HARTLAND STREAMS
CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT

NRA
National Rivers Authority
South Western Region
June 1995

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ENVIRONMENT AGENCY

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Foreword

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

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

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

Please comment, your views are important.

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

G. R. Bateman.

GEOFF BATEMAN
AREA MANAGER, DEVON

Hartland Streams
Catchment Management Plan
Consultation Report
South Western Region

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1. MISSION AND AIMS

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

Our aims are to:

* Achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters, through the control of pollution.

* Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.

* Provide effective defence for people and property against flooding from rivers and the sea.

* Provide adequate arrangements for flood forecasting and warning.

* Maintain, improve and develop fisheries.

* Develop the amenity and recreational potential of inland and coastal waters and associated lands.

* Conserve and enhance wildlife, landscape and archaeological features associated with inland and coastal waters of England and Wales.

* Improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation authority.

* Ensure that dischargers pay the costs of the consequences of their discharges and, as far as possible, to recover the costs of water environment improvements from those who benefit.

* Improve public understanding of the water environment and the NRA's work.

* Improve efficiency in the exercise of the NRA's functions and to provide challenge and opportunity for employees and show concern for their welfare.

Figure 1 - The Hartland Streams Catchment

Information correct as of March 1995

2. CATCHMENT VISION

The area of North Devon covered by this plan includes the historic villages of Hartland and Clovelly, and is famed for its rugged and spectacular coastline.

Although only a small area the importance of this catchment lies within its special habitats and landscapes, much of which is formally protected.

The entire catchment lies within the North Devon Area of Outstanding Natural Beauty and also includes the Hartland Heritage Coast. This coastline is dramatic, with spectacular cliffs and waterfalls. Inland the area is characterized by steep sided valleys, some of which contain ancient woodlands and are designated as Sites of Special Scientific Interest.

With the coast path, popular villages and beautiful scenery this catchment receives many visitors who contribute towards the rural economy, while access to much of the coastline is accessible to the public via the Somerset and North Devon Coast Path.

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

In an area of such high amenity and ecological value as the Hartland Streams our vision for the future is of a catchment where there is:

* achievement of environmentally sustainable use of the water resource
* maintenance and, where appropriate, enhancement of the biodiversity of aquatic and wetland habitats and species
* conservation and, where appropriate, enhancement of the natural and semi-natural ecosystems through improvements to degraded aquatic and water fringe habitats
* continuing improvement to existing discharges, to meet the most appropriate standards
* development of an agricultural and forestry system which reduces the risk of diffuse pollution and improves the physical habitat of the river system and wetlands for wildlife
* increasing enjoyment and appreciation of the water environment
* minimal risk to people and property from flooding
* maintenance of the natural hydrological cycle, including natural river and wetland functions and processes.

3. INTRODUCTION

This Catchment Management Plan Consultation Report

* describes how the catchment is used

* explains what we are doing to protect or restore the water environment.

Economic and political constraints will influence what we are able to do. For example, the amount of money that the farming community spend on pollution control will make a difference to the extent of water quality improvements.

We have already produced Catchment Management Plans for the River Torridge (Ref. 1), River Taw (Ref. 2) and the Taw/Torridge Estuary (Ref. 3). This plan completes coverage for the major part of North Devon.

3.1 Catchment Management Plans and Development Plans

Whilst we can control some of the things which influence the quality of the water environment we have little direct control over the way that land is developed. This is the responsibility of local planning authorities.

Local Authorities prepare statutory Development Plans. The policies in these plans will guide the way that land is developed in the future. We have published guidance for local planning authorities to encourage them to adopt policies which protect the water environment from harmful development. Where we can we will reinforce these policies when we comment on planning matters, contribute to Local Plans, or if we are making our own decisions.

This Report will highlight where we are concerned about development.

3.2 The Consultation Report

This Consultation Report includes the sections detailed below.

Catchment Characteristics

Provides a brief and general introduction to the catchment describing its key characteristics.

Catchment Uses

In the catchment there are resources and activities which use or influence the water environment. They may either have an impact on, or have certain requirements of the water environment. These various activities are discussed under 'use' headings. We include notes on our role and objectives in managing or promoting this use and comments on the catchment perspective.

Targets and State of the Catchment

We assess the state of the catchment by looking at four aspects of the water environment:

* water quality
* water quantity
* physical features
* flood defence.

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

Issues and Actions

Where we are not reaching targets or fulfilling our objectives we identify the reasons as issues. Where possible we identify actions to resolve the issues. This section summarizes these issues and proposes actions to resolve and minimize them.

3.3 Your Views

We hope that this report will be read by everyone who has an interest in the quality of the water environment in the Hartland Streams Catchment.

Have we identified all the problems in the catchment? If not we would like to know about this.

Do you agree with the River Quality Objectives proposed?

Are there any issues which you want to highlight?

Are there different ways you think we ought to tackle the issues?

Please send your comments by 31 July 1995 to:

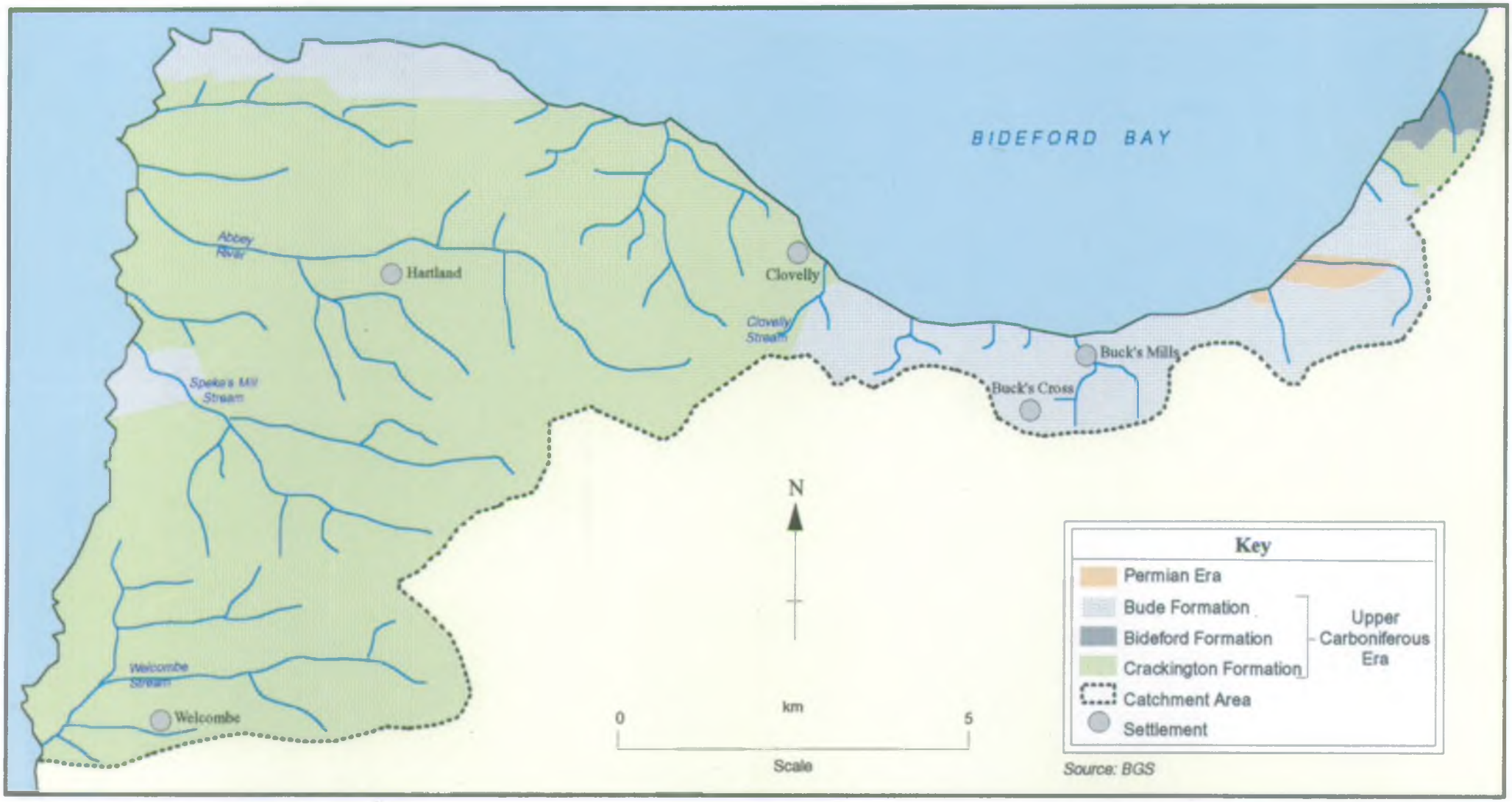
Malcolm Newton.
Area Regulation Officer - Devon Area
NRA South Western Region
Manley House
Kestrel Way
Exeter
Devon EX2 7LQ

Your views will help us finalize the Action Plan and prepare future Reports in Devon.

3.4 The Action Plan

We will collate responses to this report and publish an Action Plan. Progress with the actions identified will be checked annually and progress reports published. Within five years of publishing the Action Plan we will do a major review of the progress that has been made.

Figure 2 - Geology



Information correct as of March 1995

4. CATCHMENT CHARACTERISTICS

4.1 Introduction

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

The Hartland Streams area covers a group of small subcatchments which drain to the North Devon coast between Welcombe and Abbotsham. These coastal streams drain an area of approximately 74 km² and include the subcatchments of the Clovelly Stream, Abbey River, Speke's Mill Stream and Welcombe Stream. The longest river is the Abbey River which is 9.5 km long.

This is a rural catchment and is sparsely populated with isolated farmsteads and villages. The main centres of population are Hartland, Clovelly and Buck's Cross.

Agriculture is the main industry, principally specialist dairy farming. Tourism is also important to the area with the dramatic coastline and historic villages, such as Clovelly, attract thousands of visitors a year.

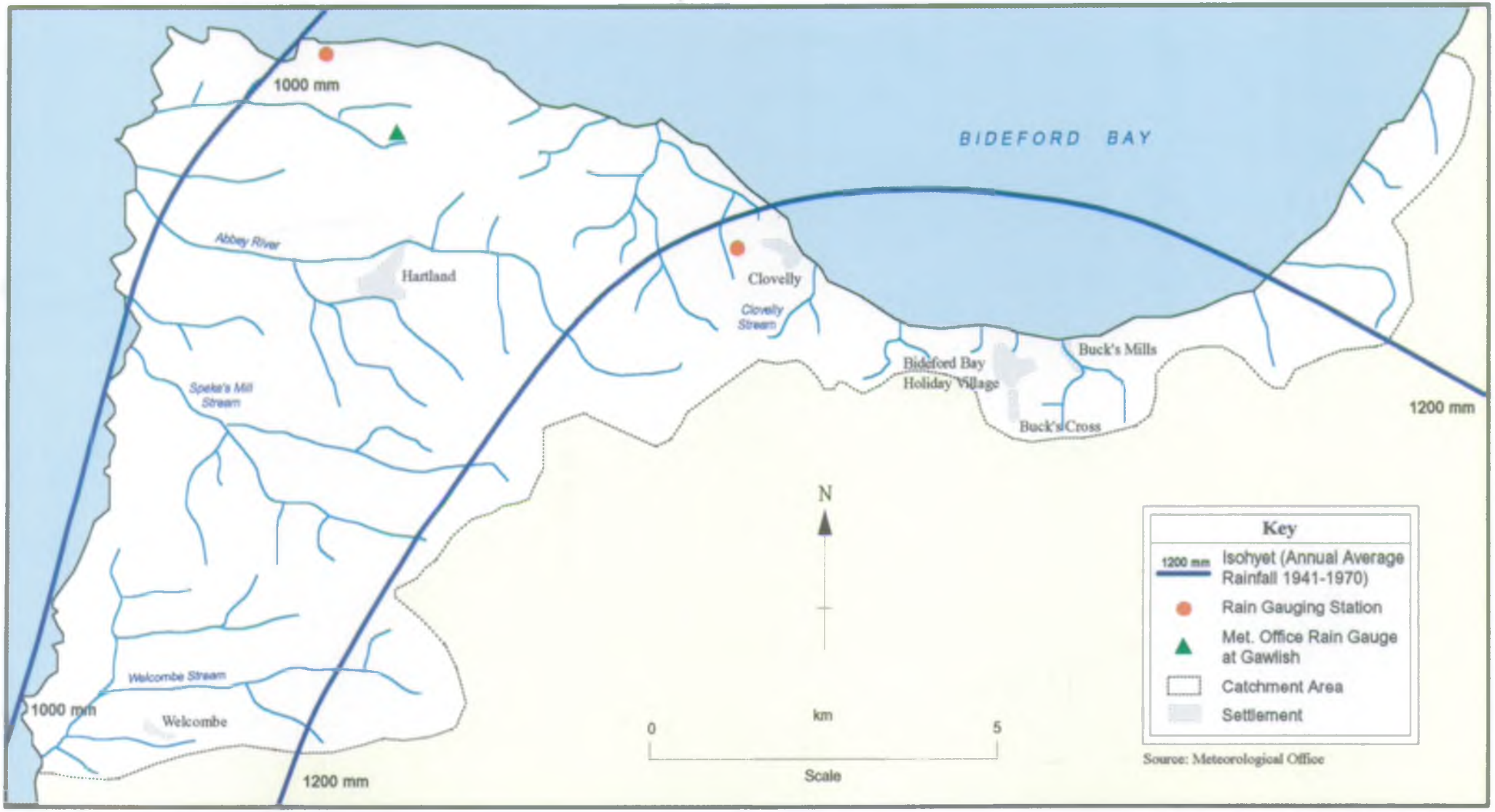
The South West Coast Path runs the entire length of the catchment providing easy access to this area for walkers. Vehicle access to the Hartland Streams Catchment is by road. There are no British Rail Stations within the catchment, the nearest rail link is the Tarka line at Barnstaple. The A39(T) runs along the edge of the catchment providing direct links with Bideford and Bude.

4.2 Geology, Hydrogeology and Soils

The Hartland Streams Catchment is underlain by rocks of the Upper Carboniferous age locally known as the 'Culm'. The Culm rocks within the catchment comprise primarily three formations the Crackington, Bideford and Bude Formations (see Figure 2). The original sediments were lain down either by marine currents (Crackington Formation) or as part of a delta system (Bideford and Bude Formations). The sand, silt and clay sediments were subjected to intense deformation and folding and subsequent faulting, resulting in a sequence of interbedded sandstones, mudstones and shales, visible along the sea cliffs.

The Crackington Formation underlies the majority of the catchment area from the southern catchment boundary to Hartland in the north and extending from the western coast to Clovelly in the east. The Bude Formation underlies the eastern limb of the catchment, east of Clovelly. Small outcrops are also mapped on the west coast and within the strata at Hartland Point. The rock type is similar to the Crackington but with sandstone units up to 20 m thick. In the extreme east of the catchment the Bude Formation is faulted against Crackington and Bideford formations.

Figure 3 - Climate



Information correct as of March 1995

The Upper Carboniferous strata have been classified as a minor aquifer unit. Groundwater flow will be dominantly via fractures and fissures in the formations and within the shallow weathered zone close to the ground surface. Groundwater within these rocks does provide a large number of private supplies from wells, springs and boreholes, suitable for domestic use and farm supplies. However, the water from some borehole sources contain elevated levels of iron and manganese, which require treatment prior to drinking. Groundwater also provides baseflow to streams and rivers within the catchment particularly supporting flows during summer months.

The Culm soils are either heavy, poorly drained and difficult clay soils derived from weathered shales or shallow, stony, agriculturally poor soils derived from weathered sandstone. These soils support Culm Grassland, a complex of several wet acidic communities of international importance.

In the eastern part of the catchment, to the north east of Peppercombe a minor outcrop of Permian strata has been identified. The sand and sandstone rock type is similar to that in South Devon and has therefore been classified as a Permian Sandstone (New Red Sandstone).

4.3 Climate

Rainfall

The mean average annual rainfall for the catchment is 1159 mm within a fairly narrow range from 965 mm to 1343 mm. The mean for England is 908 mm (see Figure 3).

Temperature

The average accumulated temperatures in the catchment range from 696°c to 1541°c and the mean (1379°c) is only slightly higher than the national average. This figure indicates a warm mid-winter to early summer period making the area favourable for early crop germination and growth.

Moisture

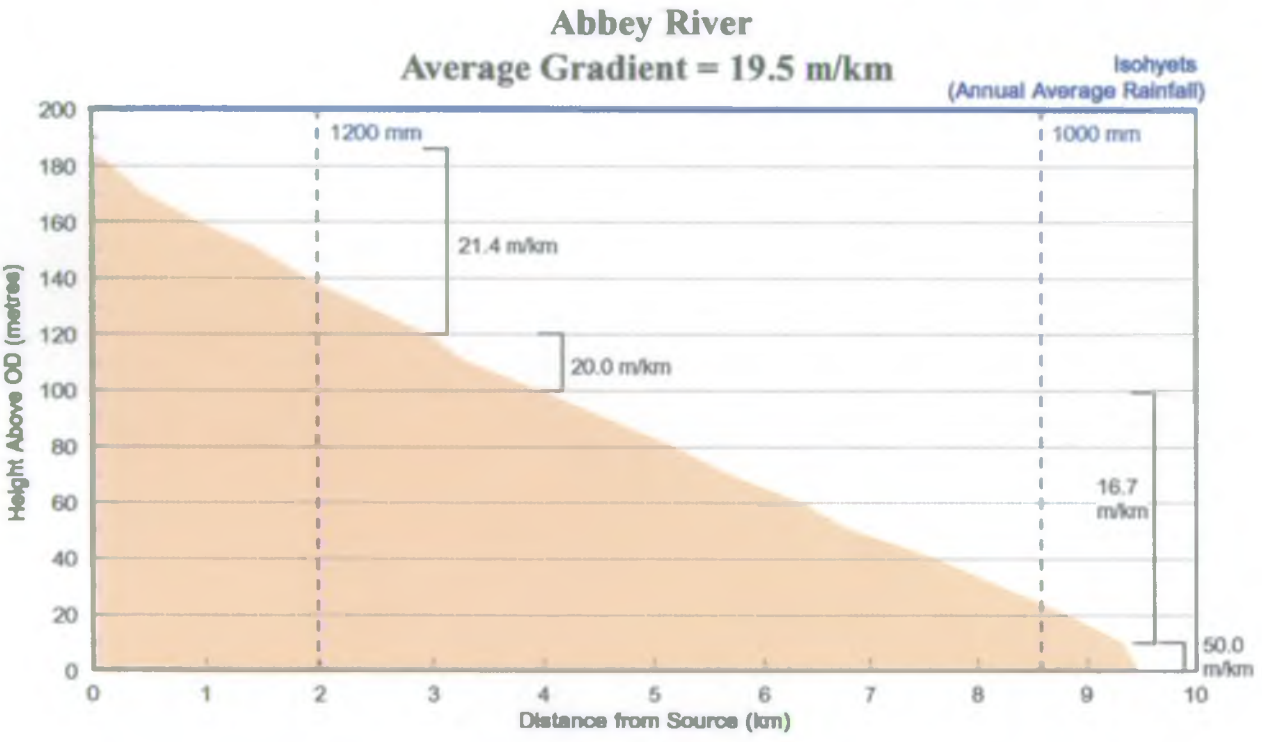
Moisture deficit is a measure of how much the land suffers from drought in the summer months. It measures how far the soils fall below saturation level, taking into account both rainfall and water uptake by plants. The moisture deficit varies between crops in the Hartland Streams Catchment under both wheat (winter sown) and potatoes (spring sown). The deficit is low compared with the national mean indicating a lower susceptibility to drought.

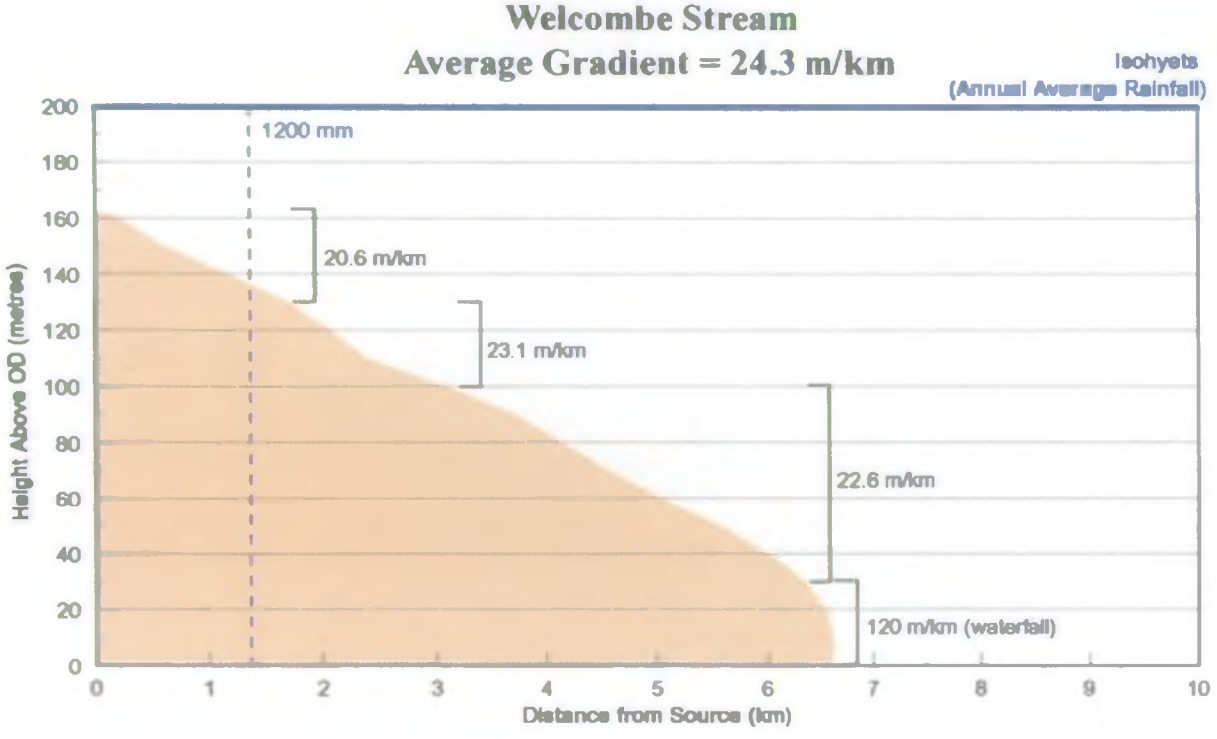
Conversely, field capacity days indicate the number of days on which the soils are saturated and cannot be cultivated. In the Hartland Streams Catchment the soils are at field capacity for 226 days in the year, an average with a wide range from 91 days to 265 days. The mean for England is 190 days.

4.4 Hydrology

With the absence of any fixed river gauging stations there is no continuous flow information for any of the coastal streams in the catchment. However, theoretical flow information based on catchment characteristics and instantaneous spot gauging data suggest that the Abbey River is the largest coastal stream in the catchment. It has a mean theorectical flow of 0.319 m^3/s and a Q95 (flow exceeded 95% of the time on average) of 0.034 m^3/s.

Figure 4 - River Profiles





The Abbey River and the other coastal streams in the catchment have similar hydrological characteristics; soils and underlying geology which cause them to respond quickly to heavy rainfall. The streams have adapted to this relatively flashy response by developing a network of steeply sloping straight channels (see Figure 4). In the past these characteristics have encouraged the use of water power and the construction of mills on several streams including Buck's Mills and Speke's Mill.

During the summer stream flows decline quickly. In recent droughts spot gauging data indicate that flow in the Abbey River near Hartland village can fall below 0.010 m^3/s. Spot gauging data from a number of other streams in the catchment indicate that flow in these was substantially less than the Abbey River during the 1976, 89 and 90 droughts.

4.5 Mining

Two disused mines have been identified within the catchment, Hartland and Portledge (see Figure 5). The precise location of both mine sites and the minerals worked is unknown. It is possible that the mines may have worked coal rather than a metalliferous ore.

4.6 Population

The main settlements within the catchment are Hartland, Buck's Cross and Clovelly. Population numbers are generally thought to increase by a third in Devon in summer.

The population of the Hartland Streams Catchment is approximately 2,200 (based on the 1991 census data as supplied by the Local Authorities), a density of 30 persons/km^2. The population density for Devon in 1991 was approximately 155 persons/km^2.

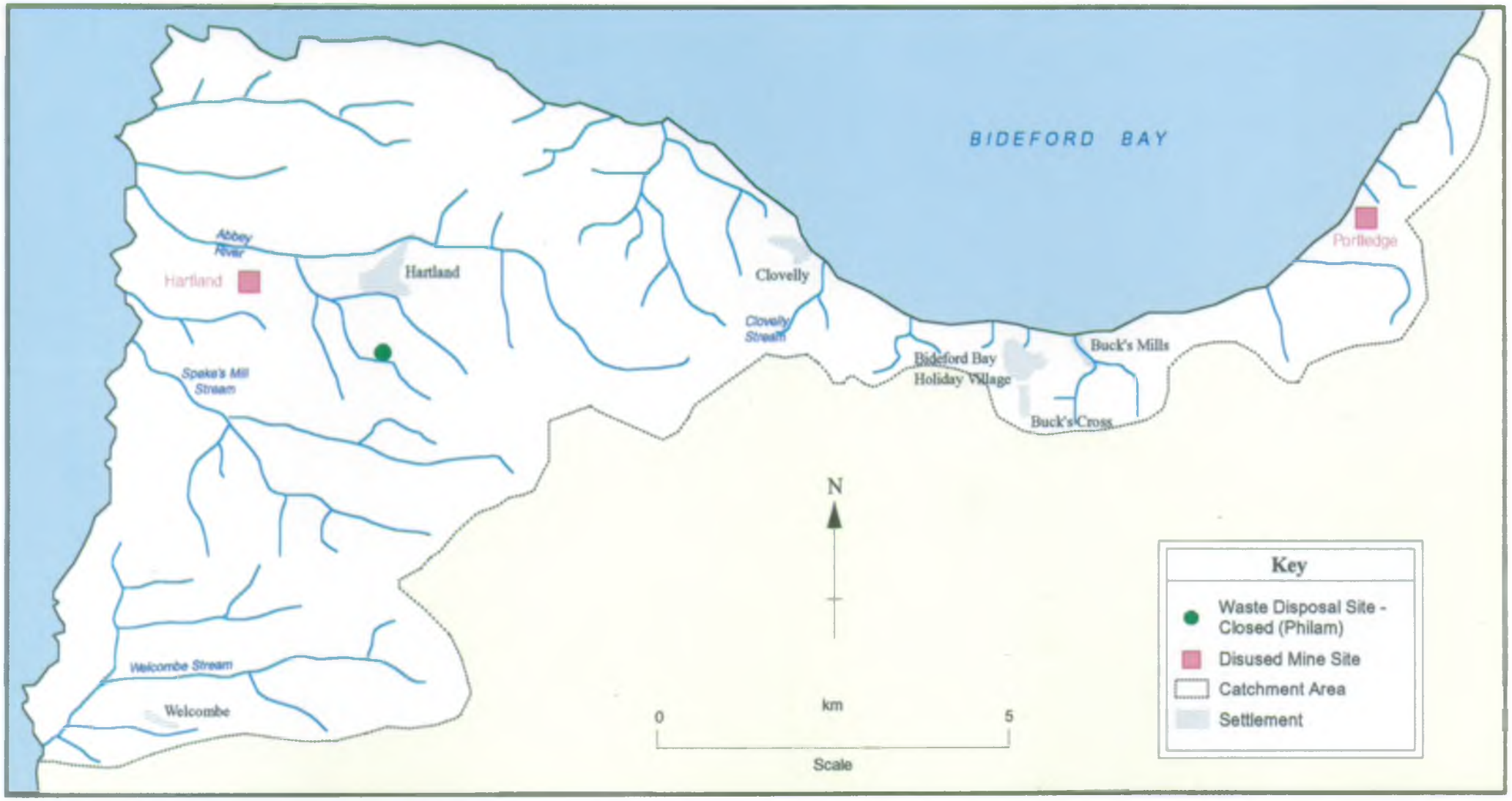
Between 1981 and 1991, the population increased by an average of 11%. The largest population increase occurred in the parishes of Welcombe, Woolfardisworthy and Alwington. Approximately half of the catchments population is located in the parish of Hartland. Abbotsham is the only parish in the catchment in which the population decreased between 1981 and 1991 (by approximately 10%).

4.7 General Quality Assessment

An assessment of water quality in the catchment has been made using the General Quality Assessment (GQA) chemical grading scheme, using data stored on the Public Register 1991 to 1993 (see Appendix 1).

Routine monitoring is only carried out on the Abbey River and Welcombe Stream, both were classified as good quality (Class A or B).

Figure 5 - Waste Disposal and Disused Mine Sites



Information correct as of March 1995

Table 1 - Key Statistics for the Hartland Streams Catchment

Catchment Area	73.5 km²
Rivers	Length of River (km) (upstream of Tidal Limit*)
Welcombe Stream	6.7 km
Abbey River	9.5 km
Population (1991)	2200 persons (approx)
Main Villages	Clovelly, Hartland
Average Annual Rainfall (source MAFF)	1159 mm
Controlled Water Length (Monitored for Water Quality Purposes)	16.2 km

* Tidal Limit as defined in Section 192 of the Water Resources Act, 1991 (Ref. 4)

5. CATCHMENT USES

5.1 Landscape, Wildlife and Archaeology

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

Our Objective

To ensure that these features are not degraded through neglect, mismanagement, or insensitive development and wherever we can to take measures to enhance them.

The Role of NRA

Legislation determines what we can and cannot do to regulate work in rivers and floodplains. An important part of our work is to influence land use planners and land managers to look after rivers and wetlands sensitively.

We have duties and powers to:

* conserve and enhance landscape, wildlife and natural features especially in rivers and wetlands

* protect and conserve buildings, sites and objects of archaeological, architectural or historic interest.

Our work involves a range of activities:

* we study river and wetland wildlife and we are developing better methods for doing this

* we are developing standard ways of reviewing the effects of our work on wildlife

* we are establishing a national database to store wildlife information

* we are improving the way we consider and carry out Environmental Assessments

* we encourage local planning authorities and developers to promote wildlife conservation on rivers and wetlands and we encourage the development of new river management techniques.

Catchment Perspective

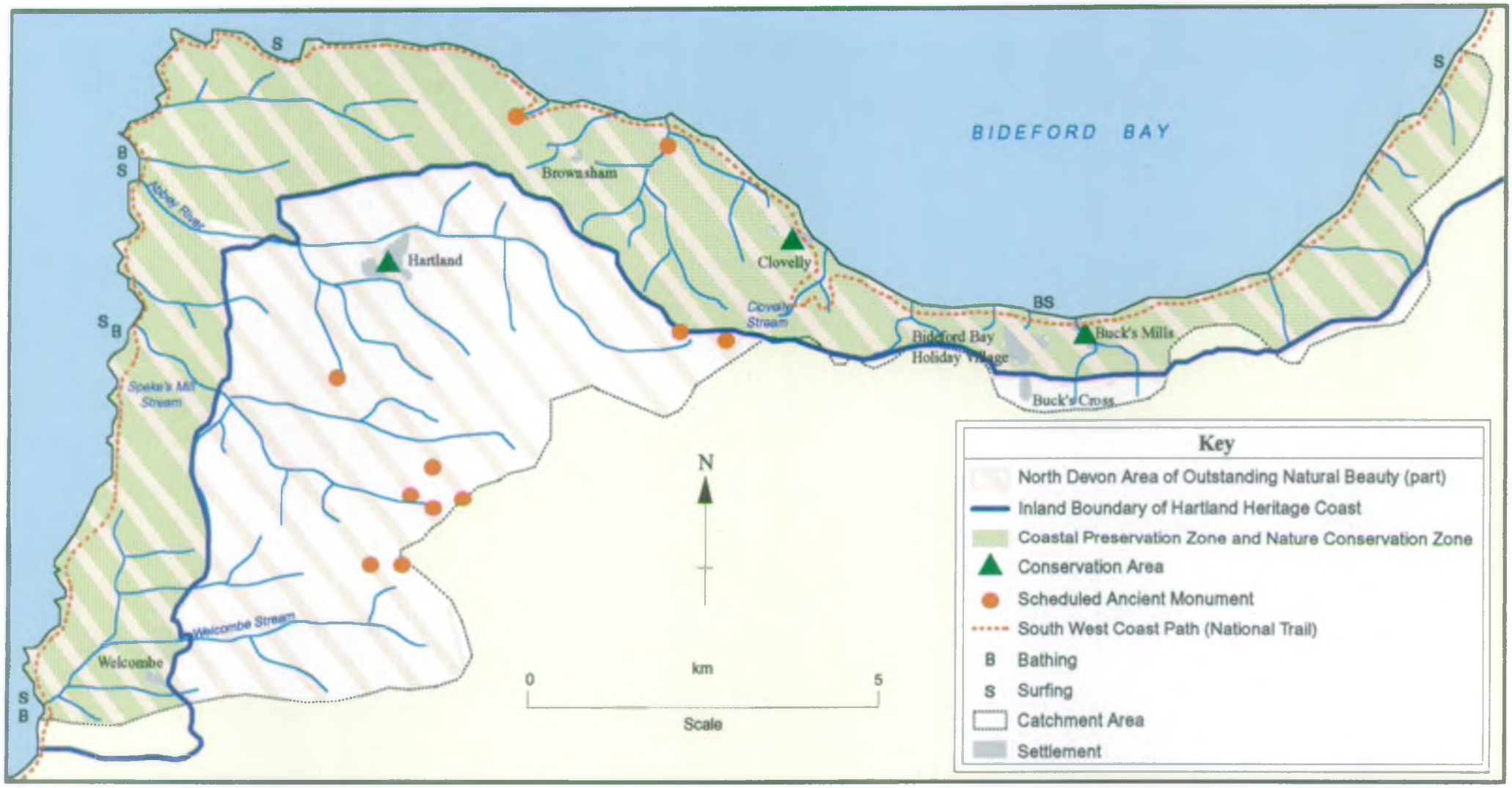
General

Much attention has been focused recently on aspects of Devon's environment. Detailed documents have been produced by various bodies which have been of great use in the production of this summary. For more detail it is recommended that reference is made to these documents:

The Torridge Landscape: An Integrated Assessment of the District's Natural Character. Chris Blandford Associates for Torridge District Council, Countryside Commission, English Nature, Devon County Council and National Rivers Authority, 1994 (Ref. 5)

The Devon Landscape: A Strategy for Consultation. Devon County Council, 1994 (Ref. 6)

Figure 6 - Landscape, Archaeology and Recreation



Information correct as of March 1995

Nature's Place: A Conservation Strategy for Devon. Devon County Council, 1994 (Ref. 7)

Landscape

The landscape of the catchment is dominated by its coastal nature. There are two distinct units associated with the coastline (Hartland and Clovelly), each of which has quite different characteristics.

Almost the entire catchment carries landscape designations (see Figure 6). It forms a part of the North Devon Area of Outstanding Natural Beauty, indicating it to be a landscape of national importance. Additionally the coastal section forms the Hartland Heritage Coast, a designation reserved for some of the finest undeveloped coast in the county. Other County Structure Plan (Ref. 8) designations also apply to much of the area.

On the North coast, the landscape is closely related to that of the rest of North Devon with high cliffs falling to the sea and associated woodland and landslips. The streams running to this northern coast flow through steep sided, densely wooded valleys with small settlements nestling in them. Inland from the cliffs the landscape is mainly rolling farmland with small hedge-lined fields.

West of Brownsham the landscape gradually changes with the increasing Atlantic influence, until at Hartland Point the coast turns south and meets the full force of the Atlantic. From here into Cornwall are some of the most dramatic landforms in the area. The cliffs facing the sea have remarkably folded strata and there is an extensive wave-cut platform extending out into the sea. The streams which fall to this coast do so down more open valleys than on the north coast and often end in waterfalls to the shore.

Inland from the west coast, the streams flow through wooded combes, although here the trees are stunted by the wind. On higher ground scattered settlements are fitted into the landscape to avoid the worst of the gales, and the few trees present are bent and deformed. Historic field patterns are still evident on the open farmland.

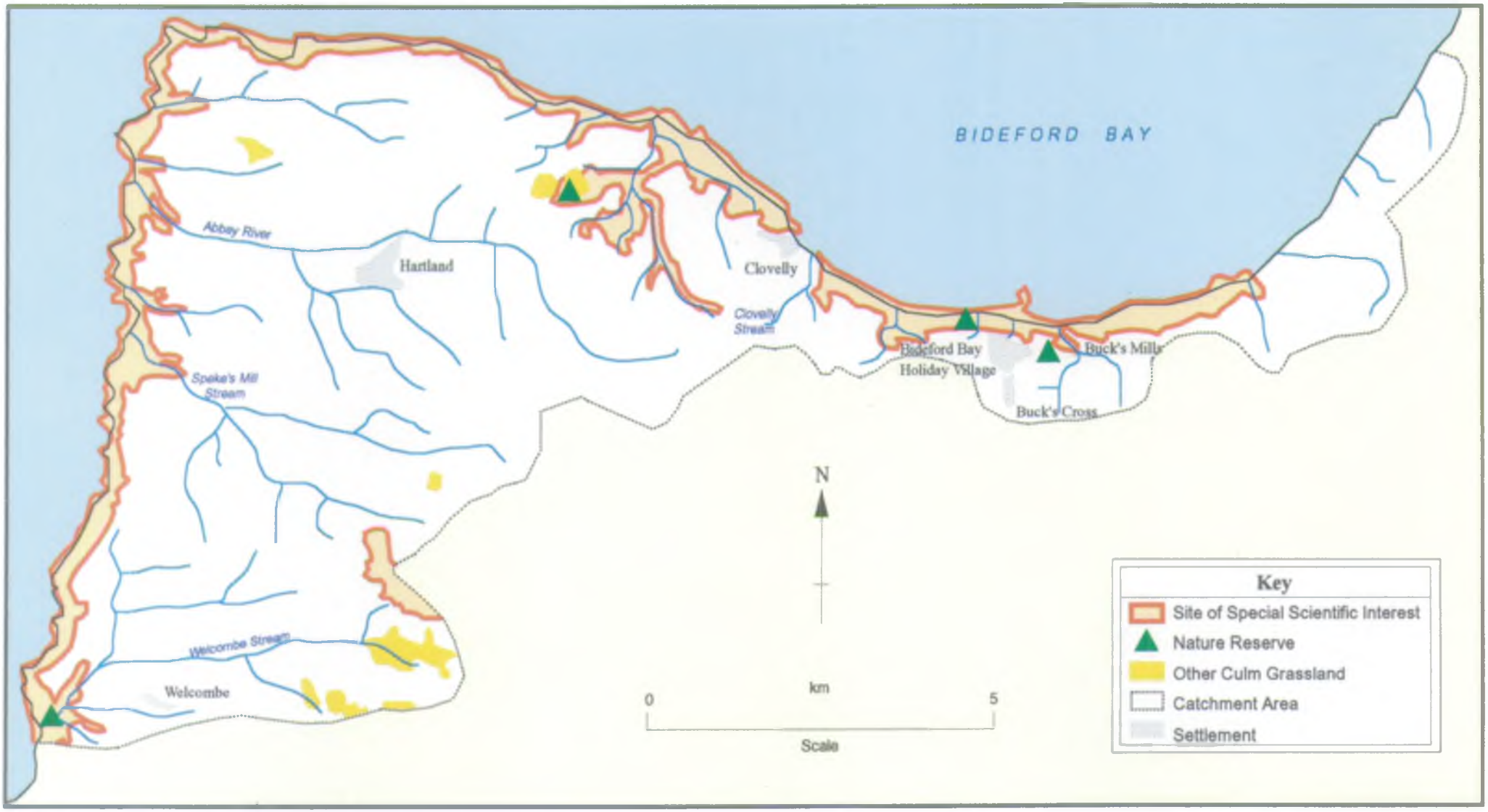
Wildlife

Despite the small size of this catchment it is of significant conservation importance. In addition to the landscape designations mentioned above, extensive areas are also of national or regional nature conservation value (see Figure 7).

Four areas are designated Sites of Special Scientific Interest (see Appendix 2 for details); two of these are Nature Conservation Review sites, indicating their particular importance. Additionally, vegetated sea cliffs are a natural habitat which the EC Habitats Directive (Ref. 9) seeks to protect by designation of Special Areas for Conservation (SACs).

There are four Nature Reserves in the catchment (see Appendix 3). No wildlife survey has yet been carried out for the Torridge District and there are, therefore, no recognized County Wildlife Sites. However, there are areas of semi-natural habitat outside the designated areas which have conservation value. In particular, there are areas of Culm Grasslands, a wetland mosaic habitat supporting a variety of plant and invertebrate communities and which is almost entirely restricted in England to north-west Devon and north-east Cornwall. Similarly there are woodlands which support rich lower plant communities, especially epiphytic lichens on waterside trees.

Figure 7 - Wildlife Resources



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The west-facing coast is important for both its wildlife and geological interest. There is a range of habitats present in a restricted area and the cliffs being excellent examples of uncommon geomorphological features. The rocks have been folded, faulted and eroded although, the streams have been unable to cut down to sea level at their mouths and so reach the sea via waterfalls.

In contrast, on the north-facing coast the streams have cut deep sheltered valleys and drain extensive ancient woodland. These woods, together with those on the cliffs and in parklands, provide habitats for an unusually rich lichen flora, including a number of species of national importance.

Mammals appear to be somewhat poorly represented in the catchment, although this may be partly due to under-recording in a sparsely populated area. However, otters are known to use some of the streams, apparently in low numbers. Otters are fully protected under the Wildlife and Countryside Act 1981 (Ref. 10) and they are listed in Annex II of the EC Habitats Directive (Ref. 9).

Water voles are present in low numbers in the Strat and Neet Catchment to the south, but the healthy mink population may be a reason for their apparent decline. Dormice and both lesser and greater horseshoe bats are all recorded in the catchment. Grey seals and several cetacean species, notably dolphins and porpoises have been recorded in the coastal waters.

There are no records of heron or kingfishers breeding in the catchment, but there are several pairs of both dipper and grey wagtail along the streams. Waders including curlew are recorded from the wet grasslands and various birds of prey are frequently seen. On the sea cliffs, fulmar, raven and peregrine are notable breeding species, while red-throated, black-throated and great northern divers are present off the coast in good numbers in winter.

We have no amphibian records for the Hartland Streams Catchment.

The area is of high value for butterflies, with thirty-four species recorded. Until the 1970s the Hartland coast was one of the last sites in Devon for the Large Blue, before changes in land management practices led to its extinction. Marsh Fritillary breeds in Culm Grassland sites in the catchment and is protected under Annex II of the Bern Convention. The High Brown Fritillary also occurs in the catchment. This species is listed as rare in the British Red Data Book: 2 Insects (Ref. 11), indicating that it is found in less than fifteen 10 x 10 km squares in Britain.

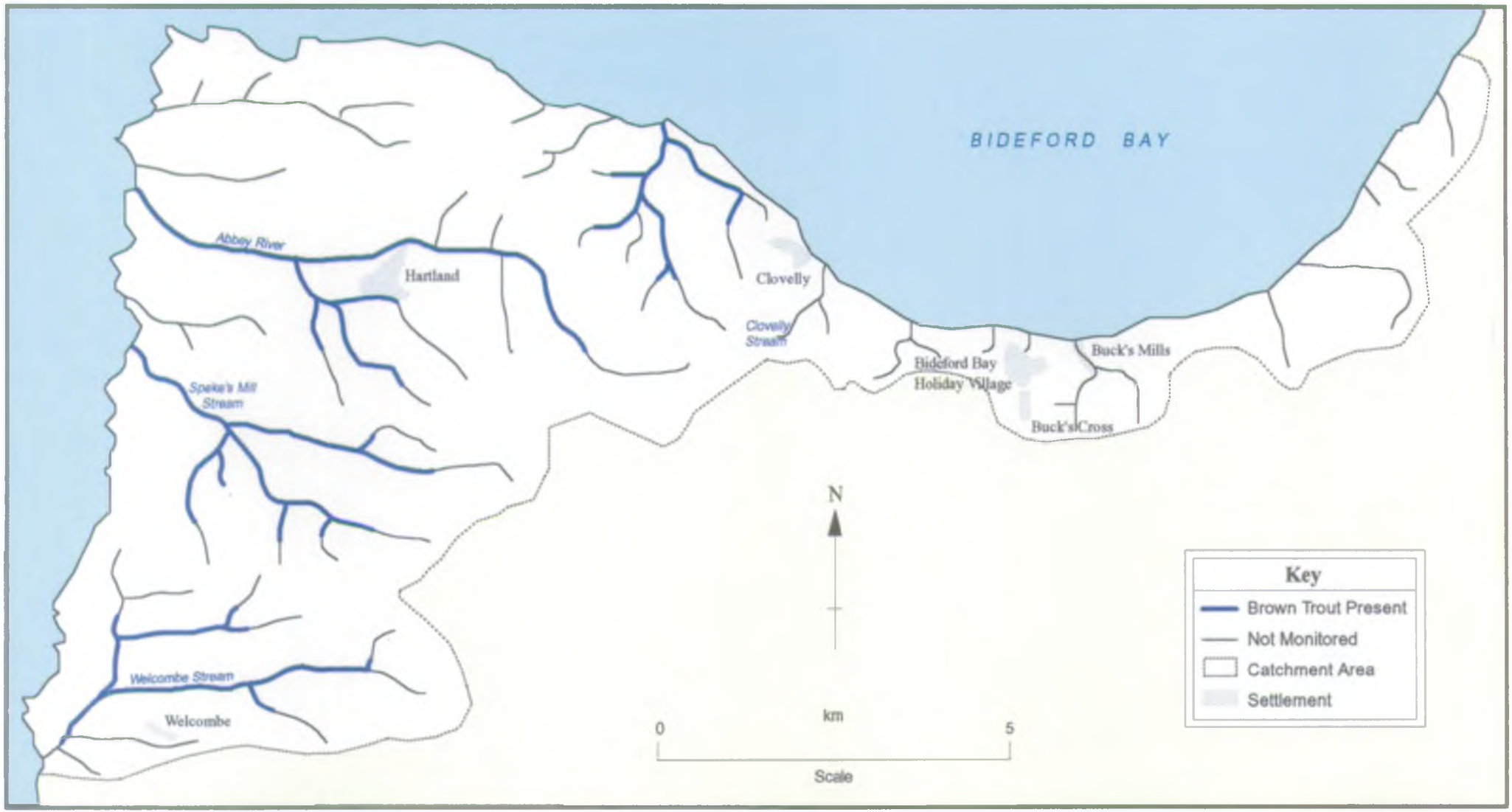
Nine nationally scarce higher plant species occur in the catchment, although none are aquatic, most have a coastal distribution.

Archaeology

The catchment is recognized as being of considerable archaeological and historic interest, and bears several designations relating to these aspects: there are at least ten Scheduled Ancient Monuments, most of which are barrows, and the settlements of Hartland, Clovelly and Buck's Mills have been notified as Conservation Areas under the Planning Act 1990 (Ref. 12).

Although extensive records and databases do exist, notably Devon County Council's Sites and Monuments Register, this information is not in a form easily usable without expert interpretation. This contrasts with that available for landscape and nature conservation. No areas have been designated in Devon as they have in some other counties (e.g Cornwall's Areas of Great Historic Value and Somerset's Areas of High Archaeological Potential).

Figure 8 - Fisheries: Salmonid (Brown Trout)



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5.2 Fisheries

We consider here the conservation of wild fish and their habitats.

Our Objective

To protect and improve the river environment to ensure the continued survival of fish stocks.

The Role of the NRA

We have duties and powers to:

* maintain, improve and develop the wild fish resource of the catchment
* ensure chemical water quality in those stretches designated under the EC Freshwater Fish Directive (78/659/EEC) (Ref. 13) complies with standards
* control the movement and introduction of fish.

Our work involves a range of activities:

* we survey rivers to check the number, age, and types of fish they support. If numbers are very low we try to identify the problem and improve the situation
* we make sure the abstraction of water or damming of rivers does not seriously disrupt the life cycles of fish
* we consult widely with people who have an interest in Fisheries
* we conduct habitat improvements which benefit the fishery.

Catchment Perspective

Fish are good indicators of the overall health of our rivers. We use special survey equipment to assess the quality of fish populations. The small and steep nature of the watercourses in the Hartland area limits the size and diversity of the fish populations present.

The larger streams support a self-sustaining population of Brown Trout (see Figure 8) and a limited distribution of minor coarse fish species and Eels. Coarse fish species include the Bullhead, which the EC Habitats Directive seeks to protect by listing in Annex II under species requiring the protection of special habitats. Migratory fish are unable to enter any of the streams due to waterfalls or impassable shingle beaches which are present at the river mouths.

CATCHMENT USES

5.3 Recreation and Amenity

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

Our Objective

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

The Role of the NRA

We have duties and powers to:

* protect and maintain access to beautiful areas or special sites of interest

* make sure that land and water we own is made available for recreation and at all times take into account the needs of the chronically sick or disabled

* charge for facilities that we provide for recreation.

We are involved in a range of activities:

* we work with other agencies such as planning authorities and sports associations to develop recreation facilities

* we work with other organisations to develop plans and strategies for promoting recreation in the water environment.

Catchment Perspective

The remoteness of the area and its spectacular scenery attract many people and the South West Coast Path, a national trail, runs the entire length of the coast around the catchment. A survey has recently been carried out by the Countryside Commission and figures will shortly be available indicating the level of usage. Public access to watercourses is fairly limited, although there are some footpaths and tracks which run alongside, particularly towards the lower end of the valleys.

Larger centres, such as Hartland and Buck's Mills, also draw a number of visitors and in particular Clovelly, with its modern visitor centre, is heavily visited, especially in the summer months. Areas under National Trust ownership and various nature reserves with public access enable visitors to enjoy the undeveloped character of the area. Elsewhere, smaller numbers of people enjoy informal walking, picnicking and outdoor activities such as birdwatching and rock climbing.

The streams in the catchment are typically too small and steep to be used for water contact sports like canoeing, but the coastal waters do provide some opportunities for both surfing and bathing. However, conditions may be hazardous and usage tends to be by experienced enthusiasts. There is some concern over the increasing use of certain areas at the mouths of some valleys as informal camping areas.

CATCHMENT USES

Angling

Although Brown Trout are distributed widely over the area, the small size of the streams has restricted the development of any sport fishery. Currently, there are no known interests in the catchment, but historically there has been a limited sport fishery on the Abbey River where non-native Brown Trout are known to have been stocked.

5.4 Flood Defence and Land Drainage

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

Flood risk and land drainage have always affected the way we use land. By improving our control of water we have been able to make better use of river and coastal floodplain for farming or building towns. This control can take many forms: from simple channel alterations to major floodbanks and artificial washlands. Works constructed for other purposes, such as weirs, mills and bridges, have also altered the natural river system.

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

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

Our Objective

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

The Role of the NRA

Legislation determines what we can and cannot do. Our statutory flood defence committees make decisions on flood defence. All rivers are classified as either 'main rivers' or 'ordinary watercourses' (sometimes referred to as 'non-main rivers'). We supervise all flood defence matters but have special powers to carry out or control work on main rivers and sea defences. Local authorities and in some areas internal drainage boards are responsible for flood defence on ordinary watercourses. Local authorities are also responsible for protecting the coast from erosion by the sea.

We have duties and powers to:

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

Figure 9 - Built Environment

Information correct as of March 1995

We are involved in a range of activities:

* we work closely with other agencies including MAFF, local authorities, conservation and recreation bodies

* we survey assets and flood risk areas to improve our management of flood defence

* we are working on a Flood Defence Management Framework and related systems to ensure that flood defence assets are managed properly

* we set and monitor specific targets to improve our performance

* we support Research and Development and are developing best practices for our work.

Catchment Perspective

The drainage system is generally natural and unmanaged although there is some field drainage which enters the system.

None of the watercourses are designated 'main' rivers, and no formal flood defence schemes have been carried out in this catchment.

Regulation

There are no existing or planned major development proposals in the catchment. A number of moderate sized developments have been proposed in the Hartland area and we have advised the Planning Authority that all surface water runoff should discharge directly to the Abbey River and not to local minor watercourses.

Improvements

There are no areas where agricultural land is at risk from flooding from tidal influences.

There are two areas where fluvial (river) flooding problems are known: at Hartland (4-5 properties) from the Abbey River and at Lymebridge (2 properties) from the Speke's Mill Stream.

Figure 9 shows areas with a known flooding problem in the catchment.

Coastal Protection

The shoreline is characterized by its cliffs. There are no areas where low land abuts the coast. Coast Protection works are controlled by the Department of Environment and the legislation is administered by the District Councils.

CATCHMENT USES

Emergency Response

The NRA has a commitment to improve the Emergency Response Level of Service (ERLOS) so that where possible a warning is issued at least two hours in advance of flooding.

A study is currently being carried out to determine where improvements are necessary to meet this standard.

There are currently no flood warning gauges within the Hartland Streams Catchment. The Meterological Office maintain a rain-gauge at Gawlish (see Figure 3). The watercourses are typically short and steep (see Figure 4) and there is no opportunity for flood warning using upstream river level sensors.

Work is continuing on using weather radar information for flood warning in rapid response catchments, such as the Hartland Streams Catchment.

5.5 The Built Environment and Development Plans

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

County and District Planning Authorities plan and control development; although they must consult the NRA, they do not have to follow our advice.

Our Objective

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

The Role of the NRA

There are two main ways we can influence development:

* **planning** We can assist local planning authorities to allocate land for development by commenting on local plans, identifying constraints and highlighting where the river environment can be enhanced through sympathetic development

* **control** We can offer formal and informal comments to planning authorities on planning applications and development guides. We can also influence development using our powers, for example Land Drainage Consents.

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

Local Authorities prepare statutory development plans. In January 1994 the NRA published guidance notes for local planning authorities on ways of protecting the water environment through development plans. The notes highlight areas that concern us and offer guidance on model policies (Ref. 14).

Planning and Flood Risk

The Government view is that development should be guided away from areas that may be affected by flooding and should be restricted where it would increase the risk of flooding.
To achieve this it expects local authorities to use their planning powers and the NRA to assist by providing advice on development and flood risk. The work that is under way now on preparing flood plans is an example of this advice for details (see 6.4 Flood Defence and Land Drainage, Targets and State of the Catchment).

Catchment Perspective

Development Plans

The Regional Planning Guidance for the South West was published in July 1994 (Ref. 15). This guidance recognized the need to achieve sustainable development, and aims to secure the best environmental development strategy for the region as a whole. The NRA has participated in the preparation of the guidance which includes advice on rivers, water supply and waste water disposal. The guidance is a prominent influence on the contents of Structure and Local Plans.

CATCHMENT USES

The Devon County Structure Plan (Ref. 8) provides a framework for development and land use within Devon as a whole. The Plan contains policies and advice to ensure protection and conservation of the environment, with development in the countryside being strictly controlled. In determining proposals for development consideration should be given to 'quality or quantity of existing and proposed water supply sources; the effect on water quality in rivers and estuaries; the effect on coastal water pollution and, any resulting increase in the risk of flooding'.

The Local Plan for the area - Torridge Rural Areas Local Plan (Ref. 16) - reflects the regional and county guidance, with positive steps included to enable a balance to be struck between maintenance of a vital and diverse rural economy and maintenance and improvement of the environment.

Hartland is included in the plan as a selected local centre to act as a focal point for meeting local needs, and where it is intended that development should be concentrated..

The Torridge District Local Plan, which will include the area of the Hartland Streams Catchment, is currently in preparation. The first draft is expected in the winter of 1995/96. At that time the NRA will seek to ensure through consultation that policies are included which give protection to the water environment.

Transport

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

The NRA has powers to control highway drainage through prohibition notices and discharge consents. This allows the NRA to insist upon measures to alleviate pollution for example, interceptors to contain accidental spillage.

During road construction the NRA seeks to prevent habitat destruction within the river corridor as this leads to a loss of conservation and amenity value.

There is only one major road in the catchment (see Figure 9), the A39 which runs from Bude to Barnstaple. This road joins the North Devon link road, the A361 (T) and provides good access to the catchment area. No major road developments are planned in the catchment, however, minor schemes on the A39 at Bucks Cross and between Clovelly and Seckington are planned mainly for safety reasons. The Department of Transport are currently reviewing both schemes.

Minerals

The Devon Minerals Local Plan, Consultation Draft 1994 (Ref. 17) sets out to protect mineral resources in Devon and to allow their exploitation without causing undue damage to the environment. The plan proposes Mineral Consultation Areas within which non mineral development is strictly controlled. This ensures that the ability to exploit important mineral resources is not lost through surface developments (but in no way guarantees planning permission for quarrying). The plan also contains policies to protect the environment from the damaging activities of quarrying.

There is one Mineral Consultation Area within the catchment. This is at Colpit, 2 km East of Hartland (NGR SS 279 249) (see Figure 9). This is a small area within which there is a small sandstone quarry extracting sandstones of the Crackington formation. The site has little impact on the landscape and any future development would be considered very carefully as it may lead to unacceptable lorry movements.

Any major future mineral developments are extremely unlikely as most of the catchment falls within the Devon ANOB. The plan only allows major mineral development within this area under exceptional circumstances. Further restrictions are placed upon mineral development within the Hartland Heritage Coast area.

CATCHMENT USES

5.6 Waste Disposal

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

Waste disposal sites are licensed by the County Waste Regulation Authority who make sure that sites do not endanger public health, cause pollution or spoil the local area. Waste Regulation Authorities consult us on all applications for waste disposal licences and we recommend ways of ensuring the water environment is protected.

Some wastes can be spread on farmland to improve the soil. We advise the Waste Regulation Authority on ways of protecting the water environment from this activity.

Our Objective

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

The Role of the NRA

We have duties and powers to:

* monitor the quality of water around waste disposal sites

* prosecute offenders if pollution is caused.

Our work involves a range of activities:

* we work with planning authorities to make sure that new waste disposal sites are located where they will not cause pollution of water

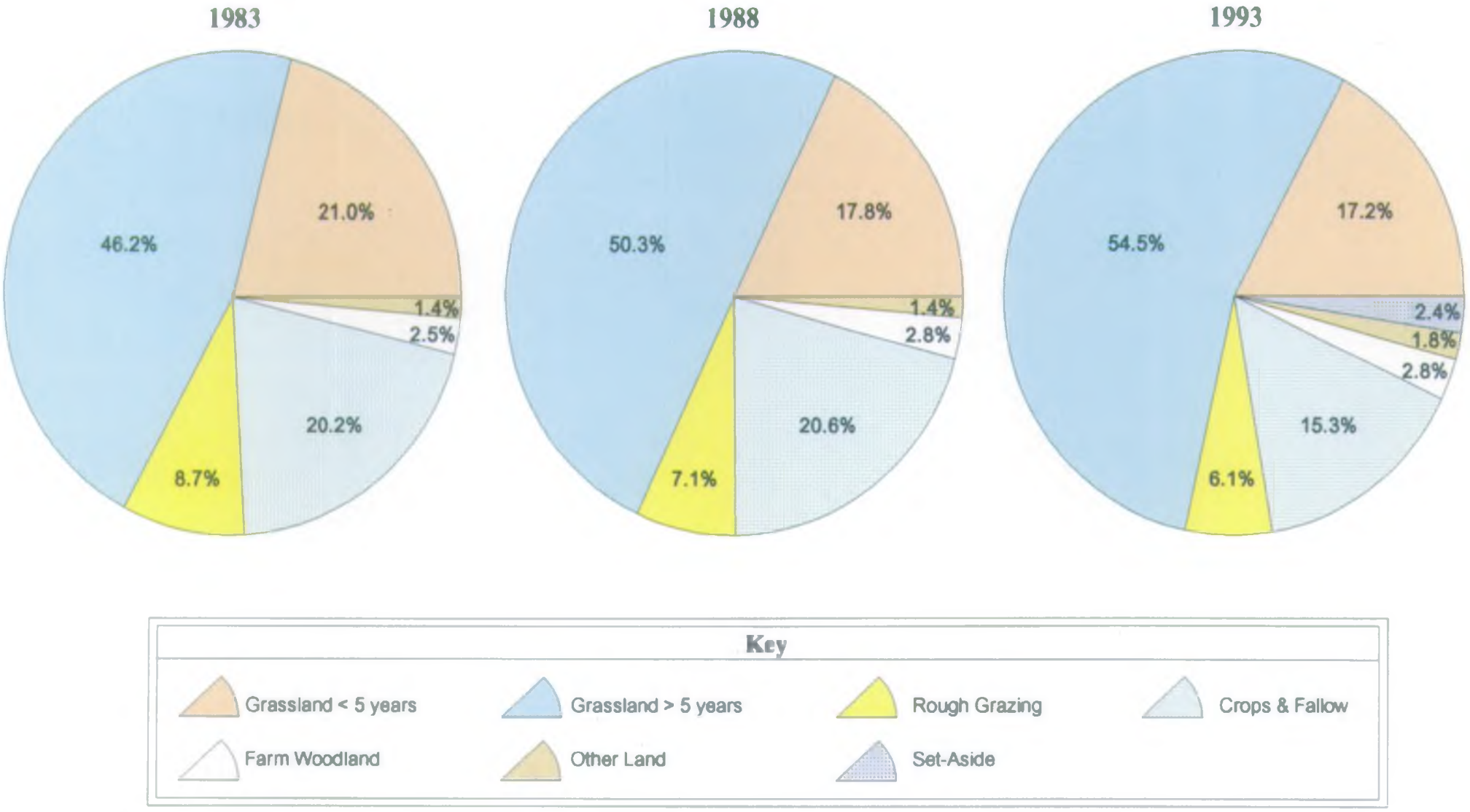
* we ensure that site operators are aware of the necessary monitoring requirements for pollution prevention purposes when new waste disposal licences are sought

* we help to make sure that sites are maintained and operated properly.

Catchment Perspective

Only one waste disposal site has been identified within the catchment (see Figure 5). This is a closed unlicensed landfill known as Philam, located 1 km south of Hartland. The site occupies a small quarry within the Crackington Formation. The waste types deposited there are unknown.

Figure 10 - Agricultural Land Use



Source: MAFF

Information correct as of stated year

5.7 Farming

General

With more than 80% of the land in England and Wales used for agriculture, there is significant scope for impact on the water environment. The intensification of agriculture aimed to provide a reliable food source has in some locations caused water pollution, low river flows, damage to fisheries and areas of important conservation value, and increased the risk of flooding.

The countryside is now undergoing further changes following reforms of the Common Agricultural Policy. The overall financial support to agriculture is being cut with a move to reduce surplus food production and provide environmental protection.

A sustainable and affordable farming system that conserves the soil, uses water wisely, minimizes and recycles wastes and protects important wildlife habitats will reduce the overall impact on the water environment.

The Role of the NRA

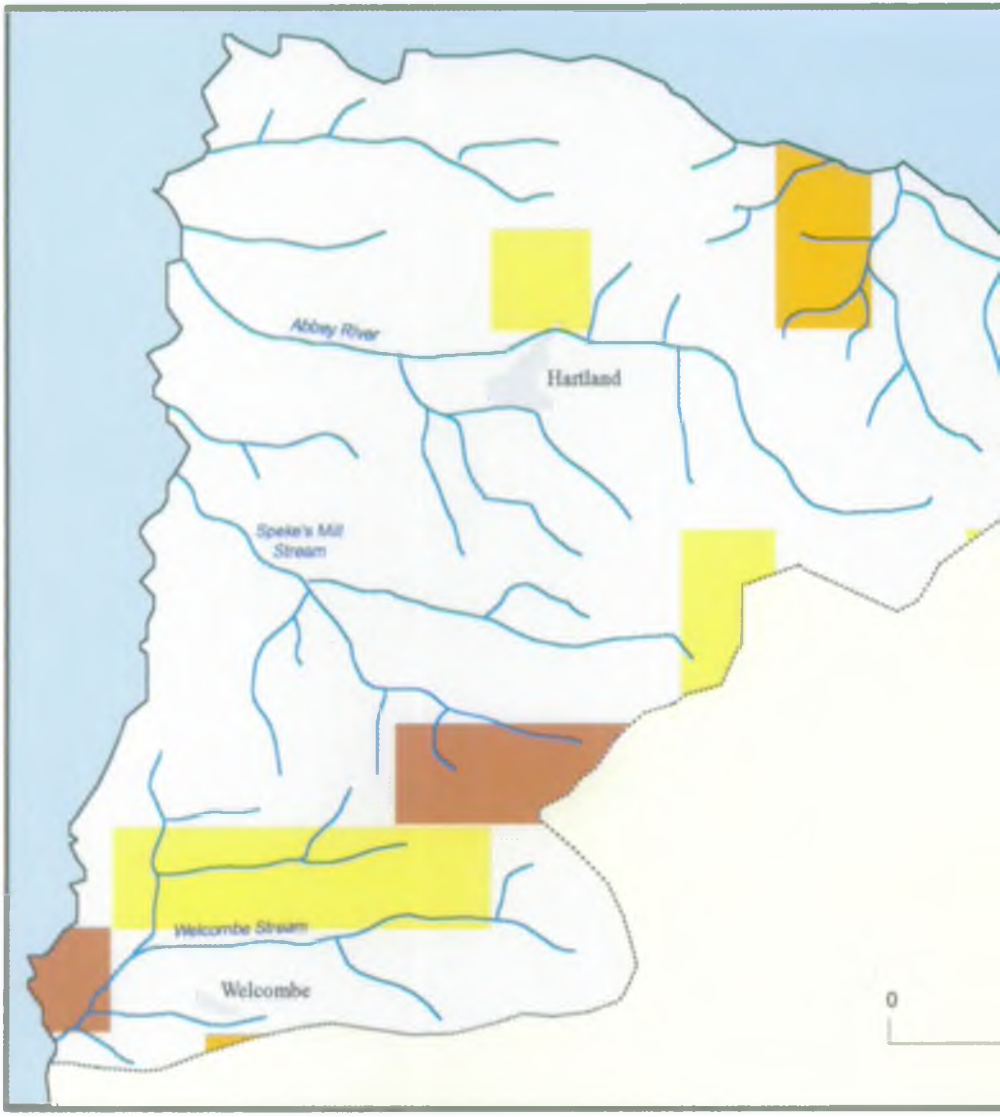
The NRA has duties and powers to:

- prevent pollution from agriculture through the enforcement of the Control Of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991 (Ref. 18)
- deal with pollution incidents restoring waters to their previous condition
- issue consents to discharge from agricultural premises. However, the NRA encourages the disposal of farm waste to land in preference to consenting discharges from agricultural treatment systems
- regulate the abstraction of water for agricultural use.

Additionally through liaison and R & D initiatives the NRA is committed to:

- promoting the Code of Good Agricultural Practice for the Protection of Water and Soil (Ref. 19)
- promoting the free pollution prevention advice from ADAS on behalf of the Ministry of Agriculture Fisheries and Food (MAFF)
- further developing best practices to prevent pollution
- carrying out farm visit programmes
- improving public awareness of the impact of agriculture on the water environment

Figure 11 - Agricultural Land Classification

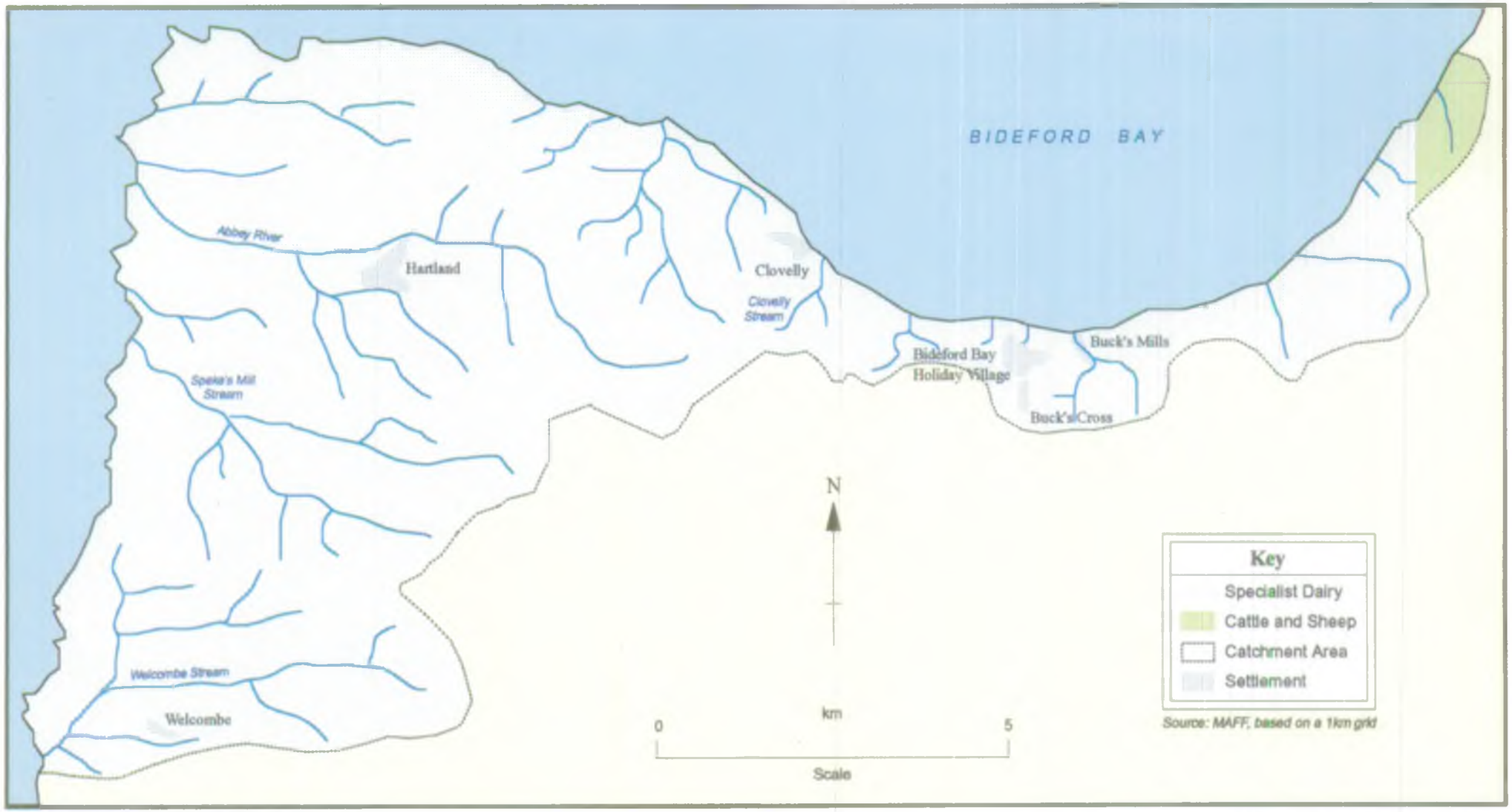


Information correct as of March 1995

Hartland Streams Catchment Management Plan

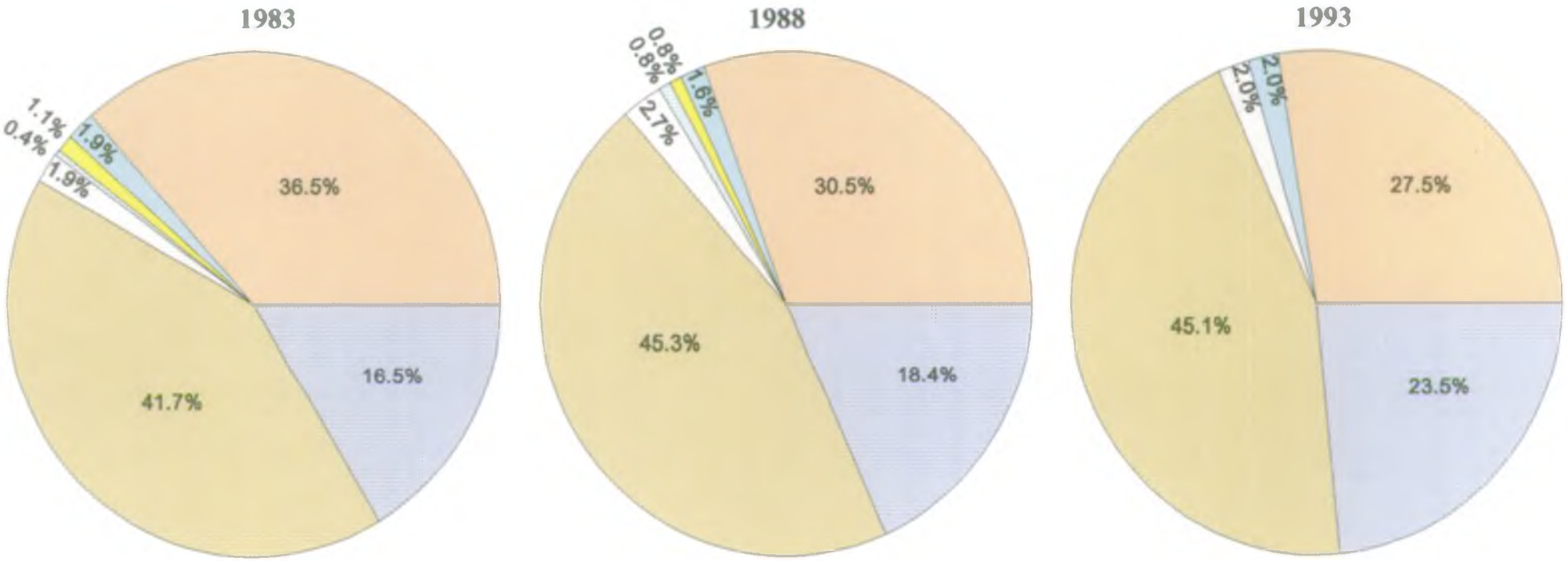
NRA South Western Region

Figure 12 - Dominant Farm Type by Parish



Information correct as of 1988 (Parish Summaries)

Figure 13 - Farm Types



Source: MAFF

Catchment Perspective

There are over 14,000 ha of agricultural land within the catchment, accounting for approximately 65% of the catchment area. Almost 78% of this land is grassland of which over half is in long term grass (>5 years). This has increased over the last 10 years at the expense of short term grass and rough grazing, rough grazing has declined by 25% over this period (see Figure 10). The area of crops and fallow has decreased over the last 10 years, partly through Set-Aside. There are no full time cropping and horticultural farms and very few mixed farms or specialist pigs and poultry.

Figure 11 shows the catchment, as classed by the MAFF Agricultural Land Classification, which defines its suitability for agricultural use. 80% of the land is grade 3 which is generally suitable for cereals and grass production. The remaining land is either grade 4 or 5, which is very limited for agricultural use. The soils are very wet and lie over steep land and would naturally support wetland habitats and so there are obvious opportunities for wetland restoration here.

Livestock farming, based on grassland, is the dominant form of agriculture in the catchment (see Figure 12). Dairy farming is still dominant amongst the full time farms despite a decline of nearly 28% over the last ten years (see Figure 13). Cattle and sheep farms (the only farm system to have shown an increase) come a close second.

The number of dairy farms has fallen from 97 farms in 1983 to 70 in 1993 whilst the average herd size has increased from 74 to 100 cows during this period. The beef herd has more than doubled over the past ten years whilst the ewe flock has increased by 40%.

Livestock farms within the catchment are the major source of pollution incidents. During a farm visit programme in winter 1993/1994, all the farms in the catchment were visited and 20 farms were found to be causing pollution or at high risk of causing pollution (see Table 2 in Section 5.7). However, the number of farms identified with this particular type of problem is not excessive when compared with findings from similar farm visit campaigns in the area. All farms causing pollution or at risk of causing pollution have been revisited and remedial action is under way. Dairy farming in the catchment is intensive and the main type of problem identified was yard runoff from areas where cattle are over-wintered.

It is expected that the trend for smaller dairy farms to go out of business will continue, whereas the larger farms will become more intensive with greater herd sizes. Other farmers will diversify their activities, or take off-farm employment, as farms become part-time occupations. The intensification of larger farms will mean an increase in the production of farm waste per farm. However, it will also mean that dairying will be located on units that are better geared and financed to handle farm waste. The gradual move to beef farming may also reduce the pollution risk since these farms are less intensive, involving straw-based systems for dealing with farm waste as opposed to slurry systems found mainly on dairy farms.

CATCHMENT USES

The NRA encourages farmers to use farm waste management plans when they apply farm waste to the land and urges farmers to use the free pollution prevention advice that is available from ADAS on behalf of MAFF. There may also be opportunities for less intensive farming on land adjacent to watercourses by farmers opting for grant aid under the Countryside Commission's Stewardship Scheme. These areas will not only improve the conservation value of the river corridor but may also act as a buffer area to prevent diffuse pollution from the more intensive use of the land. This highly successful scheme is, however, in its last year of operation with the Countryside Commission, and grant aid is very limited this year. The scheme will then be administered by MAFF. The details of transfer and amount of funding available for the scheme is currently unknown.

Table 2 - Results of Farm Pollution Investigations 1993/94
All farms shown were revisited in 1994/95

Watercourse	No. of Farms Identified as Actual or Potential Pollution Problems
Abbey River	4
Speke's Mill Stream	6
Clovelly Stream	2
Hartland Stream	1
Welcombe Stream	3(+1)*
Brownsham Stream	1
Stream at Fairy Cross	1
Stream at Abbotsham	1

* One extra farm was identified during the revisit period.

5.8 Forestry

Well managed forestry in the right places does not harm the water environment and will often bring benefits. However, in some circumstances forestry development and management can cause problems. Acidification, soil erosion, pollution, water yield, increased flood risks and damage to wildlife habitats cause us concern in some parts of England and Wales but in the South Western Region forestry does not usually cause problems for the water environment.

The Forestry Authority regulates forestry in the UK and encourages environmentally sympathetic planting and woodland management through grant schemes and the Forest and Water Guidelines (Ref. 20).

Our Objectives

To protect the water environment from the negative effects of forestry activities.

To encourage forestry practices that improve the water environment.

The Role of the NRA

We have duties and powers to:

* regulate some forestry works using land drainage legislation

* deal with pollution incidents.

Our work involves a range of activities:

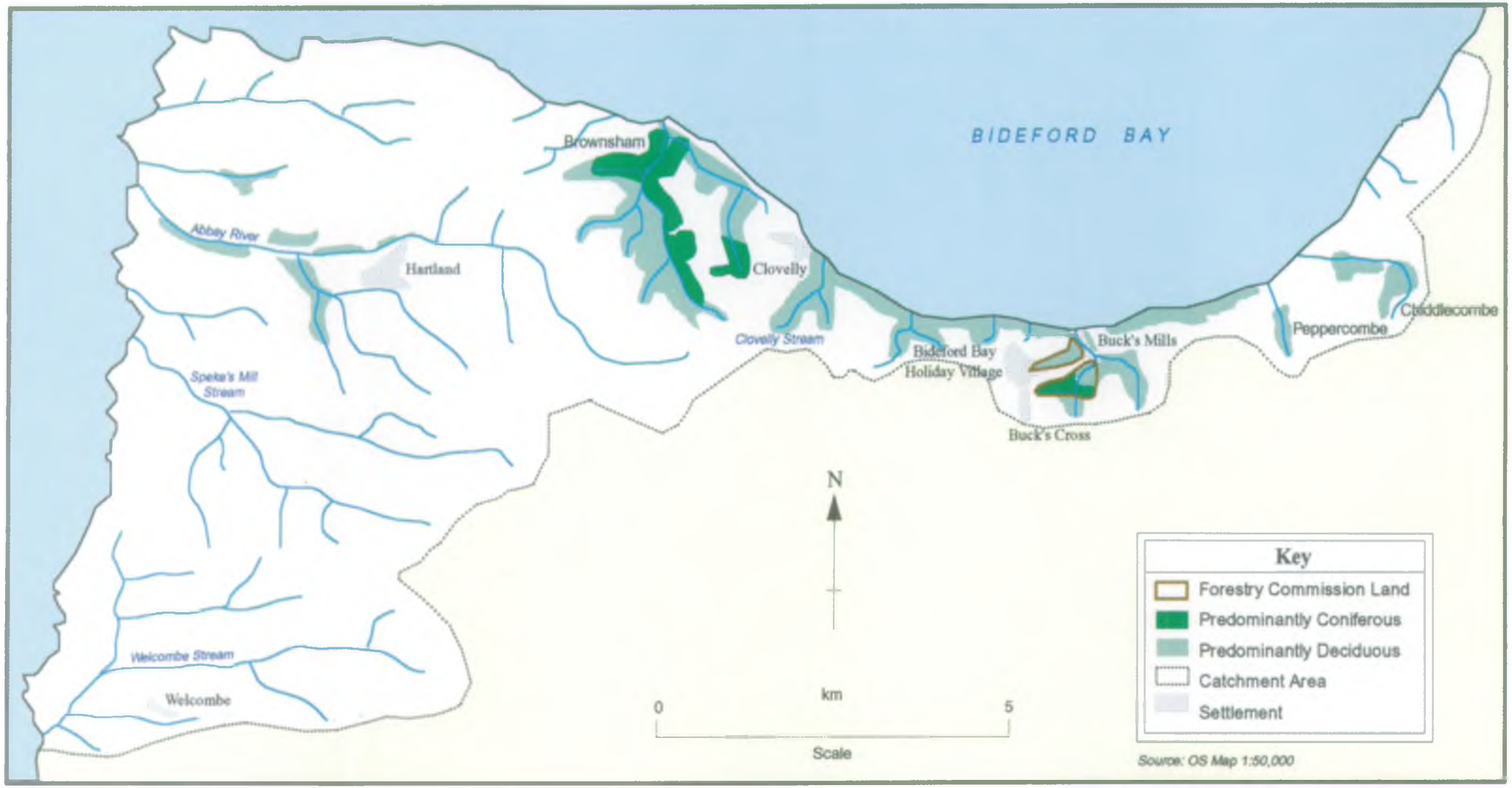
* we are improving links with the Forestry Authority and Local Authorities to ensure that we are consulted on all forestry schemes and on Structure/District/Local Plans, particularly where Indicative Forestry Strategies are being developed

* we identify areas that might be sensitive to the planting of forests to the Forestry Authority, Forest Enterprise and Local Authorities

* we are promoting our 'Forest and Water Guidelines' (Ref. 20) and developing 'best practice' techniques further

* we are working at ways of improving the way we consider the environmental impact of proposed forestry schemes. At the moment only new planting schemes require an environmental impact assessment but large scale woodland management activities can cause as much damage to the water environment.

Figure 14 - Forestry



Information correct as of March 1995

Catchment Perspective

Forests in this catchment are largely restricted to the steep sided valleys and coastal fringe near Clovelly and Buck's Mills (see Figure 14). Small pockets of woodland are also found at Peppercombe, Chiddlecombe and in the Abbey River valley.

Most of the woodland is native broadleaved and mixed woodland with small coniferous plantations occurring at Buck's Mills, Chiddlecombe and near Clovelly (Brownsham Wood). Much of the broadleaved woodland is ancient and has a high conservation value. These ancient woodlands are designated as Sites of Special Scientific Interest (see Figure 7).

The largest area of woodland is located in the steep sided valleys between Brownsham and Clovelly. This woodland was previously owned by the Forestry Commission and managed by Forest Enterprise and is now owned by the Clovelly Estate. Management to date has been sympathetic to the water environment and landscape generally and we would wish to see this continuing under the new ownership.

Land owned by the Forestry Commission is now restricted to the area around Buck's Mills. This 24 hectare forest comprises approximately half coniferous and half deciduous woodland. This woodland is managed by Forest Enterprise and has received little attention over the last few decades. A programme of thinning is planned for 1995/96 and some clear felling is proposed in the future. The NRA does not anticipate any risk to the water environment during felling operations and does not consider it a high priority for consultation. Forest Enterprise are committed to working within the 'Forest and Water Guidelines' (Ref. 20) to ensure the protection and enhancement of the water environment.

There are no acid sensitive areas within the catchment and acidification is not considered to be a problem.

Forestry is not considered to affect the water resources of the catchment.

Future forestry development within the catchment is unlikely to be significant, especially as the topography of the area makes forestry management difficult. Where replanting does occur, however, the Forestry Authority will promote deciduous planting alongside watercourses, to act as buffer zones and conservation corridors, in line with the 'Forest and Water Guidelines' (Ref. 20).

CATCHMENT USES

5.9 Water Abstraction and Supply

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

Our Objective

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

The Role of the NRA

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

* ensure water is used properly, regulating abstractions using licences

* conserve water supplies and protect them from pollution or over use.

Our work involves a range of activities:

* we plan for the sustainable development of water resources, developing criteria to assess the reasonable needs of abstractors and the environment

* we plan the future use of water on the basis that water supply companies reduce leakage to an acceptable level and make best use of available resources

* we are working on a system for mapping the availability of groundwater

* we are studying rivers stressed by abstraction, reviewing how we can limit the environmental effects - for example 'minimum acceptable flows'

* we are developing and implementing a consistent approach to determining licences

* we are working on ways of setting Environmental Quality Standards to help us determine licences

* we promote selective domestic metering where resources are stressed

* we define source protection zones to protect resources from development and pollution risks.

CATCHMENT USES

Catchment Perspective

The entire Hartland Streams Catchment lies within the area of the Devon River Authority (DRA) Exemption from Control Order 1970 (Ref. 21). This Order was obtained because yields from groundwater in this area were generally low and the impact of groundwater abstraction on water resources was considered to be insignificant. Therefore, all groundwater abstraction irrespective of their volume or use can take place without a licence to abstract.

As a result there is only one current licence in the Hartland Streams Catchment for surface water abstraction with a total annual authorized abstraction of 1364 m^3. This abstraction is for industrial processing (concrete and gravel washing) at Colpit Quarry (see Figure 9), a consumptive use, meaning the water is not returned to the watercourse, although residual water from gravel washing will ultimately be returned to the catchment.

Although there are no major aquifers in the Hartland Streams Catchment the rocks do contain sufficient groundwater to support many private supplies.

Public Water Supply

There are no public water supply sources located within the catchment, nor any likelihood of developments in the near future.

Public Water Supply for the major settlements in the area is sourced from the Upper Tamar Lake and Roadford Reservoir via Northcombe Water Treatment Works.

Private Domestic Supplies

Though a large number of premises within the catchment have a mains supply, there are also numerous private domestic supplies in the rural catchment the majority from groundwater, for which the NRA has no information. Most domestic supplies use less than 20 m^3/day and are not licensed.

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

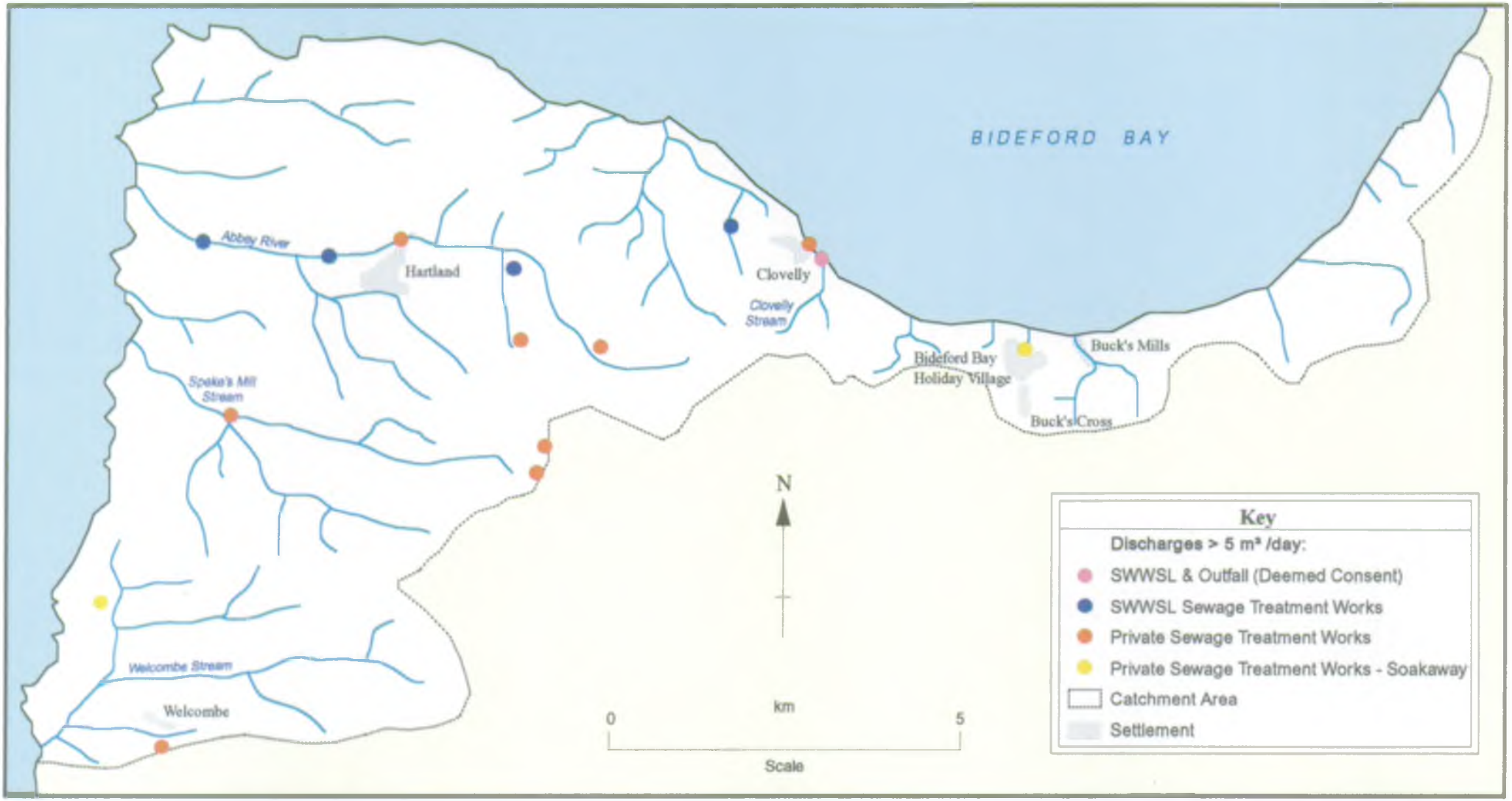
Spray Irrigation

Water abstraction for spray irrigation purposes does not occur in the catchment. Topography, soils and the road network do not make spray irrrigation economically viable. Groundwater yields are unlikely to be able to support large schemes but no information is available for groundwater use due to the excluded area.

Spray irrigation for both agriculture and leisure have been identified as a growing use in the NRA National Water Resources Strategy - 'Water Nature's Precious Resource' (Ref. 22). Increases are predicted to be 1.7% 1991-2001 and 1% 2002-2021. In this catchment growth is likely to be minimal.

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

Figure 15 - Effluent Disposal



Information correct as of March 1995

5.10 Effluent Disposal

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

Rivers break down most types of pollution naturally; with proper controls the environment should not be harmed.

Objective

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

The Role of the NRA

We have duties and powers to:

* license discharges through a system of consents. We must issue a consent to discharge unless there is a good reason to refuse it. We look at the circumstances in each case. If a river is already badly polluted or if the required effluent standards are unachievable after treatment a consent will not be issued

* check discharges to see if they comply with consent standards. We may prosecute dischargers if they break consent conditions

* prevent illegal discharges

* work with the Office of Water Services (OFWAT) to direct investment in sewage treatment by the water companies.

We are involved in a range of activities:

* we work with planning authorities to control development where the sewerage or Sewage treatment system is overloaded

* we liaise with trade dischargers, farmers and South West Water Services Limited (SWWSL) carrying out regular site inspections

* we are constantly reviewing and developing our approach to water sampling.

CATCHMENT USES

Sewage Treatment Funding Plans

Improvements to sewage treatment works (STWs) over the next ten to fifteen years can only be carried out if money is available. OFWAT (the government water company regulator) decides where and when this money is spent. We help OFWAT to set these priorities and agree spending plans - known as AMP2 Plans - with the water services companies. In priority sequence, AMP2 includes:

1 schemes required to meet current legal obligations

2 schemes required to meet future legal obligations

3 schemes which have been separately justified to maintain river quality relative to the 1990 survey or to achieve river or marine improvements.

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

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

Catchment Perspective

The total consented organic load, expressed as Biochemical Oxygen Demand (BOD), which can be discharged directly to watercourses from SWWSL STWs (with numeric consents) has been estimated as approximately 4 kg/day. Less than 0.5 kg/day is from private STWs (see Figure 15).

The discharge from Bideford Bay Holiday Village to ground has a consented BOD load of approximately 19 kg/day and is the largest in the catchment (see Figure 15). The second largest is from Hartland STW (SWWSL) with a load of 2 kg/day.

Problems were experienced in 1994 with high suspended solids and low pH in the effluent from Hartland STW. Improvements to the sand filters have cured this problem.

The small watercourses in this catchment are not used extensively for the disposal of effluent, although as the catchment is characterized by few settlements and many isolated houses there are many individual septic tanks. Inadequate soakaway facilities and illegal septic tank overflows may cause pollution problems especially as the soils are often waterlogged. Negotiations are currently being held with the owner of the Old Smithy Inn, Welcombe to secure improvements to the private sewage treatment facilities.

Between 1968 and 1973 a scheme for first-time sewerage and treatment was put forward for the Buck's Mills and Buck's Cross area. This scheme was via a 1971 Devon River Authority (DRA) notice of intention to provide a combined foul and surface water sewer at Buck's Mills with an on-line storm tank and discharged via a sea outfall at high tide. A public sewer was laid, but no connections were made neither was any treatment plant built.

We currently do not recommend against development at any STW in the catchment, as current sewage treatment facilities are adequate to meet the needs of the planned small-scale future development.

Pollution Events

Table 3 - Reported Incidents in the Hartland Streams Catchment (1992-94)

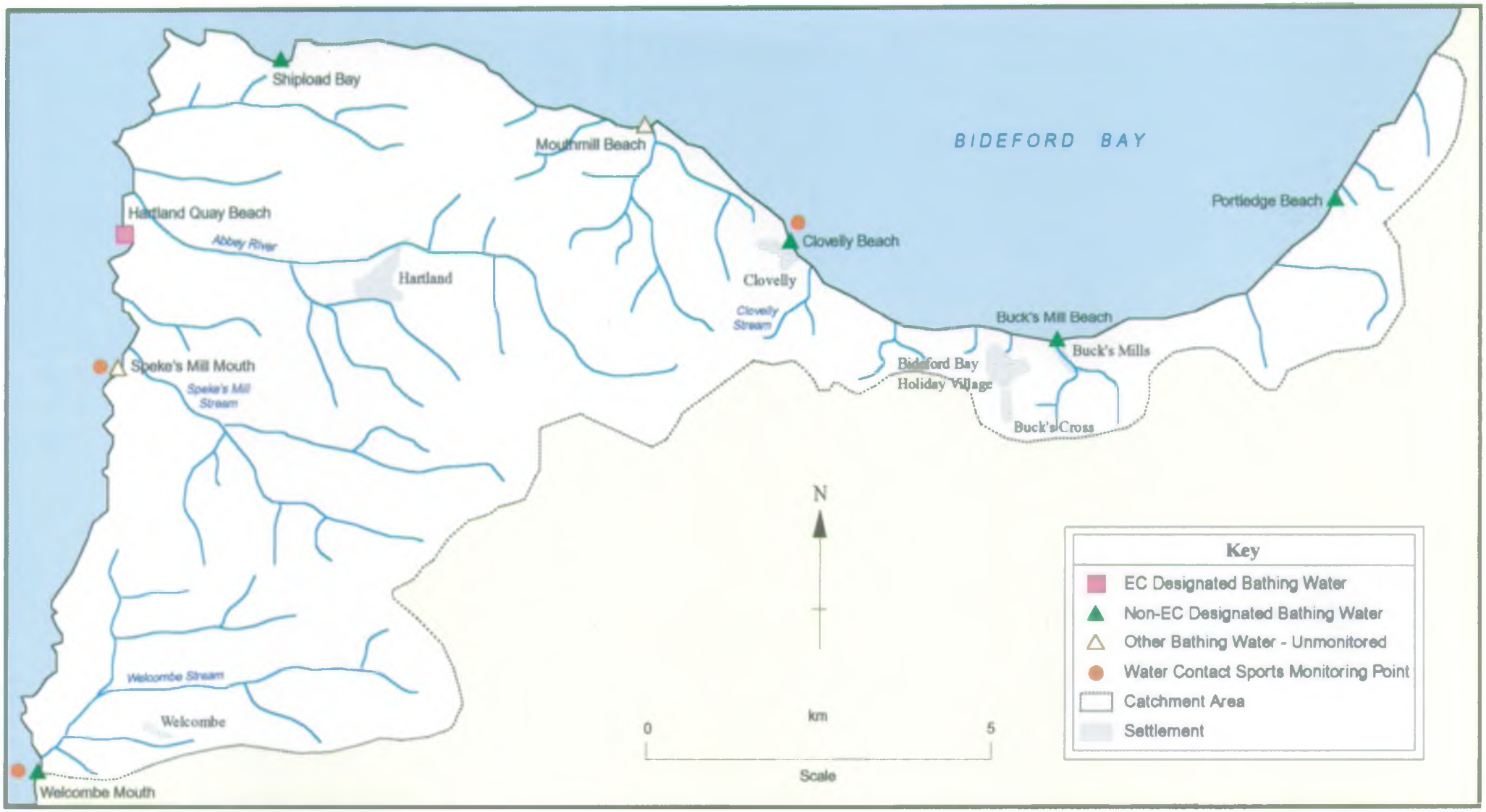
Type of Pollution	Number of Incidents		
	1992	1993	1994
Farms	5	8	9
Storm Sewage Overflow	1	0	2
Vehicle	1	1	1
Other	2	1	2
Not Found	1	0	0
Total	10	10	14

CATCHMENT USES

Future Perspective

In the strategic business plan submitted by SWWSL in early 1994 Lower Clovelly was the only scheme identified as requiring improvements under AMP2. This scheme is needed to meet conditions set by the Urban Waste Water Treatment Directive (Appropriate Treatment) (Ref. 23) and the proposed treatment is to secondary level. It should be emphasized, therefore, that the improvements identified for the Hartland Streams Catchment under AMP2 are provisional until a financial commitment is established.

Figure 16 - Bathing Beach and Water Contact Sport Monitoring Points



Information correct as of March 1995

6. TARGETS AND STATE OF THE CATCHMENT

6.1 Water Quality

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

* River Quality Objectives to protect recognized uses

* standards laid down in EC Directives.

In this chapter, the state of the catchment is compared with relevant water quality targets. We have identified issues where targets are not being achieved and action is needed to improve water quality. We have also identified other water quality issues in the catchment.

6.1.1 EC Directives

There is one EC Directive which currently applies to the catchment - the EC Bathing Waters Directive (Ref. 24) at Hartland Quay (see Figure 16).

Target

The Bathing Waters Directive 'concerning the quality of bathing water' (76/160/EEC)(Ref. 24) protects the environment and public health of bathing waters, by reducing pollution entering identified bathing areas. The Directive contains standards for nineteen microbiological, physical and chemical parameters (Appendix 4) to assess bathing water quality, but compliance is assessed mainly by standards for bacteria found in sewage: total and faecal coliforms.

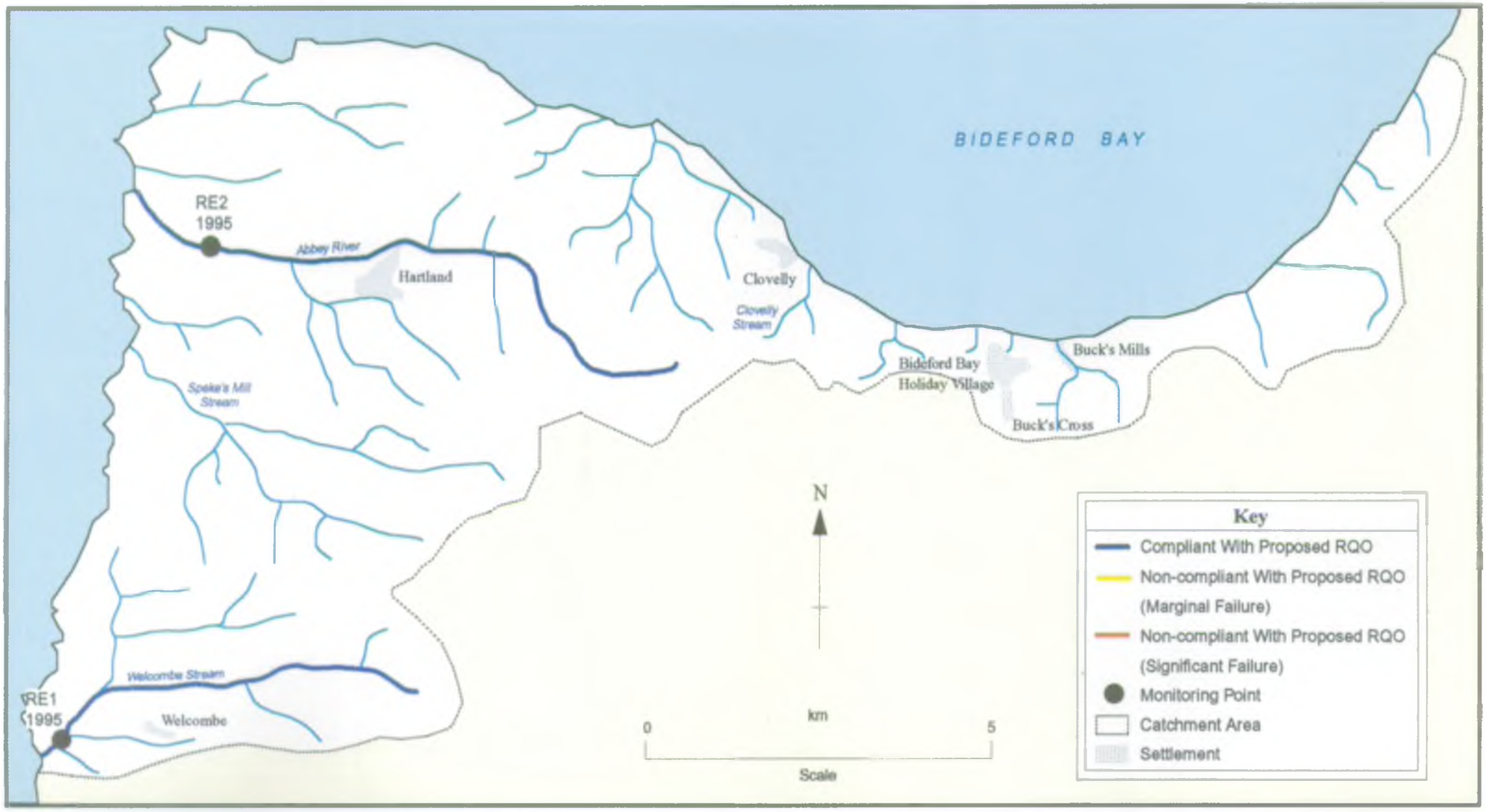
We are responsible for monitoring the quality of identified, popular bathing waters and providing the results to DoE, who decide whether the standards in the Directive have been met. Where identified bathing waters fail to meet the Directive we are responsible for identifying sources of pollution that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

State of the Catchment

Hartland Quay Beach is the only designated bathing beach in the catchment and has complied with this EC Directive each year from 1986 to 1994.

There are five non-designated beaches in the Hartland Streams Catchment which were monitored as part of a three year "Rolling Programme".

Figure 17 - Compliance with River Quality Objectives - River Ecosystem Classification



Information correct as of March 1995

Hartland Streams Catchment Management Plan

NRA South Western Region

Table 4 - Non-designated Bathing Beaches in the Hartland Streams Catchment

Beach Name	Years Monitored
Welcombe Mouth	1991 & 1994
Shipload Bay	1991 & 1994
Clovelly Bay	1991
Buck's Mill Beach	1992
Portledge Beach	1991 & 1994

All of these beaches have met the imperative standards for total coliforms and faecal coliforms, as specified in the EC Bathing Waters Directive (Ref. 24), in the years that they have been monitored. Monitoring of bathing water quality at these beaches will no longer continue.

6.1.2 River Quality Objectives

The water quality targets that we use in all rivers are known as River Quality Objectives (RQOs). RQOs are used for managing water quality and are based on the River Ecosystem (RE) classification scheme. The River Ecosystem scheme is made up of five water quality classes (RE1 to RE5) (Appendix 4 - Table 2) which reflect the chemical quality needed by different types of river ecosystem including the types of fishery they are able to support.

RE Target Classes

The RQOs based on the RE Classification which we are proposing for the Hartland Streams Catchment are shown in Figure 17. These RQOs will apply from 1 January 1995.

State of the catchment

Figure 17 also shows where current water quality is good and meets the targets proposed. Current water quality is based on three years of routine monitoring data from the Public Register collected between 1991 to 1993.

Figure 18 - Biological Classification (1990/91)

Information correct as of 1991

6.1.3 Biological Monitoring

We monitor the ecological quality of rivers by looking at benthic macroinvertebrates. These are small animals which live in river sediments. Living in the river and unable to move far they are affected by long term conditions in the river. Our biological surveys complement our General Quality Assessment.

We collect samples from two sites in the catchment during spring and autumn and make lists of macroinvertebrate species present (see Table 5). By looking at the numbers and range of species present and comparing them with what we might expect in an unpolluted river of a similar nature we can identify any long term pollution problems. There are four classes:

Table 5 - Biological Classes

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

State of the Catchment

The results collected from both rivers reflect consistently good water quality (see Table 6). Figure 18 shows the Biological Classes for the catchment in 1990/91.

6.1.4 Water Quality in Estuarine and Coastal Waters

There are no statutory water quality objectives for estuaries or coastal waters although there are a number of recognized standards.

The South West is recognized internationally as a surfing venue and is also popular for other water contact sports. The survey of bathing water quality for the EC Bathing Water Directive (Ref. 24) and the non-designated beaches will indicate water quality problems close to beaches. In some locations we also sample further off-shore.

Table 6 - Biological Monitoring Programme - Summary Results for Hartland Streams, 1994

Site Location	NGR	Watercourse	Season	No. of Taxa	BMWP Score	ASPT	Comments
30m downstream footbridge, The Hermitage	SS 2160 1830	Welcombe Stream	Spring	25	164	6.54	Results consistent with previous years, indicating continued good water quality.
			Autumn	25	156	6.24	
50m upstream bridge, Hartland Abbey	SS 2383 2488	Abbey River	Spring	27	175	6.48	Results consistent with previous years, indicating continued good water quality.
			Autumn	29	179	6.14	

State of the Catchment

There are three water contact sports sites in the Hartland Streams Catchment (Figure 16) which have been monitored as detailed in the table below.

Table 7 - Water Contact Sport Site Monitoring in the Hartland Streams Catchment

Site Name	Years Monitored
Welcombe Mouth (South) Welcombe Mouth (North)	1992, 1993 & 1994
Speke's Mill Mouth (South) Speke's Mill Mouth (North)	1992, 1993 & 1994
Clovelly Beach (West) Clovelly Beach (East)	1992, 1993 & 1994

There is no directive specifically assigned to water contact sports. However, all the sites have met the imperative standards for total coliforms and faecal coliforms as specified in the EC Bathing Waters Directive (Ref. 24), in the years that they have been monitored.

Monitoring sea water quality at these sites will no longer be carried out.

6.1.5 Pollution Events

State of the Catchment

The majority of pollution incidents reported for this catchment are from farms (see Table 3 in Section 5.10). These statistics include a fish kill in 1993. The task force investigations (see Table 2 in Section 5.7) aim to prevent poor farm waste management practices leading to a deterioration in the water quality or in the freshwater ecosystem of the watercourses in the Hartland Streams Catchment. There is, therefore, a need to continue to monitor the problem farms identified.

Polluted runoff from low-rate spray irrigation of farm waste is the major concern in the catchment although inadequate storage of slurry and cattle yard drainage is also a problem.

Issue 1 Farm-related pollution incidents.

6.1.6 Groundwater Protection

In 1992 we published our Policy and Practice for the Protection of Groundwater (available separately from our Public Relations department) (Ref. 25). This document sets out why we must safeguard the quality and flow of water in aquifers and outlines how the NRA and other organizations can respond to the threats posed to groundwater by the way we use and develop land.

Our document contains policy statements in the following areas:

* physical disturbance of aquifers affecting quality and quantity
* waste disposal to land
* contaminated land
* disposal of sludges and slurry to land
* discharges to underground strata
* diffuse pollution
* other activities affecting groundwater quality.

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

We work with planning authorities to minimize the risks posed to groundwater from development and land use changes. We concentrate our efforts in the most vulnerable areas around water supply boreholes.

Target

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

State of the Catchment

Limited sampling of groundwater has taken place. Groundwater is generally of good quality, however, the water from some borehole sources contains elevated levels of iron and manganese which requires treatment prior to drinking.

6.2 Water Quantity

The natural water environment

Target

To protect the water environment from damage by abstraction, maintaining and improving the situation wherever we can.

State of the Catchment

Overall the catchment is not stressed by abstraction. There is, however, one problem area. This was identified during a study commissioned by NRA South West Region in 1990. This report 'NRA South West Region - Low Flows Study' (Ref. 26) identified many low flow sites where low flows were perceived to affect the river adversely in terms of amenity, fisheries or ecology. Problem sites were ranked as serious, major, medium, small or minor according to their perceived severity of low flow effects.

One site, ranked as minor, was identified in the Hartland Streams Catchment at Docton Mill, Lymebridge on the Speke's Mill Stream.

The stream is dry most summers in a reach bypassed by a leat which supplies Docton Mill. This abstraction is currently unlicensed. This site was ranked as minor in its regional significance. The scale of problems nationally means that only limited funds are likely to be available for sites with impacts ranked below serious. However, the NRA would wish to work with the owners of this abstraction to identify a practical solution which takes full account of the abstractor's rights.

Issue 2 Low flows in Speke's Mill Stream at Docton Mill, Lymebridge caused by an unlicensed abstraction.

Public water supply

Target

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

State of the Catchment

Overall potable water is imported into the catchment as at Hartland and as this water is returned as treated effluent to the Abbey River this results in a net gain in flow. 'Tomorrow's Water', the overall Water Resources Development Strategy for the South Western Region (Ref. 27) sets out how we would like to see water resources developed in the future. Our Strategy follows the principles of sustainable development with proper safeguards for the environment.

TARGETS AND STATE OF THE CATCHMENT

The Regional Water Resources Strategy (Ref. 27) was published in April 1995 and any implications that it has for the catchment will be reviewed and included in the Hartland Streams Action Plan due to be published in January 1996.

Details on the sources of public water supply are contained within the River Tamar Catchment Management Plan Consultation Report (due to be published in July 1995).

6.3 Physical Features

State of the Catchment

Recreation

It is to be expected that recreation use of the catchment will increase gradually, but no major new attractions are believed to be planned. Sensitive management of existing features to ensure that recreation use does not adversely affect conservation and other interests is the main aim and we will work with others in the development and implementation of suitable strategies.

Issue 3 Lack of comprehensive recreation use data.

Issue 4 Restricted public access to watercourses.

Landscape

The characteristic landscape may be adversely affected by land use changes and new development. Intensification of farming practices in response to new pressures or incentives may result in loss of hedgerows and changes to historic field patterns.

This area owing to its exposed nature, is of interest for possible development of wind power generation. Inappropriate expansion would have a major impact on the landscape.

River valleys are important landscape features within the catchment. We now have a standard survey method (River Landscape Assessment, Conservation Technical Handbook No.2, NRA, 1993, Ref. 28) to enable us to evaluate areas in need of protection or enhancement. Planning Authorities can also use their powers to protect river valley landscapes. The assessments which have already been carried out here have indicated a need to secure landscape enhancement.

Issue 5 Absence of river landscape assessment to support existing documents.

Issue 6 Need to improve awareness of importance of landscape.

Archaeology

Features of interest will require continued protection if they are to survive, which may include active management to prevent deterioration. Unidentified features are at risk from new development or changes in practice, both of which may result from increased use of the area. Such losses might include information relating to the ancient environment, as well as artifacts.

Issue 7 Need for a simple assessment of the overall archaeological value of the catchment for considering actions in relation to the historic river environment.

TARGETS AND STATE OF THE CATCHMENT

Nature Conservation

Although we can control and influence many of the factors which affect the quality of our water environment it is difficult for us to set targets to protect a minimum amount of a particular habitat or a minimum number of particular plants or animals in the catchment. The Rivers and Wetlands Project, funded by Devon Wildlife Trust and the Tarka Project and supported by English Nature, the Wetland Ecosystem Research Group, South West Water and the NRA, will produce a report containing agreed targets for many species and habitats in Devon. Until these targets are set we will continue to encourage sound management of rivers and wetlands to promote wildlife conservation in balance with other uses. Once these targets have been agreed we will adopt them within Catchment Management Plans where appropriate.

To achieve environmental sustainability in the water environment we need to maintain biodiversity in the catchment. Specific targets, such as those from the Rivers and Wetlands Project, are needed to guide the prioritization and direction of effort.

Issue 8 Need for clear biodiversity targets for conservation in the water environment.

The protection afforded by various designations should help to maintain the high conservation value of large parts of the catchment. However, many other sites of conservation value exist and are vulnerable to the effects of increasing visitor and development pressure. Much of Devon has been surveyed to identify these other sites and to aid their protection.

Issue 9 Need for identification of sites of nature conservation importance in Torridge District to improve protection.

Where degraded sites occur and can be rehabilitated, careful targeting of programmes such as Countryside Stewardship and MAFF's agri-environment initiative may be of use in encouraging retention or revival of traditional and less intensive agricultural practice.

Issue 10 Need for appropriate land use to retain or restore conservation value.

A large proportion of the species-rich Culm Grasslands which previously covered this area has been lost, largely through agricultural improvement. This loss should be halted and reversed if at all possible.

Issue 11 Loss of semi-natural habitats, especially Culm Grassland.

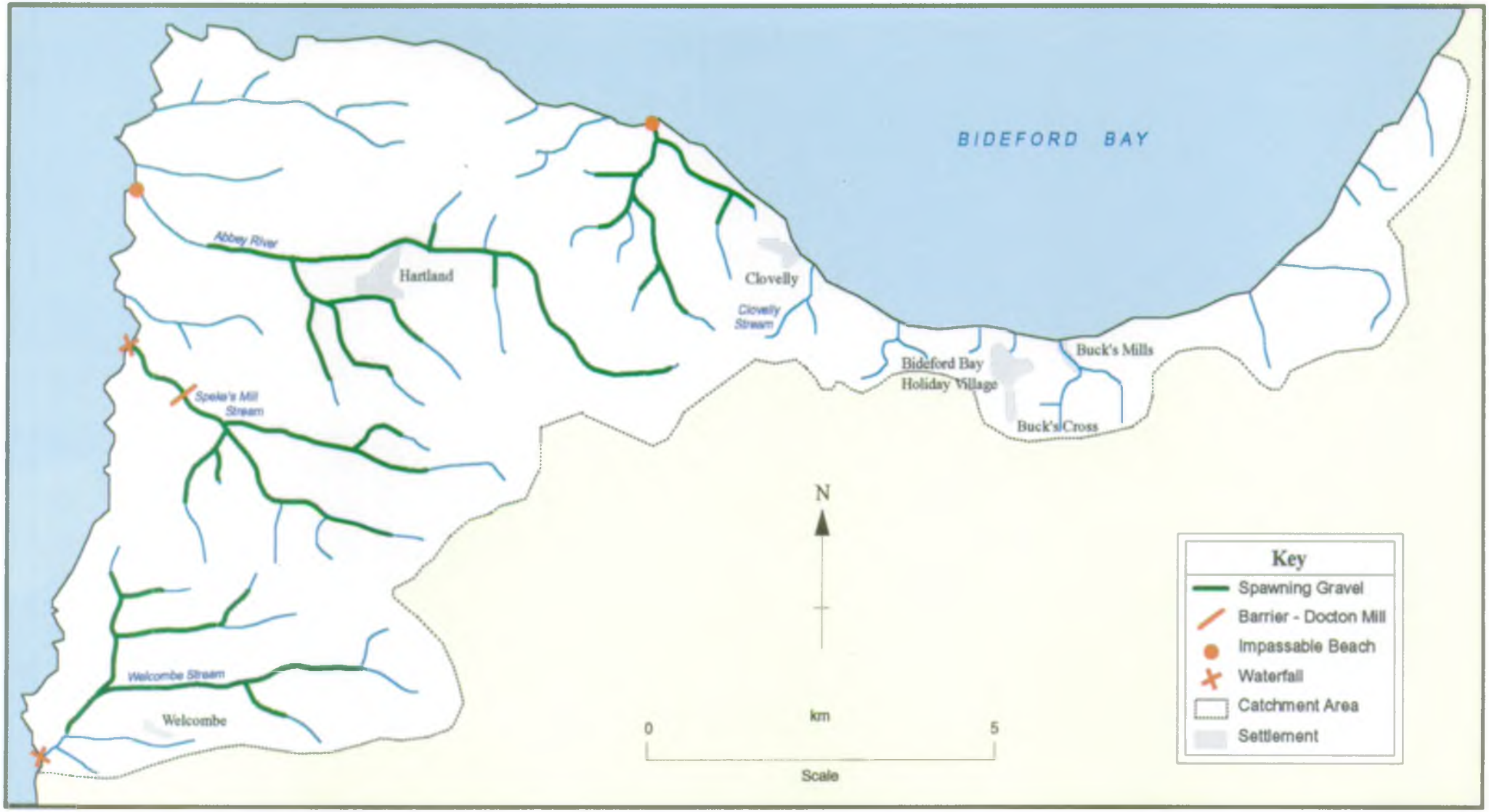
Woodland habitats alongside streams are of particular conservation interest as they support unusual and important lower plant communities, although our knowledge is not fully developed.

Issue 12 Need for improved understanding of streamside lower plant communities.

The catchment is not covered by the National Otter Surveys and more information would be useful, particularly in terms of coastal use by this species.

Issue 13 Lack of full information on otter distribution.

Figure 19 - Spawning Gravels and Barriers



Information correct as of March 1995

Marsh Fritillaries are largely restricted to Culm Grassland sites and have been severely affected by habitat loss.

Issue 14 Decline of Marsh Fritillary.

A number of invasive plant species are associated with rivers, including Himalayan balsam and Japanese knotweed. This latter species seems to be spreading rapidly in the Hartland Catchment at a range of sites.

Issue 15 Need for better understanding of distribution of invasive bankside plant species.

Barriers

Target

To maintain access for Brown Trout to spawning territory by establishing and by maintaining fish passes and the removal of man-made barriers after fully considering wider ecological impact and according to the agreed Regional procedure.

State of the Catchment

The absence of migratory Salmonids in the area reduces the significance of obstructions in the rivers since they will only influence the movement of Brown Trout. In most cases, these fish will have no difficulty in gaining access to gravels on which to spawn, however, Docton Mill Weir on the Speke's Mill stream presents a barrier to upstream movement in all but the highest flows (see Figure 19). This structure will prevent Brown Trout which have dropped below the weir from gaining access to the more suitable spawning areas further upstream.

Issue 16 Impeded fish passage at Docton Mill Weir.

Spawning Gravels

Target

To ensure the provision of spawning areas.

State of the Catchment

The habitat of the area is generally good as most streams have gravels suitable for Brown Trout spawning over much of their length.

TARGETS AND STATE OF THE CATCHMENT

6.4 Flood Defence and Land Drainage

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

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

The standard of flood protection at a location is the worst flood (expressed as a return period) which can be withstood without significant flooding. Flood defence schemes only alleviate flooding up to the design standard, a more serious flood may still occur.

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

Target

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

State of the Catchment

The NRA is a member of the North Devon, Somerset and South Avon Coastal Group which includes Torridge District Council and other coastal defence authorities. The NRA is the lead authority for the production of the Shoreline Management Plan (SMP).

Preparation of the Shoreline Management Plan from Hartland Point to Sand Point will be in three phases:

Phase 1 will be a scoping study.

Phase 2 will be a more detailed study involving the collection of data and information to identify and/or model coastal processes. This will suggest strategic options for the developed and natural environments.

Phase 3 will be the publication of the Shoreline Management Plan. It will describe coastal processes and the strategic guideline for the future management, including maintenance methods, of the shoreline as agreed between all consultees.

A working group has been formed from members of the Coastal Group. Part of their function will be to oversee, acquiring the services of third parties necessary for completion of Phases 1 and 2.

TARGETS AND STATE OF THE CATCHMENT

An application for grant aid is to be made to MAFF for work done externally for the development of the SMP.

Issue 17 Proposals for coastal defence works need to be considered within an overall and integrated strategy.

Regulation

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

Target

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

State of the Catchment

Information is currently provided on the basis of historic flood records and survey data. We have agreed with planning authorities how we can improve this information.

Issue 18 Need to identify flood risk for planning authorities.

Target

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

State of the Catchment

A number of moderate sized developments have been proposed in the Hartland area.

Issue 19 Inappropriate development, particularly in floodplains, may affect standards of flood defence and damage environmental interest.

Target

100% of consents or byelaws to be dealt with within prescribed time.

State of the Catchment

98% actually dealt with.

Target

To ensure 80% of consents or byelaws audited to ensure compliance.

State of the Catchment

Consent compliance is not rigorously checked in the catchment at the moment.

Issue 20 Need to audit Land Drainage consent proposals.

Improvements

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

Different types of land and property need different levels of protection.

We use the indicative standards (return period in years) below to design schemes.

Table 8 - Indicative Flood Defence Standards for Different Land Use

Current Land Use	Sea (Years)	River (Years)
High density urban, containing significant residential and non-residential property.	200	100
Medium density urban.	150	75
Low density or rural communities. Highly productive agricultural land.	50	25
Generally arable farming with isolated properties.	20	10
Low productivity land with few properties at risk.	5	1

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

TARGETS AND STATE OF THE CATCHMENT

Target

To identify and investigate all flood risk locations.

State of the Catchment

We maintain a Register of flood problems and we are developing a Long Term Plan of Needs. There are two places in this catchment where flooding is known to occur (see Figure 9).

The introduction of the Flood Defence Management Framework will identify the relative priority of schemes to alleviate flooding problems.

Issue 21 Flood problems for investigation identified at two locations.

7. SUMMARY OF CATCHMENT ISSUES AND ACTIONS

1. Farm-related Pollution Incidents

- Complete planned task force investigations.
- Continue to enforce farm waste legislation and secure improvements in farm waste management practices as necessary in line with NRA policy and the Code of Good Agricultural Practice (Ref. 19).
- Encourage farmers to take advantage of the free pollution advisory visits that are available from ADAS on behalf of MAFF.
- Encourage farmers to take advantage of less intensive land management schemes, such as Countryside Stewardship.
- Encourage the use of farm waste management plans to minimize the risk of pollution from land runoff.
- Seek to implement buffer zones or other appropriate land management techniques to reduce pollutants reaching the watercourse.

2. Low Flows in Speke's Mill Stream at Docton Mill.

- License current abstraction and seek to impose environmentally protective conditions on licence.
- Negotiate improvements to amount and timing of abstraction.

3. Lack of Comprehensive Recreation Use Data.

- Continue to monitor recreation use of the catchment.

4. Restricted Public Access to Watercourses.

- Promote appropriate recreation use of inland and coastal waters taking into account the needs of the disabled.
- Work with Devon County Council, Torridge District Council and Heritage Coast Officer to investigate the development of recreation routes linking to other areas e.g. Tamar Lakes.

5. Absence of River Landscape Assessment to Support Existing Documents.

- Carry out river landscape assessment in conjunction with River Corridor Survey when planning NRA operations.

SUMMARY OF CATCHMENT ISSUES AND ACTIONS

6. Need to Improve Awareness of Importance of Landscape.

- Support initiatives to raise public understanding.

7. Need for a Simple Assessment of the Overall Archaeological Value of the Catchment for Considering Actions in Relation to the Historic River Environment.

- Investigate possibilities of collaboration with County Archaeologist and other interested parties to produce document covering whole catchment.

8. Need for Clear Biodiversity Targets for Conservation in the Water Environment.

- Cooperate through Rivers and Wetlands Project in setting targets.

9. Need for Identification of Sites of Nature Conservation Importance in Torridge District to Improve Protection.

- Support any production of wildlife survey and inventory for Torridge District.

10. Need for Appropriate Land Use to Retain or Restore Conservation Value.

- Support new and existing initiatives to promote less intensive agricultural practices.

11. Loss of Semi-natural Habitats, Especially Culm Grassland.

- Promote retention of existing wetland habitats.
- Cooperate with other conservation bodies to set targets for restoration/rehabilitation of Culm Grassland.
- Encourage wetland restoration when consenting or advising on developement proposals or other activities affecting the water environment.

12. Need for Improved Understanding of Streamside Plant Communities.

- Investigate possibilities of lower plant surveys in collaboration with others.

13. Lack of Full Information on Otter Distribution.

- Look at option of extending national survey.
- Promote continuation of other surveys, including local otter group and NRA wardens.

14. Decline of Marsh Fritilary.

- Promote habitat conservation and implement targets when set.

15. Need for Better Understanding of Distribution of Invasive Bankside Plant Species.

- Continue invasive plant surveys.
- Investigate possibility of collaboration with other agencies e.g. Hartland Heritage Coast Service.

16. Impeded Fish Passage at Docton Mill Weir.

- Once abstraction licensed ensure conditions are met.
- Modify weir to permit fish passage, according to regional priority and capital availability (capital cost).

17. Proposals for Coastal Defence Works Need to be Considered Within an Overall and Integrated Strategy.

- Complete and agree 'Shoreline Management Plan' for this coastal cell - Bridgwater and Bideford Bay.
- Consider any future proposals for coastal defence works within the context of the Shoreline Management Plan.
- Develop a Coastal Zone Management Plan to extend the scope of the present Shoreline Management Plan to cover all coastal aspects.

18. Need to Identify Flood Risk for Planning Authorities.

- Identify flood risk for the Hartland Streams Catchment according to national guidelines (programme due for completion by 1999).

19. Inappropriate Development, Particularly in Floodplains, May Affect Standards of Flood Defence and Damage Environmental Interest.

- Advice should continue to be given to planning authorities to ensure that all surface water runoff from new development in Hartland is discharged directly to the Abbey River and not to local minor watercourses.

20. Need to Audit Land Drainage Consent Proposals.

- Set up a system to check consent compliance in this catchment consistent with regional policy.

21. Flood Problems for Investigation Identified at Two Locations.

- Review flood problems at Hartland and Lymebridge according to the regional programme.

8. Summary Table of Issues and Options for Action.

ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
				LEAD	OTHER
1. Farm-related pollution incidents.	• Complete planned task force investigations. • Enforce farm waste legislation and secure improvements in farm waste management. • Promote ADAS pollution advice visits. • Encourage less intensive land management. • Encourage farm waste management plans. • Reduce pollutants reaching watercourse e.g. implement buffer zones.	Environmental gain Improved water quality	Cost Acceptance Ability	NRA	MAFF NFU Farmers
2. Low Flows in Speke's Mill Stream at Docton Mill.	• License abstraction and seek to impose protective conditions. • Negotiate improvements to amount and timing.	Environmental gain Assist fish passage	Cost Ability	NRA	Abstractor
3. Lack of comprehensive recreation use data.	• Continue to monitor recreation use.	Better data and planning	Cost	NRA	Recreation bodies, DCC, TDC, Sports Council, Heritage Coast Officer
4. Restricted public access to watercourses.	• Promote appropriate recreation use taking into account need of disabled. • Investigate development of recreation routes linking other areas e.g. Tamar Lakes.	Improved access Encourages wider use	Cost Potential conflict with conservation	TDC NRA DCC CoCo Heritage Coast Officer	Riparian owners
5. Absence of river landscape assessment to support existing documents.	• Carry out assessment when planning operations.	Better protection of landscape	Cost Time	NRA	
6. Need to improve awareness of importance of landscape.	• Support initiatives to raise public understanding.	Gain support for landscape protection	Cost	NRA CoCo TDC DCC Conservation bodies	
7. Need for a simple assessment of the overall archaeological value of the catchment for considering actions in relation to the historic river environment.	• Investigate possibilities of collaboration to produce a document for the whole catchment.	Better protection of archaeological value	Cost	DCC NRA EN EH	
8. Need for clear biodiversity targets for conservation in the water environment.	• Cooperate through Rivers and Wetlands Project in setting targets.	Environmental gain Allows monitoring of conservation status	Cost	NRA Devon Wildlife Trust Tarka Project	NRA EN SWWSL Ecosystem Research Group
9. Need for identification of sites of nature conservation importance in Torridge District to improve protection.	• Press for production of wildlife survey and inventory.	Better protection	Cost	Conservation Agencies TDC DWT	NRA DCC

ISSUE	OPTIONS/ACTIONS	ADVANTAGES	DISADVANTAGES	RESPONSIBILITY	
				LEAD	OTHER
10. Need for appropriate land use to retain or restore conservation value.	• Support initiatives to promote less intensive agriculture.	Environmental gain	Cost Acceptance	MAFF/ADAS CoCo EN NRA	NFU Farmers
11. Loss of semi-natural habitats, especially Culm Grassland.	• Promote retention of existing wetlands. • Cooperate to set targets for restoration/rehabilitation of Culm Grassland.	Environmental gain	Cost	EN NRA DWT DCC	TDC CoCo Other conservation bodies
12. Need for improved understanding of lower plant communities.	• Investigate possibilities of lower plant surveys in collaboration with others.	Better understanding Better protection	Cost	EN	NRA DWT
13. Lack of information on otter distribution.	• Look at extending national survey. • Promote continuation of otter surveys	Better understanding Better protection	Cost	EN	NRA DWT
14. Decline of Marsh Fritillary.	• Promote habitat conservation and implement targets.	Better protection	Cost	EN	NRA DWT
15. Need for better understanding of distribution of invasive bankside plant species.	• Continue invasive plant surveys. • Investigate collaboration.	Better data and planning	Cost	NRA	Riparian Owners
16. Impeded fish passage at Docton Mill Weir.	• Once abstraction licensed ensure conditions are met. • Modify weir.	Improved fish passage	Cost Ability	NRA	Mill owner
17. Proposals for coastal defence works need to be considered within an overall and integrated strategy.	• Complete and agree 'Shoreline Management Plan'. • Consider future coastal defence works with context of SMP. • Develop coastal zone management plan.	Better protection Environmental gain	Cost	NRA	TDC WDC DCC SDC MAFF SCC WSDC NDDC EN
18. Need to identify flood risk for planning authorities.	• Identify flood risk for Hartland Streams Catchment.	Better protection	Cost	NRA	TDC
19. Inappropriate development may affect standards of flood defence and damage environmental interest.	• Planning advice should ensure all surface water runoff discharges directly to Abbey River.	Better protection Environmental gain	Cost Ability	NRA	TDC
20. Need to audit land drainage consent proposals.	• Set up a system to check consent compliance.	Better control	Cost	NRA	
21. Flood problems identified at two locations.	• Review flood problems at Hartland and Lymebridge.	Not yet known	Cost Time	NRA	

APPENDIX 1 - CHEMICAL COMPONENT OF THE GENERAL QUALITY ASSESSMENT SCHEME FOR RIVERS AND CANALS

Water Quality	Grade	Dissolved Oxygen % Saturation	BOD (ATU[1]) mg/l	Total Ammonia mg N/l
		10 percentile	90 percentile	90 percentile
Good	A	80	2.5	0.25
	B	70	4	0.6
Fair	C	60	6	1.3
	D	50	8	2.5
Poor	E	20	15	9.0
Bad	F[2]	-	-	-

Notes: [1] as suppressed by adding allyl thio-urea
[2] ie quality which does not meet the requirements of Grade E in respect of one or more determinands

APPENDIX 2 - SITES OF SPECIAL SCIENTIFIC INTEREST

SITE	TYPE	GRID REF	AREA (ha)
Bursdon Moor	Culm grassland - rich invertebrate fauna.	SS 267 200	144.2
Brownsham to Clovelly	Ancient sessile oak woodland/parkland with nationally important lichen flora. Wet meadows and scrub - botanical, ornithological and invertebrate interest.	SS 298 254	248.6
Hobby to Peppercombe	Sessile oak woodland with nationally important lichen communities and maritime heath.	SS 320 242 - 383 242	240.6
Marsland to Blackchurch Rock	Cliffs, cliff tops and valleys containing woodland, grassland and heathland - botanical, ornithological, invertebrate and geomorphological interest.	SS 210 175 SS 230 278 SS 297 265	656.0

APPENDIX 3 - NATURE RESERVES

SITE	TYPE	GRID REF	OWNER
Buck's and Kevills Wood Buck's Mill	Woodland	SS 355 234	Woodland Trust
Brownsham, Hartland	Wet/dry heathy grassland, scrub, wet woodland and stream	SS 287 257	National Trust - Leased by Devon Wildlife Trust
Welcombe and Marsland	Woodland, maritime grassland, grass heath and flushes	SS 218 185	Wildlife Trusts (Royal Society for Nature Conservation)

APPENDIX 4 - WATER QUALITY STANDARDS

TABLE 1: EC DIRECTIVE CONCERNING THE QUALITY OF BATHING WATERS (76/160/EEC)

MICROBIOLOGICAL STANDARDS

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

PFU = Plaque Forming Units

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

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

AESTHETIC CRITERIA

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

APPENDIX 4 - TABLE 2 : STANDARDS FOR THE FIVE RIVER ECOSYSTEM USE CLASS

Use Class	DO % sat 10%ile	BOD (ATU) mg/l 90%ile	Total Ammonia mgN/l 90%ile	Un-ionised Ammonia mgN/l 95%ile	pH 5%ile & 95%ile	Hardness mg/l $CaCO_3$	Dissolved Copper µg/l 95%ile	Total Zinc µg/l 95%ile	Class Description
1	80	2.5	0.25	0.021	6.0 - 9.0	≤10 > 10 and ≤50 > 50 and ≤100 > 100	5 22 40 112	30 200 300 500	Water of very good quality suitable for all fish species
2	70	4.0	0.6	0.021	6.0 - 9.0	≤10 > 10 and ≤50 > 50 and ≤100 > 100	5 22 40 112	30 200 300 500	Water of good quality suitable for all fish species
3	60	6.0	1.3	0.021	6.0 - 9.0	≤10 > 10 and ≤50 > 50 and ≤100 > 100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for high class coarse fish populations
4	50	8.0	2.5	-	6.0 - 9.0	≤10 > 10 and ≤50 > 50 and ≤100 > 100	5 22 40 112	300 700 1000 2000	Water of fair quality suitable for coarse fish populations
5	20	15.0	9.0	-	-	-	-	-	Water of poor quality which is likely to limit coarse fish populations

GLOSSARY

AGRI - ENVIRONMENTAL

Agricultural practices which have environmental benefits.

AQUIFER (MINOR AQUIFER)

A sub-surface zone or formation of rock which contains exploitable resources of groundwater. Minor Aquifers seldom produce large quantities of water but are important for local water supplies and in supplying base flow for rivers.

AREA OF OUTSTANDING NATURAL BEAUTY (AONB)

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

ASSETS MANAGEMENT PLAN 2 (AMP2)

South West Water's Capital Investment Programme.

BERN CONVENTION

International agreement which carries obligations to conserve wild plants, birds and other animals, with particular emphasis upon endangered and vulnerable species and their habitats. This agreement forms the basis of the Habitats Directive.

BIOCHEMICAL OXYGEN DEMAND (BOD)

A measure of the amount of oxygen consumed in water, usually as a result of organic pollution.

BIODIVERSITY

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

BUFFER ZONES

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

CARBONIFEROUS

Period of the Palaeozoic era, following the Devonian era and preceding the Permian. Economically, the most important system containing the world's coal reserves and oil, oil shale, iron ore and fire clay deposits.

COLIFORM (FAECAL COLIFORMS)

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

COUNTRYSIDE STEWARDSHIP SCHEME

An initiative of the Countryside Commission in collaboration with English Nature, English Heritage and MAFF to enhance and conserve important English landscapes, wildlife habitats and history.

COUNTY WILDLIFE SITES

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

CULM

A geological formation in SW England comprising beds of shales and thin layers on impure anthracite, all of carboniferous age.

CULM GRASSLAND

A habitat which comprises a characteristic mixture of marshy grassland, bog, wet heath and scrubby woodland which collectively supports a wide range of flora and fauna. The habitat is underlain by a geological formation of sandstones and shales.

DELTA

A deposit of sediments formed at the mouth of a river where it enters a lake or the sea and where there is no tidal or current action capable of removing the sediment.

ENTEROVIRUS

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

ENVIRONMENTAL QUALITY STANDARD (EQS)

The quantity of a substance found in a body of water which should not be exceeded in order to protect a given use of the water body. An EQS is set by the European Community through EC Directives and the government.

FAECAL STREPTOCOCCI

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

FISSURE

A crack or open break in rocks

FRACTURE

Clean break in rock due to strain and stress from faulting or folding: characteristic break pattern of a mineral.

GEOMORPHOLOGY

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

HERITAGE COAST

The finest example of a coastal and adjacent inland area as designated, through cooperation between the Countryside Commission and local authorities, for its protection and enhancement of enjoyment by the public.

HYDROGEOLOGY

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

INTERCEPTOR

A device for containing oil, which when used as part of a drainage system limits the amount of oil discharging to watercourses and to the ground from roads and garages etc.

NATURE CONSERVATION REVIEW SITE

Key site, where nature conservation should be the primary purpose of management and which is typical of one of the main habitat types as identified in Britain by the former NCC and Natural Environment Research Council 1977.

PERMIAN

Final geological period of the Palaeozoic era. It succeeds the Carboniferous and precedes the Triassic. New red sandstone is linked with this era.

PHENOLS

A class of aromatic compounds with one or more hydroxyl (-OH) groups directly attached to the benzene nucleus.

Q95

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

SALMONELLA

These are anaerobic rod shaped bacteria of the Enterobacteriace family. All members of the genus *Salmonella* are intestinal animal pathogens. *Salmonella typhi* and to a lesser extent *Salmonella paratyphi* are primarily human pathogens. They are well adapted to water as a mode of transmission and cause typhoid and paratyphoid respectively.

SET-ASIDE

The EC Set-Aside Scheme was first introduced for the crop year 1991/92 as part of the CAP reform to allow farmers to remove land from production by receiving compensation. Eligible crops are a wide range of arable crops, principally cereals.

SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

A site given a statutory designation by English Nature or the Countryside Council for Wales because it is particularly important, on account of its conservation value.

SPECIAL AREA OF CONSERVATION (SAC)

Areas designated under the Habitats Directive.

TOPOGRAPHY

The surface features of the Earth's surface including the relief, the terrain, the vegetation, the soils and all the features created in the landscape by human endeavour.

UNITS

mm	Millimetre
m	Metre
km	Kilometre
km^2	Kilometre squared
m/km	Metres per kilometre
persons/km^2	Number of people per square kilometre
ha	Hectare
m^3	Cubic metres
m^3/s	Cumec; cubic metre per second
m^3/day	Cubic metres per day
M1/day	Megalitres per day
M1/year	Megalitres per year
kg/day	Kilogrames per day
°C	Degrees Centigrade
%	Percentage
>	Greater than
≥	Greater than or equal to
<	Less than
≤	Less than or equal to
mg/L	Milligrammes per litre
mg N/L	Milligrammes of Nitrogen per litre
no/100ml	Number per 100 millilitres
no/L	Number per litre
PFU/10L	Plaque forming units per 10 litres.

ABBREVIATIONS

AMP2	Asset Management Plan 2
ANOB	Area of Natural Outstanding Beauty
AOD	Above Ordnance Datum
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
CMP	Catchment Management Plan
CoCo	Countryside Commission
DCC	Devon County Council
DoE	Department of the Environment
DRA	Devon River Authority
DWT	Devon Wildlife Trust
EC	European Commission
EH	English Heritage
EN	English Nature
EQS	Environmental Quality Standard
ERLOS	Emergency Response Level of Service
ESA	Environmentally Sensitive Area
FC	Forestry Commission
FDMF	Flood Defence Management Framework
FE	Forestry Enterprise
GQA	General Quality Assessment
MAFF	Ministry of Agriculture, Fisheries and Food
MMC	Mergers and Monopolies Commission
NDDC	North Devon District Council
NFU	National Farmers Union
NGR	National Grid Reference
NRA	National Rivers Authority
NWC	National Water Council
OFWAT	Office of Water Services
PWS	Public Water Supply

R&D	Research and Development
RE	River Ecosystem, RE1, RE2 etc
RQO	River Quality Objective
SAC	Special Areas of Conservation
SAM	Scheduled Ancient Monument
SCC	Somerset County Council
SDC	Sedgemoor District Council
SMP	Shoreline Management Plan
SoS	Standards of Service
SSSI	Sites of Special Scientific Interest
STW	Sewage Treatment Works
SWQO	Statutory Water Quality Objective
SWWSL	South West Water Services Limited
TDC	Torridge District Council
UWWTD	Urban Waste Water Treatment Directive
WDC	Woodspring District Council
WOAD	Welsh Office for Agricultural Development
WQ	Water Quality
WQO	Water Quality Objective
WRA	Waste Regulation Authority
WSDC	West Somerset District Council
WT	Woodland Trust

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

NRA Emergency Hotline

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