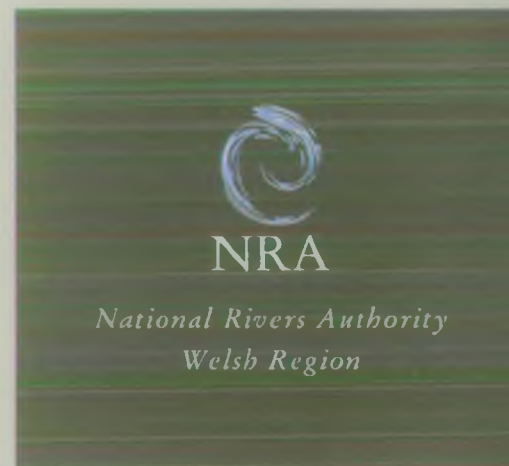


TEIFI CATCHMENT MANAGEMENT PLAN CONSULTATION REPORT





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TEIFI CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT
FEBRUARY 1996

National Rivers Authority
Welsh Region

Further copies can be obtained from :

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However responses should be sent to the same address.

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Awarded for excellence

OUR VISION FOR THE TEIFI CATCHMENT

The Teifi catchment contains a rich mosaic of coastal cliffs, rocky gorges, river meadows, tree lined river banks, bogs, marshes and mountain lakes. Large numbers of visitors are attracted to the area because of the beauty and variety of the scenery. From its source in the Cambrian Mountains at Llyn Teifi, the river drops rapidly to meander across its wide floodplain, which is inundated by flood waters each winter, before entering Cardigan Bay. The Teifi has excellent water quality with 100% of the main river in the highest classes in 1994, and offers some of the best salmon and sea trout fishing in Wales. The river corridor has a very high conservation value and is currently being considered by the Countryside Council for Wales for designation as a Site of Special Scientific Interest, as a precursor for its consideration as a Special Area of Conservation under the EC Habitats Directive.

Our aim is to manage the catchment in a way that provides, during the five year life of this plan, significant and sustainable progress in:

- **improving flood protection for urban areas** - flood protection standards at Llechryd, Cenarth, Newcastle Emlyn, Llandysul, Llanybydder, Lampeter, Tregaron and Pontrhydfendigaid are considered to be in need of improvement. Our key objective is to determine whether improvements at these sites are feasible and to promote works as funds become available.
- **protecting river corridors and floodplains** - our key objectives are: (i) to protect and encourage the formation of natural river corridor habitats where waterside flora and fauna can thrive, particularly by promoting the creation of "buffer zones" alongside watercourses in rural and urban areas and (ii) wherever possible, to direct new development away from floodplains, unless appropriate flood defence works are in place or alleviation works form part of the proposal.
- **improving water quality** - our key objective is to maintain the existing excellent water quality throughout the catchment with an ongoing pollution prevention programme. Specific localised issues of acidification in the upper Teifi and several tributaries, and discharges from abandoned metal mines, may be difficult to resolve during the plan period. However, we expect to make progress in resolving other issues relating to the sewerage and sewage treatment infrastructure.
- **balancing abstraction with the needs of the environment** - the abstraction of water must be balanced against the environmental needs of the river system, and our key objective is to implement an objective methodology for assessing the state of the catchment in water quantity terms and determining availability of water for any new abstraction uses.

Realisation of this vision, which we expect to take forward into the Environment Agency, will be achieved through a balanced management approach to all activities. We will encourage imaginative proposals to allow sustainable economic and community development to proceed whilst ensuring protection and improvement of the water environment. We will collaborate actively with all users of the catchment and all those statutory bodies that can assist us in striving to achieve this vision.

DAVID WALKER
AREA MANAGER - SOUTH WEST WALES

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PART I
THE TEIFI CATCHMENT
MANAGEMENT PLAN

**1.0 THE PURPOSE OF
CATCHMENT MANAGEMENT
PLANS**

1.0 THE PURPOSE OF CATCHMENT MANAGEMENT PLANS (CMPS)

1.1 THE ROLE OF THE NRA

The rivers, lakes, estuaries and coastal waters of Wales are subject to large and rapidly increasing demands from the users of water. Many different uses interact, or compete for water or water space, and may come into conflict with one another. The National Rivers Authority (NRA) aims to protect and improve the water environment in England and Wales and to harmonise conflicts between competing water users. Our general duties include:-

- Maintenance and improvement of water quality by control of pollution in surface and groundwater.
- Flood defence for people and property.
- Flood warning.
- The management of water resources to achieve the right balance between the needs of the environment and those of abstractors.
- Maintenance and improvement of fisheries.
- Conservation of the natural water environment.
- Promotion of water based recreation.
- Navigation (in some rivers).

We also play a key role in the strategic management of the interaction between users of the water and land environments.

We believe that it is important that the interests of all water users are considered in the development and protection of the water environment. Consequently, we have chosen to promote our *vision* and management proposals via published Catchment Management Plans (CMPS).

1.2 WHAT THIS PLAN IS DESIGNED TO DO

This consultation document presents a number of issues and options for the future management of the Teifi catchment, and is based on a detailed study that we carried out during 1994/95. A number of proposals are presented for comment and it is intended that, following consultation with you and other river users, an Action Plan will be presented which will seek to manage conflicts in river use and optimise the overall benefits to all river users within the catchment.

The Action Plan will steer us in developing our own management programme for the catchment and guide in the way we respond to any development proposals.

This consultation document is divided into 2 parts:

Part I: presents the range of management issues, and options to address them, that have been identified by the NRA;

Part II: provides background information on the approach we took in developing this plan, using information on identified river Uses (including those to be incorporated in the new Water Quality Objectives scheme) and the statutory and informal targets required to support them. The targets are expressed in terms of water quality, water quantity and physical features.

We hope that you find the information in this consultation document informative and thought provoking (for your convenience a glossary of terms and abbreviations is provided as an appendix). Let us know whether you agree or disagree with our current proposals: remember this is not just our document, it is also yours; without your help we cannot produce a workable Action Plan that will be of benefit to you and all users of the Teifi Catchment.

Please send any comments you may have on the Consultation Report to:

The Area Catchment Planner
National Rivers Authority
Llys Afon
Hawthorn Rise
Haverfordwest
Dyfed
SA61 2BQ

Telephone: (01437) 760081.

The Environment Agency

The new Environment Agency for England and Wales will be created in April 1996 by the merger of the NRA, Her Majesty's Inspectorate of Pollution and the Waste Regulation Authorities. It will be the largest environmental protection agency in Europe. While it will incorporate the full role of the NRA, there will be wider responsibilities for integrated pollution prevention and control of air, land and water. One of the Agency's principal aims will be to contribute towards attaining the governmental objective of achieving sustainable development by protecting or enhancing the whole environment.

The government has recognised both the success of integrated river basin management, as developed and practised by the NRA, and the importance of CMPs as an integral part of that philosophy. It is therefore anticipated that CMPs will continue as the focus for river basin management in the Agency, although they may be developed in the context of wider management plans for the protection and enhancement of water, land and air.

2.0 AN OVERVIEW OF THE TEIFI CATCHMENT

2.0 AN OVERVIEW OF THE TEIFI CATCHMENT

2.1 Introduction

The Teifi, at 122km, is the longest of the westerly flowing rivers which discharge into the southern half of Cardigan Bay. Its source is Llyn Teifi in the Cambrian Mountains at an altitude of 455m AOD from where it descends steeply through moorland and forestry to the geologically and ecologically important basin of Cors Caron (Tregaron Bog) where the gradient is negligible. The river continues at a generally uniform gradient of 1.5:100 in a southwesterly direction through rural areas largely supporting dairy and mixed stock farms. Rocky, tree-lined sections are a feature of the catchment and a number of impressive gorges, particularly at Maesycrugiau, Alltycafán, Henllan and Cilgerran, add significant environmental and landscape value. The falls on the main river at Cenarth are a spectacular attraction under high flows, and are famous as a location for watching salmon leaping and elvers migrating.

2.2 Infrastructure

The main towns of the catchment are well connected by 'A' class roads. From Cardigan the A484 winds up the valley through Llechryd, Cenarth and Newcastle Emlyn before joining with the A485. This continues south of the Teifi through Llandysul and Llanybydder to Lampeter. On the north side of the river the A475 runs from Newcastle Emlyn to Lampeter. From Lampeter the A485 continues to Tregaron before turning north to leave the catchment, joining the main coast road, the A483, south of Aberystwyth. Other minor roads criss-cross the catchment to connect smaller settlements.

There is no main railway link through the catchment. To the north, a rail link runs from Aberystwyth through Mid-Wales; and to the south lies the main London to Fishguard line.

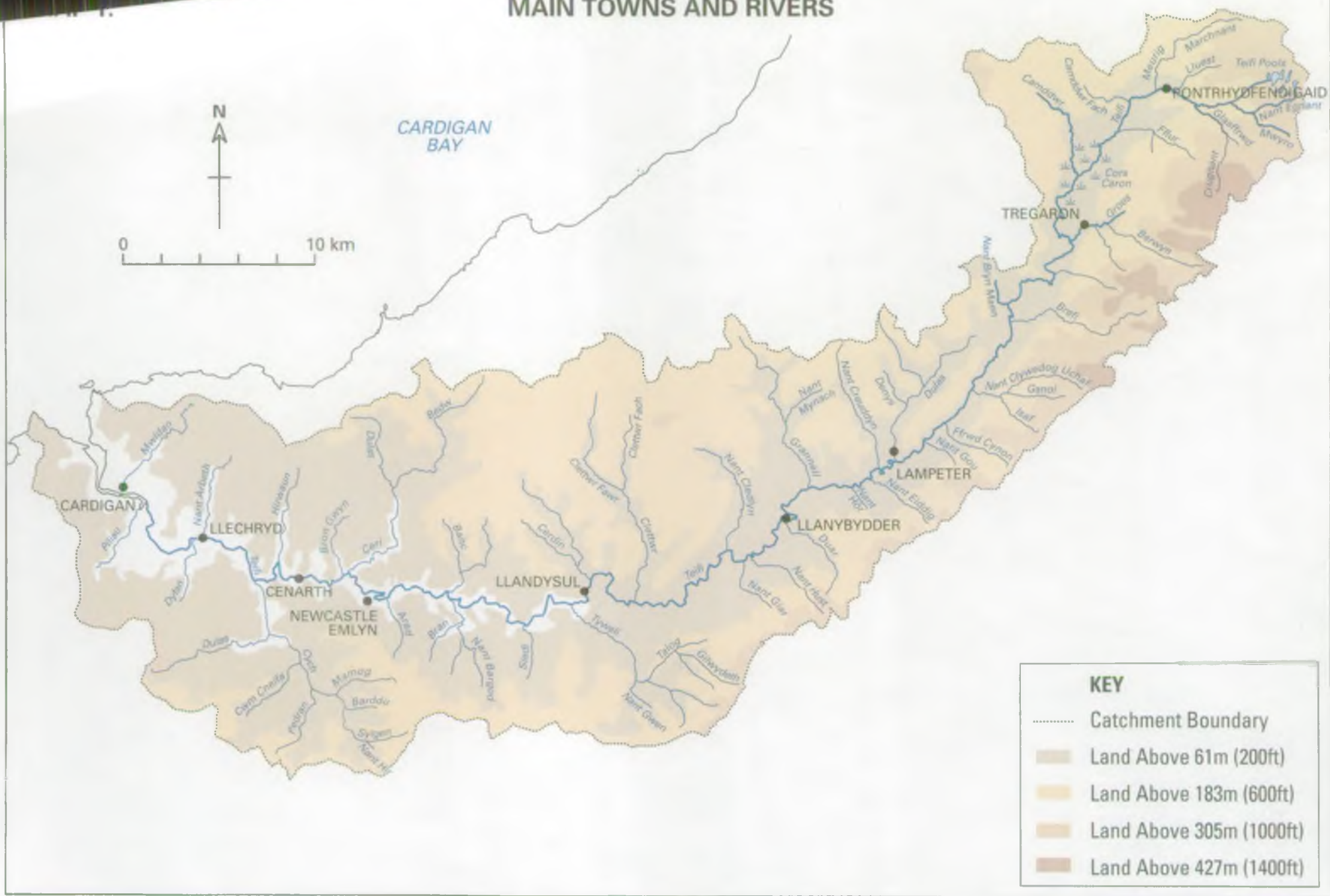
2.3 Land Use

The catchment is predominantly rural with agriculture and forestry accounting for the majority of the available resource. Large dairy units predominate in the lower reaches of the catchment with mixed dairy and livestock rearing present in the middle reaches. In the upper catchment, the poorer soil conditions allow livestock rearing on rough grazing and improved pastures.

Forestry accounts for 15% of the land available in the catchment; mixed planting and deciduous species account for 8% and conifer plantations in the upper areas account for the remaining 7%.

Much of the urban development has centred along the flood plain of the middle and lower reaches, with most towns being located adjacent to the Teifi itself.

MAIN TOWNS AND RIVERS



MAP 1

2.4 Flood Defence

The majority of the extensive flood plain is inundated by flood waters each winter. Small towns and villages have developed on the flood plain and are at risk from flooding. Our flood defence interest relates primarily to these areas and we aim to provide and maintain appropriate standards of flood protection. Our operations generally involve maintaining and inspecting existing flood defences; maintaining channel capacity, by limited shoal removal operations; controlling bankside vegetation, in order to prevent trees being dislodged and swept downstream; and to reduce potential erosion by implementation of a tree management programme. These operations are regularly reviewed to ensure a cost effective service. Revenue expenditure for our flood defence maintenance purposes within the catchment averages £45k per annum.

2.5 Hydrology & Hydrogeology

Average annual rainfall varies from 1000mm at the coast to 1800mm above Llyn Teifi, with a mean value for the catchment of 1370mm. This is close to the Welsh Region average of 1310mm, but somewhat higher than the England and Wales average of 909mm.

The average daily flow in the Teifi, as measured at our river gauging station at Glan Teifi, is 2450 megalitres per day.

The geology consists mainly of older rocks, with Silurian deposits upstream of Llandysul and Ordovician deposits downstream. These include shales, slates, quartzites and volcanic rocks which generally hold little groundwater, except in areas where deep weathering and fracturing has produced a sub-surface permeable zone. There are Quaternary deposits of fluvial alluvium in the valley floor between Llandysul and Tregaron, containing sands and gravels which yield some groundwater.

2.6 Fisheries, Conservation & Recreation

Fisheries

Historically the Teifi has always been noted as a salmon river and has supported extensive commercial netting and trapping. Fears about declining stocks over the years have resulted in reductions in this commercial activity to the extent that now only 6 seine net licences and 12 coracle net licences are available annually for the estuary and river below Llechryd. Conversely, there has been a dramatic increase in the numbers of anglers fishing the catchment with a possible ten fold increase since the 1950s. Prior to the 1920s sea trout were scarce in the Teifi, but catches and average size have increased, particularly since the 1950s. On the basis of declared rod catches the Teifi is now arguably the most productive mixed stock (salmon and sea trout) fishery in Wales. Much of the best fishing on the main river is leased or owned by angling clubs who take an active role in managing exploitation through enforcing club rules and improving the fisheries through active management.

Anecdotal evidence suggests that the numbers of large brown trout in the catchment have declined over recent decades, but our monitoring surveys conducted since 1985 indicate very healthy stock densities for both salmon and trout throughout the catchment. A few stillwater trout fisheries exist in the catchment, in particular in the headwaters at Teifi Pools, though there are few coarse fisheries.

Conservation

Many of the catchment's habitat types, including coastal cliffs, rocky gorges, river meadows, tree lined banks, bogs, marshes and mountain lakes, are of SSSI status, and three are National Nature Reserves. Part of the upper catchment falls within the Cambrian Mountains ESA and three areas are proposed for designation as Special Areas of Conservation, under the EC Habitats Directive.

A major study carried out in the early 1980s as part of a project investigating the 'Conservation of Wildlife in River Corridors' identified 49 habitat types in the catchment and highlighted their very high quality. Otters are generally widespread throughout the catchment, although riparian cover is sparse on the section of main river between Cors Caron and Lampeter, restricting their presence.

The root disease *Phytophthora* has been found in alders at two locations in the catchment. The impact of a spread of this disease throughout the catchment could be very serious.

Recreation

Large numbers of visitors are attracted to the area because of the beauty and variety of its scenery, its many leisure activities including rambling, birdwatching, canoeing, pony trekking and sightseeing, and its wealth of interest. Castles and cottages, working woollen and flour mills, coracle and woollen industry museums, red kite in the mountains and chough on the coast all contribute to the rich and varied experience for visitors. There is also the recently opened Welsh Wildlife Centre near Cardigan which is owned by the Dyfed Wildlife Trust.

Water sports are largely restricted to the estuary downstream of Cardigan as there is no public right of navigation above the tidal limit. Canoeing is practised within the Cilgerran Gorge and at a white water slalom course at Llandysul, by agreement with Llandysul Angling Association, where there are plans to develop a canoeing centre. There are some riverside footpaths, notably at Cilgerran, and many areas provide pony trekking, particularly at Tregaron.

Angling is a major recreational activity, the quality of the fishing attracting many visitors and providing a major boost to the local economy. The three principle angling clubs, namely Teifi Trout Association, Llandysul Angling Association and Tregaron Angling Club, between them control over 50 miles of the river. A number of privately owned still water trout fisheries are also present and upland trout fishing is available at the Teifi Pools. There are few opportunities for coarse angling which tend to be limited to small stillwaters such as Falcondale Lake.

2.7 Water Quality

Water quality in the main freshwater river is generally high with 100% of classified reaches being Class A or Class B in the 1994 General Quality Assessment Survey. High quality waters need to be maintained to protect important uses such as the potable water supplies and salmonid fisheries.

The upland part of the catchment suffers from low pH and associated elevated aluminium concentrations due to surface water acidification. Metal contaminated drainage from abandoned metal mines also contributes to elevated zinc levels in the uppermost Teifi and several tributaries.

There are a number of small sewage treatment works (STWs) serving small rural communities. Those STWs serving the larger centres of population discharge into the main river or larger tributaries, which generally provide ample dilution for the effluents. The exceptions to this are downstream of Lampeter where the combined impact of the STW and sewer overflow affect the Teifi for a 1km length and at Cardigan, where the discharge from Cardigan STW has an aesthetic impact within the upper Teifi estuary. Various, relatively small discharges of untreated sewage or overflows, mainly from the Cardigan sewerage system, also lead to unacceptable aesthetic conditions within the Teifi estuary.

There is little industrial activity within the catchment, other than agriculture which is predominantly livestock orientated (dairy, beef and sheep production). Overall, and considering the fairly intensive nature of agricultural practices, these have relatively little impact on either the main river or major tributaries.

2.8 Monitoring

River Levels, Flows and Rainfall

There is one primary river gauging station at Glan Teifi which is located 4.5km upstream of Llechryd. There is also a river level recorder at Pont Llanio downstream of Tregaron and another on the Brenig in Tregaron itself. There are 12 raingauges in the catchment that provide daily rainfall data.

We use the collected data to manage water resources, which includes the control and regulation of abstraction. The Brenig recorder has been installed in support of flood defence investigations. The Glan Teifi and Pont Llanio recorders and 3 of the raingauges are connected to telemetry to provide information immediately to our staff at times of flood risk. There is no routine monitoring of groundwater levels within the catchment.

Water Quality

Water quality monitoring takes place regularly at 23 river sites, samples being analysed for a wide range of chemical parameters. This monitoring is undertaken to assess general water quality and compliance with the requirements of certain EC Directives, as well as to support special investigations and surveys. All significant consented (licensed) discharges to watercourses are sampled and analysed routinely to assess compliance with discharge consents issued by ourselves.

Historically, groundwater quality has not been routinely monitored.

Inspections are carried out at sites which are known to present a high risk of pollution, trade premises, industrial sites, agrochemical stores, and periodic inspections of some larger farms as part of our pollution prevention programme.

Biology

An assessment of the biological quality is made by analysing the species of insect larvae and other small aquatic animals that are present in or on the river bed. Routine biological monitoring, is currently being undertaken at 23 sites within the catchment, as part of the General Quality Assessment Survey. This monitoring will be repeated in the year 2000. Additional ad-hoc monitoring is undertaken for impact assessment and pollution prevention purposes.

Habitat Surveys

A River Corridor/Habitat Survey has yet to be carried out for the Teifi catchment, although the major study in the early 1980s recognised the rich diversity of habitats in the catchment, identifying 49 habitat types. A River Habitat Survey is due to be carried out in 1996 subject to funding being available.

Fish Stocks

Assessment of fish stocks is undertaken as part of the Regional Juvenile Salmonid Monitoring Programme which estimates juvenile abundance using electro-fishing techniques. A sampling programme has been carried out annually on the Teifi since 1986 with 16 quantitative sites, 20 semi-quantitative sites and 14 riffle sites being last sampled in 1994.

Trends in adult salmon and sea trout stocks are monitored using catch returns from anglers and netmen. These figures, however, are based on a declared catch and represent minimum catch statistics. There are no fixed traps or fish counters operating in the catchment.

2.9 KEY DETAILS

CATCHMENT DETAILS

Area	1012.1km ²												
Population (1991 census)	36,890												
Main Towns (by ward)	<table> <tr> <td>Cardigan</td><td>4,350</td></tr> <tr> <td>Lampeter</td><td>1,989</td></tr> <tr> <td>Llechryd</td><td>550</td></tr> <tr> <td>Newcastle Emlyn</td><td>931</td></tr> <tr> <td>Llanybydder</td><td>1,540</td></tr> <tr> <td>Llandysul</td><td>1,300</td></tr> </table>	Cardigan	4,350	Lampeter	1,989	Llechryd	550	Newcastle Emlyn	931	Llanybydder	1,540	Llandysul	1,300
Cardigan	4,350												
Lampeter	1,989												
Llechryd	550												
Newcastle Emlyn	931												
Llanybydder	1,540												
Llandysul	1,300												
Population Density	37 per km ²												

TOPOGRAPHY

Ground Levels	Max. level 593m AOD				
Sea Levels	<table> <tr> <td>Mean High Water Springs</td><td>2.36m AOD</td></tr> <tr> <td>Mean Low Water Springs</td><td>-2.26m AOD</td></tr> </table>	Mean High Water Springs	2.36m AOD	Mean Low Water Springs	-2.26m AOD
Mean High Water Springs	2.36m AOD				
Mean Low Water Springs	-2.26m AOD				
Geology	<p>Solid Geology: Silurian sandstones, shales and mudstones. Carboniferous millstone grit comprising shales and sandstones.</p> <p>Surficial Deposits: Quarternary alluvium and glacial sand and gravel.</p>				

ADMINISTRATIVE DETAILS

ADDITIONAL DETAILS		% of Catchment Area
County Councils	Dyfed	100
District Councils	Ceredigion	68
	Carmarthen	21
	Preseli Pembrokeshire	8
	Dinefwr	1
Unitary Authorities (from 1st April 1996)	Ceredigionshire	68
	Carmarthenshire	22
	Pembrokeshire	8
National Parks	Pembrokeshire Coast	2
Local Flood Defence Committee	South West Wales	
NRA	Welsh Region - South West Area - West District	
Water Company	Dŵr Cymru Welsh Water	

CATCHMENT OVERVIEW

WATER QUALITY

Length of Classified River in 1994 General Quality Assessment (GQA)	Class A	158.4km (73.5%)
	Class B	57.1km (26.5%)
Estuary Quality (1990 Survey)	Class A	9.5km (100%)
Designated under EC Freshwater Fisheries Directive (78/659/EEC)	Salmonid	113.1km

WATER RESOURCES

Average Annual Rainfall	1370mm	
Total Licensed Abstraction	Public Supply	8857.6 MI/a
	Industry	157.5 MI/a
	Agriculture	1612.4 MI/a
	Other	47834.7 MI/a
Total Number of Abstraction licences	96	
Primary Gauging Station	Teifi at Glan Teifi, 4.5km upstream of Llechryd	
Principal Reservoirs (volumes)	Llyn Egnant	522.8 MI
	Llyn Teifi	704.6 MI

FLOOD PROTECTION

Length of Designated Main River	242.82km
Length of River on which Flood Alleviation Schemes implemented	550 metres
	(Walls 180 metres)
	(Embankments 370 metres)
Length of River covered by a Flood Warning Scheme	110km

FISHERIES

Declared Annual Fish Catches (10 year annual averages 1982-1991)	Salmon	Sea Trout
Rod	742	2960
Coracle Nets	63	316
Seine Nets	202	349
Salmon Spawning Target No. of eggs per 100m² (1982-1991)	390	
Actual	310	
Deficit	21%	

3.0 ISSUES AND OPTIONS

This section of the Plan presents the key Issues that we have identified from our analysis of the Teifi catchment. One or more suggestions are made for addressing each issue and you are invited to comment on these. This section relates solely to those areas which have been shown not to be able to support certain of the identified Uses; the rest of the catchment should be regarded as being able to support **all** identified Uses.

- Section 3.1 identifies in detail, those areas that fail to meet specific targets to support identified Uses. Significant areas of conflict between Uses are also discussed.
- Section 3.2 presents these **Issues** along with **Options**, identified by the NRA, to address them.
- The background information that has been used to identify these Issues is provided in **Part II** of this report, which lists the known Uses of the catchment and sets targets to support them.
- You should note that the Issues and Options do not constitute NRA policy but have been considered within our policy framework: no priority should be inferred from the order in which they appear.

3.1 THE STATE OF THE CATCHMENT

- This section reviews the current quality of the catchment against the Targets set in **Section 5** in **Part II**.
 - The **Targets** used are designed to protect the needs of the identified catchment Uses.
 - The targets are also guided by the concepts of **sustainable development** and **environmental capacity**.
 - This allows the key management **Issues** to be identified: potential solutions are addressed in **Section 3.2**.
-

3.1.1 WATER QUALITY

General

In addition to compliance with water quality targets, we used information from biological monitoring surveys to assess the state of the catchment. Information on the invertebrate fauna found in rivers is particularly useful since the animals present reflect the water quality of the river in the preceding weeks or months, unlike chemical data which presents a series of 'snapshots' of water quality. A further benefit is that invertebrates respond to a far wider range of polluting materials than are routinely tested for by chemical monitoring. We can therefore, use biological data as supporting evidence for issues generated by assessment of chemical quality and to identify new issues which are not detected by chemical sampling alone. Biological monitoring is particularly useful in small streams which are not routinely sampled chemically. In Welsh Region we use biological techniques for the rapid assessment of watercourses affected by acidification and farm pollution. Additionally we employ biological assessments of point sources such as sewage treatment works, industrial sites and mine discharges to identify the need for improvements.

Issues from failures to achieve River Ecosystem (RE) Targets:

Issue 1

Surface water acidification in the upper catchment causes several reaches and tributaries to fail to achieve RE Class 1 or 2. The Teifi, upstream of Pontrhydfendigaid sewage treatment works (STW), and the Glasffrwd, Clywedog, Brefi, Brennig, Berwyn, Groes, Upper Duar and Ffleur tributaries all fail to achieve their target class due to low pH, causing them to fall into RE Class 5. These problems are thought to reflect the combined impacts of acidification from acid deposition and conifer afforestation in areas sensitive as a consequence of their geology and soil types.

Issue 2

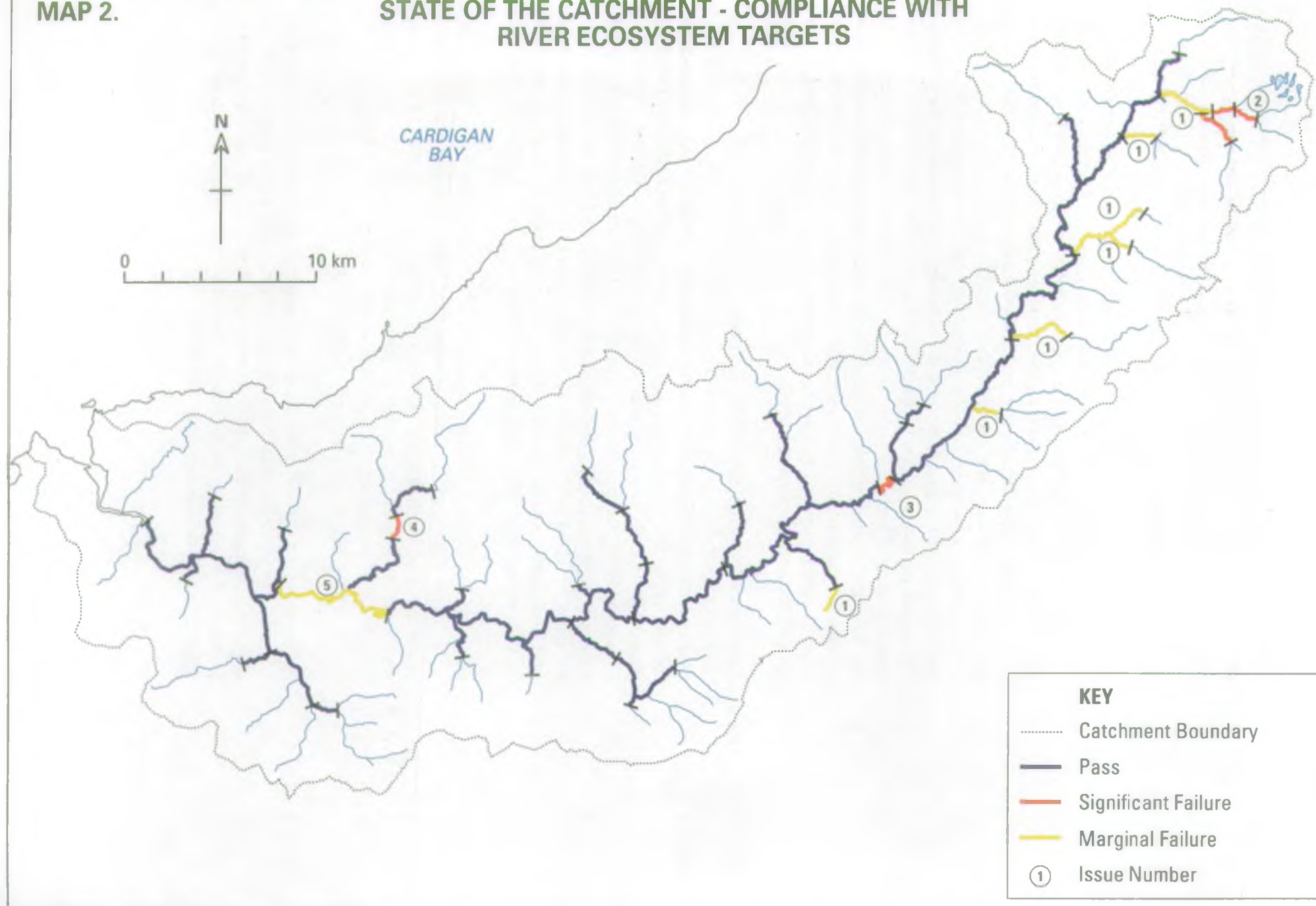
Elevated zinc levels in the Teifi upstream of Strata Florida water treatment works cause this stretch to fail to achieve RE Class 1, placing it in RE Class 3. In addition, the drainage from several disused metal mines impacts to a similar extent in minor tributaries of the upper Teifi, notably the Marchnant and Lluet. These also impact on the biological quality of the Meurig and the Teifi from the Meurig confluence to Cors Caron.

Issue 3

A 1km stretch of the Teifi downstream of Lampeter STW fails to achieve RE Class 1 due to elevated ammonia levels, placing it in RE Class 2. This is thought to be caused mainly by the premature operation of combined sewer overflows (CSOs) in Lampeter, but the relative impact of the discharge from the treatment works needs to be established.

MAP 2.

STATE OF THE CATCHMENT - COMPLIANCE WITH RIVER ECOSYSTEM TARGETS



Issue 4 The Ceri downstream of Troedysraur fish farm at Brongest, fails to achieve RE Class 1 due to reduced dissolved oxygen concentrations, causing it to fall into RE Class 2. We will continue to monitor closely the discharge from the fish farm and will assess whether there is a need for any remedial measures at the site and for a review of the existing consent conditions.

Issue 5 A 9.3km stretch of the Teifi from the Arad at Newcastle Emlyn to just downstream of Cenarth marginally fails to achieve RE Class 1 due to BOD concentrations, placing it in RE Class 2. This is thought to be mainly due to drainage from agricultural activities around this stretch, and further upstream. The impact of a discharge from a food manufacturing processes, and several sewage discharges, needs to be established.

In addition to the above, a number of issues have arisen from our routine work programme, and other investigations or surveys as follows:

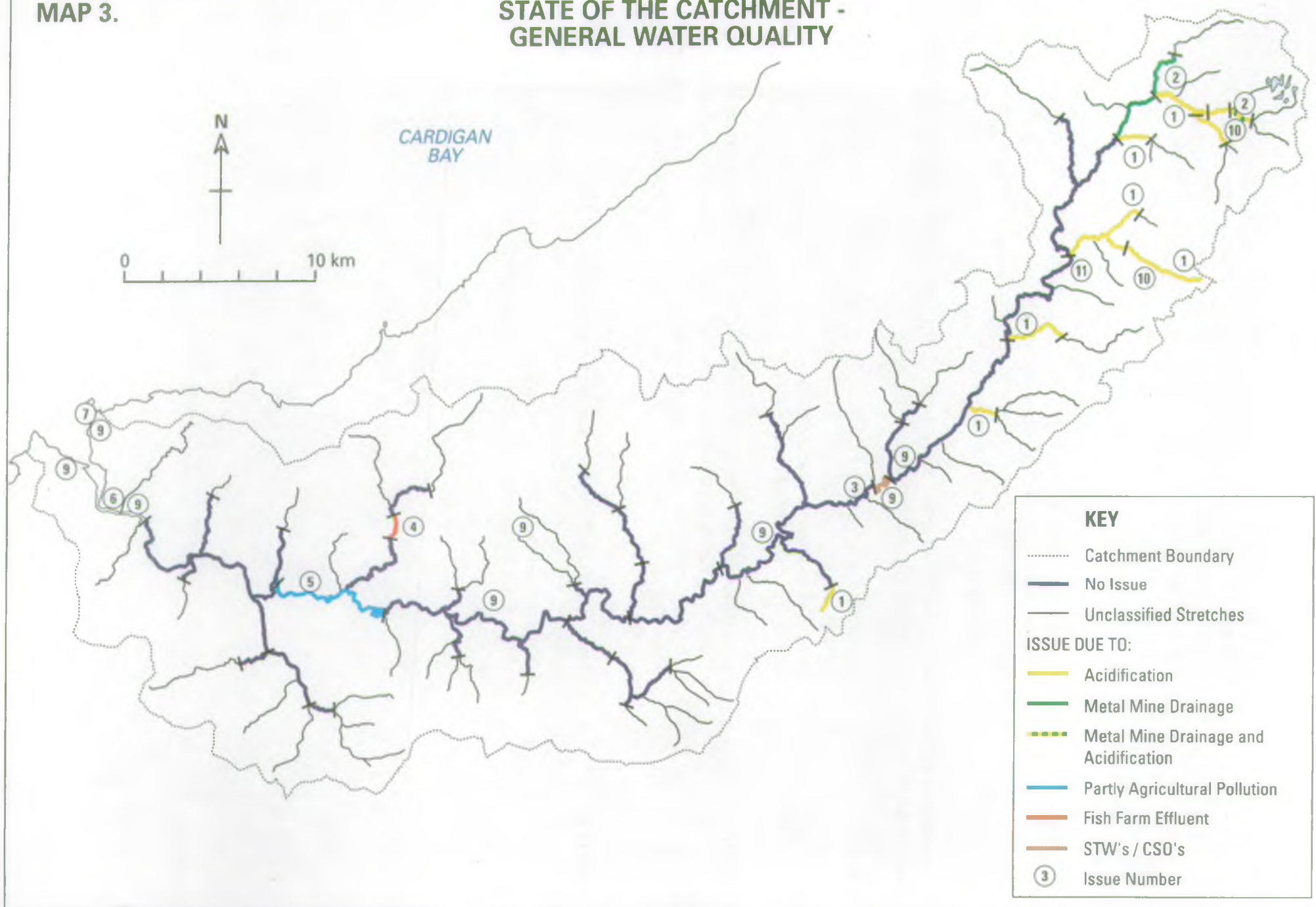
Issue 6 Premature discharges from CSOs and pumping stations within the Cardigan sewerage system, together with numerous illegal cross connections within the town, lead to unacceptable aesthetic impacts, both within the Teifi estuary and the lower reaches of the Mwldan.

Issue 7 An untreated sewage discharge occurs into the sea at a rocky inlet at Graig y Gwbert. A nearby hotel and numerous residential properties are connected to this discharge. A sewerage requisition scheme, connecting to the Cardigan system, is proposed which will allow termination of this discharge (see also Issue 9).

Issue 8 Litter is a problem throughout the catchment, particularly from domestic and agriculture sources (which includes silage bale wrapping and fertilizer bags). Animal carcasses are also found in watercourses on occasions. A campaign to help reduce the problem and combat the unacceptable aesthetic impacts is proposed.

MAP 3.

STATE OF THE CATCHMENT - GENERAL WATER QUALITY



Issue 9

There are several STWs and sewerage systems within the catchment that have discharges which cause unacceptable environmental impact. Further development may exacerbate existing problems and we may recommend refusal of planning applications where no remedial works are proposed to alleviate the impacts. Problems have been identified at the following locations:

- | | | |
|----------------------------------|---|--|
| Lampeter | - | part of the sewerage system is inadequate leading to premature discharges from CSOs. |
| Cwmann | - | unsatisfactory discharges from sewage pumping stations. |
| Llanybydder | - | unsatisfactory discharges from the sewage pumping station serving part of the village. |
| Croeslan and Penrhiwllan | - | unsatisfactory discharges from the pumping station in Penrhiwllan, which also serves Croeslan. |
| Cardigan and St. Dogmaels | - | several pumping stations cause problems; a small number of properties drain directly to the Teifi or Mwldan. |
| Gwbirt | - | foul drainage from a hotel and surrounding properties discharges directly into the estuary. |

Issue 10

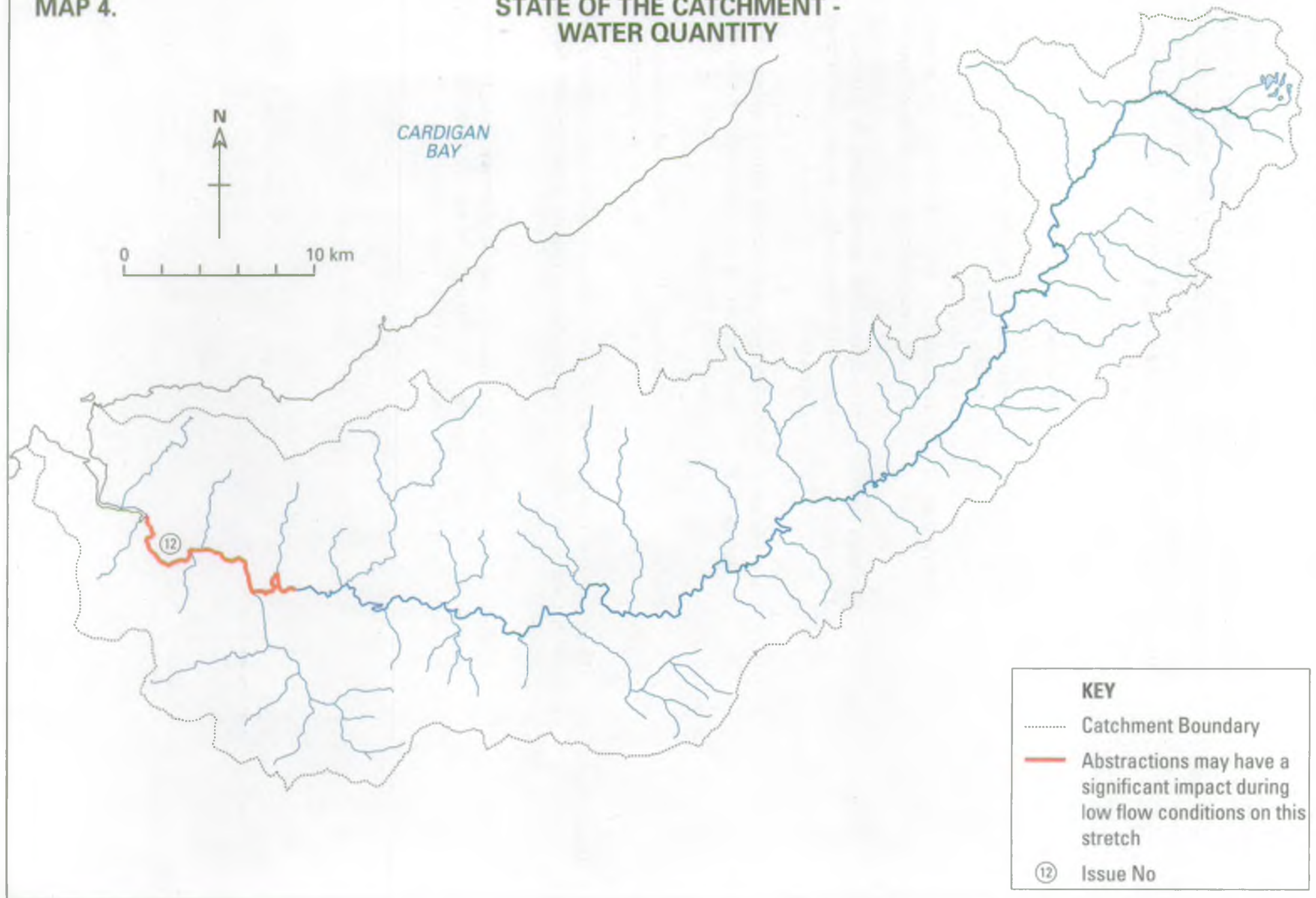
There is poorer than expected biological quality in the Berwyn and the Teifi downstream of the confluence with the Mwyro, despite apparent good water quality.

Issue 11

Abandoned waste disposal sites present a risk of pollution from possible unauthorised disposal of materials. For example, sheep dip chemicals have been detected in the leachate emanating from Tregaron Tip.

MAP 4.

STATE OF THE CATCHMENT -
WATER QUANTITY



3.1.2 WATER QUANTITY

General

A catchment would fail its targets for water resources if abstraction was causing rivers and streams to dry up or flows to become unacceptably low, or if groundwater levels were declining or groundwater quality deteriorating.

Licences of Right had to be granted in 1965 without regard to the ability of the resource to sustain the abstraction in the long term without detriment. Over the years, the actual rates of abstraction have, in some cases, increased to the volumes specified in the licences. As this occurs, the potential arises for low flows or declining groundwater levels.

We have considered carefully the available surface and groundwater resources within the Teifi catchment and their degree of utilisation. The following Section and Map summarise the results of this analysis. It must be stressed that where no problems or areas for further investigation have been identified, we are satisfied that resources are adequate. As more information becomes available, for example about the actual flow requirements of the aquatic ecosystem, we will review our management of resources in each catchment.

Assessment of the catchment assumes that existing licence conditions are complied with. The NRA has a policy of active inspection and enforcement of licence conditions.

No allowance has been made for climatic change because future scenarios are uncertain and within the lifespan of this Plan (5 years) any change is unlikely to be significant.

Local Perspective

The major abstraction in the catchment is by Dŵr Cymru Welsh Water (DCWW) at Llechryd. This is equivalent to less than 1% of the total available river flow. However, the licence has no low flow restrictions written into it and therefore, when combined with the cumulative impact of small upstream abstractions, it has the potential to have a significant impact under lower than average summer flows. Cenarth Falls may also be affected, albeit to a lesser extent, under similar conditions. There is potential for concern if there is to be any increased level of abstraction from tributaries of the Teifi, many of which are major spawning areas. However, although the Ceri, Clettwr and Cych are all identified as being of particular importance as a fishery resource, they are meeting all current water quantity targets.

We have one river gauging station in the catchment, on the Teifi upstream of the Llechryd intake. There is no groundwater monitoring undertaken as no significant aquifers are present.

Issues Identified

Issue 12

It is unclear whether existing or additional abstraction will have an adverse impact on the catchment, specifically on the Teifi downstream of Cenarth. In order to determine this, our abstraction licensing policy needs to be implemented in the catchment. Prior to its implementation, low flow restrictions probably based on the 95 percentile flow, will be enforced on new licences where required.

Issue 13

The DCWW potable water sources in the catchment are heavily utilised with in excess of 90% of the licensed quantity being abstracted. We predict that even with the lowest expected increase in demand for potable water, a shortfall in supply in the Mid and South Ceredigion areas is likely before the end of the century. The lowest demand projections assume that adequate demand management measures, such as leakage detection and control are implemented. This increase in demand will need to be met by DCWW, possibly by the development of new sources or enhancement of existing sources either inside or outside the Teifi catchment. No major developments are envisaged.

Issue 14

A review of the catchment needs to be undertaken to assess the benefits and costs of installing additional hydrometric monitoring facilities.

3.1.3 PHYSICAL FEATURES

General

Flood risk has been assessed by studying the flood history over the past 25 years and the known distribution of flooding.

Many of the environmental targets for Physical Features are necessarily subjective (Section 5.3) and it therefore follows that their assessment often cannot be precise. Data from many sources including routine fisheries, biological and habitat surveys and special investigations are used to identify areas that are apparently deficient in certain essential or desirable features such as spawning gravels, riparian tree cover or in-river habitats.

The following section and map illustrate the current state of the catchment and identify areas where there are felt to be deficiencies.

Issues Identified

Issue 15

The existing levels of flood protection in the urban areas on the flood plain of the Teifi are not known precisely, but are believed to be below the indicative standard for residential areas (Land Use Band B) at the following locations: Llechryd, Cenarth, Newcastle Emlyn, Llandysul, Llanybydder, Lampeter, Tregaron and Pontrhydfendigaid.

Issue 16

During flood events, bankside trees are frequently dislodged and carried downstream by flood water. Such trees can cause general river bank instability, increased shoaling within the river channel and reduced flood protection standards.

Issue 17

The Government has indicated that our main input to development plan preparation regarding flooding issues should be via surveys undertaken under Section 105 (2) of the Water Resources Act 1991. These surveys will be undertaken over the next five years and will identify the extent of land liable to flood and will highlight any likely flood defence problems.

Issue 18

The flood warning scheme for Pontrhydfendigaid does not comply with our target standards.

Issue 19

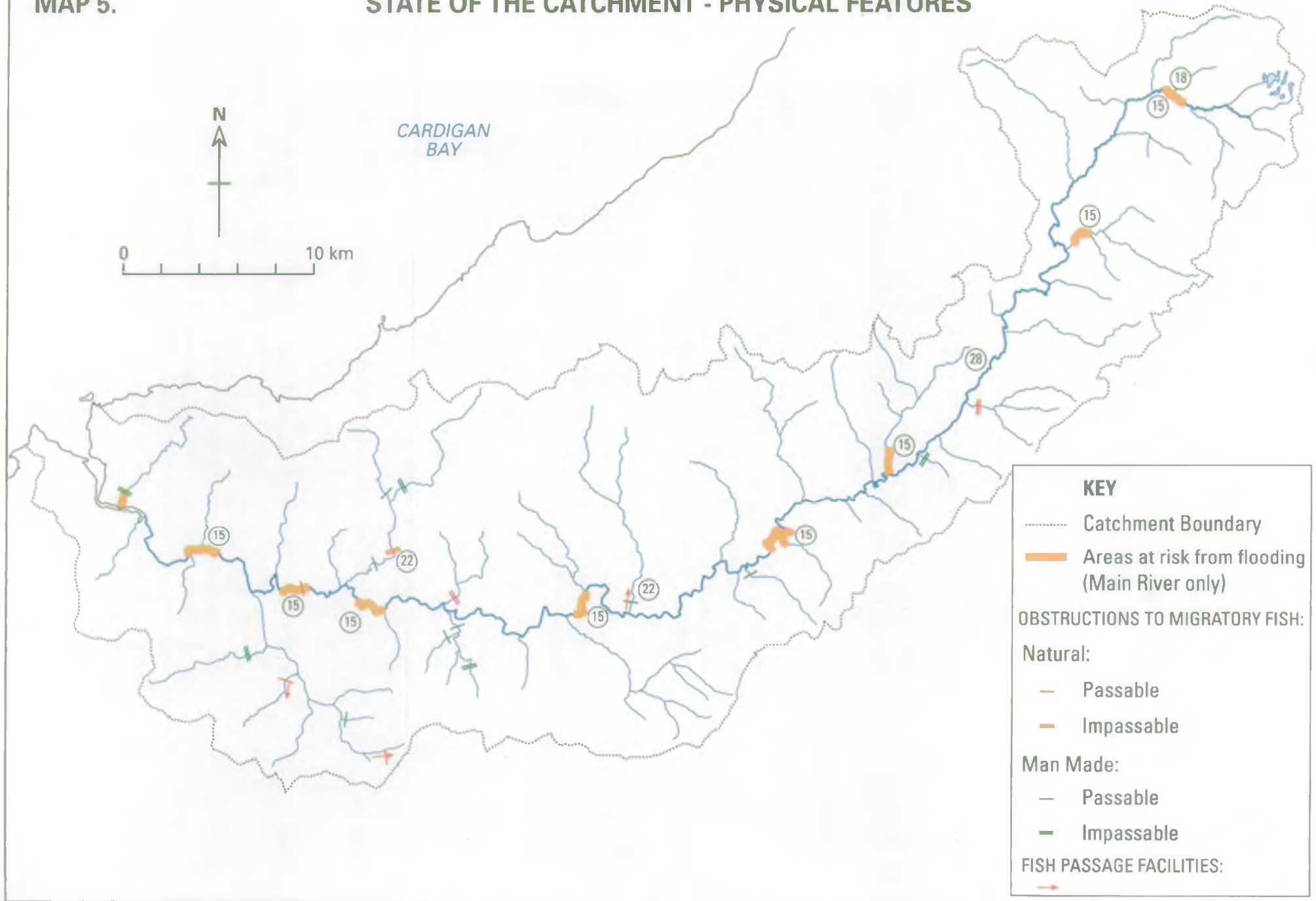
There are properties on the flood plain of the Teifi which are at risk from flooding, but which do not currently benefit from flood warning schemes.

Issue 20

The removal of gravel shoals from the river channel, particularly in towns and villages, is necessary in order to maintain channel capacity and existing flood protection standards. The cost of removing and disposing of gravel has increased significantly in recent years, and this threatens the viability of the operation.

MAP 5.

STATE OF THE CATCHMENT - PHYSICAL FEATURES



THE STATE OF THE CATCHMENT

- Issue 21** There are minor flooding problems in urban areas within the catchment due to overloading of existing culverts.
- Issue 22** The upstream migration of salmon and sea trout is impeded by several natural and artificial barriers. Whilst access has been improved at some structures already, the feasibility of facilitating fish passage at other obstructions needs to be determined taking into account the cost/benefits, ecological impact and landscape implications of such activity. Priority sites are those at the Ceri Falls, upstream of Felin Geri Mill near Newcastle Emlyn, and at the top weir at Dolbantau on the Clettwr, which is passable only under certain flows.
- Issue 23** We have yet to agree formally with the Countryside Council for Wales a 'Standard of Service' for Sites of Special Scientific Interest. There is also a requirement for us to review all the authorisations we have issued, and prepare management statements, for potential Special Areas of Conservation.
- Issue 24** Poaching, particularly unlicensed netting in the middle to lower reaches and the estuary, continues to be a problem. The illegal use of lamp and gaff to take fish from the spawning grounds also continues to be a threat. It is increasingly important to ensure effective targeting of enforcement resources to high risk areas.
- Issue 25** Evidence suggests that trout stocks in the upper catchment, historically an important brown trout rod fishery, are sub-optimal. Further research is required to identify the extent and cause of this apparent decline.
- Issue 26** A perception by netsmen and anglers that salmon catches have reduced in recent decades appears to be borne out by investigations carried out as part of the Net Limitation Order/Byelaw Review, which indicated, amongst other factors, that salmon spawning targets are 21% below expected levels. Although Teifi stocks appear to be in a relatively healthy state, some measures to reduce exploitation are considered necessary, in addition to planned improvements to other factors which affect fish stocks. Early running multi-sea winter fish are particularly in need of protection.
- Issue 27** A River Habitat Survey has not yet been carried out for the Teifi.
- Issue 28** Riparian tree cover is lacking between Lampeter and Cors Caron, reducing the habitat quality for otters, fish and other fauna.

Issue 29

There are few coarse fisheries within the catchment. There is a need, under our Coarse Fish Strategy, to assess demand for new coarse fisheries and to develop, collaboratively, new fisheries where required.

Issue 30

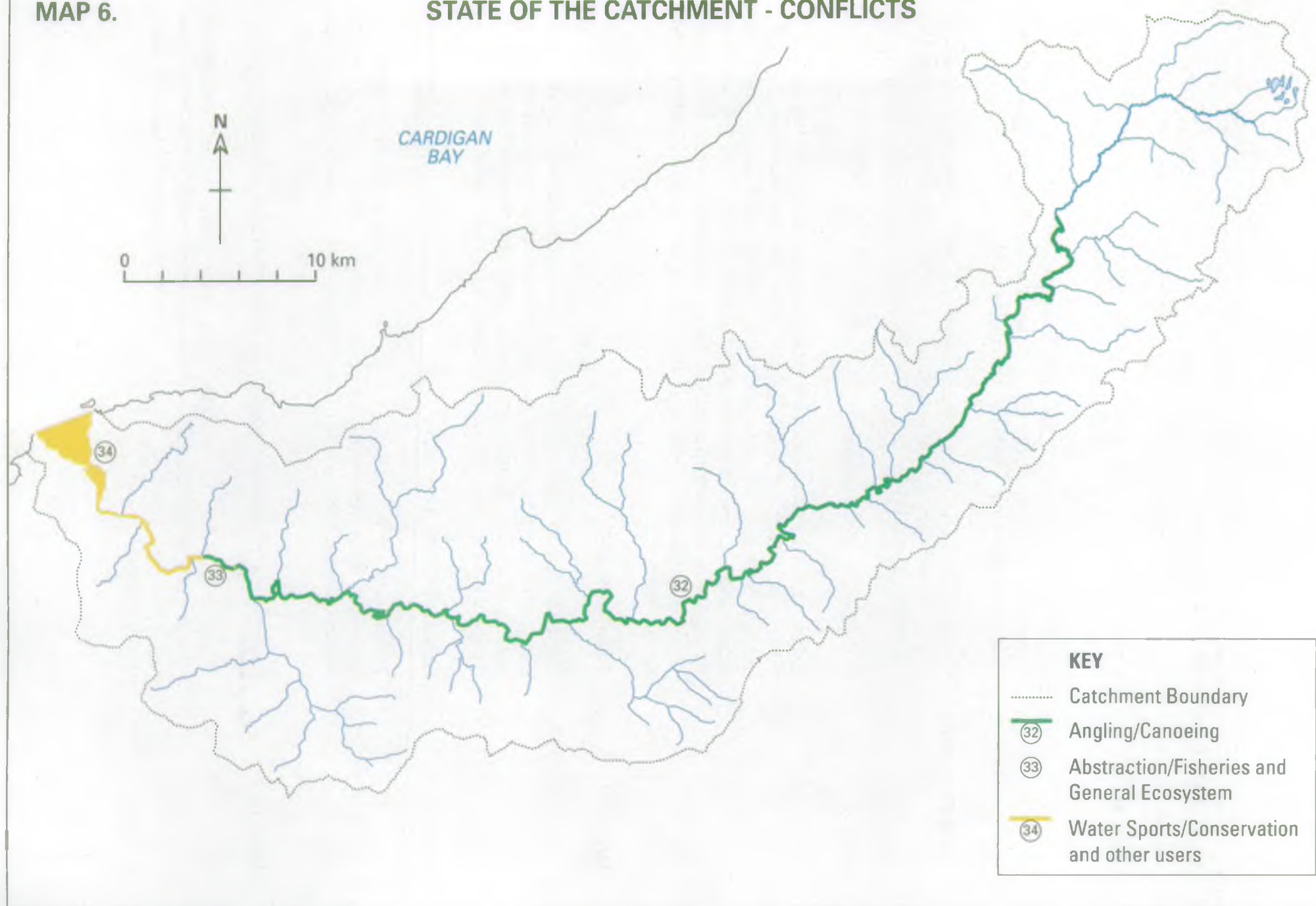
The extent and potential impact of the root disease Phytophthora on alders is unknown. There is a need to assess the distribution of this disease and adopt appropriate remedial measures to control its spread.

3.1.4 CONFLICTS BETWEEN USES

General	Certain conflicts may arise between different catchment uses, irrespective of the catchment's ability to support these uses in terms of Water Quality, Water Quantity or Physical Features. For example, demands placed on the catchment by recreational uses often come into conflict with the need to conserve the wider environment. This section identifies conflicts between uses which are present within the Teifi catchment.
Local Perspective	We have set out where significant areas of conflict have been identified within the catchment and suggest that a change in mode of operation by the use/interest shown in bold should be considered.
Issue 31	Flood Defence/Development Extensive development within the catchment, and particularly on the flood plains, can impact on flood defence standards by increasing run-off, reducing/restricting channel capacity, interfering with access along the watercourse, reducing the opportunities to construct new flood defences, and putting the development itself at risk. Any development which takes place should only proceed on the basis that it does not adversely affect flood defence operations.
Issue 32	Canoeing/Angling Llandysul Angling Association have made an agreement with canoeists to allow the free use of a stretch of the Teifi at Llandysul for white water slalom canoeing. Canoeing also takes place on the tidal reach between Llechryd and the sea. However, there are no other access agreements in place.
Issue 33	Fisheries/DCWW Abstraction The impacts of the abstraction from the Teifi at the DCWW WTW at Llechryd on fish movements and the general ecology of the river downstream together with the effectiveness of the fish exclusion provisions at the intakes are unknown.
Issue 34	Conservation Interests and Other Users/Water Based Recreation Boating and other recreational uses, particularly those employing powered craft, in the tidal reaches of the catchment and off the coast can have a damaging impact on the high conservation value of the area and on other users.

MAP 6.

STATE OF THE CATCHMENT - CONFLICTS



3.2 A SUMMARY OF THE ISSUES, AND OPTIONS FOR THEIR RESOLUTION

General

This section of the plan considers options to address the issues that have been raised in the preceding section. The options as presented are the initial thoughts of the South West Area, Welsh Region of the NRA and do not constitute policy statements. Comments on the issues and options are invited together with any new ideas/suggestions.

Wherever possible the body responsible for carrying out each option has been identified. In some cases this is identified as an individual(s) or an organisation other than the NRA. However, the options as presented are intended to facilitate improvements to the water environment for the benefit of all users. Their implementation will entail many bodies and individuals co-operating.

In the tables of issues and options that follow, no priority has been assigned to the issues. They are listed in accordance with the current understanding of when the work, or a significant part of the work will be completed.

The following abbreviations are used in the tables:

AMP	Asset Management Plan
BOD	Biochemical Oxygen Demand
CCW	Countryside Council for Wales
CSO	Combined Sewer Overflow
DC	District Council
DCWW	Dŵr Cymru Welsh Water
HMIP	Her Majesty's Inspectorate of Pollution
KWTC	Keep Wales Tidy Campaign
LA	Local Authority
LPA	Local Planning Authority
NRA	National Rivers Authority
p.a.	per annum
RE	River Ecosystem
RHS	River Habitat Survey
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
WCA	Welsh Canoeing Association
WDA	Welsh Development Agency
WO	Welsh Office

Issue 1 Surface water acidification in parts of the upper catchment causes several reaches to fail to achieve RE targets.			
OPTIONS	Responsibility	Advantages	Disadvantages
Control new planting and replanting of coniferous forestry in sensitive areas.	Forestry Authority/ NRA/Forest Owners	Maintenance and recovery of water quality.	Limits forestry development in sensitive upland areas.
Control sulphur emissions nationally and from local sources (e.g. Pembroke Power Station).	NRA/HMIP/Government/Industry	Improved water, fishery and biological quality.	Cost and environmental impact of control techniques.

Issue 2 Zinc concentrations are elevated in parts of the upper Teifi causing a failure to achieve RE Class 1. Tributaries of the Teifi are also affected, notably the Marchnant and Lluest.			
OPTIONS	Responsibility	Advantages	Disadvantages
Implementation of site reclamation schemes (in whole or in part), to stabilise metal-rich spoil.	LAs/WDA/NRA	Improvements in water quality, fisheries and possibly environmental value of the sites.	Cost and maintenance of necessary works.
Diversion of surface and sub-surface waters away from areas of metal-rich spoils or metal-rich ores.	LAs/WDA/NRA/ Landowners	Improvements in water quality and fisheries.	Cost and maintenance of necessary works.

Issue 3 A 1km stretch of the Teifi downstream of Lampeter fails to achieve RE Class 1 due to elevated ammonia levels.			
OPTIONS	Responsibility	Advantages	Disadvantages
Further investigation into cause of problem.	NRA	Identify cause of problem and negotiate remedial action.	Cost (unknown)
Liaison with DCWW on improvements to the sewerage system/STW.	NRA/DCWW	Remedial work programmed and progressed. Improved water quality.	Cost (unknown)

Issue 4 The Ceri downstream of Troedyraur Fish Farm at Brongest fails to achieve RE Class 1 due to reduced dissolved oxygen levels.			
OPTIONS	Responsibility	Advantages	Disadvantages
Continue to monitor the discharge from the fish farm and the Ceri downstream, and if necessary review the conditions in the consent.	NRA	Assesses whether discharge consent should be reviewed	Cost £0.8k
Liaison with discharger on remedial measures/ improvements to ensure better quality effluents.	NRA/Fish Farm Owner	Improvement to effluent quality with benefit to river.	Cost to discharger (unknown)

Issue 5 The Teifi, between the Arad at Newcastle Emlyn and just downstream of Cenarth, marginally fails to achieve RE Class 1 due to elevated BOD concentrations.			
OPTIONS	Responsibility	Advantages	Disadvantages
Investigate the cause of the problem, including review of the impact of sewage and trade effluent discharges into this stretch.	NRA	Identify the source of the problem and the need for further catchment investigations.	Cost: £5k.
Review current compliance of discharges with consent conditions and assess the need for more stringent consents.	NRA	Confirmation of required actions.	Cost (unknown)
Implement a programme of farm inspections.	NRA	Identification of actual or potential point sources of pollution.	Cost: £6k for 60 site inspections
Liaise on improvements to farm effluent storage and disposal systems.	NRA/Farmers	Improvement to water quality.	Cost (unknown)
Seek to establish 'buffer zones' alongside appropriate stretches of the Teifi and its tributaries.	NRA/LPAs/ Landowners	Improvement in water quality and river corridor value	Cost (unknown)
Ensure pollution prevention measures are incorporated into future developments through planning liaison process.	LPAs/NRA	Reduction in pollution incidents	Cost to developers

Issue 6 Premature discharges from CSOs and pumping stations within the Cardigan sewerage system, together with numerous illegal cross connections within the town, lead to unacceptable aesthetic impacts, both within the Teifi estuary and the lower reaches of the Mwldan.			
OPTIONS	Responsibility	Advantages	Disadvantages
Stop illegal sewage discharges within Cardigan town and St. Dogmaels.	NRA/individual dischargers/ Ceredigion DC/ Preseli Pembs. DC.	Improved water quality.	Cost (unknown)
Improvements to sewerage system in Cardigan Area (CSOs and pumping stations).	DCWW/ Ceredigion DC.	Fewer discharges, improved water quality.	Cost (unknown); £500k allocated in AMP2
Uprating of Cardigan STW.	DCWW	Improved water quality.	Estimated Cost: £1.5million

Issue 7 An untreated sewage discharge occurs into the sea at a rocky inlet at Graig y Gwbert. A nearby hotel and residential properties are connected to this discharge. (See also Issue 9).			
OPTIONS	Responsibility	Advantages	Disadvantages
New sewer to connect properties in this area to Cardigan STW.	Ceredigion DC/ DCWW	Elimination of crude discharge, with improvements in water quality.	Cost (unknown) Increased loading to Cardigan STW.

Issue 8 Litter, from both domestic and agricultural origins, causes aesthetic impacts, mainly in the lower reaches of the Teifi.			
OPTIONS	Responsibility	Advantages	Disadvantages
Increase awareness of litter issue via public relations campaign and encourage better practices.	NRA/LAs/Farming Organisations/ KWTC	Reduced litter and improved amenity	Cost (unknown)
Develop a co-ordinated litter campaign in conjunction with local groups.	NRA/LAs/KWTC/ Local Groups	Increased public participation	Requires ongoing commitment

Issue 9 Development in some sewered areas may lead to further environmental impact.			
OPTIONS	Responsibility	Advantages	Disadvantages
Recommend refusal of planning permission in areas where inadequate sewerage systems and/or STWs cause unacceptable environmental impact and for which no remedial schemes are committed.	NRA/LPAs/DCWW	No increased adverse environmental impacts. Interim or longer term improvements may be promoted or accelerated.	Constraints on development in affected areas.
Improvements needed to some sewerage systems and STWs	DCWW/LA	Progress improvement schemes allowing further development	Cost (unknown)

ISSUES AND OPTIONS

Issue 10 Poorer than expected biological quality in the Berwyn and the Teifi downstream of the confluence with the Mwyro.			
OPTIONS	Responsibility	Advantages	Disadvantages
Further investigation into the cause of the problem using biological and chemical monitoring.	NRA	Identification of causes of problems to enable remedial measures to be affected.	Cost: £3k

Issue 11 Closed waste disposal sites present a risk of pollution arising from continuing, unauthorised disposal of materials.			
OPTIONS	Responsibility	Advantages	Disadvantages
NRA to obtain and review details of all such sites from the relevant local authority, and seek tighter control over the continuing deposit of materials.	NRA/LAs/Site Owners	Improved control of sites and reduced pollution risks.	Cost (unknown)

Issue 12 Current or increased levels of abstraction may have an adverse impact on in-river requirements, particularly the Teifi between Cenarth and Cardigan.			
OPTIONS	Responsibility	Advantages	Disadvantages
Apply abstraction licensing policy to existing and proposed abstractions.	NRA	Better identification of low flows. Better management of future licence determination.	Cost of remediation of any identified shortfall (e.g. compensation to licence holders).

Issue 13 Projected shortfall in potable water supply in near future.			
OPTIONS	Responsibility	Advantages	Disadvantages
Proposals detailing how future demands are to be met to be developed.	DCWW	NRA able to consider viability of proposals in water resource management and environmental terms.	

Issue 14 There is an inadequate hydrometric monitoring network within the catchment.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake review of the catchment to assess benefits and costs of installing additional hydrometric monitoring facilities.	NRA	More accurate flow assessment to enable better determination of licences and consents. May assist in flood warning standards of service.	Cost: additional monitoring is expensive to provide.

Issue 15 Flood protection standards for towns and villages on the Teifi valley flood plain are believed to be below the indicative standard for residential areas.			
OPTIONS	Responsibility	Advantages	Disadvantages
Determine existing levels of flood protection and feasibility of undertaking improvement works for each site.	NRA	Increased standard of flood protection to property at risk of flooding.	Cost of improvement works or increased maintenance.
If feasible, and subject to funds being available, undertake improvement works or increase channel maintenance.	NRA	As above	May be detrimental environmental impacts.
Impose the maintenance of the natural run-off regime for future development within the catchment.	LPAs/NRA/WO (Highways)	Preserve existing flood protection standards	Perpetuate existing infrastructure

Issue 16 Trees dislodged during flood events can cause general river bank instability, increased shoaling within the river channel and reduced flood protection standards.			
OPTIONS	Responsibility	Advantages	Disadvantages
Develop and implement a tree management programme.	NRA	Reduce flood risk to downstream properties. Reduce the need for in-channel works. Maintain bankside stability. Optimise tree cover in the river corridor. Protect bankside ecology.	Cost: £10k p.a.

Issue 17 S105 surveys are required to identify the extent of land liable to flood.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake S105 survey for the catchment.	NRA	Flood plain and flood defence problems identified to enable the NRA to advise LPAs for Local District Plan preparation. NRA better placed to advise LPAs and developers on impacts of proposed development and on possible measures to offset such impacts.	Cost: £73k.

Issue 18 The flood warning scheme for Pontrhydfendigaid does not comply with our target standards.			
OPTIONS	Responsibility	Advantages	Disadvantages
Review existing scheme and determine areas for improvement	NRA	Improved standard of flood warning to public at risk.	Cost: £10k
Implement improvements.	NRA		

Issue 19 There are areas without the benefit of flood warning schemes.			
OPTIONS	Responsibility	Advantages	Disadvantages
Investigate feasibility of providing schemes.	NRA	Flood warnings provided to public at risk.	Cost (unknown)
Implement schemes where possible.			

Issue 20 There is a need to reduce gravel removal costs.			
OPTIONS	Responsibility	Advantages	Disadvantages
Review existing operations and improve where possible.	NRA	Reduced costs of removal and haulage of gravel.	Cost: £32k
		Improved flood protection standards.	
		Reduced disturbance by limiting dredging operations to specific sites.	

Issue 21 There are minor flooding problems in urban areas within the catchment as a result of the overloading of existing culverts.			
OPTIONS	Responsibility	Advantages	Disadvantages
Investigate and replace existing culverts.	NRA/LAs/ WO (Highways)	Improve flood protection standards.	Cost (unknown)
Impose the maintenance of the natural run-off regime for future development within the catchment.	As above	Preserve existing flood protection standards.	Perpetuate existing infrastructure. Cost to developers.
Adopt a minimum size for future culverting works.	As above	Minimum disruption to urban infrastructure. Clear defined parameters for developers and planners. Ensure adequate capacity and easier maintenance.	Cost (unknown)

Issue 22 Impaired migration for salmon and sea trout due to obstructions to passage.			
OPTIONS	Responsibility	Advantages	Disadvantages
Identify sites and establish programme of works in compliance with our Brown Trout Strategy.	NRA	Appropriate solutions identified. Cost/benefit analysis undertaken.	Cost: £0.5k.
Carry out improvement programme subject to available finance and agreement with riparian owners.	NRA/Riparian owners	Increased natural productivity.	Cost: £0.5k to £10k. Increase in vulnerable poaching areas.

Issue 23 "Standards of Service" for SSSIs have not been formally agreed with CCW, and management statements need to be prepared for potential SAC sites.			
OPTIONS	Responsibility	Advantages	Disadvantages
Agree "Standards of Service" and implement.	NRA/CCW	SSSIs safeguarded.	Cost (unknown)
Review NRA activities affecting potential SACs	NRA	Potential SACs safeguarded	Cost (unknown)
Produce management statement for potential SACs	NRA/CCW	As above	Cost (unknown)

Issue 24 Poaching, particularly in the lower reaches and the estuary, continues to be a problem.			
OPTIONS	Responsibility	Advantages	Disadvantages
Through planning and prioritisation, maximise the effectiveness of enforcement activities.	NRA	Protect stocks for legitimate harvesting and spawning.	Cost
Maximise the use of the Criminal Intelligence Service.	NRA/Fishery Owners	Improved information and success at apprehending poachers.	Reduces ability of staff to devote time to other elements of work.
Maximise the use of new technology and methods of operation.	NRA	As above	Cost
Maximise the use by the public of the 0800 24 hour emergency telephone service.	NRA/Angling Interests/Riparian Owners	As above	

Issue 25		Brown trout stocks in the upper Teifi catchment are sub-optimal.	
OPTIONS	Responsibility	Advantages	Disadvantages
Review data on upper catchment and identify gaps.	NRA	Further study needs identified.	Cost: £0.5k
Implement further studies to assist in identification of status of stocks and causes of decline, and to make recommendations.	NRA/Angling Interests	Identify appropriate solutions.	Cost: £10k
Implement programme of improvement works as appropriate in compliance with strategies.	NRA/Angling Interests/Land Owners	Improved trout stocks and fishery values.	Cost: dependent on scale of works required.

Issue 26 Shortfalls in salmon stock abundance, particularly of early running multi-sea winter fish, have been identified.			
OPTIONS	Responsibility	Advantages	Disadvantages
To implement the recommendations of the Net Limitation Order/Byelaw review for rods and nets subject to confirmation by the Secretary of State for Wales.	NRA	Reduced exploitation by rods and nets resulting in greater escapement for spawning. Improved stock abundances. Improved protection of early run	Increased enforcement requirements. Reduced income to netsmen and fishery owners possible.
Monitor the effectiveness of the measures and adjust the regulation of the fisheries accordingly.	NRA/Angling and Netting Interests.	Improved fisheries management.	Cost: dependent on scale of monitoring required in practice.

Issue 27 There is a need to carry out a River Habitat Survey (RHS) in order to identify habitats in need of restoration/improvement/protection.			
OPTIONS	Responsibility	Advantages	Disadvantages
Carry out RHS.	NRA	Base-line data collected.	Cost: £5k
Review RHS data.	NRA/CCW/RSPB/Angling Clubs	Identify those areas requiring improvements/special protection.	Cost: £1k
Seek to secure collaborative schemes (e.g. to secure European funding) where the need for improvements are identified.	NRA/CCW/RSPB/Angling Clubs/Riparian Owners/Land Owners	Improvement in habitat diversity and abundance.	Costs (unknown)

Issue 28 Riparian tree cover is lacking between Lampeter and Cors Caron.			
OPTIONS	Responsibility	Advantages	Disadvantages
Identify a programme of tree planting and fencing in upper catchment.	NRA/Riparian Owners	Appropriate works identified.	Cost: £2k
Implement programme subject to funding and riparian owner consent/contribution	NRA/Riparian Owners/Angling Interests	Improved habitat diversity and cover for otters, fish and other wildlife.	Cost: dependent on location and scale of scheme involved.

Issue 29 There are few coarse fisheries within the catchment.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake a Demand Survey and assess the results against the availability of angling.	NRA/Riparian Owners/Angling Interests	Actual requirements identified.	Cost: £2k
Improve facilities on a prioritised basis	As above	Appropriate facilities developed.	Cost: dependent on outcome of demand survey.

Issue 30 The extent and potential impact of the root disease Phytophthora on Alders is unknown.			
OPTIONS	Responsibility	Advantages	Disadvantages
Undertake survey to assess the extent of the disease.	Forestry Authority/CCW/NRA/Landowners	Clarification of risk	Cost (unknown)
If required, develop appropriate management measures to control the spread of the disease.	As above	Alders protected Reduced risk of flooding problems caused by fallen trees.	Cost (unknown)

Issue 31 Development on flood plains conflicts with flood defence requirements.			
OPTIONS	Responsibility	Advantages	Disadvantages
Close liaison between NRA and LPAs to ensure protection standards are not compromised.	NRA/LPAs/WO	No reduction in existing flood protection. Developer pays for any necessary mitigation works, rather than public.	Cost to developer.
Keep flood plains free from development.	As above	Ensures that existing defences and river channel can be maintained at reasonable cost and new defences provided in future if required.	Reduction in land available for development.

Issue 32 Access for canoeists to navigable stretches of the main river is very restricted.			
OPTIONS	Responsibility	Advantages	Disadvantages
WCA to establish contacts with angling interests and riparian owners to pursue access agreements.	WCA/NRA/Angling Interests/Riparian Owners	Increase recreational use of river. Possible income for angling clubs and fishery owners.	Possible disturbance to fisheries and conservation.

Issue 33 The impact of the abstraction at the DCWW pumping station at Llechryd, together with the effectiveness of the fish exclusion provisions, are unknown.			
OPTIONS	Responsibility	Advantages	Disadvantages
The operation of the fish exclusion provisions to be examined, recommendations made and implemented.	DCWW/NRA	Protection of smolts ensured and consequently improved runs of salmon and sea trout likely. Compliance with statutory requirements.	Cost: dependent on scale of work required.
Impact of reduced flows on fisheries/ecosystem below the intake to be reassessed in light of current knowledge and research.	NRA/CCW	Appropriate works identified. River ecosystem and fisheries afforded maximum protection.	Cost: £2k.
Implement recommendations if appropriate.	DCWW/NRA		Cost: dependent on scale of recommendations.

Issue 34 Water based recreation, in particular through the use of powered craft, can have adverse impact on fisheries and conservation and on the interests of other users.			
OPTIONS	Responsibility	Advantages	Disadvantages
Review the present controls on such activities and to recommend amendments.	Harbour Authority/LAs/Teifi Fairway Committee.	Identification of conflicts and remedies.	Possible reduction in enjoyment by powered craft users.
Implement the recommendations and their enforcement as appropriate.	As above	Protection of fisheries and conservation value of area. Improvements to public enjoyment and safety. Reduction in conflict.	Costs of implementation and enforcement.

PART II

SUPPORTING INFORMATION

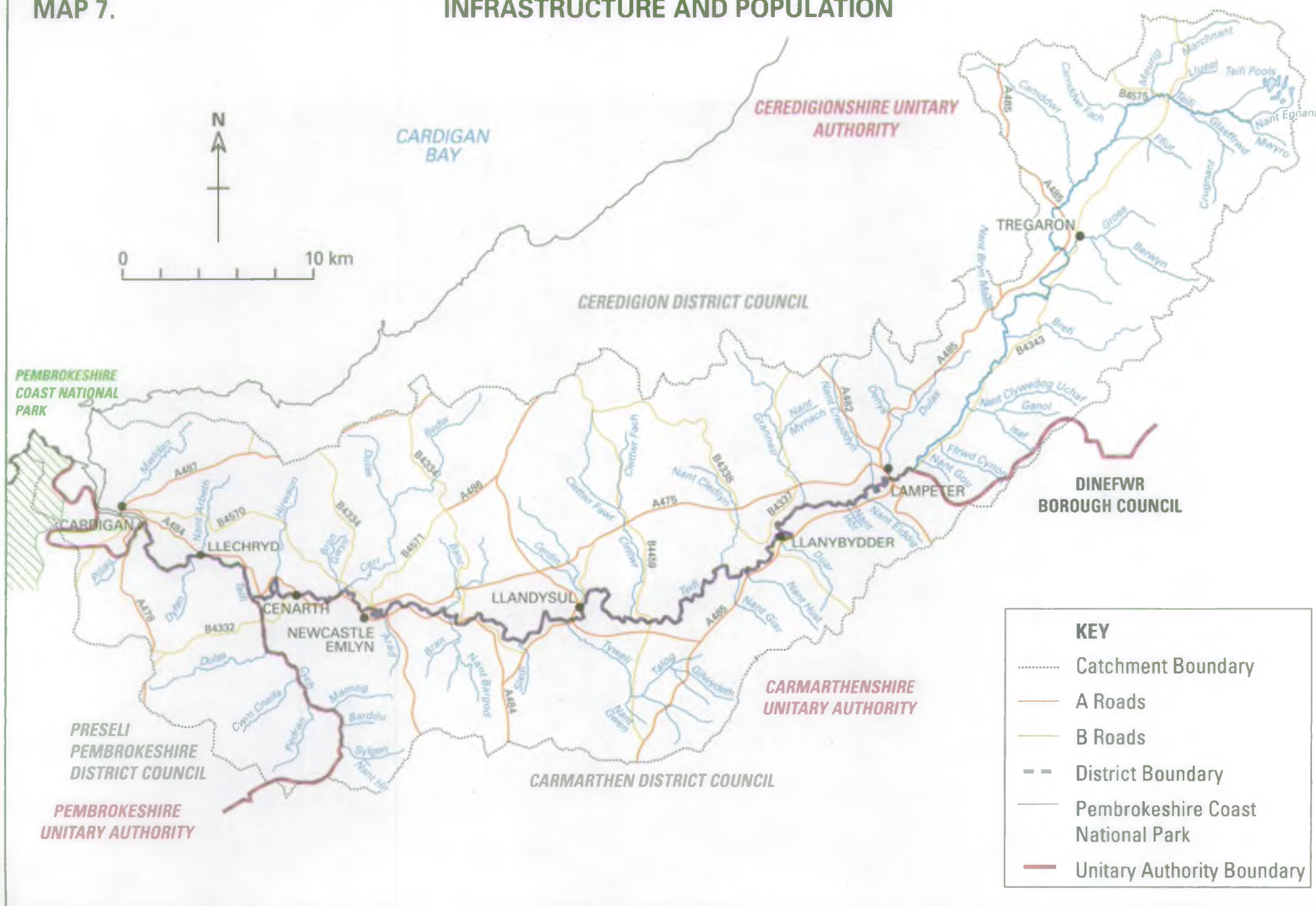
4.0 THE USES OF THE TEIFI CATCHMENT

The following sections catalogue the legitimate Uses of the Teifi catchment which fall under our control or affect us in one way or another.

- The **General Information** gives an outline of the nature of our responsibility towards each Use.
- The **Local Perspective** gives more detailed information about the Uses, within this catchment.
- We have set management **Aims** and **Environmental Requirements** for each Use. These are designed to protect both the environment and the needs of other Uses.
- In **Section 5** these specific targets are used to help us set overall **targets**, for the whole catchment, for water quality, water quantity and physical features, that reflect our view of the balance of interests between the different users of water.

MAP 7.

INFRASTRUCTURE AND POPULATION



4.1 URBAN DEVELOPMENT (including road and rail)

General Information

The development of the urban or "built" environment is a land use which can affect the water environment and its uses. Such development is generally controlled via the local authority planning process involving the production of development plans and the approval of specific development proposals. The move to "plan - led" development has further increased the importance of development plans.

We attach great importance to the effective influence of the planning process through all its stages. Detailed comments are provided on all development plans and development proposals received by the NRA as a statutory planning consultee. The Authority has produced the document "Guidance Notes for Local Planning Authorities on the Methods of Protecting the Water Environment through Development Plans". Responses to planning consultations often include proposed "planning conditions" which the planning authority may include within planning approval.

Certain types of development are promoted for approval by other statutory procedures. These include major developments such as roads, railways, airports and barrages. These also are influenced and controlled by early consultation.

A key purpose of this plan is to provide planning authorities and prospective developers with information about the management and use of the water environment in this catchment, our policies and potential environmental constraints including flood risk. This should also facilitate the identification of appropriate development opportunities.

The final decision on development plan policies and development proposals are taken by planning authorities, planning inspectors or the relevant Secretary of State. However government guidance includes reference to the need to fully consider our comments when determining development plans or proposals.

When the Authority objects formally to a development proposal then supporting evidence will be provided at any subsequent Planning Appeal or Public Inquiry.

The NRA's policies for the management of the water environment are based on the sustainability principle. It is hoped that this plan can effectively link with other plans for the built environment so as to provide mutual support for development which is environmentally and economically sustainable.

Local Perspective

The catchment is currently within the administrative County of Dyfed with Ceredigion, Carmarthen, Preseli Pembrokeshire and Dinefwr responsible for local matters. With the formation of the new unitary authorities in April 1996, Dyfed County will cease to exist and functions will transfer to the new local county authorities, based largely on existing districts. The percentage of the catchment which each occupies is shown below.

County Council	District/Borough/Council	Unitary Authority (from April 1996)
Dyfed (100%)	Ceredigion (68%)	Ceredigionshire (68%)
	Carmarthen (21%)	Carmarthenshire (22%)
	Dinefwr (1%)	
	Preseli Pembs. (8%)	Pembrokeshire (8%)

A small proportion (2%) of the catchment, around Cemaes Head, lies within the Pembrokeshire Coast National Park.

The Dyfed County Structure Plan was adopted in 1983 and, following review, an amended document was approved in 1989 to cover the period 1986 to 1996. The Structure Plan will continue in force after re-organisation of local government until such time as a unitary development plan becomes fully operative. Most of the allocation for development is in the existing towns and main villages.

Our population prediction estimates indicate an overall growth of approximately 17% within the catchment, to the year 2021. However, future trends in the economy will influence growth to a large extent.

<u>Main Towns/Villages</u>	<u>Approx. Population (1991 Census)</u>
Cardigan	4,350
Lampeter	1,989
Llechryd	550 (estimated)
Newcastle Emlyn	931
Llanybydder	1,540 (rural area)
Llandysul	1,300

The current status for Local Plans for each Council is as follows:-

- Preseli Pembrokeshire DC - Draft Deposit produced February 1994. Decision awaited following EIP (Examination In Public).
- Carmarthen DC - Draft Deposit produced May 1995. Response to consultation period is currently being considered.
- Ceredigion DC - Draft Consultation produced May 1995. Deposit plan awaited.
- Pembrokeshire Coast National Park - draft Deposit plan produced.

In common with much of rural Wales, a key goal for the Teifi catchment is to achieve sustainable economic and community development. It is therefore important that the policies of all statutory bodies can be brought together in integrated actions to this end. The Development Board for Rural Wales (DBRW) has a role to play in this process as it acts to stimulate investment and create employment in rural businesses. In addition, on a more localised level, Antur Teifi, a Local Enterprise Agency operating in the Teifi Valley and southern parts of the Ceredigion District, is a community based organisation working closely with the local population, organisations and agencies to strengthen and improve the economic and social infrastructure of the area.

Aims

To ensure that development or construction activity does not damage the water environment or detract from its use.

To ensure that development does not affect the water environment so as to threaten life or property.

To promote opportunities within developments that will enhance the water environment and its use.

Environmental Requirements:

Water Quality

Development should not adversely affect the water quality requirements of other uses in the catchment.

Development must not cause the failure of any Statutory Water Quality Objective within the catchment.

Developments should be consistent with relevant NRA policies. These include the "Policy and Practice for the Protection of Groundwater", and policy on "Development in Sewered Areas".

Water Quantity To protect inland waters from the detrimental effects of development, including afforestation and other changes in land use.

Physical Features Development should not have an unacceptable flood risk.

Development should not create an unacceptable flood risk in other areas.

Developers must pay for work needed to assess and reduce flood risk.

Development should be consistent with NRA policies, including the Flood Plain Policy (in production), and Policy and Practice for the Protection of Groundwater.

Development should not adversely affect the requirements of other uses in the catchment, including those associated with the conservation of the natural water environment.

4.2 FLOOD DEFENCE

General Information

This Use relates to the protection of people and property against flooding from rivers and the sea and primary role of the river as a drainage system for surface water.

Flooding normally follows from extreme climate conditions such as very heavy rainfall causing high river flows and, in coastal areas, surge and storm generated waves combining with high tides. The severity of an individual flood event is generally described in terms of its frequency of occurrence. This is often expressed as a return period in years, for example, 1 in 50 years (i.e. a flood of this severity would, on average, be expected to occur once in a 50 year period).

Areas of land next to rivers known as flood plains or washlands take the additional flow or naturally store water when the channel capacity is exceeded. If significant areas of flood plain are embanked, tipped or built upon the lost storage volume leads to higher river levels elsewhere.

The coastline of Wales has been divided into a series of Coastal Cells. The boundaries of each cell have been set to reflect the boundaries of the natural physical processes acting on that section of coast. Coastal Groups have been formed containing representatives of each Maritime District Council, the NRA and other bodies with an interest in the management of the Coastline.

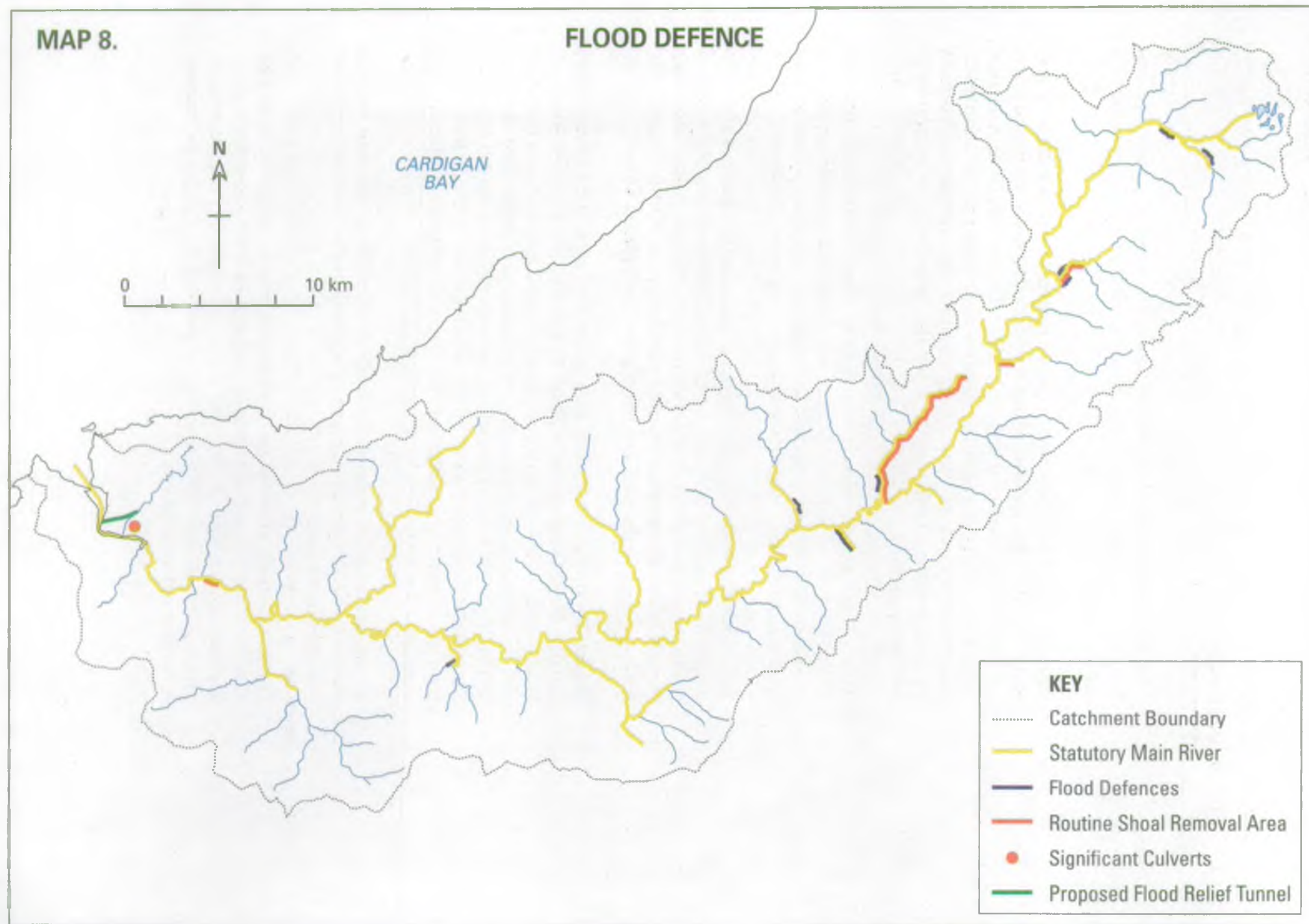
Recent Government publications such as the PPG on Coastal Planning and Circular 68/92 Development in Flood Risk Areas, place a requirement on local planning authorities to take account of coastal processes and flood risk in their determinations. The sources of information to assist these decisions will be the S.105 Survey presently under preparation by the NRA and the Shoreline Management Plan as agreed with the Coastal Group formulated from study work undertaken on the physical influences affecting the coastline.

Recent guidance has now been issued by Central Government on the preparation of Shoreline Management Plans to ensure a consistent approach between Coastal Groups.

Flood alleviation schemes are constructed where necessary and cost effective. The standard of protection to be provided is determined by an analysis of the options for the most economically and technically advantageous solution. For a scheme to proceed the benefits in financial terms must outweigh the costs.

MAP 8.

FLOOD DEFENCE



The Water Resources Act 1991 requires the NRA to exercise general supervision over all matters relating to flood defence. Powers are also provided for the issue of consents for works on rivers and watercourses designated as Main River and for ensuring the maintenance of flow in river channels and the removal of obstructions.

The Land Drainage Act 1991 provides the Local Authority and where appropriate Internal Drainage Boards with powers to carry out flood defence works to ensure the proper flow of water. The 1991 Act also provides the NRA with additional consenting powers on ordinary watercourses.

The provision of flood defences including the maintenance of channel capacity, needs to be executed with care if other Uses - notably fisheries and conservation - are not to be affected unduly. Consultations are carried out within and outside the NRA during the formulation and undertaking of schemes. In this way, wherever feasible, and consistent with the original purpose, habitat enhancements and the needs of landscape and heritage will form part of the scheme.

Water Level Management Plans will be drawn-up for sites agreed with the Countryside Council For Wales in accordance with the guidance issued by MAFF/Welsh Office.

The NRA provides and operates a flood warning system on designated main rivers and coastal areas at risk from flooding by the sea. The system provides warnings to the police who pass the warnings to the general public.

Local Perspective

Within the catchment there is a total length of 240km of river comprising the Teifi and some 18 tributaries where we have primary flood defence responsibility. The main feature of the Teifi from a flood defence viewpoint is its extensive flood plain. Flood waters occupy the flood plain each winter for long periods during and after flood events and this natural storage results in flood flows which are less flashy than in adjoining catchments. It is important that the natural storage is preserved in order to maintain existing flood protection standards.

Several towns and villages have developed on the flood plain and flooding problems exist at a number of locations. There are known flooding problems on Main River at Cardigan, Newcastle Emlyn, Llandysul, Llanybydder, Lampeter, Tregaron and in the villages of Llechryd, Cenarth, and Pontrhydfendigaid. The last major catchment wide flood occurred in 1987 and flooding of property was recorded at all of these sites.

As a result of these floods, schemes have been undertaken at Tregaron, Lampeter and Llechryd to improve flood protection standards. At other locations a regular programme of maintenance work is carried out in order to preserve existing flood protection standards. Tidal flooding is not a significant problem in the catchment although tidal effects do contribute to flooding problems at Cardigan and St. Dogmaels. These and other problems have led to a "controlled run-off" requirement for new developments in parts of the catchment, which restricts the rate of run-off to a natural regime. We seek to incorporate suitable conditions into appropriate planning permissions to achieve this requirement.

In June 1993 a belt of localised thunder storms affected the catchment and extensive and catastrophic flooding resulted in Cardigan town centre from the Mwldan Brook and also at St. Dogmaels. A major flood alleviation scheme aimed at improving flood protection standards in Cardigan has been promoted by the District Council involving upgrading the existing watercourse through the town centre and providing a tunnel which will allow flood waters to bypass the town centre. The scheme is due for completion by 1997.

In the 1960's and 1970's works were carried out on a number of the Teifi tributaries in order to improve the drainage of the adjoining flood plain and increase its agricultural productivity. These schemes require regular maintenance in order to ensure their effectiveness and there is a continuing commitment to their future maintenance, where take up of agricultural benefits has occurred. Such maintenance works involve minor shoal removal, some bank protection works and trimming of bankside vegetation. We consult widely with conservation bodies before works are undertaken in order to minimise any environmental impact.

The current maintenance regime for the Teifi catchment consists of regularly inspecting and maintaining existing flood defences; managing bankside vegetation; and removing gravel shoals and other debris from the channel to maximise channel capacity, particularly at bridge crossings. Much of the river corridor is tree lined and under flood conditions trees are sometimes uprooted and swept downstream where they can cause blockages at bridges and other restrictions to flow. A tree management programme is an essential part of the overall maintenance regime for the catchment. Not only does it minimise the flood risk in the urban areas due to tree blockage, but it also helps to maintain effective bankside cover which provides a natural defence against erosion and therefore reduces the need for gravel shoal removal and in-channel works.

Generally flood damage within the catchment has been reduced by the provision of alleviation schemes together with an ongoing programme of maintenance works. However damage potential is further reduced by issuing flood warnings for those areas of the flood plain where flood warning schemes have been introduced.

Aims

To maintain existing flood defences for people and property against flooding from rivers and the sea, taking account of environmental requirements.

To improve the standard of flood defences where appropriate by promoting and constructing new flood defences.

To maintain effective drainage, taking account of environmental requirements.

To provide warnings of imminent flooding to the public (via the police) where appropriate.

Environmental Requirements:

Physical Features

In protected areas, the flood defences/river bank should not be overtopped by a flood flow within a specified return period.

In areas where land use is primarily agricultural, the watercourse should provide effective drainage, taking account of environmental requirements.

No development should be permitted which would impair the effectiveness of any flood defence scheme or prevent access for maintenance of flood defences.

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

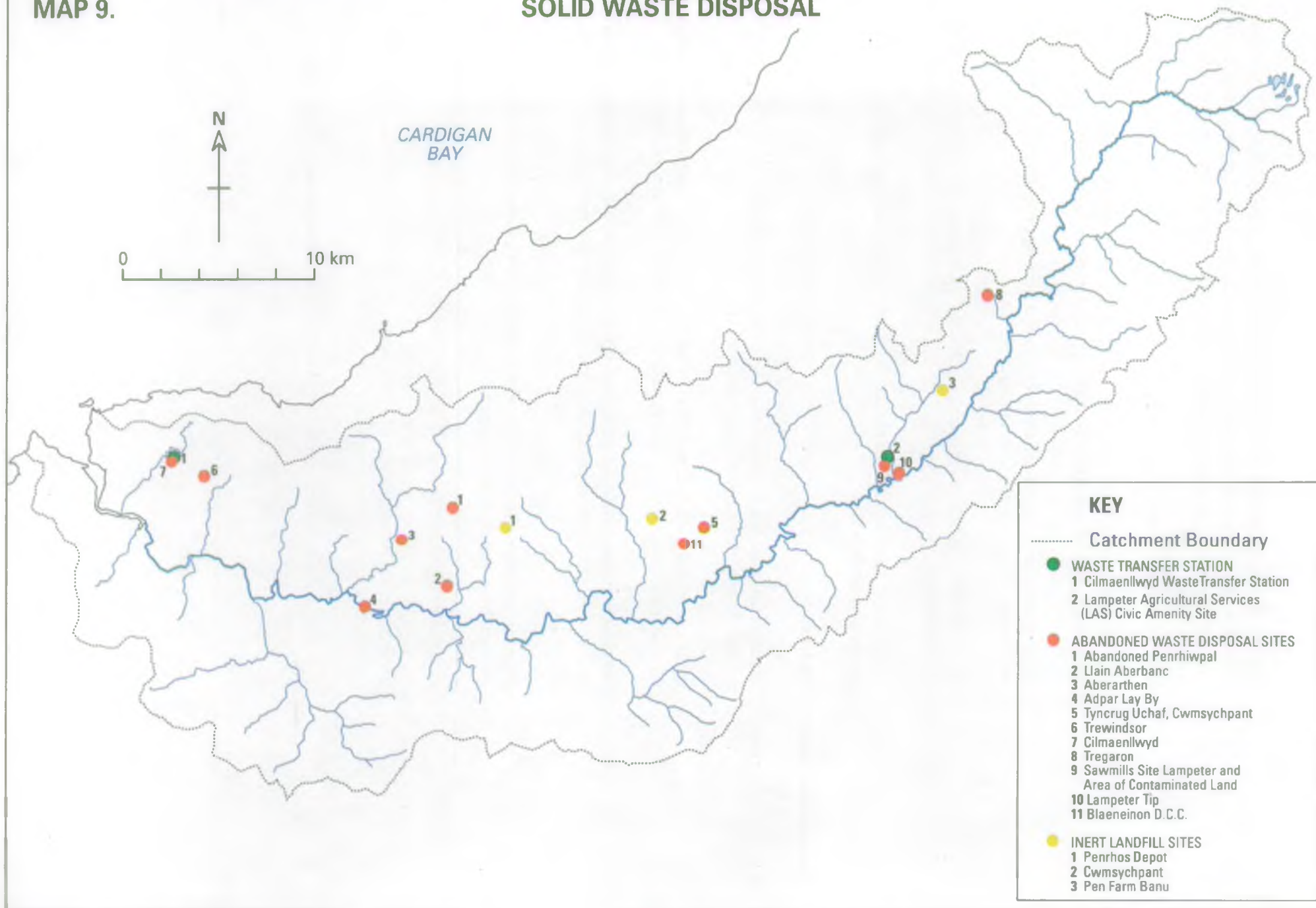
Adequate arrangements should be provided for flood warning.

Environmental requirements will be taken into account when designing and undertaking flood defence works.

The operating practices agreed in Water Level Management Plans will be followed.

MAP 9.

SOLID WASTE DISPOSAL



4.3 SOLID WASTE DISPOSAL (LANDFILL)

General Information

The disposal of domestic, commercial and industrial waste into landfill sites is a common form of waste disposal in England and Wales. Sites receiving material that is not inert have the potential to produce a toxic liquid effluent (leachate) which can pollute surface and groundwater. Consequently our policy is for all new sites to be designed and operated in a way that contains any liquid effluents. This is monitored by the NRA. Older sites may cause pollution long after tipping has ceased and in these cases, the owner or operator may be required to undertake remedial works.

Waste Regulation Authorities (WRAs) presently issue (Waste Management) licences to handle waste or operate a waste disposal site under the Environmental Protection Act 1990. The NRA is a statutory consultee on applications for all landfill waste management licences.

Local Perspective

There are no active domestic waste disposal sites within the catchment. A waste transfer station at Cilmaenllwyd receives domestic refuse for compaction and bailing prior to transportation outside the area.

There are two civic amenity sites, at Cilmaenllwyd and Lampeter, which accept domestic refuse. There are three landfill sites which are licensed to receive inert waste only; Penrhos depot, Cwmshychpant and Penbanu Farm

We have undertaken routine water quality surveys of the watercourses adjacent to the abandoned waste disposal sites to monitor the possible production and impact of leachate. Sheep dip chemicals have been detected in the leachate emanating from Tregaron tip. In spite of investigation, the source has not been identified, although it is likely to be as a result of inappropriate disposal of sheep dip on site. Material from an unlicensed abandoned tip site at Trewindsor Farm, Penparc, slipped in June 1993 causing elevated suspended solids in the Arberth.

Aims

To ensure that waste disposal sites are designed and operated in a way that does not adversely affect other uses of surface water or groundwater.

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

Environmental Requirements:

- Water Quality** Waste disposal sites must be designed and managed to prevent liquid effluent from adversely affecting the quality of surface water and groundwaters.
- All Waste Management sites must comply with the conditions included in the licence, enforced by the WRA.
- Sites must comply with the conditions included on any discharge consent or prohibition notice, issued and enforced by the NRA.
- Water Quantity** Waste disposal activities must not harm groundwater resources or adversely affect the rights of water abstractors.
- The NRA's Position Statement regarding landfill and waste management can be found in the document "Landfill and the Water Environment".
- Physical Features** Windblown litter from waste disposal sites must not be permitted to create an aesthetic problem in adjacent rivers, estuaries or coastal waters.
- Following the cessation of tipping, all aftercare provisions stated on the planning consent, or licence surrender conditions, must be carried out by those responsible.

4.4 FISHERIES

General Information

The Fisheries Use addresses the protection, maintenance and improvement of fish stocks within the catchment: angling is covered in Section 4.13 as a recreational Use.

In order to protect different types of fishery the EC Freshwater Fish Directive (78/659/EEC) provides two levels of protection for water quality to support:-

- Salmonid fisheries - e.g. salmon and trout.
- Cyprinid fisheries - generally referred to as coarse fisheries.

A third category:-

- Migratory waters - i.e. waters that are used for the passage of migrating fish such as salmon and sea trout

is largely protected by the provisions of the EC Dangerous Substances Directive which applies to all controlled waters. In addition, standards contained in our policy for the protection of estuarine water are applied to this use.

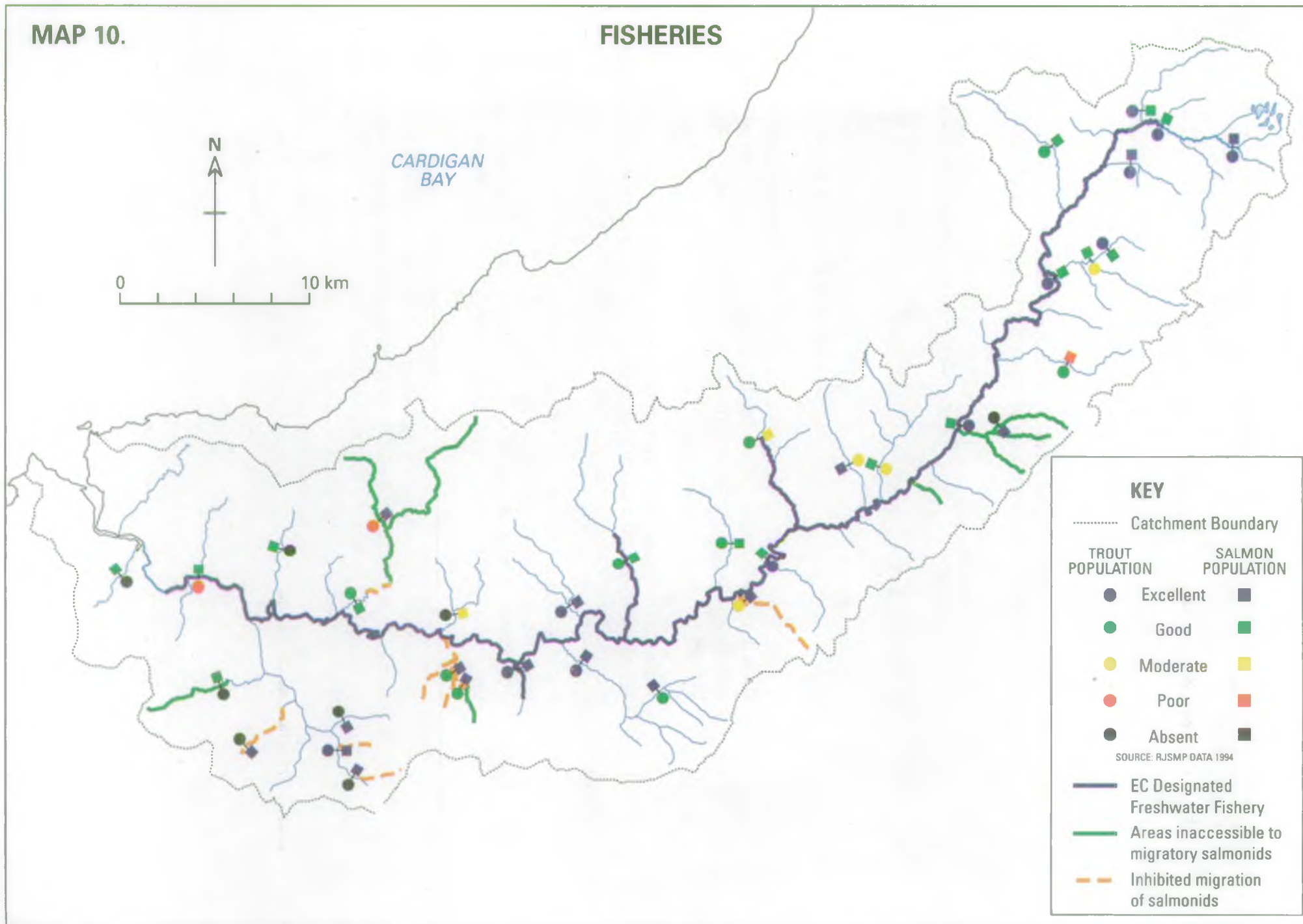
While the Freshwater Fish Directive can only be applied by statute to certain 'identified waters', the standards it contains will be used informally, for the purposes of CMPs, to assess the whole catchment for this Use.

Water quantity and the physical habitat are also very important factors in the conservation of fish stocks. While these factors do not receive the protection from formal targets, as applied to water quality, the CMP process will help to identify the requirements for their protection in the clearest manner possible.

The control of 'poaching' is a vital aspect in the conservation of fish stocks and we employ a sizeable Bailiff force to enforce the legal protection offered to fish stocks by both the Salmon and Freshwater Fisheries Act (1975) and the Salmon Act (1986).

MAP 10.

FISHERIES



Local Perspective

The Teifi supports one of the most productive mixed stock (salmon and sea trout) fisheries in Wales. Although historically it has been noted as a salmon river, with sea trout apparently being scarce prior to the 1920's, the numbers and size of the Teifi sea trout have increased considerably since then. The catchment also supports a healthy population of wild brown trout but anecdotal evidence suggests that the numbers of large brown trout have declined since the 1950's.

Many tributaries and main river sites have been surveyed routinely since 1985 as part of the Regional Juvenile Salmonid Monitoring Programme. The results indicate that the Teifi catchment supports good juvenile salmonid populations with densities amongst the highest in Wales. During the 1994 surveys salmon parr were recorded as present at 93% of accessible sites and trout were present throughout, with 91% of sites classed as excellent or good for this species. Juvenile salmon were particularly abundant in the middle reaches of the main river where the numbers recorded were the highest in the South West Wales. Even so, production of salmon is lower than expected for the catchment.

Stocks of trout appear to be reduced locally in the inaccessible tributaries, the Hirwaun and the Cynllo. There is also concern that stocks have not fully recovered following a major pollution of the upper Teifi upstream of Pontrhydfendigaid which resulted from a discharge from the Strata Florida WTW in 1989.

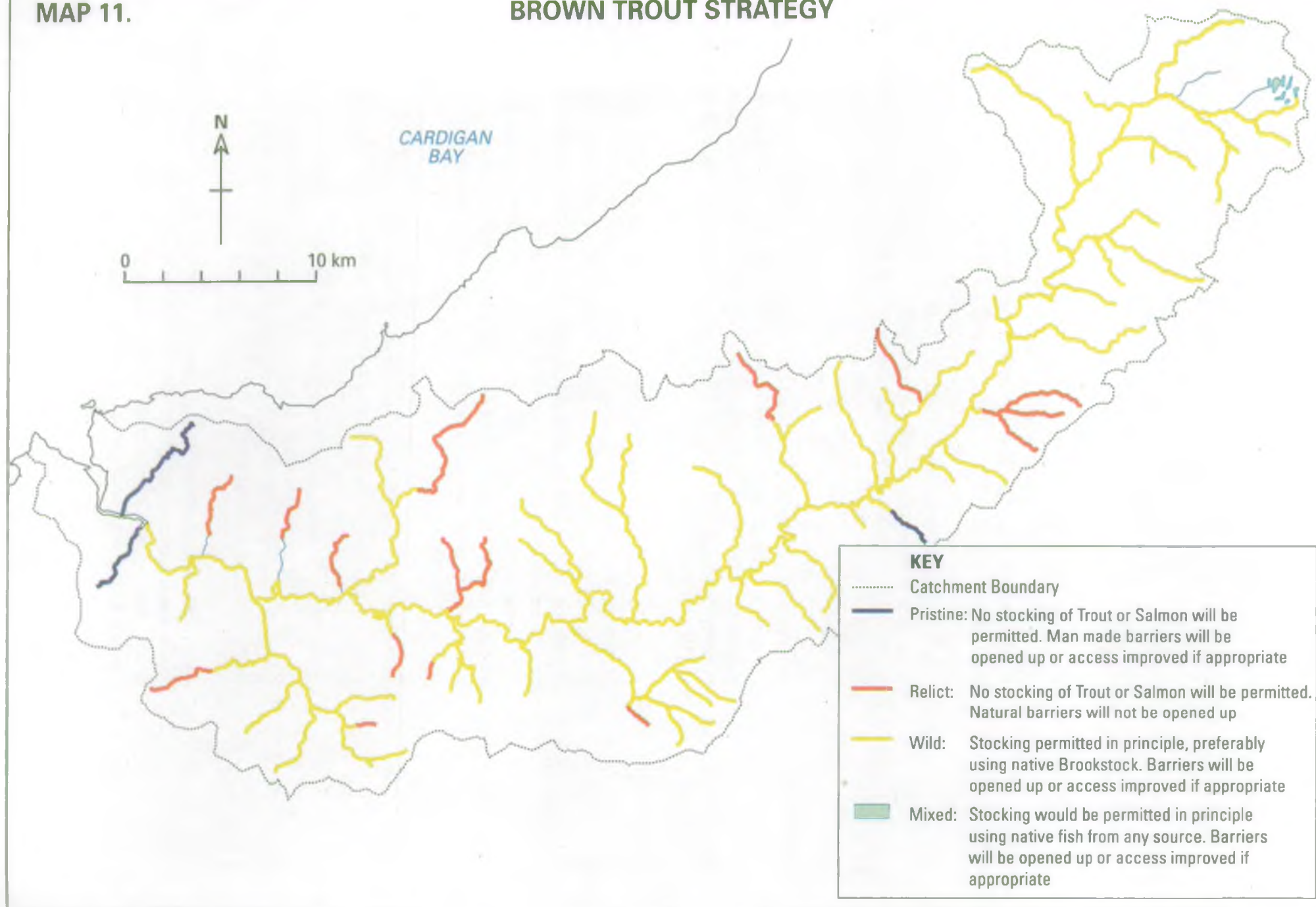
In order to protect important native brown trout populations, the rivers within catchment have been categorised in accordance with our Brown Trout Strategy. Those areas which have not been stocked are afforded the greatest protection. Future stocking of these areas will not be permitted nor will natural impassable barriers be opened up. This is in order to maintain the genetic integrity and fitness of these stocks to ensure their long term survival. The majority of the areas fished by anglers have rarely been stocked in the past, and therefore any restocking would preferably be undertaken using native broodstock.

Significant stretches of the catchment are designated as 'salmonid' waters under the EC Freshwater Fisheries Directive (78/659/EEC). The main river Teifi is designated throughout virtually all its length with only the extreme upper catchment upstream of Pontrhydfendigaid being excluded. Substantial lengths of the tributaries Siedi, Clettwr and Grannell are also included. The catchment has complied with the standards for salmonid fisheries contained in the Directive in recent years.

Other fish species present in the catchment include minnow, stickleback, stone loach, lamprey, grayling, pike, perch, eel, bullhead and American brook char. A small population of grayling in the Llanybydder area has remained localised and shows no signs of expanding its range. Perch are

MAP 11.

BROWN TROUT STRATEGY



found in Falcondale Lake, Lampeter , and are believed to escape occasionally into the main river. Pike have spread in the upper main river around Tregaron since their illegal introduction about 20 years ago, but control measures and habitat limitations appear to be keeping their numbers in check. American brook char were introduced to Llyn Hir (Teifi Pools) in the 1970's and there was some evidence of successful breeding, though no char were recorded from extensive netting surveys in the mid 1980's.

Aim To sustain, or assist the recovery of, the populations of wild fish species at the levels appropriate to a catchment of this type and to protect the passage of migrating fish into and from freshwater.

Environmental Requirements:

Water Quality

Rivers Waters should comply with the appropriate standards under the EC Freshwater Fish Directive (78/659/EEC).

Stillwaters These waters should comply with the same standards as set for rivers.

Estuaries These waters should comply with the appropriate standards of the EC Dangerous substances Directive and the appropriate standards in the NRA policy for the protection of estuarine water quality.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features An appropriate diversity of natural instream and bankside habitats should be maintained to support the fish typical of the river type.

Appropriate levels of riparian and instream vegetation should be maintained to provide adequate cover for fish.

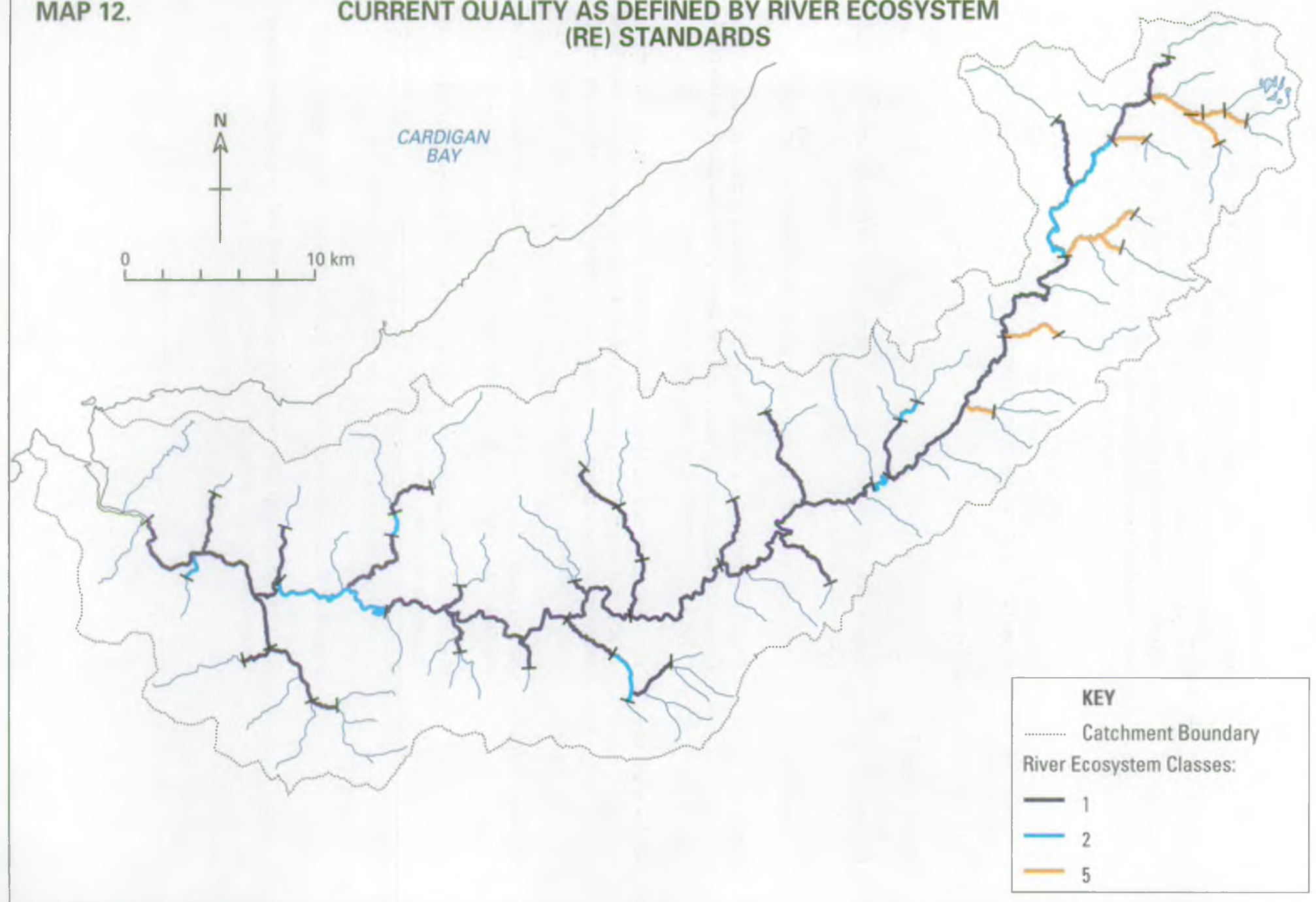
Artificial barriers should not obstruct passage of migratory fish.

Natural or artificial barriers should not lead to excessive exploitation of fish.

River maintenance and other works should be carried out in a way that causes the least detrimental impact on the fishery.

MAP 12.

CURRENT QUALITY AS DEFINED BY RIVER ECOSYSTEM
(RE) STANDARDS



4.5 RIVER ECOSYSTEM

General Information

The River Ecosystem (RE) Use addresses the protection, maintenance and improvement of the basic water quality required to support different types of river ecosystem (including fisheries). The Use is based on the River Ecosystem Classification Scheme which comprises five classes of water quality of which RE Class 1 has the highest quality.

RE Class 1: Water of very good quality (suitable for all fish species)

RE Class 2: Water of good quality (suitable for all fish species)

RE Class 3: Water of fair quality (suitable for high class coarse fish populations)

RE Class 4: Water of fair quality (suitable for coarse fish populations)

RE Class 5: Water of poor quality (which is likely to limit coarse fish populations)

Further details of the scheme may be found in Surface Waters (River Ecosystem) (Classification) Regulations 1994.

This scheme is especially useful for setting objectives which we use as planning targets to manage catchment water quality (see section 5.1).

Local Perspective

It is intended that the water quality of the catchment should be of a very good standard, able to support a thriving Salmonid fishery. Typically this would require the quality to be of RE Class 1, and the Long Term River Quality Objective (LTRQO) for most of the catchment has been set at RE Class 1.

Our assessment, based on 1992-94 data, shows that some of the headwaters, the Glasffrwd, Ffleur, Groes, Berwyn, Brenig, Brefi and Clywedog are RE Class 5 due to low pH, as are the upper reaches of the Teifi upstream of Pontrhydfendigaid.

The Teifi upstream of Strata Florida is RE Class 3 due to elevated zinc levels.

The Teifi downstream of Lampeter is RE Class 2 due to increased ammonia levels. The Tyweli upstream of Pencader and the Teifi at Cenarth are classified as RE Class 2 due to high BOD values. The Ceri in Brongest is RE Class 2 as a consequence of reduced Dissolved Oxygen levels.

ENVIRONMENT AND WATER QUALITY

Aim To provide water quality suitable to support a healthy River Ecosystem appropriate to the type of river.

Environmental Requirements:

Water Quality Waters should comply with the appropriate standards, applied formally or informally, under the Surface Waters (River Ecosystem) (Classification) Regulations 1994.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features An appropriate diversity of natural instream and bankside habitat should be maintained to support the Ecosystem typical of this river type.

4.6 GENERAL ECOSYSTEM

General Information

This Use relates to the protection of aquatic flora and fauna along with dependent organisms in the river corridor. In this context, dependent organisms are those which rely, at some stage of their life cycle, on the aquatic and bankside environment.

This basic Use is applied to **all** controlled waters within the catchment and provides protection to the aquatic environment from substances identified as "Dangerous to aquatic life" under the EC Dangerous Substances Directive. There is also a requirement to protect physical features and water quantity at appropriate levels.

Where areas of the catchment are important for more specific ecological reasons their protection/development is dealt with in the specific Use related chapters that follow and suitable, rigorous water quality standards will be applied.

Local Perspective

As a result of the rocky and tree-lined nature of the banks, the river channel is relatively stable, with few of the erosion problems of some of its more mobile, gravel based neighbours. An exception is the stretch between Lampeter and Llanybydder, where overgrazing of the banks has reduced riparian vegetation to the extent that bank instability is an increasing local problem. Where the bed and banks are stable, aquatic macrophytes can be abundant. The bed is composed of cobbles and gravels in the faster flowing sections, with mud and silt predominating in the deeper, more sluggish sections.

The tributaries, of which there are over 70, generally have steep gradients and are also rocky and tree-lined. As the land use is predominately non-intensive agriculture, resulting in low disturbance, these tributaries provide valuable havens for wildlife and spawning/nursery areas for salmonids. A river habitat survey for the Teifi has yet to be carried out.

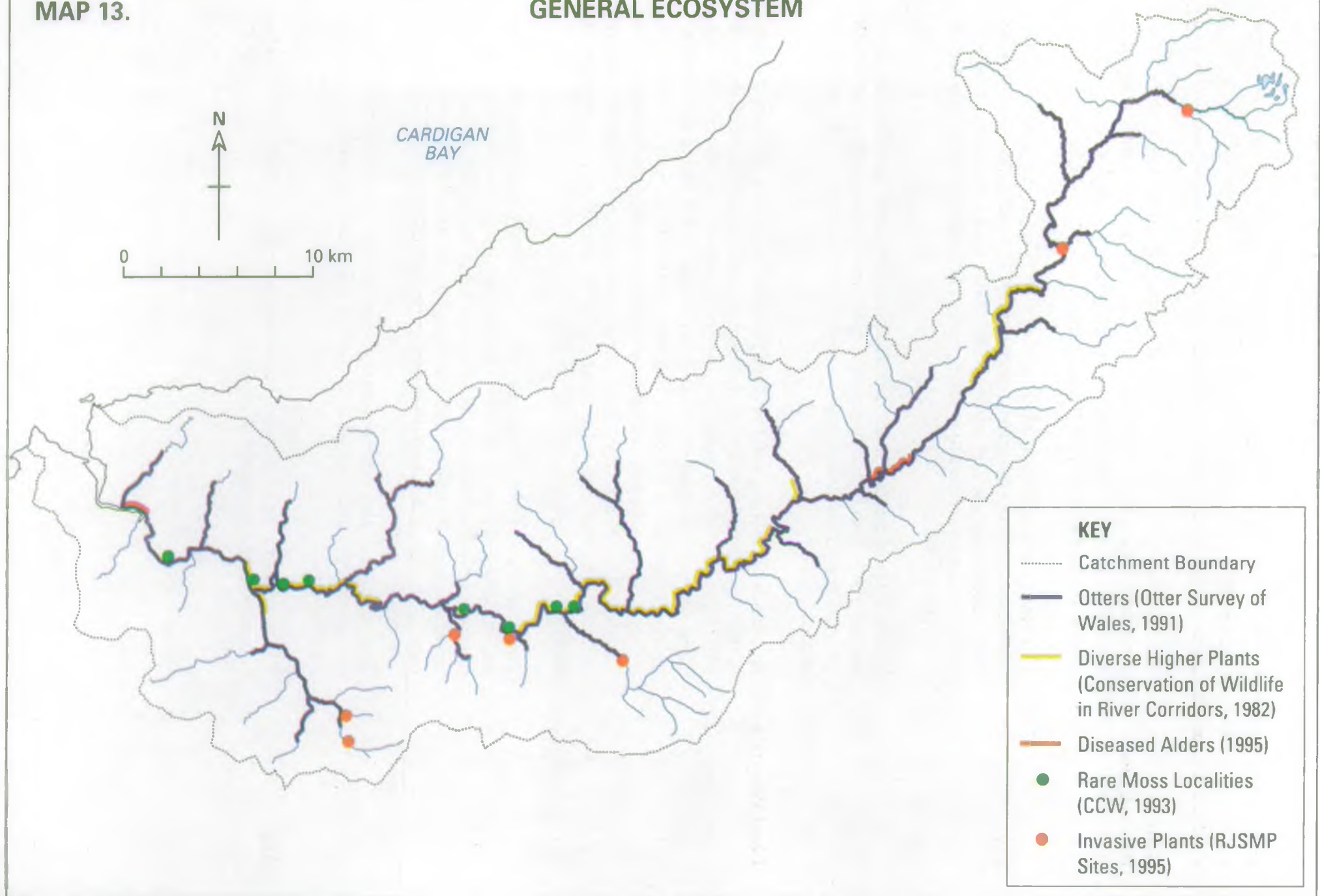
The ecological and environmental value of the catchment has been recognised by its proposal as a potential riverine Site of Special Scientific Interest.

Aim

To protect the basic general ecosystem associated with the aquatic environment and its associated corridor.

MAP 13.

GENERAL ECOSYSTEM

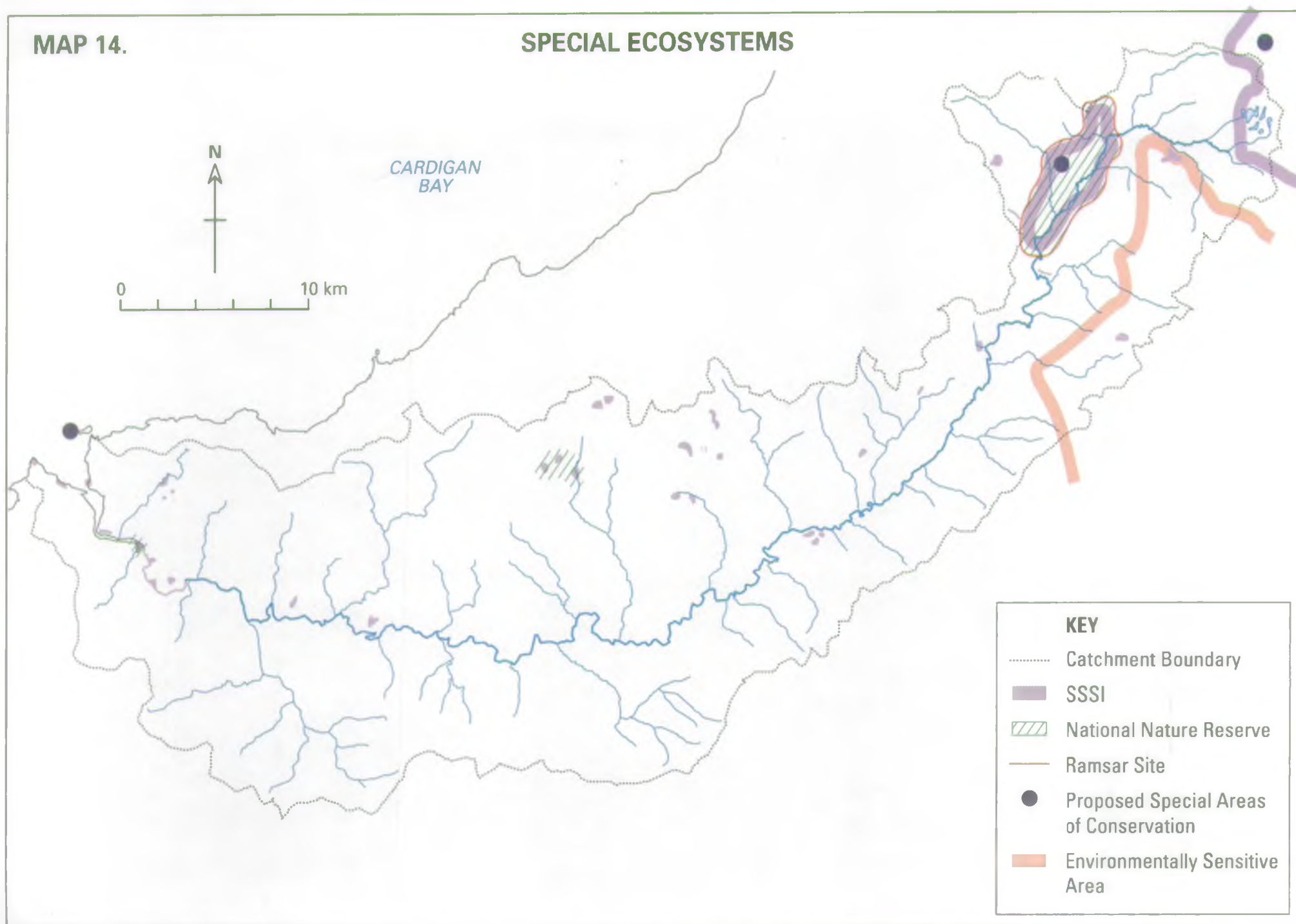


Environmental Requirements:

Water Quality	Waters should comply with requirements of the EC Dangerous Substances Directive.
Water Quantity	The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.
Physical Features	The diversity of natural instream features and river plants and animals should be maintained and enhanced.

MAP 14.

SPECIAL ECOSYSTEMS



4.7 SPECIAL ECOSYSTEMS

General Information

Special ecosystems are regarded as those areas that are formally designated for their high conservation value. Such areas include National Parks, National Nature Reserves (NNRs), Sites of Special Scientific Interest (SSSIs) and Special Areas of Conservation and Special Protection Areas designated under the EC Habitats and Birds Directives.

This Use is extended to sites that are valuable in conservation terms but are not formally protected e.g. Nature Reserves and County Trust Sites and other non-statutory nature reserves.

It is possible that a WQO for the Special Ecosystems Use will be introduced by the DoE during the lifespan of this Plan. Proposals by the NRA and English Nature are being considered and will be the subject of separate public consultation.

Local Perspective

The Teifi catchment is rich in terms of its environmental value and diversity. Within the catchment 35 sites have been designated as SSSIs, of which 15 are water related and 3, namely Rhos Llawr Cwrt, Coedmore and Cors Caron are also NNRs. Perhaps the most significant of these is Cors Caron which is a designated site under the RAMSAR Convention for its wildfowl value.

Cors Caron is also important in the European context as being one of the best examples of an active raised bog in the UK for which it has been proposed by the CCW for designation as a Special Area of Conservation (SAC) under the EC Habitats Directive. Similar designations have also been proposed for Rhos Llawr Cwrt SSSI (one of the best UK sites for the Marsh Fritillary butterfly), Cardigan Bay (one of only two UK outstanding localities for the Bottlenose Dolphin) and Elenydd SSSI (one of the best active blanket bog areas in the UK). For each SAC we are required to review all our authorisations affecting the Area. In addition there is also a need to prepare a statement for the Cardigan Bay Area setting out how we will exercise our powers so as to maintain SAC status.

The ecological and environmental value of the catchment has also been recognised by the proposal by CCW to designate it as a potential riverine SSSI, as a precursor to subsequent consideration as a SAC under the EC Habitats Directive.

The easterly edge of the upper catchment, east of Tregaron, falls within the Cambrian Mountains Environmentally Sensitive Area (ESA).

A number of environmentally important sites are owned or leased by the Dyfed Wildlife Trust, including Cemaes Head at the mouth of the estuary, noted for the chough and peregrines, and the Teifi marshes near Cardigan, where otters and water rail are included amongst the residents and harriers and wildfowl amongst the visitors. This latter site has been developed by the Trust as the Welsh Wildlife Centre.

Aim To protect the special features interest for which the site has been designated for their ecological or landscape importance.

Environmental Requirements:

Special Conservation Areas are likely to have their own specific environmental requirements for water quality, water quantity or physical features. Currently no designatory agency has identified environmental targets for any sites and, inevitably, consultation would be required before such standards could be implemented.

Water Quality At sites where water quality is a key factor in the protection of a special ecosystem, appropriate standards will be applied.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

4.8 CONSERVATION OF NATURE, LANDSCAPE AND HERITAGE

General Information

The protection of the aquatic ecosystem and designated sites for nature conservation are covered in the General Ecosystem and Special Ecosystems sections respectively. This section deals with the broader aspects of the conservation of wildlife, landscape and heritage features associated with inland waters but which may be located away from the river corridor.

The landscape and features of conservation or archaeological interest are of great importance in many catchments and may attract large numbers of visitors.

We have a duty to promote and further conservation of flora and fauna while carrying out our business. This includes the protection of water based or associated plants and animals that are so vital to the water environment. We also have to pay regard to any features of natural beauty or interest and must also consider the desirability of improving access to these features.

Exceptionally beautiful landscapes may be protected by being designated as National Parks or as Areas of Outstanding Natural Beauty (AONBs), for which we are an informal consultee.

Sites of historic or heritage interest may be classed as Scheduled Ancient Monuments (SAMs) or as 'listed buildings' which have statutory protection, but can be any feature of interest.

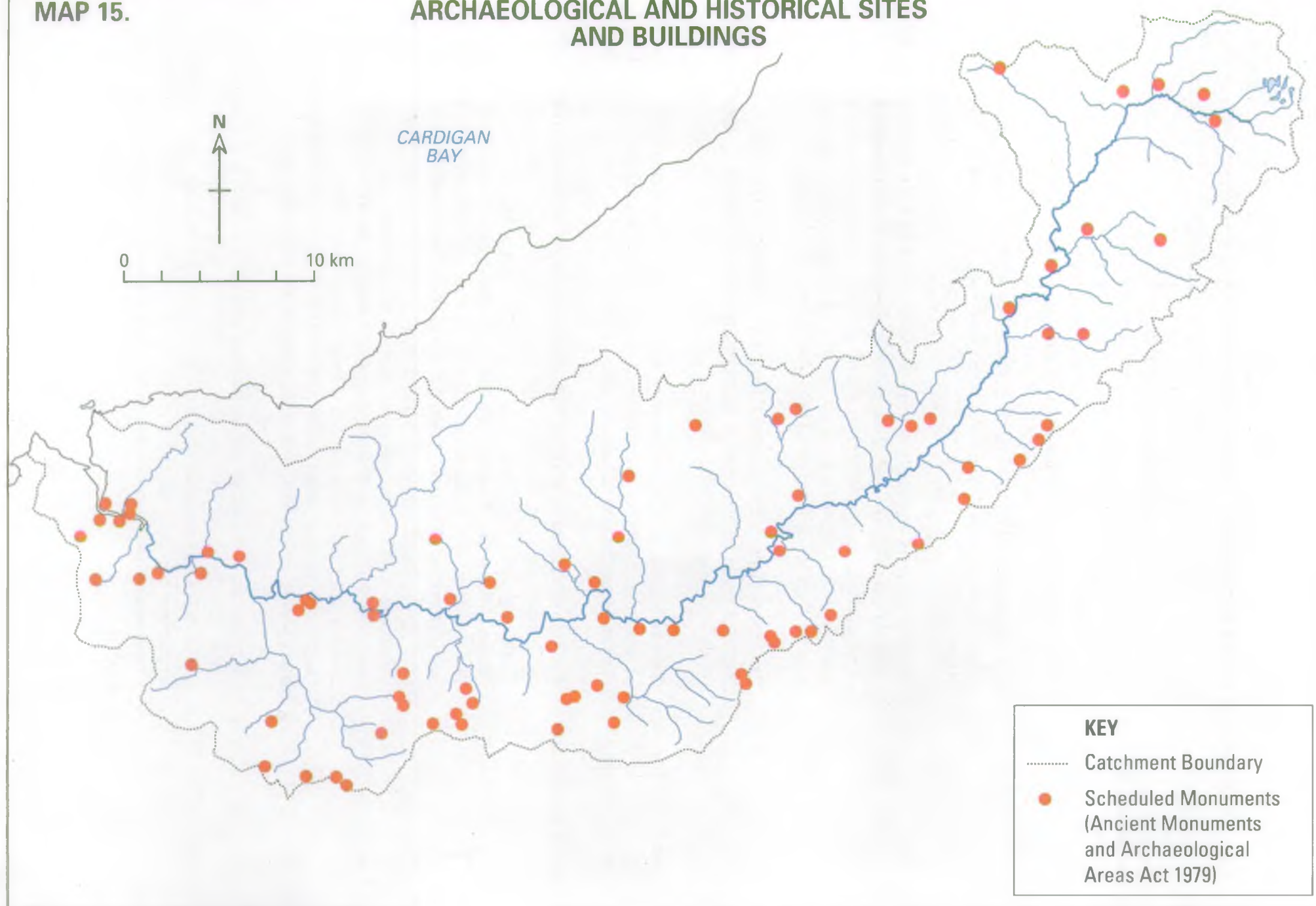
Local Perspective

The Teifi is regarded as being of high conservation value and was the subject of a major study in the early 1980's as part of a project entitled the 'Conservation of Wildlife in River Corridors', undertaken by the RSPB, the Nature Conservancy Council and our predecessor organisation, Welsh Water. The catchment was found to have a rich diversity of habitats with 49 types being identified. The river channel is generally of low gradient with stable, often rocky banks, although a number of steep gorges are also present. Woodland is widespread along the river although more concentrated in the lower reaches and the lower tributaries. Important areas of marsh exist upstream of Cardigan and in the area of Cors Caron. Elsewhere the river margin is improved grassland or heathland with the predominant land use being permanent pasture, with small areas of ley and arable land.

Higher plants, both riparian and aquatic are abundant on the Teifi particularly in the 30km between Trebedw and Llanybydder, whereas the upper reaches and the tributaries are generally of lower quality. Mosses are generally more abundant in the upper reaches and tributaries, but a particularly rare species, *Cryphaea lamyana*, is only found in Wales in the lower to mid reaches of the river.

MAP 15.

ARCHAEOLOGICAL AND HISTORICAL SITES AND BUILDINGS



An otter survey carried out in 1991 found that 59% of sites had positive signs of otters and that there was a general expansion of otter activity into the tributaries compared with previous surveys. Otters tend to predominate in those stretches of river where there is good bankside cover, heavily grazed and un-fenced sections being less favoured.

Two sites on the Teifi are the most westerly locations so far identified for alders affected by the recently identified *Phytophthora* root disease. Alders are among the most common riparian trees in the Teifi catchment and the spread of this disease would give serious cause for concern.

The catchment is rich in sites of historical and archaeological importance with 85 scheduled ancient monuments, including Strata Florida abbey, castle remains at Newcastle Emlyn, Cilgerran and Cardigan, and the Priory at St. Dogmaels. There are also many old corn and woollen mills, some of which are still in use, bridges and many fine examples of vernacular architecture. Evidence of Cardigan's trading past are the old quays and the abandoned slate quarries in the Cilgerran Gorge, whilst the remains of the stone weir which was part of a 19th century fish trap are still visible on the falls at Cenarth.

Aim To ensure that wildlife, landscape and heritage features of interest (particularly designated sites) are protected and, where appropriate accessible.

Environmental Requirements:

Water Quality Generally there will not be any specific water quality requirements to protect landscape or heritage sites although water around such public places should conform with the standards used to protect the General Ecosystem Use (Section 4.6).

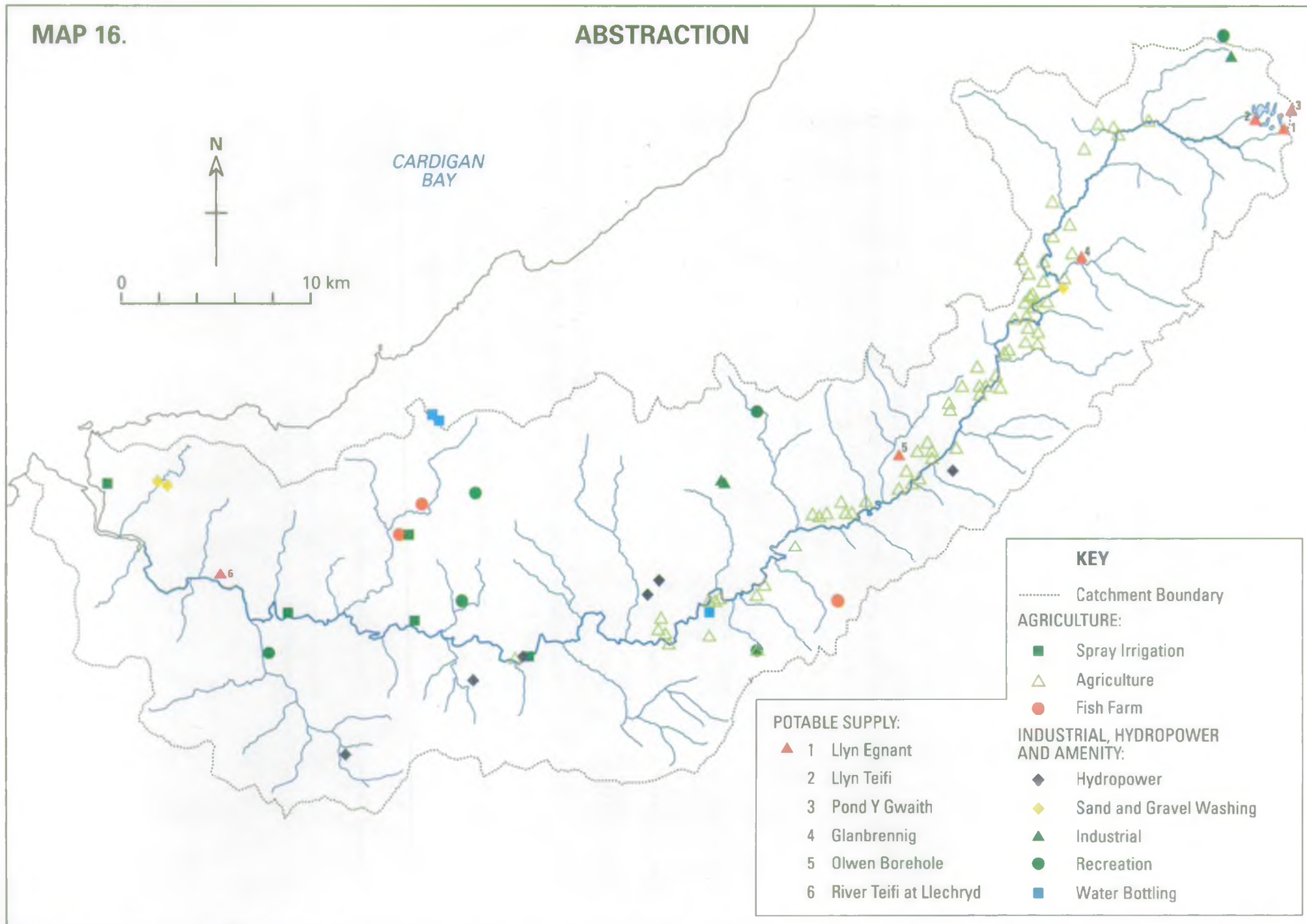
Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features Physical features that give rise to natural beauty should be protected.

Sites and buildings of interest should, where cost-effective, be protected from damage by flooding and/or drought.

MAP 16.

ABSTRACTION



4.9 ABSTRACTION

General Information

The removal of water from streams, rivers or groundwater by man is termed **abstraction**. The various uses to which the water is put are all grouped under this general heading. Abstractions are controlled by licences granted under the Water Resources Act 1991. The abstraction licensing process ensures that we can manage water resources so as to ensure that the right balance is struck between the needs of abstractors and the environment.

Exemptions from the requirement for a licence include most types of water supplies to a single household, and small (not more than 20 cubic metres a day) general agricultural uses from surface water (excluding spray irrigation) - see table in Appendix 2. Also, large areas of North and West Wales are exempted from the licensing requirement for abstractions from groundwater (wells and boreholes), regardless of use. There are a number of other specific types of abstraction (e.g. firefighting) which are exempt from the need for a licence. The requirement for an abstraction licence is shown in Appendix 2.

All abstraction licences specify maximum volumes that the licence holder may take, and many contain conditions to protect the environment and other abstractors. The exceptions are licences granted as Licences of Right in 1965, or "Licences of Entitlement" in 1990 where the legislation did not permit us, or our predecessors, to restrict pre-existing abstractions.

In considering applications for new licences, we must ensure that there is no derogation of existing abstractors without their agreement, and that the aquatic environment and associated habitats are properly safeguarded. We do not guarantee that the authorised volume will be available, nor that the water will be fit for the purpose for which it will be used.

We have a duty to protect the quality of water resources and will specify zones or areas around sources that seek to control certain potentially polluting activities. The Groundwater Protection Policy (Appendix 1) forms the basis for our activities relating to groundwater. For surface waters we can apply to the Secretary of State to designate protection zones upstream of major abstractions. In such zones, risk assessment could identify whether certain chemicals should be prohibited and/or safety procedures improved so that the abstractions downstream are protected.

Certain types of abstraction have specific issues associated with them, as follows:

Private and Public Water Supply

Water companies provide public water supplies, mainly from surface waters - rivers, streams and reservoirs - but groundwater sources can be important on a local scale. The water companies have the responsibility to ensure that water supplied by them satisfies statutory requirements.

Properties and farms not connected to Water Company supplies obtain their water from small private supplies such as springs and boreholes. The quality of these sources is monitored by the Local Environmental Health Department.

The quality of the raw water, nor that of the delivered, treated water is not our responsibility. However, we do have a duty to protect water quality and will specify protection zones around groundwater sources, that seek to control certain potentially polluting activities. The Groundwater Protection Policy (Appendix 1) forms the basis for our activities in this area.

Spray Irrigation

Spray irrigation is a high impact use of a water resource and as such is more strictly controlled than other types of abstraction. This is because it takes place during the driest times of year when flows are lowest, and little or no water is returned to the river after use. It is, therefore potentially damaging to the water environment. We encourage winter abstraction into storage and consequently set winter abstraction charges at only one-tenth of those for summer abstraction.

Fish Farming

A fish farm is usually a series of off-stream reservoirs in which fish are reared. This can severely affect a watercourse by diverting a large proportion of the flow through the farm. Although all the water is returned downstream, this does mean that a length of the river is reduced in flow. The requirement for an adequate residual flow to protect the river can restrict the viability of a fish farm.

Water Transfer

Water is not always used in the same place as it is abstracted from. It may be transferred elsewhere, within or outside the catchment. Transfers clearly represent a net loss of water to the immediate area and so their impact is generally mitigated by the release of regulation or compensation water during periods of low flows. All transfers are subject to abstraction licences.

Industry

Industrial uses of water range from those where water loss is low - such as mineral washing, to those with high loss - such as evaporative cooling. Most large industrial abstractions take water directly from surface and groundwater, but supplies from the public water mains may supply water where quality is important.

Hydropower

The energy of flowing water can be used to generate electricity, or to provide the power to drive millwheels. Both uses are growing in popularity in the search for sources of renewable energy, and as old mills are restored. However, the very large volumes of water diverted away from the river can have a significant effect on the in-river flora and fauna and other users of the watercourse, particularly where the points of abstraction and return are remote from each other.

All hydropower abstractions require an abstraction licence.

Use of water for hydropower can result in appreciable changes in the flow regime which can have a large impact on the downstream channel and its flora and fauna.

Amenity

There is an increasing demand for water to supply a wide range of amenity ponds and lakes to meet needs as diverse as nature conservation and water sports. Water for these ponds and lakes can be taken from ground or surface water supplies and is subject to the normal abstraction licensing procedure.

There may also be a requirement for a discharge and/or land drainage consent.

Ponds created by the damming of a watercourse will generally require an impounding licence.

Many amenity ponds are constructed in flood plain areas and are potentially of concern. We will seek to ensure that such developments and associated works do not affect the natural river regime.

To stop the indiscriminate spread of alien fish species and the spread of disease, all stocking of fish into amenity ponds is subject to our normal authorisation procedures.

Local Perspective

Potable Supply

There are four abstraction licences for public water supply held by DCWW in the catchment. A large part of the areas supplied by these sources are within the catchment. The four licences are:

Llechryd - This is a direct abstraction from the Teifi just upstream of the village of Llechryd. The original licence was granted in 1968 and increased in 1981 to its current rates of 19 MI/d and 5751 MI/a. This abstraction is not tied to any prescribed flow conditions.

Teifi Pools - This source, situated in the hills to the east of Pontrhydfendigaid, consists primarily of Llyn Teifi and Llyn Egnant but also includes Pond-y-Gwaith. This is a Licence of Right with an licensed quantity of 3823 ML/a.

Olwen - This licence authorises an abstraction of 0.4 ML/d from a borehole into alluvial gravels near Lampeter.

Pencefn - This is a spring source situated to the south of Tregaron. The licence authorises an abstraction of 0.21 ML/d and 6 ML/a.

Agriculture

There are only 6 spray irrigation licences in the Teifi catchment totalling 0.12 ML/d with approximately 100 small agricultural licences totalling 0.34 ML/d. There are also a large number of abstractions from groundwater in the large part of the catchment exempted from groundwater licensing and as such we know little about them.

Fish Farming

There are 3 abstraction licences for fish farming in the catchment, two being associated with Teifi Valley Fish south-east of Llanybydder on the Peithyn and Duar, and one on the Ceri at Brongest. The total authorised quantity is 7.46 ML/d (2721 ML/a), most of which is returned to the watercourses a short distance downstream of the abstraction point. The licences contain conditions restricting abstraction during periods of low flow in order to protect flows in the watercourses between the abstraction and discharge points.

Hydropower

There are 6 licensed hydropower sites within the catchment, all of which are long established sites that have either operated since their original construction dates or have recently been renovated for various purposes. The licences generally contain conditions designed to protect the river between the leat intake and outfall during periods of low flow when the relatively high flow requirements of a water wheel could be harmful to the aquatic environment of the source stream. The hydropower sites in this catchment are located on the Teifi, Cych, Clettwr, Bargoed, Ffrwydcynon and Einon.

Amenity

There are a number of ponds that have been created in the catchment for angling, conservation and ornamental purposes. Six of the sites have abstraction licences authorising a flow through an offstream pond or series of ponds. In other cases the licence authorises impounding only, so the pond is built onstream (usually on a minor watercourse or a spring) and no water is abstracted other than for the initial filling of the pond. The licence normally stipulates that filling is undertaken during winter months.

Aims

To manage water resources so as to safeguard licensed and exempt abstractions and the environment. This includes the active enforcement of abstractions.

To encourage abstractions to be made as far downstream as possible and discharges to be made as close to the point of abstraction as is practicable.

To encourage efficient water use and to optimise re-use of water.

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

Agricultural/Spray Irrigation

To minimise the impact on summer flows of spray irrigation and other forms of nett abstraction.

To encourage winter storage abstraction for use in summer.

Hydropower

Hydropower developments that restrict the ability to use upstream water resources will be opposed unless the licence authorising the abstraction is subject to an agreed volume of derogation and a time limit.

Environmental Requirements:

Water Quantity

The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

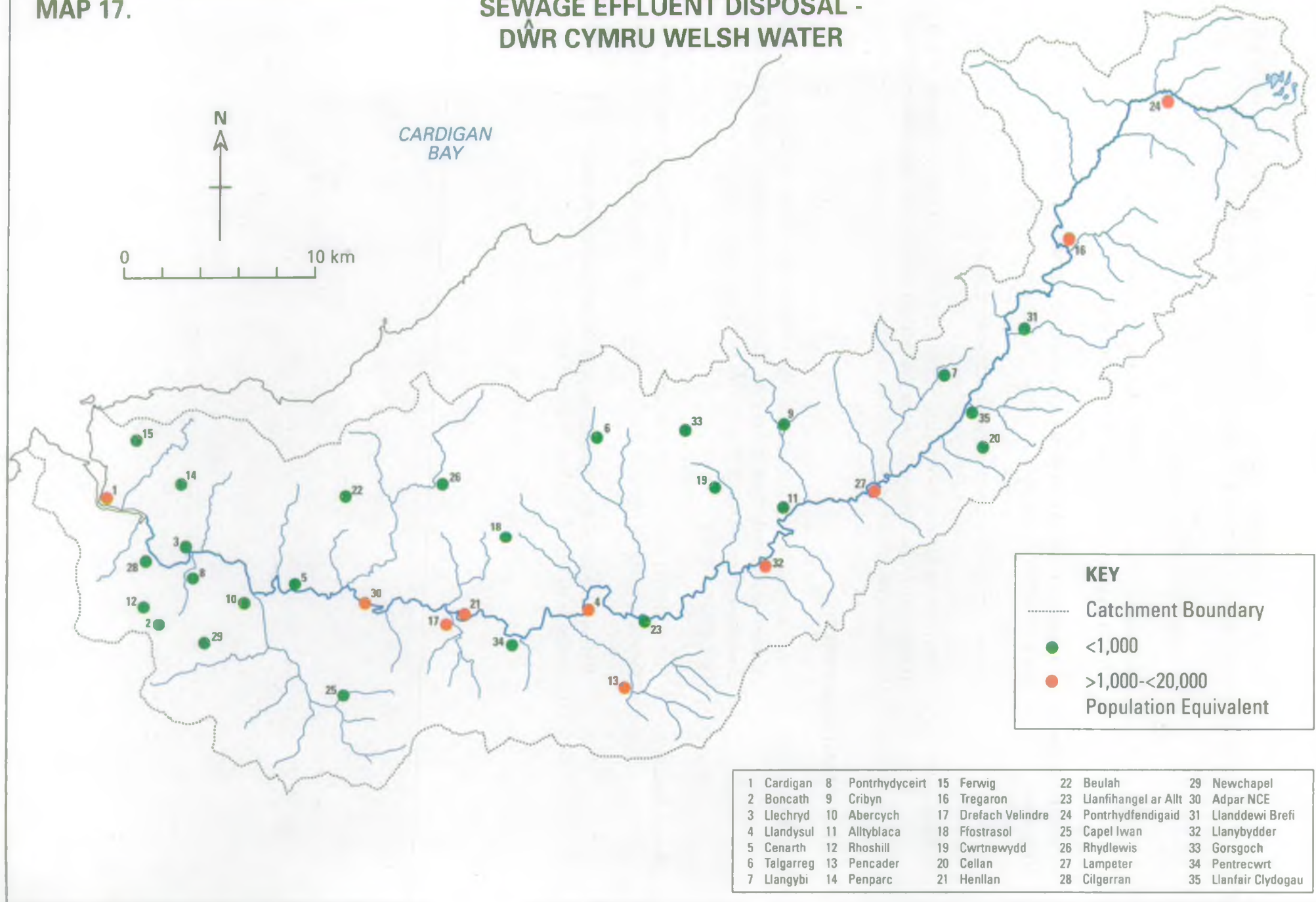
Water Quality

There should be no deterioration in water quality, below the point of abstraction, due to reduced dilution of authorised discharges.

Waters abstracted for potable supply should conform with the relevant standards of the EC Surface Waters Directive.

MAP 17.

SEWAGE EFFLUENT DISPOSAL - DŴR CYMRU WELSH WATER



4.10 SEWAGE EFFLUENT DISPOSAL

General Information

In Wales most sewage effluent is discharged into freshwaters having first been treated in a sewage treatment works (STW) or smaller facility such as a septic tank. However, some untreated sewage is occasionally discharged into rivers from overflows on the sewerage system. The overflows act as safety valves to stop the treatment works being overloaded or the sewerage system being damaged and also to prevent flooding of property. They are designed to operate only under storm conditions when river flows are high. We regulate all these types of discharge and monitor compliance with their consents. In order to protect the water environment these consents may contain conditions that variously specify the quantity, quality or circumstances of effluent discharge. In Wales Dŵr Cymru Welsh Water handles the bulk of sewage effluent discharged to freshwaters, although the greater number of STWs are privately owned.

Coastal sewage discharges which serve the majority of the population of Wales, are also generally owned by Dŵr Cymru Welsh Water although at present few of them receive the level of treatment associated with freshwater discharges.

In Welsh Region, the continuing improvement in sewage effluent treatment and disposal facilities feature highly in Dŵr Cymru Welsh Water's second Asset Management Plan (AMP2), which has been produced in close liaison with us. This plan specifies the capital investment required for Dŵr Cymru Welsh Water's assets (mainly to ensure compliance with the EC Urban Wastewater Treatment Directive). Consequently, we have, over the past two years, assessed the environmental impact of every Dŵr Cymru Welsh Water (DCWW) owned STW discharge and those from Combined Sewer Overflows (CSOs) in order to provide a basis for establishing investment priorities. Any sewage effluent related issues identified within this CMP will be considered within the agreed AMP2 programme.

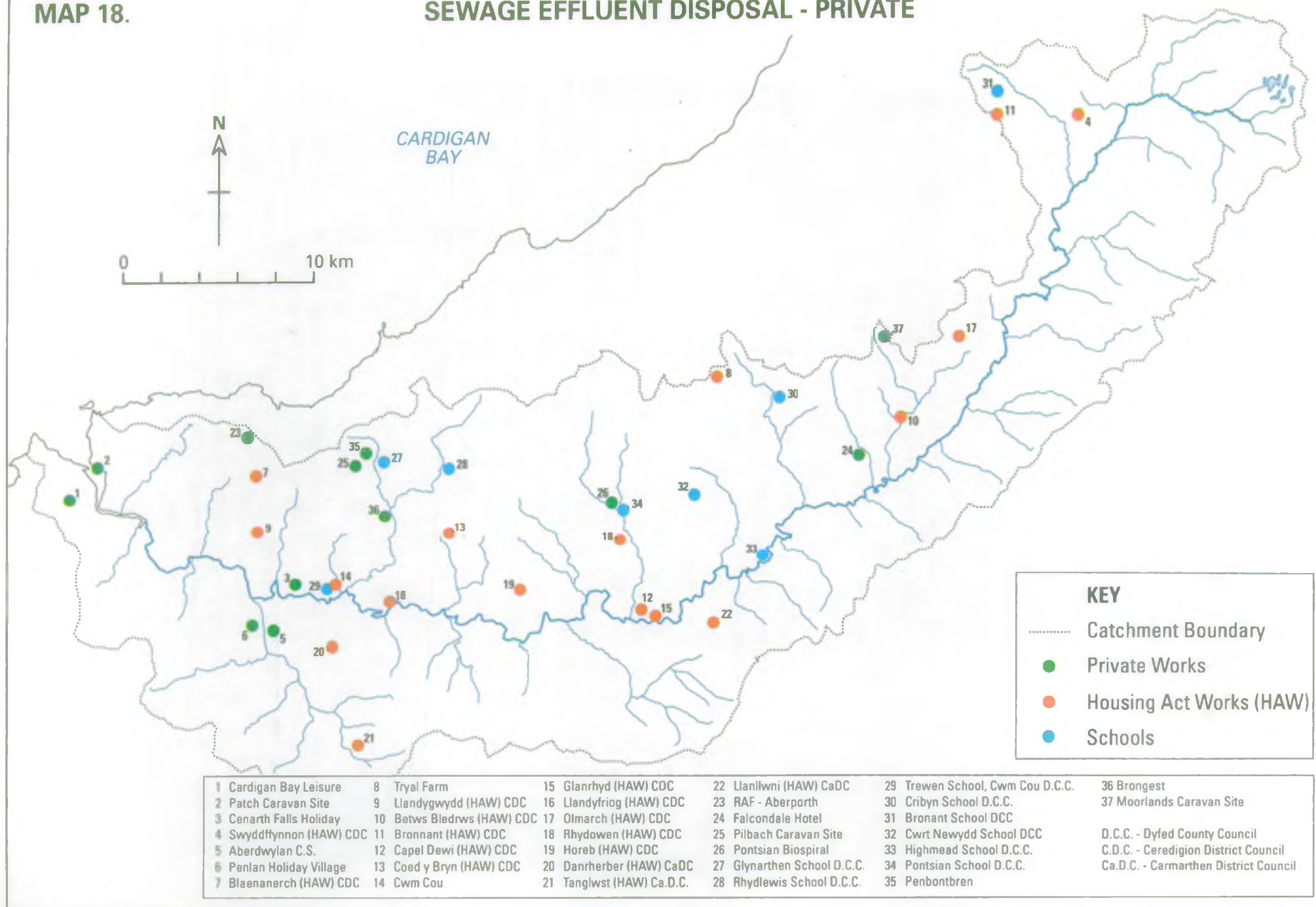
Local Perspective

Dŵr Cymru Welsh Water

STWs are dispersed throughout the catchment with the majority serving communities with populations less than 1000. We routinely monitor all DCWW works. There are 10 larger STWs, serving populations of over 1000, and 25 smaller works. Cardigan STW is the largest works and serves a population equivalent of 7159. This STW provides only primary treatment followed by a high rate biological filtration process before discharging to the Teifi estuary at Cardigan. The nine other works serving populations of over 1000 provide full biological treatment.

MAP 18.

SEWAGE EFFLUENT DISPOSAL - PRIVATE



Premature operation of some of the CSOs, particularly in Cardigan, Llandysul, Lampeter, Llanddewi Brefi and Penrhiwllan, has caused intermittent water quality problems. We have identified unsatisfactory CSOs in the our CSO strategy will be used to help prioritise DCWW investments within the AMP2 programme.

Other

Due inadequate mains sewerage in the catchment, there are 37 small private STWs belonging to District Councils, County Councils and private owners, which are each consented to discharge over 5m³ treated sewage per day to the Teifi or its tributaries. In addition to these, there are numerous small STWs which have consents to discharge effluent to land via appropriately designed and constructed soakaways.

Aims

To prevent pollution that would affect other uses of water by controlling the disposal of treated and untreated sewage effluent and sludge.

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

The NRA would generally seek to ensure that discharges are made as close as possible to the point of abstraction.

Environmental Requirements:**Water Quality**

Discharges should comply with all conditions stated within discharge consents. This will be enforced by the NRA.

There should be no significant deterioration in the quality of waters receiving discharges, beyond that assumed when setting the discharge consent.

Water Quantity

Consent conditions will be derived taking into account the upstream dilution available under average and dry weather flow conditions.

The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

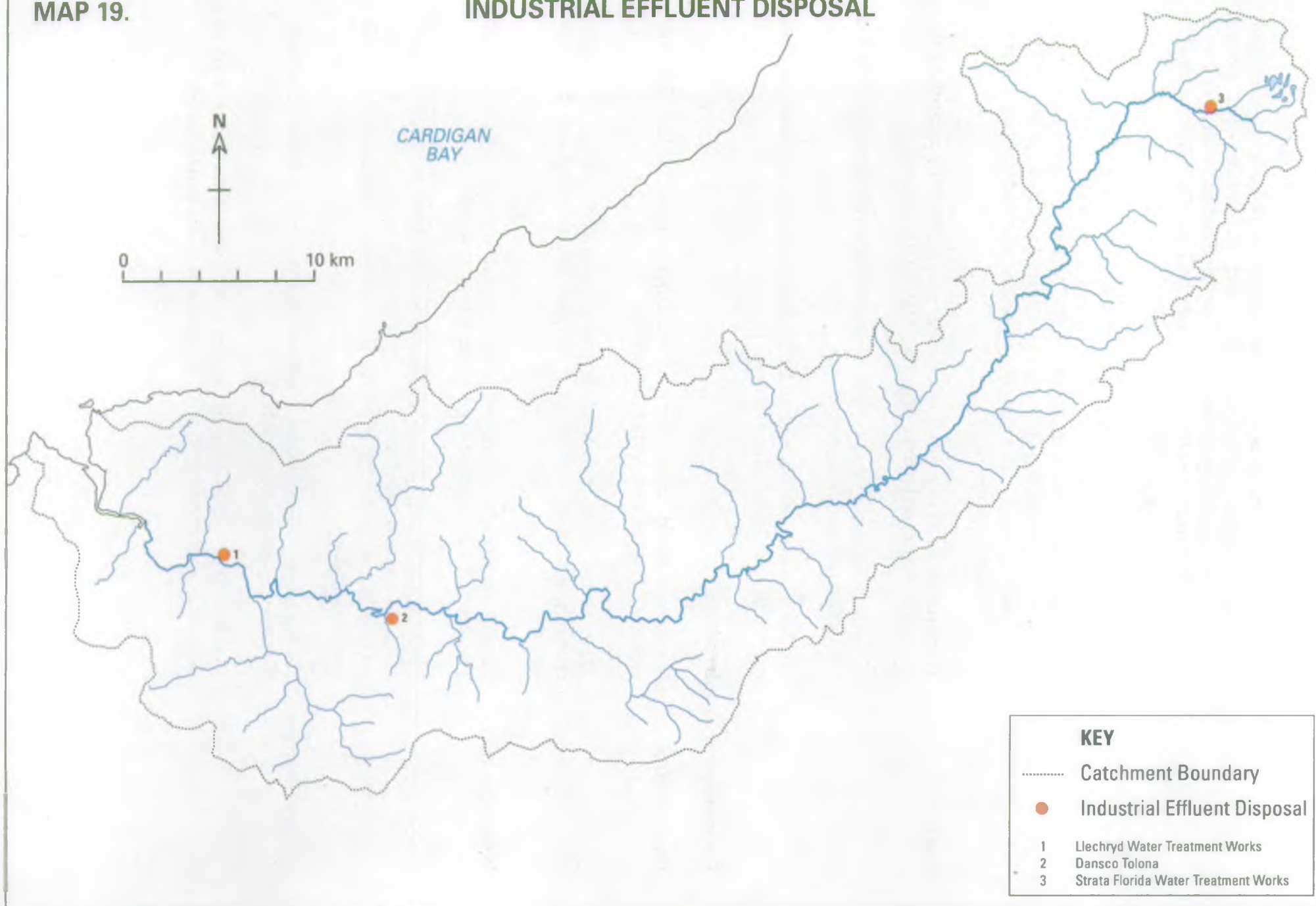
Physical Features

No discharge of sewage from overflows should occur at sewer flows less than those specified in consents.

No reduction in the quality of the physical habitat should occur as a result of the discharge of sewage effluent or construction of the outfall works.

MAP 19.

INDUSTRIAL EFFLUENT DISPOSAL



4.11 INDUSTRIAL EFFLUENT DISPOSAL

General Information	<p>In many places it is necessary to dispose of liquid wastes from industry into fresh and coastal waters. However, the material discharged can be highly polluting and close control is therefore vital if the water environment is to be protected.</p> <p>We use a system of licences called "consents to discharge" to control pollution from industrial effluents, at most sites. However, where a site is subject to Integrated Pollution Control (IPC) any discharges will be authorised by Her Majesty's Inspectorate of Pollution (HMIP), in close consultation with the NRA. Within this framework we will seek to ensure that any authorization issued is consistent with protecting the Uses of the receiving water and also the broader commitment to the reduction of dangerous materials in the environment. Where pollution prevention measures are stated by HMIP these must also be consistent with our pollution prevention policy.</p> <p>Trade effluent is discharged to sewers with the permission of the sewerage undertaker (Dŵr Cymru Welsh Water in Welsh Region) and is then subject to the sewage effluent treatment and disposal controls outlined in Section 4.10.</p>
Local Perspective	<p>The catchment is predominantly rural in nature supporting limited industrial activity. Most trade premises are located on industrial estates and their effluents should drain to the foul sewer. We regularly inspect those sites which pose a pollution risk due to their proximity to a watercourse.</p> <p>Dansco Tolona Pizza Products Ltd, based in Newcastle Emlyn, produces cheese and has a consent to discharge treated effluent to the Teifi.</p> <p>Dŵr Cymru Welsh Water has water treatment works at Llechryd and Strata Florida, both of which have consents to discharge filter backwash to the Teifi.</p>
Aim	<p>To control the discharge of liquid industrial waste to prevent pollution that would affect other Uses of the water.</p>

Environmental Requirements:

- Water Quality** Discharges should comply with all conditions stated within discharge consents. This will be enforced by the NRA.
- There should be no significant deterioration in the quality of waters receiving discharges, beyond that assumed when setting the discharge consent.
- Water Quantity** Consent conditions will be derived taking into account the upstream dilution available under average and dry weather flow conditions.
- The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.
- Physical Features** No alterations should be made to the river channel which would reduce the mixing of the effluent and receiving water.

4.12 BASIC AMENITY

General Information Basic amenity relates to those activities that are principally land based but could by their nature, attract people to the river environment. Examples include walking, picnicking and bird watching. The main areas of concern are therefore the general aesthetic acceptability of the river corridor, access and public safety.

Local Perspective The varied natural beauty of the Teifi catchment lures visitors from far and wide, catering for ramblers, bird watchers, pony trekkers, conservationists and sightseers. Certain areas attract particular attention, e.g. the Teifi Pools, Cors Caron, the gorges at Maesycrugiau, Alltycafen, Henllan and Cilgerran, the Cenarth Falls, Teifi Marshes and the lower estuary. However, the catchment also has a wealth of unspoilt, wooded valleys, attractive market towns and numerous historic remains which give much to enjoy between the more spectacular sites.

The catchment is not well provided with riverside public footpaths, access to banks normally being in the ownership of farmers or anglers, but the footpath on the southern bank of the Cilgerran Gorge is deservedly popular. Access to Cors Caron National Nature Reserve is possible, but a permit must be obtained from the resident warden. Conservationists have a wide range of habitats to explore from the sea cliffs at Cemaes Head and Cardigan Island with their chough and peregrine falcons, through the river corridor with its dippers, kingfishers and sandpipers, the marshes with harriers and wildfowl to the uplands with kite and raven.

Visitor attractions abound and are almost invariably linked to the natural environment or local cottage industry. These include the Welsh Wildlife Centre owned by the Dyfed Wildlife Trust near Cardigan; the National Coracle Centre at Cenarth; woollen mills, flour mills at Felin Geri and St. Dogmaels; the Museum of the Welsh Woollen Industry at Drefach Felindre; and fish smokeries at Cenarth and Rhydlewis.

Aims To maintain the watercourse so that the public enjoyment of bankside environment is not impaired.

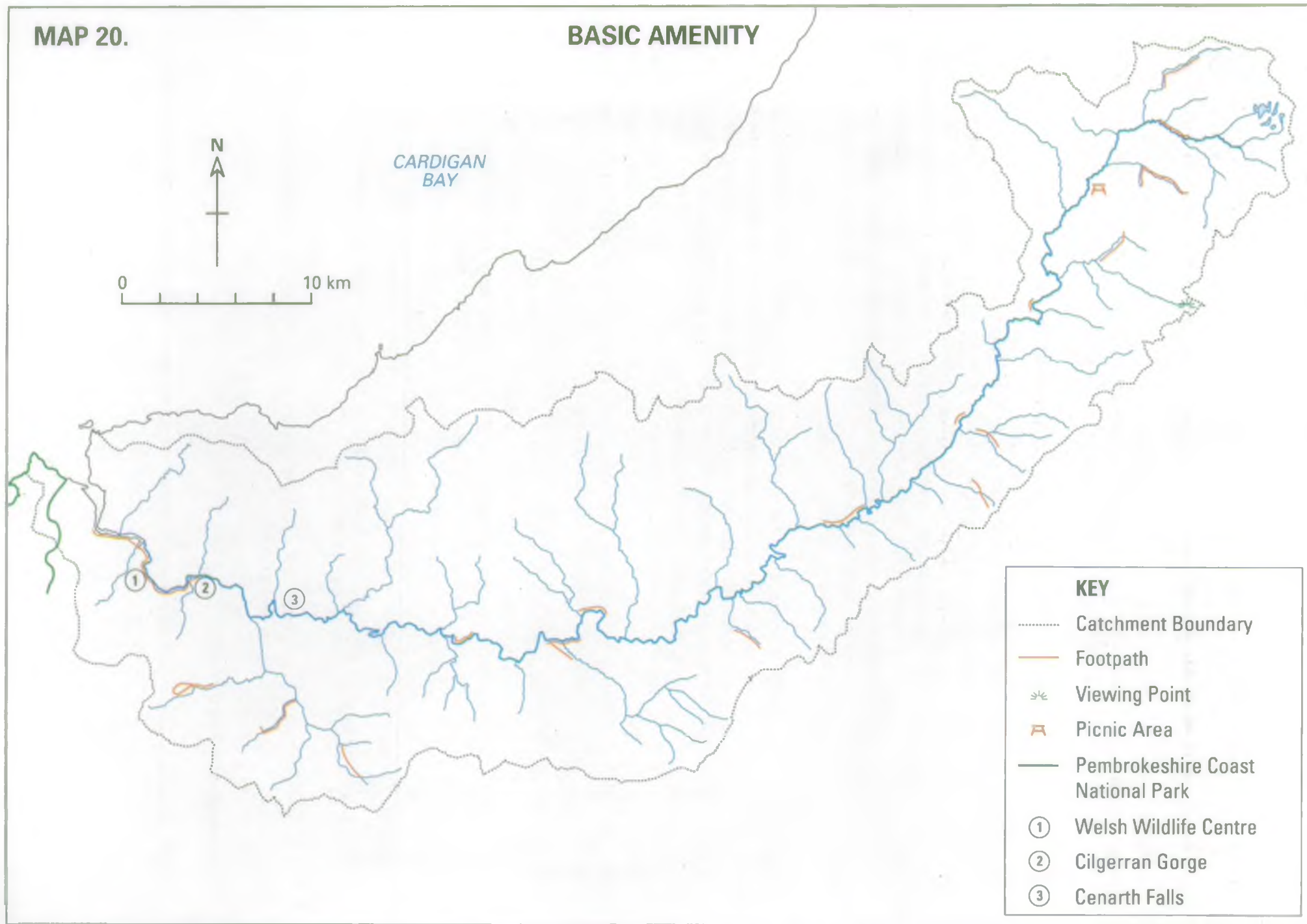
To provide safe and easy access to the waterside without unreasonably constraining other Uses.

Environmental Requirements:

Water Quality Water quality should be maintained at a level appropriate to prevent aesthetic nuisance.

MAP 20.

BASIC AMENITY



Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

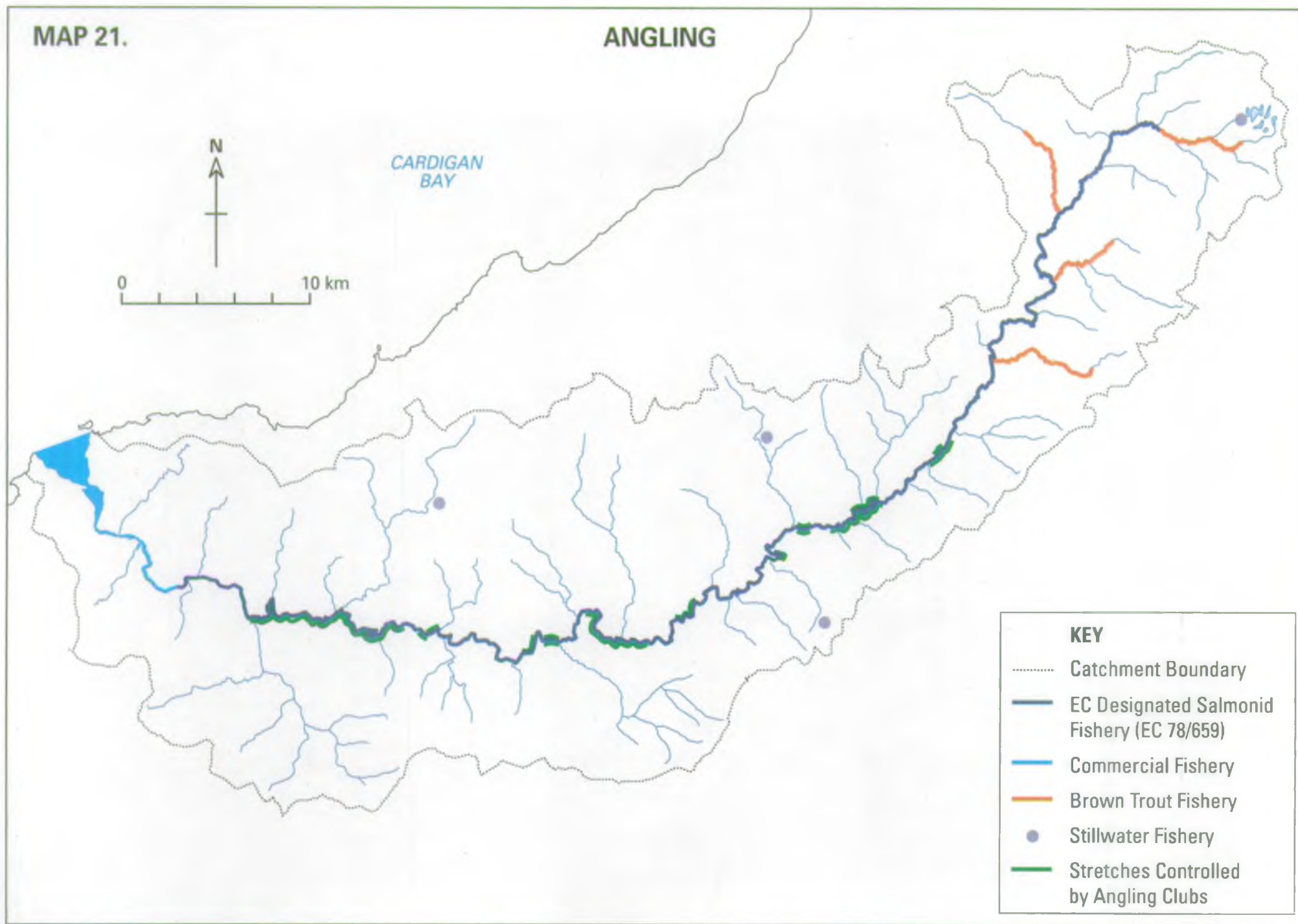
Physical Features An appropriate network of riverside paths and access points should be maintained and, where appropriate, promoted.

The development of recreational sites should be promoted at suitable locations as opportunities arise.

Development of recreational uses of the catchment should take account their potential impact on the environment and other uses.

MAP 21.

ANGLING



4.13 ANGLING

General Information

This section deals with the recreational activity of fishing with rod and line, rather than the protection of fish stocks. The latter are dealt with in the Fisheries section.

In many ways the requirements for angling are very similar to those for the basic amenity use. However, we do have formal responsibility towards angling, and issue rod licences that are a legal requirement for fishing for any freshwater fish. The income generated by licence sales contributes to fisheries management costs.

Traditionally, in Wales, game fishing for salmon and trout has been the predominant form of freshwater angling, although coarse fishing for other freshwater species is locally popular in many areas. Angling for sea fish takes place at many sites covered by Catchment Management Plans. However, we have neither control of, nor responsibility for, sea angling and it is not covered specifically in CMPs.

Local Perspective

The Teifi is arguably the most productive mixed stock (salmon and sea trout) fishery in terms of rod catch in Wales. It also supports a good brown trout fishery, although many believe that the larger brown trout have declined in number in recent years. In general, the best of the salmon and sea trout fishing is to be found in the middle reaches between Cenarth and Maesycrugiau. Sea trout are not commonly caught upstream of Lampeter, but salmon run almost to the head of main river upstream of Pontrhydfendigaid, particularly late in the season.

Most of the best fishing is owned or leased by three Angling Clubs, namely Llandysul AA, Teifi Trout Association and Tregaron AC, who between them control over 50 miles of main river fishery. The numbers of anglers fishing the river has increased dramatically since the 1950's, possibly as much as 10 fold, and over-exploitation is viewed by some as being a contributory factor in the perceived decline, particularly in salmon catches, over this period. Increasingly angling clubs are imposing their own voluntary restrictions on catches through the introduction of bag limits and other measures. Despite this, salmon spawning remains sub-optimal and further formal control measures are currently being considered.

The catchment is not particularly rich in still water fisheries accessible to the general public. Three privately owned man-made trout fisheries, at Rhydlew, Cribyn and Llanybydder issue day tickets for rainbow trout fishing. In the headwaters upstream of Tregaron, the three main Teifi Pools - Egnant, Hir and Teifi - have historically been stocked with brown trout and American brook char as well as holding wild brown trout.

Pike have been illegally introduced to the upper catchment upstream of Tregaron and are sometimes fished for by anglers as a means of controlling their numbers. A few grayling are caught in the Llanybydder area but their numbers have never increased sufficiently to warrant specific attention. There are few coarse angling opportunities in the catchment. These tend to be limited to small stillwater fisheries, such as Falcondale Lake.

Aim To ensure that the water environment can sustain angling at least at its current distribution and quality.

Environmental Requirements:

Water Quality Water quality should be maintained at a level appropriate to prevent aesthetic nuisance.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

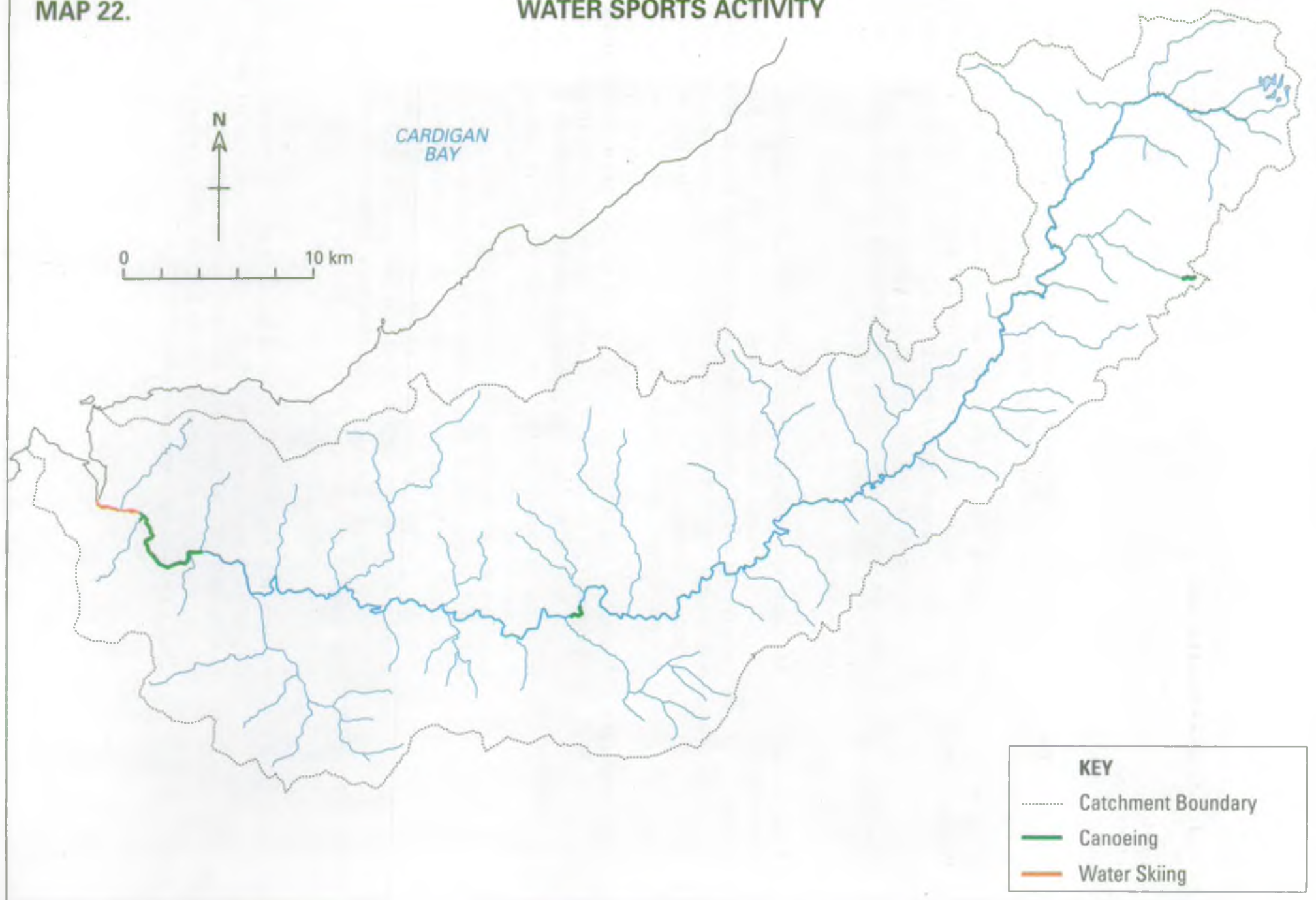
Physical Features Safe access to and from the waterside should be promoted.
The waterside features required for angling should be maintained and developed.

4.14 WATER SPORTS ACTIVITY

General Information	<p>Waters used for sports and recreation fall into two broad categories; Identified Bathing waters and Water Contact/Recreational Use waters. Each category is treated separately below.</p> <p>It is possible that in the future this Use will be included within the proposed scheme of Water Quality Objectives being developed by the DoE.</p>
Identified Bathing Waters	<p>To be identified by the Department of The Environment (DoE)/Welsh Office (WO) as falling within the terms of the EC Bathing Waters Directive (76/160/EEC), several criteria are taken into consideration including: high numbers of bathers, first aid facilities, life guards and toilets. Identified waters are required to achieve the standards of the EC Directive and are sampled according to the DoE/WO guidelines during the bathing season (May to September inclusive). In Wales, these are exclusively saline waters.</p>
Water Contact/Recreational Use Waters	<p>All waters where water sports occur, other than identified bathing waters, fall into this second category. These could include rivers, stillwaters, estuaries and coastal water and may support activities such as canoeing or water skiing where total immersion is likely, or other non-immersion based recreation. Bathing may also take place. It should be noted that we do not recommend bathing in freshwaters.</p>
Local Perspective	<p>Although the Teifi from Tregaron to the sea is a suitable river in terms of size and character for canoeing there is no public right of navigation upstream of the tidal limit and the controlling angling interests are not generally in favour of sharing their waters with canoeists. An exception to this is a short white water section at Llandysul where agreement has been reached between Llandysul AA and the Welsh Canoeing Association. This stretch is used extensively during suitable flow conditions by the Army and youth training organisations and discussions are currently under way about the possibility of developing a Welsh canoeing centre on the site. Canoeing also takes place from Llechryd Bridge at the top of the tidal limit down through the scenic Cilgerran Gorge to Cardigan. However most of this area is of high environmental value being of SSSI status and users need to have a high regard for minimising disturbance.</p> <p>Poppit Sands is a popular recreational beach, though not identified as a Bathing Water, and is used occasionally by jet skiers and water skiers. Some local residents are concerned about the impact such activities might have on the environment and the tranquillity of the area, as well as on the safety of other recreational and commercial users.</p>

MAP 22.

WATER SPORTS ACTIVITY



Aim To ensure that the catchment is maintained to an appropriate standard to support bathing in Identified Waters, and other water sports to at least their current levels of use at existing locations.

Environmental Requirements:

Bathing in Identified Waters:

Water Quality At Identified Bathing Waters, water quality should conform with the standards contained within the EC Bathing Waters Directive and the standards contained in the EC Dangerous Substances Directive.

Physical Features Promotion of safe and easy access to and from Identified Bathing Waters.

Water Contact/Recreational Use Waters:

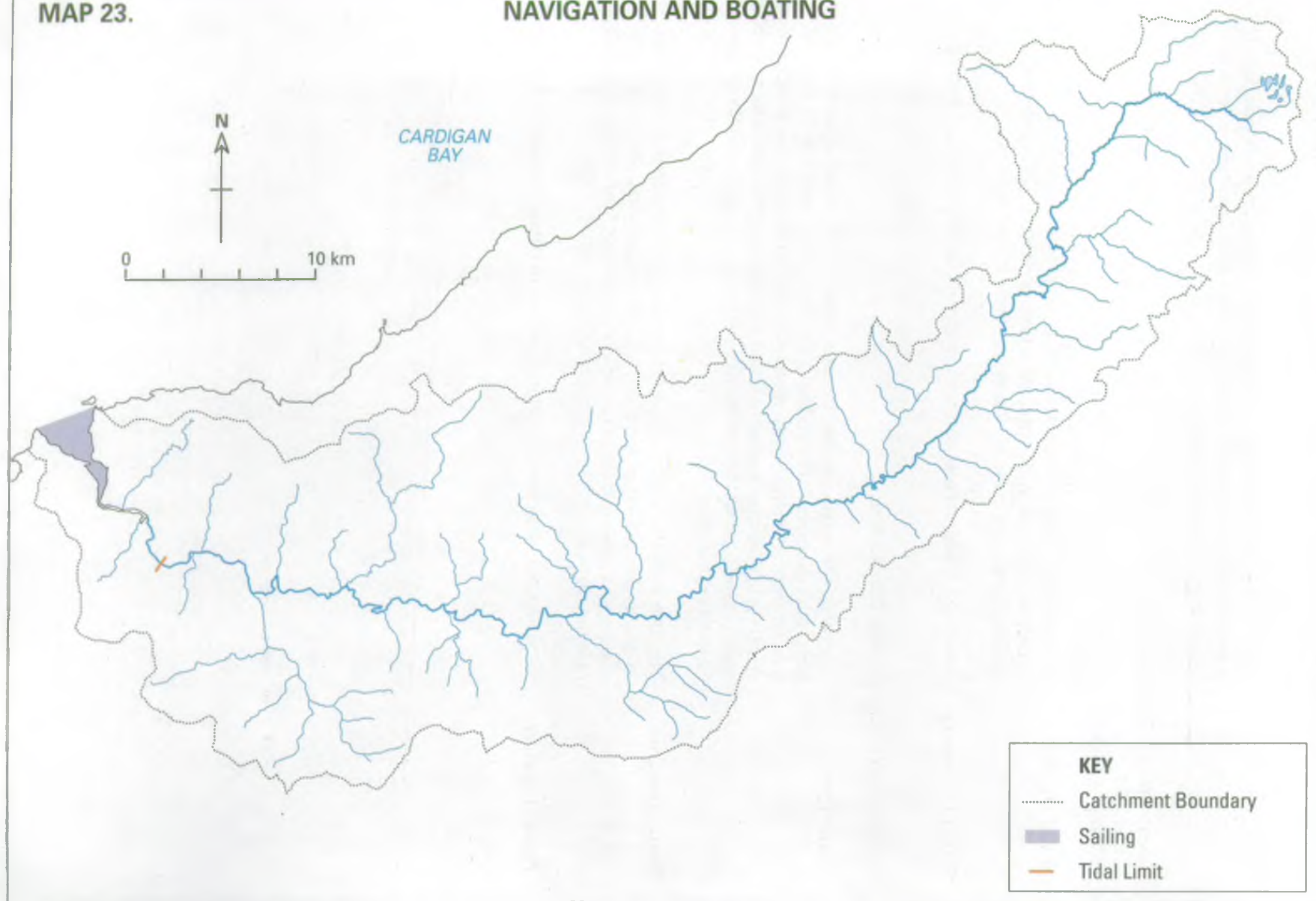
Water Quality Where marine waters are used for immersion sports, including bathing, we are guided on appropriate standards to protect public health by MAFF and local Environmental Health departments. We are unable to set bacteriological standards in CMPs for freshwaters where immersion sports or bathing take place, but waters should comply with the requirements of the EC Dangerous Substances Directive.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features To protect and, when possible, improve access to contact/recreation waters.

MAP 23.

NAVIGATION AND BOATING



4.15 NAVIGATION AND BOATING

**General
Information**

Navigation is considered to be the use of pleasure and commercial craft in waters that fall under our general control, where a right of navigation exists. This includes the maintenance of navigation aids (such as buoys, perches and marks) which are required for the safe passage of vessels.

In Wales the navigation authority is usually the local port or harbour authority who will liaise with us. However, in the Dee estuary we are the navigation authority. Elsewhere in tidal waters we have neither control over, nor responsibility for navigation.

While we are not the navigation authority for either of the two freshwater rights of navigation that exist in Wales we may under certain circumstances introduce byelaws to control navigational use of a river. We must also pay regard to the needs of those rights of navigation that do exist.

Boating is regarded as the use of boats for pleasure, rather than commercial purposes, and includes rowing, sailing and powered boats where no significant water contact is involved. Where no right of navigation exists, access to and use of the water is by formal or informal agreement of the land/fishery owners and our concern is principally for the participants' enjoyment of the activity.

Local Perspective

There is no public right of navigation on the Teifi upstream of the tidal limit and boating is therefore restricted effectively to the estuary downstream of Cardigan. Historically, large commercial vessels used to moor at the quay in Cardigan, but improvements in road and rail links together with a gradual siltation of the channel has caused a cessation of this traffic. There is some local interest in a scheme to dredge the channel in order to re-open it for commercial traffic but there are no firm proposals at present.

The estuary between St. Dogmaels and Gwbert provides sheltered moorings for sailing and speedboats for recreational use, and for small inshore commercial fishing craft. Ceredigion District Council has byelaw making powers covering the northern side of the estuary and Preseli Pembrokeshire District Council on the south side, but neither is able to enforce the byelaws actively to any significant extent. Moorings are licensed and controlled by the Afon Teifi Fairway Committee, a group of users with powers vested in the Committee by Trinity House. There is concern locally about the impact of powered craft on the environment, the community and other water users.

Aims To ensure that waters in the catchment can support boating and related activities to at least their current levels of use at existing locations, provided there is no detriment to other uses.

To encourage and support canoe access agreements on the Teifi.

Ensure that works to the river channel do not prejudice these activities as far as is practicable.

Environmental Requirements:

Water Quality Water quality should be maintained at a level appropriate to prevent aesthetic nuisance.

Water Quantity The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Physical Features Where waters under the control of the NRA are used for navigation no obstruction to the passage of vessels should be created.

Any maintenance of navigation channels or aids to navigation should take into account other uses of the water.

Areas used for boating should be protected from development that would constrain this use.

The encouragement and promotion of safe access points for boating, where appropriate.

Features required for navigation or boating should be maintained and enhanced where appropriate. This would include adequate freeboard and freedom from obstructions.

4.16 AGRICULTURAL ACTIVITY

General Information

The processes and by-products of agriculture are a major potential threat to the water environment, especially in more intensively farmed areas. Our key areas of concern include:-

- pollution by animal and other agricultural wastes;
- contamination of groundwater and surface waters by fertilisers and other agro-chemicals;
- the effects of land drainage on water tables and water courses;
- the impact of uncontrolled stock grazing on river banks;

Where there is a specific discharge of effluent from a farm site this will be dealt with via the general discharge consenting process described in the discharge uses sections. However, the highly polluting nature of agricultural waste normally precludes this option and our approach is aimed at control at source by minimising the volumes of effluent produced and stored. Often it is background pollution caused by large numbers of diffuse discharges that causes the most significant impact and these are of greater concern to us. Consequently we have worked closely with farming organisations to develop waste handling guidelines that seek to control this type of pollution. The NRA can also enforce legal minimum standards for new silage, slurry and agricultural fuel oil installations. In key areas our programme of farm visits helps to alert farmers to potential and existing problems.

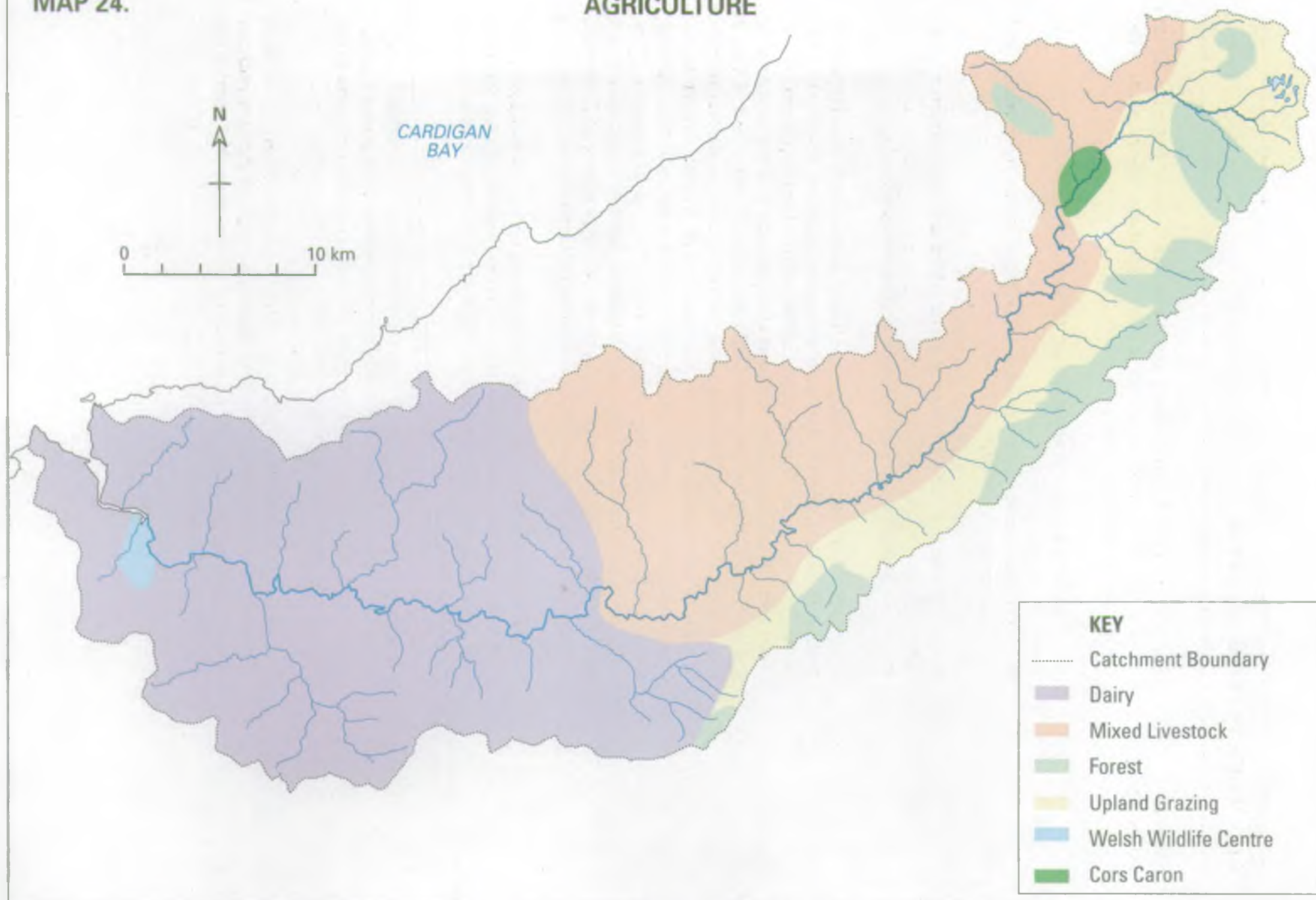
We issue codes of practice for the use of fertilisers, herbicides and pesticides, to protect the water environment and, in certain places (Nitrate Sensitive Areas), may control the application of fertilisers to protect groundwater supplies.

Farmers are encouraged to fence riverbanks to prevent uncontrolled access by stock. Cattle and sheep can severely damage riverbanks in a way that can lead to channel instability, increased flood risk and a marked reduction in the fisheries and conservation value of the river.

Fish farming can severely affect a watercourse by diverting a large proportion of the flow through the farm, leaving a length of the river reduced in flow. The requirement for an adequate residual flow can restrict the viability of a fish farm.

MAP 24.

AGRICULTURE



Local Perspective Large dairy units predominate in the lower reaches of the catchment, with mixed dairy and livestock rearing in the middle reaches. Poor soil conditions in the upper reaches of the south bank tributaries favour livestock rearing or rough grazing on improved pastures. There is also some light grazing on parts of the Welsh Wildlife Centre and Cors Caron.

A programme of targeted farm inspections is underway to help minimise the risk of pollution from agricultural sources. Visits are targeted to areas of intensive land use, areas with a history of pollution problems, locations where biological surveys demonstrate an adverse impact, and upstream of drinking water intakes.

We also regularly inspect agricultural merchants, particularly those carrying products listed by NOAH (National Office of Animal Health Ltd) or those with stores registered by BASIS (British Agrochemical Standards Inspection Scheme).

Discharges from the four fish farms in the catchment are controlled by discharge consents and we monitor their compliance.

Aims To protect the water environment from the potential adverse effects of agricultural activity.

To protect the quality and volume of groundwater by implementing the NRA's Groundwater Protection Policy.

Environmental Requirements:

Water Quality Discharges should comply with all the conditions stated within the discharge consent. This will be enforced by the NRA.

The codes of practice for the handling and use of Pesticides, Herbicides and Fertilisers should be strictly followed.

Where applicable, the management practices set out for Nitrate Sensitive Areas should be strictly followed.

The Code of Good Agricultural Practice for the Protection of water should be complied with as should the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991.

Water Quantity

The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

Agricultural activities must be designed and managed to prevent liquid effluent from adversely affecting the quality of surface and groundwaters.

Physical Features

Land drainage activity should not adversely affect the fishery and conservation value of rivers.

Agricultural processes should not lead to a reduction in the quality of physical habitats of fishery and conservation value nor increase river instability or flood risk.

4.17 FORESTRY

General Information

Well managed woodland in the right places does not harm the water environment and will often bring benefits. However, in certain circumstances forestry development and management can cause problems. Areas of concern to the NRA, nationally, include acidification, soil erosion, pollution, water yield, increased flooding risks and damage to wildlife habitats.

While we have duties and powers to regulate some forestry works, overall regulation of forestry is the responsibility of the Forest Authority. In recognition of the potentially harmful impact of poorly managed forest development, the Forestry Authority has published The Forests and Water Guidelines, against which all forest operations are assessed.

We are currently consulted on a non-statutory basis on applications for new planting under the Woodland Grant Scheme (where considered necessary by the Forestry Authority) and in relation to acid sensitive areas documented in the Forest and Water Guidelines. However, we are seeking improved national links with the Forestry Authority to achieve a consistent and effective approach to the general environmental assessment of forestry schemes and operations, including felling and restocking.

To ensure that the water environment is properly considered, we will continue to liaise with Local Authorities, the Forestry Authority and local forest managers about the production of Indicative Forest Strategies, and general forest management issues.

Local Perspective

The catchment is approximately 7% afforested by conifers and 8% afforested with mixed woodland or deciduous species.

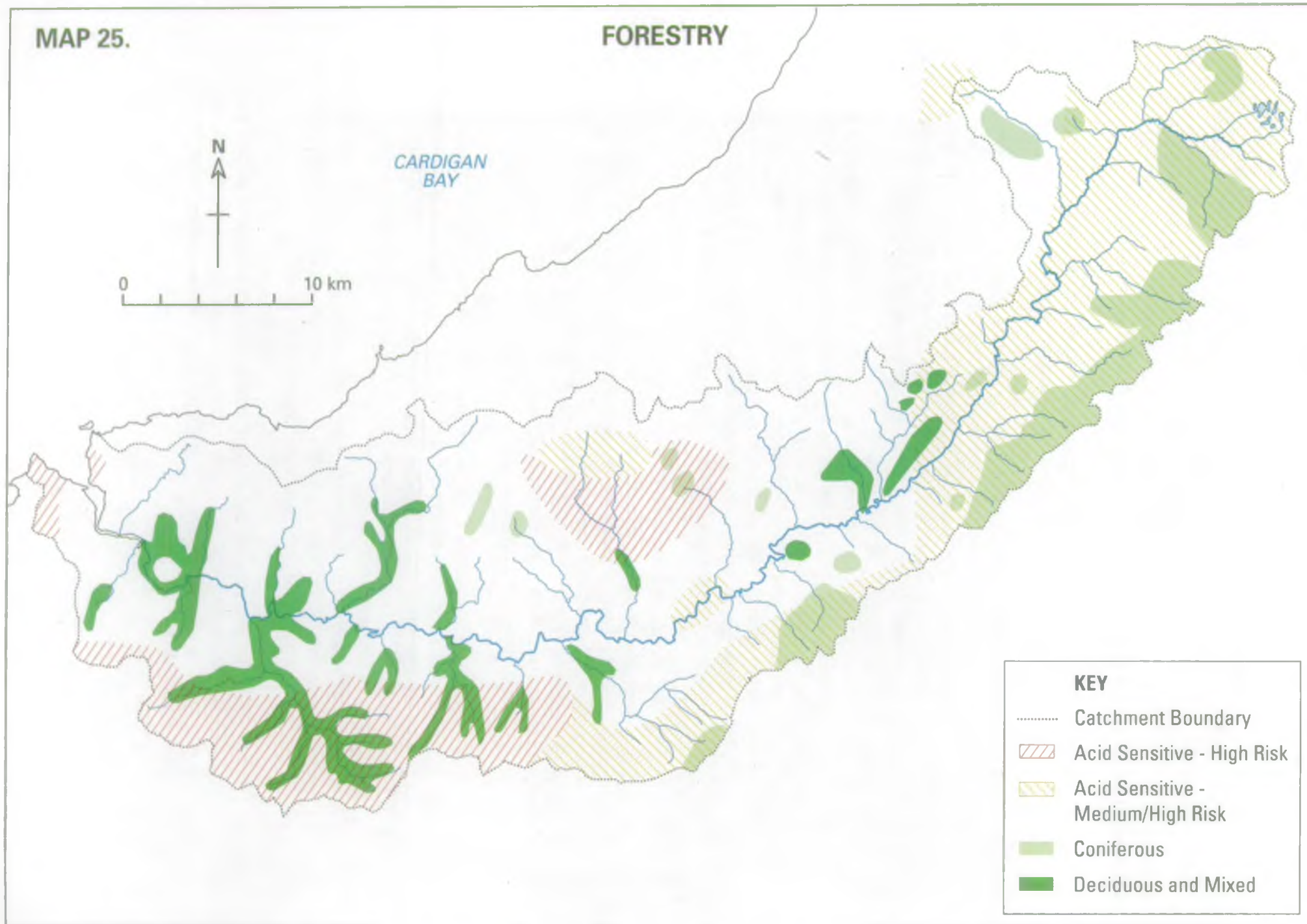
In the lower reaches, the woodland consists mainly of privately owned deciduous and mixed woodland situated on steep banks of river valleys. In the upper reaches the woodland is mostly coniferous. About half of this is owned by Forest Enterprise and the rest is privately owned.

In the coniferous areas many of the trees are reaching maturity and felling is ongoing. Restocking is planned with a mixture of conifers and broadleaves with creation of open spaces and clear riparian zones.

Conifer afforestation in the upper reaches is associated with acidification of surface waters, although such problems are not so acute or widespread as they are in the adjacent Tywi catchment, where afforestation is more extensive.

MAP 25.

FORESTRY



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

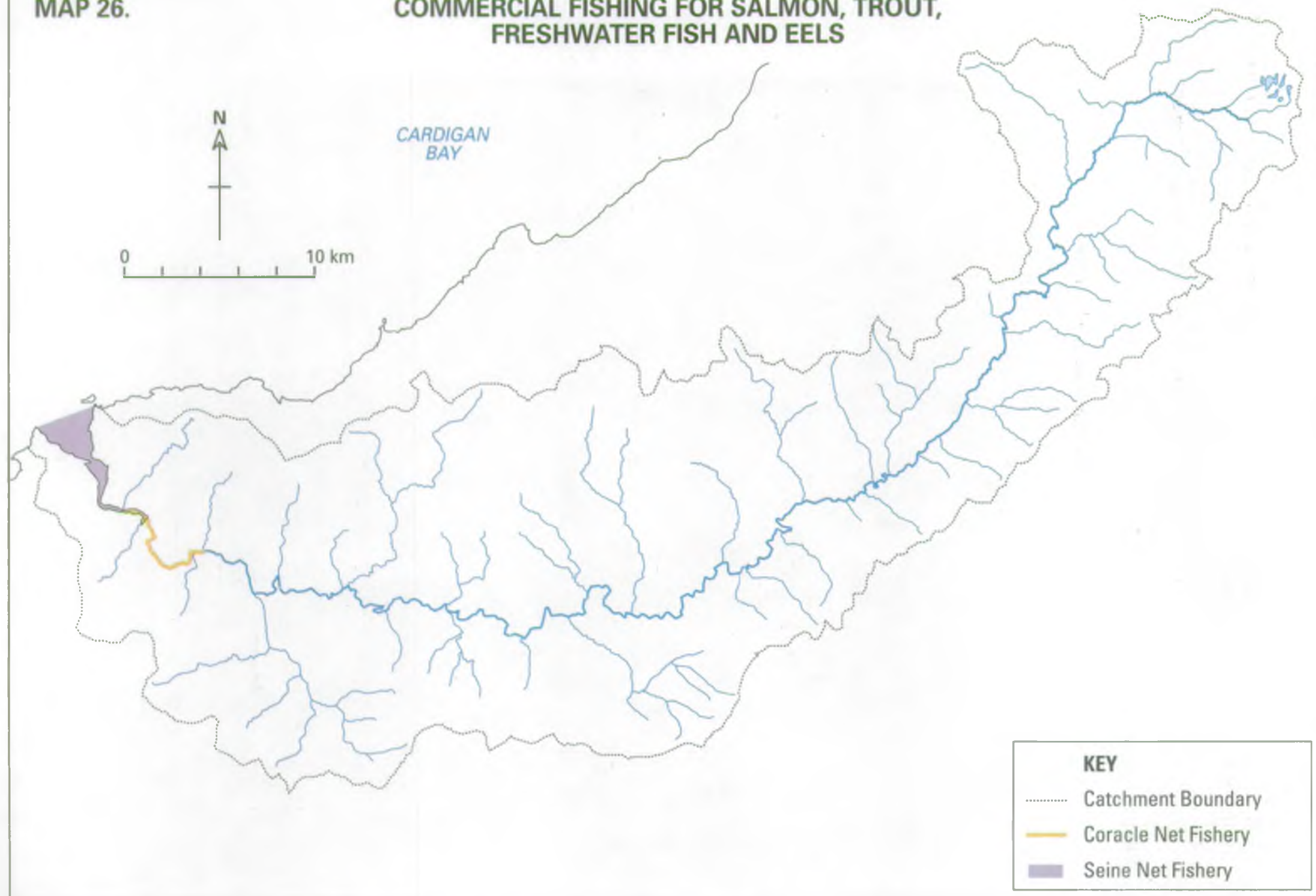
To encourage forestry practices that improve the water environment.

Environmental Requirements:

The Forests and Water Guidelines should be followed.

MAP 26.

COMMERCIAL FISHING FOR SALMON, TROUT,
FRESHWATER FISH AND EELS



4.18 NET FISHING FOR SALMON, TROUT AND EELS

General Information

This Use is principally concerned with the use of nets and other types of gear to catch migrating eels, salmon and trout. Other than sea fish, migrating adult salmon and sea trout are the main quarry for net fisheries in Wales and these are restricted to coastal waters and estuaries. The number of these fisheries is closely controlled by Net Limitation Orders and Byelaws which are designed to conserve stocks. We license salmonid net fisheries within the terms of the Orders and enforce Byelaws. In many places the fishing techniques allowed reflect local culture, and consequently in Wales there is a very wide variety of fishing methods employed. These range from coracles and nets to ranks of fixed traps, called putchers, which have significant heritage interest.

We also license net fishing for eels. While there is no limit to the number of licences that can be issued, we specify certain methods that can be employed, and may refuse to issue a licence for a location if we feel that fish stocks could not support the fishery, or that the migration of salmon and trout could be impaired.

Local Perspective

During the 19th century salmon were heavily exploited commercially by estuary seine nets, fixed nets and coracle nets as far upstream as Cenarth and even a salmon trap at Cenarth Falls. Stricter controls have reduced exploitation over the years to the present level of six seine net licences, available annually for the estuary downstream of Cardigan Bridge, and 12 coracle net licences, for the tidal stretch downstream of Llechryd Bridge. There has not been full take up of even these licences in recent years, and proposals currently under consideration as part of the periodic Net Limitation Order Review seek to reduce the available seine net licences to 4 and the coracle net licences to 10.

No licence applications have been made for commercial eel fishing in the catchment in recent years.

Although the unlicensed and illegal commercial harvesting of salmon and sea trout has reduced in recent years due to effective enforcement, stiffer penalties and reduced demand, the illegal exploitation of salmon is still a problem on the lower Teifi particularly through the use of set nets.

Aim

To ensure that net fishing takes place in a manner that does not over-exploit fish stocks or interfere with other legitimate uses of the water environment.

Environmental Requirements:

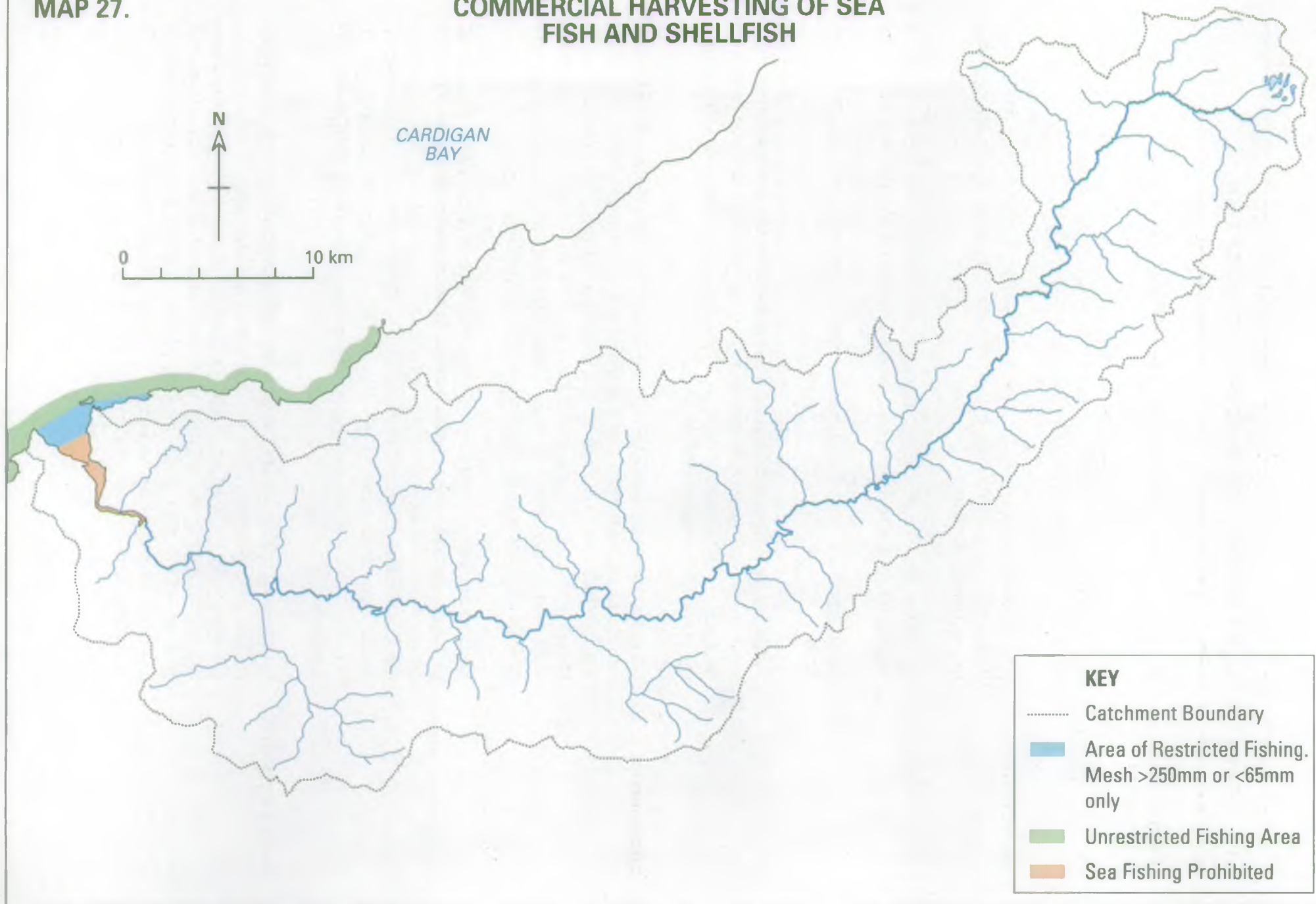
- Water Quality** Water quality should be maintained at a level appropriate to prevent aesthetic nuisance: fish stocks are protected by the provisions within the Fisheries and River Ecosystem Uses (Sections 4.4 & 4.5) .
- Water Quantity** The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.
- Physical Features** To enforce the provisions of the Net Limitation Orders and Byelaws to ensure that stocks of salmon and sea trout are not endangered by net fishing.
- To license and regulate net fishing for eels and non-salmonid freshwater fish to protect stocks.
- To minimise conflict between the requirements of different fisheries.
- Access points for net fisheries should be protected.

4.19 COMMERCIAL HARVESTING OF SEA FISH AND SHELLFISH

General Information	Commercial fishing for sea fish and shellfish is controlled by a variety of laws and EC Directives. The NRA has some responsibility for each type of fishery although we often share this with others, such as Local Authorities, Sea Fisheries Committees and the Ministry of Agriculture, Fisheries and Food (Welsh Office Agriculture Department, in Wales).
Sea Fisheries	<p>Sea fisheries are regulated by local Sea Fisheries Committees who control fishing sites and methods using bylaws that are drawn-up, where appropriate, in consultation with us.</p> <p>In Wales the Welsh Office monitors fish stocks and catches and is responsible for the registration of fishing vessels and enforcement of quotas.</p> <p>Environmental Health Departments monitor the health and quality of fish flesh.</p> <p>While we have responsibilities in some coastal waters our main concern is the protection of migrating salmon and sea trout, although in some places we have powers (by agreement with local Sea Fisheries Committees) to enforce the protection of bass stocks in coastal waters.</p>
Shellfisheries	<p>Like sea fisheries, shellfisheries (not including crabs, lobsters and other crustacea) are regulated by several different authorities, including the NRA. The shellfish are protected by the provisions of the EC Shellfish Waters Directive that allows us to protect and monitor water quality in designated shellfisheries. However, the Menai Strait is the only commercial shellfishery in Wales that has been designated under this Directive.</p> <p>Shellfish are known to concentrate materials such as toxic algae, metals and pathogenic bacteria which can be harmful to people who eat them. Thus the quality of shellfish harvested for sale for human consumption is protected by the EC Shellfish Hygiene Directive that is administered by Environmental Health Departments and MAFF (Welsh Office Agriculture Department, in Wales). So far about 30 sites in Wales have been designated under this directive.</p>
Local Perspective	Commercial fishing for sea fish and shellfish is carried out on a small scale by part time fishermen from Cardigan and St. Dogmaels. Crab potting is practised along the coast north and south of the mouth of the Teifi but there is no other significant shellfishery. Some set netting for bass, mullet and other round fish takes place along the coastline outside of the mouth but, as a salmon conservation measure, drift netting and most set netting is prohibited within the estuary by Byelaws of the North Western and North

MAP 27.

COMMERCIAL HARVESTING OF SEA FISH AND SHELLFISH



Wales Sea Fisheries Committee. Exceptions to this prohibition are the authorised use of nets of mesh less than 65mm for herring or nets of mesh greater than 250mm for flatfish and rays in the outer estuary only.

Aims

To maintain and where possible enhance, marine and shellfisheries.

To protect migrating salmon and sea trout from interference by marine fishing activities.

Environmental Requirements:

Marine Fisheries:

Water Quality

Discharges to coastal waters should be controlled to meet the requirements of the EC Dangerous Substances Directive.

Physical Features

Marine fishing activities should not interfere with the migration of salmon or sea trout.

The physical marine environment should not be altered in a manner that would affect migratory fish stocks.

To enforce statutory measures that protect bass and other sea fish stocks, where appropriate.

Shellfisheries:

Water Quality

Discharges to coastal waters should be controlled to meet the requirements of the EC Dangerous Substances Directive.

Water quality at shellfisheries designated under the EC Shellfish Waters Directive should comply with the appropriate standards. The Shellfish Hygiene Directive has no associated target classes and therefore no Environmental Requirements can be set.

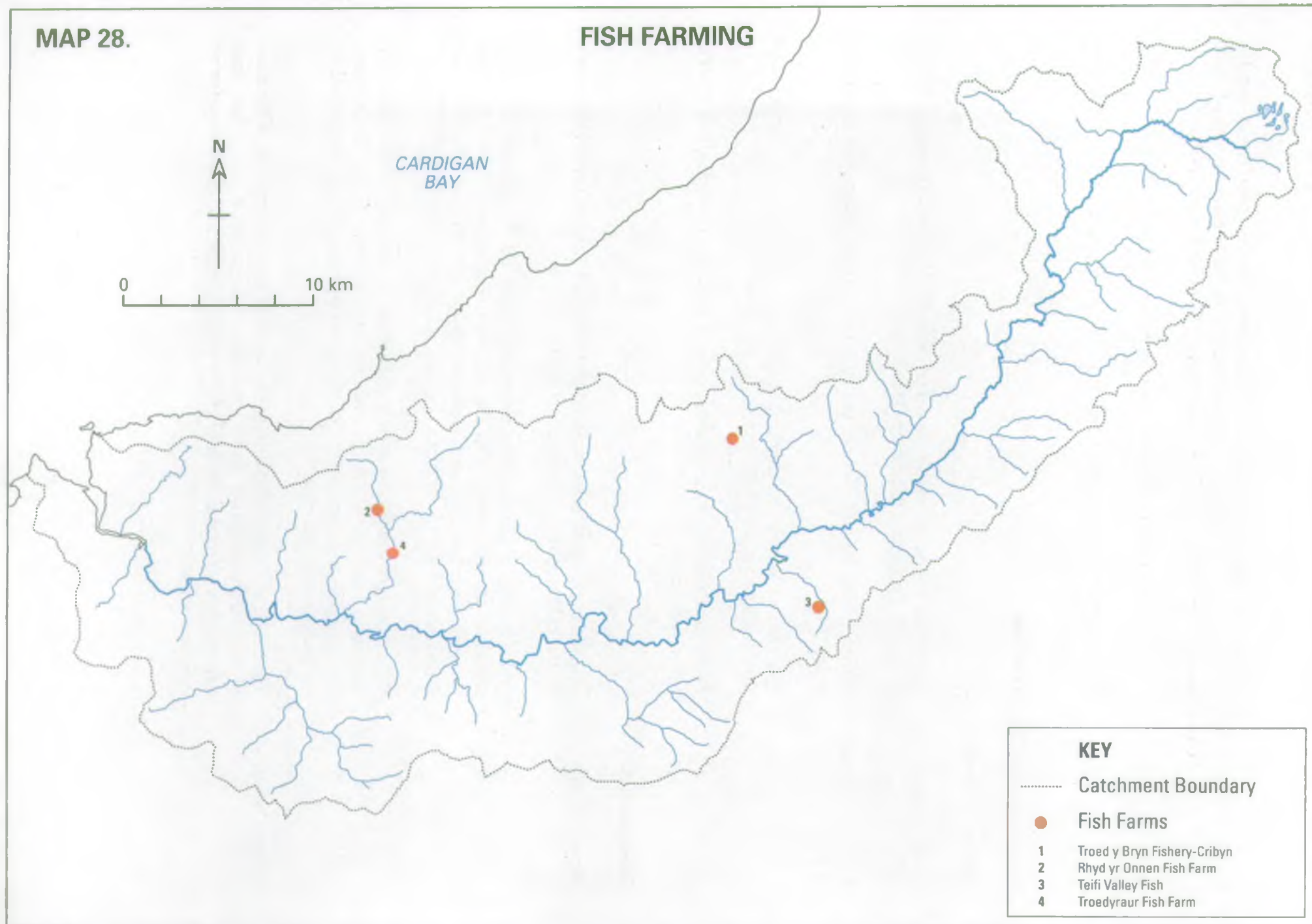
Where a recognised commercial shellfishery has not been officially designated under the EC Shellfish Waters Directive, we will, for the purpose of setting informal targets for Catchment Management Plans, be guided by the provisions of that directive.

Water Quantity

The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

MAP 28.

FISH FARMING



KEY

----- Catchment Boundary

● Fish Farms

- 1 Troed y Bryn Fishery-Cribyn
- 2 Rhyd yr Onnen Fish Farm
- 3 Teifi Valley Fish
- 4 Troedraur Fish Farm

4.20 FISH FARMING

General Information

Fish farming has especially close links with the water environment and requires large volumes of clean water that are later discharged as effluent. Consequently, there is a large potential for adverse environmental impact. Thus all fish farms must be registered with the Ministry of Agriculture Fisheries and Food (Welsh Office in Wales) and we issue licences to abstract and consents to discharge effluent for freshwater fish farms (marine farms may require a consent to discharge, depending upon circumstances). Careful management of fish farms is required by all involved to control the impact and our particular concern is to prevent the spread of disease, alien species or strains of fish to wild stocks and to maintain free passage for upstream and downstream migrating wild fish.

Fish farming can severely affect a watercourse by diverting a large proportion of the flow through the farm, leaving the river reduced in flow. This requirement for an adequate residual flow can be a factor that restricts the viability of a fish farm at some locations.

Local Perspective

There are four fish farms within the catchment; Troed-y-Bryn, Rhyd-yr-Onnen, Teifi Valley Fish, and Troedyrour. Each of these have been issued with a Consent to Discharge and are monitored by us. Details of their water abstraction requirements are given in Section 4.9.

Aim

To control fish farming activity to protect wild fish stocks and other uses of the water environment.

To manage the quality and volume of watercourses so as to safeguard licensed and exempt abstractions and the environment. This includes the active enforcement of abstractions.

The NRA will encourage abstractions to be made as far downstream in a river as possible and discharges to be made as close to the point of abstraction as is practicable.

Environmental Requirements:

Water Quality

Discharges should comply with all conditions stated within the discharge consent. This will be enforced by the NRA.

There should be no significant deterioration in the quality of waters receiving discharges, beyond that assumed when setting the discharge consent.

Water Quantity

The NRA has the task of balancing the needs of the environment, with those of abstractors and other users. An abstraction licensing policy has been developed to ensure that this is carried out consistently and effectively for all new abstractions.

All conditions stated on the abstraction licence must be complied with; this will be enforced by the NRA.

Physical Features

That suitable provision should be made to prevent the escape of stock to the wild and the trapping of wild stock within the farm. Where appropriate this will be enforced by the NRA. Similarly provision should be made to prevent the spread of diseases and alien species.

4.21 MINERAL EXTRACTION

General Information

Mineral extraction can affect surface and groundwaters in a wide variety of ways. Discharges from active quarries and mines can contain toxic and suspended materials that are harmful to aquatic life and are subject to the normal discharge consenting procedure described in the Discharge Uses section. However, discharges from abandoned mines are not adequately controlled by the law and may cause locally severe problems.

The exploitation of minerals can have major impact on water resources by altering groundwater flows and hence affecting streamflows. The removal of material from above the water table reduces the opportunity for natural filtering and attenuation of pollutants, which will consequently enter groundwater more readily. Summer springflows can be reduced as a result of the loss of the water storage capacity of the mineral that has been removed. Reclamation with impermeable materials will increase run-off and reduce the recharge of groundwaters by rainfall.

Open cast mining can be of particular concern to us. These mines can also affect the fishery and conservation value of long lengths of diverted river as well as groundwater quality and quantity.

Gravel extraction may take place from the river channel or floodplains and is controlled by planning law, but may also require a land drainage consent from the NRA. If works are not properly managed, the river channel can be seriously damaged by gravel removal.

In some areas land reclamation schemes may cause renewed problems as toxic metals are exposed or fine solids run off into watercourses. Consequently, we license and monitor such discharges.

All mineral workings are subject to general planning control and we are consultees on such applications and consider each application on a case by case basis.

Local Perspective

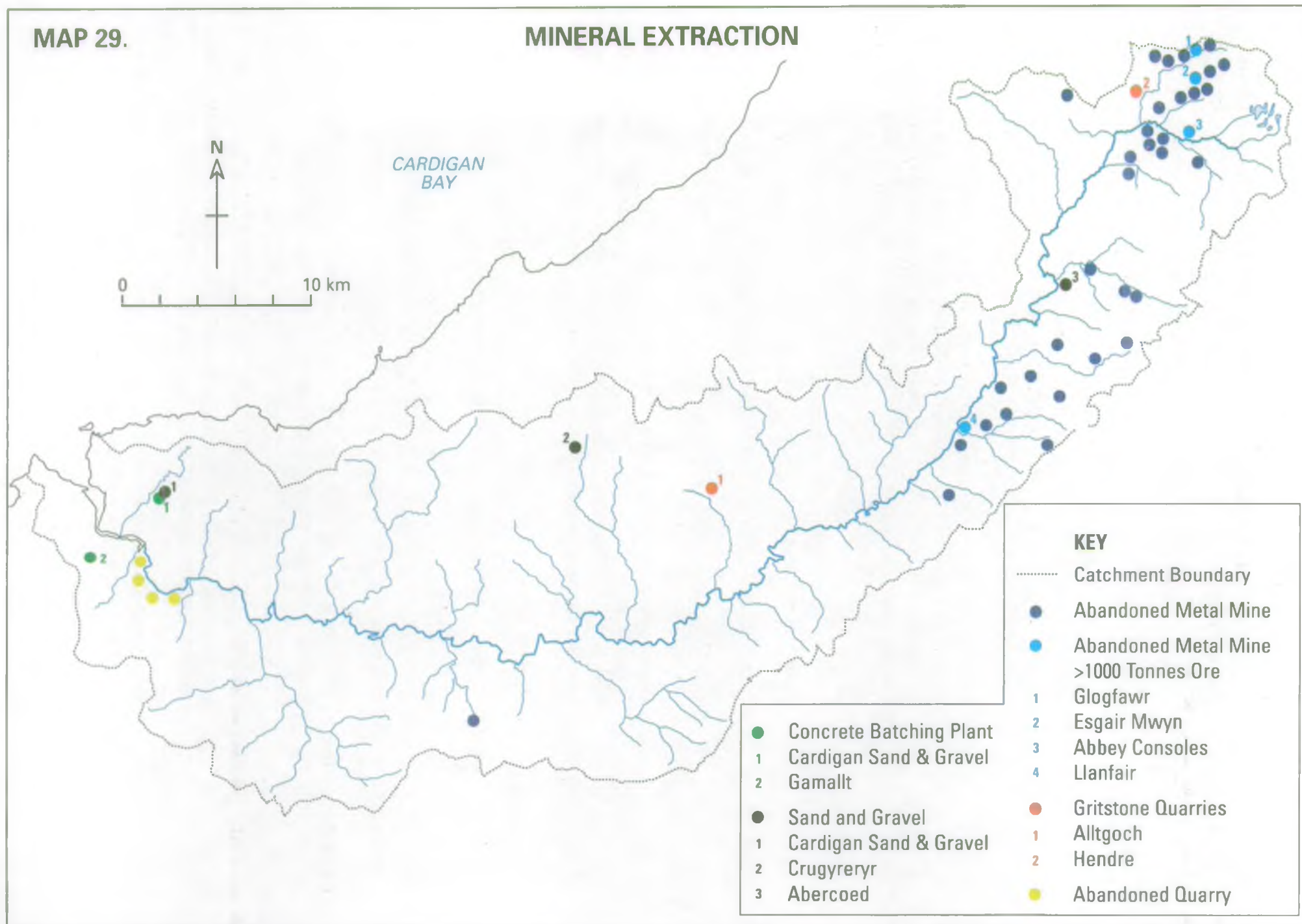
The two active gritstone quarries in the catchment provide roadstone, building stone, and stone for concrete block making. There are also two concrete batching plants from which mixer lorries operate.

Sand and gravel is extracted from glacial deposits at three sites in the catchment which supply washed sand and stone to the concrete industry. We regularly monitor consented discharges from settlement lagoons.

Of greater significance, in terms of water quality, are the numerous abandoned metal mine workings which are located largely in the upper part

MAP 29.

MINERAL EXTRACTION



of the catchment. Glogfawr, Esgair Mwyn, Abbey Consoles and Llanfair mines each extracted more than 1000 tonnes of lead ore when they were worked. Esgair Mwyn was the most recently operated mine, closing in 1927, although there have subsequently been proposals to reprocess the spoil tips.

Although these mines are known locally as 'lead mines', copper, zinc and silver have also been extracted. Other metals (e.g. cadmium) are also present in some ores.

Metalliferous and acidic effluent and site run-off from these sites still continues to affect the water quality of several tributaries and the Teifi itself, and in some areas the river sediments are metalliferous.

Removal or subsequent re-use of mine spoil from disused metal mines can lead to increased water quality problems. These arise from the deposit of this spoil in previously uncontaminated areas and the disturbance of the spoil heaps themselves causes the release of additional metals into the environment.

The pollution risk from these sites is being assessed by monitoring the major discharges and undertaking local and national surveys.

Aims

To ensure that mineral extraction and associated activity, including land reclamation, does not adversely affect the water environment.

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

Environmental Requirements:

Water Quality

All consented discharges must comply with the conditions stated within the consent. This will be enforced by the NRA.

There should be no significant deterioration in the quality of waters receiving discharges beyond that assumed when setting the discharge consent.

Measures must be taken to prevent diffuse pollution that may arise from rainfall run-off.

Water Quantity

Mineral working and land reclamation should not have an adverse effect on surface and groundwater resources or the rights of licensed water abstractors.

Physical Features

Mineral working, land reclamation and associated activity should not reduce the quality of the physical habitats available in the water environment.

The aesthetic quality of restored landscapes should be in keeping with the overall nature of the catchment and reflect the local needs for amenity and recreation.

5.0 CATCHMENT TARGETS

In this section we set targets for:-

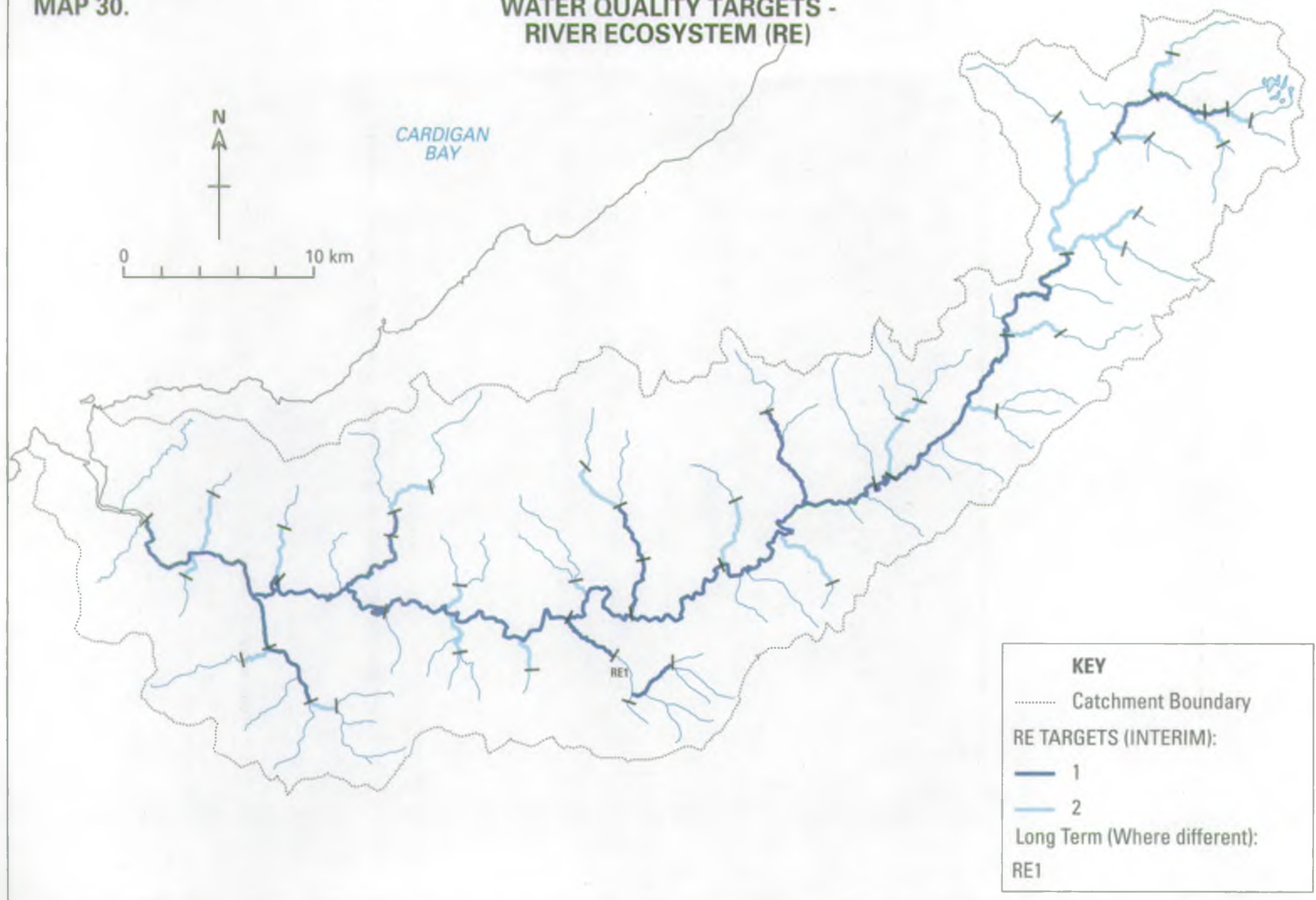
- Water Quality
- Water Quantity
- Physical Features.

These targets reflect the needs of the Uses identified for any area of the catchment and are set using the guiding principles of:-

- Sustainable development
- Environmental capacity

MAP 30.

WATER QUALITY TARGETS -
RIVER ECOSYSTEM (RE)



5.1 WATER QUALITY TARGETS

General

Section 4 of this report identified the many Uses to which the Teifi catchment is put, and the appropriate water quality requirements of each Use. These requirements provide the basis for setting targets to ensure the protection of legitimate Uses.

Targets are commonly derived from water quality standards contained in relevant EC Directives such as those concerning Dangerous Substances, Freshwater Fisheries and Bathing Waters. These targets are applied on a statutory basis in certain parts of the catchment. Elsewhere we may informally apply standards contained within appropriate EC Directive to provide planning targets for the protection of legitimate Uses.

SWQOs

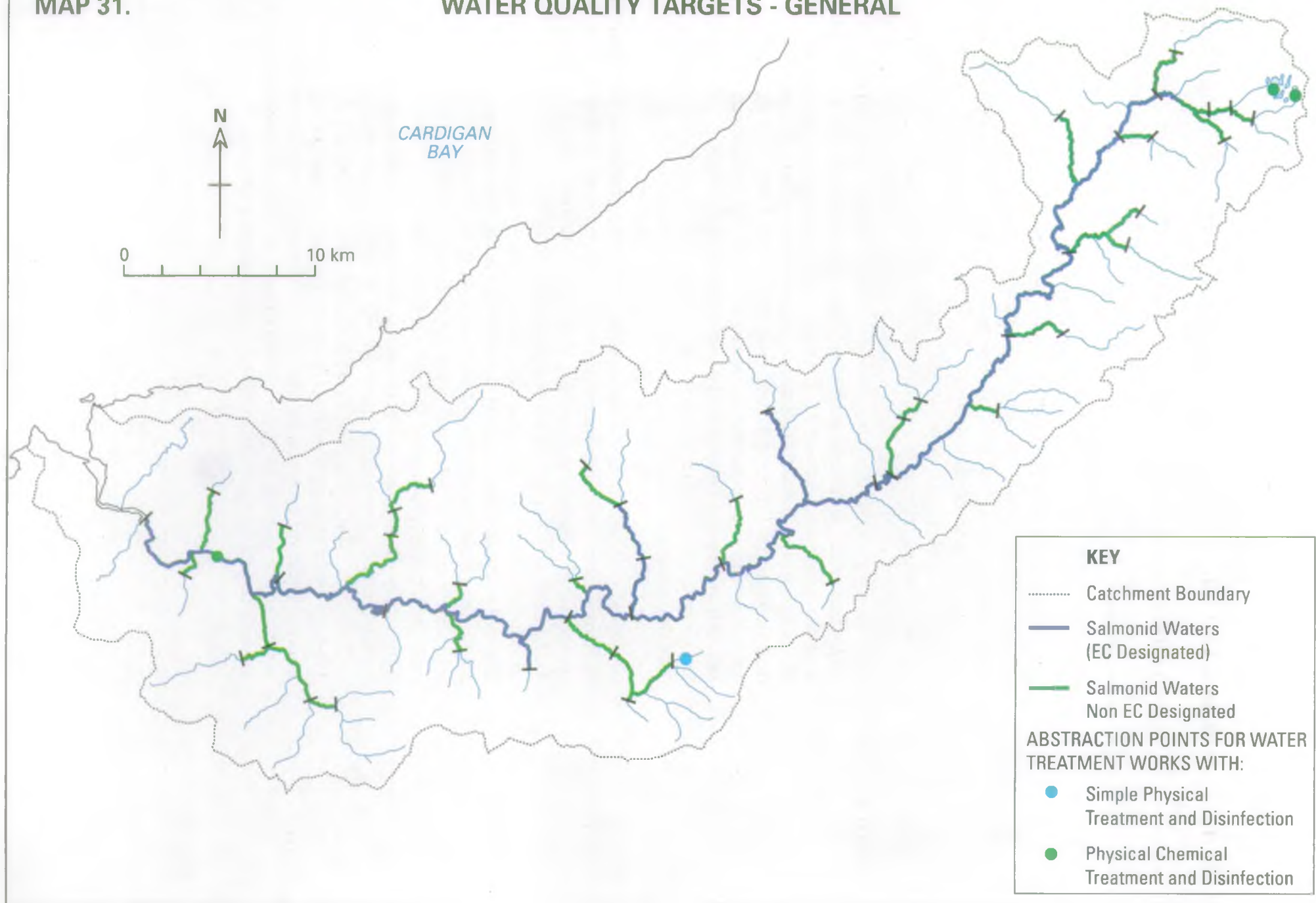
Provision for setting Statutory Water Quality Objectives (SWQOs) in controlled waters was made under the Water Resources Act (1991). The scheme is based on recognised Uses to which a river may be put and includes River Ecosystem, Potable Abstraction, Agricultural/Industrial Abstraction and Watersports. At present only standards for the River Ecosystem Use have been formally developed and were introduced by the Surface Waters (River Ecosystem) (Classification) Regulations 1994.

The Government is currently conducting a pilot implementation of SWQOs following which it is hoped they will be applied more widely. Until then objectives proposed using the River Ecosystem (RE) scheme in this CMP will remain informal. They will however, form the basis of our approach to water quality management (replacing the National Water Council scheme). In this CMP we propose two RE objectives for each river stretch. The first, or long-term objective, represents our aspiration for water quality. Attaining this level of quality may not always be possible during the lifespan of a CMP (5-10 years) therefore we also propose a second RE objective. This reflects what improvements in water quality are achievable during the CMP's lifespan and therefore represents an interim objective which will be reviewed periodically. It is these interim objectives which will be given a statutory basis when and if implementation of the SWQO scheme proceeds.

Where Uses are not supported by formal water quality standards we may set informal targets to protect a particular Use. These then provide additional water quality planning targets. Such standards have been developed for example to protect migratory salmonid fish in estuarine waters.

MAP 31.

WATER QUALITY TARGETS - GENERAL



Local Perspective**River
Ecosystem**

Beyond the life of this plan, Long Term River Quality Objectives (LTRQOs) of RE Class 1 are proposed for the whole of the catchment, with the following exceptions:

- the Teifi within and immediately downstream of Cors Caron. Here, dissolved oxygen concentrations are depressed by the poor natural re-aeration characteristics as the Teifi runs through the bog. As a consequence, this stretch has a LTRQO of RE Class 2.
- For the upstream stretch of the Dulas, which also has poor re-aeration characteristics, an LTRQO of RE Class 2 is also proposed.

These targets reflect our long term vision for the catchment and the water quality that should be expected to support a thriving salmonid fishery.

During the life of this Plan other failures to achieve RE targets, as identified in Section 3.1.1 (Water Quality State of the Catchment), are to be addressed. RE Class 1 standards should be achievable in all these situations, apart from those watercourses affected by surface water acidification. It is, however, our intention to apply a derogation in respect of pH in these stretches. This will allow the stretches to achieve interim water quality targets. An RE Class 2 target has been set in the interim for the Nant Gwen, a very small tributary of the Tyweli.

**EC
Freshwater
Fisheries
Directive**

In addition to RE targets, standards specified in the EC Freshwater Fisheries Directive (78/659/EEC) are set as targets for the whole of the Teifi, upstream to Pontrhydfendigaid, together with stretches on the Siedi, Clettwr and Grannell.

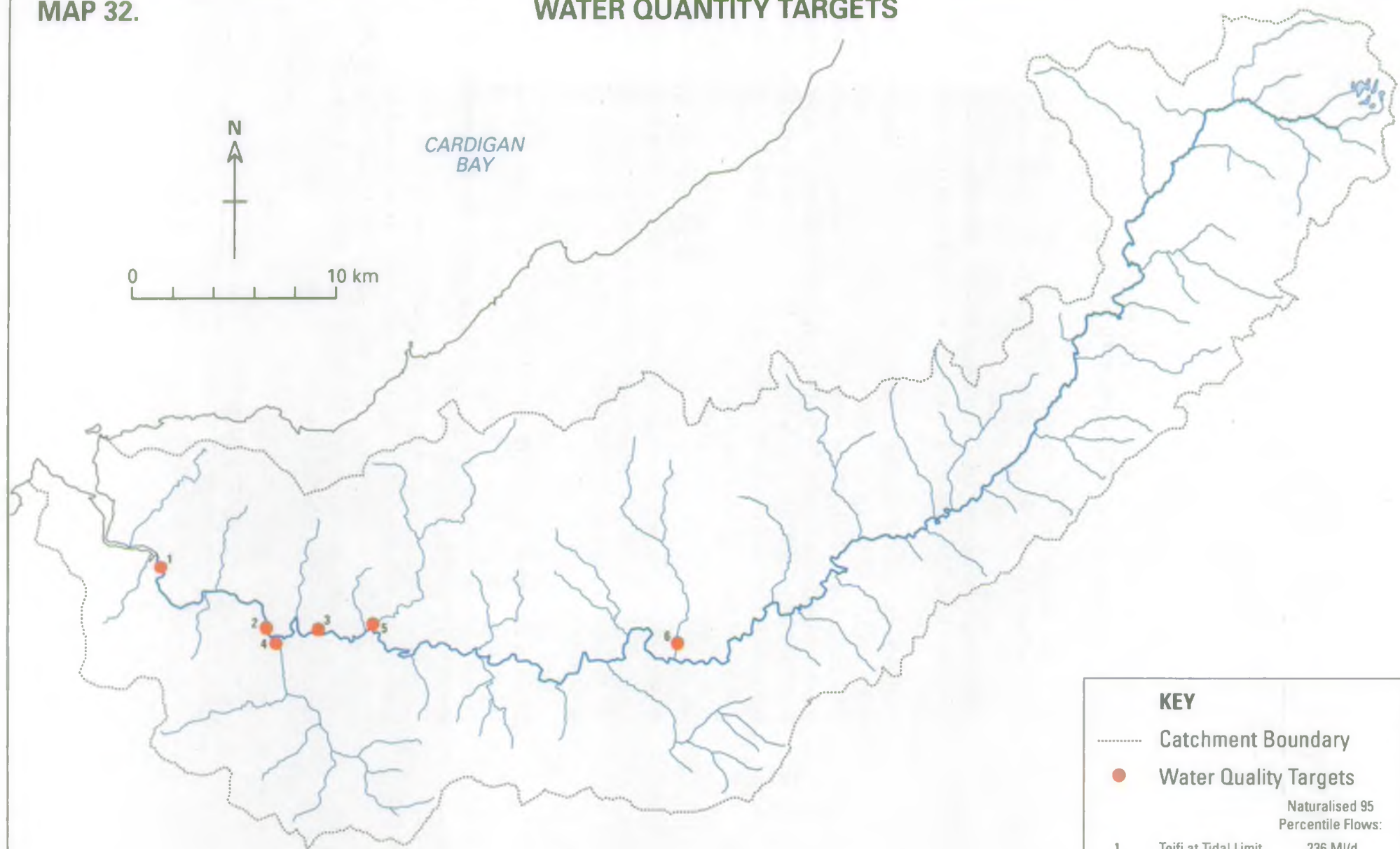
Much of the remaining catchment should achieve water quality suitable for supporting salmonid fish. Although these watercourses are not formally designated under the EC Freshwater Fisheries Directive, the standards therein are set as informal targets.

**Bathing
Waters**

Bathing is known to be locally popular at Poppit Sands, near the mouth of the Teifi estuary. This bathing water is not identified for the purposes of the EC Bathing Waters Directive (76/160/EEC). The standards therein have, however, been set as informal targets.

MAP 32.

WATER QUANTITY TARGETS



KEY

----- Catchment Boundary

● Water Quality Targets

Naturalised 95
Percentile Flows:

1	Teifi at Tidal Limit	236 Ml/d
2	Teifi at Glan Teifi	226 Ml/d
3	Teifi at Cenarth	198 Ml/d
4	Cych at Abercych	24 Ml/d
5	Ceri at Felin Ceri	13 Ml/d
6	Clettwr at Dolbantau	18 Ml/d

5.2 WATER QUANTITY TARGETS

General

The implementation of the Water Resources Act 1963 required almost all types of abstraction to be authorised by a licence. Pre-existing abstractions had to be granted a Licence of Right in 1965 that reflected the historical abstraction regime and could not take into account its impact. Subsequently, licences have been granted only if they do not adversely affect existing abstractors and the environment, or if conditions can be imposed which restrict their impact.

We take a precautionary approach to the granting of new licences, and will only grant them if we are confident that the available resources are able to sustain the proposed abstraction in the long term without harm to the environment or existing abstractors. We also regularly monitor the compliance of abstractors with licence conditions and enforce them as necessary.

We will adopt an abstraction licensing policy that will allow us to consider, in a structured way, the environmental needs of the river system and to balance these with the needs of abstractors. The policy will permit a review of the volume of existing abstractions in the catchment.

A methodology for the assessment and prioritisation of rivers that suffer artificially reduced flows is already in use. In Welsh Region we will use Catchment Management Plans to assist this process.

We will seek to balance the needs of existing and potential abstractors with those of the environment.

We have powers to limit abstraction and take other conservation measures in periods of drought.

Flow Requirements

To prosper, the natural river ecosystem requires a certain flow, minimum flow or pattern of flows. While research towards identifying these specific needs is underway, an interim minimum flow has been set. On most rivers this is equivalent to the flow that would, on average, be exceeded for 95% of the time (Q). Although new abstractions would not generally be permitted to cause flows to drop below this level, rivers will naturally fall below it, from time to time.

Water Level Requirements

At some designated wetland conservation sites we will agree Water Level Management Plans, with the Countryside Council for Wales, to manage water levels to meet the needs of the protected ecosystem.

Local Perspective

Much of the demand for potable water in Ceredigion is met from sources within the Teifi catchment. With increasing demand and the closure of a number of minor sources over recent years, the major abstractions at Llechryd and Teifi Pools are heavily relied upon by the water undertaker.

Any increase in potable water abstraction would have to be met without increasing the impact on the Teifi during low flow conditions. Clearly there is extra water available during the winter months if it is required. However, the storage of large quantities of water is costly and difficult to achieve, and may have significant environmental impacts.

At present the Llechryd licence has no conditions protecting the Teifi and under most states of flow the abstraction takes less than 1% of the total water available. However, at 95 percentile flows it takes nearer 10% of the flow and under extreme low flow conditions, such as experienced in 1976, it can abstract one third of the available river flow. Any application for a variation to the summer quantity would enable us to set conditions on the licence to protect low flows as necessary. Any such conditions would be set according to the abstraction licensing policy that is currently being developed, but would possibly protect the 95 percentile flow in the river.

The Teifi Pools abstractions are subject to the provisions of an Order made at the time of implementation of the scheme. The conditions of this order guarantee a prescribed flow downstream of both Llyn Teifi and Llyn Egnant broadly equivalent to the calculated dry weather flow. Any increase in abstraction from the pools would be subject to these conditions being met.

Many of the other abstractions in the catchment for fish farming, hydropower and amenity purposes are non-consumptive, returning all the abstracted water to source a relatively short distance downstream of the abstraction point. With the exception of Licences of Right, conditions related to local flows are attached to the licences as appropriate, to protect low flows.

As the catchment is a major fishery it is important that flows and their distribution are protected sufficiently to facilitate salmon and sea trout spawning and movement. Particular sites to target in the catchment are on the major tributaries including the Clettwr at Dolbantau fish pass, the Ceri at Felin Geri Mill, and the Cych at Abercych.

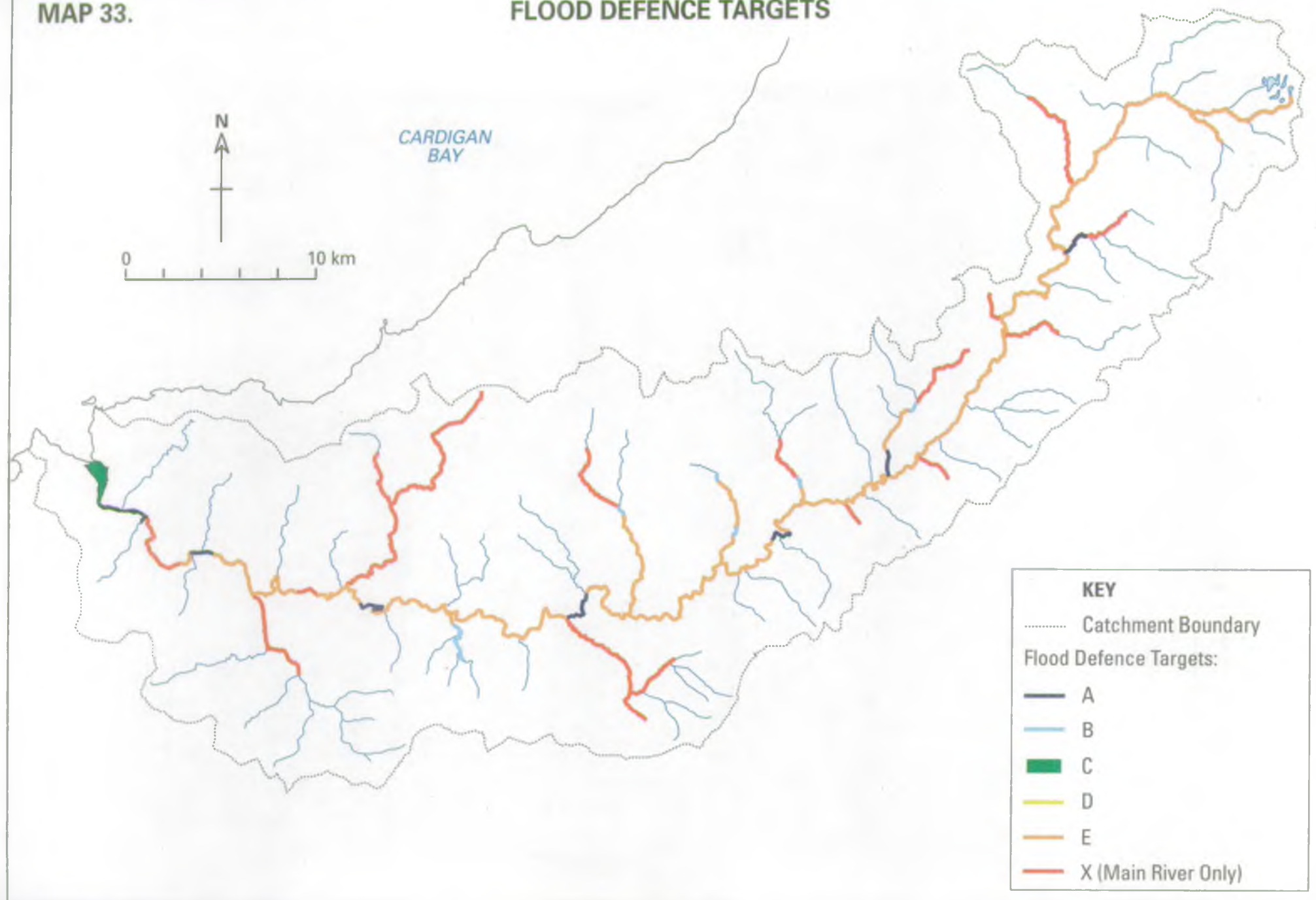
The natural beauty and amenity value of Cenarth Falls would be diminished by prolonged low flows, while the Teifi at Llandysul is growing in importance as a white water canoeing venue, where spate conditions would clearly be desirable. Sufficient flow is required in the lower reaches of the Teifi through Cardigan to render it navigable for small craft.

CATCHMENT TARGETS

In the absence of the policy to assess in-river needs for the watercourses within the catchment, the current 95 percentile flow (Q95) has been calculated for the sites referred to above, to give an indication of the flow that should be the target for protection when considering licence applications. (The 95 percentile flow is that flow which one would expect to be exceeded 95% of the time on average; this is an estimate of the dry weather flow which the river would be at, or below, for 18 days per year on average).

MAP 33.

FLOOD DEFENCE TARGETS



5.3 PHYSICAL FEATURES TARGETS

General

Many Uses are affected by the physical characteristics or features of the river and this is especially true of Uses related to wildlife and its conservation. The habitat requirements of the wildlife associated with rivers are too complex to allow simple targets to be set, even if such habitats could be effectively measured. Consequently until such a time as quantitative physical targets can be set, Catchment Plans will adopt the general theme that the abundance and diversity of physical features typical of the type of river, should be maintained and where possible, improved. This requires subjective assessment by trained staff. To assist this assessment we are developing a habitat classification system and use related targets for physical features such as spawning and nursery sites for fish.

In a similar manner the physical features requirements of recreational Uses of waters cannot yet be quantified in order to set firm targets, again professional judgement must be used.

Flood Defence targets nearly all relate to physical features and the requirement for the river channel to contain certain specified flows at different points in its length.

Local Perspective

There are many Uses in the catchment which have their own physical features requirements. The following requirements are considered targets for the Teifi catchment:

Flood Defence**Flood Protection**

Where economically, technically and environmentally justifiable, the NRA will aim to maintain or improve in a cost effective manner, designated "Main Rivers" to standards of service (SoS) which accord with the following Land Use bands:

CATCHMENT TARGETS

Land Use Band	Typical Description of Reach	Reference SoS - Flood Return Period (Years)	
		Fluvial	Tidal
A	Contains residential and non-residential properties distributed over a significant proportion of its length. Amenity uses may be prominent.	50-100	100-200
B	Reaches containing residential and non-residential property over some or all of the reach length but at lower density than Band A. Intensive agriculture may be present.	25-100	50-200
C	Isolated rural communities at risk with limited number of residential properties. Agricultural interests will be more apparent than in band A and B.	5-50	10-100
D	Isolated properties at risk. Agricultural use will probably be the main use with arable farming a feature.	1-10	2.5-20
E	Very few properties at risk. Agricultural use will be predominant with extensive grass land the main feature.	<2.5	<5
X	No recorded areas at risk of flooding.		

Note: The above standards of service table does not imply an entitlement to the provision of this or any standard but is indicative of the standards considered reasonable for the land use defined.

Water Level Management Plans will be prepared for all sites agreed with the Countryside Council for Wales (CCW).

Regulation and Enforcement

The NRA, in its role as statutory consultee under the planning legislation and by use of its consenting powers under the Water Resources Act (1991) and Land Drainage Act (1991), will:

- Ensure provision of suitable access for maintenance of river/channel and sea/tidal flood defence and for the construction of new defences by the limitation of development within 7 m of the top of the river bank (use of byelaws and planning laws).
- Ensure that obstructions to flow do not result in an increased flood risk (consent under WRA 1991 and LDA 1991).

CATCHMENT TARGETS

- Ensure development on the flood plain is identified and encourage planning authorities to use the planning process to guide development away from these areas (Section 105 (2) survey and Welsh Office Circular 68/92).
- Ensure that there is no increase in flood risk to existing properties as a result of further development either remote/or adjacent to existing development (catchment planning to manage flows and/or loss of flood plain storage).

Flood Warning

Where flood warning schemes are in place, the NRA will aim to provide a two hour warning of commencement of flooding.

Fisheries

Through our operational, regulatory and advisory activities, and particularly in our role as a statutory consultee to the Local Planning Authorities, we will endeavour to ensure that there is:

- suitable habitat for fish breeding with an adequate distribution of potential redd sites and nursery areas.
- unimpeded access for migratory fish through the estuary and river to and from all potential spawning reaches (where appropriate), with adequate holding pools and cover throughout the catchment.
- effective fish screening on all abstractions and discharges (where necessary) to protect wild fish stocks and prevent escapement from fish farms.

Our intention to set specific targets relating to fish stocks and spawning success was recently announced in our published Fisheries Strategy . We will use the results of continuing fisheries monitoring surveys in the catchment to help in the determination of these targets, as well as data collected from rod and net catch returns.

Our target for salmon spawning in the Teifi is 390 eggs per 100m² of available rearing area.

Conservation

Our developmental national habitat classification scheme, together with the results from the ongoing River Corridor Surveys, will assist in setting specific targets for conservation.

Through our operational, regulatory and advisory activities, and particularly in our role as a statutory consultee to the Local Planning Authorities, we will endeavour to ensure that:

- the current diversity of natural features such as bankside features, wetlands, emergent vegetation, meanders, pools and riffles are maintained in order to conserve river corridors and safeguard landscape quality; improvements are effected and degraded features reinstated where possible. In order to achieve this, water fringe buffer zones should be fenced off wherever possible to protect waterside habitats from damage. Livestock watering points should be clearly defined to protect river banks from degradation.
- for each SSSI and NNR potentially affected by our activities, we will agree a "standard of service" that will maintain, and if possible enhance, the conservation value of the site.
- areas of degraded wetland and riverine habitat are identified and, where possible, restored to a level at which they support a range of species typical of similar habitats elsewhere in the catchment.
- the physical structure of archaeological sites and their settings is maintained and, where possible, enhanced, recognising the interdependence of many of the sites and monuments. Where unavoidable change occurs, the original detail of the site should be carefully recorded.
- the survival and, where necessary, reinstatement of threatened fish populations is promoted. This will include not only rare species, but also specific local strains of more common native species.
- control of the spread of Japanese knotweed and other alien weeds is undertaken as required under the Wildlife & Countryside Act 1981.

Recreation

Through our operational, regulatory and advisory activities, and particularly in our role as a statutory consultee to the Local Planning Authorities, we will endeavour to ensure that:

- an appropriate network of riverside paths and access points is maintained and, where appropriate, promoted.
- protection is given to existing recreational sites, and that the development of new sites is promoted at suitable locations, as opportunities arise.
- consideration is given to the design of paths, access points and recreational developments, taking into account, wherever possible, the needs of the infirm and disabled.
- provision is made for both canoe touring and white water canoeing, where appropriate, within the catchment.

APPENDICES

APPENDIX 1**THE GROUNDWATER PROTECTION POLICY**

The preservation of groundwater quality and quantity is a major objective of the NRA. Limiting the risk from pollution and over abstraction must be dealt with in a structured methodical manner.

The NRA has therefore produced a "Policy and Practice for the Protection of Groundwater" which provides advice on the management and protection of groundwater on a sustainable basis. The Welsh Region is implementing this national framework policy for the protection of groundwater which will effectively manage groundwater protection in the Teifi Catchment. 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, together with policy objectives of the NRA with respect to the threat to groundwater from abstraction, physical disturbance of groundwater flows, waste disposal, contaminated land, discharges to underground strata, disposal of sludges to land and diffuse pollution.

The implementation of the policy relies in part on the construction of a series of protection zone maps. Resource protection maps will be produced after consideration of vulnerability of groundwater based on the nature of the strata and type of soil and drift.

The Policy recognises three groundwater source protection zones:

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.

APPENDIX 2

THE REQUIREMENT FOR AN ABSTRACTION LICENCE

	0 - 5 m ³	5 - 20 m ³	Above 20 m ³
One off, any purpose	No restriction	Consent	Licence
	0 - 5 m ³ /d	5 - 20 m ³ /d	Above 20 m ³ /d
Domestic, to one household	No restriction in most cases		Licence
Agriculture (from surface water)	No restriction for land adjoining watercourse		Licence
Agriculture (from groundwater)	Licence	Licence	Licence
All other purposes	Licence	Licence	Licence

APPENDIX 3**GLOSSARY OF TERMS, UNITS AND ABBREVIATIONS****ABSTRACTION**

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

ABSTRACTION LICENCE

Authorisation granted by the NRA to allow the abstraction of water from a source of supply.

ACUTE

Used to describe a sudden dramatic effect, e.g a major pollution or overnight change in river course. Often used in conjunction with 'chronic' which describes longer term lower level impacts.

ADIT

An almost horizontal shaft into a mine, for access or drainage.

AFFORESTATION

The process of creating a forest where none existed before.

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).

ALLUVIAL DEPOSITS

Layers of sediment resulting from the activity of rivers. Usually fine material eroded, carried, and eventually deposited by rivers in flatter areas such as flood plains or lake beds.

AMELIORATE

To cause something to get better.

AMMONIA

A chemical which is often found in water as the result of the discharge of sewage effluents. It is one of the chemicals measured 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 etc.

AQUIFER (MINOR AQUIFER)

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

BASE - FLOW

That part of the river flow that is derived from groundwater sources rather than surface run-off.

BIOACCUMULATION

The accumulation, by living organisms, of materials to concentrations higher than those of the surrounding environment. This is particularly important where poisons are accumulated.

BOD

An abbreviation for Biochemical Oxygen Demand. This is an estimate of the rate at which biological and chemical processes use up the oxygen available in water. It is one of the features that are used to classify water quality

BUFFER ZONE

A strip of land, usually 10-100m wide, at the side of a river which is isolated from the general surrounding land-use and allowed to develop naturally. This provides a number of benefits as well as providing valuable wildlife habitat. These include reduced inputs of silt and some pollutants and protection of river banks from erosion by livestock while allowing the river to respond naturally without undue threat to life or property.

CATCHMENT

The area of land draining to a defined point.

CHRONIC

Used to describe an effect, usually pollution or physical damage, that has gone on for a long time or takes a long time before an impact is seen. Often used in contrast to 'acute' which describes sudden dramatic effects.

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, many belonging to the carp family (Cyprinids).

CONFLUENCE

The point where two or more streams or rivers meet.

CONSENT

Two types of consent are issued by the NRA:

Discharge Consents are statutory documents issued by the NRA to indicate any limits and conditions on the discharge of an effluent to a controlled water.

Land Drainage Consents authorise works to the beds and banks of a river.

CONTROLLED WATERS

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

CULVERT

Artificial channel, pipe or conduit that carries water under a road, canal etc.

CUMECS

Short for cubic metres per second (m^3/s). This is used to express river flows.

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 into less dangerous substances. They are classified as List I or List II.

DEROGATION (Water Quality)

Derogation (i.e. waiving the result) may be applied where water quality fails a target due to natural or man-made conditions that are not readily controllable (e.g. low pH and/or elevated metal concentrations). This approach prevents unnecessary downgrading of waters and also carries the benefit that other, more controllable, aspects of water quality can be protected by the NRA at the target level.

DEROGATION (Water quantity).

A legal term that describes a diminution of the water rights of existing water users due to a new abstraction.

DIFFUSE

Spread out, not associated with a single place or point.

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 one of the features that are used to classify water quality.

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.

ENVIRONMENTALLY SENSITIVE AREA (ESA)

An area where the landscape, wildlife and historic interest are of national importance. Payments are made by Welsh Office to ensure appropriate sensitive land use.

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 which may pose a health risk to humans and livestock.

FAUNA

Animal life.

FLORA

Plant life.

FLUVIAL

Associated with river processes such as flow and erosion.

FRESHET

A naturally or artificially generated increase in river flow after a period of dry weather, having the effect of enhancing water quality and the aquatic environment e.g. through improved levels of dissolved oxygen and flushing of accumulated debris and silt.

FRY

Fish which are less than 1 year old.

GAUGING STATION

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

GROUNDWATER

Water contained within pores, cracks and fissures in rocks.

HABITAT

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

HEAD

A measure of the height between upstream water level and power generating equipment.

HEADRACE

A channel that carries water to a water wheel or turbine.

INDICATIVE FORESTRY STRATEGY

These are produced by some local authorities and show the areas of land that are suitable or unsuitable for afforestation. They are divided into 'preferred areas', 'potential areas' and 'sensitive areas'.

LEACHATE

This is the product of the removal of soluble substances by action of water percolating through soil, waste or rock. Often used in association with dumped waste materials.

LEAT

A channel which conveys water to a mill wheel.

LIST I AND LIST II 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 I substances are considered to be the most harmful. Pollution caused by these must be eliminated.
- List II substances are less harmful and pollution caused by these must be reduced.

m³/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. This unit is often used to measure abstraction of water.

m³/s

Short for cubic metres per second (cumecs). This is used to express river flows.

MACROINVERTEBRATE FAUNA

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

MI/a and MI/d

Short for megalitres per annum or per day, both standard international units 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. This unit is often used to measure abstraction of water.

NITRATE SENSITIVE AREAS (NSA) AND NITRATE VULNERABLE ZONES (NVZ)

Land in areas where water sources exceed or will exceed 50mg/l of nitrate by 2010 are designated as NVZs. Farmers are required to follow regulations designed to reduce nitrate loss from their land in both NVZs and NSAs although they only receive compensation for doing so in NSAs.

PARAMETER

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

PARCOM

A monitoring programme for pollutants selected by the **Paris Commission**, carried out by the NRA in England and Wales.

PARR

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

PERMEABILITY

The ease with which liquids (or gases) pass through materials, (often rocks or soils).

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'.

POROSITY

The volume of water that can be held within rock or soil. This is determined by the total volume of the rock or soil divided by the spaces (voids) within it.

POTABLE

Water suitable for drinking.

REACH

A length of a river.

RED LIST SUBSTANCE

A substance that has been selected for monitoring due to its toxicity, persistence and bioaccumulation.

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.

RIPARIAN

Associated with the river bank. A Riparian owner is the owner of the banks and land adjacent to the river and usually owns the river bed to the mid - point of the wetted channel.

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.

RIVERINE

Something that is associated with the river environment.

RIVER QUALITY OBJECTIVE (RQO)

The quality of water that the river should attain in order to support its agreed uses. An RQO may be bound to a certain date for achievement or to a future, indefinite, time. The latter is described as a Long Term RQO (LTRQO).

SALMONID FISH

Game fish, e.g. trout and salmon.

SETASIDE

The Common Agricultural Policy reform provides for land to be removed (set aside) from food production to reduce surpluses. The land can be set aside temporarily or permanently and can be a valuable opportunity for wildlife habitat improvement or the provision of riparian buffer zones.

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.

SPATE (flash flood)

A sudden increase in river flows that may cause flooding or other damage. Typically the flows will fall as quickly as they rose once rainfall ceases. A spate, or flashy river is one that is characterised by such sudden and wide variations in flow as a result of rainfall.

SPRING RUN

Salmon return from the sea to freshwater rivers when adults. 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; spring and autumn. The spring run fish are often larger than later-run fish, and are often more prized by anglers.

SSSI

Abbreviation for 'Site of Special Scientific Interest'.

STATUTORY MAIN RIVER

A legal definition which defines particular rivers and streams 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.

SURFACE WATERS

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

TELEMETRY

Telemetry is a means of collecting information that has been collected by unmanned monitoring stations (often for river flows or rainfall) using a computer that is connected via the public telephone system.

TIME LIMITED LICENCE

Every licence states whether it is to remain in force until revoked or is to expire on a specified date.

UNCLASSIFIED REACHES

Stretches of river (usually smaller streams) that do not fall under the General Quality Assessment classification scheme and therefore do not have their water quality monitored routinely.

WASHLANDS

Extensive areas of semi-natural flood plain next to a river, where water is stored during floods. The amount of water stored may be altered by man made devices such as weirs and sluices. Washland storage has the effect of reducing the flood peak downstream and may help to protect developed areas from flooding and also provide valuable wildlife habitats.

WEIR

A low dam built across a river to raise the water level, divert the water or control its flow.

WETLAND

Wet areas where the animals and plants that live there are dependent on that 'wetness' for their survival. They include bogs, reed-swamps and mires but not the river corridor.

95-PERCENTILE FLOW (Q)

The flow which one would expect to be exceeded 95% of the time on average. This is an estimate of the dry weather flow which the river would be at, or below, for 18 days per year on average.