local environment agency plan

RIVER TORRIDGE & HARTLAND STREAMS

ACTION PLAN

PLAN from SEPTEMBER 1999 to SEPTEMBER 2004

ENVIRONMENT AGENCY

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ENVIRONMENT AGENCY

Note: This is not a

Map 1 - River Torridge and Hartland Streams

Map 4 - 1998 Compliance with River Quality Objectives (River Ecosystem Classification)

Map 3 - River Quality Objectives (River Ecosystem Classification)

Map 2 - Simplified Geology and Special Conservation Areas

Foreword

The Torridge and Hartland Streams Local Environment Agency Plan (LEAP) aims to promote integrated environmental management of this important area of Devon. It seeks to develop partnerships with a wide range of organisations and individuals who have a role to play in the management of the Torridge and Hartland Streams.

This plan embodies the Agency's commitment to deliver improvements to the environment.

We are very grateful for the contributions made during the consultation period and are convinced that they represent the spirit of partnership that will be required to implement the plan.

Geoff. Bateman.

GEOFF BATEMAN
Area Manager (Devon)

Contents

1. Introduction

1.1 The Environment Agency

We have a wide range of duties and powers relating to different aspects of environmental management. These duties are described in more detail in Appendix One. We are required and guided by Government to use these duties and powers in order to help achieve the objective of sustainable development. The Brundtland Commission defined sustainable development *'as development that meets the needs of the present without compromising the ability of future generations to meet their own needs'*[1].

At the heart of sustainable development is the integration of human needs and the environment within which we live. Indeed the creation of the Agency itself was in part a recognition of the need to take a more integrated and longer-term view of environmental management at a national level. We therefore have to reflect this in the way we work and in the decisions we make.

Taking a long-term perspective will require us to anticipate risks and encourage precaution, particularly where impacts on the environment may have long-term effects, or when the effects are not reversible. We must also develop our role to educate and inform society as a whole, as well as carrying out our prevention and enforcement activities, in order to ensure continuing protection and enhancement of the environment.

One of the key outcomes of the United Nations 'Earth Summit' held in Rio de Janeiro in 1992[28] was agreement by governments that, in order to solve global environmental problems, local action is crucial: we must all therefore think globally but act locally.

Our vision is:

- a better environment in England and Wales for present and future generations

Our aims are:

- to achieve major and continuous improvements in the quality of air, land and water
- to encourage the conservation of natural resources, animals and plants
- to make the most of pollution control and river-basin management
- to provide effective defence and warning systems to protect people and property against flooding from rivers and the sea
- to reduce the amount of waste by encouraging people to re-use and recycle their waste
- to improve standards of waste disposal
- to manage water resources to achieve the proper balance between the country's needs and the environment
- to work with other organisations to reclaim contaminated land
- to improve and develop salmon and freshwater fisheries
- to conserve and improve river navigation
- to tell people about environmental issues by educating and informing
- to set priorities and work out solutions that society can afford

We will do this by:

- being open and consulting others about our work

- basing our decisions around sound science and research
- valuing and developing our employees
- being efficient and businesslike in all we do

1.2 Local Environment Agency Plans

We are committed to a programme of Local Environment Agency Plans (LEAPs). They help us to identify and assess, prioritise and solve local environmental issues related to our functions, taking into account the views of our local customers.

LEAPs replace the Catchment Management Plans, which were produced by the former National Rivers Authority and build on their success by covering all the Agency's functions.

This LEAP Action Plan has been produced following consultation of the River Torridge and Hartland Streams LEAP, Consultation Draft (September 1998).

The Annual Review - We will monitor implementation of the Plan and report on progress in a published Annual Review. The Annual Review will also identify any additional actions needed to maintain progress in the light of any changes in the plan area and also whether any actions need removing or amending where they are no longer appropriate. After five years, or sooner if required, we will carry out a major review of the progress we have made.

Review of the consultation process - The issues listed in this Action Plan were either identified in the Consultation Draft or resulted from the consultation process. The Consultation Draft was launched in September 1998 and the consultation period concluded on 14 December 1998. Responses were received from 43 individuals and organisations; these were collated and summarised in our "Summary of Responses to Public Consultation document" (available on request).

In general, consultees were very supportive of the Plan and welcomed the opportunity to comment on environmental issues (see Appendix Six). Many of the organisations who responded identified specific areas where they could work in partnership with the Agency to help resolve some of the issues.

1.3 Action Tables

The following tables outline the actions needed to address the issues identified by the consultation process. The tables show the following information:

- organisations which will implement the proposed actions, either in a lead role or as a key supporter (shown in *italics*), are listed under the heading 'Action by Lead *Other*';
- which of the Agency's nine themes from the Environmental Strategy (see section 4) are covered by the action;
- a timetable for the action;
- an estimate of cost to us over the next five years, where available. The inclusion of a cost does not mean funds have been allocated to the action. All actions will be incorporated into the Agency's annual business plan on a priority basis and bids will be made for appropriate funding. The letters 'n/a' indicate that we do not contribute to the funding of the action, 'unknown' indicates that no cost estimate is available at present and 't.b.c.' indicates to be confirmed;
- the financial years covered by this plan are represented by a single year, for example, '99 is the financial year April 1999 to April 2000.

Please refer to the abbreviations and units section at the end of the report for the definition of acronyms and abbreviations.

The following points should also be noted:

- Our everyday work commits substantial resources to monitoring and managing the environment. Some of this work was explained in the Consultation Draft.
- Some actions will require feasibility studies and cost-benefit appraisal of options prior to work commencing. In some cases, depending on the outcome of these studies, further action may not be justified. The Environment Agency and

participating organisations have limited resources and powers. Some work may take longer than indicated owing to funding availability, government policy or changing priorities.

- New issues will be added during the Annual Reviews.

2. The LEAP Area

2.1 Physical Features

This Local Environment Agency Plan comprises the entire catchment of the River Torridge and all its tributaries and the coastal streams which drain to the Hartland Coast and Lundy Island (Map 1). The Plan area includes the Torridge side of the Taw/Torridge Estuary and any issues relating to the joint estuary are covered in this Plan. A separate Plan is being developed to cover the Taw Catchment which also includes issues relating to the joint estuary.

The Plan area will be subsequently referred to as 'the catchment'. The entire catchment covers an area of 925 km^2.

The majority of the catchment is drained by the River Torridge system. The main River Torridge rises on a gently rolling plateau near the coast at Baxworthy Cross at a level of 200 m AOD (Above Ordnance Datum). The River Torridge is 77 km long and falls steeply down to the Estuary at Bideford.

The River Okement, a major tributary of the Torridge, rises on the granite massif of Dartmoor at a level of 600 m AOD.

The Taw/Torridge Estuary is a significant feature of the catchment; the upper reaches of the Torridge estuary are narrow, meandering and muddy whilst from its confluence with the Taw estuary from the east it forms a sandier combined estuary.

To the west of the catchment lie a group of streams, which drain to the North Devon coast between Welcombe and Abbotsham. These streams include the Clovelly Stream, Abbey River, Speke's Mill Stream and Welcombe Stream.

Lundy Island lies 18 km off the North Devon coast. This granite mass rises some 142 m from the sea. The island has some small streams, many of which are seasonal, and some areas of standing open water.

River Flow - River flows rise rapidly following heavy rainfall and fall sharply once the rain has passed. As there is little input from groundwater flows throughout the catchment, the river flows reduce quickly in response to spells of dry weather.

There are nine surface water gauging stations within the Torridge Catchment. Torrington gauging station which is sited at Great Torrington is located the furthest downstream. The maximum instantaneous flow at the station was recorded on 27 December 1979 as 730 cubic metres per second. The maximum recorded daily mean flow of 338.491 cubic metres per second occurred on the same day. The minimum daily mean flow of 0.120 cubic metres per second was recorded on 24 August 1976. The Q95 (see Glossary) for Torrington for the period 1964 to 1998 is 0.884 cubic metres per second.

The Abbey River and the other coastal streams in the catchment have similar hydrological characteristics; they are steep and fast-flowing and rise and fall sharply after rain or during droughts. The streams have adapted to this relatively flashy response by developing a network of steeply sloping straight channels.

The majority of the catchment is underlain by rocks with generally low permeability. In these rocks groundwater flow is effectively restricted to weathered zones and rock fractures, yielding relatively small amounts of groundwater. Despite the restricted underground flow, groundwater still plays an important role in the catchment hydrology by helping to maintain river flow during dry weather. However, the scale of this baseflow support is limited and river flow through the fracture networks in such rocks can be rapid.

Geology - The geology of the catchment is dominated by deposits from the Carboniferous period which lasted for 65 million years, 345-280 million years ago (see Map 2). The oldest rocks within these deposits are those of the Lower Carboniferous Period, which occur between Meldon and the East Okement River. The deposits of the Upper Carboniferous Period, known as the Culm Measures, include the Bude and Crackington Formations which were formed in thinly bedded layers, alternating between shale and sandstone: the sandstone predominating in the Bude Formation and the shales in the Crackington Formation.

Intruding into this sedimentary sequence are minor deposits of doleritic and basaltic igneous rock which lie just to the north of the Dartmoor granite.

Towards the end of the Carboniferous Period, the Bude and Crackington Formations were subject to intense pressures causing deformation and folding which subsequently led to faulting. This has resulted in a sequence of steeply inclined interbedded sandstones, mudstones and shales that are visible along the coast. There are two coastal geological SSSI:

Mermaids Pool to Rowden Gut and the Westward Ho! Cliffs.

Permian (280-225 million years ago) deposits are present to the south east of the catchment, forming the western extent of the Crediton Trough. These deposits are known as the Bow Conglomerates and consist of fine and coarse-grained red conglomeritic breccias with unsorted sediments ranging from pebbly sandstones to silts.

During the Tertiary Era (65-2 million years ago), further tectonic movement occurred causing additional faulting. The most important of these is the Sticklepath Fault, which runs through the catchment in a NW-SE direction from Bideford Bay to Torbay. Along this fault is situated the Petrockstow Basin. Here sand, clay and lignite accumulated along the riverbed, forming deposits, which are now quarried for ball clay. There are three quarries in the catchment, which are geological Sites of Special Scientific Interest (SSSI), they are Hannaborough Quarry, Meldon Quarry and Meldon Aplite Quarry.

In contrast to the majority of the catchment, Lundy Island is mainly composed of coarse-grained granite of the Tertiary Era, with only the Castle Hill peninsula composed of sedimentary deposits, known locally as Morte Slates.

Hydrogeology - Groundwater is utilised throughout the Torridge Catchment. Groundwater is abstracted from boreholes, wells and springs, mainly by private users, for a variety of agricultural, domestic and commercial uses where access to mains supply is impractical.

The Torridge Catchment is comprised of Minor Aquifers, which seldom produce large quantities of water for abstraction, though they are important for local supplies. Groundwater is also essential in the maintenance of flow of surface watercourses and wetland features, providing a component flow (base flow) to many watercourses throughout the year.

The majority of the Torridge Catchment is underlain by the Carboniferous Crackington and Bude Formations, which consist of interbedded sandstones and shales. In these aquifers, water is stored and transmitted within fissures and fractures, and typical abstractions yield quantities of water sufficient for private domestic use and limited agricultural use. Higher yields are associated with areas of more intense fracturing.

To the south east of the catchment is an outcrop of Permian Breccias forming the western extent of the Crediton Trough. These conglomeritic sandstone deposits predominately store and transmit water through fissure systems which vary locally, and generally have higher yields than similar sources in the Crackington and Bude Formations.

2.2 Wildlife

The River Torridge contains areas of regional, national and international importance for wildlife. A range of semi-natural habitats support a variety of species, many of which now have restricted distributions. Several formal designations apply to parts of the catchment; these relate to nature conservation, landscape and heritage. However many important features in the catchment remain without designation.

The Taw/Torridge Estuary and much of the associated land is of special ecological interest. The major part of the area is designated a Site of Special Scientific Interest (SSSI) and lies within a County Nature Conservation Zone. The area is valued for its wading birds, wildfowl and a range of maritime and estuarine habitats and as a result it is an Important Bird Area (IBA). An IBA is a site identified as qualifying for protection as a Special Protection Area under the Birds Directive[2].

Perhaps the most important habitat is the remaining area of Culm grassland. This marshy grassland habitat occurs on the gley soils of the Culm Measures and is of international importance for the plant and animal communities it supports. In England it is almost entirely restricted to north-west Devon and north Cornwall, with approximately half the Devon resource lying in the catchment. It is estimated that only about 10 per cent remains of the area that existed at the turn of the century.

Dartmoor contains many species that are highly valued, whether by wildlife conservation bodies or by the general public, and a wide range of wildlife habitats. North Dartmoor SSSI is part of the Dartmoor candidate Special Area of Conservation (cSAC), and there are areas of the internationally important habitat Rhôs pasture. Other key habitats include upland oak woodland (West and East Okement Valleys) and parkland (Okehampton Deer Park).

The River Torridge supports major salmon, sea trout and brown trout fisheries. Salmon, which are important both economically and as a species of international importance, were once recorded in good numbers in the catchment but have suffered a serious decline since the 1960s, particularly the spring fish run. The main spawning areas for salmonids are the upper reaches of the River Torridge, the River Lew, the River Waldon and in particular the River Okement.

Some coarse fish are also found in the catchment, the most common species is dace, which is found in the middle and lower reaches of the River Torridge. Many of the streams which drain to the Hartland Coast support brown trout

populations; migratory fish are not able to access any of the streams because of the waterfalls and shingle banks at their mouths. Other species including bullheads, stone loach and minnows are found in many of the watercourses.

The Torridge also has a run of elvers during the spring months. Many thousands of these juvenile eels enter the system from the estuary, and work their way upstream, well into the freshwater river. Adult eels are widespread and common across the catchment.

The Torridge Estuary is a designated bass nursery area, which provides protection for juvenile bass during the period 1 May to 1 October each year. Several other common sea fish species are found in the estuary and are exploited by local fishermen throughout the year.

The River Torridge and Hartland Streams Catchment supports one of the best otter populations in England. This population is of international importance and otters are expanding from this area to occupy less populated catchments to the east.

2.3 Archaeology & Heritage

The area has a high heritage value and a number of formal designations apply indicating national or local importance. Many buildings, structures and other sites are Scheduled Ancient Monuments, while several of the older towns and villages contain Conservation Areas and listed buildings.

There are approximately 145 Scheduled Ancient Monuments in the catchment, 13 of which are on Lundy Island. These include bridges, castles, dykes and fortified settlements.

The area is known to have a number of organic archaeological remains[3]. In the Westward Ho! area finds date from the Mesolithic and Neolithic periods and include structural timbers, hazelnuts and split bones. At Wrangworthy Cross structural timbers were found and at Great Torrington a mass of leaves and a wooden sheath were discovered: both sites date from the Bronze Age. Further finds are listed for Darracott Moor and the River Torridge.

There are many lime kilns along this part of the coast and in the river valley, which stand out as architectural features indicating the importance of this trade in both the maritime and agricultural history of the area. There are also a number of historic wreck sites on the coast and in the Taw/Torridge Estuary, and historic quays on the navigable sections of the River Torridge.

Dartmoor contains a fascinating diversity of important archaeological sites illustrating many facets of human history. It represents one of the best preserved and most complete upland archaeological landscapes in Britain. The earliest visible structures probably date from the Neolithic and may include at least two hilltop enclosures, together with a number of stone rows and burial cairns. The prehistoric archaeology for which the upland moor is best known, however, belongs to the Bronze Age. There are many Scheduled Ancient Monuments on Dartmoor which fall within the catchment in addition to sites included on the Sites and Monuments Register held by Devon County Council.

2.4 Land Use

The catchment is predominantly rural in nature and is sparsely populated with a few small towns, villages, hamlets and isolated farmsteads. The largest populations are at Bideford, Great Torrington, Hatherleigh, Okehampton, Bradworthy, Hartland, Woolfardisworthy and Clovelly. The catchment population (1991 Census) is approximately 54,000.

There is some quarrying for stone and ball clay, and a limited amount of light industry mainly associated with industrial estates around the larger urban areas.

Meldon Reservoir on the West Okement River is the only reservoir used for public water supply in the catchment.

There are thirteen licensed waste disposal sites in the catchment, of which six are in operation, six are closed and one has remained dormant and unused for the last five years. The operational sites are used for domestic, inert and industrial materials.

Approximately 83 per cent of the catchment area is farmed[4]. Most of the agricultural area is grassland, supporting dairy and other livestock; a smaller area is under crops and fallow. Other agricultural uses include farm woodland, rough grazing and set-aside (see Table 1). Some hill farming takes place in the upper parts of the West and East Okement Catchments.

Woodland and forestry occupy 7 per cent of the Torridge Catchment area, ranging from scrub invading neglected pastures, through to managed deciduous woodlands and coniferous monoculture. Coniferous woodland covers 64 per cent of the wooded area of the catchment occupying land of limited agricultural potential, such as steep valley sides and land

where soil drainage is impaired due to low permeability. These areas include river valleys and isolated plantations in the upper reaches of the Torridge. The majority of the upper Torridge is unforested, limiting the capacity of the land to hold water. Indeed, much of the banks of the Torridge and its tributaries remain unforested before the confluence with the River Okement.

Much of the broad-leaved woodland in the Hartland catchment is ancient and has a high conservation value, the Western Oak Woodlands near Clovelly are designated a Site of Special Scientific Interest.

Table 1 - Agricultural Land Use in the Catchment

	Area (ha)	%
Grassland	57,341	74
Crops & Fallow	11,640	15
Farm Woodland	3,223	4
Rough Grazing	3,264	4
Set-aside	953	1
Other Land	1,246	2

Tourism, which is concentrated mainly around the North Devon coast and on Dartmoor, is a major source of income to the catchment. The dramatic coastline and historic villages, such as Clovelly, attract many thousands of visitors a year. The South West Coast Path provides easy access to this area for walkers and brings considerable numbers of people to the area. The development of the Tarka Trail and the reopening of the old railway routes to pedestrian and cycle traffic have added a new opportunity for access to the countryside. The Tarka Trail forms a strong recreational focus bringing people into contact with the river and its environs. Other popular activities include angling both freshwater and sea, bird-watching, boating, swimming and canoeing.

3. Our Targets for Water Quality

3.1 Managing Water Quality

We manage water quality by setting targets called River Quality Objectives (RQOs).

RQOs are intended to protect current water quality and future use, and we use them as a basis for setting consents for new discharges and planning future water quality improvements.

We also manage water quality by applying standards set in EC Directives and other international commitments. Failures to comply with these standards and RQOs are outlined under the appropriate issues.

We have set RQOs using a classification scheme known as the River Ecosystem (RE) Classification which was introduced by the National Rivers Authority, following public consultation, in 1994. It replaces a former scheme introduced by the Water Authorities in the late 1970s and used by the NRA until 1994. The RE Classification comprises five hierarchical classes as summarised below:

Table 2 - The River Ecosystem Classification Scheme

RQO (RE class)	Class description
RE1	Water of very good quality suitable for all fish species
RE2	Water of good quality suitable for all fish species
RE3	Water of fair quality suitable for high-class coarse fish populations
RE4	Water of fair quality suitable for coarse fish populations
RE5	Water of poor quality which is likely to limit coarse fish populations

(For details of the actual standards used see Appendix Two.)

The RQOs we set must be achievable and sustainable; we must be able to identify what needs to be done to meet the RQO and to ensure as far as practicable that water quality can be maintained at this level in the future.

Where we are unable to identify solutions or resources to resolve current water quality problems, we may also set a long term RQO. We will measure compliance against RQOs, but use long term RQOs as a basis for setting consents for new discharges. This will ensure that future developments will not prevent us from achieving our long-term objectives.

The rivers of the catchment have been divided into 53 classified stretches and the RQOs that we have set are shown on Map 3 and in Table 6 (see Appendix Three).

3.2 Compliance with RQOs

Map 4 shows where current water quality fails to meet its RQO. This assessment is based on three years of routine monitoring data collected between 1996 and 1998 and held on the Public Register. We have shown failures to meet RQOs as *significant* and *marginal*. Significant failures are those where we are 95 per cent certain that the river stretch has failed to meet its RQO. Marginal failures are those where we are less certain (between 50 per cent and 95 per cent) that the stretch has failed to meet its RQO.

Of the 55 monitored stretches (303 km) in the catchment, one stretch (5.3 km) significantly fails to meet the RQO. Five stretches (35.3 km) marginally fail to meet their RQO.

We have also assessed whether river stretches meet their long term RQO. Two stretches (8.3 km) significantly fail to meet their long term RQO. Six stretches (35 km) marginally fail to meet their long term RQO.

RQO non-compliances are addressed in Issues 1, 2, 3, 4, 5 and 6.

'Set Aside' of Data - In certain circumstances we can 'set aside' data, that is we will not take into account some or all of the results of a particular determinand when we assess compliance with an RQO.

Metals and pH - We will set aside data where high concentrations of metals or low pH are caused by the natural geology of the catchment. This allows us to protect good water quality reflected by other parameters in the RE Classification.

Biochemical oxygen demand (BOD) - Substantial growths of planktonic algae can occur in slow-flowing, nutrient-rich rivers. Where the algal growth is dense, the algal cells themselves can exert a high BOD during laboratory analysis. These elevated BOD values do not necessarily represent the BOD exerted in rivers, or that resulting directly from effluent discharges. If this impact is not excluded from classification and the compliance assessment, spurious results may be reported and there is a risk that investment, put in place to improve discharges, will not be targeted efficiently.

In those river stretches where the Agency has evidence that 'exceptional conditions' exist because planktonic algae are the predominant cause of unusually high BOD results, the affected BOD data may be set aside when assessing compliance with the RQO.

Map 4 and Table 6 in Appendix Three shows where these determinands have been set aside for the 1998 classification.

4. Issues and Proposed Actions

Environment Strategy - Our principal and immediate environmental concerns are stated in our national strategy 'An Environmental Strategy for the Millennium and Beyond' and relate to nine themes. They are:

Theme 1 Addressing climate change

Theme 2 Improving air quality

Theme 3 Managing our water resources

Theme 4 Enhancing biodiversity

Theme 5 Managing our freshwater fisheries

Theme 6 Delivering integrated river-basin management

Theme 7 Conserving the land

Theme 8 Managing waste

Theme 9 Regulating major industry

We will deliver this strategy at a local level by dialogue between ourselves and the various organisations involved in the protection and management of the environment. In order to achieve our aims and objectives and deliver our strategy in this catchment, issues and actions are presented on the following pages.

Issue 1 Impact of Farming

Historical changes in agricultural land use between 1952 and 1988, in the catchment of the River Torridge and its tributaries, have been investigated[5]. Livestock farming has intensified over this period, resulting in a substantial increase in the area of grassland (25 per cent) and numbers of dairy cattle (160 per cent) since the 1970s. Much of the increase in permanent grassland was achieved by draining the naturally waterlogged soils. Consequently the area of rough grazing decreased by 57 per cent over this period.

These changes have been linked to a number of environmental effects including the dramatic decline in the numbers of salmon returning to the River Torridge system and a sharp rise in farm-related pollution incidents over this period[6].

In the last ten years the agricultural land-use changes have been less dramatic and there has been considerable investment in farm waste storage and handling, largely aided by MAFF grant aid, which ceased in 1994. This investment, together with pollution prevention work, has resulted in a decline in point source farm-related pollution incidents in the Torridge Catchment. Diffuse pollution however still represents a significant problem in the catchment.

Dartmoor has been included in MAFF's Environmentally Sensitive Areas (ESAs) scheme because of the outstanding environmental importance of its upland landscape. Recent changes in farming practices are threatening the area's environmental interest. Those entering the scheme are expected to farm in sympathy with the special environment of the Dartmoor ESA.

RQO non-compliance: The Torridge Headwaters - three stretches of the River Torridge failed to meet their RQOs or long term RQOs in 1998 as a result of elevated BOD: source to Fordmill Farm marginally failed to meet its RQO of RE1; Fordmill Farm to Putford Bridge significantly failed to meet its long term RQO of RE1; and Putford Bridge to Gidcott marginally failed to meet its long term RQO of RE1. In addition the Dipple Water, a tributary of the Torridge Headwaters, significantly failed to meet its RQO of RE1 and the Clifford Water, another tributary, marginally failed to meet its long term RQO of RE1 because of elevated BOD.

Most of the elevated results occurred on the same days in 1997 and 1998. They are generally accompanied by elevated ammonia levels and are linked to rainfall events. The most likely cause of this poor water quality is diffuse agricultural pollution. We have identified some sites where poor landspreading practices result in significant quantities of runoff following wet weather.

RQO non-compliance: The River Lew - All four stretches of the River Lew failed to meet their RQOs and/or long term RQOs in 1998 as a result of elevated BOD: source to Hole Stock Bridge marginally failed to meet its RQO of RE1; the two stretches from Hole Stock Bridge to Hatherleigh Bridge marginally failed to meet their long term RQOs of RE1; and Hatherleigh Bridge to the Torridge confluence significantly failed to meet its long term RQO of RE1. In addition, the Hookmoor Brook and the Northlew Stream, both tributaries of the River Lew, marginally failed to meet their RQOs of RE1 because of elevated BOD.

Water quality in the River Lew and its tributaries is impacted by agricultural pollution. The area is intensively farmed and we are concerned about landspreading activities in this area.

A further tributary of the River Lew, the Pulworthy Brook from Lewmoor Bridge to the Lew confluence, marginally failed its long term RQO of RE3 due to low dissolved oxygen. Historically there have been severe water quality problems in this watercourse. This is partly a natural phenomenon; the area is relatively flat and the watercourse receives little aeration and is also prone to low flows. West Devon Meats used to spread waste from their meat-processing activities onto fields adjoining the Pulworthy Brook, which sometimes resulted in runoff and subsequent pollution of this watercourse. More recently this waste has been conveyed in tankers from the abattoir. An investigation in 1997 found problems with low dissolved oxygen levels in the Pulworthy Brook in the summer months; but there was no evidence that drainage inputs from land surrounding the lower stretch of the brook affected water quality. In 1998 the monitoring site for this stretch was moved downstream to a point just above the Lew confluence, enabling us to monitor more land drainage inputs to the watercourse. This site was considered more representative of the whole stretch.

RQO non-compliance: The River Okement from Woodhall Bridge to the Torridge confluence - marginally failed to meet its RQO of RE1 in 1998 as a result of elevated BOD. The majority of these results was accompanied by elevated ammonia and is linked to rainfall events. Water quality in this stretch is impacted by diffuse agricultural pollution, particularly from farms in the Hole Brook catchment, which is a tributary of this stretch of the Okement.

Potential eutrophication of the River Torridge - There are concerns that the River Torridge is eutrophic; agriculture is a possible cause (see Issue 3).

Sheep-dips - There is growing concern about the increased use of sheep-dip insecticides based on synthetic pyrethroids. Many farmers have switched to these products because of the health concerns associated with organophosphate insecticides. Synthetic pyrethroids are highly toxic to aquatic life (up to 100 times more toxic than organophosphates) and they have caused some serious pollution incidents in other parts of the country.

The Groundwater Regulations introduced in January 1999 require anyone who disposes of certain dangerous substances (including sheep-dip) onto or into land to have an authorisation from the Agency. Where there is a risk of pollution to groundwater the Agency may serve a notice prohibiting this activity or allowing it subject to conditions. These Regulations will allow us to minimise the risk to the environment from the disposal of these insecticides.

In 1998 the Agency undertook a pilot study, located on Exmoor in the upper tributaries of the Exe catchment, to investigate the potential impact from the use of synthetic pyrethroid sheep-dips. Initial assessment of the data has found no evidence of an impact from these substances on invertebrate life in these watercourses. A report is in preparation. Routine biological sites in the Torridge and Hartland Streams Catchment will be surveyed in 2000 as part of the National GQA survey.

In addition, we are currently inspecting known permanent sheep-dip facilities in the Taw catchment to assess their acceptability in terms of location, integrity and design of equipment. We will also assess the operation of mobile sheep-dips, particularly to find out how used dip is controlled and disposed of in a safe manner. We intend to extend these inspections to the Torridge Catchment in the future.

Farm waste - Farm-related pollution incidents form a high proportion of the total number of reported incidents in the catchment, in some years as much as 45 per cent. Although the number of farm-related incidents has fallen in the last two years, there is still a need for improved farm waste management and particularly in relation to the problem of diffuse pollution, for example from waste spread to land.

There are many ways in which the Agency and other organisations work with farmers to help them reduce the impact of their industry on the environment. We are currently reviewing our own activities with the aim of developing more effective methods.

We are proposing to run a trial programme called PRIM - Pollution Reduction by Inspection and Management on the River Lew subcatchment (where there are 122 farms). The programme will involve conducting farm inspections and holding discussions with the farmers on pollution prevention, followed up by the production of a maintenance regime based on a year planner, specific to each farm and its particular problems. We are also supporting developing sustainable land management practices in partnership with the Westcountry Rivers Trust project. (See: Decline of the salmonid fishery.)

Farms in the upper Torridge and Waldon catchments were approached in autumn 1997 by ADAS to produce Farm Waste Management Plans. There was a good response to this initiative, however we need more information before we can assess whether improvements have occurred.

Decline of the salmonid fishery - The salmonid fishery of the River Torridge effectively collapsed in the 1970s. A number of fishing restrictions and a farm pollution campaign were implemented. Despite these initiatives, rod and net catches of salmon and sea trout continued to decline and the distribution and numbers of juvenile fish throughout the river remained poor.

The NRA in conjunction with MAFF instigated a five-year research programme on the river in 1990. The study concluded, amongst other things, that:

- There is an impact on embryo survival in intensively farmed subcatchments, relating to spawning gravel quality.
- Riverbed gravels in the intensively farmed areas contained fine sediment concentrations likely to be damaging to salmonid embryo survival and dissolved oxygen levels present in these gravels were low enough to be lethal to embryos.

The report recommended that:

- Remedial measures that will help to minimise the runoff of fine sediment from the land are likely to improve spawning conditions.
- Control of animal access points and the maintenance of bank stability, through fencing and the establishment of adequate bankside vegetation, have the potential to reduce greatly the amount of sediment delivery from the immediate riparian area.

We are working with others to deliver these recommendations and we are continuing this research by sponsoring a PhD

studentship at the University of Exeter. Artificial salmon redds have been installed on the River Waldon to investigate the process of sediment intrusion into these redds, and to relate this to suspended solids concentrations in river water. Sources of sediment are also being determined. The findings of this project will help prioritise where remedial work may be carried out to reduce sediment pollution.

MAFF have recently issued 'Controlling Soil Erosion: Advice for preventing erosion by water in lowland England' which informs farmers and landowners of the effects of soil erosion and suggests measures by which it can be prevented.

In 1997 the Agency proposed a pilot project on the River Waldon - chosen for its known chronic suspended sediment problems and identified low juvenile salmonid production - to attempt to influence sediment input to the river by bankside fencing and riparian habitat restoration and improvement. A proposal was developed in conjunction with the Westcountry Rivers Trust to seek EU funding for the project. This proposal now forms part of an initiative, covering the whole of the South West Peninsula, which aims to expand the work carried out by the Westcountry Rivers Trust on the River Tamar. This initiative sets about developing sustainable land management practices, conserving and restoring key river and wetland habitats.

The Torridge fishery has also suffered from fish kills resulting from farm pollutions. There have been several significant incidents in recent years that have resulted in substantial fish mortalities.

Regeneration of bankside trees - In a number of areas of the Torridge Catchment there has been a problem with the regeneration of bankside trees. The main reason for this lack of regeneration is erosion to the riverbank caused by cattle grazing close to the water's edge. Trees are important in stabilising riverbanks as their roots help to bind the bank materials together; the underwater roots also provide spawning areas for some coarse fish, as well as cover for all fish. Overhanging branches similarly provide cover and act as reservoirs of terrestrial invertebrate food items for many fish. Bankside trees also afford habitats for other important biota, e.g., otters, bank voles, emergent aquatic invertebrates etc. Where damage has occurred the riverside margins should be fenced off and formal drinking areas created. This will allow the natural vegetation and tree cover to regenerate.

Loss and decline of key habitats and species - Many habitats and species have declined or been lost as a result of intensive agricultural practices in the catchment. These are mainly covered in Issue 17. In an attempt to reverse some of these losses we are supporting The Torridge Headwaters Environmental Enhancement Pilot Project. This partnership undertaking between Devon Wildlife Trust, the North Tamar Leader Project, English Nature, Torridge District Council and the Environment Agency has run since July 1996. Working with the community who live and work in the upper reaches of the Torridge, the Project sets out to integrate a rich and healthy environment with the needs of a working landscape. Providing a free advisory and information service to farmers, community groups and local schools, the Project also facilitates access to grants to support the costs of farming with wildlife and the environment in mind.

The Project was set up with the aim of safeguarding and expanding key habitats (particularly Culm grassland), looking after and creating more landscape features such as hedges and copses, protecting the environmental quality of the river and its tributaries and taking care of other important features such as archaeological remains. The Project is intended as a pilot exercise, being carried out in order to learn lessons and develop models which could be applied elsewhere in the future, in order to generate wider environmental benefits for Devon.

The Project concentrates on a 35 square kilometre area within the Upper Torridge Catchment, from the sources of the river downstream to Haytown Bridge and encompasses the valley through which the river flows.

The Project targets the following key habitats and species: Rhôs pasture (Culm grassland); rivers, streams, floodplain and fluvial processes; alder/willow wet woodland; species-rich hedges; brown hare; dormouse; nightjar; Atlantic salmon; otter; curlew; marsh fritillary.

Local impacts on water quality - Water quality in the Abbey River and Welcombe Stream is impacted by agricultural activities, and there have been a number of farm-related pollution incidents in this area in recent years. The Welcome Stream has an RQO of RE1 and the Abbey River an RQO of RE2; there is currently insufficient data to assess whether these stretches complied with their targets in 1998.

River flows - There are concerns that the River Torridge Catchment has become more 'flashy' (i.e. responding more quickly to rainfall, leading to increased frequency of low flows and higher peak flows) as a consequence of land drainage schemes in the catchment. Flows in the catchment have been investigated[7]; however the analysis showed no evidence of an increase in flashiness in the River Torridge at Torrington. Other research[8] in the UK has shown that land drainage elsewhere may increase extremes of flow. The Moorland Improvement and Restoration of Exmoor (MIRE) project is currently being undertaken on Exmoor which will study the effects of blocking up drainage ditches on stream flow. This project aims to address issues raised within the Exe LEAP. If any benefits are proven from this study we will investigate the possibility of replicating the practices elsewhere.

Action Table 1 - Impact of Farming

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Develop initatives to further reduce farm-related pollution incidents in the catchment: PRIM - Pollution Reduction by Inspection and Management - trial on the River Lew.	Agency, Farmers, NFU	10k	●
b Review success of Farm Waste Management Plan initiative in the catchment.	Agency, ADAS	2k	●
c Promote awareness of the danger to the water environment from synthetic pyrethroids.	Agency, MAFF, NFU, Farmers	unknown	●
d Conduct research to determine sediment dynamics and sediment sources in artificial salmon redds.	University of Exeter, *Agency, NERC*	4k	●
e Promote MAFF advice for controlling soil erosion, where relevant.	Agency, MAFF, NFU, farmers	<1k	●
f Support West Country Rivers Trust's bid for funds for Devon projects to help farmers to reduce impact of farming on the water environment.	West Country Rivers Trust, Agency, Others	unknown	● ● ●
g Encourage and support fencing of poached areas to stabilize banks and promote tree regeneration.	Agency, Farmers, NDCCS	unknown	● ● ● ● ●
h Continue to support Torridge Headwaters Project.	Agency, DWT, EN, NDCCS	unknown	● ●
i Carry out pollution prevention visits on farms in areas of the Torridge Catchment where problems have been identified.	Agency	unknown	●
j Develop new initiatives to help farmers reduce the impact of their activities on the environment.	Agency	unknown	●

Issue 2: Impact of Effluent Discharges

We regulate the disposal of effluent direct to surface or groundwater by determining discharge consents. Discharge consents can only be used to control point source discharges, for example:

Continuous discharges - sewage works, industrial, etc.

Intermittent discharges - sewer overflows, some surface water runoff, etc.

Discharges to ground - soakaways, etc.

Rivers and coastal waters can naturally render the main constituents of many effluents harmless and with proper controls over effluent disposal the environment will not be harmed.

Sewage treatment improvement plans - The water companies' improvement plan for the period 1995-2000 is known as Asset Management Plan 2 (AMP2). AMP2 was developed in 1994 along guidelines agreed between the National Rivers Authority (now the Environment Agency), the Department of the Environment (now the Department of the Environment, Transport and the Regions), the water services companies and the Office of Water Services (OFWAT).

OFWAT is undertaking a review of water prices which will result in a review of improvements required for the period 2000-2005; the outcome of this will be AMP3. The Environment Agency has been reviewing, for agreement with the DETR, those sewage discharges where improvement is required. The DETR have now considered our proposals and have translated these into detailed environmental obligations, where we expect the improvements to take place by 2005. Many of these schemes will be delivered before 2005; the water companies are currently preparing their Strategic Business Plans which will confirm the delivery dates of these schemes.

We expect improvements to Okehampton STW to be carried out in AMP3. See RQO non-compliance: River Okement from Brightley Bridge to South Dornaford text. Any improvements will be subject to available funding being approved by OFWAT.

Failures of EC Bathing Water Directive - The bathing water at Instow failed to comply with the microbiological requirements of the Directive in all years in the period 1990 - 1998, except for 1995 and 1996. This non-compliance is due to unsatisfactory discharges of sewage to the Taw/Torridge Estuary. In 1998 there were also bathing water failures at Hartland Quay, considered to result from an inadequate soakaway from a hotel septic tank. Failure of the Bathing Water Directive in 1998 at Westward Ho! and Saunton Sands was due to the impact of the Rock Nose outfall and other discharges to the Taw/Torridge Estuaries, which are being addressed by the Taw Torridge scheme.

SWW Ltd are working on a 'Clean Sweep' scheme for the Taw/Torridge Estuary; once this scheme is completed Ashford STW will be the only continuous discharge of sewage by SWW Ltd to either the Taw or the Torridge Estuaries. This discharge receives ultraviolet disinfection all year round, as does the other continuous discharge of sewage from the Royal Marine Base at Chivenor. It was planned that the sewage discharges from Bideford Fine Screening Installation, Yelland and Westleigh would be removed from the estuary in 2000 and treated at the proposed new STW at Cornborough. The 'Clean Sweep' scheme will significantly reduce the microbiological loading to the estuaries, and should ensure that sewage discharges will not compromise compliance with the EC Bathing Water Directive at Instow. However, the scheme has been delayed as a result of a challenge to the Compulsory Purchase Order needed to complete the scheme.

The proposed new STW at Cornborough will take sewage from Northam Fine Screening Installation in addition to that from Bideford and Yelland. Northam currently discharges sewage continuously at Rock Nose; removal of this discharge will result in water quality improvements at Westward Ho!

RQO non-compliance: The River Okement from Brightley Bridge to South Dornaford - marginally failed to meet its long term RQO of RE1 in 1998 as a result of elevated ammonia. This stretch receives the discharges from Okehampton STW; improvements are required at the works in order to meet the long term RQO. In addition, frequent discharges from the STW storm overflow impact on water quality in the River Okement. The unsatisfactory state of this discharge means we recommend that development in Okehampton involving connection to the public foul sewer is restricted.

The improvements to Okehampton STW that we expect to be carried out in AMP3, have two components to them:

a) The Urban Waste Water Treatment Directive component will reduce the frequency of storm spills from the works.

b) The RE compliance component will consent the works for ammonia and secure improvements to treatment that will ensure compliance with the long term RQO of RE1.

Potential eutrophication of the River Torridge - There are concerns that the River Torridge is eutrophic; sewage discharges are a possible cause (see Issue 3).

Restriction of development - There are a number of locations where consented discharges are having an environmental impact. We recommend that development involving connections to the public foul sewer is restricted at Kingscott, Little Torrington, Merton, Milton Damerel, Monkleigh, Petrockstow, Riddlecombe, Roborough, Instow, Appledore, Bideford, Bideford-East-the-Water, Northam, Buckleigh Field and Westward Ho!

We have been negotiating with SWW Ltd regarding improvements to these discharges.

First time sewerage - The Environment Act 1995 introduced new duties on water service companies to provide public sewers for certain domestic properties where environmental or amenity problems exist or are likely to arise. Any Parish or District Council or group of residents may apply to SWW Ltd for such a scheme. The Agency can provide information to relevant bodies, and will act as an arbitrator if there is disagreement over the need for a scheme or implementation of the new duty.

A septic tank serving 17 properties at Peters Marland discharges into a tributary of the River Mere; this has an aesthetic effect on water quality and is likely to affect chemical and biological quality as well.

Residents at Peters Marland have made an application for first time sewerage to SWW Ltd (under the provisions of section 101A of the Environment Act). SWW Ltd have accepted that the provisions of the Act do apply at this site and they are currently in the process of designing a new sewage treatment system to serve the affected properties.

Action Table 2 - Impact of Effluent Discharges

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Complete 'Clean Sweep' scheme for Taw/Torridge Estuary (South scheme).	SWW Ltd	n/a	● ●
b Seek improvements to Okehampton STW in AMP3.	Agency, SWW Ltd	< 1k p.a.	● ●
c Recommend against further development leading to increased sewage flow at Kingscott, Little Torrington, Merton, Milton Damerel, Monkleigh, Petrockstow, Riddlecombe, Roborough, Instow, Appledore, Bideford, Bideford-East-the-Water, Northam, Buckleigh Field and Westward Ho! until necessary improvements carried out.	Agency	< 1k p.a.	● ● ● ● ●
d Support improvements to sewerage system at Peters Marland.	Owners, occupiers, Parish/District Council, SWW Ltd, Agency	n/a	● ●

Issue 3 Potential Eutrophication of the River Torridge

Elevated levels of nutrients, principally nitrates and phosphates, in a watercourse can result in the increased production of algae and higher plants. This is called eutrophication. If algal production becomes excessive then this can affect the chemical, biological and aesthetic quality of the estuary. The major sources of nutrients in a watercourse are agricultural activities and sewage effluent.

There is some concern that the algal blooms may be related to increasing levels of nutrients in the river. We have collected biological and chemical data from the River Torridge for analysis to confirm the nutrient status of the river. Should data analysis show the river is eutrophic, further action will be considered.

In 1995, the stretch of the River Torridge from Newbridge to the Normal Tidal Limit that is designated as salmonid under the EC Freshwater Fisheries Directive did not meet the Directive standards for pH. Non-compliance was due to the prevailing drought conditions and algal activity; this was confirmed by investigations. Since 1995, there have been no further instances of non-compliance due to algal activity and we will continue to monitor the situation.

The River Torridge from Newbridge to the Normal Tidal Limit was identified to the DETR as a potential Sensitive Area (Eutrophic) under the UWWTD. Sensitive Areas (Eutrophic) are surface waters that receive discharges from STWs serving population equivalents greater than 10,000 and which are, or may become, eutrophic. The qualifying STW on the River Torridge was Great Torrington STW which received effluent from a large Dairy Crest creamery. This creamery has now closed and Great Torrington STW is no longer a qualifying discharge as the population equivalent is significantly below 10,000.

However, there is still concern that the algal blooms may be related to increasing levels of nutrients in the river. We have collected biological and chemical data from the River Torridge for analysis to confirm the nutrient status of the river. If data analysis shows that the river is eutrophic, further action will be considered.

Action Table 3 - Potential Eutrophication of the River Torridge

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Complete investigation of nutrient status of the River Torridge and consider action if appropriate.	Agency	unknown	● ●

Issue 4 Impact of Waste Generation and Disposal

Associated Plans: Devon County Waste Strategy, Devon County Waste Local Plan[9]

In the UK we generate 430 million tonnes of waste per annum. This is enough to fill a hole the size of Lake Windermere every nine months. The total annual quantity of controlled waste produced in Devon in 1993/94 was over 2 million tonnes. Industrial waste made up 52 per cent of this figure, commercial waste accounted for 27.5 per cent, domestic waste 20.2 per cent and special waste 0.3 per cent. The Environment Agency is currently intending to conduct a National Waste survey, which will allow more accurate figures to be calculated[10].

The National Waste Strategy[11] outlines the government's policy framework for the management of waste. It identifies ways in which waste can be managed in a more sustainable way, and provides targets for achieving that aim. The strategy sets out the following hierarchy of options for the management of waste: reduction; re-use; recovery - recycling, composting, energy; disposal.

In the past the disposal of waste to landfill has been an attractive option, because it is initially inexpensive and suitable for many types of waste. However landfill sites have the potential to cause pollution, particularly older sites which have had fewer pollution control measures built into their original design.

Uncontrolled and illegal tipping of waste, known as fly-tipping, can pose hazards to wildlife, may attract vermin and can cause pollution as well as ruining the appearance of an area. Following the introduction of the landfill tax on 1st October 1996 much media attention has been focused on fly-tipping and the identification of problem sites. There are two levels of tax, £2 per tonne for inactive (inert) wastes and £10 per tonne for all other wastes.

RQO non-compliance: The Hookmoor Brook from source to Lew confluence - marginally failed to meet its RQO of RE1 in 1998 as a result of elevated BOD. The main cause of poor water quality is likely to be farming (see Issue 1). However there are also problems with leachate from Peacewater tip. This is a closed landfill site, managed by Devon County Council. The Hookmoor Brook has been culverted under the landfill and downstream of the site the streambed is stained orange-brown (ochreous) indicating possible contamination by metals in the leachate from the site. Devon County Council carried out remediation work in 1994 and 1995 to raise the pH of the leachate and to precipitate out the metals. However ochreous staining of the stream remains a problem; leachate is ponding at the lowest corner of the site and is believed to be entering the stream. Further work was carried out by Devon County Council in 1998/1999 to install an in-stream passive treatment system; this involved the placement of limestone blocks to further raise the pH of the leachate and the planting of reed beds to reduce levels of other substances such as ammonia. An initial assessment shows this has reduced the visual impact from the site. We will be monitoring water quality to see if further improvements occur.

Impact on water quality of Deep Moor landfill - Water quality in the upper reaches of the Peagham Stream has historically been impacted by leachate and surface runoff from Deep Moor landfill. This site has been receiving household, industrial and commercial waste since 1970. Prior to 1989, the site was operated by the County Council according to 'dilute and disperse' landfill principles. This process allows leachate from the site to migrate into the underlying strata where it is diluted by groundwater flow and its pollution potential is dissipated by degradation and adsorption onto the underlying geology. These filled areas were unlined and do not have the benefit of an engineered cap to prevent infiltration of rainwater. Although perimeter leachate drainage was subsequently installed and a clay cover was placed over the waste it is likely that some rainwater drains through these areas of the landfill before entering the Peagham Stream. At this location, adjacent to the headwaters of the stream, the flow available to dilute impacts is limited. As a consequence, historically there have been significant water quality problems downstream of the site due to high levels of ammonia and suspended solids in the watercourse.

In order to comply with increasing environmental standards and waste management legislation, Devon Waste Management, the current operators of Deep Moor landfill, have installed a leachate collection system on the site. The leachate is pre-treated to reduce levels of BOD and ammonia and since 1994 has been discharged to Great Torrington STW via a purpose-laid pipeline. At the sewage treatment works further treatment takes place to ensure compliance with the discharge consent standards for Great Torrington STW. In addition, a settlement lagoon has been installed to control the impact of surface water drainage from the site.

Assessment of water quality data in the Peagham Stream immediately downstream of Deep Moor landfill suggests that whilst water quality has improved as a result of these remedial works, local water quality problems are still occurring. Data collected by Devon Waste Management between 1995 and 1997 at a site in the Peagham Stream above the B3227 Road Bridge shows that water quality significantly failed to meet the RQO of RE2 as a result of elevated levels of ammonia. However, water quality at our routine monitoring site on the lower end of the Peagham Stream at Town Mills complied with the RQO of RE2 in 1997 and 1998.

As a result of Agency concerns regarding water quality in the Peagham Stream downstream of Deep Moor, Devon Waste Management were requested to draw up a schedule of improvements and investigations at the site aimed at ensuring that the impact of Deep Moor does not cause the Peagham Stream to fail the RQO of RE2. The first phase of this programme was completed in 1998; subsequent phases will incorporate retrospective capping and remediation of unlined parts of the site.

The Agency and Devon Waste Management consider that the works completed in 1998 should adequately address a number of identified sources of pollution, although it is possible that some of the scheduled investigations work will lead to a requirement for further capital works which may need further investment or programming. The current agreed programme includes investigation of leachate breakout and groundwater contamination, installation of further leachate monitoring and improvements to the handling and treatment of the surface drainage system. It is expected that significant improvements in water quality will occur as a result of these remediation works and investigations. We have set a date of 2001 to achieve compliance with the RQO of RE2 in the upper stretch of the Peagham Stream; compliance is normally assessed on three years of data that would include 1999, 2000 and 2001. This compliance date allows the 1998 improvement programme to take effect.

Waste reduction - We are keen to promote the reduction of waste at source; an initiative taking place in North Devon aims to minimize waste generated by local companies. Two companies, Coutant-Lambda Ltd and S & T (Barnstaple) Ltd, took part and completed a six-month scheme driven by the PAYBACK business environment association in partnership with Business Link, local authorities and ourselves. Several areas were identified where these companies could reduce the amount of waste they generate.

New legislation aims to make those that produce waste more responsible for how it is managed. The Producer Responsibility Obligations (Packaging Waste) Regulations 1997 came into force on 6 March 1997. They require certain companies who handle packaging to ensure that a percentage of that packaging is recovered and recycled. There are four companies in the

catchment, affected by these regulations, who are registered with the Agency or a compliance scheme. In the future, producer responsibility is likely to be applied to other waste streams, and a larger number of companies will be affected. In addition, the Northern Devon Coast and Countryside Service, which is supported by the Agency, has obtained LEADER money (see Glossary) to assist in the development of waste minimisation schemes with companies in the area.

Fly-tipping - A piece of land near the Old Mines Road, Bideford is permanently used for fly-tipped waste, as is some undeveloped land off Kingsley Park, Westward Ho! As yet it is not clear who owns these sites and who is responsible for the fly-tipping. We will investigate the land ownership and try to identify the origin of the waste. Once responsibility has been identified clean-up can be undertaken.

Fly-tipping occurs repeatedly in the lay-by on Gammaton Road just prior to entering East-the-Water, Bideford. Torridge District Council has removed illegally dumped waste on several occasions; investigations to identify those responsible for dumping have been unsuccessful. Any information relating to fly-tipping at this site would be gratefully received.

Survey of closed landfills - The Environment Agency has collected details of closed landfill sites and rubbish tips using information obtained from Parish and District Councils; so far there are 637 identified sites in Devon.

The sites have been prioritised according to proximity to buildings and watercourses. There were a small number of sites in the priority list for Devon that fall within the Torridge Catchment. These sites have been visited and assessed. It is our conclusion that none of these sites pose a significant risk to the environment or human health. Further work may be required in the future.

Winkleigh closed landfill site - This is a County Council managed site, which took household, commercial and industrial waste until 1991. The site operated under a type of authorisation called a resolution that is no longer effective. The leachate management and control practice undertaken at the site since its closure has been re-circulation by spray irrigation onto the waste mass. We are currently working with Devon County Council to prioritise sites in Devon where remediation work is needed. A sustainable leachate management system is required to reduce the site's impact on the adjacent tributary of the River Okement.

Threat of erosion to landfill site - The restored landfill site at Northam Burrows is on the seaward end of the Northam Burrows Nature Reserve. It is not engineered to the standards required for today's completed landfills, such as having a properly engineered clay cap: the waste is simply covered by plant-colonised sand. The only protection offered to the landfill site from wave erosion is a shingle/pebble ridge between it and the sea. There is a low point in this ridge that has been breached in the past. There are concerns that if this were to happen again landfill waste could be scoured out. This has serious implications for Northam Burrows and the Taw/Torridge Estuary SSSI. If landfill waste were to enter the estuary this could damage the site, which is of national importance for its wading-bird populations. In addition, rare plants grow along its shores and such pollution would present a threat to these fragile ecosystems.

This issue is being examined as part of the Bideford Bay - Bridgwater Bay Shoreline Management Plan (see Issue 18) and we are currently negotiating with the County Council over improvements to this site.

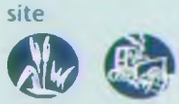
Breach of waste management licence - Pillhead Copse landfill, Bideford, is licensed to take inert materials only. Historically there have been problems with the disposal of wood and other non-inert materials at this site. The occurrence of the problem seems to have reduced since a recent increase in the frequency of site inspections. There is a potential for putrescible materials in the landfill to cause pollution of a stream that is adjacent to the site, although our monitoring data shows no evidence of this as yet.

A length of this same stream has been culverted and will be covered by the landfill as the tipping progresses. At certain times the culvert is unable to take all the stream flow and flooding occurs. Enforcement action has been carried out and will continue until the culvert has been modified to cater for the necessary flows.

Options for disposal of waste within the catchment - As in all areas of the County, the quantities of waste presented for disposal in the catchment show little evidence of any significant reduction, in spite of the increased rates of recycling which are being achieved. Deep Moor landfill is the only large co-disposal site accepting domestic and commercial waste in the Torridge Catchment and provides a vital service to the residential and business communities of North Devon.

Deep Moor has a limited life span and alternative capacity needs to be identified for the waste, which remains after the processes of waste minimisation, re-use and recovery. Deep Moor or an alternative facility will be required to fulfil this need. Devon County Council and the District Councils are responsible for waste management and land-use planning.

Action Table 4 - Impact of Waste Generation and Disposal

	Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a	Monitor water quality in the Hookmoor Brook following remediation work at Peacewater tip. 	Agency	< 1k	● ●
b	Carry out first phase of programme of investigations and improvements at Deep Moor landfill. 	DWM, Agency	unknown	●
c	Subsequent phases of programme of investigations and improvements to be implemented. 	DWM, Agency	unknown	● ● ●
d	Support PAYBACK initiative to reduce waste at source. 	PAYBACK, Business Link, LAs, Agency, NDCCS	t.b.c.	●
e	Provide advice to those companies affected by the Producer Responsibility Obligations. 	Agency	t.b.c.	● ●
f	Investigate any new information relating to fly-tipped sites near end of Old Mines Road, Bideford and Kingsley Park, Westward Ho! and seek to prosecute offenders if possible. Investigate options for cleaning up the site and preventing future fly-tipping. 	Agency	t.b.c.	● ●
g	Consider need for further investigation of closed landfill sites 	Agency, LAs	< 1k	● ● ● ● ●
h	Assess need for remediation work at Winkleigh closed landfill site 	DCC, *Agency*	n/a	● ●
i	Encourage the public to give information about suspected illegal waste tipping. 	Agency	unknown	● ● ● ● ●
j	Assess risk to and consequence of potential wave erosion at Northam Burrows landfill. 	Agency, DCC, TDC	t.b.c.	● ●

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
k Ensure improvements to waste management and disposal, and culverted section of stream, occur at Pillhead Copse landfill	Agency	< 1k	● ●
l Investigate the role of Deep Moor landfill in terms of its contribution to waste management in Devon.	Agency	< 1k	●

Issue 5 Impact of Mineral Extraction

Associated Plans: Devon Minerals Local Plan[12]; Dartmoor National Park Local Plan (Revised)[13]

Meldon Quarry is situated in the headwaters of the West Okement River. Historically there have been severe water quality problems in the catchment as a result of a combination of low pH and high levels of metals. Discharges from the quarry have significantly contributed to the problem.

Fish mortalities - Historically there have been incidents of high fish mortality related to both low pH and high metal levels, and to high pH as a result of problems with the addition of neutralising compounds at the quarry. Fish kills have mainly occurred at the end of long, dry summers when water levels are low and water temperatures are high.

Non-compliance with EC Dangerous Substances Directive - We monitor a site downstream of the discharge from Meldon Quarry under this Directive. Environmental Quality Standards (EQSs) for copper and zinc were exceeded at this site in all years in the period 1995-1997. In addition, the EQSs for nickel and pH were exceeded in 1995.

Data analysis has shown the EQSs for copper and zinc were exceeded upstream of the Meldon Quarry discharge in the period 1995-1997 due to the natural geology of the catchment. However the quarry discharge is known to increase significantly the amount of metals in the watercourse, thereby contributing to EQS failures at the Dangerous Substances monitoring site.

In 1990, a major fish kill led to the then quarry owners, British Rail, installing a crude treatment system and applying for consents to cover the existing discharges to the West Okement River. These consents were issued in 1991; subsequently British Rail appealed to the DoE (now the DETR) against the consents, and in particular regarding conditions for metals. This Appeal has now been withdrawn.

Since 1990 work has been undertaken to improve discharges from the quarry; the number of discharges has been reduced to one and the discharge is now partially treated to reduce its acidity and remove metals. Further treatment has been proposed by the present quarry owners, Bardon Aggregates, and discussions have taken place between the operators and the Agency regarding the conditions and a new consent for Meldon Quarry has recently been issued.

We have attempted to solve the problem of fish kills through:

i) Improvements to Meldon Quarry discharge

ii) An agreement with Meldon Quarry to use their treatment system to increase pH in the river if requested by us

iii) Doubling the compensation release from Meldon Reservoir

iv) Transfer of juvenile fish from the West Okement to the East Okement River and elsewhere, as required.

There have been no reported problems since 1995.

Two companies, Watts Blake Bearne Company and English China Clays, extract ball clay from a number of sites in the Merton area.

Other impacts on water quality - Effluent from ball clay quarries in the catchment is discharged at five points to the Rivers

Mere and Little Mere. This effluent can have a high suspended solids content that has an aesthetic impact on water quality, causing a milky discoloration in the receiving watercourses. The Agency has been working with both operators to review consents to reduce this impact.

Gravel extraction at Instow Beach - There were concerns that illegal gravel extraction taking place at Instow Beach could affect coastal defences in the estuary and increase the risk of flooding. Devon County Council has now stopped this activity; the Agency needs to work with local authorities to ensure that such operations do not compromise natural or man-made flood defences.

Action Table 5 - Impact of Mineral Extraction

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Pursue the review of the consent to discharge for Meldon Quarry. 	Agency, DETR, Bardon Aggregates	0.5k	●
b Continue to transfer fish from West Okement to the East Okement and elsewhere, as required. 	Agency	2k p.a.	● ● ● ● ●
c Review revised ball clay discharge consents and environmental impact. 	Agency	2k	● ●
d Ensure no new gravel extraction sites are developed in the estuary. 	Agency	< 1k p.a.	● ● ● ●

Issue 6 Unknown Causes of Non-compliance with River Quality Objectives

There were four stretches of watercourse in the catchment that marginally failed their river quality objectives in 1997 (based on data from 1995-1997), for which the cause was unknown.

Investigations have revealed that diffuse agricultural pollution has been identified as the most probable cause for the River Okement from Woodhall Bridge to the Torridge Confluence and the River Torridge from Putford Bridge to Gidcott (see Issue 1).

The West Okement River from Meldon Reservoir to below Meldon Dam - low pH is found to arise from the natural geology of the area and a 'set aside' provision was used in 1998.

The River Duntz from the source to the Yeo (Bideford) - this stretch now complies with its RQO, however concerns about poor water quality remain. We will be carrying out further work in this area.

Action Table 6 - Unknown Causes of Non-compliance with RQOs

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Continue work to identify the causes of poor water quality in the River Duntz. 	Agency	< 1k	●

Issue 7 Addressing Climate Change

The climate has always been changing, but the rate of change appears to be increasing in recent years. There is a broad consensus of scientific opinion that such changes are occurring because of the impact of human activities on the global atmosphere. Emissions of a range of gases, notably carbon dioxide and methane, are adding to the natural 'greenhouse' effect, which may cause global warming.

It is thought that climate change may result in the melting of the polar ice caps and glaciers and sea levels world-wide may rise by more than 500 mm in the next 100 years. We take account of sea-level rise estimates when planning coastal flood defence schemes. The current allowances for the South West Region of the Agency are a rise of 5 mm/year until the year 2030 and 7.5 mm thereafter.

If the predicted sea-level rise occurs, one of the concerns is that coastal habitats may be lost as they are 'squeezed' between the sea and the land defences that protect people and property from flooding.

There are two proposed coastal flood defence schemes in the catchment: Bideford Quay and Bideford East-the-Water (see Issue 12). The Bideford Quay scheme has been designed to take account of sea-level predictions over the 50-year life of the scheme and will provide opportunities for quayside recreation as appropriate in accordance with our duties under the Environment Act 1995. The East-the-Water scheme will need to be funded by the development of the residential scheme that it is designed to protect. We will provide appropriate consent and advice.

We are planning to conduct flight surveys of the North Devon coast to help us examine current and future areas at risk from flooding. We hope to be able to combine this information on flooding with previously gathered information on vegetation in the Taw/Torridge Estuary. The resulting data could be used to examine the problem of 'coastal squeeze'. If significant areas of habitat are to be lost, mitigating measures will be required. Investigations are underway at Annery Kiln to reinstate the tidal flooding regime and recreate saltmarsh through a 'managed retreat' scheme (see also Issue 12 and Issue 17g).

Some processes we regulate produce greenhouse gases, for example landfill sites which produce methane. Through our regulation we will help to ensure that the Government's emission reduction targets are met. We will also set an example by reducing our own energy and fossil fuel consumption.

Deep Moor landfill - Devon Waste Management have been undertaking methane production trials at Deep Moor landfill with a view to installing power generation equipment at the site. A 30-day gas abstraction trial indicated that there was sufficient landfill gas generation within the waste mass to produce 2MW of electricity. On the basis of this trial a bid was put forward to the Non Fossil Fuel Obligation for a grant to install the equipment needed to abstract gas on a commercial scale. The grant has been approved and the site is currently being prepared. It is hoped that production of electricity will commence in autumn 1999. The installation of this plant will significantly reduce methane emissions from the site (see also Issue 4).

Action Table 7 - Addressing Climate Change

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Map flood risk areas by conducting flight survey of the coast. 	Agency	< 1k	●
b Combine survey information to produce habitat map to examine the possible habitat losses due to 'coastal squeeze'. 	Agency, NDCCS	< 1k	● ●
c Install methane gas recovery systems, with high temperature flaring and power generation, at Deep Moor landfill site. 	Devon Waste Management	n/a	●

Issue 8 Decline of Spring Salmon

Associated Plans: River Torridge Salmon Action Plan[14]; Strategy for the Management of Salmon[15]:

In March 1998 the Agency reported that the 1997 catches were amongst the worst on record and that nationally salmon stocks were depleted. Of particular concern has been the long-term decline in the larger, early-running salmon, which are believed to be genetically different from later-running stock.

In June 1998, the North Atlantic Salmon Conservation Organisation (NASCO) received international scientific advice that stocks of larger, multi-sea-winter salmon are dangerously low, due largely to changes in ocean climate. NASCO subsequently set the lowest ever quotas for the Greenland and Faroes fisheries. The Greenland net fishery, which can take substantial numbers of our larger salmon, agreed to a subsistence quota, about 20 tonnes (compared to a catch of about 2700 tonnes in the 1960s).

Other countries are also concerned about the state of salmon stocks. For example, last year the Irish Government introduced new regulations for their large driftnet fishery including delaying the start of the fishing season to 1 June, and confining netting to 6 miles from the coast. Tagging studies by the Agency prior to these new regulations showed that the Irish driftnet fishery was a major exploiter of salmon returning to English and Welsh rivers.

The contracting parties of NASCO, including the European Union (which represents the United Kingdom), agreed to examine measures in their homewaters taking full account of the advice to achieve a significant reduction in the exploitation of larger salmon in 1999.

The Agency responded immediately to this advice in July 1998 and sought the views of its Regional Fisheries, Ecology and Recreation Advisory Committees (RFERACs) on the need for national measures, including byelaws.

The Government also reviewed the international advice and concluded that additional measures were needed to reduce exploitation of early-run, multi-sea-winter salmon. In September 1998, Elliot Morley, the Minister for Fisheries and the Countryside, wrote to the Agency asking it to take forward appropriate measures to reduce exploitation by both nets and rods so that these could be ready for adoption as soon as possible.

After a further consultation with the RFERACs in October 1998, the Agency developed a package of measures to protect salmon stocks namely:

- River-by-river measures: continued development during 1999, and beyond;
- Promotion of national baseline byelaws for 1999 to protect early-run salmon;
- Enhance promotion of catch-and-release technique, and voluntary release of stale salmon by anglers.

The National Byelaws were approved by the MAFF in early April, and became effective on 15 April 1999. The byelaws, which affect both the rod and net fishery, will run for a 10-year period although there will be a major review of stocks after 5 years. The byelaws applicable to the Torridge area are as follows:

- No netting prior to 1 June;
- Catch and release of all rod caught salmon before 16 June;
- Use of artificial baits only prior to 16 June.

The national byelaws are considered to be the lowest common denominator across the county addressing the national problem of a decline in early-run, large salmon. Measures to address other local stock problems will continue to follow a river-by-river approach based on the programme of individual Salmon Action Plans developed by the Agency with local fisheries interests.

Poaching can have a dramatic effect on fish stocks if uncontrolled. We maintain a programme of regular enforcement to minimize the numbers of fish taken illegally, and presently the extent of poaching carried out is thought to be limited. However the importance of maintaining an enforcement presence on the river and at sea is recognised as a necessary requirement to prevent levels of illegal activity escalating.

On some of the Cornish rivers, rod fishermen/riparian interests have 'bought out' the net fishery by paying the net fishermen not to fish at certain times during the season. This is clearly an effective means of increasing escapement to the

freshwater river, and should be considered in the Torridge Catchment. The Agency would act as an 'honest broker' between netting and rod fishing interests if such negotiations were initiated.

In managing its salmon fisheries, the Agency uses salmon spawning targets as a means of assessing the condition of the fishery. Currently annual compliance is assessed using the rod catch, and estimating what percentage of the run is taken by the rod fishery, and what remains to go on to spawn. A more accurate assessment could be made if a fish counter were installed which could provide a good indication of the numbers and timing of the salmon run. Investigations have been undertaken at Beam Weir to see whether a counter could be installed in the existing fish pass. A counter located here would almost certainly be effective, but the costs associated with its installation considerable. The Torridge Fishery Association has been pursuing a lottery grant to help fund these works. The total cost will probably be greater than £80K.

Action Table 8 - Decline of Spring Salmon Stocks

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99	00	01	02	03
a Ensure compliance with new regulations for the net and rod fishery.	Agency	unknown		●	●	●	●
b Agency to act as honest broker if required during negotiation between rod fishery and netsmen leading to net buy-out	Agency	< 1k	●	●	●	●	●
c Finalise and implement Torridge Salmon Action Plan.	Agency, ROs, Fishing Associations	unknown	●	●	●	●	●
d Design and install a fish counter at Beam Weir.	TFA, Agency	unknown		●	●		

Issue 9 Barriers to Fish Migration

Associated Plans: River Torridge Salmon Action Plan[14]

Many of the historical man-made barriers in the catchment now have fish passes installed. A recent survey of obstructions identified just two weirs, which are complete barriers to fish migration, one on the Bideford Yeo, and one on the Jacobstowe stream. The benefits of installing passes on these weirs need to be assessed; both are likely to require significant engineering works and authorisations.

Coarse woody debris sometimes accumulates to form trash dams. These can provide an important in-stream habitat for a range of species, particularly invertebrates. However, under extreme events, they can obstruct the passage of migratory fish and back up water to drown out spawning riffles and reduce the rate of flow, resulting in sediment deposition. Under these circumstances, and providing that there will be no detrimental impact, we would seek to remove these obstructions.

There are abstractions at some sites in the system which create problems for the downstream migration of smolts, when the fish are drawn into the abstraction intake. The installation of screens is an effective means of alleviating the problem. The 1995 Environment Act amended section 14 of the Salmon and Freshwater Fisheries Act, which now requires certain abstractors, including fish farms, to install screens to the satisfaction of the Agency. We will be carrying out assessments at abstraction sites and the abstractor will be made aware of any problems at the site. In most cases, the Agency will expect abstractors to have adequate screening designed and in place during 1999. However at some sites this may result in considerable expenditure, under which circumstances extra time may be allowed.

Action Table 9 - Barriers to Fish Migration/Movement

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Evaluate cost benefit of improving fish passage to weirs at Yeo Vale on the Bideford Yeo and Jacobstowe on the Jacobstowe Stream.	Agency	2k	●
b Subject to findings of above, implement fish pass construction.	Agency, Fishery/weir owners	Unknown	● ●
c Remove trash dams and other obstacles after fully considering the wider ecological impact.	Agency, Riparian/ Fishery owners	3k	● ● ● ● ●
d Identify sites which create problems for the downstream migration of smolts.	Agency	2k p.a.	● ●
e Following National Guidance on screening policy, advise abstractors of Agency screening requirements and work towards implementation.	Abstractors, Agency	2k p.a.	● ● ● ● ●

Issue 10 Fish-eating Birds

In common with many rivers in the area, there has been a marked increase in the numbers of cormorants observed in the catchment. Concerns are regularly expressed by various fishing interests that this increase in levels of predation is adversely affecting the fishery. However we shall not support licensed killing of fish-eating birds unless and until proof of serious damage has been established and culling is proved to be the most effective means of preventing significant loss of fish stocks.

The MAFF, DETR and the Environment Agency manage and fund the national research programme into fish-eating birds. The contractors undertaking the research report on progress annually. The most significant research is investigating the perceived short and long-term damage caused by cormorants to inland fisheries in England and Wales. Interim findings from two of the four regions included in the investigation have been presented. In the Midlands at Holme Pierrepoint, feeding success was high. Favoured prey were coarse fish of less than 10 cm in length. The lake contains large populations of fast-growing fish that appear unaffected by predation. On the Trent, feeding success was much lower, but preferred species were again small coarse fish, mainly roach. At Grimsargh reservoir in the North West, feeding success was high with most of the prey coarse fish of less than 15 cm in length.

Research is also being undertaken into the effectiveness of predation control measures; the population, distribution and movement of fish-eating birds; and the feeding behaviours of cormorants, using radio tracking.

The final report on the research programme is nearing completion.

Action Table 10 - Fish-eating Birds

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Progress research into the effects of fish-eating birds. Disseminate findings of research and develop actions if appropriate.	MAFF, Agency, Landowners, Anglers	unknown	● ● ● ● ●

Issue 11 Introduction of Non-native Flora and Fauna

When species are introduced into an area in which they do not normally occur, serious problems can result. These species, free from the constraints of their natural environment (e.g., predators and diseases), may thrive in the new area. Problems caused can include the loss of native flora and fauna, loss of recreational/amenity value and even damage to man-made structures.

Species populations that have been isolated for some time may develop a distinct genetic make-up, adapted to particular local conditions. The introduction of members of the same species from a different locality may adversely affect these isolated populations.

Man is usually the vehicle for the movement of flora and fauna, either deliberately or unwittingly.

Invasive terrestrial plants - Several plant species are causing concern because of the rate at which they are spreading. Some, like Himalayan balsam, Japanese knotweed and giant hogweed, are terrestrial plants that are often, but not exclusively, found alongside watercourses. They often spread at the expense of other native plants, creating dense single-species stands that are of lower wildlife value. Himalayan balsam and Japanese knotweed die back in winter to leave bare banks, which are vulnerable to erosion. Japanese knotweed does not set viable seed in this country but is able, rather like bindweed, to grow from small pieces of root or stem. It can be spread with soil from one site to another and presents problems for control and disposal. Giant hogweed is less common than the other two species but also has a significant health risk attached; contact with the sap or coarse hairs can result in severe blistering of skin and even sensitisation to sunlight, which causes problems in subsequent years. We cannot undertake to eradicate these plants at all sites but we can advise on the best methods of control and will control them where they are growing on land that we own or manage.

Invasive aquatic plants - There are several non-native aquatic plants that are causing problems in the catchment. Many exotic plants have been sold by garden centres and other suppliers for use in ponds or even fish tanks. The plants the Agency is particularly concerned with are parrot's feather (*Myriophyllum aquaticum*), fairy fern (*Azolla filiculoides*), Australian swamp stonecrop (*Crassula helmsii*) and floating marsh pennywort (*Hydrocotyle ranunculoides*). The rapid growth of these plants leads to deoxygenation of the water at the expense of other organisms and reduces biodiversity. Although they may look attractive, the plants present a public safety hazard as they form dense mats on the surface of the water which can be mistaken for solid ground. It is extremely easy for these plants to be spread unwittingly as the tiniest fragment introduced on another plant will soon flourish. All are present in the catchment, although quantification of this is difficult, as most cases tend to be in private gardens.

We have raised our concerns with the relevant trade associations and have asked them to increase awareness amongst retailers as to the threats presented by these plants. As it is not against the law to sell these plants, the Agency is not in a position to ban them from sale. There has been a successful press campaign aimed at increasing public awareness and as a result there have been new reports of invasive pond plants in Devon.

Brown trout stocking - Historically, fishing interests have stocked parts of the catchment with farmed brown trout originating from a variety of sources. This practice, which is carried out to improve angling quality, may have an adverse effect on the native population through increasing competition for food and habitat, and by increasing predation of native juveniles. These introductions will modify the genetic make-up of remaining native stocks. The farmed fish may also be more susceptible to disease, which could then be passed on to the native population. Farmed fish are less adept at avoiding predators; this coupled with an artificially high level of stock may also attract predators such as cormorants to the area.

It is particularly important to ensure protection is given to the pristine trout stocks in areas inaccessible to migratory fish and where no stocking has taken place, for example the East Okement River upstream of Cullever Steps and the West Okement River upstream of Shelstone Tor.

Action Table 11 - Introduction of Non-native Species

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Record all occurrences of invasive species on Agency-owned sites or flood defence banks we manage and implement control programmes.	Agency	3k p.a.	● ● ● ● ●
b Collaborate with Japanese knotweed control programmes considered by others.	TDC, DCC, DNPA	unknown	● ● ● ● ●
c Encourage control of invasive plants by riparian owners and other interested bodies.	Agency	< 1k	● ● ● ● ●
d Raise awareness of problem of introduced aquatic plants among general public and distributors, and discourage suppliers from making these species available.	Agency, Garden Centre Trade Associations	1k p.a.	● ● ● ● ●
e Encourage removal of invasive aquatic plants where already established	Agency	< 1k p.a.	● ● ● ● ●
f Check ponds for presence of alien species as part of routine operations	Agency	1k p.a.	● ● ● ● ●
g Discourage stocking of farmed fish and promote habitat improvements as preferred method of increasing brown trout stock levels. In areas where there are discrete brown trout stocks consent will be refused to maintain genetic integrity.	Agency, Riparian owners, Fishing Associations	< 1k p.a	● ● ● ● ●

Issue 12 Impact of Urban Development

Associated Plans: Devon County Structure Plan[16]; West Devon Borough Local Plan[17]; Torridge District Local Plan[18]; North Devon District Local Plan[19]; Dartmoor National Park Authority Local Plan[20]

Development in the catchment is largely restricted to the towns of Hartland, Great Torrington and in particular Bideford. We concentrate here on identified current and potential future problems associated with the development in the catchment, which are of direct interest to the Agency. Apart from the problems identified here, development also generates extra waste and increases demand for water resources. These problems are dealt with separately under Issue 2 and Issue 13.

Although development can cause environmental problems it can also bring benefits, such as the redevelopment of brownfield sites and the clean-up of contaminated land. The planning process can be used to ensure that, where damage does occur, appropriate mitigation measures are taken.

Contaminated land - The precise nature of contaminated land in the catchment is not fully known. The forthcoming 'Contaminated Land Regulations', to be brought in under environmental protection legislation[21], will require local authorities to identify contaminated land within their area. Once these sites have been identified, it will be necessary to decide if remedial work is required. Any contaminated land issues will be reported in future Annual Reviews.

Development and flood risk - We advise planning authorities on development and flood risk matters. The Government expects the Environment Agency to ensure that planning authorities have sufficient information on flood risk matters to enable them to make informed and sound planning decisions. This information may come from the Agency or it may have to be provided by the potential developer.

Clearly, close collaboration is required between the Agency and the planning authorities. For effective floodplain protection the planning authorities must recognize the conflicts that exist between development and natural uses of the floodplain and seek to reconcile them in a way that is both balanced and sustainable. This requires comprehensive floodplain land use planning which take a holistic view.

To assist in this, we are in the process of producing up-to-date and consistent maps of floodplains as part of our survey duties under section 105(2) of the Water Resources Act 1991.

The first stage, 'Level A', of the survey has now been completed and this shows the indicative floodplain areas for all the main rivers in the catchment. Work has now started on the 'Level B' studies that are concentrated in areas of proposed development or sensitive flood risk areas. Level B studies are concentrated in a specific area and involve a greater amount of hydraulic modelling and investigation. Because the Level B studies are more closely related to development, closer liaison and consultation with the planning authorities will be required.

Loss of habitat from road development - A significant number of road schemes have been discussed and in some cases details agreed and consent given over the past 30 years. A proportion of these schemes have been shelved but some could be implemented in the future. Full co-operation from Devon County Council and the DETR will be required for some of these schemes which fall below the current environmental standard.

Restriction of tidal and fluvial floodplains - The construction of flood defence schemes will result in the loss of the natural functioning of tidal and fluvial floodplains which have conservation value. The Agency will need to investigate the possibility of providing additional compensation areas.

Need for environmental protection within Local Plans - Planning Policy Guidance on Nature Conservation (PPG9) recognizes the importance not only of designated sites but also of undesignated areas and, in particular, linear features such as rivers which are of recreational value and important for migration or dispersal of wildlife.

Local authonties are required to include policies to protect these features. Some river corridors are identified in the West Devon Local Plan and will be protected as a result. We are keen to work with Torridge District Council to achieve similar results in the Torridge area. It is likely that wildlife corridors will be defined in the written statement of the Torridge District Local Plan to include river corridors.

The identification of sites of county and local wildlife importance would be an important advance in achieving the protection of non-statutory sites. We would wish to co-operate in any survey programme carried out across Torridge District (see Issue 20).

In addition to protection within Local Plan polices individual planning applications can have conditions attached to ensure the protection of important environmental assets.

Restriction of development - There are a number of locations where we recommend the restriction of development (see Issue 2).

Impact of future development on water resources - The availability of water resources is an increasingly important issue across England and Wales. Whilst the Government has said that it does not expect water resources to be a reason for development proposals being rejected, the provision of adequate water supplies could have an influence on the timing of developments. The Agency comments on all county and district plans, and any individual planning applications that will have a significant water use, with respect to water resources and indeed water efficiency (as all new homes are now metered water efficiency can reduce customers' bills). However we can only comment on water resources in general as the specifics depend on which sources the relevant water company would plan to use to supply the development. In the light of this we would wish to see water companies added to the list of statutory consultees. (See Issue 13).

Flooding problems at Bideford, Bideford East-the-Water and Taddiport Bridge - It is planned that flooding at Bideford will be partly alleviated by the Bideford Quay Scheme, which may involve extending the quay. The proposal has been subject to much public debate and was programmed for commencement in September 1998. MAFF raised some concerns over the current proposals and further discussion will be required to resolve the issues they have raised. The Agency remains committed to providing a flood defence scheme for Bideford and is presently re-evaluating options.

A proposed residential development at East-the-Water will require a flood defence scheme to be constructed. This will need to be funded by the developer but will require consent and advice from the Environment Agency.

Property upstream of Taddiport Bridge has been flooded in the past due to the constriction of flow at the bridge. A scheme was proposed to alleviate the problem at the bridge but was objected to by a local resident. The objection could not be resolved or withdrawn and as a result of this a further scheme involving individual property protection has been proposed.

Managed retreat - Flood and coastal defences have in the past involved claiming land from the estuary on which the defences are built. This approach has led to the gradual reduction of foreshore within the estuary over the last 200 years. There is a changed philosophy in the management of flood and coastal defences that makes the best possible use of the natural process and demands a more holistic view of the coastal processes that prevail in any area. This can involve the managed re-alignment of the coastline to liberate sediment or dissipate wave or tidal energy to reduce problems elsewhere.

There should be considerable conservation benefits from managed retreat identified at Landcross, Annery Kiln and Hallspill, through the creation of saltmarsh habitat.

Recent MAFF-funded agri-environment schemes are intended to benefit the environment by encouraging less intensive farming. One such scheme encourages re-creation of saltmarsh from grassland. The Taw/Torridge Estuary Project has identified sites where this can be achieved by removing tidal defence banks without affecting non-target areas. In addition they are working to promote the added value of saltmarsh-reared lamb, which will provide an economic return for farmers as well as ensuring the habitat is sustainably managed. (See also Issue 7 and Issue 17h).

In all cases the applicants will require the consent of the Environment Agency under the Land Drainage Byelaws for breaching the banks.

Action Table 12 - Impact of Urban Development

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Ensure all road schemes meet current environment standard.	DCC/DETR/Las, Agency	unknown	● ● ● ● ●
b Identify areas where flood control standards could be relaxed to improve/enhance wetland habitats.	Agency, NDCCS	<1k p.a.	● ● ●
c Construct flood scheme for Bideford Quay.	Agency, MAFF, TDC	1,700k	● ●
d Advise on flood scheme design at East-the-Water.	Agency, Developers, TDC	unknown	● ●
e Progress flood scheme for properties at Taddiport Bridge.	Agency, MAFF,	unknown	unknown
f Provide necessary advice/support for managed retreat at Landcross, Annery Kiln and Bideford.	Agency, NDCCS, Landowners, MAFF	<1k p.a	● ● ● ● ●

Issue 13 Increasing Demand for Water Resources

Associated Plans: Tomorrow's Water[22]*; Taking Water Responsibly*[23]

Water is an essential but finite resource. One of the Agency's roles is to protect the water environment (lakes, rivers and wetlands) from over-abstraction whilst considering the needs of the public, agriculture and industry for water.

The Agency is not responsible for the supply of water to households and industry but has a central role in water resources planning in England and Wales. We contribute to protecting the environment by looking at current use of water in the home and at work and the water that is available for these uses without damaging the environment. This may involve correcting any imbalances or over-abstraction. We continue to protect the environment by comparing future demands for water with water availability and balancing the two in an environmentally sustainable manner. To achieve this we work closely with the water companies requiring them to submit detailed Water Resource Plans (see Section 5: A Better Environment Through Partnership).

Managing current demand - To manage water resources the Agency issues abstraction licenses for specific volumes of water from identified sites. The abstraction licence may include conditions to control abstraction where environmental damage is likely. The abstraction licensing system for England and Wales was reviewed during 1997/98 and a number of changes were proposed and consulted upon. "Taking Water Responsibly"[23], a paper detailing the Government decisions following consultation, was published in March 1999 and is available from the Department of the Environment, Transport and the Regions (DETR). The full nature and impact of changes will not be confirmed until the final papers are approved by Parliament. We will need to implement any changes that arise from this process and amend licensing polices as appropriate.

In 1998, there were only three active abstraction licences in the LEAP area, representing 10,774 million litres of water per year or 31 million of litres of water per day. This is because the majority of the catchment is exempt from licensing (see: Meeting future demand). The only public water supply company who operates within the catchment is South West Water Limited (SWW Ltd).

Meeting future demand - Water resource planning is carried out over large geographic areas often extending over several LEAP boundaries. It is therefore difficult to obtain data for a specific LEAP and the precise impact of new development on water resources in the plan area can be difficult to predict. Before any new resources can be developed or existing resources developed further, we must be satisfied that water companies have looked in detail at a range of appropriate options. These include encouraging people to use water more efficiently (demand management) increasing the efficiency of uses of sources (resource management) and increasing efficiency of pipe networks (distribution management) as well as reducing their leakage towards an acceptable level.

Demand management involves a number of different initiatives including metering. Meters are installed in all new domestic properties connected to the water company supply, and SWW Ltd's customers have the option to have their home metered at a subsidised price between now and April 2000. After this they will be able to have a meter fitted free of charge. People who have a garden sprinkler are asked to register it with the company on the understanding that they may be metered at a later date.

Water companies have a duty to promote efficient use of water and we expect them to pursue this duty with imagination and vigour. SWW Ltd has published a water efficiency plan, which contains strategies to deliver water savings by the customer. Their plan includes advice on how to save water in the home and garden and explains what the company is doing to encourage other bodies, such as the local council and builders, to help the customer save water. Water efficiency advice is also available to business customers. SWW Ltd has a free educational resource pack, 'Running Water', which provides National Curriculum support for 8-13 year olds.

Extra resources can be obtained from making savings through reducing leakage. The water companies are set leakage targets each year by the Government's financial regulator OFWAT. They are obliged to meet these targets, but they can voluntarily set themselves lower targets. SWW Ltd have a target of 84.0 million litres a day (Ml/d) for 1999/2000. Their actual leakage figure for 1997/1998 was 101.1 Ml/d, which was below the target for that year.

Water companies use areas known as Resource Zones in order to help manage the way in which they supply water. The Torridge and Hartland Streams LEAP area is part of the Roadford Resource Zone, which supplies water to most of Devon and part of the North East Cornwall. Within the LEAP area 92 per cent of licensed abstraction is for public supply. There are very few private water abstractions as a local exemption from licensing Order applies in the catchment[24]. This Order recognizes that groundwater abstraction from the minor aquifers in the Torridge and Hartland Streams is unlikely to be significant. The result is that most groundwater abstraction in the catchment is exempt from the conventional abstraction licensing legislation.

Expiry of the Newbridge abstraction licence - The demand for water in the catchment is currently met by supplies from a number of sources including Meldon Reservoir in the south of the catchment and a number of sources from outside the catchment. These include the abstraction at Newbridge on the River Taw which is licensed until 2004. The transfer of water from the River Exe to the River Taw currently supports this abstraction. The transfer is only licensed until the year 2000; SWW Ltd will need to secure at least equivalent resources to meet demand in North Devon if a continuation of abstraction from the current site on the River Taw is not feasible. This is likely to consist of a combination of distribution management and demand management measures.

Promotion of water-saving measures - The average family uses approximately 146 cubic meters (32,000 gallons) of water per year and within the home there are many opportunities to help reduce this figure, for example:

- turning taps off, showers rather than baths;
- washer replacement, rapid repair of leaks;
- low flush toilets, normal rather than power showers, water-efficient washing machines and dishwashers;
- water butts, trigger switches on hosepipe nozzles, drought resistant garden plants, mulch on flowerbeds to retain moisture and restrict weed growth.

The workplace and industry also offers many opportunities to reduce water use (and save money). Measures outlined above may be suitable together with process/site specific measures. Examples of these and other water-efficiency measures are detailed in the document 'Saving Water on the right tracks 2' which can be obtained from the Agency.

Rainwater collected from roofs and recycled household waste wash water (greywater) can be used for toilet flushing and garden watering. It offers potential for large water savings but to encourage more rapid development and take-up of suitable systems there is a need for water quality standards to be established for this use.

Action Table 13 - Increasing Demand for Water Supplies

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Publish updated regional water resources strategy 	Agency	unknown	● ●
b Ensure impacts of all options are balanced against the need to secure future supplies as a consequence of the expiry of the licence authorising transfer of water from the River Exe to support the Newbridge licence. 	Agency	unknown	● ●

Issue 14 Risk of *Cryptosporidium* Entering Public Water Supply

Cryptosporidium is a microscopic animal that can infect the gut of mammals, birds and reptiles. One species *Cryptosporidium parvum* can cause the disease Cryptosporidiosis, a symptom of which is prolonged severe diarrhoea in humans. *Cryptosporidium parvum* is thought to be widely present in the environment and may be found extensively in cattle and sheep.

Occasionally outbreaks of Cryptosporidiosis occur in human populations, and the public water supply is often implicated in these situations. The risk of *Cryptosporidium* entering the water supply is thought to be greatest where there is a direct river abstraction, particularly in an agricultural catchment. SWW Ltd can abstract water for public supply at Gammaton, Melbury and Meldon Reservoirs, and the West Okement River.

In recognition of the increased awareness, nationally, of the potential risk to public health posed by this organism a task group was formed in 1997 with representatives from SWW Ltd, MAFF, Environmental Health Departments and the Environment Agency. This group has assessed the risk of *Cryptosporidium* entering the public water supply in the South West and SWW Ltd will be reviewing procedures for the spreading of sewage sludge in catchments with potable supplies. The Environment Agency, in conjunction with MAFF, will also be promoting the Codes of Good Agricultural Practice in the same catchments.

Issue 15 Flood Warning

A Flood Warning Service is currently provided on the Rivers Torridge, Okement, Waldon, Lew and Kenwith Stream and for the North Devon Coast within this LEAP area.

A study into the current levels of service provided by Fluvial Flood Warning across the Region on main rivers was carried out and has just been completed. It will enable levels of service to be compared across the whole Agency region. The study has identified risk areas, lead time and cost/benefit assessment amongst other things, using the section 105 survey (see Issue 12) and other data. Now the study is complete, priorities for improvements are being identified and a programme of future work together with costs will be produced.

A study is also programmed for completion by the year 2000 into the Tidal levels of service currently provided. This will similarly drive the Regional capital programme for improvements to the Tidal Flood Warning system. We liaise with members of the public who receive direct warning and also local authorities and the Emergency Services on a regular basis. Any person or organization that wants to receive direct flood warnings should contact us. Leaflets are available which give information on the current service provided. Information on flood warnings in force at any time is available via FLOODCALL 0645 881188 and once within the system the caller will be prompted to use a quickdial code number 04211 to receive a message.

Action Table 15 - Effectiveness and Scope of Flood Warning in the Catchment

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Continue to progress fluvial flood warning study on main rivers.	Agency	10k	●

Issue 16 Improving Air Quality

Associated Plans: National Strategy for Air Quality[25]

Air pollution can damage flora, fauna and buildings and can have significant effects on soils and water. It can also pose a serious risk to public health.

In 1990 the Government published a National Strategy for Air Quality[25] including a framework of standards and objectives for the pollutants of most concern and a timetable for achieving objectives. Obligations will be placed on local authorities to carry out periodic reviews of air quality in their areas. Where standards are not being met or are not likely to be met they will be required to designate local air quality management areas and make action plans to improve air quality in these areas.

We will be working closely with local authorities to help achieve the objectives of the Strategy, principally through our regulation of emissions to air from controlled ('Part A') major industrial processes. Local authorities are responsible for the regulation of smaller, less complex ('Part B') industrial processes and for reducing traffic pollution.

There are no known impacts of air pollution in the catchment; however data are limited and there are a number of concerns which require further investigation.

Effect on sensitive species - Some lower plants (lichens, mosses and liverworts) are particularly sensitive to air pollution. Within the catchment there are two habitats that are particularly important for lower plants, namely western oakwoods and parkland. The Western Oak Woodlands found near the coast at Clovelly and Hartland have developed extensive, internationally important, lichen, moss and liverwort communities due to the damp conditions and clean air brought by the prevailing winds from the Atlantic Ocean. The nationally rare western lichen species *Enterographa hutchinsiae* and the critically endangered species *Porina guaranitica* are both found in the area. Other important sites include Black-a-Tor Copse National Nature Reserve (NNR), which contains important lichen communities and Halstock Woods SSSI that has some lower plant interest.

Parkland is a particularly British landscape feature that is uncommon in mainland Europe. Two areas, Clovelly Deer Park and Dunsland Park SSSI, have extensive lichen communities.

Lichens are particularly sensitive to atmospheric sulphur. Estimated annual mean sulphur dioxide concentrations for the catchment[25] are <5 $\mu g/m^3$; this is lower than the standard of 10 $\mu g/m^3$ proposed for the protection of sensitive lichens[26]. More information is required to establish the status of these sensitive communities in the catchment.

Eutrophication - In upland areas, where nutrients are usually quite limited, there is growing concern that the deposition of atmospheric nitrogen can act as a fertilizer and cause changes to plant growth and eutrophic conditions. The Institute of Terrestrial Ecology is carrying out a national monitoring programme for atmospheric ammonia, in order to obtain a more accurate assessment of potential aerial nitrogen deposition. We will continue to work with other agencies to gain a better understanding of the problem.

Acidification - Moorland areas are typically acid due to the underlying geology and soils. The acidity of Dartmoor, however, may be exacerbated by atmospheric acid deposition. The main sources of acid deposition are sulphur dioxide and oxides of nitrogen, which dissolve in water to produce acid rain. These compounds come mainly from burning fossil fuels.

Emission of nitrogen oxides are thought to be responsible for about one third of the acidity of rainfall, and the proportion appears to be increasing. Road vehicles are responsible for about half of the emissions of nitrogen oxides in the UK. Agency-regulated processes account for an estimated 22 per cent of total UK nitrogen oxide emissions. By 2005 we aim to reduce these emissions by 33 per cent from 1995 levels.

Effects-based emissions control policies have been developed in the UK through a critical loads approach. This approach involves assigning a critical load of acidity to particular ecosystems: that is the amount of acid deposition below which harmful effects do not occur according to present knowledge.

Map 8 shows modelled critical load exceedences for soils in 1995 and 2005. The data for 2005 is based on the predicted emissions of sulphur dioxide and oxides of nitrogen from the major sources. It can be seen that the critical loads are exceeded over Dartmoor. The predicted exceedences in 2005 are greatly reduced; these reductions are due to agreed international emission reductions.

Agency regulated processes account for an estimated 70 per cent of total UK sulphur dioxide emissions. By 2005 we aim to reduce these emissions by 75 per cent from 1993 levels.

The critical loads model assumes land use remains unchanged. However changes in land use could have significant effects on the level of acid deposition. Forestry, in particular coniferous forests, can increase the level of acid deposition where they are present; this is primarily due to the way the forest canopy 'scavenges' pollutants from the atmosphere. It is important that any proposals for forestry development within the areas that are exceeding their critical loads are subject to an environmental impact assessment. This is in line with the Forests and Water Guidelines Third Edition[27].

There are no confirmed effects from atmospheric acidification in the catchment; however there is concern that the ecology of Dartmoor, in particular its watercourses, blanket bog habitat and associated species, may be affected by acid deposition.

The Institute of Freshwater Ecology is currently conducting a research project for the Agency, which seeks to develop a biological monitoring system for assessing acidification. A number of the sampling sites are in the catchment and the study could be used as a basis for examining any catchment-specific effects.

Action Table 16 - Improving Air Quality

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Review air quality in the area, in line with National Air Quality Strategy.	TDC, NDDC, WDBC, Agency, *DNPA*	unknown	● ●
b Improve knowledge of status of lichen communities in the catchment.	DWT, EN, DCC, DNPA, Agency	unknown	● ● ● ●
c Conduct research to improve understanding of effects of airborne acidification and eutrophication on semi-natural habitats and species.	Universities, Agency, EN, IFE, ITE, *DNPA*	unknown	● ● ● ● ●
d Ensure all proposals (>10k) for afforestation within the areas of critical load exceedence receive an environmental impact assessment in line with the Forests and Water Guidelines Third Edition.	Agency, Forestry Authority	<1k p.a.	● ● ● ●

Issue 17 Enhancing Biodiversity

Associated Plans: Biodiversity: The UK Steering Group Report, Volume 2: Action Plans 1995; The Biodiversity of the South-West: An Audit of the South-West Biological Resource February 1996, Action for Biodiversity in the South-West: A Series of Habitat and Species Plans to Guide Delivery June 1997; The Nature of Devon: A Biodiversity Action Plan for Devon; North Devon District Council Biodiversity Action Plan; Dartmoor National Park Authority Biodiversity Action Plan; The Nature of Dartmoor: A Biodiversity Profile

Biodiversity, or the variety of life, is being lost. In the UK alone over 100 species have been lost this century. The global decline in biodiversity was recognised at the Rio Summit in 1992[28], where over 150 world leaders signed the Biodiversity Convention. The convention requires each country to 'develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity'. The UK responded with a process of Biodiversity Action Planning, which aims to reverse this decline by prioritising habitats and species for action, ensuring that conservation efforts are directed where they are most needed. In Devon, Biodiversity Action Planning also includes the conservation of important earth science features and processes.

Biodiversity: The UK Steering Group Report[29] was published in 1995 and since then a number of regional plans have been produced including Action for Biodiversity in the South West (1997)[30]. In Devon a steering group involving a large number of organisations involved in conservation have produced The Nature of Devon: A Biodiversity Action Plan for Devon[31]. Of the planning authorities covered by this LEAP, North Devon District Council and Dartmoor National Park Authority are producing their own Biodiversity Action Plans.

We are taking part in this process in the following ways:

- We are the UK contact point for 12 species in the UK Biodiversity Action Plan[29]; one of these species, the otter, is present in this catchment. As a contact point we are responsible for stimulating action to achieve targets, monitoring results and reporting progress to the national group.

- We are a joint lead partner for the otter and the freshwater pearl mussel, both present in this catchment. As a lead partner we are responsible for preparing detailed work plans, directing resources and overseeing plan implementation.

- As part of producing LEAPs we are identifying, with others, key habitats, species and geological features on a catchment basis on which we will concentrate our conservation efforts (Table 3). Many of the actions in this plan will help towards the conservation of these features, habitats and species; the associated issues are given in Table 3. We will also set catchment-specific targets for some of the key habitats and species, which will enable us to measure our progress in conserving and enhancing biodiversity.

We have in addition to our normal conservation duties, additional responsibilities placed upon us under the European Habitats and Species Directive. There are four candidate Special Areas of Conservation either partly or wholly within the catchment; Lundy Island, Dartmoor, the Culm and the Tintagel-Marsland - Clovelly Coast. The Lundy Island candidate Marine Special Area of Conservation (cSAC) has been selected because it contains habitat types and species that are rare or threatened within a European context, such as reef habitats.

The Government has decided that all candidate sites under the Habitats Directive should be treated as already designated. This means that the Conservation Regulations 1994 (which were how the habitats regulations were translated into British law) already apply to the cSACs in this catchment.

The Environment Agency is a 'competent authority' under the regulations. As a competent authority we have a number of obligations, including reviewing all existing authorisations and activities that we license within the area. In practice this also means looking at consents that are outside the site but have the potential to affect it. Any new authorisations that are made must contribute towards the conservation objectives of the site.

English Nature (EN), the government's statutory nature conservation adviser, has divided England into 120 Natural Areas based on their physical attributes, wildlife, land use and culture. Profiles are being produced for each of these areas which will help to identify the distinctive nature conservation character and to guide action for their benefit. The Natural Areas that include parts of the Torridge & Hartland Streams Catchment are Dartmoor, Lands End to Minehead and the Culm.

Concerns have been raised in the past by the Agency and the Lundy Island Marine Advisory Group regarding options for the disposal of waste and sewage on the island. We are working with the managers of the Island, the Landmark Trust, to resolve these problems.

Action Table 17 - Biodiversity - General

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
(i) Complete process of identifying key features, habitats and species in Devon catchments, and set catchment-specific targets where appropriate.	Agency, RSPB, DWT, EN, DCC, DNPA	2k	● ● ●
(ii) Review activities on Lundy which fall within Agency's remit.	Agency, Landmark Trust, EN, NDCCS	1k	● ●
(iii) Continue to work with interested parties to minimise the environmental impact of human activities on Lundy SAC.	Agency, Landmark Trust, English Nature, National Trust, TDC	unknown	●

Table 3 Key Habitats, Species and Geological Features in the Catchment

Key Habitats/Associated Species/Geological features	**Reason for Inclusion**	**Threats in this Catchment**	**Associated Issues**
Blanket Bog	Internationally important	Overgrazing, burning, drainage	
Dunlin	Threatened in Europe	Disturbance, habitat loss	1
Golden Plover	Localized breeder		
Rhôs Pasture	Internationally important	Agricultural improvement/intensification, neglect/undergrazing, pond creation.	1
Narrow bordered bee Hawkmoth	Threatened in Europe	Intensification	
Double line moth	Nationally scarce		
Marsh Fritillary	Threatened in Europe		
Whorled Caraway	Nationally rare		
Barn Owl	Nationall threatened		
Upland Heath	Internationally important	Overgrazing, burning	1
Red Grouse	Local decline	Changes in management	
Skylark	National decline	Habitat loss	
Rivers and Streams	Threatened	Invasive plants, pollution, mineral extraction	1, 8, 11
Otter, Freshwater Pearl Mussel	Threatened in Europe		
Salmon	Nationally threatened	Disturbance, pesticides	
Kingfisher	Nationally threatened	Exploitation, water quality, siltation of spawning gravels	
Water vole	Nationally threatened		
Exposed Riverine Sediments (geomorphological)	Conservation value of habitat unknown, supports some endangered species	Possibly habitat loss, extent of populations unknown Removal for river maintenance purposes	
Lowland Farmland	Nationally threatened	Agricultural specialization and intensification	1
Skylark			
Reedbed			
Otter	Threatened across Europe	Disturbance, pesticides	1
Water Rail	National decline	Habitat loss	
Reed Bunting	National decline		
Warblers	National decline		
Estuaries, Estuarine Habitats and Saltmarsh	Threatened	Development, recreation Sea-level rise leading to coastal squeeze	1, 7, 12
Curlew	Threatened		
Golden Plover	Threatened		
Lapwing	Threatened		
Dunlin	Threatened		
Salmon	Threatened		
Sea-lavender	Threatened		
Shingle ridge (Northam Burrows)	Threatened geomorphological feature		
Coastal and Floodplain Grazing Marsh	Nationally threatened	Floodplain development pressures and disturbance. Agricultural intensification	1, 12
Golden Plover			
Sand Dunes	Nationally threatened	Sea-level rise leading to 'coastal squeeze'.	
Water Germander		Tourism - trampling of dune ridges and disturbance to wildlife.	7, 19
Rock Sea-lavender			
Sharp Rush			

Key Habitats/Associated Species/Geological features	Reason for Inclusion	Threats in this Catchment	Associated Issues
Sea Cliff and Slope Lundy Cabbage Hanging valleys Wave-cut platform	Threatened, support endemic population	Recreation, overgrazing, invasive non-native species - Rhododendron	1, 11, 19
Rocky Foreshore Pink Sea Fan	Threatened	Pollution from sewage outfalls, shoreline developments	17, 19
Rocky Seabed Pink Sea Fan Kelp - *Laminaria ochroleuca* Cup Corals - sunset coral, Weymouth carpet coral, Sea slug - *Caloria elegans*	Threatened Threatened Threatened Threatened Threatened Threatened	Fishing, dredging, recreation, water quality	17, 19
Woodland Pasture and Parkland Goldenhair lichen Lungworts (*Lobarion* sp.)	Possibly threatened - extent of habitat poorly quantified	Atmospheric pollution, changing agricultural practices, removal of old trees	1, 16

17a Blanket bog - Dartmoor is internationally important for this wetland habitat. Poor moorland management has allowed much blanket bog to become degraded; drainage, burning and grazing at inappropriate intensity have resulted in lost value. A small area of this habitat on Dartmoor is within the Torridge Catchment and within the Dartmoor cSAC.

Target: (i) Golden plover and dunlin - Maintain viable populations of breeding golden plover and dunlin on Dartmoor.

Action Table 17a - Blanket Bog

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Dartmoor for:			
(i) Blanket bog - includes prevention of uncontrolled burning, protect hydrology;	Agency	2k	● ● ● ● ●
(ii) Golden plover and dunlin - need to set and implement targets for increasing breeding populations.	RSPB, DBWPS, EN, DNPA	n/a	●

17b Rhôs pastures - These species-rich grasslands, known locally as the 'Culm grasslands', have a very restricted distribution. Ninety per cent of the resource that remained at the turn of the century has now been lost. The catchment contains a very significant proportion of the remaining resource. Agricultural improvement is probably the largest single threat to this habitat and its associated species, but neglect and inappropriate management are also problems. The Southern Damselfly is a globally threatened species associated with Rhôs pasture, although not present in this catchment. It is hoped that as a result of the management of this habitat potential re-introduction sites may be identified. Some Culm grassland sites in the catchment are within the Culm cSAC (see Appendix Four).

Targets: (i) Maintain and where possible enhance the current extent and condition of Rhôs pasture within Dartmoor.
(ii) No loss of larger Rhôs pasture sites on the Culm and Dartmoor.
(iii) No net loss of smaller Rhôs pasture sites in those areas.

Action Table 17b - Rhôs Pastures

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon, Dartmoor and North Devon for:			
(i) Rhôs pasture - includes promoting management agreements, scrub clearance;	DNPA, Agency, EN, NDCCS,, DWT	3k	● ● ● ● ●
(ii) Marsh fritillary - includes habitat restoration, correct grazing regime;	DNPA, BC, Agency, DWT, NDCCS	2k	● ● ● ● ●
(iii) Southern damselfly - includes protection of hydrology, possible re-introduction;	Agency	2k	● ● ● ● ●
(iv) Barn owl - provide nestboxes to encourage colonization by barn owls in areas of potential barn owl habitat.	Agency, Barn Owl Trust	< 1k	●
Secure appropriate management of feeding habitat via land management advice and agri-environment schemes	Agency, MAFF, NDCCS	unknown	● ● ● ● ●

17c Upland heath - Large areas of Dartmoor are covered by heather moorland, much of which is in poor condition as a result of overgrazing and/or burning. Skylark numbers have dropped dramatically nationally and it is essential that upland heath be retained to provide suitable habitat. The catchment contains a small area of this habitat, which is within the National Park and the Dartmoor cSAC. Increased participation of the Dartmoor ESA scheme on Dartmoor may help, particularly if agreements can be achieved on commons.

Targets: *(i) Prevent loss of upland heathland to grass moor.*
(ii) Restore substantial areas of grass moor to heathland.

Action Table 17c - Upland Heath

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Dartmoor for:			
(i) Upland heath - includes prevention of uncontrolled burning and overgrazing.	EN	n/a	● ● ● ● ●

17d Rivers and streams - The rivers and river valley habitat in the catchment support a diverse flora and fauna including salmon, otters and the freshwater pearl mussel. The freshwater pearl mussel is a bivalve mollusc that lives in fast-flowing, nutrient poor rivers with clean, sandy and stony bottoms. The freshwater pearl mussel is a rare, globally threatened species that has been lost from all but seven English rivers. In Devon, it is now only known in the River Torridge and here only in moderate numbers. The River Torridge has been chosen by English Nature and the Environment Agency as one of several catchments within England where investigations will be carried out as part of a national project into the threats to pearl mussels. The main threats to this habitat and its associated species are covered elsewhere in this plan.

It has recently been recognised that areas of sand and gravel ('shoals') deposited by the river, termed Exposed Riverine

Sediments (ERS), are particularly valuable as habitats for invertebrates (especially beetles). These sediments are vulnerable to erosion control works and some Flood Defence activities. We are currently undertaking Research & Development to improve understanding of the problem and develop appropriate policy to protect these features.

The water vole is Britain's largest vole, often confused with the water rat. Water voles prefer slow-flowing watercourses with a relatively stable water level and an adjacent steep earth bank. In Devon its habitat is relatively scarce, so the county has never supported a nationally important population. Opportunistic surveys have found possible colonies on the Taw and Otter and it is likely that there are other undiscovered colonies.

Targets: *(i) Maintain the quality of existing natural channel and flood plain features.*
(ii) Maintain and re-establish wherever possible, the natural processes of rivers, streams and their flood plains.

Action Table 17d - Rivers and Streams

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon, Dartmoor and North Devon for:			
(i) Rivers, streams, floodplains and fluvial processes - includes pollution control, production of water-level management plans, increase floodplain woodlands where possible 	Agency, EN, LAs, Riparian owners	5k	● ● ● ● ●
(ii) Otter - includes continued post-mortem examinations, habitat reinstatement; 	Agency, DWT, Riparian owners	3k	● ● ● ● ●
(iii) Freshwater pearl mussel - ensure suitable conditions in relevant watercourses to encourage recruitment. Encourage further research and monitoring in Devon and promote awareness of threats to species and their current legally protected status. 	Agency, EN, LAs, SWW Ltd	2k	● ● ● ● ●
(iv) Invertebrates of ERS - Implement recommendations of ERS invertebrate R & D. 	Agency, EN	2k p.a.	● ● ● ● ●
(v) Water vole - Support survey to identify core populations, provide management advice, identify sites for habitat restoration and population re-establishment. 	Agency, DWT, EN, DNPA, NDCCS, WDBC Wildcru, DCC	2k	● ● ● ● ●

17e Lowland farmland - Parts of the catchment are a typical lowland farming landscape, with a mixture of improved pasture and arable. Field boundaries are important features, as are the small areas of semi-natural habitat. Changing agricultural practices have resulted in changes to the flora and fauna of farmland.

Action Table 17e - Lowland Farmland

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon for:			
(i) Lowland farmland - promote extensive agricultural systems that have less impact on biodiversity, work with others to reduce nutrient levels, identify and target key watercourses where creation of buffer zones should be encouraged to take up excess fertilizer runoff. 	Agency, NFU, MAFF, CLA	2k	● ● ● ● ●

17f Estuaries, estuarine habitats and saltmarsh - The Taw/Torridge Estuary supports nationally important numbers of curlew, golden plover and lapwing. Estuaries are under pressure from shoreline development and expansion of recreational activities..

Targets: *(i) Ensure no net loss of intertidal area within Devon's estuaries.*
(ii) Achieve a 10 per cent increase in area of saltmarsh in Devon via 'managed retreat' by 2010.
(iii) Curlew - carry out a countywide survey on existing and historically suitable breeding sites by 2000.

Action Table 17f - Estuaries, Estuarine Habitats and Saltmarsh

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon and North Devon for:			
(i) Estuaries, estuarine habitats and saltmarshes - includes protection from development. 	Agency, LAs	2k	● ● ● ● ●
(ii) Curlew - ensure good advice and publicity to user groups on estuaries of the sensitivity of feeding and roost sites. 	Agency, NDCCS, DBWPS	2k	● ● ● ● ●

17g Coastal and floodplain grazing marsh - The grazing marshes of the South West form some of its most dramatic lowland landscapes and are an essential part of our biological and cultural heritage. Threats to this habitat include floodplain development pressures, agricultural intensification, land drainage and flood defence works leading to direct loss of habitat or hydrological continuity. The main objective is to promote agricultural and 'managed retreat' schemes, which can aid rehabilitation and maintenance of grazing marsh habitat (see also Issue 12).

Targets: *(i) Maintain current extent of approximately 600 hectares and improve quality of grazing marsh in Devon.*
(ii) Create 100 hectares of grazing marsh from arable land by the year 2005.

Action Table 17g - Coastal and Floodplain Grazing Marsh

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon and North Devon for:			
(i) Grazing marsh - recreate grazing marsh where it has been lost and create new areas where opportunities arise, e.g., as part of managed retreat at Northam Burrows. 	Agency, NDCCS	2k	● ● ● ● ●

17h Sand dunes - Although often thought of as dry, arid areas, sand dune systems are typically of great importance for wetland wildlife. This is because the water table in the slacks, that is in the hollows between the dunes, is usually near the surface, or even at times above. These wet slacks often support highly specialised wetland plant communities that, because the habitat is so restricted, contain many rarities. Sand dunes are scattered around most of the European coast, but are considered a highly threatened habitat throughout the continent. The key threats to this habitat are: falling water tables due to drainage of the land itself or of adjacent land and/or abstraction; dune stabilisation and sea defence works, leading to no new slacks being created from blow-outs; and golf course management, leading to habitat loss and change. The University of Plymouth carried out hydrological research on the dune system at Northam Burrows to identify possible causes for falling water tables. Data showed that the efficiency of the drainage network was influencing the local groundwater regime and it was concluded that the proposed managed retreat project involving tidal inundation would encourage the 'wetting-up' of the system.

Action Table 17h - Sand Dunes

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for North Devon for:			
(i) Sand dunes - ensure coastal defence works are, through shoreline management plans and related strategies, sympathetic to natural processes, encourage and support research into the cause of falling water tables and possible solutions, encourage and support research into prevailing coastal processes and the effect of coast defences. 	LAs, MAFF, Agency, EN	2k	● ● ● ● ●

17i Sea cliff and slopes - The sea cliffs and slopes of the South West support one of the richest plant and animal communities. Marsland to Clovelly Coast SSSI is designated for its vegetated sea cliffs. Many cliff sites support a number of rare or uncommon plant species. The cliffs of Lundy support the endemic Lundy Cabbage. There are important geological features associated with this habitat. Threats to this habitat include: visitor pressures and recreational activities which can have detrimental effects on cliff vegetation and nesting birds; overgrazing; and interruption of natural processes of erosion, by defences or cliff stabilisation projects. On Lundy, the cabbage is facing a threat from the invasive non-native rhododendron. Lundy is a candidate Special Area of Conservation.

Target: (i) Ensure existing sites of high quality sea cliff and slope are maintained in terms of their wildlife and earth science.

Action Table 17i - Sea Cliff & Slopes

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon and North Devon for:			
(i) Sea cliff and slopes - support and implement strategies (Shoreline Management Plans) for managing coastal zone, avoid disrupting dynamics of natural coastal zone processes by coastal defence and other constructive works, support identification of County Geological Sites of coastal nature. 	Agency, TTEP, LAs, Devon RIGS Group, DCC, EN, NDCCS	2k	● ● ● ● ●
(ii) Lundy cabbage - control rhododendron on cliffs of Lundy. 	EN	n/a	● ● ● ● ●

17j Rocky seabed - The physical and biological processes responsible for maintaining the diversity of marine life on the rocky seabed are still poorly understood. Lundy is the most important site featuring this habitat in the catchment, reflected in its designation, as England's only statutory Marine Nature Reserve. The main threat to this habitat is from fishing gear (towed gear including beam trawls/dredges) causing direct damage to habitats and species, especially in boulder fields and areas of softer bedrock.

Target: (i) Seek to improve understanding of the rocky seabed environment around Devon in terms of its distribution, the ecology of its flora and fauna, and the processes, man-induced and natural, that affect it.

Action Table 17j - Rocky Seabed

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon for:			
(i) Rocky seabed - continue to manage use of scallop dredgers and beam trawlers in a way that minimises potential damage to wildlife, support introduction of fisheries zoning and other appropriate management of fisheries. 	MAFF, DSFC, EN, Agency	3k	● ● ● ● ●
		2k	● ● ● ● ●

17k Rocky foreshore - The rocky foreshore habitats of Devon are among the richest in Britain and are home to a diverse and fascinating range of plants and animals. Threats to this habitat include oil spills which can cause extensive medium-to long-term damage to foreshore communities, pollution from sewage outfalls, shoreline developments which cause a fundamental change to intertidal environments and recreation pressures such as pollution from lost fishing tackle and shellfish collecting. Large sections of the coastal zone within this LEAP area are intertidal SSSIs either for their

geological or wildlife interest; these include Marsland to Blackchurch Rock, Brownsham to Clovelly and Hobby to Peppercombe SSSIs. Some sites already receive a degree of protection through their inclusion within landscape designations such as Area of Outstanding Natural Beauty (AONB) and Heritage Coast, or as geological SSSIs. Management of the former is secured by the Northern Devon Coast and Countryside Service and the latter by English Nature.

Target: (i) Seek to improve understanding of the rocky foreshore habitats of Devon in terms of their distribution, the ecology of their fauna and flora, and the processes, man-induced and natural, that affect them.

Action Table 17k - Rocky Foreshore

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon and North Devon for:			
(i) Rocky foreshore - seek to ensure that leisure and commercial boat maintenance laws prevent chemical pollution.	Agency, LAs, NDCCS	<1k p.a.	● ● ● ● ●
(ii) Provide advice on suitable alternatives to bleach and other harmful agents with respect to municipal cleaning.	EN, Agency	<1k p.a.	● ● ● ● ●

17l Woodland pasture and parkland (linked species: Goldenhair lichen, lungworts *Lobarion* sp.) - Wood pasture and parkland, such as that at Okehampton Deer Park, are historic habitat systems derived from glade browsing. The South West has some particularly fine examples of wood pasture, especially medieval deer parks. These are of great importance for the conservation of lichens and mosses, as well as fungi and insects that depend on dead wood.

Targets: (i) Maintain the current extent, distribution and quality of parkland and wood pasture in Devon.
(ii) Extend and improve knowledge of the resource of parkland and wood pasture in Devon, its constituent communities and species, and management options for conservation and enhancement.

Action Table 17l - Woodland Pasture and Parkland

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon for:			
(i) Wood pasture and parkland - encourage the safeguarding and managing of sites, and research and monitoring.	EN, DWT, LAs, MAFF, Site owners	1k p.a.	● ● ● ● ●

17m Sand martin and kingfisher populations - Whilst not identified species in Biodiversity Action Plans both these species have high public appeal. They are typical birds of lower reaches of rivers, where erosion creates high, vertical banks in which they can excavate nesting tunnels. Erosion control and other river management practices not only may directly destroy nest sites but can stabilise eroding faces, leading to subsequent abandonment. We need to have a better understanding of the numbers and distribution of these birds, which are also vulnerable to population fluctuations as a result of hard winters (kingfisher) or drought in wintering areas (sand martin). Quarries are also potential nest sites for sand martins.

Action Table 17m - Sand Martin and Kingfisher Populations

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
(i) Retain all known sand martin and kingfisher sites and seek to create suitable conditions for colonization elsewhere.	Agency, NT	<1k p.a.	● ● ● ● ●

17n Earth science sites and features - There are concerns over the impact of quarrying on landscape and earth science features. Regionally important geological sites (RIGS) will be identified to aid their protection. RIGS are places that are considered to be especially important for the geology they show. The Devon RIGS Group is responsible, with the help of geologists in the County, for the identification of sites of geological importance and seeks to promote geological conservation by working with local authorities, landowners and others.

The following sites in the catchment have been identified as RIGS by the Devon RIGS Group and Torridge District Council and are now awaiting recognition by West Devon District Council. We are keen to see this designation formalised as it will give extra protection to these valuable sites: Colpit Quarry, Hartland; Rosemoor Quarry; Barley Grove, Torrington; Bradworthy Mill Quarry; Devil's Stone, Shebbear; Beam Quarry, Monkleigh; Friars Hele Cross; River Okement, Exbourne; Solland Quarry. Dartmoor National Park Authority is currently identifying RIGS within its area.

Coastal landforms such as those at Hartland Quay, Westward Ho! and the shingle ridge at Northam Burrows also deserve recognition and protection from threats such as recreation, rising sea level, sea defence and cliff stabilisation projects.

Some sites already receive a degree of protection through their inclusion within landscape designations such as Area of Outstanding Natural Beauty (AONB) and Heritage Coast, or as geological SSSIs. Management of the former is secured by the Northern Devon Coast and Countryside Service and the latter by English Nature.

Action Table 17n - Earth Science Sites and Features

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
Implement actions from Biodiversity Action Plans for Devon, North Devon and Dartmoor for earth science sites and features.			
(i) Promote measures to prevent loss of earth science sites and features in rivers and floodplains.	Agency, *NT, LAs*	unknown	● ● ● ● ●
(ii) Identify and document County Geological Sites.	Devon RIGS Group, *Agency, LAs, EN, DNPA*	< 1k p.a.	● ● ● ● ●
(iii) Encourage greater appreciation and understanding of County Geological Sites.	Agency, DCC	<1k p.a.	● ● ● ● ●

Issue 18 Integrated Coastal Zone Management

Associated Plans: Taw Torridge Estuaries Action Plan[32]; Bridgwater Bay to Bideford Bay Shoreline Management Plan[33]; Bideford Harbour Oil Spill Contingency Plan

Devon and Cornwall have one of Europe's finest natural and historic coastlines. There are numerous bodies in this area, which have formed partnerships and developed coastal initiatives over a number of years, including Estuary Management Plans, Heritage Coasts, Shoreline Management Plans, Marine Action Plans etc. Components of LEAPs also relate to the coastal zone.

The Atlantic Living Coastlines Project seeks to draw these threads together and produce a strategy for Integrated Coastal Zone Management. This project is funded from the EU TERRA fund with funding matched by existing expenditure on coastal zone management in the area (including the Agency's LEAPs for Devon and Cornwall). It is intended that the outputs of the project will be extended to other coastal regions across Europe. The Agency is represented on the project's sponsors group and a special focus group which has been set up to examine the use of data and technology in coastal zone management.

A **Shoreline Management Plan (SMP)** is a document which sets out a strategy for coastal defence for a specified length of coast, taking account of natural coastal processes, human and other environmental influences and needs.

SMPs are part of an initiative on the future planning of our coastline, backed by MAFF, the Association of District Councils, English Nature and ourselves.

The Agency, in partnership with the North Devon and Somerset Coastal Group, have prepared a Bridgwater Bay to Bideford Bay SMP, which was adopted by all the coastal operating authorities in December 1998. The SMP is reviewed every five years.

Oil Pollution - In the event of a major coastal oil pollution incident draft plans are in place, for both the Taw and Torridge estuaries, that identify the following: sensitive areas; options for estuary protection (including possible booming positions); an agreed coastal clean-up plan; and temporary holding sites for oiled waste.

Booming of the Taw/Torridge estuary would be difficult and will not be 100 per cent successful, but will significantly reduce oil pollution upstream of the boom and therefore reduce clean-up requirements. An exercise to train people and test boom deployment methods will be conducted once plans have been tested and finalised.

Taw Torridge Estuaries Action Plan - The Taw/Torridge Estuary is a complex and diverse area that experiences many of the problems typical of estuarine areas in the UK.

W S Atkins was commissioned in August 1992[34] to prepare a management plan for the Taw/Torridge Estuary. In 1995 an Estuary Manager was appointed to review the plan and implement the revised plan. The majority of the actions were implemented after various modifications. The complete revision of the plan was included as one of the conditions of the European Fund that supported the implementation process.

We are members of the partnership that funds and guides the Taw Torridge Estuaries Action Plan. This includes specific projects that help us to meet our objectives.

Shellfisheries in the Taw/Torridge Estuary - Public consumption of shellfish commercially collected from the Taw/Torridge Estuary is regulated by the EC Shellfish Hygiene Directive. Commercial collection of shellfish from some beds in the estuary is prohibited due to bacterial contamination of the shellfish flesh. At other beds, shellfish must be relayed to clean waters before sale to ensure that the quality of shellfish flesh is suitable for public consumption. Water quality improvements to the estuary which will result from SWW Ltd's Clean Sweep scheme will lead to improvements in shellfish quality and may lead to further harvesting potential (see also Issue 2).

If the fishery operates fully again, it would provide a valuable source of income for local fishermen. It will be necessary to ensure that the Agency as Sea Fisheries Committee for the estuary regulates the shellfishery effectively and, if stocks appear under threat, introduces legislation to allow increased control. Any relevant actions will appear in future plans for this catchment.

The Shellfish Waters Directive sets standards to protect shellfish from the discharge of polluting substances and includes a guideline standard for bacteria in shellfish flesh, which is included to protect public health. Following a consultation exercise by the Department of the Environment, Transport and the Regions (DETR) on whether waters, including sites in the Taw/Torridge Estuary, should be designated under this Directive, the Government announced, on 8 July 1999, a revision of designated EC Shellfish Waters. As a result the following three areas are to be designated as shellfish waters: Taw/Torridge Estuary mouth, Taw estuary and Torridge estuary. The Agency is responsible for controlling discharges to ensure the requirements of the Directive are achieved. This action by the Government ensures that the Shellfish Hygiene Directive and the Shellfish Water Directive are now running in parallel, and their key aims of consumer protection and environmental protection will now complement and reinforce each other.

Action Table 18 - Integrated Coastal Zone Management

	Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a	Continue to support the Taw Torridge Estuaries Action Plan.	Agency	1k p.a.	● ● ● ● ●
b	Continue to support the Atlantic Living Coastline Project.	DCC, CCC	< 1k p.a.	● ● ● ● ●
c	Finalize oil pollution contingency plans for the Estuary and implement training and testing.	Agency, LAs, Emergency Services	t.b.c.	● ●
d	If water quality improves consider introduction of regulatory order to allow better management of shellfishery.	Agency, MAFF	unknown	Dependent upon water quality improvement

Issue 19 Impact of Recreational Use of the Catchment

Associated Plans: Taw Torridge Estuaries Action Plan

Many people spend their spare time enjoying our rivers and coasts. The Agency have a duty to promote the use of inland and coastal waters and associated land for recreational purposes, and to take account of the needs of the less able. In carrying out this duty we carefully balance the potential conflicts between conservation and recreation. We will not encourage new access routes or promote the use of particular rights of way without considering the needs of landowners or other countryside interests.

Canoeing - The British Canoe Union have an access agreement which permits the use of the Torridge for canoeing activities covering the section of river from Sheepwash Bridge to Bideford. We have a duty when furthering recreation to ensure safe access whilst having regard for any conservation concerns. Poor access raises safety concerns and we need to ensure that provisions are made for the less able when improving access. Erosion of the existing access points is also a major concern along with the potential disturbance of wildlife using the river corridor. Three sites within this section have been identified as having poor access and in need of improvements.

At Little America planning permission has been granted for a stone-built slipway. This will be constructed using European funding in collaboration with the Northern Devon Coast and Countryside Service. The access has been designed for less able people and will alleviate the pressure on the current access point, which is heavily used and subject to erosion. The proposed site is a little further upstream so therefore will cause less erosion to the bank. A proper access point is required at Weare Giffard. The part of the bank currently used is suffering from erosion due to heavy use. The Taw Torridge Estuary Project has put forward a design that will involve incorporating an access point into the existing headwall structure. At Beaford Bridge there is also no access point and wooden steps are proposed. We have established the partnerships for these projects but will need to attract additional funds.

We have recently launched Rivercall, which provides information over the telephone about current river levels. This will help canoeists and anglers decide whether conditions on the river are suitable for the activity. The information is updated daily and can be obtained by ringing 0930 107705. Calls are charged at 50 pence per minute.

Concerns over impacts of recreation on Estuary - The estuary provides an important recreation resource for the local population, sports clubs, activity centres and tourists. A wide range of activities are carried out including active water sports such as water-skiing, windsurfing, sailing, rowing and canoeing and land based activities such as golf, horse-riding and most particularly walking and cycling, especially on the Tarka Trail.

Water-based recreation is concentrated in key areas and as a result conflicts occur between activities, particularly between motorised and non-motorised water sports. Jet skiing has been identified as a problem not only adversely affecting the

enjoyment of other estuary users, but also causing serious disturbance to wildlife and fish.

Pressures also arise from land-based recreation particularly on Braunton Burrows, causing disturbance to wildlife and erosion of dunes and grassland. These issues will be addressed through the Taw Torridge Estuaries Action Plan (see also Issue 18).

Action Table 19 - Recreation

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Implement access improvements at Little America, Beaford Bridge and Weare Giffard.	BCU, NDCCS, Agency, TDC	2k	● ● ● ● ●
b Work with others to develop sustainable recreation in the catchment which does not conflict with wildlife interests.	Agency, TDC, NDCCS	1k	● ● ● ● ●

Issue 20 Lack of Information on Catchment Resources

Some gaps have been identified in information, which is required to make informed management decisions in the catchment. The required data will be useful to the many organisations working in the catchment.

Aquatic invertebrate populations - An aquatic invertebrate survey was undertaken in 1997 and examination of the data shows encouraging results. In general terms samples obtained from sites on the main river Torridge contained a diverse fauna, with pollution sensitive groups present. As part of the General Quality Assessment (GQA) a national biology survey will be undertaken in 2000. This survey will include sites on the catchments of the Torridge and Hartland Streams.

Need for a wildlife inventory for the Torridge District - There are many sites, including those listed in the Inventory of Culm Grasslands (produced by the Devon Biodiversity Records Centre following a survey of Culm grassland carried out by Devon Wildlife Trust) that are worthy of County Wildlife Site status, but as yet no full wildlife survey has ever been carried out in the Torridge District. There are many areas in the catchment that would benefit from this recognition.

Coarse fish - Routine fisheries surveys have tended to concentrate on juvenile salmonid fish and data collected to date on other species are limited. It is particularly important to improve our knowledge of the distribution of bullheads and the three species of lamprey (brook, river and sea lampreys) as these species are all listed under Annex IIa of the Habitats Directive[35].

Archaeology - Under Section 7 of the Environment Act 1995, the Agency has a duty to have regard to the desirability of protecting and conserving buildings, sites and objects of archaeological, architectural, engineering or historic interest. In order to ensure we fulfil this duty it is important that we ensure we know as much as possible about the archaeological and historic value of the catchment. Improved liaison with relevant organisations and local groups is an important part of this process.

Action Table 20 - Lack of Information on Catchment Resources

Actions	Action Lead By *Other*	Cost to Agency (£)	Financial Year 99 00 01 02 03
a Complete analyis of invertebrate data and add appropriate issues and actions. 	Agency	2k	●
b Encourage the implementation of a survey leading to the production of a wildlife inventory. 	Agency, DWT, DCC	1k	●
c Encourage involvement in surveying for otters in the catchment 	DWT, Agency	1k p.a.	● ● ● ● ●
d Improve knowledge of distribution and abundance of bullhead and lamprey species, identifying lampreys to species level in surveys, and improve awareness of conservation importance of these species amongst field staff. 	Agency	5k	●
e Improve knowledge of archaeological/historic value of the catchment through collaboration with other interested parties. Pilot project to be carried out in another catchment. 	DCC, Agency, English Heritage, Universities, DNPA, North Devon Museum Trust, Devon Archaeological Society	unknown	● ● ● ● ●

5. A Better Environment Through Partnership

We outline here the main ways this plan links to the community, other plans and initiatives in the catchment.

5.1 The LEAP Steering Group

This group represents a range of commercial, local authority and environmental interests. The group comment upon the Consultation Draft and Action Plan prior to public release. They will monitor the implementation of the Action Plan and provide us with specific advice on the importance of issues within the catchment. They act as a communication link between the local community and ourselves, they will help to promote and develop initiatives of benefit to the environment within the catchment. The steering group members are:

	Representing
Mr A Bell	AONB/Countryside Development Officer, Coast and Countryside Service
Mr P Hickman	Torridge District Council
Mr B Butler	National Farmers' Union
Mr R J Chappell	Torridge Environmental Forum
Mr R G Copp	Industry/Watts Blake Bearne North Devon Clay Works
Mr J Daniel	Net Fishing Interests
Mrs R Day	Taw Torridge Estuary Forum
Mr I Edmonds	Bideford Canoe Club - BCU
Mr T Hynes	Northern Devon Coast and Countryside Service
Mr C Inniss *	Devon Fisheries Forum/The River Torridge Fishery Association
Ms M R Lane	Devon Wildlife Trust
Mr R Lascelles	Riparian Owners Association
Mr G Mountjoy	Bideford Angling Association
Mrs T Norton-Smith	The River Torridge Fishery Association
Mr A Vickery	Devon Waste Management
Mr L J Walter	Hartland Parish Council
Mr M Williams	South West Water Ltd

* Mr C Inniss vacated his place on the steering group in June 1999.

5.2 Links with Development Plans

The Town and Country Planning System in England operates at several levels. Broadly these are national, regional, countywide, district and site specific. Generally decisions taken at one level need to accord with those taken at a higher level. Increasingly international obligations, e.g. through the European Union or the United Nations, are influencing the planning system. Such influence is particularly important in environmental issues and is normally evident through amendments to the relevant national legislation.

We can control some of the factors influencing the quality of the environment, but we have limited control over the way that land is developed. This is the responsibility of local planning authorities.

Local authorities prepare statutory development plans. The policies in these plans will guide the way that land is developed in the future. We provide advice and guidance to local planning authorities and work with them to develop and adopt policies that minimise the impact of any development upon the environment. We will reinforce these policies, where we can, when commenting on planning matters or in making our own decisions. LEAPs are one way in which we aim to influence the content of local authority plans.

The Devon County Structure Plan First Review - adopted February 1999 - provides a framework for development and land use within Devon for the period up to 2011. The plan contains policies and advice to ensure protection and conservation of the environment in a sustainable way. It proposes the development of about 75,800 dwellings in Devon and provides for about 755 hectares of employment land (see Table 4).

The Torridge and Hartland Streams catchment area falls within the jurisdiction of three local authorities: Torridge District Council, North Devon District Council and West Devon Borough Council. A small part falls within Dartmoor National Park. They are all required to prepare 'Local Plans' for their area, which give more detail and basis for their day-to-day decisions

on planning applications or other matters connected with land use.

To ensure consistency across the planning districts within the catchment, all districts are issued with Environment Agency liaison documents. These documents give information on our liaison with local planning authorities, our own procedures and the types of Plans and developments requiring Agency consultation. Specific advice is also provided on settlements where there are sewerage infrastructure deficiencies that are, or could be, affecting water quality.

Table 4 - Future Land Use Proposals in the Catchment

Local Authority (approx % in catchment)	Housing Provision 1995 - 2011 (Dwellings) as per Devon County Structure Plan	Employment Land Provision 1995 - 2011 (ha) as per Devon County Structure Plan	Plan Status	Existing Environment Protection Polices
West Devon Borough Council (25%)	4,100	35	West Devon Borough Local Plan adopted January 1997	A wide range of protection policies
Torridge District Council (70%)	7,100	65	Torridge District Local Plan, Committee Version.	Protection policies being developed for Draft Local Plan
North Devon District Council (1%)	6,800	70	North Devon Local Plan - Public Inquiry March - September 1997. Inspector's Report awaited.	A wide range of protection polices.
Dartmoor National Park (4%)	800 (but none in the catchment)	None	Dartmoor National Park Local Plan (Revised) including Minerals & Waste Policies: Adopted Version February 1996	A wide range of protection policies

5.3 Links with Non-statutory Plans

The protection and management of the environment requires the Agency and other organisations to work together in partnership. This LEAP gives the basis for a greater understanding of the Agency's work, enabling such partnerships to be developed.

The Agency is working with various bodies that also seek to develop partnerships and collaborative work through other non-statutory plans. These include:

- Devon Biodiversity and Earth Science Action Plan
- The Nature of Dartmoor: A Biodiversity Profile
- Dartmoor Biodiversity Action Plan (in preparation)
- Landscape Policy Areas Local Plan
- Devon's Local Agenda 21 Network Issues Report
- Bridgwater Bay to Bideford Bay Shoreline Management Plan (in preparation)
- Bideford Bay to Land's End Shoreline Management Plan (information collection)
- Taw/Torridge Estuary Management Plan, W S Atkins (currently being revised)
- Heritage Coast Management Plan
- Countryside Service Area Plan (untitled)

5.4 Local Environment Agency Plans and Catchment Management Plans

The former NRA prepared a sequence of plans, called Catchment Management Plans, which covered river catchments in England and Wales. This LEAP supersedes previous plans and covers all the duties relating to environmental management and improvement for which the Environment Agency has responsibility in this catchment.

National Rivers Authority Catchment Management Plans in the Torridge and Hartland Streams Catchment:

River Torridge Catchment Management Plan:
Consultation Report May 1993, Final Report September 1994, First Annual Review September 1995, Second Annual Review October 1996, Third Annual Review January 1998.

Taw/Torridge Estuary Catchment Management Plan:
Consultation Report August 1993, Action Plan March 1995, First Annual Review April 1996, Second Annual Review April 1997.

Hartland Streams Catchment Management Plan:
Consultation Report June 1995, Action Plan March 1996, First Annual Review combined with Torridge Third Annual Review January 1998.

5.5 Links with Local Agenda 21

Agenda 21 is the global action plan endorsed at the United Nations Conference on Development and the Environment in 1992. It has been designed to achieve sustainable development within all levels of our society - from national government to individuals in their homes and workplaces.

Local authorities are assisting their local communities in developing strategies and action plans for sustainable development.

In West Devon, the Agenda 21 process is led by the West Devon Environmental Network, a community-based network created in 1992 which is now a charity. Extensive public consultation led to the formation of 16 principles that are the basis for Agenda 21 in West Devon.

In Torridge District, Torridge Agenda 21 Environmental Forum, (Tag 21), also a community-based network, created in 1998, lead Agenda 21.

Dartmoor National Park Authority endorses the Statement on National Parks, Sustainability and Work on Local Agenda 21; this statement provides a commitment to the pursuit of sustainability and Local Agenda 21 and forms the basis for future action.

The Agency is committed to encouraging more sustainable lifestyles for all, through our work and in partnership with others. This is captured in our vision, which is 'a better environment in England and Wales for present and future generations'.

In Devon, we have nominated an officer with responsibility for Agenda 21 who will liaise with the above local authorities and other individuals or groups to progress sustainable development in the county. We are already involved in a number of groups and projects across Devon.

5.6 Links with the Water Industry

The Agency is responsible for the environmental regulation of water companies in England and Wales whilst OFWAT is responsible for the financial regulation. The Agency works with the water companies in order to ensure best possible use of available resources.

OFWAT is undertaking a review of water prices that will result in a review of improvements required for the period 2000-2005; the outcome of this will be 'Asset Management Plan 3' (AMP3). The Agency's proposals for the National Environment Programme for water companies from 2000 to 2005 were submitted to Government in May 1998 in the document 'A Price Worth Paying'. Following consultation with the Agency and OFWAT, the DETR published guidance in September to OFWAT for the environmental and quality objectives to be achieved by the water industry in the period 2000 to 2005; this is the report 'Raising the Quality'. This guidance has now been translated into detailed environmental obligations, which have been agreed by the Secretary of State for each water company. There are no water resources obligations within the Torridge and Hartland Streams LEAP area.

AMP3 also requires the water companies to revise their water demand forecasts, review their resource availability and consider any potential resource options to meet forecasted deficits within the planning horizon. In parallel with this the Agency require the water companies to complete Water Resource Plans by March 1999. The Water Resource Plans require water companies to produce demand forecasts and compare them with their available resources for the next 25 years. Potential demand or resource-

management options, including leakage reduction, have to be considered, and, if necessary, any resource development options which may be required to meet the forecast demand. These plans have been received and a report on them, 'Planning Public Water Supplies', was sent to the DETR in June 1999. The companies will be expected to update these plans on an annual basis and the report also details the main changes the Agency wishes to see incorporated in the revisions of the plans.

5.7 The Environment Agency and Public Information

We are committed to being an open organization; we will provide information about our decisions and actions and ensure consultation for our customers on plans and reports. Our customer charter sets out how we aim to achieve this commitment. We must maintain a set of Public Registers which hold information on the activities we regulate and the monitoring we carry out; in addition to the information we place in Registers, we make available to the public most other environmental information that we hold.

We have produced a guide to information available to the public, which sets out what information is accessible and how to obtain it. Information is usually provided free of charge, but for large and complex requests we may charge for staff time and materials. Confidential information, incomplete or draft reports, and information where disclosure may lead to environmental damage are generally not available. Some environmental details and information about our public registers are available on the Internet on http://www.environment-agency.gov.uk.

If you wish to obtain more information about anything presented in this Action Plan, please contact the Team Leader LEAPs at our Exminster office.

Appendix One - Duties, powers and interests of the Environment Agency

The Environment Agency has a wide range of interests in the areas of water management, waste management and pollution prevention and control. Whilst many of these interests are supported by statutory duties and powers, much of the Agency's work is advisory, with the relevant powers resting with other bodies such as local planning authorities. The

Agency Duty	The Agency has powers to:	The Agency has an interest (but no direct powers) in:	Partnership
Water Resources The Agency has a duty to conserve, redistribute, augment and secure the proper use of water resources.	• Grant or vary water abstraction and impoundment licences on application. • Revoke or vary existing licences to reinstate flows or levels to surface waters or groundwater which have become depleted as a result of abstraction, and are subject to a liability for compensation.	• The more efficient use of water by water companies, developers, industry, agriculture and the public and the introduction of water efficiency measures and suitable design and layout of the infrastructure.	• The Agency is committed to water-demand management and will work closely with water companies and developers, local authorities and relevant organisations to promote the efficient use of water. The Agency acknowledges that new resources may be needed in the future and supports a twin-track approach of planning for water resource development alongside the promotion of demand-management measures. The Agency seeks to influence planning decisions for new development by encouraging the inclusion of water conservation measures in new properties, particularly in areas where water resources are under stress, and by ensuring that planning authorities allow for the lead time for resource development.

Agency Duty	The Agency has powers to:	The Agency has an interest (but no direct powers) in:	Partnership
Flood Defence The Agency has a duty to exercise general supervision over all matters relating to flood defence throughout each catchment.	• Control, through Land Drainage consents, of development within 8 m of main river (Water Resources Act 1991, Section 109) or construction of a structure that would affect the flow of an ordinary watercourse (Land Drainage Act, 1991 Section 23). • Produce flood risk maps for all main rivers under S105 of Water Resources Act 1991. • Undertake works to main rivers using permissive powers. • Issue flood warnings relating to main river to the public, local authorities and the police. • Consent mineral working within 16 m of main rivers.	• Granting of planning permission throughout a catchment but especially floodplains where development can significantly increase flood risk. This permission is granted by local planning authorities. • Installation of surface water source control measures e.g. flood attenuation structures. • Supervising the maintenance of ordinary watercourses which is a local authority remit, but may impact on main rivers. • Installation of buffer zones which reduce flood risk and have significant environmental benefits. • Urban and rural land use and measures that can reduce flood risk or the need for watercourse maintenance.	• As a statutory consultee on planning applications within main river floodplains the Agency offers advice based on knowledge of flood risk. It also advises on the environmental impacts of proposed floodplain development. • The Agency will encourage best practice, including source control measures and common standards, among local authorities and riparian owners to protect and enhance the environment. The Agency works with the civil authorities to prepare flood warning dissemination plans and supports their endeavours to protect communities at risk.
Water Quality The Agency has a duty to monitor, protect, manage and, where possible, enhance the quality of all controlled waters including rivers, groundwaters, lakes, canals, estuaries and coastal waters through the prevention and control of pollution.	• Issue discharge consents to control pollution loads in controlled waters. • Regulate discharges to controlled waters in respect of water quality through the issue and enforcement of discharge consents. • Issue 'works notices' where action is required to reduce the risk of pollution. • Prosecute polluters and recover the costs of clean-up operations. • Serve prohibition notices (with or without conditions) on highway authorities to require treatment and pollution measures for highway runoff.	• The greater use of source control measures to reduce pollution by surface water runoff. • Prevention and education campaigns to reduce pollution incidents. • The provision of highway runoff control measures, which is a highway authority remit.	• The Agency will liaise with local authorities, developers, the Highways Agency, industry and agriculture to promote pollution prevention and the adoption of source control measures. As a statutory consultee on planning applications, the Agency will advise local planning authorities on the water quality impact of proposed developments.

Agency Duty	The Agency has powers to:	The Agency has an interest (but no direct powers) in:	Partnership
Air Quality The Agency has a duty to implement Part 1 of the Environment Protection Act 1990.	• Regulate the largest technically complex and potentially most polluting prescribed industrial processes such as refineries, chemical works and power stations including enforcement of, and guidance on, BATNEEC and BPEO. • Have regard to the government's National Air Quality Strategy when setting standards for the releases to air from industrial processes.	• The vast number of smaller industrial processes which are controlled by local authorities. • Control over vehicular emissions and transport planning.	• The Agency provides data on IPC processes and advice on planning applications to local authorities. The Agency is willing to offer its technical experience to local authorities on the control of air pollution. The Agency wishes to liaise with local authorities in the production of their Air Quality Management Plans. The Agency will advise and contribute to the government's National Air Quality Strategy.
Radioactive Substances The Agency has a duty under the Radioactive Substances Act 1993 to regulate the use of radioactive materials and the disposal of radioactive waste.	• Issue certificates to users of radioactive materials and disposers of radioactive waste, with an overall objective of protecting members of the public.	• The health effects of radiation.	• The Agency will work with users of the radioactive materials to ensure that radioactive wastes are not unnecessarily created, and that they are safely and appropriately disposed of. The Agency will work with MAFF to ensure that the disposal of radioactive waste creates no unacceptable effects on the food chain. • The Agency will work with the Nuclear Installations Inspectorate to ensure adequate protection of workers and the public at nuclear sites. The Agency will work with the HSE on worker protection issues at non-nuclear sites.
Waste Management The Agency has a duty to regulate the management of waste, including the treatment, storage, transport and disposal of controlled waste, to prevent pollution of the environment, harm to public health or detriment to local amenities.	• Vary waste management licence conditions. • Suspend and revoke licences. • Investigate and prosecute illegal waste management operations.	• The siting and granting of planning permission for waste management facilities. This is conducted by the waste industry and local planning authorities. The Agency, as a statutory consultee on planning applications, can advise on such matters.	• The Agency will work with waste producers, the waste management industry and local authorities to reduce the amount of waste produced, increase re-use and recycling and improve standards of disposal.

Agency Duty	The Agency has powers to:	The Agency has an interest (but no direct powers) in:	Partnership
Contaminated Land The Agency has a duty to develop an integrated approach to the prevention and control of land contamination, ensuring that remediation is proportionate to risks and cost-effective in terms of the economy and environment.	• Regulate the remediation of contaminated land designated as special sites. • Prevent future land contamination by means of its IPC, Water Quality and other statutory powers. • Report on the state of contaminated land.	• Securing with others, including local authorities, landowners and developers, the safe remediation of contaminated land.	• The Agency supports land remediation and will promote this with developers and local authorities and other stakeholders.
Conservation The Agency will further conservation, wherever possible, when carrying out water management functions; have regard to conservation when carrying out pollution control functions; and promote the conservation of flora and fauna which are dependent on an aquatic environment.	• The Agency has no direct conservation powers but uses its powers with regard to water management and pollution control to exploit opportunities for furthering and promoting conservation.	• The conservation impacts of new development. These are controlled by local planning authorities. • Protection of specific sites or species, which is a function of English Nature. The Agency does, however, provide advice to local authorities and developers to protect the integrity of such sites or species. • Implementation of the UK Biodiversity Plan for which it is the contact point for twelve species and one habitat.	• The Agency supports action to sustain or improve natural and man-made assets so that they are made available for the benefit of present and future generations. Many development schemes have significant implications for conservation. The Agency will work with developers, local authorities, conservation bodies and landowners to conserve and enhance biodiversity.
Landscape The Agency will further landscape conservation and enhancement when carrying out water management functions; have regard to the landscape when carrying out pollution control functions; and promote the conservation and enhancement of the natural beauty of rivers and associated land.	• The Agency must further the conservation and enhancement of natural beauty when exercising its water management powers and have regard to the landscape in exercising its pollution control powers.	• The landscape impact of new development, particularly within river corridors. This is controlled by local planning authorities.	• The Agency produces River Landscape Assessments and Design Guidelines which it uses when working with local authorities and developers to conserve and enhance diverse river landscapes.
Archaeology The Agency has a duty to consider the impact of all of its regulatory, operational and advising activities upon archaeology and heritage, and implement mitigation and enhancement measures where appropriate.	• The Agency must promote its archaeological objectives through the exercise of its water management and pollution control powers and duties.	• Direct protection or management of sites of archaeological or heritage interest. This is carried out by local planning authorities, County Archaeologists and English Heritage.	• The Agency will liaise with those organisations that have direct control over archaeological and heritage issues to assist in the conservation and enhancement of these interests.

Agency Duty	The Agency has powers to:	The Agency has an interest (but no direct powers) in:-	Partnership
Fisheries The Agency has a duty to maintain, improve and develop salmon, trout, freshwater and eel fisheries.	• Regulate fisheries by a system of licensing. • Make and enforce fisheries byelaws to prevent illegal fishing. • Promote the free passage of fish and consent fish passes. • Monitor fisheries and enforce measures to prevent fish entrapment in abstractions. • Promote its fisheries duty by means of land drainage consents, water abstraction applications and discharge applications.	• The determination of planning applications which could affect fisheries.	• Many development schemes have significant implications for fisheries. The Agency will work with anglers, riparian owners, developers and local authorities to protect fisheries.
Recreation The Agency has a duty to promote rivers and water space for recreational use.	• The Agency contributes towards its recreation duty through the exercise of its statutory powers and duties in water management.	• Promotion of water sports. This is carried out by the Sports Council and other sport bodies.	• The Agency will work with the Countryside Commission, the Sports Council, British Waterways and other recreational and amenity organisations to optimise recreational use of the water environment.

Appendix Two - The RQO Classification

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 (NRA 1994), which replaces the former NWC scheme.

These classes reflect the chemical quality needed by different types of river ecosystem including the types of fishery they can support. We set RQOs based on the need to protect current water quality and future use.

Table 5 Standards for the Five River Ecosystem Use Classes

Use Class	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mgN/l 90%ile	Un-ionised Ammonia mgN/l 95%ile	pH 5%ile & 95%ile	Hardness Copper mg/l $CaCO_3$	Dissolved Zinc µg/l 95%ile	Total 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 1,000 2,000	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 1,000 2,000	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 Three - River Quality Objectives

Table 6 River Quality Objectives for the Catchment

River	Stretch name	RQO	Long Term RQO	Set aside used 1998
Torridge	Source - Fordmill Farm	1		
	Fordmill Farm - Putford Bridge	2	1	
	Putford Bridge - Gidcott	2	1	
	Gidcott - Kingsley Mill	2		
	Kingsley Mill - Rockhay Bridge	2		
	Rockhay Bridge - Hele Bridge	2		
	Hele Bridge - Newbridge	2		
	Newbridge - Beaford Bridge	2		
	Beaford Bridge - Undercleave	2		
	Undercleave - Town Mills Torrington	2		
	Town Mills Torrington - Rothern Bridge	2		
	Rothern Bridge - Normal Tidal Limit	2		
Yeo (Bideford)	Foxdown - Tuckingmill	2		
	Tuckingmill - Hoopers	2		
	Hoopers - Normal Tidal Limit	2		
Duntz	Source - Yeo (Bideford) confluence	2		
Lydeland Water	Source - Duntz confluence	2		
Langtree Lake	Source - Torridge confluence	2		
Peagham Stream	Source - B3227 Road Bridge	2 (2001)		
	B3227 Road Bridge - Torridge confluence	2		
Woolleigh Brook	Source - Torridge confluence	2		
Mere	Coleford Bridge - A386 Bridge at Merton	2		
	A386 Bridge at Merton - Torridge confluence	2		
Little Mere	Woolladon Moor - Downstream Stockleigh Quarry	2		
	Downstream Stockleigh Quarry - Mere confluence	2		
East Okement	Source - Okement confluence	1		
West Okement	Source - Meldon Reservoir Inflow	1		pH
	Meldon Reservoir - Downstream Meldon Dam	1		pH
	Downstream Meldon Dam - Meldon Viaduct	1		
	Meldon Viaduct - Downstream Meldon Quarry Bridge	1		
	Downstream Meldon Quarry Bridge - Okehampton Hospital	1		
Okement	Okehampton Hospital - Knowle Bridge	1		
	Knowle Bridge - Brightley Bridge	1		
	Brightley Bridge - South Dornaford	2	1	
	South Dornaford - Woodhall Bridge	1		
	Woodhall Bridge - Torridge confluence	1		
Hole Brook	Source - Okement confluence	2		
Lew (Torridge)	Source - Hole Stock Bridge	1		
	Hole Stock Bridge - Great Rutleigh	2	1	
	Great Rutleigh - Hatherleigh Bridge	2	1	
	Hatherleigh Bridge - Torridge confluence	2	1	
Pulworthy Brook	Source - Lewmoor Bridge	3	2	
	Lewmoor Bridge - Lew confluence	4	3	
Hookmoor Brook	Source - Lew confluence	1		
Wagaford Water	Source - Lew confluence	2		
Northlew Stream	Source - Lew confluence	1		
Whiteleigh Water	Source - Torridge confluence	2		
Waldon	Source - Sutcombe	2		
	Sutcombe - Waldon Bridge	2		
	Waldon Bridge - Torridge confluence	2		
Cookbury Stream	Source - Waldon confluence	2		
Dipple Water	Source - Torridge confluence	1		
Clifford Water	Source - Torridge confluence	2	1	
Abbey River	Source - Mean High Water	2		
Welcombe Stream	Source - Normal Tidal Limit	1		

Note: **'Set aside' of data**

In certain circumstances we can 'set aside' data, that is we will not take into account some or all of the results of a particular determinand when we assess compliance with an RQO. For the 1998 classification we 'set aside' pH for two stretches due to low pH being caused by the natural geology of the catchment. This allows us to protect good water quality reflected by other parameters in the RE Classification.

Appendix Four - SSSIs falling within catchment

SSSIs within candidate Special Areas of Conservation

Bursdon Moor	(Culm cSAC)	SS 267 200
Hollow Moor & Odham Moor	(Culm cSAC)	SS 470 015
Kismeldon Meadows	(Culm cSAC)	SS 351 171, SS 343 172
Lundy	(Lundy cSAC)	SS 135 460
Mambury and Stowford	(Culm cSAC)	SS 390 162, SS 386 174
North Dartmoor	(Dartmoor cSAC)	SX 580 850
Thorne and Dove Moors	(Culm cSAC)	SS 413 157, SS 412 145
Marsland to Clovelly Coast	(Tintagel-Marsland - Clovelly Coast cSAC)	SS 212 175 - SS 315 254
Hobby to Peppercombe	(Tintagel - Marsland - Clovelly Coast cSAC)	SS 320 242 - SS 383 242

SSSIs

Beaford Moor	SS 580 147
Brendon Farm	SS 368 077
Common Moor, East Putford	SS 374 180
Common Moor, Langtree	SS 460 132
Coombe Meadows	SS 498 022
Deptford Farm Pastures	SS 275 187
Dunsland Park	SS 409 051
Gilmoor and Moorlands	SX 633 987
Halsdon	SS 555 125
Halstock Wood	SX 607 936
Hannaborough Quarry	SS 529 029
Hunshaw Wood	SS 510 160
Meldon Aplite Quarry	SX 566 919
Meldon Quarry	SX 570 927
Mermaids Pool to Rowden Gut	SS 403 266
Northam Burrows	SS 445 305
Okehampton Park Flush	SX 583 938
Ribson Meadows	SS 495 021
Southmoor Farm	SS 564 003
Taw-Torridge Estuary (part)	SS 470 310
Westward Ho! Cliffs	SS 420 291 - SS 434 296
Whiddon Moor, Luckcroft and Odham Marshes	SS 463 004 - SS 489 001
Whiteleigh Meadows	SS 415 030

Appendix Five - Actions from the Consultation Draft September 1998

Consultation Draft Issue Number	Proposed Action	Number in this Action Plan
Issue 1	a. Develop initatives to further reduce farm-related pollution incidents in the catchment: PRIM - Pollution Reduction by Inspection and Management - trial on the River Lew.	1a
	Review sucess of Farm Waste Management Plan initiative in the catchment.	1b
	b. Relocate monitoring site for Pulworthy Brook to a more representative site.	Completed 1998
	c. Investigate causes of low summer dissolved oxygen levels in the Pulworthy Brook.	No longer required
	d. Promote awareness of the danger to the water environment from synthetic pyrethroids.	1c
	e. Conduct research to determine sediment dynamics and sediment sources in artificial salmon redds.	1d
		New 1e
	f. Support bid for funds for a Devon/Cornwall project to help farmers to reduce impact of farming on the water environment.	1f
	g. Encourage and support fencing of poached areas to stabilize banks and promote tree regeneration.	1g
	h. Continue to support Torridge Headwaters Project.	1h
	i. Consider further investigations into 'flashiness in the catchment'.	Superseded by Exmoor study
	j. Conduct consultation on Groundwater Regulations.	Completed
		New 1i
		New 1j
Issue 2	a. Complete 'Clean Sweep' scheme for Taw/Torridge Estuary (South scheme).	2a
	b. Seek improvements to Okehampton STW through AMP3.	2b
	c. Object to further development leading to increased sewage flow at Kingscott, Little Torrington, Merton, Milton Damerel, Monkleigh, Petrockstow, Riddlecombe, Roborough, Instow, Appledore, Bideford, Bideford-East-the-Water, Northam, Buckleigh Field and Westward Ho!	2c
	d. Seek improvements to sewerage system at Peters Marland.	2d
Issue 3	a. Complete investigation of nutrient status of the River Torridge and take action if appropriate.	3a
Issue 4	a. Implement remediation work to stop pollution of the Hookmoor Brook by Peacewater tip.	4a
	b. Install routine water quality monitoring site on the Peagham Stream above the B3227 Road Bridge.	Completed, monitoring begun
	c. Carry out first phase of programme of investigations and improvements at Deep Moor landfill.	4b
	d. Subsequent phases of programme of investigations and improvements to be implemented.	4c
	e. Support PAYBACK initiative to reduce waste at source.	4d
	f. Provide advice to those companies affected by the Producer Responsibility Obligations.	4e
	g. Investigate any new information relating to fly-tipped sites near end of Old Mines Road, Bideford and Kingsley Park, Westward Ho! and seek to prosecute offenders if possible. Investigate options for cleaning up the site and preventing future fly-tipping.	4f

Consultation Draft Issue Number	Proposed Action	Number in this Action Plan
	h. Investigate closed landfill sites and take action as appropriate	4g
	i. Implement remediation work at Winkleigh closed landfill site	4h
	j. Encourage the public to give information about suspected illegal waste tipping.	4i
	k. Assess risk to and consequence of potential wave erosion at Northam Burrows landfill.	4j
	l. Ensure improvements to waste management and disposal, and culverted section of stream, occur at Pillhead Copse landfill	4k
	m. Investigate the role of Deep Moor landfill in terms of its contribution to waste management in Devon.	4l
Issue 5	a. Pursue the review of the consent to discharge for Meldon Quarry.	5a
	b. Continue to transfer fish from West Okement to the East Okement and elsewhere.	5b
	c. Review revised ball clay discharge consents and environmental impact.	5c
		New 5d
Issue 6	a. Investigate causes of poor water quality in the River Okement and take action as appropriate	Completed
	b. Review results of monitoring of the River Torridge at Gidcott to see if RQO failure recurs.	Completed
	c. Investigate causes of low pH in the West Okement River and take action as appropriate.	Completed
	d. Review results of monitoring of the River Duntz at the Yeo (Bideford) confluence to see if RQO failure recurs.	Not failure 1998
		New 6a
Issue 7	a. Map flood risk areas by conducting flight survey of the coast.	7a
	b. Combine survey information to produce habitat map to examine the possible habitat losses due to 'coastal squeeze'.	7b
	c. Pursue installation of methane gas recovery systems, with high temperature flaring and power generation, at Deep Moor landfill site.	7c
Issue 8	a. Ensure compliance with new regulations for the net and rod fishery.	8a
	b. Encourage wider adoption of catch and release of rod caught salmon especially autumn and spring fish.	Superseded by national byelaws
	c. Agency to act as honest broker if required during negotiation between rod fishery and netsmen leading to net buy-out	8b
		New 8c
		New 8d
Issue 9	a. Evaluate cost benefit of improving fish passage to weirs at Yeo Vale on the Bideford Yeo and Jacobstowe on the Jacobstowe Stream.	9a
	b. Subject to findings of above, implement fish pass construction.	9b
	c. Remove trash dams and other obstacles after fully considering the wider ecological impact.	9c
	d. Identify sites which create problems for the downstream migration of smolts.	9d
	e. Following National Guidance on screening criteria, advise abstractors of Agency screening requirements and work towards implementation.	9e
Issue 10	a. Progress research into the effects of fish-eating birds. Disseminate findings of research and develop actions if appropriate.	10a
Issue 11	a. Record all occurrences of invasive species on Agency-owned sites or flood defence banks we manage and implement control programmes.	11a
	b. Collaborate with Japanese knotweed control programmes considered by others.	11b

Consultation Draft Issue Number	Proposed Action	Number in this Action Plan
	c. Encourage control of invasive plants by riparian owners and other interested bodies.	11c
	d. Raise awareness of problem of introduced aquatic plants among general public and distributors, and discourage suppliers from making these species available.	11d
	e. Encourage removal of invasive aquatic plants where already established.	11e
	f. Check ponds for presence of alien species as part of routine operations.	11f
	g. Discourage stocking of farmed fish and promote habitat improvements as preferred method of increasing brown trout stock levels. In areas where there are discrete brown trout stocks consent will be refused to maintain genetic integrity.	11g
Issue 12	a. Ensure all road schemes meet current environment standard.	12a
	b. Identify areas where flood control standards could be relaxed to improve/enhance wetland habitats.	12b
	c. Construct flood scheme for Bideford Quay.	12c
	d. Advise on flood scheme design at East-the-Water.	12d
	e. Progress flood scheme for properties at Taddiport Bridge.	12e
	f. Provide necessary advice/support for managed retreat at Landcross, Annery Kiln and Bideford.	12f
Issue 13	a. Publish updated regional water resources strategy	13a
	b. Ensure impacts of all options are balanced against the need to secure future supplies as a consequence of the expiry of the Newbridge licence.	13b
	c. Initiate discussions with SWW Ltd regarding visual impact downstream of Meldon outflow.	Natural phenomenon not due to Meldon outflow
Issue 15	a. Conduct fluvial flood warning study on main rivers.	15a
Issue 16	a. Review air quality in the area, in line with National Air Quality Strategy.	16a
	b. Improve knowledge of status of lichen communites in the catchment.	16b
	c. Conduct research to improve understanding of effects of airborne acidification and eutrophication on semi-natural habitats and species.	16c
	d. Ensure all proposals (>10k) for afforestation within the areas of critical load exceedence receive an environmental impact assessment in line with the Forest and Water Guidelines.	16d
Issue 17	a. Complete process of identifying key features, habitats and species in Devon catchments, and set catchment-specific targets where appropriate.	17 (i)
	b. Review activities on Lundy which fall within Agency's remit.	17 (ii)
		New 17 (iii)
Issue 17a	• Blanket bog - includes prevention of uncontrolled burning, protect hydrology.	17a (i)
	• Golden plover and dunlin - need to set targets for increasing breeding populations.	17a (ii)
Issue 17b	• Rhôs pasture - includes promoting management agreements, scrub clearance;	17b (i)
	• Marsh fritillary - includes habitat restoration, correct grazing regime;	17b (ii)
	• Southern damselfly - includes protection of hydrology, possible re-introduction;	17b (iii)
	• Barn owl - provide nestboxes to encourage colonization by barn owls in areas of potential barn owl habitat, secure appropriate management of feeding habitat via land management advice and agri-environment schemes.	17b (iv)
Issue 17c	• Upland heath - includes prevention of uncontrolled burning and overgrazing.	17c (i)

Consultation Draft Issue Number	Proposed Action	Number in this Action Plan
Issue 17d	• Rivers, streams, floodplains and fluvial processes - includes pollution control, production of water level management plans, increase floodplain woodlands where possible;	17d (i)
	• Otter - includes continued post-mortem examinations, habitat reinstatement;	17d (ii)
	• Freshwater pearl mussel - ensure suitable conditions in relevant watercourses to encourage recruitment. Encourage further research and monitoring in Devon and promote awareness of threats to species and their current legally protected status.	17d (iii)
		New 17d (iv)
		New 17d (v)
Issue 17e	• Lowland farmland - promote extensive agricultural systems that have less impact on biodiversity, work with others to reduce nutrient levels, identify and target key watercourses where creation of buffer zones should be encouraged to take up excess fertilizer runoff.	17e (i)
Issue 17f	• Lowland heathland - increase uptake of ESA scheme on Dartmoor, support and contribute towards implementing heathland restoration initiatives.	not in the catchment
Issue 17g	• Estuaries, estuarine habitats and saltmarshes - includes protection from development.	17f (i)
	• Curlew - ensure good advice and publicity to user groups on estuaries of the sensitivity of feeding and roost sites.	17f (ii)
Issue 17h	• Grazing marsh - re-create grazing marsh where it has been lost and create new areas where opportunities arise, e.g., as part of managed retreat at Northam Burrows.	17g (i)
Issue 17i	• Sand dunes - ensure coastal defence works are, through shoreline management plans and related strategies, sympathetic to natural processes, encourage and support research into the cause of falling water tables and possible solutions, encourage and support research into prevailing coastal processes and the effect of coast defences.	17h (i)
Issue 17j	• Sea Cliff and slopes - support and implement strategies (Shoreline Management Plans) for managing coastal zone, avoid disrupting dynamics of natural coastal zone processes by coastal defence and other constructive works, support identification of County Geological Sites of coastal nature.	17i (i)
	• Lundy cabbage - control rhododendron on cliffs of Lundy.	17i (ii)
Issue 17k	• Rocky seabed - continue to manage use of scallop dredgers and beam trawlers in a way that minimizes potential damage to wildlife, support introduction of fisheries zoning and other appropriate management of fisheries.	17j (i)
		New 17k
Issue 17l	• Wood pasture and parkland - encourage the safeguarding and managing of sites, and research and monitoring	17l (i)
Issue 17m	• Support county-wide survey of sand martin and kingfisher nest sites.	Completed
	• Retain all known sand martin and kingfisher sites and seek to create suitable conditions for colonization elsewhere.	17m (i)
Issue 17n	• Promote measures to prevent loss of earth science sites and features in rivers and floodplains.	17n (i)
	• Identify and document County Geological Sites.	17n (ii)
	• Encourage greater appreciation and understanding of County Geological Sites.	17n (iii)
Issue 18	a. Continue to support the Taw Torridge Estuaries Action Plan.	18a
	b. Continue to support Atlantic Living Coastline Project.	18b
	c. Finalize oil pollution contingency plans for the Estuary and implement training and testing.	18c

Consultation Draft Issue Number	Proposed Action	Number in this Action Plan
	d. Complete Bridgwater Bay to Bideford Bay Shoreline Management Plan.	Completed
	e. Consider designation of the estuary under Shellfish Waters Directive.	DETR announced designations
	f. If water quality improves consider introduction of regulatory order to allow better management of shellfishery.	18d
Issue 19	a. Implement access improvements at Little America, Beaford Bridge and Weare Giffard.	19a
	b. Work with others to develop sustainable recreation in the catchment which does not conflict with wildlife interests.	19b
Issue 20	a. Complete analyis of invertebrate data and add appropriate issues and actions.	20a
	b. Encourage Torridge District Council to implement survey for the production of a wildlife inventory.	20b
	c. Encourage involvement in surveying for otters in the catchment.	20c
	d. Improve knowledge of distribution and abundance of bullhead and lamprey species, identifying lampreys to species level in surveys, and improve awareness of conservation importance of these species amongst field staff.	20d
	e. Improve knowledge of archaeological/historic value of the catchment through collaboration with other interested parties. Pilot project to be carried out in another catchment.	20e

Appendix Six - List of Consultees who responded

National Organisations
The Atlantic Salmon Trust
British Hydropower Association
Clean Rivers Trust
The Coal Authority
Council for the Protection of Rural England
English Nature
English Sports Council
Forestry Commission
Friends of the Earth
The House Builders Federation
The Inland Waterways Association
Institute of Freshwater Ecology
Ministry of Agriculture, Fisheries and Food
National Farmers Union
The Ramblers' Association
Royal Holloway Institute for Environmental Research
Royal Society for the Protection of Birds

Regional and Local Organisations
Bishop's Nympton Parish Council
Dartmoor National Park Authority
Devon Archaeological Society
Devon Conservation Forum
Devon County Council
Devon Waste Management Ltd
Devon Wildlife Trust
Instow Parish Council
Northern Devon Coast & Countryside Service
South West Water Limited
Sutcombe Parish Council
Taw & Torridge Estuary Forum
Torridge District Council
Westleigh Parish Council
Woolfardisworthy Parish Council
Yarnscombe Parish Council
Further responses were received from members of the public.

Glossary

Above Ordnance Datum (AOD) - land levels are measured relative to the average sea level at Newlyn in Cornwall. This average level is referred to as 'Ordnance Datum'. Contours on Ordnance Survey maps of the UK show heights in metres above Ordnance Datum.

abstraction - removal of water from surface or groundwater.

abstraction licence - licence issued by the Environment Agency under section 38 of the Water Resources Act 1991 to permit removal of water from a source of supply.

acidification - the detrimental effect of acid rain on soils and freshwater.

algae - a diverse group of simple aquatic plants, some microscopic, which may grow in rivers and the sea in great profusion (blooms).

alien - plant or animal not native to the country concerned.

ammonia - a chemical found in water often as the result of discharge of sewage effluents. High levels of ammonia affect fisheries and abstractions for potable water supply.

aquatic plants - a term given to plants that grow entirely covered by water, like water-milfoil, or at the surface, such as yellow water-lily. Some plants have both aquatic and emergent forms.

aquifer - layer of porous rock able to hold or transmit water.

Area of Outstanding Natural Beauty (AONB) - designated by the Countryside Commission under the National Parks and Access to the Countryside Act 1942, to conserve and enhance the natural beauty of the landscape, mainly through planning controls.

augmentation - the addition of water by artificial input. Usually to 'top up' low river flows in the summer either by groundwater pumping or via reservoir release.

biodiversity - variety of life.

Biochemical Oxygen Demand (BOD) - A standard test which measures, over five days, the amount of oxygen taken up by aerobic bacteria to oxidise organic (and inorganic) matter.

buffer zone - strip of land, 10-100 m wide, alongside a river that is removed from intensive agricultural use.

catchment - the total area from which a single river and its tributaries collect surface runoff.

coarse fish - cyprinid fish and other commonly associated species such as pike, perch and eels of angling significance. The term does not normally refer to minor species such as bullhead, stone loach, minnow and stickleback.

confluence - the point at which two rivers meet.

controlled waste - defined by the Control of Pollution Act 1974, Part 1 section 30. It includes household, industrial and commercial waste.

Conservation Area - the Planning (Listed Buildings and Conservation Areas) Act 1990 imposes on local planning authorities a duty to designate as conservation areas any 'areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance'. Conservation Area status is the main mechanism available to effect conservation policies over a particular neighbourhood or area, as opposed to individual buildings. Designation introduces a general control over the demolition of unlisted buildings and provides the basis for policies designed to preserve or define an area's special architectural or historic interest.

critical load - the annual quantity of acidity, in hydrogen ion equivalents per hectare per year, which can be neutralised by soil or by freshwater's natural buffering capacity.

Culm grassland - this is a local name for the Rhôs pastures found on the Culm Measures. These are characterised by species-rich pastures, typical of poorly drained acid soils, supporting a suite of purple moor-grass and rush communities. They typically form a mosaic of vegetation communities together with heathland, other species-rich grasslands and wet woodland (see also Rhôs pasture).

dangerous substances - substances defined by the European Commission as in need of special control because of their toxicity, bioaccumulation and persistence. The substances are classified as List I or II according to the EC Dangerous Substances Directive.

demand management - activities to manage the amount of water required from a source of supply; includes measures to control waste and/or discourage use.

determinand - a general name for a characteristic aspect of water quality. Usually a feature which can be described numerically as a result of scientific measurement, e.g. pH, BOD, DO, etc.

diffuse pollution - pollution without a single point source, e.g. acid rain, pesticides, urban runoff, etc.

diversity - relates to the number of species present and their abundance.

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

Environmental Quality Standard (EQS) - the concentration of a substance found in the environment that should not be exceeded in order to protect the environment or human health. An EQS is set by the EC through EC Directives and also by the government.

eutrophication - the enrichment of water by nutrients, such as compounds of nitrogen or phosphorus. It causes an accelerated growth of algae and higher forms of plant life.

floodplain - parts of river valleys or coastal plains which are inundated during floods.

groundwater - water contained in the void spaces in pervious rocks and also within the soil.

habitat - natural home of plant or animal.

Integrated Pollution Control (IPC) - an approach to pollution control in the UK which takes account of potential effects upon all environmental media. Applies to prescribed processes and uses the principles of BATNEEC and BPEO.

invertebrates - animals without a backbone, e.g. insects, worms and spiders.

landfill site - site used for waste disposal into/onto land.

leachate - solution formed when water percolates through a permeable medium.

LEADER - European Objective 5b funding helps to redevelop rural areas (large parts of Wales, the South West, the North of England, parts of the Midlands and parts of East Anglia). There are thirteen initiatives which home in on situations of deprivation caused by more specific reasons, the LEADER initiative is for preservation and improvement of the environment in rural areas. The funding from MAFF is administered by the District Councils

lichen - a group of lower plants consisting of a fungus which enfolds an alga, the two living together to their mutual benefit.

Main River - designated under the Water Resources Act 1991 by the Ministry of Agriculture, Fisheries and Food. Formal consent is required for all activities that interfere with the bed or banks of the river or obstruct the flow.

margin - a term used to describe the junction of the water and the bank.

National Nature Reserve (NNR) - a site owned or leased and managed by English Nature and established as reserves under the National Parks and Access to the Countryside Act 1949.

outfall - the point where a river or pipe discharges.

PAYBACK - business environment association.

pH - a measure of the concentration of hydrogen ions in solution. Water with a pH less than 7 is acid and water with a pH of more than 7 is alkaline.

poaching (of fish) - taking fish illegally.

Q95 - standard minimum flow criteria applied to rivers, the flow that on average is equalled or exceeded for 95 per cent of the time.

reach - a length of channel.

rehabilitation - the partial return to a pristine state.

restoration - the return to a pristine state.

Rhôs pasture - Rhôs is a Welsh word that means 'a wet, often heathy grazing pasture'. Nationally the word Rhôs has come to be used to describe this type of unimproved pasture, a characteristic mix of wet heath, rush pasture, fen meadow, mire and scrub. On the Culm Measure of north-west Devon and north-east Cornwall the habitat is known as Culm Grassland.

riparian - relating to or situated on the bank of a river or stream.

riparian owner - owner of land next to river; normally owns riverbed and rights to mid-line of channel.

River Quality Objective (RQO) - the level of water quality that a river should achieve in order to be suitable for its agreed uses.

runoff - water leaving a river catchment. Normally regarded as rainfall minus evapotranspiration (evaporation and loss of water by plants) but commonly used to mean rainwater flowing across the land (also known as overland flow).

salmonid fish - game fish, e.g. trout and salmon.

septic tank - an underground tank used to treat sewage from properties without mains drainage. The sewage is settled and some bacterial treatment occurs. Discharge of effluent is usually to a soakaway system.

set-aside - the EC set-aside scheme was first introduced for the crop year 1991/1992 as part of the Common Agricultural Policy reform. Farmers are compensated for setting aside land used for the production of arable crops.

sewage - liquid waste from cities, towns and villages which is normally collected and conveyed in sewers for treatment and/or discharge to the environment.

sewerage - a system of underground pipes designed to carry sewage to Sewage Treatment Works.

shoal - exposed gravel/pebble-bar deposit.

siltation - the deposit of material carried in suspension.

Site of Special Scientific Interest (SSSI) - a site of national importance designated under the Wildlife and Countryside Act 1981 by English Nature in England. Sites may be designated to protect wildlife, geology or land forms.

sludge - the accumulation of solids from treatment processes.

smolt - young salmon migrating to sea for the first time.

soakaway - system for allowing water or effluent to soak into ground, commonly used in conjunction with septic tanks.

Special Area of Conservation (SAC) - an area designated under the EC Habitats Directive.

spring fish - Multi-Sea-Winter adult salmon returning to freshwater in the early part of the year

strata - layers of rock, including unconsolidated materials such as sands and gravels.

surface water - general term used to describe all the water features such as rivers, streams, springs, ponds and lakes.

sustainable development - development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

wetland - transitional zones between terrestrial and aquatic ecosystems, at least seasonally waterlogged, and capable of supporting plants and animals adapted for life in saturated conditions.

Abbreviations and Units

ADAS	Agricultural Development Advisory Service
Agency	Environment Agency
AMP	Asset Management Plan
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
BATNEEC	Best Available Technique Not Entailing Excessive Cost
BAP	Biodiversity Action Plan
BC	Butterfly Conservation
BCU	British Canoe Union
BDS	British Dragonfly Society
BPEO	Best Practicable Environmental Option
BOD	Biochemical Oxygen Demand
CCC	Cornwall County Council
DBAP	Biodiversity and Earth Science Action Plan for Devon
DBWPS	Devon Bird Watching and Preservation Society
DCC	Devon County Council
DETR	Department of the Environment, Transport and the Regions
DNPA	Dartmoor National Park Authority
DO	Dissolved Oxygen
DoE	Department of the Environment
DSFC	Devon Sea Fisheries Committee
DWT	Devon Wildlife Trust
EC	European Council
EN	English Nature
EQS	Environmental Quality Standard
ERS	Exposed Riverine Sediments
ESA	Environmentally Sensitive Area
EU	European Union
GQA	General Quality Assessment
IPC	Integrated Pollution Control
JNCC	Joint Nature Conservation Committee
LA	Local Authority
LEAP	Local Environment Agency Plan
MAFF	Ministry of Agriculture, Fisheries and Food
MNA	Marine Natural Area
NDDC	North Devon District Council
NDCCS	Northern Devon Coast and Countryside Service
NERC	National Environmental Research Council
NFU	National Farmers Union
NRA	National Rivers Authority
NT	National Trust
NWC	National Water Classification
OFWAT	The water industry regulator
PPG	Planning Policy Guidance
RE	River Ecosystem
RIGS	Regionally Important Geological Site

RQO	River Quality Objective
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SMP	Shoreline Management Plan
SSA	Strategic Supply Area
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SWW Ltd	South West Water Limited
TDC	Torridge District Council
TFA	Torridge Fishery Association
TTEP	Taw Torridge Estuary Project
UK	United Kingdom
UWWTD	Urban Waste Water Treatment Directive
WDBC	West Devon Borough Council
WRA	Waste Regulation Authority

Units

°C	degrees centigrade
g	grams
ha	hectare
km	kilometres
km^2	square kilometres
l	litre
m	metre
m^3/day	cubic metres per day
m^3/s	cumecs: cubic metres per second
mg	milligrams
Ml	megalitre
Ml/d	megalitres per day
Ml/yr	megalitres per year
mm	millimetre
MW	megawatts
ng/l	nanogram per litre
ppb	parts per billion
$\mu g/m^3$	micrograms per cubic metre
<	less than
≤	less than or equal to
>	greater than
≥	greater than or equal to
%	percentage

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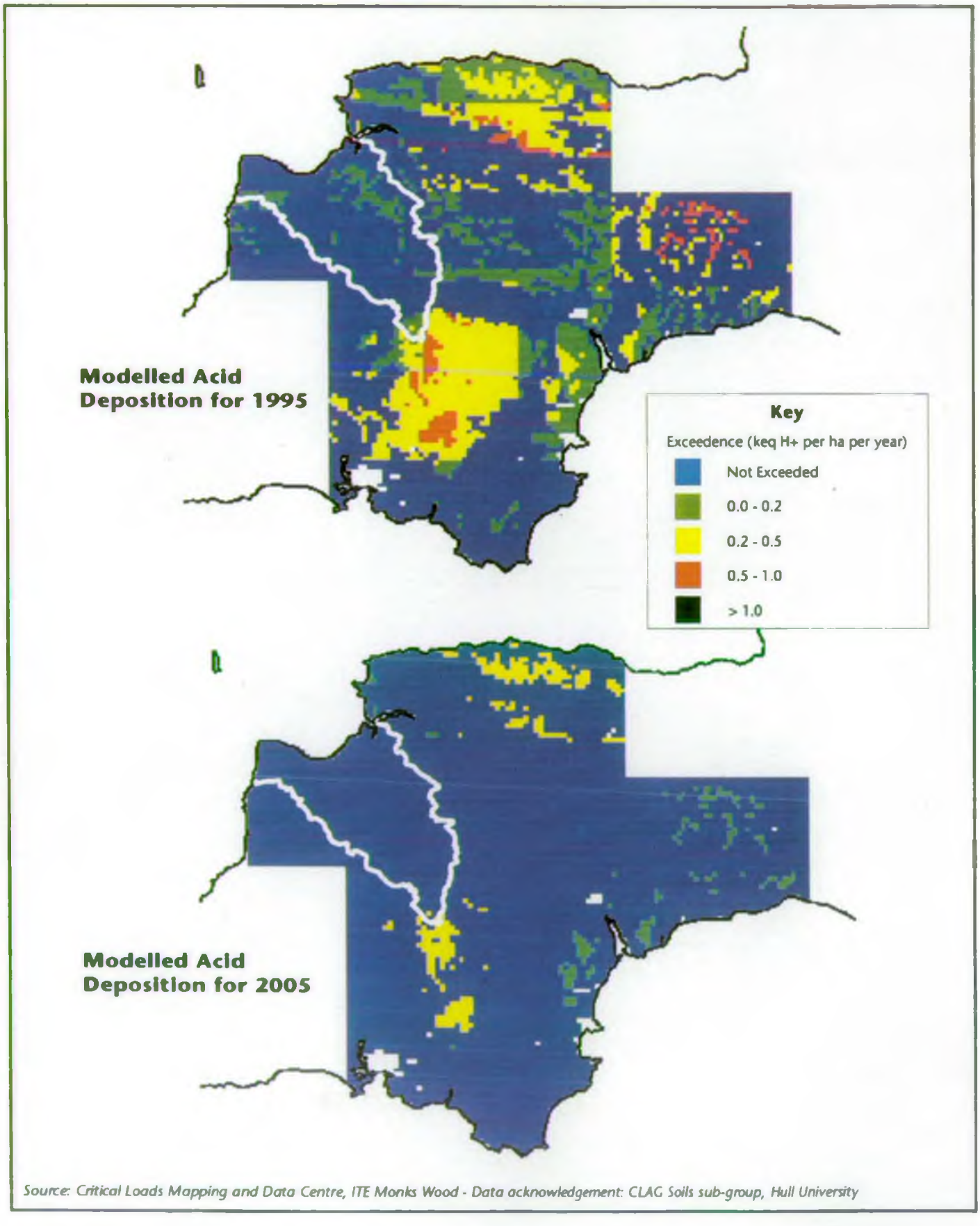
Map 5 - Torridge and Hartland Streams Issues 1, 2, 4, 5, 7.

Map 8 - Exceedences of Critical Loads of Acidity for Soils



Source: Critical Loads Mapping and Data Centre, ITE Monks Wood - Data acknowledgement: CLAG Soils sub-group, Hull University

Map 6 - Torridge and Hartland Streams Issues 9, 11, 12, 14, 16, 17, 19.

Map 7 - Torridge and Hartland Streams District Boundaries and National Park

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