

# TAW/TORRIDGE ESTUARY CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT



NRA

*National Rivers Authority  
South Western Region*

**TAW/TORRIDGE ESTUARY**  
**CATCHMENT MANAGEMENT PLAN**  
**CONSULTATION REPORT**  
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# **TAW/TORRIDGE ESTUARY CATCHMENT MANAGEMENT PLAN**

## **CONSULTATION REPORT**

### **FOREWORD**

The National Rivers Authority has, since its formation in 1989, been developing the process of catchment management.

A major initiative is the commitment to produce Catchment Management Plans setting out the Authority's vision for realising the potential of each local water environment.

An important stage in the production of the plans is a period of public consultation. The NRA is keen to draw on the expertise and interest of the communities involved.

This plan, for consultation in the south west, is one of three plans covering the Taw/Torridge Catchment. The NRA looks forward to receiving comments on the attached draft.

A final plan will then be produced with an agreed action programme for the future protection and enhancement of this important catchment.

**MRS KATHARINE BRYAN  
REGIONAL GENERAL MANAGER**

# **TAW/TORRIDGE ESTUARY CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT**

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## INTRODUCTION

### 1.1 Catchment Management Planning - Concept and Process

#### The National Rivers Authority

The National Rivers Authority (NRA) is responsible for protecting and improving the water environment in England and Wales. It has a wide range of responsibilities which include :

- Flood defence, including the protection of people and property
- Flood warning
- Effective management of water resources
- Control of pollution and improving the quality of rivers, groundwaters and coastal waters
- Maintenance and improvement of fisheries
- Promotion of water-based recreation
- Conservation of the natural water environment

To achieve its aims, the NRA must work with or seek to influence central government, local government, industry, commerce, farming, environmental organisations, riparian owners and the general public. Successful management of the water environment requires consideration of a wide range of interests and requirements which may sometimes be in conflict.

To assist in its work, the NRA is producing **Catchment Management Plans (CMPs)**. These allow the full range of water management issues to be identified and considered within a geographical area which is relevant and meaningful.

#### Scope and Process of Catchment Management Planning

The production of Catchment Management Plans within the NRA is in two stages:

- Catchment Management Consultation Report and
- Catchment Management Final Plan

## **INTRODUCTION**

The **Consultation Report** includes the following sections:

- **Uses**

The uses of the catchment are identified and discussed. Information is presented in the form of a map with one or more pages of supporting text. Uses may have impacts on the water environment and/or impose requirements on the water environment. Wherever possible or appropriate, objectives and targets are identified in terms of the requirements for water quality, water quantity and physical features.

- **Objectives**

By taking the objectives and targets relevant to the area in which each use takes place, overall objectives and targets for the catchment can be derived. At any location it is the most stringent use related target which must be achieved. In some areas targets have yet to be developed.

- **State of the Catchment**

The state of the catchment is assessed against the objectives and targets which apply. Areas where objectives are not met and issues which need to be addressed in order to meet objectives are identified.

- **Issues and Options**

The identified issues are discussed and where possible some options for their resolution are proposed. A tabulated summary of issues and options concludes this section. The organisation responsible and also some advantages and disadvantages of the suggested options are proposed.

The Catchment Management Consultation Report is intended to be a focus for consultation between the NRA and all those with interests in the catchment. Consultees may wish to :

- raise additional issues not identified in the plan
- comment on the issues and options identified in the plan
- suggest alternative options for resolving identified issues

The NRA recognises that many of the options for action identified by the Consultation Report will involve organisations or individuals other than the NRA and their views will be crucial to the preparation of the Final Plan.

## INTRODUCTION

The **Final Plan** will be produced following consultation and will have regard to the comments received and the level of resourcing available. The Final Plan will form a basis for the NRA's actions within the catchment and also provide a public document which will form a framework for the NRA's interaction with other organisations. The NRA will be seeking commitment to planned actions by others wherever possible.

### Limitations of Catchment Management Plans

The finished CMP will inevitably be subject to some limitations, the major examples of which are as follows.

Where improvement works are required to overcome catchment problems, these works will in many cases be the responsibility of other organisations or individuals. The NRA may have no powers to carry out or control the necessary actions. This could involve a Company who may see little or no financial benefit in carrying out the actions, or a Local Authority with restricted expenditure.

It will inevitably be the case that the achievement of some objectives will depend upon the Development Planning Policies of the County and District Councils. The NRA is a consultee in the development of such policy, but it is recognised that the Councils are subject to many other constraints in meeting their obligations and will not always be able to put the needs of the river catchment first.

The land use within a catchment is a major contributor to the state of that catchment, as is apparent from this report. In area terms, the largest land use is agriculture, over which, apart from restricted areas, such as Sites of Special Scientific Interest (SSSI) and Environmentally Sensitive Areas (ESA), there are few relevant controls. In cases where changing farming practice is needed to achieve catchment improvements, it will be necessary to obtain the support of the landowners concerned.

Whilst these limitations will inevitably hamper the achievement of some of the plan objectives, it is essential that these objectives be set and pursued. Alternative means of achieving them might be identified, or the very fact of their identification and promotion might bring the necessary incentive to those involved to work towards their achievement.

### **1.2 Catchment Management Plans in NRA South Western Region**

The Taw/Torridge Estuary Catchment Management Plan is one of three CMPs being produced by the NRA South Western Region for the Taw/Torridge system. The Taw/Torridge Catchment covers an area of more than 2000km<sup>2</sup> and has been divided into three for the purposes of the catchment management process. The River Torridge Catchment Management Plan Consultation Report was published in May 1993 and covers the River Torridge above the tidal limit and freshwater rivers feeding the Torridge Estuary.



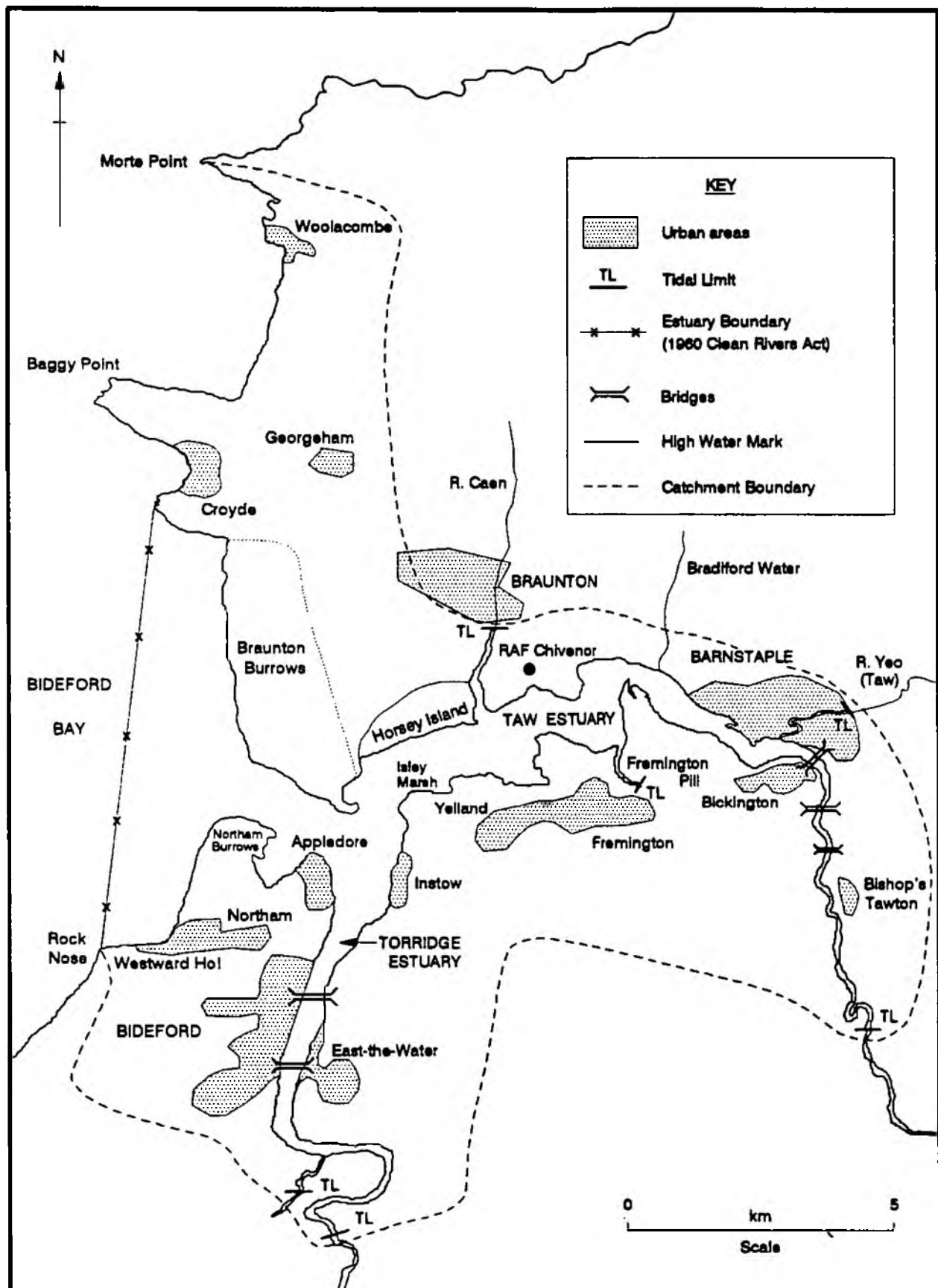
## **INTRODUCTION**

The Taw/Torridge Estuary Catchment Management Plan Consultation Report covers the estuary below the tidal limit and a short length of the adjoining coastline. The River Taw Catchment Management Plan Consultation Report, to be published later this year, will cover the River Taw above the tidal limit and the freshwater inputs to the Taw Estuary.

Dividing up the catchment in this way has enabled this CMP to be published alongside the Local Authorities' Taw Torridge Estuary Management Plan, which has been prepared for Torridge District Council (TDC), North Devon District Council (NDDC), Devon County Council (DCC), English Nature and South West Water Services Limited (SWWSL). Together, these two plans provide complementary strategies for the future management of this important estuary system.

In the future, CMPs will be published for the combined river and estuary catchments and their adjoining coastal waters.

# TAW/TORRIDGE ESTUARY CATCHMENT



## CATCHMENT DESCRIPTION

### 2.1 Introduction

This section provides a brief introduction to the Taw/Torridge Estuary Catchment and describes some of its key features, which are important to its management, for example its geology, which is important to the management of water resources, its hydrology and tidal regime which are important for the management of water quality and flood defence; and populations which are important to the management of water resources, flood defence and waste disposal in the catchment.

The Taw/Torridge Estuary Catchment has been defined as the Taw and Torridge estuaries from their tidal limits, including the tidal sections of the Rivers Caen, Barnstaple Yeo and Bideford Yeo, and the adjoining coastal area between Rock Nose and Morte Point.

The freshwater sections of the River Bideford Yeo are covered in the River Torridge Catchment Management Plan Consultation Report (Ref. 1) and those of the Rivers Caen, Barnstaple Yeo and Bradiford Water will be included in the River Taw Catchment Management Plan Consultation Report to be published later in 1993.

This Catchment Management Plan is being launched alongside the Local Authorities' Taw Torridge Estuary Management Plan (Ref. 2), which provides a wealth of detailed information about estuary features, activities and uses, and provides a management strategy for future development. The NRA's Plan covers a slightly larger geographical area, and considers the management of the estuary and adjoining coastline with particular emphasis on the duties and responsibilities of the NRA.

#### Key Statistics

<b>Taw/Torridge Estuary Catchment Area</b>		142 km <sup>2</sup>
<b>Coastline Length</b>	Rock Nose to Morte Point	27.5 km
<b>Main Towns &amp; Populations (1991 Census)</b>	Barnstaple Bideford Northam	20,767 13,006 9,600
<b>Long Term Annual Average Rainfall</b>	Barnstaple Bideford Bishop's Tawton	889mm 912mm 920mm

## **CATCHMENT DESCRIPTION**

### **2.1 Introduction**

#### **Key Statistics**

##### **Principal River Catchments**

	<b>Catchment Area (km<sup>2</sup>)</b>	<b>Q95 (m<sup>3</sup>/s)</b>	<b>ADF (m<sup>3</sup>/s)</b>	<b>Tidal Limit (*)</b>
River Torridge	787	1.31	16.7	SS 5695 2825
River Taw	914	1.81	18.6	SS 4750 2100

\*Tidal Limits as defined in Section 192 of the Water Resources Act, 1991

## CATCHMENT DESCRIPTION

### 2.2 General Features

The Taw/Torridge Estuary Catchment is situated on the north coast of Devon along the Bristol Channel. The major freshwater catchments of the Rivers Taw and Torridge drain into the Taw/Torridge Estuary, which together with the smaller river catchments including those of the River (Barnstaple) Yeo and (Bideford) Yeo, and the River Caen drain an area of approximately 1930km<sup>2</sup> of land in north, mid and west Devon and west Somerset, including substantial areas of Dartmoor and Exmoor.

The tidal limit of the Taw Estuary is at New Bridge. The upper reaches of the estuary, between New Bridge and Barnstaple, occupy a narrow winding channel with a typically muddy substrate. The middle and lower reaches are broad, although at low tide the water occupies narrow channels, bordered by intertidal mud and sandbanks. The principal tributaries are on the north bank in the middle reaches.

In the Torridge Estuary, the tidal limit is just downstream of Beam Weir. The upper reaches are narrow, winding and muddy, and receive the principal tributary. Although it widens just south of Bideford, the Torridge Estuary is much narrower than that of the Taw. It also drains through a series of narrow braided channels at low tide, which exposes large areas of mud banks, salt marsh and sandbanks.

The joint estuary is short and broad, having extensive sand and gravel banks. A substantial sand bar across much of the mouth is exposed at low water.

As well as Barnstaple and Bideford, there are many smaller settlements within the catchment.

The large intertidal areas in the Taw/Torridge Estuary provide extremely valuable habitats for birdlife and invertebrate species. The estuary was renotified as a Site of Special Scientific Interest (SSSI) in 1988. In addition there is a Royal Society for the Protection of Birds (RSPB) Reserve at Isley Marsh.

South of the estuary mouth is Northam Burrows with its natural Pebble Ridge and sandy beach, which has been notified as a SSSI and an Area of Outstanding Natural Beauty (AONB). North of the estuary, the Braunton Burrows, an extensive area of sand dunes, have been identified as a National Nature Reserve (NNR) and a United Nations Educational, Scientific and Cultural Organisation (UNESCO) Biosphere Reserve. Further north, the coastline is a succession of rocky outcrops (Saunton Down, Baggy Point and Morte Point) and sandy areas (Croyde Bay and Woolacombe Sands). There are small coastal settlements at Westward Ho!, Croyde and Woolacombe.

## **CATCHMENT DESCRIPTION**

### **2.2 General Features**

The climate of the catchment is typical of Atlantic Britain, with a limited temperature range and high winter rainfall. The annual average rainfall is approximately 900 mm per annum. The growing season (when temperatures are above 6°C) lasts approximately 300 days.

The catchment used to be an important shipping centre, however natural accretion of sediments in the estuary (Ref.3), particularly the Taw, over the last century has led to a decline in this industry. Tourism has now become a significant element in the local economy with many people visiting Appledore, Instow and Bideford. The number of day visitors in 1991 to selected tourist attractions in the catchment was approximately 850,000 (Ref. 4). The Tarka Trail is an important recreation facility and has increased access to the estuary. In addition the seaside towns of Westward Ho!, Croyde and Woolacombe are popular with summer visitors, particularly because of their sandy beaches. The bathing waters at Woolacombe (Putsborough) are one of only eight bathing waters in the south west to have always achieved the strictest guideline standards of the European Community (EC) Bathing Water Directive (76/160/EEC).

Pollution from sewage in the catchment is perceived as a major problem, causing both water quality problems in the Taw/Torridge Estuary, aesthetic pollution at Croyde, as well as causing problems for the future commercial exploitation of shellfish in the catchment since the introduction of the EC Shellfish Hygiene Directive (91/492/EEC). The catchment is to be the subject of a major new sewage disposal scheme, to be carried out as part of the South West Water Services Limited (SWWSL) Capital Programme, which should improve water quality, in particular the bacterial and ammonia levels and aesthetic condition of the catchment. Other potential sources of pollution to the estuary include agricultural run-off, Northam waste disposal site, effluent discharge from RAF Chivenor, industrial discharges, sand and gravel extraction, and pollution from the freshwater rivers in the catchment.

Flood defences are a particular issue for this estuary catchment with the completion of a comprehensive flood defence scheme held up pending a public inquiry. The majority of future works will relate to maintenance of existing defences.

Road links to the catchment are still relatively poor, although recent improvements to the A39, North Devon Link Road and the A361, have increased access. This preserves the special character of this catchment. Future exploitation of the catchment, particularly with the improvements that are expected in the environment will, in part, depend on the provision of infrastructure to access this unique area.

## **CATCHMENT DESCRIPTION**

### **2.3 Hydrology and Tidal Regime**

Water flow in estuarine systems is generally complex and an understanding is essential when managing the water environment. This section describes the key aspects of flow in the Taw/Torridge Estuary Catchment.

#### Hydrology

The salinity regime in the upper Taw/Torridge Estuary is dependent on the quantity of freshwater entering the estuary at the tidal limits of the rivers feeding the estuaries. The theoretical average daily flow (ADF), Q95 flow (the flow that on average is equalled or exceeded for 95% of the time) and catchment areas have been calculated for principal rivers draining into the Taw/Torridge Estuary and are shown in the table below:

#### **Principal River Catchments draining into the Taw/Torridge Estuary**

##### Theoretical River Flow

	<b>Catchment Area (km<sup>2</sup>)</b>	<b>Q95 (m<sup>3</sup>/s)</b>	<b>ADF (m<sup>3</sup>/s)</b>
River Torridge	787	1.31	16.7
River (Bideford) Yeo	58.7	0.102	1.29
River Taw	914	1.81	18.6
River (Barnstaple) Yeo	86.7	0.241	2.44
River Caen	39.5	0.075	0.715
River Venn	39.2	0.057	0.709

For all the above rivers, the Q95 represents a low percentage of the ADF and reflects the 'flashy' nature of these river catchments, that is they respond to rainfall with rapid increases and decreases in river flow. In addition, periods of dry weather, especially during droughts, can cause long periods of low river flows.

#### Tidal Regime

Most of the Taw/Torridge Estuary and the adjoining coastal waters of the Bristol Channel are macrotidal, experiencing tidal ranges of more than four metres (m), as shown in the table over:

## CATCHMENT DESCRIPTION

### 2.3 Hydrology and Tidal Regime

#### Tidal Ranges in the Taw/Torridge Estuary (Ref. 5)

	Spring Tide			Neap Tides		
	MHW	MLW	Range	MHW	MLW	Range
	(m AOD)	(m)	(m)	(m AOD)	(m)	(m)
Appledore	4.32	-2.98	7.3	2.02	-1.58	3.6
Bideford	4.52	-1.38	5.9	2.22	-1.38	3.6
Barnstaple	4.60	0.90	3.7	2.00	0.90	2.9
Ilfracombe*	4.40	-4.10	8.5	2.10	-1.80	3.9

MHW: Mean High Water      MLW: Mean Low Water

\* Nearest coastal port to catchment with tidal ranges information

Within the Taw/Torridge Estuary, the tides are typified by extended periods of ebb tide followed by short but vigorous flood tides. Above Barnstaple and Bideford, the Taw and Torridge estuaries, respectively, are semi-riverine, that is they experience tides while being predominantly freshwater with surface salinity typically below 5 practical salinity units (psu) for most of the tidal cycle. The extent of this low salinity area within the estuary is sensitive to river flow, with high river flows causing freshwater to move further down the estuary.

Further down the two estuaries, particularly following sudden increases in river flow (Ref. 6), the water can become stratified, that is lower salinity water of a lower density overlying higher salinity water with limited vertical mixing of the water bodies. However, these features are not permanent, in part due to the very shallow channels present at low water. By contrast to the Taw and Torridge estuaries, the combined estuary is dominated by the influx of coastal water and is vertically well-mixed showing no significant differences in salinity through the water column.

In the Taw, currents in excess of 1.5m/s (3 knots) on Spring tides, and in excess of 1.0m/s (2 knots) on Neap Tides have been measured. In the Torridge, maximum currents of approximately 1.0m/s on Spring and 0.5m/s on Neap tides have been measured. In the combined estuary maximum currents in excess of 1.7 m/s on Spring tides and approximately 1.0 m/s on Neap tides have been recorded (Ref. 6).

The coastal waters of the catchment experience tides typical of this part of the Bristol Channel. In Bideford Bay, mean current speeds of 0.19m/s and maximum of 0.56 m/s have been measured, with flows in a north-easterly direction from the Atlantic on flood tides, and in the approximately opposite direction on ebb tides. Off Croyde, the current direction is similar to Bideford Bay, with a measured mean current speed of 0.66 m/s and a maximum speed of 1.46 m/s (Ref. 6).



## CATCHMENT DESCRIPTION

### 2.4 Geology

The Taw/Torridge Estuary Catchment lies across the Upper Carboniferous Bideford and Crackington Formations to the south; and the Lower Carboniferous Pilton Shales, Baggy Sandstones, and the older, more resistant Devonian slates and sandstones to the north.

Most of the catchment is underlain by rocks of low permeability and porosity, including Carboniferous rocks. In these rocks groundwater flow is restricted to weathered zones or rock fractures yielding relatively small amounts of water to boreholes. Groundwater flow through the fracture networks in such rocks can be rapid, and any pollutants can travel over moderate distances in relatively short periods, weeks or months in some cases.

Small areas of strata have sufficient porosity and permeability to support significant groundwater abstractions of soft, acidic water, notably the thick terrace deposits of gravel, sand and silt which overlay granite along the Torridge river valley, and wind-blown sand near Westward Ho!. Some use of small-scale abstractions from boreholes, wells and springs for mainly agricultural and private water supply is made in the catchment, however, the size of these abstractions is limited by the poor transmissivity of groundwater supplies. Information on the use of groundwater to the south of the Taw Estuary is limited because much of the area is part of an exemption zone within which most groundwater abstractions are exempt from licensing.

The surface geology adjacent to the estuaries is mostly of Pleistocene or recent origin. Wind-blown sand is found in the Pebble Ridge at Northam Burrows, and the dunes of Braunton Burrows. The blown sand at Braunton Burrows is being reclaimed through the planting of Marram grass. At Westward Ho! alluvium and submerged forests are exposed. Boulder clay and silt, which is damp and acidic, predominates through much of the catchment to the south of the Taw Estuary. North of Barnstaple and the Taw Estuary the soil is predominantly sandy or peaty.

## CATCHMENT DESCRIPTION

### 2.5 Population

The most accurate assessment of the population of the Taw/Torridge Estuary Catchment is available from the 1991 Census, which gives a total population of 67,615, and a population density of 476/km<sup>2</sup>. The main urban centres within the catchment are Barnstaple and Bideford, which together contain half of the population of the catchment. The following table gives a break down of the population for the catchment:

#### Population Statistics \*

	<u>1961</u>	<u>1981</u>	<u>1991</u>	<u>% Change</u> <u>1981-1991</u>
Abbotsham	287	415	372	11%
Ashford	192	299	277	8%
Barnstaple	15,944	18,059	20,767	15%
Bideford	10,498	12,210	13,006	6%
Bishop's Tawton	1,056	1,235	1,199	3%
Braunton	4,303	8,675	7,558	15%
Fremington	4,409	6,503	7,394	14%
Georgeham	1,018	1,360	1,498	10%
Heanton Punchardon	931	2,169	2,230	3%
Instow	782	800	828	3%
Landcross	71	69	75	8%
Northam	6,572	8,715	9,600	10%
Tawstock	1,285	2,120	2,119	0%
Weare Giffard	275	293	334	14%
Westleigh	380	324	358	10%
TOTAL	<u>48,003</u>	<u>63,246</u>	<u>67,615</u>	<u>7%</u>

Over the last ten years there have been increases in populations in all parts of the catchment, except Abbotsham, Ashford, Bishop's Tawton, Braunton and Tawstock. In addition to these increases, certain areas have major, seasonal increases in populations associated with tourism, notably Northam and Georgeham which have tourist bed spaces of 23,800 and 11,790 respectively (Ref. 4).

\* Population statistics were obtained from Devon County Council

## **CATCHMENT USES**

### **3.1 Introduction**

The purpose of this section is to describe current and future uses of the natural water environment within the catchment. (Current uses include activities planned to be completed in the short term. Future uses include potential, possible and likely uses). For each of the catchment uses the following information is provided:

(i) page (s) of text divided into the following sections:

**General** - this describes some of the general characteristics of the use, the scope of the use heading and any key relationships the use may have with other uses.

**Catchment Perspective** - this describes how the use manifests itself with the River Taw/Torridge Estuary Catchment. Two sub-headings are provided: current use and future use.

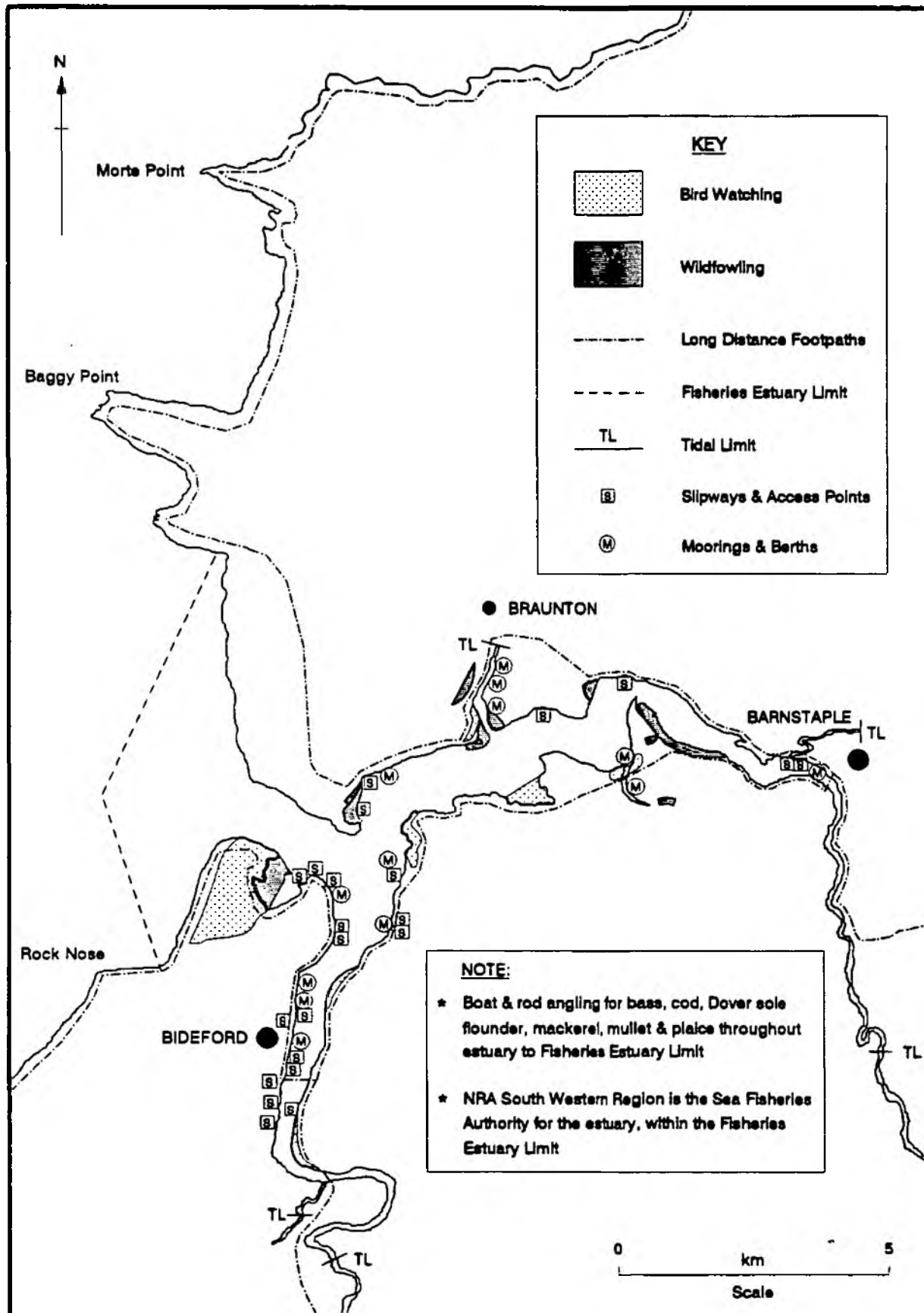
**Objectives** - this contains draft objectives for the conservation and enhancement of the use and/or the water environment. The objectives are broadly based and could form the basis for a future catchment strategy.

(ii) where appropriate, a synoptic map designed to enhance the information in the text and highlight the geographical context of the use.

In most cases the description of the use is a summary of detailed technical studies produced by the NRA and/or other organisations. Support documents may therefore be available for those interested in learning more about the catchment.

# TAW/TORRIDGE ESTUARY CATCHMENT

## AMENITY AND RECREATION



## **CATCHMENT USES**

### **3.2 Amenity and Recreation**

#### **General**

This use covers all aspects of active and passive recreation where people are close to but are not in intimate contact with water. Examples of this will include beach based family activities, walking, angling, bird watching and boating. The principle concerns are general aesthetic acceptability of water features, access, the provision of suitable facilities, and conflicts with other users.

The Recreation and Amenity duties of the NRA are set out in Section 16 of the Water Resources Act 1991. The Act generally empowers the NRA to conserve and enhance the natural beauty of inland and coastal waters and associated land, as well as the use of such waters and land for recreational purposes.

#### **Catchment Perspective**

##### Current Use

The Taw/Torridge Estuary provides a recreational area for a wide range of activities for both local people and tourists. Beaches at Westward Ho!, Instow, Saunton and Broad Sands are the most popular with Braunton and Northam Burrows providing important recreational areas. There is a well developed system of public footpaths bridleways and cycling routes throughout the study area. The Tarka Trail and the North Devon Coastal Path are the best known and most widely used by visitors. These provide reasonable access to much of the estuary and coastal surrounds for bird watchers. Angling takes place throughout the estuary and coastal areas both from the shore and from boats. Angling, like walking and bird watching, tends to be a predominantly casual use. Boating incorporates a variety of leisure activities and is largely concentrated into the area between Appledore, Crow Point and Instow. About half the craft using the estuary are on moorings located at seven main sites. The remaining boats gain access to the water by using the twenty public and a small number of private slipways.

Use of the Taw/Torridge Estuary for recreation has limited points of conflict. These tend to be between the use of powered craft (jet skis, power boats) and other more passive recreational use. Erosion of fragile habitats occurs at Northam and Braunton Burrows due to heavy public pressure and is coupled with disturbance to wildlife and associated activities.

##### Future Use

It is probable that as a result of the improved road routes to North Devon and associated developments, the Taw/Torridge Estuary will face increasing pressure as a recreational resource. The area's potential is limited by the physical nature of the estuary and the high conservation value.

## **CATCHMENT USES**

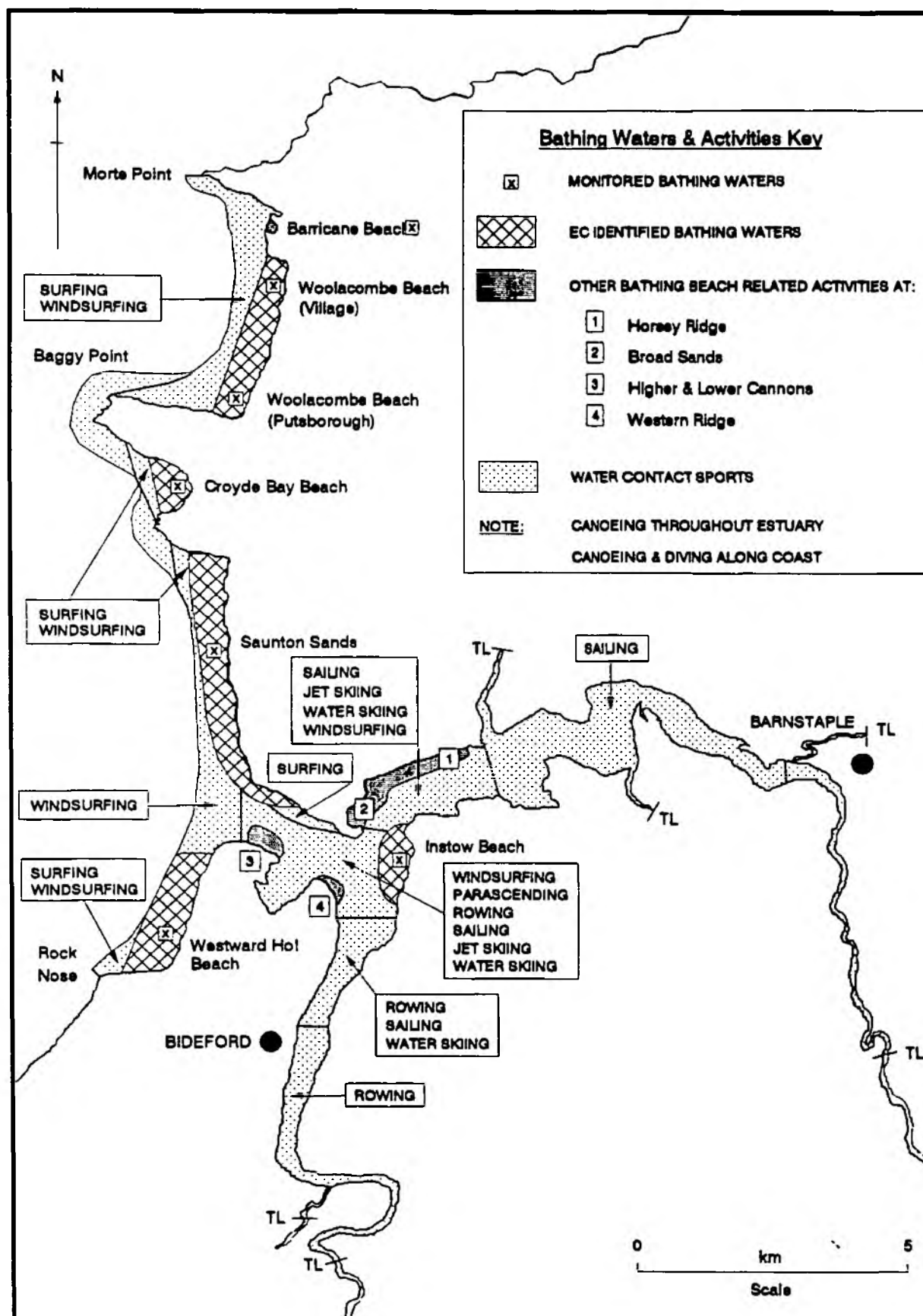
### **3.2 Amenity and Recreation**

#### **Objectives**

1. To maintain and where possible improve water quality, estuary topography and access, to allow for suitable recreational use.
2. To incorporate recreational criteria into all NRA actions and consenting procedures to further recreational use and protect public access.
3. To seek to influence other bodies to ensure recreational activities are promoted in a suitable manner.
3. To monitor recreational use and develop a recreational data base for present and future users of the estuary.

# TAW/TORRIDGE ESTUARY CATCHMENT

## WATER SPORTS



## **CATCHMENT USES**

### **3.3 Water Sports**

#### **General**

This use relates specifically to water sports activities which may involve the total or partial immersion of participants in the water. The principal concerns are acceptable water quality to protect the public health of those users, general aesthetic acceptability throughout the area, and the amenity value of the area.

The proposals for a new system of use related water quality standards, Statutory Water Quality Objectives (SWQOs) recognises the need to set standards related to health risks, and currently research is being funded by several organisations, including the NRA, DoE, and Welsh Office to establish appropriate risk-related standards to protect these uses.

#### **Catchment Perspective**

##### Current Use

The whole of the Taw/Torridge Estuary Catchment, is a popular area for water sports. The bathing waters at Woolacombe, Croyde Bay, Saunton Sands, Instow Beach and Westward Ho! have been designated as EC bathing waters under the EC Directive 'concerning the quality of bathing water' (76/160/EEC) (see page 43). Other sites including Barricane Beach, Broad Sands, Horsey Ridge, Western Ridge and the Higher and Lower Cannons are also popular for bathing and other beach activities. Recently there has been a decline in the popularity of Instow Beach because of water quality and aesthetic quality problems. The bathing waters have failed to comply with EC standards every year since 1986, except 1989.

Other water sports include water skiing, jet skiing, surfing, windsurfing, sailing, canoeing, rowing and parascending and are summarised on the map. Most of the sports are seasonal, but surfing and windsurfing occur all year round.

A detailed description of the water sports carried out in the estuary is available in the Local Authorities' Estuary Management Plan (Ref. 2).

##### Future Use

It is anticipated that there will be increases in certain water sport activities, notably jet skiing, and to a lesser extent sailing and water skiing. However, the natural physical form of the estuary and its tidal regime, and the current limited access to the estuary is likely to place some constraints on future development. In particular bathing and beach-related activities around Instow, in particular, are expected to increase as a result of the improvements to water quality, particularly to bacterial quality and aesthetic quality that should be brought about by the proposals for sewage improvement schemes in the estuary.





## CATCHMENT USES

### 3.3 Water Sports

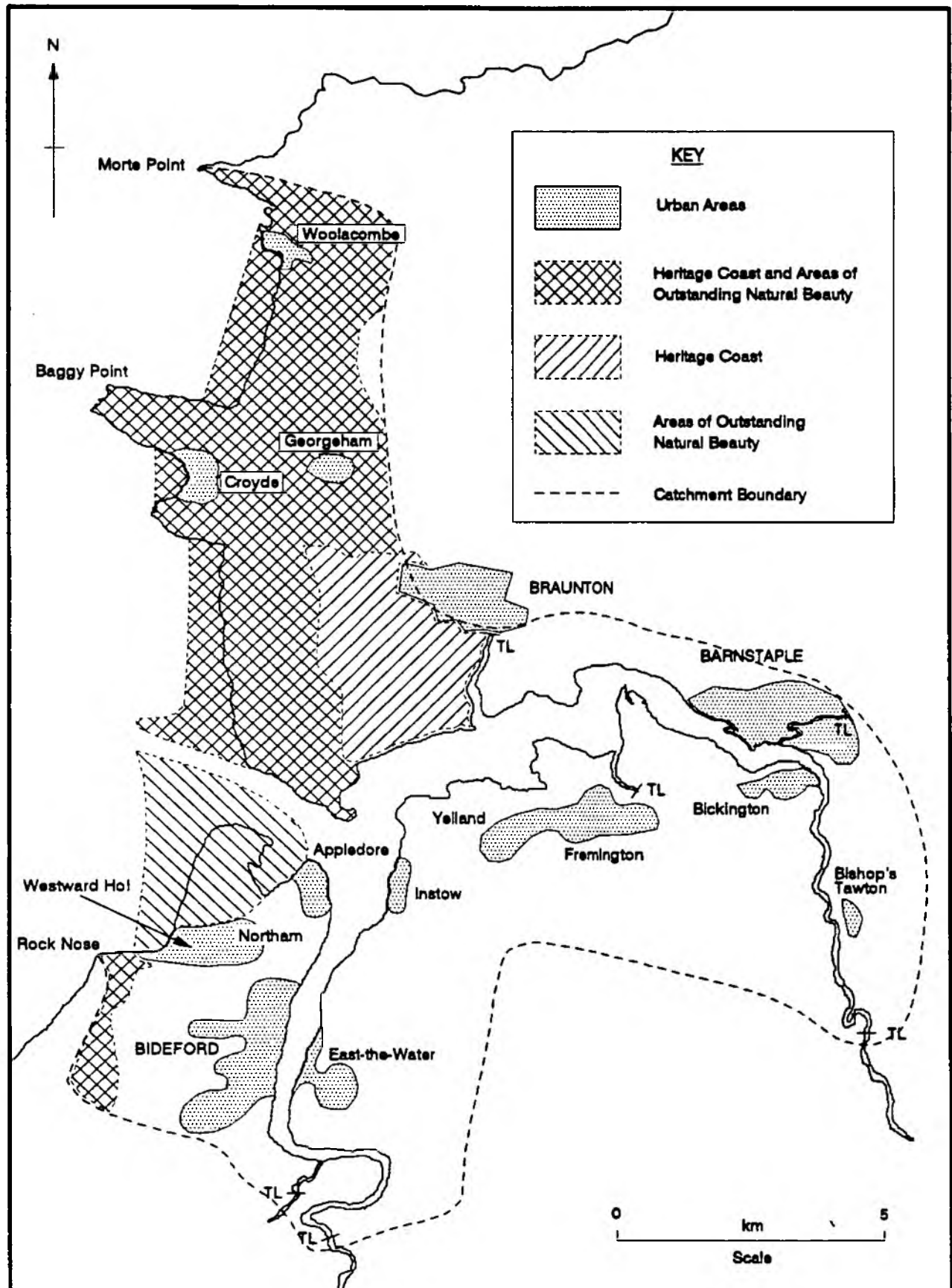
Other factors affecting future use are the management strategy to be adopted by the Local Authorities whose Estuary Management Plan (Ref. 2) identifies options for managing the recreational resources, including water sports in the estuary. The management option selected could cause anything from limited increases to water sports, to unlimited increases in certain sports (within the physical constraints of the estuary). Careful management of these resources are needed to ensure that such development does not compromise other uses on the estuary, for example fisheries. By using its own statutory powers and by influencing others, the NRA will seek to maintain a balance so that other uses are not compromised.

#### Objectives

1. To maintain and where necessary, improve water quality and physical features so as to:
  - (a) protect those involved in water sports;
  - (b) provide suitable conditions for the activity concerned.
2. To provide safe and easy access to the estuary corridor, in a way which does not impinge unreasonably on other uses.
3. To seek to influence other bodies to ensure that water sport activities do not compromise other uses.

# TAW/TORRIDGE ESTUARY CATCHMENT

## SPECIAL CONSERVATION AREAS (1)



## CATCHMENT USES

### 3.4 Ecology/Special Conservation Areas

#### General

This use relates to the protection of all aquatic flora, fauna and dependent organisms. Dependent organisms are plants and animals which rely, at some stage of their life cycle, on the aquatic environment or associated land.

The NRA's conservation duties are set out in Sections 8 and 9 of the Water Resources Act 1991. This requires the NRA, whilst carrying out its own functions or dealing with proposals by others, to further the conservation of flora, fauna, geological and physiographical features of special interest and the enhancement of natural beauty.

This requires the NRA to influence the management of the environment, either directly through its own functions or indirectly through advising others, to provide the correct aquatic conditions to maintain a balanced ecology.

An additional duty exists where the site use is recognised by a formal designation. These include National and Local Nature Reserves, Sites of Special Scientific Interest (SSSI), National Parks, Areas of Outstanding Natural Beauty (AONB), Sites of Historical or Architectural Interest and scheduled ancient monuments. Within these areas the act imposes notification and consultation procedures and requires the NRA to take special consideration of their requirements when carrying out direct actions or authorising the actions of others.

#### Catchment Perspective

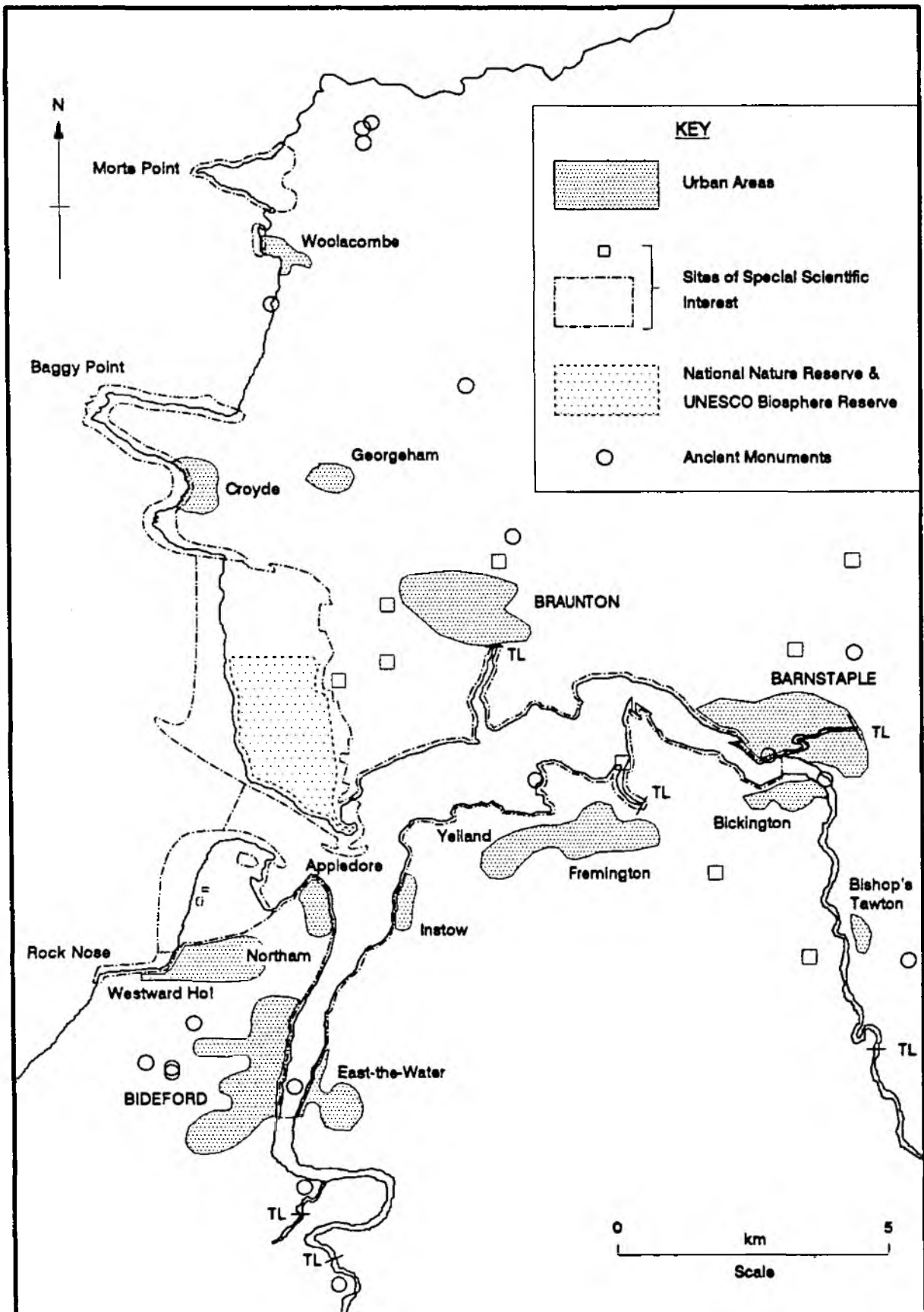
##### Current Use

The Taw/Torridge Estuary and much of the associated land is of special ecological interest. The majority of the study area is designated as a SSSI and lies within a County Nature Conservation Zone, the intertidal area is proposed for designation as a Special Protection Area under EC legislation which indicates its international importance for wildlife conservation. The nature conservation status of the estuary results largely from its use by wintering and migratory waders and wildfowl. The estuary supports greater than 1% of the national number of curlew, lapwing and golden plover and is notable for the large numbers of greenshank, oystercatchers, dunlin, wigeon, teal and brent geese. The range of maritime habitats within and around the estuary provides additional interest. Saltmarsh, sand dunes, brackish and grazing marshes are all well represented, and many are designated as conservation areas and managed with conservation objectives.

The marine benthic ecology of the estuary is of low diversity, abundance and is dominated by annelid worms, this reflects the dynamic nature of the estuary. Diversity and abundance increases in the upper estuary and creeks where more organically rich silts and a less disturbed environment exists.

# TAW/TORRIDGE ESTUARY CATCHMENT

## SPECIAL CONSERVATION AREAS (2)



## CATCHMENT USES

### 3.4 Ecology/Special Conservation Areas

The landscape of the area is complex both as a result of the size of the study area and diversity of the landscape characters. The Local Authorities' Estuary Management Plan (Ref. 2) recognised nine principle landscapes with significant variation within each category. Landscape designations are limited to the coastal fringe west of the River Caen and Appledore where AONB, Heritage Coast and Coastal Preservation Area status exists.

The estuary and surrounds have retained a number of features of archaeological and historic interest, the most significant of which are shown in Map 2. Bideford Bridge is one of a number of notable Scheduled Ancient Monuments. The drainage works and flood defence structures associated with Braunton Marsh and Horsey Island also have historic value. Braunton Great Field, which is one of the two surviving examples of a medieval open field in Britain, is of national interest and is shortly to be designated a Conservation Area by North Devon District Council. Other conservation areas already exist within a number of the historic towns situated around the estuary.

#### Future Use

The trend for increasing use of natural resources and the development pressure which follows new road routes is likely to lead to further pressures on the ecology and special conservation features within and around the estuary.

#### Objective

1. To maintain and where appropriate improve, water quality, water resources and catchment features, so as to sustain an ecology appropriate to an estuary in such a geographical situation and to safeguard the identified special conservation interests.

**N**

Morta Point

Baggy Point

BRAUNTON

BARNSTAPLE

Rock Nose

BIDEFORD

**KEY** (Information as of 9 July 1993)

- Valley gravel areas where groundwater licensing applies
- Area exempt from groundwater licensing
- - - Boundary of Exemption Area
- Estuary Bar Mark

**Licensed Surface Water Abstraction Usage:**

- ◇ Spray Irrigation
- Private Water Supply & Agriculture

**Licensed Groundwater Abstraction Usage:**

- ◆ Spray Irrigation
- Industrial Processing
- Private Water Supply
- ▲ Agriculture

(Site Ref No. is not related to volume abstracted)

736

754

338

503  
505  
506

507

504

080

212

211

213

643

681

360

361

684

481

514

470

489

202

661

732

715

660

TL

518

427

428

426

588

609

411

425

347

390

519

TL

TL

TL

TL

Scale 0 km 5

## CATCHMENT USES

### 3.5 Water Abstraction and Water Supply

#### General

This use deals with surface and groundwater abstractions for potable (i.e. public and private water supplies) and non-potable (e.g. industrial, agricultural, recreational) supplies. Since the Water Resources Acts of 1963 and 1991 most abstractions required to be licensed so that they do not derogate either existing sources or the natural water environment. The NRA must seek to take all reasonable steps to ensure that surface water and groundwater quantity and quality are maintained at an appropriate level for the use which is to be made of them.

Surface water abstractions on or above the tidal limits i.e. on freshwater rivers are identified in the River Torridge Catchment Management Plan Consultation Report (Ref. 1) and the River Taw Catchment Management Plan Consultation Report (to be published later this year). Groundwater abstractions within urban areas associated with the Taw/Torridge Estuary Catchment (e.g. in Braunton) are included in this plan.

#### Catchment Perspective

##### Current Use

There are two surface water abstraction licences in the catchment, authorising abstraction of up to a maximum of 42 m<sup>3</sup>/day, for private water supply, spray irrigation and agricultural use. On the main estuary and below the estuary bar marks, surface water abstractions are outside NRA licensing control.

There are thirty-six groundwater abstractions licensed to abstract up to a total of 782 m<sup>3</sup>/d. The largest licensed use for groundwater in the catchment is for five licences for Private Water Supply (309 m<sup>3</sup>/d); there are two licences for spray irrigation (291 m<sup>3</sup>/d); twenty-seven licences for agricultural use (171 m<sup>3</sup>/d) and two licences for industrial processing (73 m<sup>3</sup>/d). The area to the south of the Taw Estuary, excluding the indicated river gravel areas, is exempted from groundwater licensing under the Devon River Authority (Exception from Control) Order 1970.

##### Future Use

The use of small-scale groundwater abstractions for private supply will probably continue in rural areas with low population densities where there may be difficulties in supplying mains water at reasonable costs. Little growth is expected in the number and total volume of agricultural and industrial abstractions as increased requirements are likely to be met from mains water.

Spray irrigation has been identified in the regional strategy as a growing use both for agricultural purposes and leisure activities, such as the watering of golf courses.



## **CATCHMENT USES**

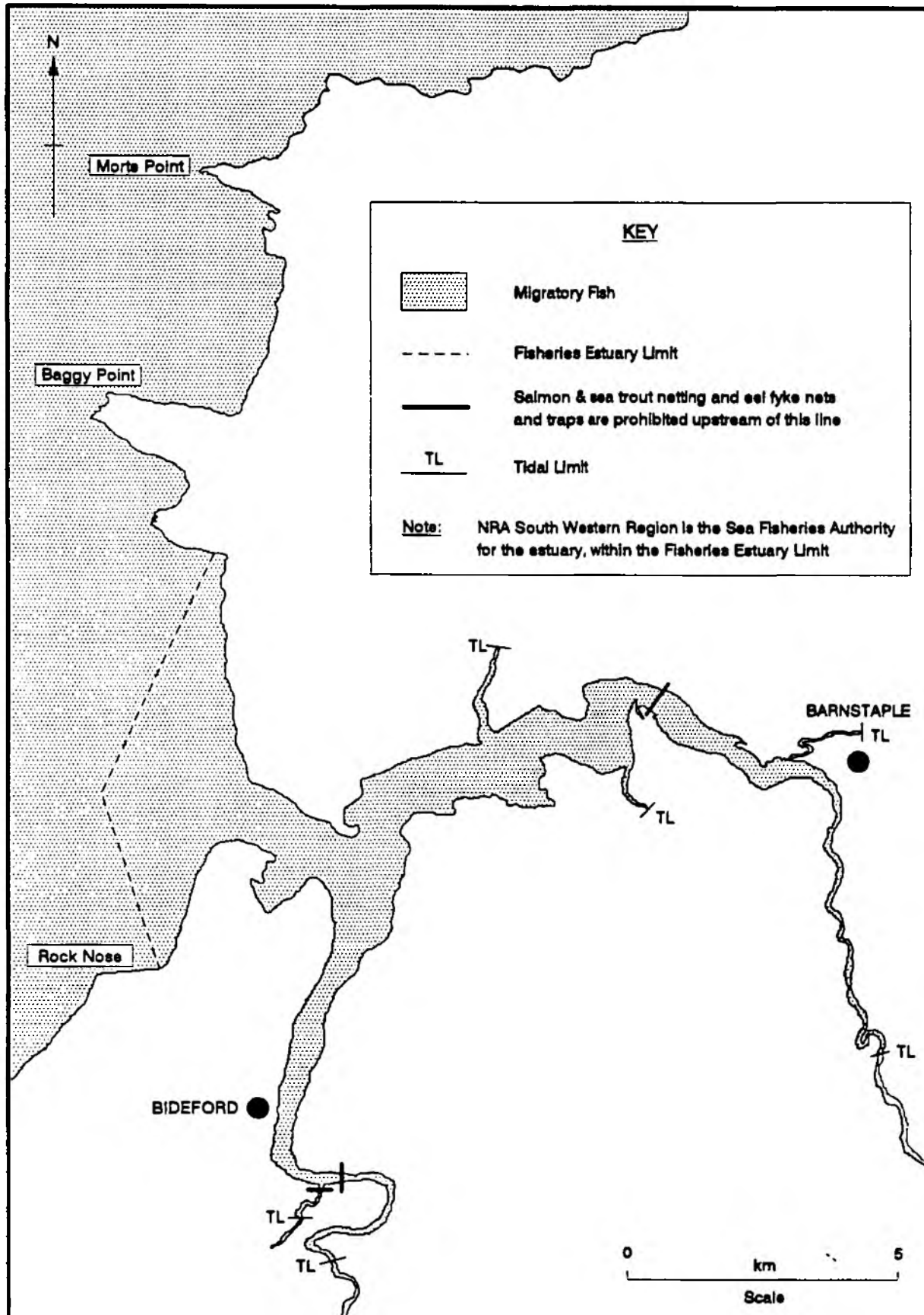
### **3.5 Water Abstraction and Water Supply**

#### **Objectives**

- 1. To safeguard potable, industrial and agricultural abstractions with respect to water quantity and quality, have regard to public health, avoid damage to crops and protect the well-being of animals.**
- 2. To manage water resources to achieve a balance between the needs of abstractors and the natural environment so that the best use of water resources is made.**

# TAW/TORRIDGE ESTUARY CATCHMENT

## MIGRATORY FISHERY



## CATCHMENT USES

### 3.6 Migratory Fishery

#### General

This use relates specifically to the maintenance of water quality in the estuary to ensure successful migration of populations of salmonid species and eels both to and from the freshwater environment. The wider community of organisms, including the salmonids' food organisms, are already covered under the use 'Ecology'.

#### Catchment Perspective

##### Current Use

The largest run of salmon and sea trout occurs in the estuary from May to September, especially during periods of spates and spring tides, although fish are present all year round. They have a tendency to remain in the estuary during periods of low river flow.

Elvers spend their first year in the estuary and move into the rivers during March and August of their second year, although many may remain to grow to maturity in the estuary. Migration appears to be dependent on water temperature. Eels will then spend several years in the river, feeding and growing, before migrating back to the sea to spawn.

##### Future Use

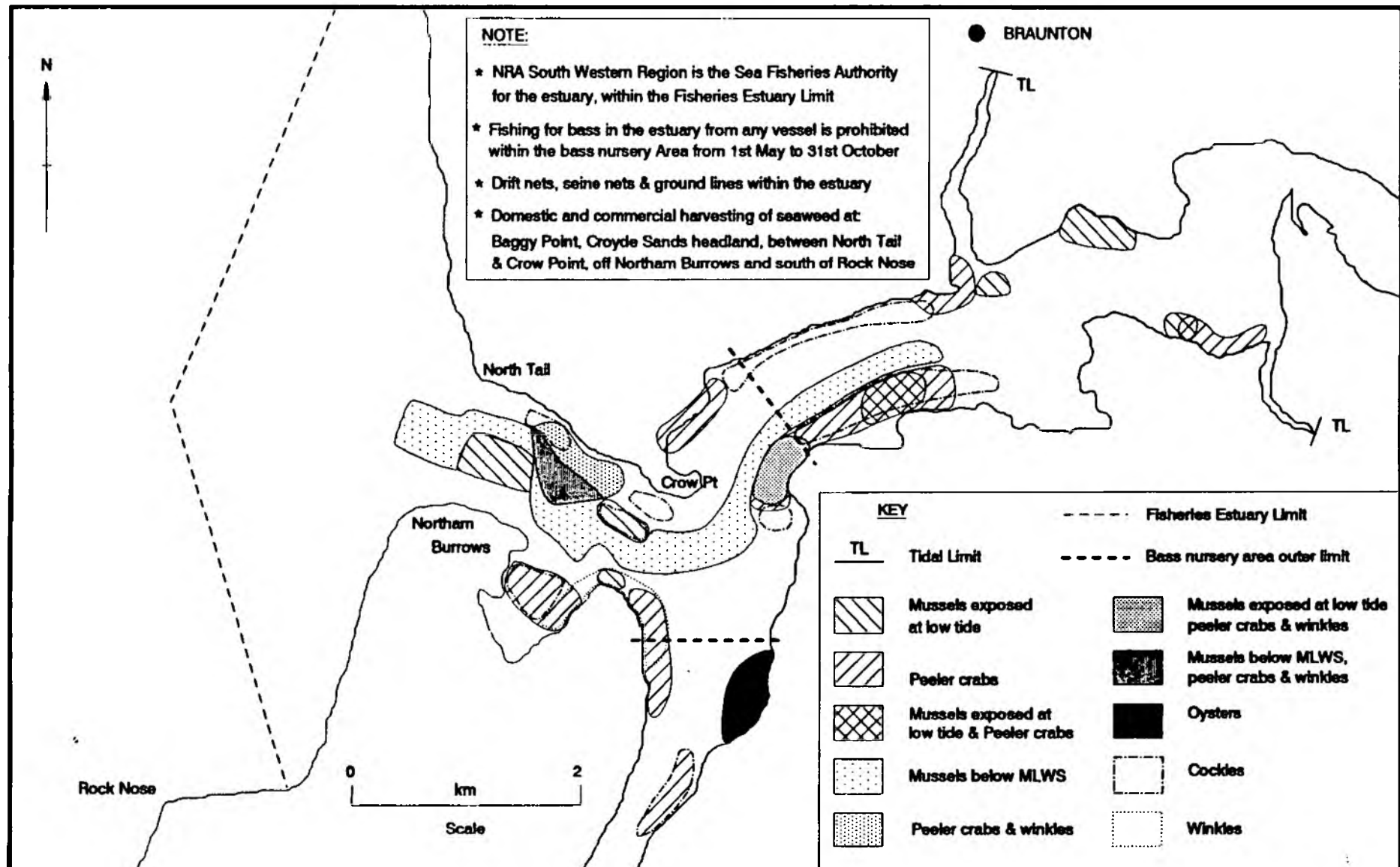
Improvements in water quality will secure the use of the estuary as a corridor for migratory fish, thus ensuring the continued recovery of salmonid stocks in the rivers and allowing sustainable cropping of migratory species by both nets and rods.

#### Objectives

1. To improve and maintain water quality and water resources so as to protect the passage to and from freshwater of salmon, sea trout and eels.
2. To sustain a natural fish population appropriate to the typical physical, chemical and biological characteristics and flow regime features of the relevant sites.

# TAW/TORRIDGE ESTUARY CATCHMENT

## SEA FISHERIES



## **CATCHMENT USES**

### **3.7 Sea Fisheries**

#### **General**

This use relates to the maintenance of satisfactory populations of shellfish and fin fish and to the conditions necessary for their continued survival and exploitation in the joint estuary of the Taw and Torridge. The Authority, uniquely in Devon, is responsible for sea fisheries regulation in the Taw and Torridge estuaries (Appendix 8.1).

#### **Catchment Perspective**

##### **Current Use**

The Taw/Torridge Estuary is important as a spawning and nursery area and as a rich feeding ground for different species of fish. Bass and mullet are known to use the estuary both as a nursery area and for feeding. They are found in the estuary in large numbers especially during the summer months. Adult flatfish also feed here throughout most of the year. For example, adult flounders migrate into the mudflats at low water to feed on the invertebrate fauna. Mature flatfish leave the estuary in February to spawn in the open sea and return during the summer.

The bass and mullet fishery is exploited by small numbers of fishermen using drift nets. Longliners in the outer parts of the estuaries take mostly cod, whiting and some flatfish.

A number of bass conservation measures were introduced by MAFF in January 1990. The minimum landing size was raised from 32 to 36 cm and nets with mesh sizes between 65 and 89 mm may not be used by British fishing vessels. The recent designation of nursery areas within the estuaries will protect young bass by the prohibition of detrimental fishing methods during certain months of the year.

Mussels, oysters, cockles and winkles all grow naturally within the estuary, although there is some active relaying and farming of mussels and introduced Pacific oysters.

Small-scale commercial collections of mussels are made in the Taw and Torridge estuaries. Oysters and cockles are similarly exploited on a small-scale and there is limited public collection of mussels and cockles. This use is restricted by the EC Shellfish Hygiene Directive (91/492/EEC) (see page 45).

Seaweed is harvested from sites within and outside the estuary limit and is sold as laver bread throughout the area both to direct customers and by post.

## **CATCHMENT USES**

### **3.7 Sea Fisheries**

#### **Future Use**

Fin fish within the estuary will be cropped commercially where this does not have an adverse effect on the juvenile sea fish stocks or on migratory salmonids. The anticipated improvements in water quality as a result of the SWWSL Capital Programme may allow commercial harvesting of shellfish to recommence. Seaweed harvesting will continue.

#### **Objectives**

1. To maintain and, where appropriate, improve water quality, water resources and catchment features so as to sustain natural populations of fin fish and to maintain beds of edible seaweed appropriate to an estuary in such a geographical location.
2. The NRA will seek to influence the development of appropriate environmental standards so as to maintain commercial rearing of shellfish in the estuary.

## **CATCHMENT USES**

### **3.8 Netting of Salmonid Fish**

#### **General**

This use relates to the maintenance of estuarine conditions to allow exploitation of the salmonid fishery by commercial fishermen.

#### **Catchment Perspective**

##### Current Use

The Net Limitation Order (NLO) was reconfirmed at fourteen on 7 February 1991 for a further five years, with the provisor that, should licences fall vacant during that period, they would not be reissued. The Authority concluded an agreement with the netsmen to cease fishing for this five year period, in return for an appropriate compensation payment.

The long term annual average catch for salmon is 2529 and 3954 for sea trout.

##### Future Use

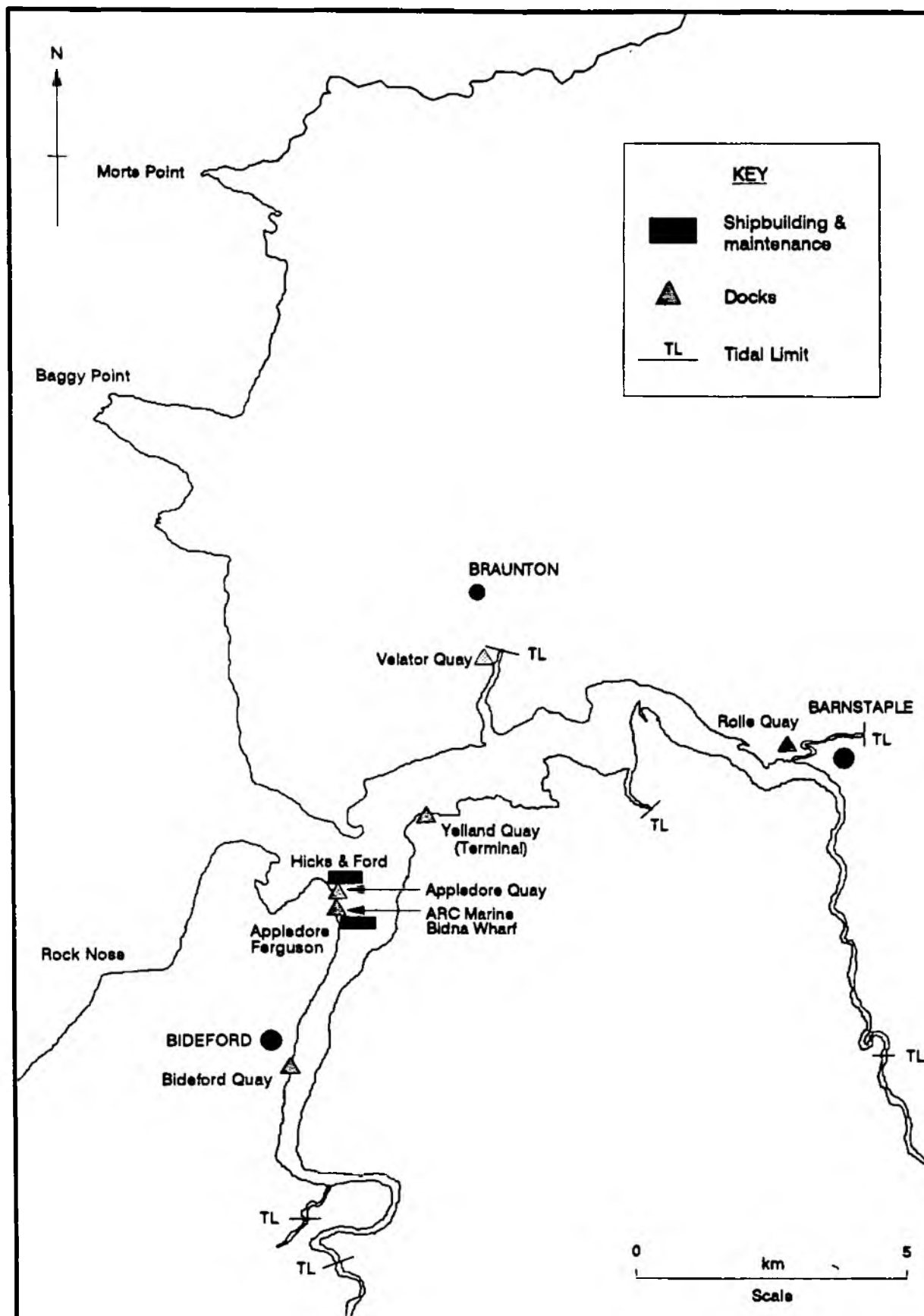
The NLO will be reviewed in 1995 and set at an appropriate level, depending on indicators such as juvenile densities and rod catches in the Rivers Taw and Torridge, to allow sustainable commercial cropping of salmon and sea trout in the estuary.

#### **Objective**

1. To maintain and, where appropriate, improve water quality, water resources, fisheries and estuarine features so as to provide suitable conditions for successful netting.

# TAW/TORRIDGE ESTUARY CATCHMENT

## SHIPPING INDUSTRY





## **CATCHMENT USES**

### **3.9 Shipping Industry**

#### **General**

This use relates to the promotion of a successful shipping industry in the catchment while ensuring that the activities of the local shipyards and docks do not cause unacceptable impacts on water quality and aquatic organisms, for example through effluent disposal or cargo spillage from docks. In addition, dredging to maintain navigation channels, and the disposal of spoil may have an adverse impact on local ecology and shellfishery interests, as well as causing localised water quality and aesthetic problems. Dredging operations are controlled by the appropriate harbour authorities and disposal of spoil below Mean High Water Springs is controlled by the Ministry of Agriculture, Fisheries and Food (MAFF) under the Food and Environment Protection Act, 1985.

#### **Catchment Perspective**

##### Current Use

Historically, the Taw/Torridge Estuary was an important centre for the shipping industry with ports at Barnstaple, Fremington, Appledore and Bideford. Nowadays, the magnitude of shipping activity has declined. Rolle Quay at Barnstaple is used for the loading and unloading of sand. There is some traffic to and from the oil terminal at Yelland. Ball clay is exported and fertilizers are imported through Bideford Quay. Dredged material from the Bristol Channel is transported from ARC Marine at Appledore. The local fishing fleet operates from Bideford and Appledore; and the Lundy Island Ferry operates from Bideford Quay.

Shipbuilding and maintenance is carried out at Appledore Shipbuilders Limited at Bidna, and some maintenance work is carried out at ARC Marine, Appledore. These activities require the dredging of channels to allow access to the yards.

##### Future Use

Shipping traffic to the estuary is limited and unlikely to increase due to the natural tidal regime which restricts access to the ports. In addition, at Bideford the lack of warehouse space and the difficulties of accessing the Bideford Port in its town centre location will also restrict further activity.

A land drainage consent has been issued by the NRA to allow for the rebuilding of Bidna Wharf. Planning permission has been granted to Appledore shipyard to extend Newquay Dock to allow larger ships to berth there.

## **CATCHMENT USES**

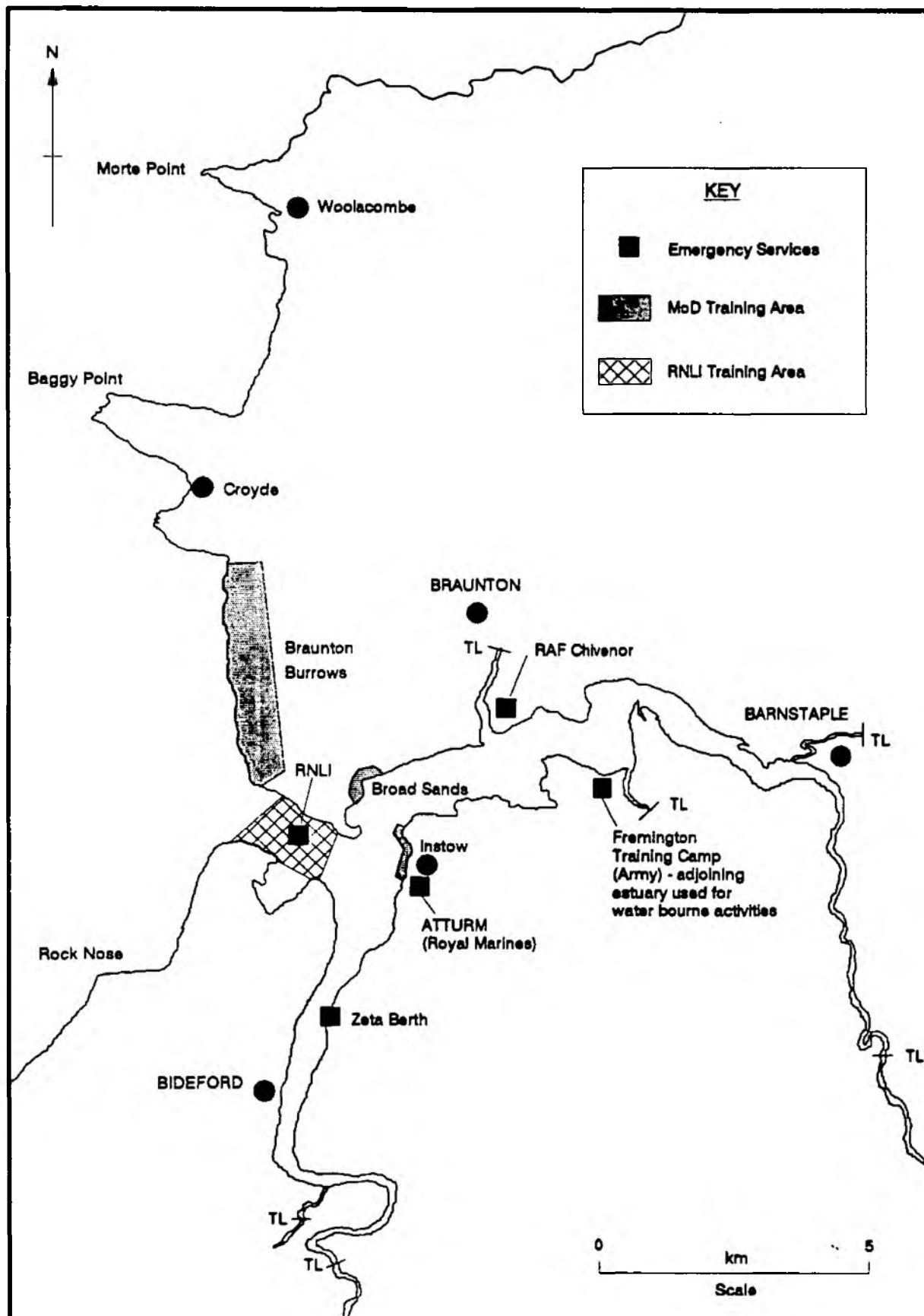
### **3.9 Shipping Industry**

#### **Objectives**

- 1. To support the needs of the shipping industry whilst maintaining, controlling and influencing their activities so that:**
  - (a) the catchment supports a variety of aquatic life and dependent organisms;**
  - (b) fish and shellfish are protected;**
  - (c) the catchment supports the benthic fauna essential to sustain the marine fishery;**
  - (d) public nuisance arising from visual and smell problems is prevented.**

# TAW/TORRIDGE ESTUARY CATCHMENT

## EMERGENCY SERVICES



## **CATCHMENT USES**

### **3.10 Emergency Services**

#### **General**

This use covers the activities of the emergency services within the catchment. These activities may cause deterioration in water quality through pollution incidents, for example fuel spillages or effluent discharges; they may impact fisheries through the obstruction of passage of fish and disturbance of nets. The noise associated with these activities may also cause nuisance to other users of the estuary and to wildlife. Recreational activities on the estuary in certain areas may also have implications for the safe operation of the emergency services.

#### **Catchment Perspective**

##### Current Use

There are three Ministry of Defence establishments in the catchment: RAF Chivenor, which operates Wessex Helicopters and Hawk Jet Aircraft; Fremington Training Camp which uses the adjoining estuary for waterborne training; and the Royal Marines Amphibious Trials and Training Unit Depot (ATTURM) at Instow, which supports amphibious vehicle trials and training. In addition use is made of Braunton Burrows, Broad Sands, Instow Sands and Zeta Berth near Tapely House for military purposes. A detailed description of the military activities on the Taw/Torridge Estuary is provided in the Local Authorities' Estuary Management Plan (Ref. 2).

The mouth of the Taw/Torridge Estuary is used for training purposes by the Royal National Lifeboat Institution (RNLI).

##### Future Use

There are no anticipated changes in the level of activity at Fremington and RAF Chivenor. Operational activity is expected to increase at the Amphibious Trials and Training Depot at Instow.

#### **Objectives**

1. To support the needs of the emergency services whilst controlling and influencing their activities so that other uses of the catchment are not compromised.
2. To support the needs of the shipping industry whilst maintaining, controlling and influencing their activities so that:
  - (a) the catchment supports a variety of aquatic life and dependent organisms;
  - (b) fish and shellfish are protected;
  - (c) the catchment supports the benthic fauna essential to sustain the marine fishery;
  - (d) public nuisance arising from visual and smell problems is prevented.

**Map of the Tamar estuary showing licensed practicable sand and gravel extraction areas.**

**KEY**

- TL Tidal Limit
- LICENSED PRACTICABLE SAND AND GRAVEL EXTRACTION AREAS:**
  - Crow Point - Exploited Site
  - Other Sites - Not Exploited

**Locations and Features:**

- Morte Point
- Baggy Point
- BRAUTON
- Crow Point
- Rock Nose
- BIDEFORD
- BARNSTAPLE
- TL (Tidal Limit) markers at Brauton, Crow Point, Rock Nose, Bideford, and Barnstaple.

**Scale:** 0 to 5 km.

## **CATCHMENT USES**

### **3.11 Sand and Gravel Extraction**

#### **General**

The extraction of sand and gravel in the Taw/Torridge Estuary is controlled by Devon County Council (DCC) as the Mineral Planning Authority under the Town and Country Planning (Minerals) Act 1981.

It is the policy of NRA Flood Defence that sand and gravel extraction should not be permitted from any location which is known to be receding, as the extraction may have an undesirable effect on the fluvial or coastal regime. Lowered foreshore or bed levels may undermine flood defences either directly or by altering the alignment of the river channel. Only locations where accretion of material is known to be occurring are considered by the NRA to be suitable for this activity.

#### **Catchment Perspective**

##### Current Use

Planning permission was granted in 1982 for extraction at four locations, off Crow Point, for a total of 15,000 tons per calendar year, and at three sites within the Taw Estuary for a further 30,000 tons per calendar year. Only the Crow Point site is currently worked. The planning permission was granted following a Public Inquiry in 1981 against DCC's refusal to renew planning permission. DCC's position was supported by the Nature Conservancy Council (NCC) and South West Water Authority (SWWA) because of environmental and flood defence concerns.

Crow Neck is a natural spit which limits wave action within the estuary and which may also limit tidal heights within the estuary and is therefore considered to be a significant natural flood defence feature. Since 1972, the foreshore levels have been monitored by NCC at Crow Neck adjacent to Crow Point, and this work has demonstrated that the foreshore is receding, although it does not establish a causal relationship between the recession at Crow Neck and the extraction at Crow Point.

In November 1984, Crow Neck was breached by a storm and since 1985, there have been negotiations with Devon County Council to revoke the planning permission, either through its terms or under Section 45 of the Town and Country Planning Act 1971. North Devon District Council also has a statutory locus for action through Section 18 of the Coast Protection Act 1949, and has been involved in the negotiations.

##### Future Use

The current planning permission for extraction in the estuary is valid until 1997. However, there is pressure on Devon County Council to revoke this planning permission before 1997.

## **CATCHMENT USES**

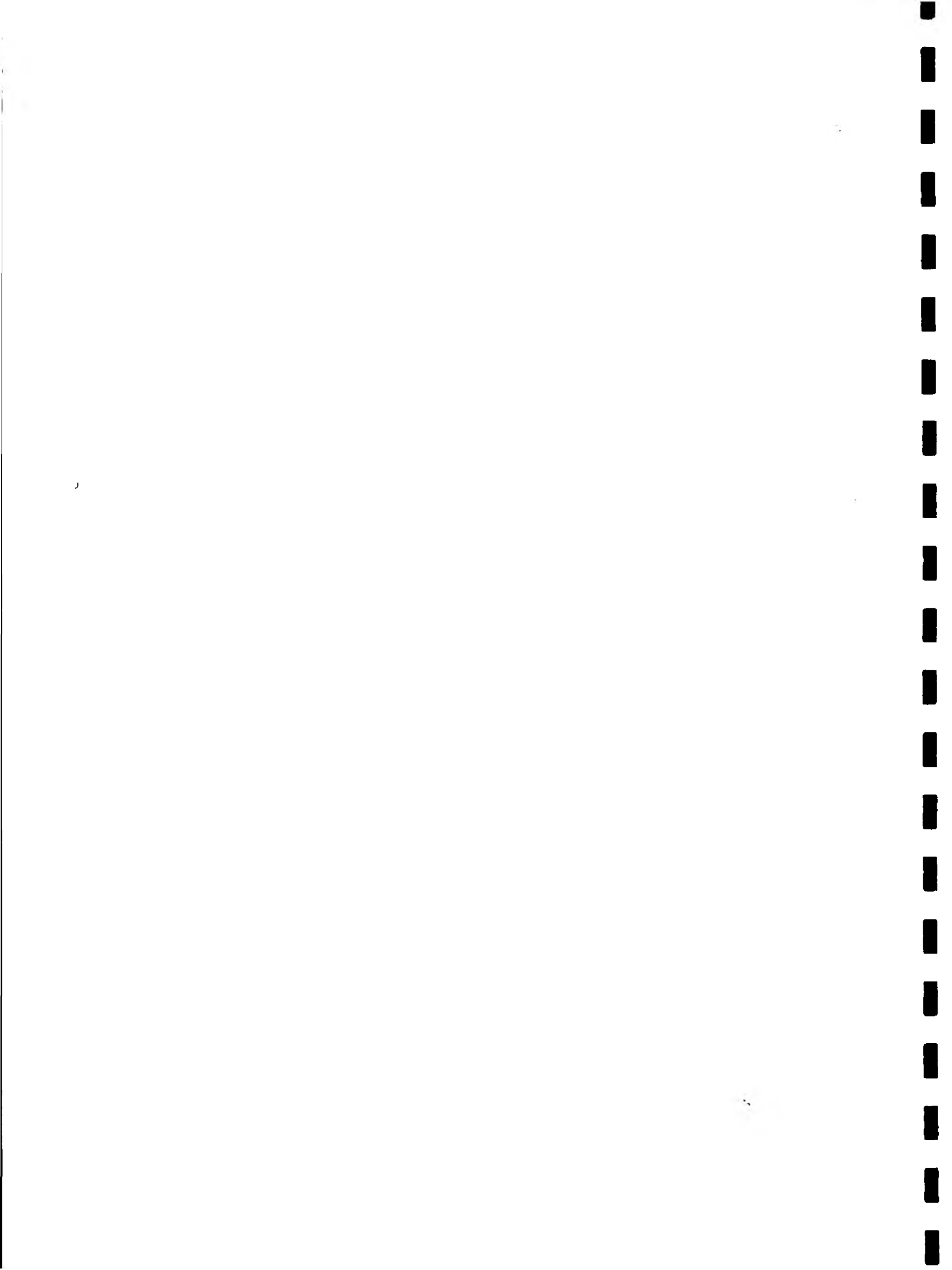
### **3.11 Sand and Gravel Extraction**

Beyond 1997, it is anticipated that Devon County Council will continue to oppose this activity because of the environmental threat and threat to natural flood defences. The Local Authorities' Estuary Management Plan (Ref. 2) recommends that this activity should not be licensed beyond 1997 and also identifies a potential threat to Isley Marsh should extraction start in the Taw Estuary.

The NRA is seeking to have sand and gravel extraction at Crow Point stopped as soon as practicable on flood defence grounds.

#### **Objective**

1. To stop sand and gravel extraction so that flood defence and other uses of the estuary are not compromised.





## CATCHMENT USES

### 3.12 Flood Defence

#### General

This use deals with the protection of people and property from flooding from natural watercourses. Certain watercourses are designated as 'main river'. On main rivers the NRA have permissive powers to: construct new defences; maintain defences; and control the actions of others through the issuing of 'Land Drainage Consents'. By controlling and influencing the actions of others the risk to existing and future uses (e.g. development) can be minimised.

The standard of flood protection can be measured in terms of the estimated frequency at which on average, it will prove ineffective (e.g. one in fifty years). In urban areas, flood defences are commonly designed to withstand a flood with a return period of one hundred years. Conversely, river defences in agricultural areas could be designed for breaching by, say, a five-year return period. The standards considered appropriate vary according to the land use to be protected and the economics of providing the service. Flood defence work is closely associated with the physical form of the river and the adjacent areas. There is therefore the potential for conflict with uses which depend on the structure of the river e.g. fisheries and ecology.

Within the catchment the Braunton Marshes are managed by the Braunton Marshes Internal Drainage Board (IDB).

#### Catchment Perspective

##### Current Use

For management purposes, only parts of the Taw/Torridge Estuary are formally designated as 'main river'. On the main river, formal consent is required for all proposals that interfere with the bed or banks of the river or obstruct the flow. The NRA has powers to control actions of others within seven metres of the channel on both sides, and to carry out works on the river. The NRA has powers over all other watercourses where persons wish to culvert them, pipe them or erect dams or other obstructions to flow; again, formal consent is required.

The nature of the works carried out for flood defence means that, in the past, this use has come into some conflict with other river uses - notably conservation and fisheries. However, great progress has been made over the last ten years, in achieving hydraulic performance targets without significant impact to the aquatic habitat.

There are a number of locations on the estuary at risk from tidal flooding. Widespread damage has been done on several recent occasions, in 1981, 1984, 1989 and 1990. Following the 1981 floods, a major scheme was carried out to protect Barnstaple and work is in progress on a comprehensive scheme to protect Bideford.

## **CATCHMENT USES**

### **3.12 Flood Defence**

A smaller scheme to protect Appledore is included in the NRA's five year capital programme; a scheme to protect Instow was completed in 1992. Work has been done to improve the existing tidal banks which protect agricultural land and isolated properties. Only the banks protecting Horsey Island, Braunton and Chivenor remain to be improved.

The Taw/Torridge Estuary is protected by a sand spit at Crow Point. This reduces storm surges entering the estuary and hence protects estuarial settlements from severe wave action. In November 1984 Crow Neck was breached by a storm. To reinstate the breach, a scheme jointly funded by BP Oil, Property Services Agency, Trinity House, North Devon District Council, CEEGB, Tapeley and Saunton Estates, SWWA and MAFF was carried out in 1985, costing £70,000. The erosion was considered to be due to sand and gravel extraction.

#### **Future Use**

Schemes to protect Braunton, Appledore and Muddlebridge are included in the NRA's five year capital programme, as are works to complete the tidal defences at Bideford. In view of the current low economic value of increasing protection to agricultural land, and likely conservation opposition, improvement work is unlikely to be carried out on the two remaining tidal banks protecting agricultural land at Horsey Island and Chivenor.

The future planning of sea defences needs to take account of possible sea level rise due to global warming and subsequent rises in sea level. The net sea level rise estimates can be included in the design of defences where this is cost justified.

#### **Objectives**

1. To provide effective defence for people and property against flooding from main rivers; ensuring that the effects of rising sea levels are considered where cost effective.
2. To provide adequate arrangements for flood forecasting and warning.
3. To ensure that flood defence operations allow the maintenance of water quality to such a condition that:
  - (a) it supports a variety of aquatic life and dependent organisms;
  - (b) fish and shellfish are protected;
  - (c) it supports a benthic fauna essential to sustain the marine fishery;
  - (d) public nuisance arising from visual and smell problems is prevented.

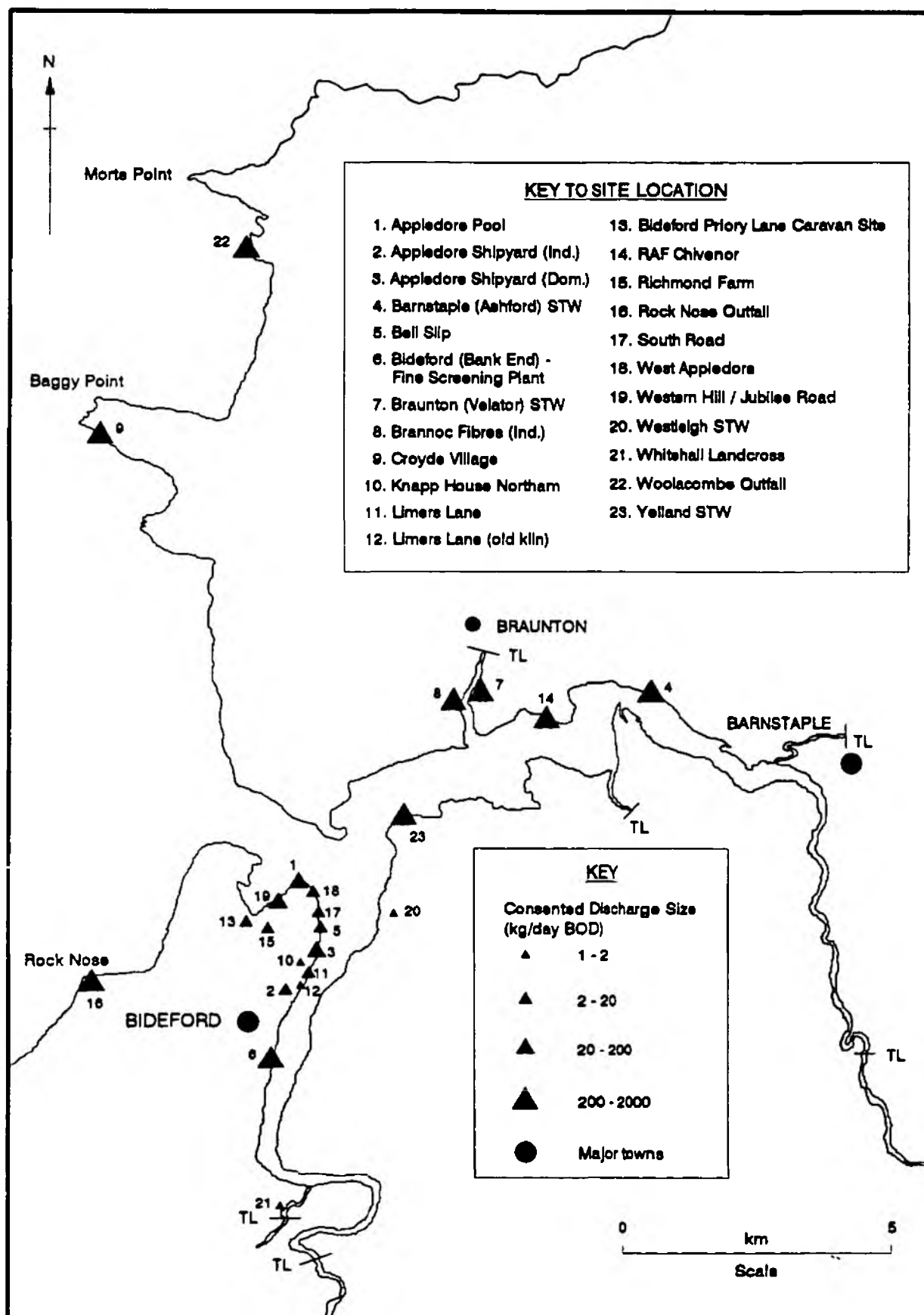
## **CATCHMENT USES**

### **3.12 Flood Defence**

4. That sand and gravel extraction at Crow Point should be stopped as soon as practicable. Unfortunately, Crow Point lies outside the main river boundary and the powers to achieve this objective therefore lie with other authorities.

# TAW/TORRIDGE ESTUARY CATCHMENT

## EFFLUENT DISPOSAL



## CATCHMENT USES

### 3.13 Effluent Disposal

#### General

The disposal of effluent is one of the recognised uses of natural waters. However, controls are necessary to ensure that environmental standards are achieved and maintained. These controls are implemented through the consenting procedures provided for in Schedule 10 of the Water Resources Act, 1991, which allows the volume and quality of effluent to be controlled. The aim is to limit the discharge of pollutants so that after mixing with the receiving waters, the concentrations comply with prescribed environmental standards appropriate to identified water uses. In addition, all discharges to estuaries and coastal waters will have a basic set of requirements imposed on them. These are that where possible, discharges must be submerged at all tidal states; that as a minimum treatment, sewage discharges must be screened to retain solid matter to minimize visual impact and aesthetic nuisance; and that effluent discharge must not exceed concentrations which the receiving watercourse can adequately dilute, so as to prevent the contamination of the marine, estuarine ecosystem.

Having determined the consent, the NRA has a statutory duty to monitor the discharges and assess compliance with consent conditions.

#### Catchment Perspective

##### Current Use

The Taw/Torridge Estuary is widely used for the disposal of effluent. There are a total of ninety-eight continuous discharges of sewage and trade waste, including discharge from a cotton processing plant at Braunton, to the Taw/Torridge Estuary, approximately half of which are untreated. In addition, there are forty-nine storm and emergency overflows. The total organic input to the estuary, expressed as Biological Oxygen Demand (BOD) is in excess of 8000 kg per day. More than 95% of this pollutant load originates from the twenty-three discharges identified on the accompanying map.

Many of the discharge consents were granted for a temporary period and have no specific controls specified. Others have limits which are considered inappropriate on an environmental needs basis and need reassessing. The NRA is currently undertaking a major reassessment of consents in three phases: untreated continuous discharges; storm and emergency overflows; and a re-examination of existing treated discharges to ensure that they are assessed on an environmental needs basis.

## **CATCHMENT USES**

### **3.13 Effluent Disposal**

#### **Future Use**

It is currently estimated that the amount of sewage which will be discharged (from existing sewage disposal facilities including industrial effluents, in the year 2012 will be equivalent to that from a population of 69,750 people. It is unlikely that such a population will exist within the catchment, but industrial effluents are taken into account in calculating the probable load.

A significant proportion of the pollutant load (particularly loadings of bacteria, ammonia and BOD) is scheduled for improvement under South West Water Services Limited (SWWSL) current investment programme. The scheme for the Taw/Torridge Estuary includes the complete re sewerage of the local catchments, installing appropriate storm attenuation facilities, terminating in strategic treatment facilities prior to disposal. The precise details of the proposal will be subject to formal authorisation by the NRA's regulatory unit.

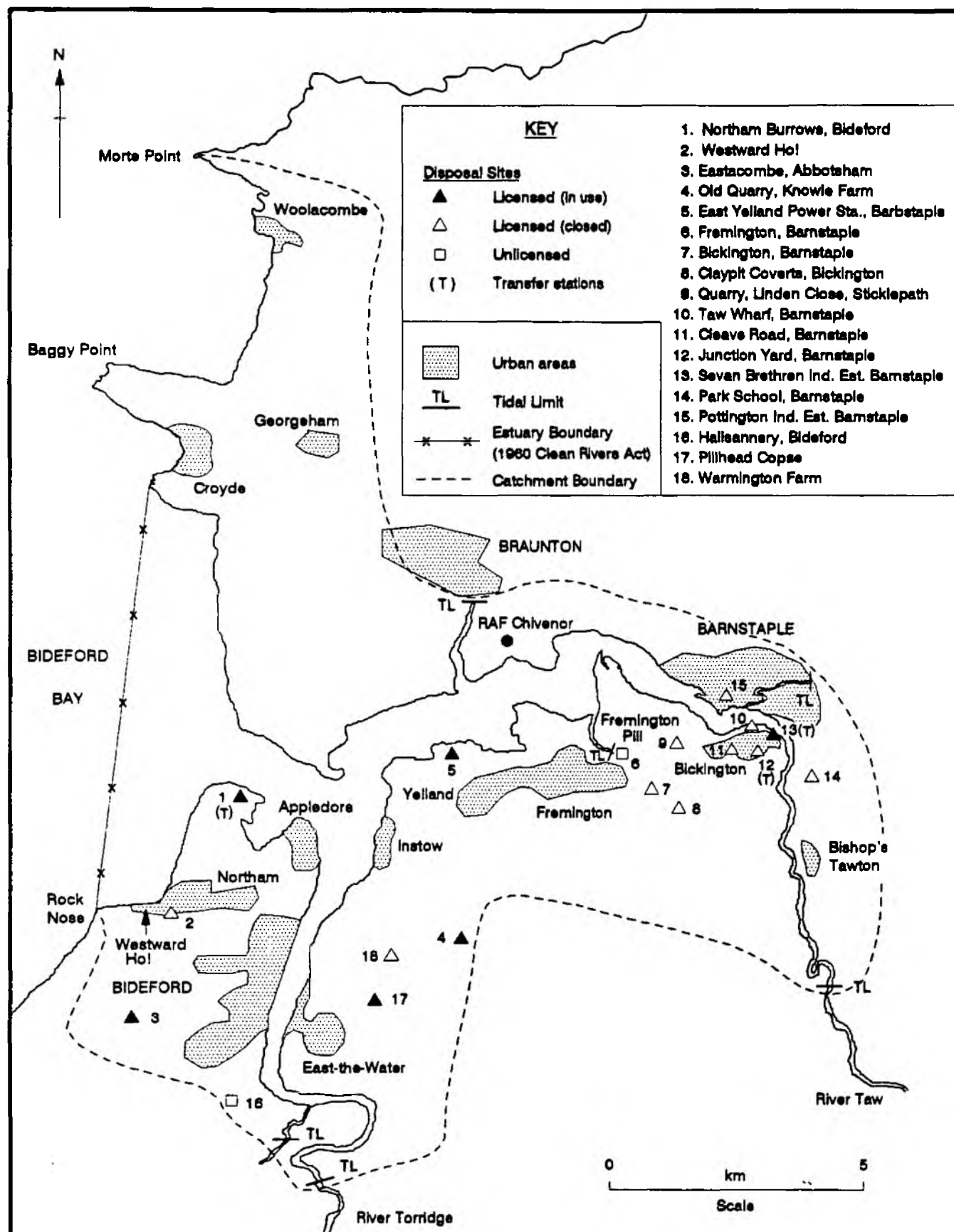
The consent conditions of those discharges which are not to be incorporated in the SWWSL scheme will also need to be reviewed to ensure, that where necessary, improvements are made to discharges which may be responsible for failures in environmental standards, and compliance with EC directives. The application of the NRA's 'no deterioration' policy in water quality will require higher treatment standards to accommodate further development to the built environment within the catchment.

#### **Objectives**

1. To control the discharge of effluent to the water environment in such a way as to achieve compliance with relevant EC directives concerning Bathing Waters (76/160/EEC), Urban Wastewater Treatment (91/271/EEC), and Dangerous Substances (76/464/EEC).
2. To control the discharge of effluent to the water environment so that water quality is maintained and where appropriate, improved, and to ensure that other uses of the estuary are not compromised.
3. To ensure that the quantity of water from the freshwater catchments is managed so as to provide an adequate contribution to dilution afforded by the receiving waters.

# TAW/TORRIDGE ESTUARY CATCHMENT

## SOLID WASTE DISPOSAL SITES



## **CATCHMENT USES**

### **3.14 Solid Waste Disposal**

#### **General**

This use deals with the disposal of waste to land. Solid waste disposal sites which are in use can affect the surface water quality and groundwater quality through the discharge of leachate to watercourses. A further threat to water quality is presented by the redevelopment or change of use of old sites, because physical disturbance can change the drainage patterns and cause release of pollutants. The NRA carries out its duty to protect water quality from waste disposal activities as statutory consultee to the Waste Regulation Authorities (WRAs).

#### **Catchment Perspective**

##### Current Use

There are eighteen waste disposal sites, including two transfer stations within the Taw/Torridge Estuary Catchment, of which only five are still operational. This largest site is Northam Burrows at which disposal of domestic refuse has recently ceased, although it is still being used as a transfer station and civic amenity. There are eleven sites which are licensed as closed, including the transfer station at Junction Yard, Barnstaple; and two sites which are unlicensed as waste disposal took place here before waste disposal licensing was controlled by the Control of Pollution Act (COPA), 1974.

Most of these sites rely on dilution, dispersion and attenuation of leachates to limit pollution of the groundwater environment. In other areas of the country, serious pollution of groundwater and surface watercourses has occurred. However, in this catchment it is recognised that, because of the hydrogeology, pollution of groundwater systems is likely to be localised. However, the main use of groundwater within the catchment is for potable water supply and this use must be protected.

##### Future Use

The waste disposal site at Northam Burrows has closed and is now being restored. The need for facilities for solid waste disposal will need to be met but this will not necessarily be within the catchment.

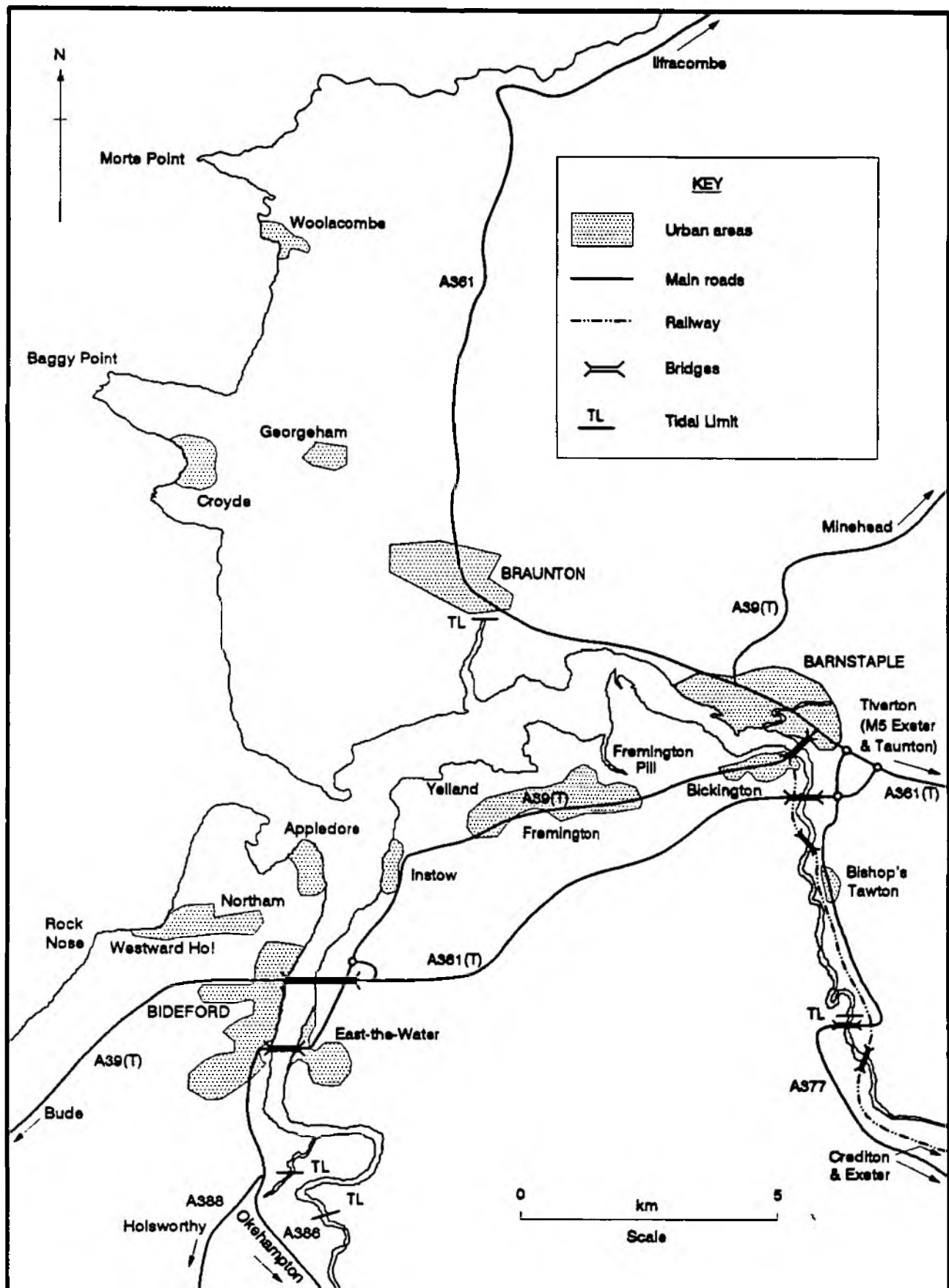
#### **Objective**

1. To control and influence solid waste disposal, and the redevelopment of contaminated land to ensure that other uses are not compromised.



# TAW/TORRIDGE ESTUARY CATCHMENT

## LAND USE



## **CATCHMENT USES**

### **3.15 Land Use**

#### **General**

This use covers residential, commercial, agricultural and industrial developments. Land use planning matters are the responsibility of County and District Authorities. However, the NRA is a statutory consultee in the planning process, and can play a key role in influencing such matters.

#### **Catchment Perspective**

##### **Current Use**

The Taw/Torridge Estuary lies within the County of Devon and is therefore subject to the general housing and employment prediction as allocated by the Devon Structure Plan. The Structure Plan has undergone its Third Iteration. The Estuary Catchment Plan area also falls between two Local Planning Authorities, Torridge District Council and North Devon District Council. Both Councils are preparing district wide plans which will accommodate the housing and employment allocations.

The estuary's urban environment is dominated by two major settlements - Barnstaple and Bideford. Both were important ports for North Devon, but the shipping use of Barnstaple has largely fallen into decline. Bideford continues to be an important port, mainly for the export of ball clay. Both towns are administrative, commercial and marketing centres for their districts, and because of their scenic and historic settings are also important tourist centres. Other settlements include Instow, Yelland, Fremington, Bickington, Braunton and Croyde which have been influenced by changes in the road network.

The road infrastructure has seen significant improvements with consequent environmental change in recent years with the construction of the North Devon Link Road. This has opened up significant local residential and commercial opportunities. The rail network relies on Barnstaple station to connect, via a local branch line, to the main-line rail network.

Rural land use includes agriculture and forestry. Whilst neither activities have significant impact on the water environment of the catchment, unlike in the main freshwater Taw and Torridge these are localised areas of concern.

##### **Future Use**

Local Authorities play a vital role in the management of the Taw/Torridge Estuary Catchment and a close professional relationship is developing between the local community, their representatives and the NRA. For the future, the production of local plans will guide the development of sustainable land use.

## **CATCHMENT USES**

### **3.15 Land Use**

#### **Objectives**

1. To influence and control land use in such a way that other uses are not compromised.
2. To seek enhancements to the water environment through sensitive land use planning.



## **CATCHMENT STATUS**

### **4.1 Introduction**

The purpose of this section is to compare the current status of the catchment (where it is known) with overall standards/targets in respect of water quality, water resources, flood defence, conservation and recreation.

Comparison of the 'current status' with the 'overall targets' enables issues - which may be problems due to failures to meet targets, or conflicts due to differing uses having opposing requirements - to be identified. The issues are presented in detail in Section 5.

## **CATCHMENT STATUS**

### **4.2 Water Quality - Current Status**

The NRA aims to maintain and improve the quality of water for all those who use it. Water quality within the Taw/Torridge Estuary Catchment can be affected by pollution from many sources, for example from freshwater inputs to the system, from effluent discharges, from pollution incidents, from waste disposal activities or the disturbance of contaminated land. Activities within the estuary, for example, the disturbance of sediments during dredging activities can also cause a deterioration in water quality. All these sources must be considered when defining a strategy for managing water quality in the catchment.

In order to achieve its aims, the NRA monitors the quality of estuarine and coastal waters out to three nautical miles from the low water mark against relevant statutory and non-statutory standards set out in European Community (EC) Directives and non-statutory, subjective National Water Council (NWC) Estuary Classification System.

To date, there has only been limited monitoring of groundwater quality within the Taw/Torridge Estuary Catchment. However, the recently published document 'Policy and Practice for the Protection of Groundwater' (Ref. 7) has established a framework for protecting groundwater quality.

A new classification system known as Statutory Water Quality Objectives (SWQOs) combined with a General Quality Assessment (GQA) Scheme (Ref.8) will be introduced which will apply to surface waters such as estuaries and coastal waters, and which may, in the future, also apply to groundwaters. SWQOs will provide statutory standards to protect the use classes for fisheries ecosystem, abstractions for drinking water supply, agricultural use, and industrial use; to protect special ecosystems; and water sports. The GQA will provide a general non-statutory system for assessing the long term quality of the watercourse based on the chemical, biological, aesthetic and nutrient status of the watercourse (Ref. 8).

A survey of the sediment fauna has been carried out, to provide an indication of the ecological condition of the estuary, and to provide preliminary data to assist with future classification under the proposed GQA.

#### **Surface Water Quality**

##### **NWC Estuary Classification System**

The NRA currently uses the subjective NWC Estuary Classification System, which was adopted in 1980, for the assessment of the water quality in estuaries. The classification system is based on the recommendations of the Classification of Estuaries Working Party which reported to the Department of Environment (DoE) and NWC Standing Technical Advisory Committee on Water Quality. The classification aims to provide a simple assessment of the status of estuaries.

## CATCHMENT STATUS

### 4.2 Water Quality - Current Status

The estuary is subjectively assessed for its biological, aesthetic and chemical quality with points being awarded if certain descriptive criteria are met (Appendix 8.2). In defining the descriptions, the uses to which the estuary might be put was considered, for example passage of migratory fish, fishing, shellfisheries, wildlife, amenity value and industry. The score is then combined to give a Class.

The four classes of the NWC estuary classification system are as follows:

<u>Class</u>	<u>Description</u>
A	Good
B	Fair
C	Poor
D	Bad

In 1992, the Taw/Torridge Estuary System was assigned a Classification of Class A. However, the Torridge Estuary failed to achieve the maximum score for Class A because of limited aesthetic pollution from untreated sewage discharges around Appledore.

This classification system only provides an overall subjective assessment of the status of the estuary, and a more objective assessment of water quality within the estuary can be gained from the routine monitoring of the estuary carried out by the NRA.

#### Current Water Quality Status

Since 1990, water quality within the Taw/Torridge Estuary has been monitored at nine sites listed in Appendix 8. 3. Each site is monitored for a number of determinands including salinity, nutrients, chlorophyll, dissolved oxygen and bacterial quality over a complete tidal cycle during different seasons.

**Ammonia:** High concentrations of ammonia have been measured in the middle and upper reaches of the Taw Estuary during summer. This is of concern as high ammonia concentrations can impede the passage of migratory fish. During the summer the main source of the ammonia is Ashford Sewage Treatment Works (STW). The concentration of ammonia in some of the samples has exceeded the proposed Environmental Quality Standard (EQS) for ammonia. More data is required to accurately define seasonal variations in quality.

**Nutrients:** Nutrients, measured as total oxidised nitrogen (TON) and orthophosphate, in the estuary are essential for biological growth in the estuary. However, in excessive concentrations they can cause algal blooms. Inputs of TON and orthophosphate to the Taw/Torridge Estuary are provided by rivers and direct discharges, with rivers currently contributing the higher load.

## **CATCHMENT STATUS**

### **4.2 Water Quality - Current Status**

Concentrations of TON and orthophosphate in the Taw/Torridge Estuary are in the normal range for estuaries, with higher concentrations tending to occur higher up the estuary where salinity is lowest.

**Dissolved Oxygen:** The presence of dissolved oxygen (DO) in a surface water column is essential to the maintenance of life within the estuary. Dissolved oxygen can be removed from the water column through the breakdown of organic matter, for example sewage, and by plant respiration at night; and can be added to the water column through plant photosynthesis during daylight. To allow the passage of migratory fish, through estuaries, a target minimum DO of 3 mg/l and 95 %ile of 5 mg/l have been recommended, although there is no relevant quality standard. Minimum concentrations of dissolved oxygen of around 5 mg/l have been measured in the Torridge Estuary. Maximum concentrations, greater than 13 to 14 mg/l have been found in the Taw Estuary.

**Chlorophyll:** The concentration of chlorophyll provides an indication of the level of algal growth in the estuary. While some algal growth is essential, excessive growth can disturb the balance of organisms present in the watercourse and be detrimental to water quality. In summer, high concentrations of chlorophyll have been measured off Ashford STW and RAF Chivenor. High concentrations of dissolved oxygen have also been found associated with high chlorophyll concentrations. Dissolved oxygen is an indicator of the photosynthetic activity of plants and the high results suggest a lot of plant activity in these parts of the estuary, and may indicate the estuary is becoming eutrophic. These results are consistent with the dense phytoplankton blooms that have been observed in the Taw Estuary.

**Bacterial Quality:** Total and faecal coliforms and faecal streptococci are monitored as microbiological indicators of the extent of human and animal derived faecal material. The inputs of total and faecal coliforms to the Taw/Torridge Estuary are dominated by inputs from treated and untreated sewage discharges. Concentrations of bacteria throughout the Taw/Torridge Estuary are extremely variable, ranging from concentration well below the standards set out in the EC Bathing Water Directive (Appendix 8.4) to concentrations more than two orders of magnitude greater than these standards in the vicinity of large sewage effluent discharges. Advice on the health implications of this data is the responsibility of the Local Authorities' Environmental Health Officer or a Medical Officer of Health.

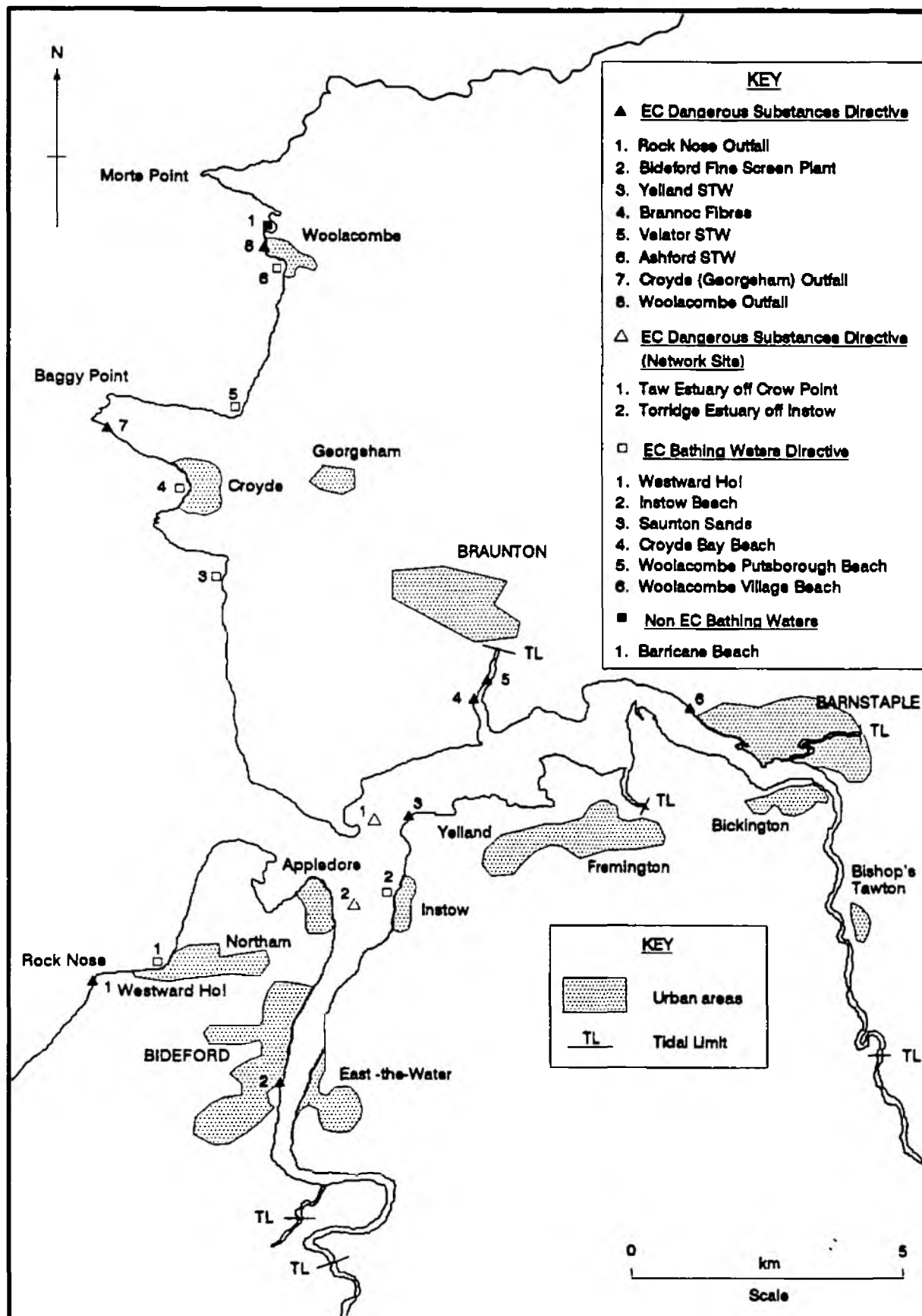
#### **Surface Water Quality - EC Directives**

There are several EC directives that currently apply to the Taw/Torridge Estuary Catchment.



# TAW/TORRIDGE ESTUARY CATCHMENT

## EC DIRECTIVE MONITORING SITES



## CATCHMENT STATUS

### 4.2 Water Quality - Current Status

The Dangerous Substances Directive 'on pollution caused by certain substances discharged in the aquatic environment of the community' (76/464/EEC) is concerned with controlling certain substances considered harmful which are discharged to the aquatic environment. As the competent authority for implementing this directive, the NRA monitors water quality and reports the results to the Department of the Environment (DoE), who assess and report compliance with the directives to the EC.

The Directive has established two lists of compounds. List I contains substances regarded as particularly dangerous because of their toxicity, persistence and tendency to bioaccumulate. Discharges of List I substances must be controlled by the setting of Environmental Quality Standards (EQSs) in receiving waters of discharges issued through Daughter Directives. List II contains substances which are considered to be less dangerous but which still can have a deleterious effect on the aquatic environment. Discharges of List II substances are controlled by EQSs set by the individual Member States (Appendix 8.5).

In the Taw/Torridge Estuary Catchment, the receiving waters to Rock Nose outfall, Bideford fine screening plant discharge, Yelland STW, Braunton (Velator) STW, Barnstaple (Ashford) STW, Croyde (Georgeham) outfall, Woolacombe STW and Brannoc Fibres discharge are monitored. The background concentration of dangerous substances is monitored in the Taw Estuary off Crow Point and in the Torridge Estuary off Instow.

In 1992, the List I EQS for hexachlorocyclohexane (HCH) was exceeded in the mixing zone at Velator STW, although other sites monitored around this discharge complied with the standard. The List II EQS for pH was exceeded in the mixing zone of the discharge from Brannoc Fibres. All other standards were met at all other sites.

The Bathing Waters Directive 'concerning the quality of bathing water' (76/160/EEC) aims to protect the environment and public health of bathing water, by reducing pollution entering identified bathing areas. As the competent authority for implementing this directive, the NRA has a two-fold obligation. The first is to monitor the quality of popular bathing waters and to provide the results to the DoE which assesses compliance. The second is to maintain and improve where necessary bathing water quality so that it complies with the standards laid down in the Directive. To achieve this the NRA has to identify the sources of pollution, quantify the effects and ensure that improvements take place.

The Directive lays down 19 physical, chemical and microbiological parameters for assessing the quality of bathing waters which include total and faecal coliforms, salmonellae, enteroviruses, pH, transparency, colour, mineral oils, surface-active substances and phenols (Appendix 8.4). Compliance with the requirements of the Directive is assessed by the DoE on a parameter by parameter basis, principally against the mandatory standards for total and faecal coliforms.

## CATCHMENT STATUS

### 4.2 Water Quality - Current Status

In the Taw/Torridge Estuary Catchment the following identified EC bathing waters are monitored: Westward Ho!, Instow, Saunton Sands, Croyde, Woolacombe (Putsborough) and Woolacombe (village). In addition to these, the stream at Saunton Sands is monitored to help quantify the bacterial loading to the bathing water. Once a bathing water has failed to comply with the Directive, it remains on the NRA's 'problem' list until improvements have been carried out, even if in subsequent years passes have been recorded.

The Results for identified bathing waters are as follows:

<u>Identified Bathing Water</u>	<u>Bathing Seasons When Failure Was Recorded</u>
Westward Ho!	1986
Instow	1986, 1987, 1988, 1990, 1991, 1992
Saunton Sands	1986
Croyde	No failures
Woolacombe (Putsborough)	No failures
Woolacombe (village)	No failures

In addition to the identified bathing waters one non-identified bathing water at Barricane was monitored in 1991. This bathing water met the bacterial standards laid down in the Directive.

There are two other EC directives which apply to surface waters which have implications for improvements to the Taw/Torridge Estuary Catchment. The EC Directive 'concerning urban wastewater treatment' (91/271/EEC) lays down minimum standards for the provision of sewerage and sewage treatment systems. The Directive specifies secondary treatment for all discharges serving population equivalents greater than 2000, but provides for higher standards of treatment for discharges to 'sensitive' areas, and lower standards of treatment to 'less sensitive' areas. Sensitive areas are those where waters are, or may become eutrophic in the near future; or where more stringent treatment, for example nutrient removal, is required to fulfil the requirements of other EC directives. 'Less Sensitive' areas are those waters with high, natural dispersion where a lower level of treatment is required.

Data is currently being collected to assess whether any parts of the Taw/Torridge Estuary should be identified as sensitive in the future.

## **CATCHMENT STATUS**

### **4.2 Water Quality - Current Status**

The Shellfish Hygiene Directive 'laying down the health conditions for the production and the placing on the market of live bivalve molluscs', (91/492/EC) is concerned with protecting the public health of consumers of live bivalve molluscs for example, mussels and oysters.

The Ministry of Agriculture, Fisheries and Food (MAFF) and the Department of Health (DoH) share responsibility as the competent authority for this directive in England and Wales. The NRA does not play a central role in the implementation of this Directive, although it is represented on liaison committees between local authorities and fishermen and has provided information on locations of discharges which may affect the classification of any harvesting area. The Directive defines the standard of shellfish quality required in the end product, and classifies bivalve mollusc shellfish harvesting areas into four categories according to the level of microbiological contamination in the shellfish flesh (Appendix 8.6). Several shellfish harvesting areas in the Taw/Torridge Estuary have been identified as Class C, where shellfish require long periods of relaying prior to marketing; other sites have been identified as Class D from which harvesting is prohibited.

At present, the NRA has no duty to control the quality of polluting effluents. However, the NRA will seek to influence the development of environmental standards so as to maintain commercial shellfisheries within the catchment.

#### **Surface Water Quality - Riverine Inputs**

At the second and third North Sea Conferences (Ref. 9), the UK Government made a commitment to reduce the loadings of certain substances ('Annex 1A' substances) entering tidal waters from rivers and direct discharges by 50% (70% for mercury, cadmium and lead) by 1995 compared to a 1985 baseline (Appendix 8.7). In England and Wales the NRA is responsible for identifying inputs where reductions must be made in order to meet this commitment. In 1991, the last year for which a full assessment of national data is available, the Rivers Taw and Torridge were identified as inputs to tidal waters which contributed significantly to the loadings for cadmium, copper, zinc, lead, arsenic, and organotin (River Torridge). The relevant Catchment Management Plans for the River Torridge (Ref. 1) and River Taw (in preparation) have identified options for the improvements in certain discharges to the rivers which may contribute to levels of trace metals. However, some of the trace metals within the freshwater systems are from natural sources from the mineralised geology in the upper river catchments and therefore beyond the control of the NRA.

## CATCHMENT STATUS

### 4.2 Water Quality - Current Status

#### Biological Quality

A survey of benthic macrofauna in the Taw/Torridge Estuary was carried out by the NRA during 1992. Macrofauna are the small animals which inhabit the estuary sediments, large enough to be retained on a 0.5mm mesh size sieve. This survey was carried out as part of a baseline survey to assess the biological quality of all the estuaries in the South West Region, to obtain information which can be used for future classification schemes. Although the benthic macrofauna have been identified, a full assessment of the results has not yet been completed.

#### Surface Water Quality - Pollution Incidents

The total number of reported pollution incidents within the Taw/Torridge Estuary Catchment is increasing. This is thought to reflect greater public awareness and therefore reporting of incidents rather than an actual increase in events. However, this does not reduce the importance attached to the effect of these pollution incidents on the natural water environment.

The majority of pollution incidents reported in the catchments are related to agriculture. The number of category 1, major; category 2, significant; and category 3, minor pollution incidents each year since 1990 are given below:

	<u>Categories</u>			<u>Total</u>
	<u>1</u>	<u>2</u>	<u>3</u>	
1990	2	7	58	67
1991	0	9	109	118*
1992	1	4	99	104*

\* These figures include pollution incidents identified by NRA task force inspections.

These figures indicate that there has been little change in the numbers of major and significant pollution incidents reported within the catchment, and the increase in the total number of pollution incidents are caused by the large increase in the number of minor incidents. Definitions of pollution incident categories are given in Appendix 8.8.

## **CATCHMENT STATUS**

### **4.2 Water Quality - Current Status**

#### **Estuary Sediment Quality - Chemical Status**

The chemical quality of estuarine sediment is an important indicator of the long term input of contaminants to the estuary as the sediments absorb many persistent contaminants, for example trace metals and organochlorine pesticides. Sediment quality can also affect water quality because under certain chemical conditions or during physical disturbance, contaminants can be released to the water column, and the fine material in suspension can also have a deleterious effect on shellfish, and be visually unacceptable. There is only limited data available for the quality of sediments within the estuary and this data suggests that concentrations of most contaminants are within the normal range found in estuaries. However, there are localised areas with sufficiently high concentrations of contaminants which are of concern, if disturbed, notably off Appledore and Bideford where high concentrations of polychlorinated biphenyls (PCBs) have been found.

#### **Groundwater Quality - Chemical Status**

Only a limited amount of data, collected during the 1992 survey of minor aquifers in the South West Region, is available to assess the quality of groundwater in the Taw/Torridge Estuary Catchment. However, further evidence of the quality of groundwater is available from the analysis of river water quality during periods of low flow, and from other parts of the county with similar hydrogeological settings.

The survey results suggest that a large proportion of small-scale groundwater supplies for potable use are contaminated with bacteria and may contain elevated concentrations of other contaminants, most commonly iron, manganese and nitrate.

The NRA is continuing to investigate the water quality of groundwaters including more sites within the catchment. The 1993 survey will sample additional sources in order to establish a baseline from which to assess any future quality changes. This data will enable the NRA's objective of no deterioration of groundwater quality to be applied.

#### **Groundwater Quality - EC Directives**

The EC Directive 'on the protection of groundwater against pollution caused by certain dangerous substances' (80/68/EEC), is concerned with protecting groundwaters from pollution from certain substances considered dangerous on the basis of their toxicity, persistence, bioaccumulation and carcinogenic, mutagenic or teratogenic properties in the aquatic environment. The Directive identifies two lists of compounds similar to those listed in the Dangerous Substances Directive (76/464/EEC). List I contains substances which are not allowed to enter groundwaters, and List II contains substances which must only have a restricted entry to groundwaters.

## **CATCHMENT STATUS**

### **4.2 Water Quality - Current Status**

This Directive applies to all discharges to groundwaters, for example discharges from waste disposal sites. The NRA carries out its duties under this Directive as Statutory Consultee to the Waste Regulation Authorities (WRAs), providing advice during the issuing of waste disposal licences, and auditing monitoring data collected by waste disposal site operators.

In carrying out its statutory duties, the NRA also has regard to the EC Drinking Water Directive 'relating to the quality of water intended for human consumption' (80/778/EEC), which prescribes standards for potable water use which forms the most widespread use of groundwater in the Taw/Torridge Estuary Catchment.

The EC Directive 'concerning the protection of waters against pollution caused by nitrates from agricultural sources' (91/676/EEC), requires Member States to identify waters, including groundwaters, affected by pollution from nitrates or which could be affected by pollution from nitrates if protective measures are not taken. The land draining to these areas are designated as 'vulnerable zones' and action plans must be established to reduce existing nitrate pollution and preventing further pollution.

However, nitrate vulnerable waters have yet to be designated by the DoE as the criteria for use in the UK have not yet been established. It thus remains unresolved whether any water in the Taw/Torridge Estuary Catchment will be included.

#### **Targets**

- (i) To develop, propose, consult and recommend SWQOs and a timetable for achievement.
- (ii) To establish a General Quality Assessment scheme for the catchment.
- (iii) To ensure compliance with the standards laid down in current and future EC Directives by reviewing existing discharge consents; where necessary, issuing new discharge consents and providing advice on waste disposal licensing.
- (iv) To ensure that discharge consent conditions are specified to protect current and future recognised uses of the estuary.
- (v) To undertake pollution prevention work such as task force action to minimise diffuse pollution and prosecute illegal discharges.
- (vi) To develop a strategy for the implementation of the Groundwater Protection Policy.
- (vii) To seek to influence activities within the catchment which may have a deleterious affect on water quality.

## **CATCHMENT STATUS**

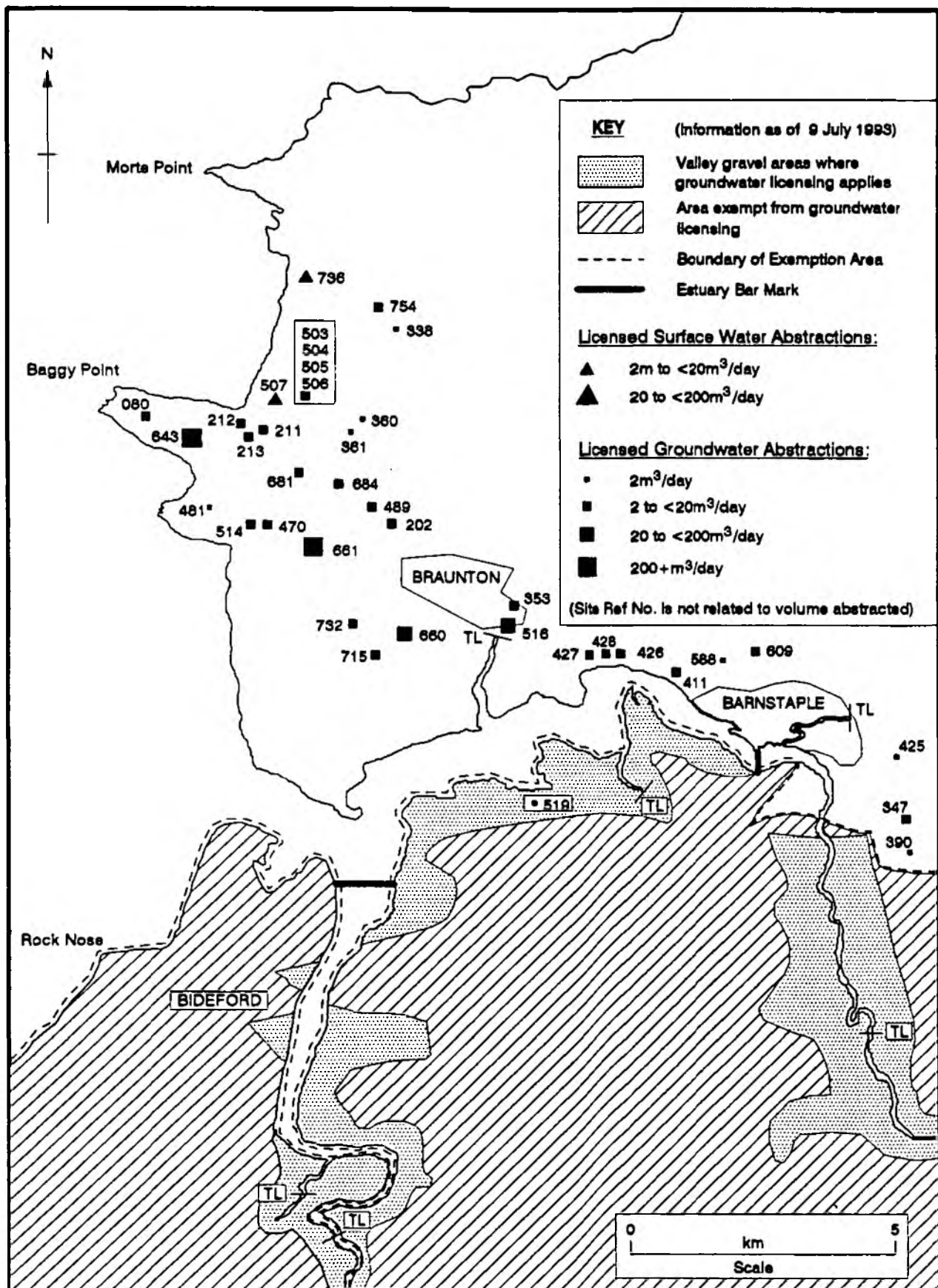
### **4.2 Water Quality - Current Status**

- (viii) To ensure the water environment in the freshwater river catchments feeding the Taw/Torridge Estuary Catchment are managed so as not to cause deterioration in estuary water quality.



# TAW/TORRIDGE ESTUARY CATCHMENT

## LICENSED WATER ABSTRACTIONS



## CATCHMENT STATUS

### 4.3 Water Resources - Current Status

The NRA aims to conserve, redistribute, augment and secure proper use of water resources. One of the key objectives to achieve this aim is to develop and implement a water resources strategy which takes appropriate account of both environmental and abstraction requirements.

Following the publication of a national water resources development strategy (Ref. 10) a regional strategy is currently being prepared, which will ultimately be followed by specific catchment strategies. It is therefore too early to report on a definitive strategy for the Taw/Torridge Catchment but the NRA's approach is to achieve the right balance between protecting public water supplies, safeguarding existing water rights and uses, and conserving the water environment.

The general water resources targets for the whole Taw/Torridge Estuary Catchment are straightforward, since the catchment is tidal in nature and subject to a significant flushing effect. They are:

- (i) to limit or regulate abstractions so that detrimental impacts are not caused to water quality; conservation interests by reduced flows in watercourses or by reduced groundwater levels; or to migratory passage of salmon, sea trout or eels;
- (ii) to regulate impoundments to ensure their design and construction will allow for the migratory passage of salmon, sea trout and eels.

The south side of the estuary lies within an area covered by the Devon River Authority (Exceptions from Control) Order 1970, which allows groundwater to be abstracted without a licence, except within the river valley gravel area. The gravel areas remain within licensing control because they are believed to be in hydraulic continuity with the rivers and so abstraction could impact river flow. In addition, surface water abstractions from the main estuary downstream of the indicated bar marks are outside NRA licensing control. This means that the NRA has little information on the quantity of water abstracted within these areas, although it is anticipated that such abstractions within the Taw/Torridge Estuary Catchment will have no detrimental impact on the estuary.

The total licensed abstractions from the catchment are tabulated below:

<u>Source by</u> <u>type</u>	<u>No. of licences in</u> <u>abstraction yield range (m<sup>3</sup>/day)</u>				<u>Cumulative</u> <u>Abstraction</u> <u>(m<sup>3</sup>/day)</u>
	<2	2 to <20	20 to <200	200+	
Surface Water	0	1	1	0	42
Groundwater	8	24	2	2	782

## **CATCHMENT STATUS**

### **4.3 Water Resources - Current Status**

A study carried out by English Nature has indicated that the water table at Northam Burrows and Braunton Burrows is falling, which is causing changes to the flora in these areas. Many factors can affect water table levels, including climatic changes, modified drainage patterns, reduced inundation, as well as over-abstraction. However, data relating to abstractions within the catchment indicate that these are unlikely to be causing a lowering of water tables. Further work is needed to identify the cause of this problem.

Of more concern to the estuary environment is the impact of abstractions on the major rivers feeding the estuary. The flashy nature of the Rivers Taw and Torridge catchments make them susceptible to extreme dry weather flows. Increases in the frequency of dry weather and longer periods of low flow may affect the estuary. Management of the river resources are discussed in the River Torridge Catchment Management Plan Consultation Report (Ref. 1) and River Taw Catchment Management Plan Consultation Report to be published later this year.

#### **Targets**

- (i) To regulate abstractions and impoundments in accordance with NRA policies.
- (ii) To manage water resources within the Taw and Torridge freshwater catchments to ensure they do not have deleterious effect upon the estuary catchment.
- (iii) To monitor water resources availability and demand within the catchment.
- (iv) To develop and implement appropriate arrangements to manage resources in droughts.
- (v) To participate in a study to investigate falling water tables on Braunton and Northam Burrows.

## CATCHMENT STATUS

### 4.4 Fisheries - Current Status

The overall objectives for the estuary fishery are as follows:

- \* the maintenance of satisfactory populations of shellfish and fin fish to allow their continued survival and exploitation;
- \* the continued protection of migratory fish (particularly salmonids) to aid in the recovery of stocks to support commercial and sport fisheries and allow sufficient escapement for optimum natural production.

The Taw/Torridge Estuary supports the following fisheries:

- \* migratory fish including salmon, sea trout and eels;
- \* sea fish (fin fish) including bass, mullet, cod, whiting and species of flatfish;
- \* shellfish including mussels, oysters, cockles and winkles.

Since our records started in 1951, the salmon fishery has declined, although catches of sea trout, whilst showing large annual variations, have maintained a level underlying trend in the past few years. This salmonid fishery has been controlled by a Net Limitation Order since 1979, with the number of licensed nets currently restricted to fourteen. In 1990, a voluntary agreement was reached with salmon netmen who, in exchange for compensation, have undertaken to cease netting for the five years up to and including 1995. The decline of the salmon fishery is attributable to problems within the freshwater sections of both rivers, although illegal exploitation in the estuary and at sea reduces the adult stocks. Small-scale exploitation of eel stocks is carried out in the estuary, with some trapping of adults and netting of elvers (young eels). The Authority has introduced new legislation (15 July 1993) which licenses these activities and regulates the construction and use within the estuary of eel fishing instruments.

The estuary supports both commercial and sport fisheries for sea fish with bass being the most important target species, followed by mullet and flounder. Bass stocks are under severe pressure round the British Isles and this has been reflected by the concern for juvenile stocks in the estuary. A number of bass conservation measures were introduced by MAFF during 1990.

Small-scale collections of shellfish are made in the estuary. As a result of bacterial and viral contamination from estuarine and riverine effluent loads, shellfish from the Taw/Torridge Estuary have to be washed in clean water for twenty-four hours before being considered fit for human consumption.

## **CATCHMENT STATUS**

### **4.4 Fisheries - Current Status**

Following the introduction of further legislation controlling bacterial levels in shellfish flesh EC Shellfish Health Directive (91/492/EEC), the status and future of the shellfish fishery in the estuary has been thrown into considerable uncertainty. The problems caused by this legislation and its implementation have yet to be resolved.

#### **Problems Identified**

- \* Declining salmonid stock levels.
- \* Illegal exploitation of adult salmonids.
- \* Pressure on both adult and juvenile bass populations.
- \* Contamination of shellfish flesh by bacteria and viruses.

#### **Targets**

The following targets are proposed for estuary fisheries:

- (i) Ensuring that juvenile sea fish stocks are given maximum protection.
- (ii) Enforcement of the Bass Nursery Regulations within the estuary.
- (iii) Maintaining adequate monitoring of fish stocks.
- (iv) Ensuring that shellfish management is carried out effectively to prevent overcropping.
- (v) Continued control of the commercial netting of salmon and sea trout including a complete closure of the net fishery for the five years 1991-1995 and a retention of a Net Limitation Order of fourteen licensed nets.
- (vi) Monitoring sea fish catches to assess the need for an estuary closure byelaw, preventing the netting of sea fish as a further aid to the conservation of salmon and sea trout.
- (vii) Establishing adequate enforcement measures to protect fish stocks in the estuary and allow the free passage of migratory fish through the estuary.
- (viii) Ensuring that sufficient dilution is given for effluents, particularly in sea fish nursery areas and to prevent the inhibition of the movements of migratory fish.

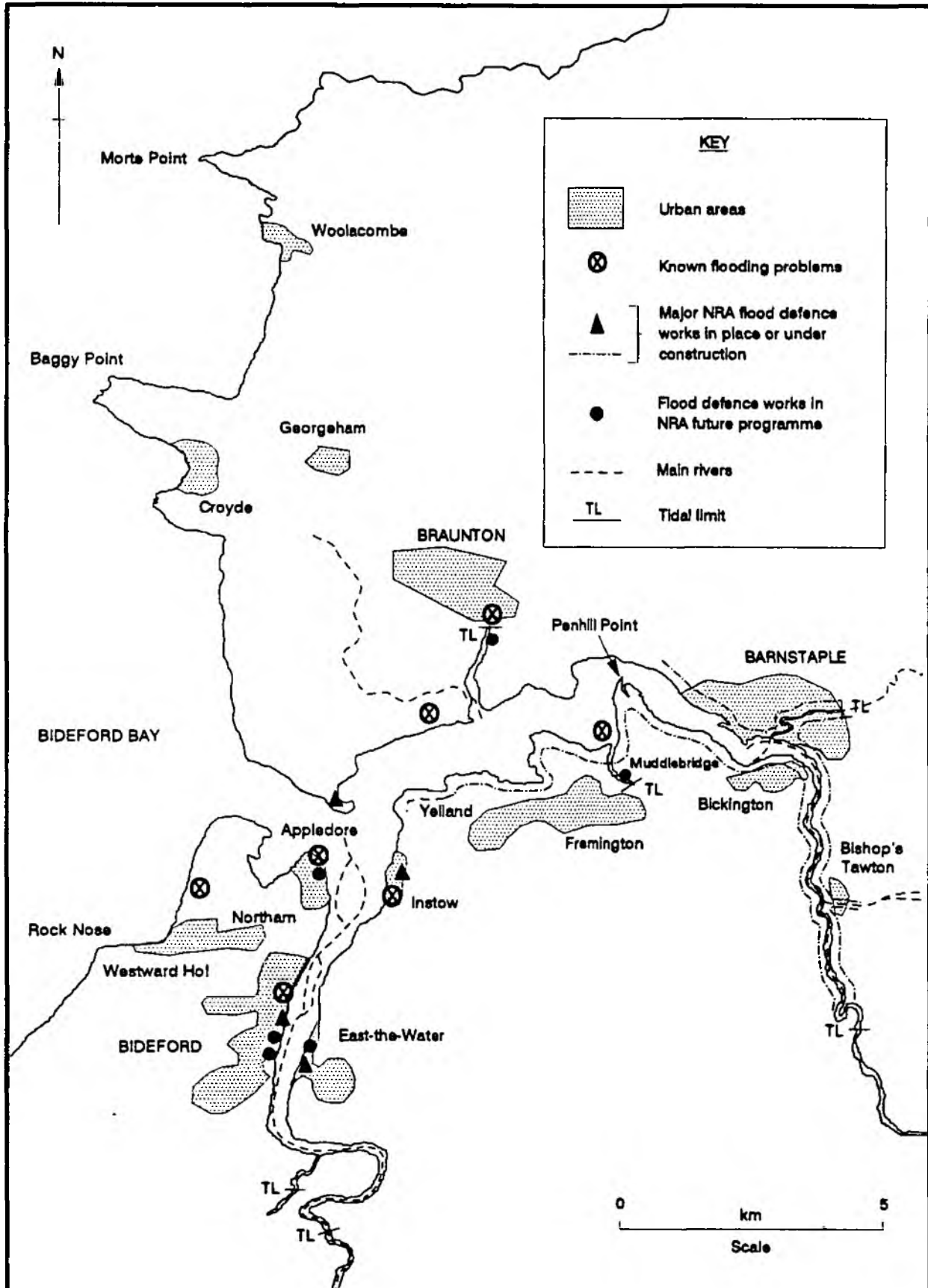
## **CATCHMENT STATUS**

### **4.4 Fisheries - Current Status**

- (ix) Seeking to influence the development of appropriate environmental standards to allow continued harvesting of shellfish.

# TAW/TORRIDGE ESTUARY CATCHMENT

## FLOOD DEFENCE SCHEMES/PROPOSALS



## **CATCHMENT STATUS**

### **4.5 Flood Defence - Current Status**

Because of the predominantly rural nature of the catchment there are limited flooding problems.

It is intended to investigate all urban locations shown as liable to flooding under the Section 24(5) Survey carried out under the Water Act 1973, and to promote schemes for flood defence where these are economically justified. Promoting of schemes within the capital programme is determined by the Regional Flood Defence Committee according to a points rating system.

In protected areas, the river bank should not be breached by a flood flow with a specified return period: generally 100 years for built-up areas.

In flood plains the river bank should be breached by a flood flow with a specified return period. This is dependent on land use.

A national standards of service system has been developed under an NRA research project. Work is in progress, and application of this methodology to the tidal reach of the River Taw from which appropriate standards of service will be assessed. Similar work will be carried out on the River Torridge tidal reach in due course.

When completed, the catchment will be assessed against the national standards to determine any maintenance or capital works necessary to reduce the frequency of flooding.

A major scheme has been carried out to protect the urban area of Barnstaple from tidal and fluvial flooding and a major tidal defence scheme has recently commenced to protect Bideford. An extensive programme for improvement of the River Taw tidal bank, protecting mainly agricultural land, commenced in 1980. Only two banks at Horsey Island and Chivenor remain unimproved. Because of changes in policy it is unlikely that these banks will be improved.

Locations set out below were identified in the Section 24(5) Survey carried out under the Water Act 1973 as liable to flooding:

Barnstaple - River Taw  
Barnstaple (Sticklepath) - River Taw  
Bishop's Tawton - River Taw  
Instow - River Taw/Torridge  
Appledore - Estuary Mouth  
Bideford - River Torridge  
Weare Giffard - River Torridge  
Westward Ho! - Estuary Mouth



## **CATCHMENT STATUS**

### **4.5 Flood Defence - Current Status**

Barnstaple and Barnstaple (Sticklepath) were protected by the Barnstaple tidal defence scheme carried out in 1982-1990. Bishop's Tawton was included in Stage 2 of the River Taw tidal embankments carried out in 1980-1982. A scheme to protect Instow was completed in 1992, and a scheme to protect Weare Giffard was completed in 1993. A scheme is included in the five year capital programme to protect Appledore, in addition to completion of works commenced at Bideford in 1990, the Braunton tidal defences and a small scheme at Muddlebridge. Some work has been carried out by Torridge District Council on the Pebble Ridge and sea defences at Westward Ho! but further improvements are required.

The sea defence survey - phase 4 tidal defences recently carried out by the NRA, identified a number of tidal defences as having a low standard of protection or being in an adequate condition. Apart from the locations identified above, protection is to low grade agricultural land and no further action is proposed.

#### **Targets**

- (i) In built-up areas to use appropriate engineering solutions to defend people and property against flood flows with a specified return period (generally 100 years).
- (ii) To assess the catchment against the national system for evaluating levels of service for flood defence, and to determine any works necessary to reduce the frequency of flooding of agricultural land.
- (iii) To seek to influence or control developments to the built environment in flood plains to minimise future potential for increases in flood risk.
- (iv) To assess changing flood defence engineering practices including the development of soft engineering options and managed retreat.

## **CATCHMENT STATUS**

### **4.6 Recreation - Current Status**

The NRA has not historically monitored the recreational use of the estuary and surrounding land and are therefore dependent on the surveys carried out by the Sports Council, Local Authorities and other interested parties. Information from these sources indicate a greater demand on the area from both passive and active recreational pursuits. The NRA's recreational objectives are as follows:

- \* To maintain and where possible improve water quality estuary topography and access, to allow for suitable recreational use.
- \* To incorporate recreational criteria into all NRA actions and consenting procedures to further recreational use and protect public access.
- \* To seek to influence other bodies to ensure recreational activities are promoted in a suitable manner.
- \* To monitor recreational use and develop a recreational data base for present and future users of the estuary.

Recreational use of the area over the last fifteen years has generally increased with the introduction of surfing, sailboarding and the greater use of powered craft on the water. The development of long distance walks and recreational areas has encouraged more use of sites such as Saunton, Braunton and Northam Burrows. Much of this increased activity has little impact on matters where the NRA has direct responsibility through legislation and landownership. Reports of conflict are limited to the use of powered craft interfering with other recreational activities or recreational use causing erosion to fragile wildlife habitats. Recreational use of land owned by the NRA within the study area was evaluated in 1992 and a programme of site management plans is to be developed. Recreational facilities and interpretative information has been incorporated into a recent tidal defence scheme at Instow where an improved slipway was constructed, together with information boards and a footpath beside the estuary.

#### **Targets**

The following targets are proposed for recreational development:

- (i) Ensure that environmental assessments are carried out for all flood defence schemes and that opportunities for recreational enhancement are identified and implemented. Schemes include: Appledore, Bideford, Braunton and Muddlebridge.
- (ii) Develop site management plans to encourage appropriate recreational use on all existing owned and maintained flood defence works.

## **CATCHMENT STATUS**

### **4.6 Recreation - Current Status**

- (iii) Ensure that all NRA consents look to protect and enhance the recreational potential of the estuary. This will include land drainage, discharges, abstractions and impoundments.
- (iv) Comment on the recreational impact of all proposed developments and District Plans affecting the water environment.
- (v) Develop a monitoring and recording system for the recreational use of the estuary to be made available to the general public.

## CATCHMENT STATUS

### 4.7 Conservation - Current Status

The NRA has not historically monitored the Taw/Torridge Estuary and surrounds for changes in the conservation value. Information is available on certain fish stocks, benthic invertebrates and chemical water quality. This information collected by the NRA together with data provided by other authorities allows for trends over the last fifteen years to be evaluated and objectives to be formulated. The NRA's conservation objectives are as follows:

- \* To maintain and where appropriate, improve water quality, water resources and catchment features so as to sustain an ecology appropriate to an estuary in such a geographical situation and to safeguard the identified special conservation interests.

#### Estuary and Coastal Zone

The ecology of the sub-tidal and inter-tidal zones of the estuary and coast is too poorly monitored to confidently demonstrate any significant difference. The dynamic nature of the estuary is seen in the changes to shape and force of channels and sand bars. This creates problems in accurate monitoring of the abundance of benthic invertebrates, and the evaluation of the impact of activities such as dredging. Surveys of vertebrate populations found within the estuary have shown mixed results. Bass between 0-2 year old have been studied for the last eleven years and have shown considerable variation but no consistent long term trend. Surveys on wildfowl and waders have found a decline in the average number of birds present during passage and overwintering on the estuary. Peak numbers of certain waders e.g. oystercatchers, lapwing, golden plover, dunlin and redshank are also lower than in the late 1970s. Wildfowl have varied in numbers but show less of a decline and dark bellied brent geese have reflected the national population growth. Habitat loss within the intertidal area through development has not been significant although losses due to landfill and flood defence schemes have occurred.

#### Terrestrial

Phase 1 habitat surveys undertaken in the early 1980s demonstrates the land use at the time. There have been no subsequent detailed studies on the area to quantify changes although the NRA are presently developing an aerial survey habitat analysis to provide this information. Braunton Marsh has been denotified as a SSSI during the last fifteen years largely as a result of stricter conservation criteria rather than a decrease in the ecological value of the site. Other areas such as Northam Burrows, Isley Marsh and Braunton Swan Pool have become actively managed to protect their conservation status. Braunton Burrows the most significant terrestrial nature conservation site within the study area continues to be managed as a National Nature Reserve by English Nature. The reserve faces increasing public pressure and changes to habitats through succession and a lowering of the water levels within the dune system.

## **CATCHMENT STATUS**

### **4.7 Conservation - Current Status**

Modifications in landscape and heritage values tend to be over a much longer period than the fifteen years currently being considered. Primary changes during this time have been largely political with increased protection through designation and protective legislation.

#### **Targets**

The following targets are proposed to protect and enhance the conservation value of the estuary:

- (i) Ensure that environmental assessments are carried out for all capital flood defence schemes and that mitigation and enhancement actions to protect the conservation interests are enforced. Schemes will include the development of new wetland areas in the Velator/Wrafton area, as a result of the Braunton Tidal Defence Scheme.
- (ii) Develop site management plans on all existing owned and maintained flood defence works, to maximise the nature conservation benefit in line with their flood defence function. Consideration will be given to managed retreat and habitat creation where appropriate.
- (iii) Ensure that all NRA consents take into account the conservation requirement to protect and enhance features of special conservation interest. This will include land drainage, discharges, abstractions and impoundments.
- (iv) Comment on the conservation significance of all proposed developments and district plans which will impact on the water environment or associated land.
- (v) Promote conservation enhancement in relation to water quality problems with Braunton Marsh.
- (vi) Establish a conservation monitoring programme to identify change in the ecological status of the catchment.

## CATCHMENT ISSUES

### 5.1 Introduction

Through the preparation of this plan we have been able to identify a number of issues which require consideration by all those interested in the future of the catchment's natural water environment.

Each issue is presented in the following manner:

- (i) A short description of the issue.
- (ii) An attempt to determine the options to address the issue.
- (iii) An assessment of the advantages and disadvantages associated with a particular option.

## **CATCHMENT ISSUES**

### **5.2 Issues and Options**

#### **5.2.1 Issue No.1 - Impact of Effluent Discharges**

**Minimise the impact of effluent discharges to achieve water quality standards in controlled waters.**

- Option No.1** Carry out appropriate monitoring to identify changes and give early warning of deterioration of water quality caused by effluent discharges. Develop and introduce improved techniques for monitoring pollution and ameliorating the impact of pollution when it occurs.
- Option No.2** Monitor effluent discharges to ensure compliance with existing consent conditions and enforce the Water Resources Act 1991 where appropriate.
- Option No.3** Review effluent discharge consents in line with NRA policy; determine new standards and revoke redundant consents as necessary; introduce nutrient standards having regard to sensitive waters; in accordance with the appropriate European and National Legislations.
- Option No.4** Promote and enforce appropriate discharge consents for South West Water's sewage disposal schemes; Veratec Ltd; RAF Chivenor and significant storm overflows.
- Option No.5** Carry out pollution prevention visits to ensure adherence with 'best practice' and 'good housekeeping' principles at sewage works, industrial sites and MOD sites and activities.
- Option No.6** Maintain close links with industry, commercial organisations and the public to publicise and promote environmental protection and enhancement.
- Option No.7** Review strategy for reduction of 'Annex 1A' substances to estuary from riverine sources.

## **CATCHMENT ISSUES**

### **5.2 Issues and Options**

#### **5.2.2 Issue No.2 - Development Control**

**The crucial role of Planning Authorities in determining development of the built and rural environment cannot be overstated. The NRA's ability to influence development control will depend on clarity, consistency and understanding.**

- Option No.1 To continue to maintain close liaison with Planning Authorities, the Highways Authority, South West Water Services Limited and the Waste Regulation Authority. Road drainage, sewage disposal and waste disposal have significant influences on water quality, water quantity, conservation, recreation and flooding in the estuary.**
- Option No.2 The production of local, strategic and national plans by Planning Authorities allows the NRA to ensure protection of the water environment and associated land is considered within the planning process.**
- Option No.3 The production of the Taw/Torridge Estuary Management Plan by the Local and County Councils will enable a wider discussion about the potential conflicts, needs and expectations of those who visit, work and live in the estuary catchment.**
- Option No.4 Consider the redevelopment of Northam Waste Disposal Site to prevent detrimental impacts on the water environment.**



## **CATCHMENT ISSUES**

### **5.2 Issues and Options**

#### **5.2.3 Issue No.3 - Promote Conservation Initiatives**

**The high conservation significance of the study area is recognised by the NRA. Emphasis will be on the conservation of existing ecological landscape and historic elements through the NRA direct actions and consenting procedures. Opportunities for conservation enhancement through habitat creation will be developed in association with flood defence and water quality actions.**

- Option No.1 To integrate conservation evaluation and actions into all NRA direct works.**
- Option No.2 To apply conservation criteria to all NRA consenting procedures and condition accordingly.**
- Option No.3 To encourage ecologically sensitive working practices by other parties working within and around the water and wetland environment.**
- Option No.4 To liaise with other environmental protection bodies to ensure the co-ordination of protection and enhancement works.**
- Option No.5 To consider the management proposals made in the local councils management plan and support where appropriate.**

#### **5.2.4 Issue No.4 - Ecological Monitoring**

**Changes in the ecology of the estuary and surrounding land resulting from changing land use, will influence the conservation status of the area. There is recognised need for the NRA to monitor changes at a strategic and site-specific level. The resulting information will inform the NRA and others of the need to modify direct actions or consents to take account of these changes.**

- Option No.1 Monitor ecological status of the study area via aerial survey interpretation, river corridor habitat, plant and invertebrate surveys and make the information available to interested parties.**
- Option No.2 Maintain and develop links with other environmental organisations, monitoring and researching areas of conservation interest and integrate the findings.**

## **CATCHMENT ISSUES**

### **5.2 Issues and Options**

#### **5.2.5 Issue No.5 - Protect and Improve the Estuary for Water Sports**

**The North Devon economy is increasingly reliant on tourism and the quality of bathing waters is a key issue. The achievement of the European Directive Standards for bathing waters must be achieved.**

**Option No.1** Ensure appropriate treatment, including sludge disposal at South West Water's Sewage Treatment Works, including Ashford (Barnstaple), Velator (Braunton), Yelland, Westleigh, Bideford and Westward Ho!.

**Option No.2** Ensure other industrial and sewage treatment works are maintained and improved to protect bathing waters, including Brannoc Fibres, RAF Chivenor and Fremington Army Camp.

**Option No.3** Investigate and where appropriate, remedy impact of river sources and bacteriological sources on water quality.

#### **5.2.6 Issue No.6 - Protect and Improve Shellfish**

**The health of shellfish and their suitability for human consumption is dependant on water quality. The EC Shellfish Hygiene Directive will shortly restrict commercial shellfish harvesting within the estuary. Improvements in water quality are required to ensure a future for the commercial exploitation of shellfish in the catchment.**

**Option No.1** Ensure the achievement of appropriate water quality standards over shellfish beds.

**Option No.2** Liaise with EHO's over the health of shellfish in the estuary and seek to identify where improvements can be made.

**Option No.3** Determine the management protocols for shellfish, including export of spat, reseedling and harvesting in conjunction with MAFF, EHO's and English Nature.

## **CATCHMENT ISSUES**

### **5.2 Issues and Options**

#### **5.2.7 Issue No.7 - Impact of Dredging Operations**

**Within the estuary, significant sand recovery and maintenance of shipping channels is undertaken. This activity impacts on water quality and can cause local impacts on the ecology of the estuary.**

**Option No.1 Seek to influence best practice and ensure positive liaison with MAFF, the licensing Authority.**

**Option No.2 Stop sand and gravel extraction.**

#### **5.2.8 Issue No.8 - Minimise Pollution Incidents**

**The NRA will seek to prevent sudden pollution caused by oil spillages, sewage, industrial effluent, agriculture and road traffic accidents. This will be achieved by a programme of inspection visits followed by requests for remedial action where appropriate. Similarly, when incidents occur action should be taken to minimise the impact on the water environment and associated flora and fauna.**

#### **5.2.9 Issue No.9 - Monitor Water Resources**

**In order that both long term planning and resource management, particularly at times of low flow in droughts, is effective, it is important to monitor the situation.**

**Option No.1 Maintain existing hydrometric network to relevant standards to effectively monitor water resource availability.**

**Option No.2 Review the need for groundwater level monitoring at representative sites in the estuary catchments.**

**Option No.3 Investigate the groundwater levels in Braunton Burrows and Northam Burrows to determine the likely cause and impacts of the falling water table.**

**Option No.4 Monitoring availability and demand and plan as appropriate.**

## **CATCHMENT ISSUES**

### **5.2 Issues and Options**

#### **5.2.10 Issue No.10 - Minimise Impact of Abstractions**

**Minimise the impact of abstractions and impoundments, particularly at times of low flow.**

**Option No.1** Review water resources information and abstraction returns to identify sites where future impacts are likely to be detrimental at times of low flow and assess whether alleviation is required using national guidelines.

**Option No.2** Monitor abstractions to ensure compliance with existing licence conditions and enforce Water Resources Act 1991 where appropriate.

#### **5.2.11 Issue No.11 - Impact of Nutrient Enrichment**

**Identify the causes of eutrophication and minimise the sources of excessive nutrient enrichment.**

**Option No.1** Review monitoring information.

**Option No.2** Identify sources and extend controls to reduce the input to the estuary from riverine sources.

**Option No.3** Identify and control the concentration of phosphates and nitrates from effluent discharges.

**Option No.4** Investigate the impact of water quality in Braunton Marshes.

## **CATCHMENT ISSUES**

### **5.2 Issues and Options**

#### **5.2.12 Issue No.12 - Reverse Decline of Salmon, Sea Trout and Trout Stocks**

**In common with many rivers in the South West, the Torridge has seen a decline in salmon, sea trout and trout stocks. The estuary plays a vital role in ensuring passage of fish, in addition to those outlined for water quality and quantity there are specific fisheries management issues.**

**Option No.1 Maintain net and rod catch controls in the catchment.**

**Option No.2 Obtain broodstock for salmon, sea trout and brown trout.**

**Option No.3 Review the evidence of fish monitoring studies to limit exploitation with the development of fishery targets and continued stock improvements. Striking the correct balance is essential.**

**Option No.4 Consider imposition of byelaws to ban netting.**

**Option No.5 Consider introduction of 'slap' or 'close' period to permit fish passage into the freshwater Torridge.**

**Option No.6 Seek to control methods of fishing baits and lures, season timing and catch and release practices.**

**Option No.7 Enforce fisheries legislation.**

#### **5.2.13 Issue No.13 - Maintain Flood Defences**

**It is necessary to maintain existing flood defences, both tidal and sea, to ensure their continued operation to design standards in order to protect people and property from flooding. This includes defences owned by the NRA, the District Councils or privately owned.**

**Option No.1 A physical assessment of defences has been completed but there is a continuing need for inspection and review of performance.**

**Option No.2 Assess the ecological and recreation potential of all flood defences to ensure maintenance procedures protect and promote such interests.**

## **CATCHMENT ISSUES**

### **5.2 Issues and Options**

#### **5.2.14 Issue No.14 - Construct New Flood Defences**

Where existing tidal or sea defences require improvement or construction, following an assessment of need, the NRA identifies the location, promotes a scheme and seeks the support of the local community to proceed. A public inquiry is currently outstanding for upgrading the Bideford Quay Tidal Defences (September 1993).

Option No.1 Carry out an assessment of need for new flood defences.

Option No.2 Carry out an environmental assessment to determine opportunities for enhancement, including managed retreat.

Option No.3 Evaluate proposals for flood defence schemes at Muddlebridge, Appledore, Bideford and Braunton.

#### **5.2.15 Issue No.15 - Planning for Climate Change**

Climate change has been predicted. Likely increase in sea level and temperature have been published. Research continues to identify likely impacts on water resources availability and flood defence. When acceptable scientific forecasts are available an appropriate strategy can be formulated.

Option No.1 Once acceptable evidence on likely changes becomes available, forecast likely impacts on water environment of the Taw/Torridge Estuary and consider measures to ameliorate deleterious ones.

Option No.2 Review flood defences to determine the likely impact of climate change and rise in sea level.

Option No.3 Promote timely development of additional water resources in an acceptable manner, incorporating proper protection for the water environment should climate change indicate the need.

## **CATCHMENT ISSUES**

### **5.2 Issues and Options**

#### **5.2.16 Issue No.16 - Visionary Issues**

**In an attempt to determine how the water environment will develop the following options identify some visionary issues for the catchment.**

- Option No.1** The value of buffer zones in the estuary catchment may be in protecting water quality and fisheries, stabilising banks and associated saline environments and preserving the special ecosystem habitats. The problem is who pays and who decides the management priorities.
- Option No.2** Powers in the Water Resources Act 1991 to determine water protection zones may benefit the catchment. We would seek wide consultation on the appropriateness, scale and forum of such zones.
- Option No.3** As water quality improves and leisure activities continue to grow the conflicting recreational and conservation uses will need careful management. Whilst for the most part these issues are not a matter for the NRA to resolve the Authority will have a significant role to play.
- Option No.4** Any development, such as a third river crossing at Barnstaple, or an estuary barrage, will have significant environmental impacts and the NRA will ensure protection of the water environment by advising an impact, remedial action and water management issues.
- Option No.5** Reinstate saltmarsh habitat where appropriate.
- Option No.6** Determine the opportunities for managed retreat of flood defences.

## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.1 - IMPACT OF EFFLUENT DISCHARGES			
Options	Responsibility	Advantages	Disadvantages
1. Monitoring of surface and groundwaters	NRA	Better data and planning	None
2. Monitoring of discharges	NRA/Dischargers	Better data and maintenance	Cost to dischargers
3. Review discharge consents	NRA/Dischargers	Update standards	Cost to dischargers
4. New discharge consents	NRA/Dischargers	Extend control of discharge	Cost to dischargers
5. Pollution prevention visits	NRA	Close pollution control Individual targets	Cost
6. Publicity and promotion	NRA	Community action Better understanding and control	Cost
7. Reduction of riverine pollution sources	NRA	Better control of pollution	None



## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.2 - DEVELOPMENT CONTROL			
Options	Responsibility	Advantages	Disadvantages
1. Maintain close liaison with planning authorities, highway authorities, SWWSL and Waste Regulation Authorities	NRA/DCC/ NDDC/SWWSL	Better planning co-ordination	Conflicting needs and aims
2. Input to local plans, strategic plans and specific development initiatives	NRA	Introduction of water protection at the planning stage	None
3. Input to the Local Authorities' Taw Torridge Estuary Management Plan	NRA	Wider consideration of management needs of estuary	Conflicting needs and aims
4. Redevelopment of Northam Waste Disposal Site	NRA/WRA/ WDA	Pollution prevention Protection of groundwater	None, but cost of redevelopment and compliance

## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.3 - PROMOTE CONSERVATION INITIATIVES			
Options	Responsibility	Advantages	Disadvantages
1. Integrate conservation advice into all NRA works	NRA	Better planning Environmental gain	Time Cost
2. Apply conservation criteria to all NRA consenting procedures	NRA	Better planning Environmental gain	Time Cost
3. To encourage ecologically sensitive working practices	NRA/Others	Environmental gain	Cost to others
4. Maintain close links with other environmental protection bodies	NRA/Conservation interests	Better planning	Time Cost
5. To consider supporting Local Authorities' conservation proposals	NRA/DCC/NDDC/ TDC	Better planning Environmental gain	Time

## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.4 - ECOLOGICAL MONITORING			
Options	Responsibility	Advantages	Disadvantages
1. Ecological monitoring	NRA	Better data and planning	Cost/Time
2. Maintain links with other environmental organisations	NRA/Environmental Organisations	Exchange of information Improved data set	None

ISSUE NO.5 - PROTECT AND IMPROVE THE ESTUARY FOR WATER SPORTS			
Options	Responsibility	Advantages	Disadvantages
1. Appropriate sewage treatment for SWWSL discharges	NRA/SWWSL	Compliance with EC Bathing Water Directive	Cost to SWWSL
2. Appropriate treatment for non-SWWSL discharges	NRA/Dischargers	Compliance with EC Bathing Water Directive	Cost to Dischargers
3. Investigate impact of river sources of bacteria	NRA	Improved water quality	Complexity/Cost

## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

<b>ISSUE NO.6 - PROTECT AND IMPROVE SHELLFISH</b>			
<b>Options</b>	<b>Responsibility</b>	<b>Advantages</b>	<b>Disadvantages</b>
1. Ensure the achievement of appropriate water quality standards	MAFF/DoH/DoE/ MOH	Recommencement of commercial shellfish harvesting	Cost No measures available to control discharges
2. Liaise with EHOs to identify where improvements are needed	NRA/MOH/NDDC/ TDC	Better information and planning	None
3. Develop management protocols for shellfish	NRA/MAFF/NDDC /TDC/ English Nature	Better management	Cost/Complexity

<b>ISSUE NO.7 - IMPACT OF DREDGING OPERATIONS</b>			
<b>Options</b>	<b>Responsibility</b>	<b>Advantages</b>	<b>Disadvantages</b>
1. Liaise with MAFF to ensure 'best practice'	NRA/MAFF	Minimise impacts	Cost to operators Complexity
2. Stop sand and gravel extraction	NRA/DCC/NDDC	Reduce threat to flood defences	Loss of revenue to operators

## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.8 - MINIMISE POLLUTION INCIDENTS			
Options	Responsibility	Advantages	Disadvantages
1. Minimise pollution incidents	NRA	Reduce incidents Minimise impact	Cost and complexity

ISSUE NO.9 - MONITOR WATER RESOURCES			
Options	Responsibility	Advantages	Disadvantages
1. Maintain existing hydrometric network	NRA	Effective planning and management	None
2. Review need to monitor groundwater levels	NRA/Owners	Better management	Cost
3. Investigate falling water table at Braunton Burrows	NRA/English Nature/National Trust/IDB	Better understanding	Cost
4. Monitoring availability and demand	NRA	Better management	Cost

## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.10 - MINIMISE IMPACT OF ABSTRACTIONS			
Options	Responsibility	Advantages	Disadvantages
1. Assess alleviation options	NRA	Environmental gain	Cost
2. Monitor and enforce abstraction licences	NRA	Reduce environmental impact	Cost

ISSUE NO.11 - IMPACT OF NUTRIENT ENRICHMENT			
Options	Responsibility	Advantages	Disadvantages
1. Review monitoring information	NRA	Improved understanding	Cost
2. Identify and control riverine nutrient sources	NRA	Better control of algal blooms	Cost/complexity
3. Identify and control sources of nutrients from discharges	NRA	Better control of algal blooms	Cost
4. Investigate water quality in Braunton Marshes	NRA/English Nature	Better understanding	Cost

## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.12 - REVERSE DECLINE OF SALMON, SEA TROUT AND TROUT STOCKS			
Options	Responsibility	Advantages	Disadvantages
1. Maintain net and rod catch controls	NRA	Reduces exploitation Faster results	Data collection to support case Cost Riparian dissent
2. Develop broodstock	NRA/Others	Wide gene pool, long term options	Cost
3. Balance exploitation with stock enhancement	NRA	Long term goal	Complex Debatable issue
4. Byelaws to ban netting	NRA	Rapid reduction in exploitation	Time/Cost
5. Introduce 'slap' or 'close' period	NRA	Reduces exploitation	Time/Cost Riparian dissent
6. Control fishing methods	NRA	Greater fish escapement	Policing
7. Enforce fisheries legislation	NRA	Legal Control	None

## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.13 - MAINTAIN FLOOD DEFENCES			
Options	Responsibility	Advantages	Disadvantages
1. Review performance of schemes	NRA/NDDC/TDC/ DCC/Owners	Maintain protection for people and property	None
2. Assess ecological and recreation potential	NRA/Others	Environmental gain	Cost

ISSUE NO.14 - CONSTRUCT NEW FLOOD DEFENCES			
Options	Responsibility	Advantages	Disadvantages
1. Assess need for new defences	NRA	Better planning Better protection for people and property	None
2. Environmental assessment	NRA	Better planning/Environmental gain	Cost
3. Evaluate scheme proposals	NRA	Better protection for people and property	None



## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.15 - PLANNING FOR CLIMATE CHANGE			
Options	Responsibility	Advantages	Disadvantages
1. Forecast likely impacts	NRA	Better planning	Cost
2. Review existing flood defences	NRA	Better planning	Cost
3. Additional water resources	NRA	Better planning	Cost

## CATCHMENT ISSUES

### 5.3 Summary of Issues and Options

ISSUE NO.16 - VISIONARY ISSUES			
Options	Responsibility	Advantages	Disadvantages
1. Develop buffer zones	Landowners/ Countryside Commission	Environmental protection Reduce diffuse pollution Reduce flooding	Cost Who pays?
2. Develop water protection zones	NRA	Water protection	Cost
3. Manage conflicting recreational and conservation uses	NRA/DCC/NDDC/ TDC/Conservation Interests	Better management Resolution of conflicts	Cost Time Complexity
4. Future development	NRA	Protection of environment	Cost
5. Reinstate saltmarsh habitat	NRA/Conservation interests	Environmental gain Planning for managed retreat	Cost Conflicts of use
6. Managed retreat of flood defences	NRA/TDC/NDDC/ DCC/Landowners	Reduced cost Environmental gain	Cost Controversial

## 6. THE WAY FORWARD

This document has been produced through internal discussion and a desk study of readily available reports produced by organisations such as local authorities. It builds on the consultation in 1990 on the pilot Catchment Management Plan and the issues raised in the Taw and Torridge Catchment Action Plans.

Whilst every effort has been made to ensure the accuracy of the information in the plan we are aware that it may contain a number of omissions and inaccuracies. Our next step, therefore, is to consult with organisations, groups and individuals interested in the future of the catchment's water environment. We believe that consultation will enable us to :

- \* clarify the extent and distribution of current uses of the catchment;
- \* assess the importance of catchment uses;
- \* identify the wide range of likely, possible and potential future catchment uses;
- \* expose catchment specific issues to a wide audience;
- \* ensure decisions on the future management of the catchment are based on accurate information and the fullest possible range of views from interested parties.

In commenting on this plan we hope that you will tackle both points of detail and strategic issues. In particular we are keen for you to consider the following questions:

- \* have we correctly identified both current and future uses of the catchment?
- \* have we fairly assessed the issues and what opinions do you have on them?
- \* have we missed any issues?
- \* how should we progress evaluation of the issues and the development of strategies and action plans?

During the consultation period comments can be submitted in writing to:

Taw/Torridge Estuary Catchment Management Plan  
Geoff Bateman  
Planning Manager  
National Rivers Authority  
South Western Region  
Manley House  
Kestrel Way  
Exeter EX2 7LQ

All comments must be with us by Tuesday 30 September 1993.

Our consultation phase incorporates a number of separate but linked activities. These include :

- \* distribution of the full plan to key organisations, groups and individuals;
- \* a general leaflet and display for use in libraries and other public areas; and
- \* organisation of a forum for key consultees to discuss issues towards the end of the consultation phase.

At the end of the consultation phase we will have to consider in detail the results of the process before producing a definitive Catchment Management Plan. The Final Plan will define both a strategy for the future management of the catchment and a series of action plans for the NRA and others to implement in order to deliver the strategy.

The information and views you provide us with now are therefore a very important step in the overall process. We hope you will respond positively to our initiative so that we can jointly develop a vision for the Taw/Torridge Estuary Catchment. The next steps are shown below.

Who's Involved	The CMP Steps	Timetable
NRA	Production of CMP Consultation Report by NRA SW	by 1 August 1993
NRA and everyone interested in the future of the catchment	Consultations with organisations, groups and individuals	from 3 August 1993
NRA and key groups, organisations, and individuals	On-going discussions as appropriate with key groups and individuals	until 30 September 1993
NRA	Production of Final CMP	1 December 1993

## 7. REFERENCES

1. River Torridge Catchment Management Plan Consultation Report, NRA South Western Region, May 1993.
2. Taw Torridge Estuary Management Plan, W S Atkins Environment, July 1993.
3. Estuaries Management Plans Coastal Process and Conservation Taw-Torridge Estuary, Coastal Research Group, University of Glasgow, July 1993.
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5. Admiralty Tide Table. Volume 1, 1993, European Waters including Mediterranean Sea. The Hydrographer of the Navy, 1992.
6. South West Water Environmental Survey. Mathematical Modelling and Long Term Monitoring of the Taw-Torridge Estuarine Region Reports A to W, Wimpol Ltd, April 1990.
7. National Rivers Authority, Policy and Practice for the Protection of Groundwaters.
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9. Final Declaration of the Third International Conference on the Protection of the North Sea. The Hague, 8 March 1990.
10. T R Turner, Water Resources Planning - Strategic Options, R & D Note 35, December 1991.
11. River Quality: The 1990 Survey and Future Outlook, NWC, ISBN 0901090360, 1981.

### Support Documents

National Rivers Authority, South West Region: Taw/Torridge Estuary Management Plan, Stage 1: Statement of Catchment Uses and Problem Identification, 1990.

Proposals for Statutory Water Quality Objectives (Water Quality Series No. 5) Report of NRA, December 1991.

National Water Council River Water Quality: The Next Stage, Review of Discharge Consent Conditions, London, 1977.

## REFERENCES

The Devon River Authority (Exceptions from Control) Order 1970, SI No. 137.

River Taw Catchment Action Plan, NRA South West, 1992.

River Torridge Catchment Action Plan, NRA South West, 1992.

Council Directive on Pollution Caused by the Discharge of Certain Dangerous Substances into the Aquatic Environment (76/464/EEC). Official Journal of the European Community, No L 129/23.

Council Directive of 21 May 1991 Concerning Urban Waste Water Treatment (91/271/EEC). Official Journal of the European Communities, No L 135/40.

Council Directive of 17 December 1979 on the Protection of Groundwater Against Pollution Caused by Certain Dangerous Substances (80/68/EEC). Official Journal of the European Communities, No L 20/43.

Council Directive of 8 December 1975 Concerning the Quality of Bathing Water (76/160/EEC). Official Journal of the European Communities, No L 31/1.

Council Directive of 15 July 1991 Laying Down the Health Conditions for the Production and Placing on the Market of Live Bivalve Molluscs (91/492/EEC). Official Journal of the European Communities No L 268/1.

Council Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources (91/676/EEC).

## **8. APPENDICES**

- Appendix 8.1    **Devon River Authority Sea Fisheries Byelaws**
- Appendix 8.2    **NWC Estuary Classification System (Ref. 11)**
- Appendix 8.3    **NRA Sampling Sites in Taw/Torridge Estuary**
- Appendix 8.4    **EC Bathing Water Directive 'concerning the quality of bathing water' (76/160/EEC)**
- Appendix 8.5    **EC Dangerous Substances Directive 'on pollution caused by certain substances discharged in the aquatic environment of the community' (76/464/EC)**
- Appendix 8.6    **Shellfish Hygiene Directive 'laying down the Health conditions for the Production and Placing on the Market of Live Bivalve Molluscs' (91/492/EEC)**
- Appendix 8.7    **3rd North Sea Conference - Priority Hazardous Substances (Annex 1A List of Substances)**
- Appendix 8.8    **Pollution Incident Categories**

## APPENDICES

### Appendix 8.1 Devon River Authority Sea Fisheries Byelaws

(applicable to the estuaries of the Rivers Taw and Torridge)

**Note:** These Byelaws were made by the Devon River Board; the River Board was superseded by the Devon River Authority on 1 April 1965, and by virtue of the Water Resources Act 1963, these Byelaws are still in force.

- 1 **APPLICATION:** The following Byelaws shall apply to the whole of the area or areas in respect of which the Devon River board (hereinafter referred to as 'the Board') have the powers of a Local Fisheries Committee, under the River Boards Act 1948, and the Sea Fisheries Regulation Acts 1888 to 1930, as amended or extended by any other enactment, except in the cases to which the provisions of the Thirteenth Section of the Sea Fisheries Regulation Act 1888, apply: PROVIDED that nothing in such Byelaws shall apply to a person fishing solely for scientific or experimental purposes or removing shellfish for stocking or breeding under the written authority in that behalf of the Board signed by their Clerk, and in accordance with the conditions contained in that authority.
- 2 **REVOCATION OF EXISTING BYELAWS:** All Byelaws of the Board relating to sea fisheries hitherto in force in the Board's area are hereby repealed, provided that nothing in such repeal shall affect any penalty, forfeiture or punishment incurred in respect of any offence committed against any Byelaws so repealed.
- 3 **TRAWLING AND TRAMMELLING:** No person shall use in fishing for sea fish any kind of trawl net or trammel net except in the area to the West of a line drawn from the most westerly point of North Tail to the most westerly point of South Tail.
- 4 **STAKE OR STOP NETS:** No person shall use any stake or stop net in fishing for sea fish except in accordance with the following regulations:-
  - (a) The site of the net shall be marked by buoys or other marks visible above the surface of the water at high water of spring tides, and such buoys or marks shall be maintained so long as stakes of the net continue in position.
  - (b) No portion of the net shall be at a less distance than 150 yards from any portion of any other stake or stop net.
  - (c) No portion of the net shall be nearer the centre of any stream or channel than the edge of such stream or channel at low water of any tide.
  - (d) No iron or metal supports for nets and no wire netting shall be used.
  - (e) No stake or fixed support shall remain in position after the expiry of 14 days after the net has been removed or the use of the net has been discontinued, whichever shall be the shorter period.



## APPENDICES

### Appendix 8.1 Devon River Authority Sea Fisheries Byelaws

- 5 **MESH AND NETS:** No person shall use in fishing for sea fish any net unless it has in all its parts a mesh of such dimension that when the mesh is stretched diagonally lengthwise of the net a flat gauge 3 inches broad and  $\frac{3}{32}$  of an inch thick will pass through it easily when the net is wet.
- 6 **REDUCING MESH OF NETS:** No person shall use any double net or over-lapping net, or any artifice so as to reduce the effective size of the mesh of any net to a size prohibited by these Byelaws.
- 7 **SHELLFISH - MINIMUM SIZES:** No person shall remove from a fishery:-
  - (a) Any oyster that will pass through a gauge having a circular opening of  $2\frac{1}{2}$  inches in diameter.
  - (b) Any mussel of less than 2 inches in length.
  - (c) Any cockle that will pass through a gauge having an aperture of  $\frac{3}{4}$  inch square.
  - (d) Any edible crab measuring less than  $4\frac{1}{2}$  inches across the broadest part of the back.
  - (e) Any lobster or crawfish measuring less than 9 inches from the tip of the beak to the end of the tail when spread as far as possible flat.
- 8 **LOBSTERS, CRAWFISH AND CRABS:** No person shall remove from a fishery and berried edible crab, lobster or crawfish or any soft shelled crab or crawfish.
- 9 **SHELLFISH - REDEPOSIT OF:** Any person who by inadvertence takes any shellfish, the removal of which from a fishery is prohibited by any of the Byelaws, or the possession or sale of which is prohibited by or in pursuance of any Act of Parliament, shall forthwith redeposit the same as nearly as possible in the place from which they were taken or under the written authority of the Clerk on other suitable ground, and, in redepositing cockles, in accordance with this Byelaw shall spread them thinly and evenly over the beds.

## APPENDICES

### Appendix 8.1 Devon River Authority Sea Fisheries Byelaws

- 10 **REGULATION OF SHELLFISH BEDS**: Where, in the opinion of the Board, in any fishery any bed or part of a bed of shellfish is so severely depleted as to require temporary closure in order to ensure recovery, or any bed or part of a bed contains mainly immature or undersized shellfish which in the interests of the protection and development of the fishery ought not to be disturbed for the time being, or any bed or transplanted shellfish ought not to be fished until it has become established, and where the bed or part thereof has been clearly defined in notices displayed in the vicinity prohibiting the removal or disturbance of the shellfish, or where the display of notices is not possible written notice has been given by one of the Board's Officers, no person shall, while the bed or any part thereof is so defined, take away or otherwise disturb any shellfish without the consent of the Board.
- 11 **DEPOSIT OF REFUSE**: No person shall deposit or discharge any solid or liquid substance detrimental to sea fish or sea fishing except in such places and at such times and in such quantities, and subject to such conditions as may from time to time be prescribed by the Board, in writing, under the hand of their Clerk.

**IN WITNESS** whereof the Common Seal of the Board was hereunto affixed this Fourteenth day of November 1962,

The Common Seal of **THE DEVON**  
**RIVER BOARD** was hereunto ) (L S)  
affixed in the presence of:-)

(Signed) F GENT  
Chairman

(Signed) C B LUCAS  
Deputy Clerk

---

Confirmed by Minister of Agriculture, Fisheries and Food on 8 January 1963.

## APPENDICES

### Appendix 8.2 NWC Estuary Classification System (Ref. 11)

#### ALLOCATION OF POINTS

##### Aesthetic Quality

(One description only is chosen)

- (a) Estuaries or zones of estuaries that either do not receive a significant polluting input or which receive inputs that do not cause significant aesthetic pollution.  
10 Points
- (b) Estuaries or zones of estuaries which receive inputs which cause a certain amount of aesthetic pollution but do not seriously interfere with estuary usage.  
6 Points
- (c) Estuaries or zones of estuaries which receive inputs which result in aesthetic pollution sufficiently serious to affect estuary usage.  
3 Points
- (d) Estuaries or zones of estuaries which receive inputs which cause widespread public nuisance.  
0 Points

##### Biological Quality

(Scores under a,b,c and d are summed)

- (a) Allows the passage to and from freshwater of all relevant species of migratory fish, when this is not prevented by physical barriers. (Relevant species include salmonids, eels, flounders and cucumber smelts etc.)  
2 Points
  - (b) Supports a residential fish population which is broadly consistent with the physical and hydrographical conditions.  
2 Points
  - (c) Supports a benthic community which is broadly consistent with the physical and hydrographical conditions.  
2 Points
  - (d) Absence of substantially elevated levels in the biota of persistent toxic or tainting substances from whatever source.  
4 Points
- Maximum score 10 Points

## APPENDICES

### Appendix 8.2 NWC Estuary Classification System

#### Chemical Quality

(One value only is chosen)

	<u>Value</u>	<u>Score</u>
Dissolved oxygen exceeds a saturation value of:	60%	10
	40%	6
	30%	5
	20%	4
	10%	3
	Below 10%	0

#### DESCRIPTION OF QUALITY PARAMETERS

##### Aesthetic Quality

In assessing aesthetic quality the following factors are considered: smell, colour, debris, oil, recognisable sewage solids, and effects from discharge of domestic or industrial effluent.

The assessment also takes into account the natural turbidity of the waters in the area, algal growth, and the frequency with which floating oil and debris enter the area.

##### Biological Quality

Biological quality is classified by the following features:

(a) Passage of migratory fish

Except where other uses are deemed of greater importance, an estuary should allow the passage of all those species of migratory fish which can be supported by the freshwater reaches. The estuary would fail this criterion if the passage of one or more of the relevant species were seriously impeded by adverse water quality. Thus certain east coast estuaries, for instance, would not be failed because migratory salmonids do not pass through them, but would be failed if they did not allow the passage of elvers and eels. Similarly, an estuary would not be failed on this parameter if the only impediment to migration was a physical barrier. The main deterrent to migration is usually low dissolved oxygen, and this is reflected in the classification score under chemical quality.

## APPENDICES

### Appendix 8.2 NWC Estuary Classification System

However, the scheme takes into account the possibility that fish might be able to migrate through an estuary with the lowest water quality classification if at the appropriate time there is sufficient dissolved oxygen present to allow migration to occur. For example, the lowest dissolved oxygen may occur during the third quarter of the year, whereas elvers and eels migrate during the second and fourth quarters respectively.

(b) Fish population

To comply with this parameter, the classification scheme requires that each area of the estuary contains a population of fish appropriate to the physical and hydrographic conditions for most of the time. It follows that where water quality criteria for recreational, commercial, or biological grounds are not met, fish populations will also be reduced, either sporadically or permanently, in numbers or species and this will therefore also cause the area of estuary to fail in this respect.

(c) Benthic community

To comply with this parameter the benthic community of each area would have a diversity and biomass which is consistent with the physical and hydrographic conditions. This parameter is included because the sedentary characteristics of benthic organisms reflect the conditions at a given location, in contrast to the fish population which is mobile. It is often not easy to determine whether the benthos is healthy or otherwise, although the extreme are readily recognisable. Thus the benthic community may need to show a substantial deterioration before its failure to comply can be stated with any certainty.

(d) Persistent toxic or tainting substances

The accumulation of toxic or tainting substances by estuarine organisms may affect their subsequent acceptability for human consumption, or the viability of populations of sensitive species. The presence of higher-than-background concentrations of persistent chemicals in the biota would not constitute grounds for failing an area of estuary on this parameter, unless the substances approach concentrations which could cause harm to the organisms or render knowledge of the nature of inputs to an estuary, there is no reason to expect the accumulation of such substances in the biota, parts of the estuaries would be given the highest rating.

## **APPENDICES**

### **Appendix 8.2      NWC Estuary Classification System**

#### **Chemical Quality**

The chemical quality is classified in terms of dissolved oxygen levels which refer to those obtained under the worst conditions, where necessary averaged with depth and over a tidal cycle. It is expected that water having a mean dissolved oxygen value of 60 per cent will exceed this value for a substantial portion of the time.

## APPENDICES

### Appendix 8.3      NRA Sampling Sites in Taw/Torridge Estuary

Estuary	Site Description	NGR
Taw	Little Pill	SS 5610 3059
Taw	Barnstaple	SS 5562 3310
Taw	Off Asford STW	SS 5310 3393
Taw	Off RAF Chivenor	SS 4885 3375
Torridge	Annery Kiln	SS 4623 2293
Torridge	By Pillmouth	SS 4615 2470
Torridge	At Bideford	SS 4580 2730
Torridge	Knapp House/ Appledore	SS 4673 2938
Combined Estuary	Off Airy Point	SS 4460 3280

## APPENDICES

### Appendix 8.4 EC Bathing Water Directive 'concerning the quality of bathing water' (76/160/EEC)

#### MICROBIOLOGICAL STANDARDS

Parameter	Units	Value (1)		Status	
		I	G	I	G
Total coliforms	no/100ml	10,000	500	95% of samples	80% of samples
Faecal coliforms	no/100ml	2,000	100	95% of samples	80% of samples
Faecal streptococci	no/100ml	-	100	-	80% of samples
Salmonella	no/l	0	-	95% of samples	-
Enterovirus	PFU/10l	0	-	95% of samples	-

PFU = Plaque Forming Units

Notes : (1) I = Imperative or Mandatory standard.  
G = Guideline standard.



## APPENDICES

### Appendix 8.4 EC Bathing Water Directive 'concerning the quality of bathing water' (76/160/EEC)

#### AESTHETIC CRITERIA

Parameter	Analysis Method	Description/Standard
Colour	Visual inspection	No abnormal change
Mineral oils	Visual inspection	No visible surface film
	Olfactory inspection	No odour
	mg/l after extraction and weighing dried residue	$\leq 0.3$
Surface-active substances (methylene-blue active)	Visual inspection	No lasting foam
	mg/l as lauryl sulphate	$\leq 0.3$
Phenols	Olfactory inspection	No specific odour
	mg/l	$\leq 0.05$
Transparency	m	1
Tarry residues, solid floating material, effluent slicks	Visual inspection	Absent

## APPENDICES

### Appendix 8.5 EC Dangerous Substances Directive 'on pollution caused by certain substances discharged in the aquatic environment of the community', (76/464/EC)

#### LIST I SUBSTANCES (TIDAL WATERS)

Parameter	Units	Value	Status (1)
Mercury (2)	$\mu\text{g Hg/l}$	0.3	AA,D
Cadmium (2)	$\mu\text{g Cd/l}$	2.5	AA,D
Hexachlorocyclohexane (HCH) (2)	$\mu\text{g/l}$	0.02	AA,T
Tetrachloromethane (CTC)	$\mu\text{g/l}$	12	AA
DDT (para-para DDT isomer) (2)	$\mu\text{g/l}$	0.01	AA
Total DDT (2)	$\mu\text{g/l}$	0.025	AA
Pentachlorophenol (PCP) (2)	$\mu\text{g/l}$	2	AA
'The Drins' (from 1 Jan 1989)	$\mu\text{g/l}$	0.03 (3)	AA,T
Aldrin (from 1 Jan 1994)	$\mu\text{g/l}$	0.01	AA
Dieldrin (from 1 Jan 1994)	$\mu\text{g/l}$	0.01	AA
Endrin (from 1 Jan 1994)	$\mu\text{g/l}$	0.005	AA
Isodrin (from 1 Jan 1994)	$\mu\text{g/l}$	0.005	AA
Hexachlorobenzene (HCB) (2)	$\mu\text{g/l}$	0.03	AA
Hexachlorobutadiene (HCBD) (2)	$\mu\text{g/l}$	0.1	AA
Chloroform	$\mu\text{g/l}$	12	AA
1,2-dichloroethane	$\mu\text{g/l}$	5	AA
Trichloroethylene	$\mu\text{g/l}$	10	AA
Perchloroethylene	$\mu\text{g/l}$	10	AA
Trichlorobenzene(TCB)	$\mu\text{g/l}$	0.4	AA

## APPENDICES

### Appendix 8.5      EC Dangerous Substances Directive 'on pollution caused by certain substances discharged in the aquatic environment of the community', (76/464/EC)

Proposals have been published for the following List I substances but these have not, so far, been adopted:

Trifluralin, endosulphan, simazine, triorganotin compounds (tributyltin oxide, triphenyltin acetate, triphenyltin oxide, triphenyltin hydroxide), atrazine, organophosphorus substances (azinphos-methyl, azinphos-ethyl, fenitrothion, fenthion, malathion, parathion and parathion-methyl, dichlorvos).

- Notes:
- (1) AA=Annual Average; D=Dissolved; T=Total
  - (2) A 'standstill' provision exists for concentrations in sediments and/or shellfish and/or fish
  - (3) Maximum of 0.005 for Endrin

## APPENDICES

### Appendix 8.5

**EC Dangerous Substances Directive 'on pollution caused by certain substances discharged in the aquatic environment of the community, (76/464/EC)**

#### LIST II SUBSTANCES (TIDAL WATERS)

Parameter	Units	Value (1)	Status
Lead	$\mu\text{g Pb/l}$	25	AA,D
Chromium	$\mu\text{g Cr/l}$	15	AA,D
Zinc	$\mu\text{g Zn/l}$	40	AA,D
Copper	$\mu\text{g Cu/l}$	5	AA,D
Nickel	$\mu\text{g Ni/l}$	30	AA,D
Arsenic	$\mu\text{g As/l}$	25	AA,D
Boron	$\mu\text{g B/l}$	7000	AA,D
Iron	$\mu\text{g Fe/l}$	1000	AA,D
pH	pH values	6 to 8.5 (3)	95% of samples
Vanadium	$\mu\text{g V/l}$	100	AA,T
Tributyltin	$\mu\text{g/l}$	0.002	M,T
Triphenyltin	$\mu\text{g/l}$	0.008	M,T
Polychlorochlormethyl-sulphonamidodiphenyl ether (PCSDs)	$\mu\text{g/l}$	0.05	T, 95% of samples
Sulcofuron	$\mu\text{g/l}$	25	T, 95% of samples
Flucofuron	$\mu\text{g/l}$	1.0	T, 95% of samples
Permethrin	$\mu\text{g/l}$	0.01	T, 95% of samples
Cyfluthrin	$\mu\text{g/l}$	0.001	T, 95% of samples

Notes:

- (1) National environmental quality standards recommended for the UK.
- (2) AA = Annual Average; D = Dissolved; T = Total; M = Maximum Allowable Concentration
- (3) A more restricted range of 7.0 to 8.5 should be applied for the protection of shellfish.

## APPENDICES

### Appendix 8.6      Shellfish Hygiene Directive 'laying down the Health conditions for the Production and Placing on the Market of Live Bivalve Molluscs' (91/492/EEC)

#### END PRODUCT STANDARD

- \*      Must be fresh and alive (response to percussion)
- \*      must contain <300 faecal coliforms or <230 *E.coli* per 100g shellfish flesh
- \*      no salmonella in 25g of flesh
- \*      no toxic or objectionable compounds such as those listed in Directive 79/923/EEC
- \*      Paralytic Shellfish Poison must not exceed 80 µg per 100g of flesh
- \*      Diarrhetic Shellfish Poison must not exceed 'dangerous levels'
- \*      provision for a future virological standard
- \*      provision for revision of bacteriological standard

#### CLASSIFICATION OF HARVESTING AREAS

<u>Category A</u>	<230 <i>E.coli</i> /100g <300 faecal coliforms/100g	flesh may go for direct human consumption
<u>Category B</u>	<4600 <i>E.coli</i> /100g <6000 faecal coliforms/100g (in 90% of samples)	must be depurated, heat treated or relaid to meet category A
<u>Category C</u>	<60,000 faecal coliforms/100g	must be relaid for long periods (2 months) to meet Category A or B (may also be heat treated by approved method)
<u>Category D</u>	above 60,000 faecal coliforms/100g or at discretion of Member State	Prohibited

## APPENDICES

### Appendix 8.7

#### 3rd North Sea Conference - Priority Hazardous Substances (Annex 1A List of Substances)

Mercury	Simazine
Cadmium	Atrazine
Copper	Triorganotin compounds
Zinc	Azinphos-ethyl
Lead	Azinphos-methyl
Arsenic	Fenitrothion
Chromium	Fenthion
Nickel	Malathion
Aldrin	Parathion
Dieldrin	Parathion-methyl
Endrin	Dichlorvos
Isodrin	Trichloroethylene
HCH	Tetrachloroethylene
DDT	1,1,1-trichloroethane
Pentachlorophenol	Trichlorobenzene
Hexachlorobenzene	1,2-dichloroethane
Hexachlorobutadiene	Polychlorinated biphenyls
Carbon tetrachloride	Dioxins (*)
Chloroform	
Endosulphan	
Trifluralin	

At the 3rd North Sea Conference, the UK Government undertook to reduce loadings (flow x concentration) of the 'Annex 1A' list of substances except dioxins (\*) entering UK tidal waters from rivers and direct discharges by 50% (70% for Hg, Cd, Pb) by 1995, against a 1985 baseline.

## APPENDICES

### Appendix 8.8      Pollution Incident Categories

#### Category 1

A major incident involving one or more of the following :

- (a) potential or actual persistent effect on water quality or aquatic life;
- (b) closure of potable water, industrial or agricultural abstraction necessary;
- (c) extensive fish kill;
- (d) excessive breaches of consent conditions;
- (e) extensive remedial measures necessary;
- (f) major effect on amenity value.

#### Category 2

A significant pollution which involves one or more of the following :

- (a) notification to abstractors necessary;
- (b) significant fish kill;
- (c) measurable effect on invertebrate life;
- (d) water unfit for stock;
- (e) bed of watercourse contaminated;
- (f) amenity value to the public, owners or users reduced by odour or appearance.

#### Category 3

##### Minor

Suspected or probable pollution which on investigation proves unlikely to be capable of substantiation or to have no notable effect.

## 9. GLOSSARY

### Terms:

ADF	Average Daily Flow
ATTURM	Royal Marines Amphibious Trials and Training Unit
AOD	At Ordnance Datum
AONB	Area of Outstanding Natural Beauty
BOD	Biochemical Oxygen Demand
CEGB	Central Electricity Generating Board
CMP	Catchment Management Plan
COPA	Control of Pollution Act
DCC	Devon County Council
DoE	Department of the Environment
DoH	Department of Health
EC	European Community
EHO	Environmental Health Officer
ESA	Environmentally Sensitive Area
EQS	Environmental Quality Standard
GQA	General Quality Assessment
IDB	(Braunton Marshes) Internal Drainage Board
MAFF	Ministry of Agriculture, Fisheries and Food
MHW	Mean High Water
MLW	Mean Low Water
MOH	Medical Officer of Health
NCC	Nature Conservancy Council
NGR	National Grid Reference
NLO	Net Limitation Order
NNR	National Nature Reserve
NRA	National Rivers Authority
NWC	National Water Council
OD	Ordnance Datum
PCB	Polychlorinated biphenyls
PSU	Practical Salinity Units
RAF	Royal Air Force
RNLI	Royal National Lifeboat Institution
RSPB	Royal Society for the Protection of Birds
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SWQO	Statutory Water Quality Objective
SWWA	South West Water Authority (prior to 1 September 1989)
SWWSL	South West Water Services Limited (from 1 September 1989)
TON	Total Oxidised Nitrogen
UNESCO	United Nations Education, Science and Culture Organisation
WDA	Waste Disposal Authorities
WRA	Waste Regulation Authorities



## GLOSSARY

### Signs:

< Less than

> Greater than

$\leq$  Less than or equal to

$\geq$  Greater than or equal to

### Definitions:

Q95: The flow that on average, is equalled or exceeded for 95% of the time.

Eutrophication: The enrichment of water by nutrients especially compounds of nitrogen and/or phosphorous, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned.

Transmissivity: The rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

Potable: Water of a suitable quality for drinking.

### Units:

m	metre(s)
m/s	metre(s) per second
km	kilometre(s)
km <sup>2</sup>	square kilometre(s)
mm	millimetre(s)
°C	temperature, degree(s) Centigrade
m/km	metre(s) per kilometre
m <sup>3</sup> /s(ec)	cubic metre(s) per second
m <sup>3</sup> /d(ay)	cubic metre(s) per day
m <sup>3</sup> p.a.	cubic metre(s) per year
µg/l	microgramme(s) per litre
ng/l	nanogramme(s) per litre
mg/l	milligramme(s) per litre
Ml	Megalitre(s)
Ml/day	Megalitres per day
kg	kilogramme(s)