UPPER WYE
CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT

NRA
National Rivers Authority
Welsh Region

NATIONAL RIVERS AUTHORITY

WELSH REGION

UPPER WYE

CATCHMENT MANAGEMENT PLAN

CONSULTATION REPORT

National Rivers Authority - Welsh Region
South East Area
Rivers House
St Mellons Business Park
St Mellons
Cardiff CF3 0LT

June 1993

UPPER WYE CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT

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FOREWORD

As 'Guardians of the Water Environment' we are committed to preparing sound and thorough plans for the future management of the Region's rivers, streams, and lakes, its groundwaters and springs, and its estuaries and coastal waters.

We see the development of Catchment Management Plans as a way of establishing the important requirements in each river catchment. By public consultation with those who have an interest in the water environment, we hope to achieve a broad consensus on the major issues and obtain the commitment of those who will need to play a part with us in their resolution.

This report is offered for consultation and represents a major step in the production of the first Catchment Management Plan for the South East Area of the Welsh Region. We have examined our information on the catchment and identified what we consider to be the main issues.

We look forward to receiving the contributions of those organisations and individuals involved with the river and its catchment.

Terry Widnall

Area Manager
South East Area

MISSION STATEMENT OF THE NATIONAL RIVERS AUTHORITY

"The National Rivers Authority will protect and improve the water environment. This will be achieved through effective management of water resources and by substantial reductions in pollution. The Authority aims to provide effective defences for people and property against flooding from rivers and the sea. In discharging its duties it will operate openly and balance the interests of all who benefit from and use rivers, groundwaters, estuaries and coastal waters. The Authority will be businesslike, efficient and caring toward its employees."

THE NATIONAL RIVERS AUTHORITY

The National Rivers Authority is the major environmental protection agency responsible for safeguarding and improving the natural water environment in England and Wales. The nature of its responsibilities are wide reaching and include:

* Control of pollution and improving the quality of rivers, groundwaters and coastal waters.

* Flood defence, including the protection of people and property.

* Flood warning.

* Effective management of water resources.

* Maintenance, development and improvement of fisheries.

* Conservation of the natural water and riverside environment.

* Promotion of water based recreation including navigation.

To achieve success in all these areas the NRA works with industry, commerce, farming, recreational and amenity users and the general public to promote environmental awareness and to enforce appropriate environmental standards.
The NRA will use its resources to:

* Respond promptly to all reported pollution incidents.

* Control pollution by working with dischargers to achieve improvement and monitor effluent compliance with appropriate standards.

* Maintain existing and invest in new assets to provide flood protection, and flood warning.

* Determine, police, enforce and review the conditions in water abstraction licences, discharge consents and land drainage consents to achieve operational and environmental objectives.

* Improve and develop salmon, trout and other freshwater fisheries and enforce legislation for their protection.

* Protect and further the conservation of the aquatic environment.

* Promote recreation, including navigation, on rivers, lakes and associated land.

* Influence planning authorities to control development so as to avoid conflict with NRA objectives and initiatives through Town and Country planning liaison.

* Assess, manage, plan and conserve water resources.

SECTION 1

CONCEPT OF THE MANAGEMENT PLAN

CATCHMENT MANAGEMENT PLANS

Catchment management assists the NRA to use its powers and work with others to ensure that the rivers, lakes, coastal and underground waters are protected and where possible improved for the benefit of future generations. River catchments are subject to increasing use by a variety of activities. Many of these interact and some conflicts arise. The competing requirements and interests of users must be balanced.

This draft catchment management plan consolidates the objectives and options for the upper Wye catchment for the overall improvement of the water environment. The plan is laid out as follows:

Uses of the Catchment

Each identified use of the water environment is described. Each description is usually supported by a map indicating where in the catchment the use occurs. Objectives for the use are identified and requirements to meet those objectives stated, where applicable, for:

* water quality
* water quantity
* physical features

Catchment Targets

By considering the requirements of individual uses, overall targets for water quality and water quantity are set for the catchment. Targets for physical features are set by reference to individual specific uses.

State of the Catchment

Having set targets, it is possible to review the current state of the catchment and identify problems that need addressing to meet future targets.

Issues and Options

It is now possible to identify individual issues. The nature of the problems are discussed and the impact on uses and conflicts between different uses are considered. Options for resolving these problems are suggested, together with the advantages and disadvantages of each. The body responsible for each option is identified.

This draft Catchment Management Plan is intended to form a basis for consultation between the NRA and all those with interests in the catchment. Consultees may wish to:

* comment on the issues and options identified in the plan
* suggest alternative options for resolving identified issues.
* raise additional issues not identified in the plan

Following the consultation period all comments will be considered in preparing the final plan. Timescales and targets will be added to the Plan at this stage. This will then form the basis for the NRA's actions within the catchment. It will also provide a public document which will form the framework for the NRA's interaction with other organisations. We expect action plans and statements of policy to be produced following the production of the final Catchment Management Plan.

The NRA intends that the plan should influence the policies and actions of developers and planning authorities as well as assisting the day-to-day management of the catchment.

We have tried to remove technical terms and jargon as far as possible. However, an explanation of some of the technical terms that remain can be found in Appendix 6 at the end of this Plan.

SECTION 2
THE UPPER WYE CATCHMENT

THE UPPER WYE CATCHMENT

2.1 CATCHMENT DESCRIPTION

This Plan covers the upper part of the Wye Catchment including the River Wye and its lakes and tributaries down to Hay on Wye. The Wye has a total catchment area of over 4000 square kilometres, and has been split in two for the purpose of producing Catchment Management Plans. The rest of the Wye catchment will be included in the "Lower Wye Catchment Management Plan" which is being prepared through 1993, with the draft plan being published for consultation in early 1994. Some aspects of this plan will overlap with the lower Wye plan and these will be re-addressed in that plan.

Topography

The catchment is predominantly rural and is characterised by upland scenery cut by deep valleys. It is flanked to the west by Plynlimon in the Cambrian mountains on which the river rises. The catchment falls from 741m above sea level at Pen Pumlumon Arwystli to 71.5 m by Hay on Wye, over a river distance of about 93 km in a north-west to south-east direction. The catchment area to Hay is 1623 sq. km, about 39% of the total catchment of the Wye. The total length of the river from its source to Chepstow where it joins the Severn Estuary is 250 km.

Geology

The geology of the catchment is dominated by hard rocks which are mainly from the Ordovician and Silurian periods, laid down between 500 and 395 million years ago. The Ordovician rocks consist of sandstones, shales and grits. The Silurian rocks are comprised of shales, mudstones, sandstones and limestones. Both are covered in parts by more recent sands and gravels.

Rainfall

Average rainfall is around 1350 mm per year of which around 470 mm is lost by evaporation and transpiration. The rainfall ranges from about 2400 mm per year on Plynlimon to 1200 mm at Hay. For comparison, the average annual rainfall for Wales is about 1385 mm, and for England and Wales together about 912mm per year.

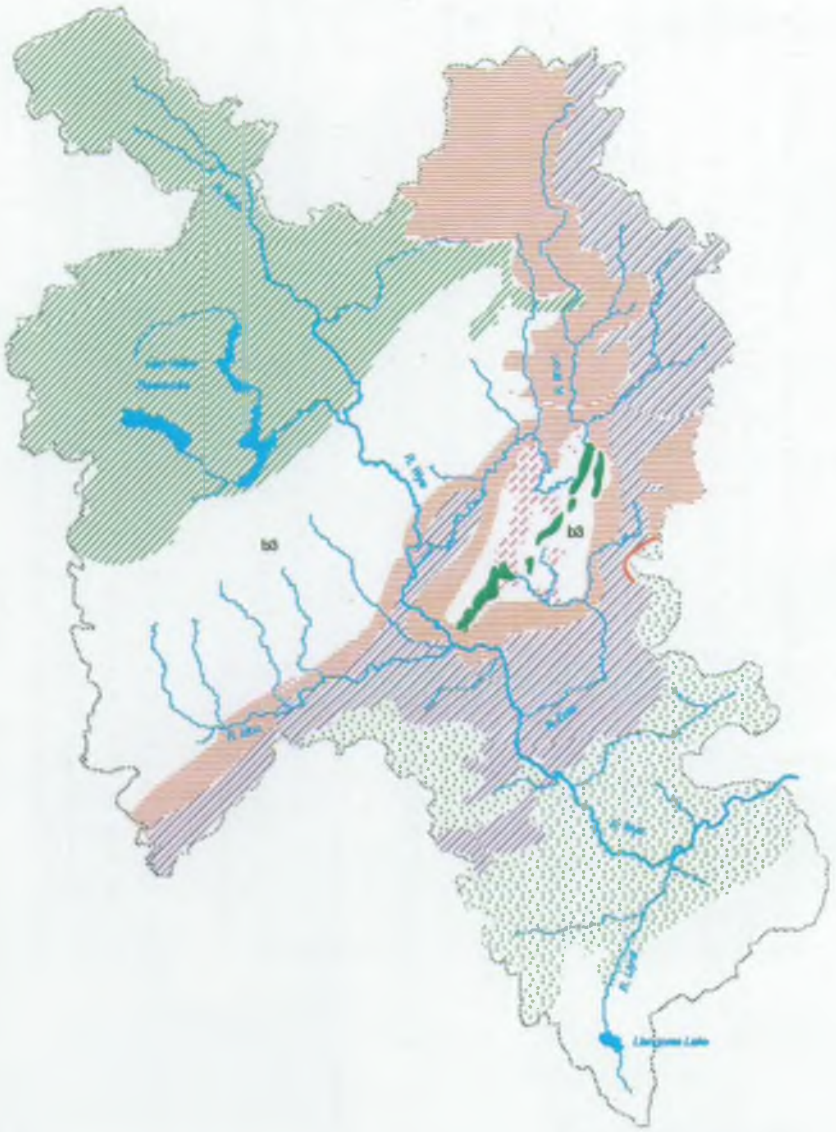
Groundwater

Groundwater occurs in the more permeable, highly weathered and fractured rocks. It is used by private abstractors for domestic supplies. The water table in these rocks is normally close to the ground surface and so can be vulnerable to pollution.

The sand and gravel deposits are generally found in the valley bottoms, but are on top of the hard rocks. They are thin and variable in nature. Water can flow through them easily so that they can be important in supplying local needs. In most cases these deposits are partially connected to surface waters, so that the groundwaters within them can be vulnerable to pollution.

Groundwater is important because it releases water throughout the year which sustains wetlands and boggy patches along the river's edge. This in turn provides the baseflows which keep water in the rivers and streams during dry periods.

GEOLOGY



KEY

IGNEOUS ROCKS

- DOLERITE
- TUFFS, ASHES & AGGLOMERATES

SEDIMENTARY FORMATIONS

- WENLOCK BEDS
- TARANNON & LLANDOVERY BEDS
- LUDLOW BEDS

SILURIAN

- b3 — UPPER DIVISION (ORDOVICIAN)
- LOWER O.R.S (MARL) (OLD RED SANDSTONE)

MAJOR FAULTS

2.1 CATCHMENT DESCRIPTION - (CONTINUED)

Surface Water Quality

Because of their rural character, the upper Wye and its tributaries are mostly unpolluted. The quality is therefore suitable for abstraction for drinking water supplies and for supporting a salmon and trout fishery. Certain rivers and streams suffer from acidification.

Land Use and Infrastructure

Agriculture is the major land use in the catchment ranging from sheep farming on the hills and moorlands in the north and west of the catchment to arable and dairy farming in the lowland areas to the south-east.

On the uplands, forestry is widespread. Other Industry is limited within the catchment, but there is some mineral extraction.

The population is mainly centred in the towns of Rhayader, Builth Wells, Llandrindod Wells, Llanwrtyd Wells and Talgarth, as well as a number of villages. Of the total population in the catchment of about 29,000, 21% live in the main towns of Builth Wells and Llandrindod Wells. The population is swollen substantially in the holiday season. The normal population density is about 18 people per square kilometre.

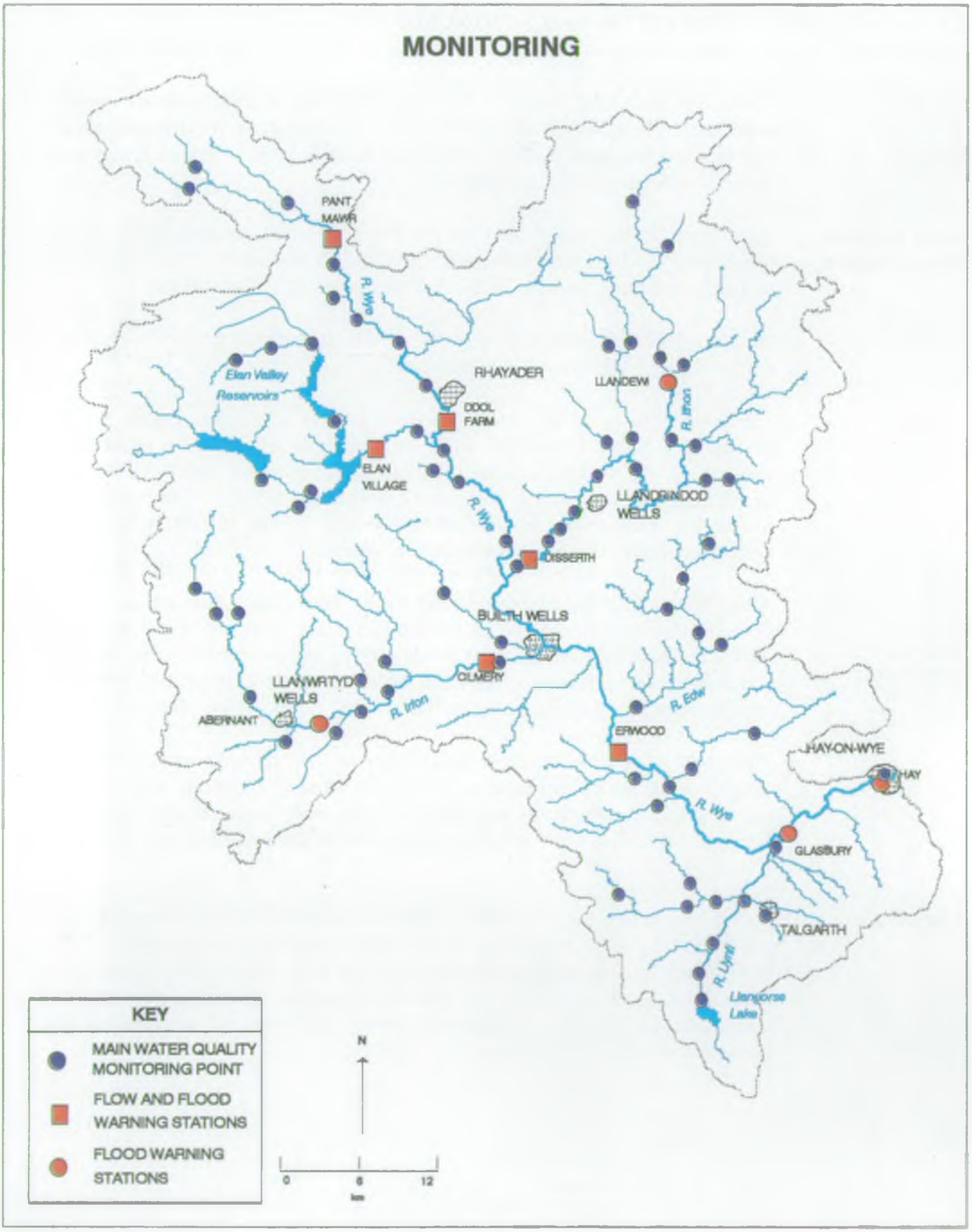
A rail link crosses the area connecting Builth Wells and Llandrindod Wells. Considerable major road works have taken place over the last few years improving both the network of A roads serving the main population centres and also minor roads linking the rural settlements. Several projects for road straightening and improvements to the existing network are planned.

The County Councils are planning to improve and provide new, short and long distance walks in the area. It is the County Councils which have responsibility for footpaths and rights of way and, in the Brecon Beacons National Park, this work is being undertaken in conjunction with the Park Authority.

Conservation

Nature has blessed the upper Wye with a rich variety of plants, animals, fish and birds. In some parts of the catchment, these are so important to the Nation they are have been specially designated under law. For example, the River Wye itself is a 'Site of Special Scientific Interest', part of the catchment lies within a National Park, and part is designated an Environmentally Sensitive Area.

MONITORING


PANT MAWR
R. Wye
Elan Valley Reservoirs
RHAYADER
DOOL FARM
ELAN VILLAGE
LLANDEW
R. Ithon
LLANDRINDOD WELLS
DISSERTH
BUILTH WELLS
CILMERY
LLANWRTYD WELLS
ABERNANT
R. Irfon
R. Edw
ERWOOD
HAY-ON-WYE
HAY
R. Wye
GLASBURY
TALGARTH
R. Llynfi
Llangorse Lake
KEY
MAIN WATER QUALITY MONITORING POINT
FLOW AND FLOOD WARNING STATIONS
FLOOD WARNING STATIONS
N
0
6
12
km

2.2 DATA COLLECTION WITHIN THE CATCHMENT

Water Levels and Flows

The NRA has a network of 10 stations measuring river levels and flows. All the river level and gauging stations are connected to the Authority's telemetry system and the majority are also used for flood warning purposes.

Rainfall

Rainfall is measured continuously at Pantmawr. Daily rainfall is measured at 37 sites by numerous private observers who supply the data to the NRA. This information is collated by the Authority and sent to the Meteorological Office at Bracknell.

Water Quality

Water quality samples are taken regularly at 75 sites covering most of the rivers and streams in the area. They are analysed for many substances. All the significant discharges are also sampled and analysed routinely to ensure that they meet the standards set for them by the NRA.

Historically, groundwater quality has not been monitored routinely.

Regular inspections are carried out at high risk sites including farms, trade premises, industrial sites and sewage installations as part of the Authority's pollution prevention programme and details are kept on a computer database to assist in catchment management.

Biological Monitoring

Routine biological monitoring is undertaken at 41 of the water quality sampling points. Each site is normally sampled twice a year. An assessment of the biological quality is made by analysing the species of insects and other small aquatic life that are present. Other surveys are carried out to discover the impact of sewage treatment works' discharges on the river. An additional 19 sites are used to monitor the effects of acidification.

Habitat Surveys

The main River Wye, the Ithon and Irfon were surveyed in 1992 to record the different habitats that exist along the river corridor.

Fish Stocks

Stocks of juvenile salmon and trout are checked annually at 52 sites by electrofishing. Catch returns are also used to evaluate numbers of adult salmon and, to a limited extent, the populations of coarse fish.

KEY DETAILS

Area: 1,623 km^2

Highest Point: 741 m AOD
Lowest Point: 71.5 m AOD

Population:

Year	Population
1991	28,723
2001 (Predicted)	31,264

Geology (from NW to SE): Silurian, Ordovician, Silurian, Devonian (Old Red Sandstone)

Administrative Details

County Councils:
Powys 97% } of plan
Dyfed 3% } area

District Councils:
Radnor
Brecknock
Montgomery

National Rivers Authority:

Welsh Region
SE Area - East District
Hadnock Road,
Monmouth NP5 3NQ

Welsh Region
South East Area
Rivers House
St Mellons Business Park
St Mellons,
Cardiff CF3 0LT

Water Companies:
Dŵr Cymru / Welsh Water
Severn Trent Water

Main Towns and Populations

Builth Wells	2,040
Llandrindod Wells	4,943

Water Quality

Length of River in National Water Council Classes:

Class 1A (very good)	380.6 km	(See Appendix 2 for description
Class 1B (good)	68.8 km	of Classes)
Class 2 (fair)	0 km	
Class 3 (poor)	4.7 km	
Class 4 (bad)	0 km	

SECTION 3

CATCHMENT USES

3.1 INTRODUCTION

The 'uses' of the catchment are identified in this Section. The term 'use' is used quite loosely. It includes human 'uses' of the catchment, as well as the use made of the catchment by the plants, animals, fish and birds that live in and around and depend upon the rivers, streams, lakes and ponds.

The 'Requirements' of each use identify the water quality, water quantity and physical features that the particular use requires. There are some cases where the requirements of one use conflict with the requirements of another. These conflicts are not dealt with in this Section but are highlighted in Section 6. This is one of the main purposes of this Plan, i.e. to identify problems and conflicts, so that they can be resolved.

The uses have been placed into 5 groups of related activities:

* Development and Land Use
* Conservation and Fisheries
* Abstractions
* Discharges and Pollution Control
* Amenity, Navigation and Water Sports

Units
We have used metric units throughout. When dealing with water quantity, the range is so great that we have expressed volumes in either cubic metres or megalitres (one thousand cubic metres). Fuller descriptions and conversions to imperial units are given in the Glossary.

3.2 DEVELOPMENT (Housing, Industry and Commerce)

General

Development, be it residential, commercial or industrial, can have a major impact on other uses of a river catchment. County structure plans and district local plans identify policies against which the Planning Authorities consider development proposals.

The NRA intends that Catchment Management Plans should positively influence the policies and actions of the planning authorities and developers.

The NRA is a statutory consultee of the planning authorities and provides advice on development proposals which may have an impact on the water environment. Protection of fisheries, conservation of the aquatic environment, flooding, protection of water resources and of ground and surface water quality are the main concerns of the NRA when considering any development proposal.

The NRA seeks to pursue its aims and policies in relation to development through the planning consultation process. Although the final decision on planning matters rests with the planning authority, government guidelines advise of the need to consider the NRA's concerns when determining proposals. The NRA's Model Land Use Policies are summarised in Appendix 1.

Local Perspective

The catchment is mainly situated in Powys and the remainder in Dyfed.

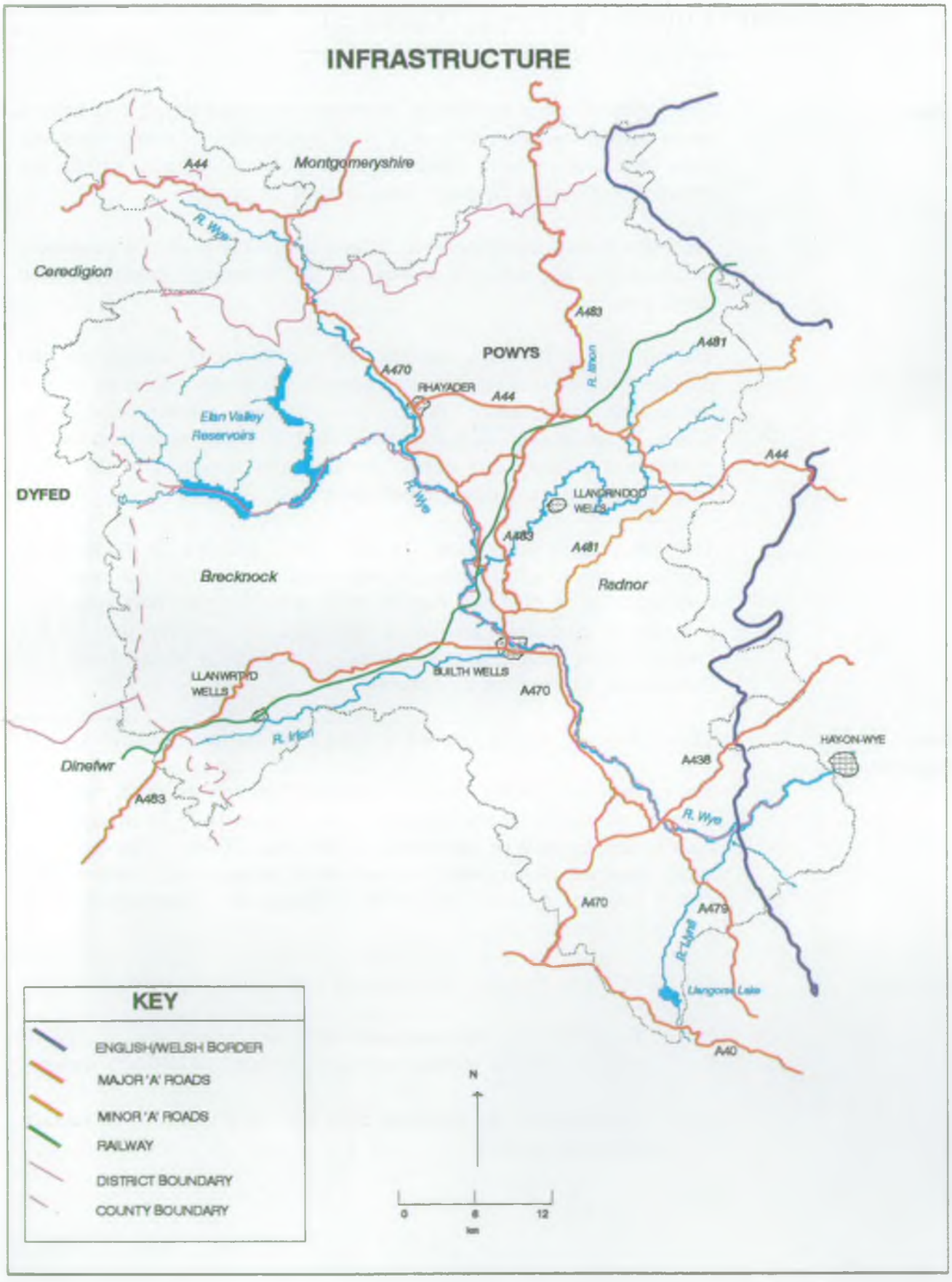
The present draft of the Powys Structure Plan recognises a need for growth and identifies a requirement for more than 5000 dwellings to be built in the upper Wye catchment by the year 2006. The need for small, localised development for industrial, storage and warehousing uses is also recognised in the towns of Rhayader, Llandrindod Wells and Builth Wells.

Objectives

The NRA's objectives for development are:

* To ensure that development does not affect the ability of existing users of surface and groundwaters to abstract water.

* To ensure that development does not cause pollution of surface and groundwaters.


INFRASTRUCTURE
A44
Montgomeryshire
R. Wye
Ceredigion
A483
POWYS
A481
A470
RHAYADER
A44
R. Ithon
Elan Valley
Reservoirs
A44
DYFED
LLANDRINDOD
WELLS
R. Wye
A483
A481
Brecknock
Radnor
LLANWRTYD
WELLS
BUILTH WELLS
A470
R. Irfon
HAY-ON-WYE
Dinefwr
A438
A483
R. Wye
A470
A479
R. Lynfi
Llangorse Lake
A40
KEY
ENGLISH/WELSH BORDER
MAJOR 'A' ROADS
MINOR 'A' ROADS
RAILWAY
DISTRICT BOUNDARY
COUNTY BOUNDARY
N
0
6
12
km

3.2 DEVELOPMENT (Housing, Industry and Commerce) - (CONTINUED)

* To ensure that adequate pollution prevention measures, such as bunding of oil and chemical storage tanks, installation of correctly designed farm slurry and silage storage systems, are incorporated into new developments.

* To ensure that developments comply with the Groundwater Protection Policy.

* To ensure that the risk of flooding of new developments is kept to an acceptable level.

* To ensure that any new development does not increase the risk of flooding to others.

* To recommend that any work which is needed to reduce the risk of flooding created by a new development is financed by the developer and not the public.

* To ensure that adequate access exists for proper maintenance of watercourses and structures associated with them, including flood defence schemes.

* To protect the conservation interests of the water environment from any detriment due to development.

* To enhance the conservation, recreation and amenity value of the water environment in conjunction with any development where possible.

3.2 DEVELOPMENT (Housing, Industry and Commerce) - (CONTINUED)

Requirements The requirements for this use are:

Water Quality

* Developments, including changes of land use, not to be allowed where they pose an unacceptable risk to the quality of ground or surface water.

Water Quantity

* Developments, including changes in land use, not to be allowed where a detrimental impact on surface water flows or levels, or groundwaters is likely.

Physical Features

* Developers to be encouraged to conserve and enhance wildlife, landscape and archaeological features associated with rivers, ponds, lakes etc.

* Developments, including the raising of land, not to be allowed where they would impede the flow of flood water, increase the risk of flooding elsewhere, or increase the number of people or properties at risk.

3.3 FLOOD DEFENCE

General

The NRA has a general duty to oversee works in rivers and has powers to control significantly obstructive works on any watercourse.

Whilst the responsibility for the maintenance of any watercourse normally rests with the riparian owner (i.e. the owner of the river bank and bed), certain reaches of the river are formally designated as the "Statutory Main River" (see Glossary at the end of this Plan). On the Main River, the NRA has permissive powers to construct and maintain defences and to control the actions of others through byelaws and the issue of Consents. However, any proposal that could interfere with the bed or banks or affect the flow of any watercourse requires formal consent from the NRA. District and County Councils have permissive powers to carry out works on 'non-Main Rivers' and to make Byelaws.

Normally flooding is a result of prolonged heavy rainfall or rapid snowmelt. The peak flow of a flood is described in terms of the frequency at which it is likely be exceeded, which is usually expressed as a return period in years e.g. 1 in 50 years. Flood defences are designed to protect an area against a flood of a particular return period. Different type of land use (e.g. urban areas and agricultural land) are protected against different sizes of flood.

The river's flood plain appears to be an attractive place for development. However it is part of the river channel and will flood at times of high flows. Developments in the flood plain are at risk from flooding. Defences to protect them may reduce the ability of the flood plain to store water and may accelerate the conveyance of water downstream, with the effect that flooding may become worse or more frequent in these areas.

The flood plain is an important habitat for plants and animals, and is part of the 'river corridor'.

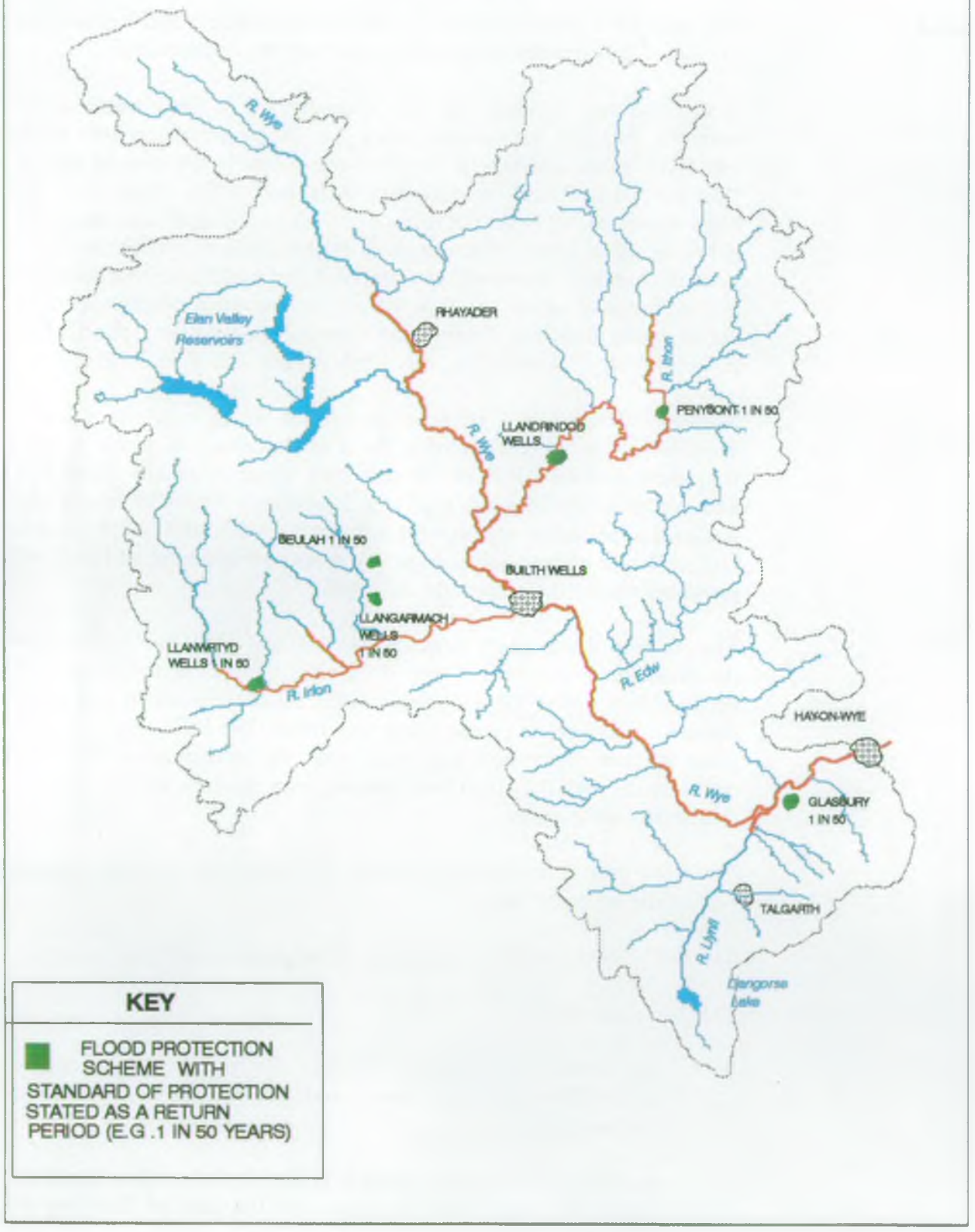
The NRA is empowered to provide a flood warning service.

This use deals with:

* the provision of effective defence for people and property against flooding from rivers, and the provision of a flood warning service.

* maintenance of river channels to ensure optimum flow capacity where this would otherwise increase the risk of flooding to property.

FLOOD DEFENCE



3.3 FLOOD DEFENCE - (CONTINUED)

* protection of the flood plain for its natural purpose of storing and conveying flood waters to the sea.

Local Perspective

Flood defences have been constructed for the communities of Glasbury, Llanwrtyd Wells, Llangammarch Wells, Beulah and Penybont. The standards of flood protection for these areas are shown on the plan opposite.

A flood protection scheme for Builth Wells has been considered on several occasions, but has not been found to be cost effective.

Flood warnings are provided for the River Ithon and for the River Wye at Rhayader, Builth Wells and Glasbury village as well as for the agricultural area around Hay on Wye.

Objectives

The objectives for this use are:

* to provide effective flood defences on main rivers for the protection of people and property to a standard appropriate to the land use. (The land use bands are described in Section 4.5 and Appendix 5).

* To ensure that, where possible, adequate warning of flooding is given to properties at risk from main-river flooding.

* To ensure that, where possible, adequate warning of flooding is given to enable livestock to be moved away from flood-prone areas.

* To ensure that the effectiveness of the flood plain to store and convey flood waters is not impaired.

3.3 FLOOD DEFENCE - (CONTINUED)

Requirements

The requirements for this use are:

Physical Features

* That in protected areas, the defences must not be overtopped by a flood flow with a return period less than that for which they were designed.

* Provision of adequate arrangements for flood forecasting and warning where this is feasible.

* The flood plain to be kept free from development.

* Upkeep flood defence schemes so that their designed standards of protection are maintained.

* Maintain 'Main Rivers' to ensure their flood carrying capacity is appropriate to the land use in the vicinity.

* Take account of environmental requirements when undertaking flood defence works.

FORESTRY

KEY

AFFORESTED AREAS >1 km^2 (predominantly coniferous).

3.4 FORESTRY

General

Forestry can have substantial impacts on water quality and quantity, and hence on other catchment uses. Indicative Forestry Strategies produced by Local Authorities provide the detail related to County Structure Plans and form the basis for consultations with the Forestry Authority.

The NRA intends that Catchment Management Plans should be taken into account in the forestry strategies of Local Authorities. The NRA liaises with the Forestry Authority in an advisory capacity on applications for planting grants and felling licences. The Authority also aims to advise forest owners and managers on other operations which may affect the water environment. The Forests & Water Guidelines provide a code of good practice which should minimise adverse impacts.

The main concerns of the NRA relating to forestry are soil erosion and deposition, effects on water yield, acidification, pollution by fertilisers and pesticides, changes to riparian and aquatic habitats.

Local Perspective

The forests most likely to have significant effects on the water environment are those on headwater catchments, particularly on acid sensitive soils and geology. Streams here are highly important as salmonid nursery habitat and for a range of other fauna and flora.

Sensitive areas with existing plantations include the River Irfon and parts of the catchment upstream of Llangurig.

New planting will be limited but felling and replanting will increase greatly over the next few years.

Objectives

* To ensure that forestry activities do not affect the ability of existing users to abstract water.

* To ensure that forestry does not cause pollution of surface and groundwaters or increase acidification.

* To recommend that forest management conforms to the Forests & Water Guidelines and that liaison with the NRA takes place wherever necessary.

* To protect and enhance the conservation value of the water environment and associated land in connection with all forestry developments.

3.4 FORESTRY - (CONTINUED)

Requirements The requirements for this use are:

Water Quality	*	Afforestation, felling and related activities to be restricted where they pose unacceptable risks to the quality of surface or groundwaters.
Water Quantity	*	Afforestation to be restricted where there are likely to be detrimental reductions in water yield or changes in the pattern of flows.
Physical Features	*	Foresters to be encouraged to conserve and enhance wildlife and landscape features of water and riparian habitats.

3.5 FARMING

General

Farming is the predominant land use in the catchment. Modern farming practices involve the use of a wide range of agrochemicals, including pesticides, herbicides, artificial fertilisers and sheep dips. Large amounts of animal waste waters and effluents from silage storage have to be disposed of to the land.

In September 1991 the Government implemented the Control of Pollution (Storage of Slurry, Silage and Agricultural Fuel Oil) Regulations 1991 which set down minimum standards for the design construction and operations of storage and disposal systems for these substances and it falls to the NRA to enforce these regulations.

The Ministry of Agriculture have also produced a Code of Good Agricultural Practice (C.O.G.A.P.) which provides practical advice on a whole range of farming practices to minimise the risk of water pollution.

Local Perspective

There are many hundreds of farms in the catchment ranging from sheep farming in the north and west of the catchment to arable and dairy farming in the south. Many of these farms are located on the banks of rivers and streams and careful siting and operation of slurry and silage storage and disposal systems are needed.

The NRA liaises closely with the local authority to prevent pollution from dead animals. Carcases found on the banks or in the river are removed without delay.

Objective

The objective for this use is:

* To ensure that farming practices are carried out in a way so as not to compromise the use of surface and groundwaters.

Requirements

The requirements for this use are:-

Water Quality

* Minimum standards set down in the 1991 Farm Regulations to be met.

* Farmers to be encouraged to follow the advice given in the Code of Good Agricultural Practice.

* The use of agrochemicals must not cause pollution of surface and groundwaters and sheep dip residues must be disposed of safely.

CONSERVATION - ECOLOGY

KEY

- SSSI INCLUDING WATERCOURSES OR PRIMARILY WETLANDS
- UPLAND SSSI WITH WETLAND COMPONENT
- LOCAL NATURE RESERVES
- NATIONAL NATURE RESERVES

NB NUMBERS ARE NRA REFERENCES (SSSI)

3.6 CONSERVATION - ECOLOGY

General

The NRA, whilst carrying out its functions, or dealing with proposals by others, has a duty to further the conservation of flora and fauna. It also has a duty to protect designated sites.

As part of a National initiative, a programme of River Corridor Surveys (RCS's) is being undertaken in the Area. These surveys describe the principal physical and biotic characteristics, and hence habitats, of the river corridor and will assist the NRA in carrying out its conservation duties by providing an initial means of identifying areas and features requiring protection or enhancement.

The Wildlife and Countryside Act 1981, protects a wide range of plants and animals.

This use deals with:

* the protection of flora and fauna in the river corridor, ranging from kingfishers, mayflies and otters, which are truly dependent upon the river for their existence, to those that exploit the river corridor such as wagtails, barn owls and voles.

* the protection of areas formally designated as being of particularly high conservation value which include National Nature Reserves and Sites of Special Scientific Interest (SSSIs).

* the protection of sites which, although valuable in ecological terms, are not formally protected e.g. Nature Reserves and County Trust Sites of Nature Conservation Interest.

(The 'use' of the river by fish are dealt with in Section 3.8, "Fisheries Ecosystem", although it is accepted that there is an overlap between the two sections).

Local Perspective

The upper Wye catchment supports a wide range of plant and animal species. The area is of high landscape and amenity value. These features are susceptible to developments and civil engineering works.

A River Corridor Survey was undertaken on the upper Wye, Ithon and Irfon during 1992. This survey identified areas of greatest morphological and ecological interest and confirmed that the greatest need on the principal corridors is for protection of the existing interest. However, opportunities for enhancement do exist in some areas.

3.6 CONSERVATION - ECOLOGY - (CONTINUED)

Sites of Special Scientific Interest and Nature Reserves

The River Wye is a designated Site of Special Scientific Interest (SSSI) in its entirety. It is of national importance as an example of a major river which has a largely natural regime and which remains relatively free from pollution. It supports a variety of aquatic animals and plants which reflect the various types of river bed, flow and water chemistry along its course.

The map shows SSSIs that are primarily associated with watercourses or wetlands. Rhosgoch Common (WR12 on the map) and Gors Goch (WR7) are Grade 1 special ecosystem sites of national importance. Other important sites include Elenydd (which is over 20,000 hectares of the Elan Valley) (WMG4), Gors-y-Llyn (WR11), Llyn Syfadden (which is the 214 hectares of Llangorse Lake) (B11) and Colwyn Brook Marshes (WR57). Also shown are National Nature Reserves, Local Nature Reserves and RSPB Reserves. In addition, there are a further 46 SSSIs in the upper Wye catchment which are not related to water features.

Part of the catchment is within the designated Cambrian Mountains Environmentally Sensitive Area.

The Wye Project was set up in 1990 by a partnership of public bodies. It catalogued many of the sites referred to, and the potential conflict between amenity, conservation and recreational uses in the Wye catchment.

Plants

The area has a number of important plant species which depend on water features or the maintenance of wet areas, e.g. wild chives.

Otters

The upper Wye catchment is an important area for otters. The presence of otters indicates that a river is generally healthy.

Birds

The Wye is notable for several bird species including the rare Little Ringed Plover as well as dippers and kingfishers. In recent years goosanders and mergansers have colonised the catchment and concern has been expressed by anglers and fishery owners about the impact these might have on the numbers of young salmon and trout. These birds are protected under the Wildlife and Countryside Act 1981.

3.6 CONSERVATION - ECOLOGY - (CONTINUED)

River Life NRA biological monitoring has shown that the upper Wye and most of its tributaries support a high quality and very varied range of insects and other small aquatic life, including the nationally rare mayfly species, *Potamanthus luteus* and *Brachycercus harisella*. However, the soft water produced from the base-poor soils and the hard underlying rocks limits the variety of species in some upper tributaries, some of which are also affected by acidification.

Crayfish The Wye is nationally important for the conservation of native crayfish. It is therefore important to protect crayfish from plague and prevent the introduction of species which are not natives of the area.

Stock Access The impact of stock access (sheep and cattle) to the river bank causes erosion and prevents the natural regeneration of bankside vegetation in some areas.

Objective The objective for this use is:

* To protect and further the conservation of the water environment and to safeguard the special conservation interests for which sites have been designated.

Requirements The requirements for this use are:

Water Quality

* Relevant surface waters (i.e. rivers, streams, lakes and ponds) to comply with the standards for amenity protection and other site specific water quality criteria.

Water Quantity

* Flow regimes not to be significantly altered from the monthly natural historic flow conditions in the river. The exception is the River Elan downstream of Caban Reservoir, which is affected by the presence of the Elan Valley reservoirs.

* All significant net abstractions to be subject to a 95 percentile Hands-Off Flow (HOF) condition which will be time limited. This will be reviewed by 1994 after the Regional licensing policy has been set.

* Groundwater levels not to be artificially lowered where it is likely to adversely affect flora and fauna dependent on those water levels.

3.6 CONSERVATION - ECOLOGY - (CONTINUED)

Physical Features

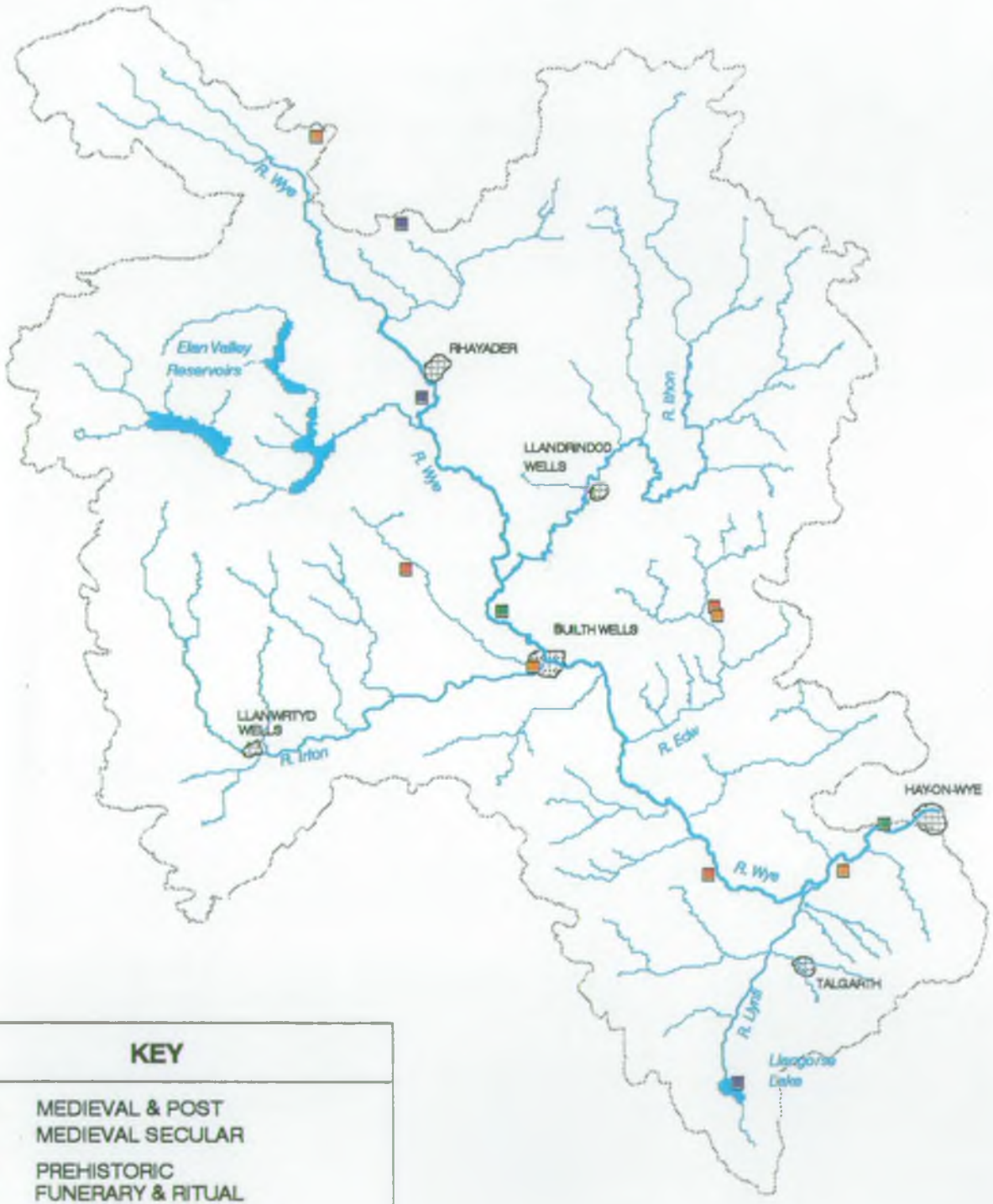
* The variety of natural river features (such as meanders, pool and riffle sequences and the presence of aquatic vegetation) to be maintained, and enhanced where possible.

* A variety of river corridor and other wetland habitats (including marsh, fringe and overhanging vegetation, bankside trees and hedges and grassland) to be maintained and enhanced where possible. The special characteristics of a designated conservation area to be preserved.

* Any works to the river channel to retain the channel form appropriate to the natural flow regime.

* NRA river maintenance operations and consented land drainage works to cause minimal damage to the flora and fauna of the river corridor and enhance them where possible.

SCHEDULED ANCIENT MONUMENTS



KEY

- MEDIEVAL & POST MEDIEVAL SECULAR
- PREHISTORIC FUNERARY & RITUAL
- PREHISTORIC DOMESTIC & DEFENSIVE
- ROMAN REMAINS

NB. Only those Ancient Monuments likely to be affected by river based activities have been shown.

3.7 CONSERVATION - LANDSCAPE AND ARCHAEOLOGY

General

The NRA has a duty to conserve and enhance landscape, archaeological, architectural and historic features which are affected by the operations that it consents and licenses, or its own operations.

This use deals with:

* the protection of areas formally designated as being of value, e.g. Areas of Outstanding Natural Beauty, Scheduled Ancient Monuments.

* the protection of areas which, although valuable in landscape and archaeological terms, are not formally protected.

Local Perspective

The upper Wye catchment is not formally designated as being of landscape value. However, many tourists are attracted by the rugged beauty of the Elan Valley and by the softer beauty of the Wye valley itself and Llangorse Lake in the Brecon Beacons National Park.

Of the 128 Scheduled Ancient Monuments found within the catchment of the upper Wye very few are affected by river activities. However, a small number are situated close to watercourses or have conspicuous locations on floodplains e.g. Llangorse Crannog and various bridges. Their location is shown on the map.

Parts of the catchment have been proposed as a National Park and much of it falls within the Cambrian Mountains Environmentally Sensitive Area (ESA). Part falls within the Brecon Beacons National Park.

The Wye Project also identified the landscape and archaeological sites in the catchment.

Objective

The objective for this use is:

* To protect the landscape, archaeological, architectural and historical features associated with rivers in the catchment and to safeguard the special interest for which sites have been designated.

3.7 CONSERVATION - LANDSCAPE AND ARCHAEOLOGY - (CONTINUED)

Requirements The requirements for this use are

Water Quality

* All surface waters to comply with the standards for amenity protection and aesthetic criteria:

Water Quantity

* Flow regimes not to be significantly altered from the monthly natural historic flow conditions in the river. The exception is the River Elan downstream of Caban Reservoir, which is affected by the presence of the Elan Valley reservoirs.

* Groundwater levels not to be reduced at archaeological sites which are dependent on a stable groundwater level.

Physical Features

* The variety of river corridor habitats (including marsh, fringe and overhanging vegetation, bankside trees and hedges and grassland) which contribute towards the landscape value of the catchment to be preserved.

* River works not to affect adversely sites of archaeological, architectural and historical interest and landscape importance.

3.8 FISHERIES ECOSYSTEM

General

The NRA has duties to maintain, improve and develop fisheries. Fish populations are affected by the quality and quantity of water as well as by the availability of suitable physical habitat features. Fish are therefore important indicators of the overall health of the river.

In many cases, Water Quality Objectives are set according to the use made of the watercourse. This use will in future be monitored against appropriate statutory Water Quality Objective standards. It is one of the pilot uses proposed by the Government which are being tested in selected catchments, but not yet in the upper Wye.

This use deals with:

* game fish, i.e. the maintenance of breeding populations of salmon and trout.

* coarse fish, i.e. the maintenance of breeding populations of coarse fish.

* the ecosystem that supports the fish life.

Local Perspective

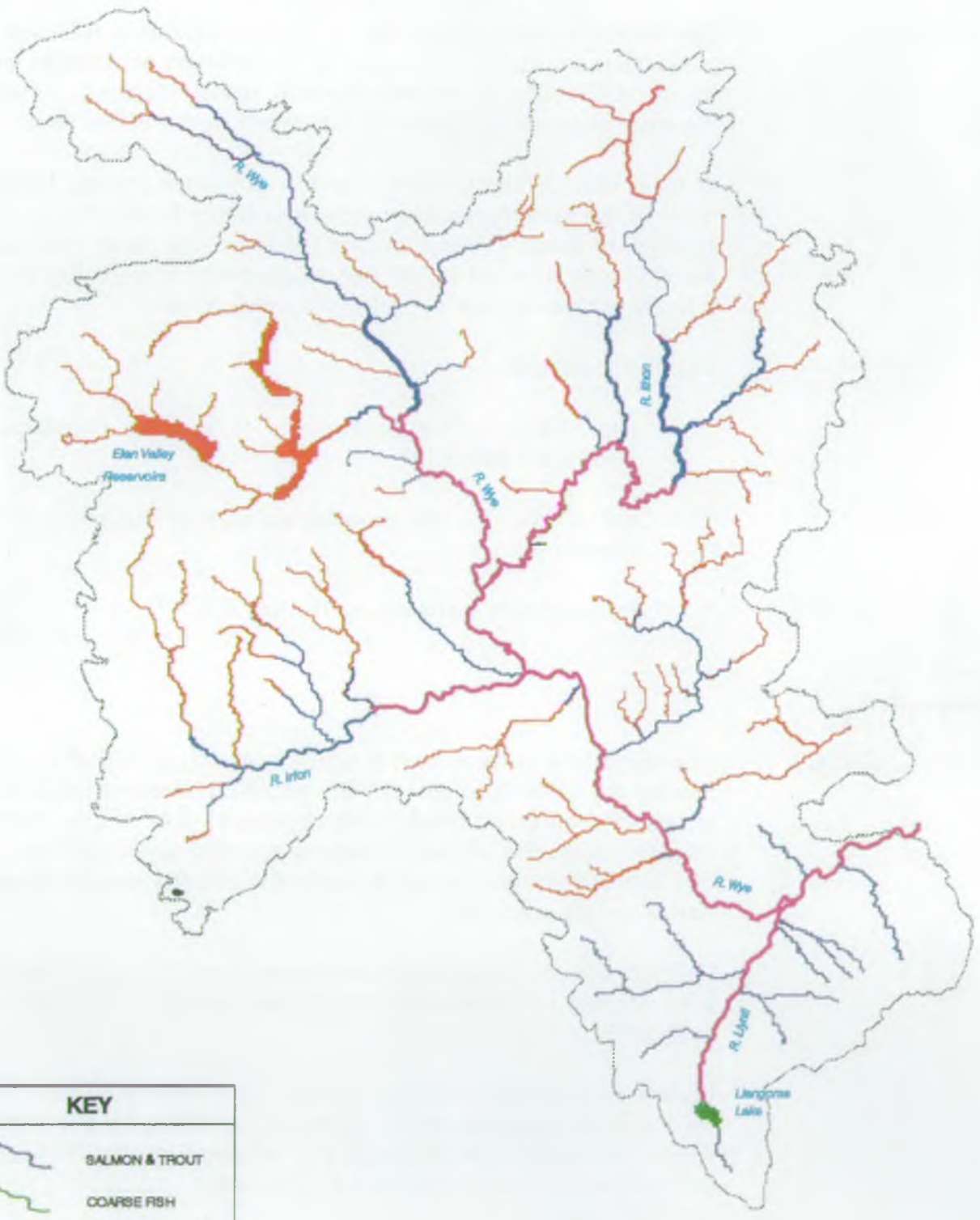
Salmon

The upper Wye is the principal salmon spawning area of the Wye. Salmon are subject to illegal fishing, particularly during the spawning season (November to January) which reduces fish stocks. Sales of illegally caught fish to food outlets in the area are a problem, since they provide an incentive and a market for illegally caught fish which can encourage poaching.

Catches of large, spring-run salmon in the upper Wye and River Irfon have declined in recent years, which may indicate stocks have also declined.

Factors suggested as affecting the rod catch decline include; illegal fishing, angling pressure, acidification, changes in land use (particularly forestry practice), avian predators and barriers to upstream migration to spawning grounds; the decline is also partly a result of a series of very dry years.

FISH DISTRIBUTION



3.8 FISHERIES ECOSYSTEM - (CONTINUED)

Trout Sea trout are rare. Brown trout are widespread though they are fewer in number than would be expected. The latter are stocked in the River Wye at two or three locations between Rhayader and Builth Wells. Concerns include acidification, changes in land use (particularly forestry practice), angling pressure and avian predators. Rainbow trout are also stocked in the River Wye at Builth Wells. Both brown and rainbow trout are stocked in a number of stillwaters.

Coarse Fish Coarse fish species including chub, dace, pike and grayling are present as far upstream as Rhayader in the Wye, in the lower reaches of the Rivers Irfon and Ithon and throughout the River Llynfi. Carp are the principal fish in Llandrindod Wells Lake, with bream, pike, roach and tench in Llangorse Lake (see map).

Other Migratory Fish Sea lamprey and twaite shad migrate to the upper Wye to spawn each May/July. Elvers enter the river and spread throughout the catchment during the spring and adult eels migrate to the sea during the autumn.

Introduced Species Introductions of fish are controlled by NRA through the issue of restocking consents under Section 30, Salmon and Freshwater Fisheries Act 1975. Non-indigenous species also require consent under the Wildlife and Countryside Act 1981.

Fish Distribution The distribution of salmon, trout and coarse fish is shown on the map. A three-pronged approach to collecting information on salmonid stocks is used. The distribution and abundance of juvenile fish has been assessed since 1985 using a programme of monitoring fixed sites on an annual basis. Information about adult salmon is collected through catch returns, redd counts and scale readings. Coarse fish stocks are monitored by surveys of anglers' catch data and angling match results.

The distribution and abundance of salmon and trout stocks is affected by acidification and changes in land use (e.g. agriculture and forestry).

NRA Hatchery The NRA has a hatchery facility at Glasbury. Eggs taken from salmon broodstock collected from the Wye are reared to the fry stage and restocked in streams inaccessible to natural spawning because of barriers to upstream migration.

3.8 FISHERIES ECOSYSTEM - (CONTINUED)

Objective

The objective for this use is:

* to sustain a natural fish population appropriate to the catchment.

Requirements

The requirements for this use are:

Water Quality

* River stretches designated for salmon and trout to comply with the standards specified in the EC Fisheries Directive (78/659/EC) for salmonid fish (salmon and trout).

* In the future all surface waters to comply with appropriate Statutory Water Quality Objectives for fisherie ecosystems.

Water Quantity

* The pattern of flows not to be significantly altered from the natural variable pattern of flows. The exception is the River Elan downstream of Caban Reservoir, which is affected by the presence of the Elan Valley reservoirs.

* In the absence of a Licensing Policy, all significant net abstractions will be subject to a 95 percentile 'hands-off flow' condition and will be time limited. This will be reviewed by 1994 after the Regional licensing policy has been set. (See Issue 5 in Issues and Options Section for more details.)

Physical Features

* A variety of natural river features and habitats to optimise the production of fish populations. This will include pools and riffles for feeding and spawning.

* Access to suitable streams for spawning.

* Maintenance and improvement of bankside vegetation for shade and cover.

* NRA river maintenance operations and consented land drainage works to cause minimal damage to fish populations and improve the variety of habitats where practical.

ANGLING AND COMMERCIAL EEL FISHING

3.9 ANGLING AND COMMERCIAL FISHING

General — This use deals with:

* the use of the catchment by anglers and commercial fishermen including commercial eel fishing.

Local Perspective

The River Wye is arguably the best salmon fishery in England and Wales. Fishing rights on the Wye and its tributaries are in private ownership. Angling for salmon occurs on the River Wye, the River Irfon and the lower River Ithon. Trout fishing occurs throughout the upper catchment in rivers and stillwaters. Brown trout stocks in the upper Wye are poor and fishing is consequently reduced, with restocked stretches of river and stocked stillwaters providing the best sport.

Coarse fishing, principally for chub, dace, grayling and pike, occurs in the Wye between Newbridge and Glasbury, in the lower reaches of the Rivers Irfon and Ithon and the River Llynfi. Llandrindod Wells Lake, Dderw Pools and Llangorse Lake are also popular locations.

Salmon fishing in the upper Wye is very dependent upon river flows and is largely restricted to the spring and autumn. Salmon fishing upstream of Newbridge (River Wye) and on the River Irfon is poor. Overall, trout fishing is poor particularly upstream of Rhayader (Wye) and on the upper Irfon.

The only commercial fishing is on the River Llynfi below Llangorse Lake, where the NRA owns an eel trap which is leased (see map).

Introductions of fish are controlled by the NRA through the issue of restocking consents under Section 30, Salmon and Freshwater Fisheries Act 1975. Non-indigenous species also require consent under the Wildlife and Countryside Act 1981.

Objectives

The objectives for this use are:

* To provide suitable conditions for successful angling and commercial eel fishing.

* To improve angling by implementing measures to increase fish stocks.

3.9 ANGLING AND COMMERCIAL FISHING - (CONTINUED)

Requirements The requirements for this use are:

Water Quality

* River stretches designated for salmon and trout to comply with the standards specified in the EC Fisheries Directive (78/659/EC) for salmonid fish (salmon and trout).
* Compliance with the basic amenity quality standards.
* Water to be free from surface films and extraneous floating material, discolouration and unpleasant odours.

Water Quantity

* The pattern of flow not to be significantly altered from the natural variable pattern of flows. The exception is the River Elan downstream of Caban Reservoir, which is affected by the presence of the Elan Valley reservoirs.

Physical Features

* A variety of natural river features to ensure a varied habitat which maximises the production of fish populations.
* The presence of bankside vegetation to provide adequate shade and cover.
* River works to cause minimum damage to fish populations and to improve the variety of river habitats where practical.

3.10 ABSTRACTION FOR POTABLE (DRINKING) WATER - GROUNDWATER SOURCES

General

Public water supply abstractions require a licence from the NRA to authorise the abstraction of water. A licence specifies the maximum quantities that may be abstracted in a day and in a year. Many small, domestic abstractions do not need a licence from the NRA and the NRA does not hold any record of these.

Abstractions in use before 1965 were granted licences of right under the Water Resources Act 1963. Since then licences have been granted only if they do not adversely affect existing uses and users of both ground and surface waters.

The issue of an abstraction licence does not guarantee that the volumes authorised by it will be available at all times, nor that the quality of the water will be fit for the purpose for which it is intended to be used.

The NRA has developed a National Groundwater Protection Policy to safeguard both individual potable sources and groundwater resources in general.

This use deals with :

* the abstraction of water from groundwater sources (wells, boreholes and springs) for potable (i.e. drinking water) use.

Local Perspective

The groundwater resources of the catchment are locally important to Dŵr Cymru, the main water company serving the area. Private domestic abstractions are small but equally important to the users. They often serve remote houses where provision of mains water would be too expensive to install.

Groundwater supplies are obtained from shallow wells and springs from the fissured Wenlock and Aymestry Limestones. There are few aquifers of any size, although some valley floor deposits, such as sands and gravels, are locally important.

There are 5 licensed abstractions from groundwater for public water supply, providing a total of 401 Ml in 1991. The water abstracted is used principally to meet demand within the catchment. Most of the water abstracted is returned to the catchment's surface waters after use, through sewage treatment works.

POTABLE WATER SUPPLY
GROUND WATER ABSTRACTIONS

KEY	
— —	ABSTRACTION LICENSING AREAS
4/29 X	POTABLE WATER SUPPLY ABSTRACTION POINT AND LICENCE NUMBER

LICENSED PRIVATE DOMESTIC ABSTRACTIONS		
CATCHMENT	NO OF LICENCES	GROSS LICENSED VOLUME (ML/D)
1	1	0.005
2	2	0.001
3	4	0.005
4	3	0.002
5	0	0
6	8	0.007
7	2	0.002

MOST ABSTRACTIONS ARE UNLICENSED AND SO NOT SHOWN

3.10 ABSTRACTION FOR POTABLE (DRINKING) WATER - GROUNDWATER SOURCES - (CONTINUED)

The water company has no plans to further develop sources in the area in the medium term. There are supply problems in the upper Ithon catchment, and planning applications in Llanbadarn Fynydd are being refused because there are inadequate local resources to meet demand. The NRA will shortly be undertaking a Regional Resources Strategy to identify the future requirements for water in the Welsh Region and how best these can be met.

There are 20 licensed abstractions for domestic use for a total of 22 m^3/d (0.022 Ml/d). There are many more domestic abstractions which do not require a licence.

Details of all licences in the catchment are held on a Register at the NRA's Monmouth office which is available for inspection during normal office hours.

Objectives

The NRA uses the following objectives for this use:

* To manage water quality and water resources to safeguard potable water supply.

* To protect aquifers from over-commitment (i.e. where abstraction exceeds the average amount of replenishment to the aquifer) and ensure groundwater abstraction does not have an unacceptable effect on surface water flows or levels.

* Not to issue licences to abstract which adversely affect existing protected rights.

* To encourage efficient water use including leakage reduction and appropriate water conservation measures.

* To protect the quality of groundwaters by implementing the NRA's Groundwater Protection Policy.

* To develop and publish a clear licensing policy for abstractions in the catchment.

* To actively enforce the conditions of abstraction licences to protect the rights of other abstractors and the aquatic environment.

3.10 ABSTRACTION FOR POTABLE (DRINKING) WATER - GROUNDWATER SOURCES - (CONTINUED)

Requirements The requirements for this use are:

Water Quality

* Groundwater quality standards have not been set. In the absence of national guidelines, water quality standards for potable abstractions from surface waters to be used as targets for groundwater quality (given in EC Directive 75/440/EC).

Water Quantity

* Water to be available to allow abstraction up to the amounts authorised in the abstraction licences.

3.11 ABSTRACTION FOR POTABLE (DRINKING) WATER - SURFACE SOURCES

General

Public water supply abstractions require a licence from the NRA to authorise the abstraction of water. Domestic abstractions for a person's own use and from their own land do not require a licence. Thus many small, domestic abstractions do not have a licence from the NRA and the NRA does not hold any record of these.

A licence stipulates the total daily and annual quantities that may be abstracted. It may also include a condition that the abstractor has to leave a minimum flow in the river to protect existing uses and users of water.

Public supply sources developed before 1963 were granted licences of right under the Water Resources Act 1963. Since then licences have been granted only if they do not adversely affect existing uses and users of both ground and surface waters.

The issue of an abstraction licence does not guarantee that the volumes authorised by it will be available at all times, nor that the quality of the water will be fit for the purpose for which it is intended to be used. However, there are Water Quality Standards for potable water abstractions, which are therefore quality objectives for river stretches where this use takes place.

This use deals with:

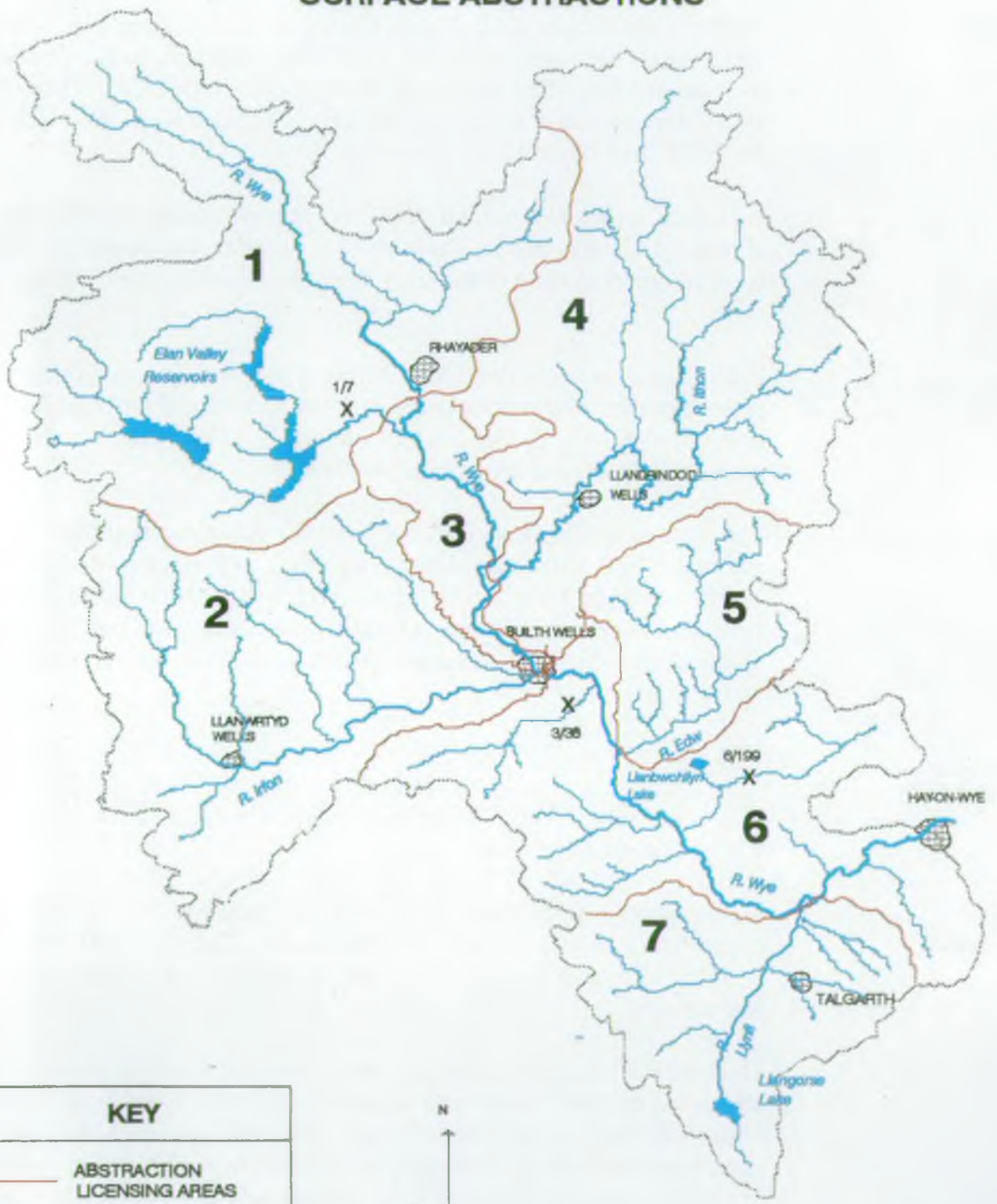
* the abstraction of water from surface water sources for potable (i.e. drinking) use.

Local Perspective

Public water supply from all sources constitutes 97% of all water abstraction authorised within the catchment. The principal abstractor is Dŵr Cymru although there are a number of small domestic abstractions.

The major abstraction is for 386 Ml/d from the Elan Reservoirs. It is abstracted by Dŵr Cymru and supplied to Severn Trent Water via the Elan Aqueduct to the Birmingham area and hence is lost to the catchment. At least 68 Ml/d must be released from the lowest reservoir to protect downstream river uses. During low flow conditions in the Wye, a further 164 Ml/d can be released to support abstractions by 2 water companies from the lower Wye. These 'regulation releases' are controlled by an Operating Agreement between Dŵr Cymru and NRA under Section 20 of the Water Resources Act 1991.

POTABLE WATER SUPPLY
SURFACE ABSTRACTIONS



KEY	
——	ABSTRACTION LICENSING AREAS
X 1/7	ABSTRACTION POINT AND LICENCE NUMBER

3.11 ABSTRACTION FOR POTABLE (DRINKING) WATER - SURFACE SOURCES - (CONTINUED)

There are 4 other surface water abstractions for public water supply, whose daily authorised total amounts to only 11.8 Ml/d serving specific local areas. About 70% of this water is returned to rivers and streams in the catchment as effluent.

There is only one licensed domestic potable abstraction which is for 0.007 Ml/d (7 m^3/d).

Acidification of the River Irfon has been partly responsible for Dŵr Cymru relocating its Llanwrtyd Wells abstraction downstream on the River Wye at Builth Wells.

The public water supply abstraction from Llanbwchllyn lake has significant implications for the SSSI at that site in that extensive drawdown can affect the aquatic flora.

Since the Elan Reservoirs are a very large resource, the detailed deployment of those resources is reviewed from time to time by the owners, Dŵr Cymru. At present, Dŵr Cymru has no plans to use these reservoirs to meet future demands in the rest of the Wye catchment.

An increase in demand of 1 Ml/d for public water supply is anticipated from the River Wye below Builth Wells. The NRA will shortly be undertaking a Regional Resources Strategy to identify the future requirements for water in the Welsh Region and how best these can be met.

A national Water Resources Strategy is being developed by the NRA. It has been suggested that further development of the Elan Valley reservoirs might provide additional supplies to other parts of England and Wales. However, this is only one of a number of options which are being considered.

3.11 ABSTRACTION FOR POTABLE (DRINKING) WATER - SURFACE SOURCES - (CONTINUED)

Objectives

The NRA uses the following supply objectives:

* To manage water quality and water resources to safeguard potable water supply.
* To manage water resources to give priority to meeting the future demands within the Wye catchment as a whole from resources within the catchment.
* To encourage efficient water use including leakage reduction and appropriate water conservation measures.
* To encourage abstractions to be made as far down a river or stream as is practical to minimise the effect of the abstraction on river flows.
* To increase and redistribute water resources where appropriate to meet potable water demands to appropriate standards of reliability.
* To actively enforce the conditions of abstraction licences to protect the rights of other abstractors and the aquatic environment.

Requirements

The requirements for this use are:

Water Quality

* All surface waters used for public water supply, at its abstraction point, to comply with appropriate standards set in EC Directive 75/440/EC.

Water Quantity

* Water resources to be available within the terms specified in the abstraction licences.
* The Elan reservoir catchments to be managed so that the yield of the reservoirs is not reduced.

3.12 AGRICULTURAL ABSTRACTION

General

All agricultural uses, with the exception of some small (less than 20 cubic metres per day) general agricultural uses from surface waters, require an abstraction licence.

This use deals with:

* abstraction from ground and surface waters for agricultural use. This includes general agricultural use (e.g. stock watering, crop spraying), as well as fish farms and spray irrigation.

Local Perspective

As a consequence of the rural character of the catchment there are large numbers of agricultural abstractions. In total, this is the second largest abstractive use in the catchment.

General Agriculture

There are 96 licensed abstractions for this purpose, of which 94 are from groundwater. This represents 66% of the licences in the catchment. Licensed abstractions total 0.95 Ml/d, or about 4% of the total volume licensed for all uses in the catchment (excluding the abstraction direct from Elan Reservoirs). The average licence is thus for only about 0.01 Ml/d (i.e. 10 m^3/d).

About 60% of the volume abstracted is returned to the river or to groundwater after use.

The increase in demand is thought to be less than 1% per year.

Spray Irrigation

In this upland, high rainfall area, arable farming is limited. Consequently, there are only 4 licences for spray irrigation, of which 2 are from underground sources. The total licensed volume is 0.439 Ml/d, or under 2% of the total licensed volume (excluding the abstraction direct from Elan Reservoirs). Thus the average licence is for an abstraction of about 0.11 Ml/d.

The net effect of a spray irrigation abstraction is for none to be returned to the river or groundwater.

The increase in demand in this area is likely to be very small. In practice, any new licences will contain a condition that severely limits the usefulness of the licence. This has to be imposed to protect existing downstream abstractors' rights.

AGRICULTURAL ABSTRACTIONS
INCLUDING SPRAY IRRIGATION AND FISH FARMS

KEY
FISHFARM
SPRAY IRRIGATION GROUND WATER
SPRAY IRRIGATION SURFACE
ABSTRACTION LICENCING AREAS

CATCHMENT	No OF LICENCES		LICENCED VOLUME (ML/D)		
	SURFACE	GROUND WATER	SURFACE	GROUNDWATER	TOTAL
1	1	5	0.002	0.017	0.019
2	0	14	0	0.059	0.059
3	0	6	0	0.034	0.034
4	0	12	0	0.041	0.041
5	0	2	0	0.003	0.003
6	0	38	0	0.705	0.705
7	1	19	0.003	0.090	0.093

AGRICULTURAL LICENSES (EXCLUDING FISH FARMS AND SPRAY IRRIGATION)
MOST SURFACE ABSTRACTIONS ARE NOT LICENCEABLE AND THESE ARE NOT SHOWN

3.12 AGRICULTURAL ABSTRACTION - (CONTINUED)

Section 57 of the Water Resources Act, 1991 allows the NRA to restrict spray irrigation abstractions in times of drought. The flow at which these restrictions are introduced is currently 455 Ml/d, measured at the Redbrook gauging station on the River Wye near Monmouth. This figure is to be reviewed by the end of 1994. These restrictions can significantly affect crop yield and quality.

Fish Farms

There are three licensed abstractions for fish rearing, all abstracting water from surface sources, with abstraction licences totalling 7.5 Ml/d. Some fish farms have to operate seasonally because natural low flows are sometimes inadequate for the fish farms in summer.

These abstractions can be very large, but all that is abstracted is returned to the river. The reduction in river flows caused by such abstractions is therefore very localised ie only between the abstraction and discharge points.

Future demand is unknown. However, the potential for fish farming in this area is limited by the low natural flows that can occur in summer.

The NRA will shortly be undertaking a Regional Resources Strategy to identify the future requirements for water in the Welsh Region and how best these can be met.

Objectives

The objectives for this use are:

* To manage water quality and water resources to safeguard agricultural abstractions.

* To manage water resources where possible in such a way as to meet all reasonable future demands.

* In respect of spray irrigation to prevent abstraction reducing river flows below acceptable limits.

3.12 AGRICULTURAL ABSTRACTION - (CONTINUED)

* To encourage efficient water use including reducing wastage and efficient irrigation plans.

* To actively enforce the conditions of abstraction licences to ensure abstractors' rights are not affected by others.

* To ensure that groundwater abstraction does not significantly affect flows or levels of surface waters.

* To ensure that the discharge from fish farms is returned as close as possible to the point of abstraction.

Requirements

Requirements for this use are:

Water Quality

* Relevant river stretches to meet standards set for the protection of waters used for irrigation and agricultural abstraction.

Water Quantity

* Water resources to be available within the terms specified in the abstraction licences.

3.13 LIVESTOCK WATERING

General

Livestock drinking from a river or pond does not require an abstraction licence.

This use deals with:

* the watering of livestock from rivers, streams, ponds and lakes.

Local Perspective

The majority of rivers and streams in the catchment are used, or have a potential to be used, by stock for drinking. A map showing the particular place where this use takes place is therefore not included.

Objective

The objective for this use is:

* To manage water quality and water resources so that the ability of livestock to drink from surface waters is not impaired.

Requirements

Requirements for this use are:

Water Quality

* To meet the standards set for livestock watering.

Water Quantity

* Flows in watercourses not to be artificially reduced such that livestock are unable to drink.

Physical Features

* The public to be encouraged not to leave litter, particularly dangerous litter such as glass bottles, drinks cans, fishing line, which might endanger livestock.

* Farmers to be encouraged to provide specific Livestock drinking areas wherever possible to reduce erosion of river bank.

INDUSTRIAL ABSTRACTIONS

KEY

+ AGGREGATES (SURFACE SOURCES)

O INDUSTRIAL (GROUND WATER SOURCES)

3.14 INDUSTRIAL AND COMMERCIAL ABSTRACTION

General

Abstraction for industrial and commercial uses always requires a licence.

This use deals with:

* the abstraction of water from ground and surface waters for industrial and commercial use.

Local Perspective

The catchment is essentially rural in character and there is relatively little industry, the major water use being for the production of aggregates from quarries.

There are only 3 abstraction licences for this use. Two of these are from surface sources for sand and gravel washing and related activities. The remaining abstraction is from groundwater. The total authorised volume is 0.005 Ml/d from groundwater, and 0.456 Ml/d from surface sources. This amounts to less than 2% of the total volume licensed for abstraction within the catchment (excluding the abstraction direct from Elan Reservoirs).

Future growth in industrial demand is difficult to predict, but is estimated to be around 1% per annum. The NRA will shortly be undertaking a Regional Resources Strategy to identify the future requirements for water in the Welsh Region and how best these can be met.

Objectives

The NRA has yet to establish formal policy, but the following supply objectives are currently in use:

* To manage water quality and water resources to safeguard industrial and commercial water supplies.

* To manage water resources where possible to meet reasonable local industrial demand.

* To encourage efficient water use, including appropriate water conservation measures.

* To actively enforce the conditions of abstraction licences to ensure abstractor's rights are not affected by others.

3.14 INDUSTRIAL AND COMMERCIAL ABSTRACTION - (CONTINUED)

Requirements The requirements for this use are:

Water Quality

* There are no general water quality standards for industrial abstractions.

Water Quantity

* Water resources to be available within the terms specified in the abstraction licences.

3.15 WATER POWER (including Mill Rights)

General

Water power is used for the generation of hydroelectric power and as a means of providing power to drive machinery, eg mills. Mills are becoming increasingly popular as tourist attractions. Use of water for hydropower can result in rapid changes in flow and large diurnal variations in flow which can have high impacts on the downstream channel and its flora and fauna.

The NRA cannot issue an abstraction licence which adversely affects another abstractor, unless that abstractor agrees to it. Hydro-power abstractions often use the whole river flow, so that any later abstraction upstream of it will inevitably affect the hydro-power user. This can mean that no-one else would be granted a licence to abstract water upstream of a hydro-power site. Where this is the case, the NRA opposes hydro-power abstractions unless the developer agrees to allow a certain amount of derogation and to having a licence which runs for a specified period.

This use deals with:

* water power as the primary motive force in energy generation.

Local Perspective

Water power is used to generate electricity at Caban Coch Reservoir, the lowest reservoir in the Elan Valley. The discharge from the reservoir is passed through turbines before being discharged to the river. The maximum discharge through the turbines is 118 Ml/d. When the reservoirs are full, or nearly so, releases of water can be made for electricity generation.

No other sites using water power are known.

Objective

The objectives for this use are:

* Hydro-power developments, which restrict the ability to use upstream water resources, to be opposed unless the licence authorising the abstraction for hydro-power is subject to an agreed volume of derogation and a time limit.

* To allow hydropower developments in such a way that they do not prevent use of upstream water resources for other purposes and do not have significant downstream impacts.

3.15 WATER POWER (including Mill Rights) - (CONTINUED)

* To ensure that discharge is made as close as possible to the point of abstraction.

* To ensure that the downstream impacts of hydropower developments are minimised.

Requirements The requirements for this use are:

Water Quality * There are no general water quality standards for water power.

Water Quantity * Operation of the Elan Valley reservoirs to allow power generation provided it does not conflict with the water resources role of the reservoirs.

3.16 SEWAGE AND TRADE DISCHARGES

General

All discharges of sewage and trade effluent require a Consent from the NRA. The Consent specifies the volume that can be discharged and what it may contain. These conditions are calculated i) by taking into account the water quality and the amount of water available to dilute the effluent at the point of discharge and ii) to ensure that downstream water quality remains acceptable for all its many uses and meets the relevant water quality standards.

This use deals with:

* the disposal of effluent to surface and underground strata.

Local Perspective

The majority of consented discharges are from sewage treatment works. There are 39 sewage treatment works with discharges of more than 5 m^3/d. There are also many small discharges from septic tanks, mainly into the ground.

The majority of the sewage treatment works are owned and operated by Dŵr Cymru. All these works are monitored by the NRA. The results of this monitoring are held on a register open to public inspection at the NRA office in Cardiff.

The principal discharges are from the works serving Llandrindod Wells (which has a consented discharge in dry weather of 904 m^3/d), Rhayader (857 m^3/d), Talgarth (650 m^3/d) and Builth Wells (628 m^3/d).

The total effluent discharge is about 4500 m^3/d (4.5 Ml/d), which is only about 1% of the dry weather flow of the river, which is 377 Ml/d measured at Erwood.

A number of storm water overflows operate in the urban areas of the catchment. There are no known problems from these, but work is continuing to find out if any of the discharges have a local impact.

There are few industrial effluents in the catchment. Effluent is discharged from Dŵr Cymru's water treatment backwash filters, from fish farms, and site drainage from quarries and sawmills. None of these pose significant water quality problems. However, there is always the risk of spillage, e.g. chlorine from a water treatment works, oils and chemicals from industrial sites. Selected sites are inspected regularly to ensure that appropriate preventative measures are taken at these sites to minimise the risk to the water environment.

SEWAGE AND TRADE DISCHARGES

3.16 SEWAGE AND TRADE DISCHARGES - (CONTINUED)

Objective

The objective for this use is:

* To allow the discharge of effluents to surface and groundwaters, whilst maintaining downstream water quality standards so that other uses are not affected.

* To allow discharge of effluents to underground strata in a manner which does not cause adverse water quality effects.

Requirements

The requirements for this use are:

Water Quality

* Consent conditions to adequately safeguard downstream water quality and prevent exceedence of EC Directives.

* Discharges to be made at a point where the risk to other uses is minimised.

* Ensure discharges to underground strata are made in accordance with the advice in the NRA's Groundwater Protection Policy.

* Discharges to comply with their consent conditions.

Water Quantity

* Effluents to be discharged as high up the catchment as is feasible to keep water in the rivers.

* Upstream flows not to be reduced to the point where the dilution of the effluent becomes inadequate.

Physical Features

* The discharge not to be so large that it alters the channel shape and size which affect conservation interests.

* Outfalls to be sited so that they allow adequate mixing of the effluent and the river.

LANDFILL SITES

KEY
LANDFILL SITE

3.17 WASTE DISPOSAL TO LAND

General

Waste disposal to land requires a licence issued by the Local Authority. The NRA has to be consulted about each application for a licence. The waste disposal licence details how the site is to be constructed and operated.

A valid planning permission is also required before a waste disposal licence can be issued. The planning permission contains conditions which control the way in which the site is restored and monitored to prevent the closed site from causing future damage to the environment. The NRA has to be consulted on planning applications which affect the water environment.

Landfill sites can cause water pollution. This is because rain falling on the site can become contaminated and drain out of the site (called leachate) into groundwater or streams. If the site is properly managed, long term harm to the environment can be avoided. This can be achieved by either collecting the leachate for disposal elsewhere, treating it, or allowing it to be diluted in the groundwater where it can naturally break down. Detailed studies are required to decide what is the best way to deal with the leachate. Badly managed sites can lead to serious pollution problems.

This use deals with:

* the disposal of waste in landfill sites.

Local Perspective

The Local Authorities own and operate three domestic landfill sites, at Nantmel, Rhosforlo and Cwrt-y-Plyfin. These do not pose any significant threat to water quality in the area.

Objective

The objective for this use is:

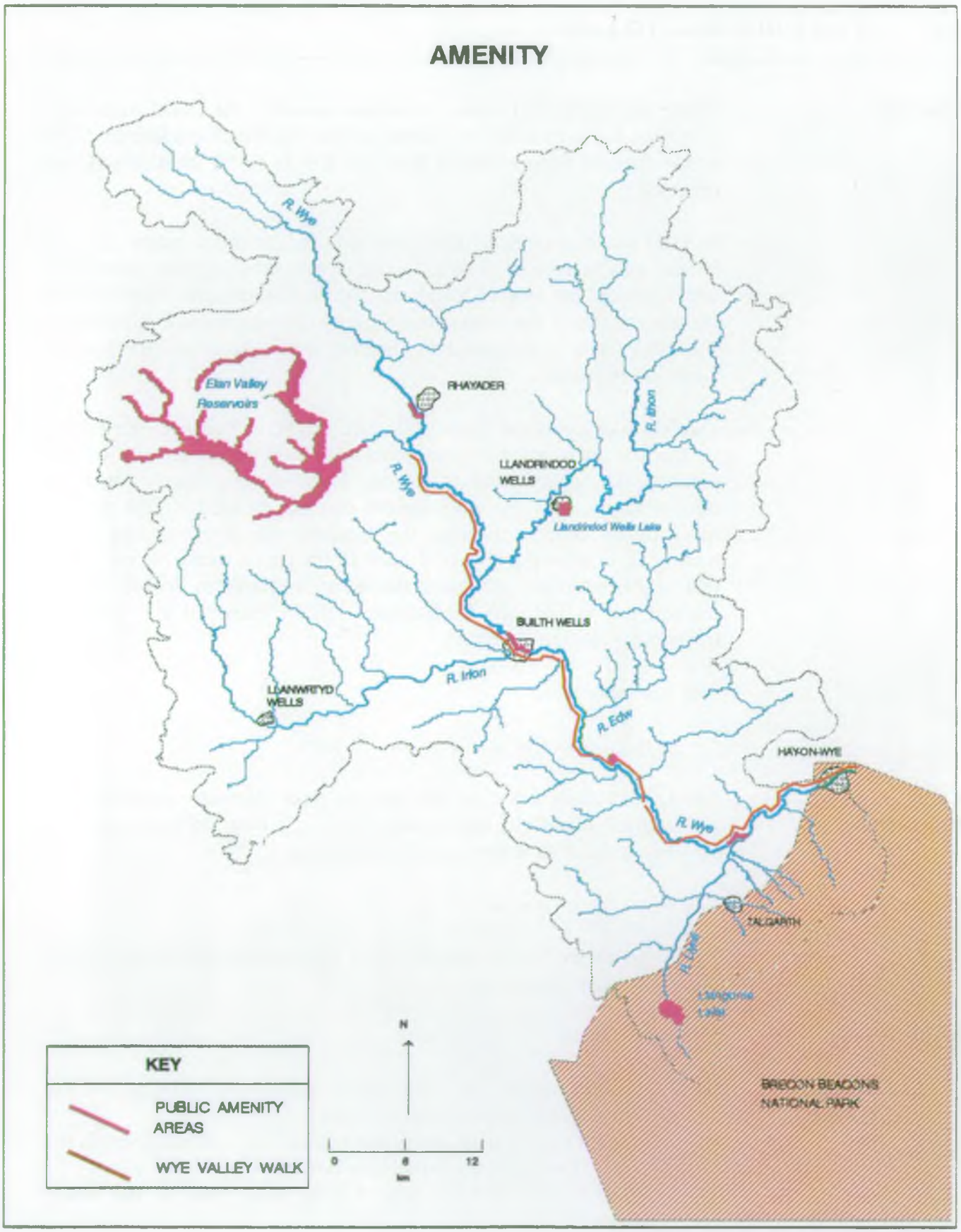
* To ensure landfill activity does not compromise water quality or water resources.

Requirements

The requirements for this use are:

Water Quality

* EC Directives on dangerous substances discharged to groundwaters to be complied with.
* Landfill to be carried out in accordance with advice given in the NRA's Groundwater Protection Policy.
* Restored sites not to pose a long term risk to the water environment.


AMENITY
R. Wye
Elan Valley
Reservoirs
RHAYADER
R. Ithon
LLANDRINDOD
WELLS
Llandrindod Wells Lake
BUILTH WELLS
R. Irfon
LLANWRTYD
WELLS
R. Edw
HAY-ON-WYE
TALGARTH
Llangorse
Lake
BRECON BEACONS
NATIONAL PARK
KEY
PUBLIC AMENITY
AREAS
WYE VALLEY WALK
N
0
6
12
km

3.18 AMENITY

General

This use deals with:

* the aesthetic aspects of the water body which can affect people who use the river corridor.

Local Perspective

Many people live adjacent to watercourses in the catchment and many more come to visit them to walk or to fish. The visual appearance of these waters is important and their amenity value should not be underestimated.

The Wye Valley Walk follows the course of the River Wye for 56 kms in the County of Powys (see map). There are many other riverside footpaths within the catchment and a number of riverside picnic sites.

Other important areas of public amenity include the Elan Valley, with its reservoirs, Llandrindod Wells Lake, The Groe Park at Builth Wells and Llangorse Lake.

There are 5 abstractions for "amenity ponds". This has been a growth area in recent years. All are from surface sources, and they total 1.38 Ml/d. They are essentially a non-consumptive use, in that water abstracted is returned back to the river or seeps back into groundwater.

The potential conflict between amenity use of the river and the conservation interests was examined in the Wye Project.

Objectives

The objectives for this use are:

* To maintain water quality to prevent any deterioration in amenity value due to visual or smell problems.

* To encourage land owners to provide safe and easy access to the river corridors

* To maintain and increase the number of amenity features.

* To maintain the natural appearance of the river and its banks.

3.18 AMENITY - (CONTINUED)

Requirements The requirements for this use are:

Water Quality

* Water to be free from surface films and extraneous floating material, deposited noxious material or associated growths, discolouration and unpleasant odour.

Water Quantity

* Flow regimes not to be significantly altered from the monthly natural historic flow conditions in the river . The exception is the River Elan downstream of Caban Reservoir, which is affected by the presence of the Elan Valley reservoirs.

* Water resources to be managed where possible in such a way as to meet reasonable amenity abstraction demands (i.e. abstractions to maintain amenity and conservation ponds and lakes).

Physical Features

* Maintain existing and encourage additional riverside footpaths, picnic sites and access points.

* Bankside to be free of litter.

NAVIGATION & BOATING

KEY

- CANOEING BY AGREEMENT WITH RHAYADER & DISTRICT ANGLING ASSOCIATION
- ACCESS AGREEMENT FOR CANOEING UNDER NEGOTIATION
- SAILING ON LAKE
- PEDAL BOATS ON LAKE

3.19 NAVIGATION AND BOATING

General

This use deals with:

* regulation of the use of waterways for navigation.

* boating, which is mainly canoeing.

Local Perspective

The River Wye has been used for navigation for many centuries. Today, boating is almost entirely recreational, but in the past the Wye was an important commercial waterway, used to transport the products of industry and agriculture. Acts of Parliament passed in the 17th Century confirmed the Wye as a "free and open" navigation, though it is not established whether or not this applies upstream of Hay. The public has a right to navigate on the Wye between Hay and Chepstow, where the river enters the Severn Estuary.

Boating activity on the upper Wye is almost exclusively canoeing. White-water canoeing between Llangurig and Glasbury, primarily during the winter months, is popular with clubs and outdoor activity centres. In the absence of an established right of navigation upstream of Hay, permission needs to be sought from the landowner and fishery owner before canoeing can take place.

Access can cause conflict between canoeists, landowners and other users. The only purpose built canoe launch facilities are at Hay and Glasbury. Measures, including possibly regulation, are necessary to reduce conflict both between users of the river and between recreational use and conservation. There is a need for an access agreement to allow canoeing on the upper Wye. Such an agreement is currently being negotiated between the Welsh Canoeing Association and the fishery owners to allow canoeing on parts of the upper Wye at certain times of the year and during periods of high water.

The Wye Project considered the issues of navigation, amenity and conservation and the conflicts between these users.

Llangorse Lake is used by many people, including adventure holiday companies for sailing and canoeing tuition. Anglers also use boats on the lake. The Lake is within the Brecon Beacons National Park and the Park Authority may shortly seek to introduce byelaws to regulate boating activity, particularly water-skiing.

3.19 NAVIGATION AND BOATING - (CONTINUED)

Objectives

The objectives for this use are:

* To safeguard the quality and quantity of the water sufficient for this use.
* To ensure that works to the channel do not prejudice these activities as far as is practicable.
* To encourage and support canoe access agreements on the upper Wye.

Requirements

The requirements for this use are:

Water Quality

* Water to be free from surface films and extraneous floating material, discolouration and unpleasant odour.

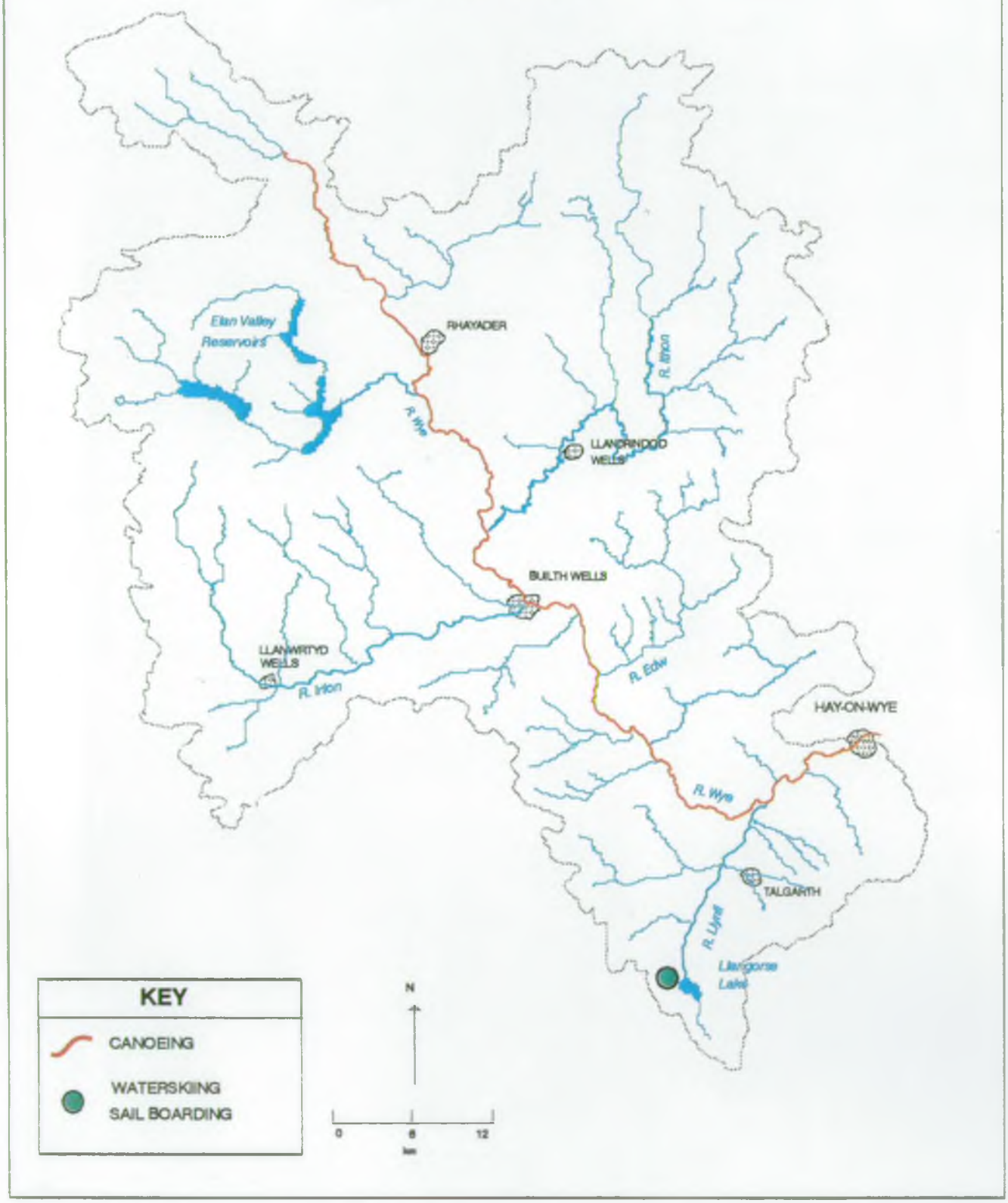
Water Quantity

* Flow regimes not to be significantly altered from the monthly natural historic flow conditions in the river . The exception is the River Elan downstream of Caban Reservoir, which is affected by the presence of the Elan Valley reservoirs.

Physical Features

* Protection of the river bed and banks whilst retaining those features which are attractive to users.
* Formalised sites for launching and retrieving canoes.

IMMERSION SPORTS



3.20 IMMERSION SPORTS

General

A number of sports involve the participant being immersed in a river or lake. Some have been dealt with in detail elsewhere eg canoeing in Section 3.19.

The NRA discourages swimming in all rivers primarily because of the risk of drowning but also because of the possibility of swimmers catching water borne diseases.

This use deals with:

* Immersion sports, which is primarily swimming, but also includes canoeing and water-skiing.

Local Perspective

Total immersion sports are not a significant use of the upper Wye. However, canoeing can at times result in total immersion and local people often swim in the rivers.

Water skiing is limited to Llangorse lake where it is a very popular sport. It is one of the best of only 5 or 6 inland waterski sites in Wales.

Objectives

The objective for this use is:

* To raise public awareness of the public health problems associated with the discharge of sewage effluent and the dangers of Weil's disease.

Requirements

The requirements for this use are:

Water Quality

There are no quality standards or classification schemes which specifically cover the health risks associated with water sports. Some health related studies are in progress, the results of which will assist in the development of a classification system.

SECTION 4
CATCHMENT TARGETS

4.1 INTRODUCTION

The uses made of the rivers, streams, lakes, ponds and groundwaters and the catchment itself where these affect water, have been identified.

This section now considers the targets that have to be set to protect those uses or allow them to continue. The targets are considered in 4 groups, namely:

Quality of Surface Waters
Quality of Groundwaters
Water Quantity
Physical Features

So, for 'Water Quality' we take those uses which have a requirement for a particular quality of water, and list the targets which have to be met to safeguard those uses or allow them to continue. The same process is used for the other target groups.

4.2 SURFACE WATER QUALITY TARGETS

Existing River Quality Objectives

In 1979, River Quality Objectives (RQO's) were set for river lengths throughout England and Wales, and were included in the NWC River Quality Classification. A limited range of criteria were used i.e. dissolved oxygen, biochemical oxygen demand, and ammonia. The classification includes a broad indication of the fisheries and water supply uses which might be made of rivers in each class. For example, Classes 1A and 1B would be considered suitable for salmon and trout fisheries and water supply with conventional treatment, whereas Class 2 would be suitable for coarse fisheries and would only be suitable for water supply after advanced treatment. The classification system is shown in Appendix 2.

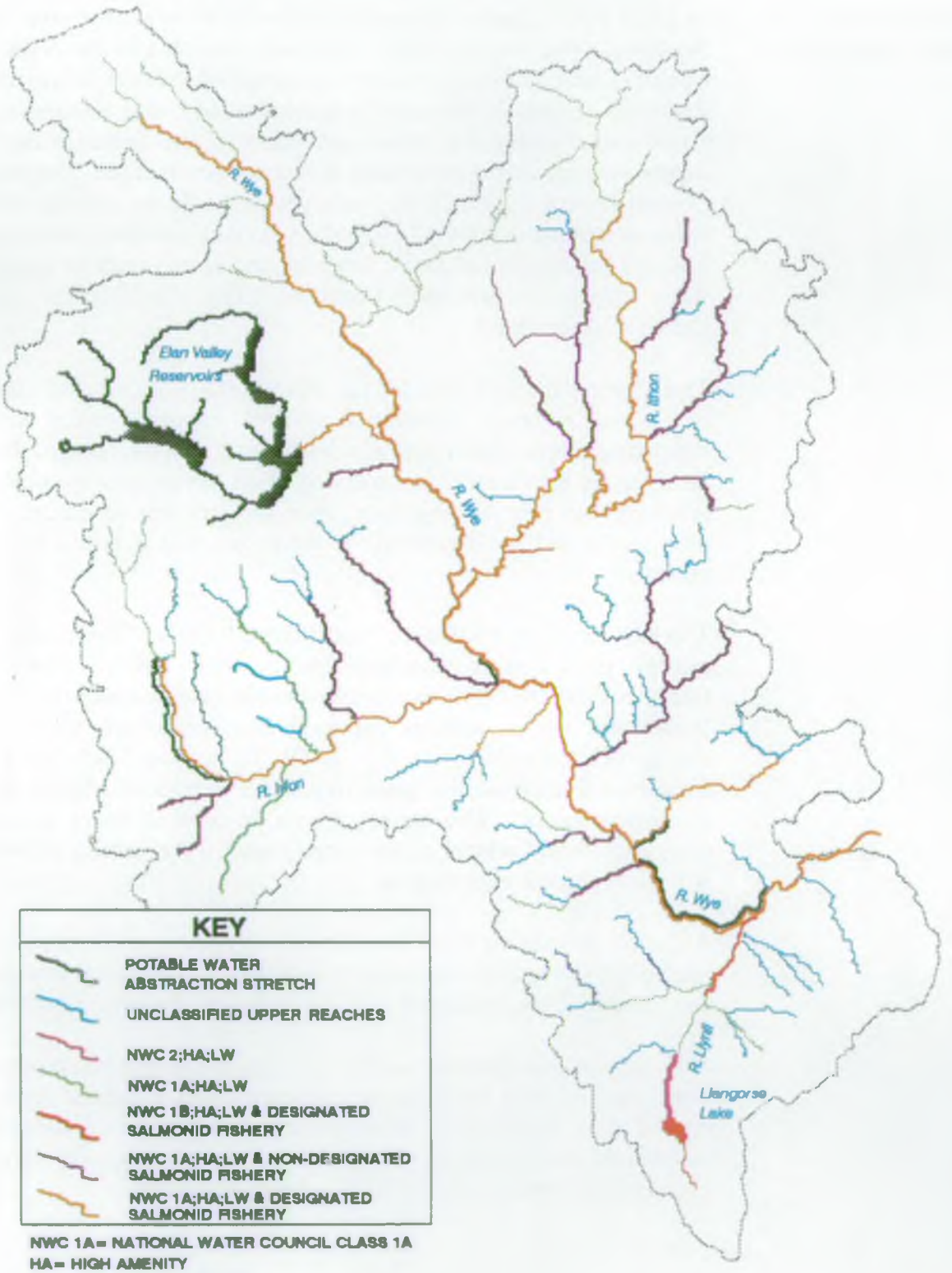
These objectives in effect set the overall 'targets' for the quality of rivers and streams. Pollution control measures were aimed at improving rivers which had a sub-standard quality, and of bringing them up to the 'target' i.e. meeting their water quality objective. Where a river met its 'objective', then the aim was to ensure that the river quality did not deteriorate to the extent that if failed to meet its objective.

The RQO's set in 1979 were "long term" RQO's. The target was to achieve these quality standards by the year 2001. The Water Resources Act 1991 (which incorporates the relevant sections from the Water Act 1989) includes provision for 'statutory water quality objectives', normally referred to as SWQO's. The NRA has recently developed framework for specifying the SWQO's of rivers and other controlled waters. This approach is to be used in future and will be more specifically related to the water's uses. The setting of SWQO's will involve local consultation.

Although the existing RQO's will eventually be superseded by the use-related SWQO's, they are currently established management objectives and are therefore considered in this Catchment Management Plan.

A biological classification is used to support this general overview of water quality. It is based on the presence of river animal groups and is used as an indication of water quality. It supplements the chemical assessment and Appendix 3 shows how the biological quality targets are used and are matched to the NWC chemical classes.

FUTURE TARGETS-WATER QUALITY



NWC 1A= NATIONAL WATER COUNCIL CLASS 1A
HA= HIGH AMENITY
LW= LIVESTOCK WATERING

4.2 SURFACE WATER QUALITY TARGETS - (CONTINUED)

Local Perspective

The Long Term River Quality Objective (RQO) for the upper Wye is mainly NWC Class 1A. However the River Llynfi has 8 km with a Class 1B objective, and 2 km with a Class 2 objective. This reflects the reality of only being able to achieve Class 1B downstream of Talgarth sewage treatment works because there is limited dilution of the discharge, and where the natural water quality of Llangorse lake is Class 2. The Howey Brook has a 1 km stretch upstream of its confluence with the River Wye with a Class 1B objective, which again is caused by the limited dilution available for the local sewage works discharge.

Use-related Water Quality Criteria

Lists of relevant water quality criteria and standards have been developed for each of the major river uses, namely:

* General Amenity
* Salmon and trout fishery (which is more stringent than the requirements for coarse fishery which is therefore not included separately).
* Potable (drinking water) abstraction
* Agricultural irrigation
* Livestock watering
* Immersion sports

These lists include the criteria specified in European Community Directives for specific uses of water. Details are given in Appendix 2.

Water quality at the abstraction points used as sources of raw water for potable (drinking water) supply should comply with the European Commission Abstraction Directive standards. Waters which are designated as supporting salmon and trout should comply with the European Community Fish Directive standards

4.2 SURFACE WATER QUALITY TARGETS - (CONTINUED)

Special nature conservation requirements are important and ideally water quality requirements related to water dependent features of SSSIs would also be specified. However, in the absence of such criteria, the suite for salmon and trout has been taken to broadly cover these requirements.

An evaluation of how well the water quality complies with standards has been made.

The water quality standards which apply to any particular stretch are the strictest use-related requirement.

Local Perspective

The catchment is characterised by two main uses, namely:

* General Amenity
* Salmon and trout fisheries

Water quality targets have been largely determined by the strictest criteria necessary to protect salmon and trout fisheries and potable water abstraction. Coarse fish inhabit some of the 'salmon' rivers and water quality targets for these fish are satisfied by the more stringent requirements of salmon and trout.

Overall Target

The water quality requirements for all the uses have been combined with the RQO to give a single summary map showing the targets for all classified lengths of river within the catchment.

4.3 GROUNDWATER PROTECTION TARGETS

General

The NRA has produced a "Policy and Practice for the Protection of Groundwater" (PPPG) which provides advice on the management and protection of groundwater on a sustainable basis. This new policy deals with the concept of vulnerability and risk to groundwater from a range of human activities. It considers both source and resource protection i.e. protection around the point of abstraction (source) and protection for the area which drains to the abstraction point (resource).

It deals in particular with:

* discharges to underground strata
* waste disposal to land
* disposal of slurries and sludge to land
* physical disturbance of aquifers affecting quality and quantity
* contaminated land
* diffuse pollution and unacceptable activities in high risk areas.

The implementation of the policy relies in part on the construction of a series of maps showing the location of the sources to be protected (protection zone maps).

The Policy recognises three groundwater source protection zones, which are currently being defined. These are:

Zone I (Inner Source Protection) Immediately adjacent to the source area defined by a 50-day travel time from any point below the water table to the source (based on biological contaminant decay).

Zone II (Outer Source Protection) Area defined by 400-day travel time (based on the delay and attenuation of slowly degrading pollutants).

Zone III (Source Catchment) The complete catchment area of a groundwater source. The controls to be exerted on a given activity will be more stringent the more vulnerable the resource and the nearer the source.

Resource protection maps will also be produced after considering how vulnerable to pollution the groundwater is, based on the nature of the strata and type of soil and drift cover. These maps should be completed by 1996.

4.3 GROUNDWATER PROTECTION TARGETS - (CONTINUED)

Local Perspective

The Welsh Region is implementing this national framework policy for the protection of groundwater which will effectively manage groundwater protection in the area of the upper Wye catchment.

The NRA does not have previously published maps delineating protection zones around groundwater abstractions. However for internal purposes to assist in the assessment of risks to major groundwater sources from specific development proposals, sensitive areas are drawn around abstractions. These zones were defined on limited information available with due regard given to local knowledge and experience.

These existing zones are used in the consideration of proposals that could pose a risk to a particular source. Refinement of a zone would be undertaken if more detailed hydrogeological information became available. Developers in connection with specific proposals may submit appropriate data which will be considered by the NRA for the modification of the existing zone.

The particular activities listed in the general introduction above are now considered in more detail.

Discharges to Underground Strata

The NRA has powers under the Water Resources Act 1991 to exert control over discharges of sewage and trade effluents to underground strata. It will seek to prevent any discharge into underground strata, either directly or via sub-surface soakaways, which may lead to pollution of groundwaters.

Waste Disposal

Waste disposal on land takes place at a number of locations in the catchment. The NRA is a statutory consultee to both the Planning and Waste Regulation Authorities for such proposals, and will exercise the PPPG through these controls.

Disposal of Sludges and Slurries to Land

Disposal of sludges and slurries to land includes wastes from agriculture, industry and sewage treatment. Provided the activities conform to certain criteria, there are no statutory controls governing them, other than EC legislation covering sewage sludge disposal. Nevertheless, the NRA is committed to limiting this activity in Source Protection Areas and this is being achieved by enlisting the co-operation of disposal contractors in their use of land.

4.3 GROUNDWATER PROTECTION TARGETS - (CONTINUED)

Physical Disturbance of Aquifers

Physical disturbance of aquifers will include activities such as mineral extraction and construction projects involving excavation work. The NRA can influence the proposals through its role as a Planning consultee and, where appropriate, through its own licences and consents.

Contaminated Land

Contaminated land has not been identified as a problem in the catchment. Lead, zinc and copper were historically mined, mainly in the Elan catchment. Monitoring targeted at these sites has confirmed no impact from these disused mine workings.

Diffuse Pollution

Diffuse pollution is, by its definition, not attributable to any one location, and is therefore principally governed by land use and land management. Other than by the creation of 'Water Protection Zones' and 'Nitrate Sensitive Areas', opportunities for the NRA to influence this, other than by persuasion, are limited.

4.4 WATER QUANTITY TARGETS

General

There are three main 'use' types which affect the natural flow regime of a river. These are:

* abstractions
* discharges
* reservoirs

Abstractions can reduce the quantity of water in rivers and streams. Discharges increase the flow. The effect of reservoirs is less simple. Below the dam, the flow regime alters considerably in that normally a steady discharge is made to 'compensate' for the reservoir's presence. However, in winter when the reservoir is full, a normal high flow regime occurs. In summer, the compensation water may be more than would naturally occur, and this may be further added to if the reservoir releases water to allow downstream abstractions to take place. However, the water released is often much colder than would naturally occur.

Abstraction licences have been issued in their present form since 1965. Initially, "licences of right" were issued to anyone who was abstracting at that time. Conditions protecting the environment or other abstractors could not be imposed on those licences. Since then, applications to abstract have been determined on an individual basis and conditions imposed to protect the environment and other abstractors' rights.

However, ever since abstraction licences were first issued, it has been extremely difficult to assess how much water can be abstracted without adversely affecting the river environment. The NRA is therefore undertaking a number of research projects to help answer this question. In reality, it will be several years before answers are available. When concluded, it will be possible to set flow targets throughout the catchment.

Local Perspective

Surface Water Sources

River flows in the upper Wye catchment are naturally very variable. The geology is mainly hard rock covered by thin soil, neither of which can store much water. As a result, river flows tend to fall quickly in dry periods. This is a natural characteristic of the catchment.

The River Elan below the reservoirs receives discharges from the reservoirs as "compensation" for the effects of the reservoir. In practice this maintains a relatively high flow in this tributary in drought periods.

4.4 WATER QUANTITY TARGETS - (CONTINUED)

The main uses which affect the natural flow regime are abstractions and discharges. The main uses which can be affected by these are conservation, fisheries ecosystem, and amenity and canoeing.It is the aim of the NRA to determine a range of seasonal river flows which are appropriate to maintaining the characteristic habitat and river ecosystems - the things that give the river its character.

In advance of the results of the research projects (e.g. derivation of ecologically acceptable flows, fish tracking studies), and as an interim measure, the NRA is about to undertake a project to produce a licensing policy. This will allow abstraction licence applications to be determined in a way that systematically balances the requirements of the river environment with those of the abstractors and dischargers.

Groundwater Sources

Groundwater use is limited within the catchment. However, over-abstraction would generally be reflected in reductions of surface water flows. Water quantity targets are therefore specified for surface rivers and streams.

New Abstractions

The NRA will determine all new abstraction licence applications within the framework of the Water Resources Act 1991. The impacts of new abstractions will be carefully considered on their own merits and viewed in the light of the sensitive issues and problems specific to the Wye catchment.

Small low loss abstractions will generally be acceptable. However any new, large, high loss abstraction from the catchment will generally be opposed unless it is accompanied by a commitment to provide local storage reservoirs filled during high flows in the winter. Any proposed abstraction other than those in the small, low loss category, will need to be supported by environmental information which adequately demonstrates that adverse environmental impacts will not arise. The NRA will also seek to improve controls on existing licences whenever the opportunity arises.

Until the new licensing policy is produced, and in the absence of detailed assessment of the needs of the river, the natural 95-percentile flows (Q95) have been calculated and these are the flows that the NRA presently intends to protect. This will also ensure that existing downstream abstractors' protected rights are not affected.

4.4 WATER QUANTITY TARGETS - (CONTINUED)

Future Demands for Water Use

The NRA is analysing information on water use and is preparing a Regional Water Resources Strategy. It will be reviewing forecasts of future demand to try and anticipate needs for water resources developments and consider ways of meeting those future demands. The Regional strategy will then feed into a National Water Resources Strategy which is also in preparation.

For public water supplies, the NRA expects that fullest opportunities will be taken for effective demand management, particularly in the areas of leakage control, and in the introduction of general domestic metering in zones of high consumption. In all its dealings with potential new abstractors, the NRA will seek to achieve environmental benefits from any new arrangements, whether these can come from minor local improvements or from the strategic considerations associated with conjunctive use of major sources.

4.5 PHYSICAL FEATURES TARGETS

General

This section considers the targets for physical features on rivers and river corridors in the catchment. Fishery, conservation and recreational matters, and flood defence works are dealt with under this heading; the term conservation includes flora, fauna, features of archaeological, architectural, historic and physio-graphical interests. Requirements for specific uses identified in Section 3 have been considered and targets set to meet these requirements.

Use Related Targets

For the relevant uses, physical features targets are as follows:

Conservation (including wildlife, landscape and archaeological interests)

The NRA is currently developing a National conservation classification scheme for rivers that will assist in setting targets for conservation. Until specific targets are set, the following conservation aims are used:-

* Ensure that future development does not reduce the conservation value of the river corridor.

* Undertake river works in a manner that has regard to and, where appropriate, increases the conservation value of the river corridor.

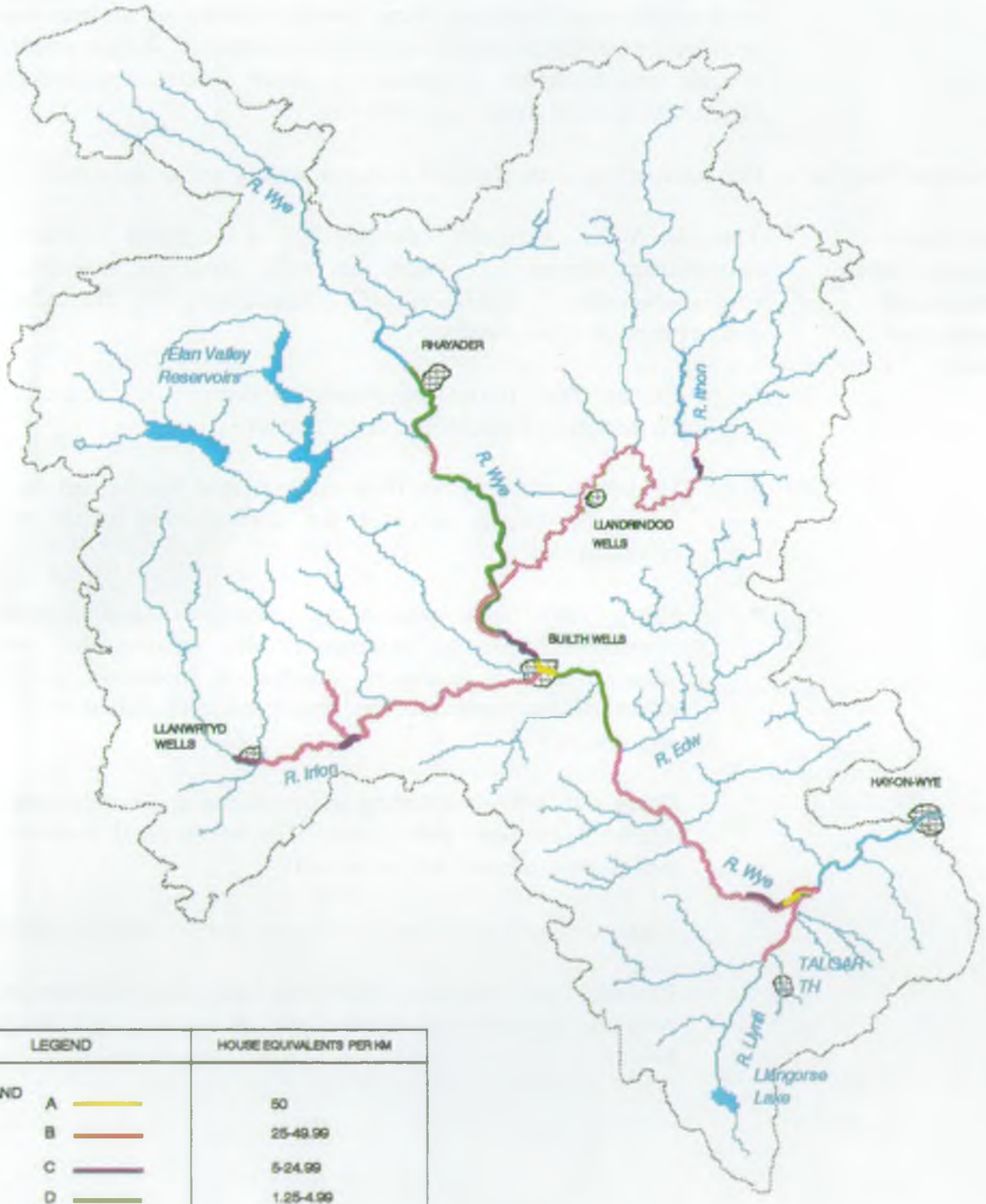
* Carry out NRA consenting practices and respond to development proposals in a manner that ensures that natural features such as emergent vegetation, meanders, pools and riffles and the landscape are preserved and enhanced where appropriate.

* Carry out NRA consenting and response to development in a manner that ensures that features of archaeological, architectural and historic interest are preserved.

* Seek opportunities to carry out conservation capital projects.

* Promote and support initiatives for the maintenance of wetland, meadowland habitat and in-stream and bankside habitat.

FLOOD DEFENCE TARGETS



LEGEND		HOUSE EQUIVALENTS PER KM
BAND	A	50
	B	25-49.99
	C	5-24.99
	D	1.25-4.99
	E	0.01-1.24
	X	NO DATA

4.5 PHYSICAL FEATURES TARGETS - (CONTINUED)

Livestock

* To seek opportunities, where appropriate, to control stock access to river banks thus minimising bank damage and allowing regeneration of bankside vegetation to ensure habitats, shade cover and natural vegetation are maintained for the wildlife in the river corridor.

Fisheries

Fisheries targets for adult and juvenile salmon and trout have not been set. The aim is a sustainable level of exploitation by the rod fishery whilst conserving the natural history of the stock.

For juvenile stocks, trends in stock abundance can be identified and comparisons made with "expected" abundances based upon habitat characteristics.

In the absence of specific targets, the following are used:

* Control illegal fishing by the use of a bailiff force in anti-poaching patrols and by targeting the market in illegally caught fish.

* Maintain an abundance of juvenile salmon which is related, where possible to the carrying capacity of the catchment based upon habitat characteristics.

* Maintain the integrity and genetic diversity of the salmon populations.

* Provide access for salmon and trout to all suitable spawning and nursery areas where appropriate.

* Maintain an abundance of brown trout which is related where possible to the carrying capacity of the catchment based upon habitat characteristics.

* Maintain a monitoring programme which quantifies accurately stock abundance.

Boating

* Support an access agreement to allow canoeing on the upper Wye.

Amenity

* Support opportunities to improve existing public amenity access where appropriate.

4.5 PHYSICAL FEATURES TARGETS - (CONTINUED)

Flood Defence A system is under development by the NRA to determine the present standard of service being achieved for Flood Defence maintenance.

The system determines whether present levels of river maintenance have produced a level of protection within a target standard, above standard or below. The river system is divided into reaches and an assessment is made of the 'Land Use' by considering for each reach the agricultural or urban content within the flood plain. For each element (eg. road, house, intensive grazing) a score is given. The score is measured by a single unit called a *House Equivalent*. The reach is placed into one of several *Land Use Bands* according to the total score achieved. Typical land use relating to each band is shown in Appendix 5.

Flood Defence Capital Schemes

* The target standard for urban flood defence schemes is protection against floods having a return period of 100 years or higher. When target standards cannot be justified economically, it may be possible to accept a lower, justifiable standard.

Flood Warning The NRA is currently looking to develop suitable targets for flood warning.

Development With regard to development, the following targets are used:

* No increase in flood risk as a result of development.
* No new development in an area where the existing level of service is considered below the standard required for the type of development proposed.
* Provision of suitable access for maintenance of the river channel.

SECTION 5
CURRENT STATE OF THE CATCHMENT

5.1 INTRODUCTION

In the last Section, we reviewed the targets that should be met to allow the current uses to continue. In this Section, we review the current state of the catchment and how well the targets are being met. Where a target is being met, there is no problem. However where targets are not being met, there is a problem to be dealt with.

We have concentrated on those areas where targets are NOT being met in this section so that problems can be identified. The next Section expands on those problems and highlights the conflicts that exist between uses.

5.2 SURFACE WATER QUALITY

General

Data from routine water quality and biological sampling have been used to assess the catchment against the 'targets' in Section 4.

The map identifies failures to meet both the use-related chemical quality targets and the NWC River Quality Classification objectives. It also identifies river stretches that fail to meet the biological class which is equivalent to the NWC Water Quality class. An explanation of how this is done is included in Appendix 3.

Biological information is also used to identify river stretches that are affected by acid runoff. More detail of how this works is shown in Appendix 3.

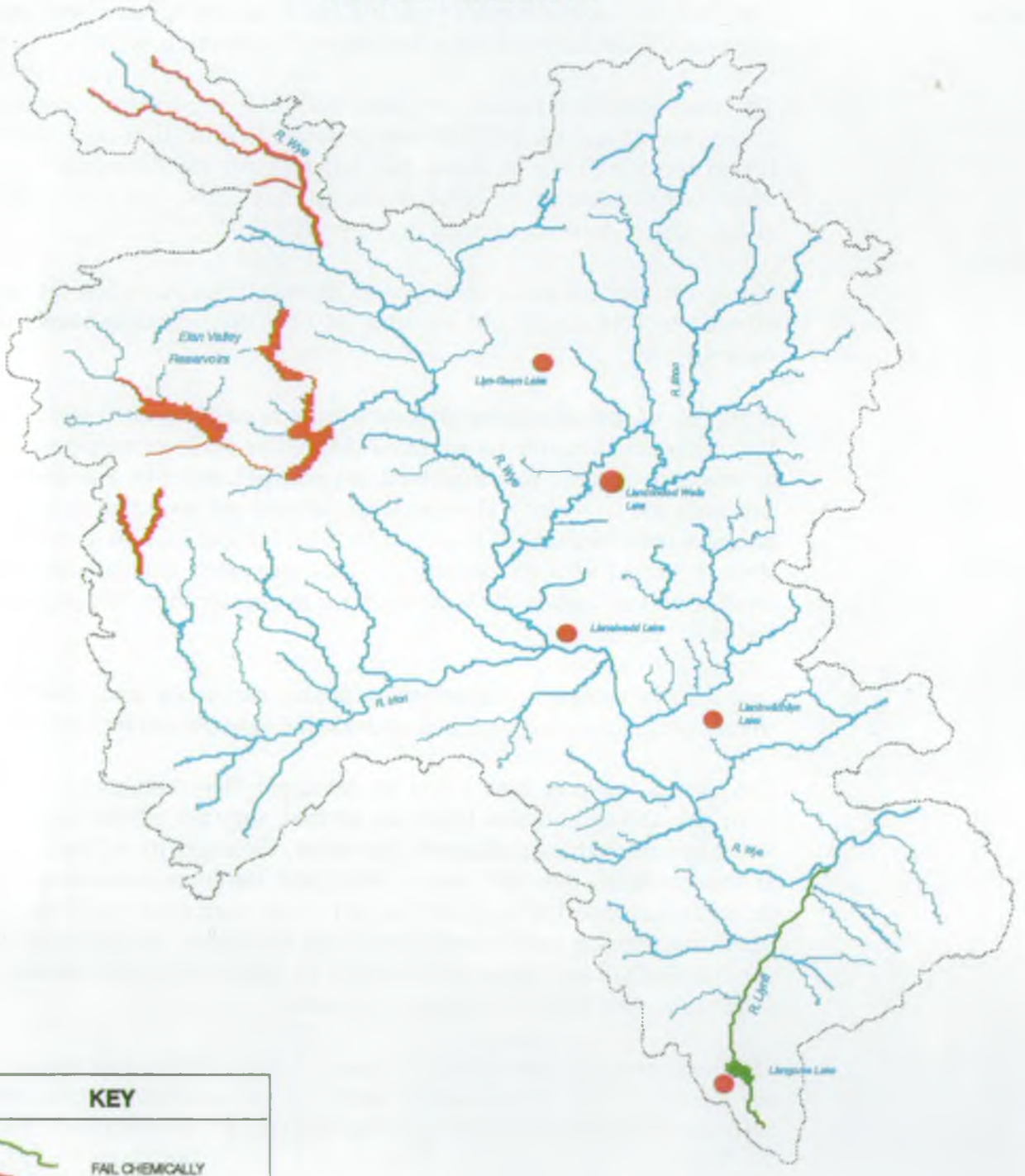
A number of stretches in the catchment have been designated under the E.C. Fisheries Directive for salmonid fish. The main parameters used to assess compliance are; dissolved oxygen, pH, unionised ammonia, ammonia and total zinc. The standards for zinc are such that in waters having a total hardness of less than 50 mg/l (as $CaCO_3$) the permitted level is 30 ug/l as a 95 percentile. This compares with a permitted level of 500 ug/l when the total hardness is greater than 250 mg/l (as $CaCO_3$).

Zinc widely occurs in nature as sulphide, carbonate and hydrated silicate ores, it can also be found in domestic sewage and in rainwater.

The natural levels of zinc found in the upper Wye catchment range from 20 - 160 ug/l. These levels are normal, they are similar to those found in comparable catchments. However, the majority of the rivers in this catchment are soft waters with total hardness concentrations generally less than 100 mg/l (as $CaCO_3$). The main river and some of the tributaries near to its headwaters have hardnesses of less than 50 mg/l (as $CaCO_3$) and these rivers have to be assessed for fish directive purposes against the very low zinc standard.

The designated stretches which are shown to exceed this zinc standard are the main river from source down to its confluence with the Scithwen Brook and the Elan from the reservoir to its confluence with the Wye.

STATE OF THE CATCHMENT
WATER QUALITY



5.2 SURFACE WATER QUALITY - (CONTINUED)

Where such a special geographical condition cannot be controlled a derogation for the affected parameter can be sought. This exempts that stretch from the requirement to comply with the Directive standard for that parameter. Derogations have been sought for zinc for the stretches identified above.

Problems Identified

1. **Acidification** Acidification, identified by using biological indicators of acid waters (see Appendix 3), affects part of the upper reaches of the River Wye and some of its tributaries. These are in areas of base-poor, low weathering bedrocks, acidic soils and where significant afforestation occurs. The main acidified stretches are the River Wye from above Llangurig to its confluence with the River Tarennig, the Tarennig and Bidno tributaries, the River Irfon upstream of Llanwrtyd Wells and parts of the Elan catchment. Some of these stretches may also be influenced by flow regulation from Claerwen and Caban Coch reservoirs.

2. **Long Term Water Quality Objectives** The River Llynfi is failing to comply with its long term river quality objective at Llangorse Lake and for 2.3 km downstream. A combination of low dissolved oxygen levels and elevated BODs during the summer are responsible for this failure. The Llynfi also fails to achieve its salmon and trout fishery requirements over the whole of its length from Llangorse to its confluence with the River Wye above Glasbury (17 kms). The failure is attributed to elevated BODs.

3. **Blue-green Algae** A number of lakes and water bodies have been subject to significant blooms of blue-green algae. The most notable of these in the upper Wye catchment are:

   Llandrindod Lake
   Llangorse Lake
   Llanbwchllyn Lake
   Llanelwedd Lake
   Llyn Glyn, near Rhayader.

   Blue-green algae are of concern because they can produce unsightly scums and toxins which are harmful to humans and animals.

5.2 SURFACE WATER QUALTIY - (CONTINUED)

The NRA developed a monitoring strategy in 1990 and, when positive levels of blue/green algae were identified the owners, local authority Environmental Health Officers, Ministry of Agriculture Fisheries and Food and Medical Officers of Health were notified.
In 1992 routine monitoring ceased as sufficient information had been collected on identification of problem lakes.

5.3 GROUNDWATER QUALITY

General

Work is currently underway to develop a groundwater classification scheme for inclusion in Statutory Water Quality Objectives.

Problems Identified

Although little data are available on the quality of groundwater, the NRA is not aware of any quality problems.

STATE OF THE CATCHMENT
WATER QUANTITY

KEY
RIVER AFFECTED BY RESERVOIR.

5.4 WATER QUANTITY

General

In the absence of the licensing policy and therefore clear water quantity objectives, a review of the 'state' of the catchment has to be rather pragmatic.

The rivers in the upper Wye have a naturally low baseflow in summer. In winter, the flows rise and fall rapidly in response to rainfall. This is a result of the geology, the thin soils and steep gradients of the catchment which forms the natural character of the upper Wye and its tributaries.

The resources in the upper Wye are heavily used, primarily from the Elan Reservoirs. Since at least 68 Ml/d of water is released from these reservoirs as "compensation" for the reservoirs being there, their impact during low flows is quite small. The remaining licences can be seen from the table at the end of this section to have only slight effects on these rivers in the summer, even if groundwater is considered as having a direct impact on surface waters. Thus actual minimum flows in dry years are thought to be adequate to meet in-river needs. The investigations leading to derivation of detailed licensing policy will lead to a more rigorous consideration of this.

Some surplus summer resource is available, within the Edw, Llynfi and Wye above the Elan confluence, but significant net abstractions will be subject to 'Hands-Off' conditions to protect the environment and existing downstream protected rights.

Surplus water is available in the winter period in all catchments, with the exception of the River Elan.

In the Elan above the reservoirs, additional abstractions might prejudice the refill of the reservoirs. When the reservoirs are not full and so not spilling, the natural variation of flow below the reservoirs is reduced. Further abstractions from the Elan below the reservoirs would further change the river regime and would not be encouraged.

There is no evidence of a long-term decline in water levels in the upper Wye catchments. General protection of the quality of groundwaters, and monitoring of the levels of groundwaters is required.

5.4 WATER QUANTITY - (CONTINUED)

With the exception of the Elan reservoirs, there are no hands-off flows set specifically to protect the river in the upper Wye. However, any application for a licence for spray irrigation or other consumptive use would at least be subject to a hands-off flow of 1275 Ml/d at the Redbrook Gauging Station on the River Wye near Monmouth to protect existing abstractors' rights.
Other local Hands-Off Flows are set as required to meet local environmental requirements.

As the Licensing Policy is produced, the hands-off flow conditions will be reviewed.

Abstractions are controlled by ensuring that abstractors comply with the conditions of their abstraction licences.

Resource Usage

The present conditions in the catchment are assessed by considering how much water is abstracted and not returned to the river and comparing that volume to the available river flows. This is shown in detail in the table at the end of this section. In summary though, there are generally no known problems associated with abstractions, and no drying up of streams from 'over-abstraction'.

The net abstractions authorised are small when compared with the summer flows, or even with lowest flows recorded.

The total licensed abstraction within each sub-catchment of the upper Wye is compared with the flows in the river under two low flow scenarios in table at the end of this section. The 'available resource at Q95' is the river flow at the 95 percentile flow, i.e. a normal summer flow. The 'available resource - lowest gauged' is the lowest river flow gauged in the catchment i.e. it is a drought flow.

Estimates are made of the net abstraction (i.e. the amount of the abstracted water that is not returned to the river or groundwater). These are 'worst case' figures, since it assumes abstractors are taking water continually at the full authorised rate, whereas normally a lower figure is actually abstracted. (Current actual usage has not been assessed, since details of the actual abstraction is not available for the many small abstractions.)

5.4 WATER QUANTITY - (CONTINUED)

The available resource in the surface sources is based on gauged flows and estimates at other sites. The groundwater resource has not been assessed, since very little data on groundwater exist. Thus the assessment assumes all abstractions have an effect on surface sources, regardless of where water is actually taken from. Again, this gives the worst case that could occur.

The purpose of the comparison is to illustrate the scale of water resource development within the catchment.

The summary table at the end of this section shows that the net abstraction is very small within the upper Wye catchment and therefore abstractions are not adversely affecting other uses of the catchment.

Problems Identified

There is no evidence of over-abstraction within the catchments. Their is some conflict over the use of Llanbuwchllyn, an SSSI, for abstraction purposes.

1. **Protection of the Water Quantity Needs of the River Environment**

Until detailed investigations are completed and detailed licensing policy produced, it is not possible to satisfactorily identify the amounts of water available for future abstractions without detriment to existing uses and the river itself.

Until the licensing policy is completed, all new significant abstractions will be subject to a hands-off condition at the 95 percentile river flow. It will be assumed that this meets the requirement not to artificially reduce flows too much. (Consent conditions are derived taking into account the upstream dilution flow which is available under average and dry weather conditions.)

2. **Public Water Supply Requirements**

Available resources in Ithon catchment are inadequate to meet future public water supply demand in the Llanbadarn Fynydd area where an additional continuous abstraction is required. In addition, about 1 Ml/d will be required from the River Wye below Builth Wells to meet forecast demands. No other future demands for public water supply are known.

The NRA will shortly be undertaking a Regional Resources Strategy to identify the future requirements for water in the Welsh Region and how best these can be met. This study will identify likely future demands to the year 2021.

5.4 WATER QUANTITY - (CONTINUED)

3. Industrial Requirements

Available water resources for future industrial demands are likely to be adequate.

4. Spray Irrigation

Available water resources for spray irrigation are inadequate, since protection of existing users requires a 'hands-off' condition at about Q90, the very time that irrigation might be required.

The NRA's powers to restrict spray irrigation abstractions in droughts can cause significant economic losses to farmers. The NRA would encourage winter abstraction into storage (i.e. farm ponds) for spray irrigation purposes. No flow restrictions would be applied to these licences, except in exceptional circumstances.

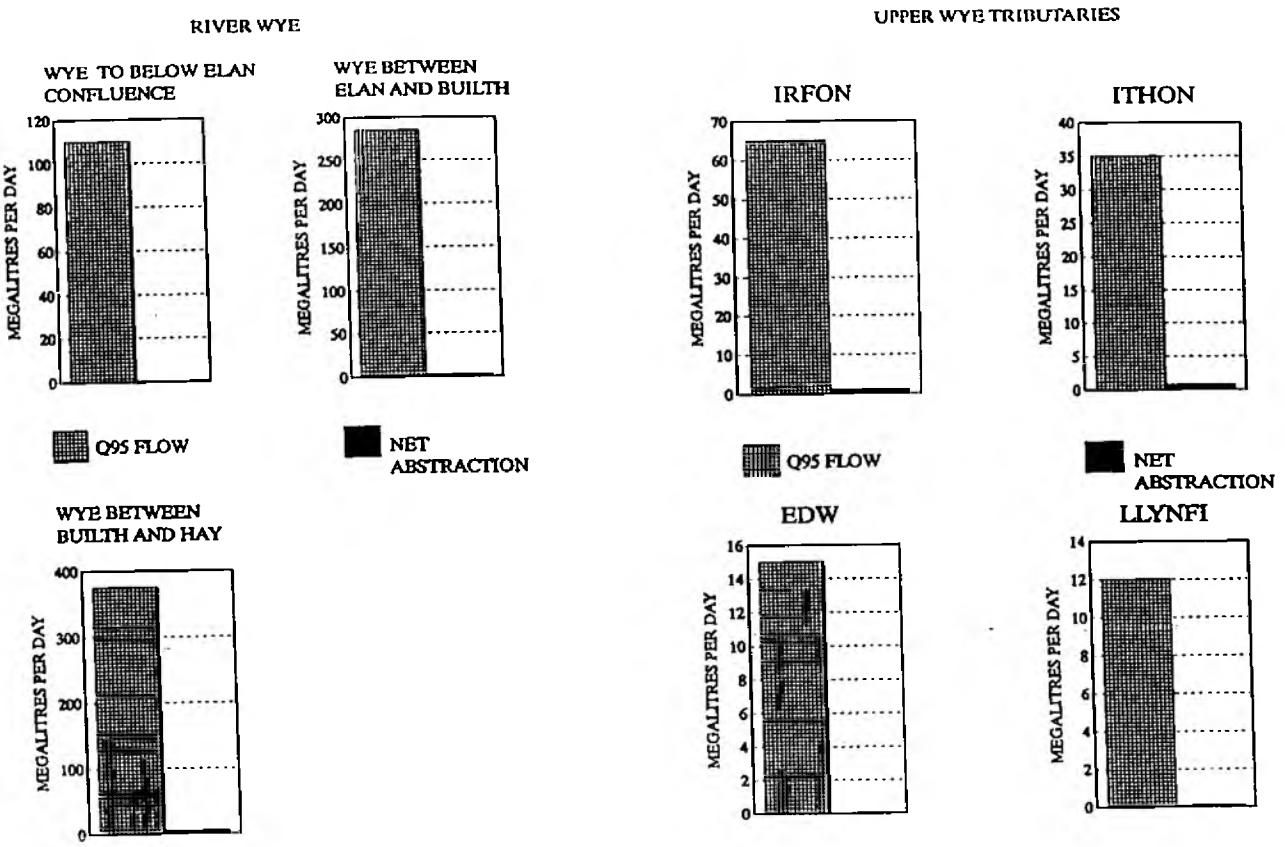
The level at which irrigation restrictions are imposed is based upon the need to protect existing abstractions and the NRA's current understanding of the flow required to protect the aquatic environment.

5. Draw-down at Llan-bwchllyn

Llanbwchllyn is a lake which is both an SSSI and a source of water for public water supply. Excessive drawdown of the lake could cause problems for the aquatic flora. In such circumstances, 'rule curves' are used to ensure this does not occur.

SUMMARY OF WATER RESOURCE USAGE IN THE UPPER WYE

* NET ABSTRACTION AT Q95 FLOW



* Net abstraction excludes abstraction from the Elan Valley reservoirs, since at Q95 flows and below, the compensation release from the reservoir is about 1.9 times the natural Q95 that would have been in the river had the reservoirs not been there.

5.5 PHYSICAL FEATURES

General

Objectives and targets have been set for a range of physical features identified for individual uses. The current status of the catchment is obtained by a comparison of the usage requirements and present conditions. Fishery, conservation and recreational matters , and flood defence works are dealt with under this heading; the term conservation includes flora, fauna, features of archaeological, architectural, historic and physio-graphical interests.

The following issues emerge:

Problems Identified

Conservation

1. **Habitat Improvements** — Generally speaking the natural habitat of the upper Wye is in good condition, largely unspoilt by human activity. However, and in the absence of specific targets, habitat improvements will be included when the opportunity arises during NRA flood defence capital schemes and during routine maintenance work .

2. **Proposals** — Proposals requiring NRA consent, or the subject of statutory consultation have the potential to damage the environment. The NRA's permission or agreement will only be given where conservation interests are preserved and enhanced where appropriate.

3. **Capital Projects** — To benefit conservation, a number of sub-catchment wide capital projects have been identified and will be pursued in due course.

4. **River Corridor Survey** — The River Corridor Survey now provides a tool for identifying areas where stock access is causing damage to the river bank. Appropriate remedial action will be encouraged.

5.5 PHYSICAL FEATURES - (CONTINUED)

Fisheries and Angling

5. Illegal Fishing

The use of gaffs, spears and, on occasions, nets to take spawning salmon does occur in the upper Wye and if not controlled would have a significant impact on salmon stocks.

Regular patrols and surveillance by Water Bailiffs is undertaken each winter to counter the threat of illegal fishing. Throughout the year Water Bailiffs check on the market for illegally caught fish by visiting potential outlets on a regular basis.

6. Stock Levels

The results of the annual survey of young fish populations in 1991 are summarised on the maps. Classes are based on the density of fry and parr for salmon, and fry and all older fish for trout. Class A sites are the best and class E the poorest. Class E in fact means "absent" which, in the case of salmon, could be the result of an impassable barrier to fish migration. The classification is described in Appendix 4.

The results of the last nine annual surveys of juvenile salmon populations have been analysed. Declines in stock densities have been noted in the Wye and its tributaries above the Elan confluence, the Llanwrthwl Brook and parts of the upper Irfon and Ithon sub-catchments.

7. Reduced Fish Catches

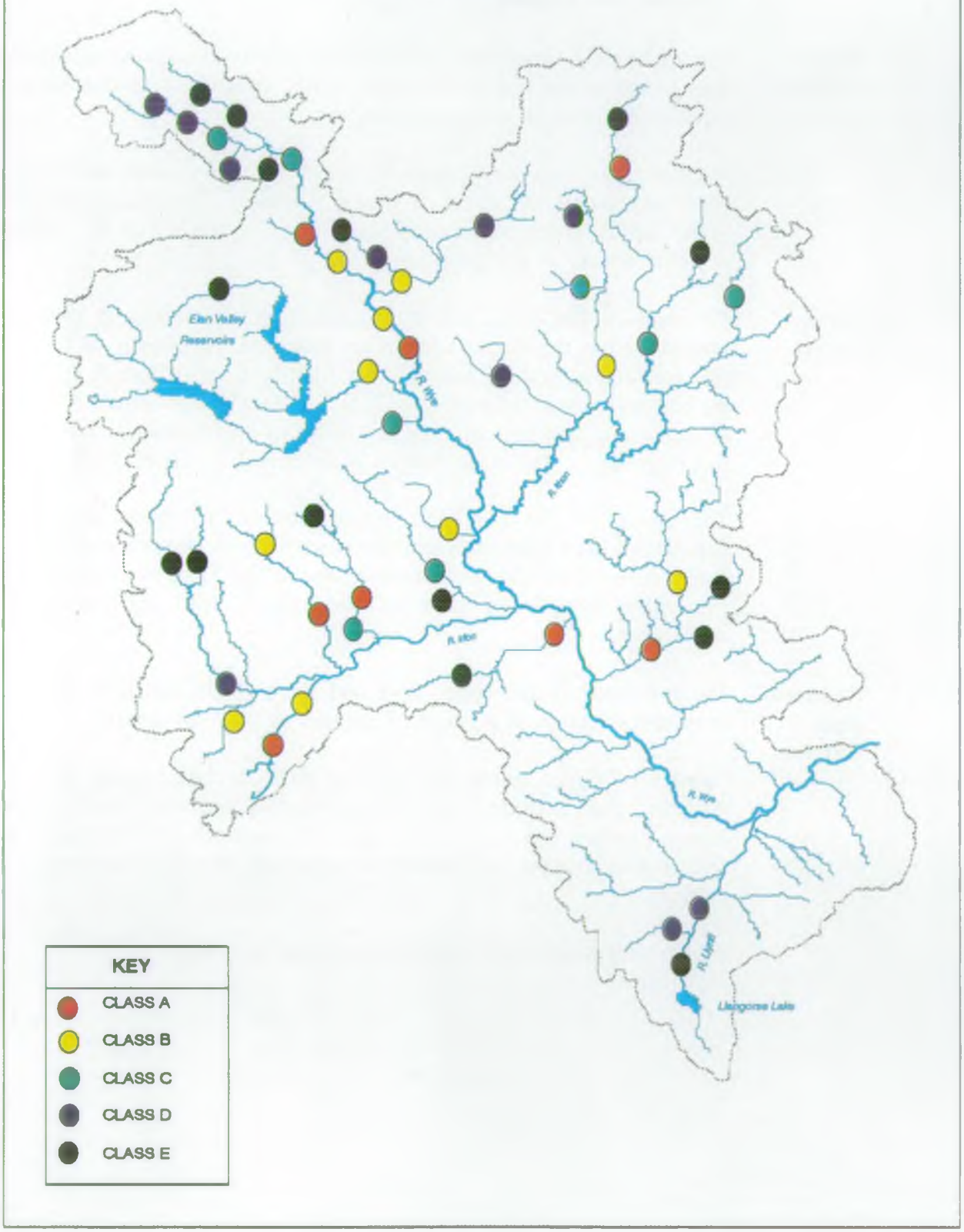
The rod catch on the upper Wye and River Irfon has been poor in recent times, partly as a result of a series of very dry years.

Catches of large, spring run salmon have declined most notably. Possible causes include illegal fishing, angling pressure, acidification, changes in land use (particularly forestry practice), sea fisheries, sea temperature changes, and barriers to upstream migration to spawning grounds.

Brown trout stocks in the upper Wye have declined.

SALMON DENSITIES

- 1991 SURVEY -



5.5 PHYSICAL FEATURES - (CONTINUED)

Concerns include acidification, changes in land use, angling pressure and avian predators. Restocked stretches of the river and stocked stillwaters provide the best sport.

8. Obstructions The upper Wye catchment is relatively free from barriers to upstream migration of salmon to their spawning grounds. However, two barriers have been identified as worthy of further investigation. Fish passes on the Garth Dulas (Irfon sub-catchment) and River Duhonw would make over 14 km^2 of additional good spawning and nursery stream available to salmon. These passes may cause undesirable impacts on those steams, and the impact will need to be investigated.

9. Monitoring Rod catches represent an unknown and probably seasonally and annually variable proportion of the stock size and are therefore not necessarily indicative of the true stock abundance. The rod catch clearly does not reflect the numbers of salmon entering the catchment during the closed season. The potential for further enumeration of the stock is restricted to trapping, resistivity counters and hydroacoustic techniques.

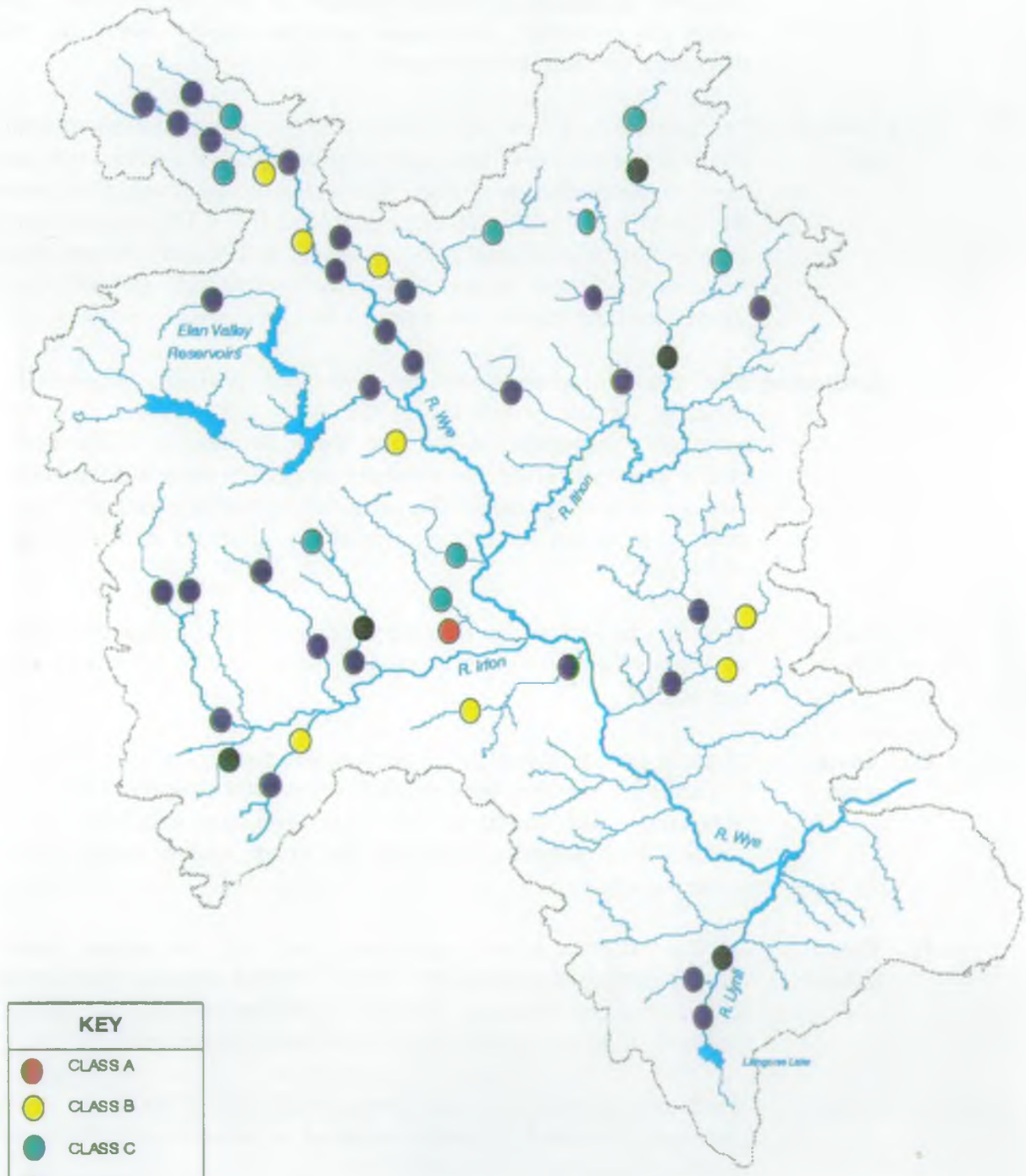
10. Predation The NRA recognises that in some locations there is considerable concern by anglers that cormorants or sawbill ducks may be adversely affecting fish stocks.

11. Navigation There is no established right of navigation on the upper Wye. There is a need for an access agreement to allow canoeing on the upper Wye. Measures, which might include regulation, are necessary to reduce conflict both between users of the river and between users and conservation.

12. Flood Defence All flood defence schemes are maintained on an annual basis and are performing satisfactorily. Other lengths of main rivers are ubject to periodic maintenance, which will be related to the appropriate standard of service when values have been determined.

Road and property flooding occurs at Builth Wells. A flood protection scheme has been considered on several occasions, but has not been found to be cost effective.

TROUT DENSITIES
- 1991 SURVEY -



KEY
CLASS A
CLASS B
CLASS C
CLASS D
CLASS E

5.5 PHYSICAL FEATURES - (CONTINUED)

Flood defences have been constructed for the communities of Glasbury, Llanwrtyd Wells, Llangammarch Wells, Beulah and Penybont. The standard of protection afforded by these schemes is 1 in 50 years.

13. Flood Warning The Authority continually refines warning threshold levels to ensure optimum operation of its flood warning scheme.

SECTION 6

ISSUES AND OPTIONS

6.1 INTRODUCTION

This section of the plan considers options and actions to address the issues that have been raised in the preceding sections. Conflicts are bound to arise because of the many demands on the catchment. A number of the uses can be in direct conflict and there is no priority ranking of uses. Indeed the duties of the NRA can themselves conflict. In essence, therefore, all users and uses of the catchment have to be considered together, and not in isolation. Often there has to be an element of compromise in arriving at the solution to a problem.

When considering the options which are available to deal with a particular issue, the conflicts between users and uses have been identified. Cost, both capital and revenue, could be regarded as a disadvantage to most of the issues, so it has been excluded from the summary tables for the sake of clarity. More detailed cost implications are planned to be included in the final Plan.

The options as presented are the initial thoughts of the Welsh Region of the NRA and do not constitute policy statements. Comments on the issues and options are welcomed, together with any new ideas/suggestions.

Wherever possible the organisations responsible for carrying out or contributing to each option have been identified. In some cases this is identified as a body other than the NRA. However, the options as presented are intended as a plan to facilitate improvements to the water environment for the benefit of **all** users. Obviously, this will involve both individuals and organisations working together to fulfil the aims and objectives detailed in this Catchment Management Plan.

Each of the issues discussed in this section has been given a reference number to help link the appropriate text to the summary tables. The order in which the issues are presented is **not** a priority ranking.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS

Issue 1 ACIDIFICATION

Nature of the Problem

Acidification is caused by the deposition, mostly as rain, snow or fog, of sulphur and nitrogen emissions produced from the burning of fossil fuels. In susceptible areas where there is little or no buffering capacity from the bedrock and soils, the acidic rain is not neutralised. This then flows into streams and rivers which then also become acidic, especially during heavy rainfall or when snow is melting. The coniferous forest more efficiently scrubs the atmosphere of its water-borne acidifying chemicals and frees up aluminium in the root zone rather more efficiently than other vegetation. The acidity itself may be damaging to aquatic life, but, when combined with high aluminium concentrations, is very toxic to fish and other aquatic animals.

Impact on Uses and Conflicts

Where acidification occurs it can adversely affect the quality and use of the water bodies, and influence the use of the surrounding land.

It may be necessary to restrict and manage conifer forestry plantations in order to limit the damage, but this could cause conflicts with landowners and forestry organisations who wish to utilise their land in this way.

The conservation value of affected reaches may be lowered due to reductions in variety and numbers of aquatic animals and plants. This will also affect birds and mammals which feed in the rivers, such as Dippers and Otters. This in turn will affect the basic amenity and recreational value of the river for those with an interest in the local wildlife.

More specifically, acidity and high aluminium concentrations contribute to poor salmon and trout survival, especially of eggs and young fish which spend their early years in upper parts of the catchments and tributaries most likely to be affected by acidification. This could limit successful spawning and reduce the genetic diversity of wild salmonid stocks. A decline in adult fish stocks affects the use of the river for angling and related recreational uses.

In some cases acidification may pose a problem for the abstraction of water for potable use, since increased treatment may be required to reduce the acidity and concentrations of aluminium and manganese. This may also be necessary for hydroelectric power generation, where precipitation of manganese in turbines may be a problem.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

The following river stretches in the upper Wye catchment have been identified as being affected by acidification:

* The main river Wye from Llangurig up to its confluence with the Tarennig;
* The Tarennig and Bidno tributaries;
* The Irfon upstream of Llanwrtyd Wells;
* Some parts of the Elan, but these are also influenced by flow regulation from the Claerwen and Caban Coch reservoirs.

Solutions

1. In the long term, aerial emissions of acidifying pollutants must be reduced to halt and ultimately reverse acidification. This requires action at a government and inter-government level since acidification is an international problem. It may also take many years for the reduction in emissions to be effective, and it is not known how rapidly water quality, and subsequently biological and fishery quality will recover. In the meantime short term measures may be required.

2. The NRA and other organisations are researching the use of limestone to adjust the acidity and hardness of affected water bodies by treating parts of the catchment. This will improve water quality, and allow recovery of the biological quality and fishery in the short term. However this involves high costs, and certain operational difficulties are yet to be resolved. There is also a potential for adverse effects on terrestrial ecosystems, some of which would lie in protected areas such as SSSIs, which may conflict with the NRA's conservation duties as well as those of other organisations. There may also be a reduction in the recreational value of treated areas.

3. Conifer afforestation has been shown to worsen acidification in acid-sensitive areas. In response to this the NRA has developed guidelines with the Forestry Authority and conservation bodies to limit afforestation in these areas. The "Forests and Water Guidelines" provide a framework within which the NRA will consider its response to consultations on planning applications. Restricting new planting should maintain present water quality conditions. The NRA is also considering extending funding of work through its R&D programme into the water quality implications of clear felling and second rotation planting which should enable additions to be made to the guidelines to cover these practices.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

4. The NRA is continuing to monitor water quality, biological quality and salmonid stocks in stretches identified as being acidic. It is also working to establish the full extent of acidification throughout Wales. This will enable any short term ameliorative measures taken to be directed most effectively.

Issue 2 **FAILURE TO ACHIEVE LONG TERM RIVER QUALITY OBJECTIVES & F1 FISHERY STATUS**

Nature of Problem

The National Water Council's (N.W.C.) classification scheme sets out standards of water quality to protect important uses of rivers such as fisheries and abstraction for potable supply. In addition the high quality classes (1A and 1B) are expected to meet standards set out by the European Inland Fisheries Advisory Commission (E.I.F.A.C.) to protect salmon and trout fisheries and these standards now form the basis of the E.C. Directive for the Protection of Freshwater Fisheries. Both the N.W.C. classification and the E.C. Directive for Freshwater Fish recognise that Dissolved Oxygen (D.O.) is essential for maintaining aquatic life and its depletion in water is probably the most frequent general result of organic pollution from sewage and farm effluents.

Impact on Uses and Conflicts

The River Llynfi fails to meet its long term river quality at Llangorse Lake and for 2.3 km downstream and it also fails to achieve its salmon and trout fishery requirements for the whole of its length. A combination of low dissolved oxygen levels during the summer months and elevated B.O.D.'s are responsible for this downgrading.

Sensitivity to low dissolved oxygen concentrations differs between species of fish, between their various life stages (egg, larvae and adults) and between the different life processes (feeding, growth and reproduction).

Low dissolved oxygen concentrations can also increase the toxicity of other poisons such as ammonia and heavy metals due to the increased rate at which water has to be pumped over the gills (thus increasing the amount of poison in contact with the gill surface where it is absorbed) to maintain the correct intake.

Persistently high levels of B.O.D. resulting in low dissolved oxygen concentrations could contribute to poor salmon and trout survival and limit successful spawning and diversity of wild stocks. A decline in fish stocks would affect the use of the river for angling and related recreational uses.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Solutions

1. The NRA is continuing to sample the River Llynfi and Llangorse Lake at regular intervals and will sample throughout the diurnal cycle to establish a more comprehensive assessment of the water quality.

2. The NRA will continue to monitor effluent discharges into the River Llynfi and will seek to control all such discharges by regular reviews of consent and treatment plant performance.

3. The NRA will continue to investigate sources of agricultural pollution and will promote effective pollution prevention measures through implementation of the Code of Good Agricultural Practice (C.O.G.A.P.) and by enforcement of The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991. This involves close liaison with farmers, farming organisations and agricultural consultants.

4. The NRA will review the quality of the River Llynfi in relation to its use related objectives under the Statutory Water Quality Objectives requirements.

Issue 3 **BLUE-GREEN ALGAE IN LAKES AND STATIC WATER BODIES**

Nature of Problem

Blue-green algae are natural inhabitants of many inland waters, estuaries and the sea. Under suitable physical and chemical conditions populations may grow to extremely high densities and a scum of algae may form on the surface and can accumulate on leeward shores. These algae produce chemicals which can be toxic to mammals, including man. Excessive blooms of algae occur where water is enriched with nutrients, especially nitrogen and phosphorus, which may enter the water from a variety of natural and man made sources.

Impact on Uses and Conflicts

Where blue-green algal blooms develop and persist they can adversely affect the appearance, quality and use of the water bodies. Algal blooms make the water more difficult to treat for potable use and can impart unpleasant odours and tastes to drinking water.

Recreational and general amenity use of water bodies with blue-green blooms, especially for water contact sports such as wind surfing, may be restricted or prohibited because of the risk to public health from the toxins.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Stock watering is inadvisable when scums are present because of health risk to animals.

Although not considered to be directly poisonous to fish, when algal blooms die and decay they use up oxygen in water which can cause problems for other aquatic life including fish.

The following lakes in the upper Wye catchment have been identified as having blue-green bloom problems in recent years. Warnings have been issued by the NRA to owners and users of the potential dangers of toxins. Some of the above uses have been affected.

Llanbwchllyn	Llandrindod Wells	Llanelwedd
Llangorse	Llyn Glyn	

Solutions

1. The NRA has established a long-term monitoring programme at selected sites in order to study the factors affecting blue-green algal growth. It has also commissioned a research programme to improve our understanding of blue-green algae toxin production and to develop techniques for toxin detection.

2. The NRA continues to sample any new sites identified by owners as having a potential blue-green algal problem and issues alerts and publicity material to make the owners and public aware of the potential dangers. Such warnings may lead to closure of affected water bodies and cause conflicts between lake owners and recreational users.

3. Short term treatment of water bodies to control algal blooms may be possible using chemical or biological methods. The NRA is investigating new, environmentally acceptable treatment methods, such as the application of barley straw. The most appropriate long term solutions involve prevention of blooms rather than treatment and require management of the whole catchment.

6.2 DESCRIPTION OF ISSUES AND OPTIONS - (CONTINUED)

4. There are NRA national guidelines for the development of management action plans for lakes with blue-green problems. Action plans will be developed for the lakes listed above in consultation with owners, users and interested parties to agree the management of lakes and lake catchments in order to reduce or prevent blue-green algal problems. Potential conflicts of interest between the parties involved must be resolved. For example, reductions in nutrient inputs may require changes in land use or additional sewage treatment.

Issue 4 **UNABLE TO MEET DEMANDS FOR SPRAY IRRIGATION IN SUMMER MONTHS**

Nature of the Problem

The NRA may not issue abstraction licences which will derogate existing abstractors rights. Because of existing licences, all new licences which are issued are subject to a condition which requires abstraction to cease when the flow of the River Wye at Redbrook falls below 1275 Ml/d. Consequently, in a dry year such as 1990 when irrigation is most important, abstraction would not be possible between May and September, except for a few days. Therefore licences with such condition are virtually useless to the abstractor as they do not permit abstraction from rivers when spray irrigation is most required.

Spray irrigation is totally consumptive, i.e. none of the water abstracted is returned to the river. The demand for spray irrigation is greatest when river flows are lowest. Consequently, spray irrigation abstractions can have a significant effect on the river itself and the conservation interests if uncontrolled.

There is little requirement at present for spray irrigation in the upper Wye. There are currently only 4 licences for this use. However spray irrigation is very common in parts of the rest of the Wye catchment.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Impact on Uses and Conflicts

For certain crops, irrigation is vital to provide both the quality and the yield required. For some crops, lack of water can result in total loss of crop.

The volume that can be abstracted is large, and none is returned. Therefore the flow in a stream or river can be severely depleted, affecting the conservation and fishery ecosystem uses of the river.

Solutions

1. Sufficient water is available in the winter months provided that it can be stored for summer use. An increasing number of farmers are providing on-site water storage facilities to store water abstracted during the winter months. This provides water when and where it is required, at a cost which is borne by the abstractor. The farmer may derive other benefits from the reservoir, eg. amenity, fire fighting, sporting use. The abstraction charges for winter storage are one-tenth of those for summer abstractions.

2. Several suggestions have been made for the NRA to provide reservoirs in the catchments so that water can be released in the summer months for spray irrigators to abstract. However, quite large storage facilities would be required at the head of every tributary from which spray irrigation abstractions are made. This would still require expensive pipelines to be laid to supply water to those farms requiring the water, leading to the NRA becoming a water undertaker which is not its role.

3. It has been suggested that the NRA could provide winter storage reservoirs. However, the cost to NRA would be extremely high for a small group of abstractors. The costs would have to be re-charged to abstractors through the charging scheme, and the costs to the beneficiaries of construction and operation are likely to be unacceptable to them.

4. A simpler alternative maybe for farmers to grow crops which are less dependent upon spray irrigation.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Issue 5 **SPECIFICATION OF ENVIRONMENTAL REQUIREMENTS OF RIVER AND ITS PLANT, ANIMAL AND FISH LIFE: SETTING OF HANDS-OFF FLOW CONDITIONS**

Nature of the Problem

When determining an abstraction licence, regard has to be given to the fish life as well as other conservation uses. This is usually accomplished by putting a condition on a licence which requires abstraction to stop when the flow at some point on the river falls below a certain level. This is known as a 'hands-off flow' or HOF.

However, the NRA is duty-bound to issue a licence unless it can demonstrate that existing rights or the river environment will be adversely affected.

Ever since licences were first issued in 1965, it has been extremely difficult to assess how much water can be abstracted without adversely affecting the river environment. A number of pragmatic solutions have been used, but none has been based on scientific studies.

Impact on Uses and Conflicts

The 'hands-off flow' philosophy has been widely used throughout England and Wales, but may in some cases restrict abstractors unnecessarily at certain times of the year, and similarly not offer sufficient protection to the river environment at other times.

The effects of over-abstraction have been clearly demonstrated over the recent dry years, particularly in the south east of England. This one extreme, i.e. a dry river bed, effectively restricts ALL other uses. At the other extreme, the effects of a very small abstraction in a big river will be undetectable. Somewhere in the middle there is a balance, and finding that point is critical - allowing abstraction without damaging the river environment.

Solutions

1. The NRA has commissioned a number of fundamental research projects through its Research and Development programme to try and quantify the flow requirements of the river flora and fauna. However in reality it will be several years before results are applicable.

2. In the meantime, a licensing policy is required that can be applied consistently across the NRA and which balances the requirements of both river and abstractor. A study is planned to begin in 1993 and which can provide policy guidance within 2 years.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Issue 6 **IMPROVED LAND DRAINAGE AND LAND-USE CHANGE ALLEGED TO HAVE REDUCED BASEFLOWS AND INCREASED RATES OF RUNOFF.**

Nature of the Problem

It is alleged that improved drainage of the upland areas of the Wye catchment, as well as changes in land use, have altered the flow regime of the river. It is said to be "flashier", have a lower base flow, and for flows to fall after rain far more quickly than in the past. Whilst these statements may well be true, there has been no study to determine the extent to which the flow pattern has changed over the years and whether this is due to man's influence or simply reflects the natural variation in the rainfall.

Impact on Uses and Conflicts

The effects of these changes are said to affect the fish, particularly the salmon and trout, as well as causing greater erosion of river banks. If the allegations are proven, there may be little that can be done in the short term, but it could affect the development of land-use policies in the longer term.

Solutions

1. Further analysis of records to quantify the extent of changes in flow pattern are to be undertaken in 1993/4. The mechanisms responsible for any changes then need to be identified and the scope for any ameliorative measures assessed.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Issue 7 **SETTING OF TRIGGER-LEVELS FOR SECTION 57 SPRAY IRRIGATION RESTRICTIONS**

Nature of the Problem

If there is an "exceptional shortage of rain or other emergency", Section 57 of the Water Resources Act 1990 allows the NRA to impose restrictions on spray irrigation abstractions from surface waters as well as those from groundwater sources which directly affect the flows in a surface water.

The restrictions are only applicable to spray irrigation abstractions. This is because abstractions for spray irrigation result in a total loss from the river, since none is returned. The volumes abstracted can be very large in total in the Wye catchment as a whole, though not the upper Wye, and can seriously damage the flora and fauna of the river.

The trigger for introducing restrictions has, in the past, been related primarily to the flow in the River Wye at the Redbrook Gauging Station near Monmouth. When restrictions were introduced in the summer of 1990, a flow at Redbrook of 5.26 m^3/s (454 Ml/d) was used as the trigger. This figure was that used in the past for the introduction of restrictions.

The trigger flow is not specifically based on an assessment of the flow at which environmental damage will occur. Similarly, using flows at one point may be too coarse an approach to protect all the tributaries of the Wye.

Impact on Uses and Conflicts

Uncontrolled spray irrigation has in the past resulted in dry river beds in some parts of England and Wales. At this extreme, the effect is to restrict all other uses and cause environmental damage to the river.

In times of drought, a number of crops are dependent on irrigation for their survival, whilst others require irrigation to obtain the quality of crop required by the purchasers of the crops. Restrictions on irrigation can therefore have severe economic impact on the growers.

The balance is to allow abstraction provided that it does not cause environmental damage to the river, and the trigger for the introduction of restrictions should reflect this.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Solutions

1. A review of the trigger flow used to introduce restrictions should be undertaken to determine at what flow, as the summer progresses, restrictions on spray irrigation should be introduced to protect the river ecology. Other locations to be used for initiating restrictions should be considered as appropriate. Much of this work would be a by-product of the research mentioned in Issue No.6.

2. The only alternative is to do nothing and retain the existing pragmatic approach. Indeed, until or unless a review is undertaken, this approach will continue.

Issue 8 **AVAILABLE WATER RESOURCES IN UPPER ITHON INADEQUATE TO MEET DEVELOPMENT DEMANDS**

Nature of the Problem

In the upper River Ithon around Llanbadarn Fynydd, local water resources to meet future demands from local development are inadequate. This has resulted in planning applications being refused in the area.

Impact on Uses and Conflicts

Development in the village is restricted. However, the flows in the river are protected against over abstraction which protects the river ecology.

Solutions

1. Continue to restrict development by opposing planning applications.

2. Obtain water from outside the area or further down river. This is a matter for the Water Company to consider, though any additional abstraction would need a licence from the NRA and would be subject to the normal controls on abstractions.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Issue 9 **GROUNDWATER ABSTRACTIONS FOR SPRAY IRRIGATION AFFECTING SURFACE WATERS**

Nature of the Problem

Following from Issue No. 7, if spray irrigation restrictions are introduced, then they must apply to ALL spray irrigation abstractions from the surface water to which the restrictions apply. Abstractions from groundwater are not affected by restrictions unless the abstraction is likely to directly affect the flow in the surface watercourse.

In the upper Wye there are only two spray irrigation abstractions from ground water, but many more in the Wye catchment as a whole. At present no assessment has been made as to whether these directly affects surface water flows, and so they cannot seriously be included in any restrictions until this has been done.

Impact on Uses and Conflicts

By not restricting spray irrigation groundwater abstractions that impact on summer river flows, full protection is not being given to the river ecology. In turn, applying the restrictions may cause the licence holder to have insufficient water to irrigate crops in times of drought.

Solutions

1. Investigate which groundwater abstractions for spray irrigations directly affect summer surface water flows, and apply restrictions to them at the appropriate time.

2. The alternative of doing nothing means that the NRA is not taking all the steps that is could do, though the impact, in view of the small number of such cases compared to the number and volumes abstracted from surface sources, is not great.

Issue 10 **PROTECT AND ENHANCE THE WILDLIFE RESOURCE**

Nature of the Problem

Man's activities have the potential to degrade the environment and reduce the wildlife resource. Development adjacent to watercourses, flood defence work and agricultural practice can affect rivers, wetlands and land adjacent to river.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Impact on Users — It may be necessary to withhold consent for certain activities or object to certain proposals to protect the environment.

Solutions

1. Consider all NRA Flood Defence capital and maintenance programmes to ensure they are carried out in an environmentally acceptable manner. To seek to further conservation when such programmes are considered.

2. To further conservation when considering all applications for abstraction licences, land drainage consents, discharge consents and planning applications.

3. Seek opportunities to plan and implement sub-catchment wide conservation capital projects, especially in collaboration with other public agencies and interested parties.

4. Protect riparian vegetation by identifying where stock grazing has had a significant impact on river bank habitat and encourage ameliorative measures.

5. Take steps to prevent the spread of crayfish plague by restricting the movement of signal crayfish to the catchment.

Issue 11 — **DECLINE IN SALMON STOCKS, ESPECIALLY SPRING FISH**

Nature of the Problem — The River Wye has long been recognised as the premier salmon river in England and Wales, not only in terms of the number of salmon caught by anglers, but also for the high proportion of large, spring-running salmon within the catch.

Over the past 20 years or so there has been a decline in the number of spring salmon caught on the Wye. This decline is not unique to the Wye as it has also been observed throughout the North Atlantic range of the salmon.

Impact on Users — The decline in the annual rod catch of salmon on the Wye, especially of the spring fish, has adversely affected the value of the Wye as a salmon fishery and caused considerable discontent amongst fishery owners and anglers. It is thought that the level of stock of large spring salmon is now so low that their future recovery is at risk.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Solutions

1. Identify the extent of acidification in the upper Wye and its impact on fish stocks. Consider ameliorative measures (see Issue 1)

2. Identify possible habitat degradation, resulting from changing patterns of land use and its impact on spawning success and production. Consider ameliorative measures where appropriate.

3. Investigate barriers to salmon migration and recommend a programme of fish pass construction. This would open-up extra spawning and nursery areas and, therefore, increase production of juvenile salmon.

4. Promote fishery byelaws to control the exploitation of salmon to allow greater escapement to spawn. The byelaws should be targeted to protect large, spring salmon in particular.

5. Consider the feasibility of a breeding programme to increase large, spring salmon. The NRA has sponsored R & D projects to investigate the genetic implications of a line breeding programme and the use of cophre broodstock.

6. Continue to operate Glasbury Hatchery to increase production of juvenile salmon by stocking fry into tributaries upstream of barriers to salmon migration.

Issue 12 **ILLEGAL FISHING FOR SALMON**

Nature of the Problem

The upper Wye and its tributaries are the principal salmon spawning grounds in the catchment. Salmon are vulnerable during the spawning season to illegal fishing by individuals using gaffs, spears and lamps.

The salmon that are taken illegally may be sold to local restaurants and hotels.

Impact on Users

While the level of illegal fishing by these methods is very low for a range of reasons the potential for damage to fish stocks is great. Also, salmon taken illegally during the summer in the lower Wye may be sold at premises in the upper Wye catchment.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Solutions

1. Maintenance of surveillance and anti-poaching patrols by Water Bailiffs to detect illegal fishing. This will include the use of surveillance equipment and support from other Districts and Reserve Bailiffs.

2. Control of the market in illegally caught salmon by regular visits by Water Bailiffs to major potential outlets for salmon. The widest possible distribution of "Buyer Beware" leaflets to all potential outlets.

3. The raising of public awareness to the problems of illegal fishing and the market for the fish by the "SALMON WATCH" initiative. Wide distribution of Salmon Watch cards.

Issue 13 **DECLINE IN BROWN TROUT STOCKS**

Nature of the Problem

Brown trout stocks have declined. It is not possible to identify clearly when the decline began but by common consent trout fishing in the upper Wye and many of its tributaries has been deteriorating over a period of at least 10 to 15 years.

There are some stretches that provide good fishing but these are supported by a restocking programme of takeable-sized fish from fish farms. Similarly there are stocked stillwaters that provide put and take trout fishing.

The survival of the restocked fish and the presence of other fish such as grayling in many stretches indicate that water quality (acidification) is not necessarily the cause of the decline. Biological sampling would appear to support these observations.

Impact on Users

Trout fishing was an important local recreation and of considerable tourist benefit to the area. Fishing in the upper catchment is increasingly dependent upon stocked lakes and restocking in rivers.

Solutions

1. Identify the extent of acidification in the upper Wye and its tributaries and its impact on trout stocks. Consider ameliorative measures (see Issue 1).

2. Identify possible habitat degradation, resulting from changing patterns of land use, and its impact on trout stocks. Consider ameliorative measures where appropriate.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

3. Review fishery byelaws to control exploitation to allow greater escapement to spawn. Proposals to increase the size limit for trout from 19 centimetres (7.7 inches) to 23 centimetres (9.3 inches), to enable the majority of trout to spawn at least once before they become legally takeable by anglers, have been advertised as part of the NRA Fishery Byelaw amendments (December 1992).

4. Act on other recommendations of the NRA-Welsh Region 1993 Brown Trout Management Strategy including the establishment of a database of all brown trout fisheries specifically identifying natural brown trout populations, research into restocking policies, the effects of predators on stocks and the monitoring of stocks.

Issue 14 **MONITORING OF FISH STOCKS**

Nature of the Problem

The monitoring of fish stocks is essential for the successful management of those stocks.

NRA carries out electrofishing surveys at several sites throughout the catchment, as part of the Regional Monitoring Programme, to assess juvenile trout and salmon stocks. Salmon rod catch data and scale reading analysis provides information on the adult salmon stock in the Wye.

There is a need to improve the monitoring of salmon stocks.

Coarse fish stocks are monitored by creel surveys and angling match results.

Solution

1. To increase the knowledge of the salmon stocks including numbers of ascending salmon, the timing of salmon runs, the numbers of descending kelts and smolts by the installation of a fish counter (to be located in the lower Wye). Investigate the feasibility of installing an acoustic counter in the Redbrook area of the River Wye.

Issue 15 **AVIAN PREDATORS**

Nature of the Problem

Fish eating sawbills, mergansers and, principally, goosanders first appeared in the Wye catchment about 12 - 15 years ago. Since then they have spread throughout the upper Wye catchment and into the ower Wye. Cormorants are less frequently seen in the upper Wye.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Fishery interests are very concerned that the sawbills are having a significant effect on salmon and trout stocks of the upper Wye, but evidence to support significant damage has not been substantiated.

Action to cull predatory birds requires authorisation by the Welsh Office under the Wildlife and Countryside Act, 1981. An applicant will be required to show that the birds have caused serious economic damage to the fishery and that other methods to deter them have failed.

Whilst the NRA will be consulted on licence applications, the culling of these species will not be considered unless the above requirements can be fully demonstrated.

Solutions

1. Assess numbers of avian predators (goosanders and cormorants) in the upper Wye by surveys.

2. Assess the impact of avian predation on salmon and trout stocks and consider possible control measures.

Issue 16 **FLOODING AT BUILTH WELLS/LLANELWEDD**

Nature of Problem

Flooding of the main A483(T) Road occurs for flood events of magnitude greater than that with a statistical return period of 1 in 4 years. More severe floods have resulted in the flooding of 13 dwellings and 20 commercial properties in the vicinity.

Impact on Uses and Conflicts

Whilst flood risks in such areas may be well known, in personal terms, flooding is inevitably distressing. The cost of damage attributed to flooding may extend to that which results from the disruption to commercial activity and communication.

Solutions

Flood defence works have been considered on several occasions, but to date all have proved not to be financially viable and to be unacceptable for environmental reasons.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

Issue 17 **CONFLICTS BETWEEN RECREATIONAL USERS OF THE RIVER AND BETWEEN USERS AND CONSERVATION IS A WIDESPREAD CONCERN**

Nature of the Problem

The principal recreational use of the upper Wye is angling. There is no established legal right of navigation on the Wye above Hay. Canoeists use the river by arrangement with Rhayader and District Angling Association at Rhayader. They also canoe between Rhayader and Hay but without permission from the fishery owners. Canoeists claim that there is a right of navigation on the Wye.

In addition to this conflict between recreational users, there is widespread concern about the impact of recreational use on wildlife conservation.

Impact on Users

The Wye Project spent 3 years looking at these issues and published its report "Conservation and Recreation : The Wye Challenge" in July 1992. The report contained proposals that fell into 6 categories:-

* Future management
* Promoting co-operation and understanding
* Information and interpretation
* Statutory regulation
* Access and visitor facilities
* Monitoring and research requirements

Solutions

1. Research to assess the impact of recreational activities on wildlife conservation.

2. Monitoring to measure changes in the level and distribution of recreational use, maintain a wildlife resource database and monitor changes by river corridor surveys.

3. Encourage and support access agreement negotiations between fishery owners and canoeists to allow canoeing on the upper Wye.

4. Produce information material to help the public to enjoy the river, reduce conflict between the different recreational activities and to protect the environment. This material should include the *Canoeists Guide to the Wye*, the *Wye Calendar of Events*, *Wye Handbook* and a *Users Code of Conduct*.

6.2 DESCRIPTIONS OF ISSUES AND OPTIONS - (CONTINUED)

5. Establish the Wye Management Advisory Group (to succeed the Wye Project Steering Committee) to ensure co-operation by relevant public agencies in the development and implementation of conservation and recreation management strategies for the River Wye with due regard to the Wye Project Report.

6. Establish a forum representing owners, river users and others to ensure that there is consultation and involvement in the management of the conservation and recreational use of the River Wye. The forum would report to the Wye Management Advisory Group.

7. Consider navigation byelaws, where appropriate, to regulate boating activity.

6.3 SUMMARY OF ISSUES AND OPTIONS

Introduction

The issues and options facing the upper Wye and described in the previous section are shown in summary tables in the following pages. These are intended to provide a quick reference to the issues and options for the upper Wye that have to be addressed as well as the means of resolving these problems.

These should not be taken as the definitive list, nor should the proposed solutions be taken to be the only ones available. We hope that interested parties will debate these issues and pass their comments to the NRA for consideration when preparing the final version of the plan.

Issue No. 1	ACIDIFICATION		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
pH and total hardness adjustment and control - 'Liming' of catchment or sub-catchment headwaters	NRA	Short term expedient to improve biological quality and fishery.	Adverse effects on terrestrial ecosystems.
Long term solution by controlling / reducing sulphur emissions	Government/ Power Generators	Improve biological quality and fishery.	Political
Control of additional coniferous tree planting by application of the Welsh Region's afforestation policy	NRA/ Forestry Authority/ CCW	Maintenance of present water quality conditions	Limitation to forestry development.
Identify stretches of river adversely affected by acidification and assess the effect on salmon and trout stocks	NRA/ Forestry Authority/CCW	Quantifies problems.	

Issue No. 2	FAILURE TO ACHIEVE LONG TERM RIVER QUALITY OBJECTIVE AND FI FISHERY STATUS - RIVER LLYNFI		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Increase monitoring to include diurnal cycle and improve data	NRA	Improved data. Better targeting of actions.	
Investigate sources of agricultural pollution and re-assess performance of sewage treatment works to reduce weed and algal growth in Llangorse lake and River Llynfi	NRA/ Welsh Water/ Farmers	Improved water quality and enhanced fishery potential.	Requires co-operation of Welsh Water and farmers.

Issue No. 3	**BLUE-GREEN ALGAE IN LAKES AND STATIC WATER BODIES**		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Develop and implement action plans for priority lakes to reduce or prevent occurrence of algal blooms.	NRA/ Lake Owners/ Landowners	Will identify the cost effective and practical long term solutions.	Long term solution may be difficult to implement and control, eg. changes of land-use, nutrient removal.
Implement short term control or prevention measures (eg. use of barley straw) where appropriate.	NRA/ Lake Owners	Short term effective control. Relatively cheap.	Success uncertain. Not long term solution. Can only apply to small water bodies.
Continue to monitor occurrence of blooms and provide warnings and advice to owner and users.	NRA/ Lake Owners	Protect users from danger. Low cost option.	Does not provide solutions to problem. Closure of lakes continues.

Issue No. 4	UNABLE TO MEET DEMANDS FOR SPRAY IRRIGATION IN SUMMER MONTHS		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Provide winter-filled storage for summer use, subject to a 'hands-off' flow.	Spray Irrigators	Acceptable supply reliability. Reduces summer demand on river. Storage ponds have conservation benefits if properly designed.	Subject to planning control. Monitoring filling of storage facility.
Augment flow in watercourses.	NRA/Spray Irrigators	Allows abstraction when water required. Reduced summer demand on river. Increased flow in dry periods.	Several storage facilities required. Dependant upon availability of water resources. Cannot realistically supply to all sites.
Provide winter storage reservoirs	NRA/Spray Irrigators	Reduces summer demand on river. Reservoirs have environmental benefits if properly designed.	Subject to planning control. Monitoring required to negate environmental effects.

Issue No. 5	SPECIFICATION OF ENVIRONMENTAL REQUIREMENTS OF RIVER AND ITS PLANT, ANIMAL AND FISH LIFE. SETTING OF HANDS-OFF FLOW CONDITIONS.		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Undertake fundamental research into flow requirements of river flora and fauna.	NRA	Partly in hand through NRA R&D programme. Difficult to quantify.	Unlikely to produce practically applicable results quickly.
Develop and implement licensing policy based on 'Yorkshire' methodology to determine licensable resource and compare with existing use.	NRA and others as consultees	Tried and tested. Widely accepted principle. Can provide policy within 2 years.	Not scientifically rigorous at every site.

Issue No. 6	IMPROVED LAND DRAINAGE AND LAND USE CHANGE ALLEGED TO HAVE REDUCED BASEFLOWS, INCREASED RATES OF RUNOFF.		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Investigate flow records to establish to what extent higher runoff rates and lower baseflows occur.	NRA	Will understand causal mechanisms. Scope for ameliorative measures can be assessed.	

Issue No. 7	TRIGGER LEVEL FOR SECTION 57 SPRAY IRRIGATION RESTRICTIONS.		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Undertake review of trigger level	NRA	Trigger level defensible.	Environmental benefits too difficult to quantify.
Do nothing		No cost or effort.	Trigger levels may not be not protect river, or unduly penalise abstractors.

Issue No. 8	AVAILABLE WATER RESOURCES IN UPPER ITHON INADEQUATE TO MEET DEVELOPMENT DEMANDS		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Oppose all future planning applications requiring additional local public water supply abstractions.	NRA	Reduced pressure on local river environment.	Restricts local development.
Obtain water from further down river or other location.	Welsh Water	Reduced pressure on local river environment. More reliable supplies.	Cost of piping in supplies.

Issue No. 9	GROUNDWATER ABSTRACTIONS FOR SPRAY IRRIGATION AFFECTING SURFACE WATERS. (Note: There are only 2 such abstractions in the upper Wye, but over 30 in the Wye as a whole)		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Determine which spray irrigation abstractions from groundwater affect river flows directly and include in any restrictions.	NRA (Andy can give Paper related to this)	Comply with legal requirements. Reduced demand on river during very low flows. Abstractors treated consistently.	Abstractors not previously affected subject to restrictions. May require some pumping tests.
Do nothing		Small number of abstractors not affected by restrictions.	Failure to comply with legal requirement. Demand on river in drought conditions higher than necessary.

Issue No. 10	PROTECT AND ENHANCE THE WILDLIFE RESOURCE OF THE WYE CATCHMENT		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Further conservation when considering NRA Flood Defence capital and maintenance programmes.	NRA	Improve habitats and conservation resource.	
Further conservation when considering all applications for abstractions licences, land drainage consents, discharge consents and planning permission.	NRA	Improve habitats and conservation resource.	
Where there has been significant impact of stock on the river bank habitat, encourage ameliorative measures.	NRA/ Land Owners	Protect riparian vegetation.	Cost to landowner.
Restrict movement of signal crayfish into catchment to prevent spread of crayfish plague.	NRA	Protection of native crayfish	Restricts opportunity for crayfish farming.
Seek opportunities to plan and implement sub-catchment wide conservation capital projects. Especially in collaboration with other agencies and interested parties.	NRA/ Conservation Agencies	Co-ordinated approach to improvements in habitats in a sub-catchment.	

Issue No. 11	DECLINE IN SALMON STOCKS, ESPECIALLY SPRING FISH		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Identify extent of acidification and its effect on fish stocks.	See Issue No.1	See Issue No.1	See Issue No.1
Review fishery byelaws to control exploitation to allow greater escapement to spawn.	NRA/ Fishery Owners	Increased stocks due to greater escapement.	Loss of angling opportunity. Reduced rod catch.
Conduct feasibility study of breeding programme to increase large spring salmon stocks.	NRA	Potential increase in stocks. Ensure any hatchery programme will benefit fishery.	
Operate Glasbury Hatchery. Collect broodstock and restock fry into catchment to increase production.	NRA	Enhancement of stocks by utilising extra nursery stocks.	
Investigate barriers to salmon migration and recommend a programme of fish pass construction to open up extra spawning / nursery areas and increase production.	NRA	Enhancement of stocks by utilising extra nursery areas.	May be undesirable impacts on indigenous fish and fauna.

Issue No. 12	ILLEGAL FISHING FOR SALMON		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Maintain surveillance and anti-poaching patrols by Water Bailiffs	NRA	Protection of stocks. Controlling illegal activity.	
Water Bailiffs visit major potential outlets for salmon.	NRA	Control of market in illegally caught fish.	
NRA ensure widest distribution of "Buyer Beware" leaflets to potential outlets.	NRA	Control of market in illegally caught fish.	
NRA raise public awareness of illegal fishing and market by distribution of "SALMON WATCH" cards.	NRA/ Fishery Interests	Control of market in illegally caught fish.	

Issue No. 13	DECLINE IN BROWN TROUT STOCKS AND MEASURES TO INCREASE STOCKS		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Acidification	See Issue No.1	See Issue No. 1	See Issue No.1
Identify habitat changes and recommend ameliorative measures.	NRA/ Fishery Owners	Improved spawning success and increased holding capacity of streams.	Cost to fishery owner.
Review fishery byelaws to control exploitation to allow greater escapement to spawn.	NRA	Allow trout opportunity to spawn before capture by anglers.	Reduced fishing opportunities.
Act on recommendations of Brown Trout Strategy. In particular (i) research into effects and amelioration and upland drainage and afforestation, (ii) research into restocking policies.	NRA	Increased brown trout stocks.	Restrictions on re-stocking and restrictions on land use.

Issue No. 14	MONITORING OF FISH STOCKS IS ESSENTIAL FOR SUCCESSFUL MANAGEMENT OF THOSE STOCKS		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Investigate feasibility of installing an acoustic fish counter to count ascending salmon and descending kelts and smolts. (To be located in the lower Wye)	NRA	To enable management to be based on knowledge of stocks	

Issue No. 15	AVIAN PREDATORS MAY BE AFFECTING FISH STOCKS ADVERSELY		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Assess numbers of goosander, mergansers and cormorants by surveys	NRA	Number of avian predators assessed allowing impact to be assessed	
Assess effects of goosander, mergansers and cormorants on fish stocks and consider possible control measures.	NRA	Protection of birds or fish stocks.	Practicality of controls.

Issue No. 16	ROAD AND PROPERTY FLOODING AT LLANELWEDD AND BUILTH WELLS		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Review viability of flood protection scheme.	NRA	Alleviate flooding	Environmental impact of scheme.

Issue No. 17	CONFLICTS BETWEEN RECREATIONAL USERS OF THE RIVER AND BETWEEN USERS AND CONSERVATION IS A WIDESPREAD CONCERN		
Options/Actions	**Responsibility**	**Advantages or Benefits**	**Disadvantages or Constraints**
Research to assess the impact of recreational activities on wildlife conservation.	NRA/ Countryside Council for Wales/ Sports Councils	Better management of recreation.	Reduced recreational opportunity.
The overall standard and distribution of information about the river to be improved through production of 'Users Guide', Calender of Events, advice on conduct and noticeboards/interpretive panels.	NRA	Increased awareness of river environment by public	
Establish a Forum representing river users, owners and other interests to ensure that these interests are fully consulted and involved in the management of the river. The Forum should report to the Wye Management Advisory Group.	NRA to initiate	Increased awareness of needs of different recreational groups	
Encourage and support access agreements between fishery owners and canoeists.	Fishery Owners/ Welsh Canoeing Association/ NRA	Agreed access for canoeists.	Possible impact on conservation interests.
Consider navigation byelaws, where appropriate.	NRA	Better management of river use.	Possible reduction in boating opportunity.
Regular monitoring to measure changes in the level and distribution of recreational use and changes in the wildlife resource (river corridor surveys).	NRA	Better management of river use.	

6.4 THE FUTURE

Despite the problems that are obviously present in the upper Wye, the catchment remains a very attractive rural area of Britain. The river is one of the best in England and Wales for salmon, and attracts many visitors who want to walk, canoe, sail or fish. The River Wye itself is a Site of Special Scientific Interest and, within the catchment, conservation is very important.

Recreational uses and interests are only there because the catchment is so attractive and is, in many ways, in a good condition. There are not problems of over-abstraction, and so the quantity of water in the rivers is not greatly affected by man, with the exception of the Elan Valley. However, even in the Elan, the reservoirs provide a different and, to many, very attractive feature of the landscape. Water quality is generally good, since there are no discharges which significantly pollute streams and rivers. However, acidification of streams in some parts of the catchment is a problem. The numbers of fish, salmon, trout and coarse fish, are not as good as expected in such a river, and some of the suggested causes are being investigated.

Against the background of this substantial demand on the resources of the upper Wye, the NRA's vision is as follows:

* Maintain the character of the upper Wye at its present high standard with respect to water quality, recreation, landscape and wildlife, and improve whenever possible.

* Improve fish stocks by identifying the mechanisms of the causes of their decline and implementing practical measures to alleviate their effects.

* Improve public awareness of the catchment's features and how to look after them for the future.

* Ensure future developments within the catchment do not cause long term harm to the rivers, and that whenever possible they include measures to improve or enhance the river environment.

* Ensure land management and any changes in land use do not harm the water environment, and where possible improve it and the surrounding environment.

* Ensure that water is used and made available to support the uses within the catchment, before supporting uses outside of the catchment.

6.4 THE FUTURE - (CONTINUED)

However, it is accepted that the River Elan will continue to provide public water supplies to many people and that the character of the Elan will remain that of a reservoired catchment.

Readers of this draft Catchment Management Plan should remember that the options as presented are the initial thoughts of the Welsh Region of the NRA and do not constitute policy statements. Comments on the issues and options are welcomed, together with any new ideas/suggestions.

Comments should be addressed in the first instance to:

The Area Catchment Planner
South East Area
National Rivers Authority
Plas yr Afon
St Mellons Business Park
St Mellons
Cardiff CF3 0LT

APPENDICES

SUMMARY OF THE NRA'S DRAFT MODEL LAND USE POLICIES

WATER QUALITY AND WATER RESOURCES

STRATEGIC/COUNTY CONCERNS

AIM

To protect surface, underground and coastal water from pollution arising from development.

STRATEGIC/COUNTY MODEL POLICY

The Council will resist changes in land use which, in its opinion after consultation with the NRA, will lead to a deterioration in the quality of underground, surface or coastal water.

New development will be resisted where the Council, in consultation with the NRA, considers that adequate water resources do not already exist, or where their provision is considered likely to pose a risk to existing abstractions, water quality, fisheries, amenity or nature conservation.

WASTE WATER MANAGEMENT

LOCAL/DISTRICT MODEL POLICY

New developments will not normally be permitted unless foul sewers and sewage treatment works of adequate capacity and design are available or will be provided in time to serve the development. The Council will discourage the proliferation of small private package sewage treatment plans within sewered areas. The use of septic tanks will only be considered if connection to the mains sewerage is not feasible, and only then if ground conditions are satisfactory and the plot of land is of sufficient size to provide an adequate subsoil drainage system.

SURFACE WATER PROTECTION

LOCAL/DISTRICT MODEL POLICY

The Council will resist development which in its opinion, after consultation with the NRA, could adversely affect the quality of surface, underground or coastal water as a result of the nature of the surface or waste water discharge, or give rise to pollution problems resulting from the disturbance of contaminated land. The Council will generally support initiatives which lead to improvements in surface water quality.

GROUNDWATER PROTECTION

LOCAL/DISTRICT MODEL POLICY

Developments will not be permitted which, in the opinion of the Council, after consultation with the NRA, pose an unacceptable risk to the quality of groundwater.

AVAILABILITY OF WATER RESOURCES

LOCAL/DISTRICT MODEL POLICY

The Council will not normally permit development which increases the requirement for water unless adequate water resources either already exist or will be provided in time to serve the development and without detriment to existing abstractions, to water quality, fisheries, amenity or to nature conservation. The Council will support water conservation measures.

FLOOD DEFENCE

STRATEGIC/COUNTY CONCERNS

AIM

To ensure that new development is not at risk from flooding and does not put other areas at risk from flooding (including tidal inundation) which could endanger life and damage property. To ensure that any work which is needed to reduce the risk of flooding created by a new development is paid for by the developer and not the public.

STRATEGIC/COUNTY MODEL POLICY

The Council, after consultation with the NRA, will resist development, including the raising of land, where such development would be at direct risk from flooding or likely to increase the risk of flooding elsewhere.

PROTECTION OF THE FLOODPLAIN

LOCAL/DISTRICT MODEL POLICY

In the areas at risk from flooding the council will resist new development, the intensification of existing development or land raising. Where development in such areas is permitted, appropriate flood protection and mitigation measures, including restoration of the floodplain, will generally be required as part of the development. At sites suspected of being at risk from flooding but for which adequate flood risk information is unavailable, developers will be required to carry out detailed technical investigations to evaluate the extent of the risk. In all cases, developers will be required to identify, implement and cover the costs of any necessary measures.

SURFACE WATER RUN-OFF

LOCAL/DISTRICT MODEL POLICY

The Council will resist development which would result in adverse impact on the water environment due to additional surface water run-off. Development which could increase the risk of flooding must include appropriate attenuation or mitigation measures, including restoration of the floodplain, defined by the Council in consultation with the NRA and funded by the developer. Developers will be expected to cover the costs of assessing surface water drainage impacts and of any appropriate mitigation works, including their long-term monitoring and management.

TIDAL AND FLUVIAL FLOOD DEFENCES

LOCAL/DISTRICT MODEL POLICIES

There will be a general presumption against development which would adversely affect the stability and continuity of tidal and fluvial defences. Access to tidal and fluvial defences for maintenance and emergency purposes will be protected, and where appropriate, improved. Where development relating to tidal and fluvial defences is permitted, the Council will, in consultation with appropriate bodies including the NRA, require appropriate measures to be incorporated in order to ensure that the stability and continuity of the defences is maintained. Developers will be expected to cover the costs of any appropriate enhancement and mitigation works, including their long-term monitoring and management.

FISHERIES, RECREATION AND CONSERVATION IN RIVER CORRIDORS AND COASTAL MARGINS

STRATEGIC/COUNTY CONCERNS

AIM

To consider the effects of development on the water environment so as to minimise its adverse impacts and maximise potential benefits. This is particularly so in river corridors and coastal margins, areas of land which are physically and visually linked to rivers, their estuaries and the coast, in wetlands, around lakes and ponds and in sensitive catchment areas.

STRATEGIC/COUNTY MODEL POLICY

The Council, in consultation with the NRA, will resist development which is likely to have an adverse effect on fisheries, nature conservation, landscape and recreation in river corridors, coastal margins and other waterside areas. The Council will generally promote and support initiatives which seek to conserve, restore or enhance the natural elements of the river corridors, coastal margins and other waterside areas, or which encourage appropriate water-based and waterside recreation.

In order to minimise the effects of tidal flooding, the Council will resist development on land to the seaward side of sea defences, including the siting of temporary holiday chalets and caravans. On land between a first line sea defence and the main defence, the siting of holiday chalets, caravans and camping sites may be permitted following consultation with the NRA. Time-limited occupancy conditions will be imposed preventing occupation during the period from November-March inclusive when the risk of tidal inundation is greatest.

RIVER CORRIDORS AND COASTAL MARGINS

LOCAL/DISTRICT MODEL POLICY

The Council, in consultation with the NRA, will seek to promote river corridors and coastal margins as important areas of open land by:

* conserving existing areas of value and wherever possible seeking to restore the nature elements within the corridors and margins;

* promoting appropriate public access;

* identifying appropriate locations for water related recreation;

* protecting and improving access for operational and maintenance purposes, including the provision of maintenance strips where practical;

* resisting development which would have an adverse impact on nature conservation, fisheries, landscape, public access or water-related recreation.

IMPLEMENTING THE STRATEGY FOR RIVER CORRIDORS AND COASTAL MARGINS

LOCAL/DISTRICT MODEL POLICY

The Council, in consultation with the NRA, will seek to ensure that all works in, under, over and adjacent to watercourses, water bodies and the coast are appropriately designed and implemented and that the likely impacts of development proposals have been adequately assessed by means of a formal environmental assessment, where appropriate. There will be a general presumption against the culverting of watercourses.

NAVIGATION

LOCAL/DISTRICT MODEL POLICY

The Council will resist development which results in an unacceptable increase in river traffic or conflict with other river users. New moorings or extensions to existing moorings will normally not be permitted except where the Council, in consultation with the NRA, is satisfied that there will be no unacceptable increase in congestion, loss of amenity or other adverse effects. Where appropriate, existing on-river facilities will be encouraged to relocate to off-river basins or disused gravel workings. The redevelopment of boatyards for housing or other commercial purposes will be resisted wherever possible.

MINERAL WORKINGS AND WASTE DISPOSAL

STRATEGIC/COUNTY CONCERNS

AIM

To reduce the negative impacts on the water environment of mineral workings and their after use, including subsequent in-filling with waste, and to maximise the environmental benefits associated with site restoration.

STRATEGIC/COUNTY MODEL POLICIES

The Council will resist proposals for new mineral extraction or waste disposal sites where, after consultation with the NRA, it considers that there would be adverse effects on groundwater, rivers or other water bodies.

The Council will generally support initiatives, including site restoration proposals, which result in benefits relating to the water environment, and improvements in the standard of flood protection.

MINERALS

LOCAL/DISTRICT MODEL POLICY

The Council will resist proposals for new mineral workings whose impact on surrounding groundwater levels is likely to have a detrimental effect on existing water abstraction, river flow, lake levels, or natural habitats.

LOCAL/DISTRICT MODEL POLICY

The Council will not normally grant planning consent for mineral workings in floodplains where the restoration would result in any raising of existing ground levels. Permission will exceptionally be granted where the Council, in consultation with the NRA, is satisfied that satisfactory flood compensation is provided elsewhere in the floodplain. Where restoration involves land-filling, care will be taken to ensure that the proposals do not affect groundwater quality and levels or impede flow paths.

The Council will generally support and encourage restoration proposals for worked-out mineral sites which offer opportunities for the inclusion of routes for floodwater, habitat creation, new or improved fisheries, recreation provision, or the proper restoration of related waste disposal sites which have been poorly restored in the past.

WASTE DISPOSAL

LOCAL/DISTRICT MODEL POLICY

Disposal of waste within the floodplain will be restricted to inert waste only. Elsewhere, the disposal of putrescible waste will not be permitted where it is likely to lead to the pollution of groundwater or surface water. There will be a presumption against waste disposal which results in a raising of ground levels within the floodplain.

APPENDIX 2

WATER QUALITY CRITERIA

2.1 NWC River Quality Classification

2.2 Aesthetic Criteria

2.3 Game Fishery (Salmon and Trout) - Use Related Criteria

2.4 Potable (Drinking Water) Abstraction - Use Related Criteria

2.5 Agricultural Abstraction - Use Related Criteria

2.6 Livestock Watering - Use Related Criteria

2.7 Immersion Sports - Use Related Criteria

APPENDIX 2.1

NOTES ON THE RIVER QUALITY CLASSIFICATION

NOTES: a) Under extreme weather conditions (eg flood, drought, freeze-up), or when rivers are dominated by plant growth, or by the decay of aquatic plants, rivers usually in Class 1, 2 and 3 may have levels of Biochemical Oxygen Demand and Dissolved Oxygen, or Ammonia outside the stated levels for those classes. When this occurs the cause should be stated along with analytical results.

b) The Biochemical Oxygen Demand refers to the 5-day carbonaceous determination performed in the presence of allythiourea (ATU). Ammonia is expressed as the ammonium ion, NH_4^+.

c) In most instances the chemical classification given above will be suitable. However, the basis of the classification is restricted to a finite number of chemical determinands and there may be a few cases where the presence of a chemical substance other than those used in the classification markedly reduces the quality of the water. In such cases, the quality classification of the water should be downgraded on the basis of biota actually present, and the reasons stated.

d) The standards set up to protect freshwater fisheries by the European Inland Fisheries Advisory Commission (EIFAC). The standards should be expressed as 95-percentiles.

e) The definition and the requirements of A2 and A3 are those specified in the Directive on the Quality of Water Intended for Abstraction for Drinking Water.

The NWC River Quality Classification has been used as a basis for Long Term Water Quality Objectives set by Welsh Water Authority in 1979.

This Classification system has also been used for the 5 yearly national Water Quality Reports in 1980, 1985 and 1990.

This system will be superseded by a new classification system associated with the framework being developed by the NRA for Statutory Water Quality Objectives.

APPENDIX 2.1

RIVER QUALITY CLASSIFICATION

RIVER CLASS	QUALITY CRITERIA	REMARKS	CURRENT AND POTENTIAL USES
1a Good Quality	1) 5 percentile Dissolved Oxygen Saturation greater than 80% 2) 95 percentile Biochemical Oxygen Demand not greater than 3 mg/l 3) 95 percentile Ammonia not greater than 0.4 mg/l 4) Where water is abstracted for drinking water, it complies with requirements for A2* 5) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures are unavailable)	1) Mean Biochemical Oxygen Demand probably not greater than 1.5 mg/l 2) No visible evidence of pollution	1) Water of high quality suitable for potable supply abstractions 2) Game or other high class fisheries 3) High amenity value
1b Good Quality	1) 5 percentile Dissolved Oxygen Saturation greater than 60% 2) 95 percentile Biochemical Oxygen Demand not greater than 5 mg/l 3) 95 percentile Ammonia not greater than 0.9 mg/l 4) Where water is abstracted for drinking water it complies with the requirements for A2* 5) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures are unavailable)	1) Mean Biochemical Oxygen Demand probably not greater than 2 mg/l 2) Mean Ammonia probably not greater than 0.5 mg/l 3) No visible evidence of pollution 4) Water of high quality which cannot be placed in Class 1a because of the effect of physical factors such as canalisation, low gradient or eutrophication	Water of less high quality than Class 1a but usable for substantially the same purposes.

* See note (e)

APPENDIX 2.1 (Continued)

RIVER CLASS	QUALITY CRITERIA	REMARKS	CURRENT AND POTENTIAL USES
2 Fair Quality	1) 5 percentile Dissolved Oxygen Saturation greater than 40%	1) Mean Biochemical Oxygen Demand probably not greater than 5 mg/l	1) Waters suitable for potable supply after advanced treatment
	2) 95 percentile Biochemical Oxygen Demand not greater than 9 mg/l	2) Water showing no physical signs of pollution other than humic colouration and a little foaming below weirs	2) Supporting reasonably good coarse fisheries
	3) Where water is abstracted for drinking water, it complies with requirements for A3*		3) Moderate amenity value
	5) Non-toxic to fish in EIFAC terms (or best estimates if EIFAC figures are unavailable)		
3 Poor Quality	1) 5 percentile Dissolved Oxygen Saturation greater than 10%		Waters which are polluted to an extent that fish are absent or only sporadically present. May be used for a low grade abstraction for industry. Considerable potential for further use if cleaned up.
	2) Not likely to be anaerobic		
	3) 95 percentile Biochemical Oxygen Demand not greater than 17mg/l. This may not apply if there is a high degree of re-aeration.		
4 Bad Quality	Waters which are inferior to Class 3 in terms of dissolved oxygen and likely to be anaerobic at times		Waters which are grossly polluted and are likely to cause nuisance.
X	Dissolved Oxygen greater than 10% saturation		Insignificant watercourses and ditches which are not usable, where the objective is simply to prevent nuisance.

* See note (e)

APPENDIX 2.2

AESTHETIC REQUIREMENTS

USE RELATED QUALITY CRITERIA

Determinand	Standard
Colour	No perceptible abnormal discolouration
Mineral Oils	No visible oil
Foaming	Only visible on detailed inspection (<2% cover)
Transparency	No unnatural turbidity *
Litter	Only visible on detailed inspection
Odour	No perceptible odour

* Depending on meterological and geographical conditions

APPENDIX 2.3

HIGH CLASS GAME FISHERIES

USE RELATED QUALITY CRITERIA

Determinand	Value	Units	Statistic
Dissolved Oxygen	>9	mg/l	50%ile
BOD	<3	mg/l	95%ile
Total Ammonia	<0.8	mg N/l	95%ile
Unionised Ammonia	<0.021	mg N/l	95%ile
pH	6-9	pH units	95%ile
Nitrite	<0.003	mg/l	95%ile
Total Residual Chlorine at pH 6	<0.005	mg/l	95%ile
Total Zinc when mean hardness: 0-50 50-100 100-250	 <0.03 <0.2 <0.3	 mg/l mg/l mg/l	 95%ile 95%ile 95%ile
Dissolved Copper when mean hardness: 0-50 50-100 100-250	 <0.005 <0.022 <0.04	 mg/l mg/l mg/l	 95%ile 95%ile 95%ile

These standards are consistent with the salmonid requirements of the EC Directive on the Quality of Water Required for Freshwater Fish (78/659/EC)

These criteria have been taken as appropriate for Aquaculture (Fish Farming) requirements.

APPENDIX 2.4

POTABLE ABSTRACTION

USE RELATED QUALITY CRITERIA

Determinand	Value	Units	Statistic
Ammonia	<1.5	mg/l	95%ile
Colour	<100 *	Pt.Scale	95%ile
Temperature	<25 *	°C	95%ile
Nitrate	<50	mg/l	95%ile
Dissolved Iron	<2	mg/l	95%ile
Zinc	<5	mg/l	95%ile
Arsenic	<0.05	mg/l	95%ile
Cadmium	<0.005	mg/l	95%ile
Total Chromium	<0.05	mg/l	95%ile
Lead	<0.05	mg/l	95%ile
Selenium	<0.01	mg/l	95%ile
Mercury	<0.001	mg/l	95%ile
Barium	<1	mg/l	95%ile
Cyanide	<0.05	mg/l	95%ile
Sulphates	<250	mg/l	95%ile
Phenols	<0.005	mg/l	95%ile
Hydrocarbons	<0.2	mg/l	95%ile
Polyaromatic Hydrocarbons	<0.0002	mg/l	95%ile
Pesticides	<0.0025	mg/l	95%ile

These standards are consistent with the mandatory requirements for the A2 category of the EC Directive on the Quality of Water Intended for Abstraction for Drinking Water (75/440/EC)

APPENDIX 2.5

AGRICULTURAL IRRIGATION

USE RELATED QUALITY CRITERIA

Determinand	Value	Unit	Statistic
pH	5.5-8.5	pH units	Annual Average
Chloride	<100-600*	mg CL/l	Annual Average
Boron	<2-8*	mg B/l	Annual Average
Chromium	<2	mg Cr/l	Annual Average
Copper	<0.5	mg Cu/l	Annual Average
Iron	<1-2	mg Fe/l	Annual Average
Lead	<2	mg Pb/l	Annual Average
Nickel	<0.15	mg Ni/l	Annual Average
Zinc	<1	mg Zn/l	Annual Average
Molybdenum	<0.03	mg Mo/l	Annual Average
Selenium	<0.02	mg Se/l	Annual Average
Vanadium	<0.08	mg V/l	Annual Average

* Depends on crop type.

APPENDIX 2.6

LIVESTOCK WATERING

USE RELATED QUALITY CRITERIA

Determinand	Value	Units	Statistic
pH	6-9	pH units	Annual Average
Chloride	<1000	mg Cl/l	Annual Average
Sulphate	<250	mg SO_4/l	Annual Average
Fluoride	<2	mg F/l	Annual Average
Dissolved Oxygen	>30	% saturation	Annual Average
Arsenic	<0.2	mg As/l	Annual Average
Chromium	<1	mg Cr/l	Annual Average
Copper	<0.2	mg Cu/l	Annual Average
Lead	<0.05	mg Pb/l	Annual Average
Nickel	<1	mg Ni/l	Annual Average
Zinc	<5	mg Zn/l	Annual Average

APPENDIX 2.7

IMMERSION SPORTS
USE RELATED QUALITY CRITERIA

Health related standards for immersion sports are not available.

In the absence of other criteria, the following aesthetic criteria have been used.

(1) No visual evidence of pollution by gross sewage solids and debris except under occasional unfavourable weather conditions.

(2) No formation of sewage slicks or sewage derived discolouration or foaming visible.

APPENDIX 3

BIOLOGICAL CLASSIFICATION OF RIVERS

The NRA uses a method called the 'Biological Monitoring Working Party' (BMWP) scheme to classify the biological quality of rivers. This system produces a BMWP 'score'.

Samples are taken of the very small animals that live in and on the bed of the river. Some of these animals are more sensitive to pollution than others. An animal which is sensitive to pollution will not be present in polluted water. If a particular animal group is present, it is given a score. The score ranges from 10 for those which are most sensitive to pollution, to 1 for those which are most tolerant. The BMWP score is worked out by adding the scores for all the animals found in a sample. The higher the score is, the cleaner the water and the better the biological quality. Clean waters have high scores and polluted waters have low scores.

BMWP scores have been compared with the NWC Water Quality Classification (detailed in Appendix 3.1). A comparison can then be made between the biological and chemical qualities. This is shown in Table 1 below. Therefore, the Biological Score range which is equivalent to each water quality class can be estimated from this Table.

The long term River Quality Objective for each stretch of river is known, and is shown on Map 21. By using Table 1, we can therefore give a biological score objective for each stretch. These objectives are used as the biological targets.

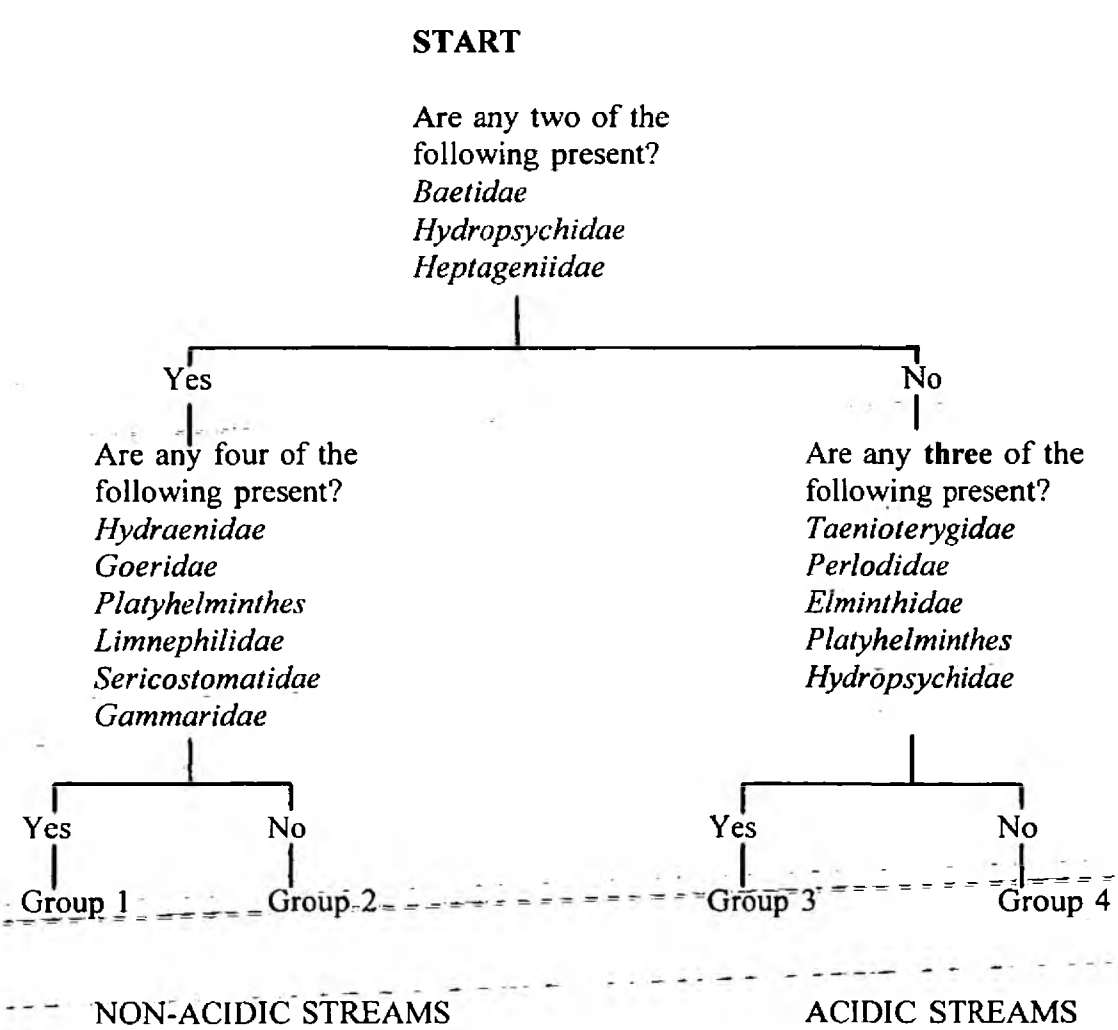
If the small animals in the river are sampled, and we find that the score is less than predicted from Table 1, then it means that the stretch being sampled is affected either by occasional pollution incidents not detected by the routine chemical monitoring, or is affected by pollutants which are not looked for when the water is analysed. The biological quality can therefore be used as check on the chemical quality.

TABLE 1 Comparison of the Chemical and Biological Classification Systems for Rivers

NWC Chemical Class	BMWP Biological Score Range
1A	> 88
1B	66 - 138
2	43 - 127
3	21 - 82
4	< 21

BIOLOGICAL METHOD USED TO DETECT IF A STREAM HAS BEEN AFFECTED BY ACID RAIN

Routine sampling of the water quality may not always detect that a stream is affected by acid rain. However, the small animals that live in the river bed may be killed when acid water runs into these streams. Therefore, the presence or absence of different animals can be used to detect if the river is affected. The animals which have been proved to be good indicators of acidified waters are shown in the flow chart below. This chart also demonstrates how their presence or absence is used to determine the acidity of streams.



APPENDIX 4

FISH ABUNDANCE CLASSIFICATION

Fish abundances are measured in two ways. They are *measured* by an electrofishing method. They are *estimated* by using a 'quick' electrofishing method.

The number caught are classified as Excellent, Good, Moderate, Poor or Absent.
The two methods give different results. In Table 1 below, over 100 fry caught would give rise to an excellent category, whereas using the estimation method, over 50 present would give the same classification.

TABLE 1 ABUNDANCE CATEGORIES FOR YOUNG SALMON AND TROUT
(Numbers of fry and parr per 10 metre square)

CLASS	MEASURED		ESTIMATED	
	FRY (0-1 year old)	PARR (1-2 year old)	FRY (0-1 year old)	PARR (1-2 year old)
Excellent	>100	>25	>50	>20
Good	50-100	15 - 25	22.5 - 5.5	10 - 20
Moderate	25-50	5 - 15	10 - 22.5	2.26 - 10
Poor	0-25	0 - 5	0 - 10	0 - 2.25
Absent	0	0	0	0

Some sites sampled will have good fry and/or good parr densities, often depending on habitat type. For example a site with a high fry densities may have very low parr densities, merely because the habitat provides only limited cover for larger fish. The reverse situation of high parr and low fry densities for habitat reasons may also occur. The parr abundances and the fry abundances are combined in Table 2 below. This shows that, for example, a moderate fry density and an excellent parr density results in an 'A' category for the abundance of young salmon and trout Table 2 shows how the abundances of parr and fry are combined to produce the classification shown on Maps 7 and 8 earlier in the Plan.

TABLE 2 CLASSIFICATION SYSTEM FOR THE ABUNDANCE OF YOUNG SALMON AND TROUT USED IN MAPS 7 AND 8

		FRY (0-1 years old)				
		Excellent	Good	Moderate	Poor	Absent
PARR (1-2 years old)	Excellent	A	A	A	B	C
	Good	A	A	B	B	C
	Moderate	A	B	B	C	D
	Poor	B	B	C	D	D
	Absent	C	C	D	D	E

APPENDIX 5

LAND USE BANDS FOR FLOOD DEFENCE TARGETS

Land Use Band	Description of Typical Land Use
A	A reach containing the urban elements of residential and non-residential property distributed over a significant proportion of its length, or densely populated areas over some of its length. Any agricultural influence is likely to be over-ridden by urban interests. Amenity uses such as parks and sports fields may be prominent in view of the floodplain's proximity to areas of population density. BAND A = 50 or more house equivalents per km.
B	Reaches containing residential and/or non-residential property either distributed over the full length of the reach or the reach or concentrated in parts but characterised by lower densities than Band A. BAND B = 25 to 49.99 house equivalents per km.
C	Limited numbers of isolated rural communities or urban fringe at risk from flooding, including both residential and commercial interests. Intensive agricultural use could also be included. BAND C = 5 to 24.99 house equivalents per km.
D	Isolated, but limited number of residential and commercial properties at risk from flooding. Agricultural use will probably the main customer interest with arable farming being a feature. In undeveloped pockets of largely urban use, amenity interests will be prominent. BAND D = 1.25 to 4.99 house equivalents per km.
E	There are likely to be very few properties and major roads at risk from flooding in these reaches. Agricultural use will be the main customer interest with either extensive grassland or, where the flood plain extent is small, arable cropping being the most common land uses. Amenity interests are likely to be limited to public footpaths along or across the river. BAND E = 0.01 to 1.24 house equivalents per km.

APPENDIX 6

GLOSSARY OF TERMS AND UNITS USED

ABSTRACTION

When someone takes water from a river, stream, spring, pond, lake or from groundwater, they are 'abstracting' the water and they are making an 'abstraction'.

ACIDIFICATION

The detrimental effect of acid rain on soils and freshwater.

ALGAE

Simple plants which may be floating or attached . They can be microscopic or very large plants but they lack true stems. Like all plants, they are capable of photosynthesis. Algae occur in still and flowing water and are often discussed in the context of Eutrophication (see below).

AMMONIA

A chemical which is often found in water as the result of the discharge of sewage effluents. It is widely used to characterise water quality. High levels of ammonia adversely affect the quality and use of water for fisheries and abstractions for potable water supply.

AOD (ABOVE ORDNANCE DATUM)

Land levels are measured relative to the average sea level at Newlyn in Cornwall. This average level is referred to as 'Ordnance Datum'. Contours on Ordnance Survey maps of the UK show heights above Ordnance Datum.

AQUATIC ENVIRONMENT

The rivers, streams, lakes,ponds, springs and features that depend on natural waters such as bogs, wetlands and so on.

AQUIFER

Most rocks contain holes, cracks and fissures. When these are interconnected they can store and allow water to pass through them. These rocks are known as 'aquifers' and the water contained within them as 'groundwater'.

BASE POOR SOILS

Soils which only very slowly release into the water the dissolved chemicals or minerals which normally result in a hard water. They are therefore unable to neutralise the effects of acid rain.

BOD and BOD (ATU) - BIOCHEMICAL OXYGEN DEMAND

These are measures of the amount of oxygen consumed in water during the breakdown of organic matter. They therefore give a relative measure of organic pollution.

The simple BOD value can be misleading because much more oxygen is taken up by ammonia in the test than in the natural water. This effect is suppressed by adding a chemical, Allylthiourea (ATU), to the sample of water taken for testing; hence BOD (ATU). Without ATU, the BOD is "uninhibited".

CATCHMENT

The area of land draining to a defined point. In this plan, the upper Wye catchment is the area of land which drains to Hay-on-Wye.

CLASSIFICATION/CLASSES

A way of placing waters in categories (classes) according to assessments of water quality based, for example, on measurements of the amount of particular chemicals in the water (especially BOD, dissolved oxygen and ammonia).

COARSE FISH

Freshwater fish other than salmon and trout.

CONSENT

A Discharge Consent is a statutory document issued by the NRA to indicate any limits and conditions on the discharge of an effluent to a controlled water.

Also a different statutory document issued by the NRA. Known as a Land Drainage Consent, it authorises works to the bed of banks of a river which have been approved by the NRA.

CONTROLLED WATERS

All rivers, lakes, groundwaters, estuaries, and coastal waters to three nautical miles from the shore.

DANGEROUS SUBSTANCES

Substances defined by the European Commission as in need of special control. This is because they are toxic, accumulate and concentrate in plants and animals, or do not easily break down in to less dangerous substances. They are classified as List I or List II.

DETERMINAND

A general name for a characteristic or aspect of water quality. Usually a feature which can be described numerically.

DISSOLVED OXYGEN

The amount of oxygen dissolved in water. Oxygen is vital for life, so this measurement is an important, but highly variable, test of the 'health' of a water. It is used to classify waters.

DRY WEATHER FLOW (DWF)

For sewage works, this is calculated by adding estimates of the domestic sewage discharge (which is the population multiplied by the per capita consumption) plus any industrial discharges plus infiltration in to the sewer.

For the river, the Dry Weather Flow is taken to be what is known as the 95-percentile flow (or Q95) which means the river is higher than Q95 for 95 percent of the time.

ECOSYSTEMS

A group of animals and plants which live together within a certain type of surrounding or habitat (e.g. woodland, pond).

EC DIRECTIVE (Control)

A type of legislation issued by the European Community which is binding on Member States and sets standards and results to be achieved.

EIFAC STANDARDS

Water quality standards for freshwater fish, recommended by EIFAC, the European Inland Fisheries Advisory Commission.

EUTROPHIC/EUTROPHICATION

Terms which describe water which is rich in nutrients or the process of enrichment. At worst, such waters are sometimes beset with unsightly growths of algae.

FAUNA

Animal life

FLORA

Plant life.

FRY

Fish which are less than 1 year old.

GAME FISH

Salmonid fish, i.e. trout and salmon.

GAUGING STATION

A site where the flow of a river is measured. Sometimes, a weir is used to assist the measurement.

HABITAT

The natural home of plants and animals. Different plants and animals have different needs, and so live in different habitats.

HANDS-OFF FLOW (HOF)

A condition is often included in an abstraction licence which says that the abstraction must stop when the flow in the river drops below a certain flow (or level). This is known as the hands-off flow, because below this flow, the abstractor must keep his 'hands off' the river.

LIST 1 AND LIST 2 SUBSTANCES

European Community Directive 76/464/EEC aims to reduce pollution in controlled waters by certain dangerous substances. These consist of chemicals selected mainly on the basis of their toxicity, persistence and bioaccumulation. These substances are divided into 2 categories:

* List 1 substances are considered to be the most harmful. Pollution caused by these must be eliminated.

* List 2 substances are less harmful and pollution caused by these must be reduced.

m^3/d

Short for cubic metres per day. There are 1000 litres in a cubic metre, and 1000 cubic metres in a megalitre (Ml). In Imperial Units, there are 220 gallons in a cubic metre.

MACROINVERTEBRATE FAUNA

Small aquatic animals, such as insects, snails and worms which live in the river bed.

MAIN RIVER

Also known as 'Statutory Main River'. It is a legal definition which defines particular rivers and streams which are defined on special maps. On the 'Main River', the NRA has permissive powers to construct and maintain defences and to control the actions of others through byelaws and the issue of Consents. Any proposal that could interfere with the bed or banks or affect the flow of the river requires formal consent from the NRA.

MINIMUM CONTROL LEVEL (MCL)

Another term used when referring to abstractions or regulation of rivers. When the river falls below a certain level, an activity would have to stop (eg an abstraction) or, perhaps an activity would have to start (eg discharge from a reservoir to add water to a very low river).

Ml/d

Short for megalitres per day, a standard international unit of measurement. There are a thousand cubic metres in a megalitre and one million litres in a megalitre. In Imperial Units, one megalitre is about 220,000 gallons.

MONTHLY NATURAL HISTORIC FLOW

The flow in a river naturally varies considerably. Rivers levels in the upper Wye rise quickly in response to rainfall and fall quickly when rain stops. Prolonged periods without rain will cause low river levels. The 'monthly natural historic flow' is used in this plan to signify this natural variation in flow and the extent by which it tends to vary from month to month.

PARR

Salmon which are 1 or more years old which have not yet gone to sea.

PERMISSIVE POWER

The NRA is given various powers to do things by a number of Acts of Parliament. Some of these powers are 'permissive', which means the NRA can do these things, but is not under a DUTY to do them. For example, NRA has permissive powers to construct flood defences, but does not have a duty to do this. In contrast, the NRA has certain statutory duties, i.e. things it must do, e.g. it must authorise abstractions, discharges and works to the bed or banks or main rivers.

POOL

A distinct, deeper area of slow flowing water, often with an eddying flow and often found between fast flowing stretches which are known as 'riffles'.

PROTECTED RIGHTS

When considering whether to issue an abstraction licence, the Authority must not issue a licence which affects other peoples legitimate rights to use that water. These rights are known as 'protected rights'. Protected rights do not include every existing use of the water. They do include all
licensed abstractions, basic riparian rights (including livestock watering) and small abstractions for domestic supplies.

Q90

The flow which is equalled or exceeded 90% of the time on average. Based on statistics derived from recorded flows, it is a flow below which the river often falls as early as May, but more often in June onwards.

Q95

The 95-percentile flow is the flow which on average is exceeded for 95% of the time. It generally occurs in the summer, and can be regarded as a typical flow in a dry summer. It is not a drought flow.

QUALITY OBJECTIVE

The statement or category of water quality that a body of water should match, usually in order to be satisfactory for use as a fishery or water supply.

QUALITY STANDARD

A standard which must be met. It may be the maximum concentration of a substance in the water, it may be a concentration that is not to be exceeded for more than 5% of the time, or some similar description depending on the circumstances.

REACH

A length of a river.

REDD

Salmon excavate a depression in river gravels into which they lay their eggs. The eggs are then covered with gravel. This 'nest' is known as a 'redd'.

RIFFLE

Fast flowing, shallow water with a distinctly broken or disturbed surface. Riffles are often found between pools.

RIVER CORRIDOR

A term which describes a stretch of river; its banks; and a varying amount of adjacent land that is affected by the presence of the river.

RULE CURVE

A term used when talking about reservoirs. The amount of water that is taken from a reservoir for water supply can depend on the amount of water stored in it and the time of year. For example, the usual aim is to have a reservoir full in the early spring; in autumn the aim is not to draw down the reservoir so far that it won't be refilled by the winter rains. Rule curves are used as a simple means of defining whether there is spare water in a reservoir, whether water should be taken sparingly from the reservoir, or whether some other action is required or possible.

SALMONID FISH

Game fish, e.g. trout and salmon.

SMOLT

At a particular stage of their development, young salmon and sea trout migrate to the sea, and at this stage are known as smolts.

SPRING RUN

Salmon return from the sea to freshwater rivers when adult. They migrate up the rivers to spawn, and this upstream migration is known as the 'run'. There are two main periods of the year when the runs occur which are in spring in autumn. The spring run fish are generally larger than later-run fish, and are often more prized by anglers.

SSSI

Short for 'Site of Special Scientific Interest'.

STATUTORY WATER QUALITY OBJECTIVE

A Quality Objective given a statutory basis by Regulations when made under the Water Act of 1989.

SURFACE WATERS

This is a general term used to describe all the water features such as rivers, streams, springs, ponds and lakes.

TARGET CLASS

The quality class which a water should achieve by a specified date. The target may be expressed in terms of chemical or biological quality. Some rivers may already be within their Target Class, others will require improvement.

TELEMETRY

River level stations record the levels every 15-minutes electronically at the gauging station. The telemetry system is a computer system that can contact these stations and ask it to send the level data back to the computer over the public telephone system. The computer then stores the data in its memory. The level data can then be converted to flows automatically by the computer. Some raingauge data is obtained in the same way.

TURBIDITY

The cloudiness of water.

UNDERGROUND STRATA

Mainly a legal term used to signify geology under the surface soil layer. If groundwater exists, or if water is being discharged to the ground, the geology underneath the soil layer is known in the various Acts of Parliament as 'underground strata'.

WETLAND

Wet areas of a river catchment where the plants, animals, birds and insects and so on that live there are dependent on that 'wetness' for their survival.

90-PERCENTILE FLOW

See Q90 above.

95-PERCENTILE FLOW

See Q95 above.

95-PERCENTILE STANDARD

A level of water quality, usually a concentration, which must be achieved for at least 95 percent of the time.