

RIVERS AXE AND LIM 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 organisation 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.

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RIVERS AXE AND LIM 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 Axe and Lim 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.



MALCOLM CHUDLEY
Area Manager (Devon)

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ACKNOWLEDGEMENTS

We would like to thank the Catchment Steering Group (see Section 2.5) for their contributions towards this report. They are:

Name	Representing
<i>D Walling</i>	<i>Regional Rivers Advisory Committee</i>
<i>D Braggins</i>	<i>Devon Fisheries Advisory Committee</i>
<i>C Pole-Carew</i>	<i>Riparian Owners (also on Axe Vale Rivers Association)</i>
<i>D Minchin</i>	<i>Riparian Owners</i>
<i>J Boulton</i>	<i>Axe Fly Fishers (also on Axe Vale Rivers Association)</i>
<i>B Terry</i>	<i>Axe Fly Fishers</i>
<i>J Williams</i>	<i>Taunton Fly Fishing Association</i>
<i>C Pulteney</i>	<i>English Nature</i>
<i>D Campbell</i>	<i>Axe Vale and District Conservation Society</i>
<i>B Newbury</i>	<i>National Farmers Union</i>
<i>I Dunsford</i>	<i>Local Industry (St Ivel)</i>
<i>T Gameson</i>	<i>South West Water Ltd.</i>
<i>D Eckhart</i>	<i>East Devon District Council</i>
<i>K Whetlor</i>	<i>Lyme Regis Town Council</i>
<i>N Butler</i>	<i>East Devon Heritage Coast</i>
<i>C Tuke</i>	<i>Axe Vale Rivers Association</i>

Your Views

We hope that this report will be read by everyone who has an interest in the water environment. Your views will help us to write 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 by 31 May 1996 to:

**Judy Proctor
Catchment Planner - Devon Area
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The Next Stage

We will 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 will do a major review of the progress we have made.

We will not republish this Consultation Report.

**Rivers Axe and Lim 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, 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 - The Rivers Axe and Lim Catchment



1. VISION FOR THE AXE AND LIM CATCHMENT

This Catchment Management Plan covers a total area of approximately 443 km² and comprises the catchments of the Rivers Axe and Lim which drain to the sea at the coastal resorts of Seaton and Lyme Regis respectively (see Map 1). This area is subsequently referred to as the Axe and Lim Catchment, or the catchment. The catchment straddles three counties, Devon, Dorset and Somerset and is mainly populated with isolated farmsteads, hamlets, villages and a few small towns with a total population of approximately 40,000. The population density is well below the average for Devon as a whole, although many more visit during the summer months.

The Axe and Lim Catchment is underlain by two aquifers, which are exploited for both public and private water supply. It is predominantly an agricultural region, and there are numerous sites which are formally designated as being of particularly high conservation value. The headwaters of the Rivers Axe and Lim and their tributaries principally rise in agricultural land which has important implications for the quality of the river. The River Yarty, the principal tributary of the River Axe and a major spawning tributary rises in the Environmentally Sensitive Area (ESA) of the Blackdown Hills. The land management of this area will play a major role in its success as a nursery area for fish.

Our vision for the River Axe and Lim Catchment is of a healthy and diverse water environment, 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 direct and diffuse pollution and improves the habitat of the river system and wetlands for wildlife
- * restoration of brown trout stocks and migratory fish runs to the River Axe
- * increasing enjoyment and appreciation of the water environment
- * minimal risk to people and property from flooding
- * minimal interference with the natural hydrological cycle, including natural river and wetland functions and processes.

2. INTRODUCTION

This report:

- ☐ describes how the catchment is used
- ☐ identifies problems in the catchment and proposes actions to resolve them where possible.

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), recognises 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 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. Catchment Management Planning will continue under the new Environment Agency from the 1 April 1996.

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 summarise the issues raised in the main report and propose options/actions to resolve and minimise them. We detail the benefits and any constraints these actions may have.

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.

INTRODUCTION

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 issues of the previous 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 Axe between the NRA and the Catchment Action Plan 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 and fisheries initiatives, including fish passes to enable wild fish to return to all river reaches.

Part of this group has formed the basis of the current Catchment Steering Group.

2.5 CMPS AND THE CATCHMENT STEERING GROUP

This group of local representatives endorse the Consultation Report and subsequent Action Plan prior to public release. They will monitor the implementation of the Action Plan and provide the NRA with specific advice on the importance of issues within the catchment. They act as a communication link between the local community, the NRA and its committees and will help to promote and develop initiatives of benefit to the water environment within the catchment.

2.6 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

The River Axe drains an area of 426 km² and the River Lim drains an area of only 17 km² (see Map 1). For the purposes of this report the River Lim Catchment will be combined with the River Axe Catchment.

The River Axe rises near Chedington in Dorset (ST 49 04) and is joined by several tributaries before discharging to the sea at Seaton approximately 44.1 km from its source. The River Coly, which rises 1.5 km south-east of Honiton, also discharges to the Axe Estuary, some 0.5 km below the tidal limit of the River Axe. The River Axe has a fairly shallow average gradient of 4.3 m/km (see Figure 1).

The River Yarty, the River Axe's principal tributary, rises near Staple Hill in Somerset (ST 23 16) and flows south for approximately 24 km, where it is joined by the Corry Brook, before joining the River Axe 1 km south-west of Axminster. The River Yarty is much steeper than the River Axe and has an average gradient of 8.5 m/km (including from the Yarty/Axe confluence to the sea).

The River Lim rises near Raymonds Hill in Devon (SY 31 96) and plunges steeply to the sea at Lyme Regis, approximately 6 km from its source. It has an average gradient of approximately 27 m/km.

The catchment is mainly agricultural with light industry limited to the three main urban areas around Chard, Axminster and Seaton. Other important industries are those associated with agriculture, such as creameries and dairies. Tourism is the most significant industry along the coast, especially at the resorts of Lyme Regis, Seaton and Beer, which places substantial demands on water supply and sewage treatment services during the summer period.

3.2 GEOLOGY, SOILS AND LAND USE

The Axe and Lim Catchment is underlain by rocks dating from the Triassic through to the Cretaceous Periods. Recent and Pleistocene drift deposits are also present underlying large areas of the catchment (see Map 2).

The lower, western part of the River Axe Catchment between Seaton and Axminster is underlain by Triassic deposits of mainly calcareous clays and mudstones of the Mercia Mudstone Group. Bedding within these deposits is nearly horizontal.

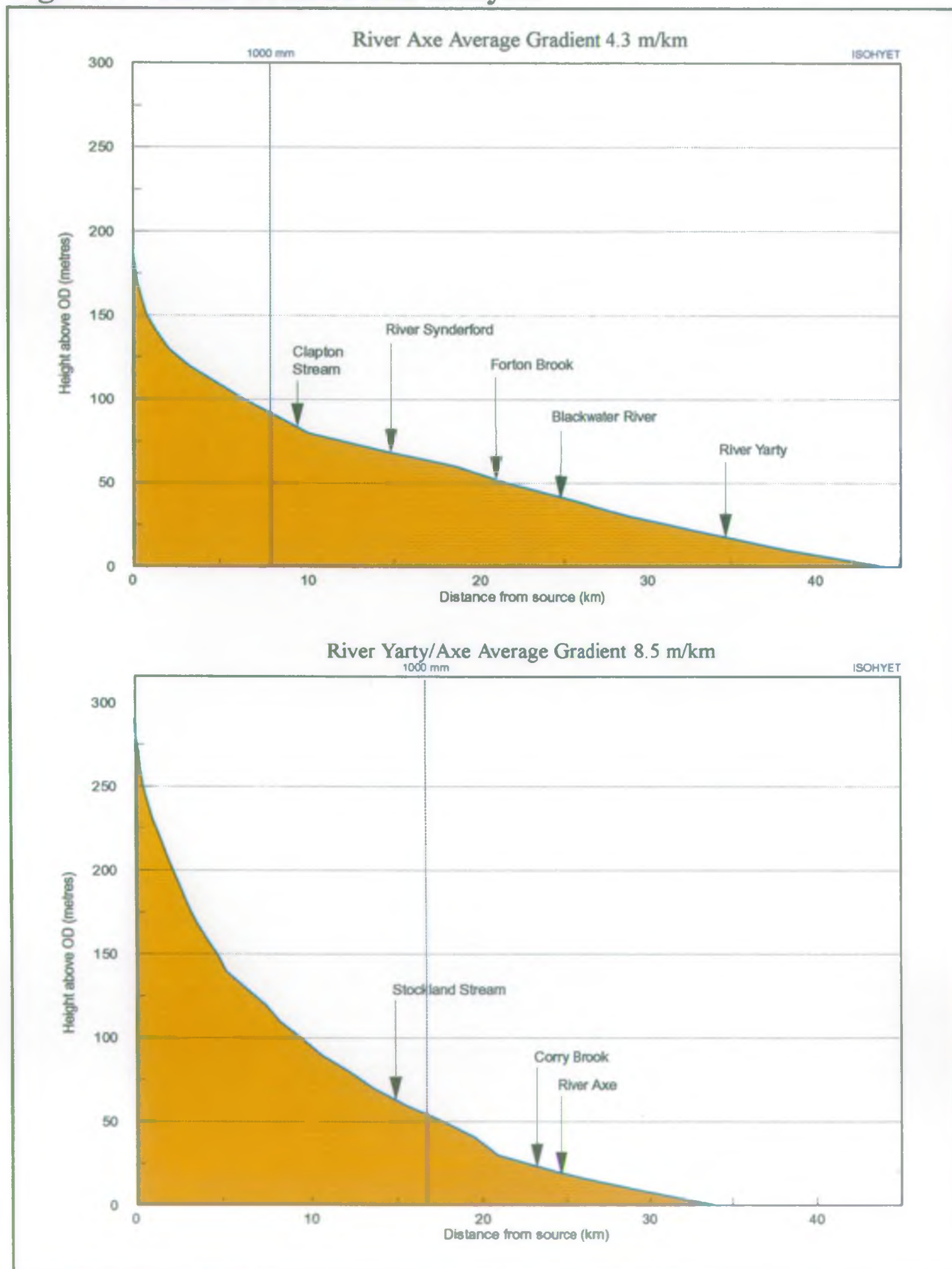
On the higher ground, Cretaceous Upper Greensand outcrops. These deposits are typically 30 - 50 m thick. Chalk deposits form isolated hill top outcrops and overlay the Upper Greensand.

The Upper Greensand and Chalk outcrops are commonly covered by Clay with Flints, forming the East Devon Table Lands.

Most of the major river valleys have associated deposits of river gravels and alluvium. Landslips have occurred in a number of places within the catchment particularly where the Gault Clay outcrops along the valley sides.

Slopes in the catchment are mainly covered by brown earth soils. Land surrounding the main river channel and some tributaries is typically fine loamy soil, slowly permeable and subject to slight seasonal waterlogging. Pockets of slowly permeable clayey soils may also be found over the mudstone.

Figure 1 - River Profiles and Isohyets



CATCHMENT CHARACTERISTICS

The River Lim Catchment has similar soils to that of the River Axe Catchment, with brown earths covering much of the area, while the coastal area surrounding Lyme Regis is covered by slowly permeable clayey soils.

These clayey soils support mainly grassland but also some crops and woodland. Dairying is the main agricultural enterprise in this catchment, and grass has traditionally been the most important crop because of relatively small farm sizes, small irregular fields and relatively high rainfall.

3.3 HYDROGEOLOGY

The Axe and Lim Catchment is underlain by two major aquifers (see Map 2), the Upper Greensand and the Chalk, although their significance in this region is somewhat diminished because they are isolated and highly fragmented outcrops. Groundwater makes a significant contribution to the baseflow of the River Axe.

The Upper Greensand drains to some major springs which are sources for public water supply at Wilmington. It also serves to maintain dry weather flow in the upper reaches of the catchment. Numerous minor springs have been tapped for domestic and agricultural purposes and also support valuable wetland habitats; the springline mires.

The Chalk, like the Greensand, has been exploited locally for public and private water supplies. The elevated hilltop deposits are often above the local water-table with rapid vertical drainage into the underlying Upper Greensand.

The Jurassic Bridport and Yeovil Sands and the Inferior Oolite are both considered to be minor aquifers but they provide locally important water supplies. Springs from these strata also contribute to the headwaters of the River Axe.

The Lower Liassic mudstones may yield small amounts of water though together with the Mercia Mudstone they are regarded as non-aquifers on account of their very low permeabilities and yields.

The Clay with Flints also contribute to a limited number of private water supplies. However, these deposits being generally of low permeability can reduce recharge to the underlying Upper Greensand.

3.4 HYDROLOGY

Rainfall

Rainfall is currently monitored each day at 14 Meteorological Office approved gauges within the Axe and Lim Catchment (see Map 3). The 1961 - 1990 long-term average for these sites can be seen in Table 1.

There is considerable contrast in rainfall between the wet high grounds of the Blackdown Hills and the North Dorset Downs, and the more sheltered lowland areas of the Axe Estuary. Average annual rainfall varies with altitude from 820 mm along the coast to over 1,067 mm on high ground.

Figure 1 shows the river profiles and isohyets for the Rivers Axe and Lim.

Map 3 - Hydrometric Network



CATCHMENT CHARACTERISTICS

Table 1: Average Annual Rainfall (1961 - 1990) at Specific Sites in Catchment

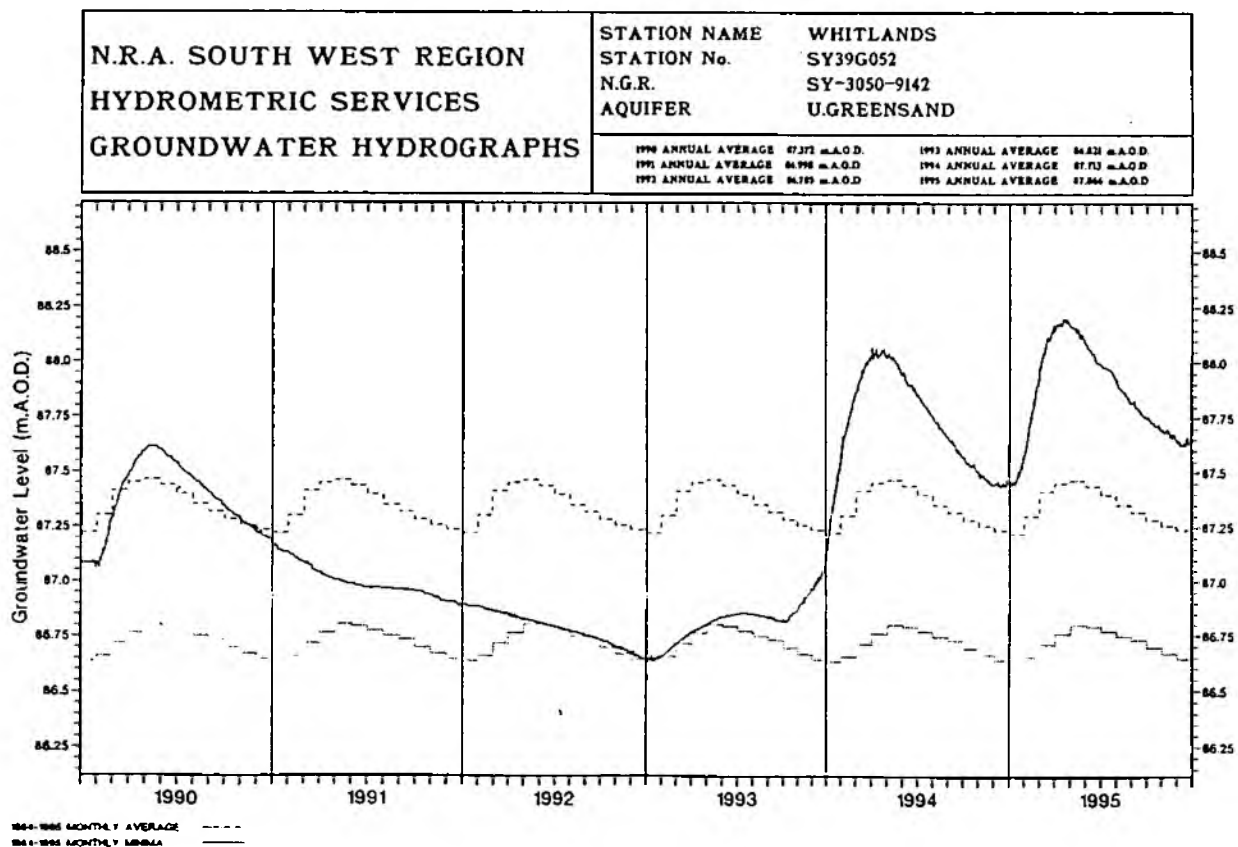
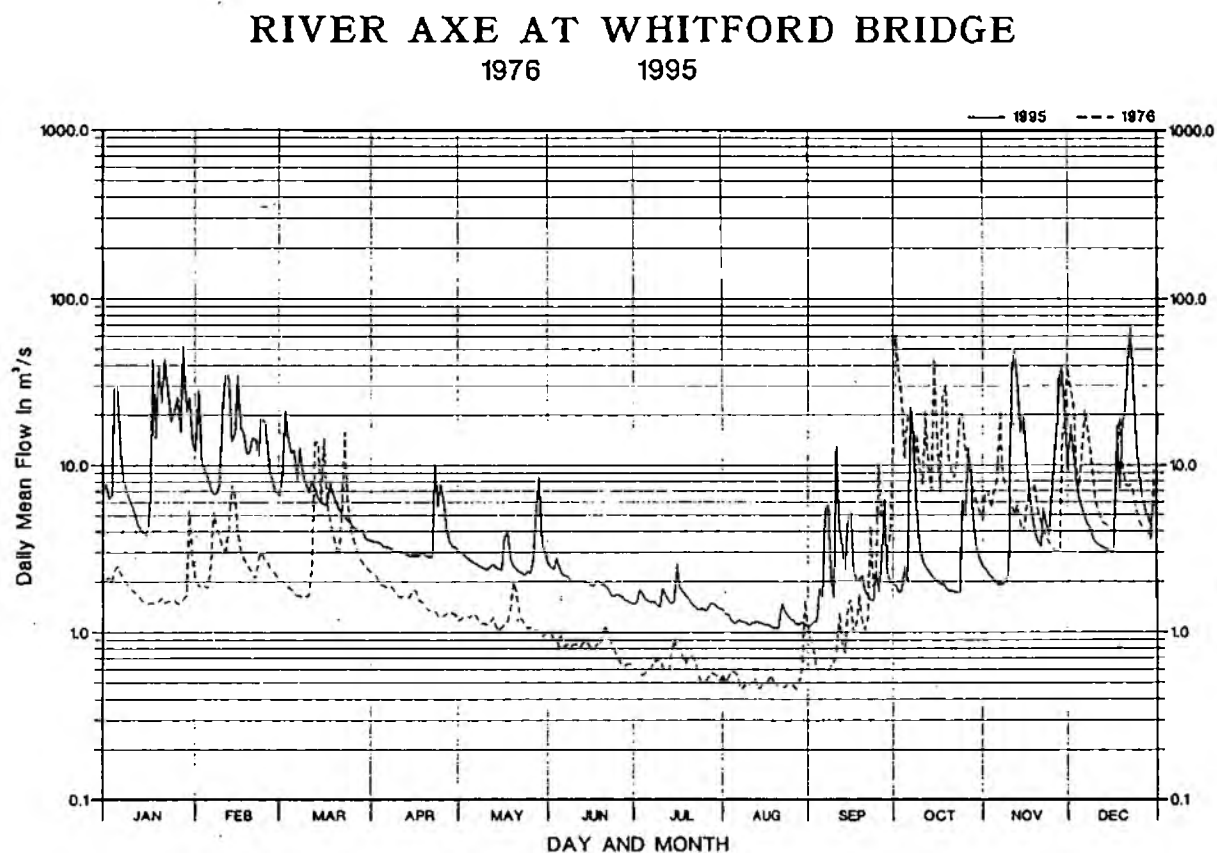
Rain Gauge Station	NGR	Site Name	Record Period	Av. Annual Rainfall (mm)
1. RF353195	SY176959	Farway, Telbridge	01.11.78 - date	1,067
2. RF353419	ST214004	Wilmington Pumping Station	01.01.72 - date	1,062
3. RF353471	SY248966	Seaton Junction	01.07.82 - date	936
4. RF353510	SY236922	Holyford	01.01.69 - date	945
5. RF353608	SY231894	Beer Windyridge	01.03.48 - date	820
6. RF352193	SY415048	Drimpton, Burstock	01.11.78 - date	1,026
7. RF352282	ST371084	Cricket St. Thomas Wildlife Park	01.01.66 - date	963
8. RF352316	ST359051	Forde Abbey	01.01.18 - date	937
9. RF352343	ST339046	Chard Junction	01.08.79 - date	911
10. RF352519	ST291073	Wambrook	01.04.68 - date	1,041
11. RF352686	SY307977	Lyme Rd, Axminster	01.08.56 - date	1,010
12. RF352746	ST272133	Buckland St. Mary	01.09.67 - date	1,027
13. RF353000	ST237038	Millhayes	01.11.88 - date	-----
14. RF351986	SY315913	Pinhay	01.01.68 - date	926

River Flow

River flow is measured at three gauging stations (see Table 2), all of which have chart recorders continuously monitoring water levels (flows are calculated from levels using known level/flow relationships). The river gauging station at Whitford Bridge is linked to the region's telemetry network and monitors water level data at 15 minute intervals. The remaining two sites are spring fed sites and are not connected.

CATCHMENT CHARACTERISTICS

Figure 2 - Hydrographs



CATCHMENT CHARACTERISTICS

Table 2: River Gauging Stations

River Gauging Station	River	NGR	Data Collected
1. Whitford Bridge	Axe	SY 262 953	01.10.64 - date
2. Rock	Tributary of Yarty	ST 275 025	16.04.69 - date
3. Wayford	Tributary of Clapton St	ST 409 072	09.12.67 - date

There are also currently ten instantaneous water level stations in the catchment which are used for flood warning purposes (see Table 3).

Table 3: Flood Warning Stations

Flood Warning Station	River	NGR	Station/ Gauge Type
1. Winsham	Axe	ST 377 060	River/Rain
2. Chard Junction	Axe	ST 342 047	River/Rain
3. Weycroft	Axe	ST 307 001	River/Rain
4. Whitford	Axe	SY 262 953	River/Level
5. Bonehayne	Coly	SY 217 948	River/Rain
6. Colyford	Coly	SY 253 928	River/Rain
7. Wilmington	Umborne Brook	SY 217 001	River/Rain
8. Goren	Corry Brook	ST 234 023	Rain
9. Court Place Fm	Yarty	ST 256 069	River/Rain
10. Blindmore	Yarty	ST 262 147	Rain

There are also four stations which continuously monitor groundwater levels in the catchment using chart recorders (see Table 4).

CATCHMENT CHARACTERISTICS

Table 4: Groundwater Stations

Site Name	NGR	Period Record
Beer	SY 2115 9043	30.12.69 - date
Rousden No 1B	SY 2886 9197	10.08.84 - date
Furlyns	ST 4145 0493	01.03.66 - date
Whitlands	SY 3050 9142	10.08.84 - date

An analysis of the 29 year record for Whitford Bridge Gauging Station (1965 -1994) indicates a mean daily flow of 4.964 cumecs and a measured Q95 of 1.198 cumecs, which represents 24% of the mean daily flow. This percentage indicates that the River Axe has a significant groundwater component in comparison to other rivers in the County of Devon.

The maximum mean daily flow at Whitford Bridge of 143.619 cumecs and the maximum instantaneous flow of 243.999 cumecs were both recorded on 27 December 1979. This maximum instantaneous flow is indicative of a flood event having a return period of 1 year in 50 years.

The minimum daily flow of 0.454 cumecs was recorded on 7 August 1976. This represents 9% of the mean daily flow. Though flows fall below the Q95 flow value for about 18 days on average per year, in the drought years of 1976, 1984 and 1989, flows were at this level for 129, 57 and 57 days respectively.

Figure 2 shows hydrographs for Whitford Bridge and Whitlands.

Theoretical flow information for the River Lim at SY 3420 9215 indicates an average daily flow of 0.269 cumecs and a theoretical Q95 of 0.065 cumecs. Theoretical flows have been used as there is no river gauging station on this river.

4. CATCHMENT USES

4.1 LANDSCAPE, WILDLIFE AND ARCHAEOLOGY

Here we consider how we protect and manage the natural environment, the buried archaeological and cultural evidence, and the historic built environment associated with rivers and wetlands.

Our Objectives

To ensure that these features are not degraded through neglect, mismanagement or insensitive development, and wherever we can, to take measures or to assist other organisations 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:

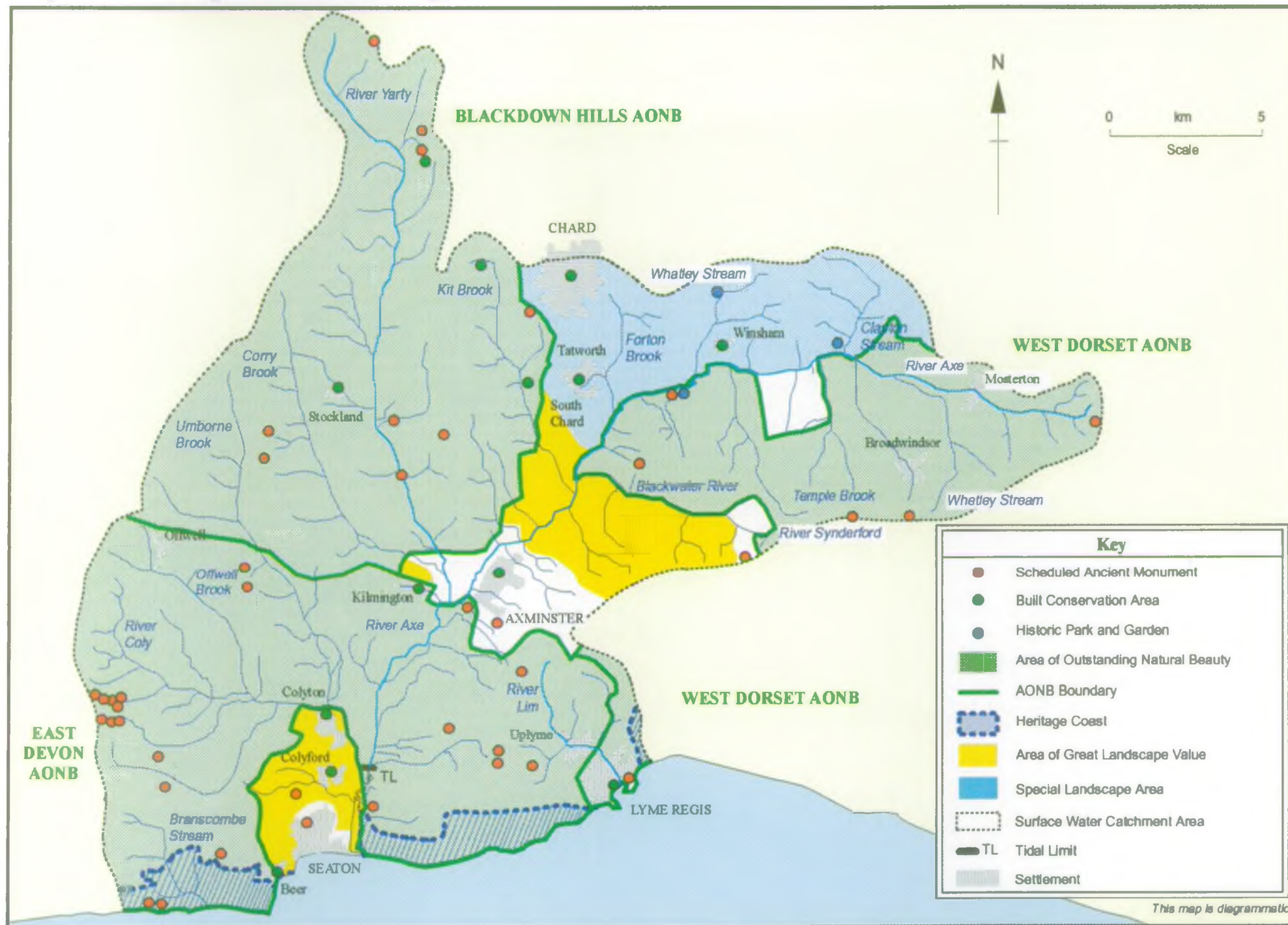
- ☐ we study river and wetland wildlife and we are developing better methods for doing this
- ☐ we are developing standard ways of reviewing the effects of our work on wildlife
- ☐ we are establishing a national database to store wildlife information
- ☐ we are improving the way we consider and carry 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.

Environmental Appraisals

Where we undertake significant works, the effects on landscape and archaeology are considered as part of an established environmental appraisal procedure. When dealing with proposals by others, we require consideration of the impact on landscape and archaeology to be appropriate to the scale of the proposal.

If inadequate information on the landscape is available, the necessary landscape assessment will be carried out. If archaeological information is lacking, the opinion of archaeological experts is sought on the need for a rapid archaeological appraisal of the affected area. However, we carry out relatively little work involving physical disturbance of the environment, outside new or existing capital schemes. A pilot project to improve the archaeological input to consenting works in rivers is in progress.

Map 4 - Landscape and Archaeology



Catchment Perspective

Landscape

Virtually the entire catchment falls within designated landscape areas with three large sections recognised as being of national importance. These three sections form part of Areas of Outstanding Natural Beauty (AONB) (see Map 4). In addition, the areas around Seaton and north-east of Axminster are of county importance (Area of Great Landscape Value), as is the part in Somerset to the north of the River Axe (Special Landscape Area). All the undeveloped coastline in the catchment is designated as Heritage Coast, recognised by the Countryside Commission as being of outstanding scenic value.

Landscape assessments have been carried out for all three AONBs and these, together with the Countryside Commission's New Map of England form the basis of this section (Refs 2,3,4 and 5).

Unlike most other catchments in the Devon Area, the rivers in this catchment do not rise on either of the two major uplands of Exmoor and Dartmoor.

The main stem of the River Axe flows through an almost unbroken agricultural landscape from its source to the sea, a fact reflected in the ecology of the river. The Axe Valley is fairly broad even at its uppermost limits, where it is positioned between the rivers running north off the Yeovil Scarplands to the Somerset Levels and those flowing south to Lyme Bay across Marshwood Vale. The valley then opens up into a broad, flat-bottomed floodplain through which the river meanders widely, leaving old channel features behind as it shifts over time, such as oxbow lakes.

In contrast the River Yarty, Corry Brook and Umborne Brook, all tributaries of the River Axe, originate on the steep slopes of the Blackdown Hills, where the springs rising on the valley sides create wetlands and rough pasture. The upper valleys are well wooded; lower down, small enclosed fields are typical. The valleys finally open out as the tributaries meet the main river floodplain.

The River Yarty joins the main river to form an extensive area of floodplain, which has been changed by the major communication routes of the new A35 and the older railway. The presence of these man-made features has resulted in necessary but conspicuous erosion control measures.

The River Lim, Branscombe Stream and a number of small tributaries of the River Axe flow through short, steep sided valleys cut into the open landscape of the Greensand and clay plateau backing the coast. The enclosed nature of the valleys contrasts with the larger arable fields and pastures of the plateau.

The Axe Estuary was once much wider than it is now, with extensive intertidal areas on the western edge. It is still a valuable area with the mudflats and remnant saltmarsh interlaced with tidal creeks. However, the extensive sweep of the Seaton marshes to the west, once also upper saltmarsh, is now separated from the channel by an embankment and the tramway, and has largely been subject to agricultural improvement to pasture.

The coastal section of the catchment contains some of the region's most important and spectacular sites. Steep cliffs in the west are interrupted by small valleys, before rising again to sheer chalk cliffs at Beer Head. Further east, stretching from Axmouth to Lyme Regis, is the Undercliff, the largest example of its type in England. The cliff face has, in a series of massive events, slumped to produce a largely untouched wilderness of wooded cliffs and chasms. This area has been proposed as a World Heritage Site to recognise, in particular, the geological importance of the Dorset and East Devon coastline.

CATCHMENT USES

Archaeology

The catchment includes many sites and features of historic and archaeological value; some are designated, while others remain unprotected. The County Sites and Monuments Registers held by County Councils are the main sources for assessing archaeological interest as they contain a huge amount of information; some 50,000 items are recorded for Devon.

Those sites recognised as being of national importance may be scheduled as Ancient Monuments. About 40 such sites have been designated in the catchment; in addition three Historic Parks and Gardens are present (see Map 4).

Buildings of particular importance are protected by the Planning (Listed Buildings and Conservation Areas) Act 1990 (Ref. 6); several grades of Listed Building are recognised. Where whole sections of towns or villages are felt worthy of protection, Conservation Areas are notified to preserve and enhance their character. Some 15 settlements in the catchment contain Conservation Areas.

Archaeological evidence, notably stone axes from Broom (on the River Axe), suggests the presence of people in the catchment as long ago as the Palaeolithic period (more than 8,000 years ago). Populations would have been small, however, and signs of their activity are few. Later colonisation during the Neolithic and Bronze Age periods resulted in more prominent features such as tumuli and round barrows. It was also at this time that much of the initial clearance of native forest took place. Iron Age hill forts such as those at Musbury, Membury and Pilsdon Pen must have dominated the surrounding areas, strategically placed for defence.

Although this area was only a frontier for the Romans, quite good evidence of their activities remains. Axminster was an important road and river crossing point and a branch of the Fosse Way appears to have run down the Axe Valley to the Roman port of Axmouth, situated on the Axe Estuary. Remains of buildings are present at Seaton and also at Uplyme.

Information on the following period is rather sparse, but it appears that improving technology began to allow cultivation of the heavier soils in lowlands and valleys. As a result, settlements increased; Colyton was at the centre of such an area. By the time *Domesday* was produced in 1086, much of the current pattern of development was already established. Changes in the landscape resulted from both enclosure, creating the small fields typical of much of East Devon, and later the Black Death, which caused major depopulation of the countryside and abandonment of settlements.

The old Roman port of Axmouth continued to be an important centre until the 16th Century when the port went into decline due to the development of a shingle bar and the subsequent silting up of the estuary. Other changes to the character of the area arose from developments in land management, with the creation of a number of estates and other large landholdings, and from new infrastructure such as the building of roads and railways. In places these had a direct impact on the water environment; at Forde Abbey, for example, manipulation of streams to feed ornamental and fish ponds had taken place, while the Cannington Viaduct over a tributary of the River Lim was built around 1900 for a now dismantled railway link from Axminster to Lyme Regis.

The setting of several towns and villages is affected by their relationship to streams and rivers; Lyme Regis is particularly strongly influenced, built astride the small but steep river, with buildings straddling the channel at a number of points. In addition, leats guide water from the river to old mills in the centre of the town.

Wildlife

Although much of the Axe and Lim Catchment is under fairly intensive agricultural use, there are still a number of areas which support valuable habitats and species.

Designated Areas

Three sites are being considered as candidate Special Areas of Conservation under the EC Habitats Directive (Ref. 7) as they contain habitats or species which are rare or threatened in a European context: Beer Quarry and Caves is an important site for bats; while Sidmouth to Beer Coast and Axmouth to Lyme Regis contain some of the UK's best vegetated seacliffs (see Map 5).

Twenty areas are designated Sites of Special Scientific Interest (SSSI), indicating their national importance. Seven sites are notified at least partly for wetland interest, ranging from valley fen and wet woodland to springline mires and wet heath. In addition, it is likely that part of the River Axe will be notified as a SSSI for both its diverse and abundant flora and its fluviogeomorphological interest. A full list of SSSIs and their interest is given in Appendix 1. Nine SSSIs are designated at least partly because of their geological importance. There are programmes to identify a range of sites of lesser value as Regionally Important Geological Sites (RIGS).

A large section of the catchment, particularly that including the River Yarty and Corry Brook, 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. The scheme, funded by MAFF, offers payment to landowners to support practices that may otherwise not be economically viable.

Lyme Bay has been identified by English Nature as supporting subtidal wildlife of national importance (Ref. 44). Although not a statutory designation we will still take account of this importance when considering proposals which may affect the area.

There are 15 nature reserves (see Appendix 1) in the catchment, varying from a 0.5 hectare wooded area to the internationally recognised National Nature Reserve of the Axmouth to Lyme Regis Undercliff. Several of these reserves, including some wetland sites are open to the public.

Programmes to identify additional sites of conservation value have been carried out throughout the catchment. These County Wildlife Sites (also known as Sites of Nature Conservation Importance), although lacking statutory designation, should gain some protection through the application of county and local planning policies and through management agreements with landowners. The sites are not identified on maps in this document as there are too many to show clearly and most are in private ownership.

Habitats

The Government's statutory nature conservation agency, English Nature (EN), has recently defined areas of the whole country according to land use and ecology. The Axe and Lim Catchment lies mostly within the Blackdowns Natural Area, with smaller parts extending into the Wessex Vales Natural Area. The coast is all part of the Lyme Bay Maritime Natural Area.

The most important 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.

Map 5 -Wildlife

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CATCHMENT USES

We have carried out river corridor surveys on most of the 'main river' sections in the catchment (see Map 5). These surveys indicate habitats and channel features of particular value or interest.

Species

Otters are present in small numbers, certainly on the River Axe and River Yarty. Recolonisation of the catchment following the major decline of this species in the 1960s is disappointingly slow. Otters are fully protected under the Wildlife and Countryside Act 1981 (Ref. 8), as amended.

Despite the existence of some areas of apparently good habitat, water voles were not recorded at any of the sites surveyed in the catchment during the 1989-90 national survey. Relatively few sites were studied, but those covered did show signs of mink. These introduced predators are still widespread, although they seem to be less common recently. The latest research links both the absence of suitable bankside habitat and the presence of mink to the decline of the water vole.

Seven species of bat have been recorded in the catchment. The area supports over 40% of the UK's hibernating Bechstein's bats. 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.

Heron breed in the catchment, with a large heronry at Wayford Woods near Clapton and a small heronry at Axmouth. The abundant plant growth in the River Axe suits mute swans, which breed at several locations on the lower section of the river; over 80 have been recorded upstream of Whitford. Cormorants are also found in the catchment. There appears to be some movement to and from the Fleet in Dorset, where there is a huge, artificially maintained population at Abbotsbury. Canada geese have not yet colonised the catchment to any great degree.

Shelduck breed in small numbers as far upstream as Axminster, but typically feed on the estuary, with around 50 present in winter. Mallard are common throughout, as on most river systems. Widgeon and teal use the estuary in reasonable numbers in winter. Lapwing breed on the marshes and meadows around the lower River Axe and up to 1,000 are seen on the estuary in winter, together with a variety of other waders. Small numbers of curlew still breed in the Blackdown Hills, but their numbers have declined as land is drained or otherwise improved. Redshank have bred irregularly around the estuary, one of very few sites in Devon.

Barn owls are recorded as breeding in the Blackdowns, where areas of rough and wet grassland still provide good feeding sites.

Kingfishers are present, with breeding recorded more often in the upper parts of the rivers. This species is notoriously vulnerable to hard winters, which cause major population crashes. Another species which suffers occasional crashes in numbers is the sand martin, although in this case the problem is drought in its African breeding grounds. Sand martins, which nest in holes in banks and cliffs, have been recorded from both river and particularly quarry sites in the catchment, though numbers declined significantly in the mid-1980s. Populations appear to be recovering again at present.

Grey wagtails are found almost wherever there is water, while dippers are also fairly common upstream. In contrast it is the lower River Axe that supports sedge and reed warblers and reed buntings.

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

Fish species of conservation importance are effectively limited to bullheads and lampreys, all of which are listed in the Habitats Directive¹. There is a healthy sea trout population in the River Axe system. Salmon have strongly declined over the years but there have been encouraging signs of recovery recently.

¹ Annex II EC Habitats Directive (Ref. 7) ² Wildlife and Countryside Act 1981 (Ref. 8)

CATCHMENT USES

Marsh fritillary butterflies are closely linked to springline mires and are found at some sites in the Blackdowns; they are declining despite extensive protection by the Habitats Directive (Ref. 7) .

Thirteen dragonfly species have been recorded from the catchment. They include keeled skimmer and ruddy darter which are considered as key species for Devon, as well as white-legged damselfly, a species with limited distribution nationally.

We have carried out some aquatic macroinvertebrate species survey work; eight sites in the catchment have been sampled and invertebrates identified to species. In addition, data have been obtained for the same sites on the aquatic plants, channel morphology and habitat. Other biological surveys have taken place at a number of sites in the catchment (see Map 5).

The invertebrate fauna of the River Axe, differs from typical Devon rivers, with a large number of mollusc species present. Several uncommon insect species with aquatic stages in their life-cycle have been recorded. These include the rare caddis-fly (*Leptocerus interruptus*). In addition, the medicinal leech has been recorded. The fairy shrimp, which inhabits temporary pools, is known from a site at Coxes Cliff; this Red Data Book species is classified as vulnerable.

We surveyed the sediment dwelling animals of the Axe estuary in 1990. The small size of the estuary and subsequent near total flushing by increased freshwater flows during winter limits the number of species present. The two sites sampled in the upper estuary were dominated by oligochaete worms. Several polychaete worms including the ragworm (*Nereis diversicolor*) were ubiquitous throughout the estuary, though numbers were much greater at the three lower estuary sites. These lower sites were characterised by more species including the common cockle (*Cerastoderma edule*) and the peppery furrow shell (*Scrobicularia plana*).

The River Axe is also particularly important for its flora, which has been well studied for a number of years. It is especially rich and diverse, and includes a number of notable species. Short-leaved water starwort is nationally scarce, although widely distributed in the River Axe system. There are regionally important populations of yellow water-lily, and the introduced but nationally scarce fringed water-lily is also found.

Himalayan balsam, an invasive introduced plant, is widespread within the catchment and appears to be spreading. Japanese knotweed is much less common and giant hogweed is present in several locations.

Bankside trees of various species are of high value, not only for conservation interests, but also for fisheries and erosion control. Regeneration is often prevented by unrestricted grazing, with a consequent reduction in the overall tree cover. In addition, there is some evidence of the presence of a fungal root disease affecting common alder; while not yet extensive, we are monitoring its presence.

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. 10) 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 find a problem we try to identify the cause and, where appropriate carry out improvements
- ☐ we make sure that the abstraction water or the damming of rivers does not significantly disrupt the life cycles of fish
- ☐ we consider the impact of development, river management and changes in water quality on fisheries and take action where necessary
- ☐ we build fish passes and 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

Salmonid Fishery

The River Axe Catchment supports populations of brown and sea trout. These are exploited by an active rod fishery on much of the River Axe and the two major tributaries; the River Coly and the River Yarty. The River Coly has always had the reputation of being a good trout stream while the River Yarty is noted for its runs of sea trout (see Map 6). Prior to the mid-1960s, the river supported a major salmon run. The size of the run declined dramatically in the 1970s and there has been no sign of a recovery in numbers of salmon returning to the river.

Although generally considered to be a productive river, water quality problems and barriers to fish movement have made it difficult for the river to realise its full potential. The catchment is supported to a large extent by a number of less vulnerable river stretches that consistently perform well in terms of salmonid production.

Map 6 - Juvenile Salmonid Distribution

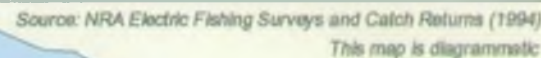


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The extent of the fishery of the River Lim is restricted by the size of the river. The river supports wild brown trout stocks and a restricted distribution of minor coarse fish species (see Map 7).

Freshwater and Eel Fisheries

The River Axe supports a limited but diverse coarse fishery in the lower reaches which is fished to a small extent by local coarse fishing interests. Roach and dace are present here in considerable numbers.

Eels are widespread throughout the catchment and have been found in all stretches monitored, but generally in low numbers. For monitored stretches see Maps 6 and 7. There is no significant fishery for this species although a small number of licences is issued annually.

Large numbers of grey mullet enter the river in spring and do not leave until October. They can be found as far upstream as the River Axe/Yarty confluence and Coles Mill on the River Coly.

Bullheads and lampreys are found in the catchment, especially in the upper parts. Both species are listed in Annex II of the EC Habitats Directive (Ref. 7) as a species requiring the protection of special habitat.

For further information on fisheries in the River Axe, copies of the '1994 Fisheries Survey Report of the River Axe' are available from our Fisheries Department.

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 organisations 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

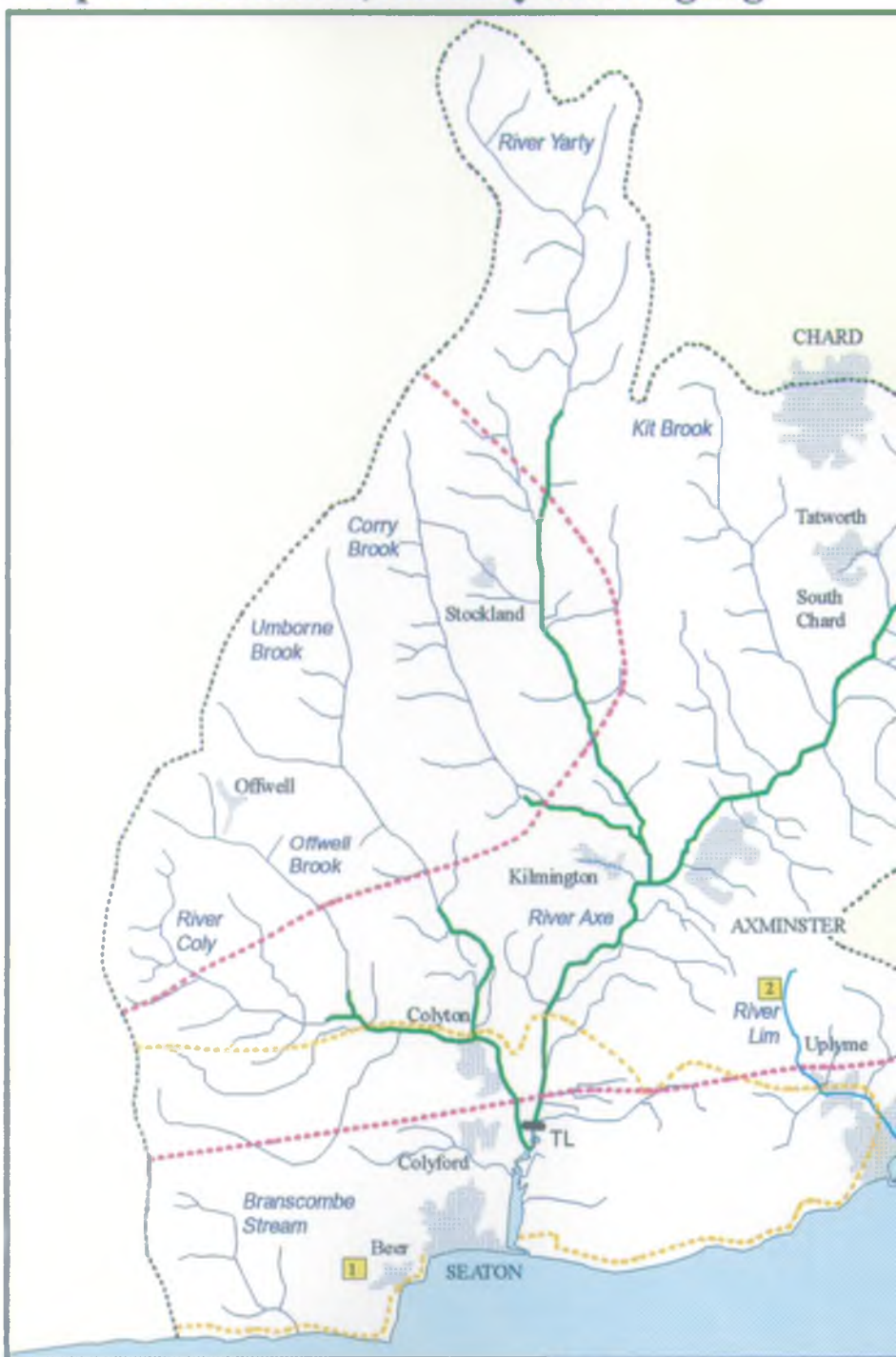
Water based recreation use of the Axe and Lim Catchment is largely restricted to the coastal section, with few sites on the river or estuary available to the public. There is an annual raft race on the River Axe, linked to the Axminster Carnival, which runs from Axminster to Whitford Green. There is a limited access agreement for canoeing on the River Axe, and the Axe Vale Canoe Club run a regular event. The river is fairly tranquil and does not attract canoeists seeking technical challenges.

Sailing on coastal waters is perhaps the most widespread activity, with the Axe Sailing Club having in excess of 500 members. Other clubs are located at Beer and Lyme Regis, where there is also a windsurfing club. Navigation in the Axe Estuary is hampered by deposition, which makes dredging a requirement.

Lyme Regis is also home to a large and active waterskiing and powerboating club and racing at a regional level takes place here. There are no jetskiing clubs on this section of coast, but occasional use takes place where access is possible.

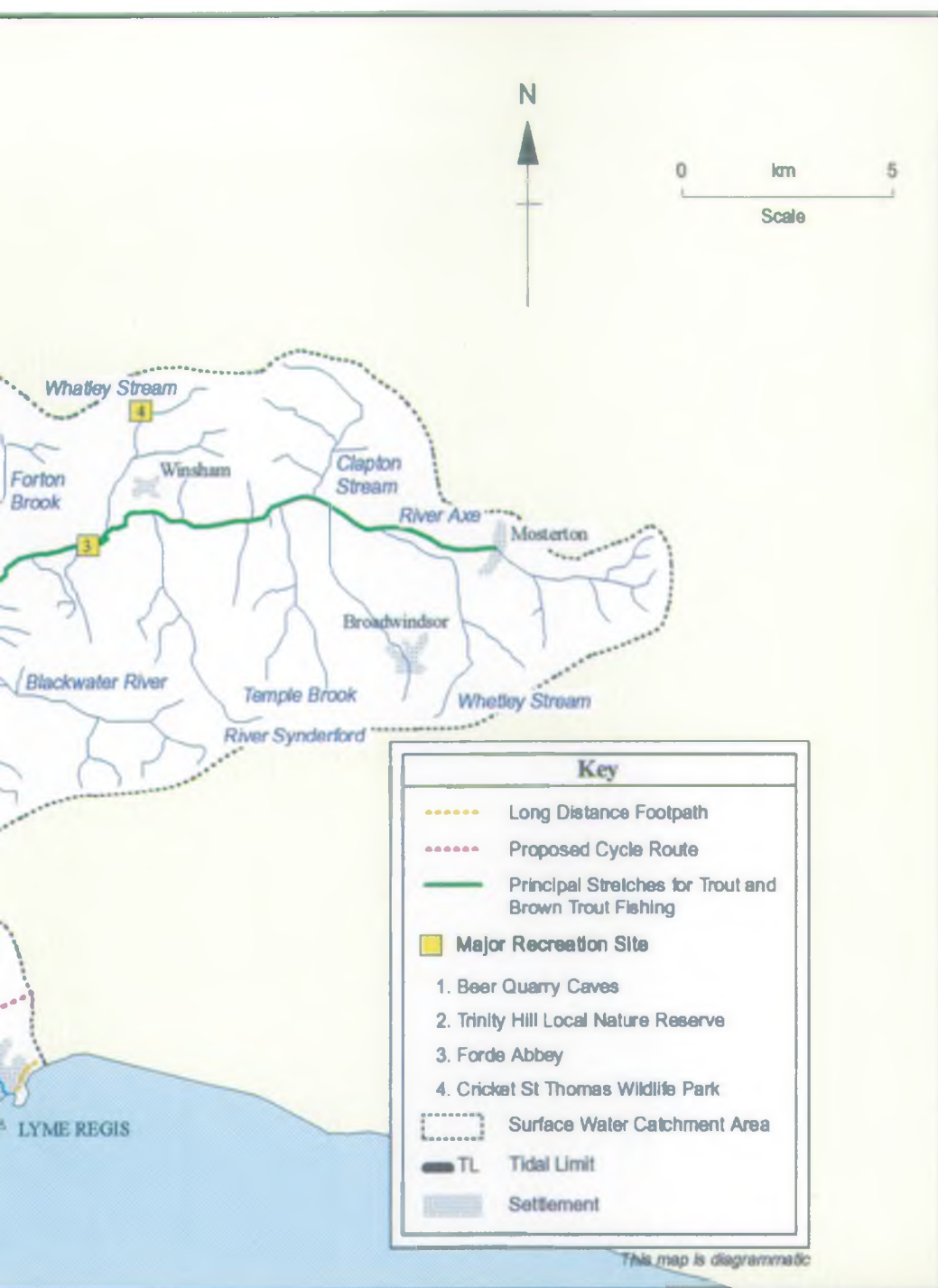
Beaches along the coast offer opportunities for swimming, diving and snorkelling and there is a sub-aqua club at Seaton.

Map 8 - Recreation, Amenity and Angling



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CATCHMENT USES

The South West Coast Path is a national trail running along the coast, with a rather lengthy diversion inland at Seaton. The East Devon Way (also known as the Foxglove Way) crosses the catchment roughly parallel to the coast and some way inland. A national cycle route is planned which will cross the catchment; this is likely to involve both existing routes and the development of new ones (see Map 8).

Parts of the lower Rivers Axe, Yarty, Coly and Umborne Brook all have stretches of bankside public footpaths. Plans are at an early stage to develop links between existing rights of way to extend the access network. While the benefits of public access to watercourses are recognised, there are some concerns over the level of disturbance that this may pose to the river environment; for example, wildlife may be deterred by large numbers of people and dogs regularly walking the banks. There is no intention to encourage access except where existing rights of way or permissive access courtesy of the landowner exist.

There are a number of stillwaters in the area that offer rainbow trout fishing and, in the Chard area, that offer coarse fishing managed by local fishing clubs.

Duck shooting occurs downstream of Axminster between January and September. Mink hunting with mink hounds occurs at various locations in this catchment.

There are a number of recreational sites in the catchment popular with visitors. These sites include; Beer Quarry Caves, Trinity Hill Local Nature Reserve, Forde Abbey and Cricket St Thomas Nature Reserve (see Map 8).

Map 9 - Flood Defence



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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 our 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 floodplains 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 flood protection and land drainage has brought benefits to 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 in this catchment 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 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

General

The land drainage system of the Axe and Lim Catchment is natural in parts but there is also extensive field drainage entering the system. The upper parts of the catchment are steep and so river levels respond quickly to rainfall in the catchment. The River Axe is a highly mobile river which meanders widely across its floodplain in the lower reaches, it carries a high sediment loading and rapidly erodes and deposits river bed material. Known flooding problems within the catchment are shown on Map 9.

There are only localised flood defence works in the catchment. The River Axe Catchment includes approximately 59 km of 'main river' and the River Lim approximately 2.3 km (see Map 9).

Maintenance

We regularly maintain specific sites where flood alleviation work has been carried out.

In addition to this scheduled work, the following work is undertaken as it arises:

- ☐ clearance of fallen trees from 'main river'
- ☐ clearance of debris, silt and gravel from 'main river'
- ☐ repairs to flood defence structures, training works (shown on Map 9), and revetments.

Improvements

Major schemes have been carried out at: Colyton and Colyford on the River Coly; Axminster, Stafford Brook and Seaton on the River Axe; and at Lyme Regis on the River Lim (see Table 5 and Map 9).

Table 5: Details of Flood Defence Schemes

Flood Defence Scheme	Area Benefiting	Properties Benefiting
Axminster	Not available	50 to 100
Stafford Brook	45 hectares (agricultural)	50 to 100
Colyton/Colyford	100 hectares	50 to 100
Seaton Tidal/Sea Defences	Not available	over 100
Lyme Regis	Not available	50 to 100

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 Objectives

To protect the water environment from the harmful effects of development and to minimise 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 (Ref. 9). 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 now underway on preparing flood plans is an example of this advice (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. 10). We also describe some things we can do to tackle the problem in this report. Planning authorities have powers that they can use to help identify and control the redevelopment of contaminated land. We:

- ☐ 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. 42) provides a new legal framework for dealing with problems of contaminated land. Part II of the 1995 Act imports a Part IIA from the Environmental Protection Act 1990 (Ref. 43).

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 were 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 in July 1994 (Ref. 11). This guidance recognises the need to achieve sustainable development and aims to influence the policies of County Structure and Local Plans to secure the best development strategy for the region. We were involved in preparing this guidance which includes advice on rivers, water supply and waste water disposal.

There are three approved Structure Plans relevant to the catchment: the Devon County Structure Plan, Third Alteration (Ref. 12); the Dorset (excluding South East) Structure Plan, Second Alteration (Ref. 13); and the Somerset Structure Plan, Second Alteration (Ref. 14). The Structure Plans provide a framework for development and land use within each county. Each Structure Plan contains policies and advice to ensure the protection and conservation of the water environment.

Each of the three counties has produced a draft review of the Structure Plan which takes the plan period forward to 2011 and embodies the principles of sustainable development. These consultation draft plans are the Somerset Structure Plan Review (Ref. 15); the Devon County Structure Plan 2011 (Ref. 16); and the Dorset County Structure Plan 2011 (Ref. 17). We have commented on each of these plans. The plan for Devon is of particular note for its comprehensive water protection policy EN24.

The catchment lies largely within three District Councils; East Devon, South Somerset and West Dorset, with a small part within Taunton Deane District (see Map 10). The existing statutory Local Plans and those currently in preparation are shown in Table 6. Once the East Devon District Local Plan (Ref. 18) and the West Dorset District Local Plan (Ref. 19) are adopted, every part of the catchment will be covered by a Local Plan. As Table 6 shows, the new Local Plans all have water protection policies,

CATCHMENT USES

which should result in better future protection for the water environment from development. Table 6 also shows the housing and employment land provision up to 2001. Development will be concentrated at Axminster, Seaton and Chard.

The district planning authorities are issued annually with consultation guides by the NRA. 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. These guides also have information on all NRA requirements for development.

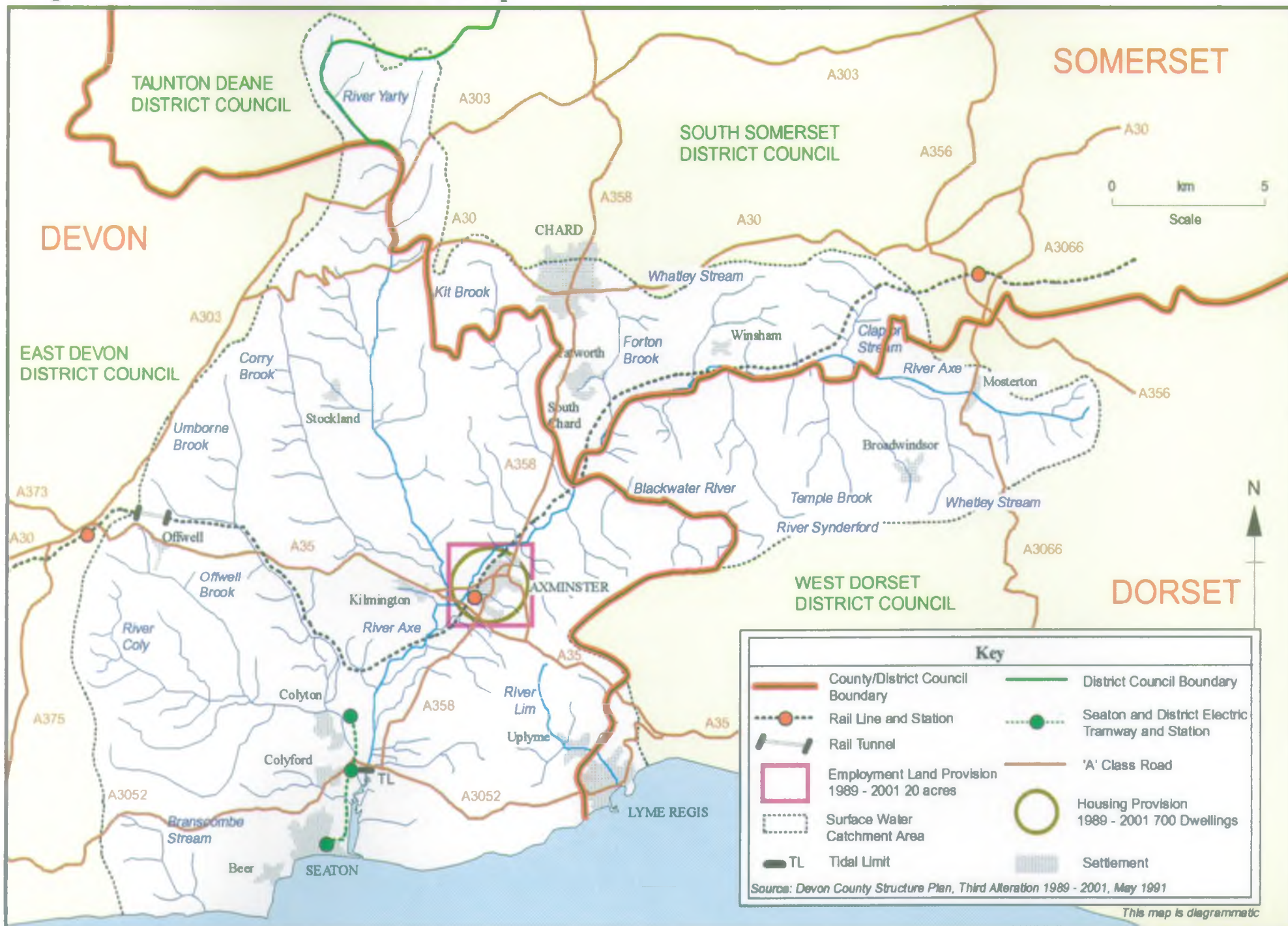
Table 6: Local Plans in the Axe and Lim Catchment

Local Authority (% within catchment)	Housing Provision (dwellings) to 2001	Employment Land Provision to 2001	Local Plan (LP) <i>Plan Status</i>	Water Protection Policies
East Devon District Council ($< 50\%$)	804 for Axminster, 541 for Seaton and 1668 in rural areas outside of Exeter area.	No new allocation within catchment. One major site already allocated at Musbury Rd, Axminster.	Seaton LP <i>Adopted 1986</i> (Ref. 20) Axminster LP <i>Adopted 1986</i> (Ref. 21) East Devon District LP <i>Consultation review</i>	None None Water quality, flood defence, water resources, river & coastal conservation.
West Dorset District Council ($< 25\%$)	No new provision within catchment.	One site within catchment. 0.5 ha off Uplyme Rd, Lyme Regis.	Dorset County Development Plan, County Map 1957 (Ref. 22) West Dorset District LP <i>Post enquiry</i>	None Water quality, water resources, flood defence, groundwater protection, river and coastal conservation.
South Somerset District Council ($< 25\%$)	225 not requiring land allocation.	Two sites within catchment at Chard; 2.5 and 0.8 ha.	Chard and Ilminster LP <i>Adopted 1995</i> (Ref. 23)	Water quality, flood defence, water based recreation.

Notes

The stages in the preparation of local plans prior to their adoption are usually as follows: consultees and members of the public may initially comment upon a consultation draft of a local plan. A deposit draft is then available for a statutory six week period, after which all representations made are considered. A public inquiry is then held at which objections to the plan are raised verbally. An inspector considers all objections raised verbally and in writing and produces a report which recommends changes to the plan. The planning authority may then accept the recommendations and adopt the plan or propose modifications, in which case there is a further period of public consultation. This process may be repeated with further modifications and a second public inquiry may be held in exceptional circumstances. Once it is satisfied that all objections have been accommodated as far as possible the planning authority will give notice of its intention to adopt the plan.

Map 10 - Built Environment and Development Plans



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Rivers Axe and Lim Catchment Management Plan
NRA South Western Region

CATCHMENT USES

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 County and District Councils. The NRA is involved throughout the process, from route choice and design, through to construction. Through consultation we seek to protect the water environment from adverse impacts and secure enhancement where possible.

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 fuel spillage. During the planning of all new roads we seek to prevent habitat destruction within the river corridor. We also identify valuable water resources' interests to minimise disruption and impact.

A number of important routes cross the catchment (see Map 10) including the A35 and A303 trunk roads. The road network is under increasing pressure from heavy traffic loads, particularly in the holiday season. Table 7 shows the road schemes currently planned within the catchment.

Table 7: Road Schemes Planned in the Axe and Lim Catchment

Scheme	Status
A35 Wilmington Bypass A303 Broadway - Marsh Trunk Road Manor Rd/Harbour Rd Seaton A358 Chard North South Bypass	Subject to DoT review Due to start before 2001 Planning permission granted. Due to start before 2001. Unlikely before 2001 but land being protected.

Waste and Minerals Plans

The Dorset, Devon and Somerset County Councils are responsible for all aspects of land use planning in connection with mineral working and waste disposal within the catchment. The Planning and Compensation Act 1991(Ref. 24) requires the County Council as the Minerals Planning Authority and the Waste Management Authority to prepare strategic policies in a Structure Plan, and more detailed local policies in a Minerals Local Plan and a Waste Local Plan (which may be combined).

The Waste and Minerals Local Plans and our role in their preparation are shown in Table 8.

Table 8: Minerals and Waste Local Plans in the Axe and Lim Catchment

Plan	Status	NRA Involvement
Devon Minerals Local Plan	Consultation Draft 1994	Comments made.
Devon Waste Local Plan	Preliminary stages	Initial meeting has taken place.
Dorset Waste and Minerals Local Plan	Deposit Plan 1994	Comments made.
Somerset Minerals Local Plan	Preparing consultation draft	Discussions ongoing.
Somerset Waste Local Plan	Preliminary stages	Expected contact in spring 1996.

CATCHMENT USES

Through consultation we will seek to ensure the Waste and Minerals Local Plans contain policies which will protect the water environment. Mineral extraction and waste disposal in the catchment are described in Sections 4.6 and 4.7 respectively.

Contaminated Land

The precise nature and full extent of contaminated land within any catchment is difficult to accurately define, since the contamination of many sites is only realised when they 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 have the potential to cause contamination. Current landfill management is addressed in Section 4.7. Twenty-two closed waste disposal sites have been identified throughout the catchment, although none were reported to have accepted putrescible or hazardous wastes.

Three former gas works sites have been identified in the catchment at Lyme Regis, Seaton and Axminster. The sites have been redeveloped since closure, although the extent of site clean up undertaken at the time of redevelopment is not known. 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, and may be present beneath the former gas works sites.

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 current and former industrial estates in Axminster and Chard. However it should not be forgotten that a large number of non-industrial activities have the potential to cause contamination, for example agriculture; petrol filling stations or even domestic heating tanks.

Development Control and Flood Risk

A brief summary of flood defence and development control issues in the catchment can be found in Table 9. Significant development in the catchment is generally restricted to the existing urban areas of Seaton, Lyme Regis, Axminster and Chard. There has been limited flood defence involvement in development proposals at Colyton and Colyford.

Recent development on the eastern limits of Seaton has been influenced by existing flooding problems in the vicinity of Colyford Road and drainage at Seaton Marshes. East Devon District Council are currently proposing a flood storage scheme to alleviate flooding problems at Valley View.

Proposed new development to the north east of Lyme Regis at Colway Lane has required drainage improvements to a tributary of the River Lim to alleviate existing flooding problems.

Development to the north-east of Axminster is currently limited by inadequacies of the Millbrook with associated flood risks. Improvement works have been identified and may be included within formal agreements for a number of development proposals in the catchment. The watercourse below the existing Axminster Carpets site is hydraulically inadequate and forms a restraint to development proposals further upstream.

Any further development to the west of Chard and within the existing industrial estate will require a detailed investigation into the receiving watercourses which drain to the south. Development in these areas and at Tatworth and South Chard will exacerbate an existing flood risk at Lower Coombses.

We are currently resisting a development proposal in the floodplain of the River Coly on the south-eastern edge of Colyton. A public inquiry is programmed for spring 1996.

CATCHMENT USES

Flood defence problems in the smaller subcatchments are generally related to surface water runoff.

Table 9: A Summary of Flood Defence Development Control Issues

Location	Type and Size of Development	Nature of Problem
Seaton	Residential/Moderate to Individual	Receiving watercourses below Colyford Road and drainage through Seaton Marshes.
Lyme Regis	Residential/Moderate to Individual	Capacity of receiving watercourses (River Lim tributaries).
Axminster	Residential/Major	Surface water runoff will increase flood risk from the Millbrook. Channel improvements have been identified.
Axminster	Residential/Moderate to Individual	Capacity of watercourse beneath Axminster Carpets site.
Chard	Residential/Major	Detailed investigation required of receiving watercourse draining to the south.
Chard Junction	Industrial/Moderate	St Ivel Dairy Site located within the floodplain of the River Axe.
Tatworth/South Chard	Residential/Moderate to Individual	Surface water runoff will exacerbate the flood risk at Lower Coombses.
Colyton	Residential/Major	River Coly floodplain.

CATCHMENT USES

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 water-table. 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 minimise 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 the water environment. 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

Two quarries are currently authorised and active within the Axe and Lim Catchment. The quarries are located at Uplyme and Beer (see Map 11) and both work chalk which is sold as an agricultural lime. At Beer a 5 m thick sequence of hard chalk known as 'Beer Stone' is also worked. Beer Stone is used for construction and restoration of local churches, bridges and historic buildings. In addition to chalk the quarry at Uplyme also works sandstone which underlies the chalk. Both sites extract rock above the water-table in a small operation. Consequently, quarrying activities within the catchment pose little threat to the water environment.

Map 11 - Mineral Extraction and Waste Disposal



4.7 WASTE DISPOSAL

Here we consider the disposal of waste to land. Some wastes can form very polluting liquids, known as leachate (rainwater contaminated by contact with the waste), as they break down. Leachate can pollute water both above and below ground.

Waste disposal sites are licensed by the 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 licences (the waste regulation authorities will form part of the Environment Agency). We recommend to them ways of avoiding water pollution and advise them 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. 25). In this statement we encourage waste minimisation 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 Objectives

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
- ☐ 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. 43) 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.

Catchment Perspective

Within the Axe and Lim Catchment there are 16 landfill sites (seven of which are open), one civic amenity site (associated with a landfill), two scrapyards and one waste transfer site. Details of these are shown in Table 10 and on Map 11.

CATCHMENT USES

Table 10: Waste Disposal Sites

Site Name	Licence Status	NGR	Waste Types
Railway Cutting near Cannington Viaduct, Uplyme	Y	SY 313923	Inert.
Whitwell Farm, Colyton	Y	SY 225915	Inert.
Sutton Barton, Offwell	Y	SY 205990	Inert, commercial, household and some difficult wastes and civic amenity.
Colwell Wood, Offwell	Y	ST 188001	Inert.
Thornfield, Storridge Lane Chardstock	Y	ST 318038	Inert.
Grovewell Farm, Field 2825, Yarcombe	Y	ST 242072	Inert.
Shute Hill, Dalwood, Axminster	Y	SY 253988	Inert (previously demolition waste).
Rly Cutting, Shapwick Grange Farm, Nr Uplyme	C	SY 303922	Inert and demolition waste.
Old Chalk Pits, Shapwick Grange Farm, Nr Uplyme	C	SY 308922	Inert.
Kings Farm, Axminster	C	SY 303970	Inert.
Smiters Pit Farm, Shute, Axminster	C	SY 241985	Inert.
Blamphyane Sawmill, Northleigh, Colyton	C	SY 209968	Inert.
Part of Sutton Quarries, Offwell	C	SY 205990	Inert and demolition waste.
Stonebarrow Fruit Farm, Hawkchurch, Axminster	C	SY 352994	Inert and demolition waste.
Tolcis Quarry, Axminster	C	SY 280009	Inert, commercial, household and some difficult waste (prior approval required).
Chaffhay Farm, Yarcombe	C	ST 252069	Inert.
Blacklands Bungalow, Offwell	Y	ST 197016	Scrapyard (motor vehicles, engine batteries).
Higher Woodside, Offwell	Y	ST 184002	Scrapyard.
Wilmington Mills, Wilmington	Y	ST 209003	Transfer station: inert, general, putrescible waste and oils.

Y = Active (licensed site) C = Closed sites

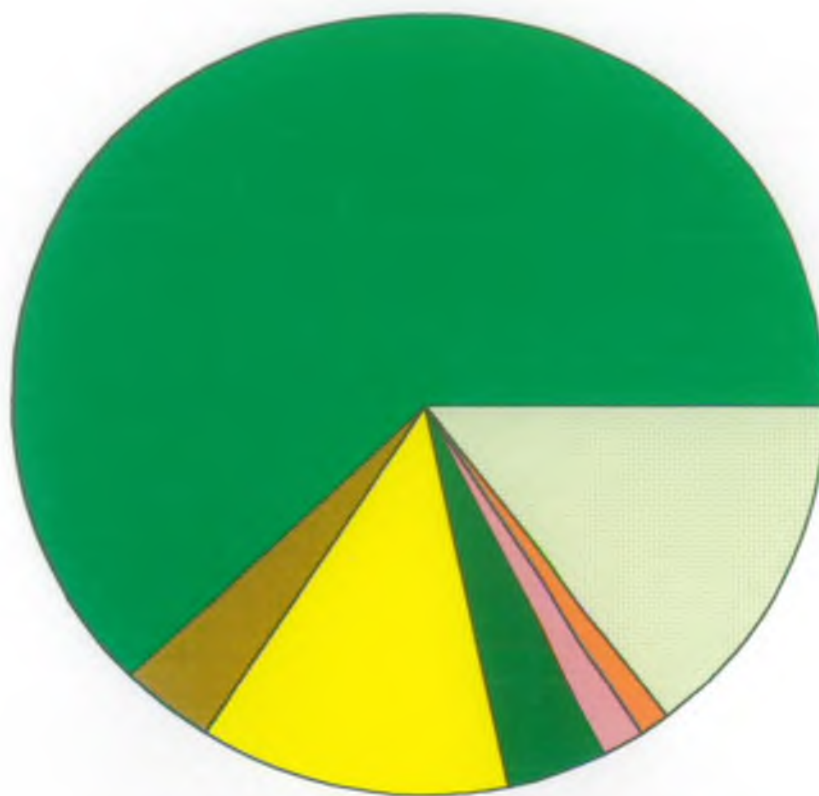
CATCHMENT USES

Seven landfill sites within the catchment are currently licensed to accept waste. Six of these sites are licensed to accept only inert waste, i.e. uncontaminated rock, subsoil, soil. One site, Sutton Barton, infills an old quarry and is licensed to accept inert, commercial, domestic and some difficult wastes. The site operates on the 'attenuate and dilute' principle of leachate management whereby leachate percolates through the base of the site, moving downwards under gravity through the unsaturated zone reducing the contamination levels through chemical and biological processes. Dilution with clean groundwater further reduces the contamination levels.

Monitoring of nearby watercourses (including the Offwell Brook) has shown no evidence of contamination by leachate and there is no conclusive evidence of groundwater contamination. However, the precise pathways of leachate movement away from the site is uncertain.








Of the nine closed sites, eight accepted inert and demolition waste. The remaining site, Tolcis Quarry near Axminster, is a former County Council operated household waste disposal site. There is no evidence of surface water contamination caused by the site.

Figure 3 - Agricultural Land Use in 1994



Agricultural Land Use (1994)

Total Agricultural Area = 43,396 ha

 Grassland > 5 years 26,967 ha	 Rough Grazing 1,615 ha
 Crops & Fallow 5,360 ha	 Farm Woodland 1,808 ha
 Other Land 746 ha	 Set Aside 536 ha
 Grassland < 5 years 6,364	

Data Source: Agricultural Census

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 minimises 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 encourage farmers to target land management agreements, such as those available in ESAs or through the Farm Woodland Premium Scheme 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 stop certain activities within them (Nitrate Sensitive Areas are an example of this)
- ☐ we visit farms so that pollution can be prevented. ADAS also provide free pollution prevention advice to farmers on behalf of MAFF. We promote the MAFF Code of Good Agricultural Practice (Ref. 26) 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 (Ref. 27) 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
- ☐ we encourage farmers to allow bankside vegetation to develop, in order to reduce erosion and protect wildlife habitat.

CATCHMENT USES

Catchment Perspective

Land Use

Agricultural land, which includes farm woodland, accounts for just under 93% of the total area of the catchment. Grassland covers 80% of this area, indicating the dominance of livestock farming and dairying in particular (see Figure 3).

Farms continue to specialise and intensify in this catchment. The average farm is larger today than ten years ago and there are many more farms in the catchment. Small-holdings of less than 5 hectares are up 55% by number, and the number of farms over 100 hectares has increased by 27% by number (thus influencing the average farm size). There has been no change in the number of mixed farms.

The most common farm type is dairy, although the number of dairy farms has declined from 439 to 345 (-21.4%) in the last ten years. The total cattle population has fallen by 3.8% to a total of 70,560; dairy cow numbers have declined by 11% to 29,044 and beef herd has increased by 39% in the same period.

Only a relatively small amount of land is cultivated in the catchment (see Figure 3). This area has declined by 19% in the last ten years although some crops, like forage maize are grown more.

Pollution Risk

Farm pollution has been a major factor affecting water quality in the River Axe Catchment and is still considered to be a factor limiting the recovery of the salmon and trout fishery. A considerable number of farms have been visited (approximately 400 since 1989) in order to prevent pollution. Detailed studies have also been carried out in the River Yarty subcatchment to identify causes of poor water quality.

Farmers have invested considerable time, effort and expenditure in order to improve storage and handling of farm waste and as a result the number of farm pollution incidents has decreased and water quality has improved.

The precise link between farming practices, poor water quality and its impact on fish stocks is still unclear. However, we have set water quality objectives to protect the salmonid fishery use throughout the catchment (see Section 5.1). Long term objectives of the highest water quality class for river stretches (RE1) have also been set which should provide the primary spawning location for salmonids. We will be using all our powers and influence to ensure these objectives are achieved. However, for some stretches it may not be possible to achieve these objectives on a sustainable basis due to factors beyond our control such as land use or the natural processes.

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 planting and management of new woodland does not usually cause problems for the water environment.

The Forestry Authority regulates forestry in the UK by licensing some operations using felling licences 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

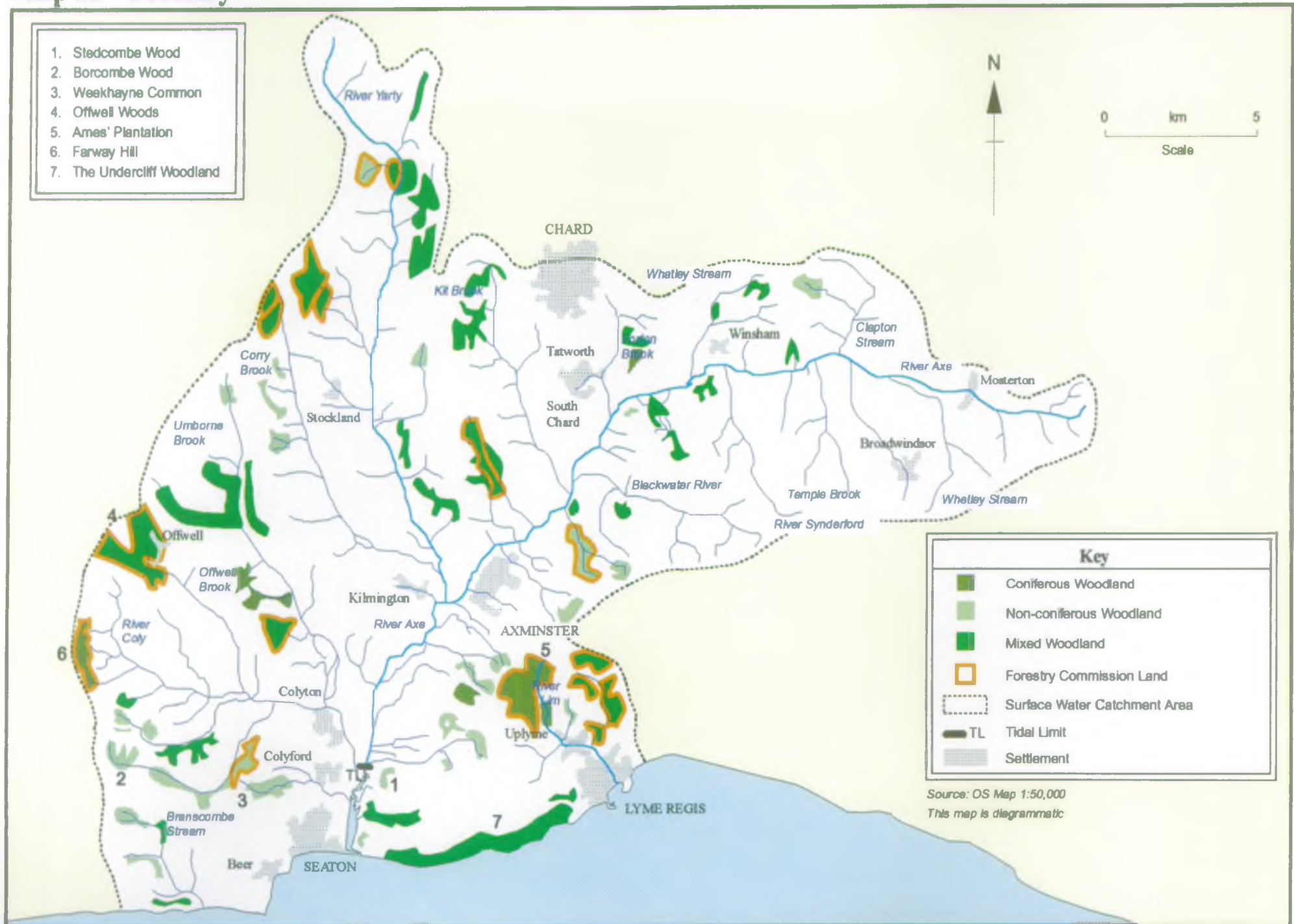
We have duties and powers to:

- ☐ 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. 28) 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 12 - Forestry



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 NRA South Western Region

Catchment Perspective

Forests and woodland are widely scattered across the catchment, occupying approximately 10% of the area (see Map 12). They range from scrub invading neglected pastures through to managed deciduous woodlands and coniferous monoculture.

Broadleaved woodland is the natural climax vegetation of the South West Region and is composed mainly of native species such as hazel, alder, ash, lime and the pedunculate and sessile oaks. However, other non-indigenous species such as sycamore and beech also contribute significantly to the catchment's canopy.

Non-coniferous woodland covers approximately 26% of the catchment's wooded area and occupies several small areas throughout the catchment predominating in the southern half. The largest examples include Stedcombe Wood, Borcombe Wood and Weekhayne Common.

Mixed woodland covers approximately 56% of the wooded area and covers several large areas in the catchment. The largest examples include Offwell Woods, owned by the Forestry Commission and managed by Forest Enterprise and the woods along the South West Coast Path. Several smaller areas of mixed woodland can also be found in the River Yarty subcatchment.

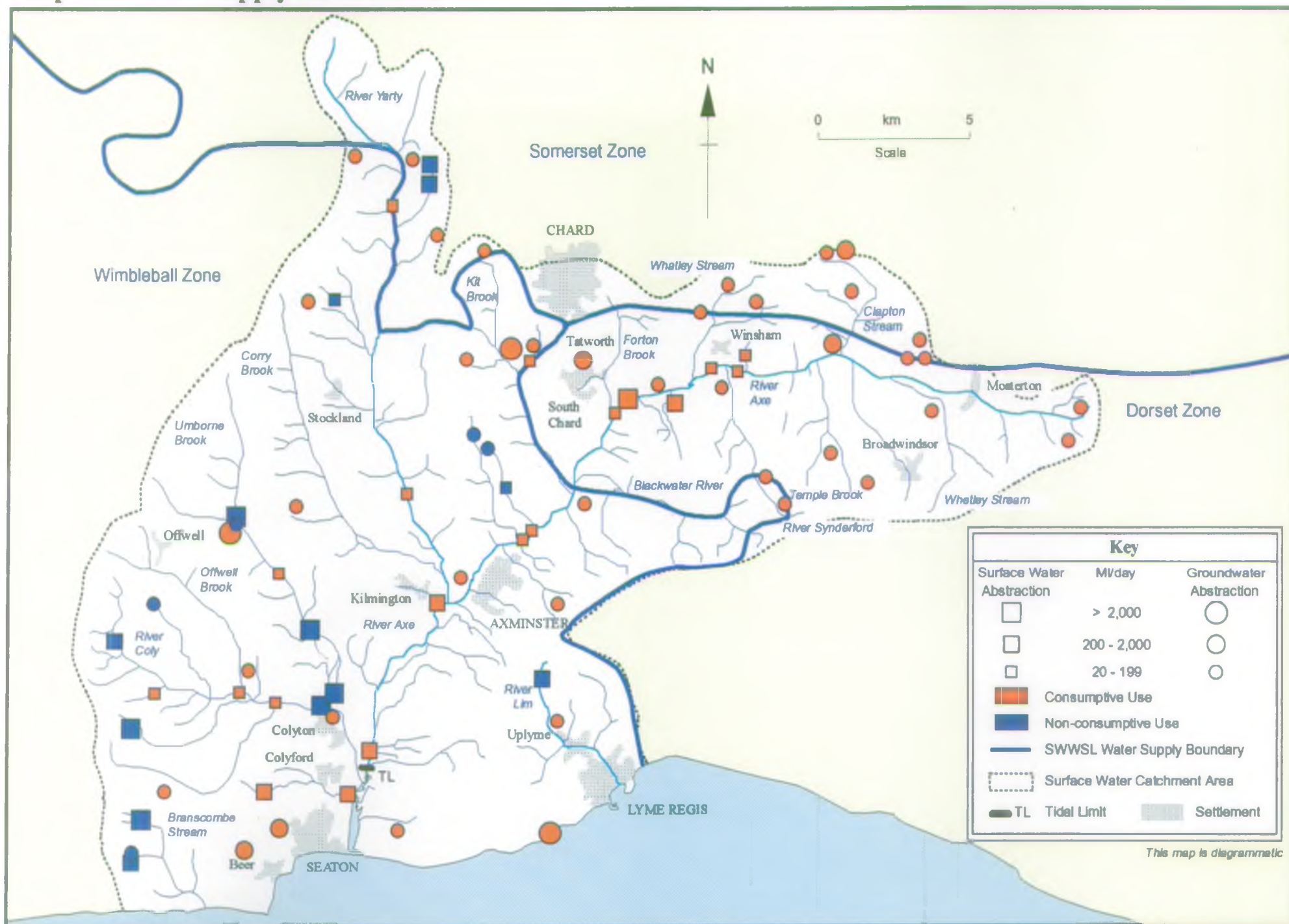
Coniferous woodland only covers approximately 18% of the wooded area of the catchment. This mainly occupies land of limited agricultural potential, such as the steep sided valleys around Ames Plantation in the River Lim Catchment and Farway Hill in the River Coly subcatchment. Ames' Plantation is of particular importance as it acts as a buffer to the River Lim from the effects of agricultural pollution. Both of these woodlands are owned by the Forestry Commission and managed by Forest Enterprise. Forest Enterprise are committed to working within the 'Forest and Water Guidelines' (Ref. 28) to ensure forestry operations do not damage the water environment. We are not aware of any problems at Forestry Commission sites within the catchment.

Farm woodland has increased by 46% between 1984 (1,237 ha) and 1994 (1,808 ha) (MAFF statistics).

There are no designated acid sensitive areas in the catchment. Forestry operations do not generally impact upon the total water resources of the catchment. We do not consider current forestry management activities in this catchment a high priority for consultation.

Future forestry development within the catchment is unlikely to be significant, although the increase in farm woodland is likely to continue, reflecting the continued interest due to grants and other financial incentives for planting trees offered by MAFF. However, we would like to be consulted about any large future forestry development which might impact upon the water environment.

Map 13 -Water Supply Abstraction



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NRA South Western Region

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

The Natural Resource

On average the total quantity of water in the Axe and Lim Catchment is in the order of 185,000 Ml/yr. This water represents the proportion of rainfall not evaporated or taken up by plants. The annual total licensed volume of water in the catchment represents approximately 20% of the natural, annual resource. However, only 4% is for consumptive use.

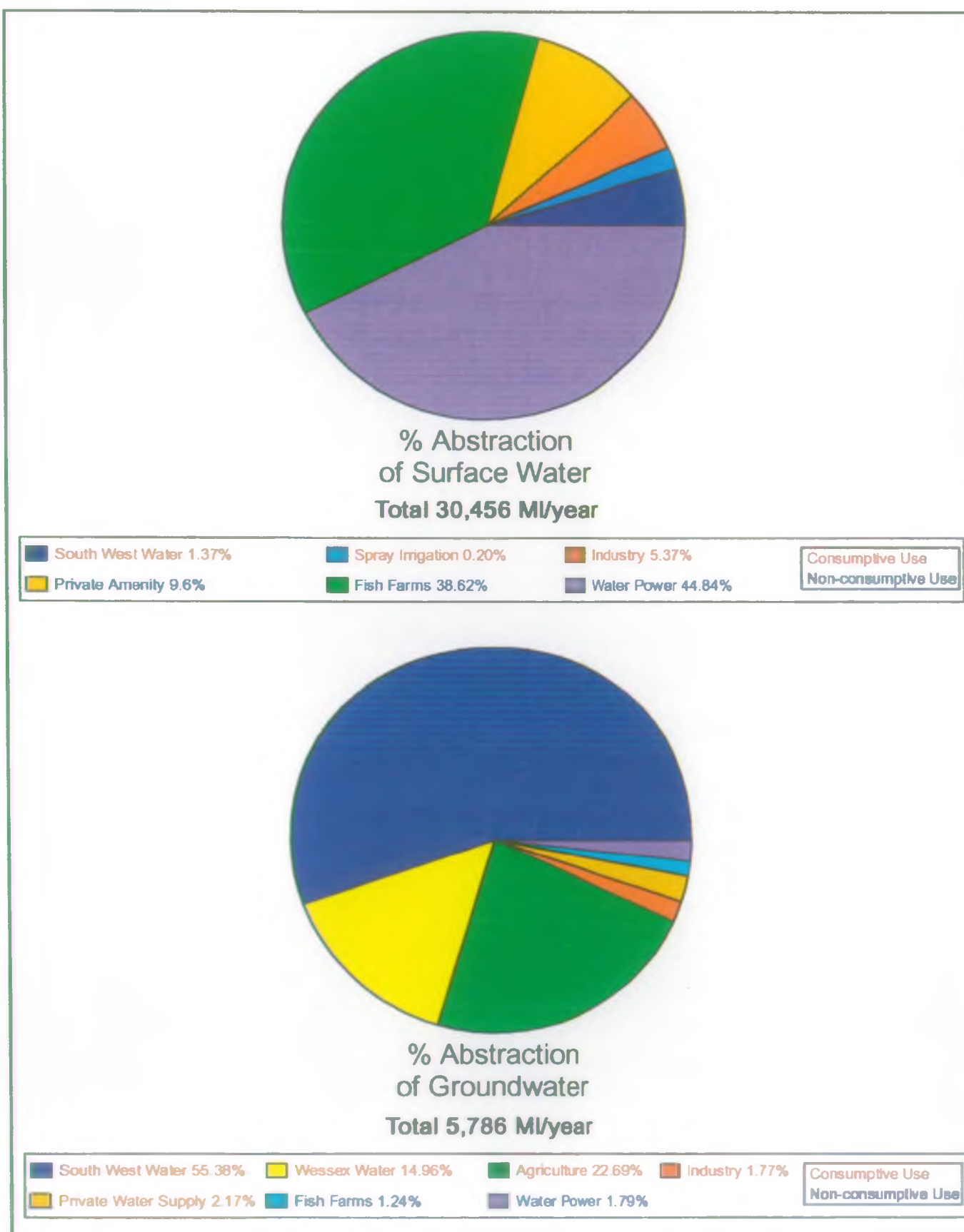
At the catchment scale potentially available water far exceeds the licensed volume, but there are localised problems; in some areas the amount abstracted may be similar in volume to the available local resource, thus causing local environmental stress. However, abstracted water is often used locally and returned to the river within the vicinity of the abstraction, thus the net effect of abstraction overall is relatively small.

Current Licensed Abstractions

Water is abstracted from the Axe and Lim Catchment for public water supply and private use. Private use includes the supply of water for agricultural purposes, fish-farming, industrial uses and amenity purposes.

There are currently 42 licensed surface water and 561 licensed groundwater abstractions within the catchment (those above 20 Ml/d are shown on Map 13).

Figure 4 - Abstraction Statistics



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NRA South Western Region

CATCHMENT USES

The authorised annual total quantity of water which can be abstracted from the catchments from these sources is 36,241 Ml. Of this, 30,456 Ml is abstracted from surface water and 5,786 Ml from groundwater sources, thus indicating the relative importance of surface water sources within the catchment (see Figure 4).

Consumptive and Non-Consumptive Abstractions

Abstractions can be categorised according to their consumptive or non-consumptive nature of water use. Consumptive abstractions commonly use all the abstracted water with little returned to the immediate catchment, e.g. public water supply, industrial processing or evaporative cooling. Non-consumptive abstractions only use a fraction of the quantity of water abstracted and return the remainder to the catchment usually within the vicinity of the abstraction point, e.g. fish-farms, water power schemes and amenity features.

Of the total annual authorised quantity of water for abstraction in the Axe and Lim Catchment, 79% is for non-consumptive uses and 21% is for consumptive uses. The majority of abstractions within the catchment are for purposes other than public water supply.

The following sections consider public water supply and then private abstractions.

Public Water Supply

Water is abstracted from both surface and groundwater sources in the catchment for public consumption. Two companies supply water to their customers within these catchments; South West Water Services Limited (SWWSL) and Wessex Water Services Limited (WWSL).

Supplying the Water Demand

The Axe and Lim Catchment is partially within SWWSL's **Wimbleball Strategic Supply Zone** and both WWSL's **Somerset Supply Zone** and **Dorset Supply Zone** (see Map 13).

The Wimbleball Strategic Supply Zone also extends over the Rivers Exe, Creedy, Culm, Otter and Sid. Wimbleball Reservoir and the River Exe are the main sources of supply which enable SWWSL to meet demand in the Wimbleball Supply Zone. Water from Wimbleball Reservoir releases, and direct River Exe abstractions, can be transferred via a link main to the River Axe Catchment. This transfer enables SWWSL to meet demands across the Zone. However, local sources within the Axe and Lim Catchment are also used to help meet local demands. SWWSL have six licensed abstractions within the catchment with a total authorised abstraction of 3,616 Ml/year.

The northern edges of the River Axe Catchment and parts of the River Lim Catchment lie within WWSL's Somerset Supply Zone. The Dorset Supply Zone covers the north-eastern sections of the River Axe Catchment and part of the River Lim Catchment. WWSL have two licensed abstractions both within the River Axe Catchment with a total authorised annual abstraction of 864 Ml.

The Demand for Water

The current public water supply demand for water within the Axe and Lim Catchment represents only a portion of total demand within each supply zone.

Wimbleball Zone

The total public demand for water in the Wimbleball Zone during 1992 was 86 Ml/d. The local sources available to SWWSL within the Axe and Lim Catchment are only able to meet a small proportion of demand. Water abstracted by SWWSL from the Axe and Lim Catchment is most likely to be consumed locally.

CATCHMENT USES

Somerset and Dorset Zones

The total public demand for water in the Somerset and Dorset Zones in 1991 was 124 MI/d and 138 MI/d, respectively. The local sources available to WWSL within the River Axe Catchment are only able to meet a very small proportion of demand. Water abstracted by WWSL from the Axe and Lim Catchment is most likely to be consumed locally.

Licensed Public Water Supply Abstractions

There are eight public water supply licences within the Axe and Lim Catchment, with a total authorised abstraction of approximately 4,479 MI/year. The majority of the public water supply comes from small groundwater sources; there are no major aquifer or surface water developments within the catchments.

SWWSL have five groundwater abstraction licences. Four are within the River Axe Catchment; Wilmington Springs, Hook and Cotley Springs, Couchill Springs (not used) and Bovey Lane Boreholes. One is within the River Lim Catchment at Pinhay Springs. These licences have an authorised total of approximately 3,197 MI/year.

SWWSL also have one surface abstraction licence within the River Axe Catchment at Holyford Ponds. This has an authorised volume of approximately 418 MI/year which is constrained by a prescribed flow condition. A temporary licence to abstract at Whitford was also held by SWWSL, but this has since expired.

WWSL have two groundwater abstraction licences both within the River Axe Catchment at Wayford Spring and Tatworth Wells. These licences have an authorised total of approximately 864 MI/year.

A further factor to consider when establishing the current status of the catchment as a source of public water supply is the total yield available from the sources. Although a licence authorises a company to abstract a maximum quantity of water, it may not always be possible to abstract this due to physical constraints. The reliable yield of a source is the theoretical maximum amount of water that can be physically abstracted during critical dry periods. SWWSL's yield from its six sources is 6.9 MI/d and WWSL's yield from its two sources is 1.7 MI/d.

Public Water Supply Conservation and Management

All new houses within the SWWSL and WWSL supply areas must now be metered. Future demand and supply options will be discussed in Section 5.2.

Private Abstractions

Water is abstracted from groundwater and surface sources for private use in the Axe and Lim Catchment. Purposes other than public water supply include the abstraction of water for agricultural purposes, spray irrigation, industrial applications - such as quarrying, food and drink, private water supply and amenity purposes.

The maximum authorised quantity of water which can be abstracted for private use is approximately 31,762 MI/year. Of this approximately 1,725 MI/year is from groundwater sources and approximately 30,037 MI/year from surface water sources.

Of the total 595 private use abstraction licences in the Axe and Lim Catchment, 554 (93%) are groundwater and 41 (7%) are surface water licences. However, surface water abstractions account for a greater volume of water than the groundwater abstractions; representing approximately 96% of the authorised private commitment.

CATCHMENT USES

The relative quantities of consumptive/non-consumptive abstractions give an insight into the nature of licensed private abstractions within the catchments. Of the total authorised quantities for private use approximately 10% is consumptive and 90% non-consumptive; indicating that the majority of water abstracted for private use is returned to the catchment.

Authorised quantities for consumptive private use total approximately 3,258 Ml/year (1,546 Ml/year from groundwater and 1,712 Ml/year from surface water sources). Authorised quantities for non-consumptive private use total approximately 28,504 Ml/year (179 Ml/year from groundwater and 28,325 Ml/year from surface water sources).

Non-consumptive surface water abstractions are the most significant category of private abstractions, in terms of volume. The main uses of non-consumptive surface water abstractions are fish-farming, water power and amenity use. These abstractions return the majority of abstracted water to the watercourse within the vicinity of the abstraction. Despite this, localised problems have been identified within the catchments, and are discussed in Section 5.2.

Future demand for private supplies is also presented and discussed in Section 5.2.

CATCHMENT USES

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:

- ☐ authorise 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 the consent conditions are exceeded
- ☐ prevent illegal discharges
- ☐ influence investment in sewerage and sewage treatment by the water companies in line with AMP2 guidelines (see section below on Improvements to South West Water Services Ltd (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 South West Water Services Ltd (SWWSL) Discharges

Improvements to SWWSL's 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.

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.

CATCHMENT USES

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 (Ref. 29). We have provided guidance on the priorities for improvements within this programme. The NRA has sought confirmation with SWWSL on the timing and details of the schemes. There is only one scheme scheduled in the catchment, this is Beer Head Outfall (see Section 5.1).

Catchment Perspective

We estimate that the total consented organic load (expressed as Biochemical Oxygen Demand (BOD)) which can be discharged directly to watercourses from numerically consented SWWSL sewage treatment works (STWs) is approximately 108 kg/day and 46 kg/day to the estuary. There is less than 4 kg/day from private STWs.

The total consented trade effluent load is slightly in excess of 50 kg/day to watercourses with none to the estuary. Most of the STWs serve small rural settlements with few large discharges (see Map 14).

The discharge from Axminster STW to the River Axe has the largest consented BOD load of 56 kg/day in the catchment. The second largest is from St Ivel at Chard (a dairy) with a load of 50 kg/day to the River Axe. Seaton STW has a consented BOD load of 46 kg/day to the estuary and is the third largest.

Since the commissioning of the Lyme Regis Sewage Scheme there are no discharges of treated sewage effluent from SWWSL STWs to the River Lim, although a number of combined storm overflows exist.

First time sewerage (connection to public sewer) is currently being agreed at Whitestaunton, but is still needed at several sites, particularly at Clapton near Crewkerne.

Table 11 is a summary of reported pollution incidents, the majority of which were recorded as minor.

In 1994 a Task Force was carried out involving the targeting of particular river stretches to identify all actual and potential pollution sources; this is reflected in Table 11. Where pollution problems were identified the sites were revisited and remedial action was taken where appropriate.

Map 14 - Effluent Disposal



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Rivers Axe and Lim Catchment Management Plan
NRA South Western Region

CATCHMENT USES

Table 11: Reported Pollution Incidents in the Axe and Lim Catchment

Origin of Pollution	No of Incidents		
	1992	1993	1994
Farm - Cattle	16	13	35
Farm - Other	31	31	41
Public Highway	3	4	4
Water Treatment	3	1	1
Sewage Collection/Treatment Unit (inc. sewers)	30	30	24
Industrial	9	12	19
Misc./Other	18	11	14
Unknown	7	15	15
Total	117	117	153

Note:

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

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.

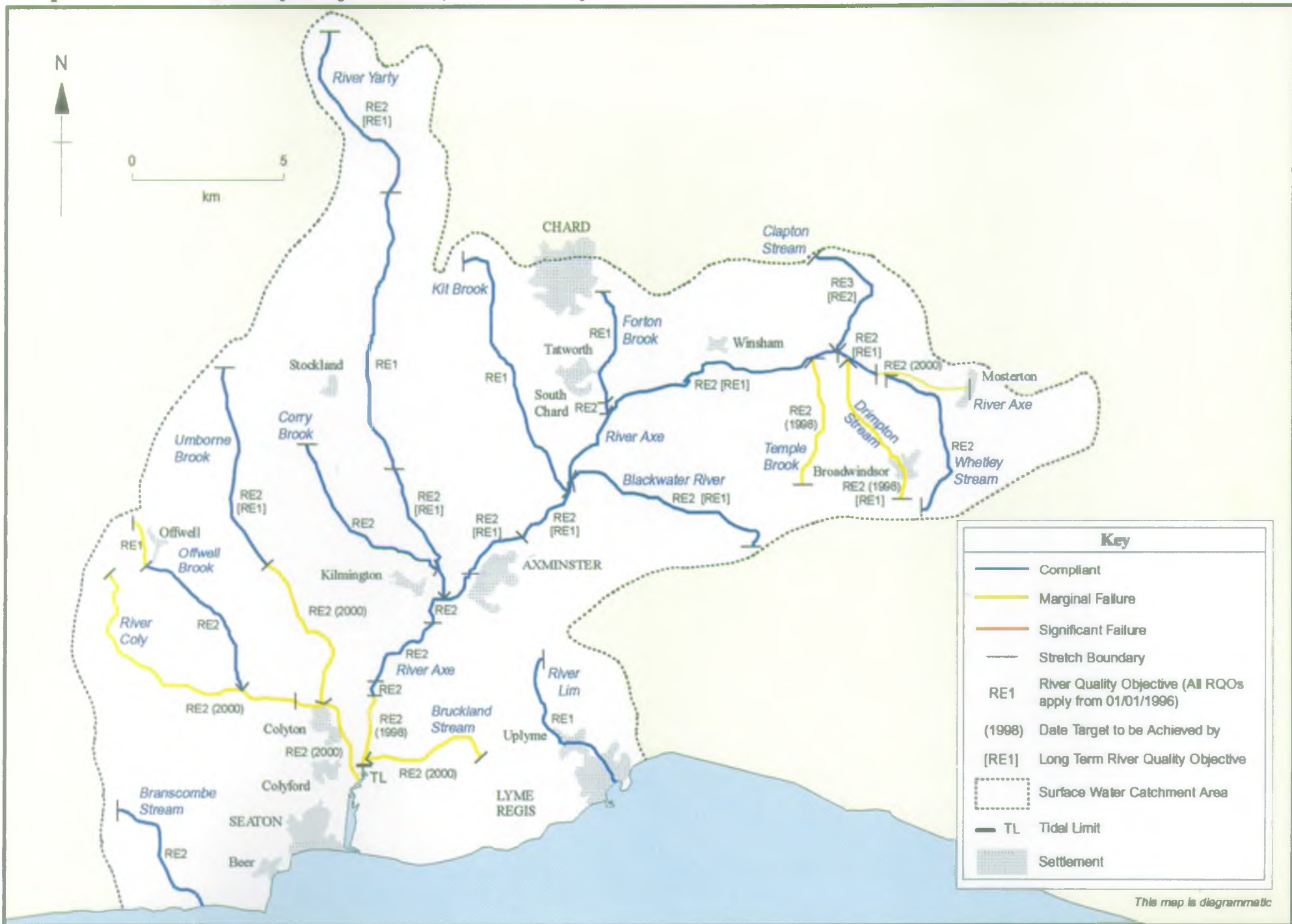
Water Treatment includes; water treatment works, treated water distribution.

Sewage Collection, Treatment Unit/Sewers includes; works plc. and 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.

Map 15 - River Quality Objectives (River Ecosystem Classification) and Compliance 1994



Information correct as of October 1995

Rivers Axe and Lim Catchment Management Plan

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 recognised 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. We have also identified other water quality issues in the catchment.

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. This scheme is made up of five water quality classes; RE1 to RE5 (see Appendix 2), which reflect the chemical water 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 us.

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

If we are unable to set RQOs that reflect historical RQOs, we will set long term RQOs, where possible, 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 Axe and Lim Catchment

The RQOs based on the RE classification that we are proposing for the Axe and Lim Catchment are shown on Map 15. These proposals must be complied with by 1996 unless a date is shown next to the class; for example, RE2 (1998) indicates that an RQO of RE Class 2 must be achieved from 1 January 1998.

We are also proposing undated long term RQOs for the river stretches shown in Table 12 that we would like to achieve but for which there are currently no financial resources to make improvements.

State of the Catchment - Compliance with RQOs

Map 15 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.

TARGETS AND STATE OF THE CATCHMENT

Of the 28 monitored river stretches (totalling 164.7 km) in the Axe and Lim Catchment there are no stretches which *significantly* fail to meet their RQO. Eight stretches (45.2 km of river) *marginally* fail to meet their RQO. The reasons for these marginal failures are explained below:

1. **River Axe (A3066 Bridge at Mosterton to Seaborough)**
River water quality in this river stretch did not meet the proposed target RE2 (2000) in 1994 because of elevated BOD concentrations. Diffuse land runoff from intensive animal farming in this area is thought to lead to poor water quality.
2. **River Axe (Below Whitford abstraction to the normal Tidal Limit)**
BOD concentrations resulted in a marginal failure of the proposed RQO of RE2 for this stretch. We will carry out investigation work to assess the degree to which tidal 'backing up' could be affecting water quality at this location and also the contributory impact of the Bruckland Stream on water quality.
3. **River Coly (Source to the normal Tidal Limit)**
River water quality in these river stretches did not meet the proposed target RE2 (2000) in 1994 because of elevated BOD concentrations. We will carry out field investigation work to determine specific sources contributing to poor water quality.
4. **Umborne Brook (Triffords Farm to confluence with the River Coly)**
River water quality in these river stretches did not meet the proposed target RE2 (2000) in 1994 because of elevated BOD concentrations. We will carry out field investigation work to determine specific sources contributing to poor water quality.
5. **Offwell Brook (Source to Offwell village)**
During 1994 BOD concentrations resulted in a marginal failure of the proposed RQO RE1 (1996). Investigation work is proposed to determine the mixing zone and impact from Offwell sewage treatment works (STW).
6. **Bruckland Stream (Source to confluence of the River Axe)**
River water quality in these river stretches did not meet the proposed target RE2 (2000) in 1994 because of elevated BOD concentrations. We will carry out field investigation work to determine specific sources contributing to poor water quality.
7. **Temple Brook (Source to confluence with River Axe)**
River water quality in this river stretch did not meet the proposed target RE2 in 1994, although recent monitoring data (1995) show that water quality is improving. We shall continue monitoring to ensure the recent improvements in river water quality are sustained and meet the proposed target.
8. **Drimpton Stream (Source to confluence with River Axe)**
BOD concentrations resulted in a marginal failure of the proposed RQO RE2 for this stretch. Field investigation work is needed to determine specific sources contributing to poor water quality.

- Issue 1: Marginal failure of proposed RQO at:*
- ☐ RE2 (2000) in the upper River Axe
 - ☐ RE2 (1998) in the lower River Axe
 - ☐ RE2 (2000) in the River Coly
 - ☐ RE2 (2000) in the lower Umborne Brook
 - ☐ RE2 (1996) in Offwell Brook
 - ☐ RE2 (2000) in Bruckland Stream
 - ☐ RE2 (1998) in Drimpton Stream.

TARGETS AND STATE OF THE CATCHMENT

State of the Catchment - Compliance with Long Term RQOs

Water quality fails to comply with long term RQOs in the stretches listed in Table 12. For four of the stretches, marked with an asterisk, we are currently unable to identify what actions need to be carried out to improve water quality. We will be carrying out investigation work during the next five years to assess how we can achieve these long term RQOs.

For the rest of the stretches listed in Table 12, we will be carrying out work over the next five years to secure further improvements in water quality to ensure that these long term RQOs are sustained.

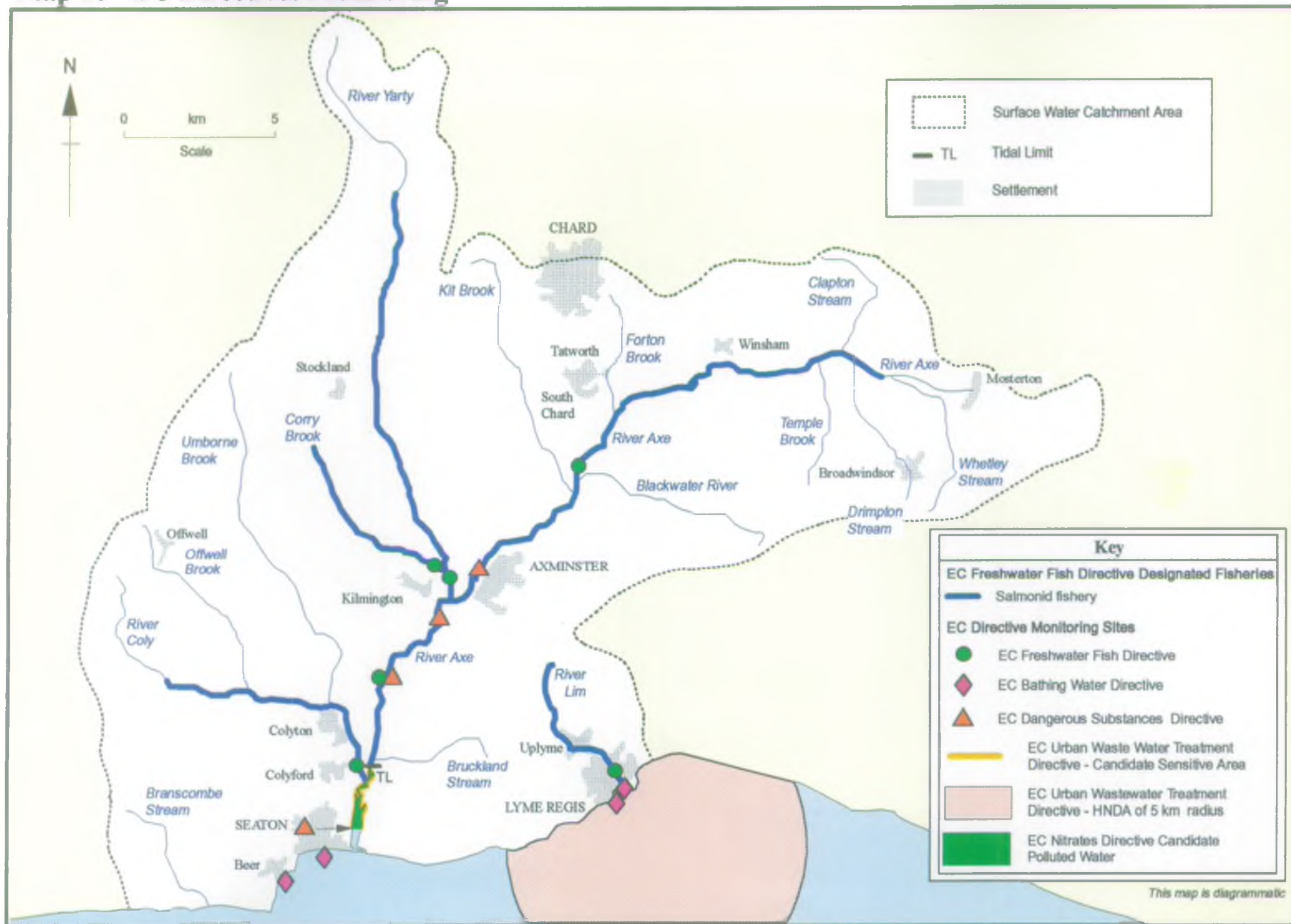
Table 12: Long Term RQOs in the Axe and Lim Catchment

River	Stretch	Long Term RQO	Reason
Axe	Seaborough to Oathill Farm Wayford	RE1*	To protect fishery use
Axe	Oathill Farm Wayford to A358 Bridge Weycroft	RE1*	To protect fishery use
Axe	A358 Bridge Weycroft to Bow Bridge Axminster	RE1*	To protect fishery use
Umborne Brook	Source to Triffords Farm	RE1	To protect fishery use
Yarty	Source to Newhaven Bridge	RE1	To protect fishery use
Yarty	Beckford Bridge to confluence with River Axe	RE1	To protect fishery use
Blackwater River	Source to confluence with River Axe	RE1	To protect fishery use
Clapton Stream	Source to Axe confluence	RE2	To protect fishery use
Drimpton Stream	Source to confluence with River Axe	RE1*	To protect fishery use

* Currently unable to identify what actions need to be carried out to improve water quality.

Issue 2: Failure to meet long term RQOs.

Map 16 - EC Directives Monitoring



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Rivers Axe and Lim Catchment Management Plan

NRA South Western Region

TARGETS AND STATE OF THE CATCHMENT

EC Directives

There are six EC Directives that currently apply to the catchment. The designated stretches and sites are shown on Map 16.

EC Bathing Waters Directive

The Bathing Waters Directive 'concerning the quality of bathing water' (Ref. 30) 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) to assess bathing water quality. Compliance is assessed mainly by standards for bacteria (total and faecal coliforms) found in sewage.

We are responsible for monitoring the quality of identified, popular 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 EC Bathing Waters in the Axe and Lim Catchment which are monitored under the Directive at Lyme Regis (Cobb), Lyme Regis (Church), Seaton and Beer (see Map 16). Table 13 shows when failures have been recorded:

Table 13: Bathing Water Failures in the Axe and Lim Catchment

Bathing Water	Year
Lyme Regis (Cobb)	1986, 1989, 1992
Lyme Regis (Church)	1987, 1988, 1989, 1990, 1991, 1992, 1993 Beach closed in 1994 and 1995 for engineering works
Seaton	1986, 1987
Beer	1994

Non-compliance at the two Lyme Regis bathing waters was caused by bacterial inputs from the River Lim and crude SWWSL sewage discharges at Broad Ledge and Cobb Gate.

Bathing water improvements at Lyme Regis have been brought about by a SWWSL improvement scheme, which became fully operational during the 1995 bathing season. This involved pumping all sewage flows from Lyme Regis and Uplyme to a new treatment works at Uplyme. The effluent receives year-round secondary treatment, with additional UV disinfection during the bathing season. Flows are discharged via a 500 m sea outfall into Lyme Bay.

At Seaton bathing water non-compliance is influenced by water quality of the Axe Estuary. However, despite observations of very high bacterial levels in the Axe Estuary the available dilution appears to be effective with no bathing water failures recorded since 1987.

The likely cause of non-compliance at Beer in 1994 was Beer Head outfall. Improvements to this outfall are planned under the appropriate treatment provisions of the EC Urban Wastewater Treatment (UWWT) Directive (see Section 4.11).

TARGETS AND STATE OF THE CATCHMENT

EC Dangerous Substances Directive

The Dangerous Substances Directive 'on pollution caused by certain substances discharged in the aquatic environment of the community' (Ref. 31) 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, persist in the environment and 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 5).

We are responsible for authorising, 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

Four sites in the Axe and Lim Catchment are identified under the Dangerous Substances Directive (see Map 16). A storm sewage overflow at Axminster Town Railway Station is designated for the List 1 substances mercury and cadmium. It is also designated for the List 2 metals zinc, lead, nickel and arsenic. Axminster (Wilmington) STW is designated for mercury, cadmium and HCH and the List 2 metals zinc, lead, nickel, arsenic and chromium. A storm and emergency overflow at Horslears Pumping Station is designated for mercury and cadmium and the List 2 metals zinc lead, nickel, arsenic, chromium and copper. Seaton STW is designated to discharge the List 2 metals copper, zinc, lead and nickel into the Axe Estuary.

Monitoring of the receiving waters and sediments for the Railway Station and Pumping Station discharges are carried out at Bow Bridge. Monitoring of the receiving waters and sediments for Axminster STW is carried out at Slymlakes. There have been no exceedences of any List 1 EQSs at any of these sites.

The National Network site at Whitford Bridge is used to assess background levels of List 1 and 2 substances; there have been no exceedences of these substances at this site.

EC Freshwater Fish Directive

The Freshwater Fish Directive 'on the quality of waters needing protection or improvement in order to support fish life' (Ref. 32) 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 protects cyprinid or coarse fish populations; the other, stricter set of standards protects salmonid fish populations for example, salmon and trout. There are also 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.

TARGETS AND STATE OF THE CATCHMENT

State of the Catchment

Table 14 shows the designated salmonid fishery stretches in the catchment. There are no designated cyprinid stretches.

Table 14: Designated Salmonid Fishery Stretches in the Axe and Lim Catchment

River	Stretch	Length (km)	Monitoring Point
Axe	Seaborough to Broom	17.1	Broom
Axe	Broom to Normal Tidal Limit	19.5	Whitford Bridge
Coly	Woodbridge to Normal Tidal Limit	9.5	Colyford
Corry	Rose Farm to confluence with River Yarty	6.8	Prior to River Yarty
Lim	Source to Mean High Water	6.4	Mill Green
Yarty	Newhaven Bridge to confluence with River Axe	16.7	Gammon's Hill

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

EC Urban Wastewater Treatment Directive

The EC Directive 'concerning urban wastewater treatment' (Ref. 33) 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.

This Directive also allows higher standards of treatment for discharges to 'sensitive' areas, and/or lower standards of treatment to 'less sensitive' areas. Sensitive areas are those waters that receive discharges from population equivalents of greater than 10,000, and are or may become eutrophic in the future.

We carry out monitoring to find out whether a watercourse is a sensitive area. We present this information to DoE who decide whether the watercourse is sensitive. We then ensure that discharges to this area receive a higher level of treatment.

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

The Beer Head Outfall has been identified as requiring secondary treatment by 2005 to meet the appropriate treatment requirements of the Directive.

TARGETS AND STATE OF THE CATCHMENT

The Axe Estuary from SY 2595 9260 to SY 2540 9060 has been identified as a candidate Sensitive Area (Eutrophication), SA(E). The qualifying discharge is Seaton STW (population equivalent 15,000). During 1995 and 1996 we will be monitoring the estuary to determine its trophic status and the principal sources of nutrients to the estuary.

Issue 3: Need to establish nutrient status of the Axe Estuary.

DoE, in consultation with us, have proposed that the sea off Lyme Regis is designated as an HNDA. However, as secondary treatment is required all year for the Lyme Regis discharge, no comprehensive studies are expected for this site until any further discharges are proposed.

EC Nitrates Directive

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. 34) protects waters from pollution by nitrates used in agriculture. This Directive 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' (NVZ).

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.

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. There are no proposed NVZs in this catchment.

The Axe Estuary from SY 2595 9260 to SY 2540 9060 has been identified as a candidate Polluted Water. During 1995 and 1996 the estuary will be monitored to determine its trophic status and the principal sources of nutrients to the estuary (see Issue 3).

Other International Commitments

Annex 1A Reduction Programme

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 6) entering tidal waters from rivers and direct discharges. Loads of most Annex 1A substances are to be reduced by 50%, but loads of mercury, cadmium and lead are to be reduced by 70%. Reductions were achieved by 1995 and compared with a 1985 baseline or a 1991/1992 baseline where data for 1985 was unavailable.

We are responsible for monitoring and identifying significant sources of these 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

Only one site in the Axe and Lim Catchment, at Axe Bridge, is monitored for Annex 1A and Paris Commission purposes. Significant loads of cadmium, copper, zinc, nickel, lead, chromium and arsenic have been recorded at this site during the period 1990 - 1994.

TARGETS AND STATE OF THE CATCHMENT

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

We will be carrying out studies to identify sources of these substances to the catchment, and identifying whether steps can be taken to control their release to the River Axe. 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 4: Significant loads of Annex 1A substances from the River Axe.

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 Axe and Lim Catchment.

Freshwater Biology Targets

We monitor the ecological quality of rivers by sampling aquatic benthic macroinvertebrates. These are small animals that live in river sediments. 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 the Biological Monitoring Working Party (BMWP) scoring system. We use this information to classify rivers as shown in Table 15.

Table 15: Biological Classification of Rivers

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

State of the Catchment

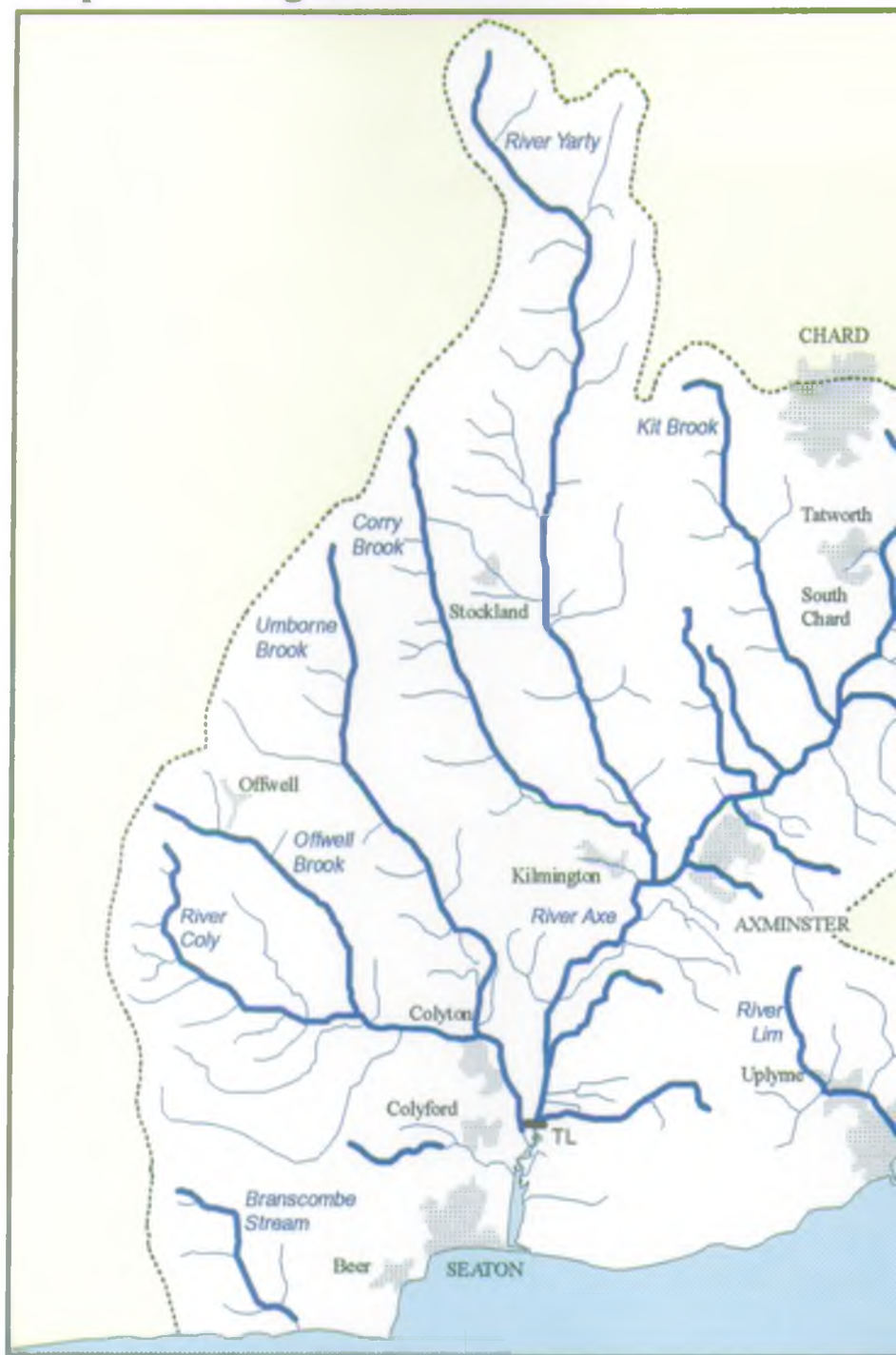
All monitored river stretches in this catchment are Class A (see Map 17).

Coastal Classification

During 1993 and 1994 a monitoring network was established to assess water quality at coastal offshore sites. Among these were four sites located one nautical mile offshore; off Lyme Regis, Charton Bay, Seaton and Branscombe Mouth. At each sampling point ten seasonal surface and depth samples were taken for a range of nutrient and bacterial parameters.

Nutrient levels were low and remained fairly constant throughout the year. Concentrations of bacteria were low at all sites.

Map 17 - Biological Classification



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TARGETS AND STATE OF THE CATCHMENT

Estuarine/Coastal Water Quality

The National Water Council (NWC) Estuary Classification Scheme provides a simple, subjective assessment for estuaries based on biological, chemical and aesthetic quality. The classification is as shown in Table 16.

Table 16: NWC Estuary Classification Scheme

Estuary Class	Description
A	Good
B	Fair
C	Poor
D	Bad

We will continue to use this NWC Classification Scheme until the new GQA chemical classification is fully developed.

State of the Catchment

In 1990 and 1991 when classified under the subjective NWC classification the Axe 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 routine monitoring data from an upper site and also a mid-estuary site in the Axe Estuary between 1990 and 1994.

Nutrient concentrations in the Axe Estuary are extremely variable and salinity dependent as would be expected in an estuary which drains at low water. At the upper estuary site, river flows draining an agricultural catchment result in constantly reduced salinities and high nutrient levels compared with coastal waters. At the mid-estuary site nutrient concentrations vary from those typical of seawater to high concentrations depending on river flow and tidal state.

Data for chlorophyll-a indicate occasional high results. 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.

State of the Catchment

Concentrations of total ammonia were not closely related to salinity and were highest during the winter. Concentrations of ammonia have not exceeded the proposed standard of 1,500 µg N/l to protect the passage of migratory fish. Seaton STW is a source of ammonia to the mid-estuary.

Monitoring data for the period 1991 to 1994 show the proposed water quality standard for migratory fish use of 3 mg/l dissolved oxygen (DO) as a 95%ile was always met.

TARGETS AND STATE OF THE CATCHMENT

Occasional high BOD concentrations have been recorded. However, there is no clear correlation with salinity. The tidal states when high concentrations were recorded suggest Seaton STW may have been the source. Since recent improvements at Seaton STW no similar occurrences have been recorded.

Concentrations of bacteria are high in the upper estuary. The principal sources are freshwater runoff particularly during periods of high rainfall, and Seaton STW.

Proposed Riverine SSSI

English Nature (EN) are proposing to designate part of the lower River Axe as a Site of Special Scientific Interest (SSSI). Management of the SSSI will seek to protect both the channel form and features, and the rich flora and fauna of the river (including the rare short leaved water starwort and medicinal leech). We will develop a conservation strategy together with EN which will consider all aspects of management of the river (this has been brought about by the Memorandum of Understanding between EN and ourselves).

However, EN have concerns over the nutrient status of the river and any impact this may have on the riverine wildlife. Plant surveys show some decline of diversity and abundance suggesting some enrichment taking place, but the results are not yet conclusive.

High levels of orthophosphate have been recorded in the lower River Axe. The STWs and the dairy that discharge to the River Axe will contribute to the phosphate load, as could some farming practices of the catchment.

Further monitoring and detailed data analysis will be required to establish the degree to which nutrient enrichment is occurring in the River Axe and whether its control is required to protect the SSSI and its unique freshwater ecosystem.

Axminster STW cannot be a qualifying discharge under the EC UWWT Directive as it is too small, and so this stretch cannot be nominated as 'sensitive' under this Directive.

Issue 5: Nutrient enrichment in the lower River Axe.

Groundwater Quality

EC Groundwater Directive Target

Whilst the EC Groundwater Directive (Ref. 35) 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, varying in three dimensions.

TARGETS AND STATE OF THE CATCHMENT

A key element to assist the protection of groundwater generally is identifying areas which are particularly vulnerable according to properties of the soil cover and the underlying rocks. A programme of groundwater vulnerability mapping is underway 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 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 place rather than try to deal with the consequences.

In 1992 we published our Policy and Practice for the Protection of Groundwater (PPPG) (Ref. 36). 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 organisations 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 the 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 land
- ☐ Discharges to underground strata
- ☐ Diffuse pollution
- ☐ Other threats to groundwater quality.

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 minimise the risks posed to groundwater from development and land use changes. We have particular concern over the areas around major water supply boreholes.

Target

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

State of the Catchment

Redevelopment of sites, particularly the old waste disposal and industrial sites may cause a release of contaminants, which could result in groundwater pollution. A risk assessment study which recommends appropriate mitigation measures would be required.

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 will assess the state of water resources in the catchment. We will 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. 37), 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 will:

- ☐ 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

Target

To protect the water environment from damage caused by abstraction.

State of the catchment

Overall the catchment is not stressed by abstraction; however, localised problems have been identified. For example; Wilmington Trout Farm, Umberne Brook. At this site there is a deprived reach of river of approximately 200 m length which is caused by a pipe abstraction (this is a Licence of Entitlement). During the period late spring to autumn the majority, if not all, of the flow is diverted from the brook. This deprived reach presents a problem to fish movement.

Issue 6: Low flows in the Umberne Brook.

Public and Private Water Supply

Target

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

State of the Catchment

As discussed in Section 4.10 the Axe and Lim Catchment falls partially within SWWSL's Wimbleball Strategic Supply Zone and WWSL's Dorset and Somerset Strategic Supply Zones. Therefore, demand forecasts are only available at a strategic zone level and do not directly relate to the individual catchment.

TARGETS AND STATE OF THE CATCHMENT

In the following sections future public and private water supply demands within the strategic supply zones are discussed, together with any potential implications.

Public Water Supply

Demand in the Wimbleball Supply Zone will increase from 86 MI/d to 121 MI/d by 2021 assuming a high growth rate in domestic, industrial and commercial consumption and current levels of demand management. However, with a lower growth rate for domestic, industrial and commercial consumption as well as water company reduction in leakage to 200 litres per property per day, demand will only increase to 108 MI/d by 2021 (Ref. 37).

Using similar assumptions for high and low forecast demands as above, and instead using water company reduction in leakage to 120 litres per property per day, the Somerset and Dorset Supply Zones of Wessex Water will have the following increases in demand:

- For the Somerset Zone, a high level of demand will result in a rise from current levels at 124 MI/d to 175 MI/d by 2021, whilst a low forecast will result in an increase to 131 MI/d by 2021 (Ref. 37)
- For the Dorset Zone, a high level of demand will result in a rise from current levels from 138 MI/d to 193 MI/d by 2021 whilst a low forecast will result in a demand of 137 MI/d by 2021 (Ref. 37).

It is unlikely that any forecast deficits in public water supply arising in the Wimbleball, Somerset and Dorset Zones will have implications for water resources developments within the Axe and Lim Catchment. Options for development of water resources will relate to other catchments. Reference to the development of Wimbleball Pump Storage Scheme to meet demands until 2021 is in the River Exe Catchment Management Plan (Ref. 38).

Issue 7: Forecast deficits in public water supply.

Private Water Supply

In Section 4.13 it was indicated that the most significant type of abstraction in the Axe and Lim Catchments is for non-consumptive surface water abstractions. The majority of private abstractions are not utilised to their full extent and any increase in demand for existing users could be accommodated within their current licences.

The Authority must have regard to the reasonable future need for water for private abstractors. Growth rates for future private abstraction demand are outlined in 'Tomorrow's Water' (Ref. 31). Using the rates specified the current net commitment to private licensed abstractions would only rise from 950 MI/yr to 1,252 MI/yr by 2021.

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. 7) 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. 45). 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

A range of priority habitats and species linked to the water environment are at risk from development and changing practices. These include spring line mires, marsh fritillary butterflies and the medicinal leech. Targets need to be set for these species to prevent further loss and to guide future recovery. The NRA is closely involved with the Rivers and Wetlands Strategy, through which realistic targets will be developed. At present, catchment specific targets are still being developed, but it is intended to include them in the Action Plan for this catchment.

Issue 8: *Decline of important habitats and species.*

Otters are still only present in low numbers in the Axe and Lim Catchment, despite areas of apparently suitable habitat. The NRA has developed a National Otter Strategy which indicates levels of action appropriate to the catchment. Recommended actions are also being promoted by the Rivers and Wetlands Project, in which we are working with others to identify issues and actions for a range of habitats and species. The Joint Nature Conservation Committee 'Framework for Otter Conservation 1995 - 2000' is the national document that will guide and co-ordinate otter conservation work during this period.

Issue 9: *Little use of catchment by otters.*

Water voles have declined rapidly in the South West over the last 30 years. A national survey (Vincent Wildlife Trust, 1993) has linked this to the introduction of mink. More recent studies suggest that loss of bankside habitat associated with agricultural intensification and improvement may play an important part.

Issue 10: *Scarcity of water voles.*

TARGETS AND STATE OF THE CATCHMENT

Floodplain habitats in this catchment are of less conservation value than might be achieved. Management has tended to reduce the water-table levels and protect areas from flooding.

Issue 11: Need for improvement of conservation value of floodplain habitats.

Invasive riparian plants can out-compete native bankside flora, reducing wildlife value and having the potential to leave banks open to erosion in winter. Proper control can be difficult, but steps need to be taken to prevent unrestricted spread. Annual surveys by NRA wardens monitor the spread of these plants and have noted the spread of Himalayan balsam.

Issue 12: Need for improved control of Himalayan balsam.

The aquatic plants in the River Axe are widespread, varied and often very prolific; the river may in some places, for example at Whitford, be almost full of plants. Anglers find this impedes their fishing and cutting of plants to create swims takes place. In addition, at some sites, water levels are raised by heavy plant growth. This may affect the operation of our flow or water level monitoring equipment and necessitate limited clearance.

Issue 13: Need for planned management of aquatic plants in lower River Axe.

Recreation

Where it can be achieved without adversely affecting the conservation value of the water environment, significant benefits for people can come from access to rivers and wetlands, especially for the less able. Some initiatives have already been carried out that improve access, and there may be further opportunities. However, it is important that this is not at the expense of other interests, including ecology and the economic interests of landowners.

Issue 14: Need for further improved access around rivers.

Historic Value

Some concern has been raised about World War II concrete pill boxes along the River Axe which are eroding and parts are falling into the River Axe. The responsibility for these structures lies with the owner, however should they be of historic importance then we may have a role to play in their protection. Another concern is that any material falling into the channel could pose a flood risk.

Issue 15: Eroding concrete pill boxes.

Barriers

River Axe

There are 31 weirs on the River Axe and its tributaries, 16 of which act as complete barriers to the upstream migration of salmon and sea trout (see Map 18).

The majority of weirs in the catchment have historically been associated with mills, many of which have now fallen into disuse. The exceptions are: Hamblyns Weir (River Coly) which supplies a tannery; Coles Mill Weir (River Coly) which is used for domestic hydro generation; Lexhayne Weir (Umborne Brook) used to supply water to a fish-farm; and Wilmington Weir also supplying water to a fish-farm on the Umborne Brook.

Map 18 - Barriers



TARGETS AND STATE OF THE CATCHMENT

Lexhayne Weir and Wilmington Weir both present major obstacles to fish migration as they can only be passed in exceptionally high flows. We have drawn up plans to install a fish pass on Lexhayne Weir, which has been identified as a priority for the Devon Area of the NRA. Fish passage at the site at Wilmington will be difficult to achieve without major expenditure, but it nevertheless remains important because of the high quality spawning areas that are located above the weir.

Of low priority at present are the two weirs in the upper reaches of the River Axe, at Clapton Mill and Mosterton. Although there is a considerable length of river above Clapton, the water quality in this area is not yet satisfactory for salmonid fish spawning. If access were possible it is thought that spawning and juvenile survival would be poor. The importance of making these weirs passable will increase as water quality improves.

Three minor tributaries have impassable barriers in their lower reaches (Forton Brook, Whatley Stream, and Clapton Stream) and salmonid migration is restricted by weirs near the headwaters of the River Coly, Corry Brook, Nanny's Water and Northleigh Stream.

At a number of sites in the catchment, mainly in the smaller streams, 'Irish Bridges' have been built to allow crossing points (see Map 18). These bridges, which are a concrete dam with pipes running through, can become blocked thus preventing fish migration as water is forced to flow around or over the bridge. Some of these bridges have been removed or modified to improve fish passage. Only one 'Irish Bridge' in the catchment acts as a barrier to fish migration, this is on the Brinscombe Stream.

River Lim

Passage of migratory salmonids into the River Lim is prevented by two impassable weirs at Lyme Regis, one was associated with a disused hydro generation plant.

Issue 16: Barriers to fish movement in the catchment.

Fisheries

The River Axe Catchment supports sea trout, brown trout, coarse and eel fisheries. Map 19 shows details of the status of the salmonid fisheries in the catchment.

One of the most marked changes in fish populations in the river over the past 30 years is the dramatic decline in the salmon run. Returns from the rod fishery had by the mid-1980s reduced to almost nothing with no evidence of a recovery until 1994 when catch returns indicated that seven salmon were taken from the river. This recovery is thought to be a reflection of the works undertaken by the NRA over the past five years to restore runs of salmon to the river, which has included annual stocking, habitat improvements, installation of fish passes and improvements to water quality.

The initial cause for the decline is uncertain and appears unique to the River Axe as neighbouring rivers were unaffected. One of the most probable explanations is the change in farming practices in the catchment, which resulted in a major decline in water quality in certain areas. The fact that salmon are now beginning to return to the river would seem to be appropriate justification for continuing with the restoration programme including further improvements to water quality.

The decline in runs is also linked to high levels of salmonid poaching in adjacent coastal waters and some in the estuary through the use of fixed gill nets. Prior to the 1980s, this was a major issue and large numbers of nets were operated along the coast ostensibly for the capture of sea fish. Changes in legislation has resulted in the creation of areas closed to netting, which with increased levels of enforcement have substantially reduced illegal capture in coastal waters.

Issue 17: Decline in runs of salmon.

Map 19 - Salmonid Fisheries Status



Map 20 - Spawning Gravels



TARGETS AND STATE OF THE CATCHMENT

Fisheries interests in the catchment identified that brown trout stocks in the catchment were also in decline which was to a certain extent substantiated by rod returns and juvenile surveys. In an effort to improve stock levels a programme of restocking was started in 1990 and habitat restoration undertaken in appropriate areas. Recovery to stock levels has been limited but continued efforts to increase the population to that of previous years are thought to be of benefit.

Issue 18: Decline in brown trout stocks.

Water quality in the catchment is clearly a major factor influencing the successful recovery of both salmon and brown trout stocks. There are localised problems where cattle erode the river bank at drinking and crossing points. High suspended solid loadings from general soil and bankside erosion and cattle in the river bed have led to siltation of spawning gravels. Map 20 shows areas of the catchment giving cause for concern, together with areas where gravel rehabilitation work has been carried out. However, any action taken to control the erosion of trampled areas (usually by cattle) should have regard to other ecological and flood defence concerns, as they provide a specialised habitat for some rare insects (see Issue 26).

In the Axe Catchment, there are many disused roads and tracks which are still registered as highways. There is an increasing trend for these ancient roads to be used by off-road vehicles. Many such highways either cross, or even run along the beds of the Axe and its tributaries. This activity needs to be discouraged where damage to the river, and in particular spawning gravels, is likely to result.

There has also been an increasing trend in recent years for riparian owners to remove gravel from the watercourse. This may result in a reduction, or very often, complete destruction of spawning areas. The extent to which the NRA can control this operation is limited, except during times when fish are spawning. We, therefore, rely on the co-operation of the owners to restrict how much gravel is extracted and try to limit the operation to the removal of gravel shoals only.

Issue 19: Removal of gravel from the river by riparian owners.

It is generally accepted that in recent years there has been a marked increase in the extent of predation by fish-eating birds on freshwater river and stillwater fisheries. In the River Axe Catchment, the large numbers of cormorants observed in various parts of the system are a concern to anglers. Both salmonid and coarse fish populations are susceptible and both are known to be taken by cormorants in certain areas. The smolt run is thought to be the most vulnerable because of the size of smolts, and that they tend to occur in large numbers over a limited time period.

Issue 20: The effect of fish-eating birds on salmonid and coarse fish populations.

Historically, riparian owners and fishery interests have stocked various reaches of the River Axe with farmed brown trout of takeable size originating from a variety of sources. This practice may have a detrimental effect on the native population through creating competition for food and available habitat, and by increasing predation of native juveniles. Furthermore, the introduction of farmed fish will inevitably modify the genetic integrity of stocks native to the catchment and may attract avian predators able to exploit an unnaturally high population.

Where stocking is thought to be of overall benefit to the fishery, all fish stocked should originate from within the catchment. The exception to this will be stocking with salmon as part of our stock recovery programme. This is a necessity as there are insufficient numbers of broodstock salmon in the River Axe to enable us to strip ova. Until these become available we will use broodstock from the River Exe.

Issue 21: Stocking with farmed fish.

TARGETS AND STATE OF THE CATCHMENT

Survey data from the 1970s showed that the middle and lower reaches of the River Axe supported large stocks of coarse fish, mainly dace and roach. Roach in particular were noted for their quality and size, with fish of over 1 kg in weight frequently caught. Although there are still coarse fish in the lower River Axe the numbers and size of the populations have declined compared with those recorded in the 1970s.

Issue 22: Decline in roach and dace, particularly of larger fish.

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).

Serious floods occur less often than minor floods. The term 'return period' describes how often on average a flood might occur. For example, a ten year return period flood might be equalled or exceeded once every ten years on average.

At any location the Standards of Service for flood protection is the worst flood (expressed as a return period) which can be withstood without significant damage. The NRA sets target standards, which are related to the nature and scale of risk, so that resources can be used most effectively. For example, the target standard to defend a town against the sea will be higher than that for marginal farmland in the floodplain of a river.

The NRA seeks to guide new development away from flood risk areas, and to maintain main rivers and existing defences, so that standards are met. New or improved defences may sometimes be justified, although a flood alleviation scheme cannot remove all risks since a more serious flood may still occur. Flood warnings are an important means of limiting damage where risks cannot otherwise be avoided.

We manage flood defence by addressing the difference between targets and existing standards. Targets may apply generally or to any of the main areas of flood defence activity; regulation, maintenance, improvements or emergency response.

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. This group will oversee the production of the Shoreline Management Plan for the South Devon Coastline, and will also ensure that it is integrated with other coastal initiatives. 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. This will be of particular importance as Sidmouth to West Bay is a candidate Special Area of Conservation with new requirements to protect features of conservation value under EC legislation.

Issue 23: 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. 39).

TARGETS AND STATE OF THE CATCHMENT

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 Rivers Axe and Lim Catchment by 1999.

Issue 24: Need to identify flood risk for planning authorities.

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

Issue 25: Inappropriate development, particularly in floodplains, may affect standards of flood defence and damage environmental interest.

Maintenance

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

We focus our work where it is most needed. 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, and will also include the asset management surveys (at existing schemes).

We use the asset management surveys to target work on the 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 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 17 to design and then maintain schemes for different classes of land use. Map 21 shows the land use bands 'main river' within the River Axe and Lim 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 and compare with the target. This comparison is indicative of where maintenance may be appropriate. However, within this catchment maintenance is concentrated on flood defence schemes, tree and debris removal rather than to meet the target Standard of Service.

Map 21 -Flood Defence Land Use Bands



TARGETS AND STATE OF THE CATCHMENT

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

Table 17: 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 26: 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 or 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 who 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. We can provide guidance, such as that contained in the 'New Rivers and Wildlife Handbook' (Ref. 40).

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

Bank erosion and its control is a prominent feature on the River Yarty and in the lower River Axe.

Issue 27: 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 certain locations, requiring regular maintenance and special attention during periods of high flow, to avoid blockage (see Appendix 7). We also desilt at the Coly and Axminster schemes.

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.

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. No flood problems for investigation have been identified in the catchment in the current programme of capital works for 1999 to 2000.

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 Axe and Lim Catchment:

- ☐ River Axe for Mosterton, Clapton, Chard Junction, Coaxdon, Weycroft, Axminster from river level stations at Winsham, Chard Junction and Weycroft
- ☐ River Yarty for Crawley Bridge, Long Bridge, Case Bridge, Beckford Bridge and Yarty Bridge from river level stations at Court Place
- ☐ Umborne Brook for isolated locations upstream of Colyton from river level station at Wilmington
- ☐ River Coly for Colyford from river level station at Bonehayne.

No flood warnings are presently issued for locations in the River Lim Catchment. There are no rain-gauges or river level stations in the catchment used for flood warning. Additional information is obtained from the rainfall gauge at Goren Farm (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.

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 outstation sites and changes to the warning system. We expect to change the procedure for issuing flood warnings before the end of 1996.

Issue 28: 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. Marginal failure of proposed RQO at: <ul style="list-style-type: none"> ● RE2 (2000) in the upper River Axe ● RE2 (1998) in the lower River Axe ● RE2 (2000) in the River Coly ● RE2 (2000) in the lower Umborne Brook ● RE2 (1996) in Offwell Brook ● RE2 (2000) in Bruckland Stream ● RE2 (1998) in Drimpton Stream. 	<ul style="list-style-type: none"> ● Follow up previous catchment inspection to ensure improvements to treatment facilities and drainage arrangements sustained. ● Enforce pollution legislation where appropriate. ● Work with others to target these river stretches to promote the uptake of less intensive agricultural schemes, such as Countryside Stewardship. ● Consider these areas for targeting farm waste management plan promotion. 	Achieve RQO. Environmental improvement.	Cost. Potential costs to polluters.	NRA	Landowners and dischargers
2. 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
3. Need to establish nutrient status of the Axe Estuary.	<ul style="list-style-type: none"> ● Collect and analyse chemical and biological monitoring data. ● Determine trophic status of the estuary. 	Understanding of trophic status of estuary. Determination of 'sensitive area'.	Cost. Legislation.	NRA	
4. Significant loads of Annex 1A substances from the River Axe.	<ul style="list-style-type: none"> ● Await DoE guidance on further load reduction nationally. ● Consider need for quality assurance of flow data. 	Reduction in loads of Annex 1A substances. Improved water quality.	Cost. Difficult to control.	DoE	NRA

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
5. Nutrient enrichment in the lower River Axe.	<ul style="list-style-type: none"> ● Collect and analyse chemical and biological monitoring data to determine trophic status. ● Assess any changes to the freshwater ecosystem, e.g. macrophytes. ● Examine feasibility of nutrient control in the catchment and include in the conservation strategy (see Issue 7). 	Improved information.	Cost.	NRA, EN	
6. Low flows in the Umborne Brook.	<ul style="list-style-type: none"> ● Negotiate with owner to increase environment protection. ● Assess scale of impact and priority within the region. 	Improved information. Environmental protection.	Cost.	NRA	
7. Forecast deficits in public water supply.	<ul style="list-style-type: none"> ● Encourage metering in all new developments. ● Encourage selective metering as an alternative to new resources. ● Encourage and publicise efficient water use and recycling. ● Encourage leakage reduction to a regional target of 200 l/property/day. ● Seek to set local leakage targets. ● Encourage water companies to make more efficient use of water resources. ● Build Wimbleball Pumped Storage Scheme as licensed in consultation with planning authorities. 	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.
8. Decline of important habitats and 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. ● Work on conservation strategy for proposed River Axe SSSI. 	Environmental improvements.	Cost.	DWT, NRA, EN	MAFF, CoCo, RHIER

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
9. Little use of catchment by otters.	<ul style="list-style-type: none"> Continue to record sightings and all other evidence of otters in the catchment. Raise awareness of river users (e.g. riparian owners and anglers) of need for recording and encourage contributions. Assess need for habitat creation projects in collaboration with landowners and others. Establish volunteer network to carry out quarterly surveys in catchment according to National Survey methodology. Carry out surveys and monitor results. Consider eel tissue analysis to assess contaminant loading. Continue to carry out postmortem examination and tissue analysis on all otter casualties recovered. Analyze results. Promote measures to avoid casualties. Investigate potential factors limiting further expansion. Adopt actions proposed in otter BAP where appropriate. 	Increase in otter populations.	Cost.	NRA NRA, DWT DWT DWT NRA NRA NRA DWT, NRA NRA, DWT NRA	Volunteers, river users (e.g. riparian owners and anglers)
10. 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. Consider use of volunteer survey groups to gather data on distribution of water voles and mink. Promote restoration of appropriate bankside vegetation. Consider actions proposed in the Water Vole BAP where appropriate. 	Improved information.	Cost.	NRA NRA, DWT NRA, DWT	River users

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
11. Need for improvement of conservation value of floodplain habitats.	<ul style="list-style-type: none"> Investigate possibilities with landowners and others of managing water levels to increase conservation value, particularly on Seaton Marshes. Explore potential of existing grant schemes to fund less intensive use of floodplain land. Contribute to discussions relating to the proposal to designate Seaton Marshes as a Local Nature Reserve. Seek opportunities for recreation of semi-natural habitats, especially in partnership with others. Work with Axe Vale and District Conservation Society and others to enhance the conservation value of Seaton Burrow Pit. 	Environmental enhancement.	Cost.	NRA, MAFF (Countryside Stewardship), DCC	Landowners, Devon Birdwatching Preservation Society, Axe Vale & District Conservation Society, East Devon AONB
12. Need for improved control of Himalayan balsam.	<ul style="list-style-type: none"> Adopt proper control measures where NRA manages land. Encourage control by riparian owners, particularly where sites are of existing conservation value. Make NRA booklet on invasive plants widely available. 	Control of Himalayan balsam.	Cost.	NRA	Riparian owners
13. Need for planned management of aquatic plants in lower River Axe.	<ul style="list-style-type: none"> Agree procedures for control of plants by anglers to prevent excessive rise in water levels and include in the conservation strategy for the proposed SSSI. Work with fisheries interests to develop a plan for management of aquatic plants, balancing needs of both fisheries and conservation. 	Improved information.	Cost.	NRA	Angling associations, EN
14. Lack of public access to water environment.	<ul style="list-style-type: none"> Work with others to provide good access and interpretation of the water environment, while protecting the conservation value of the area and the economic interests of the landowners. 	Improved access. Encourages wider use.	Cost. Environmental protection.	NRA, East Devon Heritage Coast Officer, Blackdown Hills Officer, DCC, CoCo	Users, riparian owners

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
15. Concrete pill boxes falling in river.	<ul style="list-style-type: none"> Assess historical value and archeological interest. Assess flood risk. 	Problem is identified.	Responsibility lies with owner of structure.	NRA, County Archaeologist.	
16. Barriers to fish movement in the catchment.	<ul style="list-style-type: none"> Install fish passes on Lexhayne Weir and, Wilmington Weir according to regional priority. Plan for improvements to less significant structures and improve conditions for fish migration where possible. Restrict construction of new 'Irish Bridges' in sensitive areas. Seek to have existing 'Irish Bridges' that create fish passage problems removed or replaced. 	Improved migratory fish passage.	Cost.	NRA NRA, SCC	Riparian owners, angling associations
17. Decline in runs of salmon.	<ul style="list-style-type: none"> Continue stocking programme and review after five years. Carry out habitat improvements as necessary including gravel rehabilitation and trash dam removal. Continue to further improve water quality where necessary. Encourage temporary bankside fencing where appropriate to reduce bank erosion, cattle in river and siltation of spawning gravels, particularly in the summer. Ensure installation and operation of screens to prevent fish escapement and smolt entrapment at fish-farms. 	Improved salmon runs.	Costs. Current legislation. Ecological value of poached banks and aquatic flora.	NRA	Anglers
18. Decline in brown trout stocks.	<ul style="list-style-type: none"> Continue current restoration programme including stocking with broodstock from the catchment and gravel rehabilitation. 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. Ecological value of aquatic flora.	NRA	Fishery associations

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
18. Decline in brown trout stocks.	<ul style="list-style-type: none"> Continue current restoration programme including stocking with broodstock from the catchment and gravel rehabilitation. 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.</p> <p>Problem areas identified.</p>	Cost. Ecological value of aquatic flora.	NRA	Fishery associations
19. Removal of gravel from the river by riparian owners.	<ul style="list-style-type: none"> Seek to dissuade riparian owners from carrying out gravel removal or to limit the extent of the operation. Continue to press for changes to the legislation to allow increased control. 	Limit amount of gravel removed.	Cost.	NRA	Riparian owners
20. The effect of fish eating birds on salmonid and coarse fish populations.	<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
21. Stocking with farmed fish.	<ul style="list-style-type: none"> Discourage stocking of the catchment with farmed fish. Promote habitat improvements as the preferred means of improving the fishery. Develop line of broodstock fish originating from within the catchment to provide a regular supply of juveniles for stocking where appropriate. 	Improved fishery.	Cost.	NRA	Riparian owners, fishery associations
22. Decline in roach and dace, particularly of larger fish.	<ul style="list-style-type: none"> Investigate status of stocks. Surveys of middle and lower reaches to assess current coarse fish populations. 	<p>Improved stocks of roach and dace.</p> <p>Problem areas identified.</p>	Cost.	NRA	Fishery associations

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
23. 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
24. Need to identify flood risk for planning authorities.	<ul style="list-style-type: none"> Provide information by April 1999. 	Floodplain protection. Improved advice to planning authorities.	Cost.	NRA	Planning authorities
25. 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
26. Need to continue to improve the efficiency and effectiveness of our flood defence work.	<ul style="list-style-type: none"> Asset surveys will be undertaken. Target standards will be compared with the current state, and differences addressed. 	Flood protection and environmental improvement.	Cost.	NRA	

Issue	Options/Actions	Benefits	Constraints	Action By	
				Lead	Other
27. 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 conservation importance, especially where people or buildings are not at risk. ● Ensure use of natural materials and encourage enhancements to reduce landscape impact. ● Seek to have existing areas of inappropriate bank erosion control reinstated and replaced with less damaging option. ● Promote NRA booklet 'Understanding River Bank Erosion' (Ref.41). ● Formulate a NRA regional policy on the erosion of river banks - available in 1996. ● Review future NRA action, where previously controlled erosion, in light of current policy. 	Environmental improvement. Use of more aesthetic erosion control measures. Landscape protection.	Cost.	NRA	Landowners, Blackdown Hills AONB
28. 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

APPENDIX 1

SSSIs

<i>Name</i>	<i>NGR</i>	<i>Description</i>
Axmouth to Lyme Regis Undercliff	SY 256 896 to SY 323 913	Geological, geomorphological and biological site: undercliff habitat.
Beer Quarry and Caves	SY 215 896 & SY 215 893	Important for hibernating bats, notably Bechstein's Bat. Also geological.
Bolshayne Fen	SY 222 938	Unusually large and rich valley fen.
Broom Gravel Pits	ST 326 020	Geological site.
Bulmoor Pastures and Coppice	ST 327 024 ST 297 937	Species-rich ancient woodland. Calcareous grassland and spring-line mires.
Deadman	ST 234 156	Mixed valley mire: wet heath, bog pools, carr and acid marshy grassland.
Freshmoor	ST 280 125	Unimproved wet acid grassland and mire.
Furley Chalk Pit	ST 276 042	Geological site.
Lambert's Castle	SY 368 987	Variety of unimproved grassland types.
Long Lye	ST 265 122	Traditionally managed neutral grassland with broadleaved woodland and wet flushes.
Park Farm Meadows	SY 294 952	Herb-rich neutral grassland.
Quarry Fields Farm	ST 275 013	Traditionally managed species-rich hay meadows with abundant green-winged orchid.
Reed's Farm Pit	ST 213 003	Geological site.
River Axe	SY 259 927 to ST 322 015	Proposed site. Plants, invertebrates and geomorphology.
Shapwick Grange Quarry	SY 313 918	Geological site.
Sidmouth to Beer Coast	SY 190 881	Geological and biological site. Most westerly chalk grassland in Britain.
Snowdon Hill Quarry	ST 312 089	Geological site.
Spring Head, Axmouth	SY 272 907	Herb-rich scrub woodland, calcareous grassland and fen.
Stowell Meadow	ST 333 062	Traditionally managed wet neutral grassland with alder carr and marshy grassland.
West Dorset Coast	SY 333 913	Geological site noted for its fossils. Biological site: undercliff habitat.
Wilmington Quarry	SY 209 997	Geological site.

Possible SACs

<i>Name</i>	<i>NGR</i>	<i>Interest</i>
Axmouth to Lyme Regis Undercliff	SY 256 896 to SY 323 913	Vegetated sea cliffs
Beer Quarry and Caves	SY 215 896	Bechstein's Bat
Sidmouth to Beer Coast	SY 190 881	Vegetated sea cliffs

Local Nature Reserves

<i>Name</i>	<i>NGR</i>	<i>Description</i>
Trinity Hill	SY 306 958	Heathland

National Nature Reserves

<i>Name</i>	<i>NGR</i>	<i>Description</i>
Axmouth to Lyme Regis Undercliff	SY 256 896 to SY 323 813	Geological, geomorphological and biological site. Undercliff habitat.

Non-Statutory Nature Reserves

<i>Name</i>	<i>NGR</i>	<i>Body</i>
<i>Somerset</i>		
Bickham Wood	ST 270 085	Somerset Wildlife Trust
Bishopswood Meadows	ST 252 131	Somerset Wildlife Trust
Dommet Wood	ST 278 139	Somerset Wildlife Trust
Yarty Moor (appears to be part of Deadman SSSI)	ST 235 159	Somerset Wildlife Trust
<i>Devon</i>		
Furzehill Plantation, Uplyme	SY 323 925	Woodland Trust
Hawkswood, Northleigh	SY 201 978	Devon Wildlife Trust
Nethershaddon Spinney Shute	SY 253 975	Woodland Trust
The Pinetum, Uplyme	SY 316 936	
<i>Dorset</i>		
Black Ven and Spittles (part of West Dorset Coast SSSI)	ST 353 931	Devon Wildlife Trust

APPENDIX 2: Standards for the Five River Ecosystem Use Class

Use Class	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mg N/l 90%ile	Un-ionised Ammonia mg N/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 sticks	Visual inspection	Absent

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

EQS_s 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.

APPENDIX 5: Dangerous Substances Directive (76/464/EC) - EQSs for List II Substances

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 10 10 20 20 20	50 125 125 250 250 250	0 to 50 50 to 100 100 to 150 150 to 200 200 to 250 >250	AA,D
Chromium	µg Cr/l	5 10 20 20 50 50	150 175 200 200 250 250	0 to 50 50 to 100 100 to 150 150 to 200 200 to 250 >250	AA,D
Zinc	µg Zn/l	8 50 75 75 75 125	75 175 250 250 250 500	0 to 50 50 to 100 100 to 150 150 to 200 200 to 250 >250	AA,T
Copper	µg Cu/l	1 6 10 10 10 28	1 6 10 10 10 28	0 to 50 50 to 100 100 to 150 150 to 200 200 to 250 >250	AA,D
Nickel	µg Ni/l	50 100 150 150 200 200	50 100 150 150 200 200	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

EQS₃ 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 6:

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

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

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

APPENDIX 7: Potential Urban Flooding Schedule

AXE CATCHMENT

Location	NGR	River	Main River	Notes
<i>More than 100 properties potentially at risk.</i>				
Seaton	SY 252 899	Axe/Sea	Yes	Predominantly Tidal NRA Scheme
<i>50 - 100 properties potentially at risk.</i>				
Axminster	SY 293 984	Axe	Yes	NRA Scheme
Tatworth	ST 332 056	Unnamed Stream	No	District Council Scheme
<i>25 - 50 properties potentially at risk.</i>				
Branscombe/ Vicarage	SY 203 886	Unnamed Stream	No	
Axmouth	SY 255 910	Unnamed Stream	No	
Colyford Colyton	SY 253 926 SY 249 942	Coly Coly, Umborne Brook	{ Yes { Yes	Scheme carried out by SWWSL
Whitford	SY 262 956	Hampton Goyle	No	
Musbury	SY 271 946	Unnamed Stream	No	
Clapton	ST 413 063	Axe	No	
<i>10 - 25 properties potentially at risk.</i>				
Stockland	ST 246 044	Unnamed Stream	No	
Kilminster	SY 274 978	Unnamed Stream	No	
Membury	ST 277 033	Unnamed Stream to Yarty	No	Scheme proposed by EDDC
Chard Junction	ST 341 046	Axe	Yes	
Childhay	ST 410 040	Unnamed Stream	No	
Mosterton	ST 456 053	Axe	No	
<i>Less than 10 properties potentially at risk.</i>				
Dalwood	ST 248 005	Corry Brook	Yes	
Lower North Hill	ST 232 054	Corry Brook	No	
Smallridge	ST 303 010	Unnamed Stream	No	
Higher Wambrook	ST 293 086	Unnamed Stream	No	

LIM CATCHMENT

Location	NGR	River	Main River	Notes
<i>50 to 100 properties.</i>				
Lyme Regis	SY 343 921	Lim	Yes	NRA Scheme
<i>10 to 25 properties.</i>				
Uplyme	SY 331 933	Lim	Yes	

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.

BASEFLOW

The flow in a river derived from groundwater sources.

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 II 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.

CALCAREOUS

Of, or containing, carbonate of limestone or sandstone.

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.

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 (76/160/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 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 Water Directive (76/160/EEC).

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.

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.

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.

PELOSOLS

One of the seven major groups in the soil classification of England and Wales. They can be argillic, calcareous or non-calcareous and are classified by a brown, greyish or reddish mottled subsurface horizon.

PERMEABILITY

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

PLEISTOCENE

The first of the two epochs of the Quaternary era. The epoch is marked by several glacial and interglacial episodes in the northern hemisphere.

POPULATION EQUIVALENT (pe)

The volume and strength of an industrial waste water expressed in terms of an equivalent population, based upon a figure of 0.060 kg BOD/capita/day; the population equivalent of an industrial waste water is therefore calculated using the relationship:

$$\text{population equivalent} = \frac{\text{5-day BOD (mg/l)} \times \text{flow (m}^3\text{/day)}}{0.060 \times 10^3}$$

Q95

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

REVTMENT

Facing built to support a bank.

RIPARIAN OWNER

Owner of river bank and/or land adjacent to a river. Normally owns river bed 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.

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.

SMOLTS

Young salmon migrating to sea for the first time.

SPATE

A sudden increase in water quantity, such as a flood, causing a river to be 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).

TUMULI

Ancient sepulchral mound or barrow.

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

mm	Millimetre	ML/day	Megalitres per day
m	Metre	Ml/year	Megalitres per year
km	Kilometre	kg/day	Kilogrammes per day
km ²	Kilometre squared	%	Percentage
m/km	Metres per kilometre	>	Greater than
ha	Hectare	<	Less than
m ³	Cubic metres	≤	Less 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
MI	Megalitre		

ABBREVIATIONS

AMP2	Asset Management Plan 2	OD	Ordnance Datum
AONB	Area of Outstanding Natural Beauty	OS	Ordnance Survey
AOD	Above Ordnance Datum	PCC	Plymouth City Council
BAP	Biodiversity Action Plan	RE	River Ecosystem, RE1, RE2 etc
BMWP	Biological Monitoring Working Party	RHIER	Royal Holloway Institute of Environmental Research
BOD	Biochemical Oxygen Demand	RIGS	Regionally Important Geological Site
CMP	Catchment Management Plan	RQO	River Quality Objective
CoCo	Countryside Commission	RSPB	Royal Society for the Protection of Birds
DO	Dissolved Oxygen	SAC	Special Areas of Conservation
DCC	Devon County Council	SAM	Scheduled Ancient Monument
DoCC	Dorset County Council	SCC	Somerset County Council
DoE	Department of the Environment	SHDC	South Hams District Council
DoT	Department of Transport	SSSI	Sites of Special Scientific Interest
DWT	Devon Wildlife Trust	STW	Sewage Treatment Works
EC	European Commission	SWWSL	South West Water Services Limited
EDDC	East Devon District Council	TBC	Torbay Borough Council
EH	English Heritage	UK	United Kingdom
EN	English Nature	UV	Ultra Violet
EQS	Environmental Quality Standard	UWWT	Urban Wastewater Treatment
ESA	Environmentally Sensitive Area	WDDC	West Dorset District Council
FC	Forestry Commission	WPDC	Weymouth and Portland District Council
FE	Forestry Enterprise	WRA	Waste Regulation Authority
HNDA	High Natural Dispersion Area		
LA	Local Authority		
MAFF	Ministry of Agriculture, Fisheries and Food		
NGR	National Grid Reference		
NRA	National Rivers Authority		
NWC	National Water Council		
OFWAT	Office of Water Services		

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Telephone the emergency hotline to report all environmental incidents, such as pollution, poaching and flooding, or any signs of damage or danger to our rivers, lakes and coastal waters. Your prompt action will help the NRA to protect water, wildlife, people and property.



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