RIVER TAW
CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT

NRA

National Rivers Authority
South Western Region

ENVIRONMENT AGENCY

Published December 1994

RIVER TAW CATCHMENT MANAGEMENT PLAN

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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.

Please comment, your views are important.

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

Geoff Bateman

GEOFF BATEMAN
AREA MANAGER (DEVON)

THE NATIONAL RIVERS AUTHORITY

The NRA's mission and aims are as follows:

"We will protect and improve the water environment by the effective management of water resources and by substantial reductions in pollution. We will aim to provide effective defence for people and property against flooding from rivers and the sea. In discharging our duties we will operate openly and balance the interest of all who benefit from and use rivers, groundwaters, estuaries, and coastal waters. We will be businesslike, efficient and caring towards our employees".

AIMS

- Achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters, through the control of pollution.
- Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.
- Provide effective defence for people and property against flooding from rivers and the sea.
- Provide adequate arrangements for flood forecasting and warning.
- Maintain, improve and develop fisheries.
- Develop the amenity and recreational potential of inland and coastal waters and associated lands
- Conserve and enhance wildlife, landscape and archaeological features associated with inland and coastal waters of England and Wales.
- Improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation authority.
- Ensure that dischargers pay the costs of the consequences of their discharges, and, as far as possible, to recover the costs of water environment improvements from those who benefit.
- Improve public understanding of the water environment and the NRA's work.
- Improve efficiency in the exercise of the NRA's functions and to provide challenge and opportunity for employees and show concern for their welfare.

THE RIVER TAW CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT

CONTENTS PAGE NUMBER

1.0 INTRODUCTION

Catchment Management Planning - What It Means

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
- control of pollution and improving the quality of rivers, groundwaters and coastal waters
- management of water resources and fisheries
- promotion of water-based recreation
- conservation of the natural water environment.

Integrated environmental management requires a cross-functional approach and often involves several organisations, working to shared objectives.

To achieve its aims the NRA must work with or seek to influence central 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. The NRA's principal tool to achieve this is catchment management planning. This management treats a river together with the land, tributaries and underground water connected with it, as a discrete unit or catchment. The catchment management plan sets out a common vision for a river catchment, reached through consultation. It identifies targets for catchment water quality, water quantity, physical features and riverine ecosystem and actions for the NRA and others to achieve.

We believe that it is important that the interests of all water users are considered in the development and protection of the water environment and have consequently chosen to promote our **vision** and management proposals via published Catchment Management Plans (CMPs).

Catchment Management Planning

Catchment Management Plans within the NRA are produced in two stages:

- Catchment Management Consultation Report and
- Catchment Management Final Plan.

The **Consultation Report** includes the sections shown on Figure 1 and outlined below:

- **Uses**
  The uses of the catchment are identified and discussed. The text is usually supported by a map. Uses may have impacts on the water environment and/or impose requirements on the water environment. Wherever possible or appropriate, objectives are identified to sustain this use.

- **Targets**
  By taking the targets relevant to the area in which each use takes place, overall 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 targets are not met raise issues which need to be addressed.

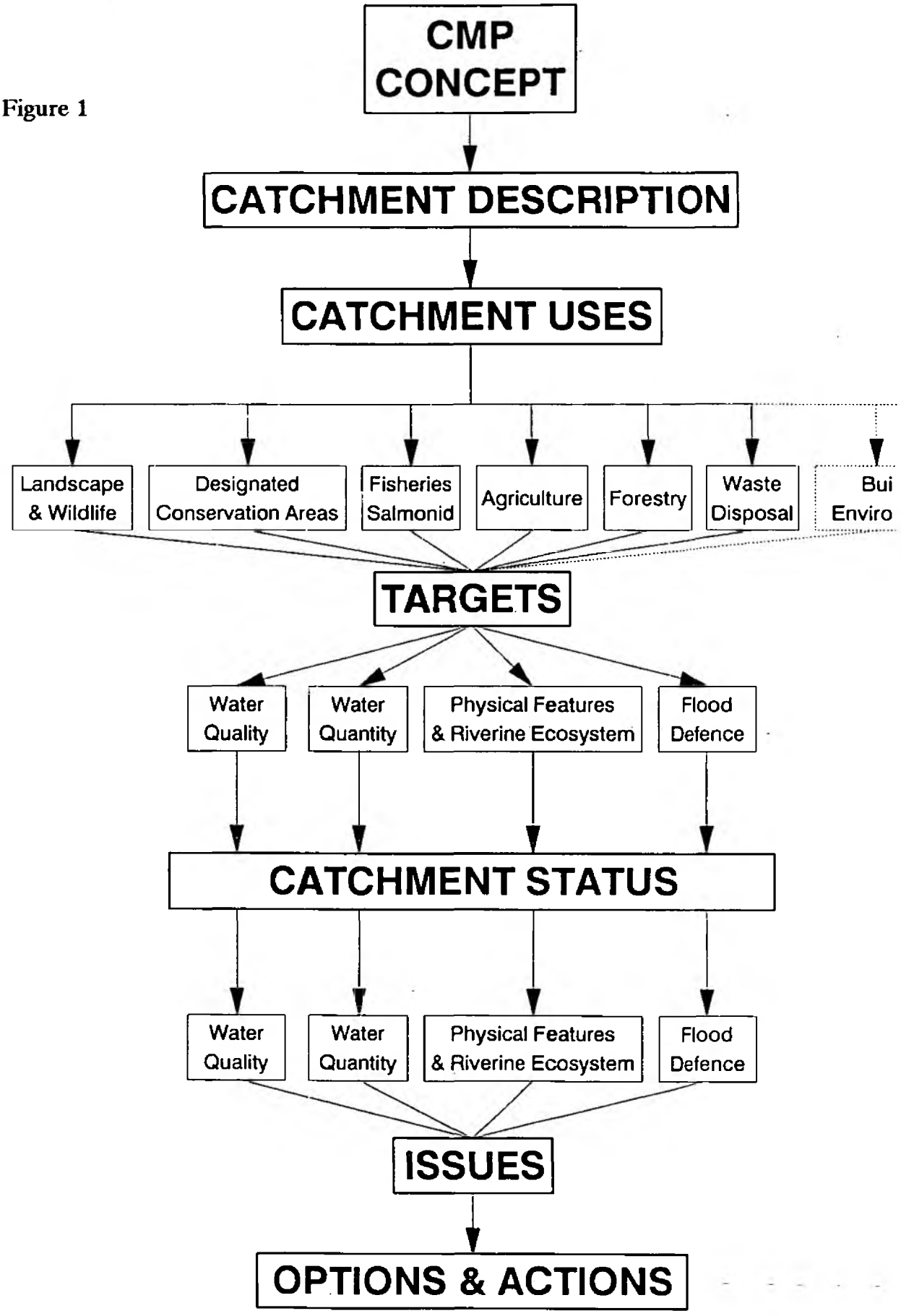
- **Issues and Options**
  The identified issues are discussed and where possible some options and/or necessary actions for their resolution are proposed. A tabulated summary of issues and options concludes this section. The organization responsible and also some advantages and disadvantages of the suggested options are proposed in the table.

The Catchment Management Plan 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 recognizes 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.**

Figure 1


CMP CONCEPT
CATCHMENT DESCRIPTION
CATCHMENT USES
Landscape & Wildlife
Designated Conservation Areas
Fisheries Salmonid
Agriculture
Forestry
Waste Disposal
Bui Enviro
TARGETS
Water Quality
Water Quantity
Physical Features & Riverine Ecosystem
Flood Defence
CATCHMENT STATUS
Water Quality
Water Quantity
Physical Features & Riverine Ecosystem
Flood Defence
ISSUES
OPTIONS & ACTIONS

Final Plan

The Final Plan will be produced following consultation and will have regard to the comments received and the level of resources 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.

The Final Plan is a consensus, and is, therefore, seen as an agreed action plan for improving the environmental quality of a catchment within certain economic and political constraints.

Limitations of Catchment Management Plans

The Final Plan 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 organizations or individuals. The NRA may have no powers to control the necessary actions directly. Therefore, we must ensure that this report is perceived as an agreed strategy for improving the environmental quality of a catchment within certain economic and political constraints. Improvements required to address catchment problems must be prioritized in the context of the funds available to the appropriate agency. This agency may be a Company or individual who may see little or no financial benefit in carrying out the actions, Local Authorities with government capping or Water Service companies with investment programmes approved by OFWAT and the DoE.

It will inevitably be the case that the achievement of some objectives will depend upon the Development Planning Policy of the County or District Council. The NRA is a consultee in the development of such policy, but it is recognized 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.

Agriculture is the largest land use in the River Taw Catchment, and farming practices are generally unrestricted, except through voluntary undertakings such as MAFF's Environmentally Sensitive Area scheme or management agreements for particular locations such as SSSI's. As a consequence, any changes considered necessary to achieve improvements in catchment management will normally require the full support and involvement of landowners and occupiers.

Whilst these limitations will inevitably hamper the achievement of our key objectives as stated in the 'vision', 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.

Area Perspective

For the purposes of the catchment management process the combined Taw/Torridge Catchment has been divided into three, covering an area of more than 2000 km².

The River Taw Catchment Management Plan is the third catchment management plan produced by the NRA South Western Region for the Taw/Torridge system. The River Torridge Catchment Management Plan Consultation Report (Ref. 1), which covers the freshwater River Torridge above its tidal limit and freshwater rivers feeding the Torridge estuary, was published in May 1993. The Taw/Torridge Estuary Catchment Management Plan Consultation Report (Ref. 2) was published in August 1993 alongside the Local Authorities Taw Torridge Estuary Management Plan (Ref. 3); it covers the estuary below the tidal limit and a short length of coastline.

The River Taw Catchment Management Plan Consultation Report completes the Taw/Torridge Catchment, it covers the River Taw above its tidal limit, and the rivers draining into the Taw estuary, including the River Caen, River Yeo (Barnstaple), and Bradiford Water.

The River Torridge Catchment Management Plan Final Report was published in September 1994 (Ref. 4).

1.1 VISION FOR THE RIVER TAW CATCHMENT

The River Taw Catchment offers a diverse environment for differing interests from its headwaters in upland moorland Dartmoor and Exmoor to the estuary on the North Devon coast at Barnstaple.

The catchment is home to a population of about 77,000 people most of whom live in the urban area of Barnstaple or in villages nearby. Many more visit to enjoy its natural beauty.

The main area of the river catchment, however, is rural in character and more sparsely populated, supporting traditional rural industries such as agriculture, quarrying and forestry as well as tourism.

Our vision for the River Taw Catchment is of a healthy and diverse water environment, managed in an environmentally sustainable way, balancing the needs of all users.

Changes in land use and the demands of development and tourism will require careful and considered management.

Key objectives will include:

- minimizing the impacts of these pressures on water quality, water quantity and the physical characteristics of the aquatic environment
- minimizing the risk to people and property from flooding
- enhancing the natural and semi-natural ecosystem through improvements to fisheries, aquatic and water fringe habitats
- restoring salmonid fisheries to their previous high quality.

It is important to recognize that already established partnerships will need to be reinforced and new areas of co-operation developed.

The NRA will work with other agencies and local representatives to promote and achieve integrated management of the catchment.

2.0 CATCHMENT DESCRIPTION

2.1 Introduction

The purpose of this section is to provide a general introduction to the River Taw Catchment and to describe some of its key features which are important to its management. For example, the Taw's geology, hydrogeology and soils are described which not only define the physical appearance of the catchment, but also help define its habitats, water quality, groundwater resources and flood defence; an understanding of climate and hydrology is important for flood defence, the passage of migratory fish and water resource management; an understanding of population data is important for the management of water resources, flood defence and waste disposal in the catchment.

The River Taw Catchment is situated in North Devon, and along with its major tributaries, the River Yeo (Lapford), River Mole and the Little Dart River, drains large areas of north and mid-Devon and West Somerset including the fringes of Dartmoor and Exmoor National Parks, see Figure 2.

The River Taw rises at Taw Head within the Dartmoor National Park at a level of 550 m Above Ordnance Datum (AOD). The River Taw and its tributaries flow through many scenic valleys before joining the Taw estuary above Barnstaple at Newbridge some 72 km from its source. Below the tidal limit the River Venn, River Yeo (Barnstaple), Bradiford Water and the River Caen all discharge into the River Taw Estuary.

The River Mole, the River Taw's major tributary, rises on Exmoor at Darlick Moors at a level of 350 m AOD. The River Mole flows generally south-westerly towards its confluence with the River Taw some 34 km from its source.

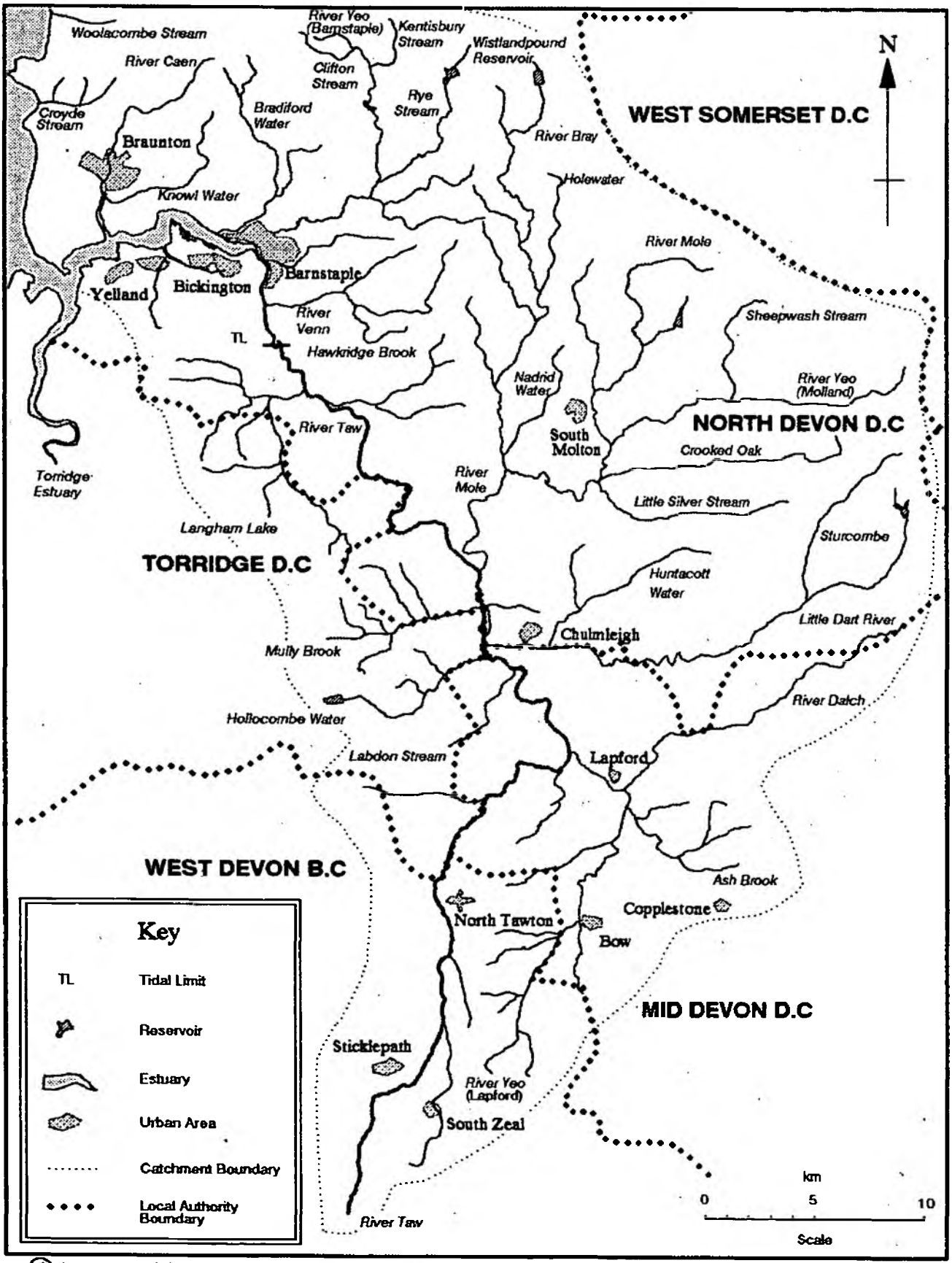
The catchment is mainly rural in nature and is sparsely populated with isolated farmsteads, villages and small towns. The major urban areas within the catchment lie around the Taw estuary, where almost half the catchment's population is based.

Historically, mining for metals such as copper, tin, silver and zinc was an important industry in the area. There are a total of fifty eight known abandoned mines in the catchment, most of which are located in the north and east and along the fringes of Exmoor, with just one in the upper Taw at Sticklepath. Drainage from abandoned mines and metal enriched rocks increases the metal concentrations in some rivers in the catchment.

Currently, the most important industry in the catchment is agriculture, principally dairy farming, livestock rearing and fish farming. Surface water abstractions for fish farms account for the largest licensed use of water resources in the catchment. Other important industries include those associated with agriculture, such as dairy processing; as well as quarrying for sandstone and gritstone; light industry associated with industrial estates; timber processing; cider production; generation of hydroelectric power and tourism.

THE RIVER TAW CATCHMENT

Figure 2



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Access to the catchment for both tourism and industry has recently benefited from the completion of the new North Devon link road, the A361(T). Although there are no main line British Rail stations in the catchment, a branch line - 'Tarka Line', which runs along the River Taw, does operate between Exeter and Barnstaple, providing a number of branch line stations.

KEY STATISTICS

Catchment Area 1242 km²

Major subcatchments

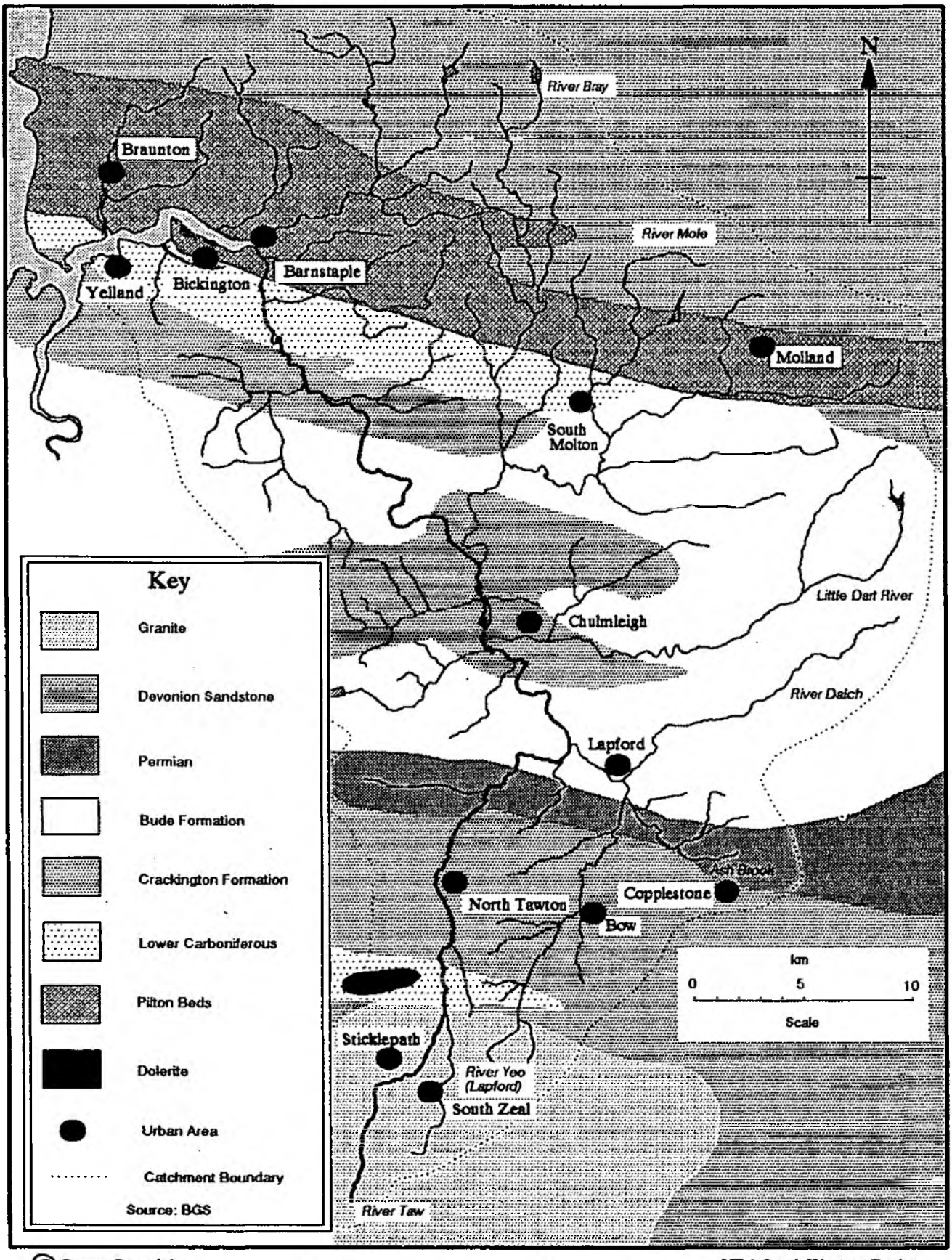
River	Area drained upstream of:	Area (km²)	Length of River
Taw	Barnstaple Bay	1242	N/A
Taw	Tidal Limit*	914	71.9
Mole	Confluence with Taw	348	34.1
Yeo (Lapford)	Confluence with Taw	132	22.4
Little Dart	Confluence with Taw	125	26.6
Yeo (Barnstaple)	Tidal Limit *	87	17.7
Caen	Tidal Limit *	40	11.9

Population (1991)	76,850 -
Major Towns	Barnstaple, Braunton, South Molton
Average Annual Rainfall (1941-1970)	868 mm (Chivenor) 2250 mm (Taw Head)
Main River Length (Maintained by the NRA for Flood Defence Purposes)	112.25 km
Controlled Water Length (Monitored for Water Quality Purposes)	415.7 km

* Tidal limits as defined in Section 192 of the Water Resources Act, 1991 (Ref. 5)

THE RIVER TAW CATCHMENT
Geology

Figure 3



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2.2 Geology, Hydrogeology and Soils

Geology

The rocks of the River Taw Catchment represent three geological periods; Permian, Carboniferous and Devonian. The catchment lies across a central area of Carboniferous rocks bounded to the south by Dartmoor granite and to the north by Devonian sandstones and slates, see Figure 3.

To the south of the catchment, in the area upstream of the confluence with the River Yeo (Lapford), the River Taw rises on Dartmoor granite overlain in part with Pleistocene and recent river terrace deposits. To the north of the confluence of the River Yeo (Lapford) and River Taw towards South Molton and the Rivers Bray, Mole and Yeo (Molland), the rocks consist predominantly of Upper Carboniferous sandstones, shales and siltstones, represented by the Crackington, Bude and Bideford Formations, which are intensely folded and faulted in the vicinity of Chumleigh. Around the margins of the Dartmoor granite intrusion, localised thermal metamorphism of the parent rocks into hard-baked shales has brought about copper, arsenic and iron mineralisation.

The area to the north of South Molton, drained by the Rivers Bray, Mole and Yeo (Barnstaple) and Yeo (Molland) consists of Upper Devonian sandstones, slates and shales.

Hydrogeology

Much of the River Taw Catchment is underlain by hard, fissured rocks of Devonian and Carboniferous age. Igneous permo-carboniferous rocks also outcrop. Bedrock of this nature is characteristically of low permeability and porosity. Groundwater flow in this area is mainly associated with the fractures and fissures in the rock body, and borehole yields are generally low. However, the water stored within these rocks does play a significant role in the catchment hydrology by providing reserves of groundwater which help maintain river base flow during dry weather.

In the south of the catchment, a narrow east-west band of Permian age breccias and conglomerates overlies the Crackington and Bude formations from Exbourne in the River Torridge Catchment to Talaton in the River Exe Catchment. The water stored within fractures and pockets of uncemented strata within these formations can provide substantial yields of water and form an important source of groundwater supply in the South West.

Alluvial deposits along the main river valley can also yield substantial quantities of groundwater. However, these supplies sometimes result in a direct loss of water in the adjacent river. The small area extent of alluvial deposits limits sustained long term development.

As well as the larger groundwater abstractions within the Permian breccias, and smaller abstractions from the river valley alluvial deposits, small scale abstractions (generally <20 m^3/day) from boreholes, wells and springs for potable and agricultural use are thought to be widespread. However, as with the River Torridge Catchment, a large part of the River Taw Catchment is within a zone exempt from groundwater abstraction licensing controls and, therefore, only limited information on the use of groundwater resources is available.

Soils

The soils in the River Taw Catchment reflect the underlying geology. The predominant soil types are ferric stagnopodzols and typical brown podzolic soils which consist of loamy and medium loamy material respectively, and support grassland for stock rearing and conifer forests. In the upper Taw Catchment, peat soils (on high ground) and humic brown podzolic soils overlay Dartmoor granite.

Further south around the fringes of the Dartmoor granite, there is a band of typical non-calcareous pelosols. Generally, this soil type, which is clay in nature, is associated with grassland, supporting dairy, beef and sheep. However, some cereals are grown, often for on-farm consumption of the grain and straw.

Typical brown alluvial soils occupy much of the River Taw Valley above the confluence with the River Yeo (Lapford) and below the confluence with the River Mole. In addition to these areas, further deposits are situated in the River Mole and Bray subcatchments downstream of South Molton and Brayley Barton respectively. The soil provides excellent arable cropping where embankments have reduced the risks of floods.

The Lower Pilton Beds which are found around the southern part of Exmoor and the Carboniferous geology in the centre of the catchment are overlain by Typical Brown Earths and Pelo-stagnogleys. These soils provide much of the arable land in the catchment, but are also associated with the use of recreation and forest sites which yields above the national average for species such as Douglas Fir, Sitka, Japanese Larch, Norway Spruce and Oak.

2.3 Hydrology

River flow is currently monitored at six river gauging stations in the River Taw Catchment. Four of the sites, at Umberleigh, Woodleigh, Leehamford Bridge and Yeotown are linked to the NRA's regional telemetry network and are also used for flood warning purposes. All data collected from river gauging stations are available on the NRA's Hydrometric Information and Processing System (HIPS) archive.

River Gauging Stations

Map No.	Station	River	NGR	Data Collected
1	Leehamford Bridge	Bray	SS 677 399	Oct 1979-date
2	Taw Bridge*	Taw	SS 673 068	Apr 1969-date
3	Umberleigh	Taw	SS 608 237	Sep 1958-date
4	Veraby*	Yeo (Molland)	SS 774 266	May 1968-date
5	Woodleigh	Mole	SS 660 211	Jan 1965-date
6	Yeotown	Yeo (Barnstaple)	SS 593 353	May 1968-date

* Proposed Telemetry site.

There are currently nine instantaneous water level (flood warning) stations in the catchment which are used for flood warning purposes, four of these sites are also used for river gauging purposes, as mentioned above. Water level data are collected once a day from these sites via the Public Switched Telephone Network. During a flood event the stations are contacted more frequently. In addition to these sites there is a proposal for a flood warning station at Bow (river level only), see Figure 6.

Flood Warning Stations

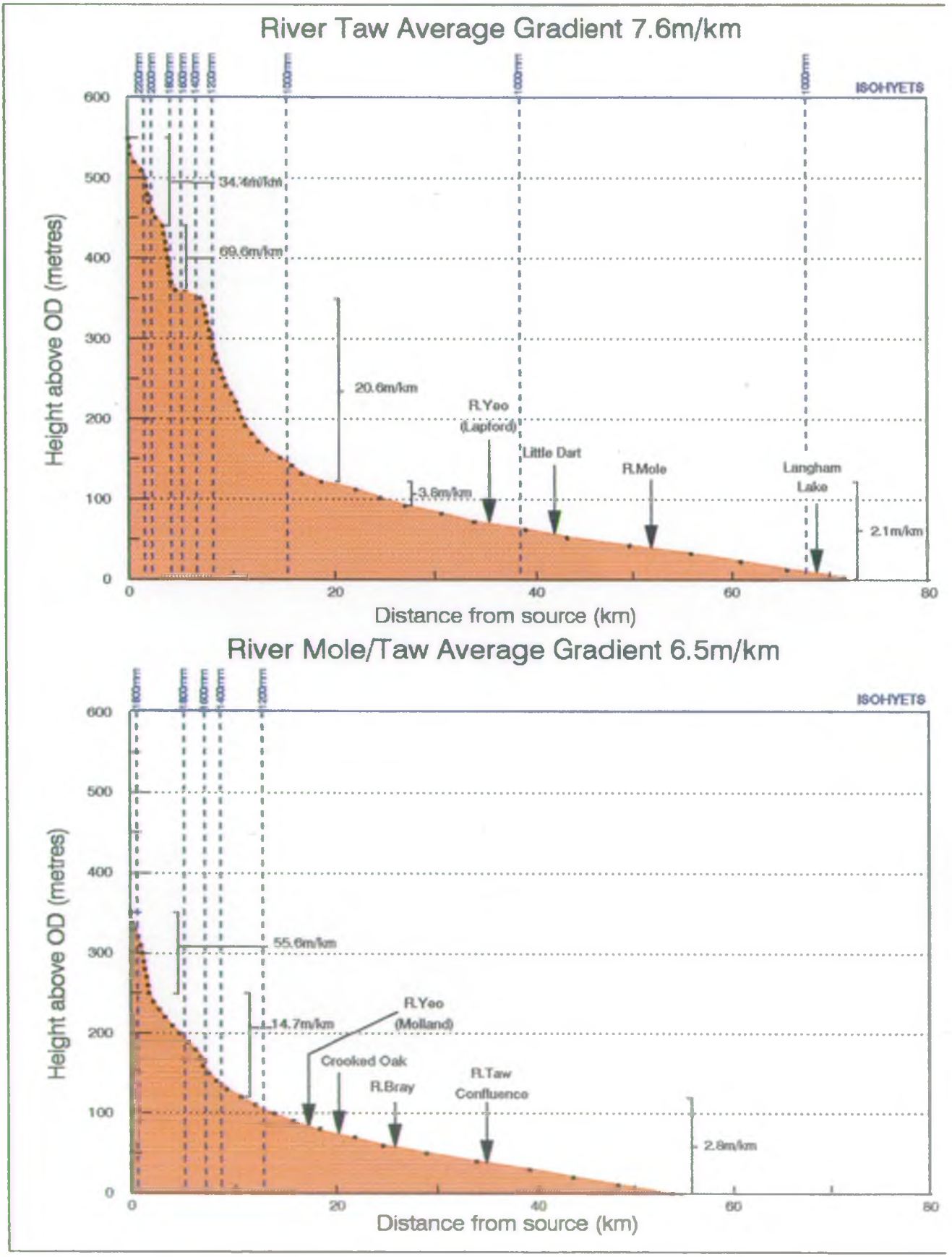
No	Station	River	NGR	Type of Station
6	Yeotown	Yeo(Barnstaple)	SS 593 353	River Level
3	Umberleigh	Taw	SS 608 237	River Level
5	Woodleigh	Mole	SS 660 211	River Level
7	Chulmleigh	Little Dart	SS 691 137	River Level
8	Lapford	Yeo (Lapford)	SS 726 081	River/Rain
9	Mole Mills+	Mole	SS 723 257	River/Rain
10	Newtown Bridge	Taw	SS 694 325	River Level
1	Leehamford Bridge	Bray	SS 677 399	River Level
11	Stoney Bridge	Caen	SS 494 394	River/Rain
12	Sticklepath	Taw	SX 647 948	River/Rain

+ Site to be relocated upstream
River/Rain = River Level Station and rain-gauge site combined

THE RIVER TAW CATCHMENT

River Profiles

Figure 4



The NRA's Low Flow Study at Taw Marsh in the upper reaches of the River Taw involved the drilling (and subsequent water level monitoring) of two observation boreholes in 1992. Monitoring ceased in September 1994.

Groundwater Stations

Site	NGR	Data Collected
Taw Marsh Borehole 2	SX 620 913	July 1990 - September 1994
Taw Marsh Borehole 7	SX 617 907	July 1990 - September 1994

The River Taw rises at a level of 550m AOD on Dartmoor and although the river descends off the moor at over 34m/km, its average gradient over its total length of 72km is only 7.6m/km. The River Mole rises at a much lower elevation of 350m AOD on Exmoor but has a slightly steeper profile of 9.1m/km over its 34km length. These profiles together with the underlying geology help to characterise the flow regimes of these rivers, see Figure 4.

An analysis of the thirty four year flow record (1959-1993) for Umberleigh gauging station on the River Taw indicates a mean daily flow of 18.0 m^3/s and a measured Q95 flow of 1.203 m^3/s. The Q95 flow represents 6.7% of the mean daily flow. This percentage is low and reflects the 'flashy' nature of this river system, i.e. it responds quickly to rainfall.

The flashy river response reflects the type of soil and subsoil, and low groundwater storage in the catchment. After heavy rainfall the river responds with characteristically rapid rises in river levels, high flood peaks and rapid reductions in flow after the rainfall ceases. These characteristics are enhanced in the steep upper reaches of the River Taw. A maximum daily mean flow of 335 m^3/s and maximum instantaneous flow of 650 m^3/s were both recorded on 4 December 1960.

On average, flows may be expected to fall below the Q95 flow for eighteen days per year. In the drought years of 1976, 1984, 1989 and 1990 flows were below this level for 92, 84, 67 and 33 days respectively. The minimum flow which was recorded on 28 August 1976 was 0.202 m^3/s, approximately 1% of the mean daily flow.

RIVER TAW AT UMBERLEIGH

Figure 5

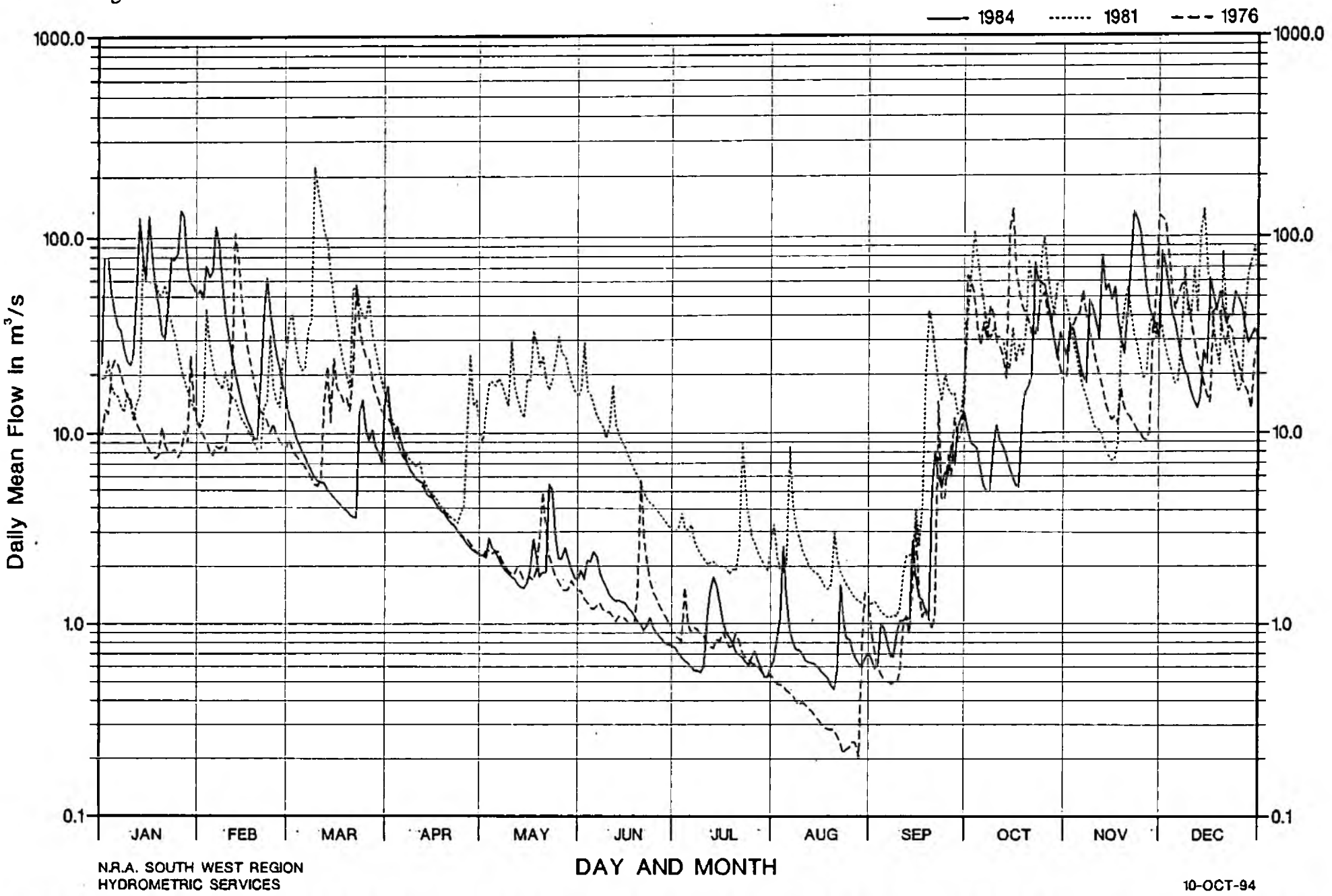
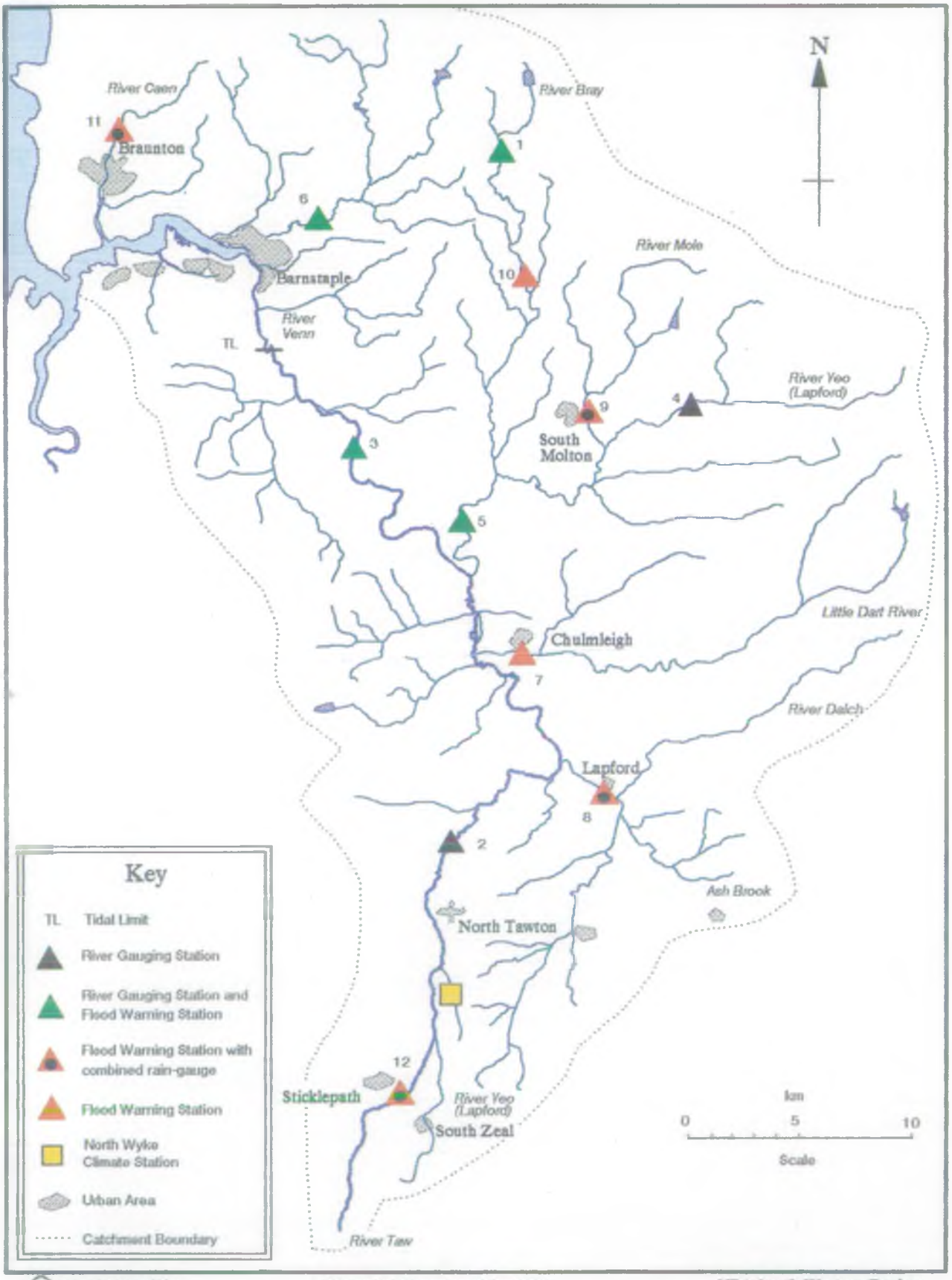


Figure 6

THE RIVER TAW CATCHMENT
Hydrometric Network



Information Correct as of Jan 1994

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2.4 Climate

The limited temperature range and high winter rainfall are typical of Atlantic Britain, although the high altitudes on Dartmoor and Exmoor do have a considerable effect on the climate of the catchment.

Rainfall is currently monitored at thirty one sites and measurements are taken every day at 0900 hours (GMT). A climate station and an autographic rain-gauge, which have been recording daily values of the full suite of climatological data since 1970, are sited at North Wyke.

Average annual rainfall ranges from 868 mm at Chivenor on the Taw estuary, to over 2200 mm on Dartmoor, with much of the Taw Valley receiving less than 940 mm/yr, see Figure 7. The high altitudes on Dartmoor and Exmoor cause much of the winter precipitation to fall as snow. The months of March through to June are relatively dry with less than a quarter of the annual rainfall in this period, which increases the time available for cultivation in the catchment.

Average annual rainfall* (1941 to 1970) at four specific sites in the River Taw Catchment

Rain-gauge Station	NGR	Position in Catchment	Average Annual Rainfall (mm)
1 RF390743	SX 609 827	Taw Head Upper Taw	2250
2 RF392825	SS 779 323	North Molton Ridge Exmoor	1600
3 RF392291	SS 636 110	Hollocombe Mid Taw	1020
4 RF395162	SS 494 347	Chivenor Meteorological Office Taw Estuary	868

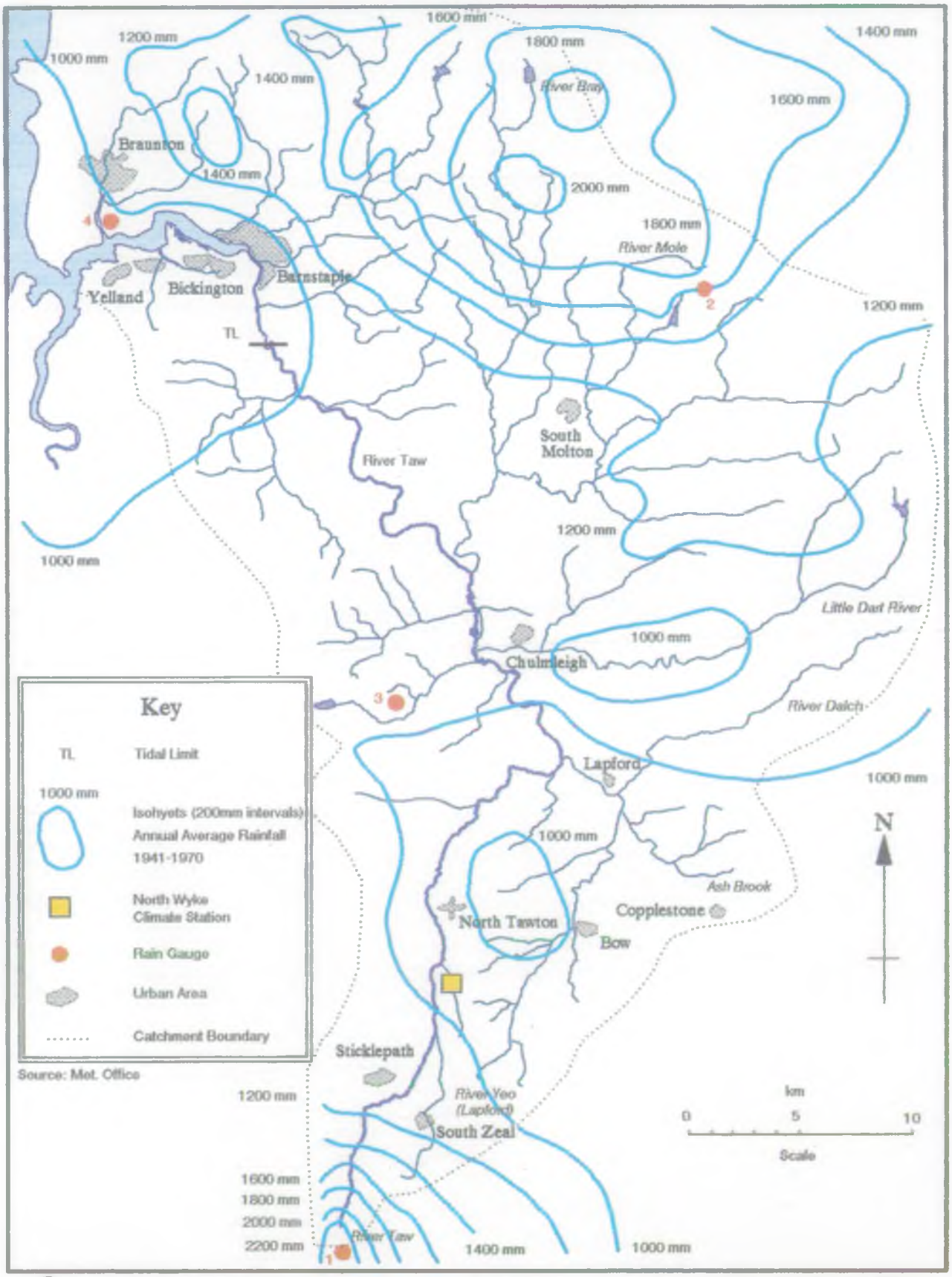
* Source: NRA Hydrometric Services

The mean summer temperature in the lower River Taw Catchment is 16°C and this falls to 6°C in winter. Over the higher ground on Dartmoor and Exmoor, mean temperatures are lower averaging 13 to 13.5°C in the summer and 3 to 3.9°C in the winter.

The growing season is defined as the period when temperatures are above 6°C and ranges from approximately 330 days near Barnstaple to approximately 260 days on Exmoor and 240 days on Dartmoor. However, exposure to the prevailing south-westerly winds in the catchment does limit horticultural cropping, notably close to the coast, and on Dartmoor and Exmoor.

Figure 7

THE RIVER TAW CATCHMENT
Rainfall Distribution



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2.5 Populations

The major urban areas within the catchment include Barnstaple, Braunton and South Molton.

The population of the River Taw Catchment is approximately 77,000 (based on the 1991 census data as supplied by the Local Authorities), a density of 62 persons/km^2. The population density for Devon in 1991 was approximately 155 persons/km^2.

Population Statistics

Subcatchment	POPULATION CENSUS		% Change
Taw Estuary (including Caen and Bradiford Water)	33822	36419	8%
Mid Taw	7278	8258	13%
Upper Taw	2605	2697	40%
Yeo (Lapford) and Dalch	4064	4504	11%
Little Dart	2749	2956	8%
Mole	4583	4715	3%
Bray	4338	4848	12%
Yeo (Barnstaple)	10986	12454	13%
TOTAL	70425	76851	9%
Population Density	57/km^2	62/km^2	9%

For the purposes of describing populations in the River Taw Catchment, population statistics have been compiled for the entire River Taw Catchment, including the Taw estuary and its major urban areas of Barnstaple and Braunton, as this allows a clearer picture of movement of populations within the catchment to be described.

Between 1981 and 1991, there has been an overall population increase in the catchment of 9%, with the largest population increases occurring in the parishes that surround the catchment's urban areas. Nearly two-thirds of the catchments population is located in the Taw estuary subcatchment (which includes the River Caen and Bradiford Water), and River Yeo (Barnstaple) subcatchment.

Population decreases of up to 24% between 1981 and 1991 occurred in parishes in the upper part of the River Taw Catchment and in the upper Mole catchment, which lie on Dartmoor and Exmoor respectively.

3.0 CATCHMENT USES

3.1 Introduction

This section describes current and future uses (these may represent uses of water, land, resources or activities) of the natural water environment within the catchment.

(i) page(s) of text for each use are 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 the use within the River Taw Catchment. Two sub-headings are provided: current use and future use.

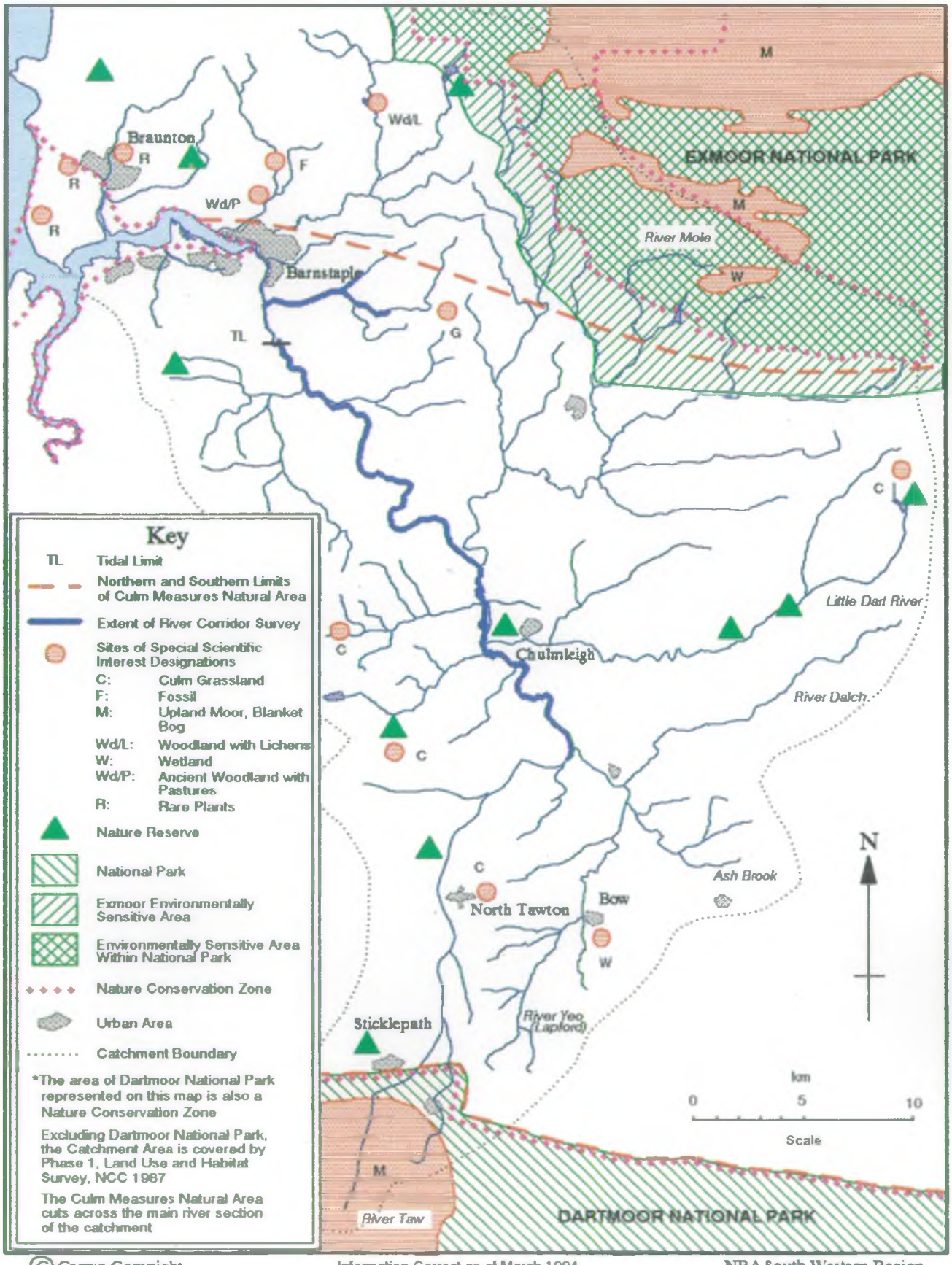
Objectives - this contains draft objectives for the conservation and enhancement of the use and/or the water environment. The objectives are broadly based and could form the basis for a future catchment strategy.

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

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 use and are detailed in the Reference Section.

Figure 8

THE RIVER TAW CATCHMENT
Conservation Resources and Formally Designated Sites



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3.2 Wildlife and Landscape

General

This use describes riverine and wetland landscape and wildlife resources in the catchment.

The NRA's conservation duties are set in Sections 2, 16 and 17 of the Water Resources Act 1991 (Ref. 5) and Sections 12 and 13 of the Land Drainage Act 1991 (Ref. 6). This legislation 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.

Catchment Perspective

Current Use

Wildlife

The River Taw Catchment includes areas of wildlife importance at international, national and regional levels. Within the catchment there are a range of semi-natural habitats that support a variety of species many of which have restricted distributions.

The Nature Conservancy Council Land Use and Habitat Survey (1987) (Ref. 7) gives an indication of the area of semi-natural habitats in the catchment. An approximate percentage cover has been estimated from the 5 km² land use maps.

Semi-natural grassland covers approximately 4% of the catchment, and is mainly unimproved rough pasture, marshy and semi-improved grassland. Heathland in the catchment is mainly confined to the fringes of Exmoor. Broadleaf woodland covers approximately 5% and is found largely in the middle regions of the catchment, the Dartmoor fringes and Exmoor valleys of the Bray and Mole. Freshwater habitats cover approximately 0.2% and include standing and running water, valley bogs and flushes.

The vegetation of the river corridor varies greatly. The River Taw rises on Dartmoor and several of its tributaries rise on Exmoor; both moors of importance for their upland heaths and blanket bogs. Other tributaries rise on the Culm Measures and flow through largely improved pasture with wooded valley sides. In its lower reaches the river meanders through wide valleys with a floodplain of mostly improved pasture and wooded slopes. The Culm grasslands, wetlands and broadleaved woodlands provide natural buffers to streams and rivers.

The NRA has carried out some River Corridor Surveys in the catchment. These surveys identify major physical and wildlife features of the river and adjacent land. Figure 8 shows the extent of river corridor survey data held.

Much of the River Taw Catchment lies on the Culm Measures, on which has developed one of the most important habitats in the catchment. Wet unimproved pastures on the gley soils are known as Culm grasslands, and are of international importance for their plant and invertebrate communities. Barn owls, curlew, marsh fritillary and wavy St John's-wort are some of the key associated species. The network of hedgerows across the farmland of the Culm Measures provides a valuable wildlife resource of particular importance for species such as the dormouse and the brown hairstreak butterfly.

The River Taw Catchment has extensive bankside tree cover with alder, oak, ash and sycamore and many stretches with thick shrubs. Where bank tops are protected these have grown to maturity with regeneration of young trees.

Aquatic vegetation is naturally sparse where there is shading from bank side trees, and where channel substrates do not encourage a rich aquatic flora. *Ranunculus species* are established on some riffles, with branched bur-reed and reed canary grass abundant on much of the river. Invasive non-indigenous Himalayan balsam and Japanese knotweed are found on the river system.

The rivers in the catchment support an internationally important otter population. The catchment supports at least eleven of the fourteen British bat species. Bridges and other structures associated with watercourses are used for roosting. Daubenton's bats feed over the river and wet meadows and noctule roosts are known in the lower River Taw valley.

The river has important salmonid populations and is known to support eels and five other species of freshwater fish. The rare allis shad has been recorded in the river.

The breeding birds associated with the river are typical of many rivers in the South West. They include dipper, sand martin, kingfisher and grey heron. Golden plover and lapwing have traditional overwintering feeding grounds on old permanent pastures in the catchment.

The British Red Data Book: 2 insects (Ref. 8) contains details of threatened insect species. Two species listed as rare (i.e. found in less than 15 10km squares) have been found on the River Taw; the snipe fly (*Atrichops crassipes*) and beetle (*Macronychus quadrituberculatus*). In addition two species generally considered to indicate important dragonfly sites are present in the catchment; white-legged damselfly (*Platycnemis pennipes*) and keeled skimmer (*Orthetrum coerulescens*).

Landscape

The Taw river system has greatly influenced the landscape of much of North Devon. The River Taw rises on Dartmoor, cutting a deep cleave as it leaves the moor, then flowing through open, mostly improved farmland before creating a major valley just upstream of Eggesford. The pronounced valley systems of the River Taw have been identified as a distinctive landscape character area by a county landscape appraisal (carried out by Devon County Council with Countryside Commission support in 1994) (Ref. 9), contrasting strongly with the high Culm Measures farmland on either side.

In the main valley, forestry planting and broadleaved woodlands seem to dominate the valley side landscape, although they are interspersed by large sections of open farmland. Mature conifers have a major impact on the landscape creating an enclosed valley and emphasising the need for sensitive management in a landscape that is heavily dependent on woodlands for the atmosphere they create.

The landscape quality of the area is dependent upon the variety of waterside habitats and natural assets such as the river, rough wet meadows and ancient woodlands. Features such as bankside tree cover, natural river forms, stone bridges, mills, weirs, distinctive waterside vegetation are all important landscape features contributing to the river valley character. The open floodplain has few hedgerows, occasional tree groups and isolated specimen trees giving the valley a parkland character in places. Upstream of Umberleigh the valley broadens and arable land becomes more common, with farms situated near the valley floor. The main road and railway line follow the river valley, the road hugging the valley sides, the railway line cutting across the floodplain, often on raised banks with settlements clustering around the stations. The main tributaries have also cut distinctive valleys in their lower reaches, with steep, heavily wooded valley sides on the Little Dart, Mole and Bray. The Rivers Mole and Bray rise on Exmoor and their valley bottoms are narrower and less intensively farmed than on the main river. The 'high culm' ridges between the river valleys display regular parliamentary field enclosures with isolated woodlands and occasional farms, hamlets and villages. Small towns have grown up at road junctions, but the overall impression is of a rural area with contrasting valleys and uplands.

Wildlife and landscape uses of the catchment may come under pressure from changes in the extent or emphasis of other uses.

The NRA will work to protect the landscape and ecology of the catchment, in co-operation with others where appropriate.

Objectives

1. To conserve and enhance the river corridor and landscape so as to protect aquatic life and associated communities and species.

2. To monitor and assess the conservation interest of inland waters and associated lands.

3. To ensure that the NRA's regulatory, operational and advisory activities take full account of the need to sustain and further conservation and landscape quality.

4. To promote conservation to enhance the quality of the aquatic and related environment for the benefit of wildlife, landscape and people.

5. To maximize the nature conservation benefit of all NRA sites.

3.3 Designated Conservation Areas

General

This use relates to the conservation and enhancement of areas identified formally as being of high conservation value, and covers natural beauty, wildlife, landscape and physical features, including archaeology and ancient monuments. Designated sites include SSSI's, National and Local Nature Reserves, National Parks, Areas of Outstanding Natural Beauty, Scheduled Ancient Monuments and sites of historical and architectural interest.

In cases where sites are identified as being of special interest and are protected by legislation it is the duty of the NRA to undertake notification and consultation procedures before undertaking direct actions or authorising the activities of others. Some species are covered by legislation to protect them at all times. The relevant legislation is given in Appendix 1.

It should be noted that the absence of a designation does not remove the need to consider value. Many valuable sites in the catchment will not be recognized by any designation, or may be covered by non-statutory designations. As new non-statutory designations are developed the NRA will consider these where they apply to the water environment.

Catchment Perspective

Current Use

Nature Conservation

There are thirteen SSSI's within the catchment, details of which may be found in Appendix 2.

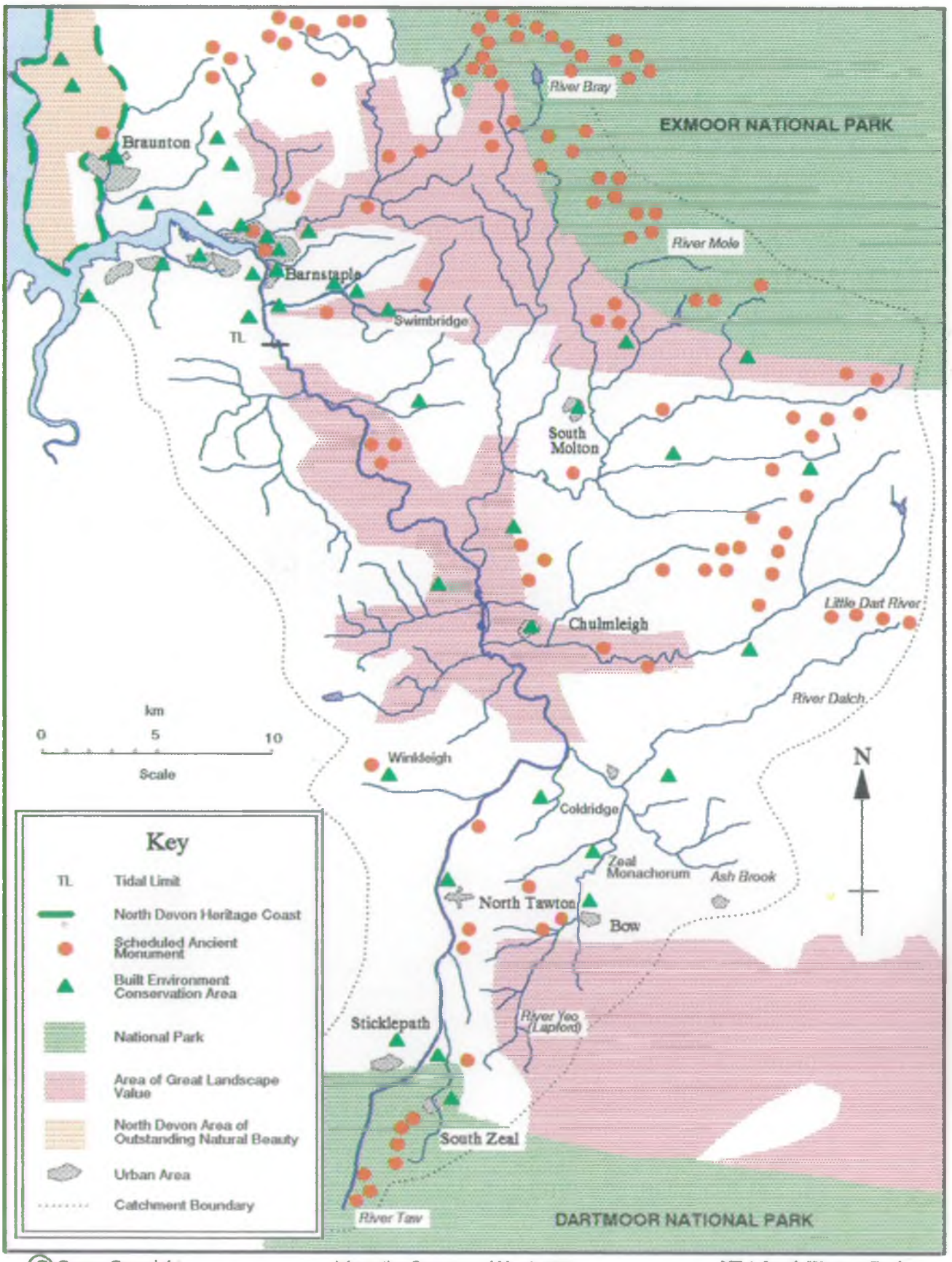
A number of species covered by the 1981 Wildlife and Countryside Act (Ref. 10) are known to occur within the catchment (see Appendix 3).

Part of Dartmoor National Park lies within the southern part of the catchment, and the Rivers Mole and Bray both rise within Exmoor National Park. Both Dartmoor and Exmoor are also designated as Environmentally Sensitive Areas.

Twelve reserves owned and/or managed by conservation bodies lie within the catchment. These areas are often not covered by any designation (see Appendix 4) and their extent, conservation value and wetland interest are variable.

Figure 9

THE RIVER TAW CATCHMENT
Landscape and Heritage



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The Countryside Commission's Countryside Stewardship Scheme recognizes the national importance of waterside landscapes and Culm grasslands, and provides grants for the conservation and re-creation of wildlife and landscape features through management. In the River Taw Catchment these have been taken up for twenty-five Culm sites covering 230 hectares, and six waterside landscape sites covering 55.8 hectares since the scheme started in 1990.

The Wildlife Enhancement Scheme run by English Nature aims to prevent further loss of Culm grassland through agricultural improvements, and to promote restoration of neglected sites. The scheme makes payments for specific land management sympathetic to wildlife on Culm SSSI's that lie within the Culm Measures Natural Area.

Figure 8 shows designated sites of conservation interest and the extent of river corridor surveys within the catchment.

Landscape

National and local designations affect developments in the landscape of the River Taw Catchment. The National Parks are national designations, with the Landscape Policy Areas Local Plan (Ref. 11) giving background, objectives and policy details of County Council designations such as Areas of Great Landscape Value (AGLV's). The Devon County Structure Plan (Ref. 12) designates the valleys of the Taw, Mole, Bray, Little Dart, Bradiford Water and Yeo as AGLV's. The aim of the designation is to conserve and enhance their distinctive local character.

Although lying largely outside the catchment boundary the coastal zone is designated an Area of Outstanding Natural Beauty (North Devon) and is an area of Heritage Coast (North Devon).

Figure 9 shows features and sites of landscape interest within the catchment.

Heritage

There are approximately 113 Scheduled Ancient Monuments (SAM's) within the catchment, ranging from numerous ancient barrows and tumulii, to Roman fort and earthworks at Lapford, and Shoulsbury Castle on Exmoor. SAM's are shown on Figure 9.

A number of the older towns and villages such as Swimbridge, South Zeal and Coldridge have Conservation Areas within them, and there are numerous listed buildings within the catchment. The NRA is currently updating its database on Conservation Areas.

Figure 9 shows features and sites of heritage interest in the catchment.

Future Use

Changing land use and demands within the catchment create potential pressures on landscape and wildlife, and may conflict with conservation interests.

Following the introduction of the European Commission (EC) Directive 92/43/EEC (Ref. 13), commonly known as the 'Habitats Directive', there may be future designations within the catchment of Special Areas of Conservation (SAC). The potential for future designations is due to the presence in the catchment of both habitats and species mentioned in the Annexes of the 'Habitats Directive'.

These habitats and species include dry heaths, Northern Atlantic wet heaths with *Erica tetralix* in Annex I and the otter, salmon, allis shad and marsh fritillary in Annex II.

The timetable for the implementation of the 'Habitats Directive' indicates that a complete list of Sites of Community Importance (SCI's), suitable for designation as SAC's, should be submitted to the Commission by June 1995. All SAC's should be designated by 2004, within the timescale covered by this plan.

3.4 Fisheries - Salmonid

General

This use relates to the maintenance of satisfactory populations of salmonids and to the conditions necessary for their successful migration both within freshwater and between the sea and freshwater.

The EC Freshwater Fisheries Directive (78/659/EEC) 'on the quality of waters needing protection or improvement in order to support fish life' provides a statutory basis for the protection of water quality in certain rivers (Ref. 14). The NRA has a duty to maintain, improve and develop fisheries and to further the conservation of fish species.

Catchment Perspective

Current Use

The salmonid fishery has declined since 1951, and the reasons for this decline are discussed in section 4.4. The decline is not only of concern to the riparian and sport fishery interests but also to the commercial net fishery in the estuary and conservation bodies. Since 1981 a number of statutory and voluntary measures has been introduced to reduce cropping by licensed nets and anglers.

In 1990, a voluntary agreement was reached with salmon and sea trout netters to cease netting for the five years up to and including 1995. A byelaw was made in 1992 which formalised the existing voluntary bag limits applied to rod fishing on the River Taw (Appendix 5). This byelaw expires at the end of the fishing season in 1995. Both these measures are aimed at increasing spawning escapement and thus augmenting salmonid stocks throughout the catchment.

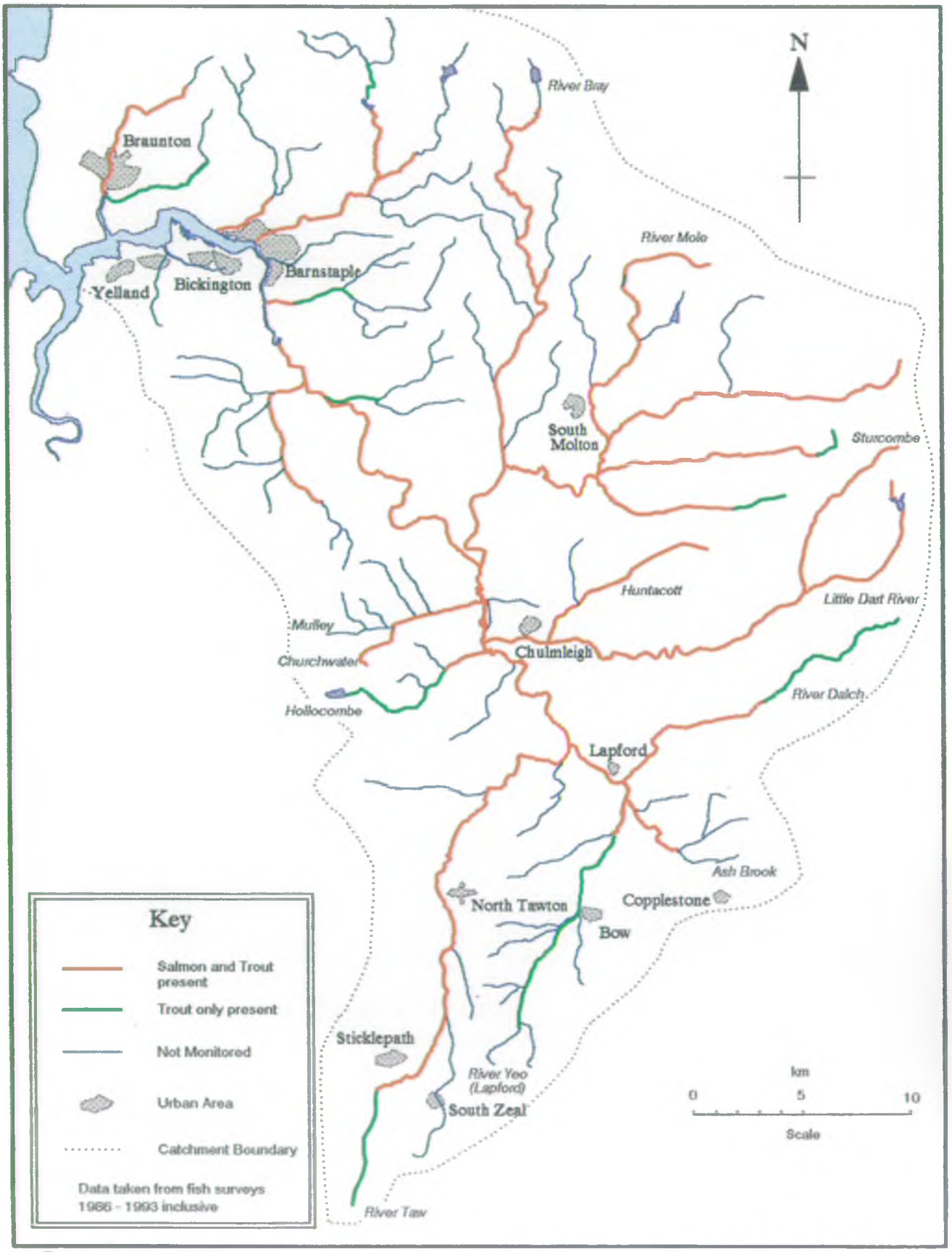
To improve salmonid habitat and accessibility, trash dam clearance work has been carried out in the upper River Taw, River Mole tributaries and River Little Dart. Reinstatement of spawning gravels has been undertaken throughout the catchment. This work has been carried out in conjunction with the River Taw Fisheries Association.

Some signs of success from the statutory, voluntary and fisheries management measures have been seen in recent rod catches and juvenile electric fishing surveys (Appendix 6). However, it is too early to say that fish stocks have fully recovered and the river is still vulnerable to pollution from livestock farms.

The extent of the salmonid fishery is shown on Figure 10.

Figure 10

THE RIVER TAW CATCHMENT
Fisheries - Salmonid



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Future Use

As the salmonid fishery recovers and security of stocks are re-established this future use of the catchment, which to many was in serious doubt, will revitalise angling and netting. The tourism and amenity benefits must be balanced in line with a sustainable salmonid population.

The importance of maintaining and improving the salmonid fishery will be further stressed with the introduction of the new 'Habitats and Species EC Directive' (Ref. 13) as the Atlantic salmon is included in the Annex of this EC Directive (see Section 3.3).

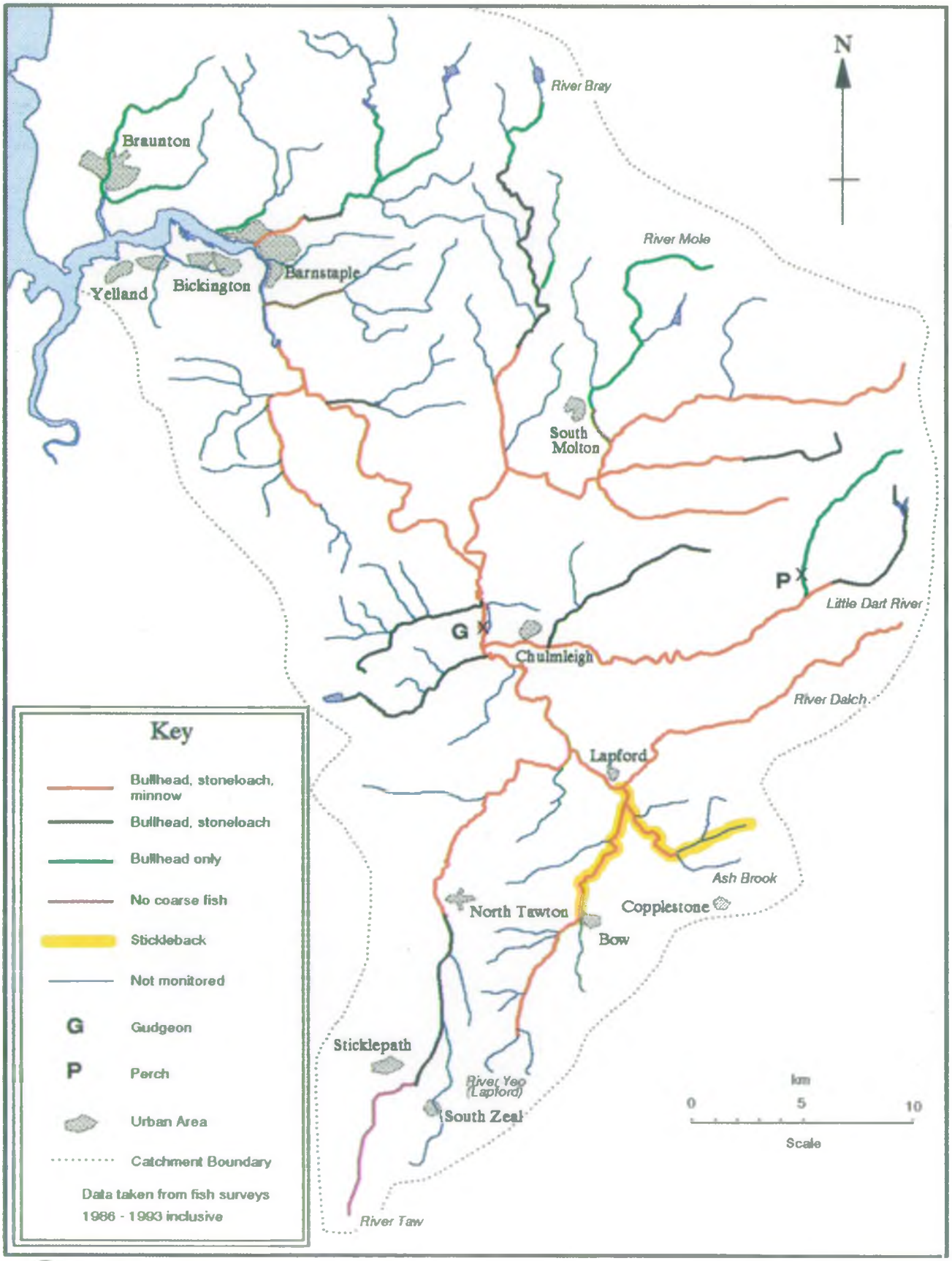
Objectives

1. To return the game fishery to a level that will both support the commercial and sport fishery interests and allow sufficient escapement for natural production.

2. To maintain water quality, water resources and catchment features so as to sustain salmonid populations appropriate to a river in such a geographical situation and to protect the migratory passage of salmonids to and from freshwater.

Figure 11

THE RIVER TAW CATCHMENT
Fisheries - Freshwater



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3.5 Fisheries - Freshwater and Eel

General

This use describes the maintenance of river conditions for the support of populations of freshwater fish and eels (i.e. non-salmonid fish), the former as sport fish and the latter as a commercially exploited food source.

Water quality must comply with the identified class of the EC Directive on Freshwater Fish (78/659/EEC for salmonid and non-salmonid fish) (Ref. 14) where applicable.

Catchment Perspective

Current Use

The freshwater fishery is localised in extent and little exploited in this predominantly salmonid fishery. The stony nature of the river bed provides suitable habitat for large numbers of small eels and so the level of exploitation of the eel fishery is low and confined to the estuary. Minimal fishing effort is directed to the apparently small elver run.

The distribution of freshwater fish and eel species is shown in the two maps, Figures 11 and 12. No management effort is applied to the freshwater fishery and its extent satisfies local demand. Only one eel fishing licence was issued in 1993.

Future Use

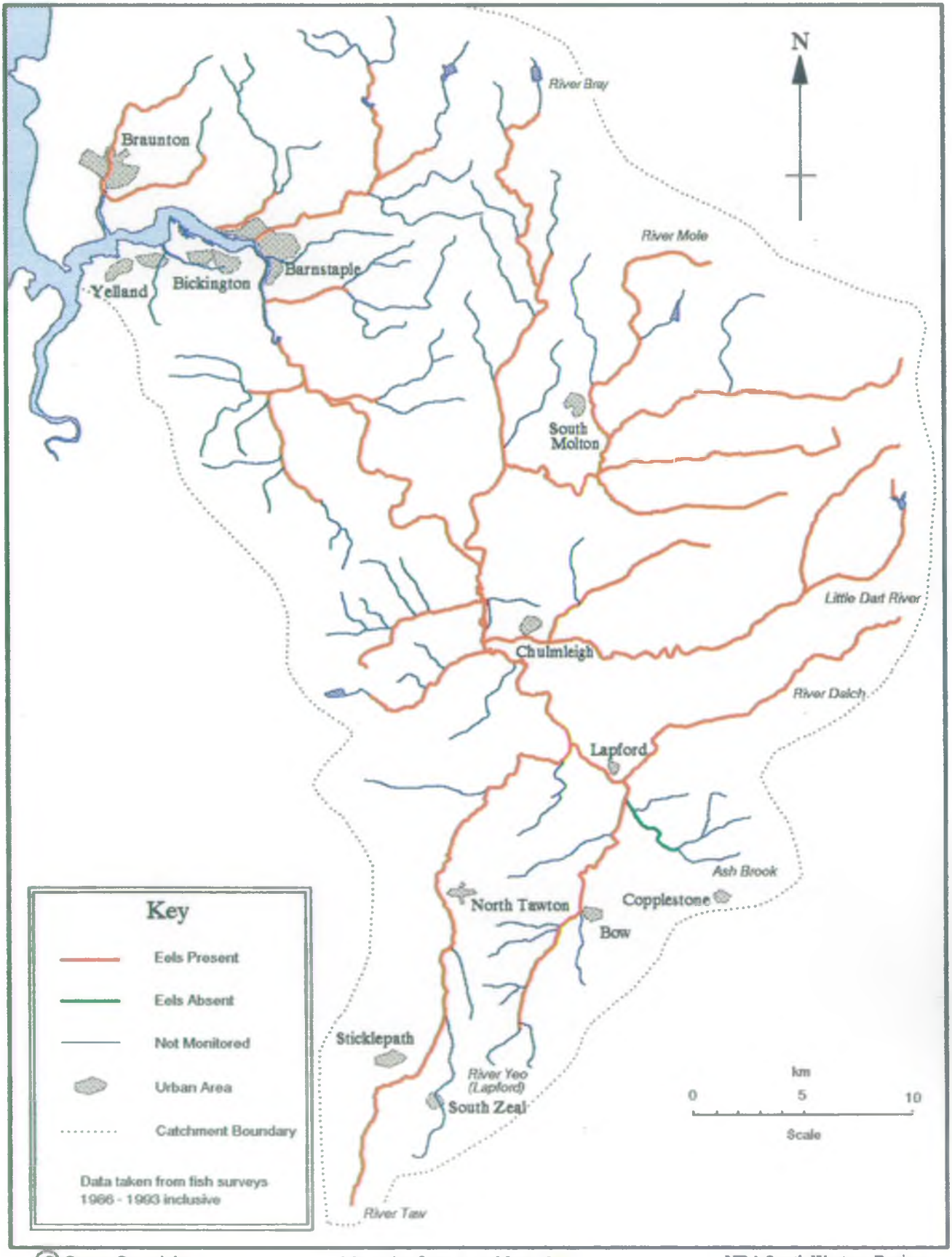
A new byelaw was introduced in 1993 which formalises existing eel netting and trapping conditions in the Devon and Cornwall Areas of the South Western Region. It is unlikely this use will see rapid or significant expansion in the medium term, but concomitant with the improving river environment, opportunities to exploit this resource will increase. The NRA is also developing a regional strategy towards coarse fish.

Objective

1. To maintain water quality, water resources and catchment features so as to sustain a natural freshwater and eel fish population appropriate to a river in such a geographical situation.

THE RIVER TAW CATCHMENT
Fisheries - Eel

Figure 12



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3.6 Agriculture

General

With more than 80% of the land in England and Wales used for agriculture, there is significant scope for impact on the water environment. Pollution of surface and groundwaters, soil erosion, land drainage and stock damage to river banks can cause environmental problems.

The NRA has duties and powers to:

- prevent pollution from agriculture through the enforcement of the control of pollution (Silage, Slurry and Agricultural Fuel Oil Regulations 1991) (Ref. 15)
- promote the designation of water protection zones and prohibition of certain activities within them. Nitrate Sensitive Areas are an example of this.

Additionally through its liaison with external organizations and Research and Development initiatives the NRA is committed to:

- assessing the impact of agriculture on water quality, prioritising our work where there is poor documentation of any impact
- developing methods to target pollution prevention activities at areas with greatest impact or risk of impact on water quality
- developing procedures for inspecting farms so that pollution can be prevented
- promoting the 'Code of Good Agricultural Practice' (Ref. 16) and further developing best practices to prevent pollution from the storage and disposal of agricultural wastes, and from the management of agricultural land. This work will include development of the use of managed 'buffer zones' and agri-environment schemes to prevent pollution
- promoting appropriate livestock management to protect the river corridor
- developing a public relations plan to educate farmers and improve public awareness of pollution associated with agriculture
- improving procedures to consult, collaborate and influence agricultural organizations such as MAFF and WOAD, to maximise environmental benefit from pollution prevention activities.

Catchment Perspective

Current Use

Grass is by far the most important crop in the catchment. Livestock farms are widespread, particularly in the north-east of the catchment on and around Exmoor, where beef cattle and sheep rearing are the dominant enterprises. During the winter months sheep and beef cattle are brought off the high areas to lower, more enclosed land. These lower areas are mainly grass with some kale and other forage crops. Further south and west of these areas, on the fringe of Exmoor, sheep and beef cattle production is diversified with some dairy farming and barley is also grown with a higher proportion of grass leys and forage crops.

In the northern part of the catchment around Barnstaple and South Molton, the areas with lower rainfall, cropping is more varied with a greater proportion of cereals as well as root vegetables grown. Maize has also been recently introduced on both sides of the Taw Estuary. Horticultural cropping has been restricted to just a few areas taking advantage of the local shelter and advantageous climatic conditions. Such areas include the north-west part of the catchment around Croyde, Braunton and Barnstaple and the area to the east of Barnstaple, where a few small isolated market gardens are located.

Dairy farming is more predominant in the south of the catchment where rainfall is higher and the heavy Culm soils are more widespread. Although such soils suffer from poor natural drainage many of the farms in this area are small with little potential for arable crops, and so there is an increasing tendency towards dairying and more intensive use of grass. On the 'Redland' overlying the Permian conglomerates swedes are grown in addition to the usual arable crops and dairying.

In the far south of the catchment high on Dartmoor, cattle, sheep and ponies graze on the common land, whilst on the adjoining foothills there is livestock rearing with some dairying.

Pollution Control

Drainage of traditional Culm grasslands, the increase in the use of fertilizers and a switch from hay to silage production led to a more intensive use of grassland, and hence more cattle in the catchment. As a result, the production of waste associated with diary and beef farming has increased and caused pollution of watercourses.

The situation led to the launch of the farm inspection campaign in 1984 by the former South West Water Authority, the National Farmers Union and the Country Landowners Association under the slogan 'Pollution - Together We Can Beat It'. The farm inspection work is continued within the framework of the Task Force Inspections. The number of farm visits carried out over the last few years are detailed in the table below.

NUMBER OF FARM INSPECTION VISITS ON THE RIVER TAW 1989 - 1993

RIVER CATCHMENT OR STRETCHES	1989	1990	1991	1992	1993
RIVER TAW			19	75	133
MIDDLE RIVER TAW	17	57			
UPPER RIVER TAW	18	231			
YEO/DALCH	8	2			
LITTLE DART	11	4			
RIVER MOLE	69	2			
RIVER BRAY	64	105			
RIVER (BARNSTAPLE) YEO		7			

Pollution Risk

This extensive farm visit work has controlled point source pollution from farms and led to an overall improvement in environmental quality in the River Taw Catchment. However, the NRA needs to continue to take steps to ensure this improvement is maintained and furthered, especially to counter the more subtle problems in wet weather where farm waste can runoff from the land to nearby watercourses.

Future Use

Agricultural use of the River Taw Catchment will continue to be mainly dairy farming but perhaps with fewer large units. With the agreements through the Common Agricultural Policy (CAP) and General Agreement on Trade and Tariffs (GATT) there may be increased set-aside of land, reduced management and increased opportunities for conservation and recreation within the countryside.

The existence of the Environmentally Sensitive Areas (ESAs) on Dartmoor and Exmoor should result in less intensive farming practices in the headwaters of the Rivers Taw, Mole and Bray.

Objectives

1. To prevent and control the pollution of surface and groundwaters from agricultural activities.

2. To encourage agricultural practices that improve the river environment.

3.7 Forestry

General

The NRA recognised that well managed forestry in appropriate areas can have minimal impacts on water and can benefit the overall environment. However, in certain circumstances conversion of land to forest and subsequent activities can have serious impacts on the water environment. Areas of concern to the NRA include:

- Acidification of surface waters caused by the planting, harvesting and replanting of conifers on poorly buffered upland soils. The forest canopy scavenges sulphur and nitrogen pollutants from the atmosphere, and tree growth removes base cations from the soil.

- Soil erosion due to forestry activities resulting in high suspended solid loads and siltation of surface waters.

- Pollution of surface waters and groundwaters from the use of fertilizers and pesticides.

- Changes to the rate of runoff of surface water or obstructions to flood plains or watercourses with associated increase in flood risk.

- Reduced water yield in catchments because forests cause increased evapo-transpiration.

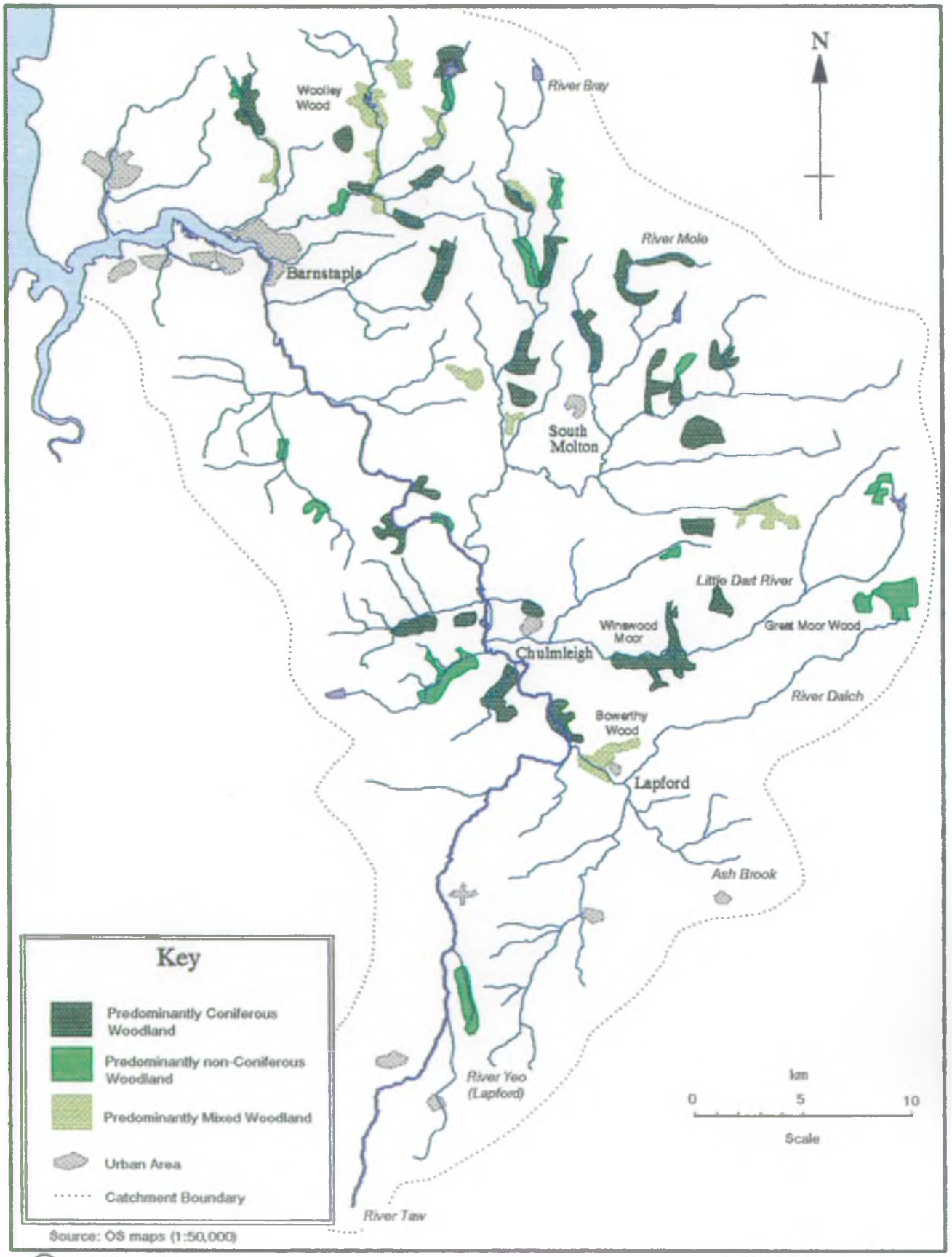
- Effects on the habitat and conservation value of riparian and associated land.

To minimise these adverse effects the Forestry Authority has published a series of Guidelines in respect of Water, Nature Conservation, Landscape Design and Recreation against which all grant aidable and licensed forest operations are assessed (Ref. 17). The NRA is currently consulted on a non-statutory basis by the Forest Authority in respect of some applications under the Woodland Grant Scheme and Felling Licence requirements. The NRA will seek improved links with Forestry Authority to achieve a consistent and effective approach to the environmental assessment of forestry schemes and operations. The NRA also intends to develop a more proactive approach to Guidelines for foresters and further develop "best practice" techniques.

Local Authorities produce Indicative Forest Strategies following the guidance circulated by the Department of the Environment and Welsh Office (circulars 29/92 and 61/92 respectively). These map 'preferred planting areas' where adverse impacts are absent or minimal; 'potential planting areas' where damaging effects may be accommodated or ameliorated at some cost; and 'sensitive areas' where no or very limited planting is acceptable due to serious or costly impacts. The NRA intends to identify such areas in its Catchment Management Plans to enable it to advise Local Authorities and Forestry Authority accordingly.

Figure 13

THE RIVER TAW CATCHMENT
Forestry



NRA South Western Region

The NRA intends to improve and develop the existing ad-hoc arrangements which exist with forest owners and managers, in particular Forest Enterprise, to discuss at local level management of forests and promote the whole forest design concept currently being used by Forest Enterprise.

Catchment Perspective

Current Use

Woodland and forestry occupy approximately 7% of the catchment area, see Figure 13. Woodland and forestry range from scrub invaded neglected pastures, through to managed deciduous woodlands and coniferous monoculture.

Fragmented pockets of broadleaved woodland occur over the whole of the area, but are generally situated on the steeper slopes adjacent to watercourses, where agricultural practices are less favoured. Conifer forests, account for approximately 70% of the River Taw's woodland and occur throughout the catchment, although it is limited to the steeper slopes and higher ground, again where farming is less favoured.

Pollution Risk

Much of the coniferous forestry in the River Taw Catchment has been planted in the river valleys. Where this occurs on the floodplain it can pose a flood risk. Clear felling can result in an increase in the suspended solid load in nearby watercourses. The NRA should be consulted of any planned felling near watercourses in order to ensure pollution is prevented.

Dartmoor is an acid sensitive area and may be at risk from the enhanced capture of acidic pollutants from the atmosphere by trees. The NRA should be consulted by the Forestry Authority for new planting proposals to ensure the water environment is protected.

Future Use

Forestry policy seeks generally to expand the area of managed woodlands but economic considerations may restrict the rate of increase.

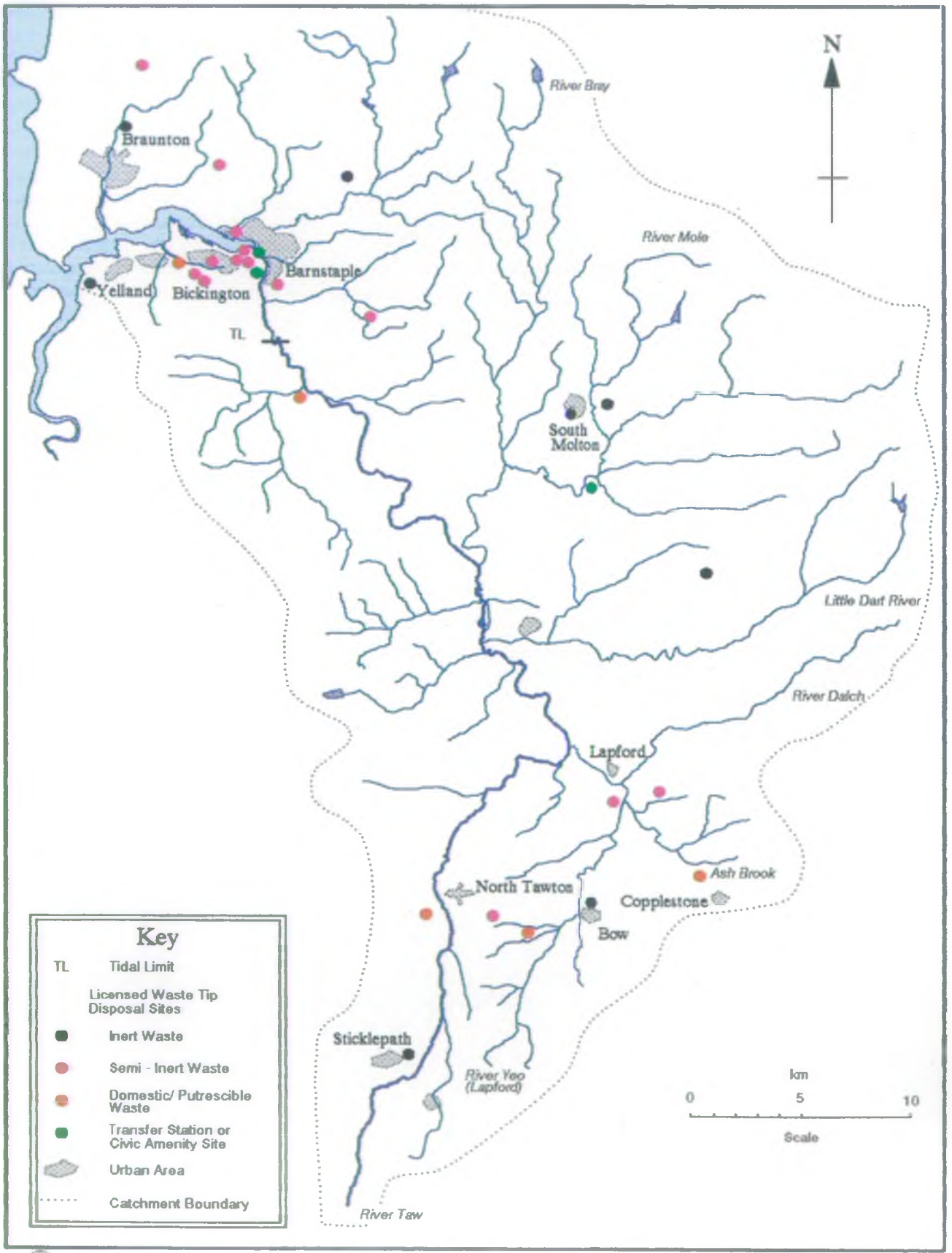
Objectives

1. To protect the water environment from the adverse effects of forestry activities.

2. To encourage broadleafed planting and regeneration within the river corridor.

Figure 14

THE RIVER TAW CATCHMENT
Licensed Waste Tip Disposal Sites



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NRA South Western Region

3.8 Waste Disposal

General

This use deals with the disposal of waste to land. Licensed waste disposal sites 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).

In addition, sewage sludge and other industrial wastes, such as dairy, food-processing, abattoir, septic tank and cesspit wastes can be spread onto agricultural land. Operators are required to notify the WRAs of their intention to spread waste on a particular site and may do so without a licence if the spreading is of agricultural benefit without causing an environmental hazard.

Although operators are not obliged to inform the NRA of their activities, there is an obligation not to cause pollution and so close liaison is being developed between NRA and WRAs so that the NRA's requirement under the Groundwater Protection Policy (Ref. 18) and the Code of Good Agricultural Practice (Ref. 16) can be considered with each application.

Catchment Perspective

Current Use

The Sitefile database held at the NRA has been used to identify known waste disposal activities within the catchment. The search identified twenty seven landfill sites, one waste transfer station and one civic amenity site.

Only four of the landfills are currently operational, with all four licensed to accept inert wastes only (Devon type "A"). The remaining landfill sites are either closed or have had their licence suspended. The majority of these sites accepted semi-inert demolition wastes (Devon type "B").

The waste transfer station and civic amenity site are licensed operational facilities.

The landfill site at Bickington accepted household waste and was operated by Devon County Council. Leachates from Bickington are collected and discharged to sewer.

Septic tank wastes are injected into the soil at various sites in the River Taw Catchment, particularly in the Hollocombe Moor and Bullow Brook areas. Industrial sludges, such as from Inch's Cider at Winkleigh and the Cheese Company at North Tawton, are spread to land within the River Taw Catchment, including Winkleigh Airfield, although much of the waste is transported outside of the catchment. Forthglade Limited also spread wastes to land on Winkleigh Airfield. Sewage sludge from South West Water Services Limited (SWWSL) Sewage Treatment Works (STWs) is also spread to land within the catchment for which we hold maps that SWWSL have supplied, Figure 14.

Devon WRA closely monitor the spreading of wastes to land and ensure frequent changes in the use of fields. There are no specific problems known in the River Taw Catchment with respect to this use.

Objective

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

3.9 Built Environment

General

This use relates to existing areas of the built environment and the process of planning the allocation and controlling the construction of new developments including roads, housing and industry.

The formal planning process follows a continuum, starting from a broad strategic overview represented by Regional Strategies, through to county-wide advice reflected in Structure Plans, down to detailed site-specific control presented in District Plans. Individual planning applications are considered by local planning authorities.

The Role of the NRA

The NRA has a duty to protect and improve the water environment, and is dependant upon and complemented by the wider powers of planning authorities to achieve its duty. The control of the impact of development is critical to the overall success of the NRA in achieving its aims and objectives for the catchment. The planning consultation process is of fundamental importance.

While the NRA is well placed through its own powers to control many factors influencing the aquatic environment, it has very little control over the mechanisms that determine land use changes. Local planning authorities, through the implementation of the Town and Country Planning Acts, control such changes in respect of the built environment.

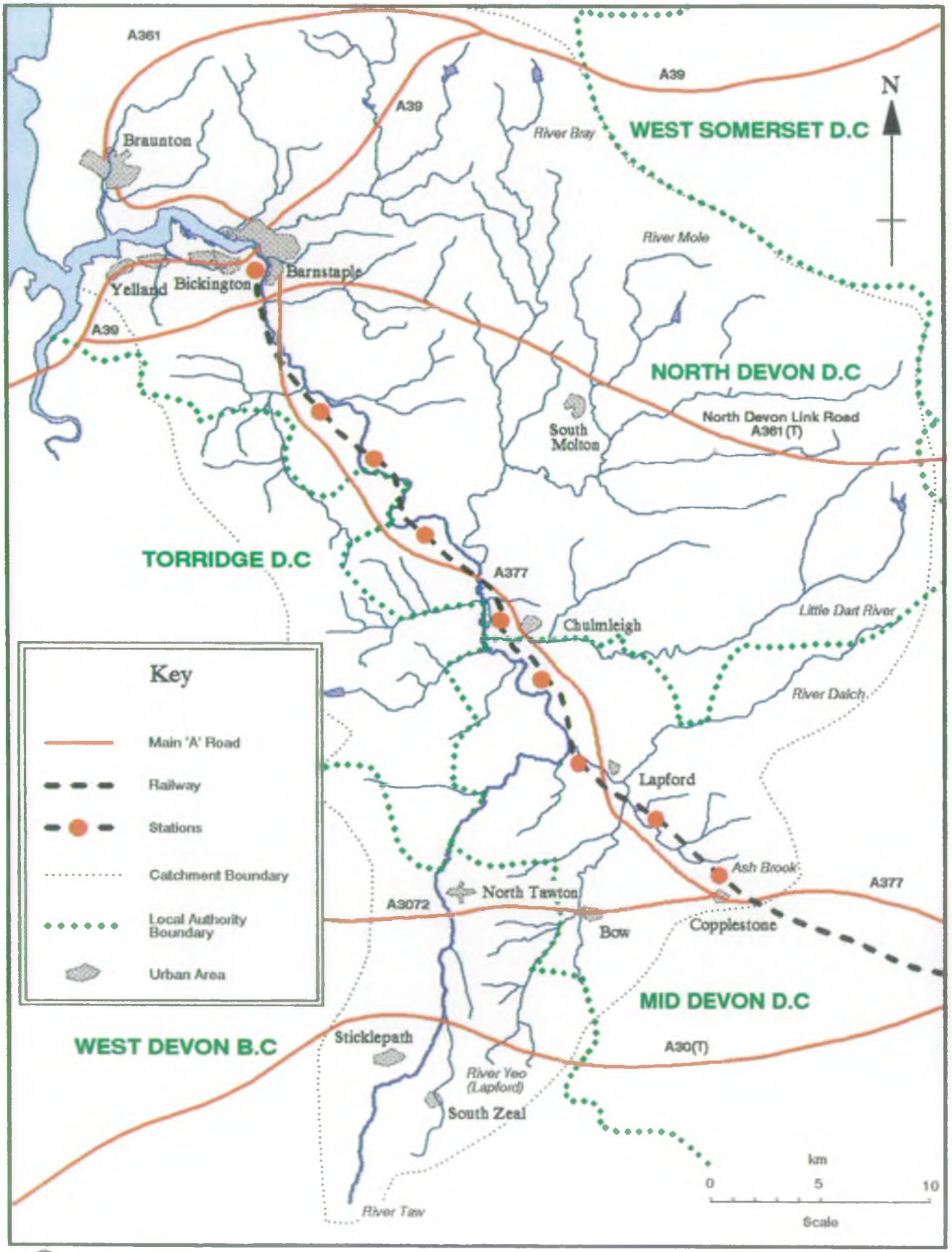
To exercise effective planning development control, the NRA in its role as a statutory consultee in the planning process, has asked planning authorities to incorporate water-related protection policies into strategic documents which include County Structure Plans, Mineral Plans, Waste Plans and the new district-wide Local Plans. Also, on a day-to-day basis, the NRA's planning liaison section is consulted and comments on individual planning applications in order to promote and safeguard the NRA's interests.

Close liaison is also maintained with the Highways Authority, SWWSL and the WRA. Road construction and drainage, sewage and waste disposal have significant influences on water quality, quantity, the physical features and riverine ecosystem.

As planning boundaries rarely coincide with hydrometric boundaries, the NRA will seek to ensure that there is consistency across planning districts. To this end the NRA issues planning authorities with consultation guides. These guides include specific advice on settlements where there are infrastructure deficiencies which could or are affecting water quality. The guide also includes advice on development within floodplains and areas liable to flooding and the impact of development runoff on flooding.

Figure 15

THE RIVER TAW CATCHMENT
Built Environment



NRA South Western Region

Catchment Perspective

Current Use

The River Taw flows through six local planning authority areas: Dartmoor National Park, West Devon Borough Council, Mid-Devon District Council, Torridge District Council, North Devon District Council and the Exmoor National Park.

Although the catchment is among the least densely populated in Devon, just 62 persons/km², it has the highest percentage of urban development, approximately 9%.

The infrastructure in the River Taw Catchment has recently benefited from the opening of the North Devon link road, the new A361(T). This new road has opened up much of North Devon to tourism and industry. Other major roads which pass through the catchment include the A377 (Exeter to Barnstaple via Chumleigh), which runs alongside the River Taw for much of its length, and the A39 (Minehead to Barnstaple), see Figure 15.

There are no main line British Rail stations in the catchment. However, a branch line which runs along the River Taw does operate between Exeter and Barnstaple, providing several branch line stations.

The Regional Strategy, which is currently before the Secretary of State for the Environment, will be finalised in the summer of 1994 and predicts a housing increase of 99,000 new dwellings for Devon between the years 1991 and 2011. Part of this total has already been committed by the Third Alteration of the Devon Structure Plan which was approved by the Secretary of State on the 10th March 1994. The Third Alteration runs from 1989 to 2001 and allocates 5,900 new dwellings to North Devon, 7,200 dwellings to Mid-Devon, 3,300 dwellings to East Devon, 6,500 dwellings to Torridge, 1,000 dwellings to Dartmoor National Park and 100 dwellings to Exmoor National Park. Between 35% and 42% of this development is allocated to areas of economic potential, which within the River Taw Catchment only applies to Barnstaple and its surrounding settlements. The deciding criteria for areas of economic potential is settlements with a population in excess of 50,000.

The Planning Strategy within the Structure Plan also outlined sub-Regional Development Objectives, which for the catchment include:

- provision should be made to accommodate rates of population growth higher than those previously experienced in North Devon
- at Barnstaple and South Molton development should continue at a rate similar to or in excess of that previously experienced
- develop Chulmleigh and Witheridge as Selected Local Centres.

The anticipated population increase, as predicted by the Regional Strategy, of around a quarter of a million people for the Region, has extensive implications for the NRA. Although a proportion of this increase is already accommodated in existing local plans, the NRA was asked to consider three scenarios for the balance.

(i) The creation of a new town or city. Such an option is attractive to the NRA as it centralises all potential problems and is easier to service in terms of water supply and the subsequent treatment of sewage. However, it is unlikely that such a town or city would be situated within the River Taw Catchment as this area fails to meet two fundamental criteria:

- a strong link with Europe
- good lines of communication.

(ii) Distribution of the balance of the housing allocation among the four main urban areas, Plymouth, Torbay, Exeter and Barnstaple. This development follows the County Planners' views with regard to increasing the size of areas of economic potential. This option is also attractive to the NRA as SWWSL have plans to build a new STW scheme in the Taw/Torridge Estuary. They have also improved the water supply to the area by augmenting the mains distribution system back to Roadford Reservoir.

(iii) Allowing settlements to develop in the traditional manner and to expand according to local need. The current Local Plans reflect this need. The NRA has asked the planning authorities to phase these increases in line with infrastructure improvements. Of particular concern is inadequate STW. The NRA has asked planners to phase development in line with SWWSL's remedial schemes.

Objectives

1. To ensure that infrastructure required for new development is provided ahead of its need, in order to safeguard the water environment.

2. To influence infrastructure provision and future built environment patterns in such a way that other water users are not compromised and the water environment is properly safeguarded.

3. To seek enhancements to the water environment through built development and infrastructure provision.

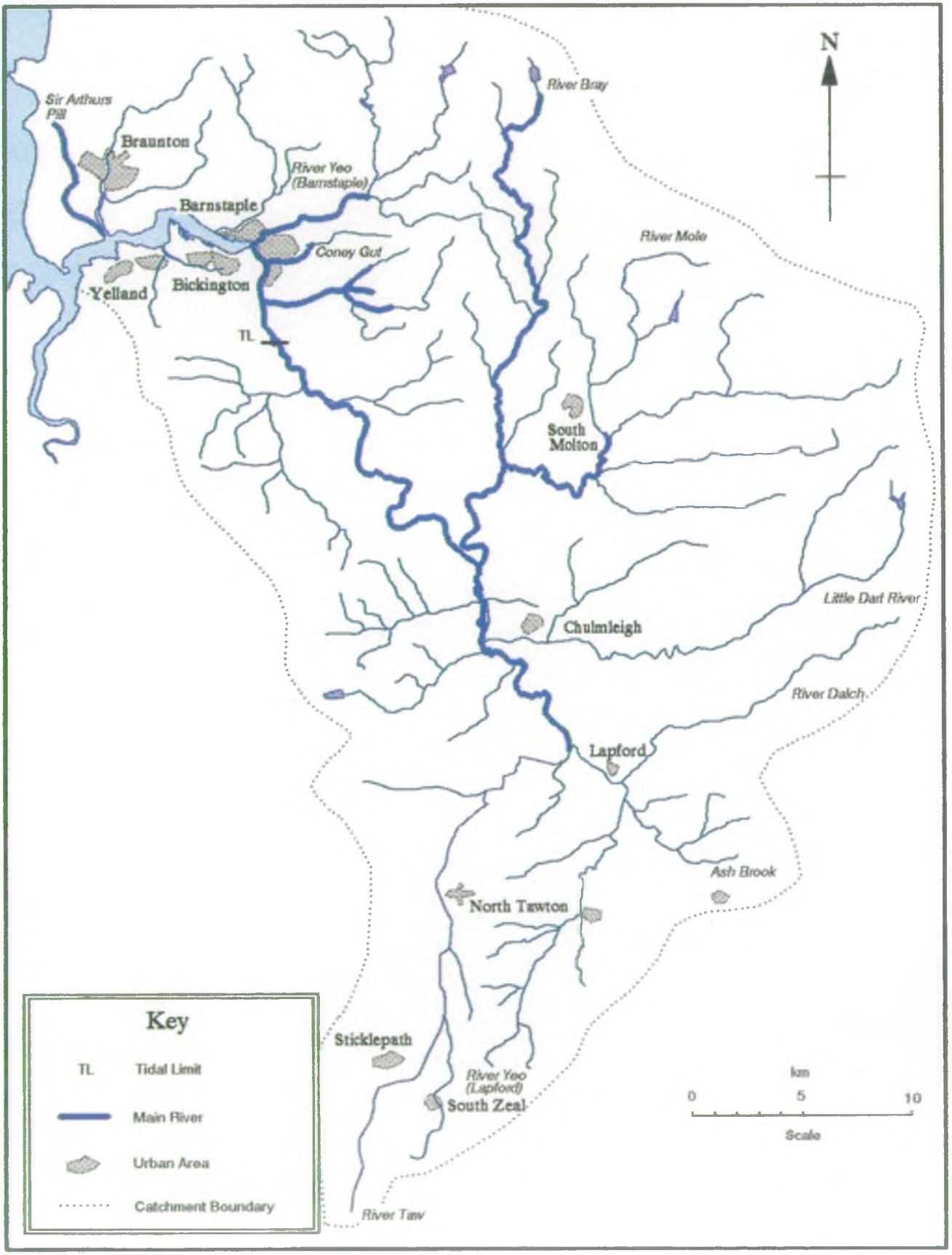
4. To ensure new development is not at risk from flooding and does not put other land or property at risk of flooding, which could endanger life, damage property or lead to wasteful expenditure of resources on remedial works (see Future Use in Flood Defence).

5. To ensure that adequate pollution prevention measures are incorporated into new developments.

6. To help ensure that new development is sustainable.

Figure 16

THE RIVER TAW CATCHMENT
Flood Defence - Main River



Information Correct as of Sept 1994

NRA South Western Region

3.10 Flood Defence and Land Drainage

General

The river system within a catchment drains surface water from the land to the sea. The climate, geology and morphology all affect the way in which this system develops and deals with the wide natural range of river flows.

Land use has been largely determined by the constraints which are imposed by flood risk and land drainage. Improved control of these has allowed the development of river and coastal floodplain for farming and urban use. This control can take many forms: from simple channel alterations to major floodbanks and artificial washlands. Works constructed for other purposes, such as weirs, mills and bridges, have also altered the natural river system.

These changes have made significant contributions to the standards of economic and social well-being; through improved agricultural output, and reductions in disease, disruption and property damage. However the impacts may not all be beneficial. Improvements at one location may lead to problems elsewhere, development may increase flood flows, and works may prove expensive for future generations to maintain. Land use change, facilitated by drainage and flood defence, may also lead to significant environmental damage, particularly to wetland species.

Increasingly, control of the physical river environment has been exercised through flood defence legislation, and management is seen in balanced, multi-functional and catchment-wide, rather than local, terms.

The Role of the NRA

The Water Resources Act 1991 (Ref. 5) and the Land Drainage Act 1991 (Ref. 6) provide the statutory framework. All watercourses are classified as either "main rivers" or "ordinary watercourses". The NRA exercises a general supervision of all matters relating to flood defence however, it generally has more comprehensive powers on main rivers, particularly to undertake work and control the activities of others. The functions relating to flood defence are carried out by statutory flood defence committees.

Local authorities have the power to undertake work on ordinary watercourses. In certain local areas, where agricultural flood defence and land drainage matters dominate, it may be exercised by separate Internal Drainage Boards.

The legislation also applies to the NRA in respect of sea defence; that is defence against tides and wave action which may directly, or through effect on rivers, lead to flooding. Coast protection, from the effects of sea erosion on the land, is not a matter for the NRA.

Specifically the NRA has duties and powers which it exercises to:

- ensure effective regulation, through advice to planning authorities and through control of certain works close to rivers which may affect flood risk
- maintain those parts of the floods defence system under its control, to achieve the levels of flood protection and drainage appropriate to the land use
- improve the flood defence system under its control, through the promotion of flood alleviation schemes which are appraised in accordance with agreed engineering, economic and environmental criteria
- operate an emergency service which provides flood forecasts, warnings and procedures so that risk to life is diminished and damage to property alleviated.

Catchment Perspective

Current Use

The land drainage system of the River Taw is generally a natural system in a predominantly rural catchment. Extensive field drainage enters into the river system.

There are no extensive flood defence works on any of the 'main' river system or ordinary watercourses.

Flood defence schemes have been carried out to deal with urban flooding from the Coney Gut in Barnstaple, and from the River Venn in Landkey and Swimbridge.

River Maintenance

A previous pioneer clearance scheme, which started in 1984, is now complete for all the main river length of the River Taw.

Routine river maintenance work is carried out on the Coney Gut and on the River Venn at Landkey, Swimbridge and Bishops Tawton, associated with the flood defence schemes. This work includes grass cutting, desilting and screen clearing.

A clearance scheme exists in the Main Drain through Braunton Marsh. The NRA also maintain the Water Control Structures and the gates at Great Sluice, although the Internal Drainage Board (IDB) are the body responsible for controlling water levels.

Development

Major development occurs in the Barnstaple area; residential, commercial and industrial. Generally, there are only minor development pressures elsewhere in the catchment and these are generally within the scope of existing services.

Emergency Response

Flood warnings are given for areas with identified flood risks, which are within current monitored areas, on the River Caen, River Mole and the Upper and Lower River Taw.

Operational emergency response is concentrated at Swimbridge and the Coney Gut involving the clearance of screens and culvert entrances.

Future Use

The introduction of the Flood Defence Management Framework, explained in the earlier 'General' Section will determine future management of flood defences in the River Taw Catchment.

Objectives

1. To provide effective defence for people and property against flooding from main rivers.

2. To provide adequate arrangements for flood forecasting and warning.

3.11 Mining and Quarrying

General

The NRA recognizes the economic importance of quarrying, mining, gravel and mineral extraction to the region. However, exploration and extraction can significantly affect surface and groundwaters locally and across catchments.

Areas of concern to the NRA are outlined below.

- The loss of aquifer material and groundwater resources as a result of extraction.
- Extraction often involves de-watering, sometimes for substantial periods of time. Dewatering can lead to the loss of water supply from nearby wells and boreholes, the removal of natural groundwater supplies to ponds and streams, and can affect wetlands.
- Removal of material from above the water table reduces natural filtration and increases pollution risk to groundwaters.
- The increased risk of pollution from plant or operations close to or below the water table.
- Surface water runoff from spoil heaps and worked areas, and discharges from mines and quarries can contain toxic and suspended materials that are harmful to aquatic life.
- The abandonment of mines and the after use of quarries may also pose threats.

The aim of the NRA is to control the impact of mining and quarrying activities on the water environment and promote suitable after use activities.

The NRA has a duty to:

- licence abstraction for dewatering purposes
- consent discharges from quarries and operational mines
- respond to Mineral Plans as a statutory Consultee of the Planning Authority.

The NRA is committed to improving liaison with planning authorities and control through the planning process.

In considering proposals, the NRA will have regard to its 'Policy and Practice for the Protection of Groundwater' (Ref. 18) which states:

"For any proposals which would physically disturb aquifers, lower groundwater levels, or impede or intercept groundwater flow, the NRA will seek to achieve equivalent protection for water resources and the water environment as if the effect were caused by an abstraction controllable under the Water Resources Act 1991."

The NRA will object to a new proposal for mineral extraction where there will be demonstrable harm to water resources and/or the water environment, unless measures to mitigate any effects can be agreed within planning controls. The NRA will normally object to proposals where the obstruction of groundwater flow is likely to cause undesirably high groundwater levels or cut-off groundwater flow, unless measures to mitigate any effects can be agreed.

The NRA will also encourage best practice regarding the backfilling of any abandoned shaft, well, borehole, tunnel or adit in order to prevent pollution or loss of water resources.

With regard to the standing of long-abandoned quarries, mines and their associated contaminated land, however, it is currently impractical to attempt to ameliorate their effects, by whatever means, until their relative contribution to poor water quality has been fully assessed. It is suggested that priority needs to be given to those which:

- cause a breaching of a surface water quality standard which was already in existence and in compliance prior to the mine being abandoned;

- can be shown to be a significant ($>1\%$) contributor to the annual input of certain toxic and persistent (Red List) substance into coastal waters; or

- are a unique cause of poor water quality in an otherwise good quality river.

Catchment Perspective

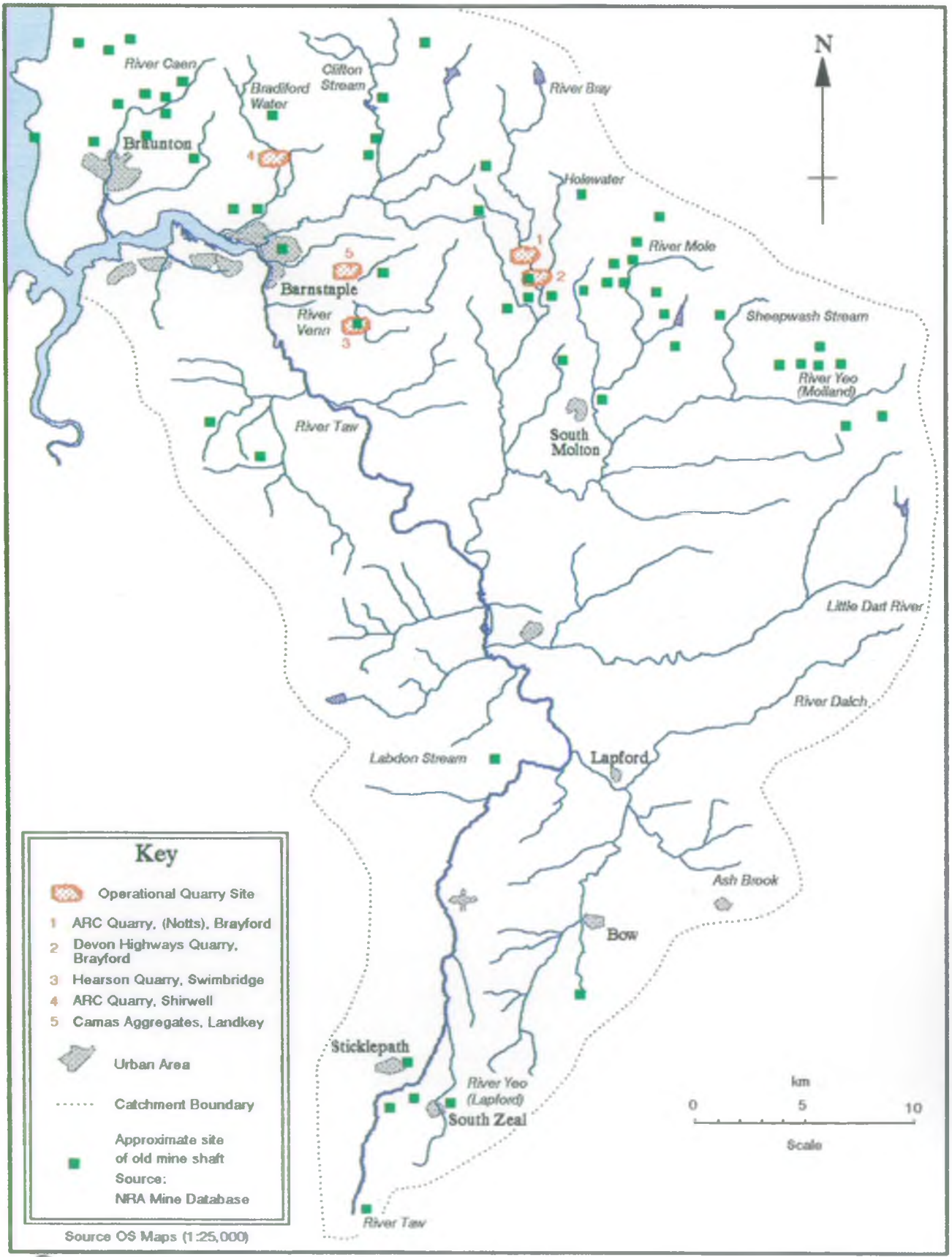
Current Use

There are no active metalliferous mines within the River Taw Catchment. A total of fifty-eight abandoned metalliferous mines have been identified within the catchment (see Figure 17). Fifty adit portals have also been identified by desk study work. These have the potential to discharge mine drainage to the surface water environment.

THE RIVER TAW CATCHMENT

Figure 17

Mining and Quarrying



Source OS Maps (1:25,000)

Information Correct as of Sept 1994

NRA South Western Region

Mineralisation within the Devonian and Carboniferous rocks of the River Taw Catchment is less intensive than in many other catchments of South West England. Some copper and arsenic mineralisation is associated with the northern margin of the Dartmoor Granite. Elsewhere, the absence of thermal activity associated with granite emplacement has resulted in scattered, generally small scale mineral deposits. The principal minerals worked included iron, copper, lead, zinc, arsenic, manganese and silver. Small amounts of antimony and gold have also been reported. Iron and manganese ores occur as oxides, whilst copper, lead, zinc, arsenic, pyrite and antimony ores occur as sulphides.

Some of the oldest and most historically productive mines in the area can be found in the River Mole subcatchment, two of the best examples of these mines include the Bampfylde and Florence Mines which lie along the banks of the River Mole near Heasley Mill. Around 18,000 and 38,000 tonnes of iron and copper ore were extracted from these mines respectively. Although most of the mines in the catchment had closed by the late 19th century, several mines had brief revivals around both world wars in the 1920s and 1940s.

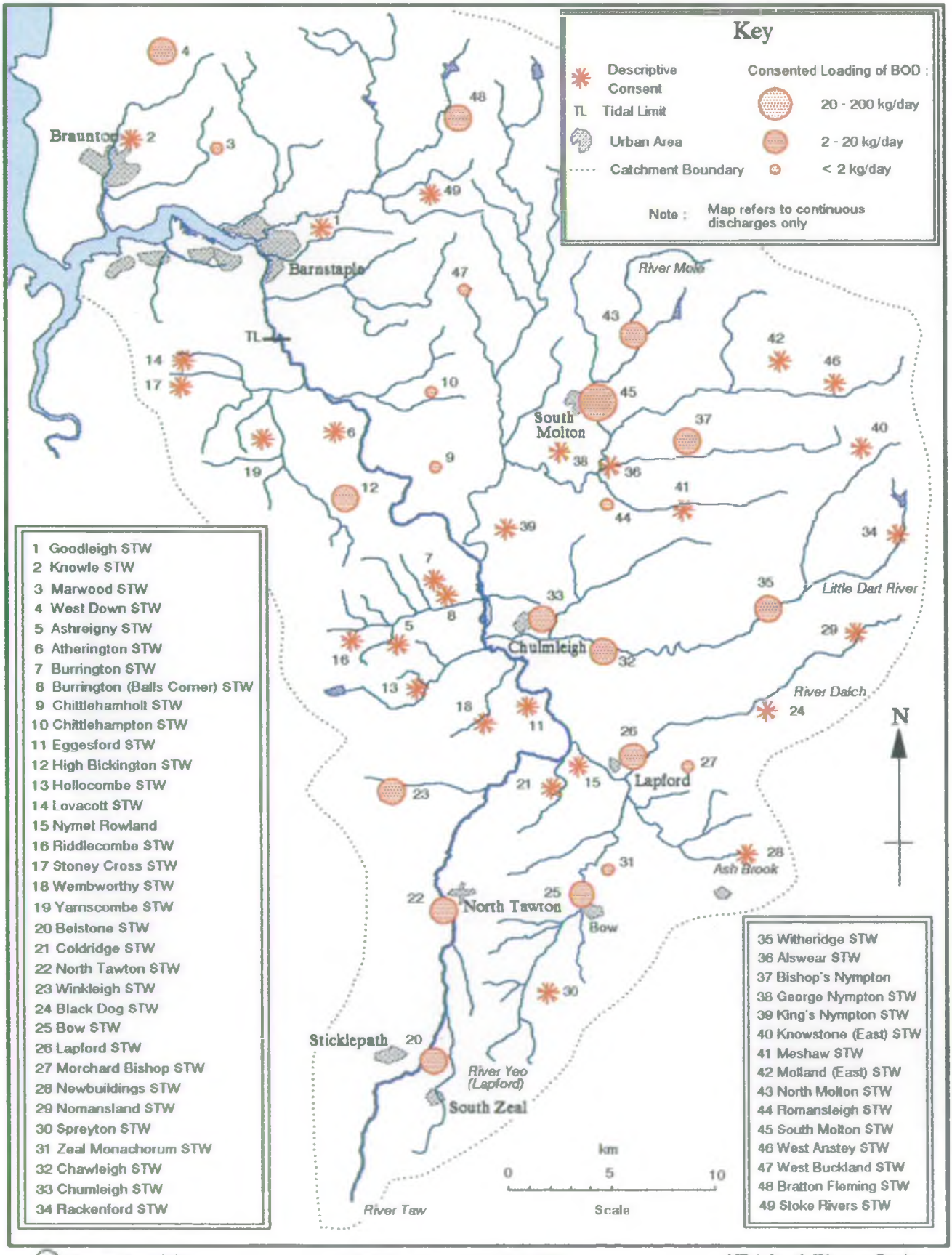
The NRA has conducted studies to identify the location of abandoned metalliferous mines, but has not undertaken any field based sampling within this catchment. The majority of the mines were small scale operations and worked poor, low grade mineralisation. Consequently the environmental impact of most will be limited and restricted to small unmonitored watercourses in the immediate vicinity of the mineral workings.

There are currently five working quarries identified in the River Taw Catchment, all of which extract sandstone/gritstone; Bray Valley Quarry and Barton Wood (Devon Highways) Quarry lie within the River Bray Catchment. Hearson Quarry and Venn Quarry lie within the River Venn Catchment. Plaistow Quarry lies within the Bradiford Water Catchment.

In addition to a ready-mixed concrete plant sited at Venn Quarry, coating plants where rock aggregate is mixed with bitumen to form road making material, are sited at the Bray Valley and Barton Wood (Devon Highways).

Figure 18

THE RIVER TAW CATCHMENT
Consented Effluent Disposal - Sewage (SWWSL)



Information Correct as of July 1994

NRA South Western Region

3.12 Effluent Disposal

General

River systems are used widely for the disposal of effluents. There are three principle categories of discharges which enter the catchment:

- continuous
- intermittent
- diffuse.

Continuous discharges include domestic, industrial and agricultural effluents in the River Taw Catchment. Discharges to controlled water require a consent (licence) from the NRA. In calculating consent conditions the NRA considers the quality of receiving waters and the amount of available dilution in order to protect the recognized uses made of the waters.

Intermittent discharges include consented and non-consented discharges from a variety of sources including combined sewer overflows (CSO), surface water outfalls, accidental industrial and agricultural discharges or road traffic spillages.

Diffuse discharges arise from sources such as runoff from land and as a result of excess chemical application of liquid wastes to land and are dealt with in Section 3.6.

Catchment Perspective

Current Uses

Figures 18 and 19 refer to sewage and trade effluent disposal respectively.

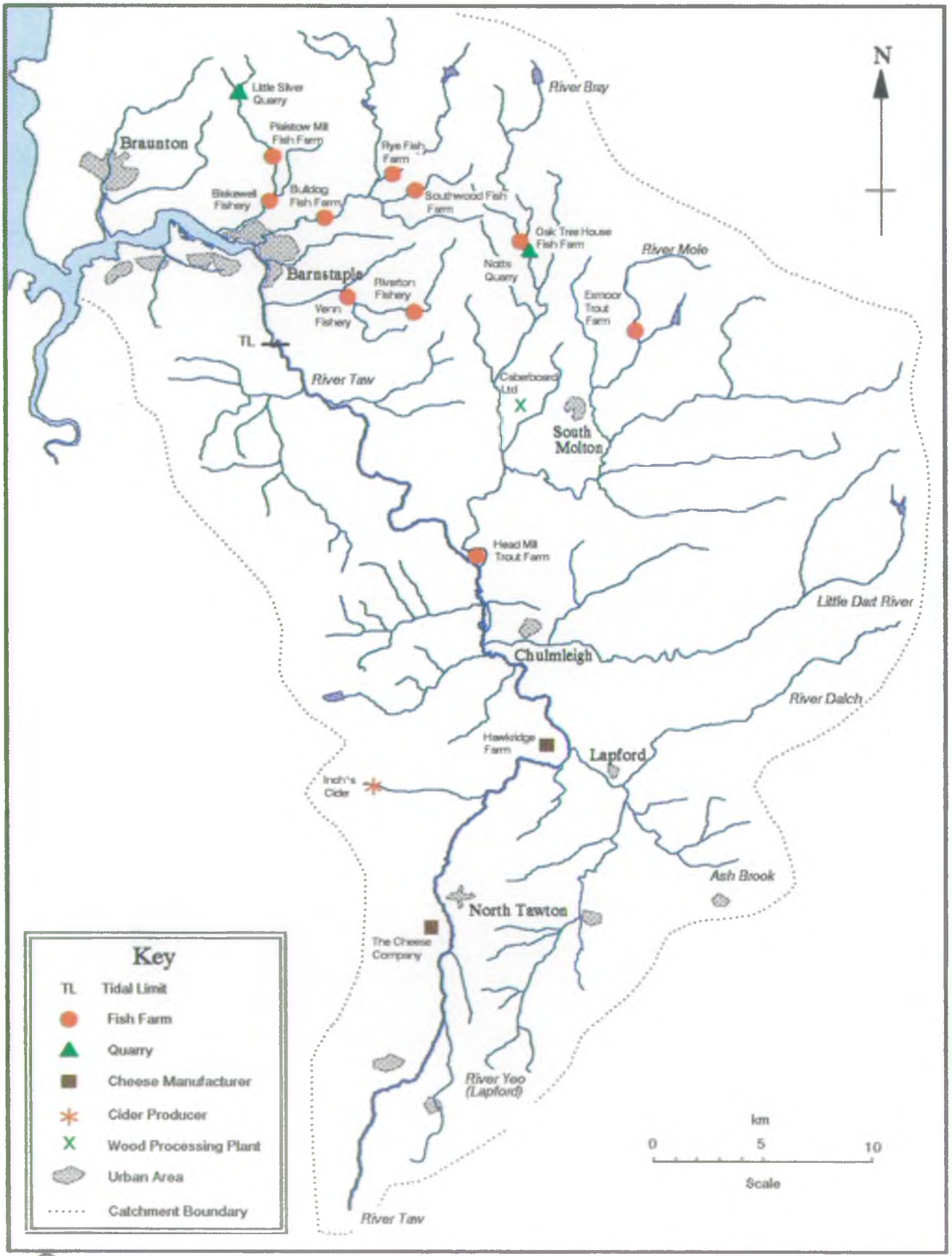
It is estimated that the total consented organic load (expressed as Biochemical Oxygen Demand, (BOD) which can be discharged directly to watercourses from SWWSL numerically consented STW is approximately 90 kg/day. Less than 4 kg/day is from private STWs.

The discharge from The Cheese Company, North Tawton has a consented BOD load of 22.5 kg/day and is the largest in the catchment. The second largest in the catchment is from South Molton STW with a load of 21 kg/day. Many consents include criteria to limit ammonia and suspended solids.

Twenty SWWSL discharges in the catchment are of concern as they receive little dilution in the receiving watercourse. Some of these are the subject of consent reviews.

Figure 19

THE RIVER TAW CATCHMENT
Consented Effluent Disposal - Trade



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NRA South Western Region

There are approximately fifty storm sewer overflows (SSOs) and pumping station emergency overflows in the catchment (excluding discharges at sewage works). Only nine are understood to have impacts on their receiving watercourses (mainly aesthetic), of which two are considered significant (Chulmleigh SSO and Saunton Road Pumping Station at Braunton). As there is limited SWWSL investment available for the resolution of these unsatisfactory discharges (under the AMP2 programme), these, and other CSOs in the catchment, may not be assigned sufficient priority to qualify them for improvement work within the next ten years.

Although there are no major pollution problems, provision of rural first time sewerage would rectify minor pollution at Morchard Road and at Down St Mary prevent contamination to a private borehole.

Future Use

Improvement Schemes

Provisional STW improvements have been planned at the following STW's:

- Eggesford STW
- North Molton STW
- Riddlecombe STW
- West Anstey STW.

Improvements to SWWSL STWs over the next 10-15 years are subject to available funding to be approved by OFWAT. Strategic Business Plans for these investments (AMP2) have been developed based on guidelines agreed between the Water Services Companies, NRA, DoE and OFWAT. In priority sequence for investment:

(i) schemes required to meet and maintain current EC and domestic statutory obligations

(ii) schemes required to meet and maintain new EC and domestic statutory obligations

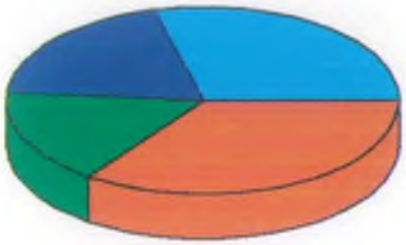
(iii) schemes which have been separately justified, required to maintain river quality relative to the 1990 survey or to achieve river or marine improvements.

Strategic Business Plans were submitted in early 1994, and OFWAT declared the associated customer charging base in July 1994. However, no commitment to the delivery of the environmental programme can be given by SWWSL until their request for an assessment by the Mergers and Monopolies Commission (MMC) is completed. It should be emphasized, therefore, that the improvements identified for the River Taw Catchment under AMP2 are provisional until financial commitment is established.

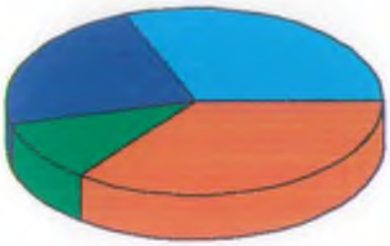
THE RIVER TAW CATCHMENT

Figure 20

Pollution Incidents By Source



1991
TOTAL 220 INCIDENTS



1992
TOTAL 203 INCIDENTS

1993
TOTAL 230 INCIDENTS

Key

- FARMS
- SEWAGE
- TRADE
- MISC. Including road construction, road traffic accidents, fires & domestic waste

The timing of any improvement works will depend on a priority rating system agreed between SWWSL and the NRA. Details of individual works will not be known until after the completion of the MMC assessment.

Urban Waste Water Treatment Directive

The EC Directive concerning urban waste water treatment, (91/271/EEC) (Ref. 19), lays down minimum standards for the provision of sewerage collection systems and sewage treatment which must be implemented by 2005. Even though no STW in the River Taw Catchment will be required to provide more than secondary treatment (as would be required of STW's serving population equivalents greater than 2,000 and discharging to 'sensitive areas') the EC Urban Waste Water Treatment Directive (UWWTD) (Ref. 19) is the most significant driver of investment in the catchment during the AMP2 period.

Further information concerning the EC UWWTD and its role as a water quality target can be found in Section 4.1.

Improvements to current effluent treatment facilities are being made at Inch's Cider, and any further increase in production will need to be matched by the treatment facility capacity.

Recent improvements to effluent treatment at the Cheese Company, include improved sludge storage, relining the aeration lagoon, new aerator diffusers and improved sand filter facilities. The agreement between the landowner, tenant and the Company, has also been renewed providing the ability to spray irrigate the effluent to fields, if for any operational reason the effluent would be likely to exceed its consent.

ARC Bray Valley Quarries have recently improved their site drainage and treatment facilities by installing a second settlement lagoon. Barton Wood Quarry (Devon Highways) are proposing to install settlement and oil interception facilities that will resolve the longstanding problems that result in site runoff colouring the River Bray after heavy rain.

Figure 20 shows the data for pollution incidents by source for 1991 to 1993.

Objectives

1. To control the discharge of effluent to the water environment in such a way that water quality objectives are achieved and maintained, and other uses are not compromised.

2. To continue to liaise with the planning authorities to ensure that they are aware of NRA concerns and priorities concerning effluent disposal issues in the River Taw Catchment.

3. To liaise regularly with trade dischargers, farmers, SWWSL and undertake regular site inspections.

4. To continue the audit of consent compliance monitoring and formal sampling (possibly leading to court action) where necessary.

5. To monitor all consented discharges with flows exceeding 5 m^3/day (excluding uncontaminated surface water) to ensure compliance with numeric consent standards.

6. To perform a cost-benefit analysis to enable the priority rating of improvement works planned by SWWSL over the AMP2 period.

3.13 Amenity and Recreation

General

The recreation and amenity duties of the NRA are set out in section 16 of the Water Resources Act 1991 (Ref. 5). The Act generally empowers the NRA to conserve the natural beauty and amenity of inland and coastal waters and associated land, as well as the use of such areas for recreation purposes.

There are two types of recreation that are of concern to the NRA and each requires separate levels of provision to be made.

Activities such as walking, bird-watching, angling and picnicking bring people into close proximity with watercourses. The general concerns are with the aesthetic acceptability of water features, access to and along watercourses and the provision of appropriate facilities.

The other type of recreation deals with sports such as canoeing and activities such as swimming, where there is intimate contact with the water. In these cases the concerns are more with water quality, provision of adequate facilities and the potential levels of disturbance to wildlife caused by these activities.

Catchment Perspective

Current Use

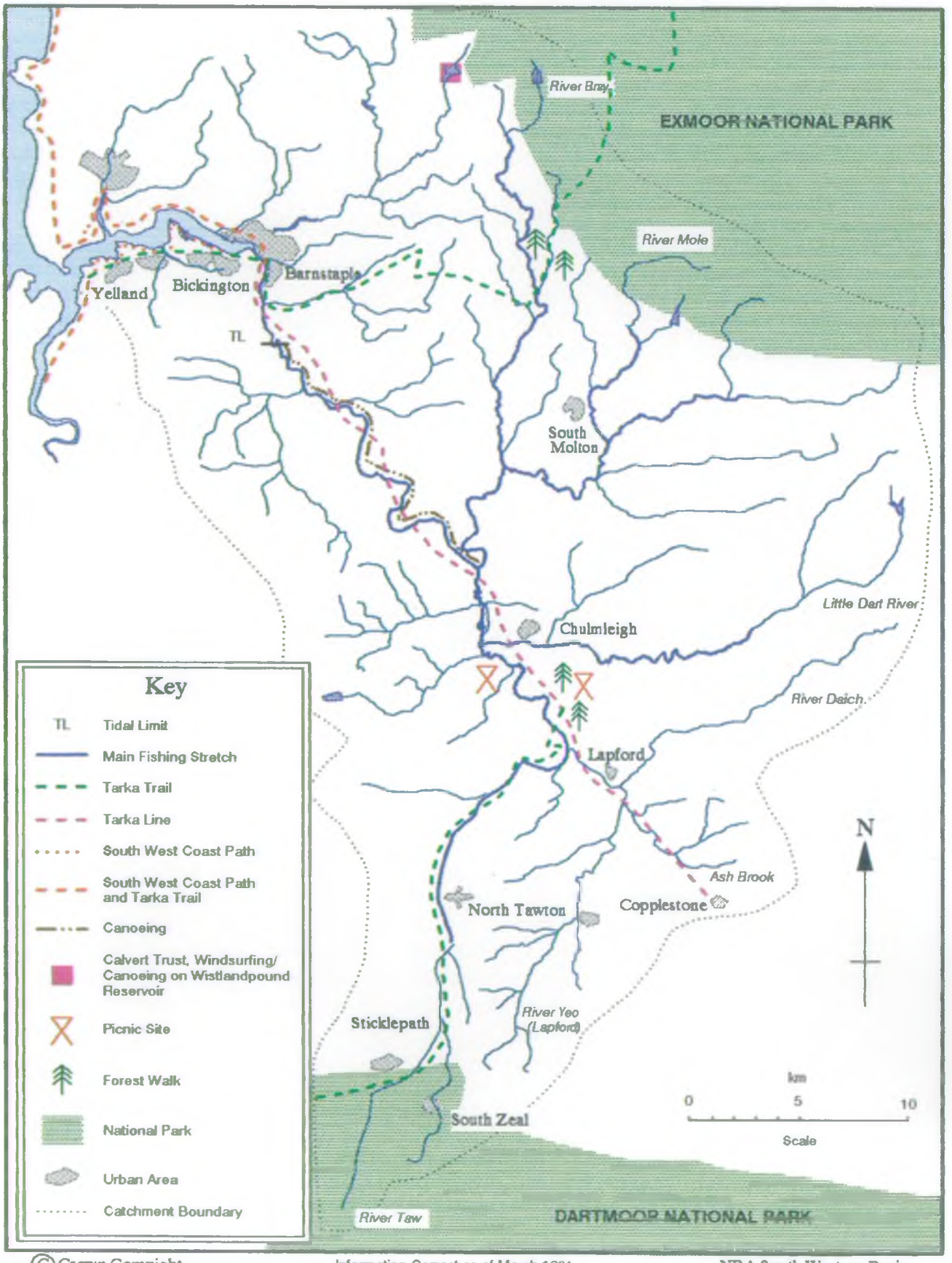
There are widespread recreation activities throughout the catchment, with a low impact on the area and requiring relatively low levels of provision, see Figures 21 and 22.

There are two long distance footpaths partly within or running close to the catchment boundaries; the South West Coast Path, (a National Trail), and the Tarka Trail. Both provide maintained footpaths, the former follows the coast to the north of the catchment, the latter provides access to stretches of river within the River Taw Catchment. The Tarka trail is a 180 mile route which leaves the River Okement in the River Torridge Catchment on Dartmoor and joins the River Taw at its headwaters close by, following it north to Eggesford. From here the trail joins the British Rail Tarka Line to Barnstaple before heading out on public rights of way across Exmoor to the South West Coast Path at Lynmouth.

Bird-watching and picnicking tend to be informal pursuits without specific provision. There are several picnic sites within the catchment maintained by Devon County Council, Dartmoor and Exmoor National Parks and Forest Enterprise.

Figure 21

THE RIVER TAW CATCHMENT
Amenity and Recreation



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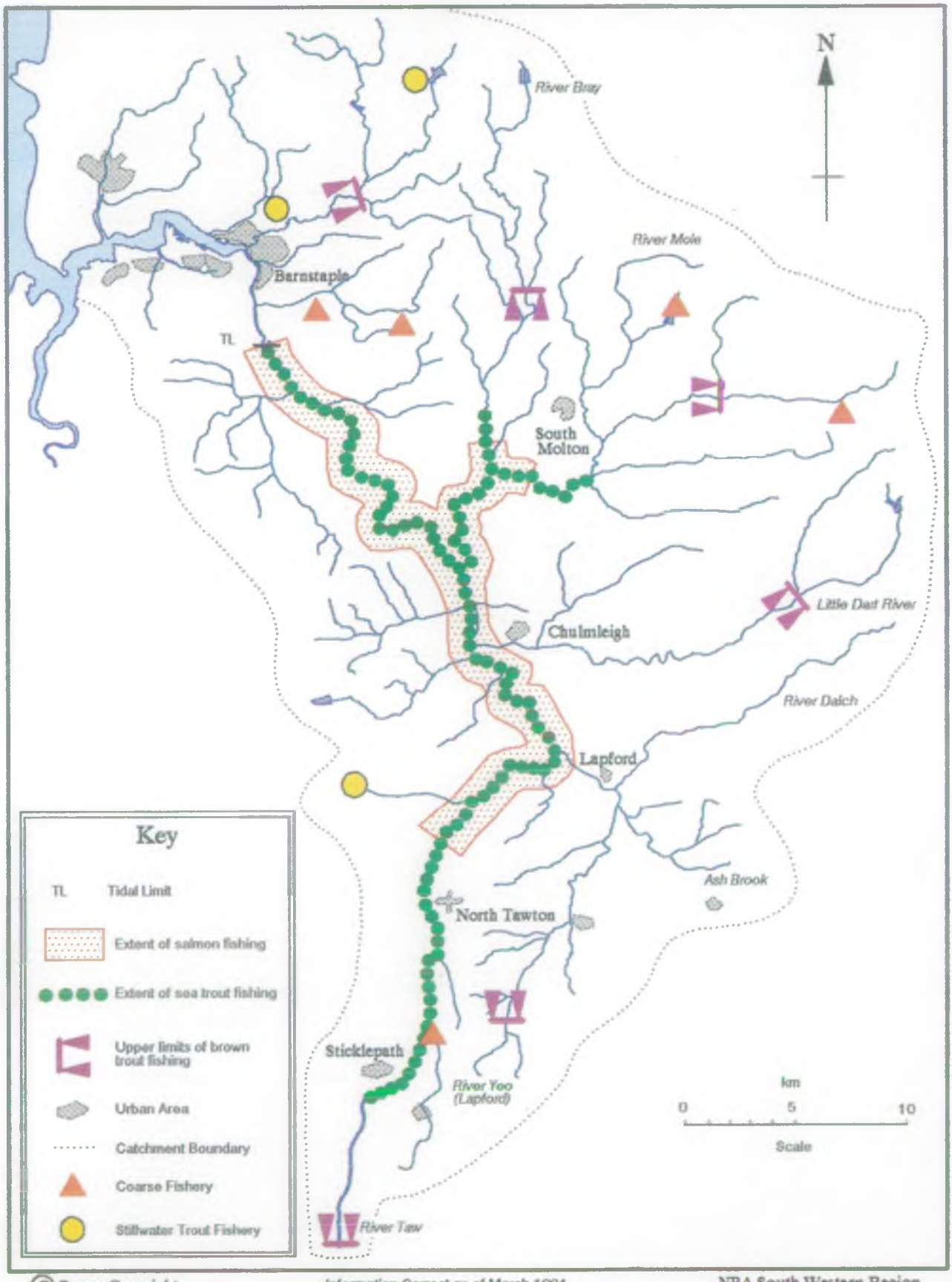
THE RIVER TAW CATCHMENT
Angling

Figure 22



Information Correct as of March 1994

NRA South Western Region

Canoeing occurs on the lower stretches of the River Taw downstream from Junction Pool with the season running from 1 October to 28 February. There is no access agreement and access has to be negotiated with the landowners through the British Canoe Union or Bideford Canoe Club. To respect riparian rights only agreed access and egress points should be used.

Provision for watersports in the catchment is low, with the Calvert Trust having an agreement with SWWSL to use Wistlandpound Reservoir. The River Taw and its tributaries are used at a number of points for informal bathing, with no facilities provided for these activities. The river is also used for a twice yearly raft race from Umberleigh to Barnstaple.

Angling occurs along the River Taw, from North Tawton downstream to the tidal limit, on the Little Dart River downstream from New Bridge, on the River Bray downstream from Leehamford Bridge, on the River Mole downstream from North Molton and on the River Yeo downstream from Bottreaux Mill, in all cases principally for salmonids. There are a number of stillwater fisheries in the catchment, offering both coarse and trout fishing mostly away from main watercourses.

Some stretches of the river are used by outdoor activity centres, schools and organised groups.

Future use

It is likely that this use of the catchment will develop and expand. Where activities are likely to conflict with other uses the NRA will attempt to ensure a balance through liaison with other bodies, and through its own statutory duties and powers.

Objectives

1. To maintain, develop and improve recreation use of NRA owned sites.

2. To take account of recreation in proposals relating to any NRA function.

3. To promote the use of water and associated land for recreation purposes, where such actions will not compromise or conflict with other uses.

4. To monitor recreation use.

3.14 Water Abstraction

General

This use covers all surface and groundwater abstractions, including domestic, industrial, agricultural and amenity supplies.

Licensed abstractions fall into two basic categories: consumptive and non-consumptive uses. Consumptive uses generally involve a loss of a proportion of the water abstracted. Non-consumptive uses are those which essentially return all the abstracted water back to the catchment. In the River Taw Catchment these latter uses include fish farms and hydro-electric power generation. Such uses can have a detrimental impact on the catchment if they severely reduce flows in the by-passed reach.

Licensing Policy

All abstractions other than those for certain small agricultural and domestic supplies require an NRA licence, see Figures 23 and 24.

The main exceptions to this general rule of licensing control are explained below.

1. Agricultural abstraction from inland-waters on one's own land and/or those for own private domestic household use from inland-waters on one's own land, where in aggregate these do not exceed 20 m^3/day.

2. Those for own private domestic household use from groundwater on one's own property where this is less than 20 m^3/day.

3. Those groundwater abstractions which occur within relevant parts of the catchment covered by the 'Exemptions from Control' Order 1970 (Ref. 19), obtained by the former Devon River Authority. This Order was obtained because yields from groundwater are generally low and their impact on water resources was considered to be insignificant.

Licences when issued contain a schedule of conditions under which the holder can operate the abstraction. This schedule can include:

- how much water can be abstracted in specified periods, and how this is assessed
- where it can be used and for what purpose
- residual flow conditions to protect the environment and other legal users.

Licence conditions are subject to routine enforcement by the NRA.

A number of licences were granted as 'licences of right' upon the implementation of the Water Resources Act 1963 (Ref. 21), and again in a more restricted range of categories as 'licences of entitlement' under legislative change in 1989. The NRA were required by law to issue such licences on the basis of established use and could not impose conditions to protect the environment.

Regional licensing policy currently has a basis of protection centred on protection of low flows (a Q95 based condition) and limited disruption to hydrograph pattern. This policy will be refined as more detailed knowledge on habitats and environmental needs emerges from national R & D Projects.

Licences for any future developments will only be granted where local resources are available and the need is justified. They will be issued subject to conditions to ensure they will not cause derogation of existing protected rights, or adversely impact in-river uses or the river environment.

Groundwater Protection Policy

The NRA will apply its policy and practice for the protection of groundwater in the catchment to protect the availability of these groundwater resources (Ref. 18).

The main activities which require constraint so as not to impact on groundwater flows and yields include:

- quarrying or mineral abstraction, particularly below the water table
- deep construction work that involves drainage or de-watering operations such as trunk road cuttings
- urbanization.

The NRA will seek to protect groundwater either through its own authorizations or by statutory or non-statutory consultation with other agencies. In view of the local nature of groundwater units in this catchment any such developments will be considered on a case-by-case basis.

Catchment Perspective

There are 543 current licences in the River Taw Catchment (as at 11/5/94) with a total annual authorized abstraction of approximately 154,788 Ml, 97% of this is from surface waters and 3% from groundwater. The annual total represents 20% of the average daily flow of the River Taw at its tidal limit. Only 16% of the total authorized resource is for consumptive uses the remainder being from non-consumptive.

The annual authorized total for consumptive use within the River Taw Catchment on a daily basis represents approximately 3% of the average daily flow of the River Taw at its tidal limit.

Figure 26 shows the abstraction statistics for the River Taw Catchment.

Although there are no major aquifers in the River Taw Catchment, the rocks contain enough groundwater to support minor springs, as well as, numerous private supplies.

(i) Potable Public Supply

Current Use

SWWSL provide the mains public water supply within the catchment, their abstraction represents 12.6% of the total authorized abstraction from surface water and 66% of the total authorized abstraction from groundwater in the River Taw Catchment.

SWWSL abstracts water from rivers, reservoirs and groundwater sources as shown on Figure 23. Opportunity is taken to integrate the operation of various intakes and sources to meet demand. When abstractions are restricted by prescribed flow conditions or by the lack of local storage, mains supplies can be augmented by importing water from Roadford Reservoir lying in a neighbouring catchment.

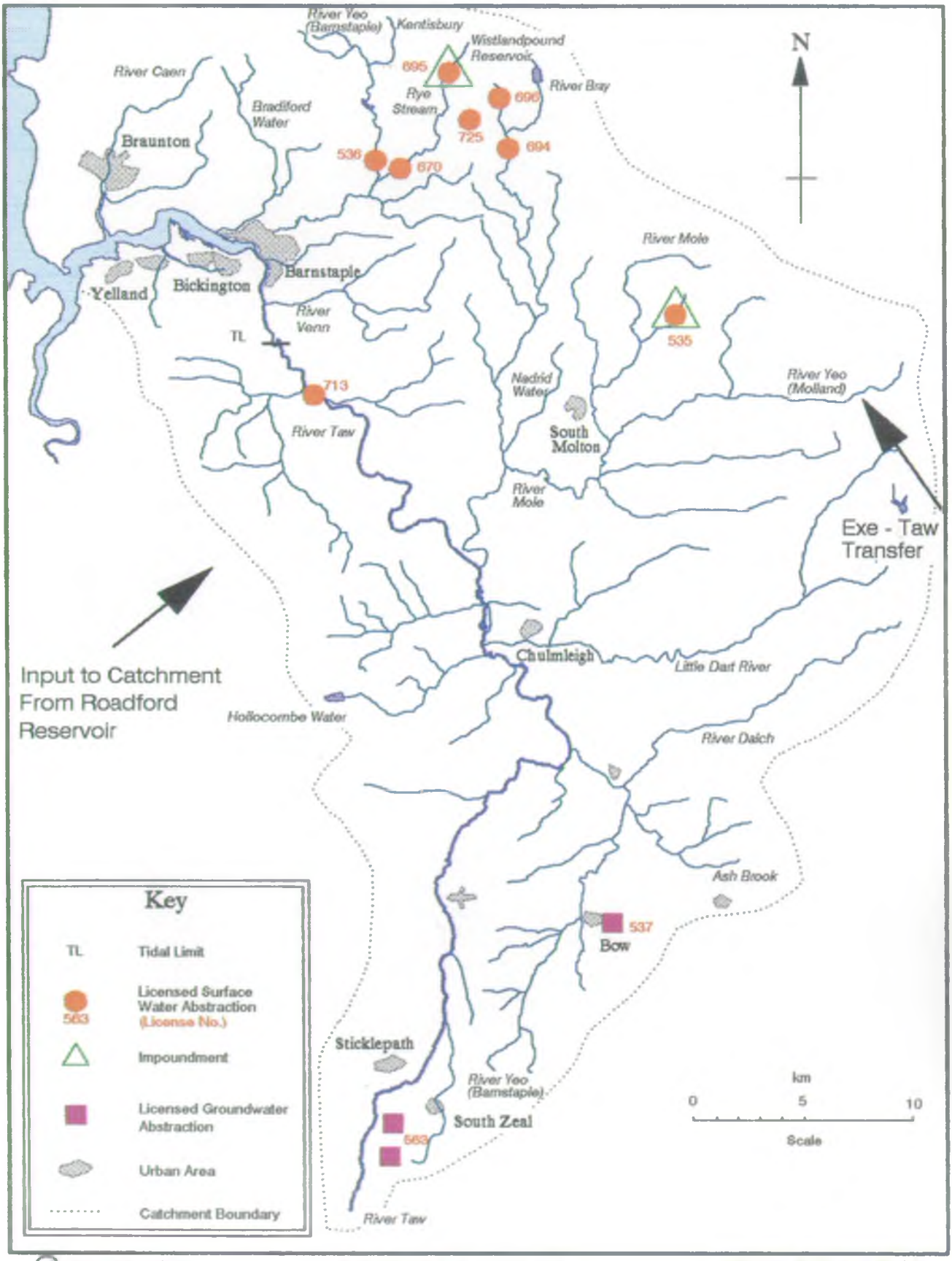
This conjunctive use arrangement forms a long term strategy for the River Taw Catchment as documented in the Regional Water Resources Strategy (Ref. 22). Improvements associated with the Roadford Scheme have markedly increased the reliability of supply and minimized the need for drought orders detrimental to river flows within the catchment.

The largest licensed public water supply sources within the catchment are those located within the River Yeo Catchment and in the headwaters of the River Bray. These abstractions include up to 34 Ml/day at Leehamford (694), 17 Ml/day from Wistlandpound Reservoir, 8 Ml/day from Loxhore, River Yeo (670), 4.5 Ml/day from the Bratton Stream and 2.2 Ml/day from the Spreycott Stream. The latter licence will expire in 1997.

The main River Taw abstraction which is authorised for 18 Ml/day is at Newbridge, close to the tidal limit. This abstraction can be supported by releases from Wimbleball Reservoir when required via an inter-catchment transfer as shown on the map. The licences for Newbridge and the transfer expire in 1995. The NRA anticipate that SWWSL will seek to continue these arrangements. These abstractions are shown on Figure 24.

Figure 23

THE RIVER TAW CATCHMENT
Licensed Public Water Supply Abstractions



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A further notable abstraction is licensed from Taw Marsh (563) see Figure 25. Here up to 8 Ml/day can be taken from boreholes subject to flow conditions to protect the river.

Future Use

Before any new water resource schemes are considered, the NRA will require SWWSL to demonstrate that they have satisfactorily pursued leakage control, demand management and best use of existing supplies. Where additional resources are confirmed to be necessary the NRA prefers abstraction in the lower reaches, supported by appropriate storage. In the long term SWWSL may wish to increase winter abstraction from the River Taw as part of the wider conjunctive use of the Roadford Reservoir. Investigations will be required to establish appropriate licence conditions and, if relevant, source operating arrangements to ensure that legal water interests and the water environment are properly protected. The future status of the Exe/Taw transfer will also be reviewed.

Demand predictions are included in the Regional Water Resources Strategy (Ref. 22) and are a little over 0.5% per year until 2021 for the Region.

Potable abstraction from classified river stretches is the subject of a proposed Statutory Water Quality Objective (SWQO), whose application and standards are currently being researched. It is intended that these SWQO's will allow for the statutory protection of the quality of watercourses upstream of present and future river intakes where water is abstracted for public potable supply.

(ii) Non-mains Domestic Supplies

Current Use

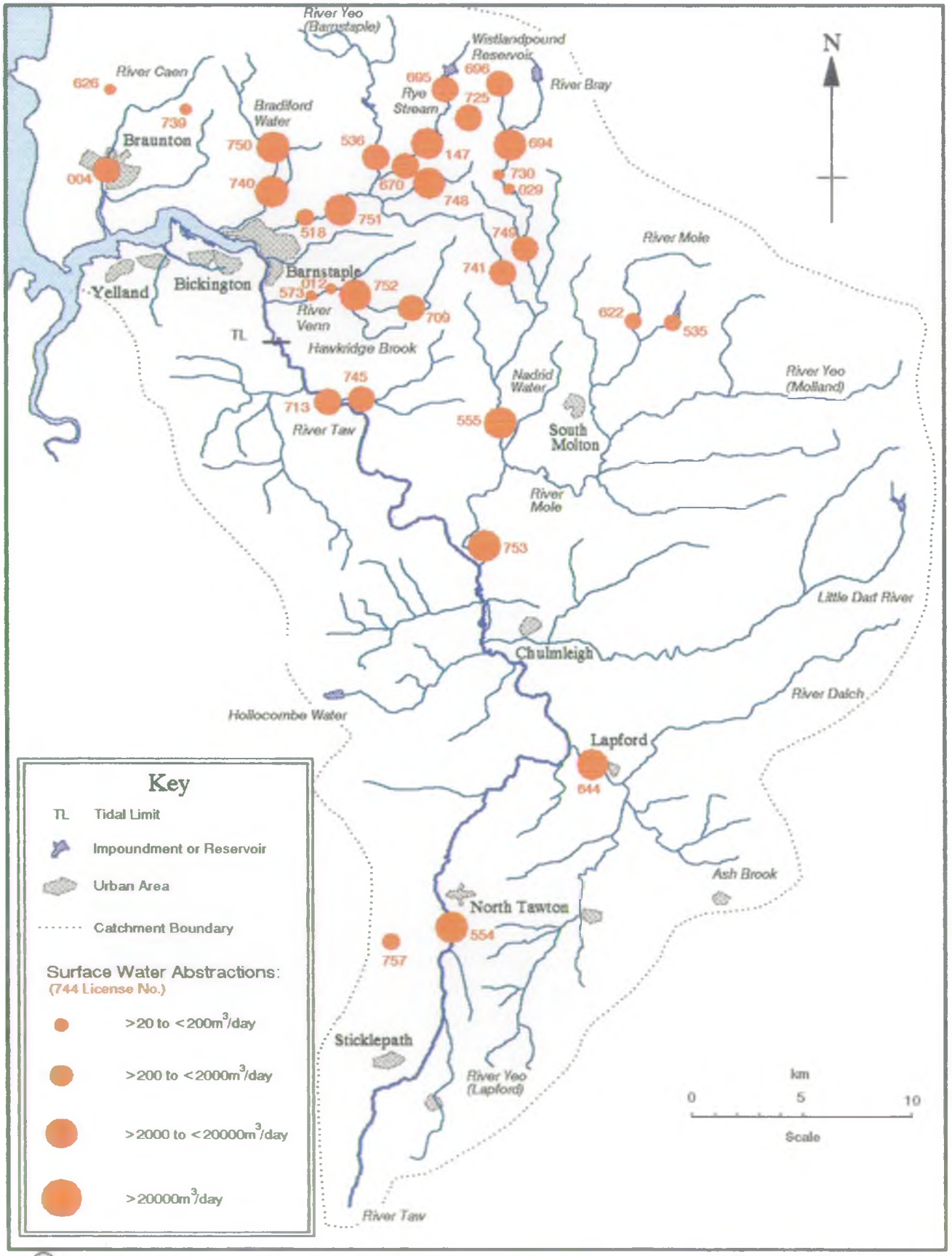
Though the majority of premises within the catchment have a mains supply, there is also a large number of private domestic supplies in the inland rural area. Authorized abstractions are mainly from groundwater and account for 1.7% of the total authorized groundwater abstraction. However, it must be remembered that many such abstractions are exempt from licensing control, being located within the excluded area or by being less than 20 m^3/day for own private domestic household use.

Future Use

In rural areas with low population density there may be difficulties in supplying mains water at reasonable cost. In these circumstances groundwater supplies provide a useful alternative, yields permitting.

Figure 24

THE RIVER TAW CATCHMENT
Licensed Surface Water Abstractions



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(iii) Agricultural

Current Use

Agricultural abstractions feature strongly because of the predominance of this activity in the catchment. Many agricultural supplies are exempt from licensing control (see exceptions 1 and 3 under "Licensing Policy).

Future Use

Little growth is expected in abstractions for general agricultural purposes.

SWQOs standards are currently being developed to protect water quality intended for agricultural abstraction.

(iv) Spray Irrigation

Current Use

Water abstraction for spray irrigation purposes (including agriculture, horticulture and leisure facilities, such as golfcourses) represents only 0.5% of the total groundwater resource authorized for abstraction. Very little is abstracted from the surface water resource.

Demand generally occurs at times of the year when rivers are naturally low and impacts can be high.

Future Use

Spray irrigation for both agriculture and leisure have been identified as a growing use in the NRA National Water Resources Strategy - 'Water Nature's Precious Resource' (Ref. 23). Increases are predicted to be 1.7% 1991-2001 and 1% 2002-2021.

The NRA will generally expect such schemes to include the provision of off-stream storage to protect the water environment.

(v) Industrial

Current Use

In the catchment there is only a limited amount of industrial abstraction such as for quarrying and the cheesemaking. Most businesses obtain their water supply from the mains.

THE RIVER TAW CATCHMENT

Figure 25 **Licensed Groundwater Abstractions ≥20m³/day**

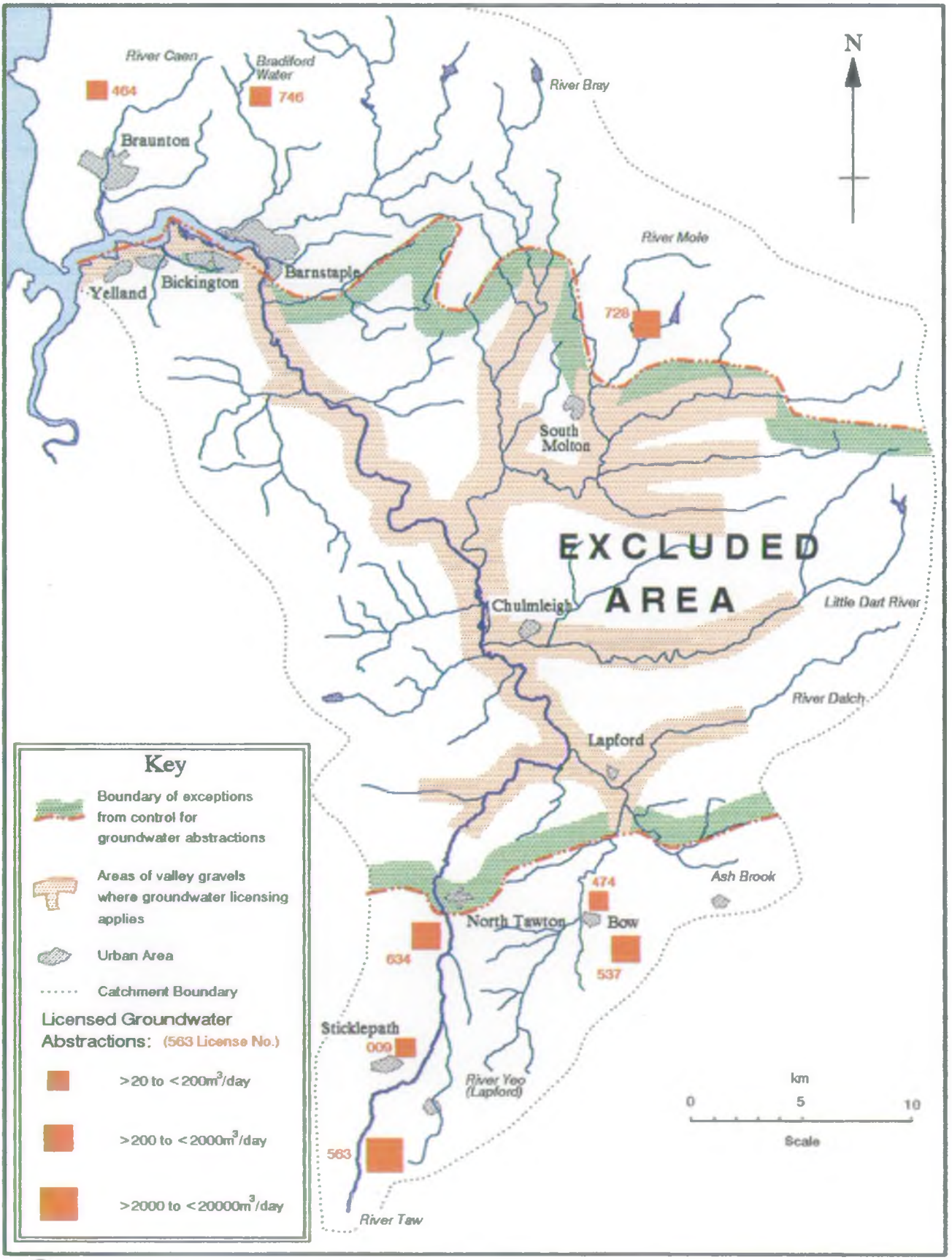

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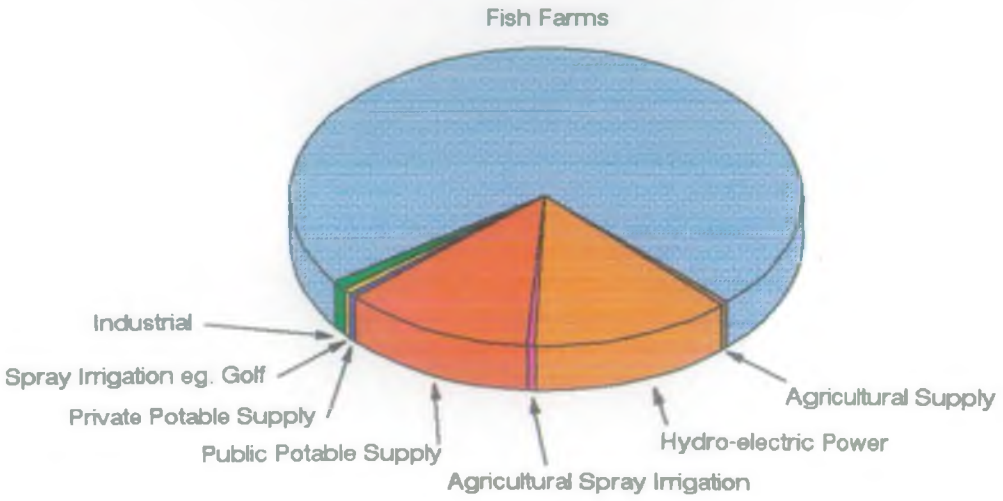
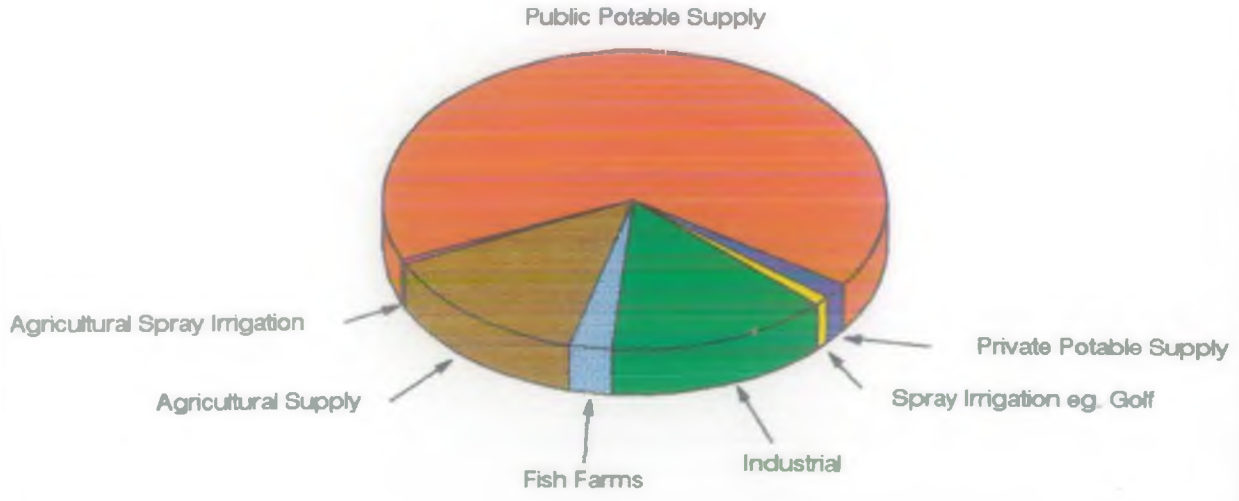
Figure 26

THE RIVER TAW CATCHMENT
Abstraction Statistics

% Abstractions of Surface Water



% Abstractions of Groundwater



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Future Use

Little growth is expected in industrial abstraction in the River Taw Catchment. The national Water Resource Strategy 'Water Nature's Precious Resource' (Ref. 23), gives a growth rate of 0.8% for the UK as a whole.

(vi) Hydro-electric Power Generation (HEP)

Current Use

Thirteen percent of the total surface water authorized to be abstracted from the River Taw Catchment is used for the production of HEP. These abstractions are mainly associated with old water mills. There are no groundwater licences.

Future Use

No growth in this use is expected.

(vii) Fish Farms

Current Use

Approximately 74% of the total surface water and 3% of the total groundwater authorized to be abstracted is for fish farming purposes. Larger fish farms include Head Mill Trout Farm Ltd (753), Bulldog Fish Farm (751), Blakewell Fisheries (740), Exmoor Trout (622), Plaistow Mills (750), Southwood Farm (748), Venn fisheries (752) and Oaktree House (749). The location of these are shown on Figure 24 and can be referenced using the licence number, which is given in brackets in the previous sentence.

Future Use

No growth in this use is expected.

Objectives

1. To achieve a best use of water resources within a planned and sustainable framework and through effective licensing control, in such a way to achieve and maintain the right balance between protected rights, lawful water uses and the natural environment.

2. To promote the efficient use of water by all types of abstractor.

4.0 CATCHMENT TARGETS

4.1 Water Quality Targets

General

The NRA aims to maintain and improve, where appropriate, the quality of controlled waters for all those who use them. Water quality management is achieved by setting objectives for the catchment, which are based on Water Quality Objectives (Ref. 24) designed to protect recognized uses and also by ensuring compliance with the standards laid down in EC Directives.

Targets

Individual river reaches to meet their target Water Quality Objective River Ecosystem Class and EC Directive Standards where they apply.

1. Water Quality Objectives

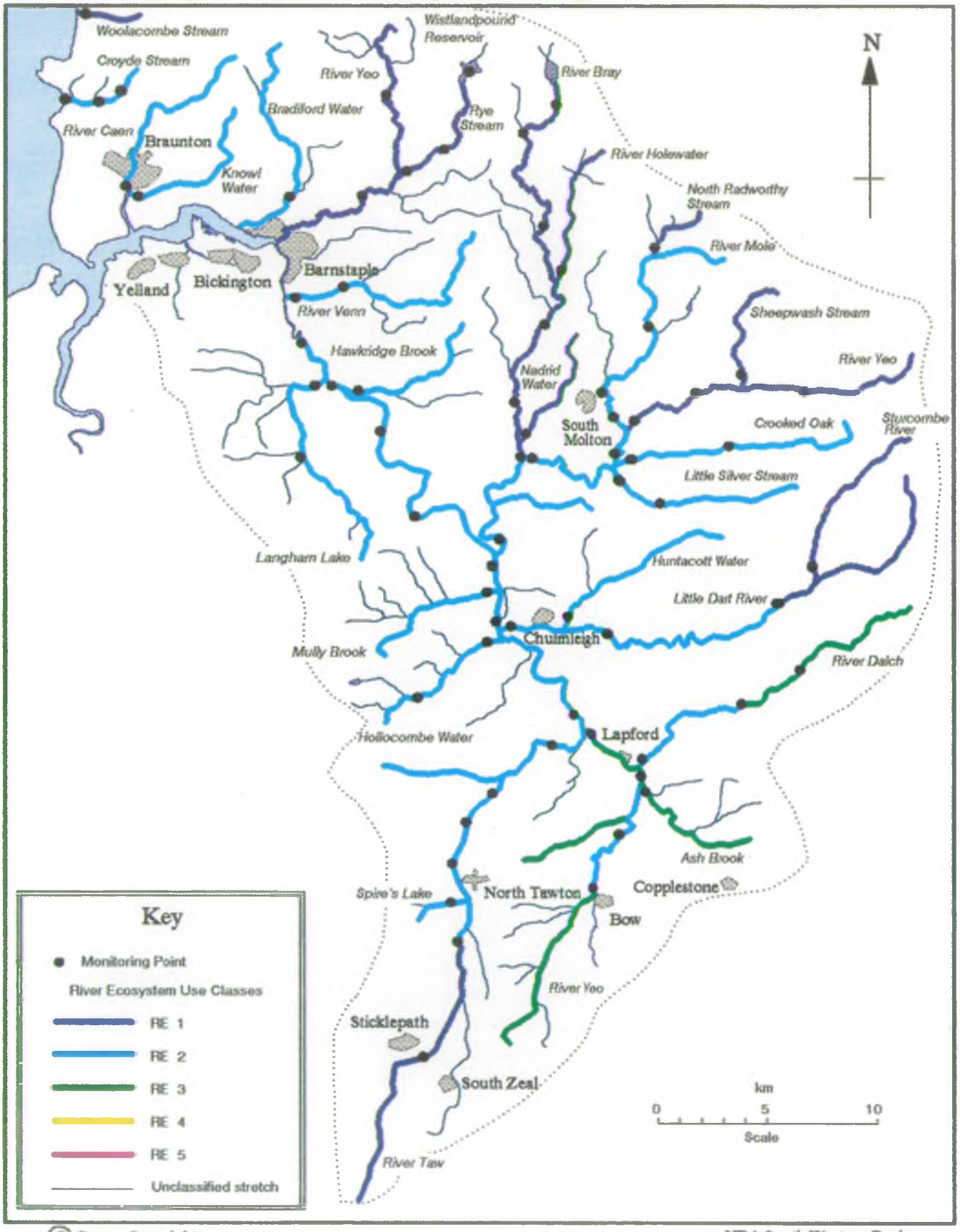
The Water Resources Act 1991 contains legislation which allows the Secretaries of State to prescribe classification schemes for water quality and to use them for the setting of Water Quality Objectives (WQOs). Previous references to water quality have been based on the National Water Council (NWC) classification system. Because of its limited range of chemical parameters and subjective interpretation it has been replaced with a dual system of use-related classifications; statutory WQOs and a General Quality Assessment (GQA) system. These reporting facilities will operate in parallel and will represent a neutral translation in standards from the NWC scheme. The WQO system will set use-related objectives and examine compliance with EC Directives and those objectives with specific use-related standards. The purpose of the GQA is to provide a means of accurately assessing and reporting on the general state of controlled waters in a nationally consistent manner.

A Use-Related Scheme

The Classification Scheme proposed for establishing statutory WQOs is based upon the recognized uses to which a river stretch may be put. These uses include River Ecosystem, Abstraction for Drinking Water Supply, Agricultural Abstraction, Industrial Abstraction, Special Ecosystem, and Watersports. The first phase of WQO implementation will be restricted to the River Ecosystem Use Class only; the standards for further uses are still under development. For each stretch, a target River Ecosystem Use Class Objective will be proposed, including a date by which this level of water quality should be achieved.

Figure 27

THE RIVER TAW CATCHMENT
Proposed River Ecosystem Target Classes - 1995



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a) River Ecosystem Use Class

There are five Classes within the River Ecosystem (RE) scheme, one of which will be applicable to every stretch of classified river. The term 'Ecosystem' is used in recognition of the need to protect the ecosystem that is sustained in a healthy river.

The proposed standards for the five River Ecosystem Classes are based on the chemical water quality requirements of different types of ecosystem, and consequently the types of fisheries they are capable of supporting (see Table 5 in Appendix 6). Until the RE Classes are formally established by catchment, they will initially equate to a cost-neutral translation from the former NWC-based River Quality Objectives (RQOs) (see Table 2 in Appendix 7).

The proposed water quality targets on a non-statutory basis for the River Ecosystem Use are shown on Figure 27 and will apply from January 1995.

2. EC Directives

There are four EC Directives that currently apply in the River Taw Catchment.

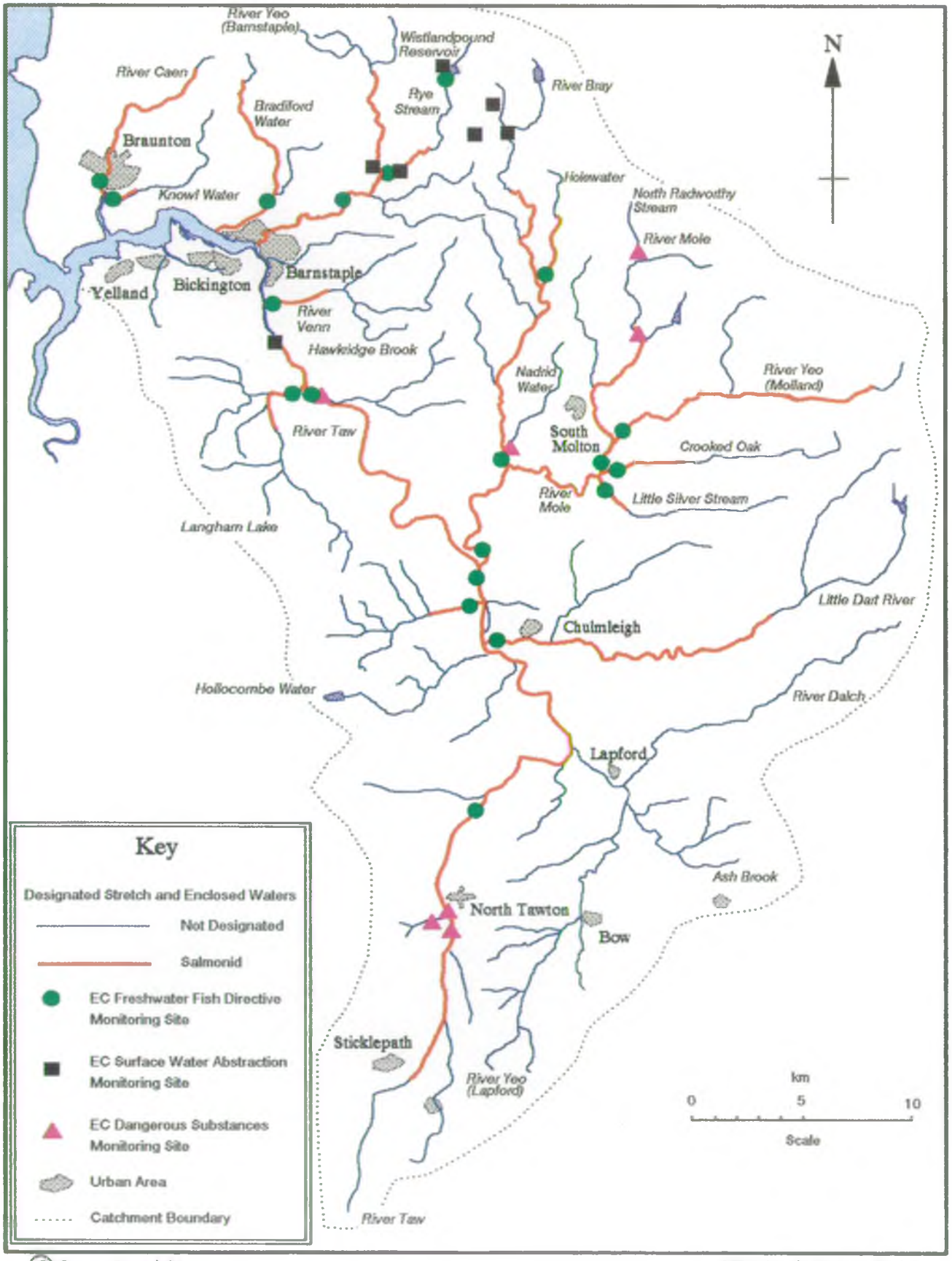
a) EC Freshwater Fish Directive

The EC Freshwater Fisheries Directive "on the quality of waters needing protection or improvement in order to support fish life", (78/659/EEC) (Ref. 25), is concerned with ensuring that water quality in designated stretches of water is suitable for supporting fisheries. This EC Directive contains two sets of quality standards, one at levels to support a cyprinid fish population (i.e. coarse fish) and another set at stricter levels to support a salmonid fish population (e.g. salmon and trout). There are two sets of standards for each fishery type; imperative standards which must be achieved and guideline standards which Member States should aim to achieve (see Table 4 in Appendix 7).

Designated river stretches in the River Taw Catchment are shown on Figure 28.

Figure 28

THE RIVER TAW CATCHMENT
EC Directive Monitoring



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b) EC Dangerous Substances Directive

The EC Dangerous Substances Directive "on pollution caused by certain substances discharged in the aquatic environment of the community", (76/464/EEC) (Ref. 26), is concerned with controlling certain substances considered harmful which are discharged to the aquatic environment. The EC Directive established two lists of compounds. List I contains substances regarded as particularly dangerous because of their toxicity, persistence and bioaccumulation. Discharges of List I substances must be controlled by Environmental Quality Standards (EQSs) 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 (see Table 5 in Appendix 7).

Sites monitored under this EC Directive are also shown on Figure 28.

c) EC Urban Wastewater Treatment Directive

The EC Directive "concerning urban wastewater treatment", (91/271/EEC) (Ref. 19) lays down minimum standards for the provision of sewerage collection systems and sewage treatment. The EC Directive specifies secondary treatment for all discharges serving population equivalents greater than 2,000 to inland waters and estuaries and greater than 10,000 to coastal waters, 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 which receive discharges serving population equivalents greater than 10,000 and also where surface waters are or may become eutrophic in the near future. "Less Sensitive" areas or "High Natural Dispersion Areas (HNDAs)" are those waters with high, natural dispersion where a lower level of treatment is acceptable, subject to "Comprehensive Studies" being carried out by the discharger to establish that a lower level of treatment will be sufficient to protect the environment from adverse effects. Discharges below the specified population equivalents for inland and estuaries and coastal waters must also receive "appropriate" treatment as defined in the AMP2 guidance note (see Table 6 and 7 in Appendix 7).

No stretches in the River Taw Catchment have been identified as "sensitive" areas although certain Sewage Treatment Works (STW) are being assessed under the "appropriate" treatment criteria (see Section 3.12).

d) EC Surface Water Abstraction Directive

The EC Directive "concerning the quality required of surface water intended for the abstraction of drinking water in the Member States" (75/440/EEC) (Ref. 27), ensures that surface water abstracted for use as drinking water meets certain standards and is given adequate treatment before entering public water supplies. The EC Directive sets out both imperative standards which must be achieved, and guideline standards which Member States should aim to achieve, for river water intended for public supply which is to be given different levels of treatment (see Table 8 in Appendix 7).

Abstraction sites that are monitored under this EC Directive are indicated on Figure 28.

3. Groundwater Quality

The protection of aquifers from pollution is of great importance, as the clean up of contaminated groundwater is a difficult and expensive operation, and may prove to be only partially effective. As well as putting large numbers of private water supplies at risk, contamination of groundwater may impact on surface water quality, particularly during dry weather periods when river baseflow is entirely dependant on groundwater discharges.

a) EC Dangerous Substances in Groundwater Directive

There is one EC Directive which currently applies to groundwaters in the River Taw Catchment. The EC Directive "on the protection of groundwater against pollution caused by certain dangerous substances" (80/68/EEC) (Ref. 28), 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 EC 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 limited entry to groundwaters. This EC Directive applies to all discharges to groundwaters including discharges from waste disposal sites and disturbance of contaminated land.

The NRA carries out its duties under this EC 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.

b) EC Nitrates Directive

The EC Directive "concerning the protection of waters against pollution caused by nitrates from agricultural sources" (91/676/EEC) (Ref. 29), also applies to groundwaters (see Surface Water Quality - EC Directives). However, in the UK, the identification of vulnerable zones is limited to areas around strategic public water supply boreholes. There are no strategic public water supply boreholes in the River Taw Catchment, therefore, no vulnerable zones have been identified in this catchment.

c) Groundwater Protection Policy

The NRA published its 'Policy and Practice for the Protection of Groundwater' in December 1992 (Ref. 18). This document provides comprehensive national general policies relating to the control of activities which may pose threats to the quality of groundwater. These activities include those listed below which do occur in the River Taw Catchment.

Certain activities in local areas are known or are likely to yield poor quality water. These include:

- disposal of liquid effluents, sludges or slurries to land - disposal of such wastes may exceed nutrient requirements of crops or vegetation, or contain mobile pollutants
- landfilling - poor control of drainage will result in escape of pollutants to groundwater
- urban and industrial development - such areas have frequently been found to result in contaminated ground. The redevelopment of such areas may exacerbate groundwater pollution if poorly controlled, but may also provide the opportunity for mitigation
- discharges to underground strata - most commonly from septic tank soakaways
- disturbance of ground affected by sulphide mineralisation - this can allow mineral oxidation with subsequent release of metals and acid to percolating waters.

Water quality standards for all these targets are listed in Appendix 7.

4.2. Water Quantity Targets

General Target or Aim

The NRA aims to manage water resources to achieve the right balance between the needs of riverine and wetland ecosystems, the needs of aquifer dependant systems, the needs of abstractors and dischargers, lawful water users, in-river needs, and to provide protective defence for people and property from flooding.

The NRA will seek to achieve the above target through the following measures:

(a) determining new abstraction and impoundment applications in accordance with regional and national policy

(b) including appropriate worded conditions on any new licence that is issued to:

- prevent over exploitation of groundwater resource
- prevent deleterious effects on migratory salmonid movements and spawning, nursery and wetland habitats
- ensure sufficient dilution for consented discharges
- ensure adequate water is available for existing licensed abstractions other protected rights, legal water uses and in-river use
- ensure proper records are maintained of actual abstraction to permit a proper understanding of water resource use within the catchment

(c) enforcing licence conditions by the NRA

(d) reviewing existing regional licensing policy in the light of any results from national R & D projects

(e) implementing Groundwater Protection Policy (Ref. 18) to protect groundwater yields and flows.

Where the above general target has not been met the NRA will undertake the following actions:

(f) investigate low flow sites (as identified in the Halcrow Report (Ref. 30), see Section 5.2 for details), within the context of national policy and available manpower and financial resources

(g) seek opportunities to transfer licensed resources downstream

(h) seek an element of environmental gain from any future water resources scheme.

4.3 Physical Features and the Riverine Ecosystem Targets

General

This section considers the requirements for physical features within the river channel and river corridor in the catchment, the provision and maintenance of permanent facilities for access and river corridor conservation and recreation.

The requirement at any particular location will reflect the combined requirements of all legitimate uses at that location where this is practicable. There will be situations where compromise is inevitable.

Targets

1. River Corridor

The Taw river corridor is of particular value for wildlife conservation, landscape and amenity. It is part of NRA's role to balance these environmental needs with those of other legitimate users. The following targets reflect NRA's approach to acquire information about the river corridor, to assess impacts and to safeguard the river environment through its regulatory duties. Where appropriate NRA may actively support initiatives which enhance recreation and conservation interests.

(a) Develop and maintain a conservation monitoring programme in association with relevant conservation bodies. The programme will concentrate on:

- identifying changes in wildlife, landscape and heritage
- monitoring the distribution of Himalayan balsam and Japanese knotweed within the catchment.

(b) Protect existing semi-natural habitats and to safeguard the character of the river corridor.

(c) Review and refine existing surveys of recreation and amenity use in order to provide a sound baseline for future action by December 1996.

(d) Liaise with all relevant bodies to ensure a collaborative and integrated approach to conservation and recreation in the catchment.

(e) Identify NRA holdings which would benefit from a management plan by April 1995.

(f) Develop management plans for selected sites so as to enhance their conservation value and encourage recreation use by December 1997.

2. Channel Morphology

a) Maintain or re-establish the presence of natural features such as emergent vegetation, meanders, pools and riffles.

b) Ensure the provision of adequate riffle areas for spawning.

3. Barriers

a) Maintain access for migratory fish to spawning territory by the establishment and maintenance of fish passes and the removal of barriers after fully considering wider ecological impact and according to the agreed Regional procedure.

4. Fisheries

a) Establish protection zones for salmonid spawning and nursery areas.

b) Establish adequate measures and enforcement to protect migratory fish.

c) Maintain adequate monitoring of fish stock levels, a method for identifying target abundance is suggested in Appendix 8.

d) Establish levels of parr and fry production for different parts of the catchment based on the 1968 survey levels.

4.4 Flood Defence and Land Drainage

General

Standards for the provision of flood defence may be prescribed (eg. the time allowed to determine a flood defence consent), indicative (eg. relating to the level of flood protection appropriate to a particular land use), or business (eg. a commitment which the NRA has imposed upon itself to improve efficiency or cost effectiveness).

Flood events are usually described in terms of the frequency with which they can be expected to occur on average. Hence a (once in) 10 year flood can be expected to be equalled or exceeded once every 10 years on average. This is also described as the "return period", although the interval before another similar event "returns" is subject to chance and only average over a long period.

Similarly the standard of protection at a location is expressed as the worst flood event which can be withstood without significant flooding. It is important to note that defence schemes alleviate flooding up to the design standard, but a worse event can still occur.

In high density urban areas the indicative (or target) Standard of Service may be 100 years, whilst a much lower standard may be appropriate to isolated properties or agricultural land. Indicative standards do not indicate an entitlement or minimum level to be aimed at.

Current standards may fall short of, or exceed, the target, and future action to address the difference will be considered in accordance with the NRA's Flood Defence Management Framework.

(a) Apply fully the Flood Defence Management Framework to the catchment

Regulation

The NRA is a statutory advisor to planning authorities on flood defence matters. It also issues consents and byelaw approvals for certain works which are likely to affect the flow of water or impede any drainage work.

(b) Complete a programme of data survey, interpretation and provision to planning authorities, by 1999.

Maintenance

Maintenance work is undertaken to ensure the efficient working of the natural drainage system, and to keep flood alleviation schemes up to their design standard.

Reaches of river, or coast, maintained by the NRA are classified by their land use in terms of the number of House Equivalents (HE's) per kilometre, on which the target Standard of Service (SoS) depends.

(c) Compare target and current SoS's and address the differences by April 1996.

Efficient management depends upon having detailed knowledge of the location, type and condition of all assets which affect the performance of the physical river system. The NRA is undertaking a programme of asset survey to provide this information.

(d) Complete the survey of flood defence assets by April 1996.

Improvements

Flood Defence improvement works may be carried out where the Standard of Service is below the indicative standard. All schemes must satisfy technical, economic and environmental criteria. The NRA maintains a Programme of Capital Works for the future which takes account of the priority of each. Although inclusion on the Programme indicates a budget provision, each scheme must satisfy the appraisal criteria before it can proceed. It should also be noted that all schemes are subject to approval by the Flood Defence Committee and are usually dependent upon grant aid from the Ministry of Agriculture, Fisheries and Food.

The following indicative standards (return period in years) apply:

Current Land Use	Tidal	Non Tidal
High density urban, containing significant residential property	200	100
Medium density urban	150	75
Low density or rural communities	50	25
Generally arable farming with isolated properties	20	10
Low productivity land with few properties	5	1

Emergency Response

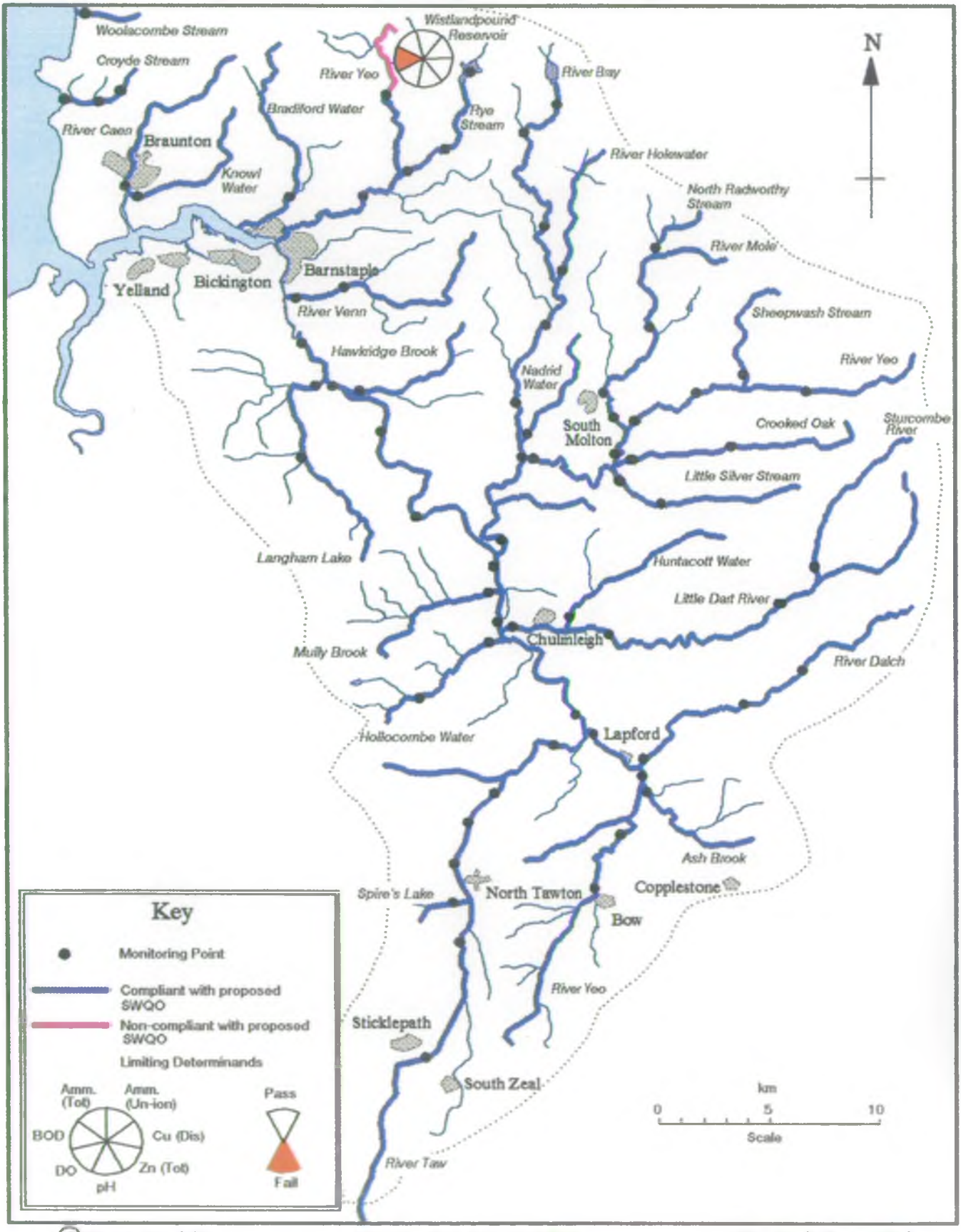
Absolute flood protection is not possible. Procedures are necessary for those who may be affected by an even greater than the current standard of service, whether that standard is less or greater than the target standard. The NRA has a strategy on Emergency Response Levels of Service (ERLOS) to clarify requirements for system performance and thereby prioritize and make more efficient use of resources.

(e) **Where possible, to issue a warning at least 2 hours in advance of flooding in accordance with a nationally agreed and consistent procedure, identifying the river reach or coastal zone at risk, together with an indication of public safety aspects, property and land at risk and an assessment of certainty.**

(f) **Operate NRA installations and defences to design criteria, to formulate and maintain a plan for responding to flooding and the failure of NRA flood defence assets and to mobilize resources to attend flood incidents within a specified time depending on the location and potential consequences of the incidence.**

Figure 29

THE RIVER TAW CATCHMENT
Compliance with Proposed RE Target Classes



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5.0 CATCHMENT STATUS

5.1 Water Quality

General

Routine water quality monitoring data collected in the River Taw Catchment have been used to compare the 'state of the catchment' against the various targets or standards outlined in Section 4.1 Water Quality Targets. These comparisons allow specific water quality issues to be identified where water quality does not meet the target set.

Water Quality Objectives - River Ecosystem Use Class

A detailed analysis of river water quality data was carried out for the River Taw Catchment in order to set targets that both protected 'use' and were achievable in the short term. Three years of routine data (1991-1993) and standard calculation methods were used in the analysis (Ref. 24).

The River Ecosystem (RE) targets are predominantly RE1 or RE2 reflecting both the need to protect high quality river ecosystems and to secure recent improvements in river water quality.

Where RE3 targets in the short term have been proposed, issues have been identified in the following text to attempt to secure further improvements in river water quality in the long term, over the time-scale of this catchment management plan.

Maps accompany this text and show the proposed target classes (Figure 27) and where compliance with these targets is not currently being achieved (Figure 29).

(a) **Non-compliance with Proposed Short Term Targets (Figure 29)**

There is only one river stretch, upstream of Brockham Bridge (SS 6034 4083) on the River Yeo (Barnstaple), where current river water quality does not meet the proposed RE1 Target Class. However, non-compliance of the target class was due to one spuriously high Biochemical Oxygen Demand (BOD) result, which when examined in relation to the rest of the data does not indicate poor river water quality. The remainder of the data indicated good river water quality and this single poor result should not result in a downgrading of the RE Target Class.

Issue 1 Non-compliance with proposed RE Target Class at Brockham Bridge on the River Yeo (Barnstaple).

(b) **River Stretches Where Improvements in River Water Quality are Necessary to Meet Longer Term WQO.**

River Dalch

Further improvements in river water quality in the River Dalch must be sought in order to achieve a RE2 Target Class in the long term.

NRA Task force investigations carried out in the winter of 1991 identified sixteen farms at which improvements to farm waste management systems were required. The majority of these farms were revisited and improvement works installed.

Black Dog and Nomansland STW's also discharge to this subcatchment and have localized impacts on the total ammonia concentrations in the receiving watercourse.

A field investigation carried out early in 1994 identified further and some outstanding causes of poor water quality in the River Dalch. It is too early for current river water quality monitoring data to indicate any improvements in water quality as a result of pollution control work following this investigation.

Point source discharges from this intensive dairy farming subcatchment have now largely been controlled. Despite this work BOD concentrations in river water still show a rising trend, indicating that the problem may now be exacerbated by widespread diffuse runoff.

Together with the absence of AMP2 investment by SWWSL in either STW, the difficulties in controlling spray irrigation practices make the River Dalch unlikely to comply with a RE2 Target Class in the short term.

Issue 2 Further river water quality improvements necessary in River Dalch to achieve long term RE2 Target Class.

Ash Brook

Further improvements in river water quality in Ash Brook must be sought to achieve RE2 Target Class in the long term.

NRA Task force investigations were carried out during February 1992 and identified four farms requiring improvements to their waste management systems. Revisits have been made by NRA staff and the necessary improvement works installed.

Newbuildings and Morchard Bishop STW's also discharge to this subcatchment. The final effluent from Newbuildings STW has an impact on BOD and total ammonia concentrations in the receiving watercourse. Improvement works were undertaken at Morchard Bishop STW to improve effluent quality, however, there is still a problem as the effluent is discharged to a small watercourse that provides little dilution.

Although the major point source discharges from the farms in this subcatchment have been controlled, widespread diffuse land runoff and the lack of planned AMP2 investment by SWWSL for the two STW's will hinder river water quality improvements in Ash Brook to achieve a RE2 Target Class in the short term. Further methods of pollution control must be sought to achieve a RE2 Target Class in the long term.

Issue 3 Further river water quality improvements necessary in Ash Brook to achieve long Term RE2 Target Class.

River Yeo (Lapford)

Further improvements in river water quality in the River Yeo (Lapford) must be sought to achieve a RE2 Target Class in the long term.

NRA Task force investigations were carried out during spring 1992 and identified ten farms at which improvements to waste management systems were required. For the majority of the farms revisits have been made by NRA staff and improvement works installed.

The final effluent from Spreyton STW is discharged to the River Yeo subcatchment and has an impact on the BOD and total ammonia concentrations in the receiving watercourse.

Despite the task force work BOD concentrations still show a rising trend. Widespread diffuse runoff from land and the absence of planned AMP2 investment by SWWSL for Spreyton STW will hinder river water quality improvements needed to comply with the long term RE2 Target Class.

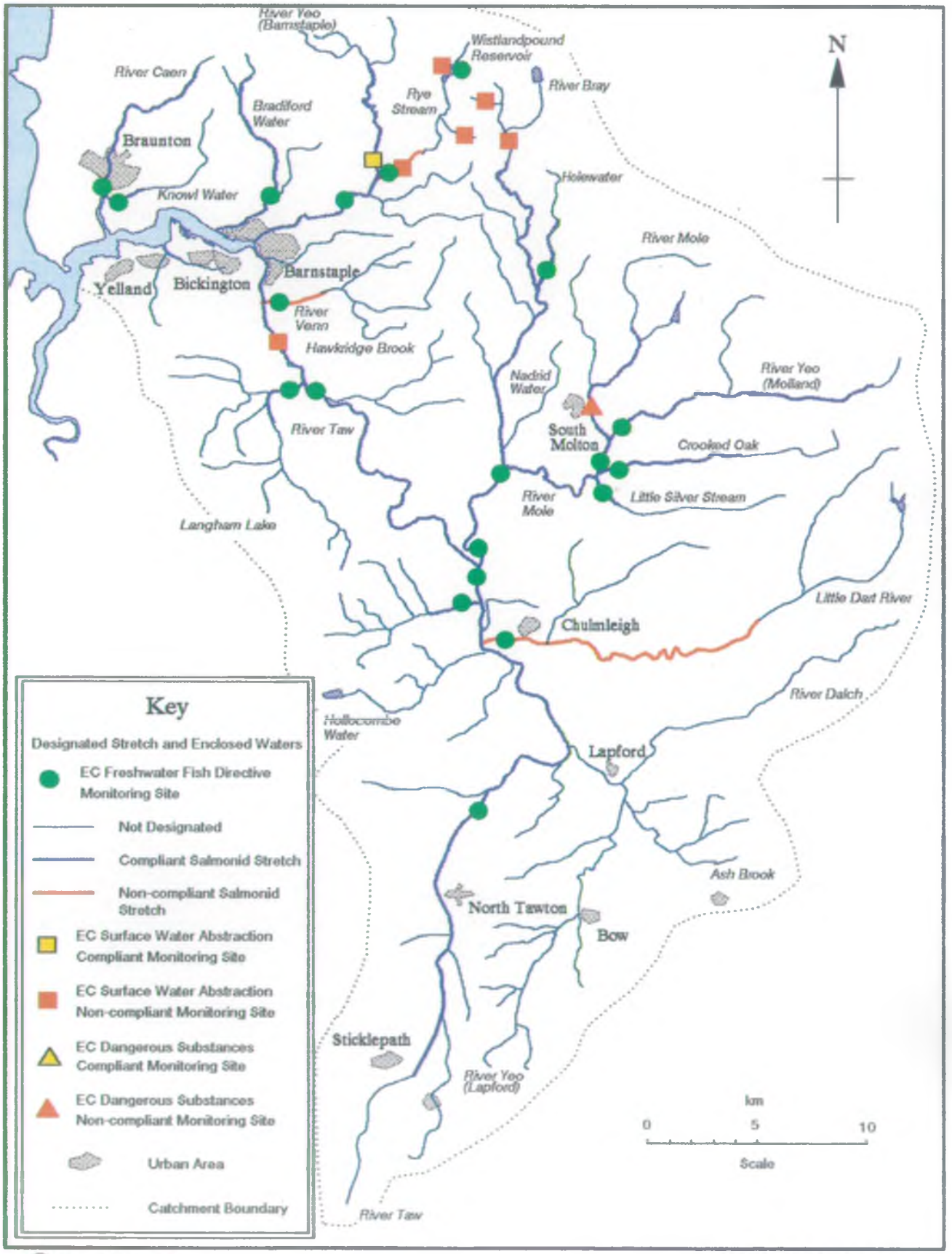
Issue 4 Further river water quality improvements necessary in River Yeo (Lapford) to achieve long term RE2 Target Class.

Gissage Lake

Improvements in current river water quality in Gissage Lake will be necessary to achieve a RE2 Target Class in the long term.

THE RIVER TAW CATCHMENT

Figure 30 **Exceedance of EC Directive Standards (1993)**



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Routine river water quality monitoring has only recently commenced on this watercourse. As a result there are insufficient historical data to analyse current water quality and assign an appropriate RE target class. Therefore, river water quality data will continue to be collected and the subcatchment investigated to identify what the causes of poor river water quality are.

Issue 5 Investigate poor river water quality in Gissage Lake.

Bradiford Water

Improvements in current river water quality in Bradiford Water are necessary to secure a RE1 Target Class in the long term.

Investigations into the causes of current water quality will be undertaken and improvements sought as appropriate.

Issue 6 Improvements to river water quality necessary in Bradiford Water to achieve long term RE1 Target Class.

EC Directives

Issues have been identified in this section where EC standards are not being met. Figure 30 shows where EC Directive Standards have been exceeded.

(a) EC Freshwater Fish Directive

River Venn at Bishop's Tawton

Total zinc concentrations have exceeded the imperative standard which is applicable to this site in 1991, 1992 and 1993.

Field investigations were undertaken in 1993, which traced the source of zinc to two discharges, in particular, from Venn Quarry. Subsequent enforcement work has resulted in negotiations between the NRA and the owners to prevent zinc being discharged to the River Venn.

Issue 7 High zinc concentrations in River Venn.

Rye Stream at Loxhore Bridge

Total zinc concentrations exceeded the imperative standard which is applicable to this site in 1993.

The source of the zinc input to the stream is unknown, although there are disused mines in the upper subcatchment (see Figure 17).

Issue 8 High zinc concentrations in Rye Stream.

Little Dart River at Dart Bridge

Total zinc concentrations exceeded the imperative standard which is applicable to this site in 1993.

The source of contamination is currently unknown. Only one river water sample exceeded the standard and was collected whilst the river was in spate.

For this reason no further action will be taken to trace the source of zinc, although monitoring for zinc in river water will continue in the Little Dart River.

Upper River Taw

Although there was no failure of pH standards in the headwaters of the River Taw during 1993, the waters are poorly buffered and have the potential to fail the standard particularly during rainfall after periods of dry weather. Acidification of surface waters could be enhanced by the planting of conifers on poorly buffered soils. For this reason the NRA should be consulted by Forestry Authority and/or Local Authorities on any planting proposals of conifer forests on Dartmoor in the River Taw Catchment to ensure there is no further acidification of surface waters.

Issue 9 Acid waters in the headwaters of the River Taw on Dartmoor.

(b) **EC Dangerous Substances Directive**

There was only one failure with this EC Directive in 1993 in the River Taw Catchment. High dissolved copper concentrations were recorded downstream of South Molton STW on the River Mole.

An investigation into the source of this copper input was undertaken in 1994, which concluded that dissolved copper occurs both in the final effluent and also upstream of the STW from the surrounding geology and possibly from the disused mines in the catchment. The concentrations of copper recorded are not particularly high but the standard is very low in low hardness waters so that even low copper concentrations fail the standard.

More detailed monitoring for dissolved and total copper must be undertaken in the final effluent and from upstream and downstream of the STW in the receiving watercourse to allow an appropriate course of action to be determined.

Issue 10 High dissolved copper concentrations recorded downstream of South Molton STW in the River Mole.

A national research and development project into the disposal of sheep dip waste (Ref. 30) included two sites in the Upper Taw and River Bray Catchments. These sites were chosen as there has been instances of surface water pollution from sheep dip in the past.

Evidence was found of sheep dip pollution in the unsaturated zone and groundwater. However, although there is potential for surface water pollution, determining peak stream concentrations is difficult with routine chemical sampling and so further investigation field work is necessary to assess the extent of any surface water pollution.

Issue 11 Control of Sheep Dip Pollution.

(c) **EC Surface Water Abstraction Directive**

High dissolved and emulsified hydrocarbons were recorded at five sites in the River Taw Catchment in 1992 and/or 1993 at the River Taw at Newbridge, River Bray at Leehamford, Brockemburrow Intake, Bratton Stream and at Wistlandpound Reservoir.

The analysis for dissolved and emulsified hydrocarbon oils is easily subject to contamination and so it is likely that these results do not represent actual failures. However, investigatory validation work will be undertaken to confirm the true results.

Issue 12 Exceedance with EC SWAD standards for dissolved and emulsified hydrocarbons at five sites.

River Bray at Leehamford

High total phenol concentrations were recorded in the River Bray at Leehamford in 1993. This result may also not be an actual failure in river water as the current laboratory method employed cannot meet the environmental standard.

Work is currently being undertaken at the NRA Laboratory to develop a new method. Therefore, no further action at present will be taken as a result of this failure.

Spreycott Spring

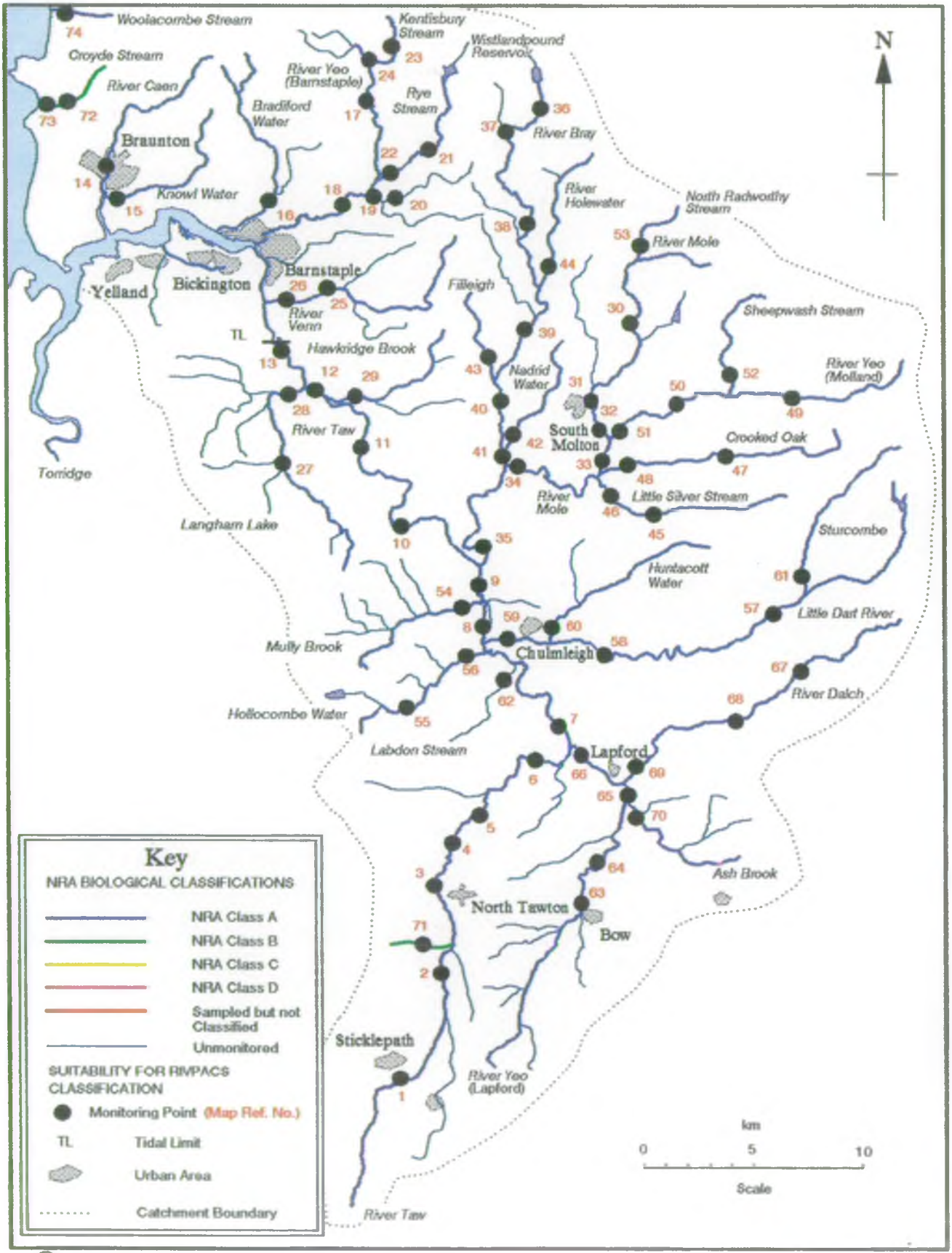
Failure of the colour standard were detected in Spreycott Spring in both 1992 and 1993.

The precise cause of coloration is unknown and will require investigation.

Issue 13 Colouration of River Water samples in Spreycott Stream.

Figure 31

THE RIVER TAW CATCHMENT
NRA Biological Class - 1992



NRA South Western Region

Brockenburrow Intake

Samples from the Brockenburrow Intake failed the directive standards for colour and iron concentrations in 1993.

Both the coloration and iron failures occurred on the same day which coincided with a heavy rainfall event. The cause of these exceedances is unknown and requires investigation.

Issue 14 Coloured river water sample and high iron concentration at Brockenburrow Intake.

Biological Quality

Figure 31 indicates the current biological quality of the River Taw Catchment. In general, the river achieves NRA Class A, which represents Good Ecological Quality.

The NRA Biological Classification indicates the extent to which a site supports its expected range of aquatic macroinvertebrate animals at any time during the year.

Summary biological data are contained in Appendix 9.

The biological quality of two watercourses only achieved NRA Class B - Moderate Ecological Quality.

Croyde Stream

A field investigation was carried out in July 1993 to identify the possible sources of poor river water quality. Silage liquor was found seeping from the stream bank into the watercourse and was controlled. Problems experienced because of low flows and cattle disturbance are also thought to contribute to the reasons for poorer ecological quality.

Issue 15 Improvements necessary in Croyde Stream to secure good ecological quality.

Spire's Lake

Further investigations into the reasons for moderate ecological quality being recorded in Spire's Lake are necessary. However, the cause may be due in part to a historical pesticide problem.

High concentrations of aldrin and its breakdown product dieldrin had been detected in 1984, in fish tissue and the source of contamination traced to a land drain pipe discharging to Spire's Lake.

High aldrin and dieldrin concentrations are still detected in river water samples collected from Spire's Lake. No evidence of pesticide contamination has been detected in the River Taw downstream of the confluence with Spire's Lake.

Issue 16 High aldrin and dieldrin concentrations recorded in river water in Spire's Lake.

Groundwater Quality

Since fissure flows predominate, the groundwater in the River Taw Catchment is vulnerable to surface water and groundwater contamination.

No precise locations of contamination are currently known to the NRA. However, as land is developed groundwater contamination issues may become apparent and will be treated on a case-by-case basis.

5.2 Water Quantity

General

The availability of water resources in the River Taw Catchment is a function of rainfall (see Section 2.4), the capacity for storage of that rainfall (see Section 2.2) and the manner in which it is being exploited (see Section 3.14).

The NRA is yet to set flow targets to meet ecosystem needs. However, a subjective assessment of perceived need has been made and the sites identified (see Halcrow Report below Ref. 31). The water quantity targets presented in the previous section (4.2) represent measures currently employed by the NRA to prevent deterioration in the current water quantity status of the River Taw Catchment.

The NRA are currently developing a methodology to help set appropriate low flow targets. Trials of the methodology are likely to be implemented soon.

Issue 17 Need for water quantity targets in the River Taw Catchment.

Catchment Perspective - Current Status

In 1990 the NRA South West Region commissioned a study to identify the sites where there were perceived to be flow problems within the region. This report 'NRA South West Region - Low Flows Study' (Ref. 31) identified many low flow sites where low flows were perceived to adversely affect the river in terms of amenity, fisheries or ecology. Problem sites were ranked as serious, major, medium, small or minor according to their perceived severity of low flow effects.

Those sites ranked as having a serious, major or medium impact in the River Taw Catchment are given in the table below and shown on Figure 32.

The River Bray at Leehamford and Taw Marsh were both ranked in the top ten 'regional' sites and are discussed in detail below.

Snapper Weir and Bradiford Waters were sites which ranked in the regional top twenty.

Detailed investigations will be necessary at each of these sites to quantify the actual impact and to assess potential solutions. The scale of problems nationally means that only limited funds are likely to be available for sites with impacts ranked below serious. However, the NRA will wish to work with owners of those and nearby abstractions to identify practical solutions which take full account of the abstractor's rights.

PERCEIVED LOW FLOW SITES IN THE RIVER TAW CATCHMENT

RIVER	NGR	SITE	PERCEIVED SIGNIFICANCE	PURPOSE	ASSOCIATED WEIR
TAW	SX 620 918	TAW MARSH	MAJOR	SWWS PWS	
TAW	SX 643 939	FOUNDRY MUSEUM STICKLEPATH	MEDIUM	HEP	CLEEVEMILL WEIR
MULLEYBROOK (TAW)	SS 640 155	BURRINGTON	MAJOR	FF	
MOLE (TAW)	SS 743 299	EXMOOR TROUT FARM (N. MOLTON)	MAJOR	FF	NORTH MOLTON WEIR
BRAY (TAW)	SS 678 399	LEEHAMFORD BRIDGE	MAJOR	SWWS PWS	
BARNSTAPLE YEO (TAW)	SS 609 366 SS 613 366	LOXHORE POND AND BRATTON FLEMING STREAM	MAJOR	SWWS PWS	LOXHORE POND
BARNSTAPLE YEO (TAW)	SS 587 344	BULLDOG FISH FARM, SNAPPER WEIR	MAJOR	FF	SNAPPER WEIR
TRIBUTARY TO BARNSTAPLE YEO (TAW)	SS 633 365	SOUTHWOOD FARM CHELFHAM	MEDIUM	FF	
BRADIFORD WATER (TAW)	SS 566 357	BLAKEWELL FISHERY	MAJOR	FF	

Surface Water

River Bray at Leehamford

In 1979 a pumping and flow measuring station was constructed close to the headwaters of the River Bray at Leehamford (SS 677 399) to allow public water supply abstraction (see Figure 32).

The existing licence operates in conjunction with abstraction licences on the Brockenburrow Stream (SS 662 417) and Wistlandpound Reservoir (SS 643 415). These sources supply water to Bratton Fleming and Hore Down water treatment works.

The River Taw Riparian Owners Association have repeatedly stated their concern over the level of abstraction. Their main concern is the abstraction from this headwater site at times of low natural flows and the perceived impact on the fishery and angling.

The NRA are concerned about any effects the abstraction may have on the passage of migratory salmonids during low flows. The River Bray upstream of the site is an important spawning area for both salmon and sea trout. There is also a concern about depleted summer flows downstream of the abstraction and any impact this would have on juvenile salmonid production in this section of river.

The NRA stated detailed investigations in 1992. A phased approach was adopted, Phase 1a, initial site investigations, set out to undertake the environmental monitoring necessary to assess the degree of impact and to recommend possible solutions.

These initial site investigations are largely complete, although fisheries studies are still continuing. Further water resources or ecological work has been postponed whilst the future direction of these investigations are under review. This review will be completed by end 1996.

SWWSL and NRA have agreed a temporary licence variation which introduced a prescribed flow of 6.83 Ml/day (naturalized Q95 flow) with a 50% take above this flow. This temporary variation expires at the end of July 1996. This temporary licence variation has helped ameliorate the low flow problem.

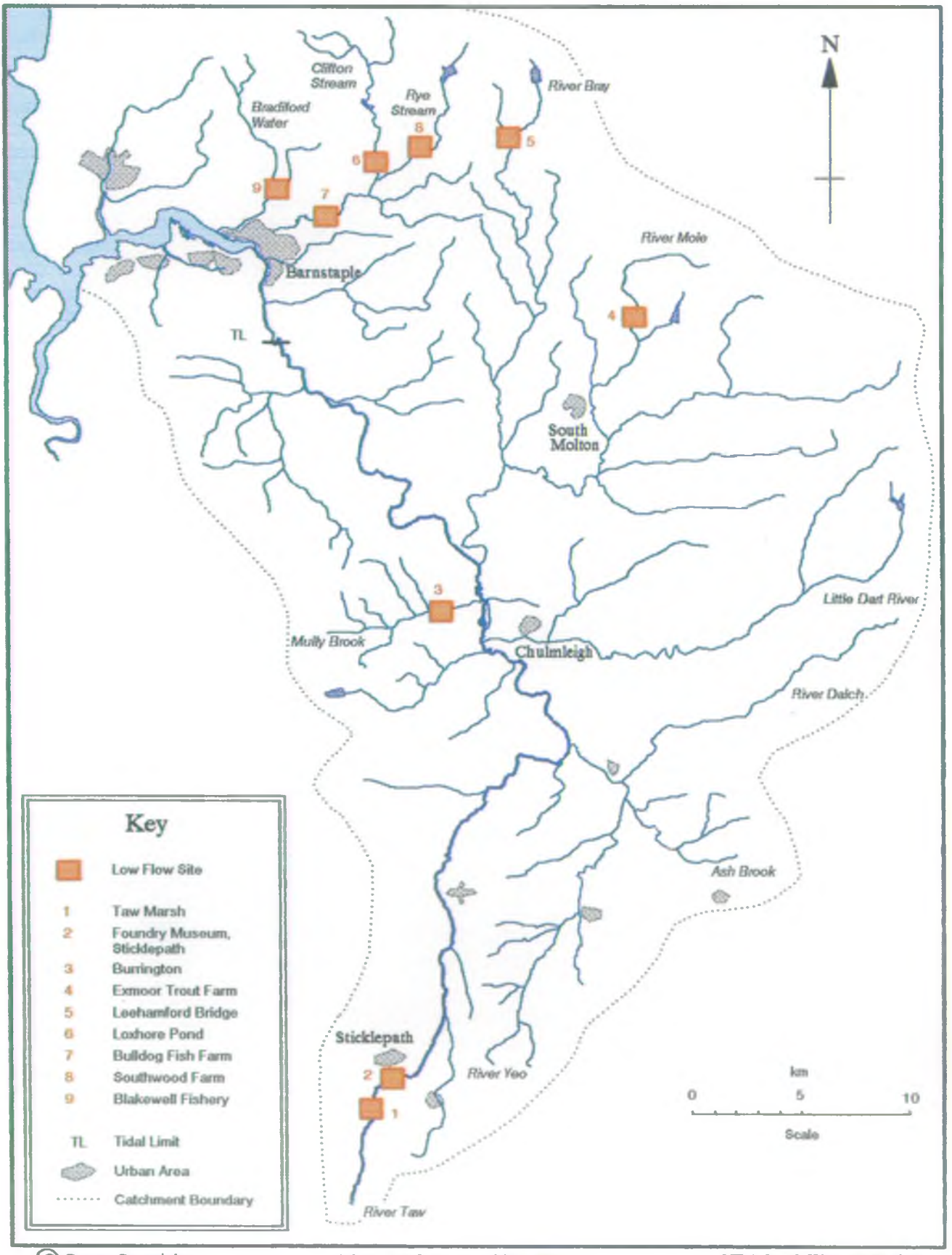
Issue 18 Perceived Low Flow Problem on River Bray.

Exe-Taw Transfer

The transfer of water from the River Exe to the River Taw, via the river Mole, for abstraction at Newbridge, has produced enhanced flows during dry periods upstream of Newbridge in the River Taw and produced a measurable increase in flows downstream of the abstraction point.

Figure 32

THE RIVER TAW CATCHMENT
State of the Catchment - Water Quantity



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As a result of this scheme up to 5 ML/day can be released into the River Taw system, which approximately corresponds to a 0.3% increase of the average daily flow and 4.8% increase of the Q95 at Umberleigh Gauging Station.

The licence for this abstraction expires in 1995. In advance of the expiry the NRA needs to consult and consider the benefits associated with this transfer and the use of water resources.

Issue 19 Future of Exe-Taw Transfer.

Groundwater

As stated before in the hydrogeology section (2.2) groundwater yields are low. Licences are only required for groundwater abstractions outside the Excluded Area or from specified gravels within the Excluded Area. Although the number of abstractions and their cumulative impact within the Excluded Area is not known, the impact on both groundwater and surface water resources is not perceived to be an overall water resources management problem, as the size of abstraction is limited primarily by poor transmissivity rather than the volume of groundwater held in storage. Furthermore, if the Excluded Area was removed, a not insubstantial nor straightforward task, the NRA is likely to be required to grant the equivalent of a 'licence of right' to the currently exempt abstractors under the normal 'no detriment' rule for change to legislation. It is also likely that many such abstractors could also switch to direct abstraction from watercourses on their land under existing common law abstraction rights without the need for a licence thereby having more direct impact on river flows.

Taw Marsh

The Taw Marsh source comprises eleven shallow boreholes sunk into river gravels which occupy the headwaters of the River Taw between SX 618 905 and SX 619 915 (see Figure 25).

The potential impact of groundwater abstraction on river flows was of particular concern to fisheries and fishing interests downstream.

Taw Marsh is situated within North Dartmoor SSSI and is within the Dartmoor National Park. English Nature and Dartmoor National Park officers indicated that the actual abstraction reduced the ecological interest of the wetland and the channel below the marsh.

The NRA initiated detailed Phase 1a, site investigations, in 1992 and in July 1993 six piezometers were installed to measure changes in groundwater levels.

At a meeting held in 1991 to discuss River Taw water resources, at which SWWSL, NRA South West and the River Taw Riparian Owners' interests were represented, SWWSL reiterated intentions to have a new licence in place by summer 1992, which would protect low flows.

SWWSL subsequently agreed to operate to a prescribed flow of 0.158 m^3/sec on a trial basis in 1993. It was intended that the prescribed flow would be high enough to act as a fail safe and that it would be reviewed following a thorough investigation of the behaviour of the aquifer. However, the pumps at Taw Marsh were shut down in July 1993 and so monitoring of operational practice and its effects on water levels in the marsh by NRA or SWWSL has not been possible.

The NRA supports the current undertaking of SWWSL regarding the prescribed flow as a realistic constraint which will benefit both the river and the ecology of Taw Marsh.

Issue 20 Perceived low flow problem at Taw Marsh.

5.3 Physical Features and the Riverine Ecosystem

General

Monitoring has produced some information on several aspects of conservation and amenity interest in the catchment. Information is available on certain fish stocks, invertebrates and the vegetation of some parts of the river corridor. However, there is a lack of accurate catchment-based information on past and present coverage of habitats, such as wetlands, other than Culm grassland, neutral grasslands, rough pasture and broadleaved woodlands. Current information on semi-natural habitats will be mapped on a 1:10,000 scale from the land survey analysis using aerial photograph interpretation.

Comparisons of current catchment status against the targets set in Section 4.3 allow issues to be identified where there are insufficient data or the target has not been met.

Catchment Perspective - Current Status

1. River Corridor

(a) Parts of the river corridor of the River Taw Catchment have been surveyed using standard methodology to assess the state of the vegetation within the river corridor. Forty kilometres of the River Taw was surveyed in 1990 and 11.5 km of Landkey Brook and two tributaries in 1987, with coverage by river corridor survey now extending to 51.5 km. These surveys show that for most of their length the rivers in the catchment are a high conservation value.

The NCC 1987 Phase 1 Land Use and Habitats survey (Ref. 7) and MAFF Small Area Statistics (Ref. 32) give some baseline information, but change within the river corridor is difficult to assess due to lack of historical data.

Issue 21 Lack of comprehensive land use information.

Himalayan balsam is extensively naturalized in the catchment and apparently spreading rapidly in suitable habitat. Japanese knotweed does not appear to be so widely distributed.

The current programme of surveys of certain invasive species, which includes these species, will address the lack of site-specific detail. Once better data exist an assessment will be made as to the extent of cover and consideration given for the need for control programmes.

Issue 22 Uncontrolled spread of Himalayan balsam and Japanese knotweed.

Regular otter surveys carried out since 1979 show the River Taw to be of international importance for its otter population. There has been evidence of a gradual increase in otter distribution of the catchment with 68.3% of survey sites being positive compared with 35% in 1979. The catchment offers excellent habitat for otters, and their success relies on the survival of suitable river and wetland habitats and food supply.

Issue 23 Lack of regeneration of mature trees used as otter holts.

The catchment is of high value for bats. Daubenton's bat is the species most frequently associated with the lower River Taw, and noctule roosts are known in the catchment. Bats are probably under-recorded in north Devon and additional roosts are likely to be found.

Dipper, kingfisher, sand martin and grey heron are all found along the river corridors. Sand martin colonies are found on the open earth cliff riverbanks, although numbers used each year tend to fluctuate.

There is little information available to assess changes in the status of these species at a catchment level, although heronry numbers fell in 1991. At county levels grey herons are generally increasing, dipper numbers are relatively stable and kingfishers are decreasing.

Issue 24 Further conservation of important species.

b) Terrestrial Habitats

The change in the ecology of the terrestrial environment is, like the river corridor, difficult to monitor due to a lack of complete historical data. However, trends have been noted in surveys that have been carried out, showing a loss of diversity and area of semi-natural habitats. Reductions in area of broadleaved woodland, neutral grasslands, wetlands and other open habitats result in potential losses of associated species. For example, the improvement of permanent old pastures poses a threat to the traditional wintering grounds of golden plovers and lapwings in the catchment.

One habitat where the losses have been identified is the Culm grassland, where surveys show a dramatic loss during this century to agricultural improvement, forestry and scrub encroachment. Culm grassland is an internationally important habitat recognized by the 'Habitats Directive' (Ref. 13). In the period from 1900 to 1978 22,400 ha were lost (mostly since 1957), leaving 7,100 ha remaining across the Culm Measures area. Since 1984, further losses have left approximately 600 ha remaining within the River Taw catchment. Overall, this loss is put at a 76% loss of area between 1900 and 1978, and between 1984 and 1990, a 65% loss of remaining areas, excluding SSSI's.

These losses in irreplaceable semi-natural habitat lead to a decline in breeding and feeding sites for associated species. This loss is especially important for curlew and marsh fritillary whose populations are restricted by the existence of suitable habitats.

Issue 25 Loss of semi-natural habitats particularly Culm grassland.

c) Landscape and Heritage Conservation

Changes to landscape are difficult to quantify. There is evidence to show that there have been losses of hedgerows and hedge banks, rough grassland and a decrease in broadleaf woodland.

The designation of large areas of the River Taw Catchment as Areas of Great Landscape Value (AGLV) recognizes their special local characteristics (Figure 9). Filleigh and Arlington Court have extensive areas of historic parklands.

Most changes to the landscape of the catchment are caused by agricultural practices since the levels of industry and urban development in the catchment are low. Therefore, the most effective form of landscape preservation is likely to be through schemes, which promote extensification of agricultural practice and retention of traditional features.

Devon County Council and the Countryside Commission recently produced a landscape appraisal of the County as a basis for a Devon Landscape Strategy (consultation draft September 1994, Ref. 9), which identifies key landscape features in the catchment and priorities for enhancement and conservation.

Modifications to heritage value tend to be over a longer period than is covered by this plan. The primary changes to heritage in the catchment will be legislative, with more areas gaining protection through designation.

Issue 26 Deterioration of landscape and heritage value.

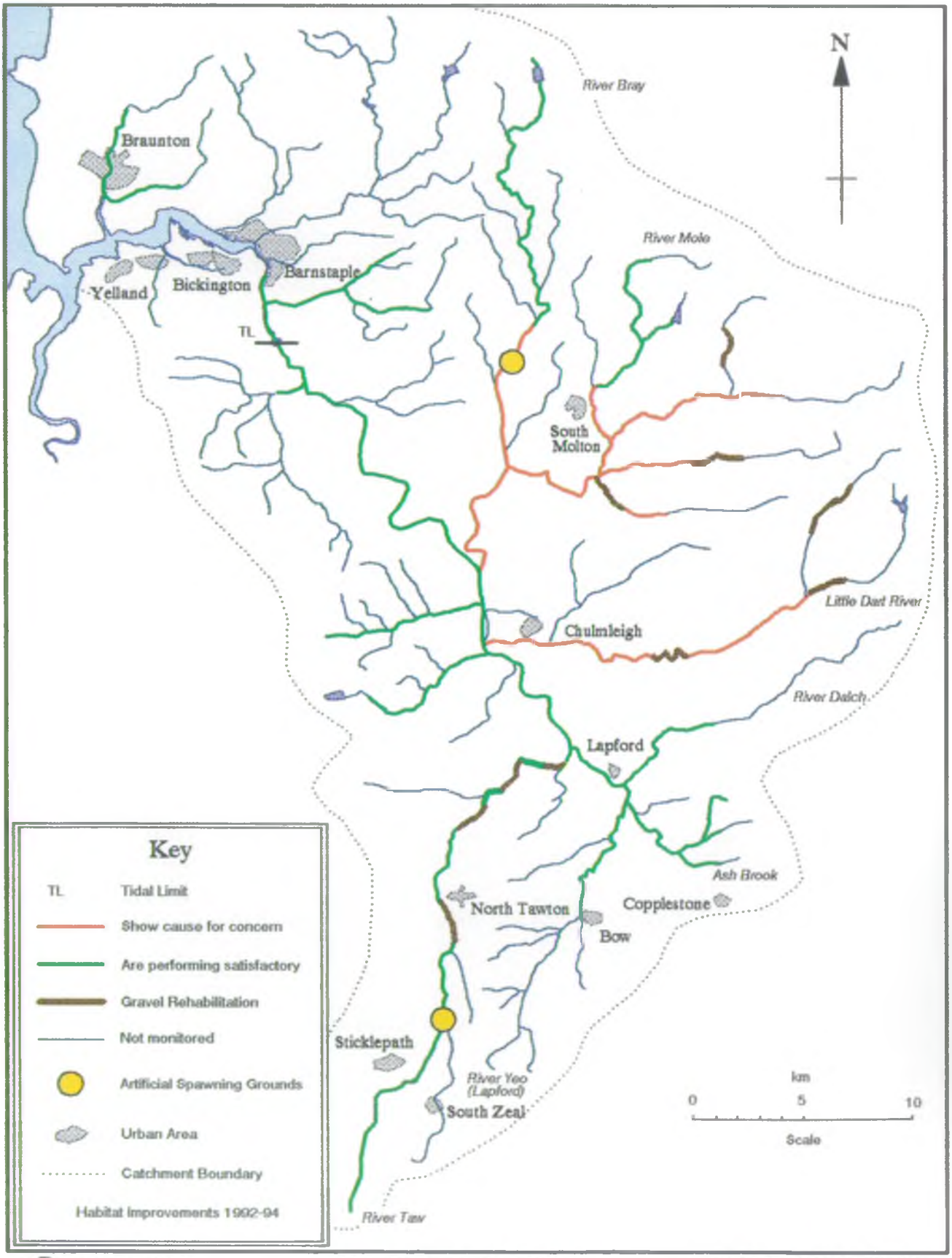
d) Recreation

There is existing low-key recreation use of the catchment waters and associated land. This use includes activities that bring people into close proximity to, and into contact with, the water. The catchment is of great recreational value in its isolated, rural nature, and provision for any increased demand must take this into account through selective and low-key recreation development.

There are limited amounts of historical data on the use of the catchment for most forms of recreation.

Figure 33

THE RIVER TAW CATCHMENT
State of the Catchment - Spawning Gravels



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Monitoring of recreation activity in the River Taw Catchment by NRA wardens has recently commenced. It is too soon to know the real levels of, or any change in recreation use, but monitoring will enable this to be kept under review, and highlight further opportunities as well as potentially damaging developments for other interests, in particular, conservation.

Issue 27 Need for improved recreation monitoring and assessment.

Salmonid angling in the catchment has undoubtedly decreased in quality over a number of years but it is unclear whether fish catch numbers give a true reflection of the state of the fishery, or whether the decrease in angling effort has affected catch numbers. There is some evidence that recently the angling is improving which may lead to greater interest in the future. A review of fisheries data will be undertaken in order to make recommendations on the level and controls imposed on estuarine netting of salmonids.

Watersports within the catchment are provided for on a low level. There is no British Canoe Union (BCU) access agreement on the river, and landowner agreement has to be negotiated via the BCU.

The Calvert Trust has an agreement with SWWSL for use of Wistlandpound Reservoir for watersports, and has a centre based there. Elsewhere on the catchment provision for watersports is low.

The presence within the catchment of the Tarka Trail has undoubtedly increased the number of people using the catchment for quiet, informal recreation. Information on the numbers of people and types of recreation activity will be gathered during 1994. The Trail has been sensitively developed so as not to conflict with other uses of the area, and it is not perceived that any conflicts will develop.

Issue 28 Promote recreation initiatives.

2. Channel Morphology

a) Rivers and watercourses in the River Taw Catchment generally flow through natural channels, although the river channel shape has been altered on the River Venn by the previous flood defence scheme.

b) Siltation of the riffle areas, affecting the spawning gravels and hence salmonid recruitment, has occurred throughout the catchment. Increased siltation has arisen due to a number of factors including increased runoff from agricultural land as a result of field drainage, road runoff, forestry practices, bank erosion from cattle disturbance and from alterations in the flow regime.

Clear felling of conifer plantations in river valleys can increase the risk of soil erosion resulting in high suspended solid loads and siltation of watercourses. To minimise these effects the Forest Authority have produced the Forest and Water Guidelines for forest operations (Ref. 17). The NRA should be consulted on proposed felling of plantations in areas adjacent to watercourses in order to ensure there is no risk of soil erosion

Where siltation has occurred, increased growth in aquatic vegetation may result. This growth will, in turn, lead to increased siltation and reduce flows.

Gravel rehabilitation work carried out by the NRA and the River Taw Fisheries Association to remove the build-up of silt to re-establish the gravels for salmonid spawning has also increased the diversity of the aquatic macroinvertebrate community. These works are always assessed so that where river stretches have particular conservation interest, work is carried out sympathetically.

Figure 33 shows details of the salmonid spawning gravels in the catchment.

Issue 29 Deterioration of salmonid spawning beds as a result of increased siltation of riffle areas.

3. Barriers

a) There are some thirty-one weirs and obstacles on the River Taw and its tributaries, only three of which constitute complete barriers to the upstream migration of salmon and sea trout, those being Challacombe Reservoir, Wistlandpound Reservoir and Arlington Court Ponds. The majority of the weirs have been associated with leats supplying water for a variety of uses, most of which have fallen into disuse. However, Cleevemill Weir is still used to run a foundry as part of a museum, and five others, namely Eggesford, Plaistow, Snapper, Head and North Molton, are now used in conjunction with fish rearing enterprises.

Plaistow, North Molton and Snapper Weirs cause serious problems for fish movement under low flow conditions. North Tawton weir causes a minor problem to fish movement. Figure 34 shows details of barriers to migratory fish in the catchment.

Works are being carried out at North Tawton Weir on the River Taw and Tutshill Weir on the Bradiford Water to improve passage for migratory salmonids. It is expected that these improvements will be completed in 1994.

Water is abstracted under a 'Licence of Entitlement' at Snapper Weir serving Bulldog Fish Farm via a leat which returns water to the Barnstaple Yeo. Initial site investigations are currently being undertaken. Salmonid juvenile and fish tracking surveys have been carried out over the past three years.

Figure 34

THE RIVER TAW CATCHMENT
State of the Catchment - Barriers

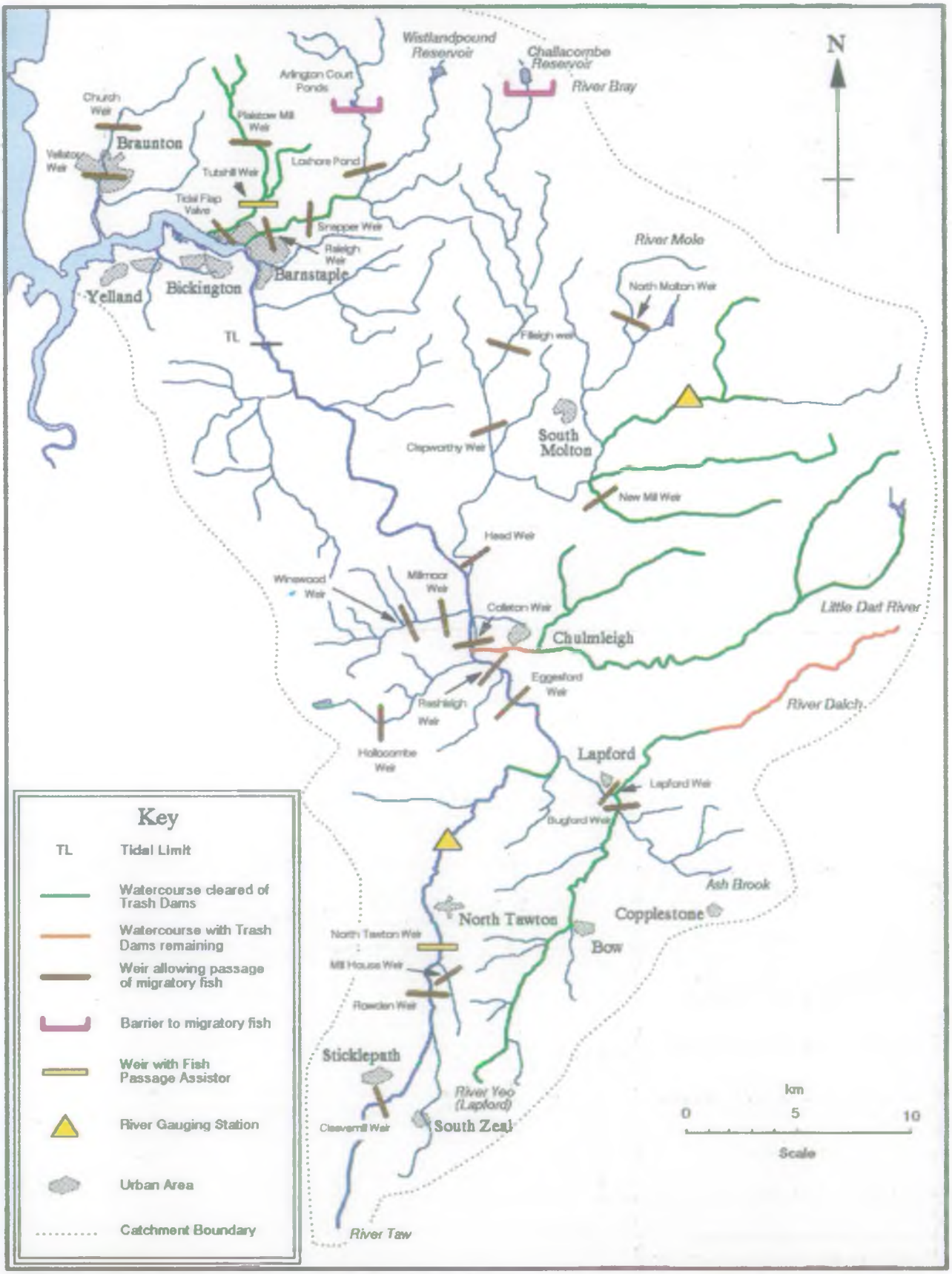

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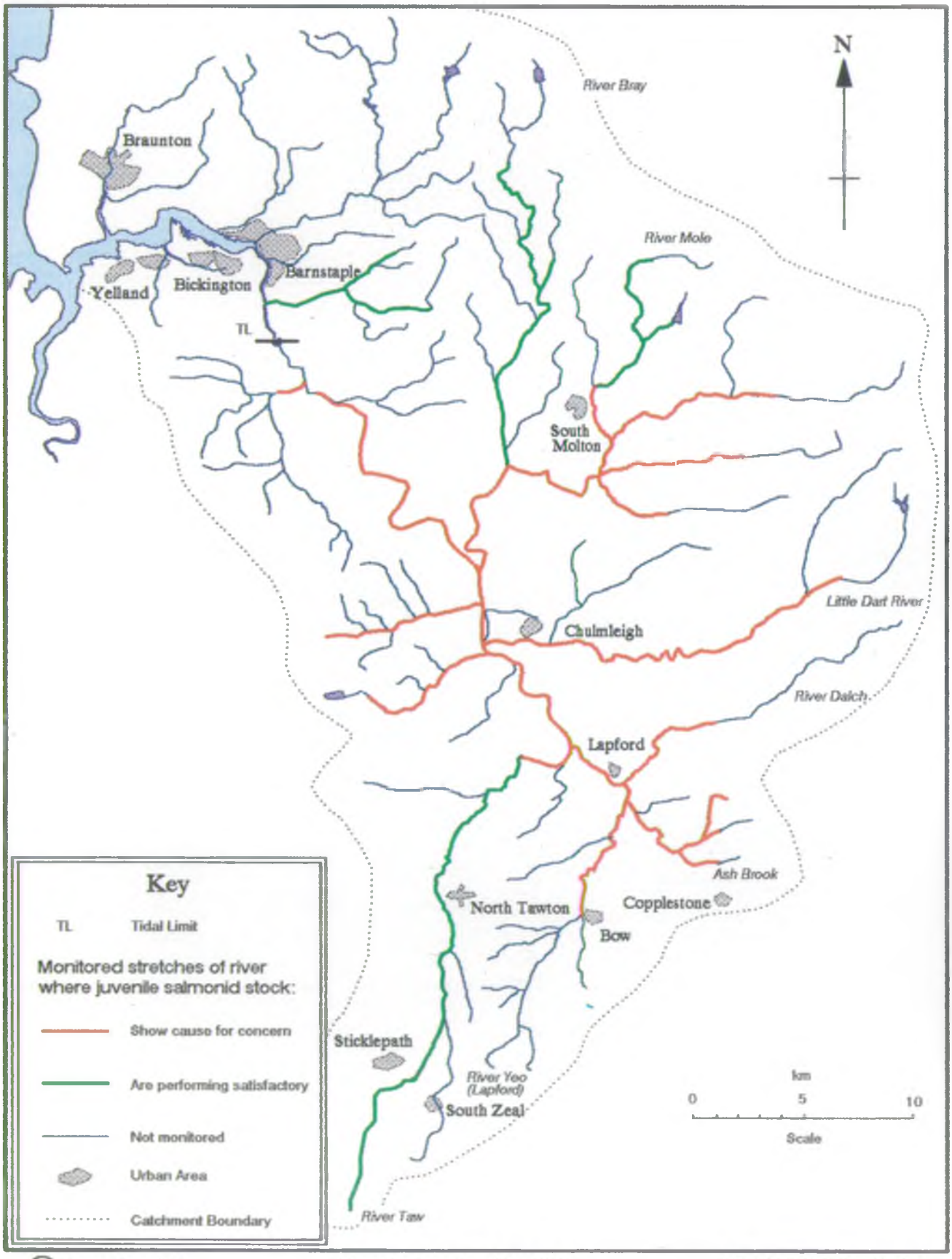
Figure 35

THE RIVER TAW CATCHMENT
State of the Catchment - Fisheries



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Issue 30 Perceived low flow problems in by-passed reach downstream of Snapper Weir.

During 1990, Head Weir on the River Mole was rebuilt by the owners. this remedial work resulted in a major impediment for fish passage and in 1991 the NRA installed a new Denil-type fish pass on the weir. This fish pass is now being monitored closely and, despite public misgivings, appears to be working effectively.

The NRA maintains a fish trap on Filleigh Weir on the River Bray which can be used for catching adult salmon and sea trout. It is some years since this installation was last operated.

Issue 31 Improve fish passage, including monitoring the effectiveness of the fish pass at Head Weir.

4. Fisheries

The River Taw Catchment supports salmon and trout (both migratory and non-migratory forms), freshwater (coarse) and eel fisheries. Figure 35 shows details of the status of the catchments salmonid fisheries.

The salmonid fishery has declined since 1951. Within the catchment poor water quality, pollution incidents and the progressive degradation of physical habitat have all affected juvenile salmonid production and subsequently limited adult numbers.

Recruitment of both salmon and trout is relatively poor in most of the catchment although recent electric fishing surveys have shown encouraging numbers of juvenile salmonids in the Upper River Taw and the River Bray. Water abstractions, associated with both commercial fish farms and public water supplies have also had an effect on fish stocks by interfering with salmonid migration and reducing the area of stream available for spawning and juvenile production. Additionally, illegal exploitation of adults in both the estuary and the river has increased pressure on adult stocks, although this is now under control.

The NRA has issued a Net Limitation Order (NLO) on the estuary between 1990 and the beginning of 1996 season, in an attempt to increase the numbers of migratory fish reaching the freshwater river to spawn. In addition, salmon netsmen, in exchange for compensation, have undertaken to cease netting for this period.

Outside the catchment, over-exploitation of salmon in uncontrolled high-seas fisheries, and overfishing of sand eels leading to declines in sea trout are thought to have contributed to reductions in stocks of salmonids in the River Taw Catchment. However, these activities are outside the control of the NRA.

Freshwater (coarse) fish species are distributed throughout the catchment. A sport fishery exists which is localised in extent and little exploited.

Eels are found in most parts of the River Taw, forming the basis of a limited commercial fishery. Stocks appear to be satisfactory.

The following issues have been identified in the River Taw Catchment with particular regard to salmonid fish stocks:-

Issue 32 **Reverse decline of salmon, sea trout and trout stocks.**
Issue 33 **Illegal exploitation of adult fish.**
Issue 34 **Conflict between water abstractions undertakings and the flow requirements for the passage of migratory fish.**
Issue 35 **Rainbow trout escapement from fish farms.**
Issue 36 **Fish Eating Birds**
Issue 37 **Lack of spring fish.**

5.4 Flood Defence and Land Drainage

a) General

Data collection required for the introduction of the Flood Defence Management Framework is due for completion by March 1996. The implementation of this framework will allow future provision of flood defence to be determined.

b) Regulation

Thirty-three locations within the River Taw Catchment have been identified in the Land Drainage Survey, Section 24(5), carried out under the Water Act 1973 (Ref. 32), as being liable to flooding and are shown in Figure 36 and listed in Appendix 10. These sites have been identified on the basis of historic flood records and survey data.

Implementation of the Flood Defence Management Framework also involves a survey of flood risks, including both floodplain mapping and a survey of flooding problems, which is termed the 'S105' survey.

The 'S105' survey will provide data, which will be used within the framework and in giving advice to planning authorities on development and flood risk issues.

Issue 38 Improve the identification of flood risk areas.

c) Maintenance

Current flood defence maintenance carried out in the River Taw Catchment is described in Section 3.9

A survey has been completed which assesses the current Standard of Service (SOS) for all main watercourses in the catchment. During the course of 1994/95 and 1995/96 current SOS will be compared with targets. An assessment will follow of possible enhancements for those areas where the SOS is marginal. It should be noted that there are no locations where the SOS is below target in the River Taw catchment on main river.

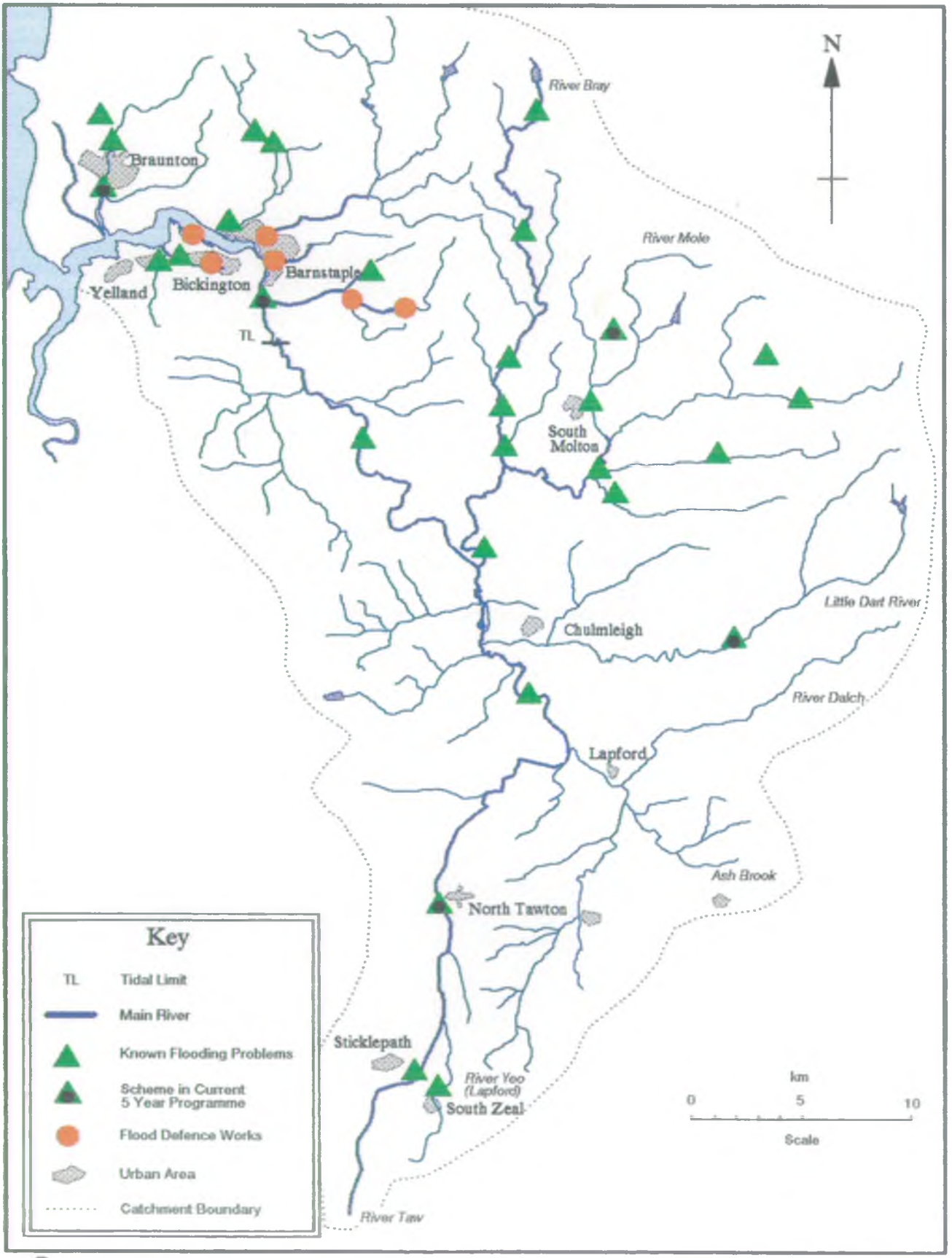
The efficiency and effectiveness of the current flood defence maintenance operations will be reviewed in light of any differences highlighted between the target and current SOS.

Existing flood defence schemes (assets) are discussed in Section 3.9 and shown on Figure 16. A survey of these assets will be completed by April 1996.

Issue 39 Review the efficiency and effectiveness of flood defence maintenance operations.

Figure 36

THE RIVER TAW CATCHMENT
State of the Catchment - Flood Defence



NRA South Western Region

d) Improvements

The provision of flood defence schemes are currently included in the five year capital programme at the following locations:

- Drayford 1997-98
- North Molton 1998-2000
- Braunton 1998-99
- North Tawton 1998-99
- Bishops Tawton 1998-99

Inclusion in the programme does not necessarily mean a scheme will be undertaken as implementation depends upon justification in accordance with agreed procedures.

Issue 40 Investigate, justify and implement flood defence schemes.

e) Emergency Response

All screens at flood schemes and other sensitive areas on the main river system are routinely inspected and cleared of debris. During severe weather and immediately following high river levels further visits are made and clearance takes place. The specific location are the flood schemes referred to in Section 3.9 and at other locations on the Coney Gut.

A project to establish emergency response levels of service, for main rivers in the Region, is being undertaken.

Issue 41 Ensure adequate provision of flood warning in the catchment.

6.0 CATCHMENT ISSUES

Introduction

Throughout the catchment status sections 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 where necessary.

(ii) An attempt to determine the actions needed or desired to address the issue.

All the issues are summarized in a table at the end of this section and include those responsible with the advantages and disadvantages for each action considered.

Issues

1. **Non-compliance with Proposed RE Target Class at Brockham Bridge on the River Yeo (Barnstaple)**

   - Continue river water quality monitoring to assess compliance.
   - If river water samples cause further non-compliance undertake a field investigation.

2. **Further River Water Quality Improvements Necessary in River Dalch to Achieve Long Term RE2 Target Class**

   - Continue river water quality monitoring and if a problem still exists undertake an investigation into wet weather land runoff.
   - Continue to enforce farm waste legislation and secure improvements in farm waste management practices as necessary in line with NRA policy and the Code of Good Agricultural Practice (Ref. 16).
   - Continue to operate 'planning restraint' advice for new development in the Black Dog and Nomansland STW's catchment areas to maintain current river water quality.
   - Seek to implement improvements where possible within the constraints of SWWSL's investment plan to final effluent quality of Black Dog and Nomansland STW.

- Encourage the uptake of initiatives that encourage less intensive land management, such as MAFF waterside fringe options, Countryside Stewardship and Wildlife Enhancement Schemes.

- Encourage the use of farm waste management plans to minimize the risk of pollution from land runoff.

- Seek to implement buffer zones or other appropriate land management techniques to reduce pollutants reaching the watercourse.

3. **Further River Water Quality Improvements Necessary in Ash Brook to Achieve Long Term RE2 Target Class**

- Continue to enforce farm waste legislation and secure improvements in farm waste management practices as necessary in line with NRA policy and the Code of Good Agricultural Practice (Ref. 16).

- Continue to operate 'planning restraint' advice for new development in the Newbuildings and Morchard Bishop catchment areas to maintain current river water quality.

- Seek to implement improvements where possible within the constraints of SWWSL's investment plan to final effluent quality of Newbuildings and Morchard Bishop STW.

- Encourage the use of farm waste management plans to minimize the risk of pollution from land runoff.

- Encourage the uptake of initiatives that encourage less intensive land management, such as MAFF waterside fringe options, Countryside Stewardship and Wildlife Enhancement Schemes.

- Seek to implement buffer zones or other appropriate land management techniques to reduce pollutants reaching the watercourse.

4. **Further River Water Quality Improvements Necessary in River Yeo (Lapford) to Achieve Long Term RE2 Target Class**

- Continue to enforce farm waste legislation and secure improvements in farm waste management practices as necessary.

- Continue to operate 'planning restraint' advice for new development in the Spreyton catchment area to maintain current river water quality.

- Seek to implement improvements where possible within the constraints of SWWSL's investment plan to final effluent quality of Spreyton STW.

- Encourage the use of farm waste management plans to minimize the risk of pollution from land runoff.

- Encourage the uptake of initiatives that encourage less intensive land management, such as MAFF waterside fringe options, Countryside Stewardship and Wildlife Enhancement Schemes.

- Seek to implement buffer zones or other appropriate land management techniques to reduce pollutants reaching the watercourse.

5. **Investigate Poor River Water Quality in Gissage Lake**

- Continue river water quality monitoring to assess compliance and allow analysis.

- Investigate inputs of pollutants to the receiving watercourse.

6. **Improvements to River Water Quality in Bradiford Water Necessary to Achieve Long Term RE1 Target Class**

- Continue river water quality monitoring to assess possible causes of deterioration.

- Investigate cause of poor river water quality.

- Secure improvements as appropriate.

7. **High Zinc Concentrations in River Venn**

- Continue negotiations with quarry owners to ensure site drainage does not lead to zinc inputs to the stream.

8. **High Zinc Concentrations in Rve Stream**

- Investigate the source of zinc inputs and circumstances for the exceedance of EC Directive Standards.

- Once the source is known then control will be sought if possible but if the source identified is a result of mineralised rocks or from disused mines, then an allowance for exceptional circumstances for zinc will be sought in the short term.

9. **Acid Waters in the Headwaters of the River Taw on Dartmoor**

- Review internal NRA procedures to improve liaison with Forestry Authority, Local Authorities and forest owners/managers such as Forest Enterprise.

10. **High Dissolved Copper Concentrations Recorded Downstream of South Molton STW in the River Mole**

- Carry out detailed monitoring for dissolved and total copper in the final effluent and upstream and downstream of the STW in the receiving watercourse to determine appropriate action.

- Seek improvements or make an allowance for exceptional circumstances for dissolved copper as appropriate.

11. **Control of Sheep Dip Pollution**

- Assess the extent and nature of the problem.

- Ensure practices follow those in the Code of Good Agricultural Practice.

12. **Exceedance with EC SWAD Standards for Dissolved and Emulsified Hydrocarbon Concentrations at Five Sites**

- Confirm the validity of the results before any action is taken.

13. **Colouration of River Water Samples in Sprevcott Stream**

- Investigate possible causes of colouration.

- Seek improvements or make an allowance for exceptional circumstances for colour as appropriate.

14. **Coloured River Water Sample and High Iron Concentration at Brockenburrow Intake**

- Investigate possible causes of colouration.

- Seek improvements where appropriate or make an allowance for exceptional circumstances.

15. **Improvements Necessary in Crovde Stream to Secure Good Ecological Quality**

- Continue biological monitoring to assess extent of improvements already secured.
- Investigate further cause of poorer ecological quality if necessary.
- Secure improvements as appropriate.

16. **High Aldrin and Dieldrin Concentrations Recorded in River Water in Spire's Lake**

- Continue biological and river water monitoring to assess nature of problem.
- Investigate precise cause of moderate ecological quality in Spire's Lake.
- Secure improvements as appropriate.

17. **Need for Water Quality Targets in the River Taw Catchment**

- Carry out trials of new methodology in Region.
- Review trials.
- Implement targets as appropriate.

18. **Perceived Low Flow Problem on the River Bray at Leehamford**

Once the initial (Phase 1a) investigations have been completed and the degree of impact has been established alleviation options could include those listed below.

- Undertake necessary capital works (modify intake of weir design).
- Permanent Licence variation to secure an acceptable low flow condition. The NRA could seek such changes as an element of 'environmental gain' associated with any future public water supply (PWS) development schemes in the catchment.

19. **Future of Exe - Taw Transfer**

- Review the benefits of the 5 Ml/day potential net increase below Newbridge.

- Secure the ability to make environmental water transfer at a cost to the Yeo, by being involved in a potential abstraction licence application by SWWSL as a result of existing licence expiry.

20. **Perceived Low Flow Problem and Possible Impact on SSSI at Taw Marsh**

Once the initial (Phase 1a) investigations have been completed and the degree of impact has been established alleviation options could include those listed below.

- Continue with SWWSL's voluntary undertaking to cease abstraction when river flows decline to 0.15 cumecs - a prescribed flow condition.

- Seek to secure a formal agreement or licence variation in place of above voluntary undertaking.

- Seek permanent cessation of abstraction in conjunction with transfer of licensed volume down to the Newbridge intake as an element of 'environmental gain' associated with any future PWS development schemes in the catchment.

21. **Absence of Comprehensive Land Use Information**

Changes in the ecology of the river catchment resulting from land use changes will influence the conservation status of the area. There is recognized 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.

- Undertake a full land survey analysis of the catchment using aerial photograph interpretation (by April 1995).

- Carry out the River Habitat Survey according to national policy guidelines.

- Maintain and develop links with other environmental organisations, monitoring and researching areas of conservation interest and integrate findings.

22. **Uncontrolled on Spread of Himalayan Balsam and Japanese Knotweed**

- Continue surveys of invasive species within the river corridor.

- Assess extent of cover and consider appropriate management techniques on NRA owned land.

- Encourage riparian owners to control spread if a problem with invasive plant species is established.

23. **Lack of Regeneration of Mature Trees Used as Otter Holts**

- Encourage suitable tree planting as part of riparian fencing, buffer zones and other such schemes.

- Ensure suitable tree planting as part of NRA capital schemes.

24. **Further Conservation of Important Species**

- Continue invertebrate and plant surveys, and the river surveys.

- Assess NRA consenting and licensing standards for discharges and abstractions to ensure they provide the water quality and flows required for the conservation of key wetland and river habitats and associated species.

- Encourage ecologically sensitive working practices as written down in the MAFF publication 'Conservation Guidelines for Drainage Authorities' (1991) (Ref. 34) by NRA and other working parties working within and around the water and wetland environment.

- Maintain and develop links with other environmental organisations, monitoring and researching areas of conservation interest and integrate findings.

- Support initiatives that encourage less intensive land management and agricultural practice, such as MAFF Waterside Fringe options, Countryside Stewardship, Wildlife Enhancement Schemes, NSA/ESA designation where relevant.

- Monitor the effectiveness of conservation measures incorporated into the NRA's regulatory and operational activities.

- Support the preparation and implementation of long term NRA policies to reduce impacts of nutrient enrichment, e.g. buffer zones, recreation of habitats, land use changes.

- Use the Biodiversity Action Plan (Ref. 35), with other relevant organisations, to set standards for habitats and species conservation and recovery.

- Ensure that historical and occupied sand martin colony sites recorded in the catchment by the 1988 RSPB 'Sand Martins in Devon and Cornwall Status and Distribution' (Ref. 36) report to South West Water are protected during any NRA capital and maintenance works or consenting/consulting procedures.

25. **Loss of Semi-Natural Habitats, Particularly Culm Grassland**

The prime responsibilities for action on this issue rests with nature conservation agencies. However, the NRA will support initiatives by other bodies and through all its own activities to prevent further loss and enhance the conservation value of the river corridor and other wetland habitats.

- Assess NRA consenting and licensing standards for discharges and abstractions to ensure they provide the water quality and flows required for the conservation of key wetland and river habitats and associated species.

- Encourage ecologically sensitive working practices as written down in the MAFF publication 'Conservation Guidelines for Drainage Authorities' (1991) (Ref. 34) by NRA and other working practices working within and around the water and wetland environment.

- Maintain and develop links with other environmental organisations, monitoring and researching areas of conservation interest and integrate findings.

- Support initiatives that encourage less intensive land managements and agricultural practice, such as MAFF Waterside Fringe options, Countryside Stewardship, Wildlife Enhancement Schemes, NSA/ESA designation where relevant.

- Monitor the effectiveness of conservation measures incorporated into the NRA's regulatory and operational activities.

- Support the preparation and implementation of long term NRA policies to reduce impacts of nutrient enrichment, e.g. buffer zones, recreation of habitats, land use changes.

- Use the Biodiversity Action Plan (Ref. 35), with other relevant organisations, to set standards for habitats and species conservation and recovery.

- Comment on and include relevant NRA policies in Structure and Local Plans.

- Consider all planning applications with impacts on the water environment, and apply NRA policies and standards.

26. **Deterioration of Landscape and Heritage Value**

- Assess NRA consenting and licensing standards for discharges and abstractions to ensure they provide the water quality and flows required for the conservation of key wetland and river habitats and associated species.

- Encourage ecologically sensitive working practices as written down in the MAFF publication 'Conservation Guidelines for Drainage Authorities' (1991) (Ref. 34) by NRA and other working practices working within and around the water and wetland environment.

- Maintain and develop links with other environmental organisations, monitoring and researching areas of conservation interest and integrate findings.

- Support initiatives that encourage less intensive land managements and agricultural practice, such as MAFF Waterside Fringe options, Countryside Stewardship, Wildlife Enhancement Schemes, NSA/ESA designation where relevant.

- Monitor the effectiveness of conservation measures incorporated into the NRA's regulatory and operational activities.

- Comment on and include relevant NRA policies in Structure and Local Plans.

- Consider all planning applications with impacts on the water environment, and apply NRA policies and standards.

- Improve NRA database on Local Authority Conservation Areas.

- Liaise with Landowners and foresters to ensure appropriate forestry activities.

27. **Need for Improved Recreation Use Monitoring and Assessment of the Catchment**

The river is widely used on a casual basis for many activities that do not have any formal provision or control such as swimming and paddling. There are no data to indicate changes in levels of this use, although this may now be identified through improved monitoring.

- Continue wardens surveys of recreation use of the water environment and associated lands.

- Collaborate with other bodies on monitoring recreation use of the water environment and associated lands, e.g. the Sports Council, local authorities, and other organisations and projects.

- Assess the need for further recreation provision within the water environment and associated lands.

28. **Promote Recreation Initiatives**

- Investigate the possibility of safety improvements at Eggesford Weir for canoe passage by the removal of anti-scour boulders in the plunge pool and inclusion of deep water chutes in top lips.

- Promote the low-key recreation use of flood defence schemes on the River Venn.

- Comment on and recommend relevant NRA recreation policies in Structure and Local Plans.

- Consider all planning applications with significant impacts on the water and associated environment and recommend NRA recreation policies.

- Identify NRA holdings which would benefit from a management plan.

- Develop management plans for selected sites to enhance their conservation value and recreation use.

29. **Deterioration of Salmonid Spawning Beds as a Result of Increased Siltation of Riffle Areas**

The first four points detail current operational procedure whereas the latter three represent options to secure long term control.

- Identify appropriate sites that could benefit from gravel rehabilitation after fully considering wider ecological benefit.

- Maintain gravels according to agreed Devon Area procedure.

- Monitor improvements in spawning success through redd counts and juvenile surveys.

- Review and report on improvement.

- Promote riparian fencing and planting schemes to stabilise banks, reduce stock ingress to streams and reduce silt inputs.

- Support initiatives that encourage less intensive land management - particularly MAFF waterside fringe options, Countryside Stewardship and Wildlife Enhancement Schemes.

- Promote buffer zones and other similar land management techniques to reduce soil erosion and reduce silt inputs.

- Review internal NRA procedures to improve liaison with Forestry Authority, Local Authorities and forest owners/managers such as Forest Enterprise.

30. **Perceived Low Flow Problem in By-Passed Reach Downstream of Snapper Weir**

- Ensure licence conditions are adhered to.

- If a significant impact is demonstrated then alleviation options could include capital works to modify the intake and weir designs to ensure an adequate residual flow occurred at all times. This could only be achieved with the co-operation of the owner of the licence and would need to include appropriate compensation.

31. **Improve Fish Passage**

- Maintain present fish passes.

- Install fish passes at North Molton and Plaistow according to regional priority and capital availability (capital cost).

- Monitor effectiveness of fish pass at Head Weir.

- Remove trash dams and other obstacles after fully considering wider ecological impact and according to the agreed Regional Procedure.

32. **Reverse Decline of Salmon, Sea Trout and Trout Stocks**

In common with many rivers in the South West the River Taw has seen a decline in salmon, sea trout and trout stocks. Factors affecting the decline may be found within the catchment and outside the catchment beyond the NRA's control. In order to redress this decline recovery programmes have been developed and the current fishery rehabilitation plan has been operating since 1990. There are common options to all plans.

- Maintain net and rod catch control in the catchment.

- Ensure liaison with organisations external to NRA such as MAFF, NASCO and AST to tackle the wider problems of uncontrolled exploitation of salmon and seatrout in high seas fisheries. Appropriate research will be required to support, justify and further sea fishery controls.

- Review evidence of fish monitoring studies, and balance exploitation with stock improvement through limitation of exploitation with the development of fishery targets.

- Issue a new NLO.

- Seek to control methods of rod fishing including the use of baits and lures and of season timing and consider the introduction of catch and release practices.

- Continue compensation payments for estuarine netting.

- Introduce other controls of netting, including byelaws.

- Ensure adequate quality and quantity of water to facilitate fish passage and production.

33. **Illegal Exploitation of Adult Fish (Salmonids)**

- Maintain current enforcement activities.

- Review present activities and fisheries data to make recommendations for the appropriate level of enforcement in the River Taw Catchment.

- Introduce new legislation where necessary.

34. **Conflict Between Water Abstractions Undertakings and the Flow Requirements for the Passage of Migratory Fish**

Abstractions for public water supply and fish farm operations have had a serious effect on the behaviour and habitat of salmonid fish throughout the catchment. The NRA will seek to ameliorate the impact of current undertakings and develop prescribed flow thresholds which will protect fisheries in the River Taw.

- Investigate currently identified ALF (Alleviation of Low Flow) sites and make recommendations to correct any adverse impact these may be having on fish stocks.

- Implement recommendations made under first action where and when appropriate subject to budget provisions.

- Critically review all abstractions on the catchment and correct problems (impediments to fish passage, reduction of spawning and nursery grounds, entrainment of smolts into intakes) subject to budget provisions.

- Investigate fish movements and other biological criteria associated with salmonid fish in order to set appropriate rules on proposed public supply abstractions so that these have a minimum impact on fish stocks.

35. **Rainbow Trout Escapement from Fish Farms**

- Carry out removal exercises.

- Ensure adequate screening and husbandry at fish farms in conjunction with the fish farmers.

36. **Fish Eating Birds**

The NRA will not support licensed killing of fish eating birds until and unless proof of serious damage has been established and killing proven to be the most effective means for preventing significant loss to fish stocks.

- Co-operate with the licensing authority to progress further research into this issue.

- Continue to work positively with owners and anglers to establish the full facts in each situation.

37. **Lack of Spring Fish**

There has been a decline in the numbers of spring fish in the River Taw Catchment in common with other rivers in the British Isles.

- Support current catch and release strategy developed by the Taw Fisheries Association.

- Consider changes in legislation designed to protect spring fish, including season changes.

- Control estuarine netting to protect spring fish.

38. **Improve the Identification of Flood Risk Areas**

- Undertake 'S105' flood risk surveys for the River Taw Catchment.

39. **Improve Efficiency and Effectiveness of Flood Defence Operations**

The introduction nationally of the Flood Defence Management Framework necessitates the re-examination of the purpose and efficiency of routine maintenance operations.

- Adopt 'Standards of Service' for defining maintenance needs on 'main river'.
- Prepare technical contracts for all maintenance operations, incorporating environmental constraints and enhancement opportunities.
- Carry out asset surveys.

40. **Investigate, Justify and Implement Flood Defence Schemes**

To protect people and property from flooding, the NRA will provide new flood defence and tidal defence schemes subject to a cost-benefit analysis based on established technical, environmental and financial criteria.

- Construct schemes at Drayford, North Molton, Braunton, North Tawton and Bishops Tawton which are planned in the current five year programme.
- Continue to liaise with the planning authorities to ensure no new development leads to increased flood risk in the River Taw Catchment.
- Ensure all options are evaluated, including managed retreat, when considering areas with known flooding problems.

41. **Ensure Adequate Provision of Flood Warning in the Catchment**

The current efficiency and level of provision of the flood warning service is being reviewed and will allow targets of service to be established.

- Review flood risk areas.
- Review existing provisions of flood warning with respect to Emergency Response Levels of Service.
- Recommend improvements and produce a programme of future work with cost implications.

No	ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
					LEAD	OTHER
1	Non-compliance with proposed RE target class, Brockham Bridge, River Yeo (Barnstaple).	• Assess compliance - water quality monitoring. • If further non-compliance undertake field investigation.	Improve water quality (WQ)	Cost to polluters	NRA	Landowners
2	River water quality improvements; River Dalch. Aim: Achieve Long Term RE2 target class.	• River water quality monitoring, investigate wet weather land runoff • Enforce farm waste legislation; secure necessary waste management practice improvements. • Continue 'planning restraint' advice in Black Dog and Nomansland STW catchments. • Improve Black Dog and Nomansland STW final effluent. • Farm waste management plans to reduce pollution from land runoff. • Encourage less intensive land management. • Reduce pollutants reaching watercourse, eg implement buffer zones.	Environmental gain Improved WQ	Cost Time Complex Issues	NRA	SWWSL Farmers Co Co Landowners MAFF
3	River water quality improvements; Ash Brook. Aim: Achieve Long Term RE2 target class.	• Farm waste legislation; improve waste management practices. • New development 'planning restraint' advice: Newbuildings and Morchard Bishop STW catchment. • Improve Newbuildings and Morchard Bishop STW final effluent. • Farm waste management plans to reduce pollution from land runoff. • Encourage less intensive land management. • Reduce diffuse pollutants reaching water course, eg implement buffer zones.	Environmental gain Better planning & control Improved WQ	Cost Acceptance Ability Time	NRA	MAFF NFU Farmers
4	River water quality improvements; River Yeo (Lapford). Aim: Achieve long term RE2 target class.	• Farm waste legislation; improve waste management practices. • New development 'planning restraint' advice: Spreyton STW catchment. • Improve Spreyton STW final effluent. • Farm waste management plans to reduce pollution from land runoff. • Encourage less intensive land management. • Reduce pollutants reaching water course, eg implement buffer zones.	Environmental gain Better planning & control Improved WQ	Cost Acceptance Ability Time	NRA	MAFF NFU Farmers

No	ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
					LEAD	OTHER
5	Investigate poor river water quality in Gissage Lake.	• Continue to assess compliance: water quality monitoring and analysis. • Investigate inputs of pollutants to watercourse.	Environmental gain Improved WQ	Cost	NRA	
6	Improvements to River Water Quality in Bradiford Water necessary to achieve long term RE1 Target Class	• Assess possible causes: water quality monitoring. • Investigate causes. • Secure improvements.	Improved WQ	Cost	NRA	Farmers Dischargers
7	High zinc concentration in Venn Stream.	• Negotiate with quarry owners so site drainage doesn't input zinc into stream. • Prosecute polluting quarry owners?	Environmental gain Improved WQ	Cost	NRA	Quarry owners
8	High zinc concentration in Rye Stream.	• Investigate source of inputs. • Identify source then control if possible. If due to rock mineralisation or from disused mines then derogation for zinc (short term only).	Improved WQ	Cost	NRA	
9	Acid Waters in the Headwaters of the River Taw on Dartmoor.	• Review internal NRA procedures to improve liaison.	Prevent deterioration in river water quality		NRA	Forestry Authority Local Authorities Forest Owners and/or Managers
10	River Mole: downstream South Molton STW high dissolved copper concentration recorded.	• Monitor for dissolved copper up and down stream of STW in receiving water course to determine action. • Seek improvements or derogate for copper.	Improved WQ	Cost	NRA	SWWSL
11	Control of sheep dip pollution	• Assess extent and nature of problem • Ensure practices follow those in Code of Good Agricultural Practice	Better knowledge Improved WQ	Cost of monitoring	NRA	MAFF Landowners
12	Exceedance with EC SWAD Standards for Dissolved and Emulsified Hydrocarbon Concentrations at five sites.	• Confirm validity of results then take action if necessary.	Improved WQ	Cost	NRA	
13	River water sample colouration in Spreycott Stream.	• Investigate causes. • Seek improvements or derogate.	Improved WQ	Cost	NRA	
14	Brockenburrow intake: coloured river water samples and high iron concentration.	• Investigate causes. • Seek improvements or derogate	Improved WQ	Cost	NRA	

No	ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
					LEAD	OTHER
15	Improvements to Croyde Stream to secure good ecological quality.	• Biological monitoring to assess improvements to date. • Investigate possible further causes of poorer quality. • Secure appropriate improvements.	Improved river water quality. Improve ecological quality.	Cost	NRA	Landowners Dischargers
16	Spire's Lake: High Aldrin and Dieldrin concentrations	• Biological and river water monitoring. • Investigate causes. • Secure appropriate improvements.	Improved river water and ecological quality.	Difficult to control. Cost	NRA	Landowners
17	Need for Water Quantity Targets	• Carry out trials of new methodology in Region • Review trials • Implement targets as appropriate	Better protection of "uses" Better management		NRA	
18	River Bray at Leehamford: perceived low flow problem.	Complete initial investigations and establish degree of impact, then alleviate by: • Necessary capital works. • Licence variations. • Low flow alleviation via compensation payments.	Improved WQ Environmental gain	Cost Loss of public water supply resource	NRA	SWWSL
19	Future of Exe-Taw Transfer	• Review benefits of potential net increase below Newbridge. • Secure the ability to make environmental transfers.	Potential benefit for fish migration.	Cost Best use of water resource?	NRA	SWWSL Riparian interests.
20	Taw Marsh: perceived low flow problem.	Complete initial investigations and establish degree of impact, then alleviate by: • Continue with SWWSL's voluntary undertaking to cease abstraction when river flows decline to 0.15 cumecs - a prescribed flow condition. • Seek to secure formal agreement or licence variation to replace voluntary undertaking subject to SWWSL long term strategy for this source.	Environmental gain	None Loss of public water supply resource	NRA	SWWSL
21	Lack of comprehensive land use information.	• Full land survey analysis by aerial photograph interpretation (by April '95). • River habitat survey (national policy guidelines). • Liaise with environmental organisations and integrate their findings.	Better data & planning Improved data set and exchange of information	Cost	NRA	Environmental and conservation interests, eg EN, CC, DWT, DNP, ENP, CPRE.

No	ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
					LEAD	OTHER
22	Uncontrolled spread of Himalayan Balsam and Japanese Knotweed.	• Surveys within river corridor. • Assess extent of cover on NRA owned land consider management techniques. • If problem established encourage riparian owners to control species.	Better data & planning	Cost	NRA	Riparian owners
23	Lack of regeneration of mature trees used for otter holts	• Encourage suitable tree planting as part of riparian fencing, buffer zones and other such schemes. • Ensure suitable tree planting as part of NRA capital schemes.	Better protection of otters	Cost	NRA	Riparian owners MAFF, Co.Co, EN
24	Further conservation of important species.	• Continue invertebrate, plant and river surveys. • Assess NRA consenting and licensing standards for discharges and abstractions, so water quality and flow required for wetland and river conservation maintained. • Encourage ecologically sensitive working practices. • Liaise with other environmental bodies & integrate their findings. • Encourage less intensive land management. • Monitor effectiveness of conservation measures in NRA activities. • Support preparation and implementation of long term NRA policies against nutrient enrichment. • Use the Biodiversity Action Plan to set targets. • Ensure all recorded sand martin colony sites are protected during NRA works and consenting/consulting procedures.	Environmental gain	Cost	NRA	Abstractors and Dischargers. Environmental & Conservation interests and planning authorities. Land Owners.

No	ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
					LEAD	OTHER
25	Loss of semi-natural habitats particularly Culm Grasslands	Responsible body: nature conservation agencies supported by NRA. • Monitor effectiveness of conservation measures in NRA activities. • Liaise with other environmental bodies and integrate their findings. • Assess NRA consenting and licensing standards. • Encourage ecologically sensitive working practices. • Support initiatives for less intensive land management. • Support NRA policies to reduce nutrient enrichment. • Use Biodiversity Action Plan to set targets. • Structure and Local Plans; include NRA policies • Consider all planning applications.	Environmental gain	Cost	Conservation Agencies	NRA Planning Authorities
26	Deterioration of landscape and heritage value.	• Monitor effectiveness of conservation measures in NRA activities. • Liaise with other environmental bodies and integrate their findings. • Assess NRA consenting and licensing standards. • Encourage ecologically sensitive working practices. • Support initiatives for less intensive land management. • Structure and Local Plans; include NRA policies. • Consider all planning applications. • Improve NRA database on Local Authority Conservation Area. • Liaise with landowners and foresters.	Improved WQ Environmental gain	Cost	NRA	Forestry Authority
27	Need for improved recreation monitoring and assessment.	• Warden surveys of water environments and associated land's recreational use. • Monitor recreation use via liaising with external bodies. • Assess need for further recreation provision.	Better data & planning	Cost	NRA	External Bodies BCU, Tarka Project, Sports Council, National Parks

No	ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
					LEAD	OTHER
28	Promote recreation initiatives.	• Improve or provide Canoe passage at Eggesford weir. • River Venn low-key use of flood defence schemes. • Structure and local plans include NRA recreation policies. • Recommend NRA recreation policies to appropriate planning applications. • Identify NRA holdings which would benefit from a management plan. • Develop management plans to enhance conservation and recreation value of selected sites.	Improve recreation facilities Better planning Encourages wider use	Cost Conflict with other water users	NRA	Recreation bodies BCU, Sports Council, Tarka Project, National Parks
29	Deterioration of Salmonid spawning beds as a result of increased siltation of riffle areas.	**Current Operations procedure:** • Gravel rehabilitation: identify sites, consider ecological benefit. • Maintain gravels: Devon area procedure. • Redd counts and juvenile surveys: monitor spawning success. • Review and report on improvement. **Options to Secure Long Term Control** • Schemes to stabilise banks, reduce stock ingress and silt input. • Encourage less intensive land management. • Reduce soil erosion, silt input: buffer zones, land management.	Improved spawning conditions Increase in fish stocks Environment gain Improve spawning conditions	Cost Short term WQ deterioration and loss of aquatic life. Long term aquatic invertebrate community improvement. Cost Loss of agricultural production.	NRA NRA Ripairian Owners MAFF Co.Co EN	Riparian Owners MAFF
30	Perceived low flow problem in by-passed reach downstream of Snapper Weir.	• Ensure adherence to licence conditions. • If impact significant, use alleviation options. • Capital works to modify intake and weir designs to maintain residual flow.	Improve migratory fish passage.	Cost	NRA	Fish Farm Owner
31	Improve Fish Passage.	• Maintain fish passes. • Install fish passes at North Molton and Plaistow. • Monitor effectiveness of Head Weir Fish Passes. • Remove trash dams and obstacles according to Regional Procedure.	Improved fish passage	Cost	NRA	Riparian Owners

No	ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
					LEAD	OTHER
32	Reverse decline of salmon, sea trout and trout stocks.	• Maintain net and rod catch control. • Liaise with external organisations to control exploitation of salmonid sea-trout in high seas fisheries. Need R & D. • Fish monitoring studies evidence, review balance of exploitation with stock improvement. • Issue a new NLO. • Compensation payments for estuarine netting. • Other netting controls. • Control rod fishing methods. • Ensure water quality and quantity to facilitate fish passage and production.	Reduce exploitation Increase salmon, sea trout and trout stocks Conservation of wild species (Species & Habitat Directive)	Cost Complex Issues Potential loss of angling opportunities and netsmen income	NRA	MAFF
33	Illegal exploitation of adult fish (salmonids).	• Enforcement activities. • Review activities and data, recommend appropriate level of enforcement. • Introduce necessary new legislation.	Better protection & fish stocks Better targeting of resources.	Cost	NRA	
34	Conflict between water abstraction undertakings and the flow needed for migratory fish passage.	• Investigate ALF sites and make recommendations to correct adverse impact. • Implement above recommendations. • Critically review all catchment abstractions and correct problems. • Investigate fish movements and biological criteria. Set guidelines for all abstractions.	Environmental gain Improved fish passage	Cost Conflict between users Loss of public water supply resource	NRA	MAFF
35	Rainbow trout escapement from fish farms	• Carry out removal exercises. • Screening and husbandry at fish farms.	Protect indigenous species	Cost	NRA	Fish Farm Owners
36	Fish eating birds	• Further research into issue. • Work with owners and anglers to establish facts of situation	Increased knowledge and protection of salmonid stocks	Cost Conflict with conservation interests	NRA	MAFF/DoE Anglers
37	Lack of spring fish	• Catch and release strategy. • Changes in legislation to protect spring fish. • Control estuarine netting.	Better protection of fish stock	Cost Potential for loss of angling opportunities and netsmen income. Conflict	NRA	Anglers

No	ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
					LEAD	OTHER
38	Improve the Identification of Flood Risk Areas	• Undertake 'S105' flood risk surveys for the River Taw Catchment	Improved knowledge	Cost	NRA	SWWSL
39	Improve efficiency and effectiveness of flood defence operations.	• Adopt 'Standards of Service' for defining maintenance needs on 'main river'. • Technical contracts for all maintenance operations. • Undertake flood risk surveys. • Asset surveys.	Better planning Potential for environmental gain Cost savings	Cost	NRA	
40	Investigate, justify and implement Flood Defence Schemes.	• Construct relevant schemes. • Liaise with planning authorities. • Ensure all options are evaluated.	Better protection	Cost Loss of natural habitat	NRA	MAFF
41	Provision of flood warning in the catchment.	• Review flood risk areas. • Review flood warning re: emergency response levels of service. • Cost and produce plan for future improvements.	Better planning & protection	Cost	NRA	

APPENDIX 1

LEGISLATION RELEVANT TO SPECIAL CONSERVATION AREAS & CONSERVATION INTERESTS

APPENDIX 1

LEGISLATION RELEVANT TO SPECIAL CONSERVATION AREAS AND CONSERVATION INTERESTS

- **Wildlife and Countryside Act 1981.**
  Sets out a range of species and habitat protection measures, including Sites of Special Scientific Interest (SSSI) and Scheduled species.

- **National Parks and Access to the Countryside Act 1949.**
  Covers the designation of National Parks and Areas of Outstanding Natural Beauty (AONB).

- **Ancient Monuments and Archaeological Areas Act 1979.**
  Sets out protection for Scheduled Ancient Monuments (SAM).

- **Planning (Listed Buildings and Conservation Areas) Act 1990 .**
  Sets out protection for the built environment.

- **EC Council Directive 92/43/EEC of 21 May 1992.**
  On the conservation of natural habitats and of wild fauna and flora, sets out to ensure bio-diversity through the conservation of natural habitats and of wild fauna and flora in EU Member states.

APPENDIX 2

SITES OF SPECIAL SCIENTIFIC INTEREST IN THE RIVER TAW CATCHMENT

SITES OF SPECIAL SCIENTIFIC INTEREST IN THE RIVER TAW CATCHMENT

APPENDIX 2

Site	Area (ha)	Summary of interest
Arlington	45.3	Woodland with lichens
Beaford Moor (lies within both the Taw & Torridge catchments)	31.6	Culm grassland
Bradiford Valley	23.2	Ancient woodland and pasture
Chapel Hill	0.22	Pennyroyal
Hare's Down, Knowstone & Rackenford Moors	218.0	Culm grassland
High Down Quarry	0.8	Geological site
North Dartmoor (not entirely within the catchment)	13,413.00	Blanket bog, moorland
North Exmoor (part in Exe Catchment)	12021.6	Blanket bog, moorland
Nymet Barton Marsh	9.28	Wetland
Plaistow Quarry	11.4	Shelly fossil site
Pope House Moor	3.19	Culm grassland
South Exmoor (part in Exe Catchment)	3132.7	Wet health
Staddon Moor	4.8	Culm grassland

Total area of SSSI's lying partly or wholly within the catchment =
13760.57 ha (including North Dartmoor SSSI)
347.57 ha (excluding North Dartmoor SSSI)

APPENDIX 3

WILDLIFE AND COUNTRYSIDE ACT 1981 - SCHEDULED SPECIES KNOWN TO OCCUR WITHIN THE RIVER TAW CATCHMENT

APPENDIX 3

WILDLIFE AND COUNTRYSIDE ACT 1981 - SCHEDULED SPECIES KNOWN TO OCCUR WITHIN THE RIVER TAW CATCHMENT. THIS IS NOT A DEFINITIVE LIST.

Schedule 1 - Birds which are protected by special penalties at all times

Kingfisher - *Alcedo atthis*
Barn Owl - *Tyto alba*
Peregrine - *Falco peregrinus*

Schedule 5 - Animals which are protected

Otter - *Lutra lutra*
High Brown Fritillary butterfly - *Argynnis adippe*
Marsh Fritillary butterfly - *Eurodryas aurinia*
Brown Hairstreak butterfly - *Theela betulae*
Allis shad - *Alosa alosa*
All bats - Rhinolophidae and Vespertilionidae
Reptiles
Amphibians

Schedule 6 - Animals which may not be killed or taken by certain methods

Badger - *Meles meles*
All bats - Rhinolophidae and Vespertilionidae
Dormouse - Gliridae
Hedgehog - *Erinaceus europaeus*
Otter - *Lutra lutra*
All shrews - Soricidae

Schedule 8 - Plants which are protected

Wood sage - *Teucrium scorodonia*

APPENDIX 4

NATURE RESERVES IN THE RIVER TAW CATCHMENT

APPENDIX 4

NATURE RESERVES IN THE RIVER TAW CATCHMENT

Source: Nature Reserves in Devon (DWT 1993)

This list is not thought to be comprehensive, nor is the presence of a reserve a reflection on the presence of significant biological or amenity value.

Site	Grid Ref.	Owner/management body
Bailey	SS 521275	Woodland Trust
Chapel Wood	SS 483415	Royal Society for the Protection of Birds
Horsemans Spinney	SS 674142	Woodland Trust
Leithbridge Wood	SS 658053	Woodland Trust
Pippacott Wood	SS 532373	Woodland Trust
Rackenford Moor	SS 858211	Devon Wildlife Trust
Shears Copse	SS 614097	Woodland Trust
South Tawton Quarry	SX 638948	Devon Birdwatching and Preservation Society
Stuckey Farm	SS 780140	Devon Wildlife Trust
Whiddon Valley	SS 576318	North Devon District Council
Wistlandpound	SS 642412	Devon Birdwatching and Preservation Society
Yeo Copse	SS 801151	Woodland Trust

APPENDIX 5

MANDATORY BAG LIMITS

NRA

NATIONAL RIVERS AUTHORITY – SOUTH WEST REGION

REHABILITATION OF SALMON AND SEA TROUT ON THE RIVERS TAW AND TORRIDGE

MANDATORY BAG LIMITS

1. As part of the programme to rehabilitate salmon and sea trout stocks in the Rivers Taw and Torridge, the NRA introduced a byelaw in 1992 which restricts the numbers of fish anglers may catch on these rivers. This byelaw formalises the voluntary bag limits which have operated on the rivers over the past few years. The byelaw expires on 30 September 1995.

2. Bag limits are as follows:–

		PERIOD		
		24 hours	7 days	Season
RIVER	SPECIES			
TAW	Salmon	2	3	10
	Migratory trout	5	15	40
TORRIDGE	Salmon	–	2	5
	Migratory trout	2	5	20

There is no bag limit for brown trout.

3. Anglers who catch the bag limit for a species on a river in any period must cease fishing for that species on the river in question for the remainder of the given period. However, having reached the bag limit for one species, the angler may continue fishing for the other species.

4. By way of illustration, an angler who has caught 2 salmon in 24 hours on the River Taw may continue fishing for sea trout on the Taw, using recognised methods for sea trout, until the bag limit for these fish is reached. Any salmon caught accidentally whilst sea trout angling in this way after reaching the salmon bag limit, must be returned unharmed to the river.

5. Whilst fishing for the bag limit, anglers are at liberty to return fish of any species to the river after catching them i.e. operating a "catch and release" system. However, such fish will count towards the bag limit. Fish caught and returned in this manner should be recorded on the rod licence return form with a note to indicate that they were returned to the water.

6. For further information and full details of fishing byelaws, contact the Fisheries Department at:

NRA SW Region
Manley House
Kestrel Way
EXETER
Devon
EX2 7LQ
Tel: 0392 444000

APPENDIX 6

RECENT ROD CATCH AND JUVENILE ELECTRIC FISHING SURVEY DATA

MONTHLY REPORTED ROD CATCHES OF SALMON AND GRILSE IN THE RIVER TAW 1989-1993

MONTH / YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	UNKNOWN
1989	-	-	37	31	24	10	4	0	54	-	-	-	0
1990	-	-	23	26	12	7	19	8	25	-	-	-	0
1991	-	-	20	32	18	22	43	13	9	-	-	-	0
1992	-	-	15	22	17	6	14	89	194	-	-	-	0
1993	-	-	10	16	9	25	38	60	74	-	-	-	0

RECENT ROD CATCH AND JUVENILE ELECTRIC FISHING SURVEY DATA

APPENDIX 6

MONTHLY REPORTED ROD CATCHES OF MIGRATORY TROUT IN THE RIVER TAW 1989-1993

MONTH / YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	UNKNOWN
1989	-	-	1	21	31	43	25	31	52	-	-	-	0
1990	-	-	1	4	2	38	77	27	26	-	-	-	0
1991	-	-	0	2	16	62	84	82	38	-	-	-	1
1992	-	-	2	3	28	27	92	78	91	-	-	-	1
1993	-	-	0	3	11	117	195	209	125	-	-	-	0

RIVER TAW SUMMARY SHEET 1993

WATERCOURSE	SITE NAME	NGR	CLUSTER	No. OF RUNS
TAW	U/s Taw Marsh	SX619 900	ALF	3
	U/s Smallbrook	SX618 908	ALF	1
	D/s Smallbrook	SX618 910	ALF	1
	Irishmans Wall	SX619 915	ALF	3
	D/s Gauging St.	SX621 922	ALF	1
	U/s Sticklepath	SX635 938	ALF	1
	D/s Sticklepath	SX645 945	ALF	3
	Taw Green	SX 654 970	A	3
	East Rowden	SX 655 994	A	1
	North Tawton *	SS 654 017	$	$
	Bondleigh *	SS 658 044	$	$
	Coldridge Bridge *	SS 685 078	$	$
	Park Mill Bridge *	SS 696 086	$	$
	Hawkridge Bridge *	SS 697 087	$	$
	Chenson *	SS 701 095	$	$
	Chawleigh Week *	SS 681 129	$	$
	Colleton Mills *	SS 664 159	$	$
	Braggamarsh *	SS 684 190	$	$
	Little Silver *	SS 626 210	$	$
	Umberleigh *	SS 608 234	$	$
	Chappleton *	SS 582 262	$	$
	Newbridge *	SS 570 280	$	$
LAPFORD YEO	North Beer	SX 694 987	A	1
	Bow	SS 717 019	A	1
	Tucking Mill	SS 724 035	A	1
	Middle Yeo	SS 733 045	C	1
	Nymphayes	SS 731 052	C	1
	Lapford	SS 730 076	C	1
	Bury Bridge	SS 738 069	C	3
KNATHORN BROOK	Bradford Farm	SS 745 058	D	1
DALCH	Mill Barton Bridge	SX 814 122	D	1
	Hele Lane	SS 795 107	D	3
	Calves Bridge	SS 749 087	D	1
LITTLE DART	Little Rackenford	SS 851 176	E	1
	Queen Dart	SS 841 165	E	1
	Bradford Mill	SS 823 164	E	3
	Witheridge	SS 800 151	F	1
	West Worlington	SS 768 134	F	1
	Stone Mill	SS 719 132	F	1
	Savourys	SS 690 137	F	3

[Revised 7/1/94 JPS]

DATE	SALMON DENSITY (100m2)		TROUT DENSITY (100m2)		OTHER
	FRY	PARR	FRY	PARR	SPECIES
21-Sep-93	0.00	0.00	19.78	4.83	-
21-Sep-93	0.00	0.00	7.68	11.77	-
22-Sep-93	0.00	0.00	6.67	10.78	-
22-Sep-93	0.00	0.00	6.14	9.21	-
22-Sep-93	0.00	0.00	5.13	10.78	-
20-Sep-93	1.58	3.82	5.60	11.77	-
24-Sep-93	5.90	8.28	4.83	4.83	-
04-Aug-93	16.81	4.05	9.12	18.03	-
09-Aug-93	17.12	4.50	11.75	14.51	-
20-Aug-93	#	#	#	#	NIL
20-Aug-93	#	#	#	#	E,SL,B,M,S1
20-Sep-93	#	#	@	#	E,SL,B,ST
07-Sep-93	#	#	@	#	E,SL,B
07-Sep-93	#	#	#	#	E,SL,B,M,S1
07-Sep-93	#	#	#	#	E,SL,B,M,
07-Sep-93	#	#	@	#	E,SL,B,M,
07-Sep-93	#	#	@	#	E,SL,B,M,
06-Sep-93	#	#	@	#	E,SL,B,M,
06-Sep-93	@	#	@	@	E,B,M
06-Sep-93	@	#	@	#	E,SL,B,M,S1
06-Sep-93	@	#	@	#	E,SL,B,M,
06-Sep-93	#	#	@	#	SL,B,M,F
16-Aug-93	2.93	0.00	2.93	7.36	-
16-Aug-93	2.49	0.00	2.49	17.83	-
17-Aug-93	0.00	0.00	0.00	3.64	-
12-Aug-93	0.84	0.00	0.84	4.03	-
19-Aug-93	0.00	0.00	0.00	3.60	-
20-Aug-93	0.00	2.58	0.00	1.84	-
17-Aug-93	0.00	2.49	2.49	4.30	-
16-Aug-93	0.00	1.05	0.00	4.22	-
13-Aug-93	0.00	0.00	0.00	3.03	-
12-Aug-93	1.85	0.00	1.11	7.38	-
13-Aug-93	0.00	0.95	0.00	7.13	-
03-Aug-93	5.77	0.28	17.93	10.97	-
03-Aug-93	2.43	0.77	4.28	6.21	-
02-Aug-93	2.78	0.40	2.38	11.30	-
10-Aug-93	4.99	7.83	0.62	11.81	-
11-Aug-93	6.80	4.05	0.08	4.38	-
11-Aug-93	0.00	1.21	0.00	2.42	-
10-Aug-93	4.58	2.51	0.00	2.80	-

RIVER TAW SUMMARY SHEET 1993

WATERCOURSE	SITE NAME	NGR	CLUSTER	No. OF RUNS
STURCOMBE RIVER	Creacombe	SS 817 194	G	3
	Crowdhole	SS 812 180	G	1
HUNTACOTT WATER	Week Bridge	SS 735 167	G	1
	Brookland	SS 710 154	G	1
HOLLOCOMBE WATER	Woodterrill	SS 628 107	H	1
	Pensford	SS 644 120	H	1
MULLEY BROOK	Winswood	SS 639 154	H	3
CHURCHWATER STREAM	Churchwater	SS 619 135	H	1
MOLE	North Heasley Mine	SS 739 322	J	1
	Heasley Mill	SS 739 328	J	3
	South Wood	SS 745 313	K	1
	North Molton	SS 744 299	K	1
	Parkhouse	SS 720 266	K	3
	South Molton *	SS 723 257	$	$
	Little Hele Wood *	SS 730 244	$	$
	Alswear *	SS 723 222	$	$
	Wampford Bridge *	SS 696 226	$	$
	Meeth *	SS 678 228	$	$
	Higher Water Town *	SS 669 215	$	$
	Lenton *	SS 662 198	$	$
	Head Bridge *	SS 667 184	$	$
BARHAM STREAM	Barham Farm	SS 745 336	L	1
BENTWITCHEN STREAM	Bentwitchen	SS 729 341	L	1
	Mines Bridge	SS 738 329	L	1
LYDDICOMBE STREAM	Lower Fyldon	SS 737 336	L	1
BRINSWORTHY STREAM	U/s Brinsworthy Bridge	SS 747 312	L	3
MOLLAND YEO	Yeo Mill	SS 843 264	M	1
	Bottreaux Mill	SS 822 264	M	1
	Touts Bridge	SS 790 265	M	3
	Mornacott	SS 766 263	N	1
	Westridge Stables	SS 758 258	N	1
	Bish Mill	SS 742 252	N	3
	Grilstone *	SS 733 244	$	$
TWITCHEN STREAM	U/s W.Molland	SS 793 275	P	1

[Revised 7/1/94 JPS]

DATE	SALMON DENSITY (100m2)		TROUT DENSITY (100m2)		OTHER
	FRY	PARR	FRY	PARR	SPECIES
24-Aug-93	22.30	1.20	17.48	4.22	-
24-Aug-93	0.00	1.81	8.75	19.08	-
25-Aug-93	0.00	0.77	8.99	1.35	-
25-Aug-93	6.37	1.58	1.09	10.19	-
26-Aug-93	0.00	0.00	0.69	4.29	-
26-Aug-93	9.92	0.00	0.33	7.34	-
27-Aug-93	0.68	0.00	0.34	30.12	-
27-Aug-93	0.00	3.41	8.03	17.07	-
05-Aug-93	23.21	2.66	24.74	22.49	-
13-Aug-93	23.94	1.38	20.36	20.36	-
05-Aug-93	4.12	3.67	16.47	14.69	-
06-Aug-93	15.64	1.17	9.11	24.99	-
17-Aug-93	8.21	6.07	2.41	6.19	-
18-Aug-93	#	#	@	#	E,B
27-Aug-93	#	#	#	#	E,SL,B,M
27-Aug-93	#	#	@	#	E,SL,B,ST
27-Aug-93	#	#	@	#	E,SL,M
06-Sep-93	#	#	@	#	NIL
27-Aug-93	#	#	@	#	E,SL
06-Sep-93	#	#	@	#	E,SL,B,M
06-Sep-93	#	#	@	#	SL,ST
04-Aug-93	0.00	0.00	36.53	9.96	-
03-Aug-93	0.00	0.00	103.44	10.79	-
03-Aug-93	21.50	0.00	33.59	16.95	-
03-Aug-93	1.97	0.00	45.48	17.31	-
04-Aug-93	17.86	0.00	51.95	33.55	-
07-Sep-93	2.34	0.71	5.68	42.64	-
16-Aug-93	7.94	0.88	7.61	10.25	-
11-Aug-93	47.70	4.09	2.73	13.63	-
16-Aug-93	17.91	2.22	3.95	16.21	-
31-Aug-93	16.02	0.00	2.16	24.11	-
18-Aug-93	11.56	3.98	0.20	13.95	-
27-Aug-93	#	#	@	#	E,SL,M
18-Aug-93	34.71	5.85	16.87	23.89	-

RIVER TAW SUMMARY SHEET 1993

WATERCOURSE	SITE NAME	NGR	CLUSTER	No. OF RUNS
CROOKED OAK	Owlaborough	SS 833 234	P	1
	Harpsem Wood	SS 813 233	P	1
	Ash Mill	SS 784 234	P	3
	Yeo Bridge	SS 758 231	Q	1
	Eastwood Farm	SS 743 231	Q	1
	Alswear	SS 725 223	Q	3
LITTLE SILVER STREAM	Whippenscott	SS 780 208	R	1
	Milltown	SS 756 204	R	1
	Odam Bridge	SS 743 206	R	3
	Kempstown	SS 728 216	R	1
BRAY	Challacombe Mill	SS 682 403	ALF	1
	Loeham Ford	SS 678 401	ALF	3
	Leeworthy	SS 677 380	ALF	1
	Brayford	SS 688 348	ALF	1
	Rock Bridge	SS 693 325	S	3
	Brayley Bridge	SS 691 304	S	1
	Filleigh Bridge *	SS 665 278	$	$
	Bray Bridge *	SS 675 257	$	$
	Meeth *	SS 675 230	$	$
HOLEWATER	Linkleham Bridge	SS 696 325	T	1
HAWKRIDGE BROOK	Hawkridge Barton	SS 608 256	T	$
LANGHAM LAKE	Court Mill	SS 571 230	T	3
	Bucks Mill	SS 565 249	T	1
NEWTON TRACEY	Bustley Bridge	SS 560 258	U	1
VENN STREAM	Landkey Bridge	SS 590 310	U	3
	U/s Whitemoor Bridge	SS 568 303	U	1
BARNSTAPLE YEO	East Down	SS 603 409	V	1
	Shirwell Mill	SS 608 375	V	1
	Riversmead	SS 594 350	V	3
	U/s Snapper Weir	SS 587 345	ALF	1
	Bulldog Fish Farm	SS 585 345	ALF	1
	D/s Bulldog d'charge	SS 582 344	ALF	3
LOXHORE STREAM	Loxhore Mill	SS 625 375	V	1
BRADIFORD WATER	Blakewell	SS 567 359	W	1
	Tutshill Weir	SS 560 351	W	1

[Revised 7/1/94 JPS]

DATE	SALMON DENSITY (100m2)		TROUT DENSITY (100m2)		OTHER
	FRY	PARR	FRY	PARR	SPECIES
10-Aug-93	0.00	0.00	11.16	3.47	-
10-Aug-93	2.60	0.61	13.67	13.06	-
12-Aug-93	1.39	3.23	6.47	18.02	-
18-Aug-93	7.43	0.78	2.87	7.37	-
19-Aug-93	1.44	0.97	0.00	2.37	-
19-Aug-93	17.82	3.18	0.00	6.68	-
20-Aug-93	0.00	0.00	1.92	6.66	-
24-Aug-93	9.02	0.00	0.85	10.13	-
20-Aug-93	5.55	1.63	0.33	9.46	-
24-Aug-93	5.69	0.64	0.38	5.29	-
07-Sep-93	44.76	0.00	49.84	26.39	-
15-Sep-93	12.10	0.55	6.87	13.20	-
23-Sep-93	24.46	0.00	13.20	12.00	-
06-Sep-93	28.46	10.97	47.51	33.88	-
01-Sep-93	10.77	3.26	7.51	22.79	-
31-Aug-93	14.05	2.13	2.44	4.56	-
01-Sep-93	#	#	#	#	E,SL,B
07-Sep-93	#	#	#	#	E,B,M,ST
06-Sep-93	#	#	@	#	E,SL,M
03-Sep-93	50.92	6.25	40.96	20.46	-
03-Sep-93	0.00	0.00	3.76	5.94	-
02-Sep-93	31.65	4.78	2.09	10.45	-
02-Sep-93	3.24	2.55	3.82	7.90	-
17-Aug-93	0.00	0.62	0.00	5.70	-
16-Sep-93	0.00	0.00	0.00	10.20	-
16-Sep-93	0.00	4.83	0.00	9.45	-
31-Aug-93	0.00	0.00	2.05	25.97	-
31-Aug-93	14.02	2.10	17.02	35.37	-
25-Aug-93	0.00	2.27	3.09	16.90	-
27-Sep-93	0.00	0.00	0.90	4.37	-
27-Sep-93	0.37	0.28	2.97	11.14	-
28-Sep-93	0.00	1.46	0.24	16.50	-
03-Sep-93	3.73	2.23	75.62	42.60	-
20-Sep-93	2.15	0.43	4.71	34.62	-
20-Sep-93	0.00	0.00	1.19	24.07	-

RIVER TAW SUMMARY SHEET 1993

WATERCOURSE	SITE NAME	NGR	CLUSTER	No. OF RUNS
CAEN	Little Comfort Farm	SS 513 402	W	3
	Nethercott Crossing	SS 494 395	W	1
	Braunton	SS 488 369	W	1
KNOWL WATER	Knowlwater Bridge	SS 522 362	W	1
	Wrafton	SS 490 356	W	1

KEY

$ = SEMI-QUANTITATIVE SITE
ALF = ALLEVIATION OF LOW FLOWS SITE
E = EEL
M = MINNOW
SL = STONE LOACH
B = BULLHEAD
ST = SEA TROUT
F = FLOUNDER

[Revised 7/1/94 JPS]

DATE	SALMON DENSITY (100m2)		TROUT DENSITY (100m2)		OTHER
	FRY	PARR	FRY	PARR	SPECIES
01-Sep-93	9.81	0.00	17.66	5.56	-
01-Sep-93	9.20	0.66	1.44	21.82	-
17-Sep-93	4.21	1.58	1.73	15.64	-
					-
17-Sep-93	0.00	0.00	11.22	30.35	-
03-Sep-93	0.00	0.00	1.44	7.48	-

RIVER TAW – HISTORIC SURVEY DATA 1968 – 1993 TROUT FRY (0+)

WATERCOURSE	SITE NAME	1968	1973	1974
RIVER TAW	500m D/s Sign	–	–	–
	U/s Taw Marsh	–	–	–
	U/s Small Brook	–	–	–
	D/s Small Brook	–	–	–
	Irishman's Wall	*	*	*
	D/s Gauging Station	–	–	–
	U/s Sticklepath	*	*	*
	D/s Skaigh	–	–	–
	D/s Sticklepath	–	*	*
	Taw Green	*	*	*
	East Rowden	–	*	*
	North Tawton	*	*	*
	Bondleigh	*	–	13.47
	Coldridge Bridge	*	–	6.10
	Park Mill Bridge	–	–	–
	Hawkridge Bridge	*	–	–
	Chenson	*	–	–
	Chawleigh Week	*	–	–
	Colleton Mills	*	–	–
	U/s Head Bridge	–	–	–
	Braggamarsh	*	–	–
	Little Silver	*	–	–
	Umberleigh	*	–	–
	Chappleton	–	–	–
	New Bridge	–	–	–
KNATHORN BROOK	Morchard Road	*	–	–
	Bradiford Farm	–	–	–
DALCH	Mill Barton	*	–	–
	Hele Lane	*	–	–
	Calves Bridge	*	–	–
LAPFORD YEO	North Beer	*	–	–
	Bow	*	–	–
	Middle Yeo	*	–	–
	Bury	–	–	–
	Lapford	*	–	–
	Nymet Bridge	*	–	–
	Nymphayes	–	–	0.91
	Tucking Mill	–	–	–
	Hayne Bridge	–	–	–

[Revised 8/12/93.JPS]

1975	1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	–	–	–	–	#	–	–
–	–	–	–	–	–	–	–	41.94	19.78
–	–	–	–	–	–	–	–	10.72	7.68
–	–	–	–	–	–	–	#	63.54	6.67
*	9.41	–	9.95	17.89	17.61	15.58	34.77	38.75	6.14
–	–	–	–	–	–	–	#	1.86	5.13
*	–	–	–	–	–	–	#	7.34	5.60
–	–	–	–	–	–	–	#	–	–
*	–	–	–	–	–	–	–	15.10	4.83
*	–	–	–	17.89	15.45	11.19	11.42	–	9.12
*	39.71	–	20.93	17.96	7.56	–	–	–	11.75
*	16.36	–	12.32	11.22	1.02	3.00	13.36	–	#
–	–	–	19.25	8.58	2.53	–	–	–	#
2.10	–	–	1.30	–	–	–	–	–	@
–	9.55	–	1.30	1.99	1.13	0.57	6.75	–	@
–	–	–	–	–	–	–	–	–	#
0.50	–	–	–	–	–	–	–	–	#
–	1.37	–	0.41	–	–	–	–	–	@
–	0.19	–	0.00	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	@
–	0.06	–	0.00	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	0.00
–	2.86	–	0.00	0.85	–	–	–	–	1.11
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	2.93
–	1.80	3.14	0.00	0.44	–	–	–	–	2.49
–	–	–	–	–	–	–	–	–	0.64
–	–	0.00	0.00	0.39	–	–	–	–	2.49
–	0.24	0.00	–	–	–	–	–	–	0.00
–	–	0.00	–	–	–	–	–	–	–
–	–	0.00	–	–	–	–	–	–	0.00
–	–	0.90	–	–	–	–	–	–	0.00
–	–	4.98	–	–	–	–	–	–	–

RIVER TAW – HISTORIC SURVEY DATA 1968 – 1993 TROUT FRY (0+)

WATERCOURSE	SITE NAME	1968	1973	1974
LAPFORD YEO CONT'D	D/s Burrow Drain	–	–	–
	U/s Burrow Drain	–	–	–
STURCOMBE WATER	Creacombe	*	–	–
	Crowdhole	*	–	–
HUNTACOTT WATER	Week	*	–	–
	Brookland	*	–	–
LITTLE DART	Little Rackenford	*	–	–
	Queen Dart	*	–	–
	Bradford Mill	*	–	–
	Witheridge	*	–	3.97
	East Worlington	*	–	–
	West Worlington	–	–	0.39
	Stone Mill	*	–	–
	Savourys	*	–	1.05
HOLLOCOMBE WATER	Whitehouse	*	–	–
	Woodterrill	*	–	–
	Pensford	*	–	–
CHURCHWATER STREAM	Churchwater	*	–	–
MULLEY BROOK	Tiddy Water	*	–	–
	Winswood	*	–	–
NORTH RADWORTHY	Higher Fyldon	*	–	–
	Barham Bridge	–	–	–
BENTWITCHEN STREAM	Bentwitchen	*	–	–
	Mines Bridge	–	–	–
BRINSWORTHY STREAM	Brinsworthy Bridge	–	–	–
LYDICOMBE STREAM	Lower Flydon	–	–	–
MOLLAND YEO	West Molland	*	–	–
	Yeo Mill	*	–	–
	Bottreaux Mill	–	–	–
	Black Cock Bridge	–	–	–
	Touts Bridge	*	–	12.10

1975	1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	3.87	–	–	–	–	–	–	–
–	–	2.27	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	17.48
–	–	–	–	–	–	–	–	–	8.75
–	–	–	–	–	–	–	–	–	8.99
–	–	–	–	–	–	–	–	–	1.09
–	–	–	–	–	–	–	–	–	17.93
–	–	–	–	–	–	–	–	–	4.28
–	0.65	–	3.55	1.74	–	–	–	–	2.38
2.20	–	–	–	–	–	–	–	–	0.62
–	–	–	–	–	–	–	–	–	–
–	2.74	–	1.59	1.79	–	–	–	1.45	0.08
–	–	–	–	–	–	–	–	–	0.00
–	0.39	–	1.39	0.46	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	0.69
–	–	–	–	–	–	–	–	–	0.33
–	–	–	–	–	–	–	–	–	8.03
–	–	–	–	–	–	–	–	–	–
–	5.11	–	10.14	34.65	–	–	–	–	0.34
–	–	–	–	–	–	–	–	–	–
–	–	–	12.87	–	–	–	–	–	36.53
–	–	–	–	–	–	–	–	–	103.44
–	–	–	3.45	–	–	–	–	–	33.59
–	–	–	5.05	–	–	–	–	–	51.95
–	–	–	–	–	–	–	–	–	45.48
–	–	–	–	–	–	–	–	–	16.87
–	–	–	–	–	–	–	#	13.10	5.68
–	–	–	–	–	–	–	#	4.21	7.61
–	–	–	–	–	–	–	#	–	–
5.50	16.03	–	9.66	10.33	–	–	–	2.93	2.73

RIVER TAW – HISTORIC SURVEY DATA 1968 – 1993 TROUT FRY (0+)

WATERCOURSE	SITE NAME	1968	1973	1974
MOLLAND YEO CONT'D	Mornacott	–	–	–
	Westridge Stables	–	–	–
	Folks Bridge	–	–	–
	Waterhouse	*	–	–
	Bish Mill	–	–	–
	Grilstone	–	–	–
CROOKED OAK	Knowstone	*	–	–
	Owlborough	–	–	–
	Harpsom wood	–	–	–
	Ash Mill	*	–	26.06
	Avercombe	–	–	–
	Yeo Bridge	*	–	–
	Eastwood Farm	–	–	–
	Radley	*	–	–
	Alswear	–	–	–
UTTLE SILVER	Cuckoo Mill	*	–	–
	Whippenscott	*	–	–
	Milltown	–	–	–
	Odam Bridge	*	–	0.00
	Kempstown	–	–	–
BRAY	Challacombe	*	–	–
	Challacombe Mill	–	–	48.04
	Leeham Ford	–	–	–
	Leworthy Bridge	*	–	49.95
	Wort Wood	–	–	–
	Brayford	*	–	53.37
	Rock Bridge	–	–	–
	Brayley Bridge	*	–	–
	Filleigh Bridge	*	–	–
	Bray Bridge	–	–	–
	Clapworthy Mill	*	–	–
	Meethe	–	–	–
HOLEWATER	Linkleyham Bridge	–	–	–
MOLE	North Radley	*	–	–
	North Heasley Mine	–	–	–
	Heasley Mill	*	–	–
	South Wood	–	–	–

1975	1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	–	–	–	–	#	–	3.95
–	–	–	–	–	–	–	–	–	2.16
–	5.05	–	1.24	3.35	–	–	–	1.20	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	0.00	0.20
–	–	–	0.29	–	–	–	#	1.50	@
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	11.16
–	–	–	–	–	–	–	#	–	13.67
29.80	11.45	–	2.65	2.27	–	–	#	2.33	6.47
–	–	–	–	–	–	–	#	–	–
–	–	–	–	–	–	–	–	–	2.87
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	@	–	0.00
–	–	–	–	–	–	–	#	–	–
–	–	–	–	–	–	–	#	–	1.92
–	–	–	–	–	–	–	#	–	0.85
3.70	4.19	–	0.75	0.72	–	–	#	3.57	0.33
–	–	–	–	–	–	–	–	–	0.38
–	–	–	–	–	–	–	–	–	–
–	164.29	–	38.13	115.54	47.57	–	–	65.38	49.84
–	–	–	–	–	–	–	–	18.87	6.87
7.50	42.78	–	13.33	37.15	32.21	23.10	31.42	26.36	13.20
–	–	–	–	–	–	–	–	38.29	–
–	69.44	–	30.14	28.24	15.80	–	–	21.24	47.51
–	13.04	–	5.15	13.28	6.30	9.59	12.06	–	7.51
–	–	–	–	–	–	–	–	–	2.44
1.20	1.49	–	1.52	3.10	3.56	5.13	#	–	–
–	–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	0.00	–	@
–	–	–	7.58	–	–	–	–	–	40.96
–	–	–	12.87	–	–	–	–	–	–
–	–	–	14.95	–	–	–	–	–	24.74
–	22.75	–	13.12	12.71	5.51	–	–	–	20.36
–	–	–	2.08	–	–	–	–	–	16.47

RIVER TAW – HISTORIC SURVEY DATA 1968 – 1993 TROUT FRY (0+)

WATERCOURSE	SITE NAME	1968	1973	1974
MOLE CONT'D	North Molton	–	–	6.06
	Parkhouse	–	–	–
	Mole Bridge	*	–	–
	South Molton	*	–	–
	Little Hele Wood	–	–	–
	Alswear	*	–	–
	Wampford Bridge	*	–	0.00
	Meeth	–	–	–
	Higher Water Town	*	–	–
	King's Bridge	*	–	–
HAWKRIDGE BROOK	Watergate	*	–	–
	Hawkridge Barton	–	–	–
NEWTON TRACY	Bustley Bridge	*	–	–
LANGHAM LAKE	Buck's Mill	*	–	–
	Court Mill	–	–	–
LANDKEY RIVER	Landkey Bridge	*	–	–
	Whitemoor Mill	*	–	–
BARNSTAPLE YEO	East Down	*	–	–
	Arlington Pond	*	–	–
	Shirwell Mill	*	–	19.45
	Riversmead	*	–	5.00
	U/s Snapper Weir	–	–	–
	Bulldog Fish Fm	–	–	–
	D/s Bulldog d'charge	–	–	–
LOXHORE STREAM	Loxhore Mill	–	–	–
BRADIFORD WATER	Blakewell	*	–	–
	Tutshill Weir	–	–	–
KNOWL WATER	Knowlwater Bridge	*	–	–
	Wrafton	*	–	–
RIVER CAEN	Little Comfort Farm	–	–	–
	Heddon Mill	*	–	–
	Nethercott Crossing	–	–	–
	Braunton	*	–	–

1975	1979	1982	1983	1988	1989	1990	1991	1992	1993
0.70	–	–	–	*	3.72	16.92	–	–	9.11
–	–	–	4.76	4.63	3.94	0.26	0.53	–	2.41
–	–	–	–	–	–	–	1.74	–	–
–	3.27	–	–	–	–	–	–	–	@
–	–	–	0.29	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	@
–	–	–	0.00	–	–	0.00	–	–	@
–	–	–	–	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	@
–	–	–	0.00	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	3.76
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	3.82
–	3.80	–	25.68	10.81	–	–	–	–	2.09
–	3.85	–	5.17	1.78	–	–	–	–	○–○
–	–	–	–	–	–	–	–	–	○–○
–	–	–	–	–	–	–	–	–	2.05
–	–	–	–	–	–	–	–	–	
–	–	–	–	–	–	–	–	–	17.02
3.40	6.13	–	12.26	–	–	–	–	–	3.09
–	–	–	–	–	–	–	–	2.45	0.90
–	–	–	–	–	–	–	–	2.28	2.97
–	–	–	–	–	–	–	–	7.01	0.24
–	–	–	–	–	–	–	–	–	75.62
–	–	–	–	–	–	–	–	–	4.71
–	19.12	–	7.46	5.72	–	–	–	–	1.19
–	12.26	–	13.71	10.75	–	–	–	–	11.22
–	–	–	–	–	–	–	–	–	1.44
–	5.45	–	67.11	–	–	–	–	–	17.66
–	–	–	–	–	–	–	–	–	–
–	23.96	–	11.11	6.79	–	–	–	–	1.44
–	–	–	–	–	–	–	–	–	1.73

RIVER TAW – HISTORIC SURVEY DATA 1968 – 1993 TROUT PARR AND OLDER

WATERCOURSE	SITE NAME	1968	1973	1974	1975
RIVER TAW	500m D/s Sign	–	–	–	–
	U/s Taw Marsh	–	–	–	–
	U/s Small Brook	–	–	–	–
	D/s Small Brook	–	–	–	–
	Irishman's Wall	25.10	35.20	35.50	28.60
	D/s Gauging Station	–	–	–	–
	U/s Sticklepath	23.05	11.60	9.60	14.30
	D/s Skaigh	–	–	–	–
	D/s Sticklepath	–	2.00	8.00	9.00
	Taw Green	27.50	34.10	17.90	20.70
	East Rowden	–	8.00	16.40	28.40
	North Tawton	4.19	18.00	3.20	14.70
	Bondleigh	10.46	–	12.40	–
	Coldridge Bridge	7.27	–	15.79	7.90
	Park Mill Bridge	–	–	–	–
	Hawkridge Bridge	7.57	–	–	–
	Chenson	4.55	–	–	6.30
	Chawleigh Week	5.76	–	–	–
	Colleton Mills	2.74	–	–	–
	U/s Head Bridge	–	–	–	–
	Braggamarsh	2.40	–	–	–
	Little Silver	1.30	–	–	–
	Umberleigh	1.55	–	–	–
	Chappleton	–	–	–	–
	New Bridge	–	–	–	–
KNATHORN BROOK	Morchard Road	15.57	–	–	–
	Bradiford Farm	33.79	–	–	–
DALCH	Mill Barton	–	–	–	–
	Hele Lane	12.18	–	–	–
	Calves Bridge	19.87	–	–	–
LAPFORD YEO	North Beer	11.72	–	–	–
	Bow	16.49	–	–	–
	Middle Yeo	8.03	–	–	–
	Bury	–	–	–	–
	Lapford	7.17	–	–	–
	Nymet Bridge	10.16	–	3.67	–
	Nymphayes	–	–	–	–
	Tucking Mill	–	–	–	–
	Hayne Bridge	–	–	–	–

[Revised 4/01/94.JPS]

1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	–	–	–	#	–	–
–	–	–	–	–	–	–	28.22	4.83
–	–	–	–	–	–	–	15.42	11.77
–	–	–	–	–	–	#	35.38	10.78
23.34	–	22.77	22.90	35.21	26.06	21.50	27.59	9.21
–	–	–	–	–	–	#	11.85	10.78
–	–	–	–	–	–	#	28.45	11.77
–	–	–	–	–	–	#	–	–
–	–	–	–	–	–	–	8.63	4.83
–	–	–	16.74	13.12	14.43	17.85	–	18.03
15.44	–	20.32	15.74	17.23	–	–	–	14.51
6.60	–	16.33	13.35	15.48	2.64	9.69	–	#
–	–	16.20	4.73	6.17	–	–	–	#
–	–	7.79	–	–	–	–	–	#
5.41	–	7.79	2.21	1.81	0.19	0.73	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
4.69	–	3.50	–	–	–	–	–	#
2.24	–	4.84	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	@
0.00	–	0.62	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	~~3.03~~ 4.22
–	–	–	–	–	–	–	–	3.03
8.10	–	3.05	11.44	–	–	–	–	7.38
–	–	–	–	–	–	–	–	7.13
–	–	–	–	–	–	–	–	7.36
16.22	14.29	16.08	11.06	–	–	–	–	17.83
–	–	–	–	–	–	–	–	4.03
–	0.65	3.20	0.19	–	–	–	–	4.30
2.38	0.88	–	–	–	–	–	–	1.84
–	0.00	–	–	–	–	–	–	–
–	0.00	–	–	–	–	–	–	3.60
–	0.00	–	–	–	–	–	–	3.64
–	2.28	–	–	–	–	–	–	–

RIVER TAW – HISTORIC SURVEY DATA 1968 – 1993 TROUT PARR AND OLDER

WATERCOURSE	SITE NAME	1968	1973	1974	1975
LAPFORD YEO CONT'D	D/s Burrow Drain	–	–	–	–
	U/s Burrow Drain	–	–	–	–
STURCOMBE WATER	Creacombe	15.32	–	–	–
	Crowdhole	20.93	–	–	–
HUNTACOTT WATER	Week	11.96	–	–	–
	Brookland	9.33	–	–	–
LITTLE DART	Little Rackenford	30.77	–	–	–
	Queen Dart	34.53	–	–	–
	Bradford Mill	23.12	–	–	–
	Witheridge	9.80	–	30.98	12.80
	East Worlington	9.87	–	–	–
	West Worlington	–	–	7.04	–
	Stone Mill	4.54	–	–	–
	Savourys	5.34	–	7.13	–
HOLLOCOMBE WATER	Whitehouse	0.83	–	–	–
	Woodterrill	26.00	–	–	–
	Pensford	21.39	–	–	–
CHURCHWATER STREAM	Churchwater	31.20	–	–	–
MULLEY BROOK	Tiddy Water	39.87	–	–	–
	Winswood	43.35	–	–	–
NORTH RADWORTHY	Higher Fyldon	21.24	–	–	–
	Barham Bridge	–	–	–	–
BENTWITCHEN STREAM	Bentwitchen	23.27	–	–	–
	Mines Bridge	–	–	–	–
BRINSWORTHY STREAM	Brinsworthy Bridge	–	–	–	–
LYDICOMBE STREAM	Lower Fyldon	–	–	–	–
MOLLAND YEO	West Molland	32.80	–	–	–
	Yeo Mill	45.02	–	–	–
	Bottreaux Mill	–	–	–	–
	Black Cock Bridge	–	–	–	–
	Touts Bridge	17.61	–	–	22.70

1979	1982	1983	1988	1989	1990	1991	1992	1993
–	7.64	–	–	–	–	–	–	–
–	6.06	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	4.22
–	–	–	–	–	–	–	–	19.08
–	–	–	–	–	–	–	–	1.35
–	–	–	–	–	–	–	–	10.19
–	–	–	–	–	–	–	–	10.97
–	–	–	–	–	–	–	–	6.21
10.65	–	15.98	6.54	–	–	–	–	11.30
–	–	–	–	–	–	–	–	11.81
–	–	–	–	–	–	–	–	–
4.48	–	7.29	12.14	–	–	–	6.52	4.38
–	–	–	–	–	–	–	–	2.42
3.12	–	5.90	2.45	–	–	–	–	2.80
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	4.29
–	–	–	–	–	–	–	–	7.34
–	–	–	–	–	–	–	–	17.07
–	–	–	–	–	–	–	–	–
19.32	–	58.78	21.93	–	–	–	–	30.12
–	–	–	–	–	–	–	–	–
–	–	22.77	–	–	–	–	–	9.96
–	–	–	–	–	–	–	–	10.79
–	–	24.14	–	–	–	–	–	16.95
–	–	49.49	–	–	–	–	–	33.55
–	–	–	–	–	–	–	–	17.31
–	–	–	–	–	–	–	–	23.89
–	–	–	–	–	–	#	19.64	42.64
–	–	–	–	–	–	#	5.40	10.25
–	–	–	–	–	–	#	–	–
12.18	–	10.22	6.34	–	–	–	2.69	13.63

RIVER TAW – HISTORIC SURVEY DATA 1968 – 1993 TROUT PARR AND OLDER

WATERCOURSE	SITE NAME	1968	1973	1974	1975
MOLLAND YEO CONT'D	Mornacott	–	–	–	–
	Westridge Stables	–	–	–	–
	Folks Bridge	–	–	–	–
	Waterhouse	15.94	–	–	–
	Bish Mill	–	–	–	–
	Grilstone	–	–	–	–
CROOKED OAK	Knowstone	42.46	–	–	–
	Owlborough	–	–	–	–
	Harpsom wood	–	–	–	–
	Ash Mill	48.52	–	11.83	20.60
	Avercombe	–	–	–	–
	Yeo Bridge	21.01	–	–	–
	Eastwood Farm	–	–	–	–
	Radley	24.70	–	38.24	–
	Alswear	11.36	–	–	–
LITTLE SILVER	Cuckoo Mill	53.57	–	–	–
	Whippenscott	9.86	–	–	–
	Milltown	–	–	–	–
	Odam Bridge	46.92	–	0.00	10.80
	Kempstown	–	–	–	–
BRAY	Challacombe	41.94	–	13.84	–
	Challacombe Mill	–	–	–	–
	Leeham Ford	–	–	–	–
	Leworthy Bridge	36.82	–	1.69	28.10
	Wort Wood	–	–	–	–
	Brayford	29.76	–	25.38	–
	Rock Bridge	–	–	–	–
	Brayley Bridge	15.91	–	–	–
	Filleigh Bridge	8.28	–	–	9.50
	Bray Bridge	–	–	–	–
	Clapworthy Mill	10.76	–	–	–
	Meethe	–	–	–	–
HOLEWATER	Linkleyham Bridge	–	–	–	–
MOLE	North Radley	80.13	–	–	–
	North Heasley Mine	–	–	–	–
	Heasley Mill	26.65	–	–	–
	South Wood	–	–	–	–

1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	–	–	–	#	–	16.21
–	–	–	–	–	–	–	–	24.11
10.83	–	13.27	9.81	–	–	–	5.58	–
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	3.48	13.95
–	–	5.27	–	–	–	#	5.13	#
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	3.47
–	–	–	–	–	–	#	–	13.06
22.14	–	25.83	9.47	–	–	#	6.98	18.02
–	–	–	–	–	–	#	–	–
–	–	–	–	–	–	–	–	7.37
–	–	–	–	–	–	–	–	2.37
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	#	–	6.68
–	–	–	–	–	–	#	–	–
–	–	–	–	–	–	#	–	6.66
–	–	–	–	–	–	#	–	10.13
6.98	–	19.55	6.04	–	–	#	3.87	9.46
–	–	–	–	–	–	–	–	5.29
–	–	–	–	–	–	–	–	–
23.81	–	13.67	16.88	15.36	–	–	19.51	26.39
–	–	–	–	–	–	–	21.80	13.20
9.35	–	51.85	10.67	24.50	6.38	19.51	2.41	12.00
–	–	–	–	–	–	–	6.57	–
29.44	–	33.10	17.08	21.46	–	–	13.13	33.88
25.30	–	20.96	14.41	17.41	12.23	29.04	–	22.79
–	–	–	–	–	–	–	–	4.56
2.16	–	24.79	9.82	18.89	9.57	#	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	1.57	–	#
–	–	46.46	–	–	–	–	–	20.46
–	–	22.77	–	–	–	–	–	–
–	–	14.95	–	–	–	–	–	22.49
43.60	–	12.21	19.93	27.95	–	–	–	20.36
–	–	27.50	–	–	–	–	–	14.69

RIVER TAW – HISTORIC SURVEY DATA 1968 – 1993 TROUT PARR AND OLDER

WATERCOURSE	SITE NAME	1968	1973	1974	1975
MOLE CONT'D	North Molton	–	–	50.43	36.60
	Parkhouse	–	–	–	–
	Mole Bridge	38.99	–	–	–
	South Molton	12.65	–	–	–
	Little Hele Wood	–	–	–	–
	Alswear	11.36	–	–	–
	Wampford Bridge	4.98	–	1.15	–
	Meeth	–	–	–	–
	Higher Water Town	6.43	–	–	–
	King's Bridge	5.28	–	–	–
HAWKRIDGE BROOK	Watergate	17.86	–	–	–
	Hawkridge Barton	–	–	–	–
NEWTON TRACY	Bustley Bridge	10.18	–	–	–
LANGHAM LAKE	Buck's Mill	15.27	–	–	–
	Court Mill	–	–	–	–
LANDKEY RIVER	Landkey Bridge	31.92	–	–	–
	Whitemoor Mill	2.85	–	–	–
BARNSTAPLE YEO	East Down	13.82	–	–	–
	Arlington Pond	4.25	–	–	–
	Shirwell Mill	28.23	–	23.54	–
	Riversmead	22.86	–	15.58	18.70
	U/s Snapper Weir	–	–	–	–
	Bulldog Fish Fm	–	–	–	–
	D/s Bulldog D'charge	–	–	–	–
LOXHORE STREAM	Loxhore Mill	–	–	–	–
BRADIFORD WATER	Blakewell	31.58	–	–	–
	Tutshill Weir	–	–	–	–
KNOWL WATER	Knowlwater Bridge	42.54	–	–	–
	Wrafton	40.29	–	–	–
RIVER CAEN	Little Comfort Farm	–	–	–	–
	Heddon Mill	25.57	–	–	–
	Nethercott Crossing	–	–	–	–
	Braunton	24.37	–	–	–

1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	–	59.85	11.92	–	–	24.99
–	–	24.41	9.81	6.06	2.38	11.48	–	6.19
–	–	–	–	–	–	31.06	–	–
4.36	–	–	–	–	–	–	–	#
–	–	7.47	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	3.47	–	–	0.37	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	4.08	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	5.94
–	–	–	–	–	–	–	–	5.70
–	–	–	–	–	–	–	–	7.90
8.70	–	25.68	6.76	–	–	–	–	10.45
6.41	–	26.73	12.46	–	–	–	–	10.20
–	–	–	–	–	–	–	–	9.45
–	–	–	–	–	–	–	–	25.97
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	35.37
12.00	–	20.44	–	–	–	–	–	16.90
–	–	–	–	–	–	–	10.95	4.37
–	–	–	–	–	–	–	15.01	11.14
–	–	–	–	–	–	–	10.23	16.50
–	–	–	–	–	–	–	–	42.60
–	–	–	–	–	–	–	–	34.62
20.00	–	17.91	36.70	–	–	–	–	24.07
18.06	–	30.86	31.18	–	–	–	–	30.35
–	–	–	–	–	–	–	–	7.48
13.94	–	19.46	–	–	–	–	–	5.56
–	–	–	–	–	–	–	–	–
21.35	–	27.78	22.22	–	–	–	–	21.82
–	–	–	–	–	–	–	–	15.64

RIVER TAW – HISTORIC SURVEY DATA 1968–1993 FOR SALMON FRY (0+)

WATERCOURSE	SITE NAME	1968	1973	1974
TAW	500m D/s Sign	–	–	–
	U/s Taw Marsh	–	–	–
	U/s Smallbrook	–	–	–
	D/s Smallbrook	–	–	–
	Irishman's Wall	*	*	*
	D/s Gauging Station	–	*	–
	U/s Sticklepath	*	*	*
	D/s Skaigh	–	–	–
	D/s Sticklepath	–	*	*
	Taw Green	*	*	*
	East Rowden	–	*	*
	North Tawton	*	*	*
	Bondleigh	*	–	0.88
	Coldridge Bridge	*	–	4.61
	Park Mill Bridge	–	–	–
	Hawkridge Bridge	*	–	–
	Chenson	*	–	–
	Chawleigh Week	*	–	–
	Colleton Mills	*	–	–
	U/s Head Bridge	–	–	–
	Braggamarsh	*	–	–
	Little Silver	*	–	–
	Umberleigh	*	–	–
	Chappleton	–	–	–
	New Bridge	–	–	–
KNATHORN BROOK	Morchard Road	*	–	–
	Bradiford Farm	–	–	–
DALCH	Mill Barton	*	–	–
	Hele Lane	*	–	–
	Calves Bridge	*	–	–
LAPFORD YEO	North Beer	*	–	–
	Bow	*	–	–
	Middle Yeo	*	–	–
	Bury	–	–	–
	Lapford	*	–	–
	Nymet Bridge	*	–	1.02
	Nymphayes	–	–	–
	Tucking Mill	–	–	–
	Hayne Bridge	–	–	–

[Revised 8/12/93.JPS]

1975	1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	–	–	–	–	@	–	–
–	–	–	–	–	–	–	–	0.00	0.00
–	–	–	–	–	–	–	–	0.00	0.00
–	–	–	–	–	–	–	@	0.00	0.00
*	0.00	–	0.00	0.00	0.00	0.00	0.00	0.00	0.00
–	–	–	–	–	–	–	@	1.96	0.00
*	–	–	–	–	–	–	@	26.33	1.58
–	–	–	–	–	–	–	@	–	–
*	–	–	–	–	–	–	–	22.19	5.90
*	–	–	–	18.81	21.57	17.66	0.18	–	16.81
*	0.37	–	20.93	42.96	23.11	–	–	–	17.12
*	6.07	–	8.31	59.19	37.31	13.39	29.65	–	#
–	54.50	–	12.44	43.34	31.80	–	–	–	#
9.90	–	–	8.77	–	–	–	–	–	#
–	73.87	–	–	25.88	32.96	39.96	73.39	–	#
–	–	–	–	–	–	–	–	–	#
6.10	–	–	–	–	–	–	–	–	#
–	10.55	–	0.41	–	–	–	–	–	#
–	4.29	–	0.68	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	@
–	1.04	–	0.00	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	@
–	–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	0.00
	–	–	–	–	–	–	–	–	0.00
–	0.00	–	0.00	0.00	–	–	–	–	1.85
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	2.93
–	0.00	0.00	0.00	0.00	–	–	–	–	2.49
–	–	0.00	–	–	–	–	–	–	0.84
–	–	0.00	0.00	–	–	–	–	–	0.00
–	0.24	0.00	–	–	–	–	–	–	0.00
–	–	7.10	–	–	–	–	–	–	–
–	–	0.00	–	–	–	–	–	–	0.00
–	–	0.00	–	–	–	–	–	–	0.00
–	–	0.00	–	–	–	–	–	–	–

RIVER TAW – HISTORIC SURVEY DATA 1968–1993 FOR SALMON FRY (0+)

WATERCOURSE	SITE NAME	1968	1973	1974
LAPFORD YEO CONT'D	D/s Burrow Drain	–	–	–
	U/s Burrow Drain	–	–	–
STURCOMBE RIVER	Creacombe	*	–	–
	Crowdhole	*	–	–
HUNTACOTT WATER	Week	*	–	–
	Brookland	*	–	–
LITTLE DART	Little Rackenford	*	–	–
	Queen Dart	*	–	–
	Bradford Mill	*	–	–
	Witheridge	*	–	7.06
	East Worlington	*	–	–
	West Worlington	–	–	0.65
	Stone Mill	*	–	–
	Savourys	*	–	1.42
HOLLOCOMBE WATER	Whitehouse	*	–	–
	Woodterrill	*	–	–
	Pensford	*	–	–
CHURCHWATER STREAM	Churchwater	*	–	–
MULLEY BROOK	Tiddy Water	*	–	–
	Winswood	*	–	–
NORTH RADWORTHY	Higher Fyldon	*	–	–
	Barham Bridge	–	–	–
BENTWITCHEN STREAM	Bentwitchen	*	–	–
	Mines Bridge	–	–	–
BRINSWORTHY STREAM	Brinsworthy Bridge	–	–	–
LYDDICOMBE STREAM	Lower Flydon	–	–	–
MOLLAND YEO	West Molland	*	–	–
	Yeo Mill	*	–	–
	Bottreaux Mill	–	–	–
	Black Cock Bridge	–	–	–
	Touts Bridge	*	–	8.62

1975	1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	0.00	–	–	–	–	–	–	–
–	–	0.76	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	22.30
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	6.37
–	–	–	–	–	–	–	–	–	5.77
–	–	–	–	–	–	–	–	–	2.43
–	0.00	–	1.78	2.83	–	–	–	–	2.78
2.60	–	–	–	–	–	–	–	–	4.99
–	–	–	–	–	–	–	–	–	–
–	1.24	–	0.68	1.61	–	–	–	12.16	6.80
–	–	–	–	–	–	–	–	–	0.00
–	3.70	–	2.43	3.37	–	–	–	–	4.58
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	9.92
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	–
–	0.00	–	0.00	0.00	–	–	–	–	0.68
–	–	–	–	–	–	–	–	–	–
–	–	–	0.00	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	0.00
–	–	–	0.00	–	–	–	–	–	21.15
–	–	–	0.00	–	–	–	–	–	17.86
–	–	–	–	–	–	–	–	–	1.97
–	–	–	–	–	–	–	–	–	34.71
–	–	–	–	–	–	–	@	1.19	2.34
–	–	–	–	–	–	–	#	7.55	7.94
–	–	–	–	–	–	–	#	–	–
4.70	5.45	–	9.66	8.22	–	–	–	18.07	47.70

RIVER TAW – HISTORIC SURVEY DATA 1968–1993 FOR SALMON FRY (0+)

WATERCOURSE	SITE NAME	1968	1973	1974
MOLLAND YEO CONT'D	Mornacott	–	–	–
	Westridge Stables	–	–	–
	Folks Bridge	–	–	–
	Waterhouse	*	–	–
	Bish Mill	–	–	–
	Grilstone	–	–	–
CROOKED OAK	Knowstone	*	–	–
	Owlborough	–	–	–
	Harpsom Wood	–	–	–
	Ash Mill	*	–	6.40
	Avercombe	–	–	–
	Yeo Bridge	*	–	–
	Eastwood Farm	–	–	–
	Radley	*	–	8.25
	Alswear	–	–	–
LITTLE SILVER STREAM	Cuckoo Mill	*	–	–
	Whippenscott	*	–	–
	Milltown	–	–	–
	Odam Bridge	*	–	0.00
	Kempstown	–	–	–
BRAY	Challacombe	*	–	–
	Challacombe Mill	–	–	0.00
	Leeham Ford	–	–	–
	Leworthy Bridge	*	–	1.57
	Wort Wood	–	–	–
	Brayford	–	–	2.81
	Rock Bridge	–	–	–
	Brayley Bridge	*	–	–
	Filleigh Bridge	*	–	–
	Bray Bridge	–	–	–
	Clapworthy Mill	*	–	–
	Meethe	–	–	–
HOLEWATER	Linkleyham Bridge	–	–	–
MOLE	North Radley	*	–	–
	North Heasley Mine	–	–	–
	Heasley Mill	*	–	–
	South Wood	–	–	–

1975	1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	–	–	–	–	#	–	17.91
–	–	–	–	–	–	–	–	–	16.02
–	13.55	–	31.54	3.11	–	–	–	9.73	–
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	0.00	11.56
–	–	–	2.63	–	–	–	#	10.87	#
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	@	–	2.60
1.40	0.00	–	0.00	0.38	–	–	#	4.88	1.39
–	–	–	–	–	–	–	#	–	–
–	–	–	–	–	–	–	–	–	7.43
–	–	–	–	–	–	–	–	–	1.44
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	#	–	17.82
–	–	–	–	–	–	–	@	–	–
–	–	–	–	–	–	–	@	–	0.00
–	–	–	–	–	–	–	@	–	9.02
0.30	0.00	–	0.75	0.48	–	–	@	2.98	5.55
–	–	–	–	–	–	–	–	–	5.69
–	–	–	–	–	–	–	–	–	–
–	0.00	–	0.00	1.62	57.30	–	–	0.00	44.76
–	–	–	–	–	–	–	–	0.98	12.1
0.20	1.13	–	2.59	0.40	60.74	8.21	11.92	4.92	24.46
–	–	–	–	–	–	–	–	13.43	–
–	4.44	–	5.48	5.75	81.37	–	–	8.50	28.46
–	6.72	–	2.94	1.13	12.96	2.65	4.47	–	10.77
–	–	–	–	–	–	–	–	–	14.05
3.20	4.31	–	3.91	2.33	15.17	10.68	#	–	#
–	–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	2.47	–	#
–	–	–	15.15	–	–	–	–	–	50.92
–	–	–	0.00	–	–	–	–	–	–
–	–	–	0.00	–	–	–	–	–	23.21
–	0.00	–	0.00	5.84	15.35	–	–	–	23.94
–	–	–	0.00	–	–	–	–	–	4.12

RIVER TAW – HISTORIC SURVEY DATA 1968–1993 FOR SALMON FRY (0+)

WATERCOURSE	SITE NAME	1968	1973	1974
MOLE CONT'D	North Molton	–	–	–
	Parkhouse	–	–	–
	Mole Bridge	*	–	–
	South Molton	*	–	–
	Little Hele Wood	–	–	–
	Alswear	*	–	–
	Wampford Bridge	*	–	1.33
	Meeth	–	–	–
	Higher Water Town	*	–	–
	King's Bridge	*	–	–
HAWKRIDGE BROOK	Watergate	*	–	–
	Hawkridge Barton	–	–	–
NEWTON TRACEY	Bustley Bridge	*	–	–
LANGHAM LAKE	Bucks Mill	*	–	–
	Court Mill	–	–	–
LANDKEY RIVER	Landkey Bridge	*	–	–
	Whitemoor Mill	*	–	–
BARNSTAPLE YEO	East Down	*	–	–
	Arlington Pond	*	–	–
	Shirwell Mill	*	–	0.00
	Riversmead	*	–	6.62
	U/s Snapper Weir	–	–	–
	Bulldog Fish Fm	–	–	–
	D/s Bulldog d'charge	–	–	–
LOXHORE STREAM	Loxhore Mill	–	–	–
BRADIFORD WATER	Blakewell	*	–	–
	Tutshill Weir	–	–	–
KNOWL WATER	Knowlwater Bridge	*	–	–
	Wrafton	*	–	–
CAEN	Little Comfort Farm	–	–	–
	Heddon Mill	*	–	–
	Nethercott Crossing	–	–	–
	Braunton	*	–	–

1975	1979	1982	1983	1988	1989	1990	1991	1992	1993
0.00	–	–	–	*	4.83	0.00	–	–	15.64
–	–	–	0.00	7.90	38.79	1.32	1.07	–	8.21
–	–	–	–	–	–	–	1.24	–	–
–	1.63	–	–	–	–	–	–	–	#
–	–	–	0.00	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	#
–	–	–	0.19	–	–	3.92	–	–	#
–	–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	#
–	–	–	0.47	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	3.24
–	7.61	–	8.78	0.68	–	–	–	–	31.65
–	0.00	–	1.72	0.00	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	14.02
2.90	0.27	–	9.75	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	0.00	0.00
–	–	–	–	–	–	–	–	0.22	0.37
–	–	–	–	–	–	–	–	1.17	0.00
–	–	–	–	–	–	–	–	–	3.73
–	–	–	–	–	–	–	–	–	2.15
–	87.35	–	15.92	2.69	–	–	–	–	0.00
–	0.00	–	0.00	0.00	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–	0.00
–	0.00	–	1.34	0.00	–	–	–	–	9.81
–	–	–	–	–	–	–	–	–	–
–	0.00	–	0.00	0.00	–	–	–	–	9.20
–	–	–	–	–	–	–	–	–	4.21

RIVER TAW – HISTORIC SURVEY DATA 1968–1993 FOR SALMON PARR (1++)

WATERCOURSE	SITE NAME	1968	1973	1974	1975
TAW	500m D/s Sign	–	–	–	–
	U/s Taw Marsh	–	–	–	–
	U/s Smallbrook	–	–	–	–
	D/s Smallbrook	–	–	–	–
	Irishman's Wall	0.00.	0.00	0.00	0.00
	D/s Gauging Station	–	0.00	–	–
	U/s Sticklepath	0.00	0.00	0.00	0.00
	D/s Skaigh Weir	–	–	–	–
	D/s Sticklepath	–	0.00	0.00	0.00
	Taw Green	0.00	0.00	0.00	0.20
	East Rowden	–	0.75	0.62	0.40
	North Tawton	1.08	2.90	0.66	0.40
	Bondleigh	17.38	–	1.95	–
	Coldridge Bridge	12.41	–	5.38	3.80
	Park Mill Bridge	–	–	–	–
	Hawkridge Bridge	6.74	–	–	–
	Chenson	0.96	–	–	2.20
	Chawleigh Week	2.45	–	–	–
	Colleton Mills	3.32	–	–	–
	U/s Head Bridge	–	–	–	–
	Braggamarsh	3.67	–	–	–
	Little Silver	0.99	–	–	–
	Umberleigh	3.19	–	–	–
	Chappleton	–	–	–	–
	New Bridge	–	–	–	–
KNATHORN BROOK	Morchard Road	0.00	–	–	–
	Bradiford Farm	–	–	–	–
DALCH	Mill Barton	0.00	–	–	–
	Hele Lane	5.46	–	–	–
	Calves Bridge	4.56	–	–	–
LAPFORD YEO	North Beer	0.00	–	–	–
	Bow	0.27	–	–	–
	Middle Yeo	0.68	–	–	–
	Bury	–	–	–	–
	Lapford	1.59	–	–	–
	Nymet Bridge	2.09	–	0.00	–
	Nymphayes	–	–	–	–
	Tucking Mill	–	–	–	–
	Hayne Bridge	–	–	–	–

[Revised 6/12/93.JPS]

1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	–	–	–	@	–	–
–	–	–	–	–	–	–	0.00	0.00
–	–	–	–	–	–	–	0.00	0.00
–	–	–	–	–	–	@	0.00	0.00
0.00	–	0.00	0.00	0.00	0.00	0.00	0.00	0.00
–	–	–	–	–	–	@	0.00	0.00
–	–	–	–	–	–	@	0.00	3.82
–	–	–	–	–	–	#	–	–
–	–	–	–	–	–	–	0.00	8.28
–	–	–	2.52	3.21	2.74	2.32	–	4.05
1.84	–	3.62	4.81	6.85	–	–	–	4.50
2.11	–	7.16	4.26	17.23	2.08	4.40	–	#
23.00	–	19.24	7.25	19.78	–	–	–	#
–	–	2.60	–	19.78	–	–	–	#
2.88	–	–	5.09	10.84	1.70	3.23	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
0.39	–	1.03	–	–	–	–	–	#
0.84	–	3.10	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
0.00	–	0.08	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	1.05
–	–	–	–	–	–	–	–	0.00
0.00	–	0.00	0.00	–	–	–	–	0.00
–	–	–	–	–	–	–	–	0.95
–	–	–	–	–	–	–	–	0.00
0.00	0.48	0.00	0.00	–	–	–	–	0.00
–	0.00	–	–	–	–	–	–	0.00
–	0.65	0.40	–	–	–	–	–	2.49
0.24	0.44	–	–	–	–	–	–	2.58
–	1.32	–	–	–	–	–	–	–
–	0.00	–	–	–	–	–	–	0.00
–	0.00	–	–	–	–	–	–	0.00
–	2.17	–	–	–	–	–	–	–

RIVER TAW – HISTORIC SURVEY DATA 1968–1993 FOR SALMON PARR (1++)

WATERCOURSE	SITE NAME	1968	1973	1974	1975
LAPFORD YEO CONT.D	D/s Burrow Drain	–	–	–	–
	U/s Burrow Drain	–	–	–	–
STURCOMBE RIVER	Creacombe	0.59	–	–	–
	Crowdhole	0.00	–	–	–
HUNTACOTT WATER	Week	0.00	–	–	–
	Brookland	3.73	–	–	–
LITTLE DART	Little Rackenford	1.71	–	–	–
	Queen Dart	0.00	–	–	–
	Bradford Mill	3.64	–	–	–
	Witheridge	8.80	–	7.94	4.10
	East Worlington	8.37	–	–	–
	West Worlington	–	–	0.73	–
	Stone Mill	2.92	–	–	–
	Savourys	2.49	–	0.80	–
HOLLOCOMBE WATER	Whitehouse	0.00	–	–	–
	Woodterrill	0.00	–	–	–
	Pensford	5.20	–	–	–
CHURCHWATER STREAM	Churchwater	0.00	–	–	–
MULLEY BROOK	Tiddy Water	0.00	–	–	–
	Winswood	0.00	–	–	–
NORTH RADWORTHY	Higher Fyldon	0.00	–	–	–
	Barham Bridge	–	–	–	–
BENTWITCHEN STREAM	Bentwitchen	0.00	–	–	–
	Mines Bridge	–	–	–	–
BRINSWORTHY STREAM	Brinsworthy Bridge	–	–	–	–
LYDDICOMBE STREAM	Lower Flydon	–	–	–	–
MOLLAND YEO	West Molland	1.61	–	–	–
	Yeo Mill	0.80	–	–	–
	Bottreaux Mill	–	–	–	–
	Black Cock Bridge	–	–	–	–
	Touts Bridge	2.91	–	5.73	5.10

1979	1982	1983	1988	1989	1990	1991	1992	1993
–	1.11	–	–	–	–	–	–	–
–	1.52	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	1.20
–	–	–	–	–	–	–	–	1.81
–	–	–	–	–	–	–	–	0.77
–	–	–	–	–	–	–	–	1.58
–	–	–	–	–	–	–	–	0.28
–	–	–	–	–	–	–	–	0.77
1.61	–	4.73	0.44	–	–	–	–	0.40
–	–	–	–	–	–	–	–	7.83
–	–	–	–	–	–	–	–	–
3.48	–	5.01	7.32	–	–	–	1.72	4.05
–	–	–	–	–	–	–	–	1.21
0.39	–	5.21	1.23	–	–	–	–	2.51
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	3.41
–	–	–	–	–	–	–	–	–
0.00	–	4.73	0.00	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–
–	–	0.00	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	0.00
–	–	3.45	–	–	–	–	–	0.00
–	–	0.00	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	5.85
–	–	–	–	–	–	#	0.30	0.71
–	–	–	–	–	–	#	0.00	0.88
–	–	–	–	–	–	#	–	–
2.88	–	3.98	0.70	–	–	–	2.44	4.09

RIVER TAW – HISTORIC SURVEY DATA 1968–1993 FOR SALMON PARR (1++)

WATERCOURSE	SITE NAME	1968	1973	1974	1975
MOLLAND YEO CONT'D	Mornacoot	–	–	–	–
	Westridge Stables	–	–	–	–
	Folks Bridge	–	–	–	–
	Waterhouse	2.66	–	–	–
	Bish Mill	–	–	–	–
	Grilstone	–	–	–	–
CROOKED OAK	Knowstone	1.80	–	–	–
	Owlborough	–	–	–	–
	Harpsom Wood	–	–	–	–
	Ash Mill	13.01	–	2.06	4.80
	Avercombe	–	–	–	–
	Yeo Bridge	5.04	–	–	–
	Eastwood Farm	–	–	–	–
	Radley	10.76	–	4.13	–
	Alswear	8.01	–	–	–
LITTLE SILVER STREAM	Cuckoo Mill	0.00	–	–	–
	Whippenscott	0.00	–	–	–
	Milltown	–	–	–	–
	Odam Bridge	5.50	–	2.71	4.40
	Kempstown	–	–	–	–
BRAY	Challacombe	0.65	–	0.00	–
	Challacombe Mill	–	–	–	–
	Leeham Ford	–	–	–	–
	Leworthy Bridge	3.33	–	0.00	2.50
	Wort Wood	–	–	–	–
	Brayford	8.78	–	0.90	–
	Rock Bridge	–	–	–	–
	Brayley Bridge	0.48	–	–	–
	Filleigh Bridge	1.99	–	–	1.30
	Bray Bridge	–	–	–	–
	Clapworthy Mill	4.48	–	–	–
	Meethe	–	–	–	–
HOLEWATER	Linkleyham Bridge	–	–	–	–
MOLE	North Radley	0.00	–	–	–
	North Heasley Mine	–	–	–	–
	Heasley Mill	2.99	–	–	–
	South Wood	–	–	–	–

1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	–	–	–	#	–	2.22
–	–	–	–	–	–	–	–	0.00
3.61	–	6.22	0.72	–	–	–	0.00	–
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	0.43	3.98
–	–	2.63	–	–	–	#	0.35	#
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	@	–	0.61
0.00	–	0.00	0.38	–	–	@	0.41	3.23
–	–	–	–	–	–	@	–	–
–	–	–	–	–	–	–	–	0.78
–	–	–	–	–	–	–	–	0.97
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	#	–	3.18
–	–	–	–	–	–	@	–	–
–	–	–	–	–	–	@	–	0.00
–	–	–	–	–	–	@	–	0.00
0.00	–	2.25	0.97	–	–	@	0.00	1.63
–	–	–	–	–	–	–	–	0.64
–	–	–	–	–	–	–	–	–
0.00	–	6.47	3.25	1.50	–	–	2.50	0.00
–	–	–	–	–	–	–	0.65	0.55
0.57	–	4.07	1.38	1.01	1.82	2.17	0.53	0.00
–	–	–	–	–	–	–	3.14	–
0.83	–	16.21	3.61	2.83	–	–	9.59	10.97
1.19	–	6.25	1.41	1.11	5.62	4.24	–	3.26
–	–	–	–	–	–	–	–	2.13
0.50	–	14.35	2.71	3.87	1.66	#	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	3.60	–	#
–	–	23.74	–	–	–	–	–	6.25
–	–	0.00	–	–	–	–	–	–
–	–	0.93	–	–	–	–	–	2.66
6.16	–	0.90	3.44	3.15	–	–	–	1.38
–	–	10.00	–	–	–	–	–	3.67

RIVER TAW – HISTORIC SURVEY DATA 1968–1993 FOR SALMON PARR (1++)

WATERCOURSE	SITE NAME	1968	1973	1974	1975
MOLE CONT'D	North Molton	–	–	8.61	0.40
	Parkhouse	–	–	–	–
	Mole Bridge	8.81	–	–	–
	South Molton	2.22	–	–	–
	Little Hele Wood	–	–	–	–
	Alswear	8.01	–	–	–
	Wampford Bridge	17.61	–	0.60	–
	Meeth	–	–	–	–
	Higher Water Town	8.57	–	–	–
	King's Bridge	8.56	–	–	–
HAWKRIDGE BROOK	Watergate	0.00	–	–	–
	Hawkridge Barton	–	–	–	–
NEWTON TRACEY	Bustley Bridge	0.00	–	–	–
LANGHAM LAKE	Bucks Mill	0.90	–	–	–
	Court Mill	–	–	–	–
LANDKEY RIVER	Landkey Bridge	0.50	–	–	–
	Whitemoor Mill	1.14	–	–	–
BARNSTAPLE YEO	East Down	0.00	–	–	–
	Arlington Pond	0.00	–	–	–
	Shirwell Mill	12.92	–	2.17	–
	Riversmead	22.86	–	0.68	3.30
	U/s Snapper Weir	–	–	–	–
	Bulldog Fish Fm.	–	–	–	–
	D/s Bulldog d'charge	–	–	–	–
LOXHORE STREAM	Loxhore Mill	–	–	–	–
BRADIFORD WATER	Blakewell	1.13	–	–	–
	Tutshill Weir	–	–	–	–
KNOWL WATER	Knowlwater Bridge	0.00	–	–	–
	Wrafton	1.44	–	–	–
CAEN	Little Comfort Farm	–	–	–	–
	Heddon Mill	0.57	–	–	–
	Nethercott Crossing	–	–	–	–
	Braunton	0.56	–	–	–

1979	1982	1983	1988	1989	1990	1991	1992	1993
–	–	–	*	0.37	3.46	–	–	1.17
–	–	15.48	5.45	7.27	5.29	4.00	–	6.07
–	–	–	–	–	–	5.96	–	–
0.27	–	–	–	–	–	–	–	#
–	–	2.30	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	3.08	–	–	0.93	–	–	#
–	–	–	–	–	–	–	–	#
–	–	–	–	–	–	–	–	#
–	–	1.42	–	–	–	–	–	#
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	0.62
–	–	–	–	–	–	–	–	2.55
3.80	–	4.73	2.36	–	–	–	–	4.78
0.64	–	0.00	0.36	–	–	–	–	0.00
–	–	–	–	–	–	–	–	4.83
–	–	–	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	2.10
2.93	–	14.47	–	–	–	–	–	2.27
–	–	–	–	–	–	–	0.85	0.00
–	–	–	–	–	–	–	1.13	0.28
–	–	–	–	–	–	–	2.05	1.46
–	–	–	–	–	–	–	–	2.23
–	–	–	–	–	–	–	–	0.43
10.88	–	14.43	11.11	–	–	–	–	0.00
0.00	–	0.00	0.54	–	–	–	–	0.00
–	–	–	–	–	–	–	–	0.00
0.00	–	0.00	–	–	–	–	–	0.00
–	–	–	–	–	–	–	–	–
0.00	–	0.00	3.90	–	–	–	–	0.66
–	–	–	–	–	–	–	–	1.58

APPENDIX 7

WATER QUALITY STANDARDS

TABLES 1 TO 7

APPENDIX 7

WATER QUALITY STANDARDS: TABLES 1 TO 7

LIST OF TABLES

WATER QUALITY STANDARDS: TABLES 1 TO 7

APPENDIX 7

TABLE 1 : STANDARDS FOR THE FIVE RIVER ECOSYSTEM USE CLASSES

Use Class	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mgN/l 95%ile	Un-ionised Ammonia mgN/l 95%ile	pH 5%ile & 95%ile	Hardness mg/l $CaCO_3$	Dissolved Copper µg/l 95%ile	Total Zinc µg/l 95%ile	Class Description
1	80	2.5	0.25	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500	Water of very good quality suitable for all fish species
2	70	4.0	0.6	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500	Water of good quality suitable for all fish species
3	60	6.0	1.3	0.021	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for high class coarse fish populations
4	50	8.0	2.5	-	6.0 - 9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for coarse fish populations
5	20	15.0	9.0	-	-	-	-	-	Water of poor quality which is likely to limit coarse fish populations

WATER QUALITY STANDARDS: TABLES 1 TO 7

TABLE 2: NEUTRAL TRANSLATION OF RQOs TO RIVER ECOSYSTEM USE CLASSES [1]

NWC CLASS	RIVERS ECOSYSTEM USE CLASS
1A	RE1
1B	RE2
2	RE3 or RE4
3	RE5
4	RE6

Note: [1] The translation from NWC-based RQOs to River Ecosystem Use Class should be cost neutral, ie standards should not be made stricter by change to the new format. However, if current data indicate that water quality is already better than RQO, the RE class may be set to protect current water quality.

WATER QUALITY STANDARDS: TABLE 1 TO 7

TABLE 3: EC DIRECTIVE ON THE QUALITY OF FRESHWATERS NEEDING PROTECTING OR IMPROVEMENT IN ORDER TO SUPPORT FISH LIFE (78/659/EEC)

DETERMINAND		SALMONID WATERS 'G'	SALMONID WATERS 'I'	CYPRINID WATERS 'G'	CYPRINID WATERS 'I'
Dissolved Oxygen as mg/l O_2 [a]		100% > 7	50% > 9	100% > 5	50% > 7
pH as pH units		-	6.0-9.0	-	6.0-9.0
Suspended Solids at mg/l [b]		25	-	25	-
BOD (Total) as mg/l O_2		5	-	8	-
Nitrite as mg/l N		0.150	-	0.460	-
Non-ionised Ammonia as mg/l N		0.004	0.021	0.004	0.021
Ammonia (Total) as mg/l N		0.030	0.780	0.160	0.780
Total Residual Chlorine as mg/l HOCl		-	0.005	-	0.005
Zinc (Total) as mg/l Zn					
Water Hardness	0-50	-	0.03	-	0.30
(mg/l $CaCO_3$)	50-100	-	0.20	-	0.70
	100-250	-	0.30	-	1.00
	>250	-	0.50	-	2.00
Copper (Dissolved) as mg/l Cu					
Water Hardness	0-50	0.005	-	0.005	-
(mg/l $CaCO_3$)	50-100	0.022	-	0.022	-
	100-250	0.040	-	0.040	-
	>250	0.112	-	0.112	-

[a] For dissolved oxygen, 50% median and 100% minimum standard.
[b] For suspended solids, the 'G' value is an annual average concentration.

For application of these standards, reference must be made to Article 6 and the Annexes of the Directive, and the appropriate DoE Implementation Guidelines.

WATER QUALITY STANDARDS: TABLES 1 TO 7

TABLE 4: EC DIRECTIVE ON POLLUTION CAUSED BY CERTAIN SUBSTANCES DISCHARGED IN THE AQUATIC ENVIRONMENT OF THE COMMUNITY, (76/464/EC)

EQSs FOR LIST I SUBSTANCES (INLAND WATERS)

Parameter	Units	Value	Status (1)
Mercury	µg Hg/l	1.0	AA,T
Cadmium (2)	µg Cd/l	5.0 1.0	AA,T AA,T,B (4)
Hexachlorocyclohexane (HCH) (2)	µg/l	0.1 0.05	AA,T AA,T,B (4)
Tetrachloromethane (CTC)	µg/l	12	AA,T
DDT (para-para DDT isomer) (2)	µg/l	0.01	AA,T
Total DDT (2)	µg/l	0.025	AA,T
Pentachlorophenol (PCP) (2)	µg/l	2	AA,T
'The Drins' (from 1 Jan 1989)	µg/l	0.03 (3)	AA,T
Aldrin (from 1 Jan 1994)	µg/l	0.01	AA,T
Dieldrin (from 1 Jan 1994)	µg/l	0.01	AA,T
Endrin (from 1 Jan 1994)	µg/l	0.005	AA,T
Isodrin (from 1 Jan 1994)	µg/l	0.005	AA,T
Hexachlorobenzene (HCB) (2)	µg/l	0.03	AA,T
Hexachlorobutadiene (HCBD) (2)	µg/l	0.1	AA,T
Chloroform	µg/l	12	AA,T
1,2-dichloroethane	µg/l	10	AA,T
Trichloroethylene	µg/l	10	AA,T
Perchloroethylene	µg/l	10	AA,T
Trichlorobenzene(TCB)	µg/l	0.4	AA,T

WATER QUALITY STANDARDS: TABLE 1 TO 7

EQSs FOR LIST I SUBSTANCES (INLAND WATERS) — Table 4 continued

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

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, T = Total, B = Background Monitoring
(2) A 'standstill' provision exists for concentrations in sediments and/or shellfish and/or fish
(3) Maximum of 0.005 for Endrin
(4) B = Background Monitoring: only applies at designated end of catchment sites

WATER QUALITY STANDARDS: TABLES 1 TO 7

EQSs FOR LIST II SUBSTANCES (INLAND WATERS) (1)

Table 4 continued

Parameter	Units	Value (3)		Hardness (mg $CaCO_3$/l)	Status (2)
		A Std	B Std		
Lead	µg Pb/l	4	50	0 to 50	AA,D
		10	125	50 to 100	
		10	125	100 to 150	
		20	250	150 to 200	
		20	250	200 to 250	
		20	250	>250	
Chromium	µg Cr/l	5	150	0 to 50	AA,D
		10	175	50 to 100	
		20	200	100 to 150	
		20	200	150 to 200	
		50	250	200 to 250	
		50	250	>250	
Zinc	µg Zn/l	8	75	0 to 50	AA,T
		50	175	50 to 100	
		75	250	100 to 150	
		75	250	150 to 200	
		75	250	200 to 250	
		125	500	>250	
Copper	µg Cu/l	1	1	0 to 50	AA,D
		6	6	50 to 100	
		10	10	100 to 150	
		10	10	150 to 200	
		10	10	200 to 250	
		28	28	>250	
Nickel	µg Ni/l	50	50	0 to 50	AA,D
		100	100	50 to 100	
		150	150	100 to 150	
		150	150	150 to 200	
		200	200	200 to 250	
		200	200	>250	
Arsenic	µg As/l	50		All	AA,D
Boron	µg B/l	2000		All	AA,T
Iron	µg Fe/l	1000		All	AA,D
pH	pH values	6 to 9		All	95% of samples
Vanadium	µg V/l	20	20	0 to 200	AA,T
		60	60	200+	
Tributyltin	µg/l	0.02		All	M,T
Triphenyltin	µg/l	0.02		All	M,T
Polychlorochlormethyl-sulphonamidodiphenyl ether (PCSDs)	µg/l	0.05		All	T, 95% of samples
Sulcofuron	µg/l	25		All	T, 95% of samples
Flucofuron	µg/l	1.0		All	T, 95% of samples
Permethrin	µg/l	0.01		All	T, 95% of samples
Cyfluthrin	µg/l	0.001		All	T, 95% of samples

WATER QUALITY STANDARDS: TABLES 1 TO 7

EQSs FOR LIST II SUBSTANCES (TIDAL WATERS) **Table 4 continued**

Parameter	Units	Value (1)	Status
Lead	μg Pb/l	25	AA,D
Chromium	μg Cr/l	15	AA,D
Zinc	μg Zn/l	40	AA,D
Copper	μg Cu/l	5	AA,D
Nickel	μg Ni/l	30	AA,D
Arsenic	μg As/l	25	AA,D
Boron	μg B/l	7000	AA,D
Iron	μg Fe/l	1000	AA,D
pH	pH values	6 to 8.5 (3)	95% of samples
Vanadium	μg V/l	100	AA,T
Tributyltin	μg/l	0.002	M,T
Triphenyltin	μg/l	0.008	M,T
Polychlorochlormethyl-sulphonamidodiphenyl ether (PCSDs)	μg/l	0.05	T, 95% of samples
Sulcofuron	μg/l	25	T, 95% of samples
Flucofuron	μg/l	1.0	T, 95% of samples
Permethrin	μg/l	0.01	T, 95% of samples
Cyfluthrin	μg/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 Std denotes standards for the protection of sensitive aquatic life
B Std denotes standards for the protection of other aquatic life

WATER QUALITY STANDARDS: TABLES 1 TO 7

TABLE 5: EC DIRECTIVES CONCERNING URBAN WASTEWATER TREATMENT (91/271/EEC) AND CONCERNING THE PROTECTION OF WATERS AGAINST POLLUTION CAUSED BY NITRATES FROM AGRICULTURAL SOURCES (91/676/EEC)

Indicative standards for the identification of Sensitive Waters (Eutrophic) and Polluted Waters (Eutrophic)

INLAND WATERS

Determinand	Indicative Standard		Notes[2]
	Running Water	Still Water	
Orthophosphate (μg P/l)	>100	>50	AA
Nitrate (μg NO_3/l)	>50	>50	P, At major public water supply abstractions
Dissolved oxygen (% saturation)	>150 daytime < 50 nighttime	Excessive supersaturation in surface layers, depletion in hypolimnion	
Chlorophyll a (μg/l)	>25	>30	
Algal Biomass	>100 g/m^2	-	Excessive growth of attached algae esp. *Cladophora*
Water Clarity (m)	-	<3, predominantly green colour	AA, Secchi Disc
Water Retention Time (days)	>5	-	Sufficient retention time for algal multiplication
Effects on fauna	Reduction in abundance of fish and invertebrate fauna		Attributed to nutrient enrichment
Effects on macroflora	Substantial adverse changes in macrophyte abundance and diversity		
Effects on microflora	Exceptional increases in plankton, and/or biomass leading to blooms, scum or discolouration		Includes blue-green algae

Notes: [1] It is not necessary that adverse effects should be found in all factors. Evidence should be considered on a site specific basis.
[2] AA: Annual average (Geometric Mean)
P: 95%ile (parametric)

WATER QUALITY STANDARDS: TABLES 1 TO 7

TIDAL WATERS

Table 5 continued

Determinand	Indicative Standard		Notes
	Estuaries	Coastal Waters	
Nitrate (mg N/l)	>0.21	>0.21	Winter concentrations
Phosphorus (μg P/l)	>6.2	>6.2	DAIP[1], Winter concentrations
Chlorophyll a (μg/l)	>10	>10	
Algal Bloom Cell Density (cells/l)	$>5x10^5$	$>5x10^5$	
Dissolved Oxygen	Daytime O_2 depletion	-	Linked to algal decay NOT organic inputs from discharges
Effects on fauna	Invertebrate, shellfish, fish mortalities		NOT associated with organic pollution
Effects on macroalgae	>10 hectares (>25% of available intertidal area) in which algal cover exceeds 25%		Especially *Enteromorpha* and *Ulva*
Effects on microalgae	Presence of significant blooms leading to accumulation of scum/foam on beaches; public complaints/concern		
Estuary Flushing Times (weeks)	>1 to 2	-	

Notes: [1] DAIP Dissolved available inorganic phosphorous

The assessment of whether a stretch of water is actually or potentially eutrophic is not possible simply by reference to numeric chemical criteria, however, they do provide an indication of symptoms, and the importance of each of the criteria should be assessed on a local basis.

WATER QUALITY STANDARDS: TABLES 1 TO 7

TABLE 6: EC DIRECTIVE CONCERNING URBAN WASTEWATER TREATMENT (91/271/EEC)

Indicative Standards for identifying HNDAs, and defining "No Adverse Affects[1]"

Any site designated as an HNDA must be subject to Comprehensive Studies to be carried out by the discharger, and audited by the NRA, before a consent can be issued for a lower level of treatment.

The comprehensive studies must show that no adverse effects will be caused by discharging a primary rather than a secondary treated effluent within the HNDA. In addition, protection of Bathing Waters and other recognised uses must be considered separately within the scheme design.

Determinand	Indicative Standard		Notes
	Estuaries[2]	Coastal Waters	
Minimum Initial Dilution	50	50	
Dilution within 1 nautical mile	≥200	≥200	Based on a post dilution BOD conc of 1mg/l
Dissolved oxygen: change caused by discharge (mg/l)	≤1	≤0.5	Based on a predicted median DO of ≥7mg/l[3]
BOD: deviation from background (mg/l)	-	<1.5	
Area must not be eutrophic	-	<1μg/l of chlorophyll ascribed to discharge	
Marine Communities	-	No change >100m from outlet	

Notes:

[1] Comprehensive Studies for the purposes of Article 6 of Directive 91/271/EEC. The Urban Waste Water Treatment Directive. Marine Pollution Monitoring Management Group. February 1994.

[2] The difference in loading from a primary treated effluent compared to a secondary treated effluent from works in the range 2000 to 10000 pe is very small. Therefore only DO is likely to be significantly affected. Therefore this is the main criterion for assessing "no adverse affect" in estuaries.

WATER QUALITY STANDARDS: TABLES 1 TO 7

TABLE 7: EC DIRECTIVE CONCERNING THE QUALITY REQUIRED OF SURFACE WATER INTENDED FOR THE ABSTRACTION OF DRINKING WATER IN THE MEMBER STATES (75/440/EEC)

Definition of the Standard Methods of Treatment for Transforming Surface Water of Categories A1, A2 and A3 into Drinking Water

Category A1

Simple physical treatment and disinfection, eg rapid filtration and disinfection.

Category A2

Normal physical treatment, chemical treatment and disinfection, eg pre-chlorination, coagulation, flocculation, decantation, filtration, disinfection (final chlorination).

Category A3

Intensive physical and chemical treatment, extended treatment and disinfection, eg chlorination to break-point, coagulation, flocculation, decantation, filtration, absorption (activated carbon), disinfection (ozone, final chlorination).

I	=	**mandatory**
G	=	**guide**
O	=	**exceptional climatic or geographical conditions**

Table 7 Continued

CHARACTERISTICS OF SURFACE WATER INTENDED FOR THE ABSTRACTION OF DRINKING WATER			CATEGORIES					
			A1		A2		A3	
PARAMETERS			G	I	G	I	G	I
1	pH		6.5 to 8.5	-	5.5 to 9	-	5.5 to 9	-
2	Coloration (after simple filtration)	mg/l Pt scale	10	20 (0)	50	100 (0)	50	200 (0)
3	Total suspended solids	mg/l SS	25	-	-	-	-	-
4	Temperature	°C	22	25 (0)	22	25 (0)	22	25 (0)
5	Conductivity	$\mu s/cm^{-1}$ at 20°C	1000	-	1000	-	1000	-
6	Odour	(dilution factor at 25°C)	3	-	10	-	20	-
7	Nitrates	mg/l NO_3	25	50 (0)	-	50 (0)	-	50 (0)
8	Fluorides	mg/l F	0.7 to 1	1.5	0.7 to 1.7	-	0.7 to 1.7	-
9	Total extractable organic chlorine	mg/l Cl	-	-	-	-	-	-
10	Dissolved Iron	mg/l Fe	0.1	0.3	1	2	1	-
11	Manganese	mg/l Mn	0.05	-	0.1	-	1	-
12	Copper	mg/l Cu	0.02	0.05 (0)	0.05	-	1	-
13	Zinc	mg/l Zn	0.5	3	1	5	1	5
14	Boron	mg/l B	1	-	1	-	1	-
15	Beryllium	mg/l Be	-	-	-	-	-	-
16	Cobalt	mg/l Co	-	-	-	-	-	-
17	Nickel	mg/l Ni	-	-	-	-	-	-
18	Vanadium	mg/l V	-	-	-	-	-	-
19	Arsenic	mg/l As	0.01	0.05	-	0.05	0.05	0.1
20	Cadmium	mg/l Cd	0.001	0.005	0.001	0.005	0.001	0.005
21	Total Chromium	mg/l Cr	-	0.05	-	0.05	-	0.05
22	Lead	mg/l Pb	-	0.05	-	0.05	-	0.05
23	Selenium	mg/l Se	-	0.01	-	0.01	-	0.01
24	Mercury	mg/l Hg	0.0005	0.001	0.0005	0.001	0.0005	0.001

Table 7 Continued

CHARACTERISTICS OF SURFACE WATER INTENDED FOR THE ABSTRACTION OF DRINKING WATER			CATEGORIES					
			A1		A2		A3	
PARAMETERS			G	I	G	I	G	I
25	Barium	mg/l Ba	-	0.1	-	1	-	1
26	Cyanide	mg/l Cn	-	0.05	-	0.05	-	0.05
27	Sulphates	mg/l SO_4	150	250	150	250 (0)	150	250 (0)
28	Chlorides	mg/l Cl	200	-	200	-	200	-
29	Surfactants (reacting with methyl blue)	mg/l (laurylsulphate)	0.2	-	0.2	-	0.5	-
30	Phosphates	mg/l P_2O_5	0.4	-	0.7	-	0.7	-
31	Phenols (phenol index) paranitraniline 4 aminoantipyrine	mg/l C_6H_5OH	-	0.001	0.001	0.005	0.01	0.1
32	Dissolved or emulsified hydrocarbons (after extraction by petroleum ether)	mg/l	-	0.05	-	0.2	0.5	1
33	Polycyclic aromatic hydrocarbons	mg/l	-	0.0002	-	0.0002	-	0.001
34	Total pesticides (parathion, BHC, dieldrin)	mg/l	-	0.001	-	0.0025	-	0.005
35	Chemical oxygen demand (COD)	mg/l O_2	-	-	-	-	30	-
36	Dissolved oxygen saturation rate	% O_2	> 70	-	> 50	-	> 30	-
37	Biochemical oxygen demand (BOD_5) (at 20°C with nitrification)	mg/l O_2	< 3	-	< 5	-	< 7	-
38	Nitrogen by Kjeldahl method (except NO_3)	mg/l N	1	-	2	-	3	-
39	Ammonia	mg/l NH_4	0.05	-	1	1.5	2	4 (0)
40	Substances extractable with chloroform	mg/l SEC	0.1	-	0.2	-	0.5	-
41	Total organic carbon	mg/l C	-	-	-	-	-	-
42	Residual organic carbon after flocculation and membrane filtrations (5 μ) TOC	mg/l C	-	-	-	-	-	-
43	Total coliforms 37°C	/100 ml	50	-	5000	-	50000	-

Table 7 Continued

CHARACTERISTICS OF SURFACE WATER INTENDED FOR THE ABSTRACTION OF DRINKING WATER			CATEGORIES					
			A1		A2		A3	
PARAMETERS			G	I	G	I	G	I
44	Faecal coliforms	/100 ml	20	-	2000	-	20000	-
45	Faecal streptococci	/100 ml	20	-	1000	-	10000	-
46	Salmonella		Not present in 5000 ml	-	Not present in 1000 ml	-	-	-

APPENDIX 8

FISHERIES TARGET ABUNDANCE

FISHERIES TARGET ABUNDANCE

JUVENILE SALMONID MONITORING

Salmon and Trout Quality Classes

These classes have been determined in the following manner: density data are taken from electric fishing survey sites and given a score according to the density range:

Fry Density	Parr Density	Score
Absent	Absent	0
0.01 - 10.00	0.01 - 5.00	1
10.01 - 25.00	5.01 - 10.00	2
25.01 - 50.00	10.01 - 20.00	3
50.01 -> ∞	20.01 -> ∞	4

Using scores for fry and parr densities, quality classes are assigned to site data according to the following matrix table:

		FRY (0+) SCORE				
		4	3	2	1	0
Parr (and older score)	4	A	A	A	B	C
	3	A	A	B	B	C
	2	A	B	B	C	D
	1	B	B	C	D	D
	0	C	C	D	D	E

This system ensures that both fry and older fish densities are taken into consideration when assessing the quality of fish stocks at a given site.

The same density ranges have been applied to both salmon and trout populations. Trout stocks may thus appear to be of better quality when compared with the abundance categories for salmon stock. However, it would be unwise to make comparisons between species using this system. Comparisons should be made between years only within a single species in a single river.

Target Abundance Categories

The target categories for the River Taw Catchment have yet to be determined.

APPENDIX 9

1992 BIOLOGICAL DATA

NRA Biological Classification - 1992

Catchment: River Taw

Corresponding Freelance map Filename(s): CATCH30.ORW

No. on Map	Watercourse Name	Site Location Name	National OS Grid Ref.	Site Ref.	Chemical Site URN	RIVP Suit	Reach Length	Season Code	Observed N.Taxa	Observed ASPT	Observed BMWP	O/E Ratio N.Taxa	O/E Ratio ASPT	O/E Ratio BMWP	Change N.Taxa	Change ASPT	CLASS N.Taxa	CLASS ASPT	CLASS BMWP	Biol. Class
1	Taw	300m u/s Old A30 Br Sticklepath	SX 6417 9393	3012	R30C001	1	11.4	7	27	6.70	180	0.84	1.04	0.87	0	0	A	A	A	A
2	Taw	50m u/s East Rowden Bridge	SX 6550 9951	3013	R30C002	1	6.7	7	33	6.50	216	0.97	1.03	1.00	0	0	A	A	A	A
3	Taw	50m u/s br Yeo Farm	SS 6511 0292	3048	R30C003	1	4.5	7	32	6.20	199	0.93	0.98	0.91	0	0	A	A	A	A
4	Taw	10m u/s br Bondleigh	SS 6578 0451	3049	R30CD04	1	2.3	7	29	6.50	188	0.86	1.02	0.88	0	0	A	A	A	A
5	Taw	100m u/s Taw Bridge	SS 6727 0649	3050	R30CD05	1	3.2	7	31	6.50	202	0.89	1.03	0.92	0	0	A	A	A	A
6	Taw	25m u/s park Mill Bridge	SS 6963 0860	3014	R30C006	1	4.6	7	28	6.50	183	0.82	1.04	0.85	0	0	A	A	A	A
7	Taw	200m d/s br Chenson	SS 7000 0953	3041	R30B001	1	3.3	7	35	5.90	205	1.02	0.93	0.95	0	0	A	A	A	A
8	Taw	30m u/s Kersham Bridge	SS 6621 1353	3042	R30B002	1	8.4	7	41	6.40	264	1.20	1.03	1.24	0	0	A	A	A	A
9	Taw	350m u/s Newnham br	SS 6599 1701	3005	R30B003	1	5.7	7	40	6.60	262	1.20	1.05	1.26	0	0	A	A	A	A
10	Taw	150m u/s rd br Kingford	SS 6253 1926	3043	R30B004	1	5.6	7	35	6.50	227	1.06	1.05	1.13	-1	0	A	A	A	A
11	Taw	250m u/s rd br Umberleigh	SS 6075 2345	3044	R30B015	1	7.1	7	42	6.30	265	1.25	1.01	1.27	1	0	A	A	A	A
12	Taw	Chapelton 200m u/s ft br	SS 5820 2592	3006	R30B014	1	4.3	7	37	6.20	229	1.12	1.00	1.13	0	0	A	A	A	A
13	Taw	75m u/s New Bridge	SS 5200 2825	3007	R30B005	1	4.8	7	39	5.80	230	1.12	0.97	1.09	0	0	A	A	A	A
14	Caen River	opposite Vicarage 75m u/s br	SS 4887 3720	3001	R30A002	1	11.9	7	28	6.10	170	0.86	0.95	0.82	0	0	A	A	A	A
15	Knowl Water	20m u/s Wrafton Bridge	SS 4903 3560	3002	R30A006	1	9.4	7	30	5.90	176	0.86	1.00	0.86	0	0	A	A	A	A
16	Bradiford Water	25m d/s Bradiford Bridge	SS 5503 3427	3003	R30A001	1	15.0	7	35	6.70	234	1.01	1.07	1.08	0	0	A	A	A	A
17	Yeo [Barnstaple]	100m u/s Brocthem Bridge	SS 6035 4087	3033	R30H001	1	4.5	7	27	6.40	174	0.82	1.01	0.84	0	0	A	A	A	A
18	Yeo [Barnstaple]	50m u/s Riversmead Bridge	SS 5958 3570	3034	R30H006	1	13.2	7	35	6.60	232	1.07	1.04	1.11	0	0	A	A	A	A
19	Chelfham Stream	10m d/s br Chelfham Mill School	SS 6089 3565	3070		1	6.5	7	34	6.80	231	1.03	1.06	1.11	0	0	A	A	A	A
20	Hakeford Stream	50m u/s rd br	SS 6132 3551	3071		1	6.0	7	34	7.00	238	1.03	1.10	1.13	0	0	A	A	A	A
21	Rye Stream	10m u/s ft br Bratton Fleming	SS 6320 3773	3072	R30H009	1	7.4	7	33	6.90	228	1.01	1.08	1.09	0	0	A	A	A	A
22	Rye Stream	25m u/s Loxhore Cross Bridge	SS 6120 3658	3035	R30H004	1	2.7	7	33	6.90	228	1.00	1.09	1.09	0	0	A	A	A	A
23	Kentisbury Brook	15m d/s Hedgeline Patchole Farm	SS 6120 4220	3074		1	4.2	7	27	6.30	169	0.83	0.98	0.82	0	0	A	A	A	A
24	Clifton Brook	30m u/s br The Old Rectory	SS 6032 4105	3073		1	3.5	7	28	6.40	178	0.86	0.99	0.86	0	0	A	A	A	A
25	Venn	180m u/s rd br Landkey	SS 5915 3204	3057	R30A003	1	5.4	7	35	6.20	217	1.02	0.98	1.00	0	0	A	A	A	A
26	Venn	100m u/s Venn Bridge	SS 5853 3075	3004	R30A004	1	3.1	7	33	6.40	210	0.98	1.01	0.98	0	0	A	A	A	A
27	Langham Lake	15m u/s B3227 rd br Langridge Ford	SS 5717 2235	3045	R30B016	1	8.7	7	36	6.30	226	1.06	0.99	1.05	0	0	A	A	A	A
28	Langham Lake	100m u/s Langham Bridge	SS 5795 2608	3808	R30B006	1	6.1	7	34	6.40	217	0.97	1.02	1.00	0	0	A	A	A	A
29	Hawbridge Brook	75m u/s Hawbridge Bridge	SS 5950 2537	3011	R30B012	1	8.2	7	31	6.00	185	0.89	0.97	0.86	0	0	A	A	A	A
30	Mole	50m d/s North Molton Bridge	SS 7440 2980	3022	R30F001	1	8.5	7	33	6.70	221	1.00	1.05	1.05	0	0	A	A	A	A
31	Mole	50m u/s br park House Drive	SS 7204 2651	3058	R30F002	1	5.4	7	30	6.40	193	0.91	1.01	0.92	0	0	A	A	A	A
32	Mole	40m u/s ft br Little Hele	SS 7308 2436	3075	R30F003	1	2.9	7	29	5.90	171	0.85	0.93	0.79	X	X	A	A	A	A
33	Mole	50m u/s New Bridge	SS 7250 2257	3028	R30F004	1	2.2	7	27	6.50	175	0.83	1.03	0.85	0	0	A	A	A	A
34	Mole	40m u/s Mole Bridge Meethe Barton	SS 6771 2294	3060	R30F005	1	6.7	7	29	6.50	189	0.88	1.04	0.92	0	0	A	A	A	A
35	Mole	75m u/s Head Barton	SS 6667 1833	3024	R30F006	1	8.4	7	29	6.50	189	0.88	1.04	0.91	0	0	A	A	A	A
36	Bray	10m d/s rd br Challacombe	SS 6930 4104	3065	R30G001	1	2.7	7	32	6.60	211	1.00	1.02	1.02	0	0	A	A	A	A
37	Bray	150m u/s Leeham Ford Bridge	SS 6785 4007	3038	R30G011	1	2.3	7	31	6.40	198	0.96	1.00	0.95	0	0	A	A	A	A
38	Bray	75m u/s rd br Brayford	SS 6880 3678	3066	R30G002	1	7.0	7	35	6.70	234	1.07	1.05	1.12	0	0	A	A	A	A
39	Bray	125m u/s Brayley Bridge	SS 6910 3043	3036	R30G003	1	5.9	7	35	6.60	232	1.00	1.06	1.06	0	0	A	A	A	A
40	Bray	40m u/s Bray Bridge	SS 6757 2562	3067	R30G012	1	5.6	7	31	6.30	195	0.96	0.98	0.95	0	0	A	A	A	A
41	Bray	50m u/s Meethe Barton Bridge	SS 6757 2303	3031	R30G004	1	3.0	7	31	6.60	204	0.91	1.04	0.95	0	0	A	A	A	A
42	Nadrid Water	150m u/s rd br Clapworthy	SS 6765 2408	3069	R30G013	1	7.8	7	32	6.30	203	0.91	1.02	0.93	0	0	A	A	A	A
43	Filleigh Stream	50m u/s rd br	SS 6735 2790	3068		1	3.3	7	34	5.80	197	1.02	0.94	0.95	0	0	A	A	A	A
44	Molewater River	100m u/s Linkleyham Bridge	SS 6967 3265	3032	R30G005	1	8.5	7	32	6.80	219	0.98	1.07	1.05	0	0	A	A	A	A
45	Little Silver Stream	30m u/s Odham Bridge	SS 7423 2058	3061	R30F010	1	8.4	7	33	6.40	211	0.95	1.01	0.97	0	0	A	A	A	A
46	Little Silver Stream	100m u/s Alswear rd br	SS 7232 2204	3025	R30F011	1	3.0	7	33	6.30	208	0.97	0.99	0.96	0	0	A	A	A	A
47	Crooked Oak	15m d/s Bridge Ashmill	SS 7883 2338	3062	R30F023	1	8.3	7	35	6.60	232	1.08	1.04	1.10	0	0	A	A	A	A
48	Crooked Oak	25m d/s Yeo Barton Bridge	SS 7582 2307	3026	R30F007	1	7.8	7	34	6.80	234	1.00	1.04	1.04	0	0	A	A	A	A
49	Yeo [Molland]	125m u/s Bottreaux Mill Bridge	SS 8222 2634	3027	R30F008	1	7.1	7	38	6.40	244	1.13	1.01	1.14	0	0	A	A	A	A

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NRA Biological Classification - 1992

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

No. on Map	Watercourse Name	Site Location Name	National OS Grid Ref.	Site Ref.	Chemical Site URN	RIVP Suit	Reach Length	Season Code	Observed M.Taxa	Observed ASPT	Observed BMWP	O/E Ratio M.Taxa	O/E Ratio ASPT	O/E Ratio BMWP	Change M.Taxa	Change ASPT	CLASS M.Taxa	CLASS ASPT	CLASS BMWP	Biol. Class
50	Yeo (Molland)	20m d/s rd br Mornacott Moors	SS 7663 2634	3063	R30F024	1	6.6	7	30	6.60	198	0.88	1.04	0.92	0	0	A	A	A	A
51	Yeo (Molland)	25m u/s Bish Mill Bridge	SS 7403 2535	3028	R30F009	1	4.8	7	32	6.70	214	0.95	1.06	1.00	0	0	A	A	A	A
52	Sheepwash Stream	20m u/s br	SS 7902 2668	3064	R30F022	1	7.1	7	28	7.20	202	0.84	1.13	0.95	-1	0	A	A	A	A
53	North Radworthy Stream	25m d/s Barham Bridge	SS 7463 3355	3029	R30F033	1	3.2	7	30	6.90	207	0.94	1.07	1.01	0	0	A	A	A	A
54	Mully Brook	300m u/s Mansford Bridge	SS 6575 1560	3009	R30B007	1	8.5	7	36	6.60	236	1.05	1.04	1.09	0	0	A	A	A	A
55	Mollocombe Water	20m u/s br. Woodroberts	SS 6278 1077	3046	R30B008	1	3.3	7	34	6.40	219	1.06	1.00	1.06	0	0	A	A	A	A
56	Mollocombe Water	100m u/s br Reeve Bridge	SS 6608 1340	3010	R30B009	1	5.4	7	35	6.30	219	1.01	0.99	1.01	0	0	A	A	A	A
57	Little Dart River	30m u/s New Bridge	SS 7968 1492	3019	R30E001	1	10.1	7	33	6.60	219	0.96	1.05	1.00	0	0	A	A	A	A
58	Little Dart River	30m u/s Stone Mill Bridge	SS 7199 1307	3056	R30E002	1	9.8	7	32	6.40	205	0.94	1.01	0.95	0	0	A	A	A	A
59	Little Dart River	200m u/s Dart Bridge	SS 6705 1378	3020	R30E003	1	6.7	7	33	6.50	216	0.96	1.03	0.99	0	0	A	A	A	A
60	Huntacott Water	80m u/s Chulmleigh rd br	SS 6957 1387	3021	R30E005	1	10.4	4	33	6.50	213	1.08	1.01	1.09	0	0	A	A	A	A
61	Sturcombe River	Bradford Tracey	SS 8127 1624	3057	R30E006	1	6.5	7	33	6.40	212	0.99	1.01	1.00	0	0	A	A	A	A
62	Labdon Stream	50m u/s Taw confluence	SS 6788 1283	3047		1	8.3	7	38	6.80	258	0.86	1.03	0.88	0	0	A	A	A	A
63	Yeo (Lapford)	20m u/s Bow Bridge	SS 7174 0170	3015	R30D004	1	10.1	7	35	6.30	219	0.98	1.02	1.00	0	0	A	A	A	A
64	Yeo (Lapford)	60m u/s br Down St Mary Vineyard	SS 7311 0448	3052	R30D012	1	4.3	7	32	5.80	187	0.90	0.93	0.83	0	0	A	A	A	A
65	Yeo (Lapford)	25m u/s Bury Barton Bridge	SS 7373 0728	3016	R30D005	1	3.2	7	37	6.00	221	1.06	0.95	1.00	0	0	A	A	A	A
66	Yeo (Lapford)	30m d/s Hymet Bridge	SS 7142 0929	3053	R30D006	1	4.8	7	37	6.10	225	1.06	0.97	1.03	0	0	A	A	A	A
67	Dalch	75m u/s Mill Barton Bridge	SS 8143 1243	3017	R30D001	1	6.2	7	31	6.00	186	0.91	0.95	0.86	0	0	A	A	A	A
68	Dalch	10m u/s Cann's Mill Bridge	SS 7859 1053	3054	R30D011	1	4.1	7	33	6.20	204	0.95	0.98	0.93	0	0	A	A	A	A
69	Dalch	125m u/s Calves Bridge	SS 7502 0877	3018	WSTW3172	1	7.5	7	30	6.10	184	0.87	0.97	0.84	0	0	A	A	A	A
70	Knighty Brook	400m u/s Yeo confluence	SS 7385 0647	3055	R30D013	1	8.0	7	31	5.90	182	0.94	1.04	0.98	1	0	A	A	A	A
71	Spires Lake	15m u/s Track Br u/s Tawton Dairy	SS 6545 0090	3051	R30C009	1	1.7	7	23	4.80	110	0.83	0.82	0.68	0	0	A	B	B	B
72	Croyde Stream	4m u/s ft br u/s Brookfield House Garden	SS 4458 3925	3038		1	2.0	7	28	5.00	131	0.77	0.81	0.63	0	0	B	B	B	B
73	Fords	15m u/s rd br Croyde	SS 4443 3918	3039	R30A028	1	4.4	7	21	4.90	103	0.63	0.78	0.49	0	0	B	B	B	B
74	Woolacombe	10m u/s br	SS 4577 4357	3040	R30A005	1	3.0	7	33	6.20	204	0.97	0.99	0.96	0	0	A	A	A	A

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APPENDIX 10

AREAS WITH KNOWN FLOODING PROBLEMS

AREAS WITH KNOWN FLOODING PROBLEMS

Location	*NGR*	*River*	*Main River*	*Notes*
Fremington	SS 514 325	Unnamed stream to Taw Estuary	No	
Muddle Bridge	SS 527 323	Unnamed stream to Taw Estuary	No	
Bradiford	SS 546 342	Bradiford Water	No	
Lapford	SS 727 078	River Yeo	No	
Umberleigh	SS 607 237	Taw	Yes	
Molland	SS 804 283	Unnamed stream to Yeo	No	
Less than 10 properties potentially at risk				
Eggesford	SS 684 114	Taw	Yes	
Head Barton	SS 667 182	Mole	Yes	
Avercombe	SS 768 232	Unnamed stream to Crooked Oak Water	No	
Mole Bridge	SS 723 258	Mole	No	
North Molton	SS 737 298	Mole	No	
Shallowford	SS 683 287	Unnamed stream to Bray	No	
Harford	SS 603 317	Unnamed stream to Taw	No	Limit of main river.
Bishops Tawton	SS 567 302	Unnamed stream to Taw	Yes	
Bottreux Mill	SS 821 264	Yeo (Bish Mill)	No	
Drayford	SS 783 137	Little Dart	No	

AREAS WITH KNOWN FLOODING PROBLEMS

Location	*NGR*	*River*	*Main River*	*Notes*
More than 100 properties potentially at risk				
Braunton	SS 486 357	Caen	No	Tidal influence.
25-50 properties potentially at risk				
North Tawton	SS 658 015	Taw	No	
Sticklepath	SS 644 941	Taw	No	
10-25 properties potentially at risk				
South Zeal	SS 653 935	Unnamed stream to Taw	No	
Little Silver	SS 728 215	Unnamed stream to Mole	No	
Alswear	SS 724 222	Mole	Yes	
Clapworthy	SS 675 240	Bray	Yes	
Fullabrook	SS 674 258	Bray	Yes	
Brayford	SS 686 347	Unnamed stream to Bray	No	
Challacombe	SS 691 408	Bray	Yes	
Muddiford	SS 564 383	Bradiford Water	No	
Milltown	SS 555 388	Bradiford Water	No	
Knowle	SS 493 385	Caen	No	
Nethercott	SS 485 393	Unnamed stream to Caen	No	

GLOSSARY

TERMS

ABSTRACTION

Removal of water from surface or groundwater, usually by pumping.

ADIT

Horizontal entrance into a mine or a horizontal passage.

AFFORESTATION

Conversion of an area into forest.

ALLIS SHAD

A marine fish of the Herring family found on the Atlantic coast of Europe and in the Western Mediterranean; which in the spring ascends rivers into freshwater to spawn.

ALLUVIAL DEPOSITS

Sedimentary deposits resulting from the action of rivers. Typically fine grained material carried by the river and deposited in areas such as flood plains.

AMELIORATE

Cause something to become better.

AQUIFER

Layer of porous rock or soil able to hold or transmit water.

AUTOGRAPHIC

Reproduction of writing or drawing.

AUTOGRAPHIC - RAINGAUGE

A rain-gauge that produces a daily or weekly chart of rainfall measurement.

BARROWS

Grave mound.

BASEFLOW

The flow in a river derived from groundwater sources.

BIOACCUMULATION

The accumulation by living organsisms of materials from their surroundings such that the concentrations of these materials in the biomass are higher than in the surrounding medium.

BIOCHEMICAL OXYGEN DEMAND (BOD)

A measure of the amount of oxygen consumed in water, usually as a result of organic pollution.

BLANKET BOG

A bog which drapes all features of lowland terrain, infilling hollows to great depths. Composed of mainly peat.

BRECCIAS

Rock composed of angular (clastic) fragments.

BUFFER ZONE

Strip of land 10-100m wide, alongside rivers which is removed from intensive agricultural use and managed to provide appropriate habitat types. Benefits include reduction of inputs into the river such as silt, nutrient, livestock waste, as well as improving habitat diversity and landscape.

CALCAREOUS

Of, or containing, carbonate of lime or sandstone.

CARBONIFEROUS

Period of the Palaeozoic era, following the Devonian era and preceding the Permian. Economically, the most important system containing the worlds coal reserves and oil, oil shale, iron ore and fire clay deposits.

CATCHMENT

The total area from which a single river collects surface runoff.

CONFLUENCE

The point at which two streams or rivers meet.

CONGLOMERATE

A sedimentary rock consisting of rounded or sub-rounded fragments, cemented together by a matrix of calcium carbonate, silica etc.

CONJUNCTIVE USE

The operation of two or more sources in a systematic manner, to provide a yield greater than the sum of those sources if operated independantly.

CONSENT

A statutory document issued by NRA under Schedule 10 of Water Resources Act 1991 to indicate any limits and conditions on the discharge of an effluent to a controlled water.

CONTINUUM

Thing whose structure is continuous not discrete.

CULM

A geological formation in SW England comprising beds of shales and thin layers of impure anthracite, all of Carboniferous age.

CULM GRASSLANDS

Type of grassland present graving on culm geological formations.

CULVERT

Channel or conduit carrying water across or under a road, canal etc.

COUNTRYSIDE STEWARDSHIP

An initiative of the Countryside Commission in collaboration with English Nature, English Heritage and MAFF to enhance and conserve important English landscapes, wildlife habitats and history.

CYPRINID

Fish like or akin to carp ie. coarse fish.

DENIL-TYPE FISH PASS

A design of fish pass which consists of a conduit through which water flows over a series of baffles. The flow regime created on the pass allows fish to swim through unhindered and ascend a height of several feet up the obstruction in the river.

DEROGATE

Loss or impairment of a water resource, action causing such loss or impairment.

DEVONIAN

The fourth of the six periods of the Palaeozoic Era. Present as both marine and continental facies. Old (Devon) Red Sandstone is a continental facies.

DE-WATERING

Removal of groundwater to reduce flow rate or diminish pressure.

DIFFUSE

The spreading out of a substance from its source along a concentration gradient; where the two substances intermingle to equilibrate their concentrations via the process of diffusion.

DROUGHT ORDER

Drought Orders are made by the Secretary of State upon application by the National Rivers Authority or a water undertaker, under powers conferred by Act of Parliament, to meet deficiencies in the supply of water due to exceptional shortages of rain. The terms and conditions under which Drought Orders may be obtained are given in Sections 73-81 of the Water Resources Act 1991. Drought Orders are sub-divided into "Ordinary" and "Emergency" Drought Orders. An "Ordinary" Drought Order could contain provisions such as to authorise abstraction from an unlicensed source, override the conditions pertaining to an abstraction licence, limit the amount of water which may be taken from a source or vary discharge conditions. An "Emergency" Drought Order might allow the prohibition of use of water for particular purposes, to allow a ban on non-essential use of water, for example in car washes, or to introduce the use of stand-pipes.

ECOSYSTEM

A functioning, interacting system composed of one or more living organisms and their effective environment, in a biological, chemical and physical sense.

ELVER

Young eel.

ENVIRONMENTAL QUALITY STANDARD (EQS)

The quantity of a substance found in a body of water which should not be exceeded in order to protect a given use of the water body. An EQS is set by the European Community through EC Directives and the government.

ENVIRONMENTALLY SENSITIVE AREA (ESA)

Area where the landscape, wildlife and historic interest are of national importance. Payments are made by Agriculture and Fisheries Departments for appropriate sensitive land management.

EVAPOTRANSPIRATION

Loss of water by land plants due to evaporation.

FAULT

Plane surface of fracture in a rock body, along which observable relative displacement has occurred between adjacent blocks.

FERRIC STAGNOPODZOLS

Stagnopodzols are a sub-division of one of the soil classes of England and Wales, podzolic soil. Characterised by a peaty topsoil and a periodically wet, gleyed bleached horizon overlying an ironpan (hence ferric).

FISSURE

A crack or open break in rocks.

FLUVIAL

Term pertaining to river flow and its erosive activity.

FRACTURE

Clean break in a rock due to strain and stress from faulting or folding: Characteristic break pattern of a mineral.

GEOMORPHOLOGY

Scientific study of land forms and of the processes that formed them.

GLEY SOILS

One of the seven major groups in the soil classification of England and Wales. They are characteristically affected by periodic or permanent saturation by water in the absence of effective artificial drainage.

HYDROGEOLOGY

Branch of geology concerned with water within the Earth's crust.

HYDROMETRIC BOUNDARIES

Boundaries preventing the flow of water.

INDICATIVE FORESTRY STRATEGIES

Produced by some local Authorities, they map different areas suitable for planting, indicating "preferred areas", "potential areas" and "sensitive areas".

IGNEOUS

One of the three main groups of rock types. They are rocks that have crystallised from a magma (molten rock).

INTRUSION

A body of rock, usually igneous, which is emplaced within pre-existing rocks.

ISOHYET

A line on a map joining places of equal rainfall amount.

LEACHATE

Solution formed when water percolates through a permeable medium. Can be mineral-rich, toxic or even carry bacteria.

MACROINVERTEBRATE

A large invertebrate eg. jellyfish, snail, fly.

MAFF WATERSIDE FRINGE WILDLIFE ENHANCEMENT SCHEME

Part of the MAFF Habitat Improvement Scheme to encourage farmers to create, protect or enhance a range of wildlife habitats by managing land in an environmentally beneficial way.

MAIN RIVER

Some, but not all, watercourses are designed as 'Main River'. 'Main River' status of a watercourse must be first be approved by MAFF. Statutory (legally binding) maps showing the exact length of 'Main River' are held by MAFF in London and the NRA in Regional Offices. The NRA has the power to carry out works to improve drainage or protect land and property against flooding on watercourses designated as 'Main River'. The NRA do not have the legal power to spend public funds on drainage or flood protection works on watercourses not designated as 'Main River'.

MONOCULTURE

Production of only one type of crop.

NITRATE SENSITIVE AREAS (NSA) AND NITRATE VULNERABLE ZONES (NVZ)

Land in areas where water sources exceed a 50mg/l nitrate limit or are forecast to by year 2010 are designated NVZ's. Farmers are required to observe an action programme to reduce nitrate loss from their land in both NVZ's and NSA's. However they do not receive compensation for such programmes where the land is designated on NVZ.

NON-CALCAREOUS

Rock containing less than 30% calcium carbonate.

PELOSOLS

One of the seven major groups in the soil classification of England and Wales. They can be argillic, calcareous or non-calcareous and are characterised by a brown, greyish or reddish mottled subsurface horizon.

PELO-STAGNOGLEYS

Clayey seasonally water-logged slowly permeable soils, prominently mottled above 40cm depth.

PERMEABILITY

The ease at which liquids (or gases) can pass through rocks or a layer of soil.

PERMIAN

Final geological period of the Palaeozoic era. It succeeds the Carboniferous and precedes the Triassic. New Red Sandstone is linked with this era.

PERMO-CARBONIFEROUS

Strategraphic age zone of rocks that span the Permian and Carboniferous eras.

PIEZOMETERS

An observation well designed to measure the elevation of the water-table at a particular level.

PLEISTOCENE

The first of the two epochs of the Quaternary era. The epoch is marked by several glacial and interglacial episodes in the northern hemisphere.

PODZOLIC SOILS

Well drained black or dark brown soils, with a compact subsurface horizon enriched in humus and normally overlain by a bleached layer.

POROSITY

The volume of water which can be held within a rock or soil, expressed as the ratio of the volume of the voids to the total volume of the material.

POTABLE

Water of a suitable quality for drinking.

Q95

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

RANUNCULUS

Plant of the genus *Ranunculus* eg. buttercup.

REDD

Hollow created in river bed gravels by spawning salmonid fish into which the female deposits ova.

REDLAND

Term referring to the characteristic red colour of the soil found in Devon.

RED LIST SUBSTANCE

Substance which has been selected for monitoring on the basis of its persistancey toxicity and ability to bioaccumulate.

RIFFLE

Stony or gravelly part of stream or river bed shallow in dry flow (opposite of pool). Fast streams on most non-chalk areas have alternating riffles and pools.

RIPARIAN OWNER

Owner of riverbank and/or land adjacent to a river. Normally owns riverbed and rights to midline of channel.

RIVER CORRIDOR

Land which has visual, physical or ecological links to a watercourse and which is dependent on the quality or level of the water within the channel.

RIVERINE

Something that is of or on the river or its banks.

RIVER QUALITY OBJECTIVE (RQO)

The level of water quality that a river should achieve in order to be suitable for its agreed uses.

SALMONID

Game fish of the salmon family eg. salmon, trout and sea trout.

SET-ASIDE

The EC set-aside scheme was first introduced for the crop year 1991/92 as part of the CAP reform to allow farmers to remove land from production by receiving compensation. Eligable crops are a wide range of arable crops, principally cereals.

SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

A site given a statutory designation by English Nature or the Countryside Council for Wales because it is particularly important, on account of its conservation value.

SMOLTS

Young salmon migrating to sea for the first time.

SPATE

A sudden increase in water quantity, such as a flood, causing a river to be in a swollen fast-flowing condition.

STRATA

Lithological term applied to rocks that form layers or beds. Can also be applied to successive layers of any deposited substance eg. atmosphere, biological tissue.

SYNOPTIC MAP

A map showing a general view of the appropriate information.

TELEMETRY SITE

Site of apparatus to record readings on an instrument at distance, by means of radio transmissions.

THERMAL METAMORPHISM

The changing of rocks as a result of recrystallisation after heating.

TUMULII

Ancient sepulchral mound or barrow.

UNCEMENTED STRATA

A layered or bedded rock where the adjacent layers are not held together by a matrix of calcium carbonate, silica etc.

WASHLANDS

Extensive semi-natural area of flood plain adjacent to a river, where water is stored in time of flood. Structures can be added to control the amount of water stored in the washland and time its release to alleviate peak flood flows in areas downstream.

WILDLIFE ENHANCEMENT SCHEME

Set up by English Nature, it is a voluntary scheme which has been designed to develop an effective partnership with managers of land in Sites of Special Scientific Interest (SSSI's).

UNITS

mm	Millimetres
m	Metres
km	Kilometres
km^2	Kilometres squared
m/km	Metres per kilometre
persons/km^2	Number of people per kilometres square
ha	Hectares
m^3/s	Cumecs; cubic metres per second
m^3/day	Cubic metres per day
Ml/day	Megalitres per day
Ml/year	Megalitres per year
Kg/day	Kilogrammes per day
tonnes	Metric tonnes
%	Percentage
>	Greater than
≥	Greater than or equal to
<	Less than
≤	Less than or equal to

ABBREVIATIONS:

AGLV	Areas of Great Landscape Value
ALF	Alleviation of Low Flow
AMP2	Asset Management Plan 2
AOD	Above Ordnance Datum
AST	Atlantic Salmon Trust
BCU	British Canoe Union
BOD	Biochemical Oxygen Demand
CAP	Common Agricultural Policy
CMP	Catchment Management Plan
CoCo	Countryside Commission
CPRE	Council for the Protection of Rural England
CSO	Combined Sewer Overflow
DBPS	Devon Birdwatching and Preservation Society
DCC	Devon County Council
DNP	Dartmoor National Park
DoE	Department of the Environment
DRA	Devon River Authority
DWM	Devon Waste Management
DWT	Devon Wildlife Trust
EC	European Commission
EEC	European Economic Community
ELBCU	English Lakes British Canoe Union
EN	English Nature
ENP	Exmoor National Park
EQS	Environmental Quality Standards
ESA	Environmentally Sensitive Areas
FC	Forestry Commission
FDMF	Flood Defence Management Framework
FE	Forestry Enterprise
GATT	General Agreement on Trade and Tariffs
GMT	Greenwich Mean Time
GQA	General Quality Assessment
HEP	Hydro Electric Power
HIPS	Hydrometric Information and Processing System
HNDA	High Natural Dispersion Areas
IDB	Internal Drainage Board
IDD	Internal Drainage Ditches

MAFF	Ministry of Agriculture, Fisheries and Food
MMC	Mergers and Monopolies Commission
NASCO	North Atlantic Salmon Conservation Organisation
NDDC	North Devon District Council
NFU	National Farmers Union
NGR	National Grid Reference
NLO	Net Limitation Order
NRA	National Rivers Authority
NSA	Nitrate Sensitive Area
NVZ	Nitrate Vulnerable Zone
NWC	National Water Council
OFWAT	Office of Water Services
PWS	Public Water Supply
R&D	Research and Development
RE	River Ecosystem, RE1, RE2 etc
RQO	River Quality Objectives
RSPB	Royal Society for the Protection of Birds
SAC	Special Areas of Conservation
SAM	Scheduled Ancient Monuments
SCI	Sites of Community Importance
SoS	Standards of Service
SSO	Storm Sewer Overflows
SSSI	Sites of Special Scientific Interest
STW	Sewage Treatment Works
SWQO	Statutory Water Quality Objective
SWWSL	South West Water Services Limited
S105 Surveys	Section 105 of the Water Resources Act allows for Standards of Service, Assets and Flood Risk Surveys
UWWTD	Urban Waste Water Treatment Directive
WOAD	Welsh Office for Agricultural Development
WQO	Water Quality Objectives
WRA	Waste Regulation Authority
WT	Woodland Trust

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Telephone the emergency hotline to report all environmental incidents, such as pollution, poaching and flooding, or any signs of damage or danger to our rivers, lakes and coastal waters. Your prompt action will help the NRA to protect water, wildlife, people and property.

NRA Emergency Hotline

0800 80 70 60

24 Hour Free Emergency Telephone Line

Further copies can be obtained from:

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