Environmental Protection Internal Report

ROUTINE BIOLOGICAL MONITORING OF RIVER QUALITY 1990

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ROUTINE BIOLOGICAL MONITORING OF RIVER QUALITY - 1990

INTERNAL REPORT No. FWS/92/014

SUMMARY

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

The monitoring programme comprised approximately 950 sites covering 4230 km of river and 27 km of canal, and was planned to be completed in two years with half the sites surveyed in any one year: 505 sites were surveyed during 1990. Twenty-two of these are key sites and are visited every year, to assess annual changes. The complete programme 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 in 100 m stretches, centred on the macro-invertebrate sampling site, were mapped using standard symbols based on the NCC river corridor survey methods. These maps were to help interpret changes in the biota in subsequent years, and to provide data for conservation assessment. Photographs were taken at every site.

Macro-invertebrates were sampled three times in the year: in Spring, Summer and Autumn, using standard NRA sampling protocols for routine samples (3 minute kick plus 1 minute search with a pond-net, or in deep water, three to five throws of a medium Naturalists' dredge).

Site details including stream width, depth, and substrate characteristics, was recorded on each visit. This was to enable RIVPACS to be used to predict the nature of the fauna that would be expected if the site was unpolluted. Biotic indices including BMWP-score, ASPT and number of families (N-fams) were determined from the aggregated data from all three seasons' samples, and compared to those predicted by RIVPACS. For each biotic index a Ecological Quality Index (EQI) was calculated, this being the ratio observed : predicted values. Biological classifications were derived from each of these EQIs, as was the overall NRA Biological Classification based on a combination of all three EQIs. The derivation and interpretation of these new NRA biological classifications is discussed in this report.

The ecological quality of most rivers in the South West Region in 1990 was good: 88% of the river length classified (representing 2220 km of rivers) had an overall NRA Biological Classification of Class A (good quality); 8% (192 km) was moderate quality; 3% (85 km) was poor quality; and 1% (17 km) was very poor quality. In the reaches that were not of good quality, toxic influences 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 for this survey demonstrated that the quality of the data was good.

ACKNOWLEDGEMENTS

This report represents most of the work undertaken by the NRA South West Region's Field Control Biologists in 1990. They undertook the initial site reconnaissances, all the sampling, and the sample processing. It also represents a substantial amount of the work undertaken by 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 database by NRA Thames Region, who also computed the results. The Institute of Freshwater Ecology undertook the quality audit, and put all samples into long-term storage.

Especial thanks are due to the biologists of NRA Thames Region who processed some 50 samples, thus enabling the processing to be completed on-time.

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1. INTRODUCTION

This report describes NRA South West Region's routine biological river quality monitoring programme, and the results of the macro-invertebrate sampling in 1990.

1.1 Biological monitoring in the South West Region

When the NRA was formed, 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 National Survey covered 174 sites in the South West Region. These were sampled in 1979 and 1980. Although a routine chemical monitoring programme was being undertaken in the Region when the NRA was formed, there was no equivalent routine biological monitoring programme. In the western part of the Region a comprehensive audit survey of macro-invertebrate communities, involving species identification, was undertaken on a catchment basis between 1980 and 1988. For most of the rivers in the eastern part of the region, detailed catchment surveys were undertaken on selected catchments only.

Since 1990, a routine biological monitoring programme has been followed in NRA South West Region. This encompasses approximately 950 sites and covers more than 4230 km of river and approximately 27 km of canal. Each site is surveyed every other year. Macro-invertebrate samples are collected in each of three seasons, macrophyte and habitat data are recorded once. The invertebrate surveys form part of the NRA National Biological Survey programme.

1.2 Aim of the routine biological river quality monitoring programme

The aim of the routine biological river quality monitoring programme is to monitor the ecological quality of running waters in the South West Region. It provides information to enable more effective assessments of overall river quality to be made, and to provide information on the impact of environmental changes. The surveys undertaken in 1990 and 1991 were to provide a baseline from which to compare conditions in the future.

The routine macro-invertebrate monitoring programme, and the new methods developed by the NRA that are described in this report, may become the basis of the United Kingdom's approach to implementing the forthcoming EC Ecological Directive. 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, and compatibility with the National Surveys, considerable effort was made to ensure that the methodologies were clearly defined in detail.

2.1 Site location and survey design

Each site in the routine biological river quality monitoring network represents either a reach of river monitored in the routine chemical water quality monitoring programme, or a watercourse not monitored chemically but which was assigned a Water Quality Objective in the South West Water Asset Management Plan (South West Water Authority, 1989). There are approximately 940 routine biological river quality monitoring sites throughout the Region.

The 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 biological monitoring sites were located away from artificial influences such as bridges, livestock watering holes and canalized reaches wherever possible. Each biological 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 located where the river was deep and slow flowing. This was a major departure from previous biological monitoring practice, where shallow riffles are chosen in preference. It reflected the fact that the programme had been designed to monitor ecological quality as opposed to solely water quality, although water quality is a major component of ecological quality. The precise location of the sampling sites could only be chosen after a field reconnaissance. An additional criterion for the choice of site location was that, wherever possible, the sites were 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. The criteria for locating sites are described in more detail in Furse et al. (1986), and a training video (National Rivers Authority, 1990).

Recommendations were made by the Statutory Water Quality Objective Group that the programme should be completed in one year. Regional resources available to implement this programme meant that it could only be accomplished over two years. Each site was surveyed every other year, except for 22 key sites, representing the main types of streams found in the South West, that were investigated every year to provide information on annual changes and the effect of droughts. This monitoring programme continues today.

In 1990 at least one site was investigated on each of the main rivers and larger tributaries. All the sites surveyed in the 1980 National Survey were covered in 1990. The programme for 1991 covered the remaining sites: the intermediate sites on larger watercourses and smaller watercourses not covered in the chemical monitoring programme. For 1992-1993 the programme has been split on a whole catchment basis.

In 1990 501 sites on rivers and 3 sites on canals were surveyed, representing 2532 km of river and 26 km of canal. Of these, five sites were not sampled owing to inaccessibility or unsuitable habitat (these were chemically monitored reaches in lakes that form part of a watercourse).

2.2 The collection of site data

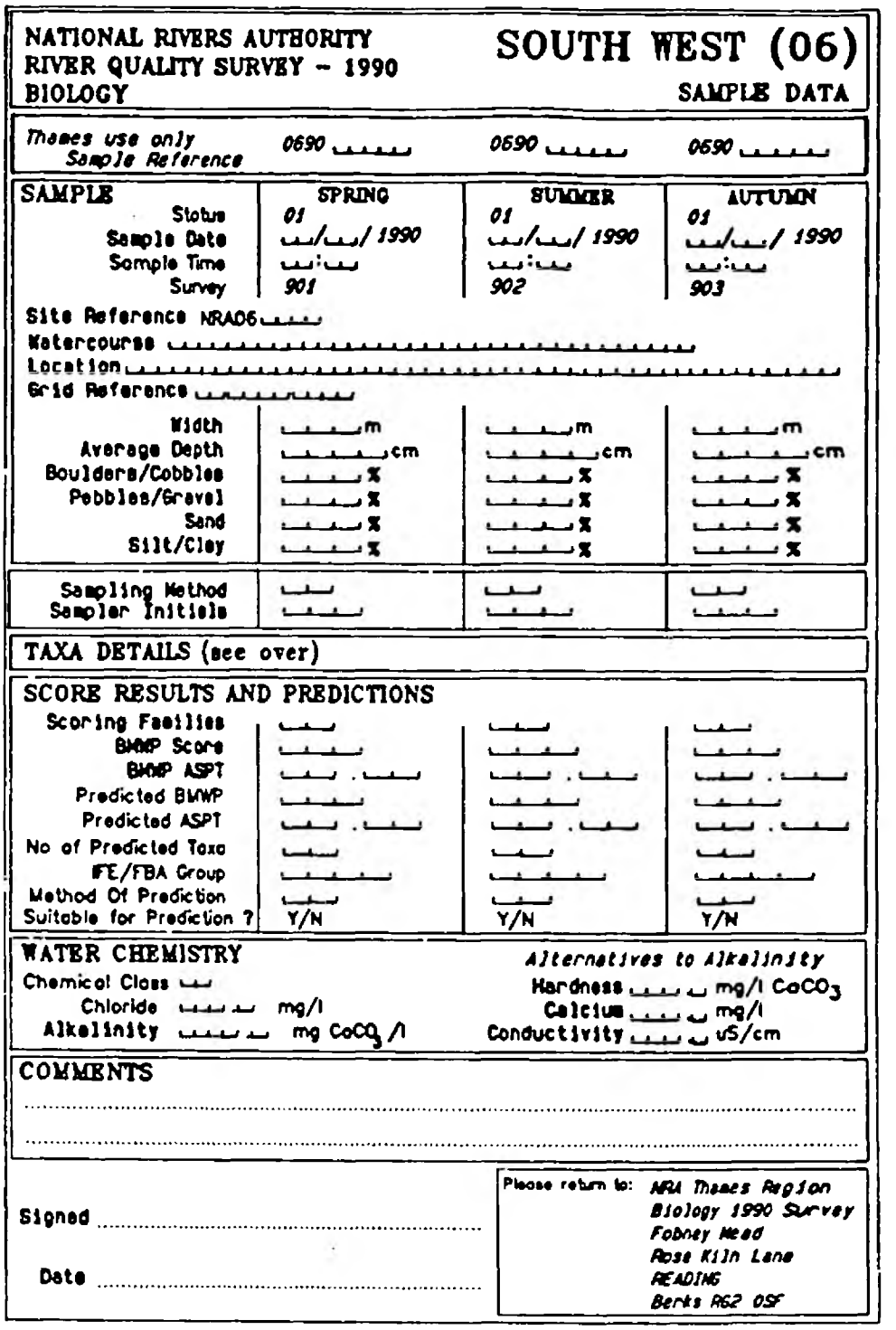
Each time that a site was visited, basic environmental data was recorded. This was to enable a prediction to be made of the fauna that the site should support, if its environmental quality (including water quality) was good. To do this the RIVPACS II (River InVertebrate Prediction and Classification System, Version II) computer model developed by the Institute of Freshwater Ecology was used. Standardised procedures 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. The area of 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, conductivity was also recorded, using a meter. This information was entered onto a standard sample data form (Figure 2.1). The field survey methods have been described in more detail in Furse et al. (1986), and in a training video (National Rivers Authority, 1990).

A photographic record of the sampling sites was made in each season, to aid re-locating them, and to provide a record of the surroundings. Brief notes about each site were recorded to enable them to be re-located easily, and to fore-warn of parking and access difficulties. The move from recording 6-figure National Grid References to 8-figure was also to help re-locate the sites. Finding the precise location of some of the sites surveyed in 1980 caused problems, and a few could not be located at all.

Habitat maps were drawn covering a 100 m length of river, centred on the invertebrate sampling site. The methods used were used to the Nature Conservancy Council's (NCC) river corridor survey methods, as outlined in Nature Conservancy Council, 1985. Following initial experiences with the NCC method, a number of the symbols were altered (see Figure 2.2). From 1992 standard NRA symbols will be used (see National Rivers Authority, 1982), though these too may be modified slightly. These sketch maps were to provide additional data to help interpret changes in biological samples from subsequent years. They were also to be used by the Conservation Section as fixed transects to support strategic habitat surveys. A single map is drawn each year that the site is visited. An example of one of the habitat maps drawn in 1990 is shown in Figure 2.3.

An attempt was made to record the presence of macrophyte species over the same 100 m of river as that 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 macrophytes were recorded in Spring, Summer and Autumn, when invertebrate samples were taken. In 1992 they are to be recorded in Summer only, and the coverage of mosses is to be 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



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. This form was printed on the reverse of Figure 2.5

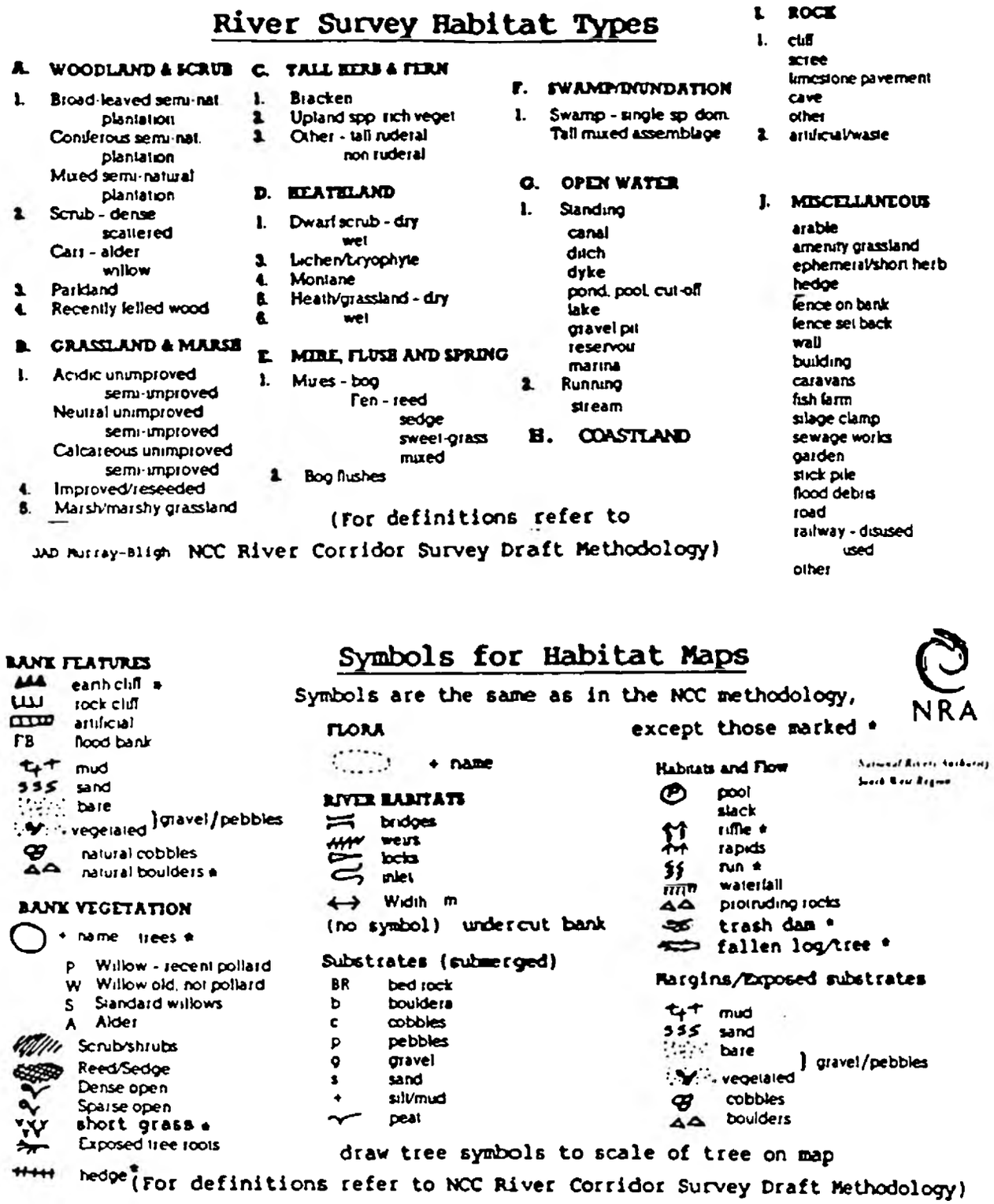


Figure 2.2 Standard symbols used for habitat maps in the routine biological river quality surveys in 1990 and 1991

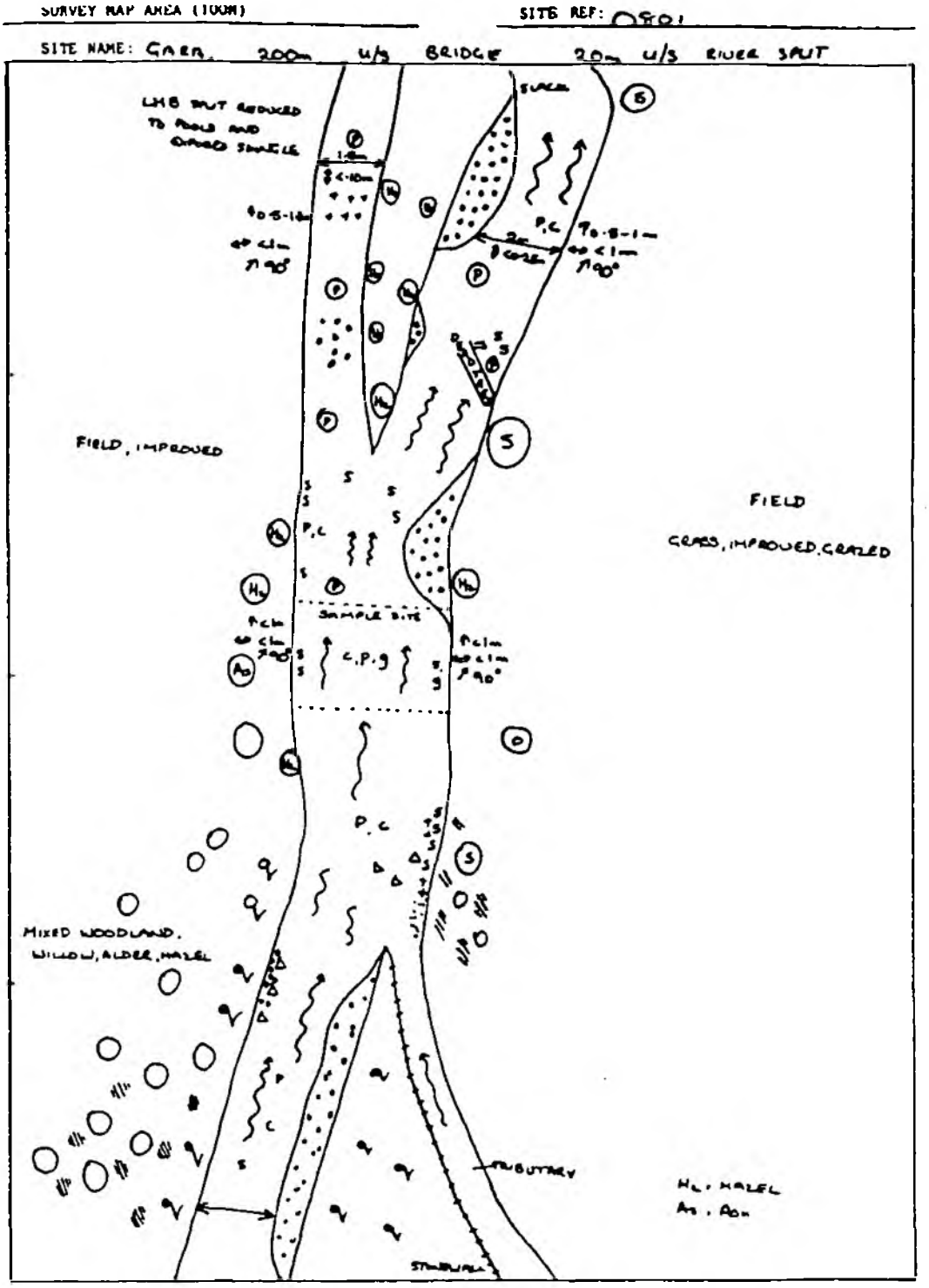


Figure 2.3 An example of a habitat map drawn for the 1990 routine biological river quality survey

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). The data 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	≤ 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	≥ 80.00

2.3 Macro-invertebrate methods

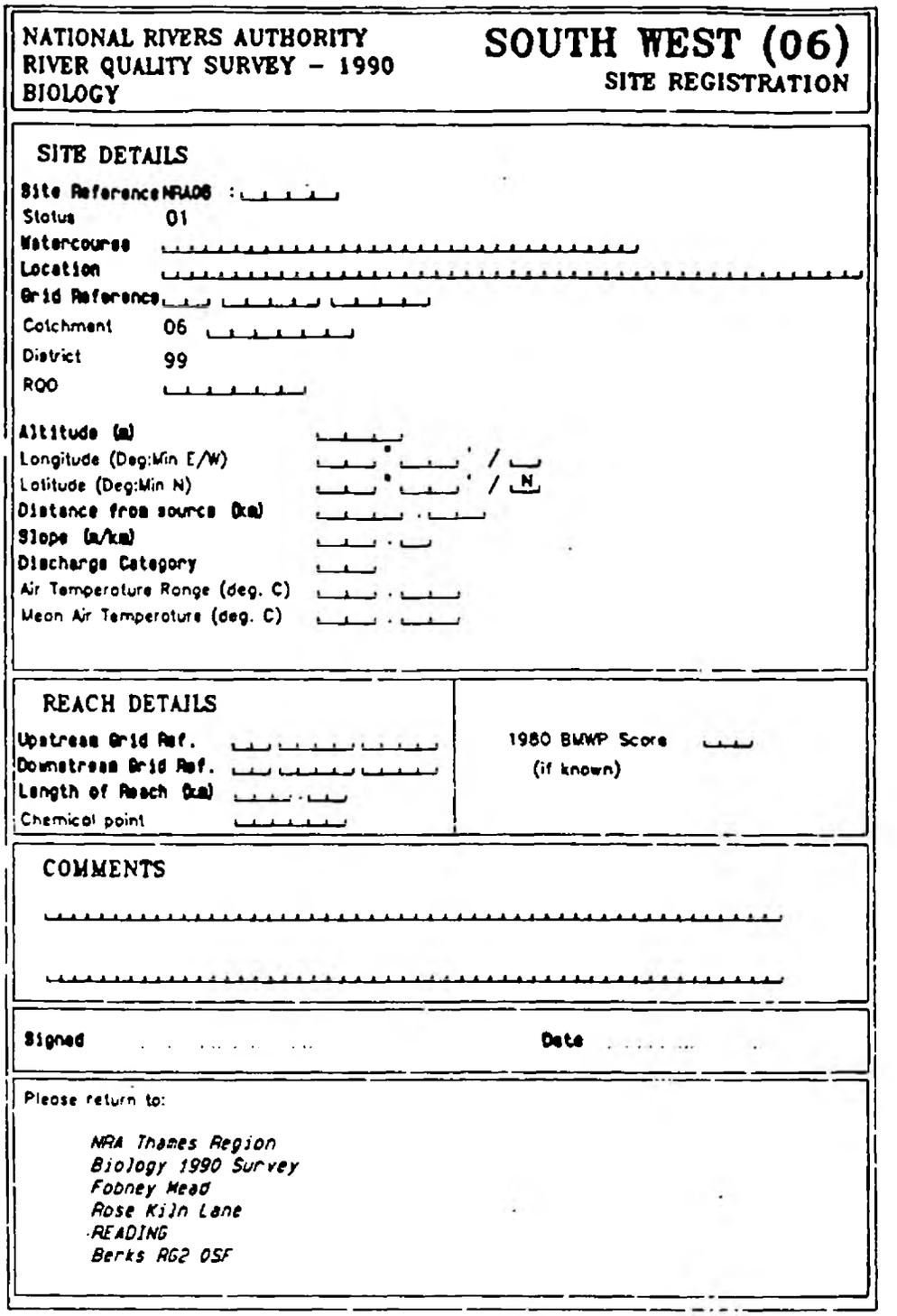
2.3.1 Sampling macro-invertebrates

Samples of macro-invertebrates were collected in each of three seasons:

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

The samples were collected using the Standard NRA methods for routine invertebrate monitoring surveys, which is compatible with RIVPACS and ensures comparability between samples. The methods were qualitative, the aim being to collect representatives of as many of the taxa present at the site as possible. All invertebrate habitats were sampled in proportion to their cover at the site. Because of the degree of standardisation, it was possible to record comparable though coarse estimates of relative abundances.

In shallow water, the samples were obtained by a three minute kick with a pond-net, followed by 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 0.9 mm mesh collecting bag that was at least 270 mm deep. When kick sampling, the net was placed downstream of the sampler's feet, resting on the river bed; 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 moved over the disturbed area to collect the invertebrates. The



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.

three minutes included only this active sampling. The net was emptied whenever it became too full or blocked. Habitats not sampled effectively by kicking were covered by the manual search. Animals from marginal areas including emergent vegetation and tree roots, were collected by actively searching with the pond net: animals from the surfaces of large stones were picked-off by hand or with a stiff brush. These animals were added to the rest of the sample.

Deeper waters were sampled using a medium naturalist's dredge (also known as a rectangular dredge), with a 457 x 200 mm aperture, fitted with a 0.9 mm mesh collecting net. The sample comprised from three to five dredges, plus a one minute search in the shallows close to the river banks. The number of dredges was not standardised, but the aim was for a sample similar in size to a 3 minute kick.

Large stones and fragments of vegetation were washed in the collecting net and discarded. Samples were placed in standard screw-topped containers or large watertight buckets for transport back to the laboratory.

The invertebrate samples were preserved in 70% alcohol (industrial methylated spirit) to which 5% glycerol was added, either in the field, or immediately on return to the laboratory at the end of the day. Later in the year, the strength of alcohol added to the samples was increased to 90%. This was because there had been inadequate preservation in some of the earlier samples, possibly due to dilution with liquids 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, because the samples were to be deposited in long-term storage. The samples from the South West Region were not fixed in formaldehyde owing to the absence of adequate laboratory facilities. This was the only major deviation from the standard NRA sample processing procedures.

2.3.2 Processing the macro-invertebrate samples, in the laboratory

The samples were stored in the laboratory prior to sorting and identification. All 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. Abundances were estimated using a logarithmic scale and recorded as abundance categories. The data was recorded on standard sample data sheets (Figure 2.5), where the abundance categories are defined.

Contrary to the methodology outlined 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 still frequently takes more than two hours.

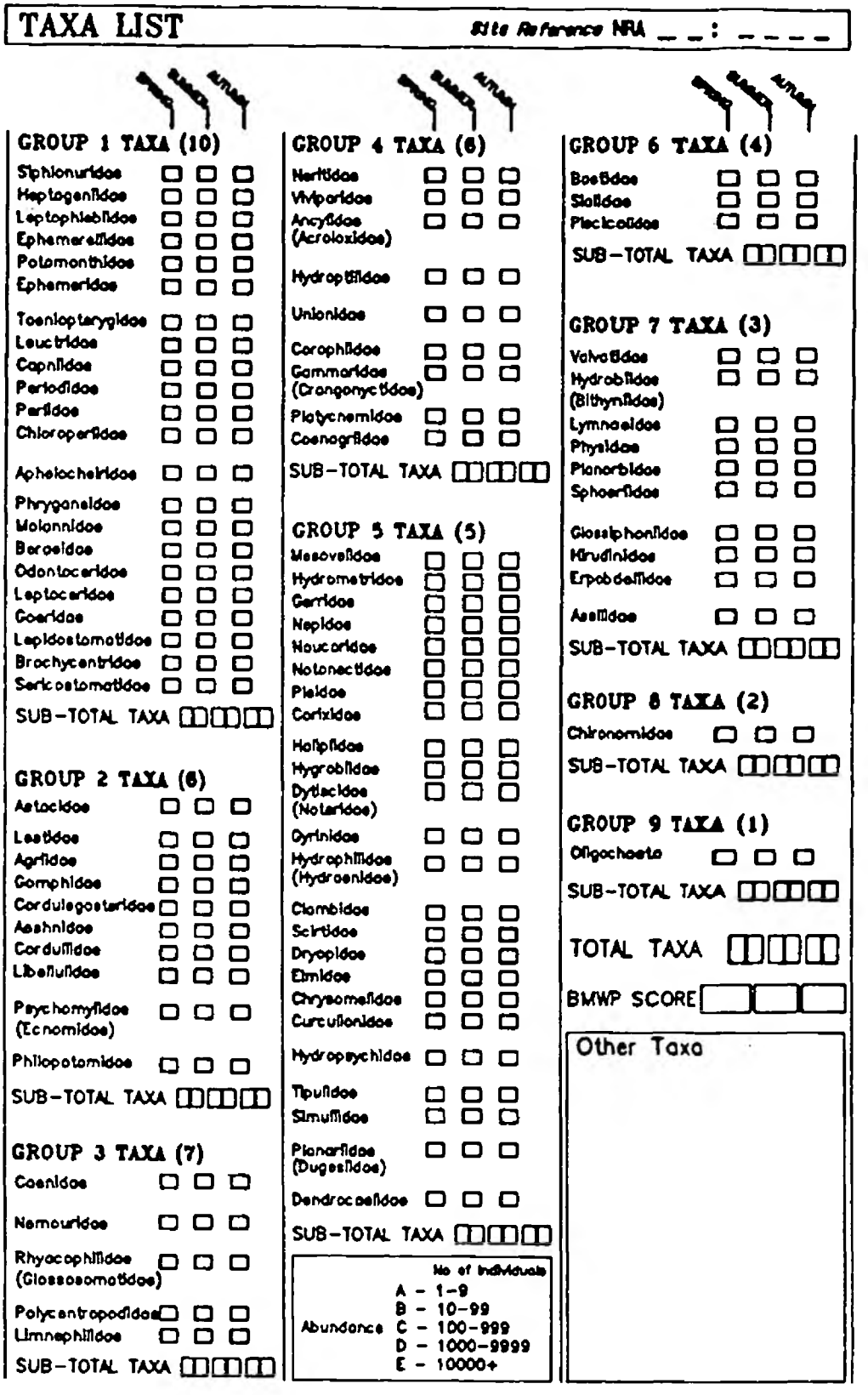


Figure 2.5 Standard sample data form used to record macro-invertebrate sample data, and to calculate BMWP-score, ASPT and N-fams. Total taxa = N-fams. This form was printed on the reverse of Figure 2.1

To help the quality audit (see Section 2.3.4) 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 transport to IFE Wareham, for quality audit and for long-term storage.

To help clear a backlog of samples at the end of the programme, approximately 50 samples were processed by biologists in NRA Thames Region. The backlog was largely the result of additional staff and laboratory resources not being available at the start of the programme.

2.3.3 Sample storage

The invertebrate samples from this survey (and the 1991 survey which completes the biennial coverage of sites in the South West Region) were deposited in long-term storage at IFE Wareham, together with other samples from the National Surveys of River Quality throughout the United Kingdom.

2.3.4 Analytical quality audit

Prior to 1990 there was no systematic programme of quality control for biological samples in the Region. From 1990, the routine biological river quality monitoring programme is subject to an independent quality audit.

The need for quality control was recognised during the initial discussions on 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. This would have involved independent sampling, sorting and analysis. Instead, a quality audit programme was instigated, covering sample processing, and taxonomic identification. A training video on sample collection (National Rivers Authority, 1990) was made and shown to all staff involved in sampling as a substitute for a quality audit on sample collection, which would have been impractical and too costly.

A small percentage of the samples were re-sorted and identified by the Institute of Freshwater Ecology (IFE) to audit the quality of the sample sorting and the identification of the macro-invertebrates. The methods and the results were discussed in Kinley and Ellis (1991).

2.3.5 Macro-invertebrate data analysis

The computer analysis of the biological data from the National Surveys undertaken in 1990 by the NRA, Scottish River Purification Boards (RPBs) and the Department of Economic Development (DED) in Northern Ireland was undertaken centrally by the Biological Section of NRA Thames Region. All the raw biological data was entered onto a database similar to the Thames Biologists' System in use at NRA Thames region, and now recently installed in NRA South West Region. The central data processing ensured that all the statistics and biological classifications were undertaken in the same way, using the same algorithms. It also enabled the latest version of RIVPACS to

be used (RIVPACS II was not finished until early in 1991), and also enabled the NRA Biological Classification to be developed and tested. Having all the raw biological data on a single database will enable the data collected in the 1990 National Survey to be compared to the data collected in subsequent surveys. It will also enable developments in RIVPACS and the NRA Biological Classification to be applied retrospectively to the 1990 data. The database has effectively become the national biological database. The central data processing also reduced the cost of this task.

The completed data recording forms were sent to NRA Thames Region, where the data was entered onto the computer database. A print-out of the data was returned to the Region where it was checked against the original data forms for transcription errors. Following correction, biotic indices, RIVPACS predictions, Environmental Quality Indices (EQIs, see below) and the NRA Biological Classification were computed for every site in the Region. This took approximately 8 hours, and was done 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 raw data from South West Region was also supplied on a copy of the Thames Biologists' System database to form the basis of the Region's biological archive.

2.3.6 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 families (N-fams, only the indicator families used in the BMWP-score system and which contribute to the BMWP-score of the site are considered). These were developed for the 1980 National Survey, but have been modified slightly to take into account advances in taxonomy.

Different watercourses and different sites on the same watercourse will naturally support different macro-invertebrates in their pristine state, because of differences in their geography, climate, geology, and the habitats that they provide.

Because different sites on different watercourses naturally support different macro-invertebrate communities, the values of biotic indices derived from different sites will vary, even if their water quality is of uniformly good quality. Biotic indices cannot be used to compare the water quality at different sites directly.

To overcome this problem, the NRA biological classifications are based on the ratios of the biotic indices from three seasons' pooled samples (observed values) to the equivalent biotic indices predicted for the site if it had good ecological quality (including good water quality). These ratios are known as Ecological Quality Indices (EQIs). By removing the effects of natural differences between the invertebrate communities at different sites, the biotic indices are placed on a universally comparable scales.

The computer model 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.

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

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

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

The EQIs are a major advance on conventional biotic indices, because they can be used to compare the biological water quality at different sites. They were made possible by the development of RIVPACS. The national surveys undertaken by NRA, the RPBs and the DED in Northern Ireland in 1990 represent the first large-scale operational use of RIVPACS in the water industry.

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

Table 2.2 Descriptions of the biological quality classes based on EQIs

Biological Class	Description
A	Good
B	Moderate
C	Poor
D	Very Poor.

Table 2.3 The bands of the EQI values (based on 3 season's data) covering each biological class, as used currently for National Surveys

Biological Class	EQI ASPT range	EQI N-fams range	EQI BMWP-score range
A	≥0.89	≥0.79	≥0.75
B	0.77-0.88	0.58-0.78	0.50-0.74
C	0.66-0.76	0.37-0.57	0.25-0.49
D	≤0.65	≤0.36	≤0.24

From Institute of Freshwater Ecology, 1991

An arithmetic error was detected in these bandings by the Region's Freshwater Science Section. For the purposes of the 1990 National Survey, the original bandings will be used, as the error affects only about 200 sites nationally. The classification may be revised subsequently. The error is described in Institute of Freshwater Ecology, 1991.

Where there is little or no difference between the observed and predicted fauna, and the biotic indices derived from them, the EQI will equal unity and it can be assumed that the water quality is good. Where 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 deficient.

The EQI ASPT relates solely to organic pollution; it is insensitive to toxic pollution such as acidification and metalliferous discharges. (Occasionally the EQI ASPT may seem to respond to toxic pollutants because it reduces the precision of the ASPT, by reducing the number of taxa on which it is based.)

The EQI N-fams is sensitive to toxic pollution, as well as to organic pollution. The EQI N-fams will also respond to other environmental disturbances including the physical degradation of habitats by canalization.

Because of the narrower error bands associated with the EQI ASPT compared to those of the EQI N-fams or the EQI BMWP-score, there is a 5% chance of miss-classification using the EQI ASPT, but a 10% chance of miss-classification by the EQI N-fams and the EQI BMWP-score.

An overall biological classification has also been derived from the EQI bands shown in Table 2.3, known as the NRA Biological Classification (here as the overall NRA Biological Classification). It is based on one of two measures: if the class based on EQI-ASPT is lowest, that is used as the NRA Biological Class; if the class based on EQI-ASPT is not the lowest, the mode of the three classes is used as the NRA Biological Class.

RIVPACS' predictions are most reliable when the site is similar to sites in the data-set on which RIVPACS is based. RIVPACS II warns of sites for which the predictions may be unreliable. These are termed suitability codes or box numbers (Table 2.4).

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

These classification procedures are suitable only for permanently flowing watercourses. Streams that become dry naturally at any time of the year, such as winterbournes, cannot be classified, because RIVPACS is unable to predict their natural fauna. This is because only permanent streams were included in the original data-set on which RIVPACS is based. If a stream

becomes dry as a result of over-abstraction, or an unusually bad drought, RIVPACS can be used, because it will predict the natural fauna that should be at that site under normal conditions.

RIVPACS is unsuitable for ponds, lakes, reservoirs and canals, therefore these could not be classified.

These NRA biological classifications relate solely to the quality of the macro-invertebrate communities. Macro-invertebrate communities recover from pollution more quickly than fish populations (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.

2.3.7 EQIs and biological classifications based on less than 3 seasons' data

RIVPACS can be used to predict the list of 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. Unfortunately, the predictions made by RIVPACS are less reliable the fewer the number of seasons' data on which they are based. This is largely because greater sampling variability is inherent in single samples than in multiple samples from a site. As a result the EQIs cannot be assigned to lower biological quality classes with a large degree of confidence. Because of this, the NRA biological classifications were based on the pooled data from three seasons' samples. Data from two seasons or a single season was only used where it was unavoidable.

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

EQI type	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-fams	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	≥0.62	≥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

From Institute of Freshwater Ecology, 1991

Different bands of EQI values are used to define the biological classes based on data from a single season or from two seasons combined (Table 2.5), to take account of the poorer precision of classifications in these circumstances. When these different bandings are used, the probability of a good quality site being misclassified as a poorer quality site is the same as the probability of such misclassification using three seasons' data, ie 5% for EQI ASPT, and 10% for EQI N-fams and EQI BMWP-score. These EQIs must depart further from unity than EQIs for combined three seasons data, before it can be asserted with confidence that the disparities between observed and predicted values of the biotic indices are due to genuine site stress, rather than to sampling effects. More information on these bandings is given in Institute of Freshwater Ecology (1991).

Class bands have also been derived for each individual season and each combination of pairs of seasons, to take into account faunal differences between seasons. It has not been decided yet whether the NRA will use these or the bandings in Table 2.5 for evaluating single and two season data.

2.3.8 A description of what the biological classes represent and the implications of basing them on data pooled from different seasons

The EQIs based on the combination of three seasons data (and the biological classifications derived from them) indicate the extent to which a site supports its expected range of macro-invertebrate taxa at any time during a year. They are unable to identify any variations in quality that may have occurred during the year.

The NRA biological classifications based on three seasons combined data 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 slurry pollution from farm yards is mainly a problem in late Winter, and stream biotas usually recover from this to some extent during the rest of the year). This is a direct result of basing the classification on the combined data from Spring, Summer and Autumn samples. If an extreme condition is considered, 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 NRA biological classifications based on combined seasons data describe the chronic biological quality of rivers. They reflect the impact of chronic influences such as continuous discharges and canalization. Where there is regular or frequent intermittent pollution, these biological classifications indicate the state to which the biota recovers moderately quickly (within a year). They represent the state to which the biota will 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.

The biological classifications based on combined seasons data will not detect

catastrophic pollution incidents, unless their impact covers a whole year. In the hypothetical example described above, the river may have become lifeless owing to a major pollution incident after the Spring sample was taken. This will not be evident in the biological classifications for that year; in the following year the classifications will reflect the condition that the biota has recovered to by the end of the year (actually when the last sample of the year is collected). Pollution events that cause long-term effects, 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 to measure overall ecological health rather than the effect of individual pollution incidents.

Pollution incidents that do not affect the long-term state of the biota (over the year) or the combined seasons' classifications may nevertheless influence the results of single seasons, from which they can be detected and assessed. These may be missed by routine chemical monitoring, but detectable by biological monitoring because of the time lag of the biota's recovery.

2.3.9 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 both the biological and chemical classifications reflected the same environmental factors, and were fully interchangeable, either the chemical or the biological classifications (and hence surveys) would be unnecessary.

There are two major differences between the biological and chemical classifications related solely to the method of derivation:

(1) Biological classifications based on data pooled from three seasons more closely represent best than worst conditions as they are statements of overall ecological health of the watercourse. In contrast, the chemical classifications are based on 'worst' (95 percentile) conditions so that they are compatible with discharge consent conditions. The chemical classifications are therefore influenced by a small number of samples that reflect poor conditions whereas the biological classification only responds to chronic water quality problems.

(2) The chemical classifications relate to conditions over 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:

(3) The biological classifications are based on a much larger and different sets of determinands: as a result, the biological classifications respond to a much wider and different set of environmental influences not solely related to water quality.

Physical disturbance is the main influence on the biological classification that is not related to water quality.

(4) Biological samples have a higher likelihood of detecting the influence of pollution incidents, especially those that occur intermittently, or outside chemical sampling hours, because biological systems take a while to recover from pollution or other incidents. Unlike chemical samples, which represent conditions in a fixed window between 09.00 hrs and 16.00 hrs Monday to Friday, biological samples will reflect conditions outside this window. Biological samples can miss pollution events, particularly if the impact is transitory, involves a small volume of pollutant, and occurs some time before a biological sample is taken.

(5) 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. The chemical class of some sites may never be capable of being very good.

Sampling error and other statistical errors will influence both classifications and may lead to mismatches:

(6) The precision of both classification procedures are different. 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.

(7) Whereas the range of chemical conditions defining each chemical class are fixed, and the risk of misclassification because of error increases when the number of samples that it is based on is reduced, the biological conditions defining each biological class are not fixed, but differ depending on the number of samples, 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 (representing "good ecological quality") covers a much wider band of environmental conditions than NWC-Class 1 (representing "good river quality"). Biological Class A encompasses pristine to mildly polluted waters. The bands of 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.

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 NRA Biological Classification in the South West Region in 1990.

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

3.1 Overview

3.1.1 Survey overview

Of the 502 sites on rivers that were surveyed in 1990, four were not sampled because they were inaccessible, or because they represented chemically monitored reaches that were actually lakes which formed part of a watercourse. Two sites were completely rejected by RIVPACS (suitability code 9, see Table 2.4). Two other sites were omitted from the biological classification because they become dry naturally for part of the year. This left 493 sites that were classified in 1990.

3.1.2 Quality audit results

The results of the independent quality audit have been reported in detail by Gunn et al. (1991), and discussed in Kinley & Ellis, 1991. A summary is shown 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 considered to be in the sample by the auditors were termed 'losses'. There were more gains than losses, and this was typical of the audit results for 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 data sheets. These errors were termed 'omissions'.

Table 3.1 Summary of the quality audit results

Total number of samples taken	number of samples checked	mean losses	mean gains	mean omissions
1479	63	0.48	1.83	0.01

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

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

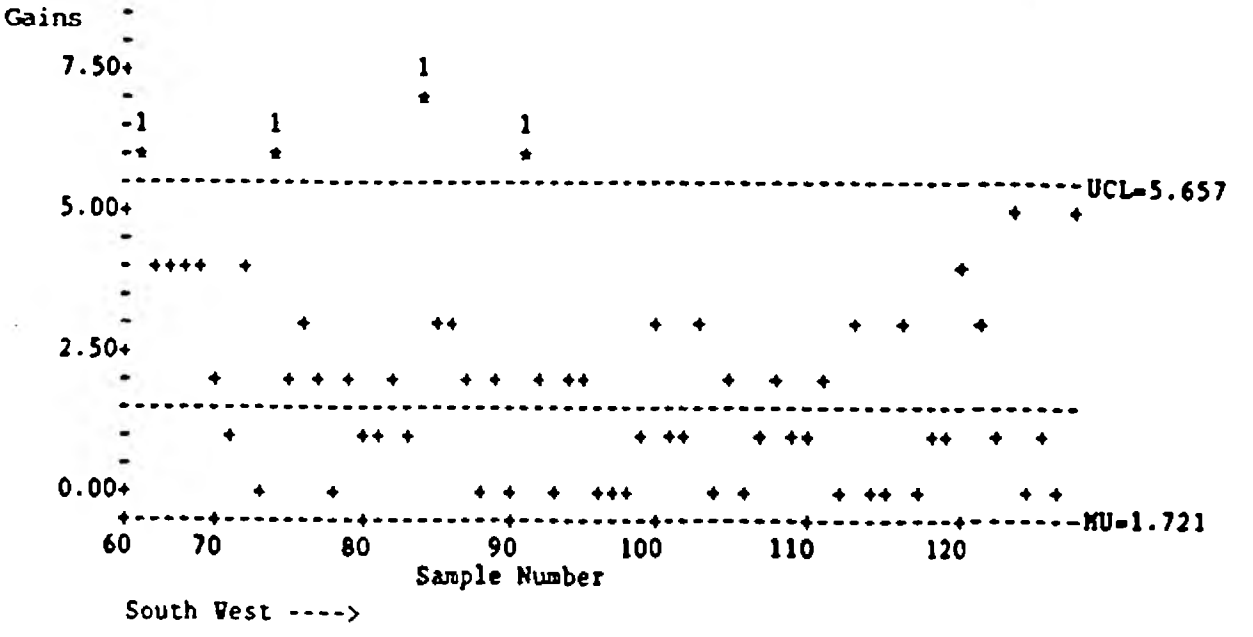


Figure 3.1 Number of 'gains' in successive audited samples. These are in roughly chronological order. Horizontal lines are proposed upper control limit (3 standard deviations from the mean, and the mean based on results from NRA Southern, South West and Yorkshire Regions). From Kinley & Ellis, 1991

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 88% of the river length classified in 1990 was of good biological 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 and their sewage (representing that of approximately 70% of the Region's population) was discharged to the sea. The invertebrate fauna of the Region was particularly rich, which is probably a reflection of 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 are relatively insensitive to eutrophication, which is one of the main ways in which agriculture impacts freshwaters. Eutrophication was a widespread problem in the Region. Agriculture is thought to have contributed to the blue-green algal problems in many lakes and ponds in the Region during 1989 and 1990. In 1990 more pollution incidents were recorded from farms than from any other identified source.

Both the china clay extraction industry, and the largely discontinued 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, though it did not substantially affect the NRA Biological Classifications based on pooled seasons' data.

Most of the larger rivers in the Region were of good ecological quality: a few sites were of moderate quality, and none were poor quality (see Table 3.2). Poor and Very poor quality reaches were mostly on smaller streams.

Table 3.2 Ecological quality according to NRA Biological Classification of rivers of different discharges.

	km of river belonging to different discharge categories[1]										
Class	1	2	3	4	5	6	7	8	9	10	TOTAL
A	673.9	525.7	517.9	209.0	142.9	86.6	48.3	15.8	0	0	2220.1
B	87.9	45.8	13.3	20.8	9.5	0	9.8	4.7	0	0	191.8
C	60.5	4.8	19.3	0	0	0	0	0	0	0	84.6
D	3.3	8.4	5.2	0	0	0	0	0	0	0	16.9

Note 1 See Table 2.1 for definitions of the discharge categories.

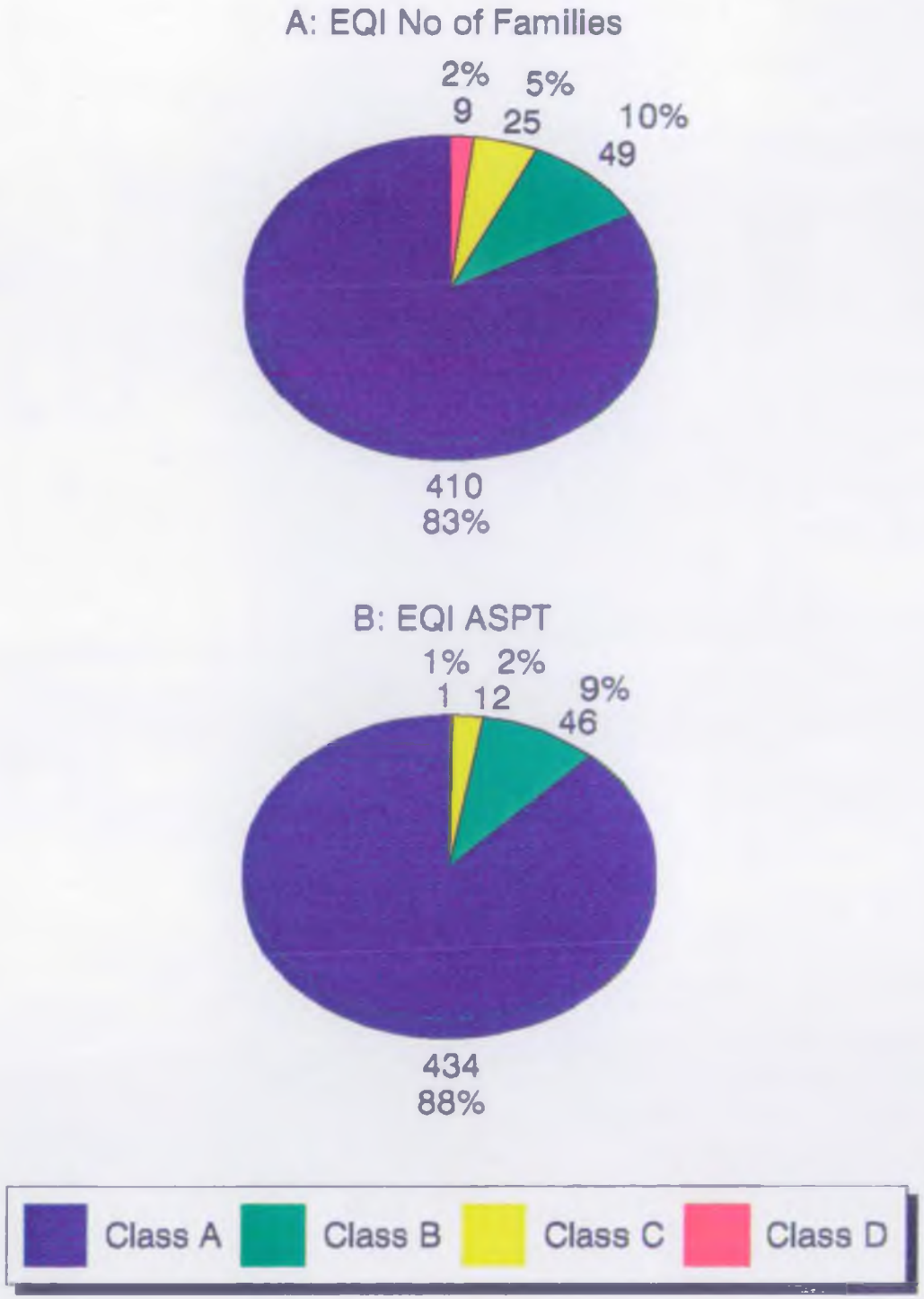


Figure 3.2 Proportion of sites belonging to different ecological classes in 1990

3.1.4 A comparison of the NWC (chemical) River Quality Classification and the NRA Biological Classification of South West Region Rivers in 1990

At first sight it appears that the NWC River Quality Classification and the NRA Biological Classification of rivers in the South West Region for 1990 were 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 3.3).

Table 3.3 Number of sites in each NRA Biological Class compared to each NWC (chemical) Class

	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

rate

Before a realistic assessment of the disparities between the NWC Chemical and NRA Biological classifications is possible, mismatches owing to differences in their derivation must be isolated. These differences are: (1) that the chemical classification relates to conditions in a three year period, whilst the biological classification relates to conditions in a single year; and (2) that the chemical classification relates to worst conditions whereas the biological classification reflects best conditions (see Section 2.3.9). Both will cause the NWC Classes to be worse than the NRA Biological Classes, but cannot be the cause of NRA Biological Classes being worse than the NWC Classes. In this section, an attempt has been made to quantify the mismatches that could have been caused by these differences in the classifications.

A mismatch owing to differences in the period over which the classification relates to was considered 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.

The 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 the 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.

A mismatch because the biological classification reflects only chronic poor quality, whereas the NWC classification reflects the 95 percentile worst short-term conditions was considered to have occurred when a poor chemical class was assigned but less than 30% of samples reflected the 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 3.4). In the first evaluation it was assumed that NRA Biological Class A equates 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 equates 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.

TABLE 3.4 Mismatches between the NRA Biological Classification and the NWC Classification

Assumption	Matches	Mis-matches	Biol Class worse than NWC-Class	NWC-Class worse than Biol Class	Reason (1) Year	Reason (2) Acute	Reason Other
'a'(A = 1A-1B)	262	199	14	185	62	10	13
'b'(A = 1A-2)	363	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 NWC (chemical) Classification being worse than the NRA Biological 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

The NWC Classification and NRA Biological 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 NWC chemical Classification indicated better conditions than the NRA Biological 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.

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 is probably explained by differences in the classification procedures. None of the mismatches where the biological classification was worse than the chemical classification would have been influenced by these differences in the classification procedures.

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 overall NRA Biological Classification is shown on the maps for each catchment (Figures 3.4 -3.45). Biological classes based on EQI ASPT and EQI N-fams and the overall NRA Biological Classification are listed in the tables for each catchment, as are the EQIs and biotic indices observed from the samples. This data is pooled from all seasons samples. The data therefore indicates the ecological quality achieved during 1990, but not variations in quality that may have occurred during the year.

Sites with a RIVPACS suitability code of 1 (see Table 2.4) are distinguished from those that were less suitable (suitability codes 2-5) on the maps. 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 number of samples on which the EQIs and biological classifications were based affects the EQI banding used to define the biological classes (see Section 2.3.7). The seasons in which the samples were taken are identified in the tables of results for each catchment as codes: these season codes are defined in Table 3.5.

The biological site codes are listed in the tables of results for each catchment. Chemical monitoring sites covering the same reaches as the biological sites are identified in the tables by code numbers (known as user reference numbers). Both the biological site codes and the chemical site user reference numbers are used to archive the raw data, and it is helpful if these can be quoted when requesting further data for the sites.

Catchments in NRA South West Region

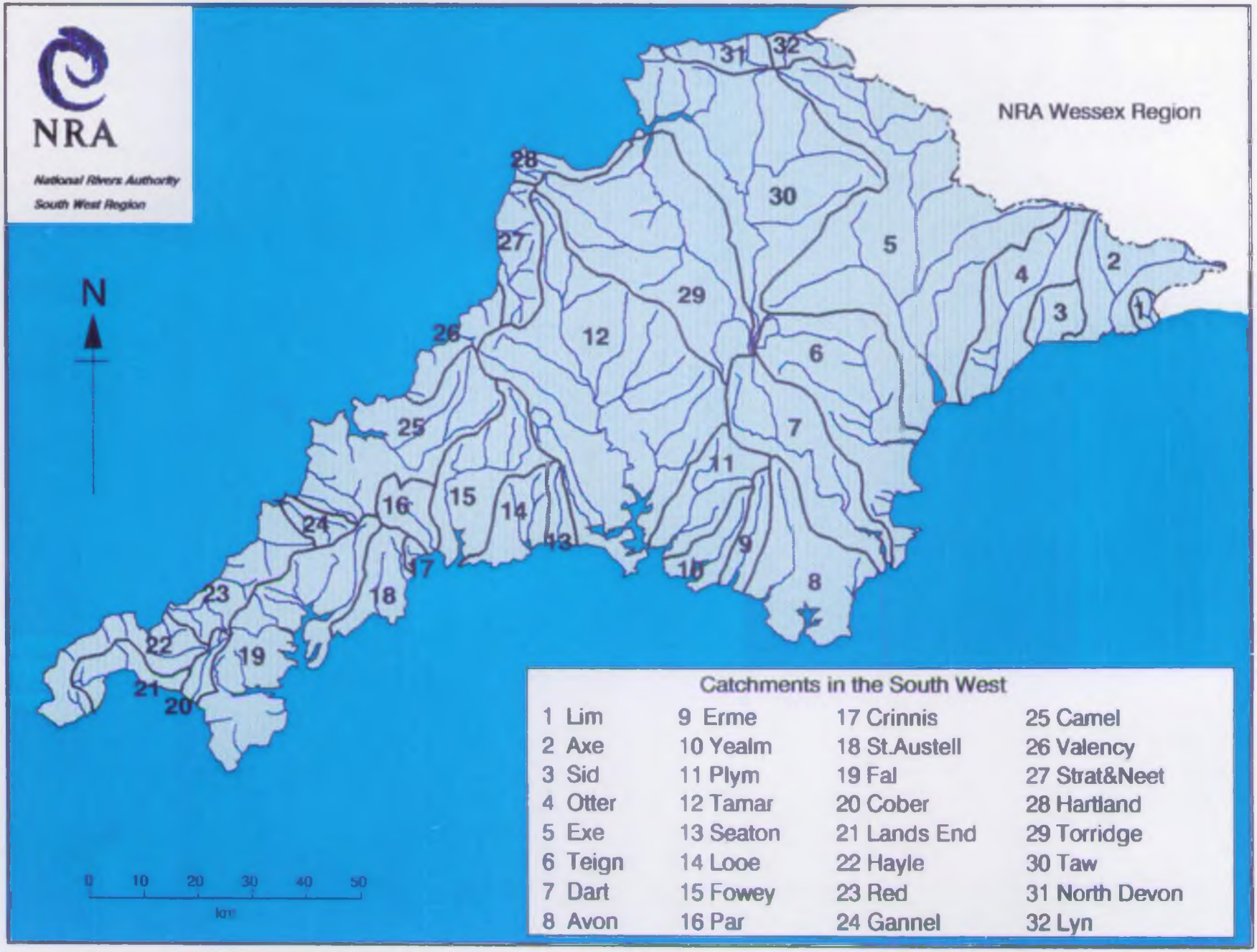


Figure 3.3 Catchments in NRA South West Region

Although not part of the Public Register, the biological data collected in routine surveys is treated as if it were, in accordance with NRA policy.

Table 3.5 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

Where EQI ASPT is poor, but EQI N-fams 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-fams is low, though some form of toxic pollution could also be responsible. Where EQI N-fams is poor, but EQI ASPT is good, toxic pollution (such as from acidic metalliferous discharges or industrial effluents) or habitat degradation (such as canalization) are the most likely causes of poor ecological quality.

There is a 5% chance of the classifications based on EQI ASPT being erroneous. There is a 10% chance of the classifications based on EQI N-fams being wrong. The chances of misclassification are greater when the EQI is near the band limits of the classes. Where there is a high risk of misclassification based on either EQI ASPT or EQI N-fams, the general NRA Biological Classification may indicate a different class. If both the class based on a single EQI and the general NRA Biological Classification are the same, there is a lower risk of the EQI based on a single class being erroneous.

3.2.2 River Lim Catchment Catchment-1

The single biological monitoring site sampled in 1990 on the River Lim indicated that the river was of good biological quality.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER LIM CATCHMENT (Catchment 1)

Site No. on Map	Watercourse	Biological Site Name	NGR	Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1	Lim	25m u/s br Mill Green	SY 3400 9253	0101	H01A002	3	7	30	5.8	0.90	0.93	A	A	A
2	Harcombe Stream	5m u/s br prior to STW	SY 3330 9333	0102										

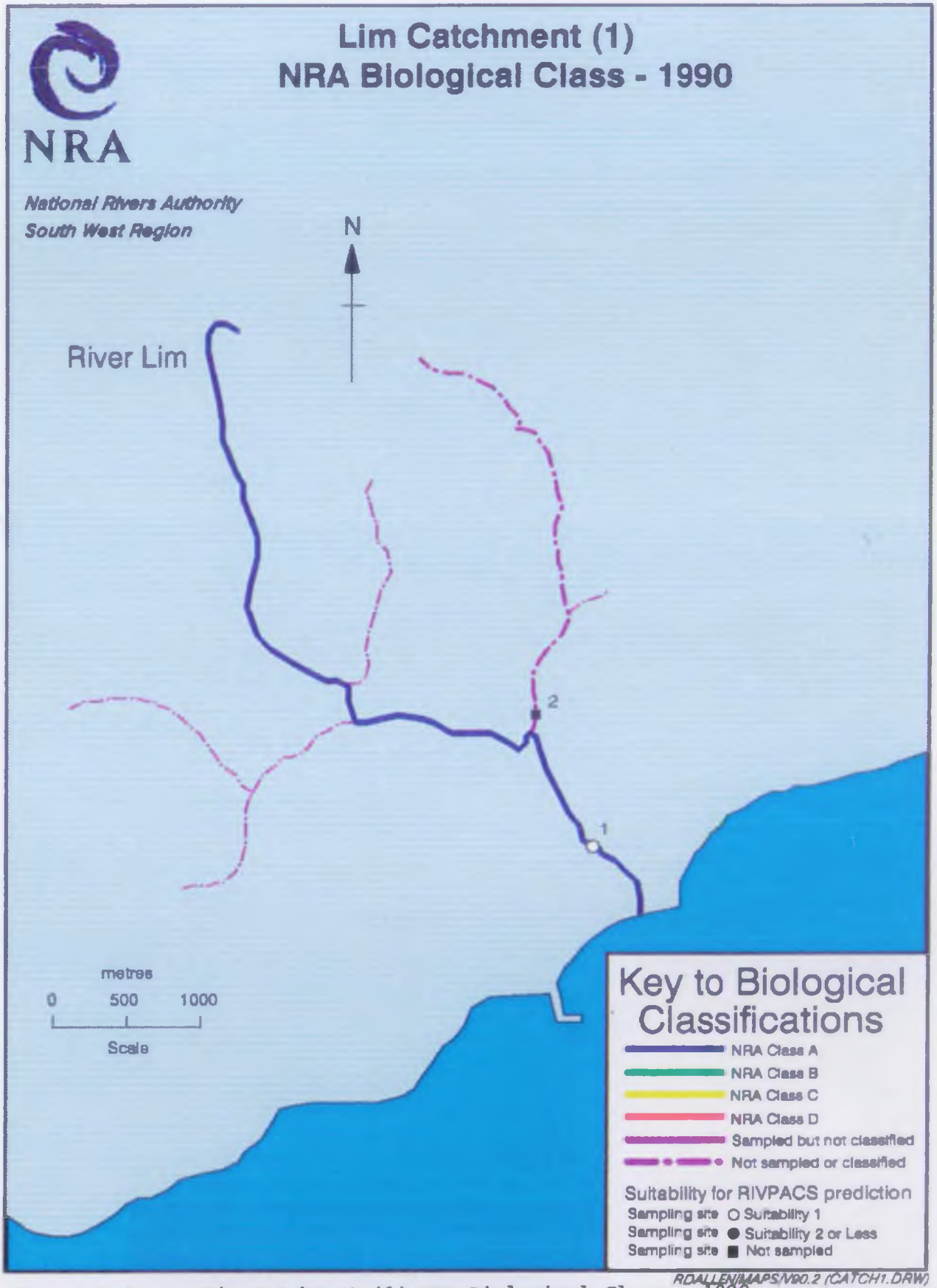


Figure 3.4 Lim Catchment (1) NRA Biological Class – 1990

3.2.3 River Axe Catchment Catchment-2

Despite being classed as having of good ecological quality, the River Axe and many of its tributaries including the River Yarty suffered from eutrophication. Although this was not evident from the biotic indices based on the macro-invertebrate communities, it was evident from the fish and algal communities. There was a permanent bloom of benthic diatoms at Whitford Bridge throughout the year, and large stands of Cladophora and Ranunculus were present in the lower reaches of the Axe during the Summer and Autumn. The lower reach of Umbourne Brook was of only moderate quality in terms of its EQI N-fams (though not its overall NRA Biological Classification) which suggested a possible toxic influence, though no potential sources were identified other than a Sewage Treatment Works (STW) effluent. The lower reach of the Branscombe Stream was classed as being of only moderate ecological quality owing to only moderate EQI-N fams. This was ascribed to the effects of dredging at the monitoring site. This routine monitoring site has since been replaced by another away from the area that is dredged, so that the ecological quality of the lower Branscombe Stream is represented better.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER AXE CATCHMENT (Catchment 2)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Axe	20m d/s A3066 br Mosterton	ST 4568 0525
2	Axe	30m d/s Seaborough Bridge	ST 4295 0570
3	Axe	Cathill Farm Waycroft	ST 4035 0603
4	Axe	60m u/s Fords Bridge	ST 3626 0534
5	Axe	25m u/s br Brooms	ST 3263 0248
6	Axe	75m u/s A358 br Waycroft	ST 3075 0002
7	Axe	125m u/s Bow Bridge	SY 2902 9833
8	Axe	300m u/s Whitford Bridge	SY 2645 9555
9	Axe	100m d/s footbr Nunford Dairy	SY 2611 9463
10	Axe	50m u/s Axe Bridge	SY 2593 9265
11	Coly	20m u/s Woodbridge	SY 1885 9533
12	Coly	75m u/s Brinkley Bridge	SY 2125 9514
13	Coly	150m u/s ford (10m u/s footbr) Heathayne	SY 2342 9437
14	Coly	60m u/s bridge Colyford	SY 2535 9268
15	Umbourne Brook	25m u/s Triffords Farm br	SY 2232 9946
16	Umbourne Brook	75m u/s Coly confluence	SY 2485 9430
17	Offwell Brook	100m d/s Offwell footbridge	SY 1930 9874
18	Offwell Brook	25m u/s br Road Pitt Farm	SY 2148 9534
19	Yarty	100m u/s Newhaven Bridge	ST 2587 1103
20	Yarty	15 u/s Longbridge	ST 2562 0551
21	Yarty	100m u/s Beckford br	ST 2650 0158
22	Yarty	100m u/s A35 br Gammons Hill	SY 2813 9812
23	Corry Brook	40m u/s rd br Rose Farm	ST 2421 0244
24	Corry Brook	100m u/s rd br Old Corryton	SY 2684 9908
25	Kit Brook	10m u/s br Narfords	ST 2958 0628
26	Kit Brook	25m u/s road bridge Axe Farm	ST 3194 0167
27	Blackwater River	50m u/s br Buddlewall	ST 3301 0217
28	Porton Brook	50m u/s B3162 rd br	ST 3403 0709
29	Porton Brook	100m d/s Tatworth STW	ST 3375 0463
30	Whatley Stream	30m d/s railway bridge Annerham	ST 3648 0556
31	Synderford	20m u/s footbridge Beere Farm	ST 3776 0573
32	Temple Brook	20m u/s Cathill br	ST 4072 0587
33	Drimpton Stream	20m u/s Nethercheay Ford	ST 4165 0542
34	Whatley Stream	25m u/s road bridge Potwell Farm	ST 4469 0493
35	Branscombe Stream	25m u/s pylons Branscombe Mouth	SY 2068 8820
36	Clapton Stream	50m u/s rd br u/s Clapton	ST 4162 0718
38	Chapplecroft Brook	60m u/s Axe confl	ST 3045 0000
39	Mill Brook	20m u/s Axe confl	SY 2965 9921
40	Old Park Brook	50m u/s Axe confl	SY 2909 9798
41	Hewood Stream	40m u/s Axe confl	ST 3462 0498
42	Stanmary Stream	50m u/s Axe confl	ST 3202 0100
43	Smallridge Stream	25m u/s rail br prior to Axe	ST 3088 0037
44	Bulmoor Stream	100m u/s Whitford Bridge	SY 2633 9533

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
0232	R02C001									
0212	R02C002	3	7	36	6.0	1.09	1.02	A	A	A
0213	R02C003	3	7	40	6.1	1.20	1.05	A	A	A
0233	R02C004									
0214	R02C005	3	7	41	6.0	1.20	1.00	A	A	A
0215	R02C006	3	7	48	6.4	1.44	1.05	A	A	A
0234	R02C007									
0230	R02B001									
0202	R02B002	3	7	37	5.9	1.09	0.97	A	A	A
0203	R02B002	3	7	42	5.8	1.19	1.01	A	A	A
0208	R02B003	3	7	31	6.0	0.93	0.95	A	A	A
0209	R02B004	3	7	32	6.0	0.95	0.95	A	A	A
0210	R02B005	3	7	31	6.0	0.98	0.98	A	A	A
0211	R02B006	3	7	37	6.3	1.08	1.01	A	A	A
0205	R02B007	3	7	33	6.7	0.98	1.06	A	A	A
0204	R02B008	3	7	27	6.3	0.78	1.02	B	A	A
0206	R02B009	3	7	35	6.5	1.09	1.01	A	A	A
0207	R02B010	3	7	31	5.8	0.91	0.92	A	A	A
0225	R02C003	3	7	34	6.4	0.99	1.01	A	A	A
0243	R02C004									
0227	R02C005	3	7	34	6.3	0.98	0.99	A	A	A
0226	R02C006	3	7	41	6.1	1.27	1.01	A	A	A
0228	R02C001	3	7	34	6.4	1.01	1.01	A	A	A
0229	R02C002	3	7	38	6.0	1.09	0.95	A	A	A
0241	R02C012									
0223	R02C013	3	7	36	6.4	1.06	1.03	A	A	A
0222	R02C008	3	7	38	6.3	1.09	1.01	A	A	A
0220	R02C010	3	7	33	5.9	0.99	0.99	A	A	A
0221	R02C011	3	7	35	5.8	1.04	1.01	A	A	A
0219	R02C015	3	7	36	6.1	1.09	1.07	A	A	A
0218	R02C014	3	7	37	6.3	1.08	1.04	A	A	A
0242	R02C018									
0217	R02C009	3	7	33	6.0	0.99	1.01	A	A	A
0224	R02C016	3	7	36	6.1	1.08	1.04	A	A	A
0201	R02A001	3	7	23	6.1	0.69	1.03	B	A	B
0216	R02C017	3	7	35	6.0	1.07	1.05	A	A	A
0237										
0236										
0235										
0240										
0239										
0238										
0231										

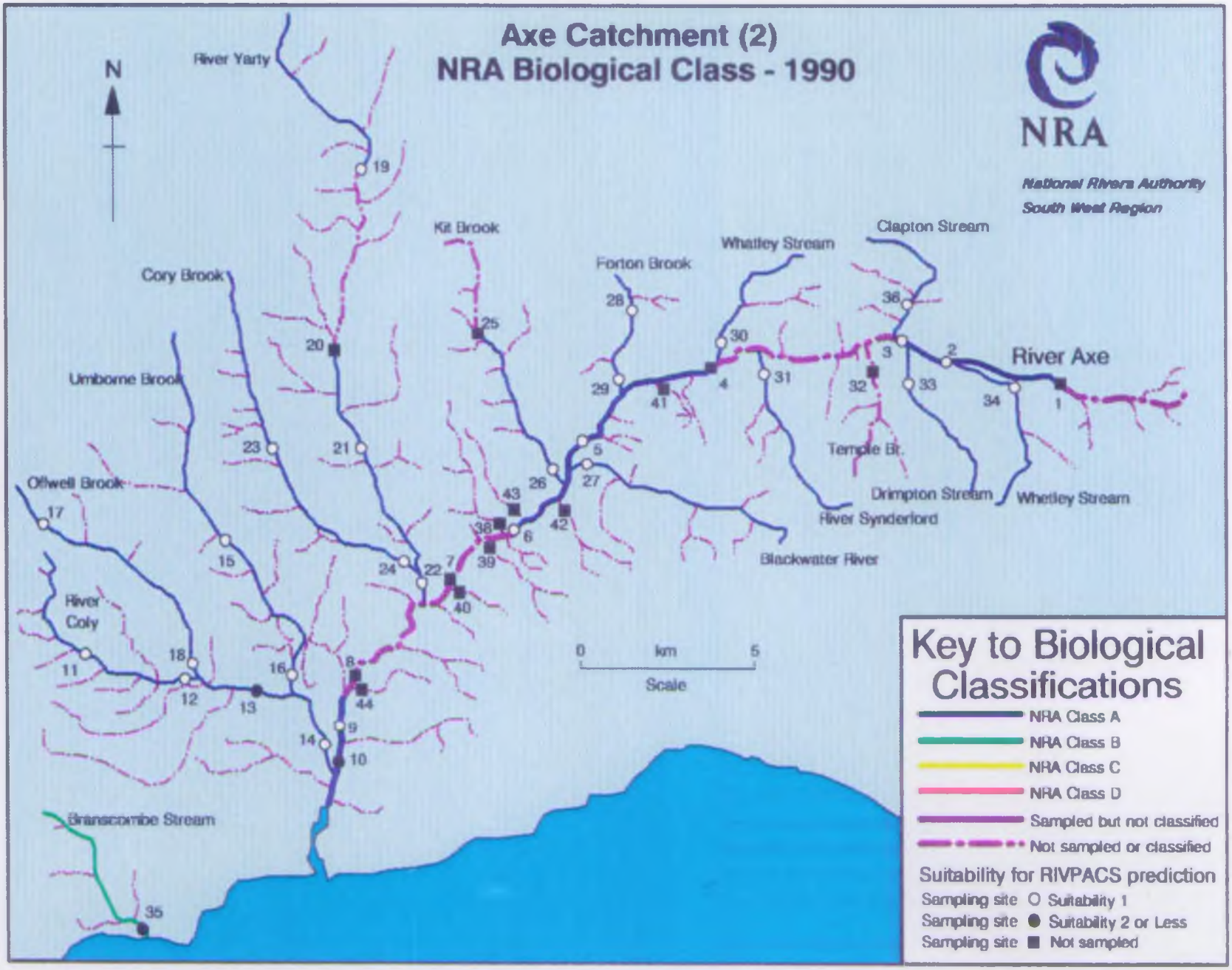


Figure 3.5 Axe Catchment (2) NRA Biological Class – 1990

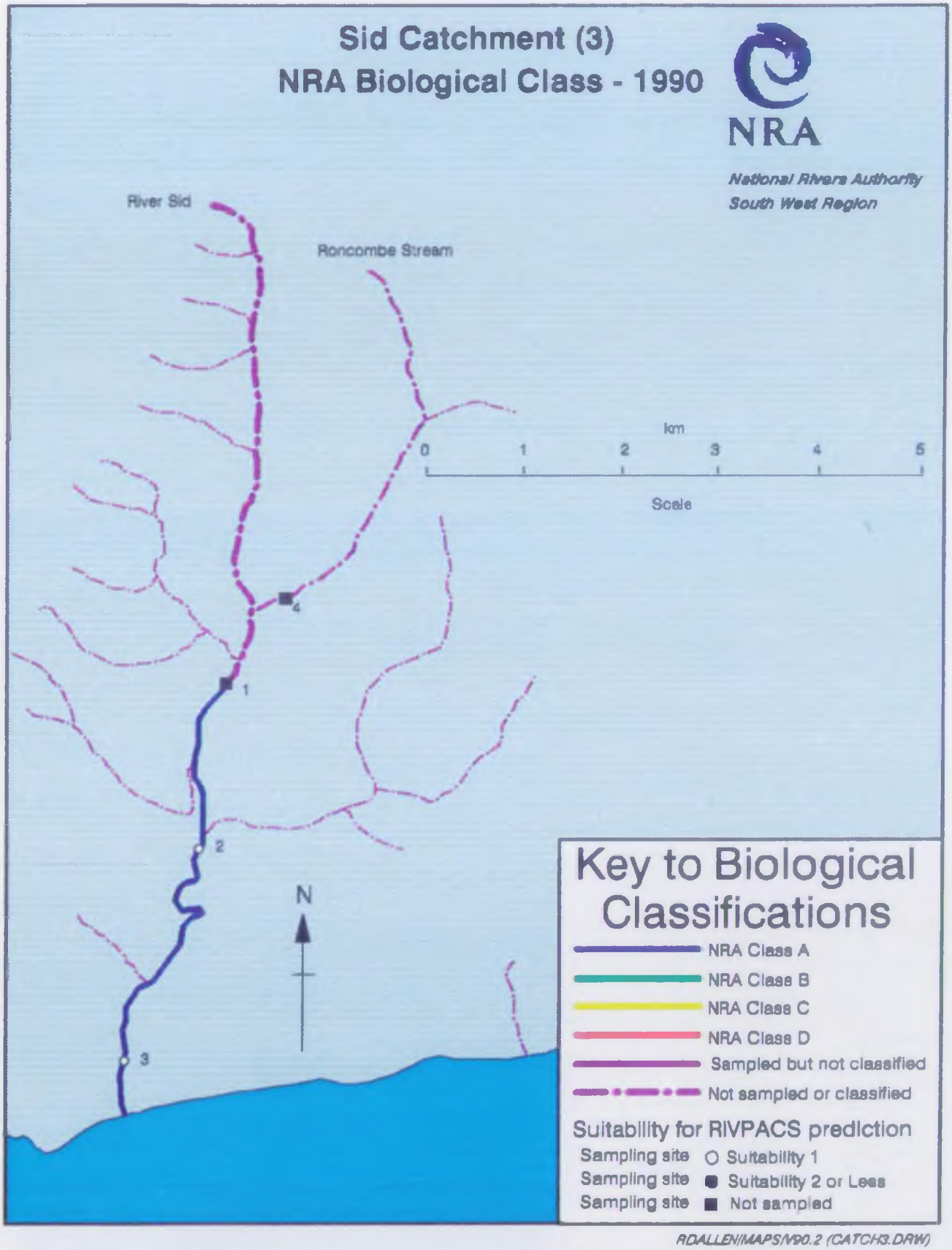


Figure 3.6 Sid Catchment (3) NRA Biological Class - 1990

3.2.4 River Sid Catchment Catchment-3

The overall NRA Biological Class of the lower and middle reaches of the River Sid indicated good biological quality.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER SID CATCHMENT (Catchment 3)

Site No. on Map	Watercourse	Biological Site Name	NGR	Site Code
1	Sid	75m u/s Stoney br Sidbury	SY 1402 9168	0303
2	Sid	20m u/s A3052 br Sidford	SY 1375 8995	0301
3	Sid	25m u/s footbr Sidmouth 300m u/s chem	SY 1280 8812	0302
4	Roncombe Stream	15m u/s br Cotford	SY 1425 9222	0304

Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
R03A001									
R03A002	3	7	34	6.3	1.00	1.01	A	A	A
R03A003	3	7	27	6.1	0.79	0.99	A	A	A
R03A013									

3.2.5 River Otter Catchment Catchment-4

Two of the lower to middle reaches on the River Otter were of only moderate ecological quality owing to moderate quality EQI ASPTs. This was ascribed to organic enrichment, most probably from farming activities, though abstraction may have been a contributory influence.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER OTTER CATCHMENT (Catchment 4)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Otter	50m u/s br Hoaxore Farm	ST 2212 1040
2	Otter	45m u/s footbr Rawridge	ST 1983 0627
3	Otter	200m u/s Ford Bridge	ST 1850 0310
4	Otter	70m u/s Clapperlane br	ST 1638 0123
6	Otter	50m d/s bridge Weston	ST 1422 0006
7	Otter	150m u/s br Penny Bridges	ST 1145 9870
8	Otter	50m u/s br Ottery St Mary	SY 0937 9607
9	Otter	200m u/s br Tipton St John	SY 0895 9196
10	Otter	50m u/s footbr Dotton Mill	SY 0873 8853
11	Otter	25m d/s Otterton br	SY 0790 8524
13	Budleigh Brook	20m u/s br Yettington	SY 0527 8570
14	Colaton Raleigh Stm	15m u/s br Pophams	SY 0718 8767
15	Metcombe Stream	20m u/s br Metcombe	SY 0797 9197
16	Fluxton Stream	40m u/s br Fluxton	SY 0863 9283
17	West Hill Stream	25m u/s br Salston Barton	SY 0883 9455
18	Tale	50m u/s bridge Danes Mill	ST 0755 0335
19	Tale	25m d/s br Taleford	SY 0895 9689
20	Vine Water	25m d/s Feniton signpost Feniton	SY 1108 9914
21	Gittisham Stream	10m d/s top of field d/s Pomeroy	SY 1343 9913
23	Wolf	30m u/s rd br Wiminford	ST 1432 0060
24	Gissage	20m Otter confluence	ST 1528 0117
25	Combe Raleigh Stream	50m u/s farm Ford Longwood	ST 1630 0175
27	Wick Stream	100m u/s fm br Mill House Nursery	ST 1685 0293
28	Odle Brook	10m u/s track Spurtham Farm	ST 1925 0640
29	Fairoak Stream	30m u/s br Upottery	ST 1994 0778

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
0401	R04B001	3	7	37	6.6	1.13	1.03	A	A	A
0412	R04B042									
0402	R04B035	3	7	31	6.6	0.90	1.04	A	A	A
0413	R04B002									
0403	R04B003	3	7	33	5.8	0.98	0.93	A	A	A
0414	R04B019									
0404	R04B004	3	7	33	5.4	0.99	0.86	A	B	B
0405	R04B005	3	7	29	5.5	0.87	0.88	A	B	B
0415	R04B006									
0406	R04B007	3	7	29	6.0	0.87	0.98	A	A	A
0425	R04B034									
0424	R04B032									
0423	R04B028									
0422	R04B027									
0421	R04B026									
0410	R04B008	3	7	33	5.9	0.96	0.94	A	A	A
0411	R04B009	3	7	29	5.7	0.82	0.90	A	A	A
0420	R04B025									
0419	R04B024									
0409	R04B011	3	7	34	5.9	0.98	0.95	A	A	A
0408	R04B023	3	7	39	5.9	1.11	0.95	A	A	A
0418	R04B022									
0407	R04B010	3	7	36	6.6	1.04	1.03	A	A	A
0417	R04B021									
0416	R04B020									

Figure 3.7 Otter Catchment (4) NRA Biological Class – 1990

3.2.6 River Exe Catchment Catchment-5

The River Exe itself was of good ecological quality, except in its lowest reach monitored at Trews Weir, which was of only moderate quality on the basis of both EQI ASPT and EQI N-fams. The biologists reported difficulties sampling at this site, which could have contributed to the poor classification of this reach. 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 South West Region, 1991a). Most of the sites on the River Clyst, and the lowest reach of its tributary the Cranny Brook, were of 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. Moderate quality in the River Culm at Higher Upton owing to organic enrichment was ascribed to effluent from a paper mill at Higher Kings Mill, as well as to farming. The lower reach of Alphin Brook, which runs through an industrial estate, is canalised and was subject to dredging; it was of moderate ecological quality owing to its EQI ASPT, implying that organic enrichment also affected the fauna. The moderate quality of the Northbrook was ascribed to urbanisation and storm-water overflow; the biological data indicated that the contamination was largely organic. The lower and middle reaches of Spratford Stream were of moderate quality owing organic enrichment, most probably because of farming, sewage works effluent, and in the lowest reach because of effluent from a meat processing factory.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER EXE CATCHMENT (Catchment 5)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Exe	10m u/s fm br Court Farm Exford	SS 8573 3806
2	Exe	75m d/s rope bridge Below Winsford	SS 9150 3387
3	Exe	25m u/s br Warmore	SS 9347 2601
4	Exe	150m u/s Exebridge	SS 9310 2448
5	Exe	150m u/s Halfpenny Bridge	SS 9510 2045
6	Exe	250m d/s Bolham Intake Lythecourt	SS 9475 1513
7	Exe	300m u/s Tiverton New Bridge Kennedy	SS 9484 1330
8	Exe	175m d/s to of field Collipriest	SS 9520 1170
9	Exe	150m d/s STW Ashley	SS 9528 1003
10	Exe	25m u/s footbridge Bickleigh Castle	SS 9368 0690
11	Exe	100m d/s br Thorverton	SS 9353 0155
12	Exe	90m u/s Stafford Bridge	SX 9223 9621
13	Exe	50m u/s Exwick Br	SX 9103 9360
14	Exe	Flood Relief by fish pass Trews Weir	SX 9242 9163
15	Kenn	A38br Kennford 50m u/s footbr Brenton Fm	SX 9117 8663
16	Kenn	20m u/s A379 br u/s Kenton	SX 9527 8463
17	Exeter Canal	30m u/s A38 br Countess Wear	SX 9395 8940
18	Clyst	30m u/s bridge Clyst Hydon	ST 0363 0158
19	Clyst	15m u/s br Clyst St Lawrence	ST 0273 0005
20	Clyst	50m u/s rd br Ashclyst Farm	SY 0115 9830
21	Clyst	20m u/s A38 br Broadclyst	SX 9843 9760
22	Clyst	100m u/s Withy Bridge	SX 9748 9580
23	Clyst	150m u/s rd br Clyst Honiton	SX 9860 9357
24	Clyst	50m u/s field br Clyst St Mary	SX 9728 9165
25	Grindle Brook	40m d/s weir Winslade Park	SX 9770 9019
26	Aylesbeare Stream	175m u/s br Dymonds Farm	SX 9883 9260
27	Pin Brook	15m u/s br Mosshayne	SX 9812 9435
28	Polly Brook	200m d/s A376 br Exton	SX 9836 8627
29	Cranny Brook	50m u/s field br Barnshayes	SY 0382 9710
30	Cranny Brook	75m u/s bridge Crannaford Crossing	SY 0135 9600
31	Cranny Brook	100m u/s rd br Wishford Farm	SX 9919 9527
32	Ford Stream	20m u/s A30 br	SY 0091 9526
33	Alphin Brook	10m u/s Dymond's Bridge	SX 8671 9288
34	Alphin Brook	30m d/s footbr Alphington u/s A379 rd br	SX 9130 9040
35	Alphin Brook	150m u/s Countess Wear br	SX 9387 8948
36	Northbrook	150m u/s rd br Northbrook Park	SX 9403 9080
37	Creedy	75m u/s Ashridge Bridge	SS 8182 0619
38	Shuttern Brook	prior to Creedy Barton House	SX 8817 9817
39	Creedy	75m d/s footbridge Lords Meadow	SS 8485 0070
40	Creedy	150m u/s field br Westacott Cottages	SX 8545 9997
41	Creedy	150m u/s br Newton St Cyres	SX 8798 9850
42	Creedy	100m d/s bridge Oakford Farm	SX 9010 9673
43	Jackmoor Brook	Langford 120m d/s footbr	SX 8983 9772
44	Shobrooke Lake	35m d/s black pipe Creedy Barton	SX 8670 9963
45	Yeo [Creedy] [=Hitts	Rinneford 100m u/s ford	SX 7596 9676
46	Yeo [Creedy]	50m u/s rd br Gunstone Mills	SX 8051 9849
47	Yeo [Creedy]	300m u/s br Downes Mill	SX 8525 9910
48	Culvery River	50m u/s bridge Uton	SX 8342 9855

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
0591	R05C001									
0547	R05C002	3	7	35	6.8	1.05	1.07	A	A	A
0592	R05C003									
0535	R05E001	3	7	30	6.8	0.95	1.08	A	A	A
0585	R05E002									
0536	R05E003	3	7	29	6.8	0.93	1.09	A	A	A
0537	R05E004	3	7	34	6.5	1.10	1.05	A	A	A
0586	R05E005									
0538	R05E006	3	7	35	6.0	1.11	0.97	A	A	A
0539	R05C015	3	7	36	6.3	1.13	1.01	A	A	A
0530	R05D001	3	7	27	6.3	0.83	1.02	A	A	A
0582	R05D002									
0531	R05D003	3	7	42	6.0	1.20	1.02	A	A	A
0532	R05D004	3	7	24	4.8	0.70	0.84	B	B	B
0502	R05A001	3	7	24	5.1	0.71	0.84	B	B	B
0503	R05A002	3	7	34	6.4	0.98	1.06	A	A	A
0501	R05A006	3	7	28	5.1	0.87	0.91	A	A	A
0508	R05B001	3	7	22	4.4	0.70	0.79	B	B	B
0567	R05B002									
0509	R05B003	3	7	32	5.5	0.96	0.93	A	A	A
0510	R05B004	3	7	27	4.8	0.80	0.87	A	B	B
0511	R05B005	3	7	31	4.9	0.86	0.86	A	B	B
0512	R05B006	3	7	31	5.1	0.91	0.86	A	B	B
0568	R05B007									
0506	R05A028	3	7	37	5.5	1.10	0.94	A	A	A
0569	R05B013									
0570	R05B012									
0566	R05A029									
0513	R05B009	3	7	18	4.1	0.54	0.71	C	C	C
0514	R05B010	3	7	29	5.2	0.85	0.90	A	A	A
0515	R05B011	3	7	28	5.1	0.81	0.88	A	B	B
0571	R05B014									
0565	R05A003									
0504	R05A004	3	7	36	5.9	1.07	1.00	A	A	A
0505	R05A005	3	7	30	4.7	0.90	0.82	A	B	B
0500	R05A026	3	7	22	4.6	0.66	0.80	B	B	B
0557	R05J001	1	1	23	6.0	0.88	0.94	A	A	A
0598	R05J021									
0558	R05J002	3	7	39	6.1	1.11	0.97	A	A	A
0594	R05J003									
0595	R05J013									
0559	R05J004	3	7	42	6.3	1.24	1.01	A	A	A
0596	R05J018									
0597	R05J017									
0562	R05K003	2	4	24	6.2	0.79	0.97	A	A	A
0561	R05K004	3	7	36	6.4	1.12	1.02	A	A	A
05100	R05K005									
0564	R05K011	3	7	36	5.9	1.04	0.94	A	A	A

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER EXE CATCHMENT (Catchment 5) continued

Site No. on Map	Watercourse	Biological Site Name	NGR
49	Ford Brook	10m u/s br Ford Farm	SX 7938 9769
50	Tronsy	40m u/s br Easterbrook	SX 7228 9703
51	Tronsy	50m u/s Yeoford Bridge	SX 7830 9900
52	Cole Brook	75m u/s br Colebrooke	SX 7779 9960
53	Holly Water	50m u/s Heath Bridge	SS 8445 0451
54	Birneford Water	100m u/s confl Ashridge Farm	SS 8198 0618
55	Horwell Stream	50m u/s br Colebrooke	SS 7715 0043
56	Culm	50m u/s br Rosemary Lane	ST 1605 1408
57	Culm	20m u/s br Hemyock	ST 1388 1391
58	Culm	100m d/s rd br Culmstock	ST 1000 1375
59	Culm	10m u/s footbr Uffculme	ST 0713 1279
60	Culm	90m d/s Skinner's Farm br	ST 0418 1014
61	Culm	225m u/s Higher Upton br	ST 0270 0677
63	Culm	25m u/s br Westcott	ST 0135 0427
64	Culm	25m d/s weir u/s mill	SS 9800 0102
66	Culm	350m d/s br d/s Silverton Mill	SS 9745 0138
67	Culm	75m d/s Columbjohn br	SX 9575 9970
68	Culm	250m d/s Stoke Canon Bridge	SX 9363 9745
69	Wheyer	40m u/s B3181 br	ST 0137 0392
70	Spratford Stream	30m u/s Leonard Moor Bridge	ST 0449 1410
71	Spratford Stream	50m u/s B3391 br Tiverton Junction	ST 0320 1160
72	Spratford Stream	50m d/s Five Bridges	ST 0265 0953
73	Heron's Bank Brook	10m u/s br Heron's Bank	ST 0242 0885
74	Sheldon Stream	20m u/s Shute Farm Bridge	ST 1239 0901
75	Madford Stream	prior to Dunkeswell confl under pylons	ST 1522 0836
76	Madford Stream	Dunkeswell Abbey 30m u/s river split	ST 1442 1015
77	Madford Stream	25m u/s Culm Bridge Hemyock	ST 1435 1352
78	Dunkerswell Stream	prior to Madford confl	ST 1490 0827
79	Bolham River	100m u/s Five Bridges	ST 1506 1247
80	Thorverton Stream	25m u/s br opp Thorverton Church	SS 9251 0220
81	Burn	50m u/s footbr Burn Mill Farm	SS 9467 0557
82	Dart (Exe)	50m u/s A373 br Bradley	SS 8958 1250
83	Dart (Exe)	75m u/s Dart Bridge Bickleigh	SS 9354 0766
84	Lowman	60m u/s wood Huntsham Wood	ST 0085 1836
85	Lowman	40m u/s Chieflowman Bridge	ST 0080 1567
86	Lowman	25m d/s A373 Bridge Tiverton	SS 9577 1256
87	Uplowman Stream	75m d/s gate to field Withayes	SS 9990 1447
90	Calverleigh Stream	100m u/s Swinesbridge	SS 9445 1397
91	Batherm	5m u/s rd br Ranscombe	ST 0043 2678
92	Batherm	75m u/s Pheasant Fm A361 br Shillingford	SS 9808 2378
93	Batherm	500m u/s rd br Bowbierhill under pylons	SS 9530 2126
94	Iron Mill Stream	40m d/s Iron Mill Bridge Stuckeridge	SS 9177 2082

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
05104	R05K010									
05101	R05K008									
0563	R05K002	3	7	30	6.2	0.86	0.99	A	A	A
05103	R05K009									
0560	R05J015	3	7	34	6.3	0.97	0.99	A	A	A
0599	R05J016									
05102										
0516	R05C002	3	7	37	6.3	1.11	0.98	A	A	A
0572	R05C003									
0517	R05C004	3	7	33	6.0	0.98	0.95	A	A	A
0573	R05C005									
0518	R05C006	3	7	32	6.4	0.95	1.01	A	A	A
0519	R05C007	3	7	28	5.1	0.82	0.83	A	B	B
0574	R05C008									
0575	R05C009									
0577	R05C011									
0520	R05C012									
0521	R05C013	3	7	34	5.5	0.96	0.89	A	A	A
0580	R05C026									
0522	R05C015	3	7	36	5.5	1.04	0.94	A	A	A
0523	R05C016	3	7	28	5.2	0.84	0.87	A	B	B
0524	R05C017	3	7	23	4.7	0.69	0.81	B	B	B
0581	R05C027									
0525	R05C014	3	7	32	6.9	0.97	1.08	A	A	A
0578	R05C041									
0527	R05C028	3	7	32	7.0	0.95	1.09	A	A	A
0526	R05C019	3	7	35	6.9	1.02	1.07	A	A	A
0579	R05C042									
0528	R05C018	3	7	39	6.6	1.16	1.03	A	A	A
0584	R05D009									
0583	R05D008									
0533	R05D006	3	7	34	6.6	1.03	1.02	A	A	A
0534	R05D007	3	7	35	6.4	1.01	1.01	A	A	A
0587	R05E009									
0543	R05E010	3	7	37	6.8	1.09	1.08	A	A	A
0544	R05E011	3	7	29	5.7	0.84	0.91	A	A	A
0589	R05E021									
0588	R05E020									
0590	R05F001									
0545	R05F002	3	7	32	6.1	0.95	0.97	A	A	A
0546	R05F003	3	7	34	6.5	1.01	1.03	A	A	A
0542	R05E008	3	7	38	6.8	1.15	1.07	A	A	A

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER EXE CATCHMENT (Catchment 5) continued

Site No. on Map	Watercourse	Biological Site Name	NGR
95	Brockey River	50m u/s Brocksbridge Cottage bridge	SS 9238 2455
96	Barle	100m u/s Simonsbath Bridge	SS 7695 3915
97	Barle	150m u/s ford Tarr Steps	SS 8667 3223
98	Barle	100m d/s Pixton Hill	SS 9243 2631
99	Dane's Brook	30m u/s Hawkridge Bridge	SS 8575 3012
100	Sherdon Water	25m u/s bridge Penny Ball	SS 8025 3540
101	Haddeo	20m u/s bridge Cuckolds Combe	ST 0014 3077
102	Withiel Brook	50m u/s field br u/s Wimbleball	SS 9805 3266
103	Haddeo	50m u/s bridge Pixycopse	SS 9377 2658
104	Pulham	25m u/s bridge prior to Haddeo	SS 9573 3000
105	Quarme	50m d/s footbridge Witheridge Farm	SS 9202 3500
106	Dawlish Water	20m d/s footbridge car park Dawlish	SX 9565 7673
107	Dawlish Water	30m u/s footbr Brook House	SX 9548 7679

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
0540	R05E012	3	7	40	6.4	1.18	1.01	A	A	A
0552	R05H001	3	7	30	6.5	0.92	1.02	A	A	A
0553	R05H002	3	7	28	7.0	0.87	1.10	A	A	A
0554	R05H003	3	7	32	6.6	1.00	1.04	A	A	A
0555	R05H004	3	7	26	7.1	0.81	1.11	A	A	A
0556	R05H005	3	7	32	7.0	0.99	1.10	A	A	A
0548	R05G004	3	7	32	6.5	0.99	1.03	A	A	A
0593										
0549	R05G005	3	7	36	7.1	1.09	1.10	A	A	A
0550	R05G009	3	7	33	6.6	1.02	1.03	A	A	A
0551	R05G006	3	7	33	7.1	0.99	1.12	A	A	A
0507	R05A027	2	4	31	6.0	1.01	0.98	A	A	A
05105	R05A027									

Figure 3.8 Exe Catchment: River Exe (5 in part) NRA Biological Class- 1990

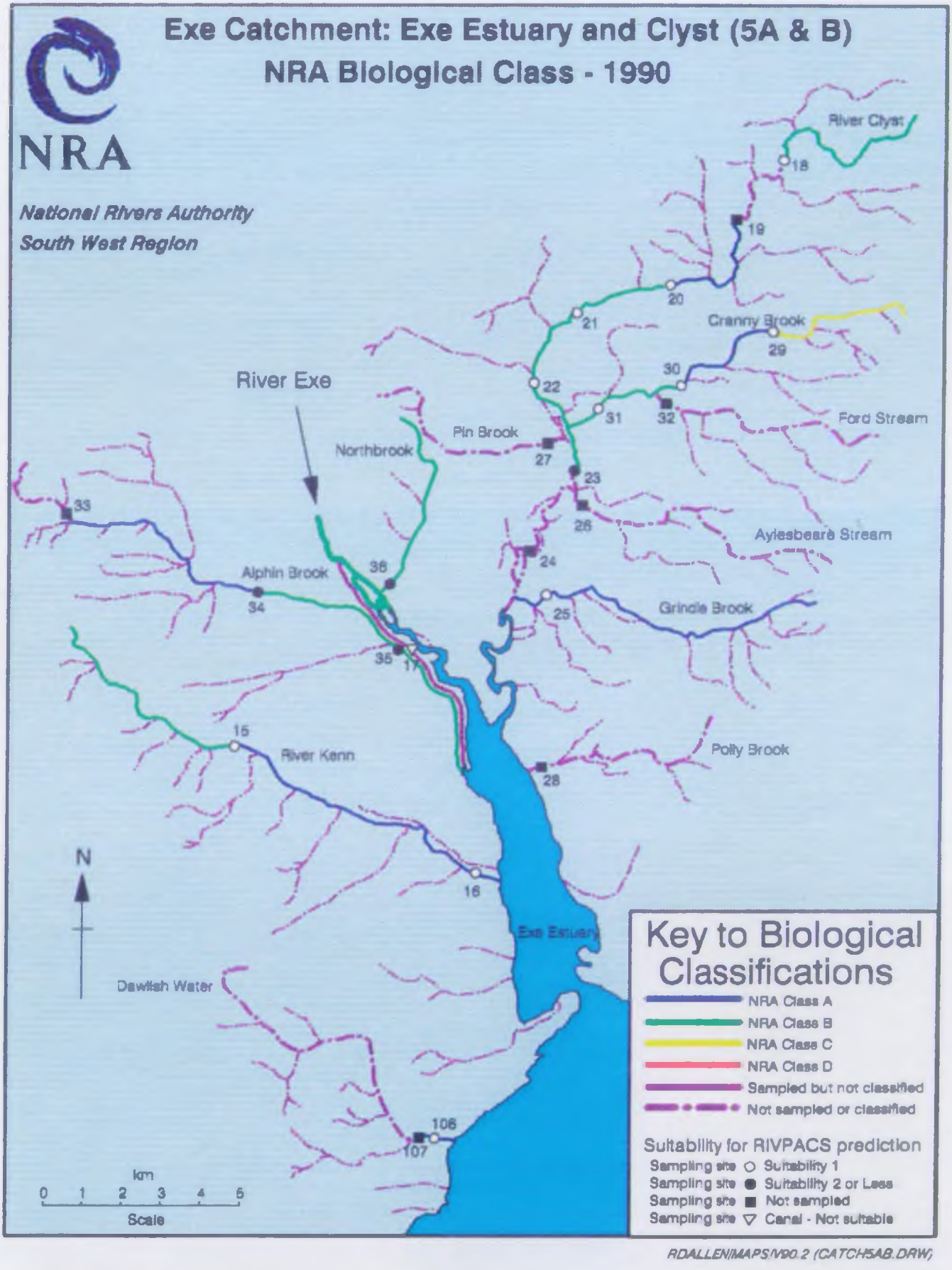


Figure 3.9 Exe Catchment: Exe Estuary and Clyst (5A & 5B) NRA Biological Class – 1990

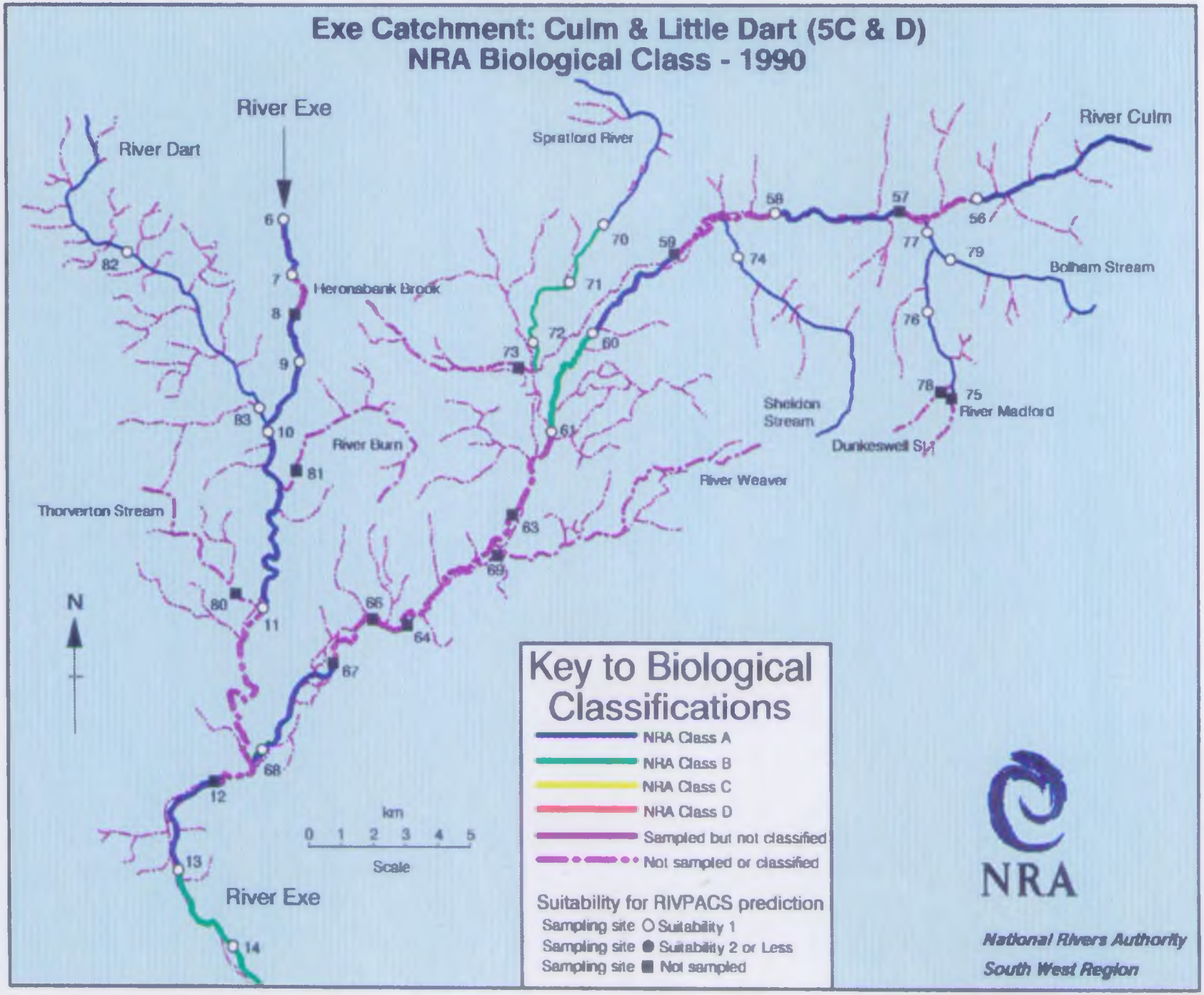
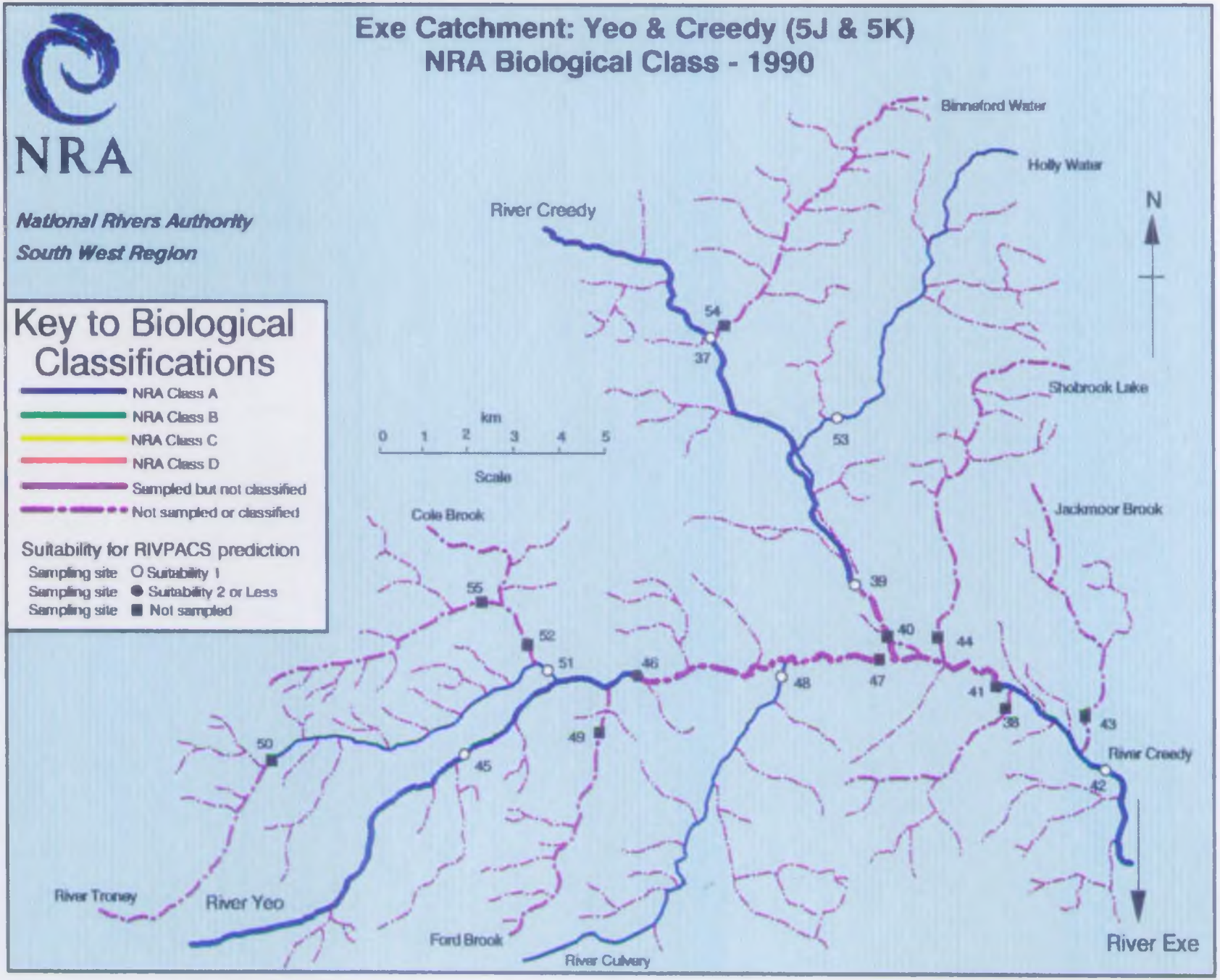


Figure 3.10 Exe Catchment: Culm and Little Dart (5C & 5D) NRA Biological Class - 1990

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



RDALLEN\MAPS\190.2 (CATCH5JK.DRW)

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

3.2.7 River Teign Catchment Catchment-6

Apart from the Aller Brook, the whole catchment was of good overall ecological quality. Aller Brook was of poor quality because of organic and inorganic pollution: its upper reach was affected by seepage from a reclaimed waste disposal site and by pollution from a vegetable processing factory (both these sources are to be confirmed by Pollution Control), and its middle reach by a effluent from Kingskerswell Sewage Treatment Works which was subsequently decommissioned, in 1991. Aller Brook was surveyed by Freshwater Investigation Team in 1992, and a report is in preparation.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER TEIGN CATCHMENT (Catchment 6)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Haldon Stream	160m u/s footbr Haws Barton	SX 8796 8032
2	South Teign River	75m u/s Leigh Bridge	SX 6828 8760
3	North Teign	100m u/s Gidleigh Park Hotel Bridge	SX 6772 8783
4	Teign	50m d/s Rushford Br u/s Chagford	SX 6940 8798
5	Teign	30m d/s Clifford Bridge	SX 7812 8979
6	Teign	50 m d/s rd br d/s Bridfordmills Weir	SX 8343 8720
7	Teign	120m u/s Spara Bridge	SX 8425 8422
8	Teign	225m u/s Croombe Bridge opp Knowle House (RHB)	SX 8470 8135
9	Teign	400m d/s Chudleigh Bridge	SX 8580 7814
10	Teign	100m u/s New Bridge	SX 8480 7630
11	Teign	300m u/s Teignbridge	SX 8573 7358
12	Aller Brook	u/s Edginswell Pumping Stn opp Rougemont Av	SX 8948 6630
13	Aller Brook	5m d/s hedge bank Manor Drive playing fields	SX 8798 6740
14	Aller Brook	30m d/s footbridge Aller Orchard	SX 8763 6883
15	Aller Brook	15m u/s fence Plywco Superstore Pennimn	SX 8708 7050
16	Lemon	10m u/s br Bagator Mill	SX 7696 7556
17	Lemon	250m d/s Sig confl 30m d/s minor trib	SX 7805 7352
18	Lemon	20m d/s footbr Bradley Park 200m u/s cp	SX 8508 7095
19	Blatchford Stream	25m d/s rd br 10m u/s footbr Perry Farm	SX 8360 7289
20	Blatchford Stream	25m d/s rd br Blatchford	SX 8560 7301
21	Compton Pool Stream	25m u/s rd br Langford Bridge	SX 8719 6908
22	Ugbrooke Stream	15m d/s discharge Higher Sandygate	SX 8660 7530
23	Ugbrooke Stream	approx 55m u/s footbr prior to Teign confl	SX 8575 7397
25	Crockernwell Stream	35m d/s rd br	SX 7617 9267
26	Sandygate Stream	15m u/s rd br New Cross Kingsteignton	SX 8685 7481
27	Liverton Brook	75m u/s Ventiford Bridge	SX 8470 7475
28	Bovey	75m d/s Blackaller Bridge	SX 7380 8370
29	Bovey	30m u/s Drakeford Bridge	SX 7891 8015
30	Bovey	50m d/s road bridge Little Bovey	SX 8316 7671
31	Bovey	u/s arm of meander Twinyeo Farm	SX 8427 7611
32	Becka Brook	100m u/s Newbridge	SX 7573 8003
33	Wray Brook	75m u/s bridge Casaley Court	SX 7855 8235
34	Wray Brook	90m u/s bridge Knowle	SX 7885 8025
35	Kate Brook	45m u/s rd br to Gappha	SX 8592 7852
36	Bramble Brook	65m u/s Teign conf 15m u/s br	SX 8487 8116
38	Beadon Brook	50m d/s bridge Tottiford House	SX 8075 8231
39	Beadon Brook	10m u/s Hyner Bridge	SX 8368 8170
40	Beadon Brook	40m d/s B3193 br prior to Teign	SX 8433 8169
44	Rookery Brook	20m u/s footbr u/s barytes mine	SX 8255 8614
45	Rookery Brook	30m d/s B3193 rd br proir to R Teign	SX 8376 8670
46	Sowton Brook	150m u/s Sowton Bridge	SX 8343 8755
47	Reedy Brook	10m d/s Reedy Bridge	SX 8199 8928
48	Scotley Brook	10m d/s br Clifford Bridge Park	SX 7811 8974
49	Fingle Brook	115m u/s Fingle Bridge 30m u/s sign	SX 7433 9001
50	Blackaton Brook	70m u/s rd br	SX 6783 8901

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
0636										
0615	R06C001	3	7	32	7.1	1.41	1.11	A	A	A
0616	R06C002	3	7	28	7.0	1.25	1.10	A	A	A
0607	R06C003	3	7	32	6.8	1.48	1.06	A	A	A
0631	R06C004									
0608	R06C005	3	7	33	6.5	1.01	1.03	A	A	A
0632	R06C037									
0633	R06C006									
0609	R06C007	3	7	34	6.2	1.02	0.98	A	A	A
0634	R06C008									
0603	R06B001	3	7	36	6.3	1.06	1.02	A	A	A
0601	R06A001	3	7	15	4.1	0.54	0.76	C	C	C
0623	R06A002									
0602	R06A003	2	5	15	4.2	0.50	0.75	C	C	C
0624	R06A004									
0627	R06B003									
0622	R06B004	3	7	30	7.1	0.94	1.11	A	A	A
0606	R06B005	3	7	36	6.9	1.05	1.11	A	A	A
0628	R06B006									
0629	R06B007									
0625										
0626	R06B012									
0604	R06B013									
0640										
0630	R06B010									
0605	R06B050	3	7	33	6.1	0.95	0.99	A	A	A
0617	R06D001	3	7	40	6.8	1.18	1.07	A	A	A
0644	R06D002									
0618	R06D003	3	7	31	6.5	0.94	1.04	A	A	A
0619	R06D004	3	7	31	6.5	0.92	1.04	A	A	A
0621	R06D012	3	7	33	7.0	1.35	1.09	A	A	A
0620	R06D008	3	7	34	6.7	1.01	1.05	A	A	A
0645	R06D011									
0635	R06C056									
0610	R06C011	3	7	38	6.7	1.11	1.08	A	A	A
0611	R06C009	3	7	25	6.0	0.82	0.93	A	A	A
0612	R06C010	3	7	24	6.6	0.79	1.04	A	A	A
0637	R06C040									
0638	R06C013									
0613	R06C014	3	7	25	7.1	0.79	1.13	A	A	A
0614	R06C015	2	5	29	6.1	0.92	0.97	A	A	A
0639	R06C054									
0642	R06C057									
0643	R06C053									
0641	R06C052									

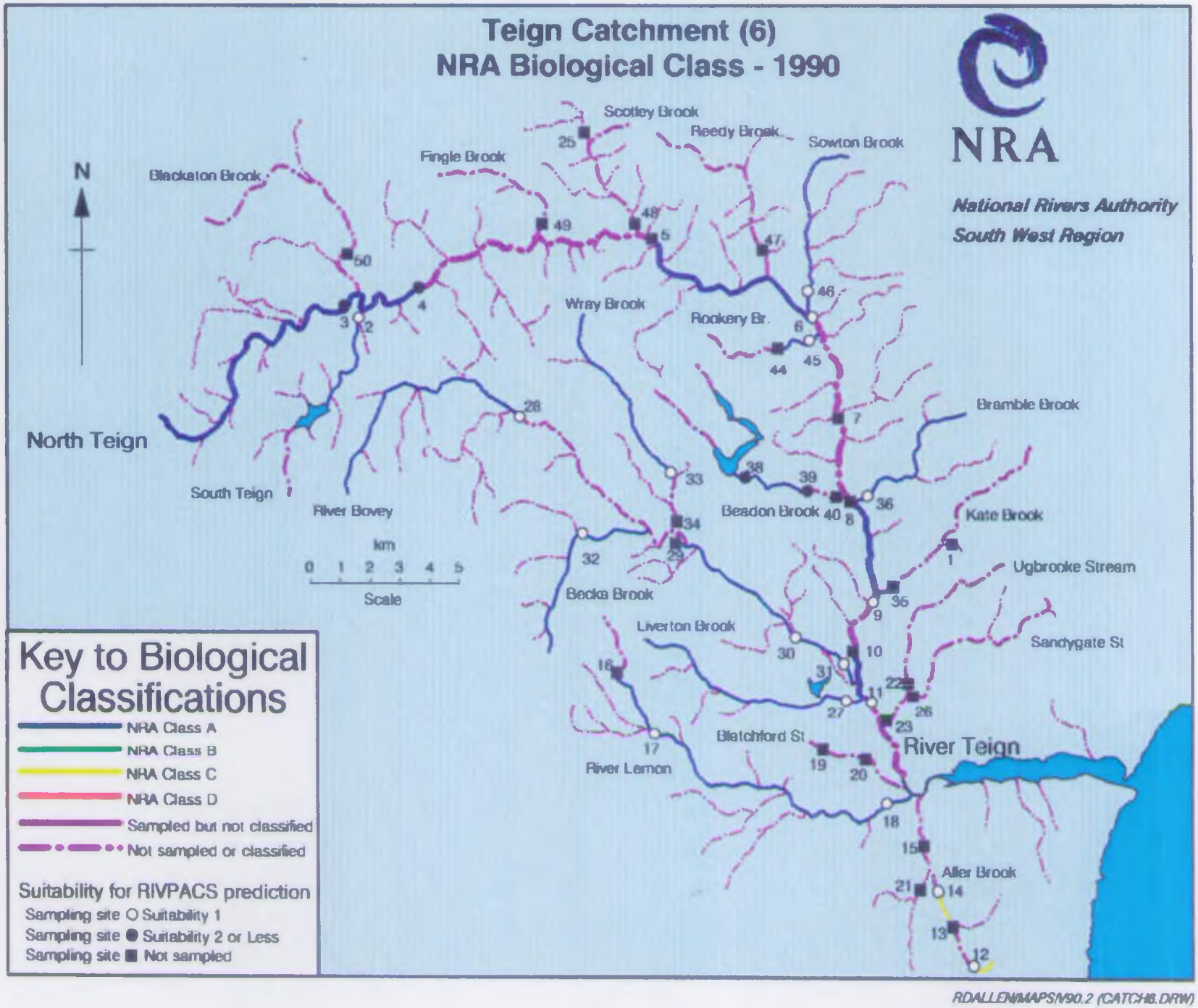


Figure 3.13 Teign Catchment (6) NRA Biological Class - 1990

3.2.8 River Dart Catchment Catchment-7

The whole catchment was of good ecological quality, except for the lower reaches of the River Dart. At Buckfastleigh, the EQI N-fams 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 apparent there. Poorer than expected taxonomic richness (as reflected in EQI N-fams) was also evident at the next site downstream, at Riverford Bridge, and this was reflected in its overall NRA Biological Classification of moderate ecological quality. The site was downstream from Buckfastleigh STW which discharges pesticides from a wool mill. The biologists reported difficulty sampling at this site, and this may have contributed to the poor taxonomic richness that was recorded there. The most downstream site on the River Dart, at Totnes Weir, was also of moderate quality, but here both the EQI ASPT and EQI N-fams were affected. This reach suffered from eutrophication, which caused algal blooms during the late Summer. This site was deep and was sampled by dredge, which gives more variable samples than the pond-net, which may have affected the results. Moreover, the site had a low RIVPACS suitability (suitability code 4, see Table 2.4), so the classification is of low reliability.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER DART CATCHMENT (Catchment 7)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	East Dart River	30m u/s rd br Postbridge	SX 6477 7895
2	East Dart River	75m u/s clapper bridge d/s Badgers Holt	SX 6720 7326
3	West Dart River	30m u/s road bridge Two Bridges	SX 6080 7505
4	West Dart River	50m u/s Huccaby Bridge	SX 6590 7293
5	Ruddycleave Water	15m u/s bridge Ruddycleave Cottage	SX 7245 7308
6	Dart	20m u/s New Bridge	SX 7113 7087
7	Dart	30m u/s wood opp Blackmoor Farm	SX 7383 6807
9	Dart	10m d/s Dart Bridge Buckfastleigh	SX 7449 6670
11	Dart	500m u/s Riverford Bridge	SX 7682 6398
12	Dart	25m u/s Totnes Weir	SX 8000 6133
13	Harbourne River	15m u/s road bridge Harbourneford	SX 7175 6235
14	Harbourne River	25m u/s Leigh Bridge	SX 7710 5670
15	Harbourne River	40m d/s road bridge Beenleigh	SX 7978 5660
16	Wash	50m u/s weir Tuckenhay	SX 8171 5593
17	Hems	20m d/s rd br Portbridge Cross	SX 7892 6599
18	Hems	20m d/s bridge u/s Tally-ho	SX 8162 6378
19	Aa Brook	15m u/s Collacombe Bridge	SX 8105 6750
20	Aa Brook	100m u/s Pishacre Bridge	SX 8195 6452
21	Bidwell Brook	10m u/s rd br Tigley	SX 7572 6087
22	Bidwell Brook	150m u/s Dartington Lodge	SX 7980 6152
23	Cowsic River	30m u/s Beardown Farm	SX 6031 7530
24	Mardle	40m u/s rail br Buckfastleigh	SX 7462 6613
25	Dean Burn	35m u/s B3380 bridge	SX 7324 6511
26	Ashburn Yeo	30m u/s Dart Bridge	SX 7457 6685
27	Holy Brook	40m u/s rd br Northwood Buckfast	SX 7400 6767
28	East Webburn River	50m d/s Cockingford Bridge	SX 7165 7505
29	Webburn	75m u/s Buckland Bridge	SX 7186 7200
30	West Webburn River	20m u/s Ponsworthy Bridge	SX 7010 7390
31	Venford Brook	25m d/s railings d/s WTW	SX 6870 7139
32	Walla Brook	300m u/s Bairney 40m d/s split	SX 6730 7545
33	Swincombe	100m d/s bridge prior to West Dart	SX 6466 7323
34	Cherry Brook	50m u/s Lower Cherrybrook Bridge	SX 6311 7485
35	Blackbrook	15m u/s bridge Tor Royal	SX 6015 7383

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
0716	R07B001	3	7	30	6.9	1.37	1.08	A	A	A
0717	R07B002	3	7	25	6.8	1.01	1.06	A	A	A
0719	R07B003	3	7	22	6.4	1.02	1.01	A	A	A
0720	R07B004	3	7	26	6.7	1.05	1.04	A	A	A
0729										
0707	R07B005	3	7	25	7.0	0.94	1.09	A	A	A
0726	R07B007									
0708	R07B008	3	7	24	6.5	0.77	1.04	B	A	A
0709	R07B009	3	7	20	4.9	0.62	0.78	B	B	B
0710	R07B010	3	7	23	4.9	0.64	0.81	B	B	B
0701	R07A001	3	7	36	6.9	1.08	1.09	A	A	A
0724	R07A002									
0702	R07A003	3	7	36	6.5	1.10	1.03	A	A	A
0703	R07A004	1	1	27	6.4	1.09	1.00	A	A	A
0725	R07B011									
0704	R07B012	3	7	38	6.0	1.12	1.02	A	A	A
0705	R07B016	3	7	29	6.5	0.88	1.09	A	A	A
0706	R07B017	3	7	35	6.2	1.04	1.07	A	A	A
0727	R07B018									
0711	R07B019	3	7	29	5.6	0.86	0.95	A	A	A
0733	R07B057									
0712	R07B014	3	7	28	6.1	0.81	0.95	A	A	A
0728	R07B052									
0713	R07B050	3	7	35	6.2	1.03	0.98	A	A	A
0714	R07B020	3	7	37	7.0	1.11	1.10	A	A	A
0731	R07B036									
0715	R07B015	3	7	34	7.0	1.55	1.10	A	A	A
0730	R07B037									
0732										
0718	R07B051	3	7	27	6.9	1.27	1.07	A	A	A
0721	R07B021	3	7	34	6.7	1.54	1.05	A	A	A
0722	R07B032	3	7	29	6.7	1.34	1.04	A	A	A
0723	R07B049	3	7	32	6.5	1.27	1.02	A	A	A

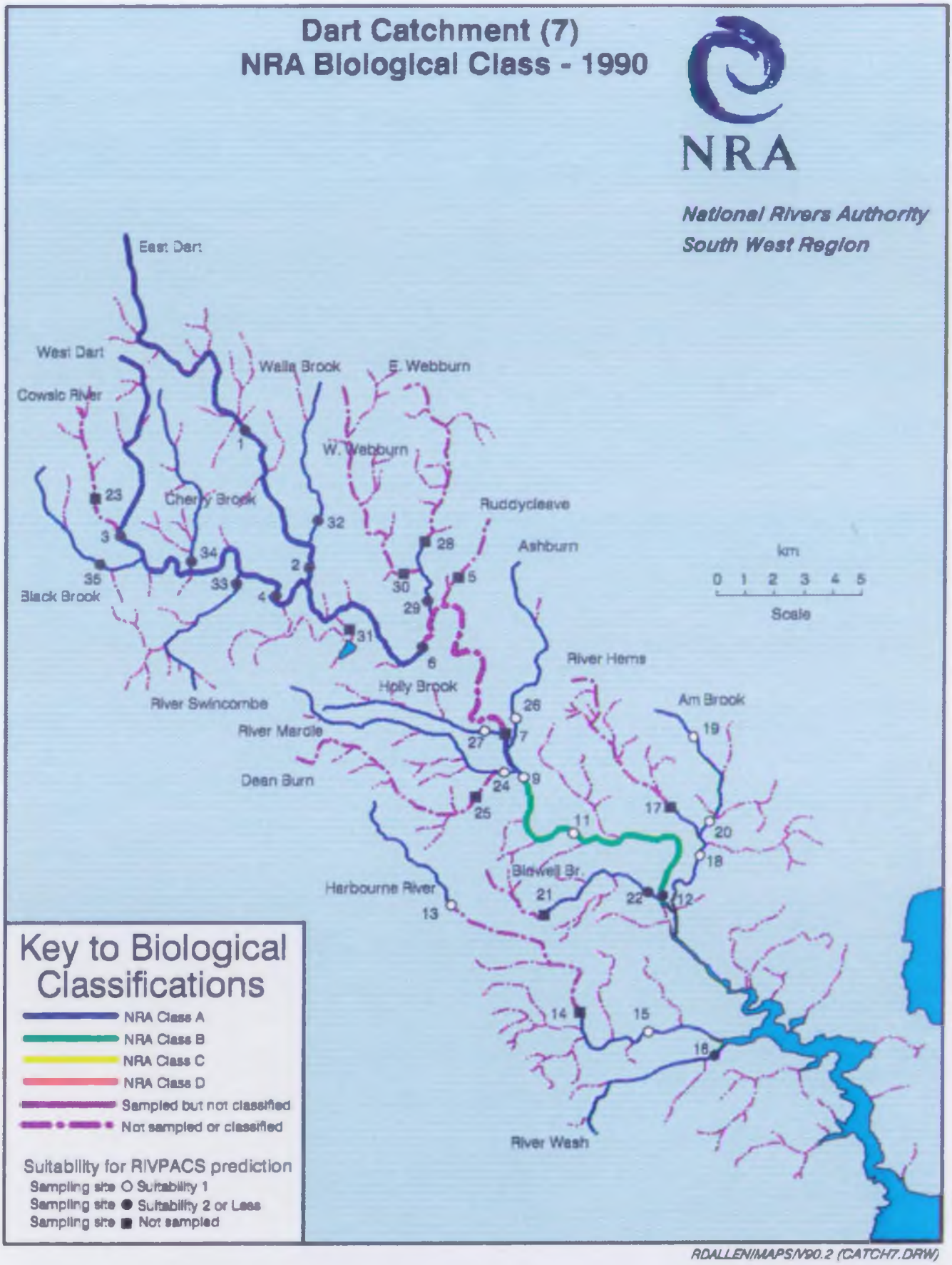


Figure 3.14 Dart Catchment (7) NRA Biological Class - 1990

3.2.9 River Avon Catchment Catchment-8

The lower reach of The Gara was of poor ecological quality overall, reflected in its poor quality EQI ASPT and only moderate quality EQI N-fams, which is usually indicative of organic pollution. In this case, the habitat probably had a greater influence on the classification than water quality. The monitoring site at Slapton Bridge was between two lakes fed by The Gara, and was in a reed swamp. The water flow was very slow, and the site was almost lentic. The site had a low RIVPACS suitability (suitability code of 4, see Table 2.4) and 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 have contributed to the poor result. Slapton Stream was also of poor overall quality, reflected in the poor EQI N-fams and moderate EQI ASPT, which suggests organic pollution. Sampling difficulties may have contributed to the poor classification, but the site had low RIVPACS suitability (suitability code 4, see Table 2.4), so the classification would have been imprecise. 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 South West Region, 1990).

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER AVON CATCHMENT (Catchment 8)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Churchstow Stream	25m u/s rd br Redford	SX 7228 4434
2	The Gara	15m u/s rd br Woodford	SX 7978 5097
3	The Gara	200m u/s br 20m u/s split Forder	SX 8105 4906
4	The Gara	60m u/s br Higher North Mill	SX 8245 4764
5	The Gara	15m u/s Slapton Bridge	SX 8282 4440
8	Slapton Stream	Iron Bridge	SX 8205 4413
9	Small Brook	100m u/s road bridge Bowcombe	SX 7511 4448
10	West Alvington Str	200m u/s bridge Ticket Wood	SX 7323 4364
11	Chillington Stream	15m d/s rd br Chillington	SX 7925 4265
12	Avon	30m u/s Shipley Bridge	SX 6809 6292
13	Avon	50m u/s Lydia Bridge	SX 6953 6070
14	Avon	5m u/s discharge 50m u/s A38 b	SX 6977 5923
15	Avon	50m u/s bridge Horsebrook	SX 7122 5847
16	Avon	150m d/s Gara Bridge	SX 7290 5332
17	Avon	40m d/s br Loddiswell	SX 7268 4825
18	Avon	150m u/s Hatch Bridge 500m d/s New Bridge	SX 7157 4722
19	Torr Brook	10m d/s rd br The Old Mill	SX 7335 4832
20	Glaze Brook	opposite mill Higher Turtley	SX 6963 5893
21	Bala Brook	100m u/s bridge Zeal	SX 6781 6249
22	South Pool Stream	5m u/s crossing point South Pool	SX 7773 4025

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
0818										
0814	R08A002									
0801	R08A003	3	7	38	6.6	1.13	1.04	A	A	A
0802	R08A004	3	7	33	6.6	1.01	1.03	A	A	A
0803	R08A006	3	7	28	4.4	0.78	0.71	B	C	C
0805	R08A012	3	7	18	4.7	0.53	0.82	C	B	C
0806	R08A013	3	7	31	5.9	0.89	0.97	A	A	A
0807	R08A014	3	7	23	5.7	0.76	0.97	B	A	B
0817										
0819	R08B007									
0808	R08B001	3	7	27	6.9	0.86	1.08	A	A	A
0820	R08B008									
0809	R08B002	3	7	29	6.9	0.89	1.08	A	A	A
0810	R08B003	3	7	39	6.4	1.30	1.01	A	A	A
0821	R08B004									
0811	R08B005	3	7	36	6.4	1.09	1.02	A	A	A
0822	R08B015									
0812	R08B009	3	7	37	6.5	1.13	1.02	A	A	A
0813	R08B011	3	7	16	5.6	0.74	0.88	B	B	B
0816										

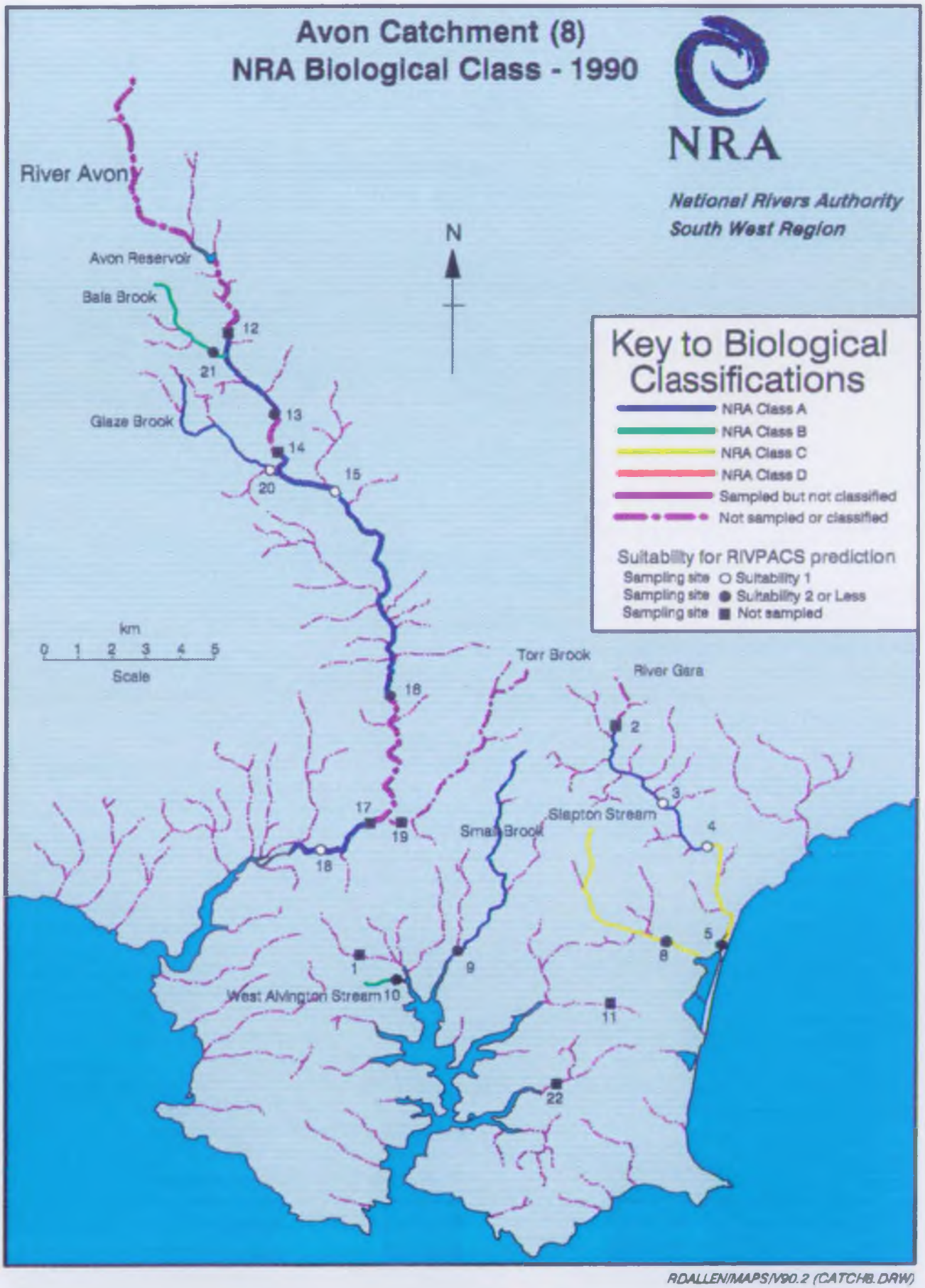


Figure 3.15 Avon Catchment (8) NRA Biological Class - 1990

3.2.10 River Erme Catchment Catchment-9

All the sites surveyed on the River Erme were of good ecological quality. In 1990, the middle reaches of the River Erme were affected by pollution incidents from a paper mill, storm overflows and a sewage treatment works, though these did not influence the biological classifications based on the combined seasons' data.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER EXE CATCHMENT (Catchment 9)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Exe	120m u/s Stowford Weir	SX 6385 5713
2	Exe	20m u/s A30 br u/s storm overflow	SX 6331 5578
3	Exe	10m u/s br Cleeve	SX 6334 5525
4	Exe	10m u/s bridge Lower Keaton	SX 6403 5449
5	Exe	30m u/s Fawn's Bridge	SX 6409 5304
6	Exe	500m u/s Sequer's Bridge	SX 6335 5225
7	Lud Brook	50m u/s br to fish farm Fawn's Bridge	SX 6413 5308
8	Left Lake	10m u/s Exe confl u/s weir	SX 6402 6330
9	Red Lake	20m u/s Exe confl	SX 6358 6612

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
0901	R09B001	3	7	26	7.0	0.86	1.10	A	A	A
0905	R09B012									
0906	R09B002									
0902	R09B010	3	7	32	6.0	0.98	0.95	A	A	A
0907	R09B011									
0903	R09B003	3	7	38	6.0	1.13	0.95	A	A	A
0904	R09B017	3	7	38	6.1	1.11	0.97	A	A	A
0908										
0909										

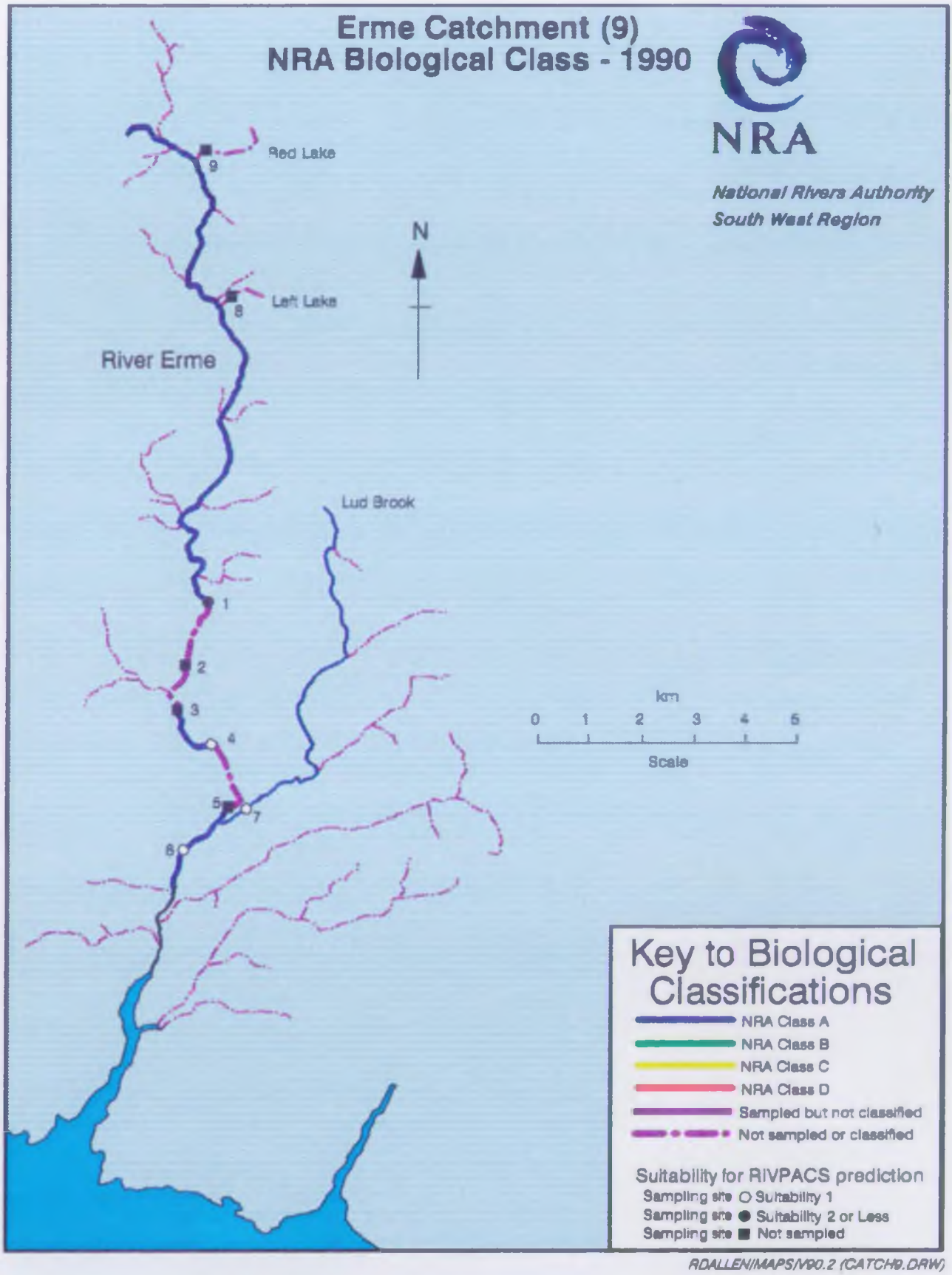


Figure 3.16 Erme Catchment (9) NRA Biological Class – 1990

3.2.11 River Yealm Catchment Catchment-10

The River Yealm was of good ecological quality, except for two reaches on its tributary, the River Piall. The upper reach of the River Piall was of poor ecological quality (reflected in both EQI ASPT and EQI N-fams), and its tributary Cholwichtown Stream was of moderate biological quality (owing to poor taxonomic richness reflected in its EQI N-fams). Both streams 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 River Piall, which is consistent with mining impact.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER YEALM CATCHMENT (Catchment 10)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Yealm	Hele Cross	SX 6144 6090
2	Yealm	Pardel Mill Farm Bridge	SX 6032 5761
3	Yealm	u/s Pardal Moor Weir d/s lake	SX 6022 5700
4	Yealm	Lee Mill Bridge	SX 6001 5580
5	Yealm	Popple's Bridge	SX 5983 5434
6	Yealm	Yealm Bridge	SX 5898 5194
7	Yealm	Puslinch Bridge	SX 5706 5099
8	Newton Stream	Bridgend	SX 5659 4821
9	Broadall Lake	Dandles Wood Bridge	SX 6138 6184
10	Ford Brook	Dandles Green	SX 6137 6180
11	Long Brook	Yealmbridge	SX 5941 5213
12	Silverbridge Lake	Brixton	SX 5620 5204
13	Piall	Quick Bridge	SX 5897 6082
14	Piall	Mark's Bridge	SX 5998 5770
15	Cholwichtown	prior to river Piall	SX 5921 6087
16	Wembury Stream	Wembury	SX 5188 4880

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1008	R10B022									
1001	R10B002	3	7	39	6.6	1.18	1.03	A	A	A
1009	R10B024									
1010	R10B003									
1011	R10B021									
1002	R10B004	3	7	37	6.5	1.23	1.06	A	A	A
1012	R10B005									
1017	R10B015									
1014										
1013										
1016										
1003	R10B018	3	7	43	6.3	1.33	1.06	A	A	A
1004	R10B007	3	7	11	4.4	0.37	0.70	C	C	C
1005	R10B008	3	7	34	6.7	1.00	1.07	A	A	A
1006	R10B006	3	7	21	5.8	0.76	0.92	B	A	B
1007	R10A001									

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

3.2.12 River Plym Catchment Catchment-11

The reaches surveyed in the Plym catchment during 1990 were of good ecological quality, except for the Tory Brook. Although the EQI ASPTs indicated moderate quality, the main biological impacts were on species richness: the EQI N-fams of the uppermost reach on Tory Brook indicated poor quality, whilst the EQI N-fams of the lower reach monitored at Plympton indicated very poor quality (though the overall NRA Biological Classification at this site was poor Ecological Quality). China clay workings were the main influence on this stream, and the toxic impacts on the macro-invertebrate communities were consistent with this being the cause of the poor ecological quality.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER PLYM CATCHMENT (Catchment 11)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Plym	u/s Blackabrook	SX 5647 6445
2	Plym	d/s Blackabrook	SX 5639 6448
3	Plym	Cadover Bridge	SX 5550 6462
4	Plym	Sheagh Bridge (Wooden)	SX 5336 6369
5	Plym	Bickleigh	SX 5270 6181
6	Plym	Plym Bridge	SX 5196 5860
7	Tory Brook	Tolchmoor Bridge	SX 5792 6192
8	Tory Brook	Cobleland Bridge	SX 5660 6088
9	Tory Brook	Portworthy Bridge	SX 5558 6016
10	Tory Brook	Station Road Plympton	SX 5431 5692
11	Tory Brook	Marsh Mills Bridge	SX 5281 5658
12	Meavy	Weir u/s Burrator Reservoir	SX 5675 6927
14	Meavy	d/s Burrator Reservoir	SX 5515 6790
15	Meavy	Gratton Ford Bridge	SX 5297 6705
16	Meavy	Hoo Meavy	SX 5265 6563
17	Blackabrook	confluence with River Plym	SX 5648 6441

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1110	R11B001									
1111	R11B002									
1103	R11B003	3	7	27	6.7	1.17	1.04	A	A	A
1112	R11B004									
1113	R11B018									
1104	R11B006	3	7	37	6.7	1.06	1.07	A	A	A
1101	R11A001	3	7	13	5.5	0.43	0.88	C	B	C
1107	R11A002									
1108	R11A003									
1102	R11A004	3	7	11	5.2	0.32	0.83	D	B	C
1109	R11A005									
1114	R11B008									
1105	R11B009	3	7	28	6.5	1.29	1.03	A	A	A
1115	R11B010									
1106	R11B011	3	7	37	6.6	1.14	1.04	A	A	A
1116	R11B007									

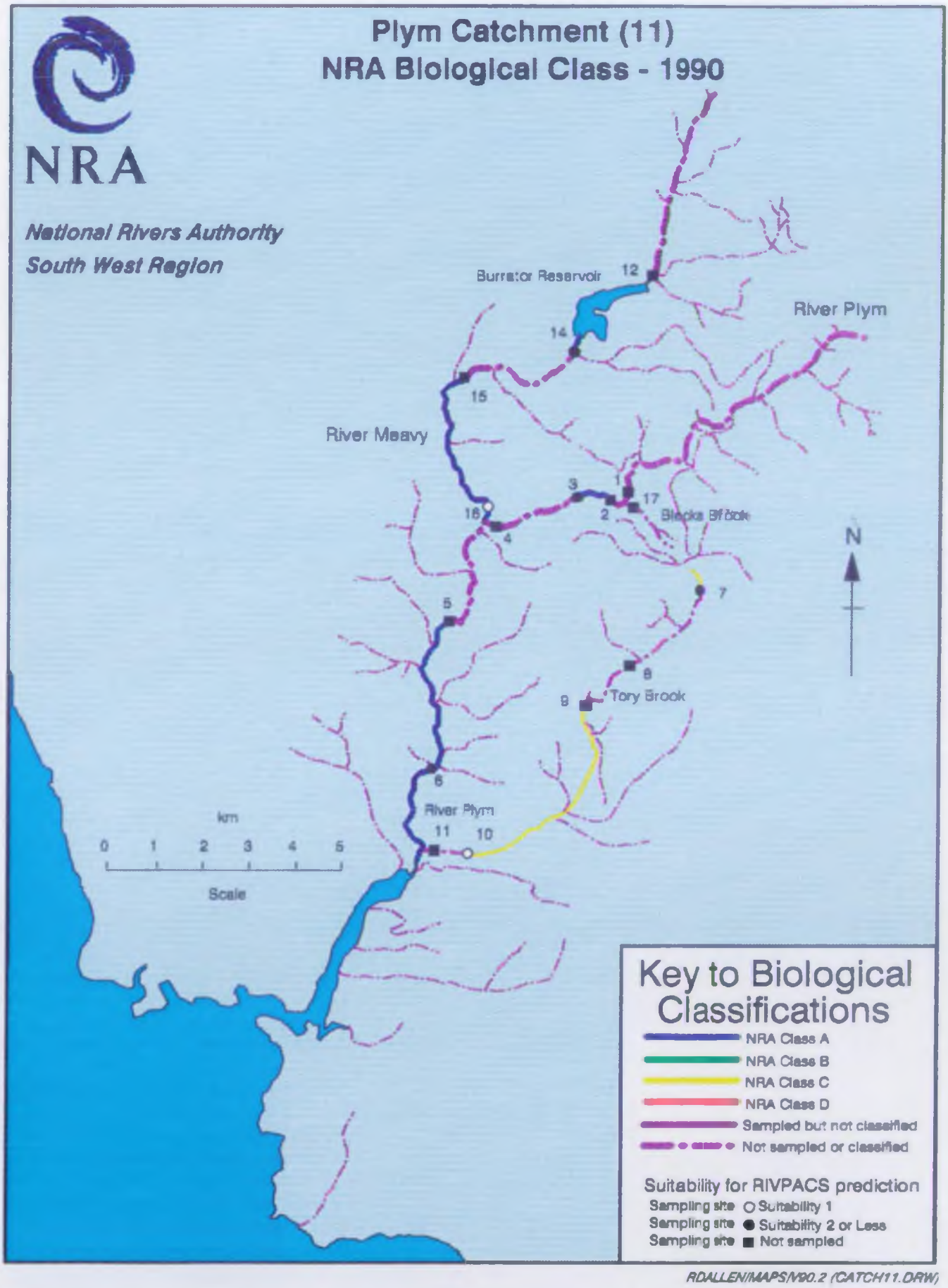


Figure 3.18 Plym Catchment (11) NRA Biological Class – 1990

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

The River Tavy and its tributaries were of good ecological quality.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER TAVY CATCHMENT (Catchment 12B, 12C & 12D)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Tavy	Hill Bridge	SX 5329 8049
2	Tavy	Harford Bridge	SX 5056 7678
3	Tavy	Kelly School	SX 4913 7498
4	Tavy	West Bridge	SX 4774 7383
7	Tavy	Wesfford	SX 4699 7106
8	Tavy	Denham Bridge	SX 4769 6800
9	Tavy	mid Lopwell Dam	SX 4773 6513
10	Tamerton Foliot Stre	Tamerton Foliot	SX 4722 6093
12	Milton Brook	point d/s Milton Coombe	SX 4829 6479
13	Walkham	Merrivale Bridge	SX 5510 7512
14	Walkham	Ward Bridge	SX 5422 7202
15	Walkham	Bedford Bridge	SX 5044 7035
16	Walkham	Grenofen Bridge	SX 4890 7101
17	Lumburn	Rushford Bridge	SX 4495 7633
18	Tamerton Foliot Stre	Tamerton Foliot (d/s trib)	SX 4687 6090
19	Amicombe Brook	22m u/s confluence Dartmoor	SX 5717 8337
20	Lumburn	Shillamill (prior to R. Tavy)	SX 4668 7191
21	Moortown Brook	Mt House School	SX 4930 7460
22	Wallabrook	prior to River Tavy	SX 4921 7548
23	Burn	prior to River Tavy	SX 4980 7618
24	Colly Brook	Peter Tavy	SX 5146 7765
25	Cholwell Brook	Brook Tavy	SX 5081 7861

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1203	R12C001	3	7	28	6.8	1.12	1.06	A	A	A
1280	R12C002									
1281	R12C015									
1204	R12C003	3	7	27	6.4	0.85	1.02	A	A	A
1282	R12C005									
1205	R12C006	3	7	28	6.4	0.88	1.02	A	A	A
1283	R12C007									
1201	R12B004	3	7	27	5.7	0.79	0.91	A	A	A
1202	R12B001	3	7	36	6.6	1.10	1.02	A	A	A
1212	R12D001	2	4	24	7.0	1.19	1.10	A	A	A
1286	R12D002									
1287	R12D003									
1213	R12D004	2	4	31	6.5	1.05	1.03	A	A	A
1284	R12C009									
1279	R12B005									
1285										
1206	R12C010	3	7	40	6.8	1.14	1.07	A	A	A
1207	R12C021	3	7	33	6.7	0.98	1.06	A	A	A
1208	R12C011	3	7	33	6.4	1.02	1.00	A	A	A
1209	R12C008	3	7	39	6.9	1.16	1.08	A	A	A
1210	R12C022	3	7	33	6.8	1.05	1.06	A	A	A
1211	R12C019	3	7	25	6.5	0.92	1.02	A	A	A

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

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

With the exception of a few smaller tributaries, all the watercourses in the Tamar catchment were of good ecological quality. Latchley Brook was of poor quality because of poor taxonomic richness, indicating toxic impacts. Run-off from quarrying, and the acidic metalliferous geology of the catchment were advocated as the underlying cause of this. The lower reach of the Luckett was of moderate quality owing to poor taxonomic richness, probably a result of discharges from a number of abandoned mines. The upper reach of the Small Brook was of moderate quality owing to poor taxonomic richness: land run-off, catchment geology, and metal residues from pig slurry were suggested as the causes of this.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER TAMAR CATCHMENT (Catchment 12E to 12P inclusive)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Tamar	Buses Bridge	SS 2809 1345
4	Tamar	d/s Lower Tamar Lake	SS 2955 1070
5	Tamar	Datbeer Bridge	SS 2957 0894
6	Tamar	Moreton Mill	SS 2833 0850
7	Tamar	Tamarstone Bridge	SS 2832 0559
8	Tamar	Bridgerule	SS 2748 0290
9	Tamar	Crowford Bridge	SX 2872 9943
10	Tamar	Tamerton Bridge	SX 3179 9739
11	Tamar	d/s confluence with River Deer	SX 3190 9726
12	Tamar	Boyton Bridge	SX 3288 9230
13	Tamar	Druxton Bridge	SX 3443 8830
14	Tamar	Netherbridge	SX 3497 8662
15	Tamar	Polson Bridge	SX 3556 8492
16	Tamar	Greystone Bridge	SX 3683 8025
17	Tamar	Horsebridge	SX 4001 7482
18	Tamar	Gunnislake Bridge	SX 4332 7221
19	Blanchdown Stream	prior to River Tamar	SX 4325 7290
20	Portontown Stream	Grenoven Wood	SX 4138 7441
21	Latchley Brook	Latchley	SX 4090 7368
22	Luckett	Oldmill	SX 3697 7386
23	Luckett	Luckett Bridge	SX 3882 7367
24	Dawrel Stream	prior to River Tavy	SX 3988 7549
25	Inny	u/s Davidstow Creamery	SX 1534 8704
26	Inny	Trewinnow Bridge	SX 1704 8647
27	Inny	St Clether Bridge	SX 2052 8419
28	Inny	Gimblett's Mill	SX 2410 8342
29	Inny	Two Bridges	SX 2700 8180
30	Inny	Trekalland bridge	SX 3000 7989
31	Inny	Trencarrel Bridge	SX 3217 7710
32	Inny	Boalsmill Bridge	SX 3587 7704
33	Penpont Water	Tralyn Bridge	SX 2000 8288
34	Penpont Water	Altarnun Bridge	SX 2228 8125
35	Penpont Water	Two Bridges	SX 2695 8165
36	Lowley Brook	Landlake Bridge	SX 3288 8237
37	Lowley Brook	Landue Bridge	SX 3471 7970
38	Lowley Brook	Lowleybridge	SX 3589 7878
39	Lyd	A386 road bridge Lydford	SX 5211 8446
40	Lyd	Greenlanes Bridge	SX 4443 8321
41	Lyd	Sydenham Bridge	SX 4291 8388
42	Lyd	Lifton Bridge	SX 3893 8477
43	Quither Brook	prior to River Lyd	SX 4268 8393
44	Lew	Combebow Bridge	SX 4854 8799
45	Lew	prior to River Lyd	SX 4268 8393
46	Combebow Stream	access rd culvert nr quarry	SX 4883 8898
47	Thrushel	Rivermead Bridge	SX 4990 9127
48	Thrushel	Wrixhill Bridge	SX 4654 8987
49	Thrushel	Stowford Bridge (Townleigh)	SX 4280 8738

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
12111	R12L001									
12112	R12L009									
1247	R12L006	3	7	40	6.1	1.12	0.96	A	A	A
12113	R12L016									
1248	R12L002	3	7	39	6.2	1.06	0.97	A	A	A
12114	R12L015									
12115	R12L003									
1249	R12L004	3	7	38	5.9	1.07	0.94	A	A	A
12116	R12L013									
12104	R12J001									
12105	R12J002									
1239	R12J003	3	7	40	6.4	1.18	1.03	A	A	A
12106	R12J004									
1214	R12E001	3	7	38	6.7	1.11	1.06	A	A	A
1215	R12E002	3	7	43	6.6	1.36	1.08	A	A	A
1288	R12E003									
1293	R12E004									
1216	R12E015	3	7	37	6.8	1.09	1.08	A	A	A
1217	R12E028	3	7	15	5.7	0.46	0.92	C	A	C
1292	R12E016									
1220	R12E007	3	7	21	6.9	0.63	1.08	B	A	B
1218	R12E014	3	7	36	6.7	1.06	1.05	A	A	A
12127	R12P001									
12128	R12P002									
1263	R12P003	3	7	38	6.6	1.08	1.04	A	A	A
12129	R12P012									
12130	R12P004									
12131	R12P005									
1264	R12P013	3	7	42	6.4	1.29	1.01	A	A	A
12132	R12P006									
1265	R12P010	3	7	37	6.6	1.22	1.06	A	A	A
12133	R12P007									
1266	R12P008	3	7	38	6.8	1.14	1.06	A	A	A
1290	R12E005									
1291	R12E017									
1219	R12E006	3	7	36	6.5	1.01	1.03	A	A	A
1221	R12F012	3	7	21	6.5	0.98	1.03	A	A	A
1222	R12F001	3	7	34	6.8	0.98	1.07	A	A	A
1294	R12F011									
1223	R12F002	3	7	32	6.8	1.02	1.09	A	A	A
1224	R12F013	3	7	34	6.4	1.00	1.01	A	A	A
1226	R12F003	2	6	35	6.8	1.16	1.09	A	A	A
1225	R12F004	3	7	35	6.8	1.00	1.07	A	A	A
1227	R12F010	3	7	34	6.7	0.99	1.05	A	A	A
1228	R12G001	3	7	34	6.8	0.95	1.07	A	A	A
1297	R12G002									
1229	R12G003	3	7	40	6.6	1.13	1.03	A	A	A

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER TAMAR CATCHMENT (Catchment 1ZE to 1ZP inclusive) continued

Site No. on Map	Watercourse	Biological Site Name	NGR
50	Thrushel	Tinhay Bridge	SX 4171 8672
51	Breazle Water	prior to River Thrushel	SX 4480 8924
52	Bratton Brook	Bratton Clovelly	SX 4677 9202
53	Wolf	Week's Mill Bridge	SX 4464 9425
54	Wolf	Rexon Bridge	SX 4141 8890
55	Wolf	prior to River Thrushel	SX 4035 8638
56	Broadwood Brook	Kellacott Bridge	SX 4065 8800
57	Kensey	Badgall Bridge	SX 2312 8696
58	Kensey	Badharlick Bridge	SX 2675 8642
59	Kensey	Truscott Bridge	SX 2984 8498
60	Kensey	Newport	SX 3262 8512
61	Kensey	St Leonards Bridge	SX 3523 8485
62	Tregeare Stream	Red Down Bridge	SX 2672 8629
63	Carey	Halwill Bridge - Quoditch	SX 4207 9851
64	Carey	Ashmill Bridge	SX 3937 9537
65	Carey	Penson	SX 3715 9258
67	Carey	Boldford Bridge	SX 3645 8824
68	Carey	Heale Bridge	SX 3589 8617
69	Henford Water	Henford	SX 3736 9479
70	Ottery	Ottenham Mill	SX 1742 9087
71	Ottery	Trenguna Bridge	SX 1885 9329
72	Ottery	Canworthy Water Bridge	SX 2220 9170
73	Ottery	Hallescott Bridge	SX 2844 8782
74	Ottery	Yeolmbridge	SX 3178 8737
75	Ottery	Ham Mill Bridge	SX 3456 8686
76	Bolesbridge Water	200m d/s Navarino Bridge	SX 2895 8818
77	Caudworthy Water	Caudworthy Bridge	SX 2469 9267
78	Caudworthy Water	prior to River Ottery	SX 2672 8890
79	Canworthy Water	prior to River Ottery	SX 2238 9144
80	Tala Water	Bridgetown	SX 3410 8913
81	Lane Lake	Lane Bridge	SX 3412 9592
82	Claw	Claw Bridge	SS 3742 0068
83	Claw	Clawton Bridge	SX 3536 9933
84	Claw	Tetcott Bridge	SX 3279 9696
85	Deer	Rydon Bridge	SS 3354 0413
86	Deer	Winscott Bridge	SS 3385 0144
87	Deer	Deer Bridge	SX 3192 9734
88	Colesmill Stream	100m d/s Holsworthy STW	SS 3387 0316
89	Derrill Water	Dux Bridge	SS 2957 0279

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1230	R12G004	3	7	39	6.3	1.10	0.99	A	A	A
1232	R12G010	3	7	37	6.6	1.07	1.04	A	A	A
1231	R12G009	3	7	32	6.4	0.95	1.00	A	A	A
1233	R12G005	3	7	32	6.8	0.98	1.07	A	A	A
1299	R12G006									
1234	R12G007	3	7	41	6.7	1.15	1.06	A	A	A
1235	R12G012	3	7	32	6.7	0.90	1.06	A	A	A
1260	R12N003	3	7	36	6.8	1.14	1.07	A	A	A
12124	R12N001									
1261	R12N004	3	7	36	6.5	1.04	1.01	A	A	A
12125	R12N005									
1262	R12N002	3	7	33	6.5	0.94	1.02	A	A	A
12126	R12N006									
12101	R12H006									
1236	R12H001	3	7	39	6.4	1.12	1.01	A	A	A
12102	R12H007									
12103	R12H008									
1237	R12H002	3	7	39	6.3	1.10	0.99	A	A	A
1238	R12H005	3	7	35	6.7	0.98	1.06	A	A	A
12118	R12M004									
12119	R12M005									
1255	R12M001	3	7	38	6.4	1.08	1.01	A	A	A
1256	R12M002	3	7	39	6.6	1.13	1.04	A	A	A
12120	R12M006									
1257	R12M007	3	7	40	6.3	1.16	1.00	A	A	A
1258	R12M012	3	7	31	6.4	0.85	1.00	A	A	A
12122	R12M010									
1259	R12M011	3	7	38	6.5	1.04	1.02	A	A	A
12123	R12M008									
1240	R12J006	3	7	36	6.5	1.01	1.02	A	A	A
1241	R12J005	3	7	30	6.3	0.86	0.99	A	A	A
12107	R12K016									
12108	R12K001									
1242	R12K002	3	7	39	6.3	1.07	1.00	A	A	A
1244	R12K003	3	7	39	6.4	1.08	1.01	A	A	A
1245	R12K004	3	7	39	6.3	1.08	1.00	A	A	A
12109	R12K005									
1246	R12K007	3	7	30	5.9	0.84	0.94	A	A	A
1251	R12L012	3	7	31	6.1	0.87	0.96	A	A	A

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER TAMAR CATCHMENT (Catchment 12E to 12P inclusive) continued

Site No. on Map	Watercourse	Biological Site Name	NGR
90	Derrill Water	Dunlstone Bridge	SS 3013 0063
91	Small Brook	Headon Bridge	SS 3101 0730
92	Small Brook	Youldon Bridge	SS 2997 0530
93	Lamberal Water	Forda	SS 2774 1116
94	Lamberal Water	Moreton Pound Bridge	SS 2757 0894
95	Hollacombe Stream	Hayne Farm	SS 3728 0255
96	Buddle Brook	Buddle Bridge	SX 4022 8989
97	Portontown Stream	prior to River Tamar weir	SX 4143 7374
98	Dunstaple Brook	u/s Coles Mill confluence	SS 3452 0352
99	Lyd	prior to River Thrushel	SX 3922 8497
100	Chillaton Stream	Chillaton Bridge	SX 4325 8184
101	Wolf	Roadford New Bridge	SX 4188 8979

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1252	R1ZL005	3	7	33	6.3	0.90	1.00	A	A	A
1253	R1ZL011	3	7	26	5.8	0.71	0.93	B	A	B
1254	R1ZL008	3	7	32	6.3	0.88	0.99	A	A	A
12117	R1ZL010									
1250	R1ZL007	3	7	35	6.1	0.98	0.97	A	A	A
1243		3	7	31	5.9	0.91	0.93	A	A	A
12100										
1289	R1ZE034									
12110										
1295	R1ZF016									
1296										
1298	R1ZG084									

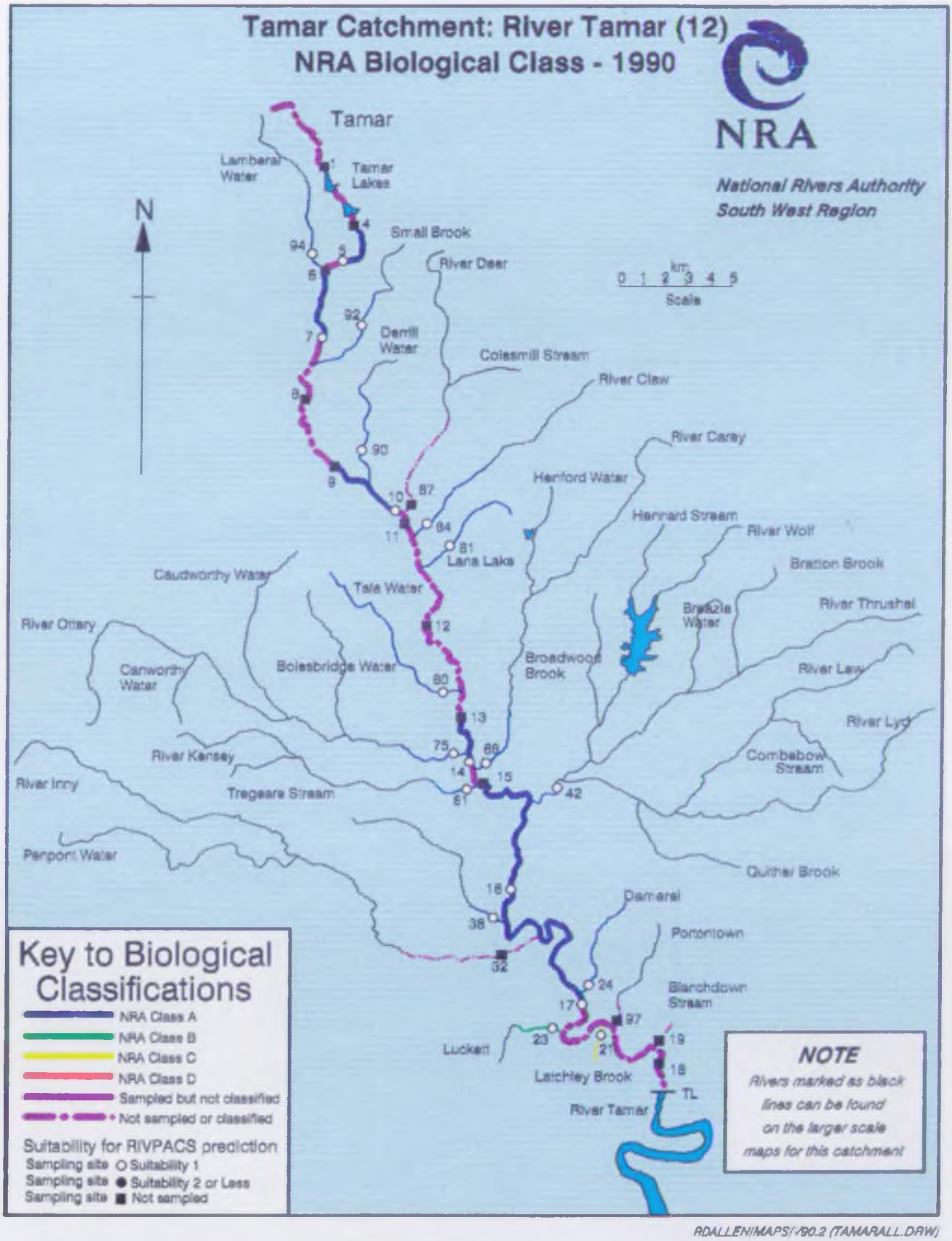


Figure 3.20 Tamar Catchment: River Tamar (12 in part) NRA Biological Class – 1990

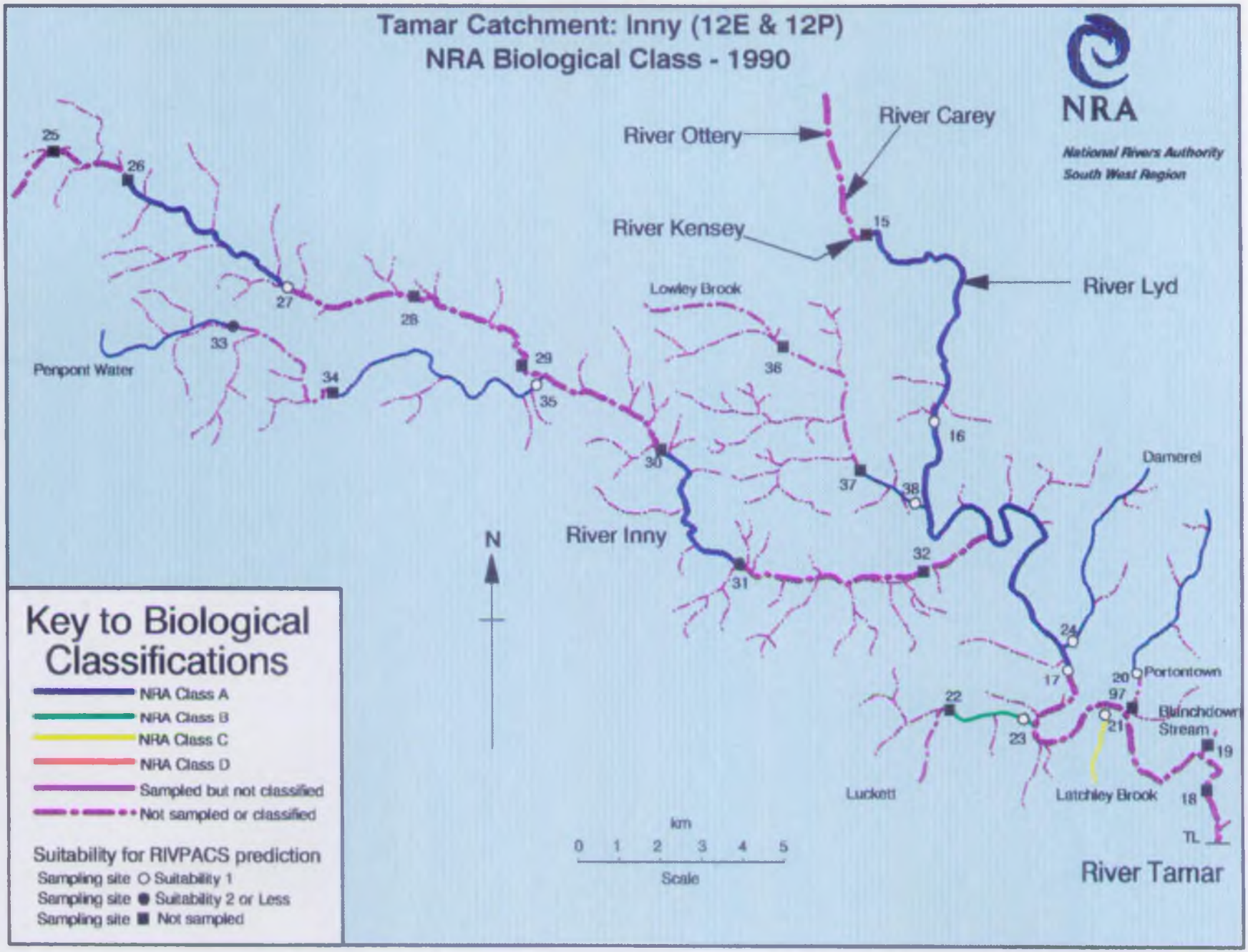


Figure 3.21 Tamar Catchment: Inny (12E & 12P) NRA Biological Class - 1990

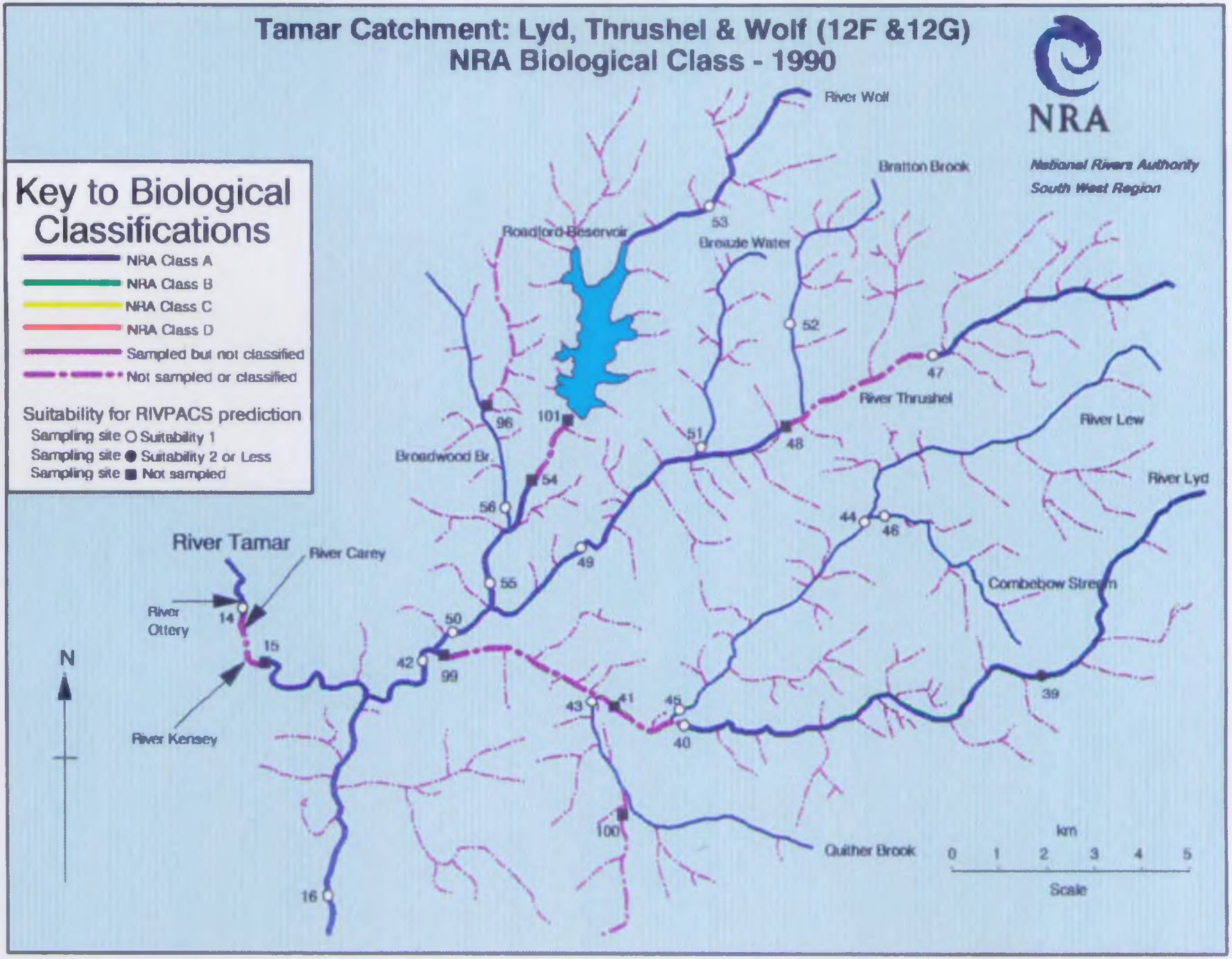


Figure 3.22 Tamar Catchment: Lyd, Thrushel and Wolf (12F & 12G) NRA Biological Class - 1990

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

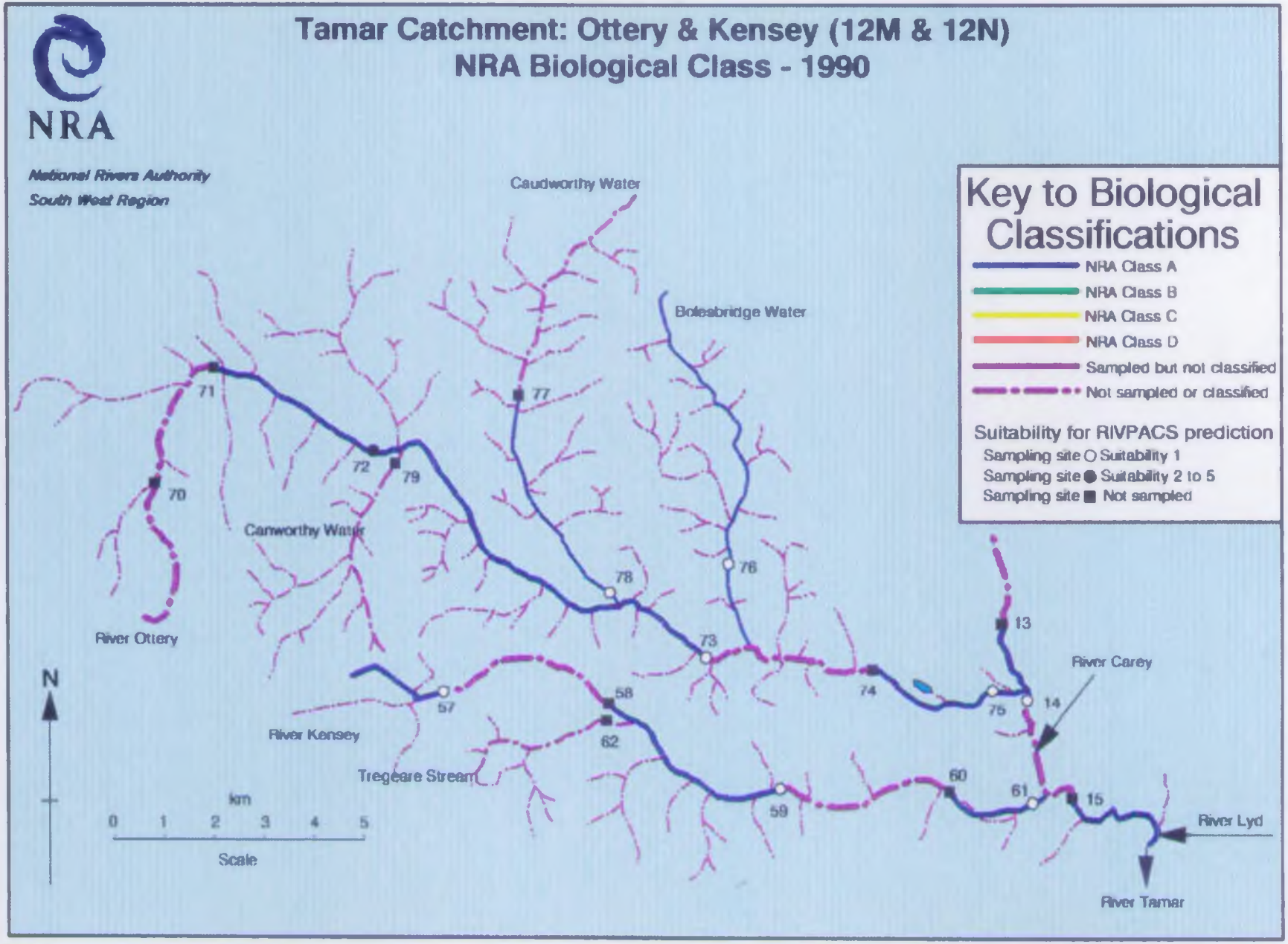


Figure 3.24 Tamar Catchment: Ottery & Kensey (12M & 12N) NRA Biological Class - 1990

3.2.15 River Lynher Catchment Catchment-12R & 12Q

The sites on the River Lynher were classed as being of good ecological quality, except for that on the Marke Valley Stream which was of poor quality owing to poor taxonomic richness (the EQI N-fams was poor). The stream bed at the monitoring site was completely covered by ochre. Metalliferous drainage from abandoned ore mines were considered to have been the cause of the poor ecological quality.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER LYNHER CATCHMENT (Catchment 12R & 12Q)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Lynher	Trebartha Road Bridge	SX 2629 7782
2	Lynher	Berriowbridge	SX 2732 7565
3	Lynher	Starabridge	SX 2895 7385
4	Lynher	Bicton Mill Bridge	SX 3215 7007
5	Lynher	Newbridge	SX 3473 6809
6	Lynher	u/s Clapper Bridge	SX 3513 6527
7	Lynher	Pillaton	SX 3659 6318
8	Lynher	Notter Bridge	SX 3848 6099
9	Dean's Brook	Bridge	SX 3824 6235
10	Kelly Stream	Haye	SX 3467 7008
11	Kelly Stream	Caddapit	SX 3400 6888
12	Manke Valley Stream	Upton Cross	SX 2862 7192
13	Withey Brook	u/s Eastreet Intake	SX 2436 7636
14	Withey Brook	prior to River Lynher	SX 2610 7720
15	Rushyford Water	Trewortha Marsh	SX 2322 7603
16	Tiddy	u/s Pensilva STW	SX 2900 6890
17	Tiddy	Butterdon Mill	SX 2952 6625
18	Tiddy	Tilland Mill Bridge	SX 3285 6188
19	Tiddy	Tideford Bridge	SX 3451 5964
20	Trecorme Stream	Tilland Bridge	SX 3320 6200

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1267	R12Q001	3	7	38	6.9	1.14	1.09	A	A	A
12134	R12Q002									
1268	R12Q003	3	7	37	6.8	1.12	1.07	A	A	A
12135	R12Q004									
1269	R12Q005	3	7	31	6.5	0.93	1.01	A	A	A
12136	R12Q025									
12137	R12Q006									
1270	R12Q007	3	7	30	6.9	0.93	1.12	A	A	A
1273	R12Q029	3	7	36	6.6	1.04	1.07	A	A	A
12139	R12Q026									
1274	R12Q009	3	7	33	6.5	1.00	1.01	A	A	A
1275	R12Q027	3	7	11	5.6	0.51	0.89	C	A	C
1271	R12Q010	3	7	30	6.8	1.37	1.07	A	A	A
1272	R12Q008	3	7	29	6.8	1.11	1.07	A	A	A
12138										
12140	R12R001									
1276	R12R002	3	7	39	6.8	1.15	1.09	A	A	A
12141	R12R003									
1277	R12R004	3	7	34	6.7	0.96	1.07	A	A	A
1278	R12R006	3	7	39	6.8	1.15	1.08	A	A	A

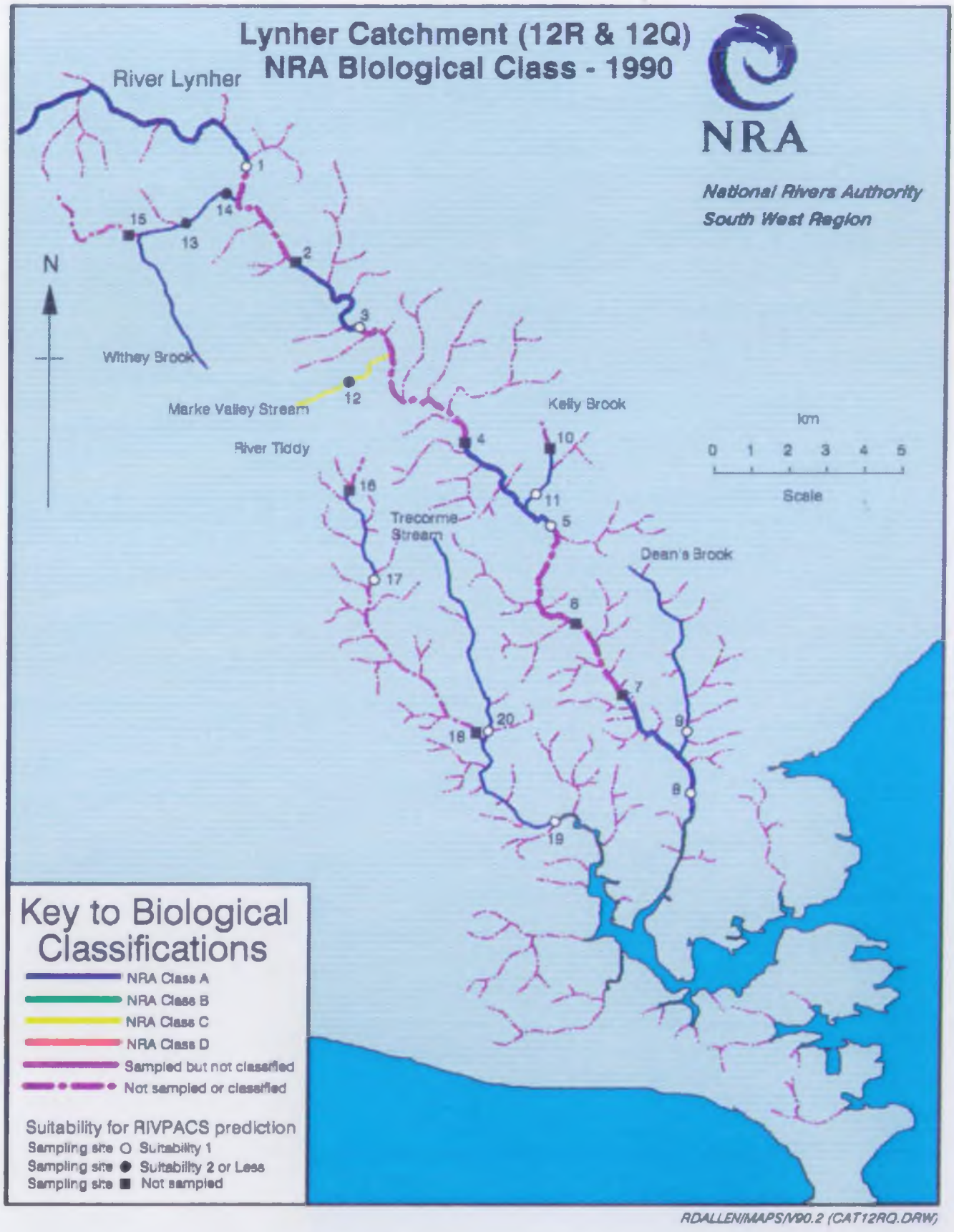


Figure 3.25 Lyhner Catchment (12R & 12Q) NRA Biological Class – 1990

3.2.16 River Seaton Catchment Catchment-13

The sites surveyed in the middle reaches of the River Seaton were of poor ecological quality solely because of poor EQI N-fams, which is indicative of toxic pollution. This was most probably caused by 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 was of flat cobbles which is inhospitable to invertebrates; the site at Hessenford had been channelised.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER SEATON CATCHMENT (Catchment 13)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Seaton	Crow's Nest	SX 2640 6938
2	Seaton	Hendra Bridge	SX 2650 6565
3	Seaton	Poseland	SX 2754 6323
4	Seaton	Courtney's Mill Bridge	SX 2878 6164
5	Seaton	Hessenford	SX 3071 5740
6	Seaton	Seaton Beach	SX 3033 5450
7	Menheniot trib.	at factory	SX 2844 6207
8	Tremar Stream	Rosecraddoc	SX 2646 6758

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1304	R13A001									
1301	R13A002	3	7	28	6.6	0.84	1.04	A	A	A
1302	R13A006	3	7	14	6.4	0.43	1.01	C	A	C
1305	R13A003									
1303	R13A004	3	7	13	6.5	0.38	1.03	C	A	C
1306	R13A005									
1308	R13A009									
1307	R13A008									

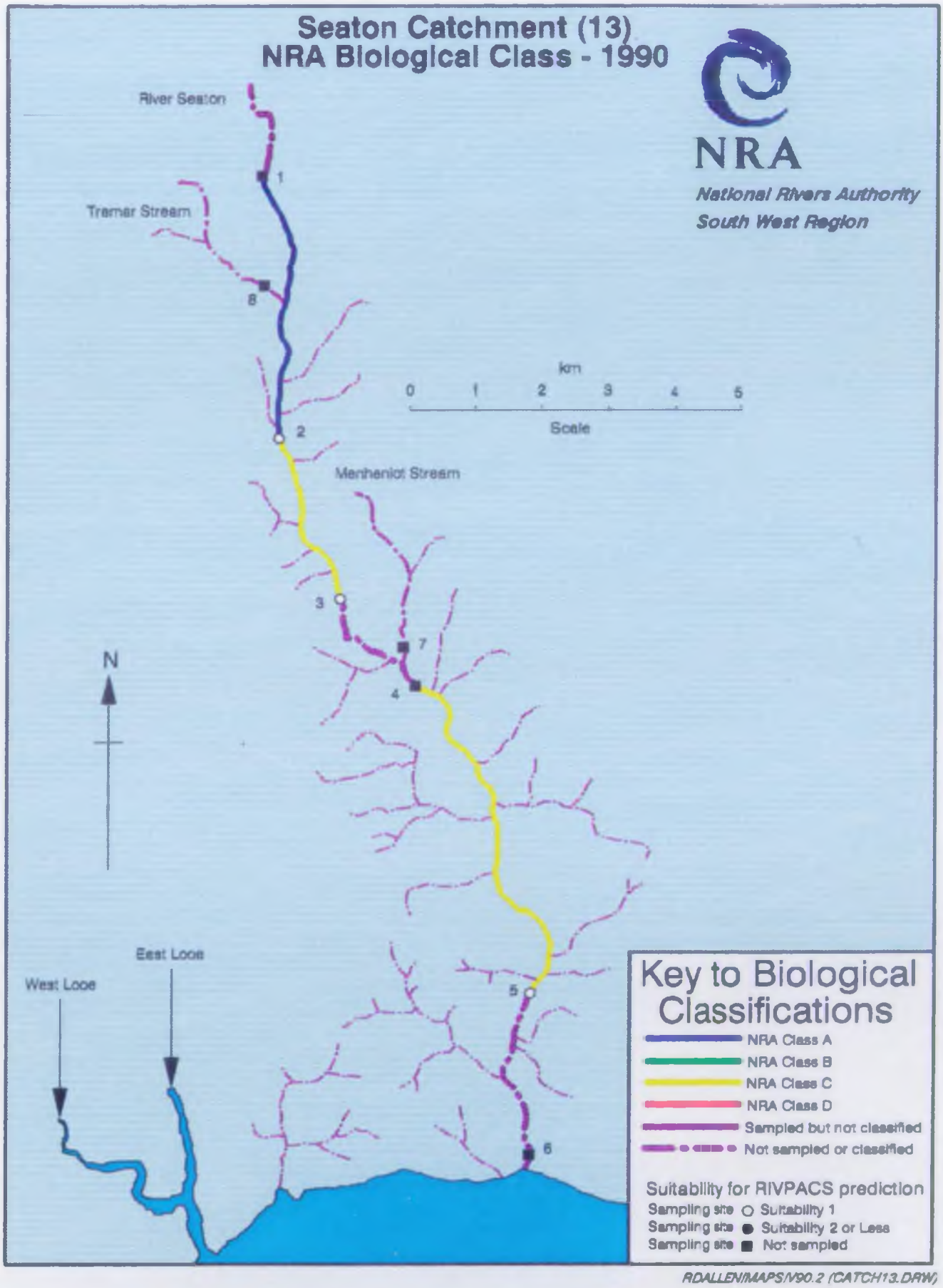


Figure 3.26 Seaton Catchment (13) NRA Biological Class - 1990

3.2.17 River Looe Catchment Catchment-14

The River Looe was of good ecological quality, except for Connon Tip Stream, a very small tributary of Connon Stream. This was of moderate ecological quality owing to its less than expected taxonomic richness. A 100% cover of ochre was recorded on the stream bed. 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.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER LOOE CATCHMENT (Catchment 14)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	East Looe River	Venton Vear Bridge	SX 2325 6574
2	East Looe River	Looe Mills	SX 2328 6465
3	East Looe River	Lamellion Mill	SX 2507 6109
5	East Looe River	Trussel Bridge	SX 2455 6205
6	East Looe River	Landlooe Bridge	SX 2499 5956
7	East Looe River	Railway Halt Sandplace	SX 2480 5719
8	Dobwalls Stream	Tuelmenna Bridge	SX 2329 6574
9	West Looe River	Bosent Bridge	SX 2127 6353
10	West Looe River	Scawn Mill Bridge	SX 2160 6216
11	West Looe River	Churchbridge	SX 2189 5865
12	West Looe River	Sowdan's Bridge	SX 2300 5562
13	Coldrinnick Stream	Tregarrick Mill Bridge	SX 2060 5711
14	Common Stream	d/s tip site	SX 1909 6245
15	Common Stream	Trevillis Wood	SX 1958 6185
16	Common Stream		
17	Polperro River	Polperro	SX 2073 5098
18	Common Tip Stream	Tip discharge	SX 1891 6241

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1411	R14B005									
1412	R14B001									
1402	R14B002	3	7	31	6.3	0.90	1.00	A	A	A
1413	R14B003									
1403	R14B006	3	7	29	6.0	0.82	0.97	A	A	A
1414	R14B004									
1415	R14B007									
1404	R14C010	3	7	29	6.3	0.85	1.01	A	A	A
1405	R14C001	3	7	33	6.8	0.96	1.09	A	A	A
1406	R14C002	3	7	38	6.9	1.14	1.09	A	A	A
1416	R14C003									
1407	R14C011	3	7	38	6.6	1.12	1.06	A	A	A
1408	R14C005	3	7	28	6.6	0.82	1.06	A	A	A
1409	R14C006	3	7	34	6.9	1.00	1.09	A	A	A
1417	R14C008									
1401	R14A001	3	7	30	6.6	0.91	1.03	A	A	A
1410		3	7	24	6.0	0.73	0.96	B	A	B

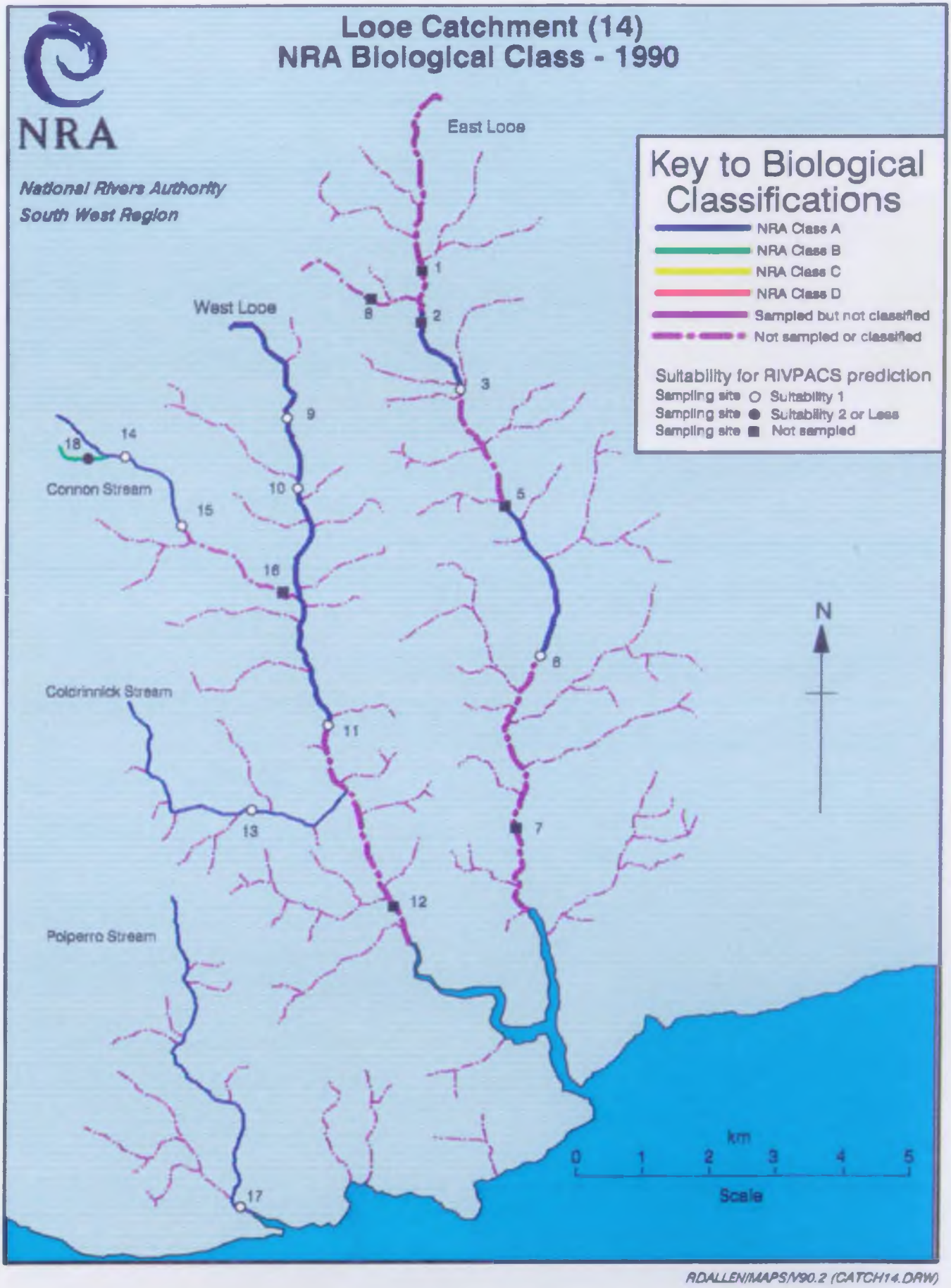


Figure 3.27 Looe Catchment (14) NRA Biological Class - 1990

3.2.18 River Fowey Catchment Catchment-15

The Fowey catchment was of good ecological quality.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER FOWEY CATCHMENT (Catchment 15)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Fowey	Harrowbridge	SX 2066 7440
2	Fowey	Lamalgate	SX 2230 7080
3	Fowey	Draynes Bridge	SX 2281 6898
4	Fowey	Treverbyn Bridge	SX 2065 6754
5	Fowey	Bodithiel Bridge	SX 1766 6488
7	Fowey	Respryn Bridge	SX 0998 6360
8	Fowey	Restormel	SX 1076 6132
9	Pont Pill	Trethake Mill - u/s Pont	SX 1561 5315
10	Trebant Water	East Trencreek u/s Penpoll	SX 1510 5551
11	Bedallva Stream	Boconnoc	SX 1550 6036
12	Lerryn River	Couch's Mill	SX 1485 5919
13	Lerryn River	Lerryn	SX 1432 5734
15	Cardinham Water	Glynnmill	SX 1110 6444
16	Warleggan River	Panters Bridge	SX 1583 6810
18	St Neot River	Colliford Bridge	SX 1810 7071
20	St Neot River	Two Waters Foot	SX 1842 6799
21	Northwood Brook	Wortha	SX 2063 6988
22	Northwood Brook	Trenant Bridge	SX 2096 6928
24	Siblyback Stream	Trekaivesteps	SX 2279 6991

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1512	R15B001									
1504	R15B024	3	7	36	6.8	1.20	1.07	A	A	A
1513	R15B002									
1514	R15B003									
1515	R15A004									
1505	R15B025	3	7	32	6.9	1.02	1.09	A	A	A
1516	R15B006									
1501	R15B032	3	7	27	6.0	0.79	0.96	A	A	A
1502	R15B031	3	7	40	6.6	1.15	1.06	A	A	A
1511	R15B030									
1503	R15B029	3	7	37	7.0	1.09	1.11	A	A	A
1510	R15A004									
1506	R15B021	3	7	36	6.9	1.10	1.08	A	A	A
1507	R15B009	3	7	32	7.3	0.98	1.14	A	A	A
1517	R15B014									
1508	R15B008	3	7	35	6.9	1.10	1.09	A	A	A
1518	R15B016									
1509	R15B011									
1519	R15B010									

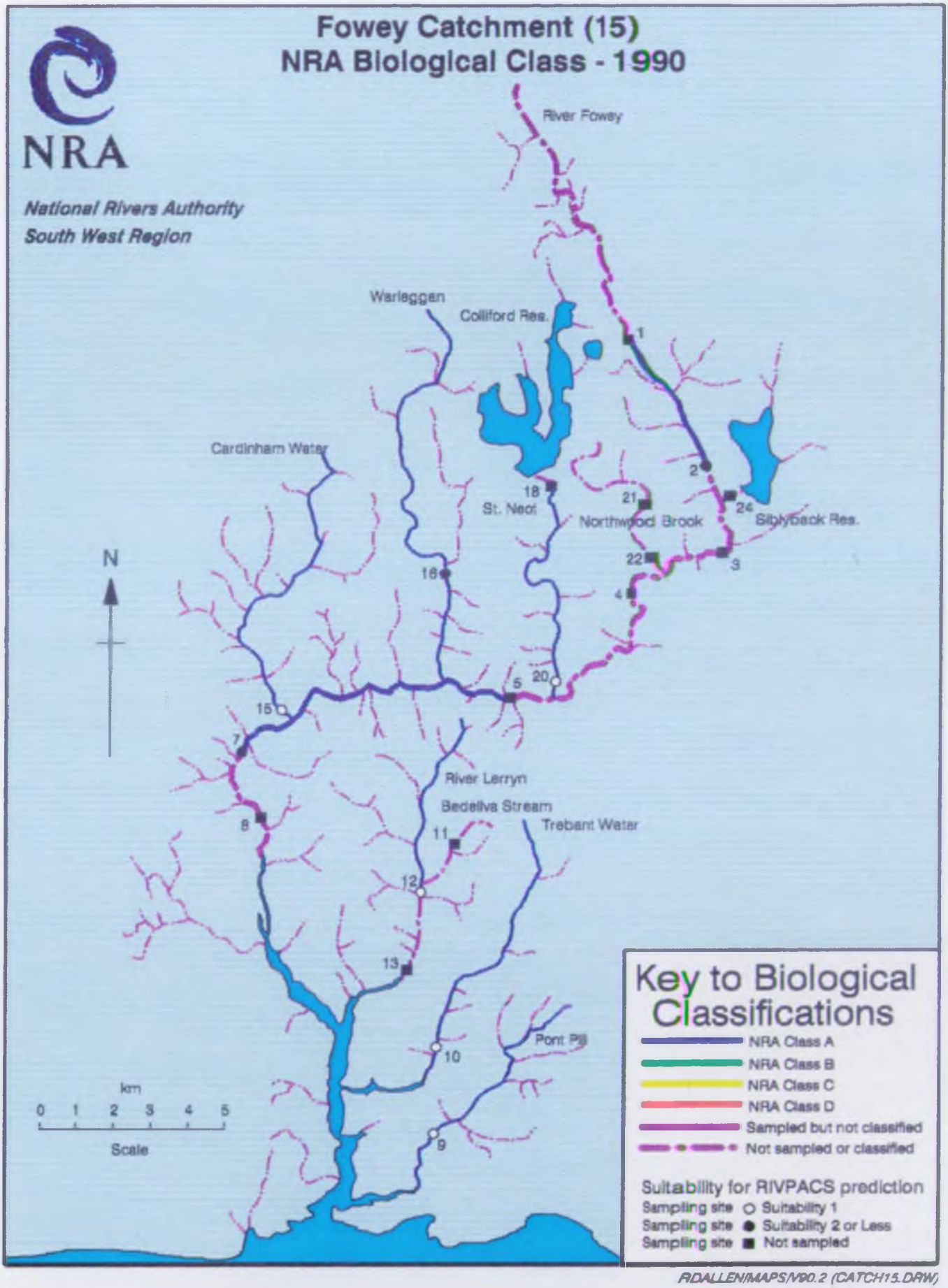


Figure 3.28 Fowey Catchment (15) NRA Biological Class – 1990

3.2.19 Rivers Par and Crinnis Catchments Catchments-16 & 17

Apart from Bokiddick Brook, none of the sites surveyed in these catchments were of good quality. With the exception of Treverbyn Stream, the EQI N-fams indicated poorest quality. China-clay extraction was purported to have caused the poor ecological quality in all these streams. Ochre was recorded at both sites on the Crinnis River and on Rosevean Stream, where a cover of 100 % was recorded. Rosevean Stream was one of the few watercourses in the South West Region that was of very poor ecological quality according to the overall NRA Biological Classification.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVERS PAR & CRINNIS CATCHMENTS (Catchments 16 & 17)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Par River	Criggan Moor	SX 0215 6076
2	Par River	A 391 Bridge	SX 0229 6069
3	Par River	Higher Menadew	SX 0296 5930
4	Par River	Lavrean Bridge	SX 0315 5927
5	Par River	Luxulyan Bridge	SX 0481 5804
6	Par River	Treffrey Bridge	SX 0567 5737
7	Par River	St Blazey Bridge	SX 0703 5518
8	Bokiddick Brook	Lowertown Farm	SX 0538 6099
9	Bokiddick Brook	Luxulyan	SX 0555 5804
10	Treverbyn Stream	200m u/s Par River confluence	SX 0433 5794
11	Roseveen Stream	prior to Par River	SX 0312 5858
12	Carbis Stream	prior to Par River	SX 0265 5934
13	Molinnis Stream	Molinnis	SX 0246 5927
14	Rosovath Stream	Rosevath	SX 0206 6100
15	Crinnis River	Cuddra Road Bridge (A 390)	SX 0454 5291
16	Crinnis River	Caryon Bay road bridge	SX 0543 5275
17	Crinnis River	Crinnis Beach (adit portal)	SX 0611 5230
18	Bodalva Brook	Bodalva	SX 0548 5323
20	Rescorla Brook	Lestoon Farm	SX 0353 5835
21	Carbis Stream	d/s Wheal Prosper mica dam	SX 0001 5955
22	Tywardreath Stream	d/s Elmsleigh Pond	SX 0768 5431

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1606	R16A007									
1607	R16A001									
1608	R16A006									
1601	R16A002	3	7	25	5.9	0.75	0.93	B	A	B
1609	R16A003									
1602	R16A004									
1610	R16A005									
1612	R16A014									
1603	R16A009	3	7	27	6.4	0.81	1.00	A	A	A
1605	R16A013	3	7	31	5.4	0.90	0.86	A	B	B
1604	R16A012	3	7	9	5.2	0.27	0.84	D	B	D
1614	R16A011									
1615	R16A016									
1616	R16A008									
1703	R17A002									
1701	R17A003	3	7	14	4.9	0.40	0.79	C	B	C
1702	R17A004	3	7	12	5.7	0.36	0.90	D	A	C
1704	R17A007									
1617										
1613	R16A018									
1611	R16A017									

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

3.2.20 St Austell and South Cornwall Stream Catchments Catchment-18

The St Austell River and its tributary Gover Stream were affected by china clay works. The upper and middle reach of the St Austell River and Gover Stream were of poor ecological quality owing to poor taxonomic richness, consistent with toxic effects and smothering by fine suspended particles of china clay. The most downstream reach on Caerhays Stream, which was of moderate ecological quality overall and poor quality in terms of taxonomic richness, was affected by canalization and possibly also by saline intrusion. Portholland Stream was of moderate ecological quality because of a moderate class EQI N-fams: no causes were ascribed to this. Gover Stream was sampled in 1990, but the site had such a low RIVPACS suitability that it was rejected by the programme, and therefore could not be classified.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
ST. AUSTELL & SOUTH CORNWALL STREAMS CATCHMENTS (Catchment 18)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	St Austell River	Lansalson Bridge	SX 0088 5478
2	St Austell River	u/s Gover Stream	SX 0124 5355
3	St Austell River	u/s St Austell STW	SX 0122 5116
4	St Austell River	Molingey Guaging Station	SX 0074 4955
5	St Austell River	Pentewan Bridge	SX 0170 4730
6	Trengrouse Stream	Trelagossick	SW 9231 4127
7	Polgooth Stream	Polgooth Bridge	SX 0034 4994
8	Polgooth Stream	prior to St Austell River	SX 0068 4985
9	Hanbal Brook	u/s Bridge	SW 9893 5205
10	Gover Stream	prior to St Austell River	SX 0068 5274
11	Mevagissey Stream	car park Mevagissey	SW 0130 4500
12	Caerhays Stream	Polmassick Bridge	SW 9719 4558
13	Caerhays Stream	Tubbs Mill	SW 9610 4334
14	Caerhays Stream	Caerhays Beach Bridge	SW 9749 4140
15	Portholland Stream	Portholland	SW 9568 4180
16	Carne Stream	Melinsey Mill	SW 9055 3925
17	Carne Stream	Pendower Beach	SW 8944 3825

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1810	R18A003									
1801	R18A004	3	7	12	5.3	0.38	0.83	C	B	C
1811	R18A006									
1802	R18A007	3	7	25	5.6	0.74	0.89	B	A	B
1812	R18A008									
1817										
1813	R18A014									
1804	R18A010	3	7	30	6.0	0.87	0.96	A	A	A
1818	R18A016									
1803	R18A005	3	7	13	5.0	0.42	0.79	C	B	C
1805	R18A009									
1814	R18A001									
1806	R18A015	3	7	33	6.5	0.96	1.03	A	A	A
1807	R18A002	3	7	17	6.2	0.51	0.98	C	A	B
1808	R18A017	3	7	24	6.3	0.70	1.02	B	A	B
1816	R18A011									
1809	R18A012	3	7	32	6.3	0.93	1.03	A	A	A

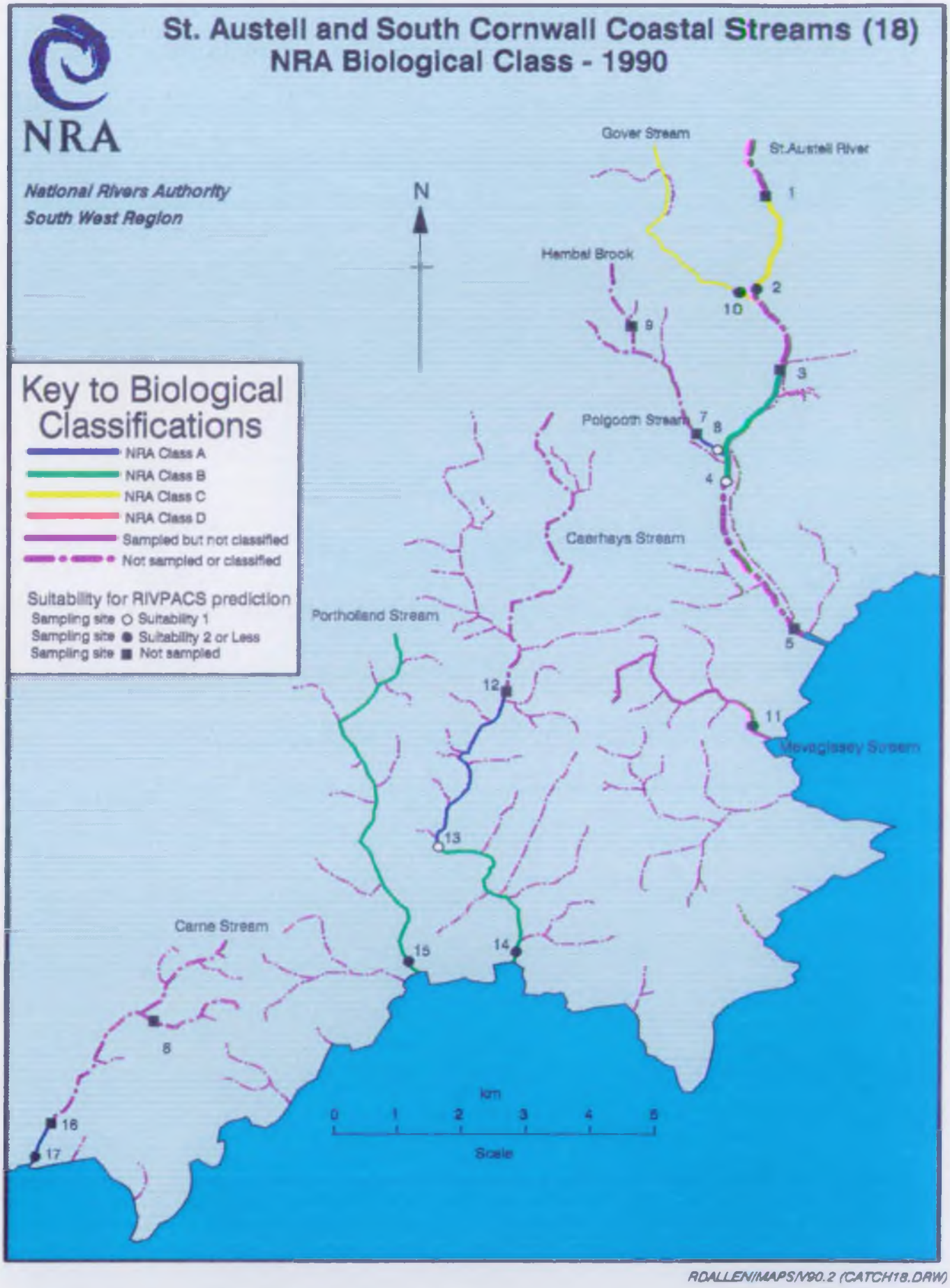


Figure 3.30 St Austell and South Cornwall Coastal Catchments (18) NRA Biological Class - 1990

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

All the sites surveyed on the River Fal were of only moderate ecological quality, whilst two tributaries sampled in its upper reaches, Bodella Brook and Gwindra Stream, were of 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 EQI N-fams but also EQI ASPT, which suggests that organic enrichment also affected this reach. Calenick Stream was of only moderate ecological quality according to its overall NRA Biological Classification because of poor taxonomic richness, which is indicative of toxic pollution. This is consistent with the effects of mining activity that is known to affect the watercourse. All the sites on the River Carnon and its tributaries were of poor ecological quality according to their overall NRA Biological Classification. Toxic effects were implicated as EQI N-fams was degraded more than EQI ASPT; in Baldhu Stream and Hick's Mill Stream EQI N-fams was classed as very poor. These results are consistent with the severe effects of metalliferous mine waters that were known to discharge into these streams. The Perranwell Stream and the most upstream reach of the Kennal were of good overall ecological quality, but of only moderate quality in terms of taxonomic richness, the reasons for which were unknown.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER FAL CATCHMENT (Catchment 19A (part), B, C, D & E)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Fal	Tregoss Bridge	SW 9663 6009
2	Fal	Gaverigan Bridge	SW 9373 5881
3	Fal	Retew Bridge	SW 9262 5700
4	Fal	Kernick Bridge	SW 9321 5462
5	Gwindra Stream	Coombe u/s confl	SW 9512 5175
6	Fal	Terras Bridge	SW 9345 5335
7	Fal	Grampound Bridge	SW 9334 4845
8	Fal	Tregoney Gauging Station	SW 9215 4486
9	Penkevil Stream		SW 8706 4198
10	Trewithen Stream	Mellingoose	SW 8952 4440
11	Gwindra Stream	Nanpean Bridge	SW 9641 5585
12	Gwindra Stream	Goonabarn	SW 9555 5491
13	Gwindra Stream	Gwindra Bridge	SW 9503 5299
14	Gwindra Stream	Treway Bridge	SW 9409 5088
15	Bodella Brook	Carsella	SW 9404 5768
16	Percuil River	Lanhouse	SW 8605 3790
17	Percuil River	Trethem Mill	SW 8620 3648
18	Tresillian River	Trendeal	SW 8866 5282
19	Tresillian River	Ladock Water Pumping Station	SW 8927 5114
20	Tresillian River	Tresowgar Bridge	SW 8853 4812
21	Tresillian River	Tresillian Pumping Station	SW 8709 4706
22	Tresillian River	d/s Ladock STW	SW 8704 4691
23	Trevella Stream	Frogmore Bridge	SW 8585 4849
24	Trevella Stream	Tregurra Bridge	SW 8476 4684
25	Kestle Stream	Condor Ford	SW 8738 4902
26	Brighton Stream	New Mills	SW 9010 5239
27	Allen	Idless Bridge	SW 8220 4704
28	Allen	Moresk Laundry	SW 8268 4505
29	Zelah Brook	Gwarnick Mill	SW 8161 4929
30	Kenwyn	New Mill	SW 8077 4585
31	Kenwyn	Bosvigo Bridge	SW 8155 4527
33	Calenick Stream	Hugus	SW 7841 4380
34	Calenick Stream	Calenick Bridge	SW 8200 4320
35	Carnon River	Chacewater Viaduct	SW 7443 4521
36	Carnon River	d/s Chacewater STW	SW 7530 4331
37	Carnon River	Twelveheads	SW 7615 4206
38	Carnon River	d/s County and Wallington adits	SW 7695 4150
39	Carnon River	Bissoe Bridge	SW 7748 4128
40	Carnon River	Devoran Bridge	SW 7909 3942
41	Perranwell Stream	Perranwell	SW 7759 3939
42	Baldhu Stream	Bissoe Bridge	SW 7760 4149
43	Hick's Mill Stream	Hick's Mill	SW 7676 4113
44	St Day Stream	Twelve Heads prior to R Carnon	SW 7595 4225
45	Minnis Stream	Trevellan	SW 8132 4829
46	Kennal	Tregolls Bridge	SW 7295 3605
47	Kennal	Ponsanooth Gauging Station	SW 7562 3795
48	Kennal	Sticken Bridge	SW 7735 3819
49	Stithians Stream	Seauraugh Moor	SW 7343 3747

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1958	R19C001									
1921	R19C002	3	7	23	5.7	0.68	0.90	B	A	B
1959	R19C003									
1922	R19C011	3	7	23	5.9	0.70	0.93	B	A	B
1963										
1960	R19C004									
1923	R19C005	3	7	24	5.1	0.69	0.81	B	B	B
1924	R19C006	3	7	24	5.1	0.66	0.82	B	B	B
1981	R19B004									
1928	R19C016	3	7	31	6.5	0.90	1.04	A	A	A
1961	R19C014									
1962	R19C017									
1925	R19C008	3	7	17	4.9	0.51	0.76	C	C	C
1926	R19C009	3	7	19	5.2	0.57	0.82	C	B	C
1927	R19C018	3	7	17	5.1	0.51	0.82	C	B	C
1901	R19A034	3	7	39	6.6	1.14	1.06	A	A	A
1947	R19A013									
1964	R19D033									
1930	R19C001	3	7	33	6.7	0.95	1.07	A	A	A
1931	R19C002	3	7	34	6.6	0.98	1.05	A	A	A
1966	R19D032									
1965	R19D034									
1933	R19D009	3	7	32	6.9	0.95	1.10	A	A	A
1934	R19D014	3	7	29	6.4	0.86	1.01	A	A	A
1932	R19D008	3	7	35	6.7	1.02	1.07	A	A	A
1939	R19D005	3	7	35	6.8	1.04	1.08	A	A	A
1935	R19D018	3	7	41	6.6	1.17	1.04	A	A	A
1968	R19D004									
1972	R19D030									
1936	R19D016	3	7	32	6.0	0.93	0.95	A	A	A
1937	R19D007	3	7	35	6.0	1.03	0.96	A	A	A
1971	R19D025									
1938	R19D006	3	7	20	6.1	0.58	0.98	B	A	B
1974	R19E016									
1975	R19E008									
1940	R19E001	3	7	17	5.0	0.50	0.80	C	B	C
1976	R19E015									
1977	R19E003									
1978	R19E004									
1943	R19E020	3	7	26	6.3	0.75	1.00	B	A	A
1941	R19E021	3	7	2	5.5	0.06	0.88	D	B	D
1942	R19E019	3	7	12	4.6	0.36	0.73	D	C	C
1980	R19E022									
1970										
1944	R19E005	3	7	25	6.3	0.76	0.99	B	A	A
1945	R19E006	3	7	33	6.6	1.00	1.04	A	A	A
1979	R19E007									
1946	R19E023	3	7	27	6.5	0.83	1.02	A	A	A

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER FAL CATCHMENT (Catchment 19A (part), B, C, D & E) continued

Site no. on Map	Watercourse	Biological Site Name	NGR
50	Coosbe Stream		
51	Mylor Stream	Enys	SW 7899 3649
52	Mylor Stream	Mylor Bridge	SW 8034 3615
53	Penryn River	Tremough	SW 7732 3506
54	Trispen Stream	Treworgan	SW 8313 4989
55	Swanpool Stream	u/s Swanpool	SW 8004 3166
56	Mawnporth Stream	Tregedna Bridge	SW 7881 3029
57	Argal Stream	Halland Mill	SW 7538 3199
58	Lamorran	Lamorran Wood	SW 8806 4228
60	Shortlandsend Stream	Roseworthy	SW 8000 4709
61	Treworgans Stream	Quintow	SW 8881 4851

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1982	R19C021									
1948	R19A035									
1902	R19A014	3	7	30	6.3	0.87	1.01	A	A	A
1903	R19A037	2	6	26	6.0	0.90	0.97	A	A	A
1969										
1949	R19A009									
1950	R19A008									
1904		3	7	30	6.1	0.90	0.96	A	A	A
1929		3	7	32	6.5	0.97	1.03	A	A	A
1973										
1967										

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

3.2.22 Helford and Lizard Peninsula Catchments Catchment-19A

Most of the watercourses in this area were of good ecological quality. The Cury River and the Gunwalloe Stream were of poor overall ecological quality owing to both EQI ASPT and poor (Cury) or moderate (Gunwalloe) EQI N-fams. Both sites were subject to dredging, and eutrophication was reported in both streams. Oil and tar were reported at the biological monitoring site on Cury River.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
LIZARD PENINSULA STREAMS & HELFORD CATCHMENTS (Catchment 19A)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Helford River	Mallangpose	SW 6826 2676
2	Helford River	u/s Gweek Mill	SW 7020 2647
3	Porth Navas Stream	Trenarth Bridge	SW 7577 2830
4	Trewince Stream	Porth Navas Bridge	SW 7520 2776
5	Tolvan Cross Stream	Kestle Dee	SW 7077 2751
6	Lestraines River	Polwheveral Bridge	SW 7377 2900
7	Carvedras Stream	prior to Lestraines River	SW 7365 2913
8	Gweek River	Mother-uny Mill Bridge	SW 7042 2918
9	Gweek River	Gweek Bridge	SW 7061 2717
10	Rosevear River	Rosevear	SW 7036 2563
11	Trelowarren Stream	Trelowarren Mill	SW 7177 2478
12	Manaccan River	Polkanoggo	SW 7557 2210
13	Manaccan River	Manaccan Road Bridge	SW 7638 2461
14	Porthallow Stream	Porthallow	SW 7970 2316
15	St Keverne Stream	Porthoustock Bridge	SW 8047 2182
16	Poltesco River	Poltesco Bridge	SW 7236 1574
17	Church Cove Stream	Church Cove	SW 7120 1268
18	Mullion Stream	Mullion Cove	SW 6685 1788
19	Cury River	u/s Poldhu Beach	SW 6675 2003
20	Gunwalloe Stream	Winnianton Farm	SW 6610 2076
21	Rosevear River	Ponson Tuel Ford	SW 7033 2551
22	Kynance Stream	Kynance Cove	SW 6840 1340
23	Gweek River	Danetto Bridge	SW 7062 2682

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
1909	R19A029	3	7	27	5.6	0.79	0.90	A	A	A
1910	R19A005	3	7	30	6.2	0.86	1.00	A	A	A
1905	R19A001	3	7	31	6.5	0.92	1.03	A	A	A
1954	R19A002									
1952										
1906	R19A003	3	7	35	6.9	1.05	1.09	A	A	A
1915	R19A027	3	7	27	6.9	0.80	1.09	A	A	A
1907	R19A028	3	7	29	7.0	0.88	1.11	A	A	A
1908	R19A004	3	7	38	6.6	1.16	1.04	A	A	A
1911	R19A006	3	7	27	6.3	0.80	1.00	A	A	A
1916	R19A030	3	7	36	6.5	1.05	1.04	A	A	A
1912	R19A031	3	7	34	6.7	1.02	1.06	A	A	A
1913	R19A021	3	7	34	6.3	0.99	1.00	A	A	A
1917	R19A032	3	7	28	5.8	0.81	0.94	A	A	A
1914	R19A017	3	7	32	5.8	0.94	0.94	A	A	A
1918	R19A016	3	7	35	6.1	1.07	0.95	A	A	A
1956	R19A018									
1955	R19A012									
1919	R19A011	3	7	16	4.1	0.44	0.72	C	C	C
1920	R19A040	3	7	14	4.4	0.39	0.77	C	B	C
1953	R19A043									
1957										
1951	R19A042									

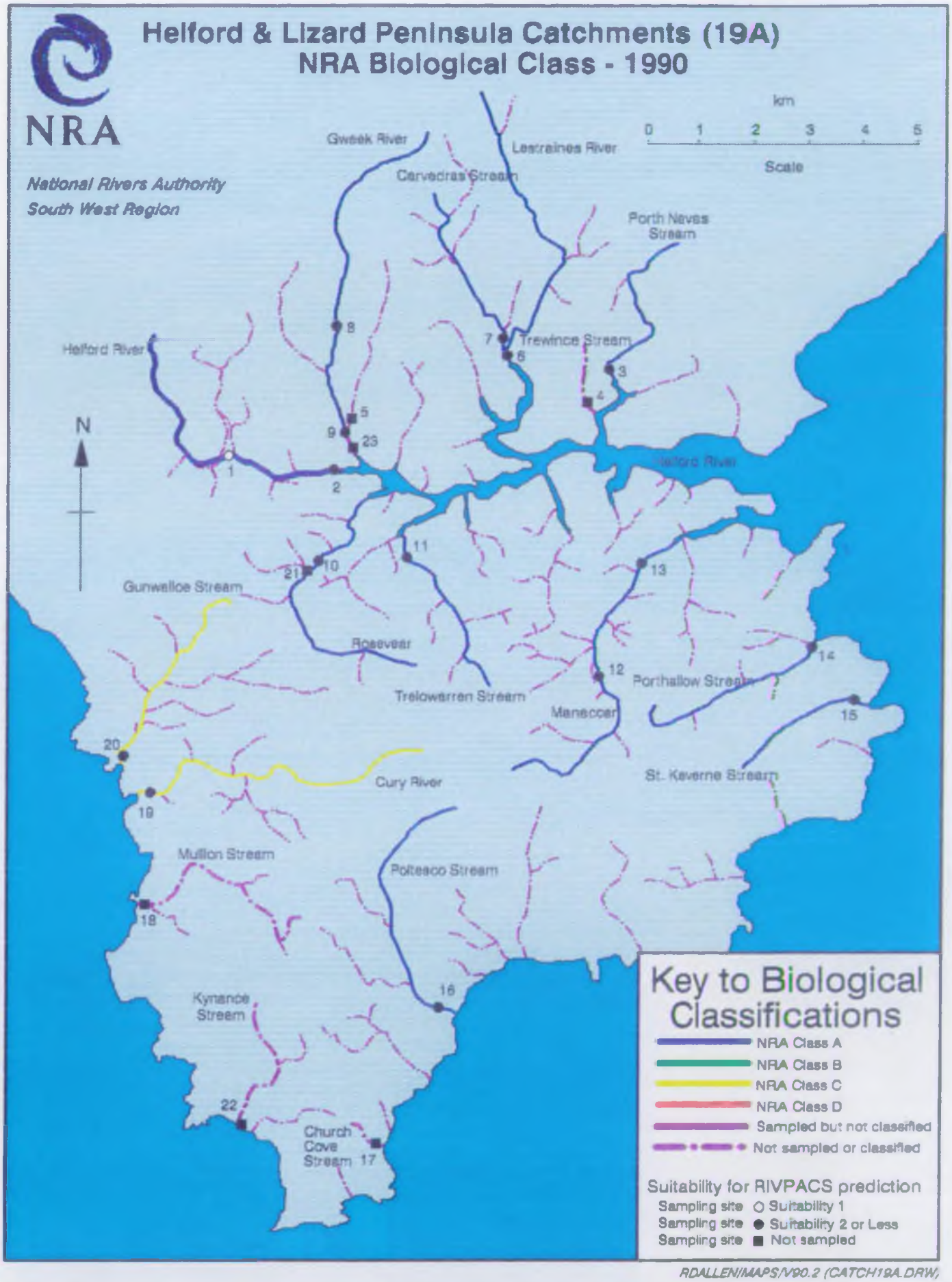


Figure 3.32 Helford and Lizard Peninsula Catchments (19A) NRA Biological Class - 1990

3.2.23 River Cober Catchment Catchment-20

The most downstream reach of the River Cober was classed as being of poor ecological quality owing to both its EQI ASPT and EQI N-fams. The monitoring site for this reach was downstream from Loe Pool, a lake which suffered severe blooms of blue-greens in 1990 owing to eutrophication, and exacerbated by the weather. Lacustrine influences would have affected the fauna here, and there would have been some saline influences also: the site had low RIVPACS suitability (suitability code 4, see Table 2.4). Bodilly Stream was classed as of moderate quality on the basis of its EQI N-fams, but this was not reflected in its overall Biological Classification which was good quality. No causes have been attributed, though the site had a low RIVPACS suitability (suitability code 5).

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER COBER CATCHMENT (Catchment 20)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Cober	Trenear Bridge	SW 6828 3144
2	Cober	Coverack Bridge	SW 6688 3012
3	Cober	Lowertown Bridge	SW 6594 2910
4	Cober	Halston Park	SW 6553 2730
5	Cober	d/s Helston STW	SW 6524 2679
6	Loe Pool	Loe Pool at Bar outfall	SW 6430 2428
7	Bodilly Stream	Bodilly Mill	SW 6700 3185
8	Madlyn Stream	Lower Polkellis	SW 6937 3263
9	Tolcarne Stream	Tolcarne	SW 6876 3470
10	Releath Stream	Vellanewson	SW 6625 3270

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2001	R20A001	3	7	26	6.8	0.80	1.07	A	A	A
2005	R20A008									
2002	R20A003	3	7	33	6.9	1.02	1.09	A	A	A
2006	R20A009									
2007	R20A004									
2003	R20A005	3	7	20	4.7	0.55	0.74	C	C	C
2004	R20A002	3	7	25	6.4	0.76	1.02	B	A	A
2009	R20A006									
2008										
2010										

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

3.2.24 Lands End Catchments Catchment-21

The lower reach of Porthleven Stream was of only moderate quality owing to both EQI ASPT and EQI N-fams. The monitoring site was slow-flowing and silty, and the stream is known to be affected by mining. Chyandour Brook was classed as being of poor ecological quality, largely on the basis of its EQI ASPT, implicating organic pollution. This was thought to be from urban contamination at the sampling site; the reach was also subject to channelisation. The two lower reaches of the Newlyn River that were sampled in 1990 were of only moderate ecological quality. Pesticide contamination has been identified in this catchment. The lower of the two sites, at Newlyn Bridge, may also have been influenced by an industrial estate. All the sites in these catchment had low RIVPACS suitability: most were small maritime streams, which is likely to have affected the accuracy of their classification.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
LANDS END STREAMS CATCHMENTS (Catchment 21 & part of 22)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Porthleven Stream	Penbro	SW 6284 2826
4	Porthleven Stream	upstream from harbour	SW 6275 2595
5	Marazion River	Nancledra	SW 4944 3610
6	Marazion River		
7	Marazion River	Truthwall Mill Bridge	SW 5247 3257
8	Tregillowe Stream	Gwallon	SW 5258 3213
9	Trevaylor Stream	Trythogga	SW 4764 3183
10	Rosemorran Stream	A30 Bridge at Chyandour	SW 4812 3113
11	Rosemorran Stream	Kenegie Cottage	SW 4788 3222
13	Chyandour Brook	A30 Bridge at Chyandour	SW 4782 3104
15	Lariggan River	Wherry Town Bridge	SW 4608 2995
16	Newlyn River	Skinnel Bridge	SW 4332 3020
18	Newlyn River	Buryas Bridge	SW 4460 2910
19	Newlyn River	Stable Hobba	SW 4542 2930
20	Newlyn River	Newlyn Bridge	SW 4609 2914
21	Tereife Stream	Dennis Place	SW 4457 3008
22	Tereife stream	prior to Newlyn River	SW 4519 2932
23	Sancreed Brook	Little Sellan Bridge	SW 4231 2981
25	Fiddlers Brook	Bojewens	SW 4321 2661
26	Lamorna Stream	Lamorna	SW 4500 2416
27	Carn Euny Stream	Trewoolfe	SW 4390 2520
30	Penberth Stream	Penberth Bridge	SW 4008 2295
33	Tregeseal Stream	prior to sea	SW 3590 3235
34	Zennor Stream	Zennor	SW 4540 3846

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2112	R21A013									
2101	R21A010	3	7	24	5.4	0.70	0.87	B	B	B
2113	R21A028									
2121	R21A001									
2102	R21A002	3	7	29	6.2	0.82	0.98	A	A	A
2114	R21A026									
2103	R21A022	3	7	32	6.3	0.97	0.98	A	A	A
2104	R21A008	3	7	31	6.5	0.90	1.05	A	A	A
2115	R21A021									
2105	R21A006	3	7	23	4.9	0.70	0.76	B	C	C
2106	R21A007	3	7	29	6.0	0.87	0.95	A	A	A
2107	R21A003	3	7	27	6.3	0.84	0.99	A	A	A
2111	R21A004	3	7	24	5.5	0.74	0.86	B	B	B
2116	R21A027									
2108	R21A005	3	7	24	5.8	0.73	0.90	B	A	B
2117	R21A019									
2118	R21A020									
2120	R21A017									
2119										
2109	R21A011	3	7	30	6.3	0.92	0.99	A	A	A
2110	R21A015	3	7	27	6.4	0.83	1.01	A	A	A
2201	R22A009	3	7	32	5.9	0.97	0.93	A	A	A
2208	R22A007									
2209	R22A008									

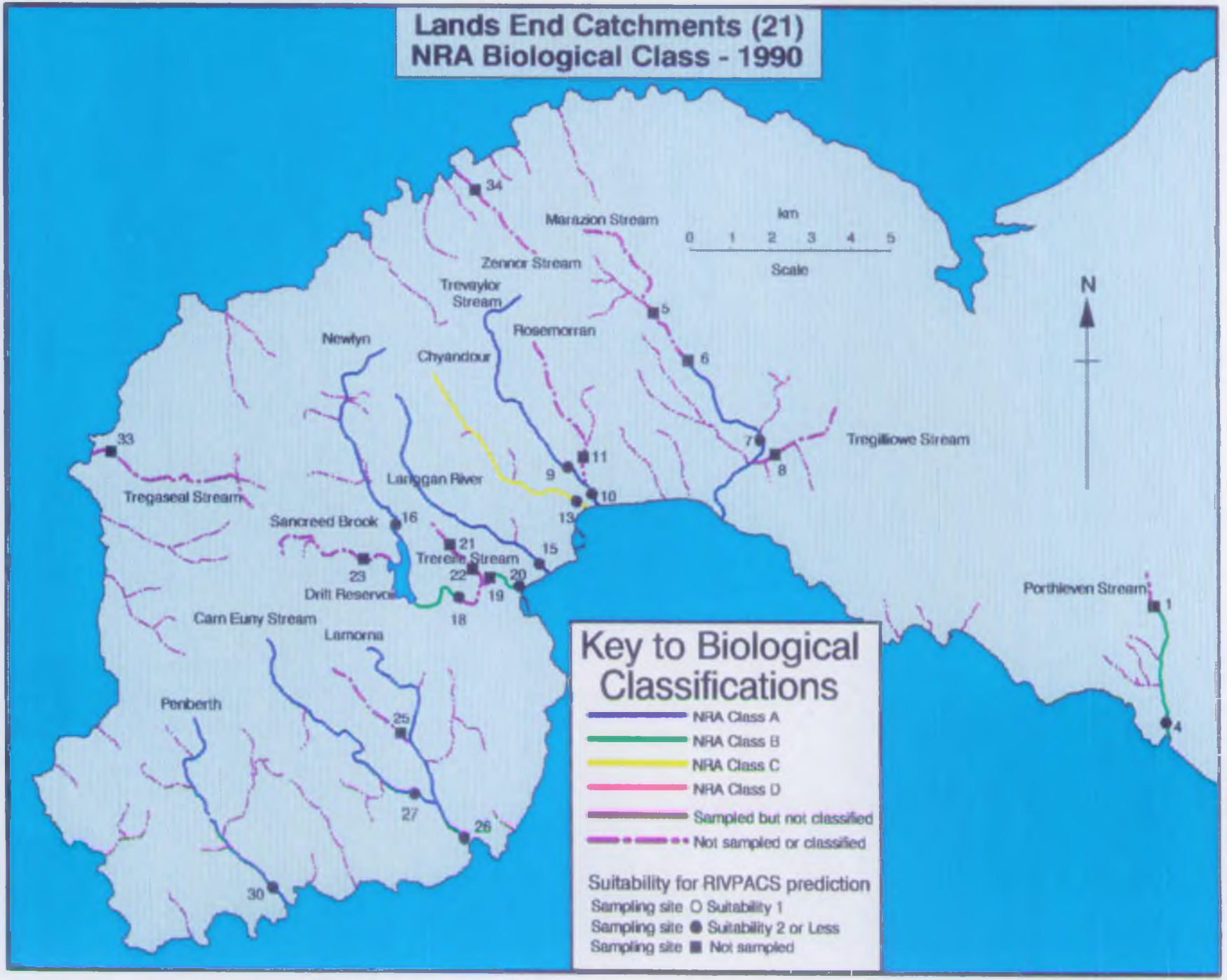


Figure 3.34 Lands End Catchments (21) NRA Biological Class - 1990

3.2.25 Hayle River Catchment Catchment-22

The River Hale at Godolphin Bridge was of only moderate quality owing to poor taxonomic richness. No causes were ascribed to this, though the effects of mining have been suggested. Millpool Stream was also of only moderate ecological quality, also owing to its EQI N-fams: the site was subject to dredging and channelisation which would have affected its taxonomic richness; mine drainage is also thought to affect this watercourse. The lower reach of the Angarrack Stream was of poor ecological quality owing solely to its taxonomic richness: this is consistent with the effects of urbanisation and channelisation which affected the stream in the vicinity of the monitoring site.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
HAYLE RIVER CATCHMENT (Catchment 22)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Bosworgy Stream	Trannack	SW 5610 3299
2	Hayle	B 3303 bridge Crowan	SW 6375 3467
3	Hayle	Drym Farm	SW 6205 3382
4	Hayle	Binner Bridge	SW 6115 3277
5	Hayle	Godolphin Bridge	SW 5969 3246
6	Hayle	Relubbus	SW 5664 3193
7	Hayle	St Erth Gauging Station	SW 5493 3507
8	Nance Stream	Lelant	SW 5407 3647
9	St Erth Stream	Treloweth	SW 5435 3558
10	Millpool Stream	Millpool	SW 5715 3138
11	Godolphin Stream	Gwedna	SW 6043 3208
12	Nancegollan Stream	Trenwheal	SW 6145 3306
13	Angarrack Stream	Nanpusker	SW 5885 3734
14	Angarrack Stream	Phillack - Copperhouse	SW 5699 3834

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2214										
2210	R22B014									
2211	R22B015									
2212	R22B001									
2204	R22B002	3	7	21	6.1	0.60	0.97	B	A	B
2213	R22B003									
2205	R22B004	3	7	29	6.0	0.81	0.95	A	A	A
2203	R22A005	3	7	28	5.6	0.82	0.90	A	A	A
2217	R22B018									
2206	R22B013	3	7	25	6.2	0.72	0.99	B	A	B
2215	R22B017									
2216	R22B016									
2207	R22A014									
2202	R22A001	3	7	15	5.2	0.44	0.92	C	A	C

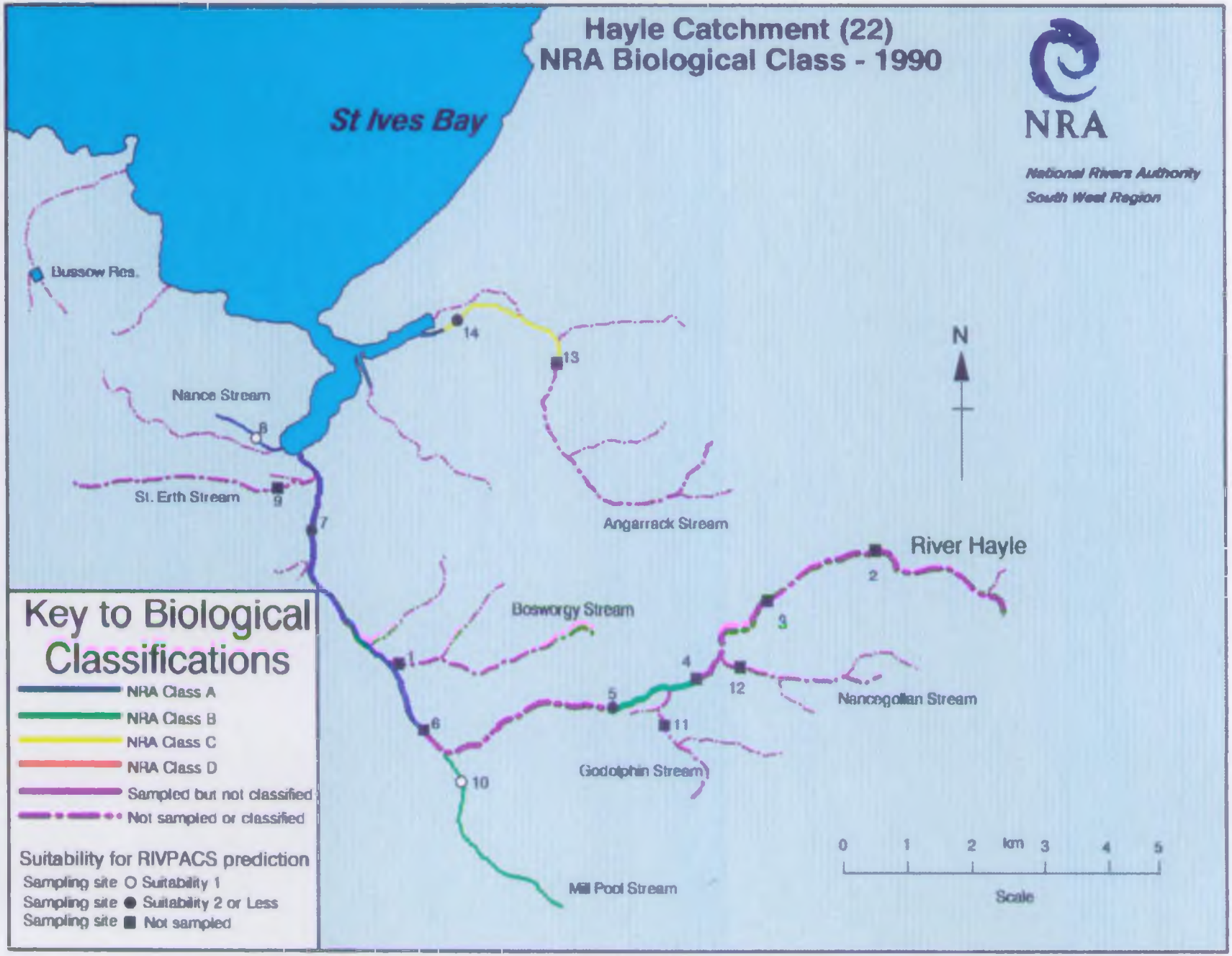


Figure 3.35 Hayle Catchment (22) NRA Biological Class - 1990

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

This catchment included streams with some of the worst ecological qualities in the South West Region. At both sites on the Red River the overall NRA Biological Classification was very poor. In the upper reach monitored at Rosegroggan Bridge this was the result of mine drainage and storm-water overflows, and in the most downstream reach sampled from Gwithian Towans it was the result of both mining and organic pollution (at this site the very poor ecological quality was due to both EQI N-fams and EQI ASPT). Although it attained an overall NRA Biological Class of good ecological quality, Roseworthy Stream was classed as only of moderate quality on the basis of its EQI N-fams. The site was dredged in Spring 1990. The lower reach of the Praze River was of only moderate overall ecological quality owing to its EQI ASPT, which implicated organic pollution. Reen Stream was of poor overall ecological quality, largely because of poor taxonomic richness which may have been the result of channelisation, though mining influences were implicated in this reach's failure to meet its chemical River Quality Objective. Both the Portreath River and Porthtowan Stream were of very poor ecological quality according to their overall NRA Biological Classifications, largely due to very poor taxonomic richness, though both were also classed as of poor quality by their EQI ASPTs. Both watercourses are known to be affected by metalliferous drainage from disused mines. Trevellas Stream was of only moderate ecological quality owing to historic metal ore mining, the toxic influence of this on the macro-invertebrate fauna being evident in its moderate quality EQI N-fams. Bolingey Stream was of moderate ecological quality, and was subject to a number of influences including the effects of historic mining activity, dredging, and run-off.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RED RIVER, PORTREATH, BOLINGEY & PERRANPORTH CATCHMENTS (Catchment 23)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Red River	u/s Bree Tin Works	SW 6692 3917
2	Red River	u/s South Crofty Mine	SW 6615 4088
3	Red River	Rosecroggan Bridge	SW 6498 4197
4	Red River	Kieve Bridge	SW 6292 4228
5	Red River	Gwithian Towans	SW 5880 4200
6	Roseworthy Stream	Botetoe Bridge	SW 6404 3765
7	Roseworthy Stream	Penponds	SW 6304 3907
8	Roseworthy Stream	Nancemellin	SW 6064 4097
10	Praze River	Praze-an-Beeble	SW 6409 3558
11	Praze River	Barripper	SW 6334 3815
12	Reen Stream	Ramsgate	SW 6420 3845
13	Tehidy Stream	Tolvaddon Bridge	SW 6633 4220
14	Tehidy Stream	Old Marrose	SW 6513 4327
15	Tehidy Stream	Coombe	SW 6298 4238
16	Portreath Stream	Bridge	SW 6708 4495
17	Redruth Stream	North Country Bridge	SW 6899 4379
18	Porthtowan Stream	Barns Vale	SW 7141 4795
19	Porthtowan Stream	Porthtowan Bridge	SW 6954 4740
20	Menagissey Stream	Menagissey Bridge	SW 7082 4638
21	St Agnes Stream	prior to culvert St Agnes	SW 7212 5128
22	Trevellas Stream	u/s Trevalance Cove	SW 7284 5166
23	Perranporth Stream	Silverwell	SW 7471 4770
24	Perranporth Stream	Mithian	SW 7468 5055
25	Perranporth Stream	Pleasure Gardens Perranporth	SW 7565 5396
26	Bolingey Stream	Perranwell	SW 7691 5287
27	Bolingey Stream	Ponsmere Bridge	SW 7604 5432
28	Holywell Stream	Trelaske	SW 7894 5679
29	Holywell Stream	Holywell Bay Bridge	SW 7680 5868
30	Porth Joke Stream	Trevowah	SW 7900 5967
31	Cambrose Stream	Pigallie Cambrose	SW 6870 4528
32	Mawla Stream	Pigallie Mawla	SW 6873 4529
33	Penwartha Stream	Penwartha	SW 7583 5226
34	Porth Joke Stream	prior to beach	SW 7728 6039
35	Treamble Stream	Trinklet	SW 7842 5606

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2314	R23A001									
2315	R23A002									
2301	R23A003	3	7	1	5.0	0.03	0.79	D	B	D
2316	R23A005									
2302	R23A006	3	7	5	3.4	0.16	0.55	D	D	D
2303	R23A038	3	7	28	6.8	0.84	1.08	A	A	A
2317	R23A008									
2304	R23A009	3	7	27	6.1	0.75	0.98	B	A	B
2318	R23A045									
2305	R23A037	3	7	30	5.5	0.88	0.87	A	B	B
2307	R23A007	2	4	12	5.3	0.41	0.83	C	B	C
2320	R23A042									
2319	R23A041									
2306	R23A017	3	7	28	6.0	0.81	0.95	A	A	A
2308	R23A015	3	7	8	4.5	0.24	0.70	D	C	D
2330	R23A014									
2331	R23A043									
2309	R23A013	3	7	11	4.5	0.33	0.72	D	C	D
2323	R23A052									
2332	R23A016									
2310	R23A051	2	6	18	6.1	0.63	0.97	B	A	B
2325	R23A046									
2326	R23A047									
2312	R23A012	3	7	31	6.5	0.86	1.04	A	A	A
2324	R23A048									
2311	R23A011	3	7	23	5.1	0.64	0.82	B	B	B
2328	R23A049									
2313	R23A010	3	7	32	5.9	0.92	0.99	A	A	A
2333	R23A103									
2321										
2322										
2327										
2334	R23A061									
2329										

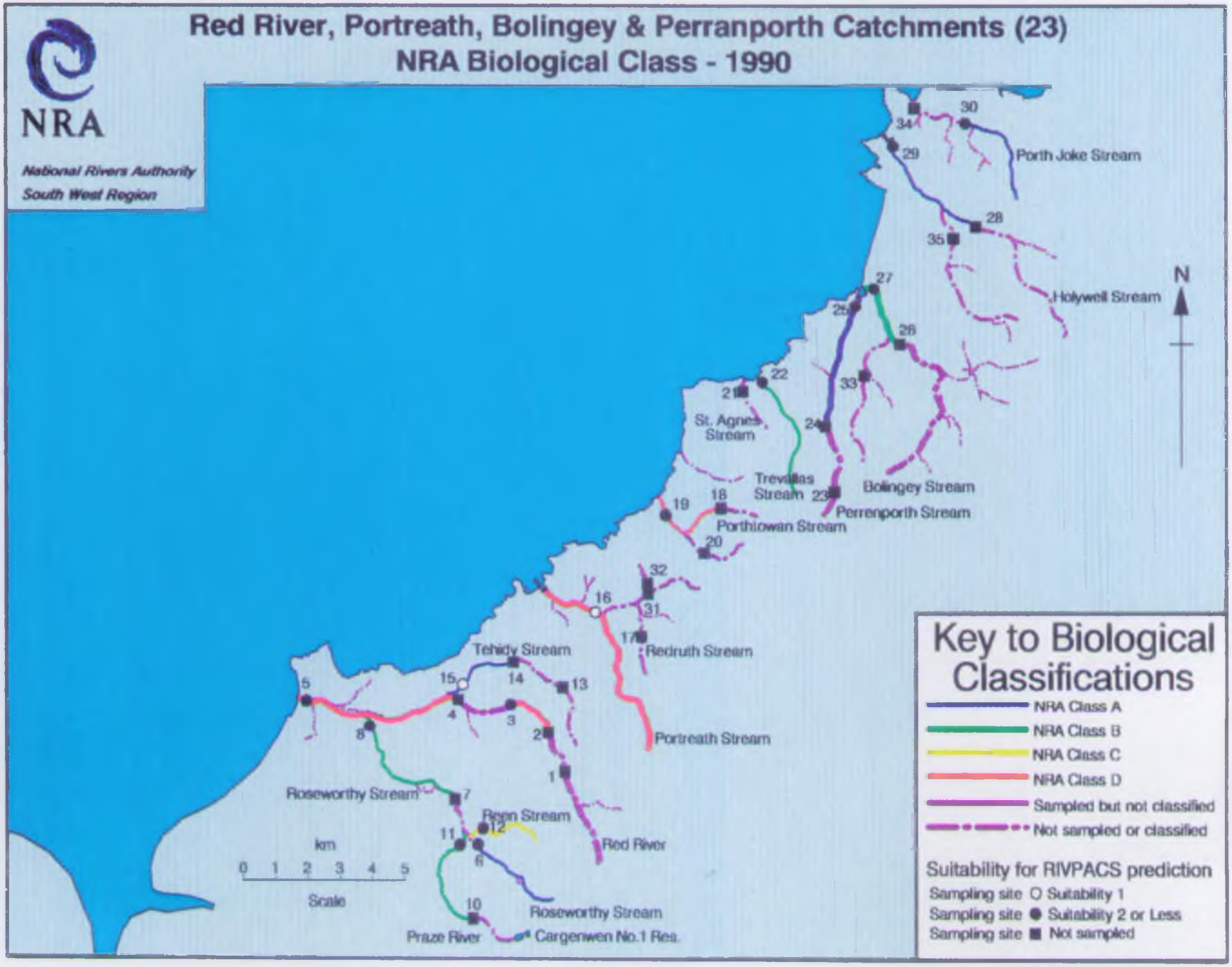


Figure 3.36 Red, Portreath, Bollingey and Perranporth Catchments (23) NRA Biological Class - 1990

3.2.27 River Gannel Catchment Catchment-24

The River Gannel was of good ecological quality. Treloggan Stream was of only moderate ecological quality owing to its EQI N-fams. There has been concern about its water quality for some time, and a number of pollution incidents have been reported on it. Although measures have been taken to improve its water quality, including the removal of potentially polluting discharges, water quality problems persist.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER GANNEL CATCHMENT (Catchment 24)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Gannel	Perrose	SW 8846 5826
2	Gannel	Kestle Mill Bridge	SW 8510 5925
3	Gannel	Owills Gauging Station	SW 8301 5929
4	Gannel	Trevemper	SW 8194 5983
5	Newlyn East Stream	Roseclistan	SW 8171 5877
6	Benny Stream	Benny Mill Bridge	SW 8421 5739
7	Benny Stream	Trewerry Mill	SW 8373 5800
8	East Wheal Rose Str	East Wheal Rose Bridge	SW 8346 5523
9	East Wheal Rose Str	Metha Bridge	SW 8387 5632
10	East Wheal Rose Str	Benny Bridge	SW 8377 5712
11	Treloggan Stream	A3075 roundabout	SW 8196 6007

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2410	R24A008									
2402	R24A005	3	7	39	6.6	1.14	1.04	A	A	A
2403	R24A006	3	7	34	6.6	0.97	1.04	A	A	A
2411	R24A009									
2405	R24A012	3	7	33	6.7	0.98	1.06	A	A	A
2406	R24A004	3	7	33	6.4	0.97	1.00	A	A	A
2407	R24A010	3	7	37	6.4	1.06	1.02	A	A	A
2412	R24A001									
2413	R24A003									
2408	R24A011	3	7	30	6.4	0.87	1.01	A	A	A
2404		3	7	19	5.0	0.74	0.98	B	A	B

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

Gannel Catchment (24)
NRA Biological Class - 1990

NRA

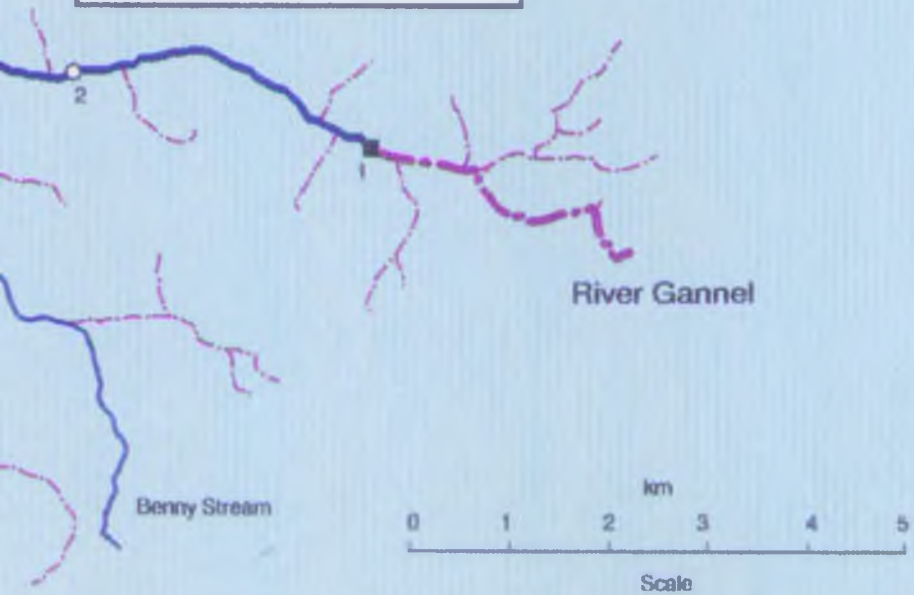
National Rivers Authority
South West Region

Key to Biological Classifications

- NRA Class A
- NRA Class B
- NRA Class C
- NRA Class D
- Sampled but not classified
- Not sampled or classified

Suitability for RIVPACS prediction

- Sampling site ○ Suitability 1
- Sampling site ● Suitability 2 or Less
- Sampling site ■ Not sampled



RDALLEN/MAPS/M90.2 (CATCH24.DRW)

3.2.28 Porth, Gluvian, Menalhyl Catchments Catchment-25A

The watercourses in this catchment were of good ecological quality, except for the most downstream reach on Harlyn Water. This was of moderate quality owing to both its EQI ASPT and EQI N-fams, suggesting that organic enrichment was a problem. The reach was considered to have been affected by the drought, and by effluent from septic tanks. However, the biological monitoring site was in a reed-bed where the water was barely flowing and 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 is to be considered upstream from the lake on Harlyn Water.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
PORTH GLUVIAN & MENALHYL CATCHMENTS (Catchment 25A)

Site no. on Map	Watercourse	Biological Site Name	NGR	Site Code
1	Porth Stream	Tregoose Ford Bridge	SW 8825 6162	2525
2	Porth Stream	Malancoose	SW 8621 6212	2501
3	Porth Stream	Rialton Bridge	SW 8478 6231	2502
4	St Mawgan Stream	Whipsiderry	SW 8373 6338	2526
5	Mountjoy Stream	Trewassick Bridge	SW 8606 6179	2536
6	Menalhyl	Tregamere	SW 9266 6461	2527
7	Menalhyl	St Columb Major Bridge	SW 9145 6398	2528
8	Menalhyl	d/s St Columb STW	SW 9046 6412	2529
9	Menalhyl	St Mawgan Bridge	SW 8730 6592	2503
10	Menalhyl	Mawgan Porth Bridge	SW 8492 6715	2530
11	Penrose Stream	Penrose	SW 8748 7061	2533
12	Tregatillian Stream	Tregatillian	SW 9269 6323	2531
13	Reterth Stream	Reterth	SW 9434 6356	2532
14	Gluivan Stream	Gluivan	SW 8629 6693	2504
15	Porthcothan Stream	Porthcothan Road Bridge	SW 8597 7206	2505
16	Harlyn Water	Harlyn Bridge	SW 8802 7532	2506
17	St Merryn Brook	Treveglos	SW 8885 7431	2534

Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
R2SA004									
R2SA009	3	7	31	6.0	0.89	0.95	A	A	A
R2SA005	3	7	36	6.2	1.01	0.98	A	A	A
R2SA013									
R2SA015									
R2SA014									
R2SA001									
R2SA011									
R2SA002	3	7	31	6.5	0.91	1.02	A	A	A
R2SA003									
R2SA016									
R2SA017									
R2SA018	3	7	36	6.6	1.03	1.03	A	A	A
R2SA008	3	7	33	6.1	0.92	0.97	A	A	A
R2SA007	3	7	22	5.0	0.63	0.68	B	B	B

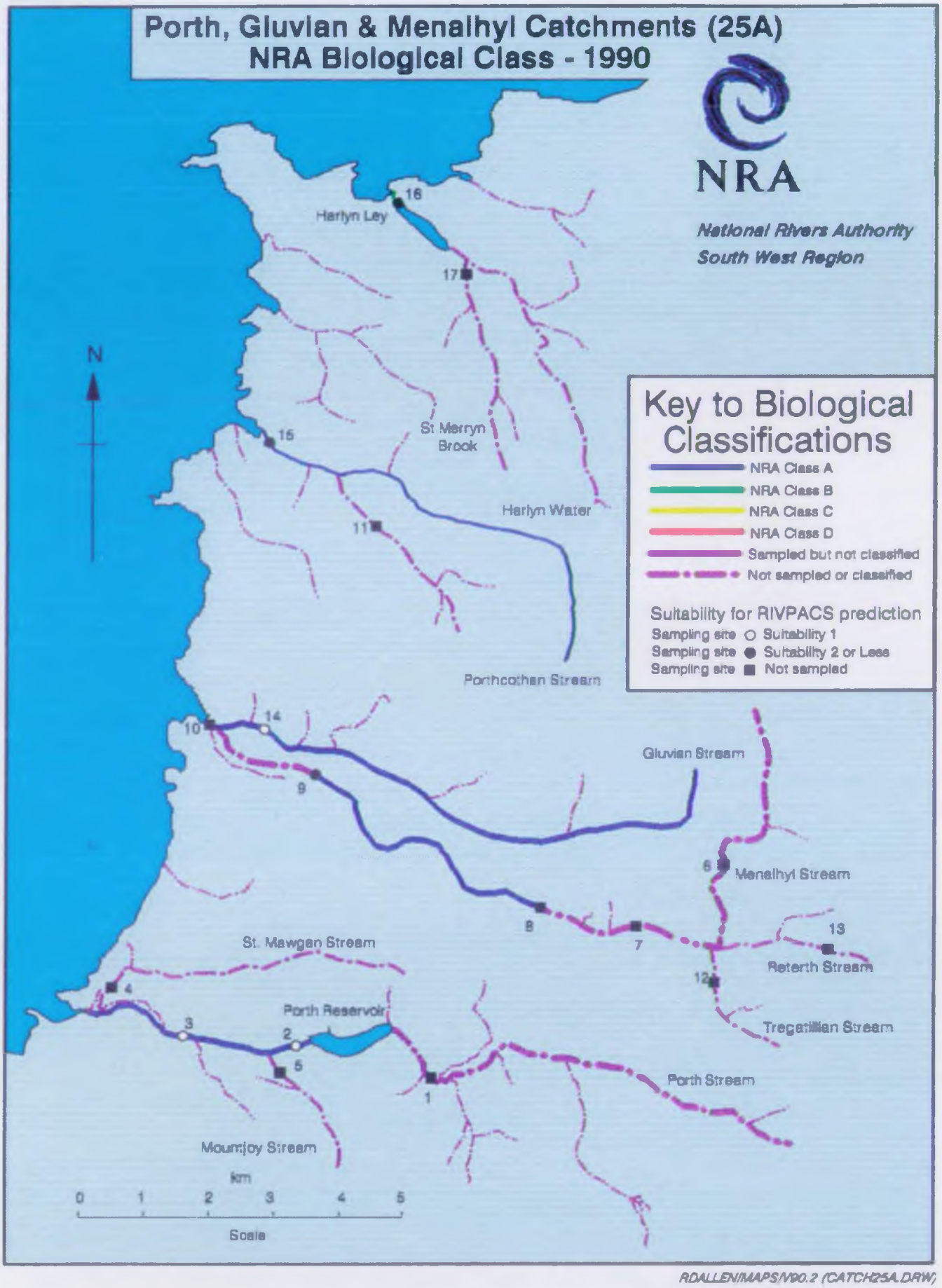


Figure 3.38 Porth, Gluvian and Menalhyl Catchments (25A) NRA Biological Class – 1990

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

All the reaches monitored in the River Camel catchment were of good ecological quality, with the exception of Dunmere Stream, which was of moderate ecological quality. This was because of organic pollution (both EQI N-fams and EQI ASPT were affected) from an urban area upstream from the site.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER CAMEL CATCHMENT (Catchment 25B, C & D)

Site No. on Map	Watercourse	Biological Site Name	NGR
1	Camel	Slaughterbridge	SX 1089 8559
2	Camel	Camelford Bridge	SX 1067 8343
3	Camel	Pencarrow	SX 1043 8278
4	Camel	Trecarne Bridge	SX 0968 8057
5	Camel	Gam Bridge	SX 0890 7790
6	Camel	Wenford	SX 0849 7519
7	Camel	Tresarret Bridge	SX 0882 7317
8	Camel	Hellandbridge	SX 0650 7150
9	Camel	Dunmere Bridge	SX 0484 6780
10	Camel	Wenstallon Bridge	SX 0354 6741
11	Camel	Grogley	SX 0144 6860
12	Camel	Polbrock	SX 0145 6940
13	Issey Brook	Mellingey	SW 9212 7171
14	Amble	St Kew Ford	SX 0211 7678
15	Amble	Chapel Amble Bridge	SW 9988 7535
16	Polmorla Stream	Polmorla	SW 9835 7159
17	Allen	Knightsmill Bridge	SX 0715 8067
18	Allen	Kellygreen Bridge	SX 0456 7591
19	Allen	Sladesbridge	SX 0106 7145
20	Shallow Water	Jordan	SX 0912 7790
21	Ruthern	Withiel Bridge	SW 9971 6590
22	Ruthern	Grogley Downs Bridge	SX 0157 6777
23	Dalabole Stream	Newhall Green	SX 0701 8221
24	Lanivet Stream	Lanivet	SX 0358 6456
25	Lanivet Stream	Hoopers Bridge	SX 0388 6546
26	Lanivet Stream	Wenstallon	SX 0355 6730
27	St Lawrence Stream	A389 Bridge	SX 0525 6586
28	St Lawrence Stream	u/s St Lawrence STW	SX 0456 6690
29	St Lawrence Stream	prior to River Camel	SX 0432 6732
30	Dunmere Stream	Dunmere	SX 0475 6779
31	Clerkenwater	Clerkenwater	SX 0688 6877
32	de Lank River	Bradford Bridge	SX 1140 7593
33	de Lank River	Keybridge	SX 0890 7390
34	Stannon Stream	Trecarne	SX 0978 8053
35	Crowdy Stream	Newhall	SX 1110 8016
36	Davidstow Stream	Tregoodwell	SX 1089 8327
37	Blisland Stream	Lavethan Mills	SX 0905 7301

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2537	R2SB021									
2510	R2SB001	3	7	34	6.4	1.04	1.00	A	A	A
2538	R2SB022									
2539	R2SB002									
2540	R2SB003									
2541	R2SB023									
2542	R2SB004									
2543	R2SB005									
2544	R2SB006									
2511	R2SB007	3	7	34	6.4	1.00	1.00	A	A	A
2545	R2SB008									
2546	R2SB029									
2507	R2SA024	3	7	34	6.3	0.99	1.00	A	A	A
2535	R2SA010									
2508	R2SA006	3	7	32	6.0	0.89	0.99	A	A	A
2509	R2SB053	3	7	37	6.4	1.03	1.04	A	A	A
2523	R2SC001	3	7	41	6.9	1.23	1.08	A	A	A
2553	R2SC002									
2524	R2SC003	3	7	38	6.6	1.08	1.03	A	A	A
2551										
2547	R2SB027									
2512	R2SB028	3	7	39	6.8	1.10	1.07	A	A	A
2554	R2SC009									
2513	R2SB014	3	7	29	5.9	0.89	0.92	A	A	A
2514	R2SB015	3	7	30	5.9	0.91	0.93	A	A	A
2548	R2SB016									
2515	R2SB017	3	7	34	6.5	0.97	1.03	A	A	A
2516	R2SB040	3	7	31	5.9	0.88	0.94	A	A	A
2549	R2SB038									
2517	R2SB026	3	7	21	5.5	0.60	0.87	B	B	B
2518	R2SB018	3	7	35	6.8	1.06	1.07	A	A	A
2521	R2SC001	3	7	45	6.8	1.57	1.05	A	A	A
2522	R2SC002	3	7	30	7.0	0.96	1.10	A	A	A
2519	R2SB025	3	7	34	6.9	1.13	1.08	A	A	A
2552										
2520	R2SB024	3	7	39	6.8	1.20	1.07	A	A	A
2550										

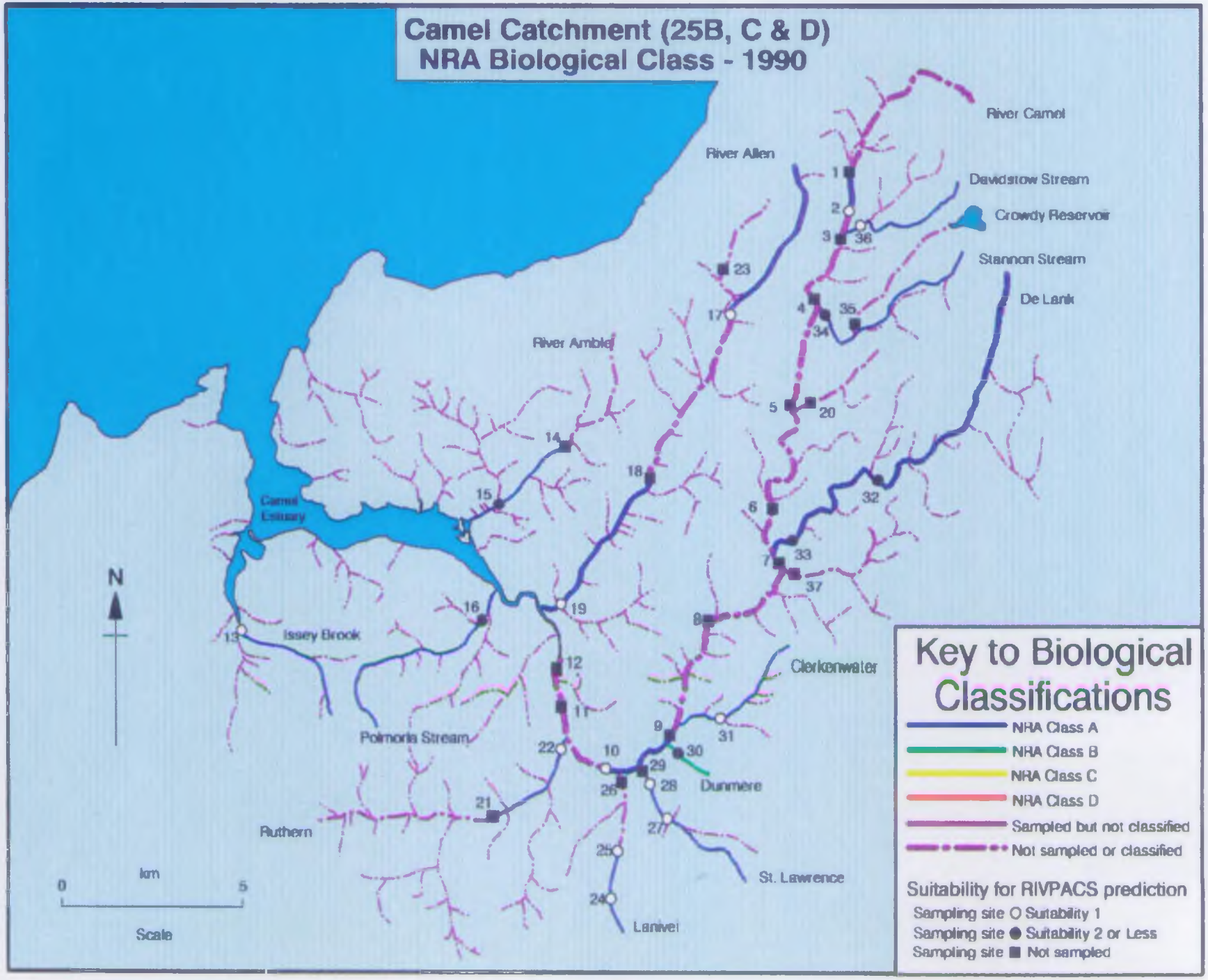


Figure 3.39 Camel Catchment (25B, 25C & 25D) NRA Biological Class - 1990

3.2.30 Valency and Crackington Streams Catchments Catchment-26

All the streams in these catchments were of good ecological quality.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
VALENCY & CRACKINGTON STREAMS CATCHMENTS (Catchment 26)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Valency	Anderton Ford	SX 1377 9128
2	Valency	Boscastle Bridge	SX 0988 9128
3	Crackington Stream	Crackington Haven Bridge East	SX 1432 9677
4	Millook Stream	Millook	SS 1849 0000
5	Wanson Water	Wanson	SS 1962 0099
6	Pengold Stream	Crackington Haven Bridge West	SX 1432 9647
7	Lesnewth Stream	Halamiling	SX 1244 9070

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2605	R26A006									
2601	R26A003	3	7	30	6.8	0.90	1.07	A	A	A
2607	R26A001									
2603	R26A004	3	7	37	6.6	1.10	1.03	A	A	A
2604	R26A005	3	7	31	6.1	0.90	0.95	A	A	A
2602	R26A002	3	7	36	6.8	1.07	1.06	A	A	A
2606										

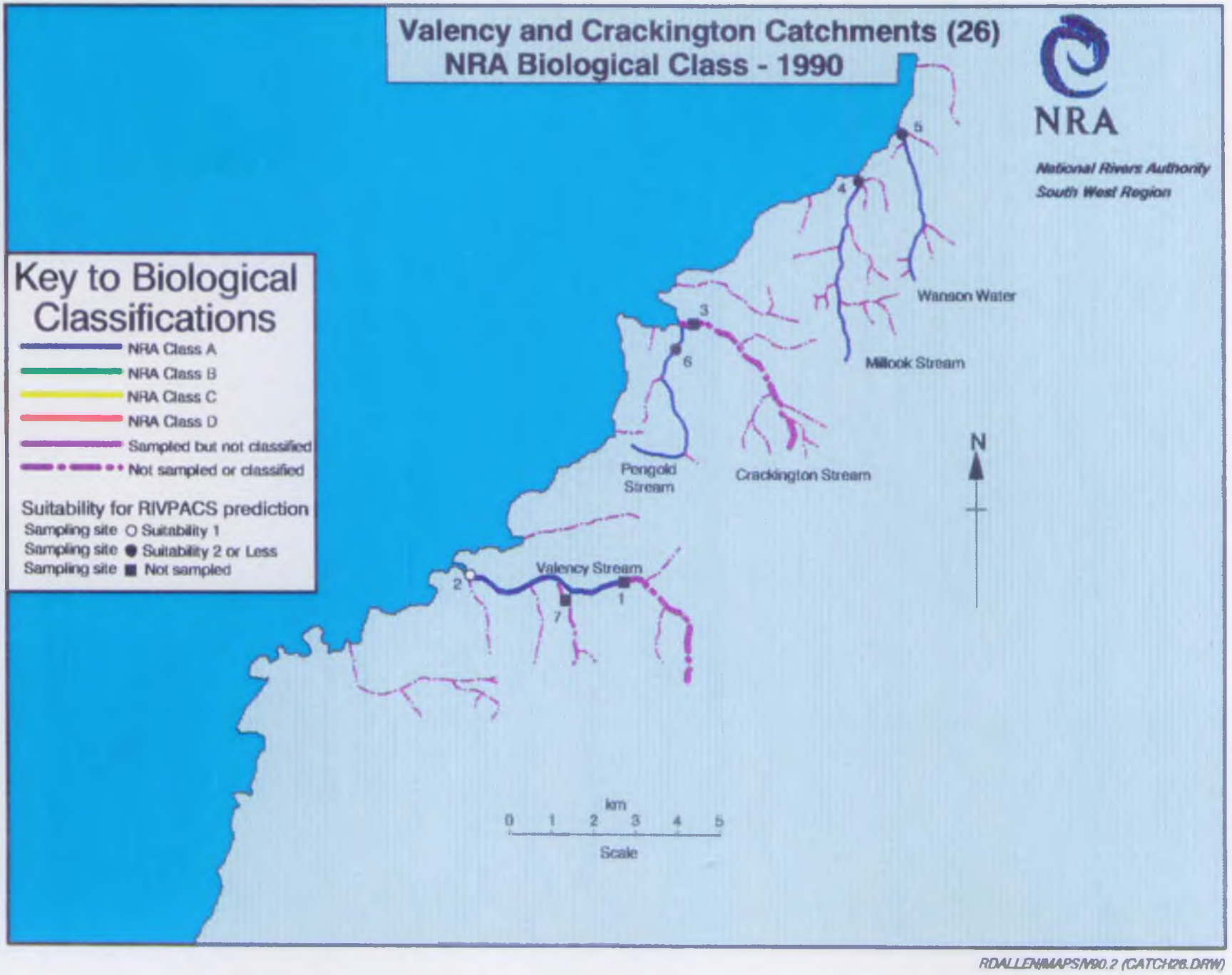


Figure 3.40 Valency and Crackington Catchments (26) NRA Biological Class - 1990

3.2.31 Rivers Strat and Neet Catchments Catchment-27

All the streams surveyed in these catchments were of good biological quality. The invertebrate fauna in the Bude Canal at Falcon's Bridge was probably not of good quality, though it could not be classified because it was a canal, not a stream.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVERS STRAT & NEET CATCHMENTS (Catchment 27)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Strat	Bush	SS 2329 0769
2	Strat	Stratton	SS 2291 0645
3	Strat	Hele Bridge	SS 2182 0377
4	Strat	Podd's Bridge	SS 2124 0477
5	Bude Canal	Podd's Bridge	SS 2111 0479
6	Bude Canal	Falcon Bridge	SS 2074 0607
7	Neet	Langford Bridge	SS 2353 0086
8	Neet	Hele Bridge	SS 2183 0330
9	Jacob Stream	Newmill Bridge	SX 2153 9873
10	South Week Stream	Kitsham	SS 2315 0027
11	Coombevalley Stream	Duckpool Cottage	SS 2025 1165
12	Marsland Stream	Goosehan Mill	SS 2324 1725
13	Tidna	Tidna Bridge	SS 2060 1482
14	Grinscott Stream	Cross Lanes	SS 2472 0640
15	Bude Canal	200m u/s Podd's Bridge	SS 2112 0461

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2710	R27A015									
2711	R27A001									
2702	R27A002	3	7	38	6.0	1.04	0.95	A	A	A
2703	R27A003	3	7	36	5.7	0.99	0.91	A	A	A
2712	R27A009									
2704	R27A010	3	7	17	4.5	0.50	0.75	C	C	C
2705	R27A007	3	7	38	6.4	1.06	1.01	A	A	A
2706	R27A008	3	7	36	6.4	0.98	1.02	A	A	A
2707	R27A006	3	7	38	6.5	1.07	1.02	A	A	A
2701	R27A005	3	7	32	6.2	0.89	0.98	A	A	A
2708	R27A011	3	7	37	6.4	1.10	1.01	A	A	A
2709	R27A016	3	7	34	6.7	1.04	1.05	A	A	A
2715										
2714										
2713										

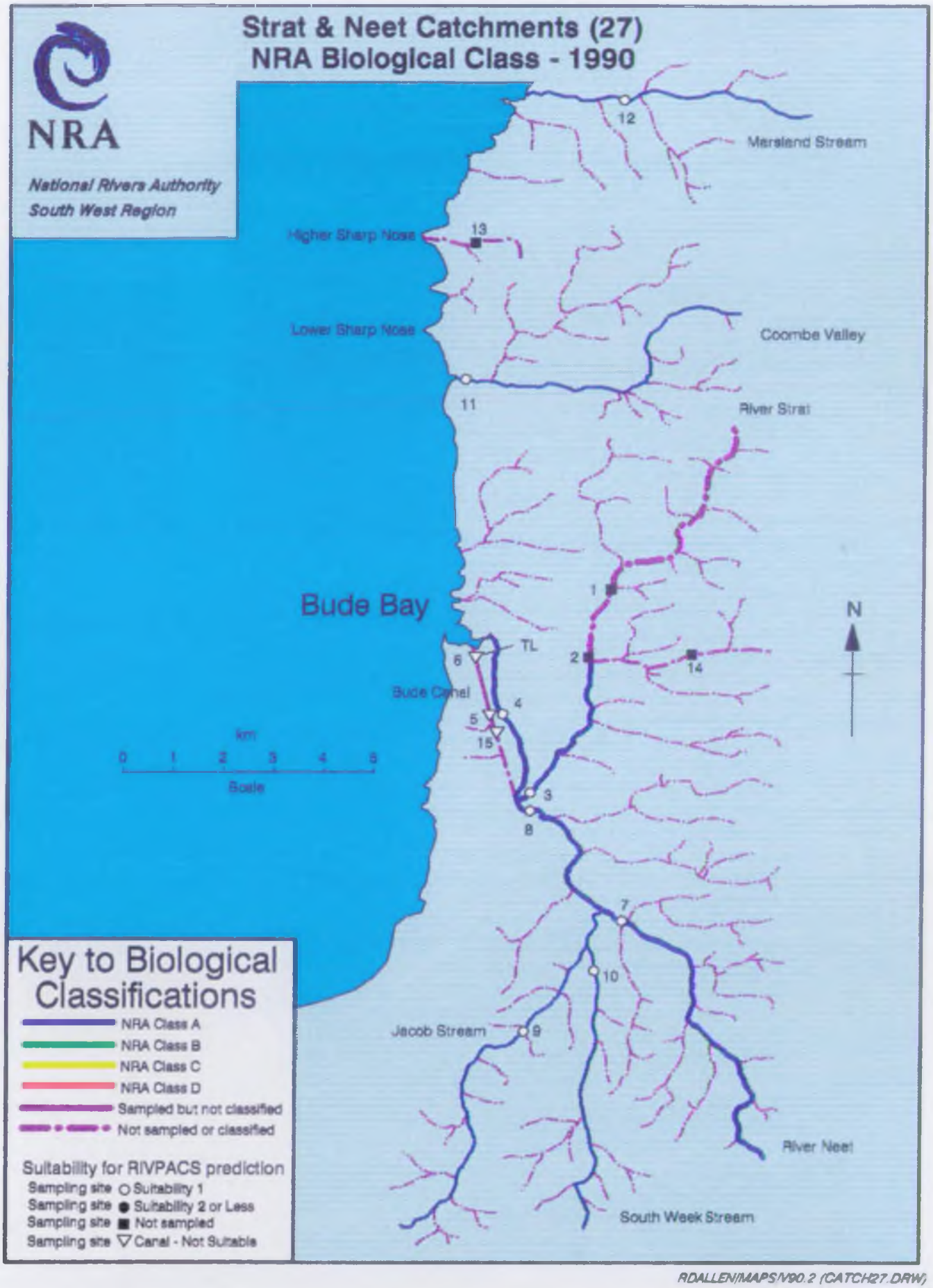


Figure 3.41 Strat and Neet Catchments (27) NRA Biological Class - 1990

3.2.32 Hartland Streams Catchments Catchment-28

Both the Welcombe Stream and Abbey River were of good ecological quality.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
HARTLAND STREAMS CATCHMENTS (Catchment 28)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Walcombe Stream	30m d/s footbr The Hermitage	SS 2160 1830
2	Abbey River	Hartland Abbey 50m u/s br	SS 2383 2488
3	Lyme Brook	15m u/s waterfall	SS 2258 2353

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2801	R28A005	3	7	34	6.8	1.04	1.06	A	A	A
2802	R28A003	3	7	36	6.6	1.10	1.03	A	A	A
2803										

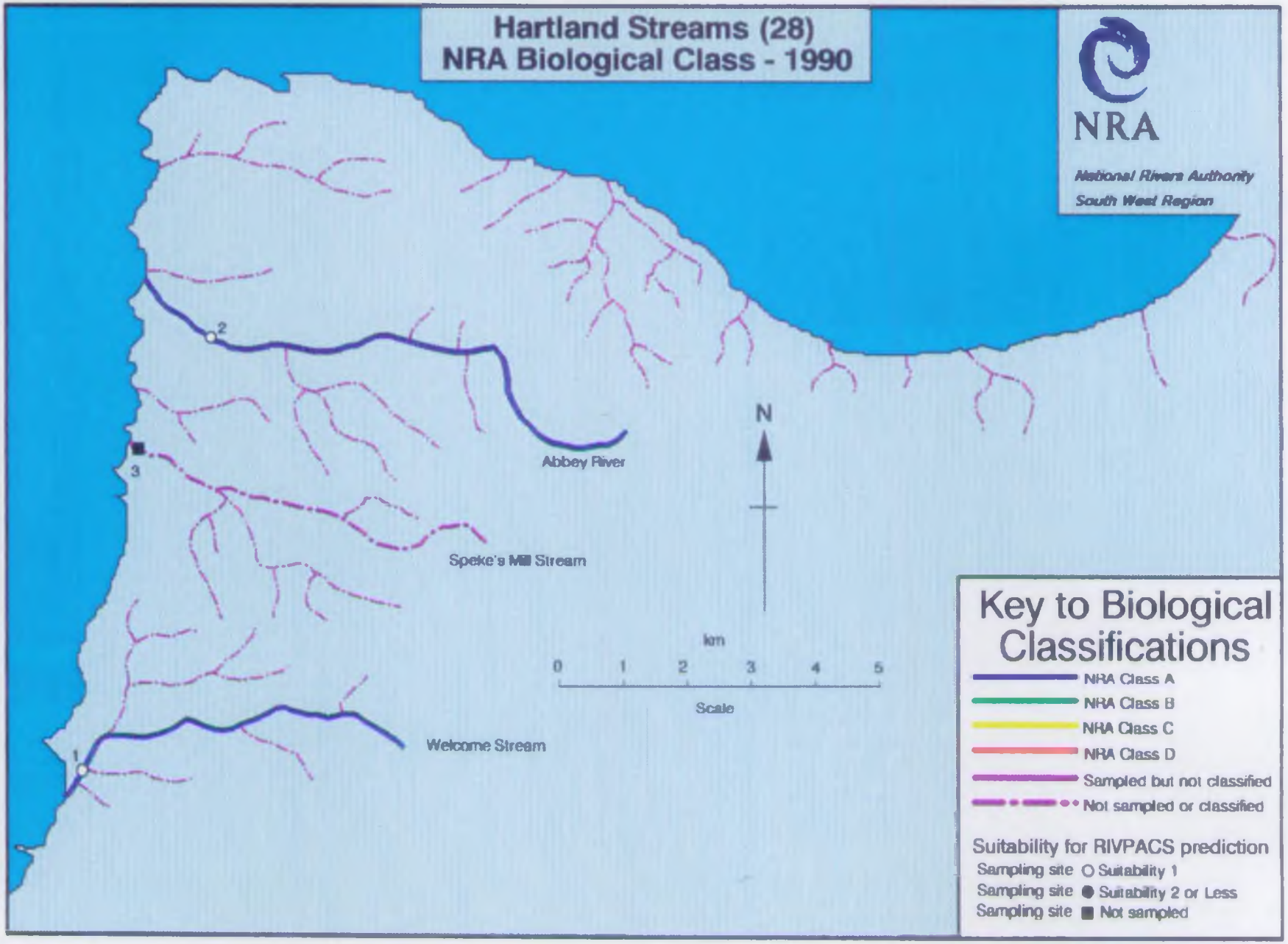


Figure 3.42 Hartland Catchments (28) NRA Biological Class - 1990

3.2.33 River Torridge Catchment Catchment-29

Most of the waters in the Torridge catchment were of good ecological quality. Common Lake was of only moderate quality because of organic enrichment from an abattoir. The most upstream reach of Mere Stream, although of good quality according to the overall NRA Biological Classification, was of only moderate quality according to its EQI N-fams. This stream was affected by ball clay mining. The West Okement at Okehampton was of only moderate ecological quality, and both were affected by acidic metalliferous discharges. The moderate quality of this reach of the West Okement was the result of poor taxonomic richness, which is consistent with the toxic effects of acidic and metal-rich waters. The stream bed was covered by ochre and fine sediment. Brightly Stream was of good ecological quality according to the overall NRA Biological Classification, EQI ASPT and EQI N-fams: this was surprising as it was known to be suffering from acidic metal pollution in 1990, particularly in its upper reaches (National Rivers Authority South West Region, 1991b).

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER TORRIDGE CATCHMENT (Catchment 29)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Torridge	30m u/s rd br Fordmill Farm	SS 3246 1777
2	Torridge	225m u/s br 30m d/s quarry Putford	SS 3638 1613
3	Torridge	200m u/s Woodford Bridge	SS 3978 1268
4	Torridge	20m u/s br Gidcott	SS 4220 0941
5	Torridge	50m d/s Cohan Br u/s Kingsley Mill	SS 4610 0632
6	Torridge	50m d/s Rockhay Bridge	SS 5060 0698
7	Torridge	250m u/s Hele Bridge	SS 5385 0613
8	Torridge	125m d/s New Bridge	SS 5489 1112
9	Torridge	50m u/s Beaford Bridge	SS 5428 1426
10	Torridge	10m u/s track end Undercleave	SS 5178 1652
11	Torridge	300m d/s Town Mills Torrington	SS 4987 1870
12	Torridge	100m d/s Rothern Bridge	SS 4780 1976
13	Torridge	100m u/s Beam Bridge	SS 4731 2089
14	Torridge	50m d/s bridge Sheepwash	SS 4865 0574
15	Dolton Stream	25m d/s track br u/s Torridge confl	SS 5531 1154
16	Yeo (Bideford)	30m u/s Tuckingmill Bridge	SS 4015 2245
17	Yeo (Bideford)	25m u/s Hoopers Bridge	SS 4273 2317
18	Yeo (Bideford)	opposite Edge Mill House	SS 4491 2293
19	Duntz	30m u/s Hanbury rd br	SS 4293 1777
20	Duntz	50m u/s Yeo confluence (Orleigh)	SS 4395 2242
21	Lydaland Water	50m u/s Tythecott Mill Bridge	SS 4190 1838
23	Huntshaw Water	30m u/s br Weare Gifford	SS 4794 2144
24	Common Lake	10m u/s Tantons Plain	SS 4940 1982
25	Langtree Lake	30m u/s br Servis Farm	SS 4774 1919
26	Wooleigh Brook	25m d/s B3220 road br	SS 5219 1714
27	Mere	50m u/s Coleford Bridge	SS 5017 1325
28	Mere	300m u/s A386 br 50m u/s pylons	SS 5238 1130
29	Mere	150m u/s fm br Greatwood	SS 5480 1285
30	Little Mere River	25m u/s track br Wooladon Moor	SS 5336 0841
31	Little Mere River	20m u/s Burymoor Bridge	SS 5257 1105
32	East Okement River	200m u/s Fatherford rail br	SX 6048 9460
33	East Okement River	300m u/s A30 rd br at car park	SX 5898 9510
35	West Okement River	100m u/s Red-a-Ven d/s Maldon Dam	SX 5641 9190
34	West Okement River	30m u/s footbr d/s Red-a-Ven	SX 5640 9205
36	West Okement River	30m u/s Maldon Viaduct	SX 5649 9230
37	West Okement River	30m u/s Maldon Quarry br	SX 5664 9331
38	West Okement River	Okehampton Hosp d/s Castle car park	SX 5850 9435
39	Okement	100m d/s Rhowle Bridge	SX 5930 9639
40	Okement	75m d/s Brightley Bridge	SX 5987 9750
41	Okement	South Domaford	SS 5999 0002
42	Okement	15m u/s A3072 br Jacobstowe	SS 5920 0169
43	Okement	25m d/s Woodhall Bridge	SS 5845 0343
44	Okement	100m u/s Iddesleigh Bridge	SS 5690 0590
45	Hole Brook	50m u/s Monkokehampton	SS 5836 0545
46	Beckamoor Brook	75m u/s Terris Bridge	SS 5818 0328
47	Brightley Stream	25m u/s rd br Brightley Mill	SX 5970 9703
48	Jacobstowe Stream	20m u/s Okement confl	SS 5913 0161
49	Red-A-Ven Brook	75m u/s West Okement confluence	SX 5647 9200

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2915	R29C001	3	7	36	6.7	1.07	1.05	A	A	A
2944	R29C032									
2916	R29C002	3	7	37	6.5	1.11	1.02	A	A	A
2945	R29C033									
2917	R29C003	3	7	37	6.5	1.09	1.02	A	A	A
2918	R29C004	3	7	32	6.4	0.96	1.02	A	A	A
2919	R29C005	3	7	35	6.6	1.06	1.05	A	A	A
2907	R29B001	3	7	32	6.6	0.92	1.04	A	A	A
2937	R29B002									
2938	R29B038									
2939	R29B003									
2908	R29B004	3	7	33	6.1	1.02	0.98	A	A	A
2940	R29B034									
2946	R29B035									
2942										
2901	R29A002	3	7	34	6.5	1.03	1.02	A	A	A
2902	R29A015	3	7	36	6.6	1.08	1.03	A	A	A
2903	R29A003									
2904	R29A004	3	7	34	6.7	1.05	1.06	A	A	A
2905	R29A005	3	7	38	6.4	1.11	1.01	A	A	A
2906	R29A006	3	7	33	6.5	1.00	1.02	A	A	A
2943	R29A026									
2910	R29B039	3	7	24	5.4	0.72	0.85	B	B	B
2936	R29A016									
2909	R29B037	3	7	39	6.5	1.11	1.02	A	A	A
2911	R29B007	3	7	27	6.3	0.77	0.99	B	A	A
2912	R29B008	3	7	35	6.2	0.97	0.98	A	A	A
2913	R29B009	3	7	34	6.5	0.94	1.02	A	A	A
2941	R29B005									
2914	R29B006	3	7	32	6.6	0.89	1.05	A	A	A
2968	R29D031									
2931	R29D001	3	7	29	6.7	1.30	1.06	A	A	A
2969	R29D027									
2970	R29D009									
2971	R29D032									
2972	R29D030									
2932	R29D002	3	7	23	6.4	0.73	1.00	B	A	B
2964	R29D026									
2925	R29D003	3	7	24	6.7	1.13	1.05	A	A	A
2926	R29D004	3	7	31	6.5	0.96	1.01	A	A	A
2965	R29D008									
2927	R29D005	3	7	31	6.6	0.94	1.03	A	A	A
2966	R29D006									
2933	R29D007	3	7	35	6.2	0.98	0.98	A	A	A
2928	R29D052	2	4	26	6.1	0.83	0.97	A	A	A
2930	R29D025	3	7	19	5.7	0.89	0.89	A	A	A
2967										
2934	R29D028	3	7	26	6.8	1.22	1.06	A	A	A

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER TORRIDGE CATCHMENT (Catchment 29) continued

Site no. on Map	Watercourse	Biological Site Name	NGR
50	Lew	50m u/s Hole Stock Bridge	SS 4885 0005
51	Lew	Bloxmaford 3rd field from rd	SS 5090 0070
52	Lew	15m u/s br Great Rutleigh	SS 5140 0079
53	Lew	200m u/s Hatherleigh Bridge	SS 5398 0400
54	Lew	130m u/s Lewer Bridge	SS 5318 0515
55	Pulworthy Brook	30m u/s hedge Furzehill	SS 5258 0415
56	Madland Brook	10m u/s br Waterhouse	SS 5481 0131
57	Hookmoor Brook	15m u/s br Narracott	SS 5310 0070
58	Wagaford Water	75m d/s Wagaford Bridge	SS 4890 0168
60	Yeo [Bideford]	75m u/s br Foxdown	SS 3809 2217
61	North Lew Stream	North Lew 55m u/s br	SX 5075 9910
62	Stoney Stream	30m u/s ford Coombe	SX 5044 9700
63	Mussal Brook	125m u/s br Westover	SS 4786 0654
64	Whiteleigh Water	40m u/s br Dipper Mill	SS 4385 0638
65	Waldon	50m u/s br Berridon Cottage	SS 3182 1412
66	Waldon	200m u/s Sutcombe Bridge	SS 3465 1100
67	Waldon	10m u/s Waldon Bridge	SS 3682 1042
68	Waldon	200m u/s br Berry Farm	SS 3910 0988
69	Waldon	250m u/s Henscott Bridge	SS 4137 0812
70	Cookbury Stream	125m u/s br Eason Cross	SS 4118 0795
71	Dipple Water	150m u/s Dipple Bridge	SS 3492 1787
72	Cranford Water	d/s rubbish and earth tip	SS 3407 2005
74	Clifford Water	15m u/s br Biteford	SS 3020 1896
75	Sackington Water	75m u/s br Gorvin	SS 2977 2006

Site Code	Chemcial Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
2923	R29C006	3	7	38	6.4	1.10	1.01	A	A	A
2950	R29C025									
2951	R29C007									
2924	R29C008	3	7	30	6.8	0.86	1.06	A	A	A
2952	R29C009									
2953	R29C021									
2954	R29C022									
2955	R29C023									
2956	R29C024									
2929	R29A001									
2957	R29C026									
2958	R29C029									
2960	R29C038									
2961	R29C039									
2947	R29C010									
2921	R29C030	3	7	38	6.4	1.12	1.01	A	A	A
2948	R29C011									
2949	R29C042									
2922	R29C012	3	7	34	6.4	1.01	1.01	A	A	A
2959	R29C043									
2920	R29C013	3	7	36	6.3	1.05	0.99	A	A	A
2935	R29C044									
2962	R29C040									
2963	R29C041									

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

3.2.34 River Taw Catchment Catchment-30

All the watercourses sampled in the Taw catchment were of good ecological quality.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER TAW CATCHMENT (Catchment 30)

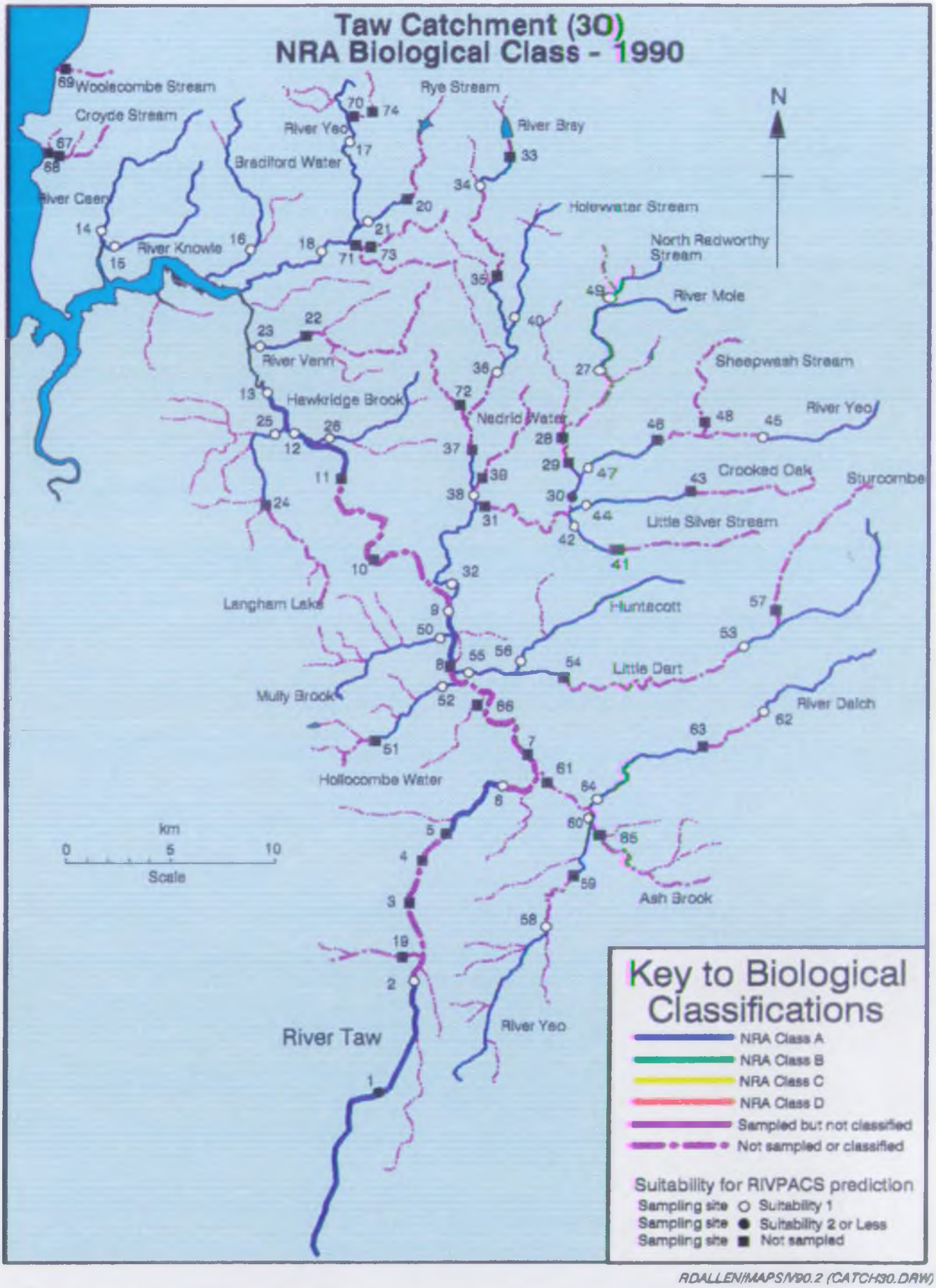
Site no. on Map	Watercourse	Biological Site Name	NGR
1	Taw	300m u/s A30 br Sticklepath	SX 6417 9393
2	Taw	50m u/s East Rowden Bridge	SX 6550 9951
3	Taw	50m u/s br Yeo Farm	SS 6511 0292
4	Taw	Bondleigh 10m u/s bridge	SS 6578 0451
5	Taw	100m u/s Taw bridge	SS 6727 0649
6	Taw	25m u/s Park Mill Bridge	SS 6963 0860
7	Taw	200m d/s br Chenson	SS 7000 0953
8	Taw	30m u/s Kersham Bridge	SS 6621 1353
9	Taw	350m u/s Newnham Bridge	SS 6599 1701
10	Taw	150m u/s rd br Kingford	SS 6253 1926
11	Taw	250m u/s rd br Umberleigh	SS 6075 2345
12	Taw	Chapelton 200m u/s footbridge	SS 5830 2592
13	Taw	75m u/s New Bridge	SS 5700 2825
14	Caen	opp vicarage 75m u/s br	SS 4887 3720
15	Knowl Water	20m u/s Wrafton Bridge	SS 4903 3560
16	Bradiford Water	25m d/s Bradiford Bridge	SS 5503 3427
17	Yeo (Barnstaple)	100m u/s Brockham Bridge	SS 6035 4087
18	Yeo (Barnstaple)	50m u/s Riversmead Bridge	SS 5958 3570
19	Spires Lake	15m u/s track br u/s Tawton Dairy	SS 6545 0090
20	Rye Stream	10m u/s footbr Bratton Fleming	SS 6320 3773
21	Rye Stream	25m u/s Loxhore Cross Bridge	SS 6120 3658
22	Venn	100m u/s rd br Landkey	SS 5915 3104
23	Venn	100m u/s Venn Bridge	SS 5853 3075
24	Langham Lake	15m u/s B3227 rd br Langridgeford	SS 5717 2235
25	Langham Lake	100m u/s Langham Bridge	SS 5795 2608
26	Hawkridge Brook	75m u/s Hawkridge Bridge	SS 5950 2537
27	Mole	50m d/s North Molton Bridge	SS 7440 2980
28	Mole	50m u/s br Park House drive	SS 7204 2653
29	Mole	5m u/s crossing point d/s fence	SS 7274 2460
30	Mole	50m u/s New Bridge	SS 7250 2257
31	Mole	40m u/s Mole br Meethe Barton	SS 6771 2294
32	Mole	75m u/s Head Barton	SS 6667 1833
33	Bray	10m d/s rd br Challacombe	SS 6930 4104
34	Bray	150m u/s Leeham Ford Bridge	SS 6785 4007
35	Bray	75m u/s rd br Brayford	SS 6880 3478
36	Bray	125m u/s Brayley Bridge	SS 6910 3043
37	Bray	40m u/s Bray Bridge	SS 6757 2562
38	Bray	50m u/s Meethe Barton Bridge	SS 6757 2303
39	Nadrid Water	150m u/s rd br Clapworthy	SS 6765 2408
40	Holewater Stream	100m u/s Linkleyham Bridge	SS 6967 3265
41	Little Silver Stream	30m u/s Odham Bridge	SS 7423 2058
42	Little Silver Stream	100m u/s Alswear rd br	SS 7232 2204
43	Crooked Oak	15m d/s br Ashmill	SS 7833 2338
44	Crooked Oak	75m d/s Yeo Barton Bridge	SS 7573 2307
45	Yeo (Molland)	125m u/s Bottreaux Mill Bridge	SS 8222 2634
46	Yeo (Molland)	20m d/s rd br Mornacott Moors	SS 7663 2634
47	Yeo (Molland)	25m u/s Bish Mill Bridge	SS 7403 2535
48	Sheepwash Stream	20m u/s bridge	SS 7902 2666

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
3012	R30C001	3	7	27	6.9	1.23	1.07	A	A	A
3013	R30C002	3	7	34	6.7	1.03	1.05	A	A	A
3048	R30C003									
3049	R30C004									
3050	R30C005									
3014	R30C006	3	7	30	6.6	0.87	1.05	A	A	A
3041	R30B001									
3042	R30B002									
3005	R30B003	3	7	38	6.6	1.15	1.06	A	A	A
3043	R30B004									
3044	R30B015									
3006	R30B014	3	7	34	6.1	1.04	0.98	A	A	A
3007	R30B005	3	7	38	6.2	1.06	1.01	A	A	A
3001	R30A002	3	7	33	6.0	1.00	0.95	A	A	A
3002	R30A006	3	7	35	5.9	0.99	0.97	A	A	A
3003	R30A001	3	7	37	6.4	1.06	1.01	A	A	A
3033	R30H001	3	7	33	6.6	1.01	1.04	A	A	A
3034	R30H006	3	7	36	6.8	1.10	1.07	A	A	A
3051	R30C009									
3072	R30H009									
3035	R30H004	3	7	36	6.9	1.10	1.08	A	A	A
3037	R30A003									
3004	R30A004	3	7	35	6.5	1.03	1.02	A	A	A
3045	R30B016									
3008	R30B006	3	7	34	6.1	0.95	0.96	A	A	A
3011	R30B012	3	7	34	6.1	0.95	0.97	A	A	A
3022	R30F001	3	7	35	6.4	1.07	1.01	A	A	A
3058	R30F002									
3059	R30F003									
3023	R30F004	3	7	30	6.4	0.92	1.01	A	A	A
3060	R30F005									
3024	R30F006	3	7	32	6.5	0.97	1.03	A	A	A
3065	R30G001									
3030	R30G011	3	7	34	6.8	1.05	1.07	A	A	A
3066	R30G002									
3036	R30G003	3	7	31	6.3	0.95	0.99	A	A	A
3067	R30G012									
3031	R30G004	3	7	33	6.7	1.00	1.06	A	A	A
3069	R30G013									
3032	R30G005	3	7	33	7.0	1.02	1.09	A	A	A
3061	R30F010									
3025	R30F011	3	7	36	6.4	1.07	1.01	A	A	A
3062	R30F023									
3026	R30F007	3	7	38	6.5	1.13	1.01	A	A	A
3027	R30F008	3	7	37	6.9	1.11	1.07	A	A	A
3063	R30F024									
3028	R30F009	3	7	30	6.7	0.89	1.06	A	A	A
3064	R30F022									

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
RIVER TAW CATCHMENT (Catchment 30) continued

Site No. on Map	Watercourse	Biological Site Name	NGR
49	North Packworthy Stre	25m d/s Barham Bridge	SS 7463 3355
50	Mully Brook	300m u/s Hansford Bridge	SS 6575 1560
51	Hollocombe Water	20m u/s bridge Woodroberts	SS 6278 1077
52	Hollocombe Water	100m u/s Bridge Reeve Bridge	SS 6608 1340
53	Little Dart River	30m u/s New Bridge	SS 7968 1492
54	Little Dart River	30m u/s Stone Mill Bridge	SS 7199 1307
55	Little Dart River	200m u/s Dart Bridge	SS 6705 1375
56	Huntacott Water	60m u/s Chumleigh road bridge	SS 6957 1387
57	Sturcombe River	Bradford Tracy	SS 8127 1624
58	Yeo (Lapford)	20m u/s Row Bridge	SS 7174 0170
59	Yeo (Lapford)	60m u/s br Down St Mary vineyard	SS 7311 0448
60	Yeo (Lapford)	25m u/s Bury Barton Bridge	SS 7373 0728
61	Yeo (Lapford)	30m d/s Nymet Bridge	SS 7142 0929
62	Dalch	75m u/s Mill Barton Bridge	SS 8143 1243
63	Dalch	10m d/s Cann's Mill Bridge	SS 7859 1053
64	Dalch	125m u/s Calves Bridge	SS 7502 0877
65	Knighty Brook	400m u/s Yeo confl	SS 7385 0647
66	Labdon Stream	50m u/s Taw confluence	SS 6788 1283
67	Croyde Stream	4m u/s footbr u/s Brookfield House garden	SS 4488 3925
68	Forda	15m u/s rd br Croyde	SS 4443 3918
69	Woolacombe Stream	10m u/s bridge	SS 4577 4357
70	Clifton Brook	30m u/s br The Old Rectory	SS 6032 4105
71	Chalfham Stream	10m d/s br Chalfham Mill School	SS 6089 3565
72	Filleigh Stream	50m u/s rd br	SS 6735 2790
73	Hakeford Stream	50m u/s rd br	SS 6133 3551
74	Kentisbury Brook	15m d/s hedgeline Patchole Farm	SS 6120 4220

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
3029	R30G010*	3	7	29	7.0	0.88	1.09	A	A	A
3009	R30B007	3	7	40	6.5	1.13	1.02	A	A	A
3046	R30B008									
3010	R30B009	3	7	33	6.6	0.94	1.04	A	A	A
3019	R30E001	3	7	39	6.5	1.14	1.02	A	A	A
3056	R30E002									
3020	R30E003	3	7	34	6.7	1.01	1.05	A	A	A
3021	R30E005	3	7	37	6.4	1.11	1.01	A	A	A
3057	R30E006									
3015	R30D004	3	7	37	5.9	1.02	0.92	A	A	A
3052	R30D012									
3016	R30D005	3	7	39	6.4	1.12	1.01	A	A	A
3053	R30D006									
3017	R30D001	3	7	30	6.0	0.89	0.94	A	A	A
3054	R30D011									
3018	R30D003	3	7	35	6.2	1.00	0.98	A	A	A
3055	R30D013									
3047										
3038										
3039	R30A028									
3040	R30A005									
3073										
3070										
3068										
3071										
3074										



RDALLEN/MAPS/N90.2 (CATCH30.DRW)

Figure 3.44 Taw Catchment (30) NRA Biological Class - 1990

3.2.35 North Devon Coastal and Lyn Catchments Catchments 31 & 32

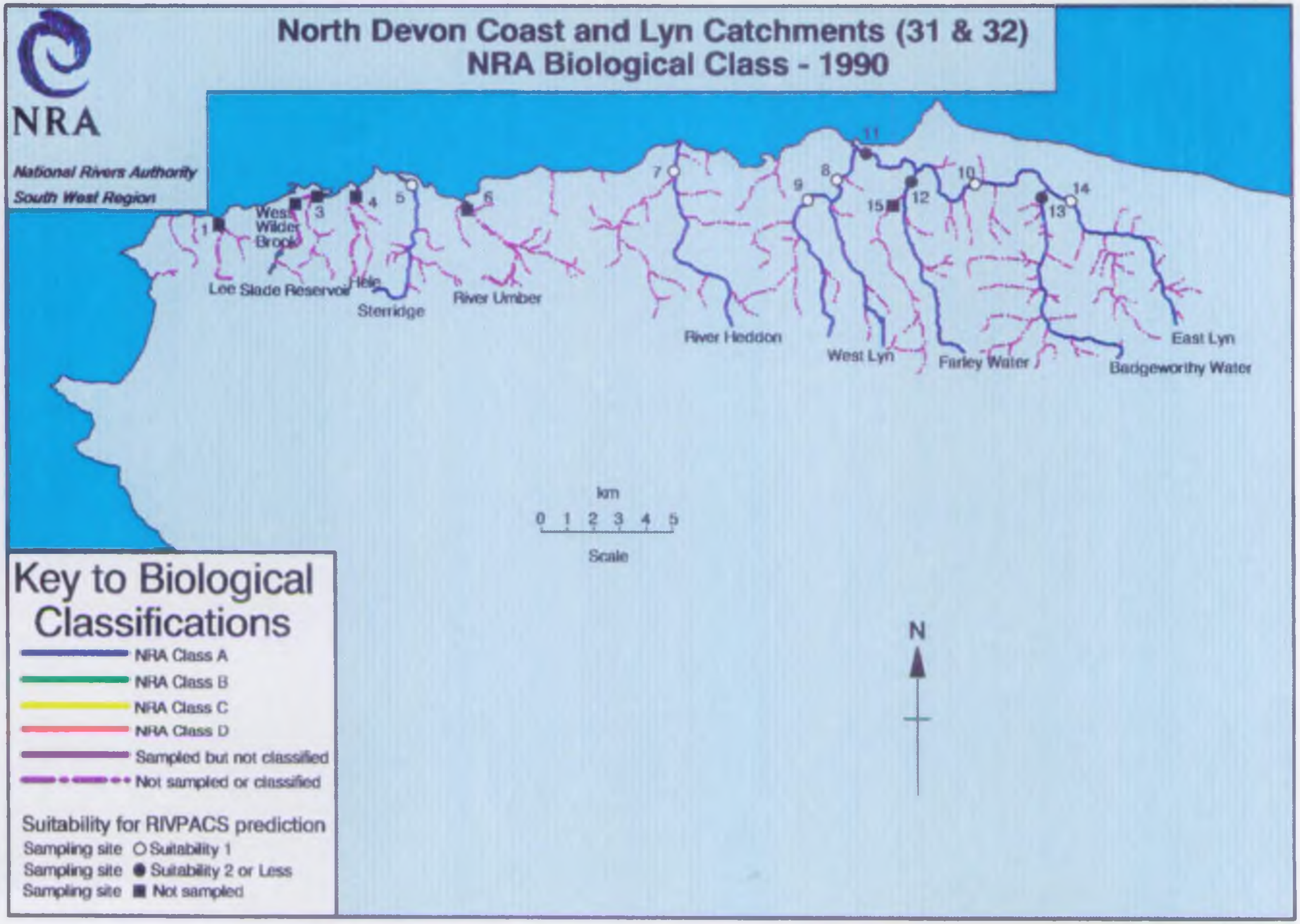
All the streams in these catchments were classed as being of good ecological quality in 1990.

BIOLOGICAL CLASSIFICATION OF RIVER QUALITY 1990 AND INDEX TO MAPS
NORTH DEVON COASTAL AND LYN CATCHMENTS (Catchments 31 & 32)

Site no. on Map	Watercourse	Biological Site Name	NGR
1	Lee Stream	immediately d/s fence Lee Bay Hotel	SS 4798 4650
2	West Wilder	u/s Langleigh Country House Hotel opp fir tree	SS 5115 4692
3	East Wilder	immediately u/s of island The Vicarage	SS 5162 4700
4	Hele Stream	24m d/s bridge Hele Mill	SS 5352 4758
5	Sterridge	Old Sawmill Inn 50m u/s rd br	SS 5585 4743
6	Umber	22m d/s bridge	SS 5798 4692
7	Heddon	Hunters Inn 150m u/s br	SS 6546 4817
8	West Lyn	Sunny Lyn Caravan Park	SS 7185 4843
9	Barbrook	100m d/s pumping stn Dean	SS 7085 4782
10	East Lyn River	opposite Hall Farm u/s Leeford	SS 7725 4825
11	East Lyn River	Lynmouth Oakleigh u/s footbridge	SS 7258 4933
12	Farley Water	100m d/s Hillsford Bridge	SS 7412 4785
13	Badgworthy Water	200m d/s Badgworthy House	SS 7930 4728
14	East Lyn (Oare Water	150m u/s Oare Bridge	SS 8030 4743
15	Hoaroak	15m u/s bridge	SS 7402 4772

Site Code	Chemical Site	No. of Samples	Seasons	N-fams	ASPT	EQI N-fams	EQI ASPT	EQI CLASS N-fams	EQI CLASS ASPT	NRA Bio Class
3103	R31A001									
3107	R31A002									
3104	R31A002									
3105	R31A003									
3101	R31A004	3	7	29	6.1	0.88	0.97	A	A	A
3106	R31A005									
3102	R31A006	3	7	28	7.0	0.86	1.09	A	A	A
3201	R32A003	3	7	29	7.0	0.90	1.10	A	A	A
3202	R32A006	3	7	31	7.3	0.96	1.14	A	A	A
3206	R32A001	3	7	30	6.6	0.93	1.03	A	A	A
3203	R32A002	3	7	30	6.8	0.92	1.06	A	A	A
3207	R32A004	3	7	30	7.1	0.93	1.11	A	A	A
3204	R32A005	3	7	33	6.5	1.02	1.02	A	A	A
3205		3	7	33	6.8	1.03	1.06	A	A	A
3208										

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



RDALLEN/MAPS/V90.2 (CATC3132.DRW)

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