

RIVERS SID AND OTTER CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT



NRA

*National Rivers Authority
South Western Region
March 1996*

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Published March 1996

THE NRA AND THE ENVIRONMENT AGENCY

The NRA will form the major part of a new organization which will have responsibilities for the environmental protection of water, land and air. The new Environment Agency starts its work of managing the environment in England and Wales on 1 April 1996.

Cover photograph kindly supplied by Geoff Jones of East Devon District Council



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RIVERS SID AND OTTER CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT

FOREWORD

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

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

An important stage in the production of the plans is a period of public consultation. The Rivers Sid and Otter Consultation Report covers a large and important catchment and the NRA is keen to draw on the expertise and interest of the communities involved.

Please comment, your views are important, even if it is to say that you think particular issues are necessary or that you support the plan and its objectives.

Following on from the Consultation Report an Action Plan will then be produced with an agreed programme for the future protection and enhancement of this much loved area.

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MALCOLM CHUDLEY
Area Manager (Devon)



Your Views

We hope that this report will be read by everyone who has an interest in the quality of the water environment. Your views will help us finalize the Action Plan.

Have we identified all the problems in the catchment?

If not we would like to know

**Are there any issues which you would like to highlight?
Do you agree with the River Quality Objectives proposed?**

Please send your comments to:

**Judy Proctor
Catchment Planner - Devon Area
Manley House
Kestrel Way
EXETER
Devon EX2 7LQ**

The Next Stage

We shall collate responses to this Report and publish an Action Plan in October 1996. Each year we will review the progress that has been made with the actions identified in the Action Plan and publish a brief review. Within five years of publishing the Action Plan we shall do a major review of the progress we have made.

We will not republish this Consultation Report.

**Rivers Sid and Otter
Catchment Management Plan
Consultation Report
South Western Region**

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MISSION AND AIMS

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 interests of all who benefit from and use rivers, groundwaters, estuaries and coastal waters. We will be businesslike, efficient and caring towards our employees.

Our aims are to:

- * 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.

Map 1 - Rivers Sid and Otter Catchment



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1. VISION FOR THE CATCHMENT

This Catchment Management Plan covers an area of approximately 283 km² and comprises the catchments of the Rivers Sid and Otter, which drain to the South Devon coast at Sidmouth and Budleigh Salterton respectively (see Map 1).

The catchment contains areas of high nature conservation value. It is dominated by traditional rural industries, principally agriculture but also forestry, with woodland covering approximately 21% of the catchment. Areas of major conservation interest include the East Devon Pebblebed Heaths, vegetated sea cliffs and the springline mires of the Blackdown Hills.

There are five main urban areas. Seasonally the population is greatly increased by visitors enjoying the natural beauty of the area, particularly the Blackdown Hills and the coastal resorts of Budleigh Salterton and Sidmouth.

The Rivers Sid and Otter Catchment is underlain by regionally important natural underground water storage areas, known as aquifers. They have been extensively exploited for both public and private water supplies. These aquifers have high quality water which should not be compromised. A number of activities occur in the catchment which may physically disturb aquifers and groundwater flow.

The River Otter Catchment supports mainly brown trout stocks, which are actively exploited by a rod and line fishery, a small population of migratory trout, and the occasional salmon in the lower reaches. The upper reaches of the rivers are generally inaccessible to migratory fish due to both natural and manmade obstructions. The River Sid Catchment also supports a small population of brown trout, but the short length of the river limits fishing.

Our vision for the catchment is of a healthy and diverse water environment, managed in an environmentally sustainable way, where there is:

- * achievement of environmentally sustainable use of the water resource
- * maintenance and, where appropriate, enhancement of the biodiversity of the water environment
- * conservation and, where appropriate, enhancement of the natural and semi-natural ecosystems through improvements to degraded aquatic and water fringe habitats
- * conservation of features of archaeological and historic interest linked to the aquatic environment
- * continuing improvement to existing discharges to meet the most appropriate standards
- * development of a sustainable agricultural and forestry system which reduces the risk of diffuse pollution and improves the physical habitat of the river system and wetlands for wildlife
- * rehabilitation of trout stocks in the River Otter to past levels
- * restoration of migratory fish runs to the River Otter
- * increasing enjoyment and appreciation of the water environment
- * minimal risk to people and property from flooding
- * maintenance of the natural hydrological cycle, including natural river, wetland functions and processes.

2. INTRODUCTION

This report:

- ☐ describes how the catchment is used
- ☐ explains what we are doing to protect or restore the water environment.

Sustainable development can be defined as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs*, and it is at the heart of UK policy on the environment. A recent Government publication, 'Sustainable Development - The UK Strategy' (Ref. 1), recognizes the inland freshwaters of the UK as *a vital and highly valued component of the UK environment and ecology*, as well as identifying with the conflicts that may arise between different purposes and the uses of water and the water environment.

A comprehensive approach to river management is required to plan for environmental sustainability and improvement. To this end, the NRA has developed the concept of Catchment Management Plans (CMPs). These allow the full range of water management issues to be identified and considered within a geographical area which is both relevant and meaningful. CMPs are strategic in nature, since individual catchments cover large areas of land often straddling local authority boundaries.

2.1 THE CONSULTATION REPORT

This Consultation Report includes the sections detailed below.

Catchment Characteristics, which provides a brief and general introduction to the catchment describing its key features.

Catchment Uses, which describes the resources and activities which use or influence the water environment. They may either have an impact on, or have certain requirements of the water environment. We include notes on our role and objectives in managing or promoting this use.

Targets and State of the Catchment, where we assess the state of the catchment by looking at four aspects of the water environment:

- ☐ Water quality
- ☐ Water quantity
- ☐ Physical features and wetland ecosystem
- ☐ Flood defence and land drainage.

We identify environmental quality targets where we can. Our present rate of success at reaching these targets is one way that we can report on the current state of the catchment.

Issues and Actions, where we identify the reasons for not reaching targets or fulfilling our objectives. This section summarizes these issues and proposes actions to resolve and minimize them.

INTRODUCTION

2.2 THE ACTION PLAN

We shall collate responses to this report and publish an Action Plan in October 1996. Each year we shall review the progress that has been made with the actions identified in the Action Plan and publish a brief review. Within five years of publishing the Action Plan we shall do a major review of the progress that has been made.

2.3 CATCHMENT MANAGEMENT PLANS AND DEVELOPMENT PLANS

While we can control some of the things which affect the quality of the water environment we have little direct control over the way that land is developed. This is the responsibility of local planning authorities. We do, however, seek to influence their decisions. We can only seek to influence the way in which farmland is used.

County Councils prepare statutory Structure Plans to guide local authorities in their preparation of Development Plans. The policies in these plans will recommend the way that land is developed in the future. We advise and guide local planning authorities to encourage them to adopt policies which protect the water environment from harmful development. Where we can we will reinforce these policies when we comment on planning matters, contribute to local plans, or if we are making our own decisions.

2.4 CMPS AND THE PREVIOUS CATCHMENT ACTION PLAN

This report builds on the achievements and remaining previous issues of the Catchment Action Plan. Catchment Action Plans were promoted in the South Western Region of the NRA. These plans set out a list of actions that needed to be completed within a five year period to resolve the issues already identified. They formed a joint approach to make real progress on the restoration of the River Otter between the NRA and the Catchment Steering Group. The support from this group, which included representatives of local farmers, planning authorities and fishing and riparian associations enabled much work to be done to achieve the improvements we all wished to see.

Some major achievements included: improvements to a number of pollution sources, such as from the salt depot and Honiton Sewage Treatment Works; large farms and fisheries initiatives, including fish passes to enable wild fish to return to all river reaches.

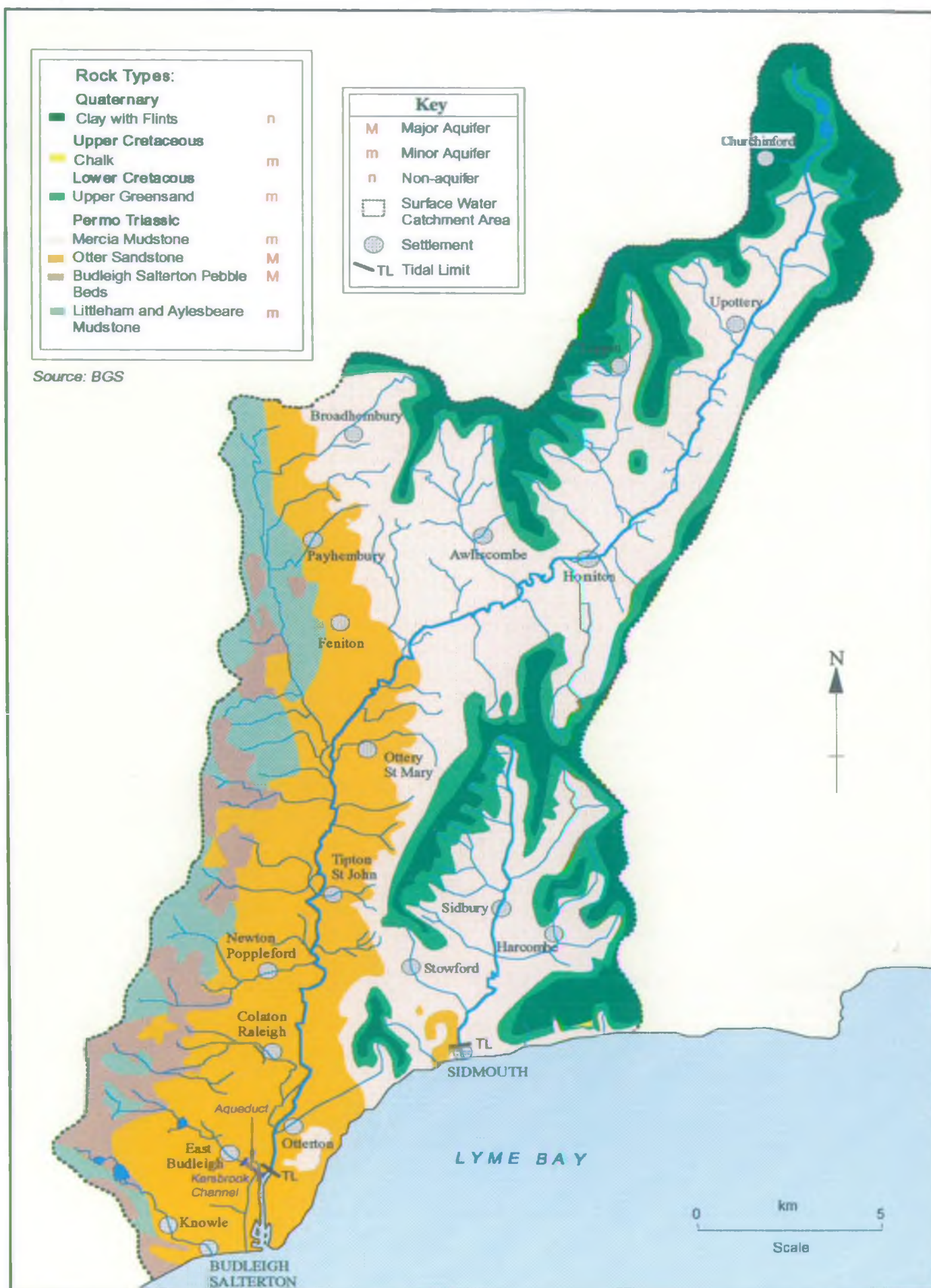
The efforts of Honiton Primary School should also be noted, as they raised the profile of a problem combined sewage overflow when they found sewage-related plastics in the River Gissage. South West Water Services Limited soon solved this problem.

2.5 CMPS AND THE BLACKDOWN HILLS MANAGEMENT PLAN

A management plan for the Blackdown Hills Area of Outstanding Natural Beauty is to be launched in the summer this year. Both this plan and our report will contain policies and suggested actions relating to the landscape, wildlife and archaeological interests of the Blackdown Hills.

Close liaison will ensure that these plans are complementary and provide co-ordinated management for the Blackdown Hills Area. In fact, some of the issues raised and actions will be carried out in partnership.

Map 2 - Geology



3. CATCHMENT CHARACTERISTICS

3.1 CATCHMENT DESCRIPTION

This plan covers the catchments of the Rivers Sid and Otter in South East Devon, which drain an area of approximately 283 km² (see Map 1). This area is subsequently referred to as the Sid and Otter Catchment. The Rivers Sid and Otter drain to the South Devon coast at Sidmouth and Budleigh Salterton respectively.

The River Otter rises in the Blackdown Hills at 280 m above sea level, and is approximately 44 km long, the total system being 243 km long. The largest tributary of the River Otter is the River Tale, which joins the River Otter just north of the village of Ottery St Mary. Flows in the River Otter are strongly supported by the significant groundwater resources in the catchment. This means that flows during dry summer periods tend to be proportionally higher in this catchment than in other catchments in the area. Indeed 53% of the flow in the River Otter Catchment is derived from groundwater.

The River Sid is only 10 km long. It rises on the edge of Pin Hill Woods at 205 m above sea level. The Roncombe Stream is the River Sid's major tributary, which joins the main river just north of the village of Sidbury. Flows in the River Sid Catchment are flashy with little contribution from the significant aquifers which contribute to the base flows in the adjacent River Otter Catchment.

The Sid and Otter Catchment has a population of 45,968 (1991 census). The population increased by 11% between 1981 and 1991, which compares with an increase of 8% for the whole of Devon over the same period. Major settlements are Sidmouth, Honiton and Budleigh Salterton.

3.2 GEOLOGY, SOILS AND LAND USE

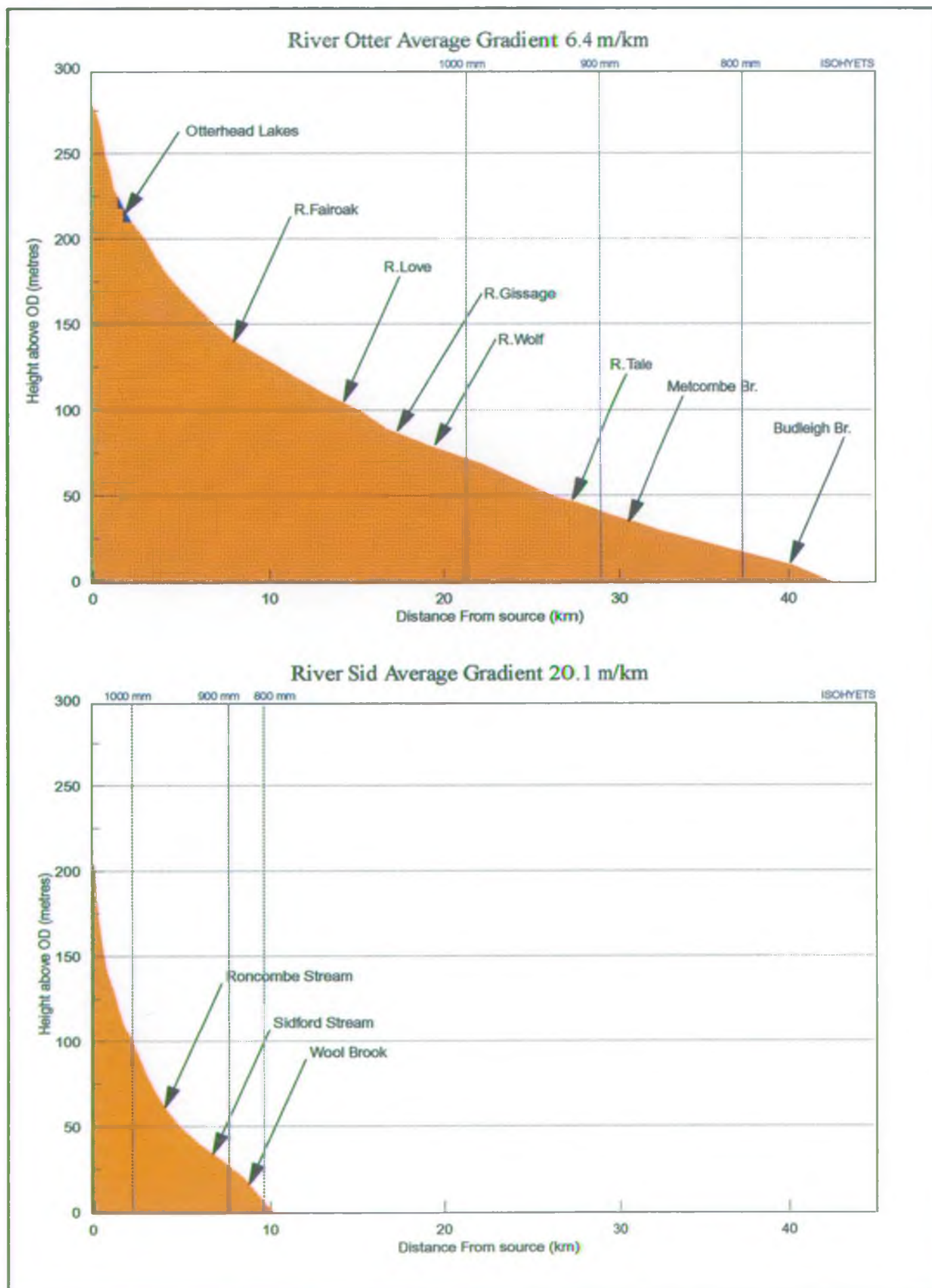
The geology of the catchment is based on rocks of the Triassic and Cretaceous periods (see Map 2). The northern and eastern parts of the catchment are largely underlain by Mercia Mudstone, which generally consists of calcareous clays and mudstones. The higher ground separating the catchments of the Rivers Sid and Otter and also forming the Blackdown Hills and eastern border of the River Otter is capped with Upper Greensand deposits, which are in turn covered by a deposit of Clay with Flints.

The western half of the catchment is predominately underlain by deposits of Permo-Triassic age (between 195 and 280 million years old). The oldest of these are the Budleigh Salterton Pebble Beds which outcrop to the west of the catchment on which have formed the East Devon Pebblebed Heaths, of great ecological value. Overlying the Pebble Beds and outcropping over much of the southern part of the River Otter Catchment is the Otter Sandstone formation.

The Otter Sandstone weathers to give well drained, fertile soils suitable for both arable and grass production. Heavier soils derived from Mercia Mudstone are found further east and are better suited to permanent pasture than those found over the sandstone. The Upper Greensand hill tops capped in Clay with Flints, have very little soil and are covered with heath and rough grass.

The catchment is mostly rural and almost 80% of the land is used for agricultural purposes (MAFF statistics, 1994). Much of the agricultural land is grassland for livestock farming (75%), whilst the remainder is mostly arable. Small, mainly mixed woodlands are scattered across the catchment with a larger area of woodland on the higher ground between the catchments of the River Sid and the River Otter.

Figure 1 - River Profiles and Isohyets



CATCHMENT CHARACTERISTICS

3.3 HYDROLOGY

Hydrogeology

The Sid and Otter Catchment is underlain by regionally important aquifers which have been extensively exploited for both public and private supplies (see Map 2). The most important of these are the Otter Sandstone and the underlying Budleigh Salterton Pebble Beds which collectively form the Sherwood Sandstone Group.

The Otter Sandstone has been developed for public water supply within the Otter Valley. The sandstones attain a thickness of over 100 m and have a high porosity. Groundwater flow is via rock pores with secondary flow via joints and fractures.

The Pebble Beds Formation is typically 20 to 30 m thick and has high porosities and permeabilities. The beds almost certainly provide recharge to the Otter Sandstone and have also yielded water from the base of deep public supply boreholes in combination with the sandstone.

The Upper Greensand is usually an important aquifer. However, within this catchment the outcrop is not very thick, covers a small area and it is difficult to establish boreholes in it since it is a running sand. Thus, the Upper Greensand is consequently of limited importance as a water resource for public water supply. Minor springs from the Upper Greensand have been tapped for private use and support valuable wetland habitats; the springline mires and wet woodland. Groundwater in the Upper Greensand will also be significant in maintaining river flows in dry summers.

The Clay with Flints and Mercia Mudstone are not generally considered to be aquifers but they do provide a source for small private supplies.

Rainfall

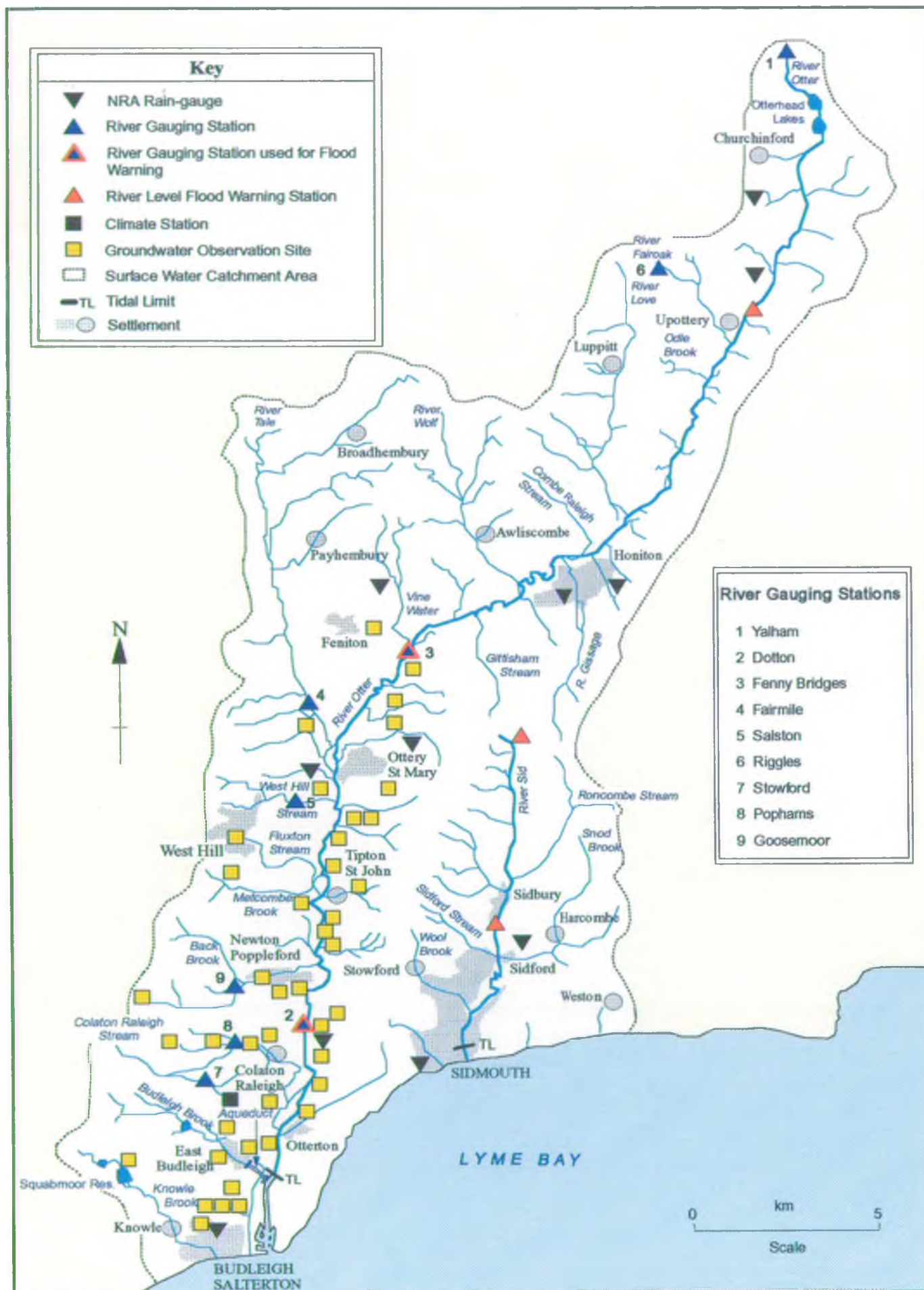
Rainfall is measured daily at eleven Meteorological Office approved gauges. It is these sites which have been used to provide the long term average rainfall (1961-1990) isohyets shown in Figure 1. There is also a telemetry rain gauge at Gittisham which provides data for flood events.

The highest rainfall in the catchment, over 1130 mm per annum, occurs on the Blackdown Hills in the north of the catchment. Rainfall is lower in the more sheltered lowland areas and decreases to 773 mm near Sidmouth.

River Flow

There are nine river gauging stations within the catchment (see Table 1 and Map 3), all of which have chart recorders which continuously monitor water levels. Information for flood warning purposes comes from river gauging stations at Dotton and Fenny Bridges, water level recorders at Upottery and Sidbury, and a rain gauge at Gittisham.

Map 3 - Hydrometric Network



CATCHMENT CHARACTERISTICS

Table 1: River Gauging Stations

No on Map 3	Station	River	Grid Ref.	Data Collected
1	Yalham	Spring/tributary of Otter	ST 219 150	Apr 1969 - date
2	Dotton	Otter	SY 087 885	Sep 1962 - date
3	Fenny Bridges	Otter	SY 115 986	Aug 1974 - date
4	Fairmile	Tale	SY 088 971	Sept 1978 - date
5	Salston	West Hill Stream	SY 088 945	May 1976 - date
6	Riggles	Spring/tributary of Otter	ST 184 094	Jan 1970 - date
7	Stowford	Stowford Leat	SY 059 867	Aug 1973 - date
8	Pophams	Colaton Raleigh Stream	SY 072 877	July 1973 - date
9	Goosemoor	Back Brook	SY 070 893	April 1976 - date

The natural river flows are mainly influenced by the geology and topography of the catchment. The river profiles are shown in Figure 1. The River Sid is a short steep river with an average gradient of 20.1 m/km whilst the River Otter has a much shallower gradient of 6.4 m/km.

The River Otter Catchment

The flow record at Dotton gauging station on the River Otter for the period 1963-1994 shows a mean daily flow of 3.082 cumecs and a measured Q95 (the flow exceeded for 95% of the time, on average) of 0.934 cumecs. The Q95 flow represents 30% of the mean daily flow. This is a relatively high percentage and reflects the strong groundwater influence of this river system (see Figure 2).

Surface runoff in the catchment is also significant and floods in this catchment are characterized by a very rapid rise and fall of water levels, with high flood peaks. Thus, there is a large difference between the maximum daily mean flow recorded at Dotton (63.903 cumecs, 23/12/94) and the maximum recorded instantaneous flow (347.011 cumecs, 11/7/68).

The minimum mean daily flow of 0.444 cumecs (14% of mean daily flow) was recorded on the 27 August 1976. In an average year the Q95 value means flows will be lower on about 18 days. In the drought years of 1976, 1984, 1989 and 1990 flows were at this level for 124, 51, 81 and 61 days respectively. Groundwater levels were extremely low in 1976 and, therefore, were less able to contribute to surface water flows during the dry summer. This resulted in the high number of days with flows below Q95 and the lowest recorded flow. In 1995 when groundwater levels were relatively high at the end of the winter period summer flows stood up well to the drought conditions.

The River Sid Catchment

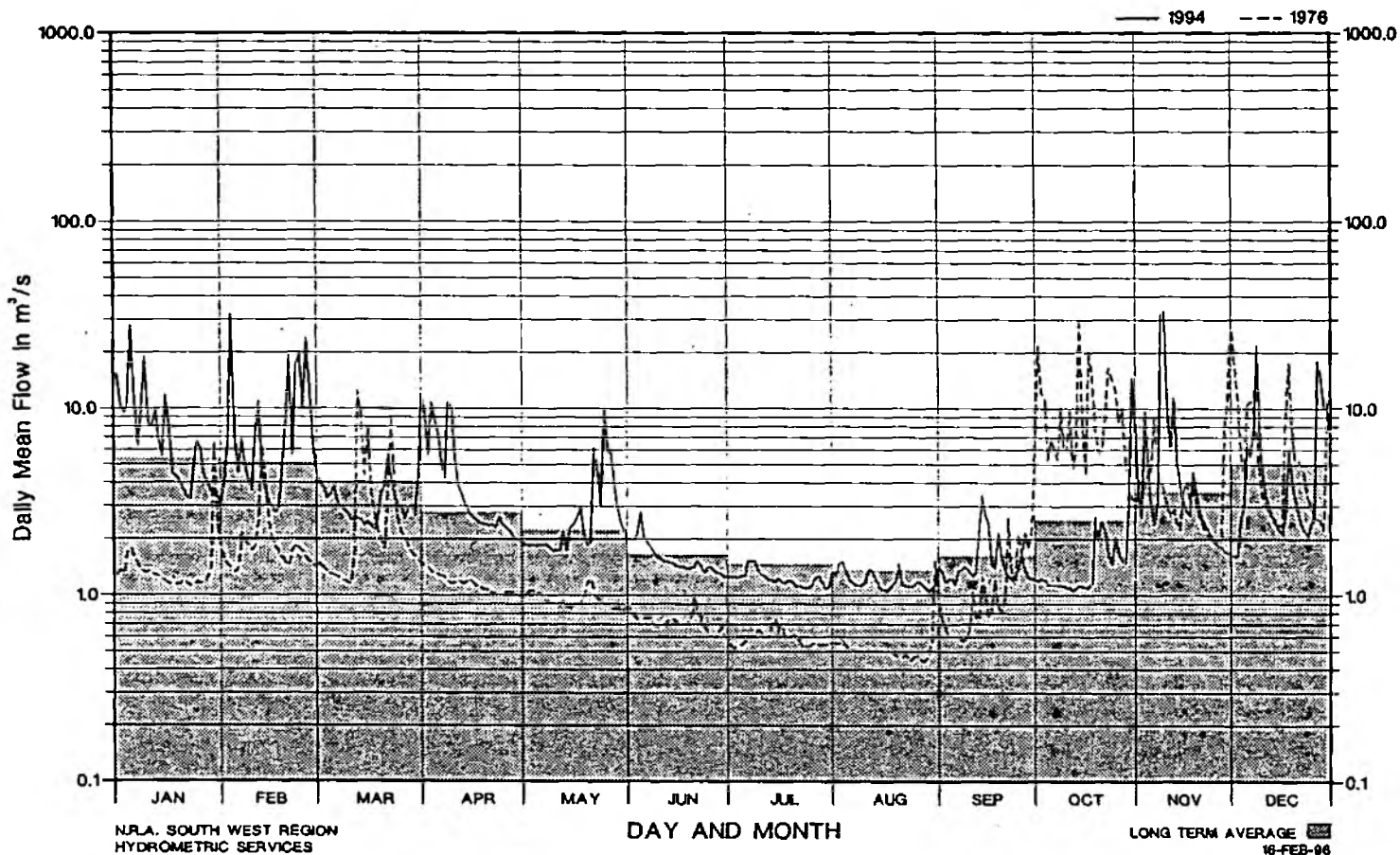
Due to the absence of any river gauging stations within this catchment theoretical flows have been calculated. These calculations give a mean daily flow of 0.574 cumecs and a Q95 of 0.134 cumecs. The Q95 represents 23% of the average daily flow. This figure is lower than that for the River Otter, reflecting the flashier nature of this catchment. This is due to the steepness of the watercourse, the nature of the soil, subsoil and relatively poor groundwater storage availability within the catchment.

Groundwater

There are around forty groundwater observation sites within the catchment (see Map 3). Groundwater levels are either recorded continuously, using a chart recorder, or manually every two weeks.

Figure 2 - Hydrographs

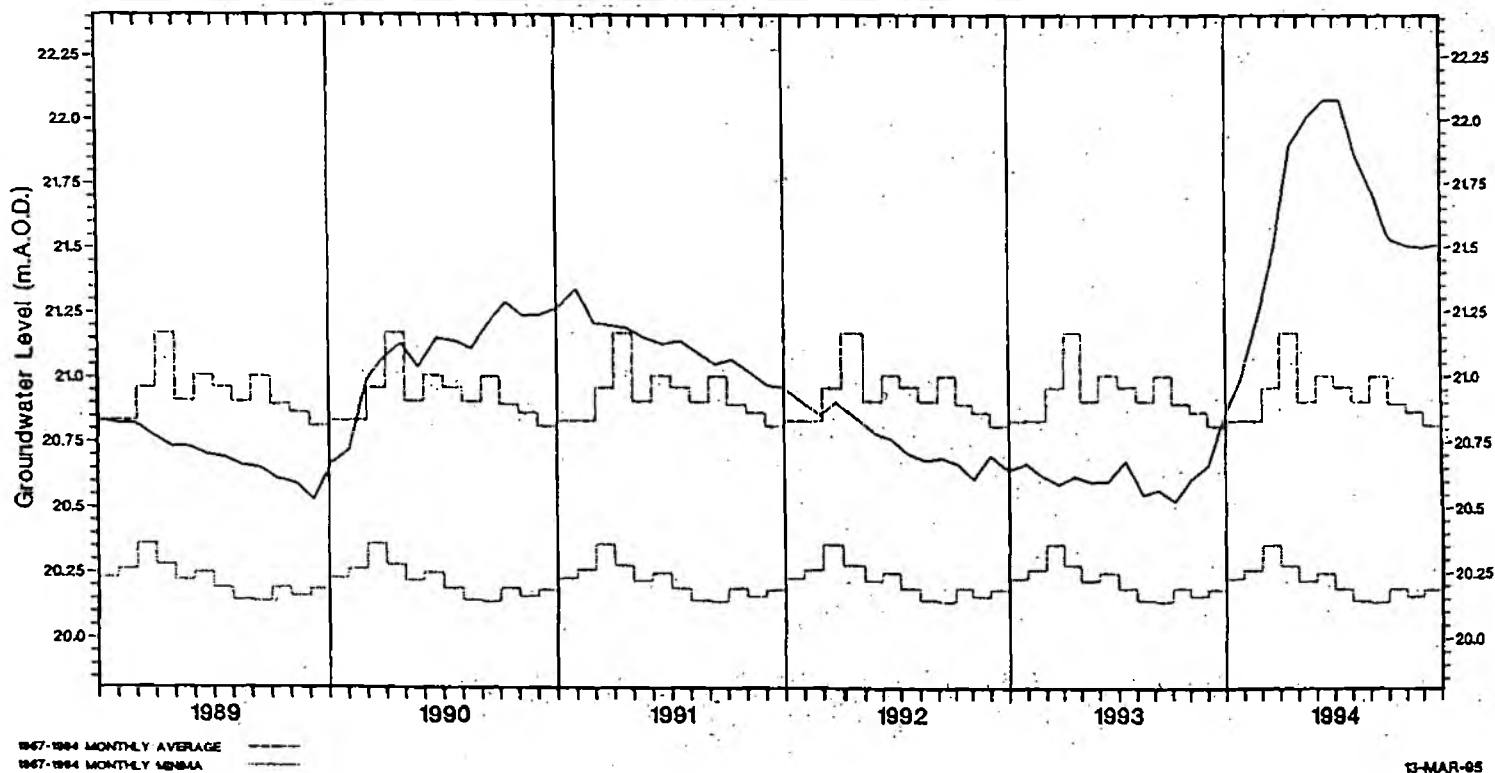
River Otter at Dotton



NRA South Western Region
Hydrometric Services
Groundwater Hydrographs

Station Name Tidwell farm
Station No. SY08G034
N.G.R. SY 0607 8332
Aquifer Upper Sandstone

1989 Annual Average 20.702 m.A.O.D.
1990 Annual Average 21.077 m.A.O.D.
1991 Annual Average 21.125 m.A.O.D.
1992 Annual Average 20.751 m.A.O.D.
1993 Annual Average 20.627 m.A.O.D.
1994 Annual Average 21.638 m.A.O.D.



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4. CATCHMENT USES

4.1 LANDSCAPE, WILDLIFE AND ARCHAEOLOGY

Here we consider how we protect and manage the natural environment and the historic built environment associated with rivers and wetlands.

Our Objectives

To ensure that the natural and historic built environments associated with rivers and wetlands are not degraded through neglect, mismanagement or insensitive development, and wherever we can, to take measures or to assist other organizations to enhance them.

The Role of the NRA

We promote the conservation of landscape, wildlife and archaeology through our work to safeguard water quality, manage water resources and provide flood defences. An important part of our work is to influence land use planners and land managers to look after rivers and wetlands sensitively.

We have duties to:

- ☐ conserve and enhance landscape, wildlife and natural features especially in rivers and wetlands
- ☐ protect and conserve buildings, sites and objects of archaeological, architectural or historic interest.

Our work involves a range of activities:

- ☐ we study river and wetland wildlife and we are developing better methods for doing this
- ☐ we are developing standard ways of reviewing the effects of our work on wildlife
- ☐ we are establishing a national database to store wildlife information
- ☐ we are improving the way we consider and carry out Environmental Assessments
- ☐ we encourage local planning authorities and developers to promote wildlife conservation on rivers and wetlands and we encourage the development of new river management techniques.

Catchment Perspective

Landscape

A large proportion of the area covered by this plan is recognized as being of national importance for its landscape (see Map 4); to the north is the Blackdown Hills Area of Outstanding Natural Beauty (AONB), while the southern part of the catchment lies within the East Devon AONB. Most of the coastal section east of Budleigh Salterton also falls into the East Devon Heritage Coast; a designation given to stretches of undeveloped coastline defined by the Countryside Commission as being of outstanding scenic value.

The River Otter and its tributaries, the River Wolf and River Love, all rise on the slopes of the Greensand ridges of the Blackdown Hills. Springlines on the steep valley sides create extensive boggy areas and rough pasture. The upper valleys are well wooded whilst, lower down, small enclosed fields are typical.

Map 4 - Landscape and Archaeology



CATCHMENT USES

The upper reaches of the River Tale have a more open, agricultural landscape, similar to that of the rivers further west.

Towards Honiton, on the southern edge of the Blackdowns, the River Otter valley opens up into a broad, flat-bottomed floodplain with larger fields and less woodland. The river meanders extensively throughout this section, although erosion control measures have been widely applied in the past (see Section 4.4).

Throughout the lower valley the landscape is dominated by agricultural practice; intensive arable and stock farming are widespread. Frequently the River Otter is constrained on one bank or the other by high sandstone cliffs, features which extend to the mouth of the estuary.

Although the River Sid also has its headwaters in springs rising where the Greensand meets underlying Keuper Marls, the landscape of the valley is quite different to that of the River Otter. The River Sid falls steeply through a fairly narrow valley. There is a secluded feel to much of this valley, with small tributaries joining from the dip slope of the ridge.

The coastal part of the catchment includes cliffs which become higher towards the east, backed by farmland on the undulating area behind. There is a variety of shore types ranging from the cobbles of Budleigh Salterton to rocky foreshores.

Where we undertake significant works, the effects on the landscape are considered as part of an established environmental appraisal procedure. If inadequate information is available, the necessary landscape assessment will be carried out. When dealing with proposals by others, we will require consideration of the impact on landscape to be appropriate to the scale of the proposal.

Archaeology

The catchment includes many sites and features of historic and archaeological value; some are designated, while others remain unprotected.

Those sites recognized as being of national importance may be scheduled as Ancient Monuments. About forty such sites have been designated in the catchment; in addition, three Historic Parks and Gardens are present (see Map 4 and Appendix 1).

The County Sites and Monuments Registers held by County Councils are the main sources of information for assessing archaeological interest - some 50,000 items are recorded for Devon.

Buildings of particular importance are protected by the Planning (Listed Buildings and Conservation Areas) Act 1990; several grades of Listed Building are recognized. Where whole sections of towns or villages are felt worthy of protection, Conservation Areas are notified to preserve and enhance their character. Some fifteen settlements in the catchment contain Conservation Areas.

The archaeological evidence indicates the existence of human activity as long ago as the Mesolithic period (7-8000 years ago). Visible signs of Bronze Age colonization include clusters of tumuli and round barrows on Woodbury Common and at Farway Hill, while Iron Age forts including Dumpdon, Hembury and Sidbury are evidence of early settlement, often in strategic locations, away from the wet valley bottoms.

Map 5 - Wildlife



Information correct as of October 1995

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CATCHMENT USES

The Romans began to open up East Devon with roads and settlements but this was a frontier area and remains are not very extensive. Native Celtic tribes continued to clear the land. Subsequently, the Saxons began to dominate the catchment, with small hamlets and farmsteads becoming increasingly common. River crossings were often the location for villages; Sidbury and Otterton are examples. Indeed Otterton appears to have been an important trading centre, meriting a mention in the Domesday Book. The River Otter was navigable up to this point during the 11th century and several small ports developed. However, the later development of the bar across the mouth of the estuary gradually restricted access for boats.

As early as the 13th century the pattern of settlement seen today was largely established. However, major changes to the landscape started to occur as a result of medieval enclosure, influenced by the population changes wrought by the Black Death. The small fields and surrounding hedgebanks with trees which resulted are still present in the modern landscape.

The largely agricultural use of the catchment, which continues today, has resulted in a large number of farmhouses and other buildings of historic value. In contrast, industrial features are less common; the Tumbling Weir at Ottery St Mary is a unique feature of considerable interest, while the remnants of the railway line which crosses the River Otter at several points provides a reminder of more recent activities.

Occasionally we may be considering work which could affect features of archaeological interest. In these cases we assess the archaeological impact of this work through our environmental appraisal procedure. When we regulate the work of others in rivers we ask for information on the archaeological effects of this work, appropriate to the scale of the proposal. A pilot project to improve the archaeological input to consenting works in rivers is in progress.

Wildlife

The Sid and Otter Catchment contains a wide variety of habitats and species of high conservation value.

To the west, the open spaces of the East Devon Heaths are proposed as a Special Protection Area under EC Birds Directive (Ref. 2). They support internationally important populations of nightjar and Dartford warbler, as well as other species, notably curlew. The area is also under consideration as a possible Special Area of Conservation (SAC) under the EC Habitats Directive (Ref. 3) to protect the dry heathland habitat and the southern damselfly (*Coenagrion mercuriale*) which breeds in small heathland streams and wet flushes. The site is considered to be one of the best areas in the UK for these communities.

The extreme eastern section of coast in the catchment forms part of another possible SAC, Sidmouth to West Bay, under consideration as some of the UK's best vegetated seacliffs.

Seven sites are designated Sites of Special Scientific Interest (SSSI); this indicates their national importance (details in Appendix 1). Wetland examples include: Hense Moor, on which the River Love rises and which contains some excellent examples of lowland mixed valley bog; and the Otter Estuary, recognized as displaying classic estuarial zonation and habitat development (see Map 5).

The upper catchment also falls within the Blackdown Hills Environmentally Sensitive Area (ESA). This designation aims to encourage traditional farming methods, resulting in protection of the ecology, landscape and historic features of the area.

CATCHMENT USES

There are twelve nature reserves (see Appendix 1) in the catchment, varying from a 0.5 hectare wooded area to 184 hectares of internationally important lowland heath. Several wetland sites are open to the public.

A large number of sites of conservation value, although lacking statutory designation, have been identified in recent surveys by Devon Wildlife Trust. These sites include County Wildlife Sites which will gain some protection through county and local planning policies and management agreements with landowners.

Sites of geological importance may also be designated SSSIs and there is a programme to identify a range of sites of lesser value as Regionally Important Geological Sites (RIGS). The sandstone cliffs of the lower River Otter and some coastal sites are already designated; other features may be recognized in the future.

Habitats

The Government's statutory nature conservation agency, English Nature, has recently defined areas of the whole country according to land use and ecology. This initiative indicates that almost all of the Sid and Otter Catchment lies within the Blackdowns Natural Area, with the eastern strip coming into the Devon Redland Natural Area. The coast is all part of the Lyme Bay Maritime Natural Area.

Priority wetland habitats in these areas are: springline mires; alder and willow carr; lowland heath; and estuarine habitat. Most of the best areas of these habitats are already protected by designation, but attention needs to be focused on other, presently unprotected areas.

River corridor surveys of the majority of 'main river' sections of the River Otter and River Sid have been carried out (see Map 5). These surveys indicate areas of particular value or interest.

Species

Otters are known to use the catchment in small numbers and they are fully protected.^{1,2}

Mink are widespread and fairly abundant, although there seems to be a downward trend in numbers. Their presence may be linked to the apparent absence of water voles, again in spite of good habitat. Water voles were recorded on the River Otter in 1990.

Some seven species of bat have been recorded in the catchment; of these, Daubenton's bat is most closely associated with water, regularly hunting over or around rivers and ponds. All bats are fully protected^{1,2} but many species are declining.

There is a sizeable heronry close to the River Otter, north of Honiton, while little egrets are sometimes found on the estuary. Mute swans breed at several locations, while Canada geese are present at Bickton in reasonable numbers, especially during the moult. Shelduck breed in small numbers on and around the estuary, while tufted duck, an uncommon breeding species in Devon, have bred near Ottery St Mary.

1 Annex II EC Habitats Directive (Ref.3) 2 Wildlife and Countryside Act 1981 (Ref. 4)

CATCHMENT USES

Meadows adjoining the lower reaches of the River Otter provide nest sites for lapwings, while curlew and other wader species breed on the wet heaths and moors of East Devon and the Blackdowns.

The River Otter is especially important for kingfishers, with breeding recorded along the whole length. Sand martins, which also nest in holes in riverbanks are common on both the lower and middle reaches of the River Otter and on the River Sid. Two other typical riparian species, grey wagtail and dipper are also abundant. Sedge warblers and reed buntings nest in the reed fringes of estuaries and ditches.

The Otter Estuary, although much smaller and, therefore, unable to support the huge numbers of birds attracted to the Exe Estuary, is nonetheless a valuable site, especially in winter with birds appearing to move regularly between the two estuaries. However, it suffers from a certain amount of disturbance, but good numbers of curlew, lapwing, mute swans, widgeon and shelduck may be present. Seacliffs provide nesting sites for a variety of birds including fulmar, cormorant, raven and even peregrine.

Although amphibian records exist for the catchment, including sites for great crested newts, no particularly important sites appear to have been recognized.

Fish species of conservation importance are effectively limited to bullheads and lampreys, all of which are listed in the Habitats Directive¹. Unusually for a Devon river, few salmon are present.

Marsh fritillary butterflies are closely linked to springline mires and are found at some sites in the Blackdowns; they are declining despite extensive protection.¹

Several notable dragonfly species are present in the catchment; southern damselfly is internationally important¹ while small red damselfly, downy emerald and keeled skimmer are also considered as key species for Devon.

White-clawed crayfish have been recorded in the River Otter, but their present status there is uncertain.

Some species survey work has been carried out by the NRA; three sites on the River Sid and five sites in the River Otter Catchment have been sampled and all invertebrates species identified. No species of particular conservation value were found in these surveys, but the presence of rare caddis flies, *Plectrocnemia brevis*, *Ernodes articularis* and *Adicella filicornis* in coastal streams around Salcombe Regis and Weston was noted. Sites surveyed generally had diverse fauna indicating good water quality; the site on the River Tale, although less diverse, still contained species sensitive to pollution. In addition, data have been obtained on aquatic plants, channel morphology and habitat for the same sites. Other biological surveys have taken place at a number of sites in the catchment (see Map 5 and Appendix 1).

The benthic macroinvertebrates of the Otter Estuary were studied in 1990. The marine biology of the soft sediments is influenced by the significant salinity changes. During high river flows the estuary is almost entirely freshwater, which influences the distribution and species present. In the higher reaches of the estuary the population is dominated by oligochaete worms. Polychaete worms such as the ragworm (*Nereis*) and the Peppery Furrow Shell (*Scrobicularia*) are dominant lower down the estuary. In the muddier salt pan areas within the saltmarsh the mud shrimp (*Corophium*) is particularly abundant providing a valuable food source for birds.

¹ Annex II EC Habitat Directive (Ref. 3)

Map 6 - Salmonid Distribution



4.2 Fisheries

We consider here the conservation of fish and their habitats. We also discuss angling and commercial fishing.

Our Objective

To maintain, improve and develop fisheries.

The Role of the NRA

We have duties and powers to:

- ☐ regulate fishing by a system of chargeable licences. With the approval of the Minister (MAFF) we may also make byelaws to regulate fishing for example by restricting fishing methods and seasons
- ☐ enforce regulations and byelaws to prevent illegal fishing
- ☐ control the movement and introduction of fish
- ☐ ensure chemical water quality in those stretches designated under the EC Freshwater Fish Directive (Ref. 5) complies with standards. We also set river quality objectives to safeguard fisheries (see Section 5.1).

Our work involves a range of activities:

- ☐ we survey rivers to check the number, age and types of fish they support. If we identify a problem we try to find out the cause and improve the situation
- ☐ we make sure that the abstracting water or the damming of rivers does not seriously disrupt the life cycles of fish
- ☐ we consider the impact of development, river management and changes in water quality on fisheries
- ☐ we build fish passes
- ☐ we improve fish habitat
- ☐ we encourage angling and publish information for anglers
- ☐ we rear fish to allow us to restock rivers for rehabilitation and mitigation purposes where fish may have been adversely affected by man-made or natural influences.

Catchment Perspective

The River Otter Catchment supports brown trout stocks which are actively exploited as a rod and line fishery on the main river and some of the major tributaries. The river is noted for good dry fly fishing for brown trout of high average weight. The river currently supports a small run of migratory trout, and the occasional salmon may be found in the lower reaches where they are known to spawn. There is a limited fishery operating in this area for migratory fish, mainly sea trout (see Map 6).

The River Sid Catchment supports a small population of brown trout which are found in the main river and most of its tributaries. The small size of the river limits the amount of fishing for this species (see Map 6).

Map 7 - Freshwater Fish Distribution



Information correct as of October 1995
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Map 8 - Eel Distribution



Information correct as of October 1995

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CATCHMENT USES

There are no significant coarse fishing interests in the Sid and Otter Catchment as the distribution of coarse fish is limited to minor species, such as bullheads, lampreys, stoneloach and minnows (see Map 7). These species are found widely over both catchments: identified at most monitoring sites. Although both lampreys and bullheads occur widely in the catchment they are both identified as requiring protection under the EC Habitats Directive (Ref. 3). The distribution of eels in the Sid and Otter Catchment is similar to other rivers in the area, with small numbers occurring throughout (see Map 8). Although not identified in the survey the lower River Otter contains an appreciable number of eels. There is no significant exploitation of this species.

4.3 RECREATION AND AMENITY

Many people spend their spare time enjoying our rivers and coasts. Where we can we try to improve facilities for these people but we must always safeguard the environment from the damage they might cause.

Our Objective

To develop the amenity and recreation potential of inland and coastal waters and associated land.

The Role of the NRA

We have duties and powers to:

- ☐ protect and maintain access to beautiful areas or special sites of interest
- ☐ make sure that land and water under our control is made available for recreation and that at all times we cater for the needs of the chronically sick or disabled
- ☐ charge for facilities that we provide for recreation
- ☐ make byelaws to regulate recreation.

We are involved in a range of activities:

- ☐ we work with other agencies and individuals such as planning authorities and sports associations to develop recreation facilities
- ☐ we work with other organizations to develop plans and strategies for promoting recreation in the water environment
- ☐ we provide information
- ☐ we manage NRA owned or leased land with recreation in mind.

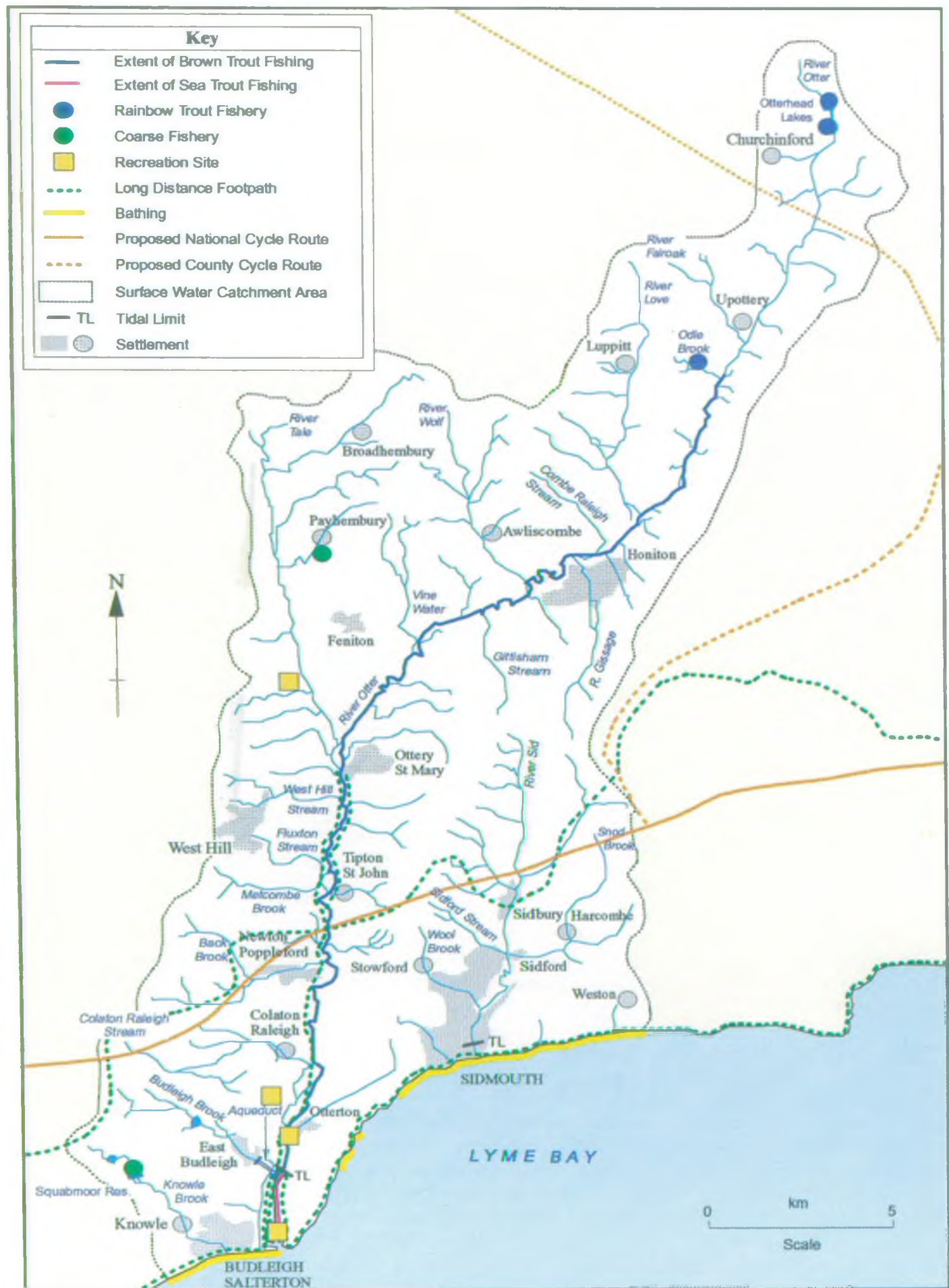
Catchment Perspective

Formal recreation use of the catchment is fairly low key. The coastal section of the catchment is moderately well used for recreation, although in places difficult access reduces the level of use. Some sailing takes place, with a club at Sidmouth. Conflict between jetskiers and bathers has occurred at Budleigh Salterton and Sidmouth.

There are no access agreements for canoeing on either the River Sid or River Otter, although some canoeing does take place on the tidal section of the River Otter where there is a public right of navigation. Several sites offer good opportunities for diving and snorkelling, especially Budleigh Salterton.

In contrast to water contact sports, there are extensive opportunities for access to the river for walkers and others. Well developed footpaths and waymarked walks run alongside much of the River Otter between the mouth and Ottery St Mary, and there is public access to parts of the lower River Sid. East Devon Heritage Coast Service have upgraded footpaths along the floodbank to the west of the Otter Estuary for wheelchair access. The South West Coast Path, a national trail, runs along the coast, while the East Devon Way crosses the catchment roughly parallel to it and some way inland. National and county cycle routes are also planned (see Map 9). At Ottery St Mary, where we have recently constructed a new flood defence scheme, we are considering ways of improving public access to our own land.

Map 9 - Recreation, Amenity and Angling



CATCHMENT USES

While the benefits of public access to watercourses are recognized, there are some concerns over the level of disturbance that this may pose to the river environment. Wildlife, particularly shy species, may be deterred by large numbers of people and dogs regularly walking the banks, especially when dogs are off the lead.

There are a number of commercial still fisheries in the catchment, for example at Otterhead Lakes and Squabmoor Reservoir.

CATCHMENT USES

4.4 FLOOD DEFENCE AND LAND DRAINAGE

River flows vary widely and are affected by the weather, geology and land use. We manage flood risk from rivers and the sea using Flood Defence and Land Drainage powers.

Flood risk and land drainage have always affected the way we use land. By improving our control of water we have been able to make better use of river and coastal floodplain for farming or building towns. 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.

Better protection from floods and better land drainage has improved our quality of life. However, unless properly managed, these benefits may result in other problems such as increased downstream flows and a legacy of expensive works for future generations to maintain. Changes in land use, made possible through drainage and flood defence, may also cause significant environmental damage, particularly to wetlands.

Today we manage flood defences and land drainage to balance the needs of all river users with the needs of the environment.

Our Objective

To provide effective defence for people and property against flooding from rivers and the sea; and to provide adequate arrangements for flood forecasting and warning.

The Role of the NRA

Our statutory flood defence committees make decisions on flood defence. All rivers are classified as either 'main river' or 'ordinary watercourse' (sometimes referred to as 'non-main river'). We supervise all flood defence matters but have special powers to carry out or control work on 'main rivers' and sea defences. Local authorities and in some areas internal drainage boards are responsible for flood defence on ordinary watercourses. Local authorities are also responsible for protecting the coast from erosion by the sea.

We have duties and powers to:

- ☐ control certain works and advise planning authorities on flood defence
- ☐ maintain and improve the flood defence system which is under our control
- ☐ provide flood forecasts and warnings so that risk to life and damage to property is reduced during river and sea floods.

We are involved in a range of activities:

- ☐ we work closely with other agencies including MAFF, local authorities, conservation and recreation bodies
- ☐ we survey assets and flood risk areas to improve our management of flood defence
- ☐ we are working on a Flood Defence Management Framework and related systems to ensure that flood defence assets are managed properly
- ☐ we set and monitor specific targets to improve our performance.

CATCHMENT USES

Catchment Perspective

'Main river' covers 7.75 km of the River Sid and its tributaries and 32.75 km of the River Otter and its tributaries (see Map 10).

There are four major flood defence schemes on the River Otter at East Budleigh, Tipton St John, Ottery St Mary and on the River Gissage and Glen Stream at Honiton. All are routinely maintained, which includes grass cutting, silt removal and debris clearance from the screens and flaps (see Table 2). The River Sid has three flood defence schemes at Sidmouth, Sidford and Sidbury. They are also routinely maintained.

Environmental enhancements of the flood defence scheme at Ottery St Mary included wetland and stream habitat creation and footpath improvements.

The River Otter is a highly mobile river which meanders widely across its floodplain in the lower reaches. It also carries a high sediment loading and rapidly erodes and deposits river bed material.

Following the 1968 floods in East Devon, river training works were carried out on the Rivers Otter and Sid at many locations due to the extreme erosion that severely affected the river regime (see Map 10). These works were to stabilize the regime, i.e. prevent the river moving and took the form of blockstone revetment and bed-check weirs. We maintain these works as and when required and take into account conservation concerns where appropriate.

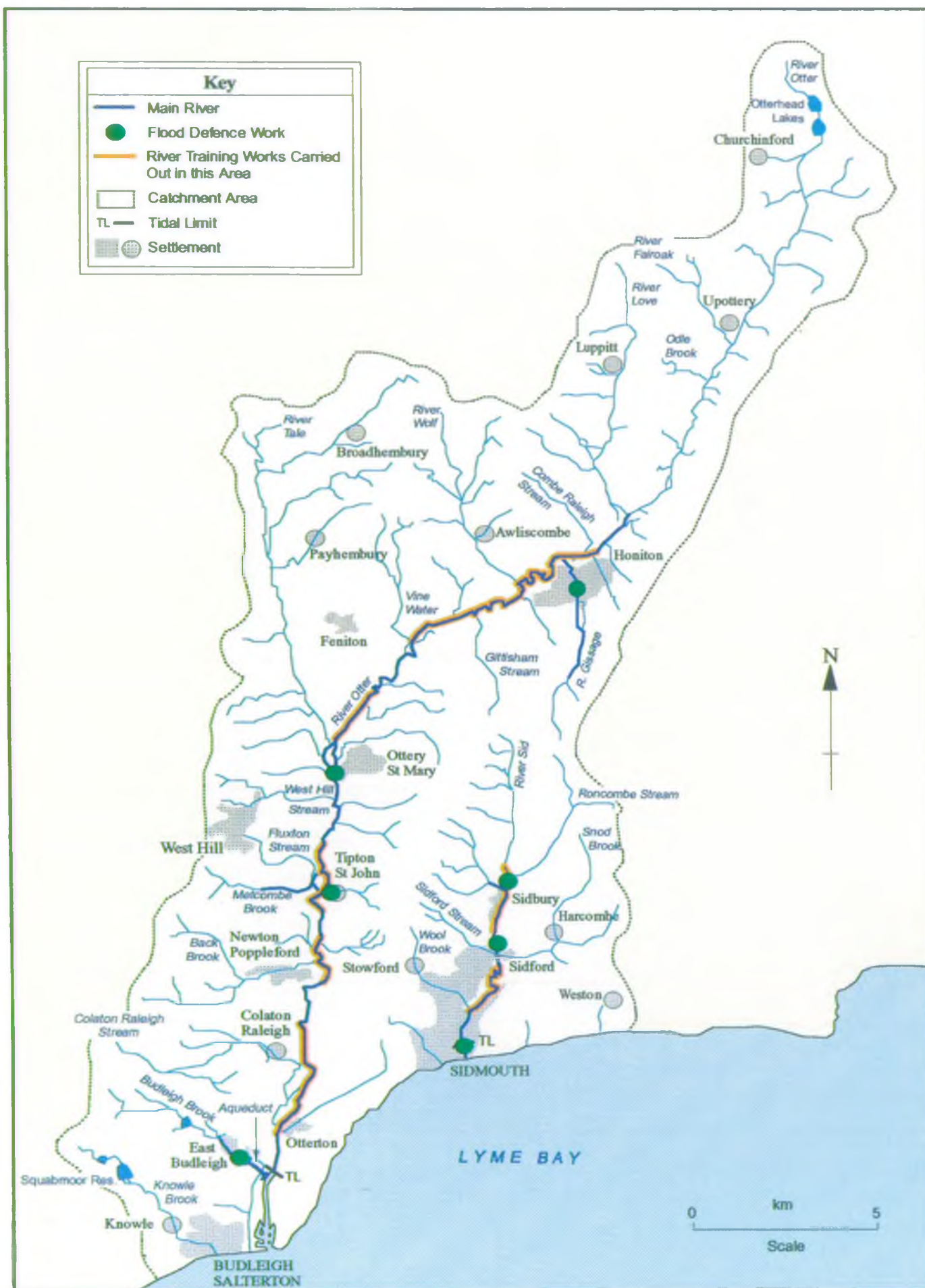
We remove tree and other debris to ensure that the channel remains clear to discharge flood flows without causing problems due to blockage.

Table 2: Flood Defence Maintenance carried out in the Sid and Otter Catchment

RIVER OTTER

Scheme	Tidal or River	Nature of Work (GC = General Clearance)
Glen, Honiton	River	GC, desilt, screen
Gissage, Honiton	River	GC, screen, desilt tunnel
Ottery St Mary	River	GC, desilt
Tipton St John	River	GC, desilt, cut grass
Budleigh Brook	River	GC, screen, desilt, cut grass, flap
Budleigh Bank	Tidal	GC, trim bank, cut grass & fall vegetation, maintain flap

Map 10 - Flood Defence



Information correct as of October 1995

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The Rivers Sid and Otter Catchment Management Plan
NRA South Western Region

CATCHMENT USES

RIVER SID

Scheme	Tidal or River	Nature of Work (GC = General Clearance)
Sidbury	River	GC, desilt
Sidford	River	GC, desilt
Sidmouth, Milford	River	GC, flood gate

CATCHMENT USES

4.5 THE BUILT ENVIRONMENT AND DEVELOPMENT PLANS

Here we consider the built environment and the process of planning and regulating the construction of new development including roads, housing and industry.

County and district planning authorities plan and control development; although they must consult the NRA they do not have to follow our advice

Our Objective

To protect the water environment from the harmful effects of development and to minimize flood risk.

The Role of the NRA

There are two main ways we can influence development:

- through the **planning** system we can assist local planning authorities to allocate land for development by commenting on local plans, identifying constraints and highlighting where the river environment can be enhanced by sympathetic development. We will continue to advise on water related issues in our comments on structure and district wide local plans
- we can advise planning authorities on the **control** of development by offering formal and informal comments to planning authorities on planning applications and development guides. We can also control some developments using our own powers, for example Land Drainage Consents.

We are also active at a higher level informing strategic planners of our environmental concerns, for example rivers affected by over abstraction or water supplies threatened by major pollution hazards.

Local authorities prepare statutory development plans. In January 1994 the NRA published guidance notes for local planning authorities on ways of protecting the water environment through development plans. The notes highlight topics that concern us and offer guidance on model policies.

Planning and Flood Risk

The Government view is that development should be guided away from areas that may be affected by flooding and should be restricted where it would increase the risk of flooding. To achieve this it expects local authorities to use their planning powers and the NRA to assist by providing advice on development and flood risk. The work that is under way now on preparing flood plans is an example of this advice (for details see Section 5.4).

CATCHMENT USES

Contaminated Land

We aim to prevent the pollution of ground and surface water from contaminated land and we have detailed our priorities in our 'Contaminated Land and the Water Environment Report' (Ref. 6). In this report we also describe some things we can do to tackle the problem. Planning authorities have powers that they can use to help identify and control the redevelopment of contaminated land. We can:

- comment on planning applications and give advice on the best way to redevelop sites
- help to identify contaminated areas
- help to ensure that the worst sites are targeted for redevelopment and clean up plans prepared
- take enforcement action if contaminated land is causing pollution.

The Environment Act 1995 (Ref. 30) provides a new legal framework for dealing with problems of contaminated land. Part II of the 1995 Act imports a Part IIA into the Environmental Protection Act 1990 (Ref. 16).

Whilst the regulation of waste under Part II of the 1990 Act will be the responsibility of the new Environment Agency, primary responsibility for identifying and assessing contaminated land is placed on local authorities. Guidance will be given to these authorities by the Secretary of State for the Environment following consultation with the Environment Agency. This guidance will form the substance of this new legislation and will determine its effectiveness.

The powers to make regulations concerning the new system of liability for contaminated land have been brought into force on 1 September 1995. The main provisions (the new Part IIA SS 78A - 78YC) have yet to be introduced. Further details will be available in due course.

Catchment Perspective

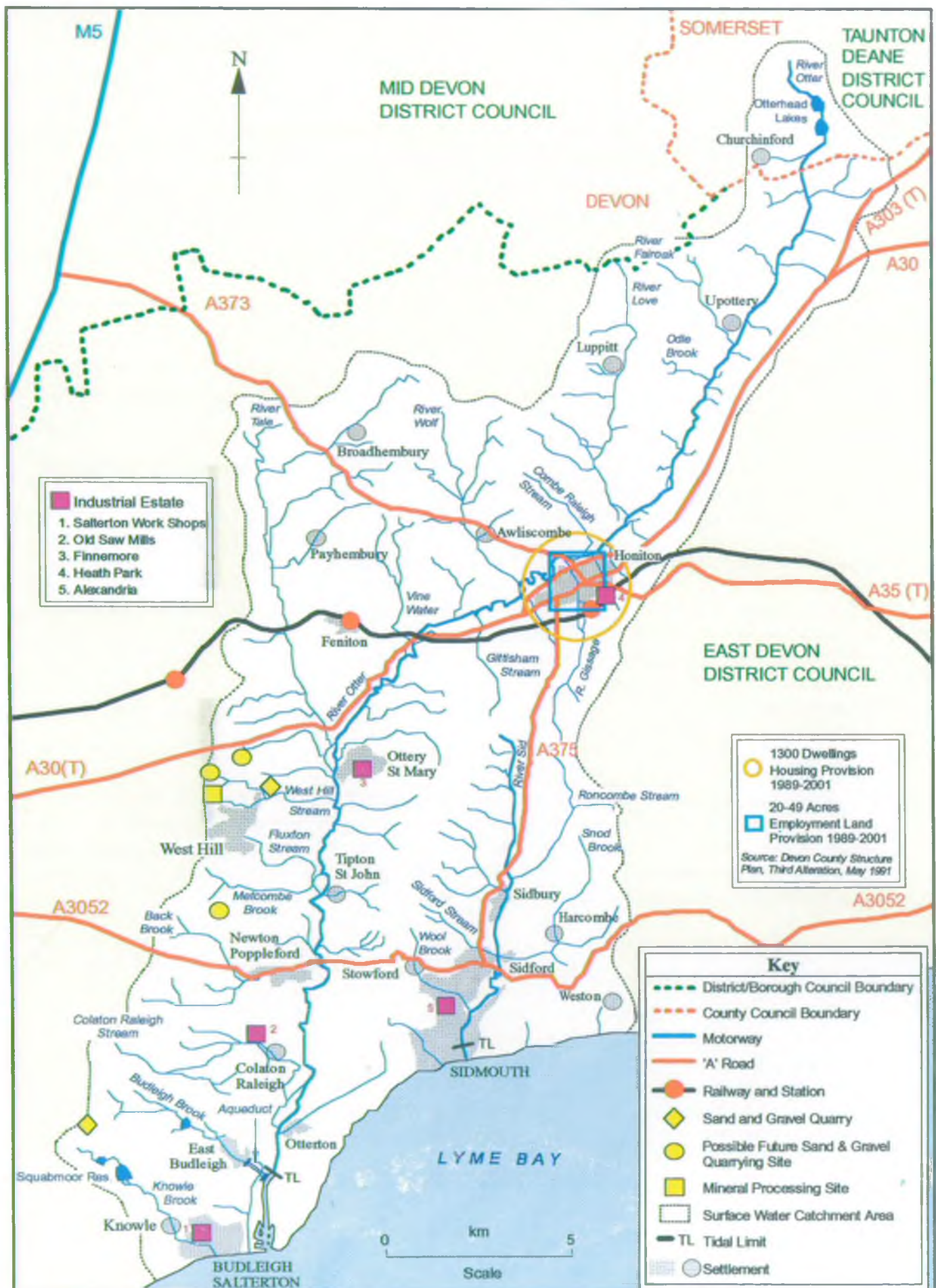
Development Plans

The regional planning guidance for the South West was published as 'RPG10' in July 1994 (Ref. 7). This guidance recognizes the need to achieve sustainable development, and aims to secure the best environmental development strategy for the region as a whole. We have taken part in the preparation of the guidance that includes advice on rivers, water supply and waste water disposal. The guidance influences the contents of county structure and local plans.

The Devon County Structure Plan 2011 provides a framework for development and land use within Devon as a whole (Ref. 8). The plan contains policies and advice to ensure the protection and conservation of the water environment for example 'Policy EN24 seeks to protect the quality of water reserves and water areas within the County, including coastal waters, and the need to take account of flood risk when considering the location of flood development.'

The Somerset Structure Plan (Ref. 9) states that 'development will not normally be permitted which will, to an unacceptable degree, prejudice the quality, quantity and availability of water in surface and underground water sources, rivers, watercourses and other storage areas'. The county structure plans in turn influence the contents of local plans.

Map 11 - Built Environment and Development Plans



CATCHMENT USES

Most of the Sid and Otter Catchment is within East Devon District Council (see Map 11), except the upper River Otter, which is in Taunton Deane District. There are currently several local plans for the catchment based on small areas e.g. Sidmouth and Honiton. These plans will be superseded by district wide local plans.

The East Devon Local Plan Consultation Draft was published in September 1994 (Ref. 10). The plan contains a good range of policies to protect the water environment and we have suggested only minor changes to the Consultation Draft. The Taunton Deane Local Plan is at a very early stage and an Issues and Options Report has been published (Ref. 11). We have commented upon this and have suggested policies for inclusion in the Consultation Draft which is expected in spring 1996.

Both planning districts within the catchment have been issued with consultation guides from the NRA (Refs. 12 & 13). These guides include specific advice on settlements where there are infrastructure deficiencies, i.e. sewerage or sewage treatment problems which could be or are affecting water quality. The guides also include advice on development within floodplains and areas liable to flooding. The guides are reviewed annually and so the details are not included here.

Roads

We are a statutory consultee to the Department of Transport when new trunk roads are developed, we also have input into road schemes proposed by the County and District Councils. The NRA is involved throughout the process, from route choice and design, through to construction. We seek to protect the water environment from adverse impacts and secure enhancement where possible through consultation.

We have powers to control highway drainage through prohibition notices and discharge consents. This allows us to insist upon measures to alleviate pollution for example, interceptors to contain accidental spillage of fuel.

The catchment has a well-developed road network which includes the A30 trunk road. This network is under increasing pressure from heavy traffic loads particularly in the holiday season. There is only one major road scheme currently planned in the catchment, a new route bypassing a section of the A30 between Clyst Honiton and Honiton. We have commented in detail on the preferred route and have raised many concerns about the possible effects on the water environment including siltation of spawning beds, deterioration of water quality and obstructions to fish movement. The plans have been modified to reduce the impact of the road. All formally consentable works associated with the plans have been agreed but formal consent has not been applied for.

A bypass for the A3052 at Sidford is proposed in Devon County Council's Highway Construction Programme to 2011. This programme is reviewed annually against available finances. If, and when a development proposal is submitted we will seek to protect the water environment in this area.

Minerals Plans

The Devon Minerals Local Plan, Consultation Draft 1994 (Ref. 14) sets out to protect mineral resources in Devon and to allow their exploitation without causing undue damage to the environment. The plan proposes Mineral Consultation Areas (MCAs) within which non-mineral development is strictly

CATCHMENT USES

controlled. This ensures that the ability to exploit important mineral resources is not lost through surface developments (but in no way presumes planning permission for mining or quarrying is likely to be approved). The plan also contains policies to protect the environment from the damaging activities of mineral extraction.

We have not objected to any of the proposed MCAs in the Devon Minerals Local Plan, but we have provided advice on areas where flooding and groundwater protection are important issues. The plan should protect the water environment but we have suggested more prominence is given to the protection of surface waters. Mineral extraction is described in Section 4.6.

Contaminated Land

The precise nature and full extent of contaminated land within any catchment is difficult to define accurately since the contamination of many sites is only realized when the sites are redeveloped or when pollution actually occurs.

All open and closed non-inert landfill sites are by definition contaminated sites, but other waste management activities may cause contamination. Current landfill management is addressed in Section 4.7. Closed waste disposal sites have been identified within the catchment, which include the following five.

South Farm Road, Budleigh Salterton

This closed council waste disposal site is on low lying marshy ground next to the tidal River Otter. Adjacent land is of national conservation value (part of a SSSI).

Dowell Street, Honiton

This closed council waste disposal site is next to the sewage treatment works and was used for spreading sludge from the works.

Claypits Farm, Ottery St Mary

The illegal disposal of soils and building wastes occurred at this site from 1983. During 1990 soils contaminated with cyanide, phenols, coal tar and lead from the old gas works at Sidmouth were deposited here. The site was identified by Devon Waste Regulation Authority and enforcement works were initiated to remove all contaminated material.

Honiton Primary School and Community College, Honiton

The playing fields between the school buildings and the A30 bypass have been previously infilled with mixed wastes to form the current surface profile. The site at present generates a low volume of leachate draining to the River Otter.

Knapps Copse

The site at Knapps Copse is discussed in detail in Section 5.1 under Groundwater Quality.

Three former gas works sites have been identified in the catchment at Ottery, Sidmouth and Honiton. Gas works sites often contain toxic metals, ammoniacal liquors, coal tars, naphthalenes and phenols arising from the former production of town gas at the sites. These contaminants can move easily into rivers and groundwater.

CATCHMENT USES

Ottery St Mary Gas Works

The former gas works is immediately adjacent to the River Otter. As part of the flood defence scheme for the town, engineering works were carried out between the site and the river. This scheme was designed to minimize the risk of pollutant release from the site during the engineering works. Monitoring has been established to assess the impact of the site on surface and groundwaters, and so assess the risk to public supply boreholes in the Otter Valley.

Sidmouth Gas Works

The old gas works at Sidmouth has been redeveloped as a car park and swimming pool although during construction there was a report of pollution into the River Sid.

Honiton Gas Works

Honiton gas works is located beside the River Gissage, a tributary of the River Otter. Seepage of contaminants from the site into the River Gissage was detected. An investigation and clean up of the site started in 1994. Service culverts constructed across the abandoned gas works may have exacerbated pollution problems from this site.

The other main potential cause of contamination within the catchment is industry, which due to the rural nature of much of the catchment is largely concentrated in Ottery St Mary, Honiton and Sidmouth. However, it should not be forgotten that a large number of activities have the potential to cause contamination, for example agriculture, petrol filling stations or even domestic heating tanks.

Flood Risk

Significant development in the catchment is generally restricted to the existing urban areas of Sidmouth, Honiton, Ottery St Mary and Newton Poppleford. There are currently two planned major developments in the catchment which affect flood defences at Ottery St Mary and Honiton.

Development of a new hospital, industrial and residential land at Ottery St Mary has been phased to run concurrent with the construction of the NRA's flood defence scheme.

Current and proposed development at Battishorne Farm, Honiton is restricted by the floodplain of the River Gissage and the inadequacies of existing road culverts beneath the A30.

A recently completed major residential development at Newton Poppleford is located within the floodplain of the River Otter but certain works, including the diversion of possible flood flows and the raising of building floor levels, have been carried out. Any further development at Newton Poppleford will be restricted by the flooding problems associated with the Back Brook. We are currently recommending refusal for any proposed development at Newton Poppleford until a scheme to alleviate the flood risk has been carried out.

We comment on the flooding and drainage implications of approximately 300 planning matters each year in the catchment.

A brief summary of flood defence and development control issues in the catchment is given in Table 3.

CATCHMENT USES

Table 3: Summary of Flood Defence and Development Control Issues in the Sid and Otter Catchment

Location	Type and Size of Development	Nature of Problem
Honiton	Residential/Major	River Gissage Floodplain and A30 Culverts
Ottery St Mary	Residential/Commercial/ Industrial/Major	River Otter Floodplain/ Surface Water Disposal
Newton Poppleford	Residential/Major	River Otter Floodplain
Newton Poppleford	Residential/Industrial/ Moderate	Back Brook Flood Risk
Sidmouth	Residential/Industrial/ Moderate to Individual	Capacity of Wool Brook
Sidford	Residential/Moderate to Individual	River Sid Floodplain
Sidbury	Residential/Individual	River Sid Floodplain upstream of FAS
West Hill	Residential/Moderate to Individual	Disposal of Surface Water

4.6 MINERAL EXTRACTION

The extraction of minerals from quarries, mines and pits for sand, gravel or clay can damage underground and surface water resources, sometimes permanently. The influence of a deep quarry which removes material from below the natural water table may extend many kilometres. Public and private water supplies and flows from springs that feed streams and rivers can be threatened when aquifers are either removed or disturbed.

Water is purified as it percolates through aquifers and surface layers of soil and rock. Removing these materials can degrade the quality of water in the aquifer and provide an easy route for pollution to reach groundwater.

The closure of a deep sub-water-table quarry does not mean that water resources will recover immediately and in some cases permanent disruption is caused. A large deep quarry may take years to fill with water to the point where springs that dried up during workings begin to flow again. Until that time pumping will usually be needed in dry weather to support river flows. Some springs may never recover because the stable lake surface in a flooded quarry may be below the highest levels of the sloping pre-quarry watertable. Using an abandoned quarry for industry or housing introduces a new risk of contamination to water resources. The open water in a quarry lake, is liable to eutrophication and other pollution by living organisms that were absent from the pre-quarry groundwater.

Our Objective

To minimize the damage that mineral extraction can do to water purity, wildlife and reserves of water held in the ground. Where possible we will steer mining and quarrying operations away from important aquifers.

The Role of the NRA

We have duties and powers to:

- ☐ control the quality of water discharged from mineral workings
- ☐ prosecute offenders if they cause pollution
- ☐ safeguard water resources.

We are involved in a range of activities:

- ☐ we monitor the changes that existing mines, quarries and pits are causing to rivers, springs, wetlands and water supplies
- ☐ many existing quarries are not subject to modern planning conditions which are designed to protect water resources. We negotiate with mineral operators to improve situations where their operations present a risk to surface water and groundwater
- ☐ we advise planning authorities on the effects that proposals for new quarries and mines may have on water resources and the water environment. When a new mineral working is proposed that may cause harm to water resources and the water environment we will object to it unless acceptable mitigation measures can be found and written into legal agreements
- ☐ wherever necessary we will attempt to secure legal agreements to protect the interests of the water environment and its users.

CATCHMENT USES

Catchment Perspective

Only two quarry sites, Blackhill and Rockbeare are currently active within the Sid and Otter Catchment. Both sites remove sand and gravel from the Budleigh Salterton Pebble Beds.

Blackhill Quarry

Planning permission to continue working minerals in the area of the current plan was granted under the Interim Development Order (IDO) legislation in 1948. Since that time four further extensions have been granted, increasing the quarry area to about 85 hectares. The quarrying operations were granted planning permission in 1972.

The outcrop of Pebble Beds and Sandstone along Woodbury Common are a major recharge area for the aquifer, which is used for public water supply abstractions. Quarrying removes the aquifer material, reducing its storage capacity. Recharge of the aquifer is also reduced if waste silt is used to backfill quarries. The 1970s planning conditions required the construction of infiltration ponds to reduce any impact on the aquifer.

Rockbeare

The Rockbeare mineral consultation Area contains three quarries (Rockbeare, Foxenhole and Venn Ottery) and a proposed Area of Search at Straitgate (see Map 11).

Rockbeare: The quarry has operated under an IDO since 1947. Mineral extraction has now ceased and the space is used for soil disposal. Planning permission has been granted for a substantial extension immediately north of the current site at Marshbroadmoor Plantation. The proposed quarry area is effectively isolated from the outcrops to the east and there should be no effect on private groundwater sources in this area.

Foxenhole: Planning permission for a gravel pit at Foxenhole was first granted in 1949, with extensions in 1964, 1975 and 1988. The reserve is expected to be worked out by 1996.

Venn Ottery: Planning permission for a 30.4 ha sand and gravel quarry was granted in 1965. Only a single strip of land has been worked and the site is not currently used.

Applications for extension or new quarries removing Pebble Bed deposit or sandstone will require supporting information quantifying the impact on water resources. We shall seek to ensure groundwater resources within the Otter Valley are safeguarded, in line with the Groundwater Protection Policy.

4.7 WASTE DISPOSAL

Here we consider the disposal of waste to land. Some wastes can form very polluting liquids - known as leachate - as they break down. Leachate can pollute water both above and below ground.

Waste disposal sites are licensed by the County Waste Regulation Authority who make sure that sites do not endanger public health, cause pollution or spoil the local area. Waste regulation authorities consult us on all applications for waste disposal or management licences. We give advice on avoiding water pollution and on the effects of some activities that are exempt from licensing controls. We have published our views on landfill in our Position Statement on 'Landfill and the Water Environment' (Ref. 15). In this statement we encourage waste minimization and recycling. Some potentially polluting wastes can be spread on farmland to improve the soil. We advise the Waste Regulation Authority on ways of protecting the water environment from this activity.

Our Objective

To prevent the pollution of ground and surface water or damage to wetlands caused by the disposal of waste to land.

The Role of the NRA

We have duties and powers to:

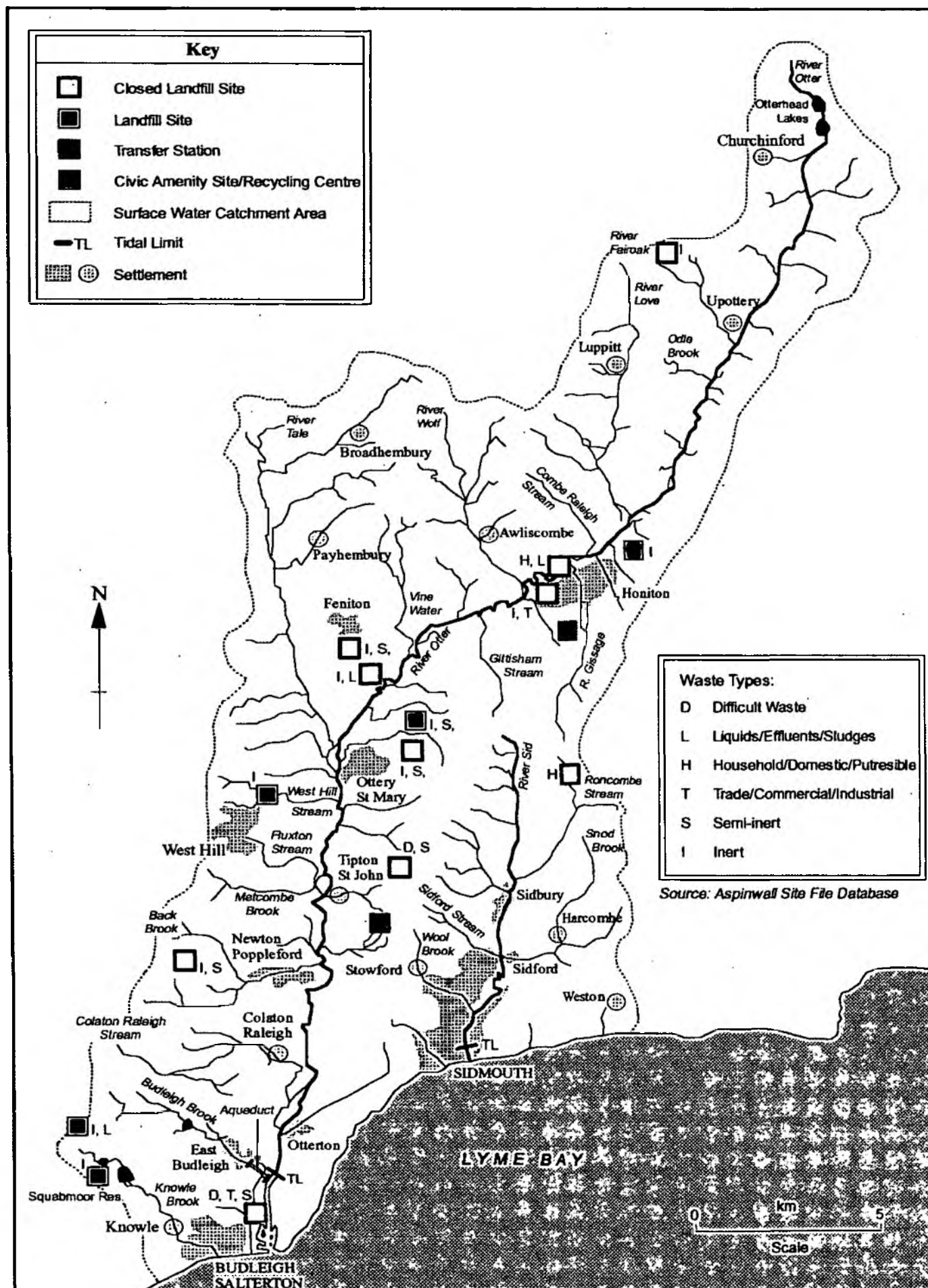
- ☐ monitor the quality of water around waste disposal sites
- ☐ take enforcement action if pollution occurs.

Our work involves a range of activities:

- ☐ we advise planning authorities to make sure that new landfill sites are put where they will not cause pollution of water by commenting on waste local plans and on individual planning applications
- ☐ we ensure that site operators make plans to monitor water and prevent pollution when they apply for a new site licence
- ☐ we help to make sure that existing sites are maintained and operated properly.

On 1 May 1994 the waste management licensing system established by the Environmental Protection Act (Ref. 16) was implemented. The legislation introduces a range of new duties on the waste regulation authorities (WRAs) and waste disposal operators. In particular, Waste Disposal Licences will become Waste Management Licences. These licences can only be surrendered where the regulating authorities are satisfied that the site no longer represents a risk to the environment and a completion certificate is issued.

Map 12 - Waste Disposal



Information correct as of October 1995

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CATCHMENT USES

Catchment Perspective

There are fifteen landfill sites, one civic amenity site and one waste transfer site in the Sid and Otter Catchment. The licence status, location and wastes accepted at these sites are shown on Map 12. There are no licensed domestic waste landfill sites within the River Sid and Otter Catchment. The unlicensed (closed) sites identified accepted inert and demolition waste. Claypitts Farm took some gas works waste (see Section 4.5). Knapps Copse is a closed domestic waste disposal site operated by Devon County Council (see Section 5.1 under Groundwater Quality).

Sewage sludge from South West Water Services Limited (SWWSL) sewage treatment works (STW) and private septic tanks and cesspools is spread to land. This is likely to increase after 1998 when the North Sea Agreement (Ref. 17) abolishes dumping sludge at sea. The location of SWWSL sludge spreading is identified on maps held by the NRA. We have been consulted over these sites to minimize the risk of pollution. These will no doubt be reviewed in light of the proposed Nitrate Vulnerable Zone.

CATCHMENT USES

4.8 FARMING

Over 80% of the land in England and Wales is farmland. The way this land is used affects the quality of our water environment. We are concerned about the pollution of surface and groundwaters from animal wastes, fertilizers and pesticides. Soil erosion, land drainage and stock damage to riverbanks can also lead to problems. A sustainable farming system that conserves the soil and minimizes and recycles wastes will reduce the risk of damage to the water environment.

Our Objective

To protect the water environment from potentially damaging farming activities and encourage agricultural practices that improve the water environment.

The Role of the NRA

There are a limited number of ways we can influence how farmers use land. However, we can control and prevent pollution in the same way as we do with any other industry. Other agencies such as MAFF can encourage sensitive farming practices using financial incentives. We urge farmers to target land management agreements such as those available in ESAs or through the Farm Woodland Grant Schemes and the Countryside stewardship scheme to help create buffer zones along river corridors. Buffer zones could restore waterside features such as ponds, wet grassland and woodland.

We have duties and powers to:

- ☐ prevent and control pollution
- ☐ regulate the abstraction of water for use on farms
- ☐ supervise matters relating to flood defence.

Our work involves a range of activities:

- ☐ we assess the impact of farming on water quality
- ☐ we promote the designation of water protection zones and stopping certain activities within them (Nitrate Sensitive Areas are an example of this)
- ☐ we inspect farms so that pollution can be prevented. ADAS also provide free pollution advice to farmers on behalf of MAFF. We promote the MAFF Codes of Good Agricultural Practice and we are developing best practices to prevent pollution from the storage and disposal of farm wastes, and from the management of farmland
- ☐ we enforce the Silage, Slurry and Agricultural Fuel Oil Regulations which set minimum standards for some storage facilities on farms
- ☐ we educate farmers and the public about the pollution problems caused by farming
- ☐ we maintain some parts of the river system to provide flood defence for agricultural land
- ☐ we are developing water level management plans for environmentally important sites on 'main river'
- ☐ we provide flood warning to mitigate damage to property and risks to stock.

Catchment Perspective

Land Use

Agricultural land accounts for almost 80% of the catchment area (36,912 ha in 1994, MAFF statistics); this area has declined by 2% since 1984. Figure 3 shows the agricultural land use changes between 1984 and 1994. Grassland dominates making up some 75% of the agricultural land, most of which is long term grassland (> 5 years). Farm woodland has shown the largest change over this period, increasing by over 31%; largely due to the introduction of the MAFF Woodland Grant Scheme and the Farm Woodland Premium Scheme.

Livestock farming dominates in the catchment (see Map 13). Dairy farming is by far the most important farm type with some 220 holdings; cattle and sheep farming is less important with only 80 holdings. Between 1984 and 1994 dairy farming (number of specialist dairy farms) declined by over 30%, due to many factors, including the introduction of milk quotas, tighter pollution regulations and a difficult economic climate. Partly as a result of this decline, and partly due to the lower capital costs involved, cattle and sheep farms increased by 23% over this period.

Pollution Risk

Livestock farms in the catchment have been and continue to be a major source of pollution incidents. Although recent improvements in waste storage and handling facilities, largely supported by MAFF grant aid, as a result of NRA farm visits, has caused a significant drop in the number of polluting discharges and improved water quality (see Table 7, Section 4.11). This grant aid has now ceased, which is likely to affect future waste management on farms. However, grant aid may be available in the future for farms within the proposed Otter Valley Nitrate Vulnerable Zone (NVZ) around Colaton Raleigh shown on Map 13. This zone is one of a number of NVZs being designated in the South Western Region to meet the requirements of the EC Nitrates Directive (Ref. 24) (see Section 5.1 under Groundwater Quality).

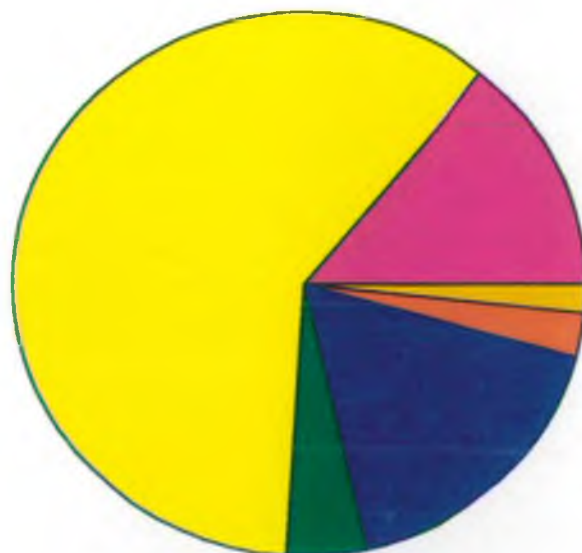
Farms in the catchment have been visited during winter 1994/1995. Seven farms in the River Sid Catchment and twenty-three farms in the River Otter Catchment were found to be polluting or having the potential to pollute. All those farms identified have been revisited and remedial action is under way.

We urge farmers within the ESA, shown on Map 13, to take advantage of the scheme and to consider targeting land management agreements to protect the water environment. A good example would be to target less intensive use of grassland along river corridors in order to create buffer zones.

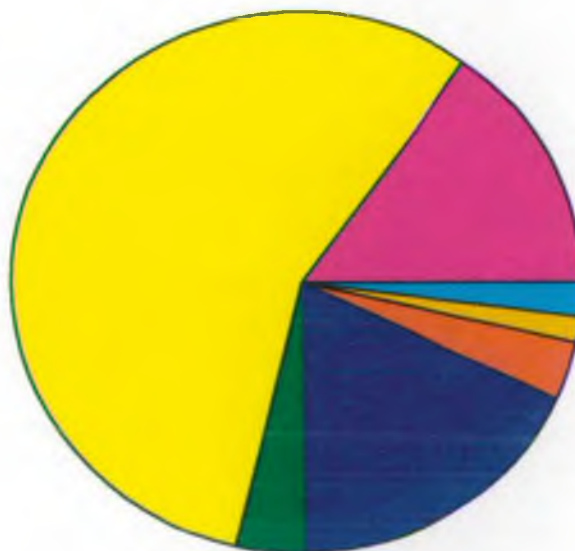
The area of maize grown in the catchment, as feed for dairy cattle, has increased in recent years from 253 ha of maize (21 holdings) in 1989, to 798 ha (76 holdings) in 1994 (MAFF statistics). Weeds are controlled in maize fields with the persistent herbicide, atrazine. Low concentrations of atrazine have been detected in the groundwater of some boreholes used for public water supplies (see Section 5.1 under Groundwater Quality). Atrazine has been banned for concentrated use as a weed killer e.g. beside railways and roads.

We have worked with local farmers, Clinton Devon Estates and the Maize Growers' Association to try and reduce the amount of atrazine used. The local farming community have co-operated and in particular have used alternative herbicides. Clinton Devon Estates are also trying out a non-chemical approach to weed control: an inter-row cultivator for hoeing.

Figure 3 - Agricultural Land Use Changes 1984 - 1994



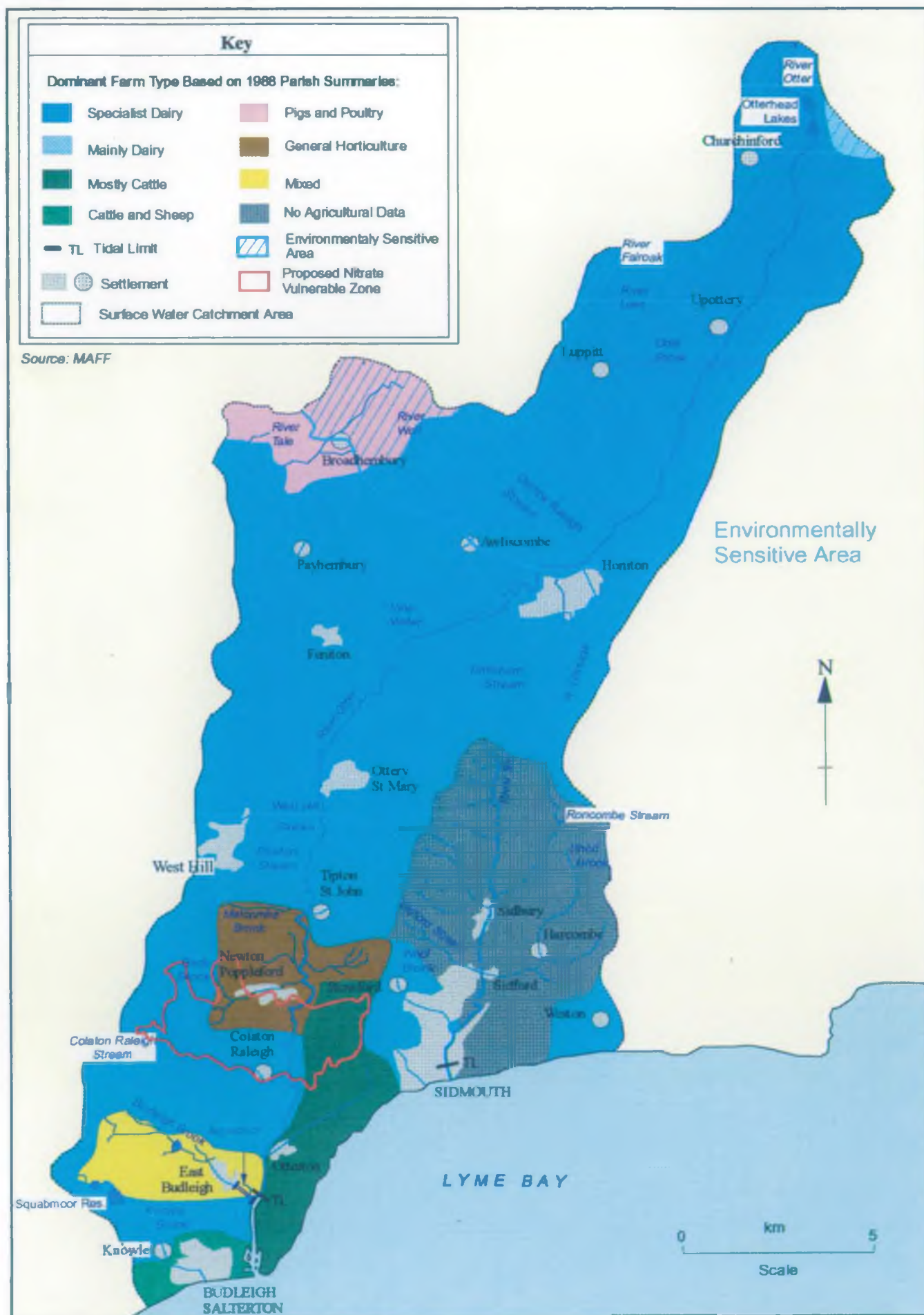
Total Agricultural Area
1984 (37,690 ha)



Total Agricultural Area
1994 (36,912 ha)



Map 13 - Farming



CATCHMENT USES

Soil Erosion

Free range pig farming has expanded and is causing serious soil erosion in the mid and lower River Otter Catchment, particularly around East Budleigh. Where this occurs adjacent to watercourses it has resulted in some high suspended solid loads, which may pose a threat to spawning gravels in the area (see Section 5.3).

4.9 FORESTRY

Well-managed woodland in the right places does not harm the water environment and will often bring benefits. However, in some circumstances woodland planting and management can cause problems. Acidification, soil erosion, pollution, water yield (evapo-transpiration balance), increased flood risk (planting in the flood plain) and damage to wildlife habitats concern us in some parts of England and Wales. However, in the South Western Region the planting and management of new woodland does not usually cause problems for the water environment.

The Forestry Authority regulates forestry in the UK by using felling licences for some operations and providing grant aid through the Woodland Grant Scheme. The Forestry Authority has published a series of guidelines on forests and; water, nature conservation, landscape design, archaeology and recreation. The guidelines encourage environmentally sympathetic planting, management and harvesting. The Farm Woodland Premium Scheme operated by MAFF also provides grant aid for new woodlands on farms.

Our Objective

To encourage forestry practices that improve the water environment and to protect the water environment from the negative effects of forestry activities.

The Role of the NRA

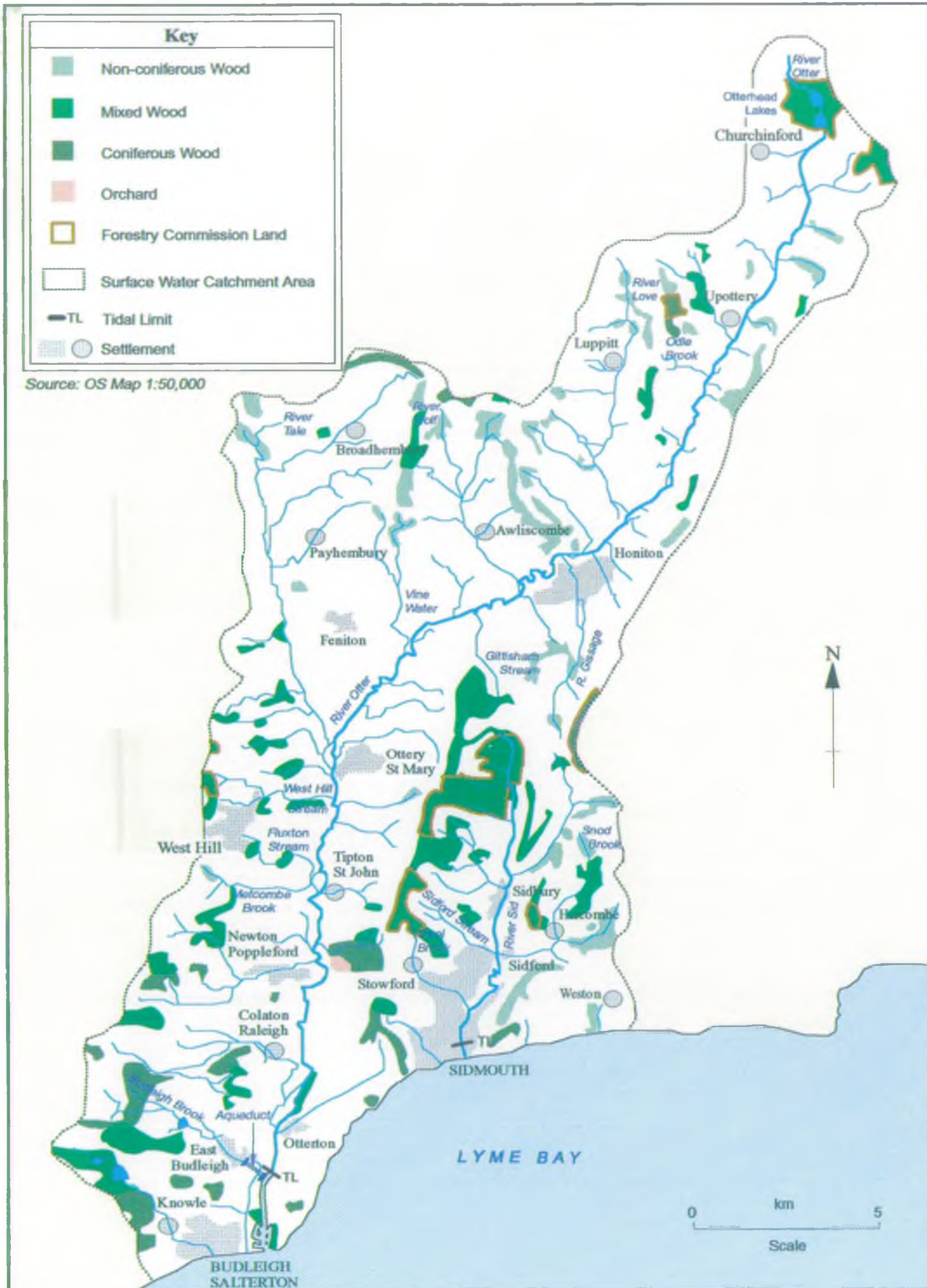
We have duties and powers to:

- ☐ regulate some forestry works using land drainage legislation
- ☐ deal with pollution incidents.

Our work involves a range of activities:

- ☐ we work with the Forestry Authority and local authorities to ensure that the most significant forestry schemes consider effects on the water environment. We welcome the opportunity to comment on these schemes and on Indicative Forestry Strategies where they are being developed
- ☐ we identify areas that might be sensitive to the planting of forests to the Forestry Authority, Forest Enterprise and local authorities
- ☐ significant planting within the 'main river' floodplain needs the consent of the NRA under land drainage byelaws. With the Forestry Authority we are looking at the prospects for new floodplain woodlands in the lowlands of England and Wales and considering their potential impact on flood storage
- ☐ we are promoting the Forest and Water Guidelines (Ref. 18) with NRA staff and developing 'best practice' techniques further through our research and development programme
- ☐ we are working with the Forestry Authority to improve the way we consider the environmental impact of proposed forestry schemes. At the moment only new planting schemes require an Environmental Impact Assessment but large-scale woodland management activities can cause as much damage to the water environment as new planting schemes.

Map 14 - Forestry



CATCHMENT USES

Catchment Perspective

Woodland covers approximately 21% of the catchment. This comprises mixed (59%), broadleaved (24%) and coniferous woodland (17%). There are approximately 1315 ha of farm woodland (MAFF statistics, 1992) in the catchment, which increased by 31% between 1984 and 1994.

Forests and woodland are widely distributed across the catchment, with the largest examples occurring in the East Hill area on the higher ground between the River Sid and River Otter Catchments (see Map 14). Most of the woodland in this area is owned by the Forestry Commission and managed by Forest Enterprise. Significant areas of both deciduous and coniferous woodland also occur around the Otterhead Lakes. The deciduous woodland in this area is of particular importance as it acts as a buffer to the lakes, and consequently the River Otter, from the effects of agricultural pollutants.

There are no designated acid sensitive areas in the catchment. Forestry is not considered to affect the total water resources of the catchment.

Forestry management in this catchment does not generally cause problems for the water environment. We do not consider current forestry management activities in this catchment a high priority for consultation.

Future forestry development is unlikely to be significant, although the increase in farm woodland is likely to continue, encouraged by the MAFF Woodland Grant scheme. We should like to be consulted on any future planting schemes which could affect the water environment.

CATCHMENT USES

4.10 WATER ABSTRACTION AND SUPPLY

Here we consider the abstraction of water from the surface or below the ground for public water supply, industry, and other uses such as hydropower and fish farming.

Our Objective

To manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.

The Role of the NRA

Our management of water resources is guided by European Union and UK legislation. We have duties and powers to:

- ☐ ensure water is used properly, regulating abstractions using licences
- ☐ conserve water supplies and protect them from over-use.

Our work involves a range of activities:

- ☐ we enforce abstraction licence conditions to protect the water environment and the rights of other abstractors
- ☐ we are working on a system for mapping the availability of groundwater
- ☐ we are developing and implementing a consistent approach to determining licences
- ☐ we are working on ways of defining acceptable river flows to help us determine licences
- ☐ we support selective domestic metering where resources are stressed
- ☐ we define groundwater protection zones and publish groundwater vulnerability maps to protect resources from development and pollution risks.

Catchment Perspective

Licensed Abstractions

Water is abstracted from the catchment for public water supply and for private uses such as domestic use or supplies for industry, agriculture, fish farming, hydropower and amenity purposes.

The mixed hydrogeology of the catchment is reflected in the numbers and type of licensed abstractions (see Table 4). The northern part of the River Otter and most of the River Sid flows over impervious mudstones whilst the southern half of the Otter is underlain by the Otter Sandstone, which is an important aquifer. As a result both surface and groundwater abstractions are significant in these river basins.

CATCHMENT USES

Table 4: Numbers and Type of Licensed Abstractions

Source	No of licences	Licensed quantity M1/year
Groundwater	435	14992
Surface water	28	10733
Total	463	25725

Consumptive and Non-consumptive Abstractions

Consumptive abstractions use most of the abstracted water with little returned to the original point of abstraction. Examples are public water supply, industrial processing or evaporative cooling. Non-consumptive abstractions use only a fraction of the quantity of water abstracted and return the remainder to the vicinity of the abstraction point. Examples of non-consumptive abstractions are fish farms, water power schemes and amenity features such as ornamental lakes.

Almost all of the water licensed for abstraction from groundwater is for consumptive use (99.5%). Non-consumptive abstractions account for nearly 80% of the total authorized from surface water (see Figure 4).

Public Water Supply

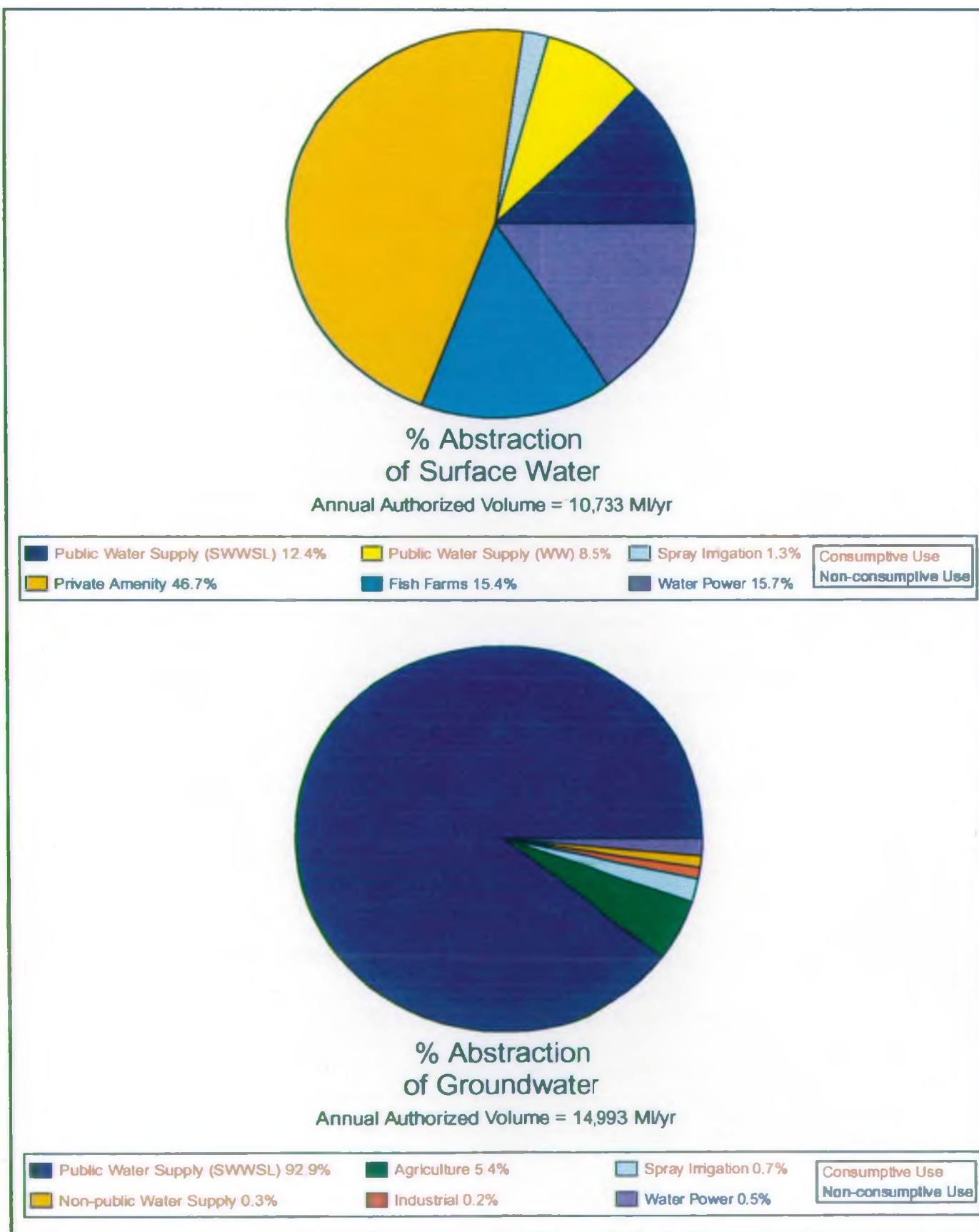
Most of the water abstracted in this catchment is for public water supply. Water is taken both from the ground and from rivers. Two companies supply water from sources within the catchment; South West Water Services Limited (SWWSL) and Wessex Water Services Limited (WWSL). WWSL operate one licensed source in the catchment whilst SWWSL operate thirteen licensed sources (see Table 5).

Table 5: Public Water Supply Licences

	South West Water Services Ltd			Wessex Water Services Ltd		
	Surface	Groundwater	Total	Surface	Groundwater	Total
No of licences	2	11	13	1	0	1
Volume M1/yr	1328	13928	15256	909	0	909

Both water companies currently abstract about two-thirds of their annual licensed maximum (volume) for sources in this catchment. **Five SWWSL licences have conditions attached:** three licences have prescribed flow conditions which restrict abstraction when river flow falls below a specified value; one licence has seasonal conditions which restrict abstraction during specified periods of the year; and one licence has a water level condition which restricts abstraction when the water level in an indicator borehole falls to a specified level.

Figure 4 - Abstraction Statistics



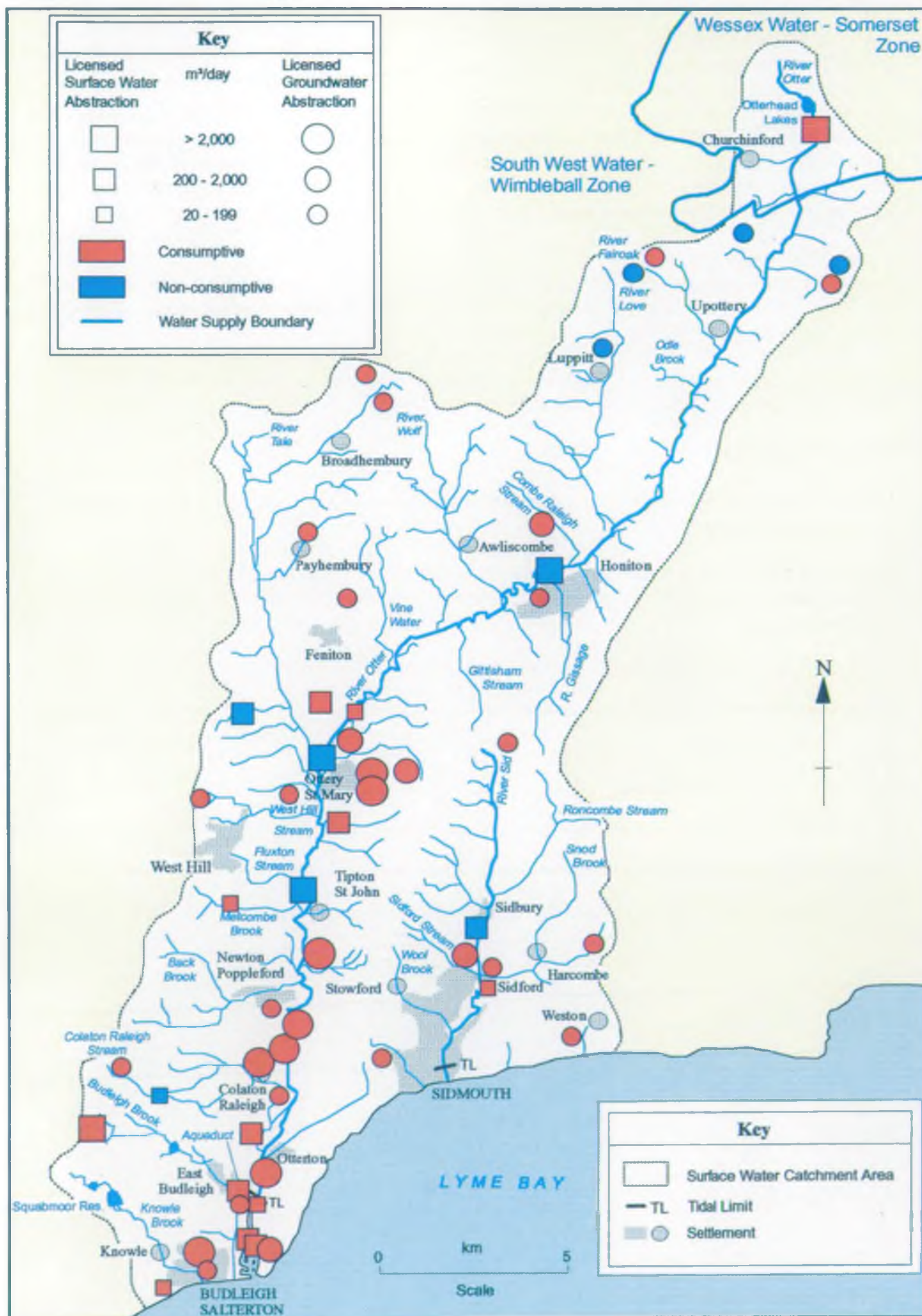
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The Rivers Sid and Otter Catchment Management Plan

NRA South Western Region

Map 15 - Water Supply Abstraction



CATCHMENT USES

South West Water Services Limited

The Sid and Otter Catchment lies within SWWSL's Wimbleball Strategic Supply Zone (see Map 15). The sources in this catchment are part of a reasonably integrated supply network but are used mainly to meet local demands in Exmouth, Seaton and Sidmouth. Water can also be imported into the supply network in this catchment from other sources within the Wimbleball Supply Zone outside this catchment. For example SWWSL can transfer treated water from their water treatment works near Tiverton.

Wessex Water Services Limited

The single source operated by WWSL in the catchment at Otterhead lake provides water to meet a small part of demand in WWSL's Somerset Supply Zone, which lies to the north of the catchment. This water is returned to the River Tone and so is lost from the River Otter Catchment.

The impact of public water supply abstractions on this catchment and the implications of an increase in demand are discussed further in Section 5.2.

Private Water Supply

Water is abstracted for a variety of private uses in the catchment including domestic supply, agriculture, spray irrigation, industry and amenities such as ornamental ponds.

Most of the water is taken from rivers and streams although these abstractions account for just 6% of the total number of licences. Private groundwater abstractions, although greater in number, tend to be for small amounts (see Table 6).

Table 6: Non-public Water Supply Abstractions.

Source	No of licences	Licenced quantity M1/yr
Groundwater	424	1064
Rivers and Springs	25	8496
Total	449	9560

The impact of non public water supply abstractions on this catchment is discussed in Section 5.2.

4.11 EFFLUENT DISPOSAL

Here we consider the disposal of effluent directly to rivers, estuaries, the sea or into the ground. Effluent includes sewage, industrial and farm wastes. We regulate the disposal of effluent by issuing consents to control discharges and by taking action if a river is accidentally polluted.

Rivers can render the main constituents of many effluents harmless by natural processes, providing that effluent disposal is properly controlled.

Our Objective

To protect the water environment from harm caused by the disposal of effluent and allow the widest possible use to be made of rivers.

The Role of the NRA

We have duties and powers to:

- ☐ authorize discharges through a system of consents. It is illegal to discharge sewage effluent or trade waste without the consent of the NRA. We consider applications for consent to discharge on a case by case basis and can refuse to consent a discharge if it will cause an unacceptable deterioration in water quality
- ☐ check discharges to see if they comply with consent standards. We may prosecute dischargers if they do not comply with consent conditions
- ☐ prevent illegal discharges
- ☐ influence investment in sewerage and sewage treatment by the water companies (see section below on **Improvements to SWWSL Discharges**).

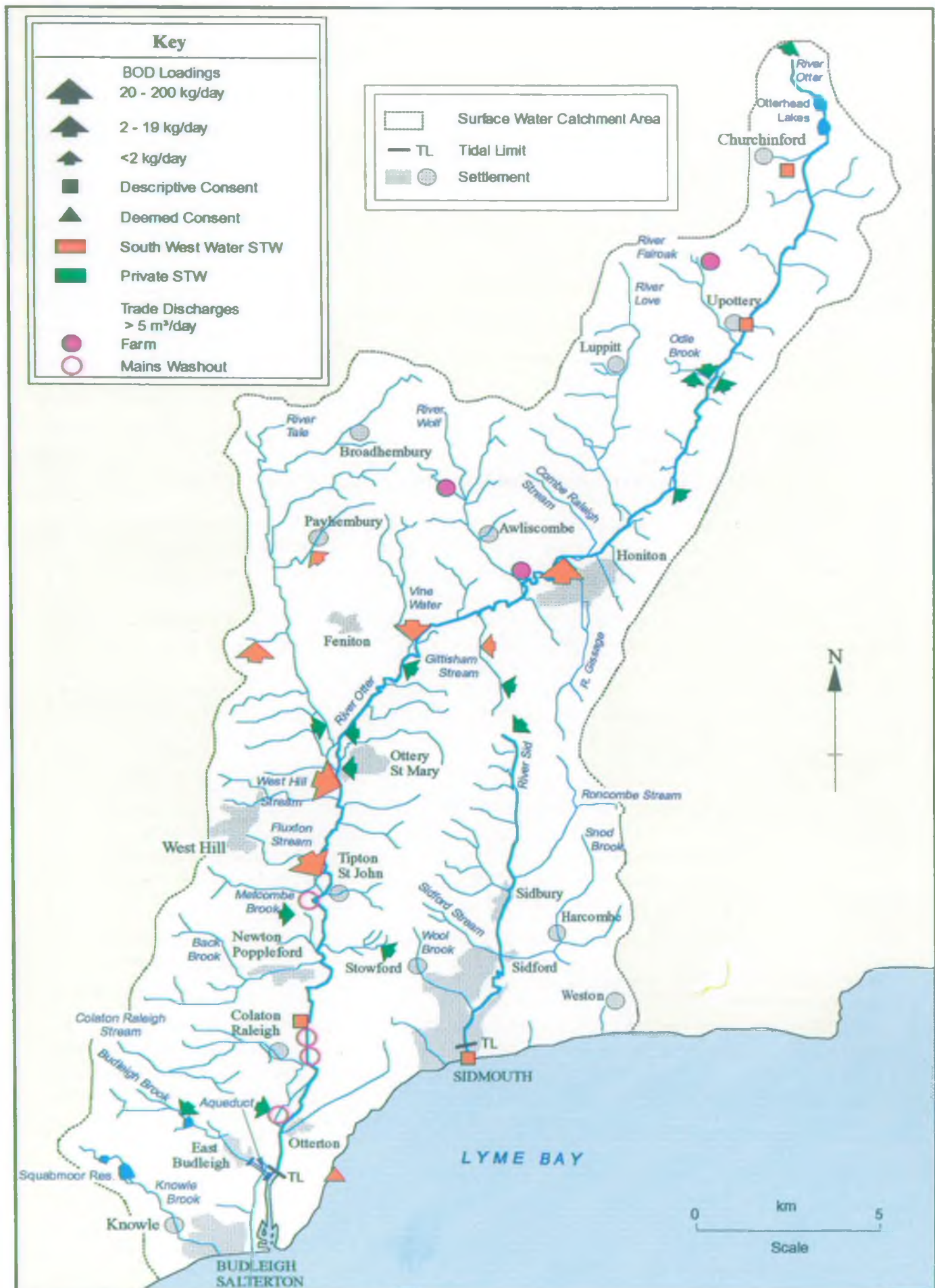
We are involved in a range of activities:

- ☐ we work with planning authorities to control development where the sewerage or sewage treatment system is overloaded
- ☐ we liaise with trade dischargers, farmers and SWWSL, carry out regular site inspections and monitor discharge quality
- ☐ we constantly review and develop our approach to water sampling.

Improvements to SWWSL Discharges

Improvements to South West Water Services Limited's (SWWSL) discharges over the next ten to fifteen years are subject to available funding approved by OFWAT, the water industry's economic regulator. A Strategic Business Plan, (Asset Management Plan 2 (AMP2)), for these schemes was developed based on guidelines agreed between the NRA, Department of the Environment (DoE), Water Services Companies and OFWAT. The plan was submitted to OFWAT early in 1994.

Map 16 - Effluent Disposal



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CATCHMENT USES

In order of priority, schemes included are:

- 1) schemes required to meet and maintain **current** EC and domestic statutory obligations
- 2) schemes required to meet and maintain **new** EC and domestic statutory obligations
- 3) schemes which already have been separately justified, required to maintain river quality relative to the 1990 NRA survey of water quality or to achieve river or marine improvements.

OFWAT declared the associated customer charging base in July 1994. At the end of July 1995 the Monopolies and Mergers Commission published their review of SWWSL's AMP2 programme. The NRA shall be seeking confirmation with SWWSL on the timing and details of the schemes outlined below.

Catchment Perspective

We estimate that the total consented organic load (expressed as the Biochemical Oxygen Demand (BOD)), which can be discharged directly to rivers in the River Otter Catchment, from numerically consented sewage treatment works (STWs) owned by SWWSL is approximately 125 kg/day (during dry weather flows).

There are no SWWSL consented STWs discharging to the River Sid Catchment. Less than 5 kg/day is from private STWs and the load from trade effluent is small (see Map 16).

The discharge from Honiton STW has a consented dry weather BOD load of 46.7 kg/day and is the largest in the catchment. The second largest is from Ottery St Mary (Fluxton) STW with a load of 33 kg/day.

A number of combined sewer overflows (CSOs) discharge to the Sid and Otter Catchment. As some of these cause problems with debris, screening and weir adjustments have been installed, for example those at Honiton. However, the premature operation of some CSOs is still of concern, in particular on the River Sid at Sidmouth and on the River Otter at Ottery St Mary.

Two STW discharges, Churchinford and Otterton, and the outfall at Sidmouth need improvement under the appropriate treatment provision of the EC Directive on Urban Waste Water Treatment (see Section 5.1). Improvements to the outfalls at Sidmouth and Budleigh Salterton are also discussed in more detail in Section 5.1.

Table 7 summarizes the data on reported pollution incidents for the catchment.

The discharge from Churchinford STW will be relocated to the River Otter. A numeric consent will shortly be issued for Churchinford STW, which currently has a descriptive consent but receives effluent from a population of over 250.

Combe Raleigh is a SWWSL STW with a descriptive consent which serves a population of greater than 250. We intend to review the consent to replace the descriptive with a numeric one.

CATCHMENT USES

Table 7: Reported Pollution Incidents in the Rivers Sid and Otter Catchment (1992-1994)

Origin of Pollution	No. of Incidents		
	1992	1993	1994
Farm - Cattle	14	18	27
Farm - Other	21	24	34
Public Highway	9	5	8
Water Treatment	7	1	2
Sewage Collection/Treatment Unit (inc. sewers)	42	38	27
Industrial	16	11	12
Misc./Other	17	17	10
Unknown	6	13	14
Total	132	127	134

Note:

Farm - Cattle includes; cattle slurry store, cattle manure (solids) store, cattle yard, dairy parlour, cattle grazing land.

Farm - other includes; spraying to land (land runoff), farm drainage, silage liquor, solid waste, yard washing, farm drainage, arable land, pig farms, fish farms, mechanical plant/equipment.

Public Highway includes; road accidents, surface runoff, road construction/maintenance.

Water Treatment includes; water treatment works, treated water distribution.

Sewage Collection, Treatment Unit/Sewers includes; works plc. & private, septic tanks, cess pits, surface water sewers, all storm overflows, all sewerages, all pumping stations, cross-country pipeline, outfalls.

Industrial includes; abattoirs, timber, quarrying/mineral industries, building sites, refuse/waste disposal, landfill, milk produce, dairies, tips, paper and printing, textiles, process water, acid processes (chemical industry).

Misc./Other includes; algae, foam (natural), fire fighting, surface runoff, vehicle washing, boat/ship.

5. TARGETS AND STATE OF THE CATCHMENT

5.1 WATER QUALITY

We aim to maintain and, where appropriate, improve the quality of water for all those who use it. We achieve this by setting water quality targets for the catchment based on:

- River Quality Objectives to protect recognized uses
- standards laid down in EC Directives
- international commitments to reduce the amount of Annex 1A substances entering tidal waters.

In this section, we report on the state of the catchment by comparing existing water quality with relevant water quality targets. We have identified issues where targets are not being achieved and action is needed to improve water quality.

River Quality Objectives

The water quality targets that we use in all rivers are known as River Quality Objectives (RQOs). RQOs are used for managing water quality and are based on the River Ecosystem (RE) classification scheme. The River Ecosystem scheme is made up of five water quality classes; RE1 to RE5 (see Appendix 2). These classes reflect the chemical quality needed by different types of river ecosystem including the types of fishery they can support. The RE classification scheme replaces the National Water Council (NWC) system that was previously used by the NRA.

Wherever possible we set RQOs that reflect historical RQOs based on the NWC system. However, RQOs must be achievable and sustainable based on the need to protect current water quality and available investment to improve water quality including for example through SWWSL's AMP2 investment programme.

Where we are unable to set RQOs that reflect historical RQOs based on the NWC system, where possible, we will set long term RQOs which we would like to achieve but for which there are currently no resources available. We will use these long term RQOs as a basis for setting consents for new discharges and planning for future water quality improvements.

In some cases the historical RQOs based on the NWC scheme are unachievable, for example where major land use changes would be required to improve water quality. In these cases we will set RQOs that reflect current water quality. This will ensure that resources to improve water quality are targeted at those parts of the catchment where water quality can be improved.

RQOs for the River Sid and Otter Catchment

The RQOs based on the RE classification that we are proposing for the Sid and Otter Catchment are shown on Map 17. We propose that these RQOs should all apply from 1 January 1996.

There is one stretch of the Sid and Otter Catchment, the River Gissage, where we are proposing an RQO more stringent than the historical RQO based on the NWC system.

In addition to these RQOs we are proposing long term RQOs for stretches of river where there is a need for further improvements in water quality to protect use, particularly the spawning areas of salmonid fish. These long term RQOs are shown in Table 8 and on Map 17.

Map 17 - Compliance with Proposed River Quality Objectives



TARGETS AND STATE OF THE CATCHMENT

Table 8: Long Term River Quality Objectives

River	Stretch	Long Term RQO	Reason
Otter	Reservoir outflow to Hoemore Farm	RE1	To protect salmonid spawning areas
Otter	Hoemore Farm to Rawridge	RE1	To protect salmonid spawning areas
Otter	Rawridge to Clapper Lane Bridge	RE1	To protect salmonid spawning areas
Love	Source to confluence	RE1	To protect salmonid spawning areas
Sid	Roncombe Stream	RE1	To protect salmonid spawning areas and to continue recent water quality improvements

There is one stretch of the River Otter, from Weston to upstream of Ottery St Mary STW, where we are proposing an RQO which is less stringent than the historical RQO based on the NWC scheme. Further improvements to water quality in this part of the catchment could not be made without substantial land use changes, therefore we have proposed an RQO to protect current water quality.

State of the Catchment

Much work has been carried out in the River Otter catchment by the NRA in recent years to improve water quality. The farming community, in particular have done much to secure these improvements. However, there is a need for further improvements in certain parts of the catchment.

Compliance with RQOs

Map 17 also shows where current water quality fails to meet its RQO. This assessment is based on three years of routine monitoring data from the Public Register collected between 1992 and 1994. We have shown failures to meet RQO as "significant" and "marginal" failures. Significant failures are those where we are 95% certain that the river stretch has failed to meet its RQO. Marginal Failures are those where we are between 50% and 95% certain that the stretch has failed to meet its RQO.

Of the 15 monitored river stretches in the Sid and Otter catchment there is one stretch, the River Gissage, which marginally fails to meet its RQO. Water quality has recently improved significantly through actions to control urban drainage problems, storm sewer overflow operation and farm discharges. Recent data shows that the River Gissage now complies with its RQO.

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Compliance with Long Term RQOs

Water quality fails to comply with long term RQOs in the five stretches listed in Table 8. We will be carrying out work over the next 5 years to secure further improvements in water quality to ensure that these long term RQOs are sustained. In addition, in the stretch of the River Otter from the reservoir outlet to Hoemore Farm, investment at Churchinford STW is required to secure achievement of RE1. There is currently no funding available for these improvements in SWWSL's AMP2 investment programme.

Issue: 1 Failure to meet long term RQOs.

EC Directives

There are five EC Directives that currently apply to the catchment. The designated stretches and sites are shown on Map 18.

EC Bathing Waters Directive Target

The Bathing Waters Directive 'concerning the quality of bathing water' (Ref. 19) protects the environment and the health of bathers using identified bathing waters by reducing pollution entering identified bathing areas. The Directive contains standards for microbiological, physical and chemical parameters (see Appendix 3) which are used to assess bathing water quality. Compliance is assessed mainly by standards for bacteria (total and faecal coliforms) that are commonly found in sewage.

We are responsible for monitoring the quality of identified bathing waters and providing the results to DoE who decide whether the standards in the Directive have been met. Where identified bathing waters fail to meet the Directive, we are responsible for identifying sources of pollution that are causing failures, and making sure that improvements are made.

State of the Catchment

There are four identified Bathing Waters in the Sid and Otter Catchment; Sidmouth (Town), Sidmouth (Jacobs Ladder), Ladram Bay and Budleigh Salterton.

Table 9 shows when failures have been recorded.

Table 9: Recorded Failures at EC Identified Bathing Waters

Bathing Water	Year
Sidmouth (Town)	1994
Budleigh Salterton	1987 1993 1994

Non-compliance at Sidmouth (Town) bathing water in 1994 was caused by bacteria from both the River Sid and the Sidmouth Outfall. The effluent quality from the Sidmouth Outfall will be improved under the provisions of the Urban Waste Water Treatment Directive by SWWSL using the AMP2 investment programme. This investment should bring about improvements in bathing water quality at Sidmouth (Town).

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Issue 2: Bathing beach failure at Sidmouth Town

Failures in bathing water quality at Budleigh Salterton can be caused by three factors: an unsatisfactory SWWSL continuous discharge to the sea at Otterton Ledge; combined sewer overflow (CSO) discharges to the Kersbrook Channel; and bacterial loadings from the River Otter and maybe from the River Sid. Improvements to the discharges of the first two factors have been carried out by SWWSL as part of the Exmouth scheme; sewage from Budleigh Salterton, Exmouth and Lymptone is now treated at the new STW at Exmouth. CSOs discharging to the Kersbrook Channel will operate less frequently and the existing outfall at Budleigh (Otterton Ledge) is now a CSO.

Issue 3: High bacterial loads in both the Rivers Sid and Otter affect bathing beach quality

EC Dangerous Substances Directive Target

The Dangerous Substances Directive 'on pollution caused by certain substances discharged in the aquatic environment of the community' (Ref. 20) protects the water environment by controlling discharges that contain harmful substances to rivers, estuaries and coastal waters.

This Directive describes two lists of compounds. List 1 contains substances regarded as particularly dangerous because they are toxic, they persist in the environment and they bioaccumulate. Discharges containing List 1 substances must be controlled by Environmental Quality Standards (EQSs) issued through Daughter Directives (see Appendix 4). List 2 contains substances which are considered to be less dangerous but which can still have a harmful effect on the water environment. Discharges of List 2 substances are controlled by EQSs set by the individual Member States (see Appendix 4).

We are responsible for authorizing, limiting and monitoring dangerous substances in discharges. We are also responsible for monitoring the quality of waters which receive discharges containing Dangerous Substances and reporting the results to DoE who decide whether the standards in the Directive have been met. Where the requirements of this Directive are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

State of the Catchment

There are no designated List 1 discharges in the catchment.

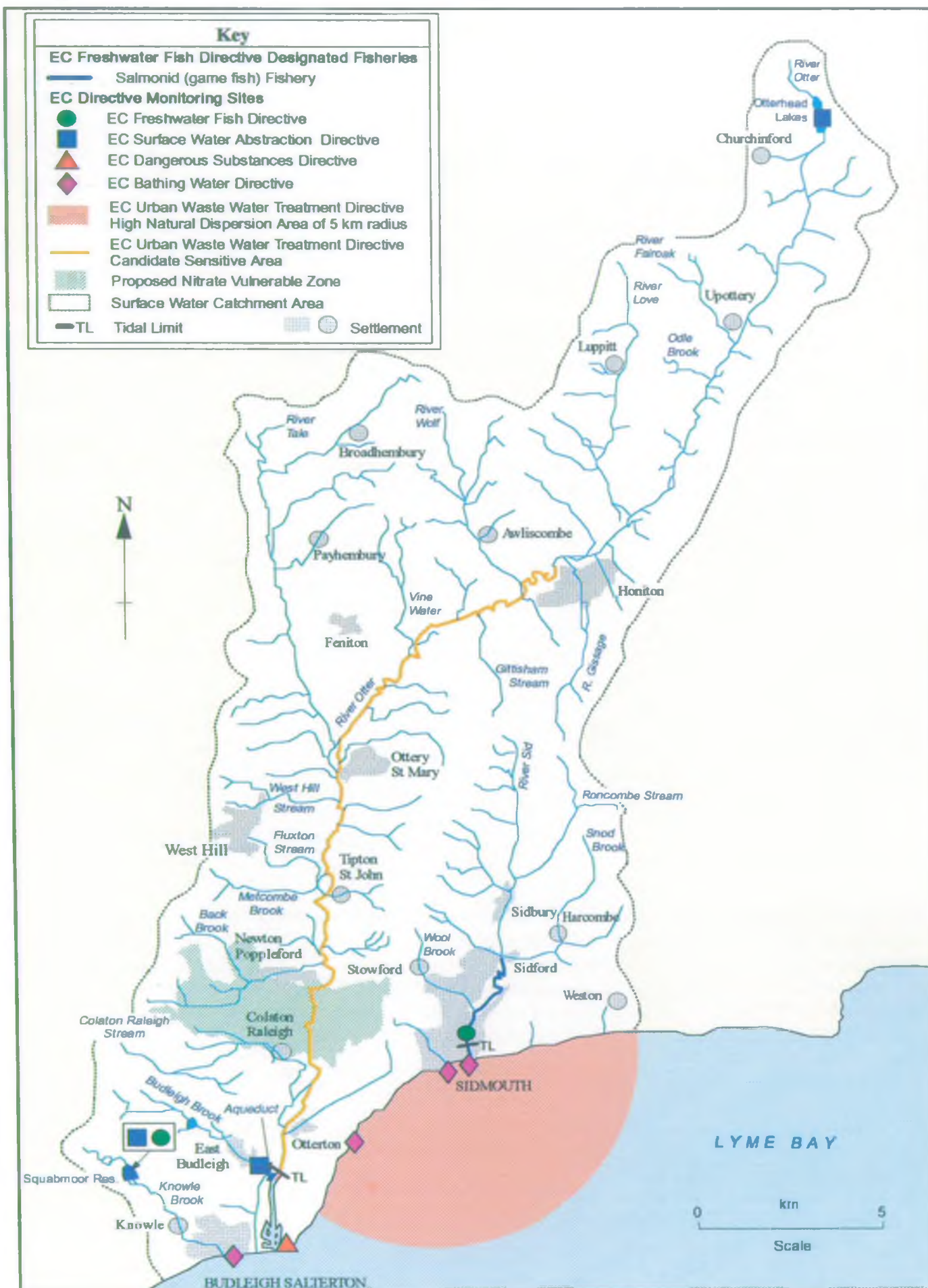
There is one designated List 2 discharge in the catchment; the previous Otterhead Outfall at Budleigh Salterton. This was designated to discharge copper, zinc, lead and nickel. Receiving waters are monitored at sites located 100 m and 250 m from the surface boil (where the discharge rises to the surface). In 1992 and 1993 saline copper and zinc results were not returned due to intermittent severe sampling contamination. The EQSs have not been exceeded. Monitoring will continue for two years to ensure that there is no impact and the designation can be removed.

EC Freshwater Fish Directive Target

The Freshwater Fish Directive 'on the quality of waters needing protection or improvement in order to support fish life' (Ref. 5) ensures that water quality in designated stretches of water is suitable for supporting certain types of fish.

This Directive contains two sets of quality standards. One set of standards protects cyprinid or coarse

Map 18 - EC Directive Monitoring



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fish populations. The other set of standards is stricter protecting salmonid fish populations, for example salmon and trout.

There are two sets of standards for each fishery type; imperative standards, which must be achieved, and guideline standards that Member States should aim to achieve. We are responsible for monitoring the quality of identified fisheries and reporting the results to DoE who decide whether the standards in the Directive have been met. Where the requirements of this Directive are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

State of the Catchment

The River Sid from the A3052 Bridge at Sidford to the Tidal Limit (TL), a length of 3.4 km, is designated as a salmonid fishery under the Directive. Squabmoor Reservoir (2.0 km²) is also designated as a salmonid fishery under the Directive.

All designated salmonid stretches have met the imperative standards of the Directive.

There are no stretches designated on the River Otter for Salmonid use under this Directive. The entire monitored network should be designated to protect use.

Issue 4: Need to designate the monitored network on the River Otter for salmonid use under the EC Freshwater Fish Directive.

EC Urban Wastewater Treatment Directive Target

The EC Directive 'concerning urban wastewater treatment' (Ref. 21) specifies minimum standards for sewage treatment and sewage collection systems.

This 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. Discharges below these population equivalents receive 'appropriate' treatment as defined in the AMP2 guidance note (see Section 4.11).

We are responsible for making sure that discharges receive the level of treatment specified in this Directive.

Less Sensitive Areas or 'High Natural Dispersion Areas' (HNDAs) are those estuarine or coastal waters which are naturally very dispersive. In these areas a lower level of sewage treatment is required. However, dischargers must demonstrate that no harm will be caused to the environment by the lower level of treatment. We are responsible for ensuring that these studies are carried out correctly.

State of the Catchment

Two discharges at Churchinford and Otterton, need to be improved to comply with the appropriate treatment provision of this directive. The improvements have already been carried out at Churchinford.

Issue 5: Need to improve Otterton discharge to comply with EC UWWT Directive.

Untreated sewage from the Sidmouth area discharges to the sea off Sidmouth. DoE, in consultation with us, have identified the sea off Sidmouth as an HNDA. Effluents need only be given primary treatment when discharging to an HNDA. The Sidmouth Outfall has been identified as requiring primary treatment

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by 2001. SWWSL will be carrying out comprehensive studies to establish whether this minimum level of treatment at the outfall will be sufficient to prevent any harm to the environment. We will be working closely with SWWSL on these studies. This area is a Sensitive Marine Area with important wildlife and so we will assess any impact carefully.

Issue 6: Confirm High Natural Dispersion Area status off Sidmouth.

The River Otter from ST 1520 0094 to SY 0766 8406 has been identified as a Candidate Sensitive Area (Eutrophication) (SA(E)). The qualifying discharge is Honiton STW (population equivalent 15,800). During 1995 and 1996 we will be monitoring the river to determine its nutrient status and the principal sources of nutrients to the system.

Issue 7: Nutrient enrichment of the River Otter.

EC Surface Water Abstraction Directive Target

The Directive 'concerning the quality required of surface water intended for the abstraction of drinking water in the Member States' (Ref. 22), protects the quality of surface water used for public supply. This Directive ensures that water abstracted for public supply meets certain quality standards and is given adequate treatment before entering public water supplies.

The Directive sets out imperative standards that must be achieved, and guideline standards that Member States should aim to achieve, for water for public supply which is to be given different levels of treatment.

We are responsible for monitoring the quality of surface water abstractions designated under this Directive and reporting the results to DoE who decide whether the standards in the Directive have been met. Where standards are not met, we are responsible for identifying sources of pollution and making sure that improvements are made.

State of the Catchment

There are three identified surface water abstraction points in the Sid and Otter Catchment. Two of these sites have exceeded the imperative standards of the Directive; Budleigh Brook and Otterhead Reservoir.

At Budleigh Brook the EQS was exceeded in 1993 for dissolved and emulsified hydrocarbons and coloration, which occurred during or after rainfall events.

The catchment upstream of the sampling point is wooded; this will colour the water. A silt trap near the abstraction point may also colour the water.

In 1994 concentrations of polyaromatic hydrocarbons (PAHs) in river water exceeded the EQSs. Nationally high PAH concentrations have also occurred, sources of these are unknown and a research and development project has been proposed to investigate this phenomenon.

Issue 8: Failure to meet standard for polyaromatic hydrocarbons at Budleigh Brook.

At Otterhead Reservoir non-compliance during 1994 was caused by dissolved and emulsified hydrocarbons. We are currently concerned about the suitability of the methods as specified in this Directive for analyzing phenols and dissolved and emulsified hydrocarbons. Where standards have been

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exceeded they cannot always be attributed to polluting discharges, some may be due to natural compounds resulting from decomposing vegetation. We have asked DoE to review the analytical methods used. We will continue to report where the EC Surface Water Abstraction Directive standards have been exceeded. However, as there are no obvious sources of these compounds in the catchment we are not planning to undertake any further studies until we receive direction from DoE.

Issue 9: Need to review analytical method for dissolved and emulsified hydrocarbons.

Other International Commitments

Annex 1A Reduction Programme Target

At the second and third North Sea Conferences in 1987 and 1990, the UK Government made a commitment to reduce the load (load = concentration x flow) of certain substances known as 'Annex 1A' substances (see Appendix 5) entering tidal waters from rivers and direct discharges. Loads of most Annex 1A substances are to be reduced by 50%, but mercury, cadmium and lead loads are to be reduced by 70%. Reductions are to be achieved by 1995 compared with a 1985 baseline or a 1991/1992 baseline where data for 1985 are unavailable.

We are responsible for monitoring and identifying significant sources of these Annex 1A substances. We identify significant sources by ranking loads of Annex 1A substances in rivers and direct discharges according to their size. A discharge is significant if it belongs to the group of discharges that contribute the first 95% of the total load entering tidal waters. In accordance with DoE guidelines we identify where reductions can be made.

State of the Catchment

The River Otter at Otterton is monitored for Annex 1A purposes. Significant loads of cadmium, copper, zinc and lead have been recorded at this site during the period 1990 - 1993. Significant levels of the following organic compounds were also detected; gamma hexachlorohexane (HCH), dieldrin, trifluralin and hexachlorobenzene. The Sidmouth Outfall is screened for Annex 1A but the loads are not significant.

For many substances the UK has met its commitments to reduce loads. Following the fourth ministerial conference on the North Sea (June 1995) we await guidance from DoE on what further action we must take to reduce loads.

We will carry out desk studies to identify sources of these substances to the catchment and to identify whether steps can be taken to control their release to the river.

Issue 10: Significant loads of Annex 1A substances from the River Otter.

Map 19 - Biological Classification



Information correct as of October 1995

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The Rivers Sid and Otter Catchment Management Plan
NRA South Western Region

TARGETS AND STATE OF THE CATCHMENT

Additional Monitoring

As well as the work we carry out to meet the requirements of RQOs, EC Directives and other international commitments, we carry out additional monitoring. This additional monitoring helps us to determine the state of water quality in the Sid and Otter Catchment.

Freshwater Biology Targets

We monitor the ecological quality of rivers by sampling benthic aquatic macroinvertebrates. These are small animals that live in, or on, river sediments and stones. They are unable to move far and so are affected by long term conditions in the river.

We collect samples from the river during spring, summer and autumn and list the different families (taxa) of macroinvertebrates present. We compare the range of families found with what we would expect to find in a similar unpolluted river using a predictive database model which uses the Biological Monitoring Working Party (BMWP) scoring system. We use this information to classify rivers as detailed in Table 10 below.

Table 10: Biological Classification Scheme

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

We have examined river stretches whose biological class is less than A (good).

State of the Catchment

The majority of river stretches in this catchment are Class A (see Map 19).

Combe Raleigh Stream and the stretch of the River Otter downstream of Honiton were Class B quality. The aquatic macroinvertebrate community sampled and the high algal cover at the monitoring site indicated mild organic pollution in the River Otter at Weston and in the Combe Raleigh Stream.

Issue 11: Moderate aquatic macroinvertebrate quality in the Combe Raleigh Stream and a stretch of the River Otter.

Non-identified Dangerous Substance Site Targets

Besides the identified EC Dangerous Substance site mentioned earlier, the receiving waters of several discharges in the Sid and Otter Catchment have also been monitored for dangerous substances.

State of the Catchment

The River Otter at Dotton Mill and sites downstream of Honiton STW and Ottery St Mary STW were monitored for mercury, cadmium and HCH. The EQSs were not exceeded at any of these sites for water or sediment samples. Sidmouth Outfall and the Otterhead Outfall at Budleigh Salterton were also

TARGETS AND STATE OF THE CATCHMENT

screened for List 1 substances. The EQSs were not exceeded at these sites. No EQSs for List 2 substances were exceeded at the Sidmouth Outfall.

Non-identified Bathing Water Targets

Besides the identified EC Bathing Waters listed earlier, we also monitor the quality of one popular 'non-identified' bathing water in the Sid and Otter Catchment.

State of the Catchment

Bathing water quality was monitored off Weston Beach in 1992 and 1995. This bathing water met the imperative standards for bacterial quality under the EC Bathing Waters Directive.

Water Contact Sports Target

Whilst our monitoring of EC and non-identified Bathing Waters provides information on water quality close to beaches, this monitoring programme provides information on water quality further offshore.

State of the Catchment

We monitor three sites used for water contact sports in the Sid and Otter Catchment under this monitoring programme. We check bacterial concentrations namely; total coliforms, faecal coliforms and faecal streptococci. Sidmouth (Town) and Sidmouth (Jacobs Ladder) and Budleigh Salterton were monitored during the bathing season (May - September) from 1992 to 1994.

Concentrations of bacteria were generally low, with all sites meeting imperative standards for bacterial quality under the Bathing Waters Directive.

Coastal Classification

In 1992 a monitoring network was established to assess water quality at coastal offshore sites; among these were five sites located in a row at 0.15 km, 1.0 km, 2.0 km, 3.0 km and 4.0 km distances off Sidmouth. At each sampling point 10 seasonal surface and depth samples were taken for a range of nutrient and bacterial parameters. For 1993 the monitoring programme was altered to one site off Sidmouth (one nautical mile offshore) and a new site off Otterton Ledge.

Concentrations of bacteria and nutrients were generally low at all sites although occasional raised values for these parameters did occur, only one of these was greater than the standards in the EC Bathing Waters Directive.

NWC Estuary Classification Scheme

The NWC Estuary Classification Scheme, shown on Table 11, provides a simple, subjective assessment for estuaries based on biological, chemical and aesthetic quality.

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Table 11: The NWC Estuary Classification Scheme

Estuary Class	Description
A	Good
B	Fair
C	Poor
D	Bad

From the end of 1995 we will use the new GQA chemical classification to monitor and assess the quality of estuaries.

State of the Catchment

In 1990 and 1991, when classified under the subjective NWC classification, the Otter Estuary achieved maximum points and an A grade classification.

We have carried out a more objective assessment of water quality in the estuary by looking at the routine monitoring data collected from a mid-estuary site in the Otter Estuary between 1990 and 1994.

Nutrient concentrations in the Otter Estuary are high compared with coastal waters. However, this is consistent with the low salinities recorded which indicate major freshwater inputs to the estuary.

The orthophosphate concentrations measured varied greatly seasonally and over a longer time period. Mean orthophosphate concentrations were greater than the proposed standard ($6.2 \mu\text{g/P/L}$) and so indicate nutrient rich (eutrophic) waters. Concentrations were highest during the summer and so are thought to derive mainly from the freshwater catchment. Phosphate levels appear to have declined over the period 1990-1994.

We have recorded some high levels of chlorophyll-a. However, these results are within the normal seasonal pattern associated with spring and autumn algal blooms.

Passage of Migratory Fish

Where significant numbers of migratory fish pass through an estuary we may set non-statutory water quality standards for ammonia and dissolved oxygen, as defined in the AMP2 guidance note. We apply these standards during critical periods of the year when salmonid migration is taking place.

Concentrations of total ammonia were highest during the winter, but did not exceed the quality standard for unionized ammonia (standard of $250 \mu\text{g N/l}$) as specified in the AMP2 Guidelines.

Data for the period 1991 - 1994 show that the proposed dissolved oxygen standard for migratory fish (3 mg/l DO as a 95%ile) was never exceeded.

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Groundwater Quality

EC Groundwater Directive Target

Whilst the EC Groundwater Directive (Ref. 33) controls the release of certain substances to groundwaters, there are no statutory standards for groundwater quality. The NRA can only compare water quality with appropriate standards for the 'use' to which groundwaters are put. However, there are no powers for the NRA to ensure that groundwater quality achieves desirable use standards.

Groundwater quality within the catchment is generally reflected by river water quality during dry weather periods when river flow is almost entirely derived from groundwater seepage. This indicates that within the catchment groundwater quality is likely to be suitable for providing river baseflow and supporting identified river water uses.

A small number of boreholes in the catchment have been sampled but no conclusions can be drawn on the general groundwater quality. This is due to our limited knowledge of geological control on groundwater quality as it links a vast area and varies in three dimensions.

A key element in protecting groundwater is to identify areas which are particularly vulnerable according to properties of the soil cover and the underlying rocks. A programme of Groundwater Vulnerability mapping is under way and will assist in future pollution prevention planning.

Groundwater Protection Policy

The protection of aquifers from pollution is of great importance as the contamination of groundwater may put water supplies and the environment at risk. Contamination may also affect river water quality where the baseflow depends on groundwater. Pollution in groundwater is not easy to detect and any clean-up is difficult and expensive. It is better to prevent or reduce the risk of groundwater contamination in the first instance rather than try to deal with the consequences.

In 1992 we published our Policy and Practice for the Protection of Groundwater (PPPG) (Ref.23). This document is a national policy which ensures that there is a consistent approach to the prevention of groundwater pollution. It sets out why we must safeguard the quality and flow of water in aquifers and outlines how the NRA with the co-operation of other organizations and individuals will work to reduce risk of groundwater pollution.

The PPPG statements cover the risks posed by various activities based on the type of aquifer, its vulnerability and, in the case of drinking water sources, the proximity to that source, under headings of:

- * Control of groundwater abstractions
- * Physical disturbance of aquifers affecting quality and quantity
- * Waste disposal to land
- * Contaminated land
- * Disposal of sludges and slurries to sand
- * Discharges to underground strata
- * Diffuse pollution
- * Other threats to groundwater quality.

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We have mapped the vulnerability of groundwaters in England and Wales and are working on a more detailed classification. The results of this work will be published in 1998.

We work with planning authorities to minimize the risks posed to groundwater from development and land use changes. We have particular concern over the areas around major water supply boreholes.

Source Protection Zones

The proximity of an activity to a groundwater abstraction is one of the most important factors in assessing the risk to an existing groundwater source. All sources, including springs, wells and boreholes, are liable to contamination and need to be protected.

Three groundwater Source Protection Zones are recognized:

- Zone I (Inner Source Protection)
- Zone II (Outer Source Protection)
- Zone III (Source Catchment).

The orientation, shape and size of the zones are determined by the hydrogeological characteristics of the strata and the direction of groundwater flow. The sources for which it is appropriate to define zones are those which are used for public supply, other private potable supply (including mineral and bottled water) or in commercial food and drink production.

Zone I (Inner Source Protection)

This zone is located immediately adjacent to the groundwater source. It is designed to protect against the effects of human activity which might have an immediate effect upon the source. The area is defined by a 50 day travel time from any point below the water table to the source and as a minimum of 50 metres radius from the source. This 50 day travel time zone is based on the time it takes for biological contaminants to decay.

Zone II (Outer Source Protection)

This zone is larger than Zone I and is the area defined by a 400 day travel time from any point below the water table to the source. The travel time is based upon that required to provide delay and attenuation of slowly degrading pollutants.

Zone III (Source Catchment)

This zone covers the complete catchment area of a groundwater source. All groundwater within it will eventually discharge to the source. It is defined as an area needed to support an abstraction from long term annual groundwater recharge (effective rainfall). For wells and boreholes the area will be defined on the authorized abstraction rate, whilst for springs it will be defined by the best known value of average annual total discharge.

Target

To protect groundwater from all types of threat, large and small, from point and diffuse sources, and by both persistent and degradable pollutants.

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State of the Catchment

Redevelopment of sites, particularly the old waste disposal and industrial sites close to Honiton and Ottery St Mary, may cause a release of contaminants, which could result in groundwater pollution (see Section 4.5 under Contaminated Land). A risk assessment study which recommends appropriate mitigation measures would be required.

Maize is being grown over increasing areas of the catchment as a feed for dairy cattle. Atrazine is used to restrict weed growth and is applied by farmers as the most economical and effective herbicide. Atrazine is known to be persistent within soils and in ground and surface waters, and has been banned for concentrated use as a weed killer, e.g. beside railways and roads. However, it is still allowed for diffuse application associated with agriculture, although it is not licensed for use in or adjacent to water.

The NRA has identified low levels of atrazine in a number of public supply boreholes and in the River Otter. These levels are regularly monitored and the pollution risk to ground and surface water in the catchment from atrazine is being assessed. Farms in the area have also been visited and asked to use alternatives to atrazine. There has been some uptake of this initiative, however, as the alternatives are more expensive further national and financial support is required.

Issue 12: Atrazine detected in public water supply boreholes and in the River Otter.

Polluted leachate from the closed domestic waste disposal site at Knapps Copse may affect achievement of the proposed WQO for the Roncombe Stream. The site owners, Devon County Council, have implemented a series of passive leachate treatment measures to reduce the impact of the site on the Roncombe Stream. Monitoring of the treatment system by Devon County Council will demonstrate the system's effectiveness, with the results being forwarded to us for review.

Issue 13: Polluting leachate from closed waste disposal site at Knapps Copse.

EC Nitrates Directive Target

Restrictions on certain agricultural activities are necessary in areas sensitive to surface and groundwater pollution. The EC Directive 'concerning the protection of waters against pollution caused by nitrates from agricultural sources' (Ref. 24) protects waters from pollution by nitrates used in agriculture. It requires Member States to identify waters that are or could be affected by pollution from nitrates. The land draining to these polluted waters must be designated as 'nitrate vulnerable zones' (NVZs). Action plans must be established to reduce existing nitrate pollution and prevent further pollution. Outside NVZs, Member States must establish and promote a code of good agricultural practice (Ref. 25). Further source protection, apart from just nitrates, is provided by our designation of Source Protection Zones (SPZs) around licensed abstractions (see earlier section on SPZs).

We are responsible for advising on the selection and boundaries of NVZs. The designation of NVZs and agricultural measures to be adopted is the responsibility of Government.

State of the Catchment

Nitrate concentrations measured in the groundwater of eight public supply boreholes within the River Otter Catchment have been rising and are expected to exceed the 50 mg/l EC standard by 2011 (criteria for NVZ). A NVZ has been proposed in the area around Colaton Raleigh and we are awaiting its confirmation.

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SWWSL have reduced abstraction from these boreholes, blended this water and used alternative sources of supply to reduce nitrate concentrations in drinking water.

The NVZs are being designated to achieve compliance with the EC Nitrates Directive (Ref. 24). The details of measures to be taken within the NVZs are still being drawn up but unlike the NSAs these measures will be compulsory and farmers will not be compensated.

Issue 14: High nitrate concentrations in groundwater.

TARGETS AND STATE OF THE CATCHMENT

5.2 WATER QUANTITY

We aim to manage water resources to achieve the right balance between the needs of the environment and those of the abstractors. In this section we assess the state of water resources in the catchment. We consider how the water environment is affected by abstraction and look at the needs of the abstractors. In particular, we will discuss the obligations we have to ensure that there is adequate water for public supply.

The Water Resource Development Strategy for South Western Region - 'Tomorrow's Water' (Ref. 26) sets out how we would like to see water resources developed in the future. Our Strategy follows the principles of sustainable development with proper safeguards for the environment.

To promote our strategy for the region we shall:

- ☐ encourage the efficient use of water
- ☐ expect abstractors to use existing sources efficiently before new sources are developed
- ☐ approve developments that cause the minimum problems for the environment
- ☐ study rivers stressed by abstraction and solve existing environmental problems where benefits outweigh the costs and funds can be found.

Here are three examples of our approach to managing water resources in the catchment:

- ☐ we plan for the sustainable development of water resources, developing criteria to assess the reasonable needs of abstractors and the environment
- ☐ we plan the future use of water on the basis that water supply companies reduce leakage to an acceptable level and make best use of available resources
- ☐ we study the spending plans of the water supply companies - known as Asset Management Plans (AMP) - to ensure that these plans do not overlook opportunities to improve flows in rivers which are stressed by abstraction.

The Natural Water Environment - Managing Flows

Our Target

To protect the water environment from damage caused by abstraction.

State of the Catchment

On average the total quantity of water theoretically available in the catchment is 130,000 Ml/year (356 Ml/d). This is the proportion of rainfall not evaporated or taken up by plants. Some of this water can be used sustainably from groundwater or rivers without significantly affecting rivers or wetlands, provided each abstraction is regulated to avoid local effects.

The total licensed annual volume of abstraction in the catchment is only one fifth of the total annual quantity of water that is theoretically available in an average year. We consider that over the whole catchment using this proportion of water is unlikely to cause unacceptable impact.

On a smaller scale, particular abstractions affect river flows. This is most apparent when river flow is naturally low, usually during late summer. This effect on the River Otter is related to abstractions for public water supply.

TARGETS AND STATE OF THE CATCHMENT

We are investigating the effects of licensed abstractions on low flows in the River Otter in the Otter Valley Study. This study consists of three phases:

1. a review of environmental data (completed in 1994)
2. a calculation of river flow, with and without existing or maximum licensed abstractions, to assess the effect on river flow, and using a consultant's spreadsheet model (completed in 1995)
3. an assessment of the environmental implications of the flow reduction caused by abstractions, and identification of what action, if any, is required to maintain flow in the River Otter for environmental benefit (to be completed 1996/97).

Through our abstraction licensing policy we contribute to the management of acceptable flows. We also check all new abstraction licence applications and formal variations of existing licences in the catchment against our Otter Groundwater Management Strategy (see Map 20). We are currently granting temporary licences to those abstraction proposals which could have an impact on flows in the catchment. These temporary licences will expire in 2000. The completed Otter Valley Study will dictate the future approach to abstraction licensing in the catchment.

Issue 15: Perceived low flows in the River Otter.

We need accurate flow information for the River Otter Catchment to put into the Otter Valley Study. The existing gauging station at Fairmile on the River Tale is not ideal for monitoring low flows, and so there is a requirement to improve it.

Issue 16: Need to improve flow gauging on the River Tale

Public Water Supply

Target

To ensure that there is enough water available for a public water supply now and in the future.

State of the Catchment

To meet the forecasted demand for public water supply in the SW region we need to consider how water resources could be developed in this catchment.

There is currently enough water available to meet present demand in the supply zones that use water from this catchment. Most public water supply licences in the Otter are under used. The Otter Valley Study discussed in 'The Natural Environment' above is examining the effect of fully utilising these licences.

SWWSL has the option to draw on resources elsewhere within its Wimbleball Supply Zone and to transfer this water to help meet the demands placed on its sources in the River Otter and River Sid Catchments. It might be difficult for SWWSL to meet larger rises in demand up to 2021 that have been forecast in the Water Resource Development Strategy (Ref. 26) without further resource development. WWSL also has the flexibility to draw on resources elsewhere within its Somerset Supply Zone rather than use the Otterhead Lakes to meet local demands.

A vertical film strip with 35 frames, each showing a different abstract pattern of light and dark shapes. The patterns are mostly black and white, with some frames showing a grid-like structure. The film strip is oriented vertically, with the frames arranged in a single column. The patterns are abstract and vary significantly from frame to frame, suggesting a sequence of images or a single image with multiple exposures. The film strip is a standard 35mm format, with the frames separated by sprocket holes. The overall appearance is that of a vintage film reel, possibly from a silent movie or a short film. The patterns are mostly black and white, with some frames showing a grid-like structure. The film strip is oriented vertically, with the frames arranged in a single column. The patterns are abstract and vary significantly from frame to frame, suggesting a sequence of images or a single image with multiple exposures. The film strip is a standard 35mm format, with the frames separated by sprocket holes. The overall appearance is that of a vintage film reel, possibly from a silent movie or a short film.



TARGETS AND STATE OF THE CATCHMENT

Future Demand for Public Water Supplies

Assuming the current level of demand management and high growth in consumption, demand in the Wimbleball Supply Zone is predicted to rise from 96 Ml/d to 121 Ml/d by 2021 (Ref. 26). Should growth be slower and water companies reduce leakage to 200 litres per property per day, then demand is predicted to rise to 108 Ml/d by 2021 instead.

In terms of meeting future demand for water across the Somerset Supply Zone the Otterhead Lakes are of minor significance. We therefore do not consider Otterhead Lakes further in the context of meeting future demand for public water supplies in this catchment.

SWWSL's Wimbleball Supply Zone total yield (the volume of water that is reliably available) is 98 Ml/d. With current demand at 86 Ml/day there is currently a small surplus of 12 Ml/d. By 2021, even with low growth in demand and significant progress on leakage reduction the Strategy forecasts a deficit of 10 Ml/d. With higher growth and no leakage reduction the forecast deficit in the Wimbleball Zone is 22 Ml/d.

Issue 17: Forecast public water supply deficit in Wimbleball Supply Zone

We encourage consumers and the water companies to use water wisely and expect abstractors to use existing sources efficiently before new sources are developed. In the Wimbleball Supply Zone we have considered the options to safeguard water supplies in the future. The key options looked at included; demand management, resource management and resource development. This approach is explained further in 'Tomorrows Water' (Ref. 26).

Option 1. Demand Management

We encourage the installation of water meters in all new properties and selective metering where there is significant stress on water resources. We will be examining the water companies local demand areas to identify problem sites. We also encourage the more efficient use of water. When we looked at this in 1992/93 there was insufficient evidence that this would secure supplies without resource development.

Option 2. Resource Management

In this catchment we are keen to see the better management of existing resources to increase the quantity of water deliverable to customers. Leakage from overflows, burst pipes and weeping plumbing is often significant. Both water companies and customers are encouraged to pursue actively the reduction of leakage, where economic. Our target maximum leakage rate for the Wimbleball Zone is 200 litres per property per day; the current leakage rate is 196 litres per property per day. However, we will be pressing for local targets based on the much smaller local demand areas in the future (based on the National Leakage Initiative Methodology (Ref. 27).

When we looked at this in 1992/93 we believed, and still believe, further reduction is possible. However, we recognised that reduction takes time and such measures on their own would not preclude resource development.

Option 3. Resource Development

This is the least preferred option to meet supply deficits. This could involve construction of completely new sources ranging from groundwater boreholes to direct river abstractions. Before such resource development is considered we would expect the water company to have made progress on demand and resource management.

TARGETS AND STATE OF THE CATCHMENT

Options to Meet Wimbleball Supply Zone Deficit

SWWSL was granted a licence in March 1993 to pump water into Wimbleball reservoir from around the River Exe. This licence has conditions to safeguard the ecology of the river and will reliably provide an additional 35 Ml/day. This could be used to meet the deficit forecast in the Wimbleball Supply Zone although the infrastructure is not in place.

An operational management strategy for Wimbleball reservoir will plan the best use of this resource within the Wimbleball Supply Zone. If used wisely the pumped storage scheme will meet the forecast deficit in the Wimbleball Supply Zone for many years to come.

Private Abstractions

Target

To achieve the right balance between the needs of the environment and those of the abstractors.

State of the Catchment

Although there are many licences for private uses the total volume licensed is relatively small. These abstractions are greatly dispersed across the catchment and we are not aware of any local environmental stress caused by them

TARGETS AND STATE OF THE CATCHMENT

5.3 PHYSICAL FEATURES AND WETLAND ECOSYSTEM

We aim to manage rivers and wetlands to ensure that they are not degraded through neglect, mismanagement or insensitive development.

The EC Habitats Directive (Ref. 3) requires us to assess carefully the impact of all new consents and licences which affect a European site (i.e. SPA or SAC), and also requires the review of existing consents which may be adversely affecting such sites. We will play an important role in ensuring that the UK's obligations are met. This requirement may need to be an issue in the Action Plan, and will depend on our discussions with English Nature, which are at an early stage.

Biodiversity

Although we can influence many of the factors which affect the quality of our water environment we do not have sufficient control over the way that land is developed and managed in order to set targets to protect a minimum amount of a particular habitat or a minimum number of particular plants and animals in the catchment.

The recently published document 'Biodiversity: the UK Steering Group Report' contains targets and actions for the future protection and restoration of habitats and species (Ref. 3). Regional and County Biodiversity Action Plans will focus more closely on the local area. We are a partner in production of the Rivers and Wetland Strategy through which species and habitat targets will be established that we can promote.

Target

To assist in the development of species and habitat action plans for rivers and wetlands in the catchment.

State of the Catchment

Marsh fritillary butterflies and Southern damselflies are both; internationally important; living in wetland habitats; and declining in numbers, possibly as a result of habitat loss. Marsh fritillary butterflies in East Devon are associated with springline mires, whereas the Southern damselflies live in flushes next to springs, particularly on the East Devon Pebble Beds.

Targets need to be set for these and other habitats and species to prevent further loss and to guide future recovery. The NRA is closely involved with the Rivers and Wetlands Project through which realistic targets will be developed.

Issue 18: Decline of important habitats and invertebrate species.

Following the widespread decline of the 1960s, otters have not properly recolonized either the River Sid or Otter despite the presence of fairly extensive areas of apparently suitable habitat. However, in the last year or two, there are signs that the species may be making a comeback, although there is no room for complacency. The NRA has developed a National Otter Strategy which indicates levels of action appropriate to the catchment.

Issue 19: Low level of use of catchment by otters.

Water voles have declined rapidly in the South West over the last thirty years. A national survey (Ref. 28) has linked this to the introduction of mink although further work suggests loss of riparian habitat is

TARGETS AND STATE OF THE CATCHMENT

also a major factor. There were no water voles recorded at all the sites surveyed on the River Otter, despite some areas of apparently good habitat. A few records of presence exist for the upper reaches.

Issue 20: Scarcity of water voles.

Grazing marsh and similar habitats in the lower River Otter Catchment are of less conservation value than might be achieved. Management has tended to reduce the watertable levels.

Issue 21: Need for improvement of conservation value of wet grassland sites and ditches.

Both the River Otter and River Sid have been subject to extensive erosion control works in the past. Maintaining or extending these areas may have significant effects on wildlife. In particular, hole-nesting birds such as sandmartins and kingfishers may have nest sites affected. For further information see Section 5.4.

Issue 22: Loss of nest sites for riparian bird species, e.g. sandmartins and kingfishers.

Invasive Species

State of the Catchment

Certain introduced plant species are recognized as problems in the water environment because they spread rapidly at the expense of native plants. Himalayan balsam is widespread in the catchment, particularly in the lower reaches of the Rivers Sid and Otter. The related Orange balsam, a much rarer introduction, is also present on the River Otter.

Japanese knotweed, the other major invasive species in Devon is only found at a few sites in the catchment. Where it does occur it often forms dense stands as on the banks of the lower River Sid.

Annual surveys by NRA staff monitor the distribution and abundance of these plants. From these surveys we can determine changes and consider the need for control programmes. The NRA is unlikely to control these plants but will advise landowners where appropriate.

Issue 23: Spread of invasive plant species.

Recreation

State of the Catchment

Where it can be achieved without adversely affecting the conservation value of the water environment, significant benefits for people can come from improved access to rivers and wetlands, especially for the less able. Some initiatives have already been carried out, and there may be further opportunities. However, it is important that this improved access is not at the expense of other interests, including ecology and the economic interests of landowners. Therefore, a joint approach is needed to promote these recreation routes away from vulnerable areas, thus avoiding sites with suitable habitat for sensitive species.

Issue 24: Need for further improved access around rivers, especially for the less able.

Issue 25: Disturbance of sensitive wildlife by excessive access.

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Barriers

State of the Catchment

In the River Otter, there are several major weirs, only some of which are passable to migrating fish (see Map 21). Otterton Weir near the tidal limit is a serious barrier to fish and has substantially limited past migratory fish runs. Riparian interests would like runs of migratory fish restored to the catchment, an initiative which the NRA will support.

Providing a fish pass at Otterton would be a major step towards improving conditions for fish passage since it is the most difficult obstacle in the catchment for fish to negotiate, and is located close to the head of tide. Other matters would be considered, these include the impact of any construction on habitats of interest at the Weir and the effect of allowing the passage of migratory fish on the ecology of the river.

The prime spawning areas in the River Otter are located above Monkton. Fish can only reach this far upstream when rivers are in spate. A number of weirs *en route* need to be modified to allow fish into these areas at other times. Since the majority of the migratory fish run is expected to be sea trout, it is important that the weirs can be negotiated in lower flows, as this is when they migrate.

A major weir at Tipton St John obstructs fish movement in all but high flows. The weir is of loose stone construction and it may prove difficult to install a fish pass without major expenditure. Tracey Weir, which is located in the River Otter to the north of Honiton, also presents a major obstacle. This weir is of similar construction to the weir at Tipton St John and ideally requires the installation of a fish pass.

The last barrier on the River Otter before Monkton is Langford Weir. This structure has a baulk pass, but it is generally felt that this is not as efficient as it could be, and that the weir still inhibits fish migration.

Other obstructions in the higher reaches of the catchment preclude access to spawning areas. Marles Farm Weir on the River Wolf is a serious barrier which needs a fish pass. An obstruction on the River Gissage created as part of the Honiton Flood Alleviation Scheme requires major works to make it passable. However, the benefits likely to be derived from carrying out these works are unlikely to offset the associated costs, so only limited priority can be given to this site. A barrier was created on the Gittisham Stream during construction of the A30. Access to fish can be improved relatively easily by modifying this barrier. A natural barrier in the form of a 4 m high waterfall is present approximately one mile upstream of the A30. It has been agreed that the necessary work will be carried out when the A30 road improvement occurs.

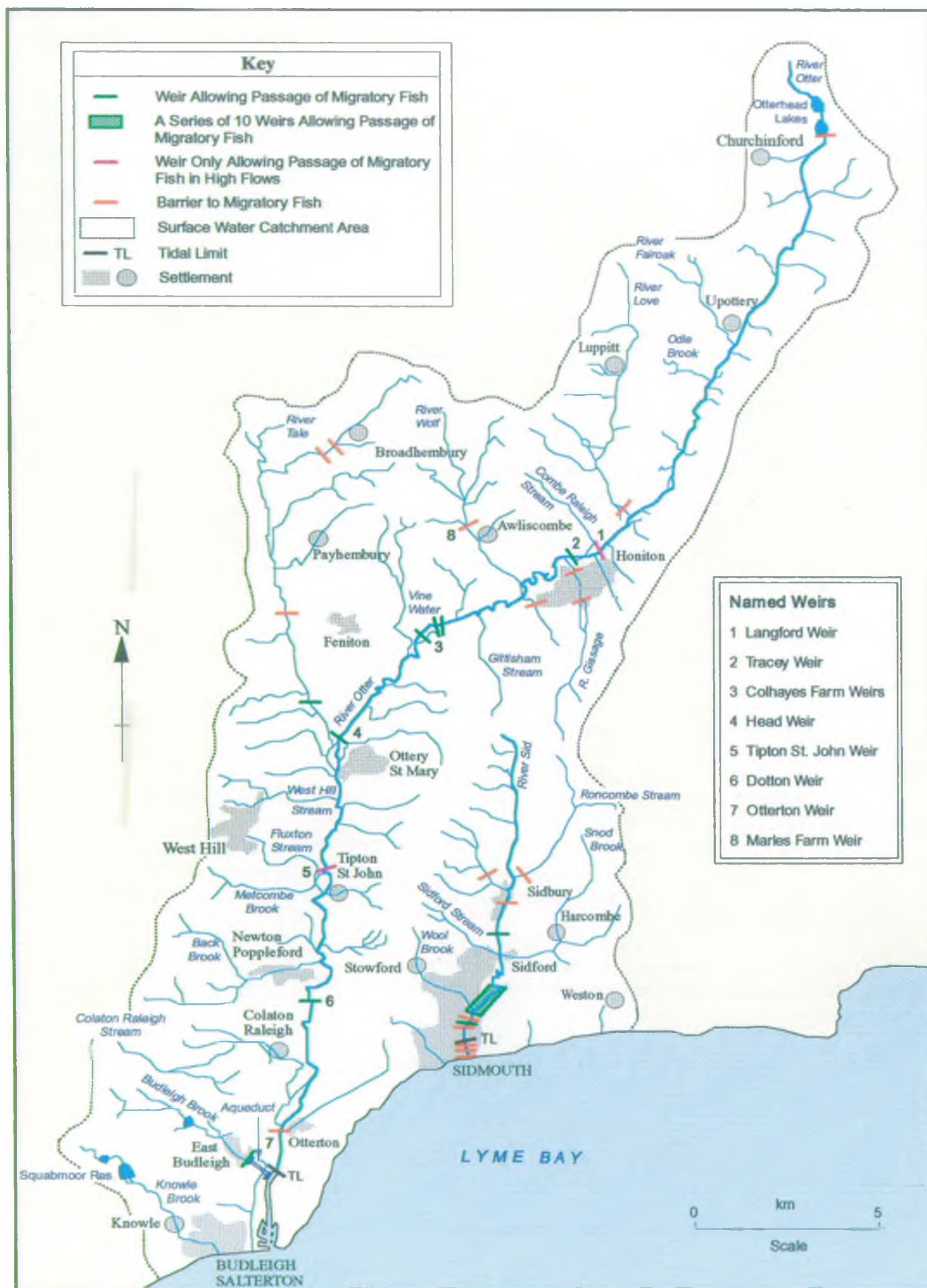
Head Weir at Ottery St Mary has had a loose blockstone fish pass installed which enables the structure to be overcome. However, in high flows, some of the blockstones may become dislodged, and so may need to be repaired to work effectively.

Any work on these weirs must consider any licensed abstractions assisted by them.

Issue 26: Restore migratory fish runs to the River Otter.

The mouth of the River Sid flows through a shingle beach which creates a virtually impassable barrier to the movement of migratory fish. This reduces the significance of other natural and man made barriers which occur elsewhere in the catchment since they are only likely to obstruct the movement of brown trout or coarse species. Providing fish passes in these structures is considered to be of low priority.

Map 21 - Barriers



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TARGETS AND STATE OF THE CATCHMENT

Brown Trout Fishery

State of the Catchment

The quality of the brown trout fishery in the River Otter has declined since the 1970s (see Maps 22 & 23), although rod catch returns suggest that the situation in recent years may be improving. A number of reasons have been put forward to explain the decline, principally relating to water quality problems within the catchment influencing brown trout ova survival.

Issue 27: Decline in brown trout population.

Historically, many riparian interests within the catchment have stocked reaches of the River Otter with farmed brown trout of takeable size, which have come from various sources. This practice may well have a detrimental effect on the native population through creating competition for food and available habitat, and increasing predation of juveniles. Furthermore, the introduction of farmed fish will inevitably modify the genetic integrity of stocks native to the catchment.

Where stocking is thought to be of overall benefit to the fishery, all fish stocked should originate from within the catchment.

Issue 28: Stocking with farmed brown trout.

There have been a number of instances recently of riparian owners excavating the river channel flowing through their land on the premise that they have an obligation to maintain the channel. Many of these works do not require the consent of the NRA, and can cause serious damage to the fishery by destroying spawning beds and nursery areas. This has occurred frequently in the middle reaches of the river and large quantities of good spawning material has been removed. This activity will take on particular significance if sea trout are encouraged to return to the river as this part of the river will be the favoured spawning area.

Issue 29: Loss of spawning/nursery areas due to works in the River Otter not requiring NRA consent.

It is widely accepted in angling circles that in recent years there has been a marked increase in the extent of predation by fish-eating birds on freshwater fisheries. The River Otter is no exception where the significant numbers of cormorants observed frequently in the middle and lower reaches are the principal cause for concern. Salmonid species are vulnerable to avian predation and are thought to be taken by cormorants at various locations in the catchment.

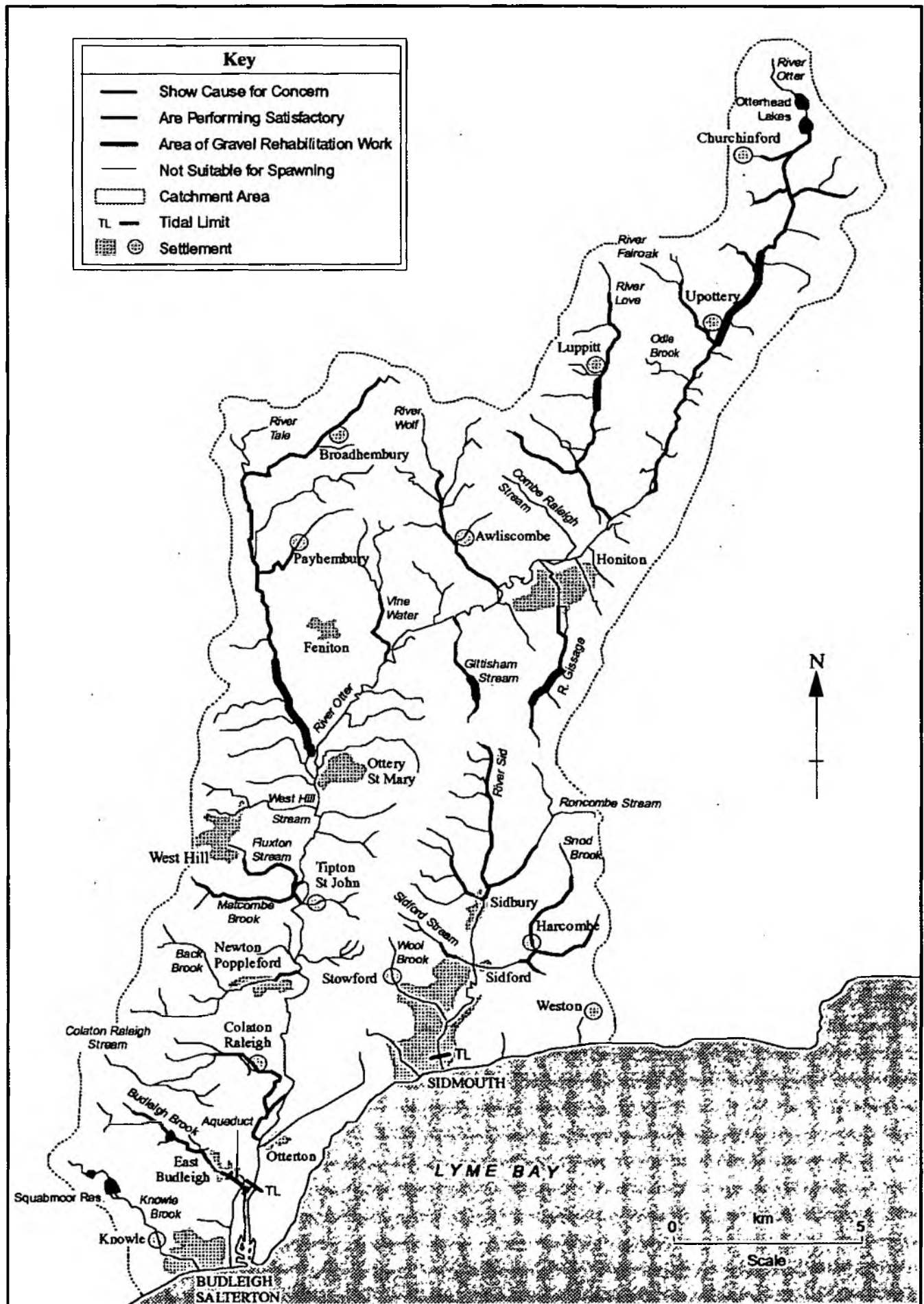
We shall not support licensed killing of fish-eating birds until and unless proof of serious damage has been established and killing proven to be the most effective means for preventing significant loss to fish stocks. However, we are committed to working positively with owners and anglers to establish the full facts in each situation.

Issue 30: The effect of fish-eating birds on salmonid stocks in the River Otter.



The Rivers Sid and Otter Catchment Management Plan
NRA South Western Region

Map 23 - Spawning Gravels



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TARGETS AND STATE OF THE CATCHMENT

Within this catchment there are localized problems with cattle eroding the river bank at drinking and crossing points. Where this coincides with good spawning areas (see Map 23), siltation of spawning gravels can occur. To a greater extent soil erosion has occurred as a result of outdoor pig farming. This has caused further siltation of spawning beds. However, any action taken to control erosion of the poached areas should have regard to other ecological concerns, as they provide a specialized habitat for some rare insects. To combat this and other siltation problems, gravel rehabilitation works have been carried out on a few stretches in the River Otter Catchment (see Map 23).

Issue 31: Siltation of spawning gravels.

TARGETS AND STATE OF THE CATCHMENT

5.4 FLOOD DEFENCE AND LAND DRAINAGE

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

The term 'return period' describes how often on average a flood might occur. For example, a 10 year return period flood might be equalled or exceeded once every 10 years on average or a more serious flood once every 100 years.

Flood defence schemes only alleviate flooding up to the design standard; a more serious flood may still occur.

We manage flood defence by setting target standards, measuring existing standards, and addressing the difference.

Coastal Defences

Target

To ensure that coastal defences take full account of coastal processes.

State of the Catchment

The NRA is a member of the Lyme Bay and South Devon Coastline Group, which includes other coastal defence authorities. The group will oversee the production of the Shoreline Management Plan for the South Devon Coastline. The scoping study for this plan has been completed. The plans (investigation study) will be prepared during 1996 and 1997 and will take account of the exceptional geological and ecological value of the area.

Issue 32: Proposals for coastal defence works need to be considered within an overall and integrated strategy.

Regulation

We advise planning authorities on flood defence matters. We also issue consents and byelaw approvals for certain works which are likely to affect the flow of water or impede any drainage work.

Target

To provide planning authorities with sufficient information to ensure that the effects of development on flood risk are properly considered in accordance with the Department of Environment Circular 30/92 (Ref. 29).

State of the Catchment

Information is currently provided on the basis of historic flood records and survey data. We have agreed with planning authorities how we can improve this information. We have planned to provide floodplain mapping information for the Sid and Otter Catchment by April 1997.

Issue 33: Need to identify flood risk for planning authorities.

Map 24 - Land Use Bands for Flood Defence



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TARGETS AND STATE OF THE CATCHMENT

Target

To ensure that development does not reduce the standard of flood defence and that opportunities for environmental enhancement are taken.

State of the Catchment

We have outlined our current particular development concerns in Table 3 in Section 4.4. With time other concerns will undoubtedly arise. In some cases our advice on flood defence matters is either not sought or followed. However, we do not know whether this presents a particular problem for us in this catchment. In addition, when we are able to refine information by supplying the floodplain mapping outlined above, our concerns will be clearer.

Issue 34: Inappropriate development, particularly in floodplains, may affect standards of flood defence and damage environmental interest.

Maintenance

We maintain rivers and flood defence structures to minimize the risk of flooding.

We focus our work where it is needed most. We work out how best to concentrate our general maintenance on 'main' rivers using a method called 'Standards of Service'.

This is part of the integrated Flood Defence Management Manual and supporting system that we are introducing. The overall framework has been agreed and the techniques were piloted during 1994 and 1995. The system will improve the targeting of resources to areas of greatest need. This system will also include the asset management surveys (at existing schemes).

We use the asset management surveys to target work on existing flood defence structures.

Target

To apply a consistent approach to flood defence maintenance, with work targeted at areas of greatest need.

State of the Catchment

The NRA Sea Defence Survey has been completed and the Standards of Service (SoS) methodology is being introduced. Different types of land use and property require different levels of protection.

We use the indicative standards (return periods in years) detailed in Table 12 to design and then maintain schemes for different classes of land use. Map 24 shows the land use band for 'main river' within the Sid and Otter Catchment.

We set an acceptable standard of defence, a target standard of service, for the catchment. By combining the land use with the frequency of flooding in the floodplain we can estimate the current standard with the target. This comparison indicates where maintenance may be appropriate. However, within this catchment maintenance is only required at existing flood defence schemes and some tree and debris removal, but not to meet the target standard of service, which is met naturally.

The existing maintenance practices are being reviewed as part of the Service Level Agreements (SLA) to take into account conservation considerations where appropriate to protect the ecology of the river.

TARGETS AND STATE OF THE CATCHMENT

Table 12: Indicative Flood Defence Standards for Different Land Use

Current Land Use	Land Use Band	Target Standard of Protection (Return Period)	
		Sea (Years)	River (Years)
High density urban, containing significant residential and non-residential property	A	100 to 200	50 to 100
Medium density urban	B	50 to 200	25 to 100
Isolated or rural communities Highly productive agricultural land.	C	10 to 100	5 to 25
Generally arable farming with isolated properties	D	2½ to 20	1¼ to 10
Extensive grassland with few properties at risk	E	Less than 5	Less than 2½

Note: Indicative standards are only a guide: they may not always be appropriate.

Issue 35: Need to continue to improve the efficiency and effectiveness of our flood defence work.

Rivers and coastline change as the forces of water adjust the land. We now operate to the presumption that natural river and coastal processes should not be disrupted, except where important natural or man-made assets are at risk.

Concerns have been raised in this catchment over works carried out by previous authorities and riparian owners to control erosion on river banks and sea defences. Furthermore some riparian owners have looked to the NRA to carry out such works.

Riparian owners may control erosion provided that their works do not affect others or cause obstruction to flow. They may require consent from the NRA which will seek to ensure that appropriate methods and materials are used. Previous works have sometimes had significant detrimental effects on the river morphology, wildlife and landscape. The NRA can provide guidance, such as that contained in the 'New Rivers & Wildlife Handbook' (Ref. 31).

The NRA will only use public funds to control erosion if the watercourse is 'main' river and if certain criteria are satisfied.

Issue 36: Inappropriate bank erosion control methods

Target

To maintain channel capacity at existing flood defence schemes.

TARGETS AND STATE OF THE CATCHMENT

State of the Catchment

Debris collects at these locations, requiring regular maintenance and special attention during periods of high flow to avoid blockage (see Appendix 6).

Desilting is required at Honiton, East Budleigh, Sidmouth, Sidford and Sidbury.

Improvements

We can build new flood defences if flooding is a serious problem in a particular area. Nowadays we usually only build new defences to protect built up areas from flooding. All schemes must be technically, economically and environmentally sound. We keep a list of schemes called a 'Programme of Capital Works' which helps us to plan for the future.

Different types of land and property need different levels of protection. We use the indicative standards (return period in years) to design schemes shown in Table 12.

Target

To identify and investigate all flood risk locations.

State of the Catchment

We maintain a register of flood problems and are developing a Long Term Plan of Needs. Flood problems for investigation have been identified at Otterton and Newton Poppleford in the current programme of capital works for 1999 to 2000. Appraisal of the need for these works will start in 1996-97. The work at Ottery St Mary has now been completed.

Issue 37: Risk of flooding at Otterton and Newton Poppleford.

Emergency Response

Absolute flood protection is not possible. Because of this we need to warn people when there is a danger of flooding. We have a strategy which details how these procedures operate and which we use to improve our emergency response.

Target

Where possible, to issue a warning at least two hours in advance of flooding.

State of the Catchment

Flood warnings are issued for the following locations in the Sid and Otter Catchment:

- ☐ River Sid: for Sidford and Sidmouth, from the river level gauging station at Sidbury
- ☐ River Otter: for Monkton, Langford Bridge, Weston, Fenny Bridges, Ottery St Mary, Tipton St John, Harpford and Otterton, from the river level gauging stations at Upottery and Fenny Bridges (see Map 3).

Additional information is obtained from the rainfall gauge at Gittisham (see Map 3).

South coast tidal warnings are issued when conditions are expected to cause problems. Local action is taken on receipt of these warnings.

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A study into the level of service for flood warning is currently being carried out to determine whether the required standard is being achieved/maintained. We expect to complete this work by the end of 1996. The results will identify additions and other changes to the flood warning network. There is an ongoing programme of improvement to the system including new sites and changes to the warning system. We expect to change the procedure for issuing flood warnings before the end of 1996.

Issue 38: Need to improve flood warning at some locations.

6. SUMMARY OF CATCHMENT ISSUES AND ACTIONS

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
1. Failure to meet long term RQOs.	<ul style="list-style-type: none"> Undertake specific water quality investigations to identify sources of poor water quality. Carry out Task Force inspections. Pursue improvements to approach SWWSL STW via their AMP3 Investment Programme. 	Achieve long term objectives. Protect spawning areas and improve fishery.	Cost	NRA	Farmers SWWSL Private dischargers
2. Bathing beach failure at Sidmouth Town.	<ul style="list-style-type: none"> SWWSL to improve effluent quality at Sidmouth outfall. 	Improved bathing beach quality.	Cost.	SWWSL	
3. High bacterial loads in both the Rivers Sid and Otter affect bathing beach quality.	<ul style="list-style-type: none"> Confirm cause of any bathing beach failure. Investigate significant sources of bacterial loadings in rivers if bathing water failures persist. 	Bathing beach compliance.	Difficult to control.	NRA	
4. Need to designate the monitored network of the River Otter for salmonid use under the EC Freshwater Fish Directive.	<ul style="list-style-type: none"> Designate the monitored network on the River Otter. 	Better protection.		NRA	
5. Need to improve Otterton discharge to comply with EC UWWT Directive.	<ul style="list-style-type: none"> Carry out improvement works at Otterton. 	Improved effluent quality.	Cost.	SWWSL	

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
6. Confirm High Natural Dispersion Area status off Sidmouth.	<ul style="list-style-type: none"> SWWSL to provide evidence through comprehensive studies. NRA to audit study and determine condition, with due regard to conservation status. 	Improved information. Determine best treatment option for Sidmouth not entailing excessive costs.	Bathing beach failure. Ecological value offshore.	SWWSL NRA	DWT
7. Nutrient enrichment of the River Otter.	<ul style="list-style-type: none"> Collect and analyse chemical and biological monitoring data. 	Improved information.	Cost.	NRA	
8. Failure to meet standard for polyaromatic hydrocarbons at Budleigh Brook.	<ul style="list-style-type: none"> Await outcome of research into causes of failure nationally. 	Meet SWA Directive. Improved water quality. Not waste resources on unnecessary investigation.	Cost. Difficult to control.	NRA	
9. Need to review analytical method for dissolved and emulsified hydrocarbons.	<ul style="list-style-type: none"> Urge DoE to review methods used. 	Better knowledge.		DoE	
10. Significant loads of Annex 1A substances from the River Otter.	<ul style="list-style-type: none"> Await DoE guidance on further load reduction nationally. 	Reduction in loads of Annex 1A substances. Improved water quality.	Cost. Difficult to control.	DoE	NRA
11. Moderate aquatic macroinvertebrate quality of the Combe Raleigh Stream and a stretch of the River Otter.	<ul style="list-style-type: none"> Confirm significance of failures. Secure improvements where appropriate. 	Environmental improvement.	Cost.	NRA	

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
12. Atrazine detected in public water supply boreholes and in the River Otter.	<ul style="list-style-type: none"> Continue monitoring atrazine in boreholes. Seek support nationally for atrazine initiative. Continue to urge farmers to use less polluting alternatives. Liaise with our specialist pesticide centre, MAFF and manufacturers to seek methods to prevent pollution and alternative methods of control. Consider enforcement action. 	Improved surface water and groundwater quality.	Cost. Lack of effective alternatives.	NRA	Local Environmental Health, Farmers, NFU, CLA
13. Polluting leachate from closed waste disposal site at Knapps Copse.	<ul style="list-style-type: none"> Ensure improvements to leachate quality before discharged to stream. Continue monitoring receiving watercourse. 	Reduced environmental impact. Improved water quality.	Cost.	NRA DCC	DCC NRA
14. High nitrate concentrations in groundwater.	<ul style="list-style-type: none"> Review of NVZs on 4 year period. Restrict nitrate application. Monitor effectiveness. Provide advice to DoE and MAFF. 	Improved information.	Cost.	DoE, MAFF MAFF NRA NRA	NRA NFU, CLA MAFF, DoE
15. Perceived low flows in the River Otter.	<ul style="list-style-type: none"> Continue to progress the three phase Otter Valley Study low flow investigation. In phase three assess the environmental implications of flow impacts caused by abstraction as identified in phase two. Develop an interim licensing approach for the River Otter whilst the study continues. 	Improved information. Environmental protection.	Cost.	NRA	SWWSL

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
16. Need to improve low flow gauging on the River Tale.	<ul style="list-style-type: none"> ● Install an electromagnetic gauge downstream of existing gauging station. ● Accept possible poor quality low flow data from the River Tale. 	Improved information.	Cost.	NRA	
17. Forecast public water supply deficit in Wimbleball Supply Zone.	<ul style="list-style-type: none"> ● Encourage metering in all new properties. ● Identify areas where significant stress on water resources and encourage selective metering. ● Encourage and publicise efficient water use and recycling. ● Encourage leakage reduction to a target of 200L/property/day. ● Set local leakage targets. ● Encourage water companies to make more efficient use of water resources. ● Promote Wimbleball Pumped Storage Scheme. 	Meet public water supply deficit in a sustainable manner.	Cost. Environmental constraints. Co-operation of the water company.	NRA SWWSL	SWWSL, water users Planning authorities.
18. Decline of important habitats and invertebrate species.	<ul style="list-style-type: none"> ● Set targets to further conservation of habitats and species through Rivers and Wetlands Project in relation to national initiative. ● Work, with others where appropriate, to achieve targets. ● Identify parishes for springline mire surveys. ● Draw up detailed site management plans for the springline mire sites. ● Identify sections of river valley where tree planting should be encouraged. 	Environmental improvements.	Cost.	NRA, DWT, EN AONB, DWT AONB	MAFF, CoCo NRA

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
19. Low level of use of catchment by otters.	<ul style="list-style-type: none"> Establish volunteer network for surveying. Set up quarterly surveys. Continue to record sightings and all other evidence of otters in the catchment. Encourage habitat creation projects in collaboration with landowners and others. Investigate potential factors limiting further expansion. Adopt actions proposed in otter BAP where appropriate. 	Increase in otter populations.	Cost.	DWT DWT NRA NRA, DWT NRA & DWT NRA	Volunteers , river users (e.g. riparian owners and anglers), landowners
20. Scarcity of water voles.	<ul style="list-style-type: none"> Continue wardens' surveys and record other evidence of presence. Record mink sightings during routine activities. Consider possibilities for establishing new riparian habitat. 	Improved information.	Cost.	NRA	River users
21. Need for improvement of conservation value of wet grassland sites and ditches.	<ul style="list-style-type: none"> Encourage landowners and others to manage water levels to increase conservation value and modify agricultural practices, target schemes in lower valley. 	Environmental enhancement.	Cost.	NRA, MAFF (Countryside Stewardship) DCC	Landowners, Devon Birdwatching Preservation Society

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
22. Loss of nest sites for riparian bird species e.g. sandmartins and kingfishers.	<ul style="list-style-type: none"> Encourage early control of erosion by landowners, using traditional methods if possible, to avoid later need for extensive works. Retain areas of suitable habitat where possible. Survey River Otter and Sid to identify sandmartin and kingfisher nest sites and areas of suitable habitat. 	Increase areas of suitable nest sites.	Cost.	NRA, landowners NRA, DWT, EDHC, EN, RSPB	Devon Bird Watching and local volunteers.
23. Spread of invasive plant species.	<ul style="list-style-type: none"> Highlight means of spread of Japanese knotweed. Continue programme of surveys. Consider need for control programmes on NRA owned/managed land. Promote NRA Guidance leaflet and raise awareness. Encourage control by others where significant problems exist. Encourage suitable control when cycle, footpaths and greenlanes are opened. 	Improved data and planning.	Cost.	NRA DCC, EDHC, EDDC, Parish Paths Initiative	Riparian owners NT

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
24. Need for further improved access around rivers, especially for the less able.	<ul style="list-style-type: none"> Investigate possibility of developing new footpath route in Ottery St Mary, linking Canaan Way to Finnimore Industrial Estate and beyond, using new NRA flood alleviation scheme for part of route. Work with others, including East Devon Heritage Coast Service, to provide good access and interpretation of the water environment on land owned or controlled by the NRA. Promote use of circular and regional routes. Develop vehicular access and public transport links for the less able. 	Improved access. Encourages wider use.	Cost. Flood alleviation requirements. Environmental protection.	NRA, Heritage Coast Officer, DCC, CoCo, East Devon Footpath Warden, DCC	Users, riparian owners
25. Disturbance of sensitive wildlife by excessive access.	<ul style="list-style-type: none"> Develop active programme of bankside habitat creation between public footpaths and River Otter to provide shelter for wildlife and to reduce the level of direct disturbance of the river. Raise public awareness of problem - consider appropriate interpretation. 	Protection of sensitive wildlife.	Cost.	NRA, Heritage Coast Officer, DCC, DWT, AONB	Users, riparian owners
26. Restore migratory fish runs to the River Otter.	<ul style="list-style-type: none"> Improve fish passage at Otterton weir, Marles Farm Weir, Tipton St John Weir, Tracey weir and Langford weir. Maintain all other fish passes, in particular, Head Weir, Ottery St Mary. Consider diverting rights of way over short distances at sensitive sites where conflicts exist and habitat management will not solve the problem. 	Improved migratory fish passage.	Cost.	NRA DCC	Riparian owners

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
27. Decline in brown trout population.	<ul style="list-style-type: none"> Determine and set targets against which to measure the need for stocking with brown trout. Continue programme of stocking with juvenile brown trout, reared from broodstock taken from the catchment. Investigate ova survival in the catchment at selected sites. Continue programme of habitat improvements including rehabilitating spawning gravels where a need is identified. 	<p>Improved fish stocks.</p> <p>Improved knowledge of fishery. Problem areas identified.</p>	Cost.	NRA	Fishery associations
28. Stocking with farmed brown trout.	<ul style="list-style-type: none"> Discourage stocking of the catchment with catchable farmed fish. Promote habitat improvements and recovery of the natural populations as the preferred means of improving the fishery. 	Improved fishery.	Cost.	NRA	Riparian owners, fishery associations
29. Loss of spawning/nursery areas due to works in the River Otter not requiring NRA consent.	<ul style="list-style-type: none"> Seek improvements in existing legislation to allow increased control of in-river works where damage to the fishery is likely to result. Raise awareness of practice with Waste Regulation Authority. 	Prevent damage to the fishery by preventing destruction of spawning/nursery areas.	Cost. Legislation.	NRA	Riparian owners
30. The effect of fish-eating birds on salmonid stocks in the River Otter.	<ul style="list-style-type: none"> 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. 	Increased knowledge and awareness.	Cost. Protected species (conflict with conservation interests).	NRA	MAFF/DoE, landowners, anglers

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
31. Siltation of spawning gravels	<ul style="list-style-type: none"> Promote temporary bankside fencing schemes, formal stock watering points, buffer zones and appropriate bank reinstatement schemes where appropriate. Promote MAFF's Code of Good Agricultural Practice for the Protection of Soil (Ref. 32). 	Reduce siltation of spawning gravels.	Cost. Conflict of interests with farmers.	NRA	Landowners, farmers
32. Proposals for coastal defence works need to be considered within an overall and integrated strategy.	<ul style="list-style-type: none"> Prepare a Shoreline Management Plan for the Lyme Bay and South Devon Coastline. (The Investigation Study will be during 96/97). 	Improved management. Better coastal defence.	Cost.	WDDC	NRA, EDDC, SHDC, WPDC, TBC, PCC, DCC, DoCC
33. Need to identify flood risk for planning authorities.	<ul style="list-style-type: none"> Provide information by April 1997. 	Floodplain protection. Improved advice to planning authorities.	Cost.	NRA	Planning authorities
34. Inappropriate development, particularly in floodplains, may affect standards of flood defence and damage environmental interest.	<ul style="list-style-type: none"> Advice should continue to be given to planning authorities. Continue to strive for inclusion of water protection policies into relevant local plans. Raise awareness of NRA flood defence concerns, such as conserving the floodplain, to the decision-maker. Review wording of our observations to planning authorities, 	Better flood protection. Environmental gain.	Cost.	NRA	Developers, planning authorities
		Increased awareness of flood defence concerns.	Cost.	NRA	Developers, planning authorities, planning committees

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
35. Need to continue to improve the efficiency and effectiveness of our flood defence work.	<ul style="list-style-type: none"> Flood Defence Management system will be introduced during 1996. Asset surveys will be undertaken. Target standards will be compared with the current state, and differences addressed. 	Flood protection and environmental improvement.	Cost.	NRA	
36. Inappropriate bank erosion control methods	<ul style="list-style-type: none"> Encourage early control of erosion by landowners, using traditional methods where possible, to avoid later need for extensive works. Avoid works in areas of particular importance, especially where people or buildings are not at risk. Ensure use of natural materials and encourage enhancements to reduce landscape impact. Screen all applications to ensure no environmental damage. Seek to have existing areas reinstated and replaced with less damaging option. Formulate an NRA Regional Policy on the Erosion of River Banks, which will be available in 1996. Review future action, where it has previously controlled erosion, in the light of current NRA policy. 	Environmental improvement. Use of more aesthetic erosion control measure. Landscape protection.	Cost.	NRA	Landowners
37. Risk of flooding at Otterton and Newton Poppleford.	<ul style="list-style-type: none"> Develop appropriate schemes. 	Flood protection.	Cost.	NRA	MAFF

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
38. Need to improve flood warning at some locations.	<ul style="list-style-type: none"> Complete the review of flood warning study. 	Improved warning.	Cost.	NRA	Emergency services voluntary sector

GLOSSARY

ABSTRACTION

Removal of water from surface or groundwater.

AQUIFER

A sub-surface zone or formation of rock which contains exploitable resources of groundwater. Aquifers are classed as either major, minor or non aquifers depending upon the availability of the groundwater sources. Major aquifers provide large yields and are usually used for public water supply, minor aquifers have smaller yields and are usually used only for local water supply, non aquifers yield little water and have very few, if any abstractions.

AREA OF OUTSTANDING NATURAL BEAUTY (AONB)

Landscapes with distinctive character and natural beauty of national importance designated under the Natural Parks and Access to the Countryside Act (1949). These areas are administered by the Countryside Commission with a view to conserving and enhancing their natural beauty.

ASSETS MANAGEMENT PLAN 2 (AMP2)

South West Water's Capital Investment Programme.

ATRAZINE

A herbicide of the triazine group which is persistent in the environment.

BED-CHECK WEIR

The raising of a structure in the river channel to slow down the velocity of the flowing water.

BENTHIC

Bottom dwelling.

BIOACCUMULATION

The accumulation by living organisms 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 dissolved oxygen consumed in water, usually as a result of organic pollution.

BIODIVERSITY

The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. (Article two of the Biodiversity Convention)

BUFFER ZONE

A strip of land, typically 10-100 m wide alongside rivers which is removed from intensive agricultural use. Can reduce inputs of pollutants and improve habitat diversity and landscape.

CARR

wet woodland composed of trees such as willow and alder, which is a successional stage between open water and dry woodland.

COLIFORM (FAECAL COLIFORMS)

A group of bacteria distinguished by their ability to degrade lactose to produce acid and gas. They are used as indicators of possible contamination of water by sewage. The faecal coliforms, a subgroup of coliforms, are normally found only in faeces and are therefore a more reliable indicator of contamination by sewage.

GLOSSARY

COUNTRYSIDE STEWARDSHIP SCHEME

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.

COUNTY WILDLIFE SITES

Sites which are of county significance for wildlife, in line with formal guidelines prepared by the Devon Wildlife Trust.

CRETACEOUS

Third of the three periods included in the Mesozoic Era. It began approximately 144 million years ago and ended about 65 million years ago.

CUMECS

Cubic metres per second. A measure of flow.

CYPRINID

Fish like or akin to carp i.e. coarse fish.

DRY WEATHER FLOW

The flow of wastewater, including industrial discharges and infiltration (if any) to a treatment works and measured after a period of seven days of dry weather (rainfall less than 0.25 mm).

ECOSYSTEM

A functioning, interacting system composed of one or more living organisms and their effective environment, in a biological, chemical and physical sense.

ENTEROVIRUS

These viruses are monitored for under the EC Bathing Water Directive (160/76/EEC) for designated bathing areas 'wherever there are grounds for suspecting a deterioration in water quality'. They replicate in the intestinal tract, commonly cause asymptomatic immunizing infections which protect against further infection, give rise to viraemia, occasionally infect the central nervous system, are more common in children than adults, cause infections predominantly in summer and autumn and include the viruses that cause polio and meningitis.

ENVIRONMENTAL QUALITY STANDARD (EQS)

The concentration 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

Area where landscape, wildlife and historic interest are of national importance. Payments are made by the Ministry of Agriculture, Fisheries and Food Departments for appropriate sensitive land management.

EUTROPHIC

Water enriched with nutrients with nutrients which result in high plant (including algal) growth. Usually used when referring to enrichment from man-made sources such as fertilizers leaching from the soil.

FAECAL COLIFORM

The name given to a group of bacteria which, if present in a water sample, indicate that it has been contaminated by faeces and that there is, therefore, a risk that it may contain faecal pathogens like cholera and typhoid fever.

FAECAL STREPTOCOCCI

Disease causing bacteria, arranged in chains and found present in faeces. Faecal streptococci are monitored as part of the EC Bathing Waters Directive (76/160. EEC).

GLOSSARY

FLOODPLAIN

This includes all land adjacent to a watercourse over which water flows or would flow but for flood defences in times of flood.

GEOMORPHOLOGY

Scientific study of land forms and of the processes that formed them.

GREENSAND

Term applied to glauconite-rich sandstones and calcareous sandstones.

GROUNDWATER

All the water contained in the void spaces in pervious rocks and that held within the soil, mainly derived from surface sources.

HABITAT

A certain type of location in which an organism prefers to live, and characteristic of it.

HYDROGEOLOGY

Branch of geology concerned with water within the Earth's crust.

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, e.g. jellyfish, snail, fly.

MAIN RIVER

Some, but not all watercourses are designated as 'Main River'. 'Main River' status of a watercourse must be first 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.

NAPHTHALENE

A byproduct of coal tar manufacture, toxic by inhalation. A polycyclic aromatic hydrocarbon (see below).

NON-CALCAREOUS

Rock containing less than 30% calcium carbonate.

ORDNANCE DATUM

The mean sea-level used as a datum for calculating absolute height of land on official British maps.

PERMEABILITY

The ease at which liquids (or gases) can pass through rocks or a layer of soil.

PHENOLS

A class of aromatic organic compounds derived from a benzene ring structure. Toxic by ingestion, inhalation and skin absorption.

GLOSSARY

POLYAROMATIC HYDROCARBONS

Naturally occurring in many products but also arising in the combustion residues of petroleum products. Some PAHs are known to be potent human carcinogens.

Q95

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

REVETMENT

Facing built to support a bank.

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.

RIVER TRAINING WORKS

Works designed to influence the location, flow scouring and silting characteristics in a river.

SALMONID

Game fish of the salmon family e.g. salmon, trout and sea trout.

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.

SPATE

A sudden increase in water quantity, such as a flood, causing a river to be swollen in a fast-flowing condition.

SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA)

Areas designated under the Habitats Directive.

TELEMETRY SITE

Site of apparatus to record reading on an instrument at distance, by means of radio transmissions.

TRIASSIC

The earliest of the three periods of the Mesozoic Era (248 - 213 million years ago).

WETLANDS

Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt including areas of marine water, the depth of which at low tides does not exceed 6 m.

UNITS & ABBREVIATIONS

UNITS

mm	Millimetre	Ml/year	Megalitres per year
m	Metre	kg/day	Kilogrammes per day
km	Kilometre	%	Percentage
km ²	Kilometre squared	>	Greater than
m/km	Metres per kilometre	<	Less than
ha	Hectare	≤	Less than or equal to
m ³	Cubic metres	≥	Greater than or equal to
m ³ /s	Cumec; cubic metre per second	mg/l	Milligrams per litre
m ³ /day	Cubic metres per day	no/100ml	Number per 100 millilitres
l/s	Litres per second	no/l	Number per litre
Ml/day, Ml/d	Megalitres per day	ug N/l	Micrograms of nitrogen per litre

ABBREVIATIONS

AMP2	Asset Management Plan 2	OS	Ordnance Survey
AONB	Area of Outstanding Natural Beauty	PAH	Polyaromatic Hydrocarbon
AOD	Above Ordnance Datum	PCC	Plymouth City Council
BMWP	Biological monitoring Working Party	PPP	Policy and Practice for the Protection of Groundwater
BOD	Biochemical Oxygen Demand	R&D	Research and Development
CLA	Country Landowners Association	RE	River Ecosystem, RE1, RE2 etc
CMP	Catchment Management Plan	RHIER	Royal Holloway Institute of Environmental Research
CoCo	Countryside Commission	RIGS	Regionally Important Geological Site
CSO	Combined Sewer Overflow	RQO	River Quality Objective
DO	Dissolved Oxygen	RSPB	Royal Society for the Protection of Birds
DCC	Devon County Council	SAC	Special Areas of Conservation
DoCC	Dorset County Council	SAM	Scheduled Ancient Monument
DoE	Department of the Environment	SHDC	South Hams District Council
DoT	Department of Transport	SoS	Standards of Service
DWT	Devon Wildlife Trust	SSSI	Sites of Special Scientific Interest
EC	European Commission	STW	Sewage Treatment Works
EDDC	East Devon District Council	SWQO	Statutory Water Quality Objective
EDHC	East Devon Heritage Coast	SWWA	South West Water Authority
EN	English Nature	SWWSL	South West Water Services Limited
EQS	Environmental Quality Standard	TBC	Torbay Borough Council
ESA	Environmentally Sensitive Area	UK	United Kingdom
HCH	Hexachlorohexane	UV	Ultra Violet
HNDA	High Natural Dispersion Area	UWWT	Urban Waste Water Treatment
IDO	Interim Development Order	WDDC	West Dorset District Council
MAFF	Ministry of Agriculture, Fisheries and Food	WOAD	Welsh Office for Agricultural Development
MCA	Mineral Consultation Area	WPDC	Weymouth & Portland District Council
NFU	National Farmers Union	WQO	Water Quality Objective
NGR	National Grid Reference	WRA	Waste Regulation Authority
NRA	National Rivers Authority	WWSL	Wessex Water Services Ltd.
NSA	Nitrate Sensitive Area		
NT	National Trust		
NVZ	Nitrate Vulnerable Zone		
NWC	National Water Council		
OFWAT	Office of Water Services		
OD	Ordnance Datum		

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APPENDIX 1

Sites of Special Scientific Interest

<i>Name</i>	<i>Description</i>
Hense Moor	Lowland mixed valley bog
Hense Moor Meadows	Herb-rich meadows
Sidmouth to Beer Coast	Chalk grassland, vegetated sea cliffs, geology
Ladram Bay to Sidmouth	Coastal geomorphology, fossils
Otter Estuary	Saltmarsh, birds, fossils
Budleigh Salterton Cliffs	Geological site: pebble beds exposure
East Devon Pebblebed Heaths	Lowland heath, birds, inverts

Nature Reserves

<i>Name</i>	<i>Body</i>	<i>NGR</i>
Aylesbeare & Harpford Common	RSPB	SY 059 903
Bystock Pools, Exmouth	DWT	SY 034 844
Clayton Wood, West Hill	Woodland Trust	SY 068 929
Core Hill Wood, Sidmouth	Woodland Trust	SY 115 910
Fire Beacon Hill	LNR	SY 112 910
The Keep, Broad Oak	Woodland Trust	SY 072 930
Otter Estuary, Budleigh Salterton	DWT	SY 076 822
Otterhead Lakes	SWT	ST 225 135
Page Wood, Salcombe Regis	Woodland Trust	SY 137 879
The Rough, Luppitt	DWT	ST 178 040
Venn Ottery, Newton Poppleford	DWT	SY 065 920
Weston Mouth	DWT	SY 164 880

Historic Parks & Gardens

<i>Name</i>	<i>NGR</i>
Bicton	SY 071865
Cadhay	SY 089963
Gittisham	SY 144978

Species Survey Sites

<i>Site No.</i>	<i>River</i>	<i>Catchment Area</i>	<i>Location</i>	<i>NGR</i>
0301	Sid	03A	A3052 bridge, Sidford	SY 1375 8995
0302	Sid	03A	Sidmouth	SY 1280 8813
0303	Sid	03A	Sidbury	SY 1402 9168
0403	Otter	04B	Weston	ST 1422 0006
0412	Otter	04B	Rawridge	ST 1983 0627
0415	Otter	04B	Dotton	SY 0873 8853
0411	Tale	04B	Taleford	SY 0895 9689
0407	River Love	04B	Mill House Nursery	ST 1685 0293

APPENDIX 2: Standards for the Five River Ecosystem Use Classes

Use Class	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mgN/l 90%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

APPENDIX 3: EC Directive Concerning the Quality of Bathing Waters (76/160/EEC)

Microbiological Standards

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

PFU = Plaque Forming Units

Notes :

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

- (2) There is currently no imperative standard for faecal streptococci, however, it has been proposed that the Directive should be revised and should include an imperative standard for faecal streptococci of 400/100ml.

Aesthetic Criteria

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

APPENDIX 4: EC Dangerous Substances Directive (76/464/EC) - EQSs for List I and II Substances

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

EQSs FOR LIST I SUBSTANCES (TIDAL WATERS)

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	10	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

EQSs FOR LIST II SUBSTANCES (INLAND WATERS) (1)

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	12	50 to 100	
		10	5	100 to 150	
		20	12	150 to 200	
		20	5	200 to 250	
		20	25	>250	
			0		
			25		
			0		
			25		
			0		
Chromium	µg Cr/l	5	15	0 to 50	AA,D
		10	0	50 to 100	
		20	17	100 to 150	
		20	5	150 to 200	
		50	20	200 to 250	
		50	0	>250	
			20		
			0		
			25		
			0		
			25		
			0		
Zinc	µg Zn/l	8	75	0 to 50	AA,T
		50	17	50 to 100	
		75	5	100 to 150	
		75	25	150 to 200	
		75	0	200 to 250	
		125	25	>250	
			0		
			25		
			0		
			50		
			0		
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	

Parameter	Units	Value (3)		Hardness (mg CaCO ₃ /l)	Status (2)
		A Std	B Std		
Nickel	µg Ni/l	50 100 150 150 200 200	50 10 0 15 0 15 0 20 0 20 0	0 to 50 50 to 100 100 to 150 150 to 200 200 to 250 >250	AA,D
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 60	20 60	0 to 200 200+	AA,T
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

EQSs FOR LIST II SUBSTANCES (TIDAL WATERS)

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

APPENDIX 5: Third North Sea Conference - Priority Hazardous Substances (Annex 1A List of Substances)

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

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

APPENDIX 6: Emergency Response Task Schedule

Operating of Major Control Structures

Barriers
Barrages

Closure of Flood Defences

Flood Gates
Stop Logs
Temporary Raising

Activating and Operating Pumping Stations

Necessary Attendance
Clearing Weedscreens

Operation of Flood Storage and Diversion Works

Inlet and Outlet Controls
Maintaining Flows over and through structures

Adjustments to River Flows Control Structures

Sluice Gates
Lock Gates
Penstocks
Flaps

Clear Debris from Authority Installed Trash Screens

Inspection
Clearance
Surveillance

Provide River Level Information

Flood Prediction
Flood Warning

Clear Debris from Other Trash Screens

Inspection
Clearance
Surveillance

Clear Obstruction During Flood Flows

Flow Control Structures
Restricted Urban Channels
Culverts
Bridges

Flood Stressed Defences

Inspection
Surveillance
Temporary Reinforcement

Note: The Schedule is not comprehensive but indicates those tasks which must be undertaken by the Emergency Response Workforce.

Standby Workforce Schedule (Alert Given)

East Budleigh

2 people, 1 hr response time

Tipton

2 people, 4 hr response time

Gissage and Glen

2 people, 2 hr response time

Sidmouth

2 people, 1 hr response time

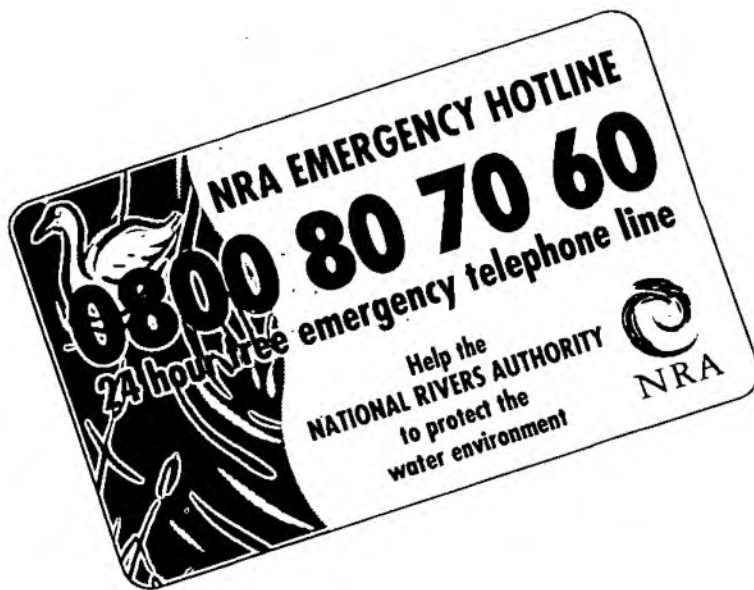
Sidbury and Sidford

2 people, 4 hr response time

Seaton Gates

2 people, 2 hr response time

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.



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