6.80	244	1.07	1.06	1.13	A	A	A	A
6	Millook Stream	Millook	SS 1849 0000	2603	R26A004	2	1990	7	37	6.60	244	1.10	1.03	1.13	A	A	A	A
7	Wanson Water	Wanson	SS 1962 0099	2604	R26A005	2	1990	7	31	6.10	188	0.90	0.95	0.85	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ; = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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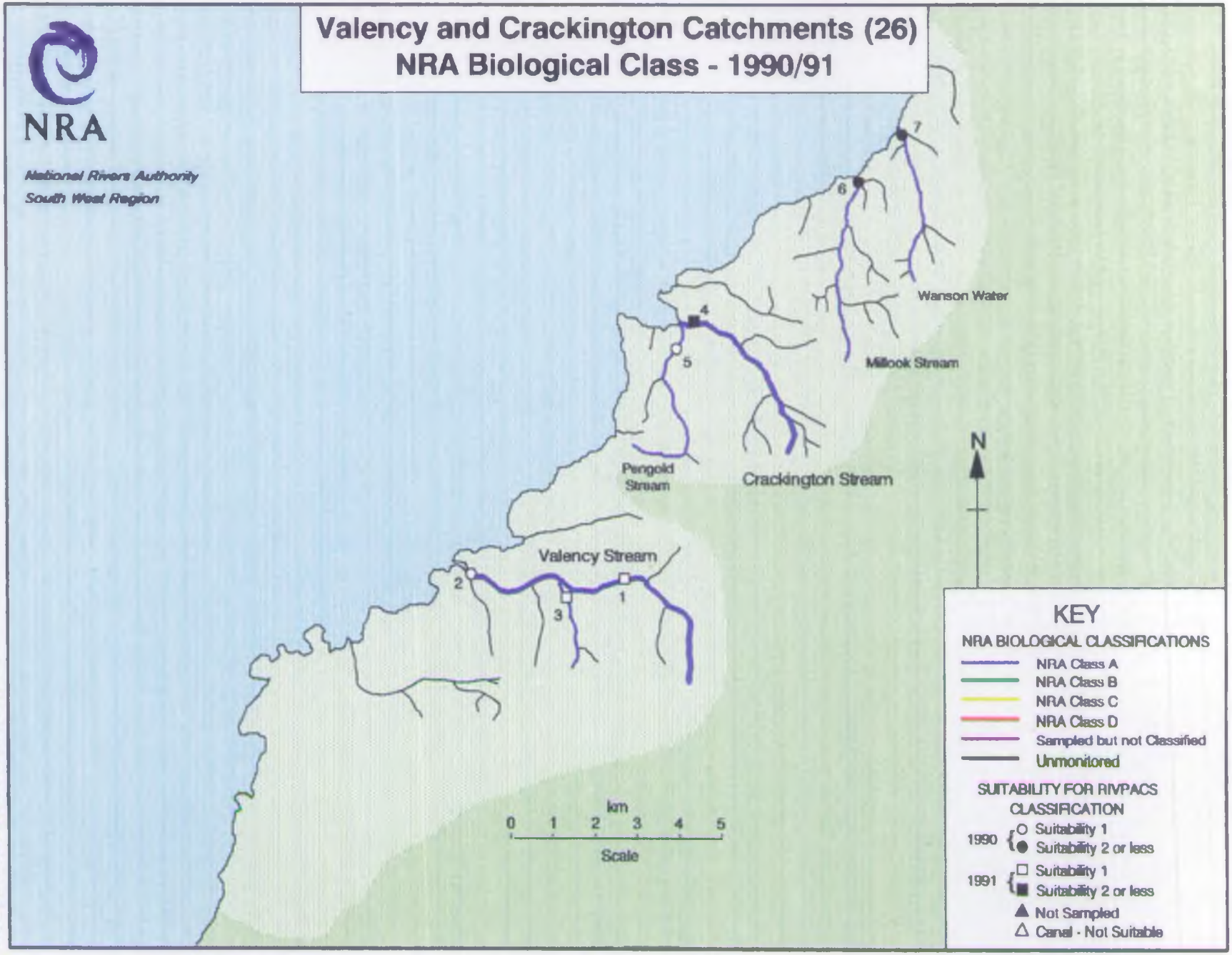

Figure 3.40 Valency and Crackington Catchments (26) NRA Biological Class-1990/1991

3.2.31 Rivers Strat and Neet Catchments Catchment-27

Summary

All 57 km of running watercourses monitored by 12 sites in the Rivers Strat and Neet catchments were classed as good quality according to the NRA Biological classification.

Likely reasons for poorer biological quality

N/A

Biological quality of canals

The invertebrate fauna in the **Bude Canal** at Falcon's Bridge, and to a lesser extent at Rodd's Bridge, was probably not of good quality because of the moderately heavy boating and angling use, and its intensively managed banks. The reach represented by the site 200 m upstream from Rodd's Bridge was of much better biological quality, because it was physically cut-off from the rest of the canal by a permanent concrete barrier, and was subjected to much less maintenance and use. This reach, unlike the more downstream reaches, had a profuse emergent flora along its banks. This reach became almost totally dry in the drought of 1990. Bude Canal could not be classified because RIVPACS II and the NRA Biological Classification apply to rivers and streams only.

Notes

The monitoring site on the Tidna was in a Nature Reserve.

NRA Biological Classification 1990 & 1991

Catchment: Rivers Strat & Neet

Corresponding Freelance map filename(s):CATCH27.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Strat	Bush	SS 2329 0769	2710	R27A015	1	1991	7	33	6.20	205	0.96	0.97	0.94	A	A	A	A
2	Strat	Stratton	SS 2291 0645	2711	R27A001	1	1991	7	36	6.30	226	1.02	0.99	1.01	A	A	A	A
3	Strat	Hele Bridge	SS 2182 0377	2702	R27A002	1	1991	7	38	6.00	229	1.04	0.95	0.99	A	A	A	A
4	Strat	Rodd's Bridge	SS 2124 0477	2703	R27A003	1	1991	7	38	5.90	226	1.05	0.95	1.00	A	A	A	A
5	Bude Canal	200m u/s Rodd's Bridge	SS 2112 0461	2713			1991	7	24	4.40	106	0.00	0.00	0.00				*
6	Bude Canal	Rodd's Bridge	SS 2111 0479	2712	R27A009		1991	7	20	4.10	81	0.00	0.00	0.00				*
7	Bude Canal	Falcon Bridge	SS 2074 0607	2704	R27A010		1990	7	17	4.50	76	0.00	0.00	0.00				*
8	Grinscott Stream	Cross Lanes	SS 2472 0640	2714		1	1991	7	34	6.30	213	1.00	0.99	0.99	A	A	A	A
9	Neet	Langford Bridge	SS 2353 0086	2705	R27A007	1	1990	7	38	6.40	242	1.06	1.01	1.07	A	A	A	A
10	Neet	Hele Bridge	SS 2183 0330	2706	R27A008	1	1991	7	35	6.10	213	1.08	0.99	1.07	A	A	A	A
11	Jacob Stream	Newmill Bridge	SX 2153 9873	2707	R27A006	1	1991	7	35	6.60	230	1.00	1.03	1.03	A	A	A	A
12	South Week Stream	Kitsham	SS 2315 0027	2701	R27A005	1	1990	7	32	6.20	199	0.89	0.98	0.87	A	A	A	A
13	Coombevalley Stream	Duckpool Cottage	SS 2025 1165	2708	R27A011	1	1990	7	37	6.40	238	1.10	1.01	1.10	A	A	A	A
14	Tidna	Tidna Bridge	SS 2060 1482	2715		2	1991	7	32	6.80	219	0.98	1.07	1.05	A	A	A	A
15	Marsland Water	Gooseham Mill	SS 2324 1725	2709	R27A016	1	1990	7	34	6.70	228	1.04	1.05	1.09	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, j = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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Figure 3.41 Strat and Neet Catchments (27) NRA Biological Class - 1990/1991

3.2.32 Hartland Streams Catchments Catchment-28

Summary

All of the 21 km of watercourses monitored by 3 sites in the Hartland Streams catchments were classed as good quality according to the NRA Biological classification.

Likely reasons for poorer biological quality

N/A

NRA Biological Classification 1990 & 1991

Catchment: Hartland Streams Corresponding Freelance map filename(s):CATCH2B.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Welcombe Stream	30m d/s footbr The Hermitage	SS 2160 1830	2801	R28A005	1	1990	7	34	6.80	231	1.04	1.06	1.11	A	A	A	A
2	Lyme Brook	15m u/s waterfall	SS 2258 2353	2803		5	1991	7	33	6.30	207	1.05	1.10	1.15	A	A	A	A
3	Abbey River	Hartland Abbey 50m u/s br	SS 2383 2488	2802	R28A003	1	1990	7	36	6.60	237	1.10	1.03	1.13	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ! = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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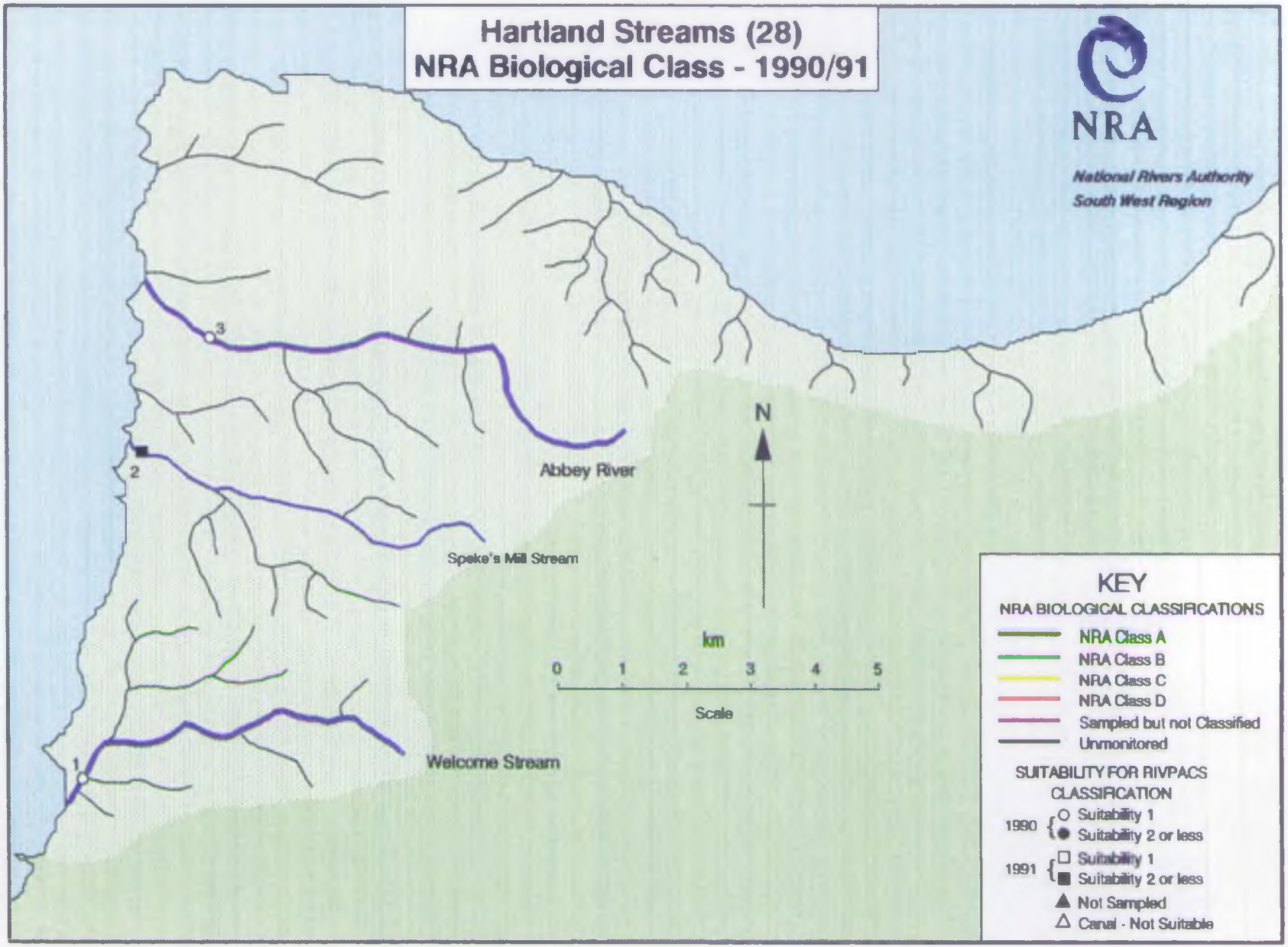

Figure 3.42 Hartland Catchments (28) NRA Biological Class - 1990/1991

3.2.33 River Torridge Catchment Catchment-29

Summary

Of the 337 km of watercourses monitored by 72 sites in the River Torridge Catchment, 95% (68 sites) were good, and 5% (4 sites) were moderate quality, according to the NRA Biological classification. None were classed as poor or very poor quality.

Likely reasons for poorer biological quality

Common Lake was of only moderate quality because of organic enrichment. This was thought to be the result of effluent from an abattoir.

The most upstream reach of Mere Stream, although of good quality according to its overall NRA Biological Classification, had moderately poorer than expected N-taxa. This stream was affected by discharges from ball clay mines.

The uppermost reach of the West Okement that was monitored, just downstream from Meldon Dam was of moderate quality owing to poorer than expected N-taxa. This probably resulted from the proximity of the dam, which would prevent colonisation by downstream drift of invertebrates. The dam also affected the chemical quality of the water, which was moderately acidic and had a high concentration of metals. The stream bed was covered by a thick slime of algae and precipitated iron and manganese oxides, which would also have affected its taxonomic richness. The West Okement near Meldon Quarry Bridge was of moderate overall quality because of poorer than expected N-taxa. This was ascribed to the effects of acidic conditions and metal contamination, as was the moderately poorer than expected N-taxa at the reach monitored at Meldon Viaduct. Although classed as good quality by the overall NRA Biological Classification, the most downstream reach of the West Okement, monitored near Okehampton Hospital, had a moderately poorer than expected N-taxa which is consistent with the toxic effects of acidic metal-rich waters. The stream bed was covered by ochre and fine sediment. All the monitoring sites on the West Okement were difficult to sample because of the bouldery river bed and the rapid flow.

Brightley Stream was classed as good according to the overall NRA Biological Classification, as well as by its EQIs for ASPT and N-taxa. This was surprising as it was known to have been affected by acidic metal pollution in 1990, particularly in its upper reaches (National Rivers Authority, 1991d).

Pulworthy Brook was of moderate quality because of its moderately poorer than expected N-taxa. It was of good quality according to its EQI ASPT. This suggests toxic pollution or habitat degradation. This stream was slow flowing, and the biologists recorded considerable amounts of 'trash' in it. The high loading of suspended solids was attributed to forestry activities. Poor chemical water quality in this stream was thought to have been because of the drought or farming activities.

NRA Biological Classification 1990 & 1991

Catchment: River Torridge — Corresponding Freelance map filename(s):CATCH29.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Torridge	30m u/s rd br Fordmill Farm	SS 3246 1777	2915	R29C001	1	1990	7	36	6.70	241	1.07	1.05	1.12	A	A	A	A
2	Torridge	225m u/s br 30m d/s quarry Putford	SS 3638 1613	2944	R29C032	1	1991	7	34	6.90	234	1.02	1.08	1.10	A	A	A	A
3	Torridge	200m u/s Woodford Bridge	SS 3978 1268	2916	R29C002	1	1991	7	39	6.70	261	1.17	1.05	1.23	A	A	A	A
4	Torridge	20m u/s br Gidcott	SS 4220 0941	2945	R29C033	1	1991	7	35	6.50	229	1.04	1.03	1.06	A	A	A	A
5	Torridge	50m d/s Coham Br u/s Kingsley Mill	SS 4610 0632	2917	R29C003	1	1990	7	37	6.50	240	1.09	1.02	1.11	A	A	A	A
6	Torridge	50m d/s bridge Sheepwash	SS 4865 0574	2946	R29B035	1	1991	7	37	6.40	238	1.80	1.04	1.24	A	A	A	A
7	Torridge	50m d/s Rockhay Bridge	SS 5060 0698	2918	R29C004	1	1990	7	32	6.40	205	0.96	1.02	0.98	A	A	A	A
8	Torridge	250m u/s Hele Bridge	SS 5385 0613	2919	R29C005	1	1990	7	35	6.60	231	1.06	1.05	1.12	A	A	A	A
9	Torridge	125m d/s New Bridge	SS 5489 1112	2907	R29B001	1	1991	7	32	6.60	212	0.92	1.04	0.95	A	A	A	A
10	Torridge	50m u/s Beaford Bridge	SS 5428 1426	2937	R29B002	1	1991	7	26	6.90	180	0.82	1.12	0.92	A	A	A	A
11	Torridge	10m u/s track and Undercleave	SS 5178 1652	2938	R29B038	1	1991	7	32	6.60	211	1.00	1.06	1.06	A	A	A	A
12	Torridge	300m d/s Town Mills Torrington	SS 4987 1870	2939	R29B003	1	1991	7	32	6.60	210	1.00	1.06	1.06	A	A	A	A
13	Torridge	100m d/s Rotharn Bridge	SS 4780 1976	2908	R29B004	1	1991	7	33	6.10	200	1.02	0.98	1.00	A	A	A	A
14	Torridge	100m u/s Beam Bridge	SS 4731 2089	2940	R29B034	1	1991	7	35	6.60	231	1.08	1.07	1.15	A	A	A	A
15	Yeo [Bideford]	75m u/s br Foxdown	SS 3809 2217	2929	R29A001	1	1991	7	35	6.40	223	1.05	1.00	1.05	A	A	A	A
16	Yeo [Bideford]	30m u/s Tuckingmill Bridge	SS 4015 2245	2901	R29A002	1	1990	7	34	6.50	222	1.03	1.02	1.06	A	A	A	A
17	Yeo [Bideford]	25m u/s Hoopers Bridge	SS 4273 2317	2902	R29A015	1	1990	7	36	6.60	237	1.08	1.03	1.11	A	A	A	A
18	Yeo [Bideford]	opposite Edge Mill House	SS 4491 2293	2903	R29A003	1	1990	7	39	6.77	264	1.14	1.07	1.22	A	A	A	A
19	Duntz	30m u/s Hembury rd br	SS 4293 1777	2904	R29A004	1	1990	7	34	6.70	229	1.05	1.06	1.11	A	A	A	A
20	Duntz	50m u/s Yeo confluence (Orleigh)	SS 4395 2242	2905	R29A005	1	1990	7	38	6.40	244	1.11	1.01	1.12	A	A	A	A
21	Lydeland Water	50m u/s Tythecott Mill Bridge	SS 4190 1838	2906	R29A006	1	1990	7	33	6.50	215	1.00	1.02	1.02	A	A	A	A
22	Huntshaw Water	30m u/s br Weare Gifford	SS 4794 2144	2943	R29A026	1	1991	7	38	6.60	249	1.11	1.02	1.14	A	A	A	A
23	Common Lake	10m u/s Tantons Plain	SS 4940 1982	2910	R29B039	1	1990	7	24	5.40	130	0.72	0.85	0.61	B	B	B	B
24	Langtree Lake	30m u/s br Servis Farm	SS 4774 1919	2936	R29A016	1	1991	7	37	6.90	254	1.06	1.08	1.14	A	A	A	A
25	Woolleigh Brook	25m d/s B3220 road br	SS 5219 1714	2909	R29B037	1	1990	7	39	6.50	252	1.11	1.02	1.13	A	A	A	A
26	Mere	50m u/s Coleford Bridge	SS 5017 1325	2911	R29B007	1	1990	7	27	6.30	170	0.77	0.99	0.76	B	A	A	A
27	Mere	300m u/s A386 br 50m u/s pylons	SS 5238 1130	2912	R29B008	1	1990	7	35	6.20	217	0.97	0.98	0.95	A	A	A	A
28	Mere	150m u/s fm br Greatwood	SS 5480 1285	2913	R29B009	1	1990	7	34	6.50	221	0.94	1.02	0.97	A	A	A	A
29	Little Mere River	25m u/s track br Wooladon Moor	SS 5336 0841	2941	R29B005	2	1991	7	26	5.80	152	0.67	0.97	0.85	A	A	A	A
30	Little Mere River	20m u/s Burymoor Bridge	SS 5257 1105	2914	R29B006	1	1990	7	32	6.60	211	0.89	1.05	0.93	A	A	A	A
31	Dolton Stream	25m d/s track br u/s Torridge confl	SS 5531 1154	2942		1	1991	7	33	6.30	208	0.99	0.99	0.98	A	A	A	A
32	East Okement River	200m u/s Fatherford rail br	SX 6048 9460	2968	R29D031	4	1991	7	27	7.10	191	1.02	1.10	1.13	A	A	A	A
33	East Okement River	300m u/s A30 rd br at car park	SX 5898 9510	2931	R29D001	1	1990	7	29	6.70	195	1.30	1.06	1.37	A	A	A	A
34	West Okement River	100m u/s Red-a-Ven d/s Meldon Dam	SX 5641 9190	2969	R29D027	3	1991	7	13	6.10	79	0.48	0.94	0.45	C	A	B	B
35	West Okement River	30m u/s footbr d/s Red-a-Ven	SX 5640 9205	2970	R29D109	4	1991	7	24	6.70	160	0.82	1.03	0.84	A	A	A	A
36	West Okement River	30m u/s Meldon Viaduct	SX 5649 9230	2971	R29D032	4	1991	7	20	6.30	126	0.76	0.98	0.74	B	A	A	A
37	West Okement River	30m u/s Meldon Quarry br	SX 5664 9331	2972	R29D030	1	1991	7	18	6.60	119	0.58	1.03	0.60	C	A	B	B
38	West Okement River	Okehampton Hosp d/s Castle car park	SX 5850 9435	2932	R29D002	1	1990	7	23	6.40	147	0.73	1.00	0.73	B	A	A	A
39	Okement	100m d/s Knowle Bridge	SX 5930 9639	2964	R29D026	1	1991	7	25	6.40	161	0.79	1.01	0.80	A	A	A	A
40	Okement	75m d/s Brightley Bridge	SX 5987 9750	2925	R29D003	1	1990	7	24	6.70	161	1.13	1.05	1.19	A	A	A	A
41	Okement	South Dornaford	SS 5999 0002	2926	R29D004	1	1990	7	31	6.50	200	0.96	1.01	0.97	A	A	A	A
42	Okement	15m u/s A3072 br Jacobstowe	SS 5920 0169	2965	R29D008	1	1991	7	37	6.60	243	1.13	1.03	1.16	A	A	A	A
43	Okement	25m d/s Woodhall Bridge	SS 5845 0343	2927	R29D005	1	1991	7	31	6.60	204	0.94	1.03	0.97	A	A	A	A
44	Okement	100m u/s Iddesleigh Bridge	SS 5690 0590	2966	R29D006	1	1991	7	35	6.40	225	1.06	1.01	1.07	A	A	A	A
45	Hole Brook	50m u/s Monkokehampton	SS 5836 0545	2933	R29D007	1	1990	7	35	6.20	216	0.98	0.98	0.95	A	A	A	A
46	Beckamoor Brook	75m u/s Terris Bridge	SS 5818 0328	2928	R29D052	5	1991	4	30	6.60	198	0.87	1.06	0.92	A	A	A	A
47	Jacobstowe Stream	20m u/s Okement confl	SS 5913 0161	2967		1	1991	7	35	6.60	230	1.04	1.03	1.07	A	A	A	A
48	Brightley Stream	25m u/s rd br Brightley Mill	SX 5970 9703	2930	R29D025	2	1990	7	19	5.70	108	0.89	0.89	0.79	A	A	A	A
49	Red-A-Ven Brook	75m u/s West Okement confluence	SX 5647 9200	2934	R29D028	4	1990	7	26	6.80	176	1.22	1.06	1.30	A	A	A	A
50	Law	50m u/s Hole Stock Bridge	SS 4885 0005	2923	R29C006	1	1990	7	38	6.40	245	1.10	1.01	1.11	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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NRA Biological Classification 1990 & 1991

Catchment: River Torridge Corresponding Freelance map filename(s):CATCH29.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
51	Lew	Bloomaford 3rd field from rd	SS 5090 0070	2950	R29C025	1	1991	7	34	6.60	223	0.97	1.03	1.00	A	A	A	A
52	Lew	15m u/s br Great Rutleigh	SS 5140 0079	2951	R29C007	1	1991	7	37	6.40	236	1.07	1.00	1.07	A	A	A	A
53	Lew	200m u/s Hatherleigh Bridge	SS 5398 0400	2924	R29C008	1	1991	7	37	6.60	244	1.05	1.03	1.08	A	A	A	A
54	Lew	130m u/s Lower Bridge	SS 5318 0515	2952	R29C009	4	1991	7	31	6.50	200	0.91	1.02	0.93	A	A	A	A
55	Pulworthy Brook	30m u/s hedge Furzehill	SS 5258 0415	2953	R29C021	1	1991	7	25	5.60	141	0.68	0.90	0.61	B	A	B	B
56	Madland Brook	10m u/s br Waterhouse	SS 5481 0131	2954	R29C022	1	1991	7	28	6.50	182	0.83	1.02	0.85	A	A	A	A
57	Hookmoor Brook	15m u/s br Marracott	SS 5310 0070	2955	R29C023	1	1991	7	35	6.80	237	1.03	1.06	1.09	A	A	A	A
58	Wagaford Water	75m d/s Wagaford Bridge	SS 4890 0168	2956	R29C024	1	1991	7	31	6.60	205	0.87	1.04	0.91	A	A	A	A
59	Northlew Stream	Northlew 55m u/s br	SX 5075 9910	2957	R29C026	1	1991	7	38	6.20	235	1.12	0.97	1.09	A	A	A	A
60	Stonay Stream	30m u/s ford Coombe	SX 5044 9700	2958	R29C029	2	1991	7	28	6.60	189	0.86	1.06	0.90	A	A	A	A
61	Mussel Brook	125m u/s br Westover	SS 4786 0654	2960	R29C038	1	1991	7	33	6.20	203	0.92	0.97	0.89	A	A	A	A
62	Whiteleigh Water	40m u/s br Dipper Mill	SS 4385 0638	2961	R29C039	1	1991	7	34	6.60	223	0.99	1.03	1.02	A	A	A	A
63	Waldon	50m u/s br Berridon Cottage	SS 3182 1412	2947	R29C010	1	1991	7	33	6.30	207	0.97	0.99	0.96	A	A	A	A
64	Waldon	200m u/s Sutcombe Bridge	SS 3465 1100	2921	R29C030	1	1990	7	38	6.40	245	1.12	1.01	1.13	A	A	A	A
65	Waldon	10m u/s Waldon Bridge	SS 3682 1042	2948	R29C011	1	1991	7	35	6.60	230	1.02	1.03	1.05	A	A	A	A
66	Waldon	200m u/s br Barry Farm	SS 3910 0988	2949	R29C042	1	1991	7	32	6.40	205	0.91	1.01	0.92	A	A	A	A
67	Waldon	250m u/s Henscott Bridge	SS 4137 0812	2922	R29C012	1	1990	7	34	6.40	218	1.01	1.01	1.02	A	A	A	A
68	Cookbury Stream	125m u/s br Bason Cross	SS 4118 0795	2959	R29C043	1	1991	7	31	6.40	198	0.88	1.00	0.88	A	A	A	A
69	Dipple Water	150m u/s Dipple Bridge	SS 3492 1787	2920	R29C013	1	1990	7	36	6.30	226	1.05	0.99	1.03	A	A	A	A
70	Cranford Water	d/s rubbish and earth tip	SS 3407 2105	2935	R29C044	1	1991	7	35	6.80	239	1.07	1.07	1.14	A	A	A	A
71	Clifford Water	15m u/s br Biteford	SS 3020 1896	2962	R29C040	1	1991	7	34	6.40	216	1.01	1.00	1.00	A	A	A	A
72	Sackington Water	75m u/s br Gorvin	SS 2977 2006	2963	R29C041	2	1991	7	36	6.30	225	1.08	0.98	1.07	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ¦ = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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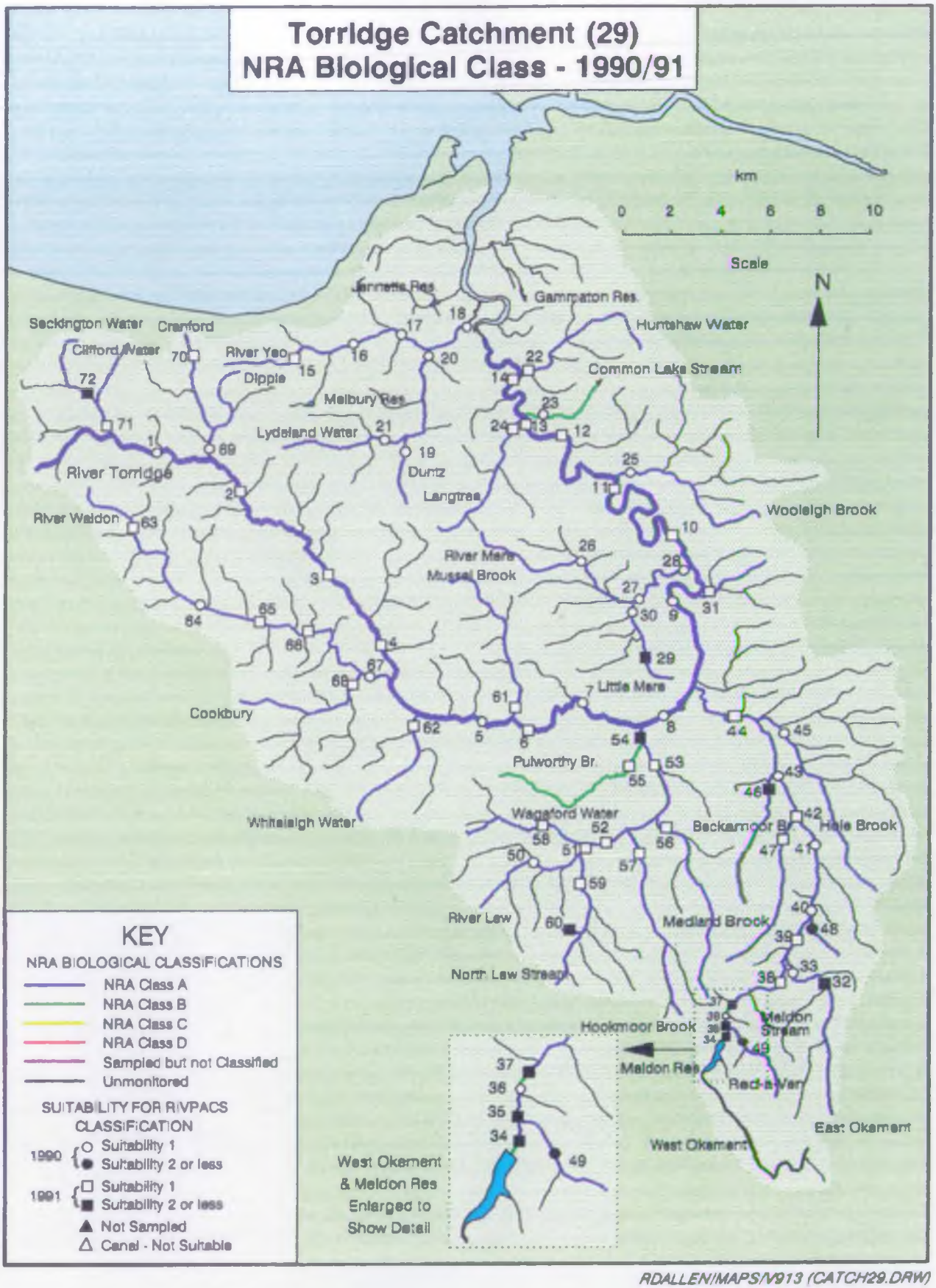

Figure 3.43 Torridge Catchment (29) NRA Biological Class - 1990/1991

3.2.34 River Taw Catchment Catchment-30

Summary

Of the 442 km of watercourses monitored by 74 sites in the River Taw catchment, 97% (70 sites) were good, and 3% (4 sites) were moderate quality, according to the NRA Biological Classification. None were classed as poor or very poor quality.

Likely reasons for poorer biological quality

Knighty Brook was of moderate overall quality, solely because of its moderately poorer than expected N-taxa. The stream was deep and difficult to sample with the dredge. There was negligible flow. The difficulty of sampling may have caused the moderate class. No causes of poor water quality were known.

Spires Lake was of moderate quality owing to a moderately poorer than expected ASPT, but it had a good EQI N-taxa: this indicates organic pollution. The stream was very overgrown during the Summer and Autumn, and had a low flow in the Autumn. This stream has a history of problems from pesticides: it drains intensively farmed arable land.

Croyde Stream was classed as moderate quality because of its moderately poorer than expected ASPT and N-taxa, which is usually an indication of organic pollution. This small stream had consistently poor biological quality throughout the year. It became overgrown with emergent plants in Autumn. A farm upstream from the site was reported to pollute the stream periodically.

The Forda was of moderate overall quality because of its moderately poorer than expected ASPT and N-taxa, implying that it was organically polluted. The monitoring site was downstream from the confluence of the Croyde Stream, and was channelised through the village. All these factors may have contributed to is moderately poor overall class.

note that there are local differences in the names given to Croyde Stream and The Forda.

NRA Biological Classification 1990 & 1991

Catchment: River Taw

Corresponding Freelance map filename(s):CATCH30.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Taw	300m u/s old A30 br Sticklepath	SX 6417 9393	3012	R30C001	4	1990	7	27	6.90	185	1.23	1.07	1.32	A	A	A	A
2	Taw	50m u/s East Rowden Bridge	SX 6550 9951	3013	R30C002	1	1990	7	34	6.70	229	1.03	1.05	1.08	A	A	A	A
3	Taw	50m u/s br Yeo Farm	SS 6511 0292	3048	R30C003	1	1991	7	31	6.00	187	0.90	0.95	0.86	A	A	A	A
4	Taw	Bondleigh 10m u/s bridge	SS 6578 0451	3049	R30C004	1	1991	7	31	6.40	198	0.91	1.01	0.92	A	A	A	A
5	Taw	100m u/s Taw bridge	SS 6727 0649	3050	R30C005	1	1991	7	26	6.30	165	0.76	1.00	0.76	B	A	A	A
6	Taw	25m u/s Park Mill Bridge	SS 6963 0860	3014	R30CD06	1	1990	7	30	6.60	198	0.87	1.05	0.91	A	A	A	A
7	Taw	200m d/s br Chanson	SS 7000 0953	3041	R30BD01	1	1991	7	39	6.10	239	1.16	0.98	1.14	A	A	A	A
8	Taw	30m u/s Kersham Bridge	SS 6621 1353	3042	R30BD02	1	1991	7	39	6.30	247	1.15	1.01	1.16	A	A	A	A
9	Taw	350m u/s Newnham Bridge	SS 6599 1701	3005	R30B003	1	1990	7	38	6.60	250	1.15	1.06	1.21	A	A	A	A
10	Taw	150m u/s rd br Kingford	SS 6253 1926	3043	R30B004	1	1991	7	43	6.50	279	1.34	1.04	1.40	A	A	A	A
11	Taw	250m u/s rd br Umberleigh	SS 6075 2345	3044	R30B015	1	1991	7	31	6.20	191	0.93	0.98	0.91	A	A	A	A
12	Taw	Chapelton 200m u/s footbridge	SS 5830 2592	3006	R30B014	1	1990	7	34	6.10	206	1.04	0.98	1.02	A	A	A	A
13	Taw	75m u/s New Bridge	SS 5700 2825	3007	R30B005	1	1990	7	38	6.20	236	1.06	1.01	1.07	A	A	A	A
14	Caen	opp vicarage 75m u/s br	SS 4887 3720	3001	R30A002	1	1990	7	33	6.00	199	1.00	0.95	0.95	A	A	A	A
15	Knowl Water	20m u/s Wrafton Bridge	SS 4903 3560	3002	R30A006	1	1990	7	35	5.90	207	0.99	0.97	0.95	A	A	A	A
16	Bradiford Water	25m d/s Bradiford Bridge	SS 5503 3427	3003	R30A001	1	1990	7	37	6.40	236	1.06	1.01	1.06	A	A	A	A
17	Yeo [Barnstaple]	100m u/s Brockham Bridge	SS 6035 4087	3033	R30H001	1	1990	7	33	6.60	217	1.01	1.04	1.05	A	A	A	A
18	Yeo [Barnstaple]	50m u/s Riversmead Bridge	SS 5958 3570	3034	R30H006	1	1990	7	36	6.80	245	1.10	1.07	1.18	A	A	A	A
19	Chelfham Stream	10m d/s br Chelfham Mill School	SS 6089 3565	3070		1	1991	7	36	7.00	253	1.10	1.09	1.20	A	A	A	A
20	Hakeford Stream	50m u/s rd br	SS 6133 3551	3071		1	1991	7	33	6.60	217	1.00	1.03	1.03	A	A	A	A
21	Rye Stream	10m u/s footbr Bratton Fleming	SS 6320 3773	3072	R30H009	1	1991	7	35	6.90	242	1.08	1.08	1.17	A	A	A	A
22	Rye Stream	25m u/s Loxhore Cross Bridge	SS 6120 3658	3035	R30H004	1	1990	7	36	6.90	247	1.10	1.08	1.18	A	A	A	A
23	Kentisbury Brook	15m d/s hedgeline Patchole Farm	SS 6120 4220	3074		1	1991	7	29	6.40	186	0.90	1.00	0.90	A	A	A	A
24	Clifton Brook	30m u/s br The Old Rectory	SS 6032 4105	3073		1	1991	7	32	6.30	201	0.98	0.98	0.96	A	A	A	A
25	Venn	100m u/s rd br Landkey	SS 5915 3104	3037	R30A003	1	1991	7	32	6.20	197	0.93	0.97	0.90	A	A	A	A
26	Venn	100m u/s Venn Bridge	SS 5853 3075	3004	R30A004	1	1990	7	35	6.50	227	1.03	1.02	1.05	A	A	A	A
27	Langham Lake	15m u/s B3227 rd br Langridgeford	SS 5717 2235	3045	R30B016	1	1991	7	35	6.50	226	1.03	1.02	1.04	A	A	A	A
28	Langham Lake	100m u/s Langham Bridge	SS 5795 2608	3008	R30B006	1	1990	7	34	6.10	207	0.95	0.98	0.91	A	A	A	A
29	Hawkridge Brook	75m u/s Hawkridge Bridge	SS 5950 2537	3011	R30B012	1	1990	7	34	6.10	207	0.95	0.97	0.92	A	A	A	A
30	Mole	50m d/s North Molton Bridge	SS 7440 2980	3022	R30F001	1	1990	7	35	6.40	225	1.07	1.01	1.08	A	A	A	A
31	Mole	50m u/s br Park House drive	SS 7204 2653	3058	R30F002	1	1991	7	29	6.10	176	0.90	0.95	0.85	A	A	A	A
32	Mole	5m u/s crossing point d/s fence	SS 7274 2460	3059	R30F003	1	1991	7	31	6.20	191	0.97	0.97	0.94	A	A	A	A
33	Mole	50m u/s New Bridge	SS 7250 2257	3023	R30F004	2	1990	7	30	6.40	192	0.92	1.01	0.93	A	A	A	A
34	Mole	40m u/s Mole br Meethe Barton	SS 6771 2294	3060	R30F005	1	1991	7	29	6.10	178	0.91	0.99	0.90	A	A	A	A
35	Mole	75m u/s Head Barton	SS 6667 1833	3024	R30F006	1	1990	7	32	6.50	207	0.97	1.03	1.00	A	A	A	A
36	Bray	10m d/s rd br Challaconbe	SS 6930 4104	3065	R30G001	1	1991	7	33	6.60	219	1.02	1.04	1.06	A	A	A	A
37	Bray	150m u/s Leeham Ford Bridge	SS 6785 4007	3030	R30G011	1	1990	7	34	6.80	232	1.05	1.07	1.12	A	A	A	A
38	Bray	75m u/s rd br Brayford	SS 6880 3478	3066	R30G002	1	1991	7	31	6.80	210	0.96	1.06	1.01	A	A	A	A
39	Bray	125m u/s Brayley Bridge	SS 6910 3043	3036	R30G003	1	1990	7	31	6.30	196	0.95	0.99	0.94	A	A	A	A
40	Bray	40m u/s Bray Bridge	SS 6757 2562	3067	R30G012	1	1991	7	28	6.90	192	0.87	1.08	0.94	A	A	A	A
41	Bray	50m u/s Meethe Barton Bridge	SS 6757 2303	3031	R30G004	1	1990	7	33	6.70	220	1.00	1.06	1.05	A	A	A	A
42	Nadrid Water	150m u/s rd br Clapworthy	SS 6765 2408	3069	R30G013	1	1991	7	35	6.10	212	0.98	0.96	0.94	A	A	A	A
43	Filleigh Stream	50m u/s rd br	SS 6735 2790	3068		1	1991	7	30	5.70	170	0.90	0.89	0.80	A	A	A	A
44	Holewater Stream	100m u/s Linkleyham Bridge	SS 6967 3265	3032	R30G005	1	1990	7	33	7.00	230	1.02	1.09	1.11	A	A	A	A
45	Little Silver Stream	30m u/s Odham Bridge	SS 7423 2058	3061	R30F010	1	1991	7	32	6.40	206	0.95	1.01	0.95	A	A	A	A
46	Little Silver Stream	100m u/s Alswear rd br	SS 7232 2204	3025	R30F011	1	1990	7	36	6.40	231	1.07	1.01	1.08	A	A	A	A
47	Crooked Oak	15m d/s br Ashmill	SS 7833 2338	3062	R30F023	1	1991	7	37	6.50	241	1.11	1.02	1.13	A	A	A	A
48	Crooked Oak	75m d/s Yeo Barton Bridge	SS 7573 2307	3026	R30F007	1	1990	7	38	6.50	246	1.13	1.01	1.14	A	A	A	A
49	Yeo [Molland]	125m u/s Bottreaux Mill Bridge	SS 8222 2634	3027	R30F008	1	1990	7	37	6.90	254	1.11	1.07	1.19	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, | = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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NRA Biological Classification 1990 & 1991

Catchment: River Taw — Corresponding Freelance map filename(s): CATCH30.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
50	Yeo [Molland]	20m d/s rd br Mornacott Moors	SS 7663 2634	3063	R30F024	1	1991	7	29	6.60	190	0.86	1.03	0.89	A	A	A	A
51	Yeo [Molland]	25m u/s Bish Mill Bridge	SS 7403 2535	3028	R30F009	1	1990	7	30	6.70	202	0.89	1.06	0.94	A	A	A	A
52	Sheepwash Stream	20m u/s bridge	SS 7902 2666	3064	R30F022	1	1991	7	39	6.90	271	1.19	1.09	1.30	A	A	A	A
53	North Radworthy Stream	25m d/s Barham Bridge	SS 7463 3355	3029	R30G010*	1	1990	7	29	7.00	202	0.88	1.09	0.97	A	A	A	A
54	Mully Brook	300m u/s Hansford Bridge	SS 6575 1560	3009	R30B007	1	1990	7	40	6.50	259	1.13	1.02	1.16	A	A	A	A
55	Hollocombe Water	20m u/s bridge Woodroberts	SS 6278 1077	3046	R30B008	1	1991	7	34	6.30	214	1.06	0.97	1.03	A	A	A	A
56	Hollocombe Water	100m u/s Bridge Reeve Bridge	SS 6608 1340	3010	R30B009	1	1990	7	33	6.60	218	0.94	1.04	0.98	A	A	A	A
57	Little Dart River	30m u/s New Bridge	SS 7968 1492	3019	R30E001	1	1990	7	39	6.50	254	1.14	1.02	1.17	A	A	A	A
58	Little Dart River	30m u/s Stone Mill Bridge	SS 7199 1307	3056	R30E002	1	1991	7	35	6.30	222	1.04	0.99	1.03	A	A	A	A
59	Little Dart River	200m u/s Dart Bridge	SS 6705 1375	3020	R30E003	1	1990	7	34	6.70	227	1.01	1.05	1.06	A	A	A	A
60	Huntacott Water	60m u/s Chulmleigh road bridge	SS 6957 1387	3021	R30E005	1	1990	7	37	6.40	238	1.11	1.01	1.11	A	A	A	A
61	Sturcombe River	Bradford Tracy	SS 8127 1624	3057	R30E006	1	1991	7	36	6.60	236	1.07	1.03	1.10	A	A	A	A
62	Labdon Stream	50m u/s Taw confluence	SS 6788 1283	3047		1	1991	7	35	6.20	216	1.05	0.96	1.00	A	A	A	A
63	Yeo [Lapford]	20m u/s Bow Bridge	SS 7174 0170	3015	R30D004	1	1990	7	37	5.90	217	1.02	0.92	0.94	A	A	A	A
64	Yeo [Lapford]	60m u/s br Down St Mary vineyard	SS 7311 0448	3052	R30D012	1	1991	7	35	5.90	208	0.99	0.93	0.92	A	A	A	A
65	Yeo [Lapford]	25m u/s Bury Barton Bridge	SS 7373 0728	3016	R30D005	1	1990	7	39	6.40	248	1.12	1.01	1.13	A	A	A	A
66	Yeo [Lapford]	30m d/s Hymet Bridge	SS 7142 0929	3053	R30D006	1	1991	7	37	6.20	231	1.06	0.99	1.05	A	A	A	A
67	Dalch	75m u/s Mill Barton Bridge	SS 8143 1243	3017	R30D001	1	1990	7	30	8.00	179	0.89	0.94	0.83	A	A	A	A
68	Dalch	10m d/s Cann's Mill Bridge	SS 7859 1053	3054	R30D011	1	1991	7	39	6.00	235	1.11	0.95	1.05	A	A	A	A
69	Dalch	125m u/s Calves Bridge	SS 7502 0877	3018	R30D003	1	1990	7	35	6.20	216	1.00	0.98	0.98	A	A	A	A
70	Knighty Brook	400m u/s Yeo confl	SS 7385 0647	3055	R30D013	3	1991	7	23	5.30	123	0.66	0.89	0.59	B	A	B	B
71	Spires Lake	15m u/s track br u/s Tawton Dairy	SS 6545 0090	3051	R30C009	1	1991	7	26	5.30	137	0.91	0.88	0.81	A	B	A	B
72	Croyde Stream	4m u/s footbr u/s Brookfield House gard	SS 4488 3925	3038		1	1991	7	26	5.00	129	0.77	0.81	0.63	B	B	B	B
73	Forda	15m u/s rd br Croyde	SS 4443 3918	3039	R30A028	1	1991	7	22	5.00	109	0.66	0.79	0.52	B	B	B	B
74	Woolacombe Stream	10m u/s bridge	SS 4577 4357	3040	R30A005	3	1991	7	31	6.10	188	0.92	0.96	0.89	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor. * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ! = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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Figure 3.44 Taw Catchment (30) NRA Biological Class – 1990/1991

3.2.35 North Devon Coastal and Lyn Catchments Catchments 31 & 32

Summary

All 96 km of the watercourses monitored by 15 sites in the North Devon coastal and River Lyn catchments were classed as good quality, according to the NRA Biological classification.

Likely reasons for poorer biological quality

N/A

NRA Biological Classification 1990 & 1991

Catchment: North Devon Coastal Streams & River Lyn Corresponding Freelance map filename(s):CATC3132.DRW

No. on Map	Watercourse Name	Site Location Name	NGR	Site Ref.	Chem. URN	RIVPACS Suitability	Year	Season Code	Observed N-Fams	Observed ASPT	Observed BMWP	O/E Ratio N-Fams	O/E Ratio ASPT	O/E Ratio BMWP	O/E Ratio Class N-Fams	O/E Ratio Class ASPT	O/E Ratio Class BMWP	Biol. Class
1	Lee Stream	Immediately d/s fence Lee Bay Hotel	SS 4798 4650	3103	R31A001	1	1991	7	31	6.50	202	0.92	1.04	0.95	A	A	A	A
2	West Wilder	u/s Langleigh Country House Hotel opp f	SS 5115 4692	3107	R31A002	1	1991	7	33	6.10	200	0.98	0.96	0.94	A	A	A	A
3	East Wilder	Immediately u/s of Island The Vicarage	SS 5162 4700	3104	R31A002	1	1991	7	32	6.10	196	0.96	0.97	0.93	A	A	A	A
4	Hele Stream	24m d/s bridge Hele Mill	SS 5352 4758	3105	R31A003	1	1991	7	32	5.90	189	0.96	0.93	0.90	A	A	A	A
5	Starridge	Old Sawmill Inn 50m u/s rd br	SS 5585 4743	3101	R31A004	1	1990	7	29	6.10	178	0.88	0.97	0.85	A	A	A	A
6	Umber	22m d/s bridge	SS 5798 4692	3106	R31A005	1	1991	7	31	6.50	200	0.93	1.03	0.96	A	A	A	A
7	Heddon	Hunters Inn 150m u/s br	SS 6546 4817	3102	R31A006	1	1990	7	28	7.00	195	0.86	1.09	0.94	A	A	A	A
8	West Lyn	Sunny Lyn Caravan Park	SS 7185 4843	3201	R32A003	1	1990	7	29	7.00	204	0.90	1.10	0.99	A	A	A	A
9	Barbrook	100m d/s pumping stn Dean	SS 7085 4762	3202	R32A006	1	1990	7	31	7.30	225	0.96	1.14	1.08	A	A	A	A
10	East Lyn (Oare Water	150m u/s Oare Bridge	SS 8030 4743	3205		1	1990	7	33	6.80	223	1.03	1.06	1.09	A	A	A	A
11	East Lyn River	opposite Hall Farm u/s Leeford	SS 7725 4825	3206	R32A001	1	1990	7	30	6.60	198	0.93	1.03	0.98	A	A	A	A
12	East Lyn River	Lynmouth Oakleigh u/s footbridge	SS 7258 4933	3203	R32A002	3	1990	7	30	6.80	203	0.92	1.06	0.98	A	A	A	A
13	Farley Water	100m d/s Hillsford Bridge	SS 7412 4785	3207	R32A004	2	1990	7	30	7.10	213	0.93	1.11	1.03	A	A	A	A
14	Hoaroak	15m u/s bridge	SS 7402 4772	3208		1	1991	7	27	6.60	179	0.84	1.04	0.87	A	A	A	A
15	Badgworthy Water	200m d/s Badgworthy House	SS 7930 4728	3204	R32A005	2	1990	7	33	6.50	216	1.02	1.02	1.04	A	A	A	A

Key to Biol. Class: A = Good, B = Moderate, C = Poor, D = Very Poor, * = Canal - Unsuitable for classification, + = Lacustrine site - also unsuitable, ! = New site for 1992/1993
= Site regularly dries up - cannot be classified, $ = Site was not sampled due to location difficulty or other error.

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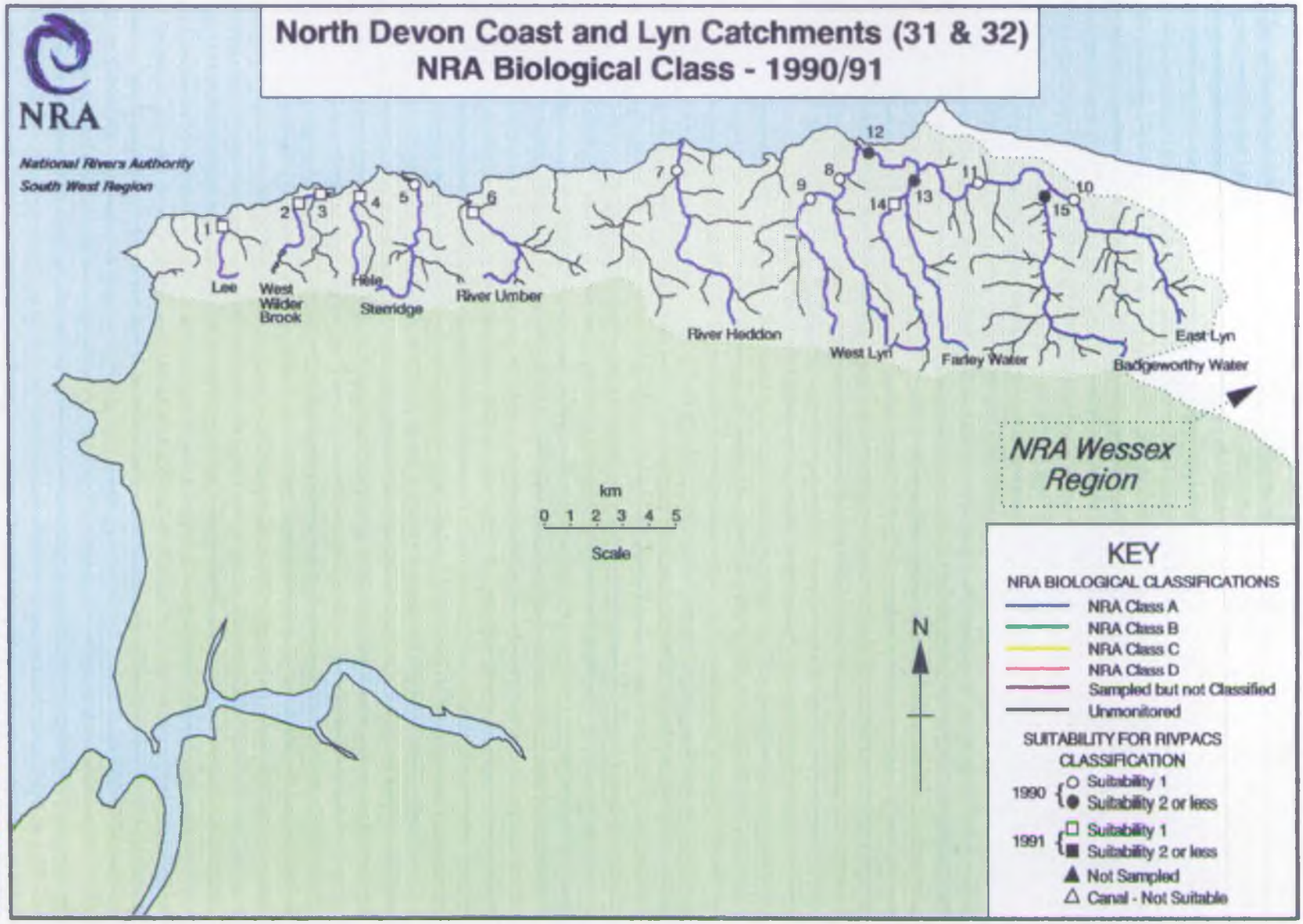

Figure 3.45 North Devon Coast and Lyn Catchments (31 & 32) NRA Biological Class - 1990/1991

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APPENDIX 1 Changes in the definitions of class bands for BMWP-score

The NRA Biological Classification used in this report differs very slightly from that used in the interim report of the results from sites sampled in 1990 only (FWS/92/014), and published in Scottish Office (1992) and Sweeting et al. (1992).

The class bands for BMWP-score were originally determined independently from those of ASPT and N-taxa. For N-taxa and BMWP-score, the boundary between Class A and Class B was the EQI differentiating the lowest 10% from the remaining 90% of ratios for the samples in the original data-set on which RIVPACS II was based. The band widths for classes B, and C were equal to the band between EQI = 1 and the boundary between classes A and B. The EQI class bands for ASPT were determined in the same way, except that classes B, C and D represented the lowest 5% in the data set.

In this report, the class bands for BMWP-score were calculated from the class bands for ASPT and N-taxa. Each class limit of the EQI BMWP-score was the product of the corresponding limit for O/E ASPT and O/E N-taxa, since:

$$\text{ASPT} = \frac{\text{BMWP-score}}{\text{N-taxa}}$$

and therefore

$$\text{BMWP-score} = \text{ASPT} \times \text{N-taxa}.$$

Table A1 Bands of EQIs for BMWP-score defining the NRA Biological Classes as originally defined independently, and as currently defined arithmetically, from the corresponding bands for the EQI ASPT and EQI N-taxa

Biological class	single season's data	two seasons' pooled data	three seasons' pooled data
a (original definition)			
A	≥0.62	≥0.72	≥0.75
B	0.24–0.61	0.44–0.71	0.50–0.74
C	≤0.23	0.16–0.43	0.25–0.49
D	no band	≤0.15	≤0.24
b (current definition)			
A	≥0.56	≥0.67	0.70
B	0.23–0.55	0.41–0.66	0.45–0.69
C	0.01–0.22	0.20–0.40	0.24–0.44
D	0.00	≤0.19	≤0.23

A consequence of this is that the band widths of classes B, C, and D for EQI BMWP-score are no longer equal.

APPENDIX 2 The National Water Council river classification system

Criteria used by the National rivers Authority, South West Region.

Non-metallic determinands

River Class	Quality criteria
1A	Dissolved oxygen saturation greater than 80% BOD (ATU) not greater than 3 mg/l O Total ammonia not greater than 0.31 mg/l N Non-ionized ammonia not greater than 0.021 mg/l N Temperature not greater than 21.5 °C pH greater than 5.0 and less than 9.0 Suspended solids not greater than 25 mg/l
1B	Dissolved oxygen saturation greater than 60% BOD (ATU) not greater than 5 mg/l O Total ammonia not greater than 0.70 mg/l N Non-ionized ammonia not greater than 0.021 mg/l N Temperature not greater than 21.5 °C pH greater than 5.0 and less than 9.0 Suspended solids not greater than 25 mg/l
2	Dissolved oxygen saturation greater than 40% BOD (ATU) not greater than 9 mg/l O Total ammonia not greater than 1.56 mg/l N Non-ionized ammonia not greater than 0.021 mg/l N Temperature not greater than 28 °C pH greater than 5.0 and less than 9.0 Suspended solids not greater than 25 mg/l
3	Dissolved oxygen saturation greater than 10% BOD (ATU) not greater than 17 mg/l O
4	Dissolved oxygen saturation not greater than 10% BOD (ATU) greater than 9 mg/l O

Statistics

Determinand	Statistic
Dissolved oxygen	5 percentile
BOD (ATU)	95 percentile
Total ammonia	95 percentile
Non-ionized ammonia	95 percentile
Temperature	95 percentile
pH	5 percentile
pH	95 percentile
Suspended solids	95 percentile

Metallic determinands

Total Copper

Note that total copper was used for classification purposes pending sufficient data on soluble copper being obtained. It is anticipated that this will be available for the 1994 classification.

Total hardness (mean) mg/l $CaCO_3$	Total copper (µg/l Cu)	
	Class 1	Class 2
0–10	≤ 5	> 5
10–50	≤ 22	> 22
50–100	≤ 40	> 40
100–300	≤ 112	> 112

Total Zinc

Total hardness (mean) mg/l $CaCO_3$	Total zinc (µg/l Cu)		
	Class 1	Class 2	Class 3
0–10	≤ 30	≤ 300	> 300
10–50	≤ 200	≤ 700	> 700
50–100	≤ 300	≤ 1000	> 1000
100–300	≤ 500	≤ 2000	≤ 2000

Statistics

Determinand	Statistic
Total copper	95 percentile
Total zinc	95 percentile

APPENDIX 3 Biological sites not classified in 1990/1991

Reason	Code	Watercourse	Site
Canals, sampled but not classified			
	0501	Exeter Canal	30 m u/s A38 br Countess Weir
	0529	Grand Western Canal	30 m u/s Fenacre Bridge
	0541	Grand Western Canal	The Basin, Tiverton
	2713	Bude Canal	200 m u/s Rodd's Bridge
	2712	Bude Canal	Rodd's Bridge
	2704	Bude Canal	Falcon Bridge
Problem re-locating site, not sampled			
	0520	Culm	d/s Columbjohn
	0823	Gara	Woodford Bridge
	0651	Scotley Brook	prior to River Teign
Site added to programme in 1992/1993, not included in the 1990/91 survey			
	1982	Coombe Stream	Coombe
	2555	Harlyn Water	Trenearne Bridge
Lacustrine/ maritime site, sampled but not classified			
	2003	Loe Pool	Loe Pool at Bar outfall
Ephemeral streams which regularly dry-up			
	0102	Harcombe Stream	5 m u/s br prior to STW
	2325	Perranporth Stream	Silverwell
Poor RIVPACS suitability, code greater than 5			
	none		

Survey summary statistics

957 Sites listed in the report for 1990/1991
954 sites included in the 1990/1991 survey
951 sites surveyed in 1990/1991
945 river sites included in the 1990/1991 survey
943 river sites surveyed in 1990/1991
940 river sites classified in 1990/1991
6 canal sites included in the 1990/1991 survey

SUMMARY OF NUMBERS OF SITES IN EACH CLASS

No of sites in Class A	788.00
No of sites in Class B	94.00
No of sites in Class C	45.00
No of sites in Class D	13.00

No of sites in O/E Ratio (N-Taxa) Class A	783.00
No of sites in O/E Ratio (N-Taxa) Class B	94.00
No of sites in O/E Ratio (N-Taxa) Class C	44.00
No of sites in O/E Ratio (N-Taxa) Class D	19.00

No of sites in O/E Ratio (ASPT) Class A	828.00
No of sites in O/E Ratio (ASPT) Class B	80.00
No of sites in O/E Ratio (ASPT) Class C	28.00
No of sites in O/E Ratio (ASPT) Class D	4.00