NRA-Wales 5

RIVER CONWY
CATCHMENT MANAGEMENT PLAN
CONSULTATION REPORT

NRA

National Rivers Authority
Welsh Region

NRA Wales 5

River Conwy
Catchment Management Plan
Consultation Report
June 1993

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CONWY CATCHMENT MANAGEMENT PLAN

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MAPS FOR SECTION 8

1.0. **CONCEPT**

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

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

Flood defence, including the protection of people and property.

Flood warning.

Effective Management of water resources.

Maintenance and improvement of fisheries.

Conservation of the natural water environment.

Promotion of water based recreation.

Promotion of navigation in some locations.

To achieve success in all these areas the NRA works with industry, commerce, farming and the general public to promote environmental awareness and to enforce appropriate environmental standards.

Catchment management assists the NRA to use its authority and work with others to ensure that the rivers, lakes, coastal and underground waters are protected and, where possible, improved for the benefit of future generations.

River catchment and coastal areas are subject to increasing use by a variety of activities. Many of these interact and some conflicts arise. The competing requirements and interests of users and beneficiaries must be balanced.

The NRA will use its resources to:

i) Respond promptly to all reported pollution incidents.

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

iii) Maintain existing assets and invest in new ones to provide flood protection, develop water resources and supply other NRA services.

iv) Determine, police, enforce and review the conditions in water abstraction licences, discharge consents and land drainage consents to achieve operational objectives. It will at all times carry out its activities in an environmentally sensitive manner.

v) Develop, protect and regulate fisheries, promote recreation, navigation and conservation.

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

vii) Assess, manage, plan and conserve water resources.

This draft catchment management plan consolidates the policies, objectives and options for the Conwy for the overall improvement of the water environment. This plan also incorporates as a pilot study, the application of proposed Statutory Water Quality Objectives (SWQOs) which is a scheme that sets standards of water quality applicable to given uses (for details, see section 8 herein).

The plan is drawn up as follows:

1. Uses of the Catchment
For the identified uses of the water environment up to two pages of text is produced supported by a map indicating where in the catchment each use occurs. Objectives for the use are identified and targets, where applicable, for Water Quality, Water Quantity and Physical Features are set.

2. Catchment Targets
By taking the targets for individual uses, overall targets for Water Quality, Water Quantity and Physical Features are set for the catchment.

3. Current State of the Catchment
Having set targets it is now possible to view the current state of the catchment and identify issues that need addressing to meet future targets.

4. Proposal for SWQOs
Following assessment of the state of the catchment, SWQOs should be proposed for the relevant Uses, that can be achieved by the catchment review date and will secure improvements in water quality where appropriate. These proposed SWQO's will be submitted to the Secretaries of State and after consultation formalised into Statutory Water Quality Objectives.

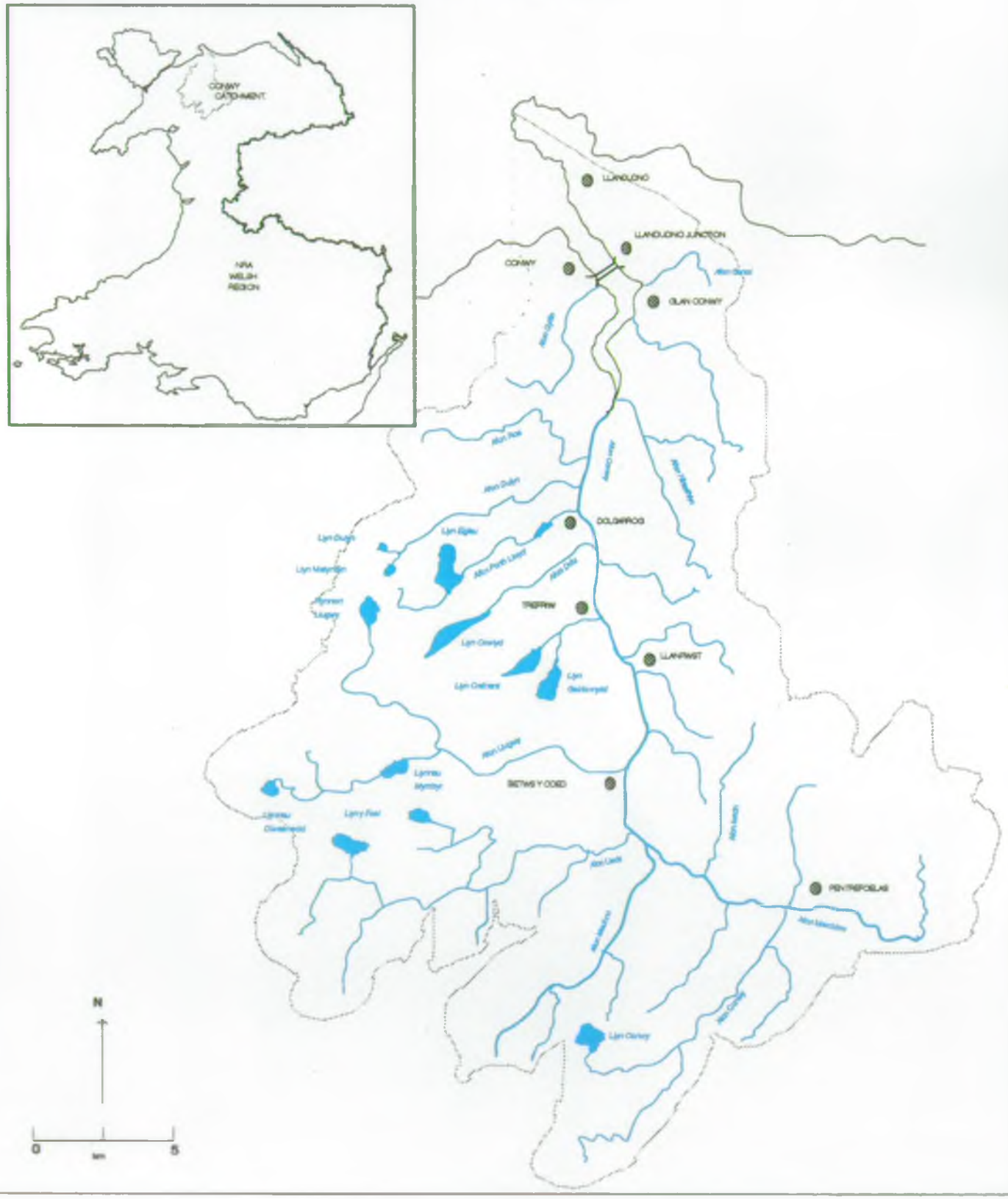
5. Issues and Options

It is now possible to identify individual issues and suggest options to resolve these problems. These options identify those responsible for their implementation and suggest advantages and disadvantages.

The plan is now released for public consultation in draft form. Comments on the objectives/targets and Issues/Options are invited before the plan is finalised to produce an Action Plan for the Catchment.

The issues and options as presented are the initial thoughts of the Welsh Region of the NRA and do not constitute a policy statement. Following the consultation period, all comments will be drawn together and considered in drafting the Action Plan.

MAP 1. CONWY CATCHMENT



2.0. **OVERVIEW**

2.1. **Introduction**

The Afon Conwy rises from Llyn Conwy (450m AOD) in the Migneint Moor in Snowdonia, drains a predominantly upland catchment (590 sq.km.) and discharges to Liverpool Bay at Conwy after flowing a distance of 56km.

It is a remarkable river because it lies on the border of the Ordovician and Silurian rocks of North Wales. On the left bank are hard resistant rocks of Ordovician age creating an alpine landscape with many lakes and spectacular waterfalls. There are a number of old slate quarries here and, where igneous intrusions have been exploited by mining, there is the legacy of dereliction and some water pollution. Many of the slopes on this west side of the river have been planted with coniferous forest and any field boundaries are of dry stone wall. This attractive and varied landscape lies within the boundary of the Snowdonia National Park.

On the right bank of the river are the less resistant Silurian rocks which have produced the rounder, softer landscape of the Denbigh Moors. Hedgerows are more typical of the field boundaries here and the farms are more productive. A small amount of arable farming occurs on the east side of the river downstream of Betws-y-Coed, but most of the catchment provides grazing of variable quality.

The configuration of low land and confining uplands is conducive to flooding and much of the low lying land is protected by tidal and fluvial embankments.

2.2. **Hydrology**

The nature of the underlying geology is such that groundwater plays an insignificant role in the general hydrology of the catchment, except locally where water discharging from old mineworkings can be important.

There is a large variation in average annual rainfall from the source in Snowdonia to the coast (4000 and 800mm respectively). The catchment average annual rainfall is 1700mm, of which some 450mm (26%) is lost through evapotranspiration with the remainder providing an average river flow of 24 cubic metres per second.

However, the considerable variability in catchment rainfall both temporally and spatially, coupled with the geology and topography (thin soil covers, impermeable underlying rocks and steep craggy slopes) results in a rapidly changing and wide ranging flow regime (0.3 cumecs - 486.6 cumecs during the period 1982 - 1992). The rapid response to rainfall events often results in widespread flooding of low lying land. In contrast, during droughts swift and prolonged recessions can cause concern for water resources, water quality and fisheries interests.

2.3. Flood Defence

The area of the catchment which is low lying (790Ha) requires protection from flooding by the sea or from rivers. An enhanced level of drainage is also required for these agriculturally valuable low lying areas of land. Consequently any work undertaken in or near to the Afon Conwy and some of its main tributaries (principally the Gyffin, Crafnant, Llugwy and Lledr) has to be carefully managed.

To achieve these aims, and under the administration of the NRA, certain areas have been designated as Internal Drainage Districts (IDD's). The Afon Conwy itself, as well as some of the main tributaries, are designated Statutory Main Rivers. Any proposals that could interfere with the river bed or banks, or obstruct the flow in the river, therefore require the consent or approval of the NRA.

2.4. Fisheries, Conservation & Recreation

The catchment forms a valuable fisheries, conservation and recreation resource. Fisheries interests range from important commercially exploited mussel beds in the estuary (~100 tonnes per year), through salmonids (salmon, sewin and brown trout) generally in the main river and tributaries, to coarse fish, largely at specifically developed sites. Angling is a major tourist attraction which will be further developed if the catchment above the Conwy Falls (21.1km, including Afon Conwy and Afon Merddwr) can be made accessible to migratory salmonids.

The conservation value of the catchment is reflected in the number of designated sites (36 SSSI's, 2 NNRs), whilst otters are found in many parts. The diverse ecology and natural beauty of the landscape is also recognised through the inclusion of much of the catchment (62%) within the Snowdonia National Park.

The catchment is, not surprisingly, a magnet for recreational activities including angling, bathing, canoeing, climbing, ornithology, walking and water skiing. There are also many sites of historical and archaeological interest.

2.5. Water Quality

Water quality is generally very good (NWC Class 1A in the River Pollution Survey, 1991) throughout the catchment. The major industries, agriculture and forestry, use extensive areas of land (75% and 12% respectively) and liaison is required to ensure the maintenance of water quality through robust pollution prevention measures.

The rivers of the catchment play a major role in attracting tourists and thus water quality is an important factor, particularly:

- In the Conwy Estuary, where compliance with the EC Bathing Waters Directive is an important objective.
- For fisheries and conservation interests.
- For potable water abstractions, licensed to Dwr Cymru Welsh Water and generally derived from undeveloped and undisturbed upland sources.

Nevertheless, parts of the upland catchment including Llyn Conwy are acidified to an extent that significantly affects river ecology, whilst a length of the estuary (5km or 16%) fails to achieve the highest quality designation.

The Department of the Environment in 1992 proposed a scheme of Statutory Water Quality Objectives (SWQOs) which sets standards of water quality appropriate for different specified uses. The SWQOs for Fisheries Ecosystem and Potable Abstractions are being applied to the Conwy by way of a pilot study (for details see Section 8).

2.6. Land Use

The catchment is predominantly rural, with the population centred in a number of towns (4 of population 3,000 - 8,500) or main villages (10 of population >250). The total population within the catchment is approximately 40,000, 60% of which is located around the Conwy/Llandudno area.

The majority of land within the catchment is Grade 4 under the MAFF classification, although there are some grade 3 areas around the flood plain and the estuarial regions of Afon Conwy. Upland areas within the catchment generally consist of poor quality Grade 5 land.

Sheep farming is the most widespread agricultural practice, with some dairy/arable farming within Grade 3 areas. There are extensive areas of afforestation in the upper reaches of the catchment.

There is some industrial development (Tilcon Ltd, Hotpoint Ltd.) in the Llandudno/Llandudno Junction area, with Dolgarrog Aluminium at Dolgarrog. Other than agriculture and forestry, the catchment depends upon tourism with 0.5 million staying visitors and 1.3 million day visits in 1981 - the last year when reliably accurate information is available.

2.7. **Infrastructure**

A network of trunk and main A roads serve the main population centres, with B roads linking smaller settlements. The construction of the A55 Chester - Bangor Expressway within this area is now complete. This involved a major crossing of an immersed tube tunnel in the Conwy Estuary north of Conwy. Work on the crossing commenced in December 1986 and has been closely monitored in view of the potential implications for water quality and upstream flooding problems. The development of the tunnel has significantly reduced the traffic congestion previously experienced in the north of the catchment, particularly that associated with tourism during the summer months.

Rail transport consists of the main Holyhead - London line, crossing the estuary at Conwy and the Conwy Valley (Llandudno - Blaenau Ffestiniog) line, which is passenger (tourism) based.

2.8. **Monitoring Network**

An extensive network of monitoring stations is used to gather the information on water quality and quantity necessary for the proper understanding and management of the catchment.

A number of fisheries investigations, including the assessment of catch statistics, evaluation of populations and genetic integrity, have also been undertaken. The 1993 strategic River Corridor Survey will provide baseline data for future conservation monitoring.

This catchment management plan will be used to identify monitoring requirements as the basis for reviewing existing monitoring programmes.

KEY DETAILS

Catchment Details

Area 590km^2

		Existing 1991	Predicted 2001
Population	(ESTIMATED)	40,500	41,500
Holiday Influx	- (LONG STAY)	500,000 (1981)	
	- (DAY TRIPPERS)	1,300,000 (1981)	

Topography

Ground Levels	Min level 5M A.O.D.
	Max level 1062M A.O.D. (CARNEDD LLYWELYN)
Tide Levels	Mean High Water Springs 4.00 A.O.D.
	Mean Low Water Springs - 2.90 A.O.D.

Geology

Lower Palaeozoic rocks of Ordovician and Silurian age to the west and east respectively. The river follows the rift (Dolgarrog fault) between the two formations. Small area of limestone to the N.E.

Administrative Details

County Council	- GWYNEDD COUNTY COUNCIL CLWYD COUNTY COUNCIL
District Councils	- ABERCONWY BOROUGH COUNCIL COLWYN BOROUGH COUNCIL
National Parks	- SNOWDONIA NATIONAL PARK
NRA	- WELSH REGION - NORTHERN AREA
Water Companies	- DWR CYMRU - WELSH WATER

Sewage Treatment Works - 26

Main Towns and Populations

CONWY	- 3,648	LLANDUDNO JUNCTION	- 3,636
LLANDUDNO	- 8,411	LLANRWST	- 2,896
CRAIG Y DON	- 5,645	GLAN CONWY	- 894
BETWS Y COED	- 572		

Water Quality

Length of River in National Water Council Class December 1990 Survey

Class 1A	(Very Good)	48.9km	Class 3	(Poor)	None
Class 1B	(Good)	None	Class 4	(Bad)	None
Class 2	(Fair)	None			

Estuary Classification

Class A	(Good)	25.5km	Class C	(Poor)	None
Class B	(Fair)	5.0km	Class D	(Bad)	None

Water Resources

Availability: Surface water from upland rivers and lakes

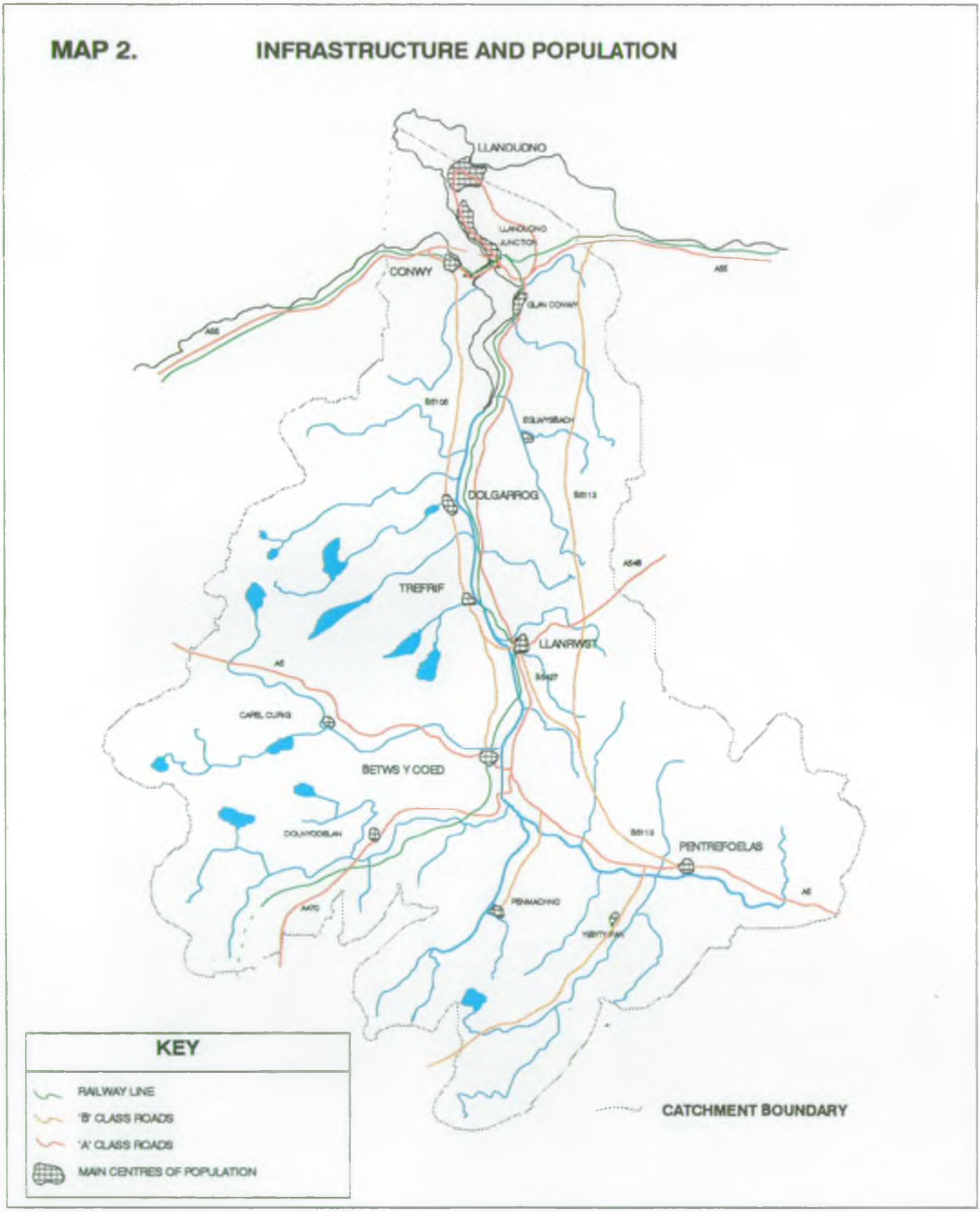
Flood Protection

Length of Main River in Catchment	129.3km
Length of Main River within Internal Drainage District	17.5km
Length of Adopted Ditch with Internal Drainage District	13.0km
Length of floodbanks maintained by NRA	21.6km
Area at risk of flood (tidal or river)	790 Ha

Fisheries - Designated under EC Directive Freshwater Fisheries (78/659/EEC)

Salmonid - 34.5km
Cyprinid - None

MAP 2. INFRASTRUCTURE AND POPULATION



3.1 DEVELOPMENT - HOUSING, INDUSTRY & COMMERCE

General

This use relates to existing and predicted future residential, commercial and industrial development which is identified in adopted and draft County Structure and District Local Plans. These Plans identify policies against which the Planning Authorities consider development proposals.

The NRA is a statutory consultee under planning legislation and advises local authorities on development proposals which may have an impact on matters relevant to the NRA.

The impact of land use is critical to the overall success of the NRA in achieving the aims and objectives for the catchment. The planning consultation process is therefore highly important with respect to development and, although the final decision on planning matters rests with the planning authority, government guidelines advise on the need to consider the NRA's concern in determining proposals.

As well as an input into Town and Country Planning matters, the NRA may use relevant powers to control the environmental impact of development proposals.

Local Perspective

The majority of the catchment (90%) lies within the administrative County of Gwynedd, with Aberconwy Borough Council responsible for district matters. The remainder, comprising much of the Merddwr sub-catchment, lies within the County of Clwyd and the district of Colwyn Borough Council. Where the catchment falls within the Snowdonia National Park, the Snowdonia National Park Committee is responsible for local planning activities.

The Gwynedd Structure Plan is currently undergoing modification by the Welsh Office. The Clwyd Structure Plan and Colwyn Borough Local Plan are currently in preparation. Most of the allocation for development is in the existing towns and main villages.

3.1 DEVELOPMENT - HOUSING, INDUSTRY & COMMERCE - (CONTINUED)

CONWY CATCHMENT - POPULATION FIGURES (1981 CENSUS)

COMMUNITY COUNCIL AREAS		MAIN TOWNS/VILLAGES	
CONWY	12511	CONWY	3648
BETWS Y COED	572	LLANDUDNO JUNCT.	3636
CAPEL CURIG	249	DEGANWY	1993
LLANDUDNO(excl. Penrhyn Bay)	14056	TREFRIW	476
		BETWS Y COED	572
LLANRWST	2908	DOLGARROG	506
EGLWYSBACH	790	TAL-Y-BONT	322
LLANDOGET	223	DOLWYDDELAN	324
GLAN CONWY	1935	PENMACHNO	287
MAENAN	189	EGLWYSBACH	279
THE ABBEY	33	GLANCONWY	894
EIDDA	135	LLANRWST	2896
LLANRWST RURAL	742	LLANDUDNO	8411
TYR IFAN	102	CRAIG Y DON	5645
CAER HUN	870		
HENRHYD	632		
DOLGARROG	505		
LLANBEDR Y CENNIN	226		
LLANRYCHWYN	150		
DOLWYDDELAN	450		
PENMACHNO	568		
TREFRIW	655		
PENTREFOELAS (+ (Clwyd Glasfryn Village)	485		
TOTAL	38,986		

Objectives

To ensure new development is not at risk from flooding and does not put other areas at risk of flooding which could endanger life and damage property.

To ensure any work which is needed to reduce the risk of flooding created by a new development is paid for by the developer and not the public.

To protect the water environment from any detriment due to development.

3.1 DEVELOPMENT - HOUSING, INDUSTRY & COMMERCE - (CONTINUED)

To enhance the water environment in conjunction with development.

To protect inland, coastal and groundwater from pollution.

To ensure that adequate pollution prevention measures are incorporated into new developments.

To protect inland waters, and groundwater which is a locally important form of water supply, from any detrimental effects of development.

Policy Summary

The conservation and enhancement of wildlife, landscape and archeological features associated with rivers, ponds, lakes, estuaries will be promoted. Any development that would adversely impact on any of these considerations would be contrary to NRA Plans and Policies.

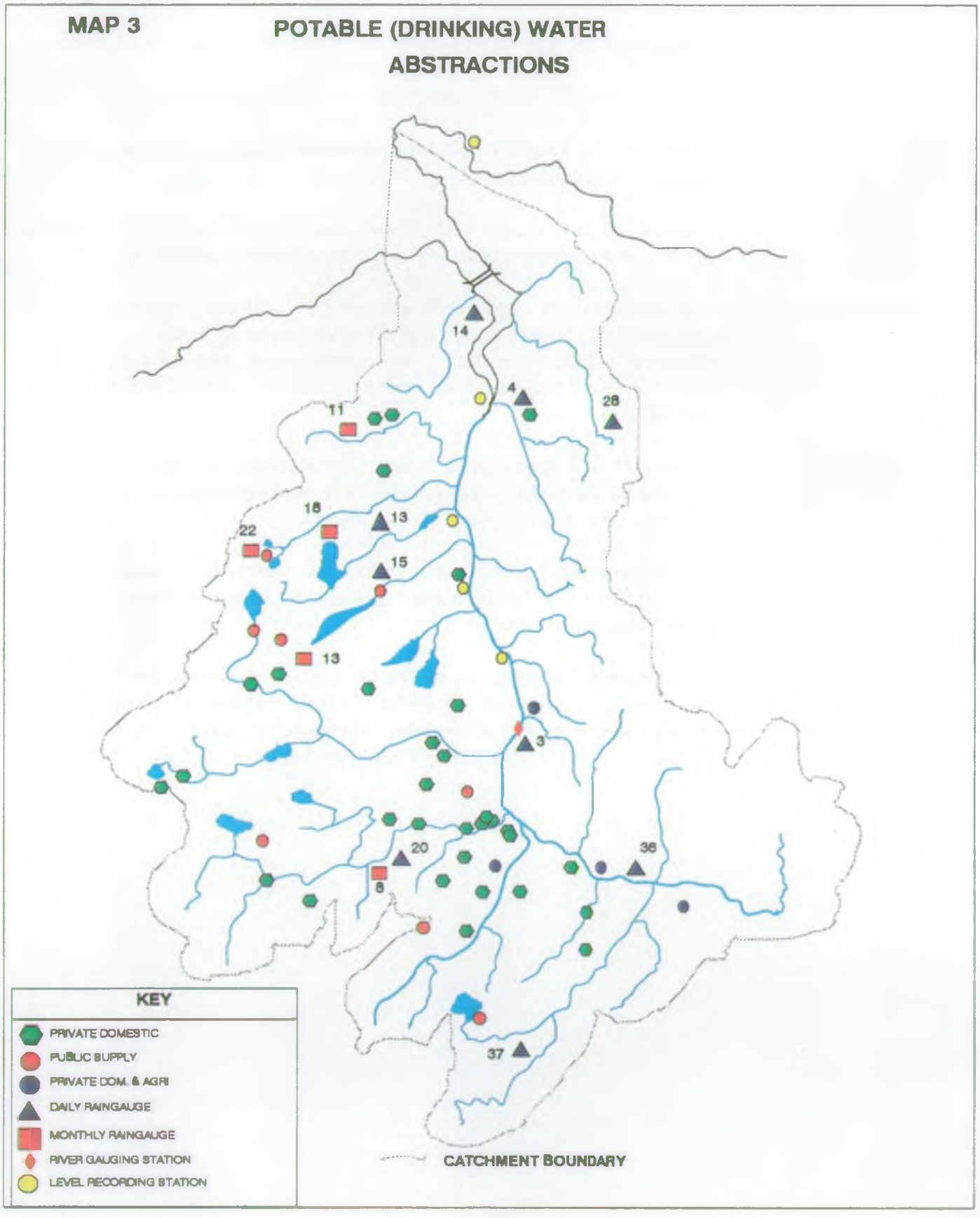
There will be a presumption against development including changes in land use which, in the opinion of the NRA, will pose an unacceptable risk to the quality of ground and surface water.

Development, including changes in land use which, in the opinion of the NRA will be a detrimental impact on water resources, will be contrary to NRA Plans and Policies.

Development, including the raising of land where, in the opinion of the NRA, such development would be likely to impede the flow of flood water, increase the risk of flooding elsewhere or increase the number of people or properties at risk, would be contrary to NRA Plans and Policies.

MAP 3

POTABLE (DRINKING) WATER ABSTRACTIONS



3.2 ABSTRACTION FOR POTABLE SUPPLY

General

Water for potable use is abstracted by the statutory water company - Dwr Cymru Welsh Water - and by individual and isolated properties which are not connected to the mains supplies. Abstractions are made primarily from surface sources, since the nature of the geology is such that groundwater is confined to springs and wells serving individual properties.

Abstractions other than for small (less than $20m^3/d$, cubic metres per day) private sources are controlled by an NRA licence. A licence generally includes conditions to protect river flows, riparian, and other licensed abstractors downstream. Such groundwater as exists in this catchment is exempt from the licensing provisions of the Water Resources Act 1991, by virtue of the Gwynedd River Authority (Exemption From Control) Order 1965.

As with the Fisheries Ecosystem, Potable Abstraction from classified river stretches is the subject of proposed Statutory Water Quality Objectives (scheme details in Section 8). Whilst the Conwy was identified as potentially suitable for a pilot study of the application, currently there are no abstractions from classified stretches. Therefore water quality assessment will be against relevant standards within EC Directives.

Local Perspective

Dwr Cymru Welsh Water are licensed to abstract water for treatment from 8 locations within the catchment. These are five high level natural sources (Llyn Cowlyd, Llynnoedd Dulyn/Melynllun, Llyn Elsi, Llyn Conwy and Ffynnon Llugwy) and three upland streams (Afon Glasgwm, Afon-y-Bedol and Ceunant-y-Garnedd). Water gravitates from these sources to the towns and villages within the catchment, but mostly to the densely populated coastal strip. Water from Ffynnon Llugwy exclusively feeds into the Arfon/Ynys Mon distribution systems outside the catchment boundary. As far as possible the distribution systems within the valley are interlinked for maximum resource usage and security of supplies. The total licensed quantity amounts to 15,822 tcma (thousand cubic metres per annum).

There are currently also 37 licences for private domestic supplies amounting in total to 20 tcma within the catchment.

Objectives

To manage water quality and water resources to safeguard water supply. To manage surface water resources to meet future demand.

3.2 ABSTRACTION FOR POTABLE SUPPLY - (CONTINUED)

To ensure compliance with all licence conditions, especially those for the protection of the water environment.
To actively enforce the provisions of abstraction licences.
To ensure the best utilisation of water resources in the catchment.

To augment and/or redistribute water resources where appropriate to meet potable water demands to appropriate standards of reliability.
To encourage efficient water use, including leakage reduction.

Water Quantity Requirements

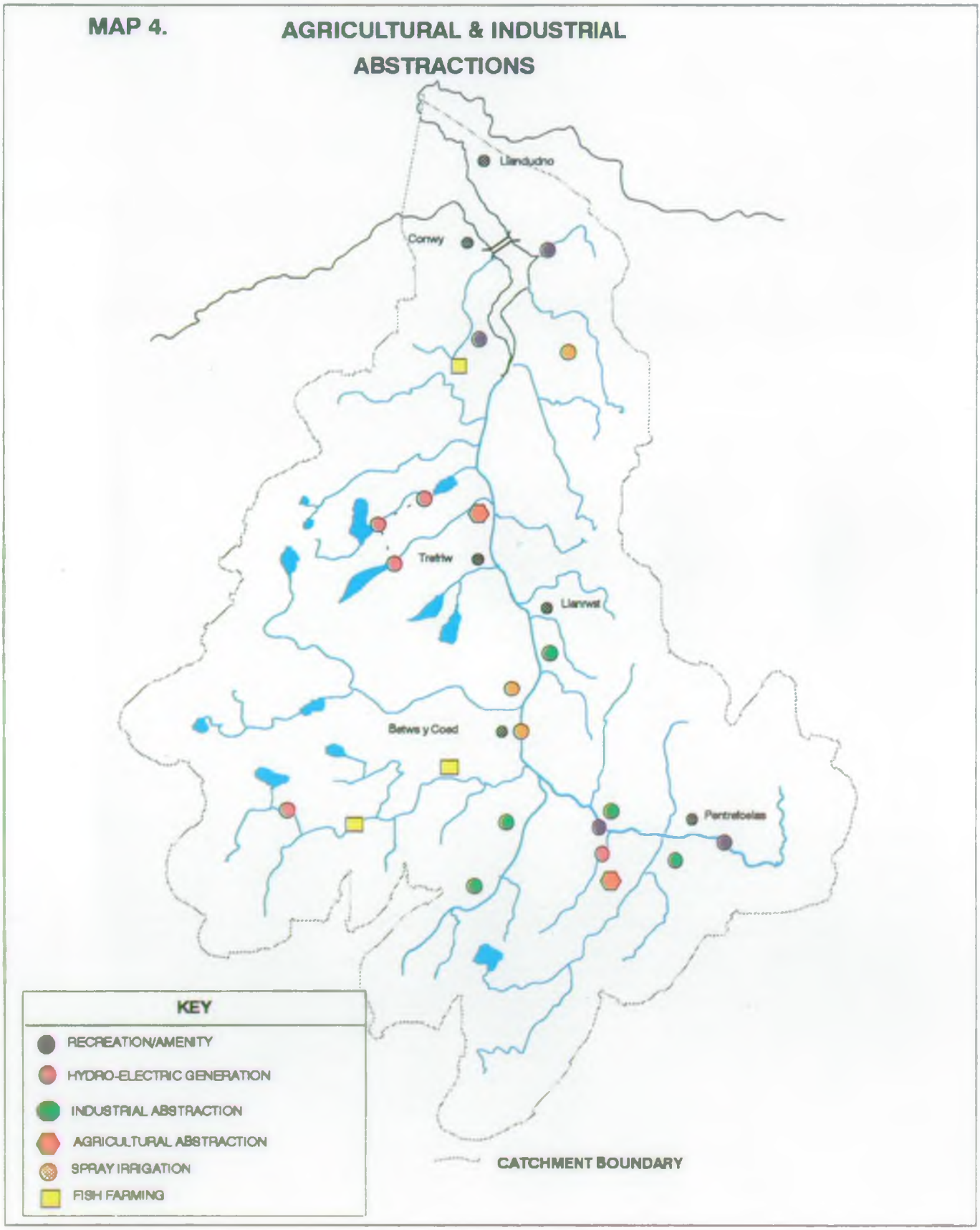
The availability of water should be safeguarded within the terms specified in the licence. However, the NRA does not guarantee either the volume or quality of the source.

Water Quality Requirements

The quality of water should comply with the standards set in EC Directive 75/440/EEC. (Water Quality Suites 1,2,7 apply, Appendix 1).

MAP 4.

AGRICULTURAL & INDUSTRIAL ABSTRACTIONS



3.3 INDUSTRIAL/AGRICULTURAL ABSTRACTION

General

This use relates to abstractions for general agricultural use, spray irrigation, fish farms and industry.

The catchment is essentially rural with little use made of water for industrial processes, but has long been associated with the generation of electricity.

Local Perspective

Hydro electric generation accounts for the abstraction of 153,000 tcma of water, all of which is returned to the river system. Two licences involve the direct abstraction of water and are subject therefore to low flow requirements which determine when generation has to cease. The Llyn Cowlyd complex of storage lakes and leats, however, allows generation to take place for more extensive periods of time and is the major user of water for this purpose.

The majority of agricultural abstractions are small (less than 20 m^3/day) and are exempt from the need for an abstraction licence. Those in the category requiring a licence (abstraction above 20 m^3/day) account for 7 licences amounting to 14 tcma.

Only a modest 25 tcma is licensed to be abstracted for Spray Irrigation purposes in this generally wet catchment. However, since none of the water abstracted is returned to the river, these licences are subject to controls to protect the river during periods of low flow.

There are two fish farms which return all abstracted water (licensed total 18,000 tcma) to river. Though the use is non-consumptive, licences are required to protect the rivers between abstraction and return points. A further licence exists on the Lledr which is currently not used.

Objectives

To manage water quality and water resources to safeguard agricultural and industrial abstraction.
To manage water resources where possible to meet all reasonable agricultural and industrial demand.
To protect river flows from excessive abstraction.
To encourage efficient water use.
To actively enforce the provisions of abstraction licences.

Water Quality Requirements

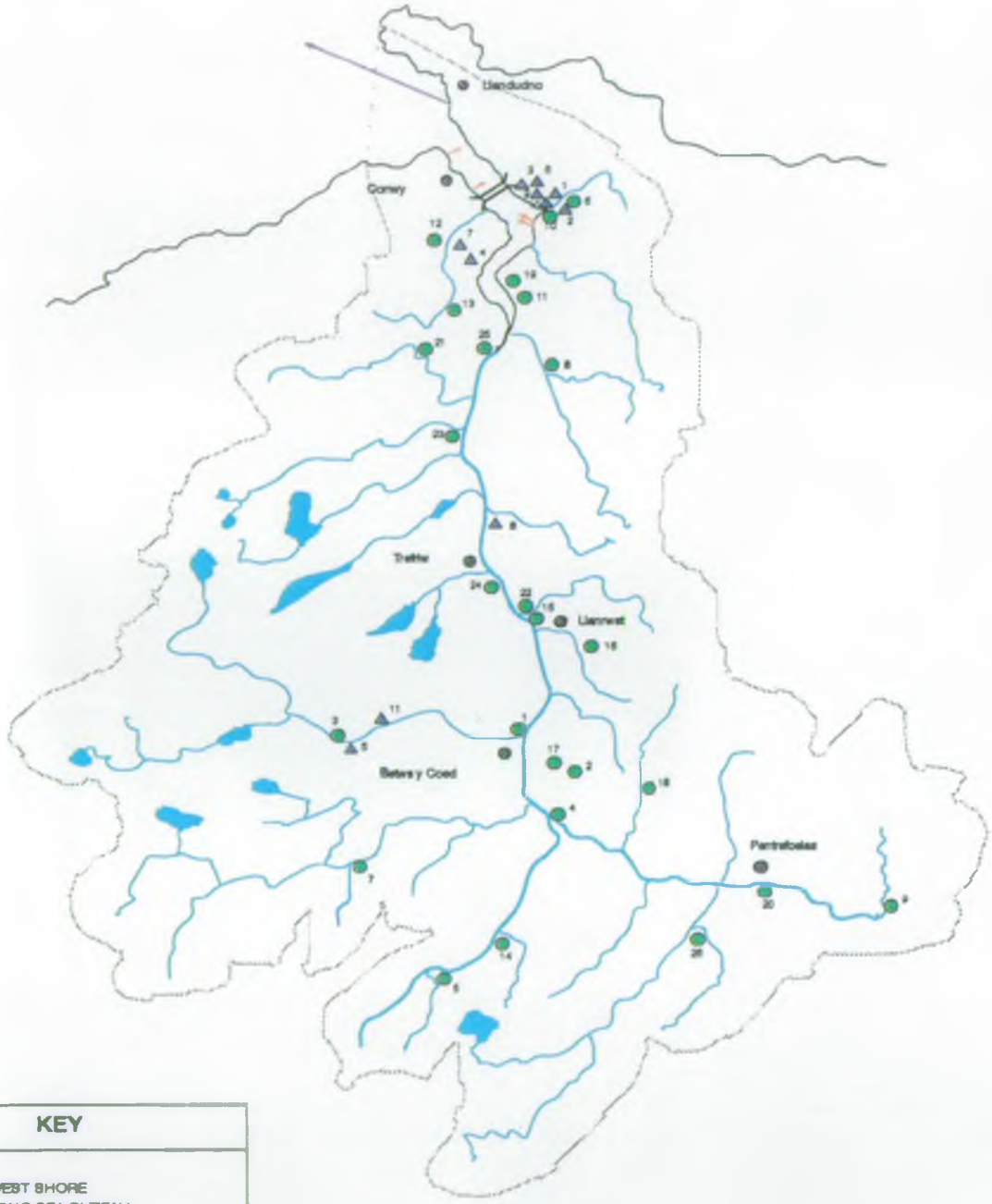
The quality of water should be maintained and, where appropriate, improved (Water Quality Suite 1, Appendix 1, applies to industrial abstractions, Water Quality Suites 1 and 2, Appendix 1, apply to agricultural abstractions).

3.3 INDUSTRIAL/AGRICULTURAL ABSTRACTION - (CONTINUED)

Water Quantity Requirements

The availability of water should be safeguarded within the terms specified in the licence. However, the NRA does not guarantee either the volume or quality of the source.

MAP 5. SEWAGE DISPOSAL



KEY

- WEST SHORE LONG SEA OUTFALL
- CRUDE SEWAGE DISCHARGES
- WELSH WATER SEWAGE TREATMENT WORKS
- PRIVATE SEWAGE TREATMENT WORKS
- CATCHMENT BOUNDARY

3.4 SEWAGE EFFLUENT DISPOSAL

General

Discharges to controlled water require a consent (licence) from the NRA. In calculating consent conditions the NRA considers the quality of receiving waters and the amount of available dilution, in order to protect the uses made of the waters. The NRA plays an important role, together with OFWAT, in determining the investment priorities for sewage treatment of the water company. These priorities are determined on the basis of environmental impact and legal requirements. Negotiations with Dwr Cymru Welsh Water are currently underway on its Asset Management Plan for 1995-2000 (AMP 2), which is a plan for prioritising Dwr Cymru Welsh Water work.

Local Perspective

There are 26 sewage disposal works operated by Dwr Cymru/Welsh Water plc in the catchment, which are all monitored by the NRA. Where works fail to meet consent standards, or impact on water quality to a degree that affects legitimate uses of the water, the NRA will impose stricter standards.

Numerous small private sewage works which operate in the catchment serving caravan parks, industrial units and single properties, are currently being assessed to determine their effectiveness in protecting the water environment.

The most significant impact of sewage is evident in the middle estuary, resulting from crude discharges from Glan Conwy and Conwy. Dwr Cymru Welsh Water Llandudno West Shore Treatment Scheme, when fully in place, will significantly reduce this impact. Already 80% of the input into the estuary has been removed by directing the finely screened sewage from Llandudno, Deganwy and Llandudno Junction down the new long outfall (4.2km) at West Shore.

Objectives

To ensure that environmental water quality standards are achieved and maintained, and that requirements for discharge improvements are identified and obtained.

Water Quality Requirements

The conditions of consent must adequately safeguard water quality and prevent exceedance of E.C. Directives and River Quality Objectives.

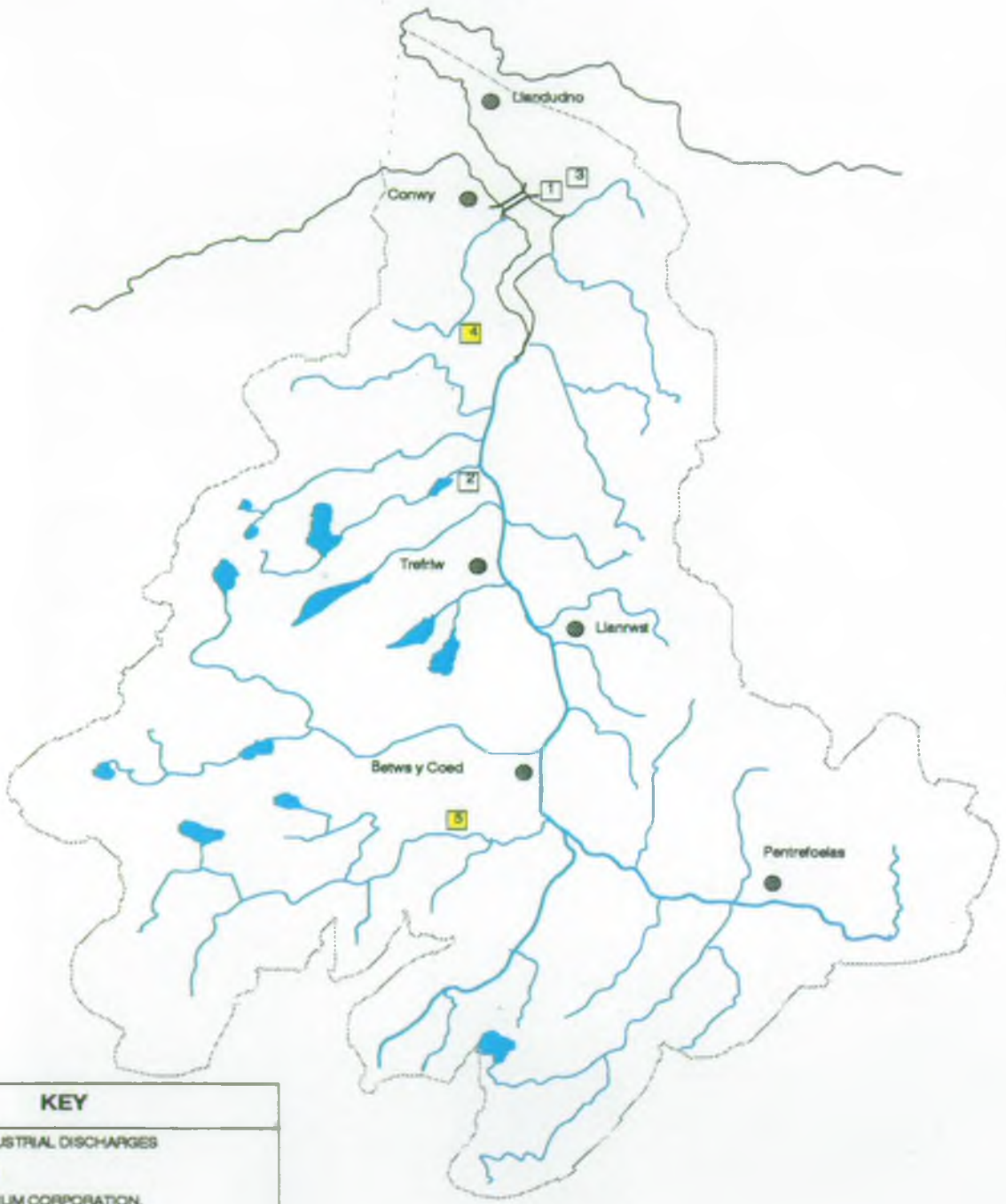
Surface waters and discharges need to be monitored to establish their compliance.

3.4 SEWAGE EFFLUENT DISPOSAL - (CONTINUED)

Water Quantity Requirements

The flow regime must not fall below that used in setting the consents. Consent conditions are derived taking into account the upstream dilution flow which is available under average and dry weather conditions.

MAP 6 INDUSTRIAL DISCHARGES AND FISH FARMS



KEY

INDUSTRIAL DISCHARGES

1. TILCON
2. ALUMINIUM CORPORATION, DOLGARROG
3. HOTPOINT LTD

FISH FARM DISCHARGES

4. CONWY VALLEY FISHERIES
5. CAE DU - NRA HATCHERY

CATCHMENT BOUNDARY

3.5 INDUSTRIAL EFFLUENT DISPOSAL

General

Industrial discharges require the consent of the NRA, which are considered as described in Section 3.4.

Local Perspective

The catchment is predominantly rural in nature supporting only 3 significant industrial concerns (Aluminium Corporation Dolgarrog, with Hotpoint Ltd and Tilcon at Llandudno Junction).

Objectives

To ensure that industrial development does not adversely affect water quality in controlled waters.

To provide advice to developers and industrialists on measures to be taken to reduce the risk of pollution at their sites.

Water Quality Requirements

The conditions must adequately safeguard water quality and prevent exceedance of EC Directives and River Quality Objectives.

Surface waters and discharges need to be monitored to establish their compliance.

Water Quantity Requirements

The flow regime must not fall below that used in setting the consents. Consent conditions are derived by taking into account the upstream dilution flow which is available under average and dry weather conditions.

MAP 7. LANDFILL SITES

KEY

1. BETWS Y COED
2. MOCHDRE
3. PENTREFOELAS B.C.
4. PENTREFOELAS B.C.
5. VALLEY TIP DOLGARROG

CLOSED SITE

ACTIVE SITE WITH PUBLIC ACCESS

CATCHMENT BOUNDARY

3.6 SOLID WASTE DISPOSAL

General

The NRA is a statutory consultee on matters of waste disposal and Town and Country Planning. Planning approval is required before a Waste Disposal Licence can be issued by the Waste Regulation Authority (District Council in Wales). Until regulations under the Environmental Protection Act 1990 are implemented, conditions under the planning approval are the means by which aftercare provisions for closed sites can be made. The Waste Disposal Licence currently relates only to the terms and conditions of the operational management of the site. The waste disposal practices presently found in the Conwy Catchment do not affect groundwater but the impact on surface waters is an important consideration.

Local Perspective

The NRA has advised the local Waste Regulation Authority, Aberconwy BC, on site licence conditions requirements for a scrapyard in Llandudno, and scrapyard/ waste transfer station at Llandudno Junction.

Landfill sites at Dolgarrog and Mochdre in the catchments of the Afon Conwy and the Afon Ganol (West) respectively, are currently being monitored by the NRA.

Objectives

To ensure landfill activity does not compromise water quality or water resources, and proceeds in accordance with Groundwater Protection Policy.

Water Quality Requirements

The quality of water must comply with the standards of E.C. Directives on dangerous substances discharged to groundwaters.

The NRA National Groundwater Protection Policy should be implemented where appropriate.

The conditions of consent must adequately safeguard quality and prevent exceedance of E.C. Directives and River Quality Objectives.

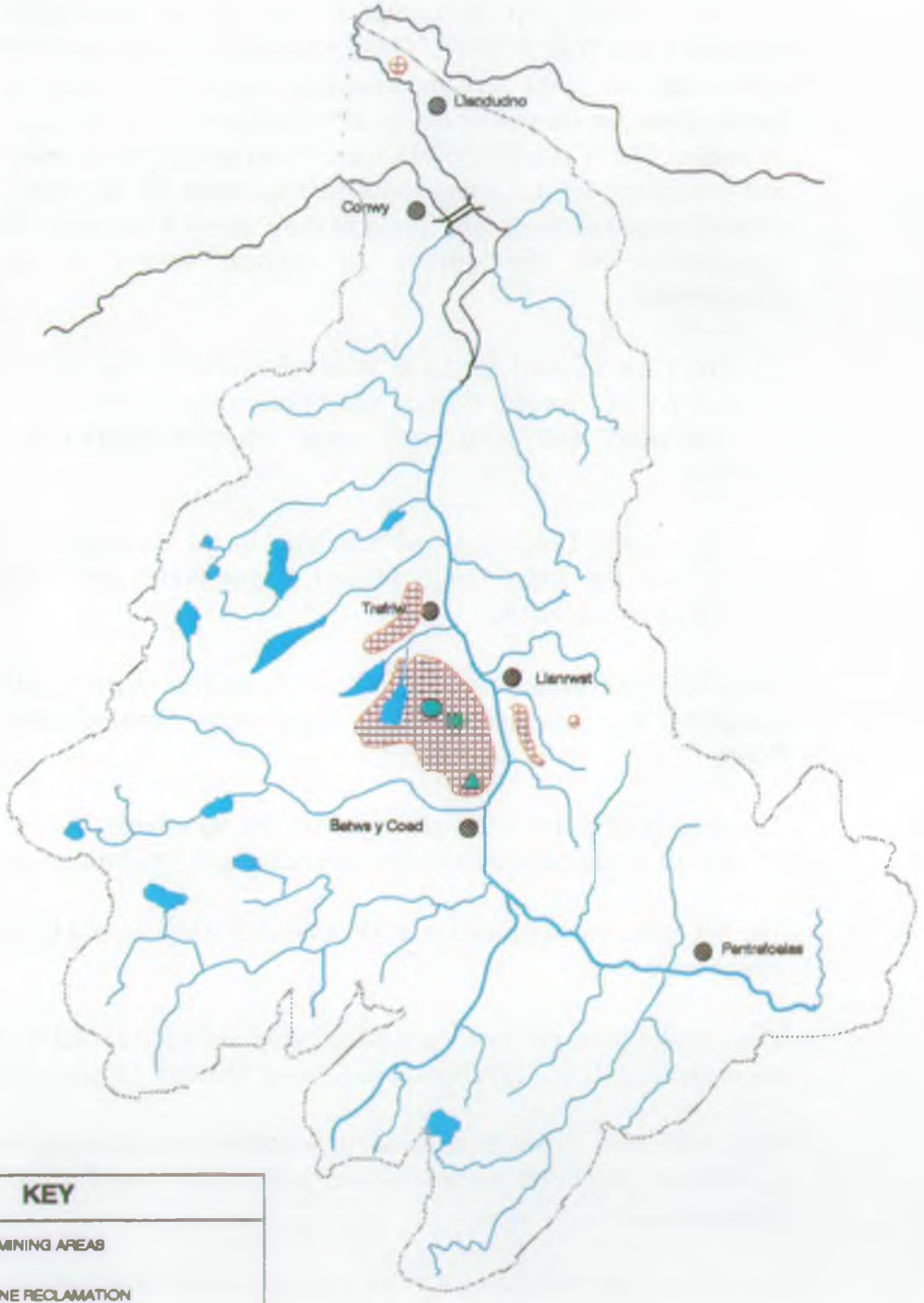
Sites will need to be monitored to establish compliance with consent conditions, effects on surface waters and, where appropriate, effects on groundwater.

Physical Features Requirements

All sites should be restored to an appropriate environmental standard.

MAP 8.

SITES OF OLD MINES



KEY

- DISUSED MINING AREAS
- HAFNA MINE RECLAMATION SCHEME
- PARC MINE RECLAMATION SCHEME
- PROPOSED RECLAMATION SCHEME AT ABERLLYN MINES

CATCHMENT BOUNDARY

3.7 MINERAL WORKING

General

Areas of current or former mineral workings pose a threat to ground and surface waters by exposing, at times, toxic spoil or veins of potentially toxic minerals to the weathering process. As a result, various contaminants can be released to enter the aquatic environment, affecting both surface and ground waters.

Mineral extraction can affect both groundwater quantity and quality. It can restrict recharge of an aquifer and divert flow. In addition purification which occurs as water percolates through the unsaturated zone cannot occur if it has been removed. Subsequent use of mineral extraction sites for landfill also poses a significant threat to groundwater quality.

Local Perspective

A considerable amount of mining activity has occurred in the Gwydyr Forest near Llanrwst since Roman times. There are no active mines at present, the last recorded operations being in the mid 1950s, and lead, zinc, and copper were the main extracted metals.

The legacy of centuries of mining activity is large areas covered in mine spoil, and underground mineral veins that have been subjected to weathering processes. Discharges, principally from shafts and adits, of metals containing water affect many local streams, principally the Nant Gwydyr (Llanrwst) and Afon Llugwy (Betws y Coed). The significant but localised impact of these discharges is generally evident in the ochreous (orange) appearance of the river due to metal particles.

Land reclamation schemes undertaken in the area include the Hafna, Nant Uchaf, and Cyffty Mines, reducing the overall metals loading in the Nant Gwydyr. Archaeological features were enhanced to create a focal point for the large number of visitors. Future river monitoring should give an indication of the relative success of the works in improving water quality.

Implementation of an improvement scheme for the Aberllyn Mine area is subject to the availability of funds from the Welsh Office.

3.7 MINERAL WORKING - (CONTINUED)

Objectives

To encourage and provide advice on future land reclamation schemes, with a view to improving water quality.
To ensure no impairment to the availability of water resources.
To ensure no detriment to groundwater and/or surface water quality.
To ensure no detriment to environmental features which depend on the presence of groundwater quality and/or quantity for their continuation.

Water Quality Requirements

The operation of mineral mining should be carried out in accordance with the guidance given in the NRA's "Policy and Practice for the Protection of Groundwater".

The operation of both mineral mining and land reclamation should incorporate appropriate pollution prevention measures to ensure compliance with standards set in EC Directives. The impact of mineral mining and land reclamation on water quality needs to be monitored.

Water Quantity Requirements

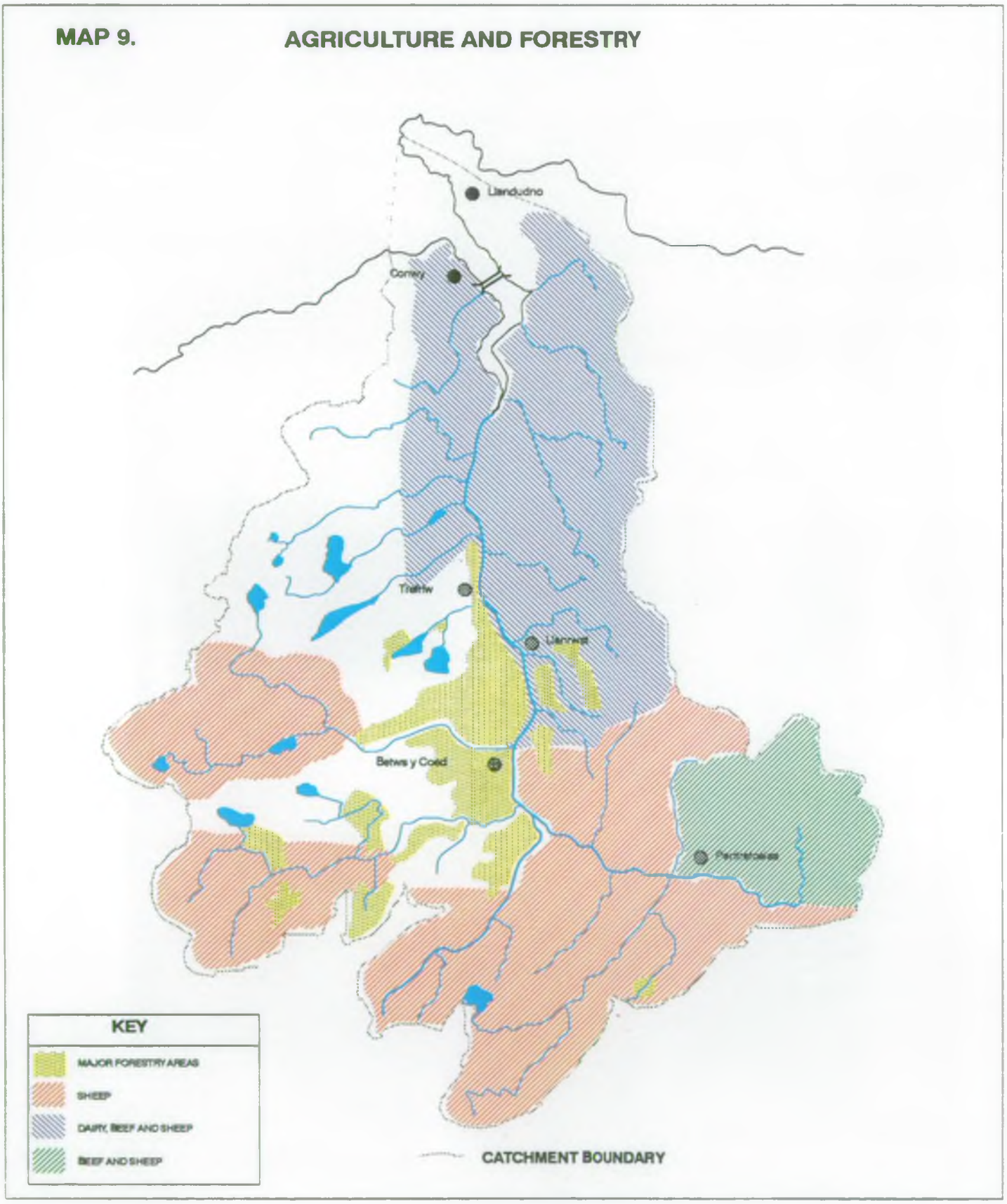
The operation of mineral mining should be carried out with the guidance given in the NRA's "Policy and Practice for the Protection of Groundwater".

The installation of settlement and balancing lagoons may be required to protect the run off characteristics of sites.

Physical Requirements

The aesthetic quality of restored landscape should be in keeping with amenity and recreational requirements.

MAP 9. **AGRICULTURE AND FORESTRY**



3.8 AGRICULTURAL ACTIVITY

General

As an integral part of its pollution control powers, the NRA enforces the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991. The Regulations begin to set new standards to reduce the risk of pollution from farms.

The Forestry and Water Industries have produced the Forests and Water Guidelines which set standards to minimise problems from forestry operations.

Local Perspective

The western side of the catchment is characterised by poorer upland grazing that mainly supports sheep and some beef production, and a substantial area is afforested. The land on the eastern side of the catchment is more fertile, supporting grazing for milk production and the growing of arable crops.

Agriculture over the past 20 years has intensified without, in many cases, comparable investment in effluent handling and storage facilities. Given the generally inadequate clean/dirty water separation and the high rainfall in the area, agricultural pollution is a common event. The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations have set standards of construction that were hitherto not available, and will serve to reduce the incidence of agricultural pollution. The NRA is also concerned about pollution problems arising from the discharge of silt into watercourses when stands of timber are harvested and temporary roads are constructed. The growing awareness of NRA concerns by Forestry Enterprises (formerly the Forestry Commission) has resulted in constructive dialogue and action to minimise the impact of timber harvesting.

The NRA is also mindful of the fact that coniferous afforestation can enhance any acidification. The upper reaches of the Conwy are the subject of acidification studies by the NRA.

Objectives

To ensure that water quality complies with E.C. Directives and River Quality Objectives standards.

Water Quality Requirements

The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations, 1991, need to be enforced.

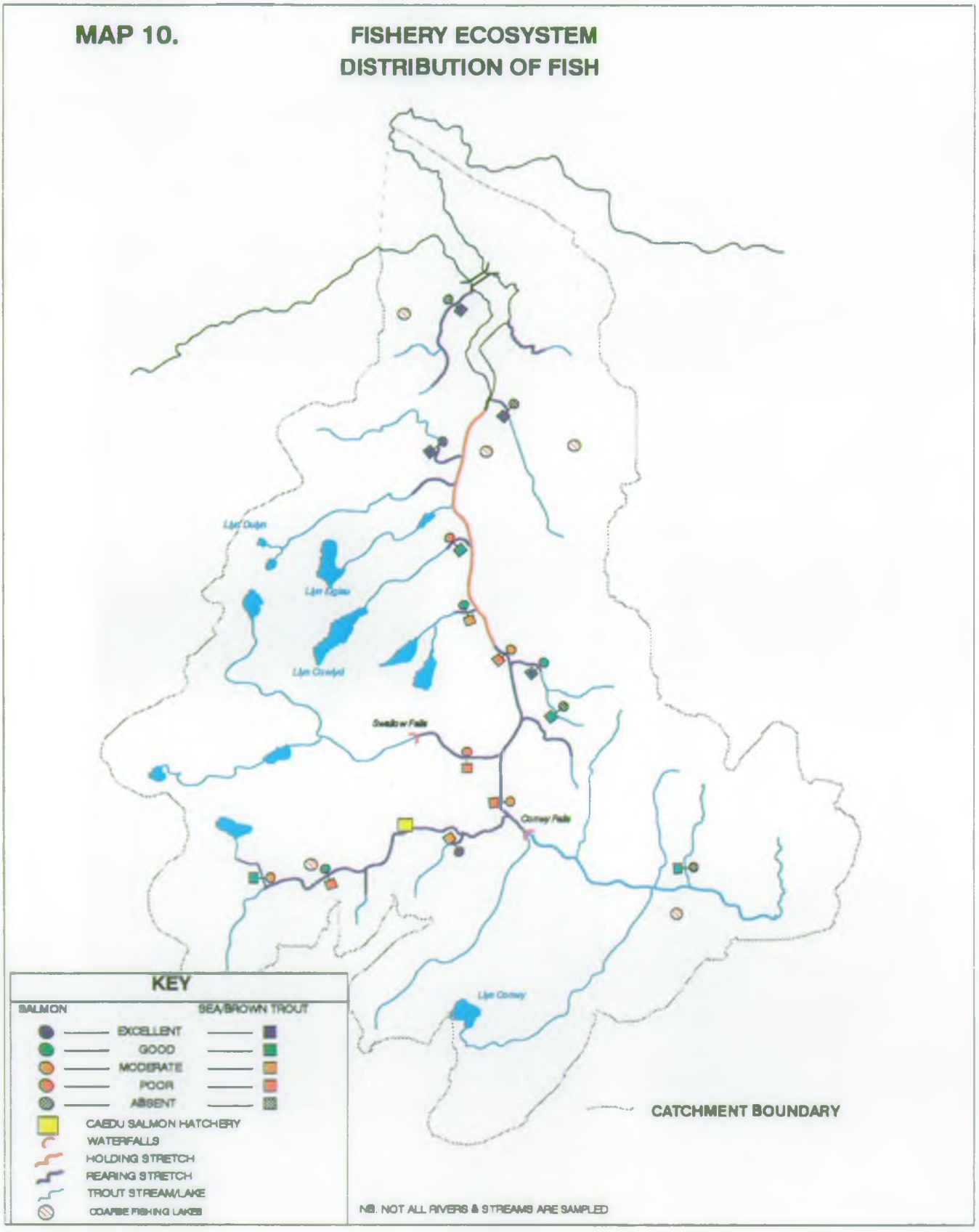
3.8 AGRICULTURAL ACTIVITY - (CONTINUED)

The risks that farming activity poses to surface and groundwaters need to be emphasized to farmers, through the implementation of a farm inspection/liaison programme.

The standards contained within the Forests and Water guidelines should be complied with.

MAP 10.

FISHERY ECOSYSTEM
DISTRIBUTION OF FISH



3.9 FISHERIES ECOSYSTEM

General

The Fisheries Ecosystem Use is applicable to all watercourses in the catchment.

The NRA is committed to the maintenance of breeding populations of salmonid and non salmonid fish, including the safeguarding of migration between the river and sea.

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

Local Perspective

Only 52% of the fish rearing area of the catchment is accessible to migratory salmon and trout, due to waterfalls and other obstructions. Juvenile migratory fish production could be increased by 25% if access could be provided above the Conwy Falls and a scheme to achieve this aim is currently being assessed.

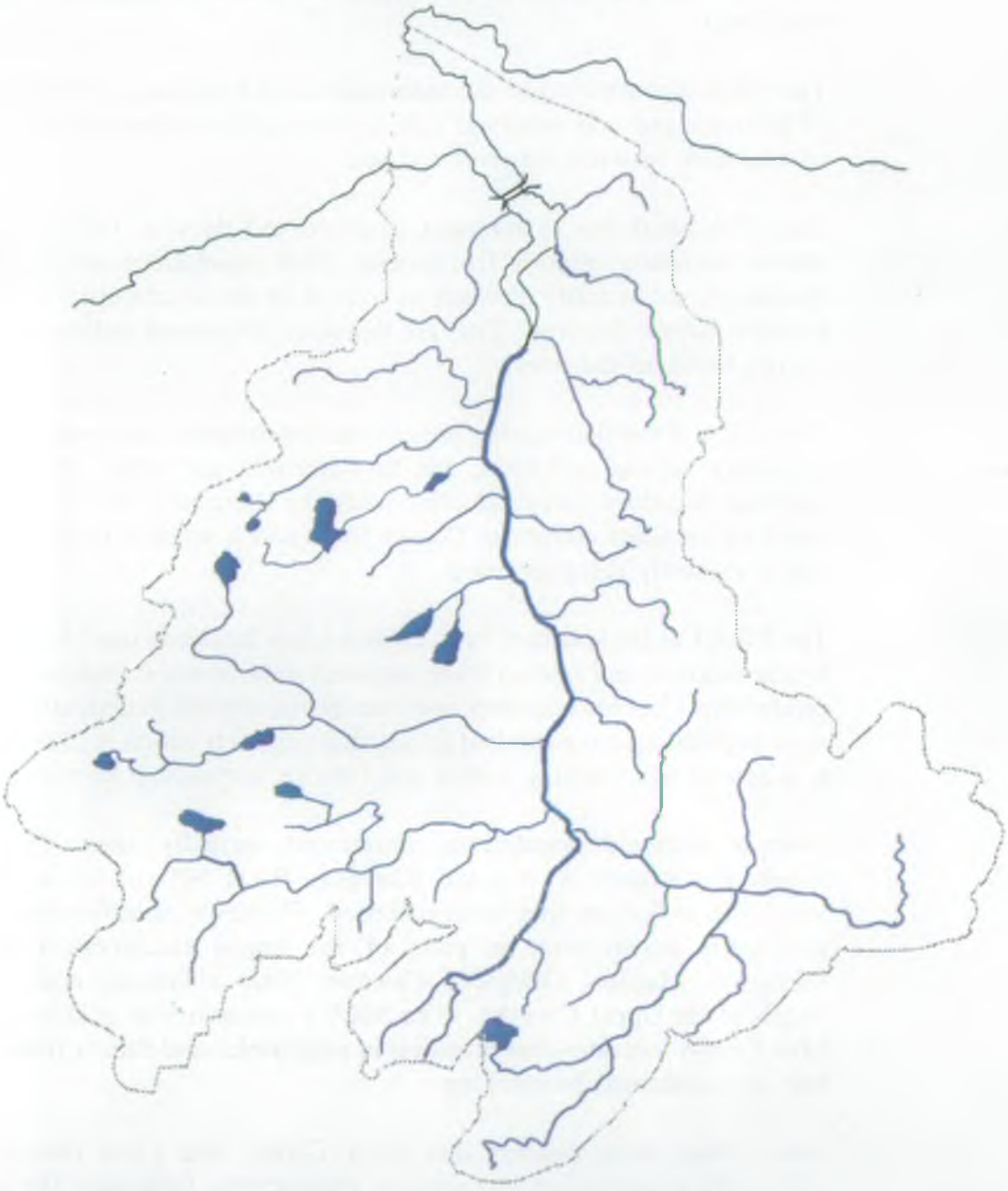
The NRA Cae Du Hatchery on the Afon Lledr has been used for 25 years to rear sea trout and salmon fry to augment natural smolt (seagoing stage) production. Recent concerns over the protection of genetically distinct trout populations have resulted in ongoing research which is likely to lead to a ban on fish stocking within areas above impassable barriers.

Juvenile salmonid populations, monitored annually since 1982, are excellent (Category A) or good (Category B) at 50% of the monitored sites, with no fishless sites being recorded. However, acidification affects principally brown trout in parts of the upper catchment (Afonydd Maesgwm, Machno, Glasgwm, Calettwr, Nant y Gwryd, and a small length of the Upper Conwy). The NRA's research into acidification in Llyn Conwy indicates that breeding is negligible, and thus a fishery can only be maintained by stocking.

Arctic charr were stocked into Llyn Eigiau and Llyn Dulyn from 1977-1982 as part of an introduction programme, following the loss of the charr population in Llyn Padarn as a consequence of the Dinorwic Pumped Storage Scheme. Subsequently they have spread into Llyn Cowlyd, resulting in the Conwy catchment holding 4 out of the 7 charr populations in Wales, the fourth being in Ffynnon Llugwy.

MAP 11.

FISHERIES ECOSYSTEM CATCHMENT TARGETS



KEY

FISHERY ECOSYSTEM USE CLASS

CLASS 1
HIGH CLASS SALMONID

CATCHMENT BOUNDARY

3.9 FISHERIES ECOSYSTEM - (CONTINUED)

Local Perspective

The non salmonid fish fauna is represented by 11 freshwater species and 5 migratory species. Of 9 riverine species the eel has the most widespread distribution, and the smelt (of high conservation value) the most restricted and confined to the area downstream of the spring tide limit. This relatively impoverished riverine fish fauna has conservation interest, representing a natural community unaffected by introductions.

In contrast a further 7 non salmonid species in different combinations have been introduced into 5 lakes. They are roach, perch, tench, crucian carp, rudd, common carp, and gudgeon. The lakes are Gwernengan, Syberi and un-named ones near Dolwyddelan, Eglwysbach, and Pentrefoelas.

The Conwy from its tidal limits to a point 2.4km upstream of Ysbyty Ifan, along with most of the Machno, and half of the length of the Lledr, are designated under EC Fisheries Directive (78/659/EEC).

Objective

To sustain the natural salmonid and non salmonid populations at levels appropriate to a catchment in such a geographical situation, and to protect the migratory passage of these to and from fresh water.

Water Quality Requirements

The quality of waters supporting salmonids should be maintained and, where appropriate improved and comply with standards set in the EC Fisheries Directive (78/659/EEC for salmonid fish), and standards of Proposed SWQOs for Fisheries Ecosystem (see Appendix A, Section 8, and Water Quality Suites 2, and 4, Appendix 1).

The quality of waters supporting only non salmonids should be maintained and, where appropriate improved, and comply with standards set in the EC Fisheries Directive (78/659/EEC for non salmonids). (Water Quality Suites 2 and 3 apply, Appendix 1).

Water Quantity Requirements

The volume of water passing through the estuary during the tidal cycle should be maintained. The NRA will seek to protect the range of flows which reflect as natural a regime as possible, as an interim measure during the development of an abstraction licensing policy which will take account of freshwater flow requirements of uses.

3.9 FISHERIES ECOSYSTEM - (CONTINUED)

Physical Features Requirements

A diversity of natural instream habitats should be maintained to ensure the availability of adequate spawning grounds and adequate rearing grounds for young salmonids and non salmonids.

Artificial barriers should not interrupt natural migration.

Artificial or natural barriers should not lead to excessive exploitation of fish stock.

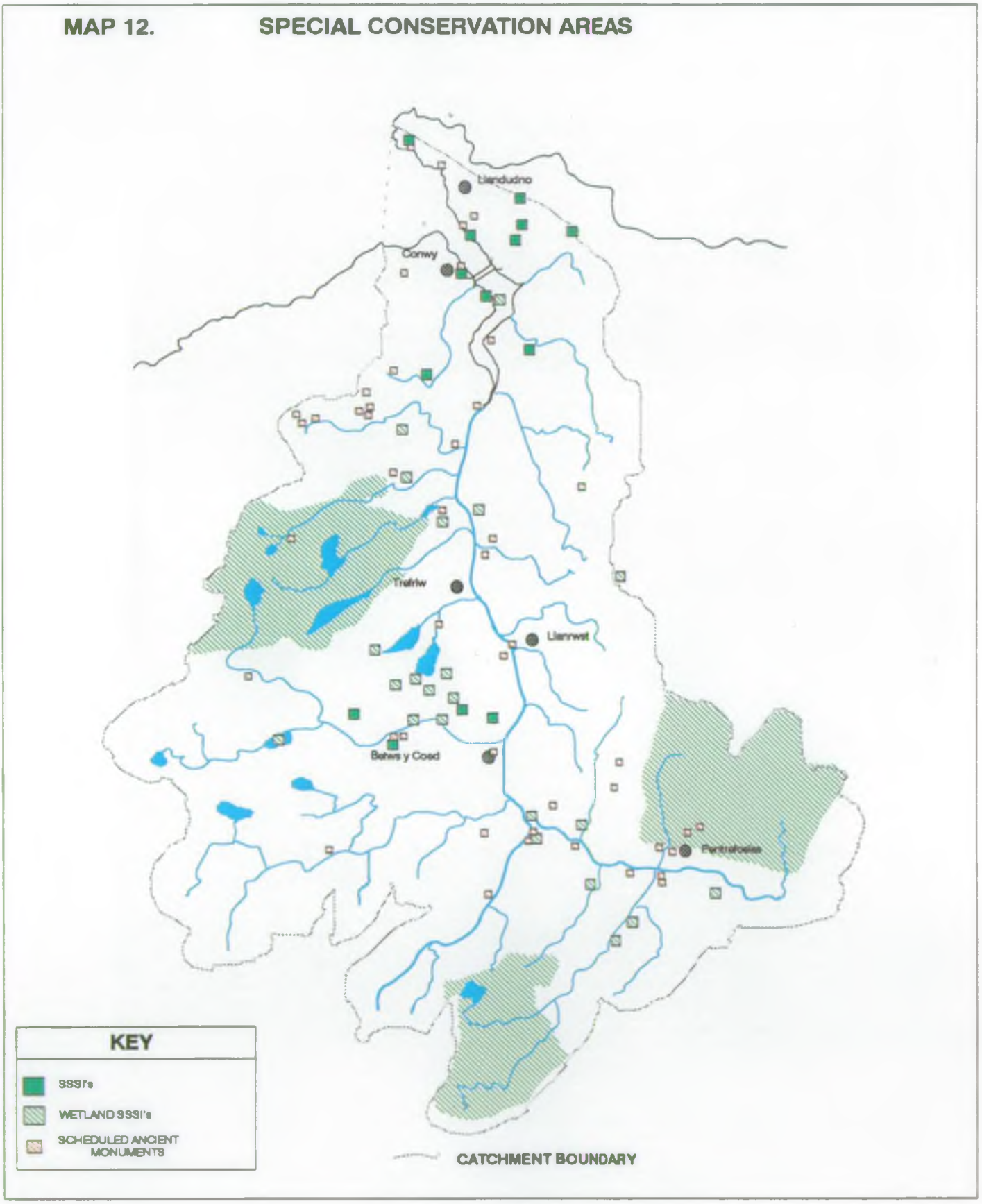
Physical Features Requirements

The Conwy Falls as a natural barrier will need to be overcome if migratory fish are to access the upper reaches of the Conwy. The consequences of introducing salmon and sea trout into brown trout habitats is addressed in the cost benefit appraisal.

Appropriate levels of bankside vegetation and physical bankside features should be maintained to provide adequate cover.

River maintenance operations should be carried out in a manner that will have a minimal deleterious impact on fish populations and enhance river habitat diversity where practical.

MAP 12. SPECIAL CONSERVATION AREAS



3.10 SPECIAL ECOSYSTEM

General

This use relates to the protection of those areas that have been designated as being of high conservation value. Those with statutory protection include Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), and Scheduled Ancient Monuments (SAMs). Also included are non-statutory sites of ecological or archaeological interest and local nature reserves.

Local Perspective

There are 36 designated and 2 proposed SSSIs including 2 NNRs, of which 24 are associated with aquatic habitats or are susceptible to drainage. There are no published details of non-statutory sites although the Countryside Council for Wales (CCW) has informal records of 60 wetland sites (>1ha) of conservation interest. The archaeological record is considerable with a total of 52 statutory and 719 non-statutory sites.

A bird sanctuary/nature reserve has been established by the RSPB at Glan Conwy on the site of the bunded dredging dumping ground from the Conwy tunnel work.

Objective

To protect and further the conservation interest of special archaeological sites and ecosystems within the river corridor or associated wetland areas.

Water Quality Requirements

Freshwater and sea water quality should be of a standard to maintain the quality of the wildfowl and wader feeding areas (site specific standards will apply).

Water Quantity Requirements

The volume of water passing through the estuary during the tidal cycle should be maintained.

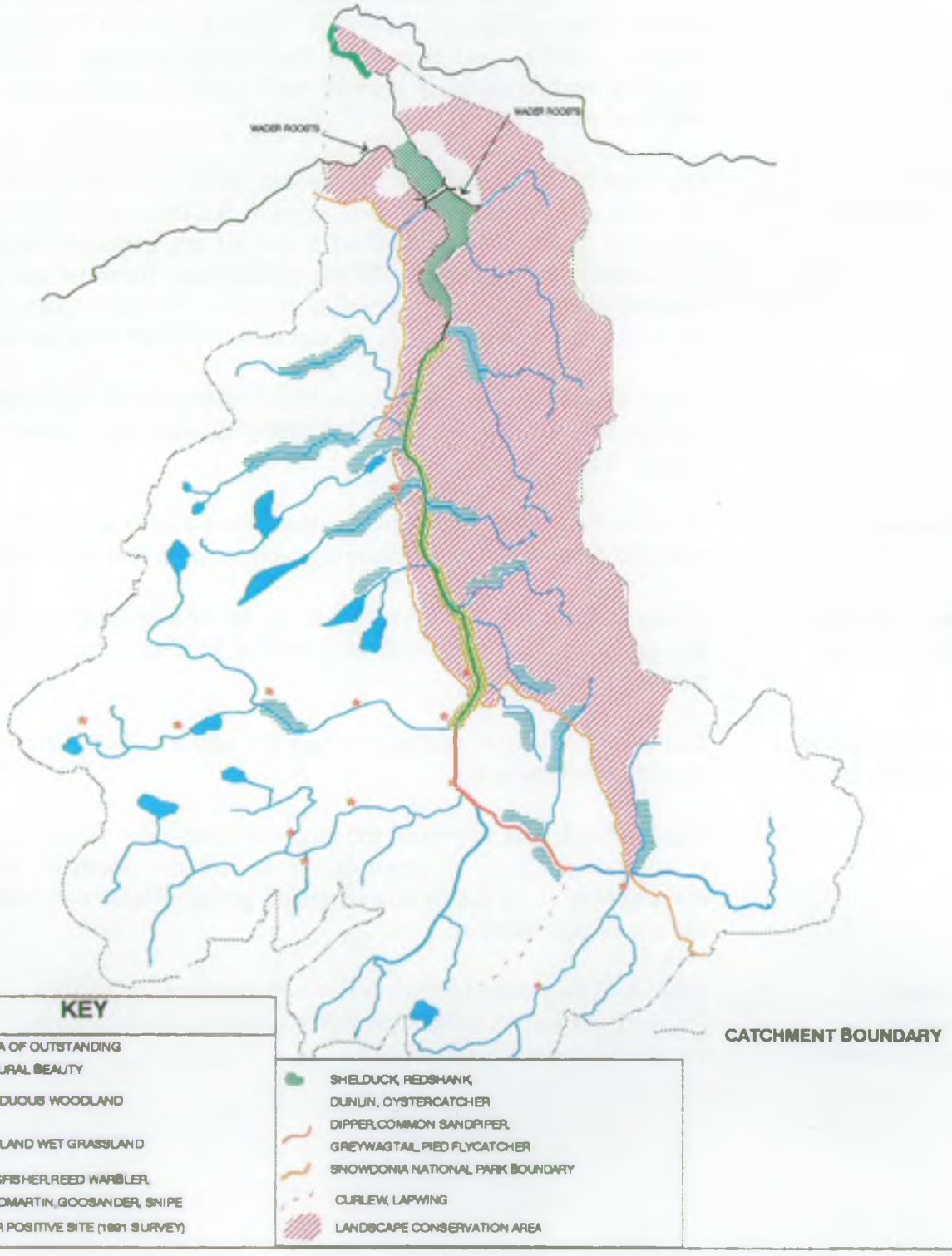
The NRA will seek to protect the range of freshwater flows which reflect as natural a regime as possible, as an interim measure during the development of an abstraction licensing policy which will take account of flow requirements of uses.

Physical Features Requirements

There will be a need to protect those features of, or within, the river corridor or associated wetlands which contribute to the special conservation interest.

MAP 13.

CONSERVATION AREAS
ECOLOGY & LANDSCAPE



3.11 CONSERVATION - ECOLOGY AND LANDSCAPE

General

The NRA has a duty to generally promote conservation and also to further the conservation of flora and fauna whilst carrying out its' functions.

This entails the protection of aquatic flora and fauna in the wider river corridor, including those species whose life cycle is only partly aquatic or partly dependent on associated land in this river corridor. It also involves the protection of water related areas of high landscape value outside the National Park.

Local Perspective

Land use adjacent to the river corridor reflects the changing altitude from open heather moorland at the source (450 m AOD), to a wooded, gorge-like mid-section supporting important plants/mosses/lichen, and to improved pasture on the embanked flood plain. The ecological value of much of the low lying area within the flood plain, maintained as an Internal Drainage District, is largely undescribed but include the Dolgarrog reedbed Proposed Site of Special Scientific Interest (PSSSI).

Approximately 18% of main channel length is ecologically pristine. Clearance of bankside vegetation for agricultural improvement, grazing and coniferous afforestation are the primary causes of habitat degradation. Lesser impacts include water abstraction, metalliferous mining and tip leachates.

Otter use of the catchment appears to be stable over the last ten years but at a much lower level than that found elsewhere in Wales. Lack of bankside cover and breeding sites are thought to be the main limiting factors.

Vulnerable bird species include lapwing, curlew and snipe in the upper catchment, migratory warblers on the floodplain reedbeds, and wildfowl and waders in the lower estuary including the declining dunlin and redshank. The invertebrate fauna of the catchment is generally species poor although the Afon Roe and Dolgarrog Marsh support particularly diverse communities. Several regional rarities, and one nationally rare beetle (Bidessus minutissimus), have been recorded.

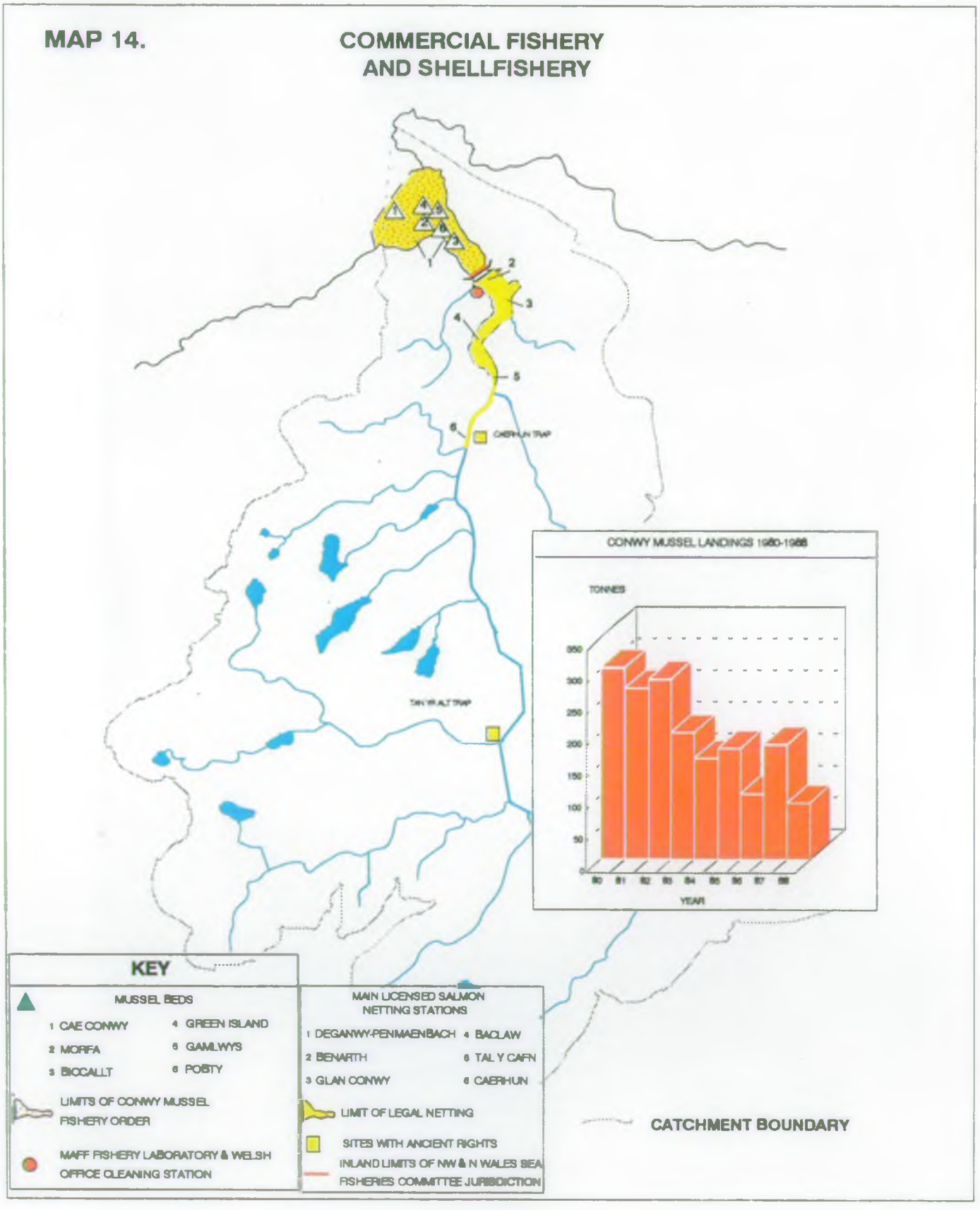
Landscape is protected by National Park designation to the west and a landscape conservation area (District Council) to the east.

3.11 CONSERVATION - ECOLOGY AND LANDSCAPE - (CONTINUED)

Objective	To protect and further the conservation of river corridors, estuary, and associated wetlands.
Water Quality Requirements	Water should be free from surface films, discolouration, extraneous floating material and unpleasant odour (Water Quality Suite 1 applies, Appendix 1).
Water Quantity Requirements	The NRA will seek to protect the range of fresh water flows which reflect as natural a regime as possible, as an interim measure during the development of an abstraction licensing policy which will take account of flow requirements of uses.
Physical Features Requirements	The diversity of natural instream river features, river corridor habitats and their associated flora and fauna need to be maintained, and enhanced where appropriate. Similarly, riverside and aquatic landscapes need to be maintained, and enhanced where appropriate.

MAP 14.

COMMERCIAL FISHERY AND SHELLFISHERY



3.12 COMMERCIAL HARVESTING OF FISH/SHELLFISH FOR HUMAN CONSUMPTION

General

This use specifically relates to the activities of commercial salmonid, sea fishing and shellfishing interests.

Local Perspective

Six seine net licences are issued annually by the NRA to operate between 1st April and 31st August within a defined tidal area (see map). Fishing generally takes place a few hours either side of low water in the latter half of the season, but is prohibited on weekends (0600 hrs Saturday to 0600 hrs Monday). The average annual reported catch has varied over the last 40 years between 60 and 498 salmon, an average of 26% of the total (nets plus rods) catch, and 10 and 2366 sea trout (average 11% of total catch).

There are two fixed traps subject to ancient rights. The inscale trap at Caerhun on the upper estuary is owned by the NRA and no longer fished. The other, at Tan yr Allt on the Lledr, is a basket trap and catches have varied from 0 to 37 salmon per annum.

A small commercial eel fishery operates in the estuary and in 1990 licences were issued for 40 baited traps with a reported catch of 50lbs.

The drift net/fixed net fishery in the outer estuary, mainly targets bass, mullet and flatfish. Bye-laws have recently been introduced to prohibit all trawling and gill netting upstream of the railway bridge in Conwy, where the NRA has Sea Fisheries responsibilities. Seaward of this line separate sea fishery bye-laws are being promoted by North West and North Wales Sea Fisheries Committee to protect salmon, as required under the Salmon Act. The estuary is a designated bass nursery.

The Commercial Fishery is dependent on good production of juvenile salmonids and the rearing of younger eels in the river.

The Conwy estuary contains an important mussel fishery with 27 licensed fishermen, which is regulated by the North Western and North Wales Sea Fisheries Committee. The Conwy Mussel Fishery Order requires that mussels taken in the area must be cleansed, for public health reasons, before being offered for sale to the public.

Landings of mussels formerly in decline in the UK since the 1940's have greatly increased as a consequence of consumer demand in recent years. In contrast, there has been no increased exploitation of the Conwy fishery but it is not clear if this is due to a decline in the fishery, or in the fishing effort. The condition of the mussel bed is being monitored by the Sea Fisheries Committee to assess any possible effect of the A55 road tunnel. The potential effect of any proposed tidal barrage on the mussel fishery would have to be carefully assessed.

Objective

To sustain suitable conditions for supporting commercial salmonid, eel, and sea fisheries, and a natural shellfishery.

Water Quality Requirements

Water should be of a quality to enable fishing to take place (Water Quality Suites 1, 2, and 4 apply, Appendix 1.)

The water quality in river stretches supporting salmonids should be maintained and, where appropriate, improved and set in accordance with standards of Proposed SWQOs for Fisheries Ecosystem (Appendix A, Section 8) where applicable.

The water quality in estuarine areas suitable for shellfish should be maintained and, where appropriate, improved (standards set by E.C. Fisheries Directive (79/923/EEC) for Shellfish Waters will be used, although the Conwy is not a designated shellfishery.).

Water Quantity Requirements

The volume of water passing through the estuary during the tidal cycle should be maintained.

The NRA will seek to protect the range of fresh water flows which reflect as natural a regime as possible, as an interim measure during the development of an abstraction licensing policy which will take account of flow requirements of uses.

Physical Features Requirements

Sufficient access points for commercial fishermen should be available.

Artificial barriers or obstructions should not affect fishing operations.

Any development proposal including artificial barriers should not reduce the area of habitat for mussels.

MAP 15.

BASIC AMENITY

KEY

- PUBLIC FOOTPATH
- P — PICNIC SITE
- F — TOURIST FOCAL POINTS
- B — BIRD WATCHING

CATCHMENT BOUNDARY

3.13 BASIC AMENITY

General

Amenity relates to land-based recreational activities which occur within the proximity of the river corridor or associated wetlands. Principally these include walking, picnicking, and birdwatching, which require access to the watercourse and an appropriate level of aesthetic acceptability.

Local Perspective

Areas of high amenity value (i.e. often frequented by the public) include the estuary in the vicinity of Conwy and Glan Conwy; river walks around Betws y Coed and Llanrwst, most of the Lledr Valley and lakes within the Gwydyr Forest.

River bank access is generally poor however, and no formal facilities exist for picnicking adjacent to the river.

Objectives

To maintain water quality so as to prevent public nuisance arising from visual and odour problems.

To provide safe, environmentally sensitive and easy access to the river corridor without unreasonably constraining other uses.

Water Quality Requirements

Water should be free from surface films, discolouration, extraneous floating material and unpleasant odour. (Water Quality Suite 1 applies, Appendix 1).

Water Quantity Requirements

The present volume of sea water in the Conwy estuary during the tidal cycle should be maintained.

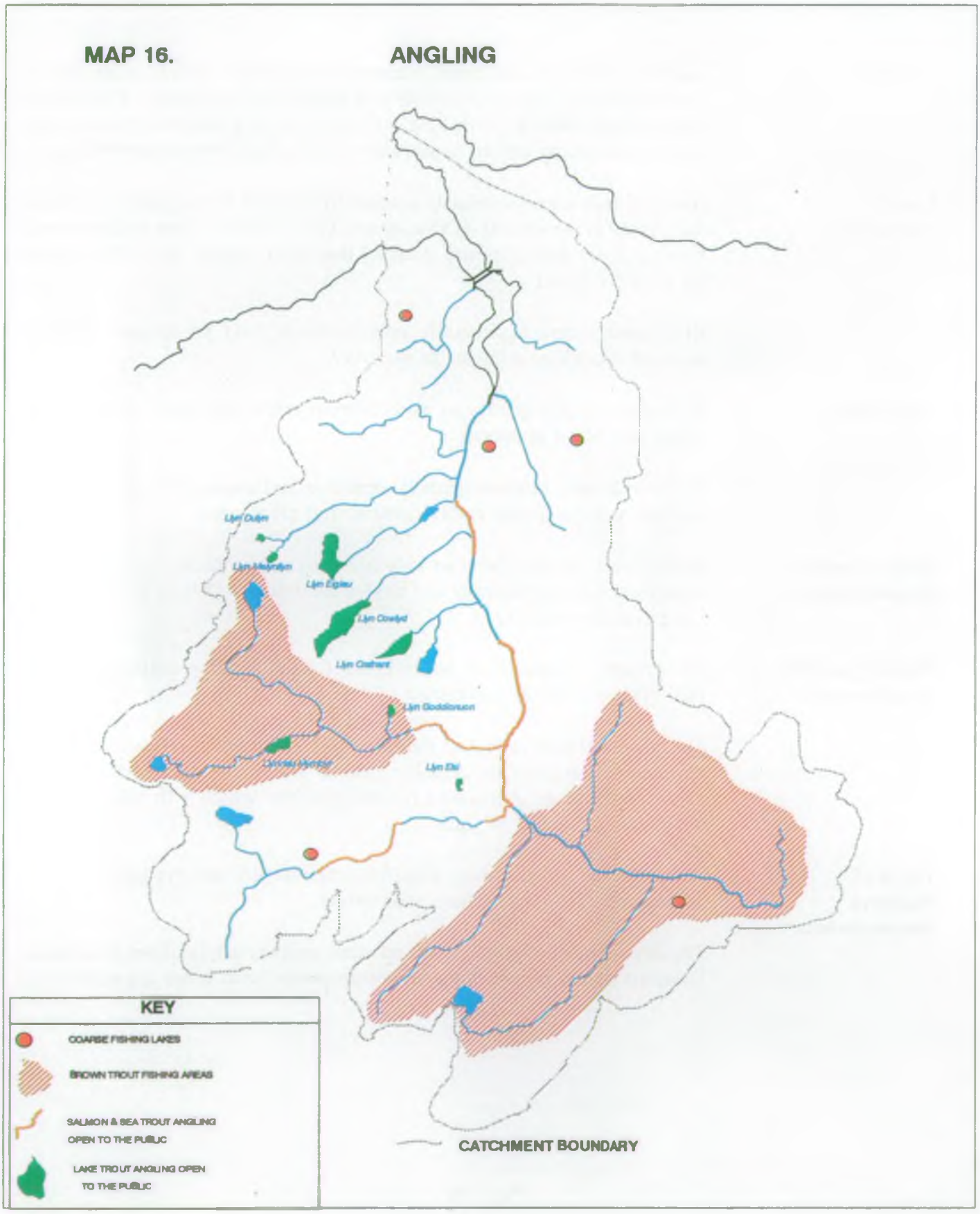
The NRA will seek to protect the range of fresh water flows which reflect as natural a regime as possible, as an interim measure during the development of an abstraction licensing policy which will take account of flow requirements of uses.

Physical Features Requirements

Footpaths and access points should be maintained, and further development promoted where appropriate.

The development of picnic sites and other appropriate facilities at suitable locations should be promoted in collaboration with other organisations.

MAP 16. ANGLING



3.14 ANGLING

General

This relates to the use of the catchment by anglers.

Local Perspective

The river is an important salmon and sea trout fishery, the declared rod catch in 1988 being 33 salmon and 479 sea trout. The rod fishing season runs form 20th March to 17th October but most of the fishing effort takes place in the latter part of the season. Over the past 30 years catches have shown the declining trend common to most other Welsh rivers, though recently this decline appears to have levelled out.

The river is unusual in having a significant length available to members of the public (see map). The Gwydir Hotel waters account for 42% of the total annual salmon rod catch, and catch returns from this source provide a very useful data base. Several of the angling associations are co-operating with the NRA in a log book system to assist in the monitoring of rod catches.

River fishing for brown trout is available on the Afon Llugwy above Swallow Falls, and on the Afon Conwy and Machno above Conwy Falls. Several lakes support good trout fisheries and these are indicated on the map. Charr fishing is developing at Llyn Dulyn and coarse fishing is available at 5 locations. Full details of angling in the area are available in a guide produced by the NRA.

Objective

To maintain suitable and safe conditions for angling.

Water Quality Requirements

Water should be free from surface films, discolouration, extraneous material and unpleasant odour. (Water Quality Suite 1 applies, Appendix 1).

Water Quantity Requirements

The NRA will seek to protect the range of fresh water flows which reflect as natural a regime as possible, as an interim measure during the development of an abstraction licensing policy which will take account of flow requirements of uses.

Physical Features Requirements

Suitable physical access points and habitats should be maintained for angling.

MAP 17.

WATER IMMERSION SPORTS

KEY

- PRINCIPAL BATHING AREAS
- PRINCIPLE WATER SKING AREAS
- MAIN CANOEING STRETCHES
- NATIONAL SPORTS COUNCIL OUTDOOR PURSUITS CENTRE PLAS Y BRENNIN, CAPEL CURIG
- CATCHMENT BOUNDARY

3.15 WATER SPORT ACTIVITY

General

Immersion sports, those activities where there is intimate contact with water, include bathing, canoeing, water skiing and windsurfing. Bathing in rivers is discouraged because of the risk of drowning in fast flows and the possibility of swimmers contracting water-borne diseases.

The result of the NRA's comprehensive water quality monitoring programmes are available to the general public, and are used by Local Authorities to assess the suitability for bathing at designated beaches.

Local Perspective

The water environment is a key attraction for the important tourist industry. Bathing is mainly confined to the estuary but other immersion sports are practised in the rivers and Llyn Geirionnydd.

The West Shore Beach at Llandudno is designated under the EC Bathing Water Directive but, due to the presence of crude sewage, does not meet the required water quality standards for bacteria.

An £11 million Dwr Cymru Welsh Water scheme, due to be completed by December 1995, is designed to ensure that these quality standards are achieved. The scheme incorporates fine screening of sewage before discharge to sea through a 4.2km outfall. Llandudno, Deganwy, and Llandudno Junction are already connected to this scheme, and work is progressing at Conwy and Glan Conwy.

Further improvements can be expected during the next 10 years as stricter standards are implemented for storm overflows particularly for the frequency with which they discharge.

There is significant water skiing and windsurfing activity, mainly in the middle estuary between the Conwy and Tal y Cafn road bridges, and at Llyn Geirionnydd.

The Conwy is regarded as one of the prime rivers for canoeing in North Wales. Access agreements between the Welsh Canoe Association and riparian owners have been established on the Lledr near Dolwyddelan, and Llugwy near Capel Curig. The tidal section between Trefriw and Conwy attracts large numbers of canoeists. Informal permission allows access to several other sections of river, notably between Betws y Coed and Llanrwst outside of the angling season.

3.15 WATER SPORT ACTIVITY - (CONTINUED)

Objectives

To maintain water quality, estuary and river conditions so as to facilitate continued use by appropriate immersion sports, and provide suitable conditions for these activities

To achieve and maintain the quality standard for bathing waters of the EC Bathing Waters Directive (76/160/EEC).

Water Quality Requirements

Water quality must be maintained to enable assessment of suitability of designated waters for bathing (Water Quality Suites 1 and 5, Appendix 1).

Water quality should be maintained and, where appropriate improved, as assessed against River Quality Objectives (Water Quality Suites 1 and 6, Appendix 1).

Water Quantity Requirements

As far as it is within the capability, and consistent with the NRA's other duties, the river flows and levels, and lake levels should be protected to allow the continued use of these waters for immersion sports.

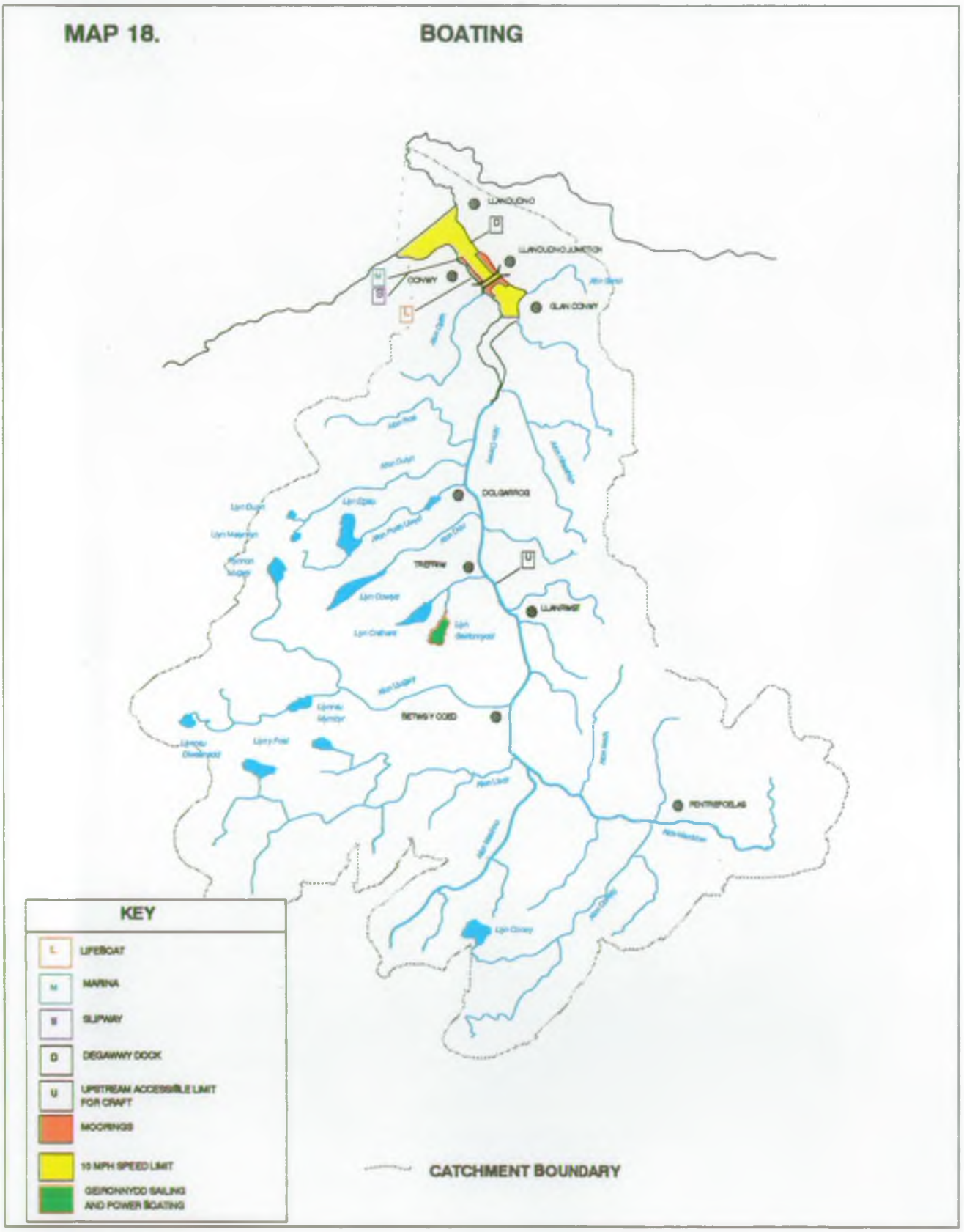
The NRA should, as far as it is able to do so in a consistent manner with its other duties, protect river flows together with levels in rivers and lakes in order to protect the continued use of these waters for immersion sports.

Physical Features Requirements

Controlled access for immersion sports should be maintained.

Any development proposal should have regard to the use of the catchment for immersion sports.

MAP 18. BOATING



3.16 BOATING

General

This includes boating activities which do not require or inevitably result in total immersion.

Local Perspective

There are two sailing clubs in the Conwy Estuary with a total membership of 610 (probable boat numbers ~200). The 460 permanent moorings administered by the Harbour Authority occur on both sides of the channel, above and below the main road bridge. There are also 80 private moorings at the Conwy Marina with scope for a further 400. Total numbers of boat users are estimated to increase to around 1500 in the short term (by 1998).

The single slipway controlled by the Harbour Authority at Conwy Morfa has 50 season tickets, although most sailings are limited by the tide. Estuarine waters are also used seasonally by holiday makers with jet skis and speedboats travelling up to Tal y Cafn and beyond on high tides.

Objective

To ensure that the Conwy continues to support boating activity.

Water Quality Requirements

The water quality should be compatible with non-immersion sports usage (Water Quality Suite 1 applies, Appendix 1).

Water Quantity Requirements

The present volume of sea water in the Conwy estuary during the tidal cycle should be maintained.

The NRA will seek to protect the range of fresh water flows which reflect as natural a regime as possible, an an interim measure during the development of an abstraction licensing policy which will take account of flow requirements of uses.

Physical Features Requirements

Development should not adversely affect the usage and aesthetic qualities of the Conwy.

Safe access points for non-immersion sports participants should be maintained or provided.

Sufficient depth of water to permit the passage of a variety of craft should be maintained.

MAP 19. NAVIGATION

3.17 NAVIGATION

General

This use relates to navigational aids such as buoys, perches and marks used to facilitate safe passage through the Conwy estuary.

Local Perspective

The NRA has no responsibility for the provision of navigation aids in the Conwy estuary.

Physical features restrict the estuary to vessels of 2m draft which can reach Conwy Harbour during the period 2 to 3 hours either side of high water on all tides. Fishing vessels and small inshore craft are the main categories of vessel using the estuary.

Responsibility for navigation comes under Trinity House, which is responsible for the maintenance of the buoys and channel approaching the harbour, and the Conwy Harbour Authority. The Harbour Authority is responsible for perches and other marks within the area stipulated in the Conwy Harbour Revision Order, i.e. between a seaward line from Penmaen Bach passing through Perch Light to Llandudno West Shore, and Cynryd Point upstream of Conwy harbour.

Objectives

To maintain navigational routes throughout the waterway and safe passages to harbour and moorings.

Water Quality Requirements

The water quality should be compatible with navigational usage (Water Quality Suite 1 applies, Appendix 1).

Water Quantity Requirements

The volume of water passing though the estuary during the tidal cycle should be maintained.

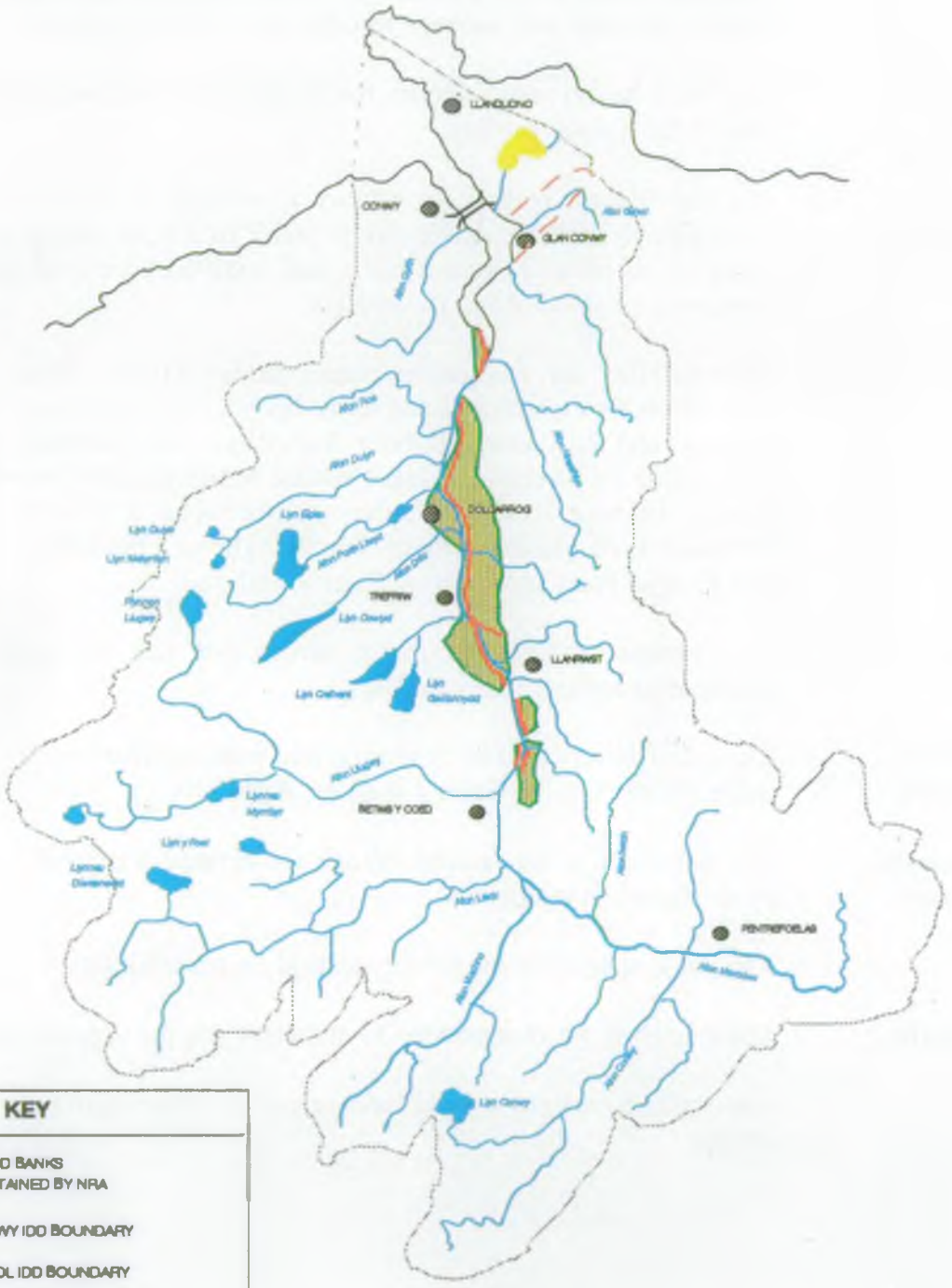
Physical Features Requirements

The physiography of the estuary should be maintained.

There must be no obstructions to endanger the passage of vessels.

Any dredging activity should have regard to other legitimate uses of the estuary.

MAP 20. CONWY FLOOD DEFENCE FEATURES



3.18 FLOOD WATER STORAGE AND FLOOD DEFENCES

General

The provision and maintenance of effective defences is required to protect people and property against flooding from rivers and the sea. Flood events, usually the consequence of extreme climatic conditions such as heavy rainfall or high winds, are described in terms of the frequency with which they occur, e.g. 1 in 50 years. The effectiveness of flood defences is similarly measured in terms of the frequency of the event from which flooding is prevented, e.g. 1 in 100 years. Different types of land use will require different levels of protection from flood defences and this is reflected in the NRA's standards of service.

Larger watercourses, and some important smaller ones, are formally designated as statutory main rivers. On Main Rivers the NRA has special powers to carry out works or control the actions of others. Any proposal that could interfere with the bed or banks, or obstruct the flow in the river, requires the formal consent of the NRA.

Certain areas are designated as Internal Drainage Districts (IDDs) and are administered by the NRA. An IDD may be described as an area which because of its topography and potential when drained requires protection from inundation by the sea or flood flows from rivers. An enhanced level of drainage is also required if the best advantage is to be made of these agriculturally valuable low-lying areas of land.

Local Perspective

Flood Defence interest in the catchment is centred primarily but not exclusively on the Afon Conwy IDD and the Afon Ganol IDD.

The Afon Conwy IDD includes most of the valley floor between Tremorfa and Rhyd y Creuau, and is protected by floodbanks. The NRA's commitment includes the maintenance and improvement of these floodbanks, and of main rivers, adopted ditches, and outfall sluices. Flooding is mainly confined to agricultural land, the risk to properties in Llanrwst and Trefriw in particular having been reduced as a result of flood alleviation schemes carried out in the past. Damage resulting from flood events is mitigated by a flood warning system operated by the NRA and North Wales Police.

The Afon Ganol IDD comprises the low lying land between Glan Conwy Corner and Penrhyn Bay. The NRA's operations in this area include the maintenance of main rivers and adopted ditches as well as tidal doors at Penrhyn Bay.

3.18 FLOOD WATER STORAGE AND FLOOD DEFENCES - (CONTINUED)

Local Perspective

The NRA is also responsible for the operation of a Flood Storage System on the Afon Wydden at Llandudno Junction.

Elsewhere in the catchment, Flood Defence work consists mainly of shoal removal and river training schemes carried out when and where necessary. There are no major flooding problems although the agricultural flood plains are inundated from time to time. There are however a few isolated cases of flooding to properties associated with non-main rivers within the catchment.

Flood Defence is an important consideration in the planning process, and the NRA will be actively involved in liaison regarding any proposed Conwy Barrage Scheme and the proposed Llanrwst By-pass.

The NRA during 1993/94 will be preparing maps that show the areas liable to flooding, which will be available as reference documents for the determination of Town and Country Planning applications by the local authorities.

Objectives

To provide effective defences for people and property against flooding from rivers and the sea (see Appendix 2).

To provide adequate arrangements for flood forecasting, warning and response to flood events (see Appendix 2).

Physical Features Requirements

To design and implement maintenance and improvements works so that the natural water environment is protected and enhanced.

There shuld be no development which would impair the effectiveness of any flood defence scheme or prevent access for maintenance of flood defences.

The protection and enhancement of the natural water environment should be a part of any flood defence maintenance and improvement work.

MAP 21.

WATER QUALITY TARGETS

KEY

COMPLIANCE WITH EC BATHING WATERS DIRECTIVE 76/160/EEC WATER QUALITY

CLASS 1 FISHERIES ECOSYSTEM RNQO

CLASS A NWC CLASSIFICATION

4.1 WATER QUALITY TARGETS

Water Quality

Water quality is assessed against a number of control measures:

i) Compliance with River Quality Objectives (RQOs)
ii) National Water Council (NWC) target classes.
iii) Biological target classes.
iv) Compliance with relevant EC Directives.
v) Compliance with Proposed Statutory Water Quality Objectives (SWQOs)

River Quality Objectives are based upon water quality requirements for different river uses. The standards relating to the most sensitive use in a given stretch apply.

The NRA currently reports on the quality of rivers, canals and estuaries to the Department of the Environment on the basis of the National Water Council target classes. These are based upon a limited range of chemical criteria, e.g. biochemical oxygen demand, dissolved oxygen and ammonia. Rivers and canals are ranked in order of decreasing water quality as 1A (very good), 1B (good), 2 (fair), 3 (poor) and 4 (bad). Estuaries are classified as A - good, B - fair, C - for poor and D - bad.

Biological assessment of the presence and abundance of aquatic invertebrates, in conjunction with sampling and analysis for some chemical parameters, provides a comprehensive indication of water quality.

EC Directives, such as the ones for Dangerous Substances, Surface Water, and Bathing Waters, set water quality standards which must be achieved.

During 1992, the NRA has produced a series of proposed Statutory Water Quality Objectives (SWQOs). These objectives encompass all the above control measures and provide a clear indication of the desired use-related water quality in a given length of watercourse. Excluding natural features, the degree to which each watercourse complies with its objectives could be regarded as a measure of the effectiveness of the NRA in controlling pollution. In this plan the proposed SWQOs for the fisheries ecosystem are applied as targets for this use. The ideal long term objective of Class 1 shown on the map may not be achievable due to natural conditions.

4.1 WATER QUALITY TARGETS - (CONTINUED)

The proposed SWQOs only apply to the river stretches included within the NWC classification scheme, but the standards will be applied as targets for all stretches supporting salmonids and non-salmonids. Information for the assessment of the classified stretches will be derived from a statutory monitoring programme, whilst the assessment of many non classified reaches will be based on a similar, though not statutory, monitoring programme.

A full explanation of the proposed Statutory Water Quality Objectives scheme is given in Section 8.

Discharges into the catchment must not only be of suitable quality to allow receiving waters to meet use-related requirements, but must also comply with discharge consents and meet all relevant legislative requirements (both current requirements and, within agreed timetables, those coming into force within the lifetime of the Catchment Management Plan).

Special & General Ecosystems

(i) The following current biological monitoring and project work will be continued:-

River Quality Survey

- Afon Conwy at LLanrwst and at Ysbyty Ifan
- Afon Llugwy at Betws y Coed
- Afon Lledr at Dolwyddelan
- Afon Merddwr at Pentrefoelas

Project Work

- Conwy Fisheries and Water Quality Monitoring Programmes (Welsh Office Funded)
- Sea Trout Stocking Investigations on the Afon Iwrch
- Acidification studies of the upper Conwy in relation to the proposed Conwy Falls fish pass.
- Machno trout fisheries survey.

(ii) Water quality should be maintained and, where appropriate, improved to protect the benthic invertebrates in the estuary.

(iii) There should be no deterioration in water quality, particularly dissolved oxygen, to protect a regionally scarce freshwater mussel (Margaritifera margaritifera) found in the Conwy between Pentrefoelas and Betws y Coed.

4.1 WATER QUALITY TARGETS - (CONTINUED)

(iv) Biological monitoring is required to determine the presence of a nationally rare water beetle (Bidessus minutissimus).

Special & General Ecosystems

(v) The results of the strategic River Corridor Survey to evaluate the conservation status of the catchment will provide the basis for targeting conservation work.

Groundwater Protection

The prevention of groundwater contamination is a major objective for the NRA. In the Conwy catchment there are very limited amounts of groundwater and these are exempt from licensing. Nevertheless, the Authority requires all those whose activities may compromise groundwater quality to have regard to its Groundwater Protection Policy. Activities of particular significance in this context are:-

i) waste disposal to land
ii) disposal of slurries and sludge to land
iii) physical disturbance of aquifers affecting quality and quantity.
iv) contaminated land
v) diffuse pollution

It is important to note that the definition of "controlled water" provided by the Water Resources Act, 1991 includes groundwater. In due course the NRA will be applying SWQOs to groundwaters.

4.2 WATER QUANTITY TARGETS

General

Abstraction of water became a licensable activity with the implementation of the Water Resources Act, 1963. The regulatory authorities were required to issue "Licences of Right" to existing abstractors. Conditions protecting the environment could not be imposed on these licences. Subsequent applications to abstract have been determined on an individual basis. The NRA is currently developing an abstraction licensing policy which will take account of the flow requirements of uses.

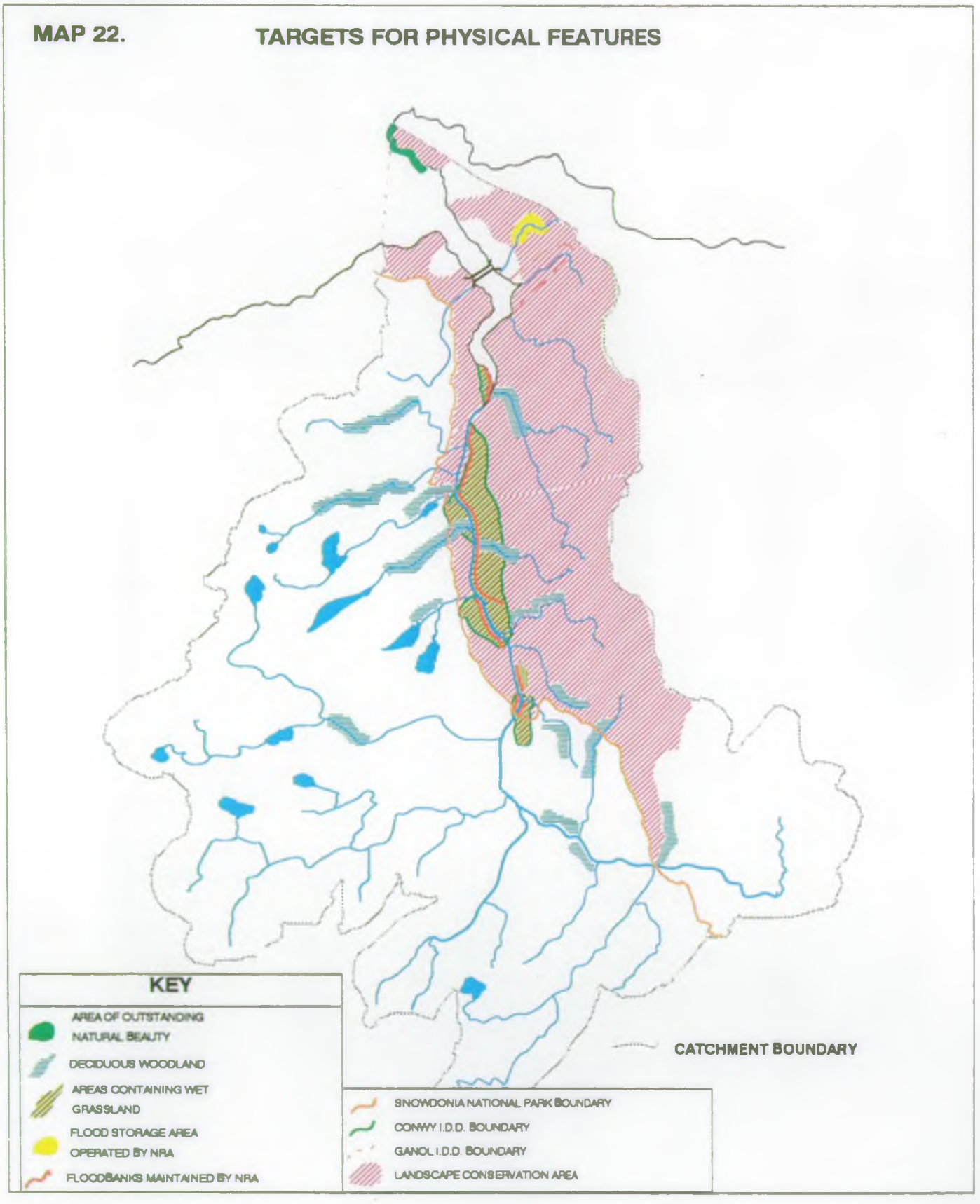
The water quantity targets for the catchment are to ensure efficient utilisation of water resources, whilst protecting the flows required for uses such as fisheries ecosystem and sewage effluent disposal.

Flow Requirements

The NRA will seek to protect the range of freshwater flows which reflect as natural a regime as possible, as an interim measure during the development of an abstraction licensing policy which will take account of flow requirements of uses.

MAP 22.

TARGETS FOR PHYSICAL FEATURES



4.3 PHYSICAL FEATURES TARGETS

General

This section considers the requirements for physical features on the estuary, rivers, and river corridors in the catchment, and the provision and maintenance of permanent facilities for access.

The target at any particular location will reflect the combined requirements of all legitimate uses at that location where this is practicable. There will be situations where an element of compromise is inevitable.

Local Perspective

There are many uses in the catchment which have their own physical features requirements. Map 22 shows the areas where, for a particular use, a specific requirement exists.

In addition to the requirements identified on map 22 the following general requirements are also considered targets for the catchment:

- No increase in flood risk as a result of development.
- No new development in an area where the existing level of flood protection is considered below the standard required for the type of development proposed, unless the installation of appropriate flood defence measures is an integral part of the development.
- Maintenance and enhancement of riparian vegetation, particularly to improve habitat for otters, and enhance the quality of the river corridor landscape.
- Control of access to the river to minimise damage.
- Provision of suitable access for maintenance of the river/channel and flood defences.
- No development that would reduce the conservation value of the river corridor.
- Promotion of initiatives through routine maintenance of I.D.D. ditches that would further conservation, whilst maintaining the flood defence level of service.
- Presence of natural features such as emergent vegetation meanders, pools and riffles for conservation of the river corridors and to enhance the landscape quality.

4.3 PHYSICAL FEATURES TARGETS - (CONTINUED)

Local Perspective

- Appropriate river flow area/profile for the flow regime of the particular reach.
- Co-operation with other responsible bodies to ensure river corridors are free from litter and other imported debris.
- No artificial barrier to fish migration to be introduced.
- Operation of flood defence structures to ensure protection of relevant legitimate uses.

The requirements for the specific uses shown on map 22 are detailed in the following table.

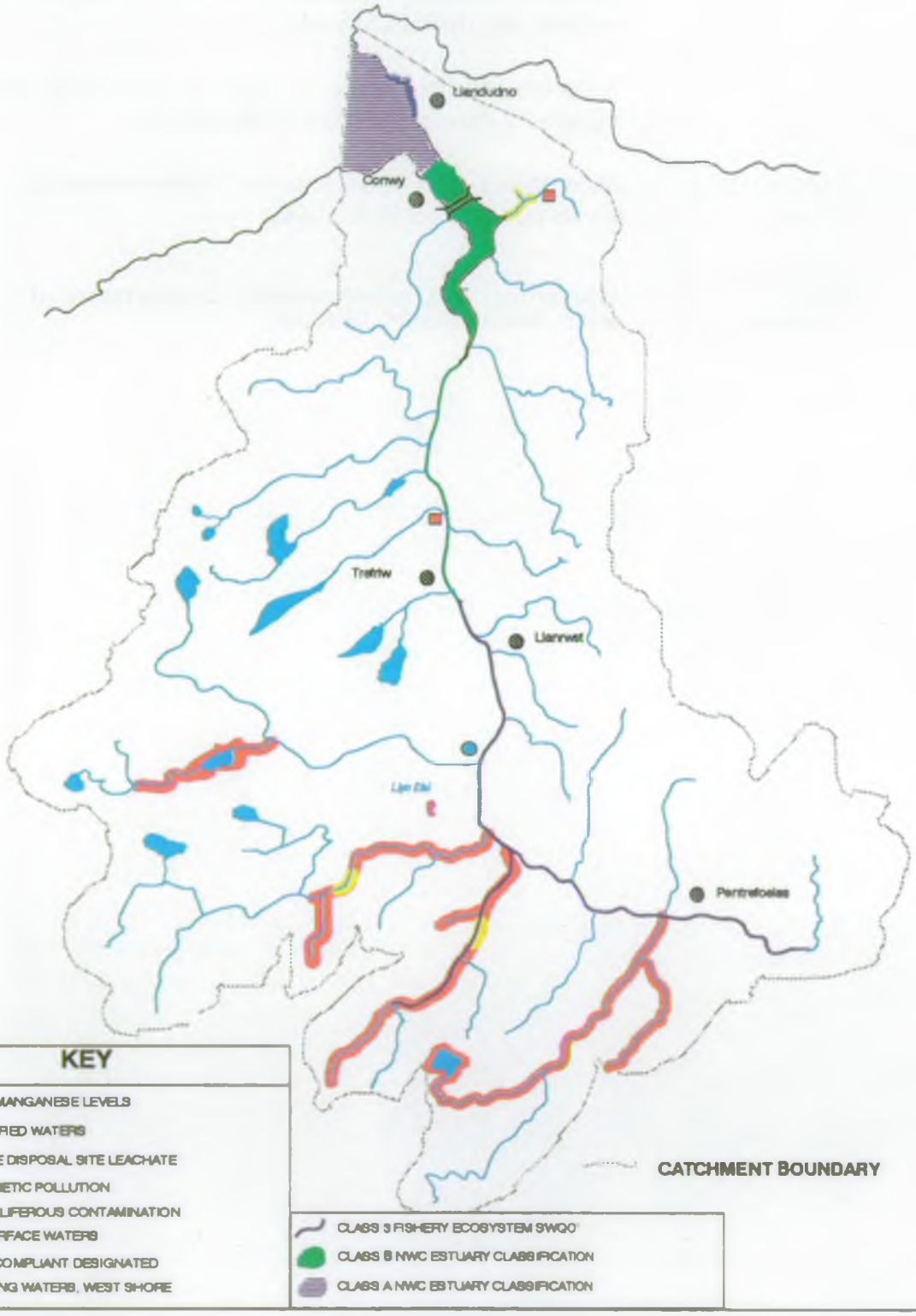
Uses	-	**Requirements**
Boating	-	Maintenance and, where required, improvement of access and associated facilities.
Immersion	-	Maintennace and, where required, improvement of Sports access and associated facilities.
Flood Defence	-	Maintenance and, where required, improvement of flood defences to provide adequate level of service.
Water	-	Undertaking of rainfall, river flow and level resources monitoring for the purpose of resource management and abstraction control.
Amenity	-	Maintenance and, where required, improvement of access and associated facilities.
Angling	-	Provision of sufficient access and maintenance of mixture of open water together with instream and bankside vegetation.
Fisheries	-	Provision and maintenance of a diversity of natural river features to ensure variety of habitat to maximise production of fish populations. Provision and maintenance of bankside vegetation and physical features to provide adequate shade and cover.

4.3 PHYSICAL FEATURES TARGETS - (CONTINUED)

Conservation	-	Maintenance and improvment to a diversity of habitats within the river corridor. Liaison with other bodies to enhance wetland and riparian habitats.
	-	Reduction of disturbance to birds by promoting studies into impacts of human activities in the estuary.
Commercial Fishery	-	Maintenance and, where required, improvement of access and associated facilities.
Commercial Shell Fisheries	-	Maintenance and, where required, improvement of access and associated facilities.

MAP 23.

STATE OF THE CATCHMENT WATER QUALITY



5.1 WATER QUALITY

General

Objectives and targets have been set in relation to water quality demands of the different uses. It now becomes necessary to examine the current state of water quality of the catchment and to compare it with the set targets. If it becomes apparent that the current water quality falls short of the use related targets, action is required to resolve the situation unless the non attainment is due to natural phenomena.

Issues

- Impact of primary settled sewage discharge from Dolwyddelan STW on the Afon Lledr is aesthetically unacceptable (Issue 12, Section 6).

- As with the Dolwyddelan STW, the discharge from Llan Penmachno STW results in identifiable sewage debris in the Afon Machno (Issue 13, Section 6).

- Premature operation of some storm sewage overflow in the catchment results in identifiable sewage debris in the river(s) (Issue 20, Section 6).

- Discharges in the industrialised part of Llandudno Junction cause aesthetic pollution of the Afon Ganol (West) and Jacksons stream. These waters are required to supplement an RSPB reserve (Issue 1,Section 6).

- Containment at some waste disposal sites is inadequate, resulting in tip leachate being discharged into the Afon Conwy and its tributaries (Issue 15, Section 6).

- Metal contamination of surface water from the abandoned Aberllyn mines, approximately 1km north of Betws y Coed (Issue 17, Section 6).

- Agricultural contamination of some tributaries (Issue 14, Section 6).

- Crude sewage discharges in the estuary from Glan Conwy and Conwy put the estuary in Class B, and are associated with failure of West Shore to comply with the EC Bathing Waters Directive (Issue 16, Section 6).

5.1 WATER QUALITY - (CONTINUED)

- Acidification of Llyn Conwy necessitates stocking as the brown trout population cannot sustain itself. Acidification of the Afonydd Maesgwm, Glasgwm, Calettwr, Machno, Nant y Gwryd and Conwy from Llyn Conwy to its confluence with the Merddwr, is implicated in the decline of the fishery (Issue 11, Section 6).

- Elevated copper levels in the estuary (Issue 6, Section 6).

- Elevated manganese levels in the potable water source Llyn Elsi, Betws y Coed (Issue 18, Section 6).

- The Class 1 target as assessed against the proposed SWQOs for Fisheries Ecosystem is not achieved due to the level of zinc present in all the classified stretches, which fall into Class 3 (Issue 5, Section 6).

MAP 24. STATE OF THE CATCHMENT

WATER QUANTITY

5.2 WATER QUANTITY

General

Having set water quantity targets for the catchment, it is now possible to consider the state of the catchment against these targets.

Issues Identified

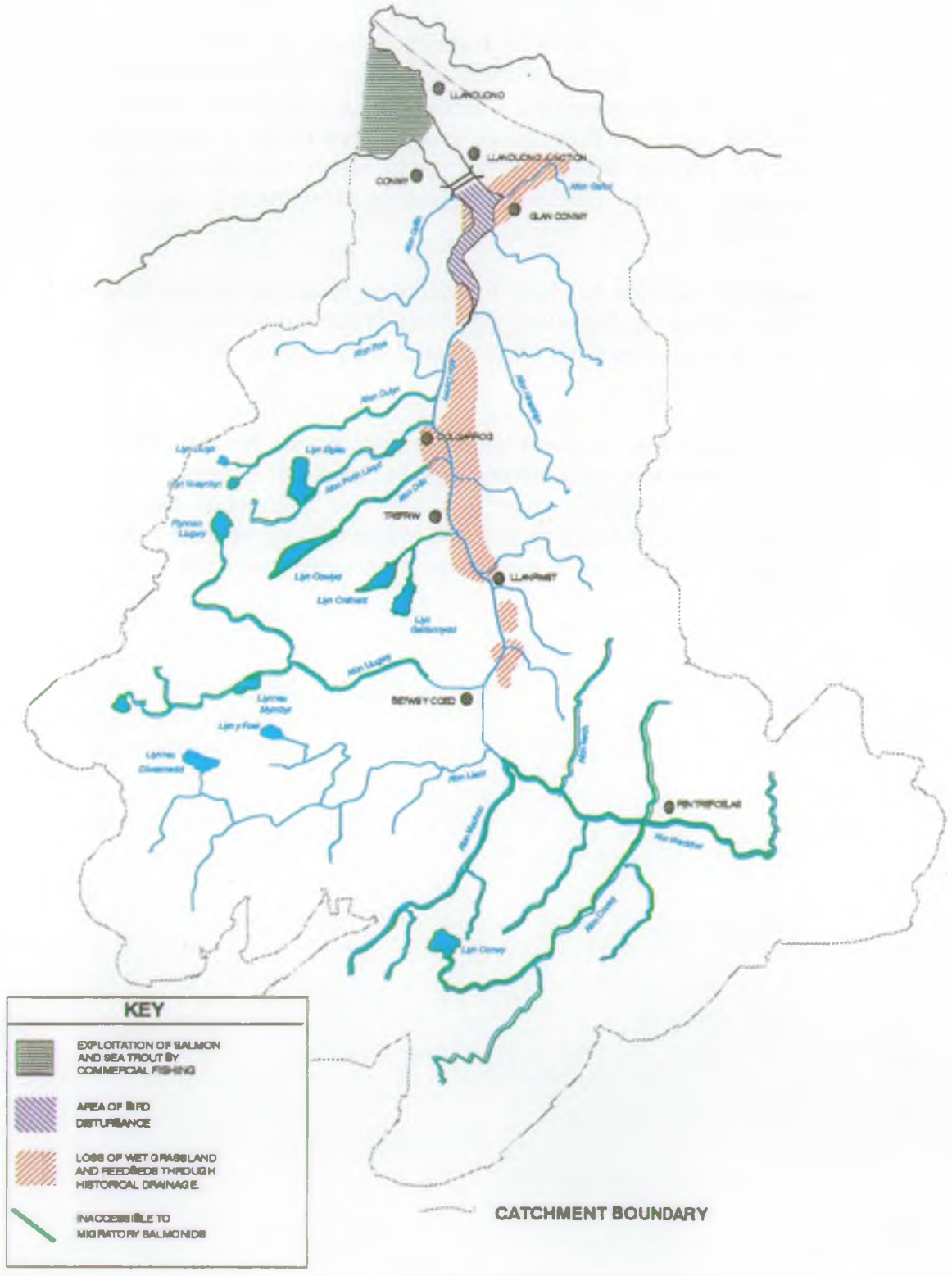
In the absence of a national abstraction licensing policy the categorical identification of locations where flow requirements of uses are not being met is not fully possible. Comparison of prescribed or residual flows with 95 percentile flows gives an indication of the locations that should be the primary focus for the study when satisfactory methods are available. They may not necessarily subsequently be identified as problems.

Only one location has been identified as requiring further investigation. The Licence of Right on the Afon Porth Llwyd does not contain a condition to protect the 95 percentile flow regime of the river (Issue 8, Section 6).

Continuous flow measurement is only available for the main river. In many cases this information can be used to estimate flows in the tributaries. However, there is a need for continuous measurement in some of the tributaries to improve understanding of their behaviour and to assist the NRA in its management of water resources.

MAP 25.

STATE OF THE CATCHMENT
PHYSICAL FEATURES



5.3 PHYSICAL FEATURES

General

The assessment of the state of the catchment with respect to physical features also includes these uses (e.g. the relative scarcity of others) which are more reliant upon physical features than upon water quality or quantity.

Issues Identified

Inaccessibility of the upper reaches of the Afon Conwy and some tributaries to migratory salmonids (Issue 2, Section 6).

The loss of adult salmon and sea trout due to foul hooking (Issue 3, Section 6).

The effect of commercial sea fishing activity on exploitation of sea trout and salmon in the estuary (Issue 4, Section 6).

Human disturbance to birds in the estuary, in the form of informal access and motorised river craft (Issue 10, Section 6).

The low numbers of otters using the catchment (Issue 9, Section 6).

Potentially a lack of riparian habitat diversity - yet to be confirmed by a river corridor survey (Issue 19, Section 6).

The potential impact of any proposed barrage in the estuary on flood protection/water quality/passage of fish/mussel fishery/salmon and sea trout commercial and rod fisheries (Issue 21, Section 6).

The impact on flood defence standards of protection of the proposed Llanrwst bypass (Issue 7, Section 6).

6.0 ISSUES AND OPTIONS

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 Northern Area, Welsh Region of the NRA and do not constitute policy statements. Comments on the issues and options are requested 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 implementa ion 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.

ISSUES AND OPTIONS

OPTIONS	Responsibility	Advantages	Disadvantages
ISSUE No: 1	Poor aesthetic quality of Jacksons stream and Afon Ganol (West) Llandudno Junction		
Intensive monitoring of streams and discharge in the industrial part of Llandudno Junction (1993)	NRA	Identification of offending discharges.	Cost of £3.5K.
Maintenance and improvement of facilities	Dischargers	Improved amenity and conservation value of streams.	Cost unknown.
ISSUE No: 2	Inaccessibility of upper reaches of Afon Conwy and tributaries to migratory salmonids.		
Installation of fish pass at Conwy falls. (Currently being assessed) Other sites have been evaluated and found economically not justifiable.	Conwy Falls Trust, with NRA support.	Increased juvenile salmonid production. Increased fishery potential for sea trout and salmon.	Cost £450K Possible loss of genetic integrity of some native brown trout populations
ISSUE No: 3	The loss of adult salmon and sea trout due to foul hooking.		
Review fishing activity at locations where fish are vulnerable to foul hooking. Create 'no fishing' areas where appropriate by the introduction of byelaws. (Currently being progressed)	NRA	Increased escapement. More fish available to legitimate anglers. Save bailiff enforc-ement time.	Loss of fishing in streches subject to byelaws prohibition
ISSUE No: 4	The effect of commercial sea fishing activity on exploitation of sea trout and salmon in the estuary.		
Confirmation of byelaws to control beach and drift netting in outer estuary. (Currently being progressed)	NRA North Western & North Wales Sea Fisheries Committee	Increased escapement of sea trout / salmon to freshwater.	Restriction on fishing methods used by fishermen.

OPTIONS	Responsibility	Advantages	Disadvantages
ISSUE No: 5	Conwy, Llugwy, Lledr and Merddwr do not achieve SWQO of Class 1 for Fisheries Ecosystem,due to presence of zinc. Class 3 acheived.		
Acceptance of status. Long term SWQO remains at Class 3. or	NRA	No cost. Status quo for fisheries maintained.	Ideal long term objective not achieved, i.e. Class1 No improvement to fisheries
Investigate the causes and sources of zinc contamination. Consider action to reduce levels. Medium term SWQO remains Class 3. Asses any impact of the zinc on the fisheries.	NRA	Understanding of problem. Application of knowledge to similar problems in other catchments. May progress achievement of long term objectives, with improved fisheries.	Resource committment and cost unknown. Anyproposed action could conflict with acid habitat requirements.
ISSUE No: 6	Elevated copper levels in estuary.		
Given this is only apparent during 1991 and 1992, further investigation is required to establish cause and whether this is an indicator of deterioration or a temporary situation (currently assessed).	NRA	Establishment of cause, provision of data to consider appropriate action.	Commitment of staff and resources. Cost unknown.
ISSUE No: 7	Proposed Llanwrst by-pass; impact on flood defence		
Specification of requirements to safeguard existing level of flood protection. (currently available) Construction of a by pass in accordance with NRA requirements.	NRA	Maintenance of current standard of flood protection. Maintenance of current standard of flood protection	None Cost unknown.

OPTIONS	Responsibility	Advantages	Disadvantages
ISSUE No: 8	Drying out of the Afon Porthllwyd.		
The nationally approved methodology of establishing severity of problem to be applied. The necessary action can then be considered and cost-benefit analysis be undertaken (application of methodology 1993/94).	NRA	Establishment of severity of problem as a basis for considering options.	Resource commitent.
ISSUE No: 9	Low number of otters within the catchment		
Investigate cause (by 1993/94). Improve habitat.	CCW/NRA NRA	Identification of most cost effective solutions. Provision of conditions suitable for new colonisation.	Time and resource committment. Cost unknown. May not work. Cost £K unknown
ISSUE No: 10	Human disturbance to birds in the estuary.		
Investigate potential for byelaws to control river motor craft traffic (by 1994). Control public informal access to foreshore.	NRA Gwynedd County Council	Implementaion of byelaws would reduce disturbance. Area subjected to disturbance reduced.	Difficult to implement and police. Cost unknown. Difficult to implement and police. Cost unknown.
ISSUE No: 11	Acidification of upper reaches of Afon Conwy, Afon Lledr and Afon Machno, and Afon Nant y Gwryd.		
Identify local causes of acidification (eg acid rain/ afforestation/land drainage) and investigate cost benefit of liming as a remedial measure.	NRA	Improve water quality to support salmonids.	Cost unknown. Potential damage to naturally acidic habitat if liming considered as a solution.

OPTIONS	Responsibility	Advantages	Disadvantages
ISSUE No: 12	Dolwyddelan SWT discharge to Afon Lledr (primary settelment only)		
Full biological treatmen plus secondary settleme by 1995.	Dwr Cymru Welsh Water	No discharge of identifiable sewage in receiving water.	Cost £350K
ISSUE No: 13	Llanpenmachno settled sewage discharge to Afon Machno.		
Full biological treatment by 1995.	Dwr Cymru Welsh Water	No discharge of identifiable sewage in receiving water.	Cost £250K
ISSUE No: 14	Agricultural Contamination of some tributaries.		
Programme of farm inspections/liaison completion.	NRA	Maintenance of water quality and pre-empting pollution incidents.	Cost unknown
Improved farm effluent handling/storage systems.	Farmers	As above, and 50% grant aid available to farmers.	Cost of installing facilities not quantified.
ISSUE No: 15	Tip leachate discharges to Conwy and tributaries		
Restoration, leachate collection and disposal (by 1999).	Local Authorities	Avoid pollution of the Afon Conwy and tributaries.	Cost £40K
ISSUE No: 16	Crude sewage discharges in the estuary from Conwy, Glan Conwy.		
Connection to the West Shore outfall (by 1999).	Dwr Cymru Welsh Water	Improved water quality in estary. Compliance with EC Bathing Waters Directive at West Shore.	Cost £11M (Total cost of estuary scheme) NRA will object to further development at Conwy, Glan Conwy, until connection is made.

ISSUE No: 17	Metal contamination of surface water from Aberllyn mine, Gwydr Forest.		
Stabilisation of spoil heaps and introduction of vegetation at Aberllyn lead and zinc mines.	Snowdonia National Park / WDA.	Water quality, aesthetic, and conservation gain within National Park. Improved water quality for private abstractor.	Estimated cost £200K
ISSUE No: 18	Elevated manganese levels in Llyn Elsi, Betws y Coed.		
pH adjustment of Llyn Elsi waters, by dosing with crushed limestone.	Dwr Cymru Welsh Water	Compliance with EC Directive (75/440/EEC) on quality of water abstracted for potable use. Compliance with Drinking Water Regulations 1989. Increased fish populations in Llyn Elsi.	Cost of dosing £1K at 18 month intervals. Impact on acidic habitats
ISSUE No: 19 (potential)	Lack of Riparian habitat diversity		
Results of River Corridor Survey required before Options can be proposed, if any. (1993)			
ISSUE No: 20	Combined storm overflows (CSOs)		
Investigate CSOs in catchment to identify any environmental impact and remedial measures required (by 1994).	NRA	Target Problematic CSOs.	Resource Implications
Screening and resetting of weirs.	Dwr Cymru Welsh Water	Improves water quality and amenity value	Cost unknown.

OPTIONS	Responsibility	Advantages	Disadvantages
ISSUE No: 21	Potential impact of any barrage in estuary on level of land drainage, flood protection, passage of fish, water quality, mussel fishery, salmon and sea trout, commercial and rod fisheries. (NO FIRM PROPOSAL TO DATE)		
Specification of require ments to safeguard existing interests of all concerned at the proposal stage.	NWNWSFC Fishermen etc. NRA	Maintenance of existing standard of land drainage, fish movement, water quality, etc.	Resource implications, staff time and cost unknown.
Construction and main tenance of barrage and ancillary installations in accordance with NRA NWNWSFC and fishermen requirements.	Developer	Maintenance of existing standard of land drainage, fish movement, water quality, etc.	Cost unknown. May affect other legitamate uses of navigation, boating etc.

7.0 CONFLICTS

General

In considering the many uses, and the demands which those uses place upon the water environment, conflicts are bound to arise. An example would be an increased demand for water abstraction, which could reduce water quality because of lower dilution for effluents, and affect fisheries. Areas of conflict have been addressed during the formulation of this Plan, resulting in the options for action that are proposed for wider consideration. Some conflicts still remain and the public consultation will no doubt identify others. A strategy for action to address these issues will be developed following this process of consultation.

Sensitivity

When considering the functions that the NRA performs internal conflicts can and do arise. The table below shows the interactions between these functions in the Conwy catchment. The table shows the degree to which requirements of the functions listed along the top of the matrix need to be taken into account by the functions listed in the left hand column. (VS = very significant, S = significant, -- = insignificant). The NRA has a responsibility for navigation on some waters, but this does not apply to the Conwy.

	Fisheries	Conser-vation	Rec-reation	Flood Defence	Water Resources	Water Quality
Fisheries		S	VS	--	S	S
Conser-vation	--		S	VS	--	--
Rec-reation	VS	--		S	S	S
Flood Defence	S	VS	--		--	S
Water Resources	S	S	S	S		VS
Water Quality	S	S	S	--	S	

7.0 CONFLICTS - (CONTINUED)

Summary of General Conflicts

In considering the issues and options three main areas of conflict recur:

Priorities of water use - The water resources duties vested in the NRA through the Water Resources Act, 1991 require that special regard is given to the needs of water undertakers. However, any new or varied licences to abstract water which are issued must not (except by consent) derogate existing protected rights. The NRA needs also to take into account the impact of proposed abstraction upon the water environment. Licences will be considered and determined in accordance with the Authority's statutory duties.

It should be understood that there is no priority ranking of uses of the water environment. All users must consider each other and an element of compromise may be required.

Cost - in many of the options cost is identified. Whilst not a constraint in the identification of options it is a major factor in determining the preferred course of action.

Environmental impact - again in considering any options to resolve issues, consideration is given to what, if any, environmental impacts would occur. In any discussion regarding future works the overall effect on the environment must be considered along with all other factors. This aspect, as with the previous two, is the responsibility of all users of the water environment who must work together to seek the improvements that all would wish to see.

This consultation process is a vital stage in determining how these conflicts can be addressed for the overall benefit of the catchment.

8.0 PROPOSED STATUTORY WATER QUALITY OBJECTIVES

General.

Within the Catchment Management Plan (CMP), the Statutory Water Quality Objectives (SWQO) scheme will only apply to the classified river stretches. The only Uses currently in the scheme are the Fisheries Ecosystem Use and the Potable Abstraction Use. The latter only applies where an abstraction is planned for the future. The protection of existing Potable Abstractions occurs through the EC Directive on Surface Water Abstraction.

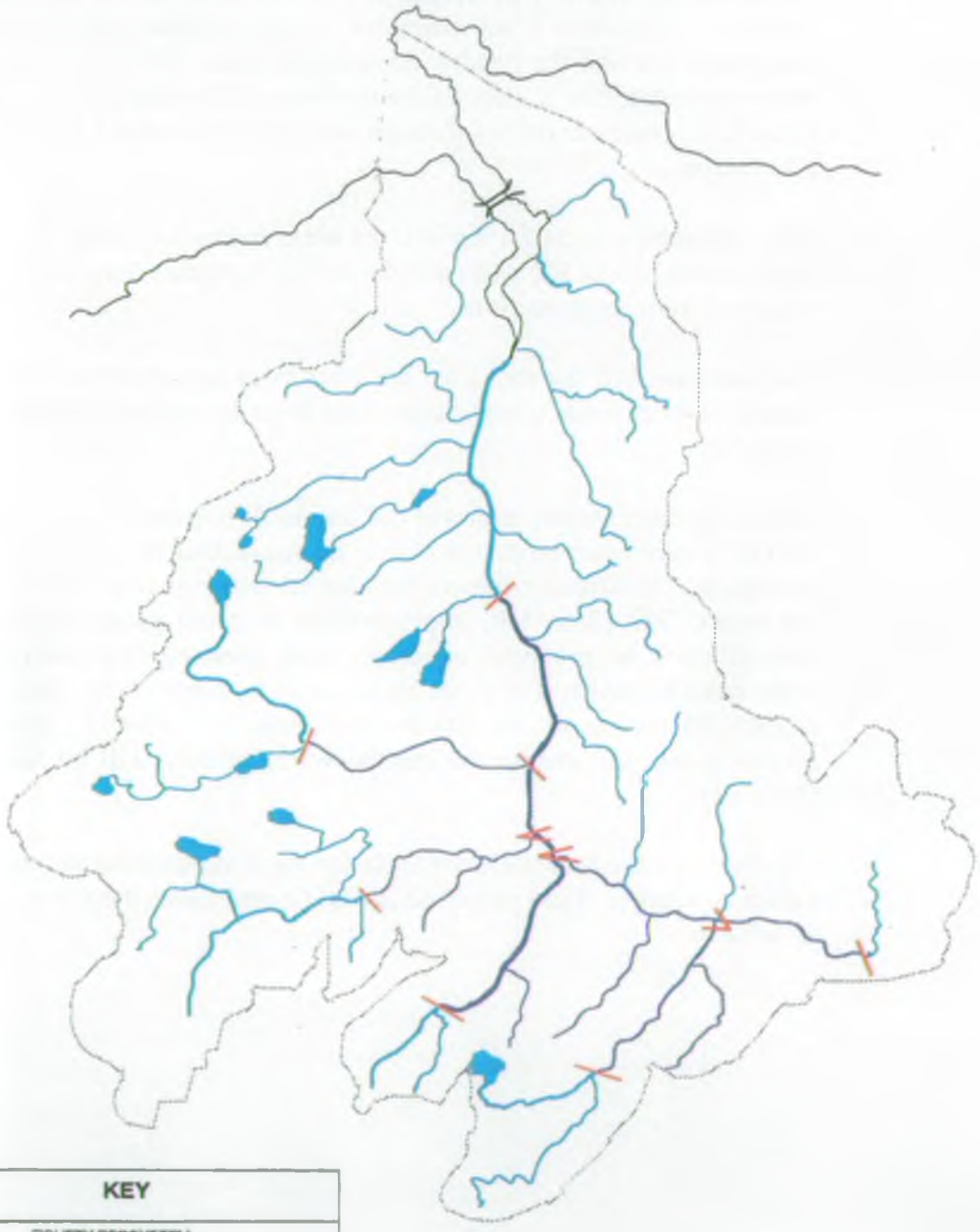
The catchment targets for these Uses were identified under the relevant Uses in section 3 of the plan, and the SWQO targets (Map 26) have been extracted from these sections.

The assessment of the status for the catchment against these SWQO Use targets has been made using routine data from designated sampling points (Map 27).

Where the water quality achieves the standards required by the Use Class, SWQO's have been proposed that will ensure that this water quality is maintained. In situations where the current water quality fails to achieve the target CMP Class, but, improvements in water quality are planned, SWQO's will be proposed to reflect these planned improvements. In other cases however, it will not be possible to achieve the desired water quality improvements by the review date, so SWQO's have been proposed that will ensure the current water quality will be maintained (Map 28).

It remains for the Secretaries of State for the Environment and the Welsh Office to approve these proposed SWQO's and issue them for the NRA to achieve.

MAP 26. **FISHERIES ECOSYSTEM USE TARGET CLASSES**



KEY

FISHERY ECOSYSTEM USE CLASS

CLASS 1 HIGH CLASS SALMONID

UNCLASSIFIED STRETCH OF RIVER OR LAKE

CATCHMENT BOUNDARY

8.1. FISHERIES ECOSYSTEM

Targets

The CMP identified Fishery Ecosystem (FE) Class 1 as the target Use throughout the classified stretches in the Catchment and assessment was made with these targets in mind.

Current status

Due to "naturally" occurring high levels of Zinc, parts of the river are of a quality equivalent to a FE Class 3, and as such it fails to achieve the FE Class 1 targets of the CMP. However, because all other parameters indicate the Catchment is of FE Class 1 quality, it is proposed that a derogation for Zinc should apply and for this Determinand a FE Class 3 standard should be set. This will ensure that the water quality of the catchment is protected. The stretches in this catchment which are designated under the EC Freshwater Fish Directive, already have a derogation for Zinc so that a derogation within the proposed SWQO's will ensure a consistent approach to this problem in the catchment. Thus the following SWQO's are proposed for the Afon Conwy.

SWQO Proposals

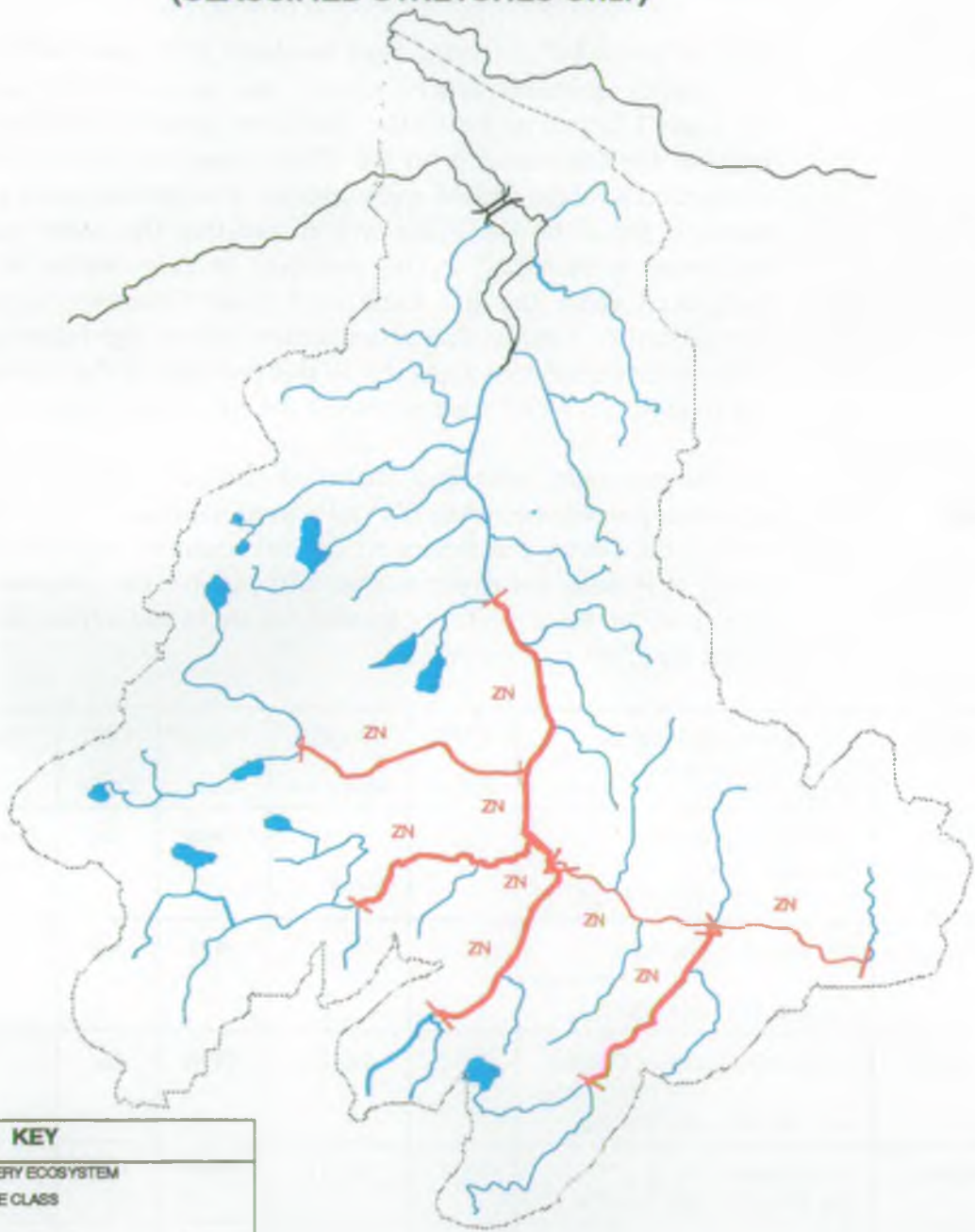
For the proposals, individual classified stretches were joined together wherever possible (ie. when SWQO's were identical in adjacent stretches) and for the Conwy Catchment six overall stretches were identified in this way. It is these six stretches that will receive the proposed SWQO's. The date for these stretches to achieve these objectives is to be 1998 when the CMP is reviewed.

Ref.	River	Stretch Description d/s u/s	CMP Target	SWQO's Proposed	Target Date	FFD Desig	Comments
1	Conwy	HWMOT - c/w Afon Merddwr SH 790 635 - SH 856 512	FE 1	FE 1*	1998	Sal	Zinc derogation
2	Llugwy	c/w Conwy - c/w Afon Gwryd SH 798 573 - SH 720 578	FE 1	FE 1*	1998	Sal	" "
3	Lledr	c/w Conwy - c/w A. Ceunant Ty'n y Ddol SH 798 543 - SH 704 514	FE 1	FE 1*	1998	Sal	" "
4	Machno	c/w Conwy - c/w A. y Foel SH 809 534 - SH 763 479	FE 1	FE 1*	1998	N/A	" "
5	Merddwr	c/w Conwy - Glasfryn SH 856 512 - SH 916 499	FE 1	FE 1*	1998	N/A	" "
6	Conwy	c/w Merddwr - Blaen y coed SH 856 512 - SH 817 456	FE 1	FE 1*	1998	Sal	" "

*Derogation for Zn to be set to FE 3 class. FFD = Freshwater Fish Directive designation. Sal = Salmonid

MAP 27.

STATE OF THE CATCHMENT ASSESSED AGAINST S.W.Q.O. USES (CLASSIFIED STRETCHES ONLY)



KEY

CURRENT FISHERY ECOSYSTEM USE CLASS

ZN — CLASS LIMITING DETERMINANDS

CLASS 3

CLASSIFIED STRETCH

CATCHMENT BOUNDARY

MAP 28. PROPOSED STATUTORY WATER QUALITY OBJECTIVES (CLASSIFIED STRETCHES ONLY)

KEY

S.W.Q.O. PROPOSED

FISHERY ECOSYSTEM 1

W.Q.O. STRETCH REFERENCE

CLASSIFIED STRETCH

CATCHMENT BOUNDARY

8.2 POTABLE ABSTRACTION USE

Targets

Within the Conwy there are no plans for future potable abstractions located in the classified river reaches and as a result no SWQO's have been proposed for this Use.

8.3. ISSUES AND OPTIONS

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

OPTIONS	Responsibility	Advantages	Disadvantages
ISSUE	Conwy, Llugwy, Lledr and Merddwr do not achieve SWQO of Class 1 for Fisheries Ecosystem, due to presence of zinc. Class 3 achieved.		
Acceptance of status. Long term SWQO remains at Class 3. or	NRA	No cost. status quo for fisheries maintained.	Ideal long term objective not achieved, i.e. Class 1. No improvement to fisheries.
Investigate the causes and sources of zinc contamination. Consider action to reduce levels. Medium term SWQO remains as Class 3. Assess any impact of the zinc on the fishery. or	NRA	Understanding of problem. Application of knowledge to similar problems in other catchments. May progress achievement of long term objectives, with improved fisheries.	Resource committment and cost £K, unknown. Any proposed action could conflict with acid habitat requirements.
Long term SWQO Class 1 with derogations for zinc (and pH). (1993)	NRA to seek derogation. DoE to approve.	No cost. Status quo for fisheries maintained. Class 1 Fisheries. Ecosystem.	Does not provide for potential improvement to fisheries.

Water Quality Suite 1 : Aesthetic Criteria

DETERMINAND	ASSESSMENT METHOD	STANDARD
Colour	Visual inspection	No perceptible abnormal discolouration
Mineral oils	Visual inspection	Only visible on detailed inspection (<2% cover)
Foaming	Visual inspection	Only visible on detailed inspection (<2% cover)
Transparency	Visual inspection	No perceptible turbidity *
Litter	Visual inspection	Only visible on detailed inspection (<2% cover)
Odour	Olfactory inspection	No perceptible odour
Excessive biological growth	Visual inspection	Only visible on detailed inspection (<2% cover)
Aerobic conditions	Visual inspection	Aerobic conditions should be maintained

* Depending upon meterological and geographical conditions.

Parameter	Unit	Water quality standard Inland		Marine[a]		Standstill provision[b]
Mercury	µg Hg/l	1	TAA	0.3	DAA	Yes[c]
Cadmium	µg Cd/l	5	TAA	2.5	DAA	Yes
Hexachlorocyclohexane[d]	µg HCH/l	0.1	TAA	0.02	TAA	Yes
Carbon tetrachloride	µg $CC1_4$/l	12	TAA	12	TAA	No
DDT						
(total)	µg DDT/l	0.025	TAA	0.025	TAA	Yes
(para, para DDT)	µg ppDDT/l	0.01	TAA	0.01	TAA	Yes
Pentachlorophenol	µg PCP/l	2	TAA	2	TAA	Yes
Drins						
(total)	µg/l	0.03	TAA	0.03	TAA	Yes
(aldrin)[e]	µg/l	0.01	TAA	0.01	TAA	Yes
(dieldrin)[e]	µg/l	0.01	TAA	0.01	TAA	Yes
(endrin)	µg/l	0.005	TAA	0.005	TAA	Yes
(isodrin)[e]	µg/l	0.005	TAA	0.005	TAA	Yes
Hexachlorobenzene	µg HCB/l	0.03	TAA	0.03	TAA	Yes
Hexachlorobutadiene	µg HCBD/l	0.1	TAA	0.1	TAA	Yes
Chloroform	µg $CHC1_3$/l	12	TAA	12	TAA	No
1,2-dichloroethane[f]	µg EDC/l	10	TAA	10	TAA	No
Perchloroethylene[f]	µg PER/l	10	TAA	10	TAA	No
Trichlorobenzene[f]	µg TCB/l	0.4	TAA	0.4	TAA	Yes
Trichloroethylene[f]	µg TRI/l	10	TAA	10	TAA	No

Estuarine Waters Parameter	Water Quality Studies			Standstill Provision
Cd	$\mu g/cdl^{-1}$	5	DAA	YES
Mg	$\mu g/Hgl^{-1}$	0.5	DAA	YES

NB. For all other determinands Marine Water Quality Standards apply to estuarine waters.

Notes:

TAA total, annual average

DAA dissolved, annual average

a Although the daughter directives for mercury and cadmium specify different standards for estuarine and coastal waters, in the UK the more stringent standards for coastal waters apply. For other substances the EC standards for estuarine and coastal waters are the same (HMSO 1989).

b Most directives include a provision that the total concentration of the substance in question in sediments and/or fish and/or shellfish must not increase significantly with time. For the precise wording see individual directives.

c For mercury an additional standard applies: the concentration of mercury in a "representative sample of fish flesh chosen as an indicator" must not exceed 0.3 mg Hg/kg.

d All isomers, including lindane.

e The standard relating to this substance comes into effect on 1/1/94.

f The standard relating to this substance came into effect on 1/1/93.

Water Quality Suite 3 : Protection of aquatic life including cyprinid fish

Standards applying to Inland Waters and Estuaries / Coastal Waters:

DETERMINAND	UNIT		VALUE: Inland Waters	Estuaries/ Coastal Waters	STATISTIC
Arsenic	µgAs/l		50	25	AA, D
Boron	µgB/l		2000	7000	AA, T
*Inorganic tin	µgSn/l		25	10	AA, T
Organotins:	µg/l	TBT	0.02	0.002	M, T
TBT / TPT		TPT	0.02	0.008(E)	M, T
pH	pH values		6.0-9.0		95P
Iron	µgFe/l		1000	1000	AA, D
Mothproofing agents:µg/l					95P, T
PCSDs/PADs			0.05	0.05	
Sulcofuron			25	25	
Flucofuron			1	1	
Permethrin			0.01	0.01	
Cyfluthrin			0.001	0.001	

Standards applying to Estuaries and Coastal Waters:

DETERMINAND	UNIT	VALUE	STATISTIC
Ammonia:	mgN/l		
Total		0.78	M
Unionised		0.021	AA
		0.042	95P
		0.12	M
Dissolved Oxygen	mg0_2/l	>5	95P
		>3	M
Hydrogen Sulphide	µgH_2S/l	10	Average over 24 hours
Chromium	µgCr/l	15	AA, D
Copper	µgCu/l	5	AA, D
Lead	µgPb/l	25	AA, D
Nickel	µgNi/l	30	AA, D
Zinc	µgZn/l	40	AA, D
Vanadium	µgV/l	100	AA, T

* Proposed EQS

Standards applying to Inland Waters

DETERMINAND	UNIT	VALUE (Inland Waters)	STATISTIC
Nitrite	$mgNo_2/l$	0.03	95P
Ammonia:	mgN/l		
Total		0.78	95P
Unionised		0.021	95P
BOD	mg/l	6	95P, T
Dissolved oxygen	mgO_2/l	$\geq$ 7	AA, T
Suspended Solids	mg/l	25 **	AA, T
Residual chlorine	$mgCl_2/l$	0.0068 (at PH6)	95P, T
*Hydrogen sulphide	$\mu gH_2S/l$		
	<15 °C,	<5 mg O_2/l 0.5	(24 hr max 5.0)
	<15 °C,	>5 mg O_2/l 1.0	(24 hr max 10.0)
	>15 °C,	<5 mg O_2 1 0.25	(24 hr max 2.5)
	>15 °C,	>5 mg O_2/l 0.5	(24 hr max 5.0)
Temperature	°C	Thermal discharges must not cause a rise greater than 3°C	98P
		$\leq$28 **	98P
		$\leq$10 for breeding of cold-water species **	98P
Phosphorus (indicative of need to reduce eutrophication)	$mgPO_4/l$	0.13	AA,T

The following standards are hardness-related in inland waters:

		Mean Hardness (mg/l as $CaCo_3$)						
		<50	50-100	100-150	150-200	200-250	>250	
Chromium	µgCr/l	150	175	200	200	250	250	AA, D
Copper	µgCu/l	1	6	10	10	10	28	AA, D
		5	22	40	40	40	112	95P, D
Lead	µgPb/l	50	125	125	250	250	250	AA, D
Nickel	µgNi/l	50	100	150	150	200	200	AA, D
Zinc	µgZn/l	75	175	250	250	250	500	AA, T
		300	700	1000	1000	1000	2000	95P, T
Vanadium	µgV/l	20	20	20	20	60	60	AA, T

AA = annual average; M = maximum; 95P = 95 percentile; 98P = 98 percentile; T = total; D = dissolved; E; Value applies to Estuaries only; ** = Derogation permitted in the event of exceptional meteorological or geographical conditions. * Proposed EQS

Water Quality Suite 4 : Protection of sensitive aquatic life including salmonid fish

DETERMINAND	UNIT		VALUE (Inland waters)	STATISTIC
Arsenic	µgAs/1		50	AA, D
Boron	µgB/1		2000	AA, T
Inorganic tin	µg/Sn1		25	AA, T
Organotins:	µg/1	TBT	0.02	M, T
TBT / TPT		TPT	0.02	M, T
pH	pH value		6.0-9.0	95P
Iron	µgFe/1		1000	AA, D
Mothproofing agents:	µg/1			95P, T
PCSDs/PADs			0.05	
Sulcofuron			25	
Flucofuron			1	
Permethrin			0.01	
Cyfluthrin			0.001	

The following standards are hardness-related:

		Mean Hardness (mg/1 as $CaCo_3$)						
		<50	50-100	100-150	150-200	200-250	>250	
Chromium	µgCr/1	5	10	20	20	50	50	AA, D
Copper	µgCu/1	1	6	10	10	10	28	AA, D
		5	22	40	40	40	112	95P D
Lead	µgPb/1	4	10	10	20	20	20	AA, D
Nickel	µgNi/1	50	100	150	150	200	200	AA, D
Zinc	µgZn/1	8	50	75	75	75	125	AA, T
		30	200	300	300	300	500	95P T
Vanadium	µgV/1	20	20	20	20	60	60	AA T

Water Quality Suite 4 (Continued)

DETERMINAND	UNIT	VALUE (Inland waters)	STATISTIC
Nitrite	mgNo_2/l	0.01	95P
Ammonia:	mg N/l		
Total		0.78 *	95P
Unionised		0.021 *	95P
BOD	mg0_2/l	3	95P, T
Dissolved oxygen	mg0_2/l	≥9 *	AA, T
Suspended solids	mg/l	25 **	AA, T
Residual chlorine	mg$C1_2$/l	0.0068 (at pH 6)	95P, T
Hydrogen sulphide (undissociated H_2S)	µgH_2S/l		AA
	<15 °C, <5 mg 0_2/l	0.5 (24 hr max 5.0)	
	<15 °C, >5 mg 0_2/l	1.0 (24 hr max 10.0)	
	>15 °C, >5 mg 0_2/l	0.25 (24 hr max 2.5)	
	>15 °C, >5 mg 0_2/l	0.5 (24 hr max 5.0)	
Temperature	°C Thermal discharges must not cause a rise greater than 1.5 °C		98P
	≤21.5		98P
	≤10 for breeding of cold-water species		98P
Phosphorus (indicative of need to reduce eutrophication)	mg PO_4/l	0.065	T

AA = annual average; 95P = 95 percentile; T = total; D = dissolved; M = maximum; 98P = 98 percentile; ** Derogation permitted in the event of exceptional meterological or geographical conditions.

* Different values apply for migratory salmonids in estuaries and coastal waters: -

Ammonia	mg N/l		
Total		1.0	M
Unionised		0.021	AA
		0.042	95P
		0.12	M
Dissolved oxygen	mg0_2/l	>3	95P
		>5	M

Guidelines on public health standards for bathing are being awaited. In the absence of guidelines, the following standards will apply.

Aesthetic standards

i. No visual evidence of pollution by gross sewage solids and debris except under occasional unfavourable circumstances.

ii. No regular or consistant substantiated complaints from water users

iii. No formation of sewage slicks ,discolouration or foaming visible from offshore areas frequented by the public.

iv. In order to meet these standards, foul flows into bathing waters shall be subject to the following requirements.

MINIMUM STANDARDS FOR DOMESTIC SEWAGE DISCHARGES TO TIDAL WATERS

The following sections detail the minimum standards required of discharges following current and developing NRA policy, both internally derived and as required to implement UK government and EC policy and Directives.

To a large extent, the minimum standards vary dependent upon the degree of treatment that is provided. In some cases, for larger discharges, policy requirements are such that minimum levels of treatment must be provided. It is therefore appropriate to present such standards with reference to treatment level rather than water use.

For rainfall dependent intermittent discharges such as combined sewer overflows the minimum standards are generally expressed relative to the use and sensitivity of the receiving waters. These discharges are therefore dealt with separately.

IMPORTANT NOTE:

This Appendix describes minimum standards only. The NRA will apply further standards or consent conditions, necessarily required to achieve relevant use-related EQS's as detailed in the main text of this document, as appropriate to the discharge on a case by case basis. (e.g. offshore outfall location, increased treatment level, etc.).

A2.1 PRELIMINARY TREATED DISCHARGES

a) All persistent material to be removed from the flow and disposed of off site.

b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).

c) Faecal particle size discharged will be dependent upon the available minimum initial dilution (AMID) in the receiving waters at the discharge point as calculated during a mean spring or neap tidal range, whichever gives the lowest value at any time during the tidal cycle.

Available minimum Initial dilution	Maximum particle size
AMID <= 10	<= 1mm
10 < AMID < 100	<= 3mm
AMID >=100	<= 6mm

A2.2 PRIMARY TREATED DISCHARGES

a) All persistent material to be removed from the flow and disposed of off site.

b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).

c) Primary treatment will be required for all qualifying discharges of sewage effluent into relevant coastal waters serving a population equivalent of more than 10,000 or into relevant estuarine waters serving a population equivalent of between 2,000 and 10,000. (See Appendix 3).

A2.3 SECONDARY TREATED DISCHARGES

a) All persistent material to be removed from the flow and disposed of off site.

b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).

c) The minimum flow to full treatment to be at least 3 x DWF as calculated from the equation: 3xPG+I+3xE where:
P = Peak population served.
G = Water consumption per head per day.
I = Allowance for infiltration water entering sewerage network.
E = Industrial effluent to sewer from trade effluent activities.

d) The storm tanks should be sized to provide at least 2 hours retention of all flows between 3xDWF and the greater of Formula A (Ref. 2.1 below) or 6xDWF.

e) Maximum consent limits of 50 mg/l Biochemical Oxygen Demand (BOD) and 60 mg/l Suspended solids will be applied on a 95%ile basis.

f) Secondary treatment will be required for all qualifying discharges of sewage effluent into relevant coastal waters serving a population equivalent of more than 150,000 or into relevant estuarine waters serving a population equivalent of more than 10,000. (See Appendix 3).

A2.4 STORM DISCHARGES

a) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).

b) The sewerage system must be designed such that the combined sewer overflow will not spill until the incoming flow exceeds that calculated from Formula A (Ref. 2.1 below).

c) For storm discharges located at MLWS (See a) above) and discharging to sensitive use waters, the number of spills within the period May to Sept inclusive will be restricted between 1 (identified bathing waters) and 3 (water contact/shellfish harvesting waters). In the case of shellfish harvesting waters, this will subject to the agreement of MAFF and in consultation with the Local Sea Fisheries Committee.

d) For storm discharges to sensitive use waters, extending beyond MLWS and receiving increased dispersion, the NRA will consider increased spill frequencies provided it can be demonstrated, to the NRA's satisfaction, that no deterioration in water quality to that which would be afforded in c) above would occur and that, for identified bathing waters, failure of bacteriological standards in the waters as a result of the storm discharge(s) will not exceed 0.8% of the time during the bathing season.

e) Solids separation will be required with persistent material returned to the pass forward flow or removed off site. The level of separation will depend upon such factors as the sensitivity of the waters and the spill frequency of the overflow(s). Typical NRA requirements will be for solids separation equivalent to the performance of 6mm aperture screening, 10mm bar screening or effective physical installations (e.g. high-side weir) as appropriate.

A2.5 EXCEPTIONAL CIRCUMSTANCES

Only under exceptional circumstances may the achievement of one or more of the minimum standards be waived or amended. The NRA policy allows for local decisions to be made on a case by case basis to determine the best practical environmental option in such circumstances. As for all tidal discharges, consultation with Welsh Office and MAFF would be required before consent is given.

REFERENCE:

2.1 Technical Committee on Storm Overflows and the Disposal of Storm Sewage (1970).

Microbial standards

Standards used to assess compliance with bathing water quality objectives will be those used by the Department of the Enviroment to assess compliance with the EC Bathing Waters Directive in designated bathing waters. These standards are as follows:

E. Coli (per 100 ml)	2000	95 percentile. Imperative value.
Total coliforms (per 100 ml)	10000	95 percentile. Imperative value.

The Catchment Management Plan should note whether Salmonella or enteroviruses are present above the following limits:

Salmonella (per litre)	0	95 percentile
Enteroviruses (PFU / 10 litres)	0	95 percentile.

The Catchment Management Plan should also note whether the following standards, which must be passed if a bathing beach is to quality for a European Blue Flag award, are achieved:

E. Coli (per 100 ml)	100	95 percentile.
Total coliforms (per 100 ml)	500	95 percentile.

In cases where a beach has been awarded a Blue Flag, these standards will be used to assess water quality in preference to the Department of the Environment standards listed below.

Guidelines on public health standards for immersion sports are being awaited. In the absence of guidelines, the following standards will apply.

Aesthetic standards

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

ii) No regular or consistent substantiated complaints from water users.

iii) No formation of sewage slicks, discolouration, or foaming visible from foreshore areas frequented by the public.

iv) In order to meet these standards and safeguard participants in immersion sports, foul flows into recognised areas where such sports are traditionally practised within the catchment shall be subject to the following requirements:

MINIMUM STANDARDS FOR DOMESTIC SEWAGE DISCHARGES TO TIDAL WATERS

The following sections detail the minimum standards required of discharges following current and developing NRA policy, both internally derived and as required to implement UK government and EC policy and Directives.

To a large extent, the minimum standards vary dependent upon the degree of treatment that is provided. In some cases, for larger discharges, policy requirements are such that minimum levels of treatment must be provided. It is therefore appropriate to present such standards with reference to treatment level rather than water use.

For rainfall dependent intermittent discharges such as combined sewer overflows the minimum standards are generally expressed relative to the use and sensitivity of the receiving waters. These discharges are therefore dealt with separately.

IMPORTANT NOTE:

This Appendix describes minimum standards only. The NRA will apply further standards or consent conditions, necessarily required to achieve relevant use-related EQS's as detailed in the main text of this document,

as appropriate to the discharge on a case by case basis. (e.g. offshore outfall location, increased treatment level, etc.).

A2.1 PRELIMINARY TREATED DISCHARGES

a) All persistent material to be removed from the flow and disposed of off site.

b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).

c) Faecal particle size discharged will be dependent upon the available minimum initial dilution (AMID) in the receiving waters at the discharge point as calculated during a mean spring or neap tidal range, whichever gives the lowest value at any time during the tidal cycle.

Available minimum Initial dilution	Maximum particle size
AMID <= 10	<= 1mm
10 < AMID < 100	<= 3mm
AMID >=100	<= 6mm

A2.2 PRIMARY TREATED DISCHARGES

a) All persistent material to be removed from the flow and disposed of off site.

b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).

c) Primary treatment will be required for all qualifying discharges of sewage effluent into relevant coastal waters serving a population equivalent of more than 10,000 or into relevant estuarine waters serving a population equivalent of between 2,000 and 10,000. (See Appendix 3).

A2.3 SECONDARY TREATED DISCHARGES

a) All persistent material to be removed from the flow and disposed of off site.

b) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).

c) The minimum flow to full treatment to be at least 3 x DWF as calculated from the equation: 3xPG+I+3xE where:
P = Peak population served.
G = Water consumption per head per day.
I = Allowance for infiltration water entering sewerage network.
E = Industrial effluent to sewer from trade effluent activities.

d) The storm tanks should be sized to provide at least 2 hours retention of all flows between 3xDWF and the greater of Formula A (Ref. 2.1 below) or 6xDWF.

e) Maximum consent limits of 50 mg/l Biochemical Oxygen Demand (BOD) and 60 mg/l Suspended solids will be applied on a 95%ile basis.

f) Secondary treatment will be required for all qualifying discharges of sewage effluent into relevant coastal waters serving a population equivalent of more than 150,000 or into relevant estuarine waters serving a population equivalent of more than 10,000. (See Appendix 3).

A2.4 STORM DISCHARGES

a) The soffit level of the discharge must be located below the level of low water mark of mean spring tides (MLWS).

b) The sewerage system must be designed such that the combined sewer overflow will not spill until the incoming flow exceeds that calculated from Formula A (Ref. 2.1 below).

c) For storm discharges located at MLWS (See a) above) and discharging to sensitive use waters, the number of spills within the period May to Sept inclusive will be restricted between 1 (identified bathing waters) and 3 (water contact/shellfish harvesting waters). In the case of shellfish harvesting waters, this will subject to the agreement of MAFF and in consultation with the Local Sea Fisheries Committee.

d) For storm discharges to sensitive use waters, extending beyond MLWS and receiving increased dispersion, the NRA will consider increased spill frequencies provided it can be demonstrated, to the NRA's satisfaction, that no deterioration in water quality to that which would be afforded in c) above would occur and that, for identified bathing waters, failure of bacteriological standards in the waters as a result of the storm discharge(s) will not exceed 0.8% of the time during the bathing season.

e) Solids separation will be required with persistent material returned to the pass forward flow or removed off site. The level of separation will depend upon such factors as the sensitivity of the waters and the spill frequency of the overflow(s). Typical NRA requirements will be for solids separation equivalent to the performance of 6mm aperture screening, 10mm bar screening or effective physical installations (e.g. high-side weir) as appropriate.

A2.5 EXCEPTIONAL CIRCUMSTANCES

Only under exceptional circumstances may the achievement of one or more of the minimum standards be waived or amended. The NRA policy allows for local decisions to be made on a case by case basis to determine the best practical environmental option in such circumstances. As for all tidal discharges, consultation with Welsh Office and MAFF would be required before consent is given.

REFERENCE:

2.1 Technical Committee on Storm Overflows and the Disposal of Storm Sewage (1970).

DETERMINAND	UNIT	VALUE (95P, T, unless shown otherwise A1 treatment	A2 treatment	A3 treatment	
Bacteria and viruses					
Total coliforms (37°C)	/100 ml	50	5000	50 000	G
Faecal coliforms	/100 ml	20	2000	20 000	G
Faecal streptococci	/100 ml	20	1000	10 000	G
Salmonella	/ 5 l	0	0		
List I Substances					
Cadmium	µgCd/l	5	5	5	
Mercury	µgHg/l	1	1	1	
Total pesticides	µg/l	1	2.5	5	
List II Substances					
Arsenic µgAs/l		50	50	100	
Boron	µgB/l	1000	1000	1000	G
Chromium	µgCr/l	50 (T)	50 (T)	50 (T)	
Copper	µgCu/l	20	50	1000	G
Iron	µgFe/l	300 (D)	2000 (D)	1000 (D)	G
Lead	µgPb/l	50	50	50	
Selenium	µgSe/l	10	10	10	
Zinc	µgZn/l	3000	5000	5000	
Organotins:	µg/l				
Tributyl tin		0.02(M)	0.02(M)		
Triphenyl tin		0.09(M)	0.09(M)		
Mothproofing agents:	µg/l				
Cyfluthrin		0.001	0.001		
Permethrin		0.01	0.01	0.01	

DETERMINAND	UNIT	VALUE (95P, T, unless shown otherwise) A1 treatment	A2 treatment	A3 treatment
Other Determinands				
Ammonia	$\mu gNH_4/1$	0.05(G)	1.5	4
Dissolved Oxygen	% sat	>70 (G)	>50 (G)	>30 (G)
BOD	mg $0_2/1$	<3 (G)	<5 (G)	<7 (G)
Barium	$\mu gBa/1$	100	1000	1000
Cyanide	$\mu gCN/1$	50	50	50
Fluorides	$\mu gF/1$	1500	700-1700(G)	700-1700(G)
Phenols	$\mu gC_6H_5OH/1$	1	5	100
Polycyclic aromatic hydrocarbons	$\mu gPAH/1$	0.2	0.2	1
Dissolved or emulsified hydrocarbons	$\mu g/1$	50	200	1000
pH	pH value	6.5-8.5(G)	5.5-9.0(G)	5.5-9.0(G)
Colour	mg/1 Pt scale	20 **	100 **	200 **
Temperature	°C	25 **	25 **	25 **
Nitrates	$mgNO_3/1$	50 **	50 **	50 **
Sulphates	$mgSO_4/1$	250	250 **	250 **
Phosphates	$\mu gP_2O_5/1$	400(G)	700(G)	700(G)
Chloride	mgC1/1	200(G)	200(G)	200(G)
Kjeldahl Nitrogen (except NO_3)	mg/1 0_2	1 (G)	2 (G)	3 (G)
COD	mg/1 0_2			30 (G)
Odour	Dilution factor 25°C	3 (G)	10 (G)	20 (G)
Conductivity	$\mu g/cm^{-1}$,20°C	1000(G)	1000(G)	1000 (G)
Suspended solids	mg/1	25 (G)		
Surfactants (laurylsulphate)	$\mu g/1$	200(G)	200(G)	200 (G)
Sustances extractable with Chloroform	$\mu g/1$ SEC	100(G)	200(G)	500 (G)

M = Maximum; D = Dissolved; 95P = 95 percentile; T = Total.
** = Exceptional climatic or geographic conditions; G = Guide value.

Definition of the standard methods of treatment for transforming surface water of categories A1, A2 and A3 into drinking water.

Category A1

Simple physical treatment and disinfection, e.g. rapid filtration and disinfection.

Category A2

Normal physical treatment, chemical treatment and disinfection e.g. pre-chlorination, coagulation, flocculation, decantation, filtration, disinfection (final chlorination).

Category A3

Intensive physical and chemical treatment, extended treatment and disinfection e.g. chlorination to break-point, coagulation, flocculation, decantation, filtration, absorption (activated carbon), disinfection (ozone, final chlorination).

PROPOSED STATUTORY WATER QUALITY OBJECTIVES

USE CLASS	WATER QUALITY CRITERIA							
1.Fisheries Ecosystem	Class	DO % sat 10% ile	BOD (ATU) mgN/1 90%ile	Total Ammonia mgN/1 90%ile	Un-ionised Ammonia mgN/1 95%ile	p11 95%ile	List II Substances	Class Description
	1	80	2.5	0.2	0.021	6.9	Standards for 'sensitive' aquatic life	Water quality suitable for high class salmonid and cyprinid fisheries.
	2	70	4.0	0.6	0.021	6.9	Standards for 'sensitive' aquatic life	Water quality suitable for sustaining salmonid and high class cyprinid fisheries.
	3	60	6.0	1.3	0.021	6.9	Standards for 'other' aquatic life	Water quality suitable for high class cyprinid fisheries.
	4	50	8.0	2.5	.	6.9	Standards for 'other' aquatic life	Water quality suitable for sustaining cyprinid fisheries.
	5	20	15.0	9.0	.	.	.	Some species may be present but water quality unsuitable for fishery
	6	<20	.	.	.	.	.	Fish unlikely to be present

APPENDIX 2 STANDARDS OF NRA FLOOD PROTECTION

1. This refers to the maintenance and improvement of floodbanks, main rivers, adopted ditches and outfall sluices. The standard of protection will be appropriate to the land use, in accordance with the NRA's Standard of Service. The target levels of protection for the Conwy Valley are as follows:-

   - predominantly agricultural land will be protected against floods of return period up to 1 in 10 years.

   - residential and non-residential buildings will be protected against floods of return period up to 1 in 100 years.

2. Ditches and outfall sluices will be maintained to allow for the evacuation of floodwater within a reasonable time. The target time for the Conwy Valley will be 36 hours.

3. Flows will be monitored and the data analysed for any trends. The results will be evaluated against design standards and this will provide the basis for any recommendations.

4. The existing flood warning system will continue to operate and will be improved as necessary to give landowners and the emergency services enough time to make an appropriate response to the warnings. The following target times will apply:-

   - Yellow Alerts will be issued to the Police at least 4 hours before unprotected land in the Conwy Valley is flooded.

   - Amber Alerts will be issued to the Police at least 4 hours before floodbanks in the Conwy Valley are overtopped.

APPENDIX 3 GLOSSARY OF TERMS

cumecs	=	cubic metres per second
m^3/d	=	cubic metres per day
MRF	=	minimum residual flow (Q95)
MCL	=	minimum control level
tcma	=	thousand cubic metres per annum
Q95	=	flow which is exceeded 95% of the time
STW	=	sewage treatment works
CCW	=	Countryside Council for Wales
NWNWSFC	=	North Western and North Wales Sea Fisheries Committee
SSSI	=	Site of Special Scientific Interest
SNCI	=	Site of Nature Conservation Interest
SAM	=	Scheduled Ancient Monument
PSSI	=	Proposed Site of Special Scientific Interest
NNR	=	National Nature Reserve
NWC	=	National Water Council
SNP	=	Snowdonia National Park
AONB	=	Area of Outstanding Natural Beauty
SWQO	=	Statutory Water Quality Objectives
IDD	=	Internal Drainage District
CMP	=	Catchment Management Plan

APPENDIX 4 - DEVELOPMENT

1. Catchment Area	Conwy
2. Total Population (1981)	38,986
3. Towns and Main Villages	1981 Population
Betws y Coed	572
Conwy	3,648
Llandudno Junction	3,636
Deganwy	1,993
Trefriw	476
Dolgarrog	506
Tal y Bont	322
Dolwyddelan	324
Penmachno	287
Eglwysbach	279
Glan Conwy	894
Llanrwst	2,896
Llandudno	8,411
Craig y Don	5,645
4. Local Authorities/Utilities Companies	
Gwynedd County Council	
Aberconwy Borough Council	
Colwyn Borough Council	
Snowdonia National Park	
MANWEB plc	
British Gas	
Dwr Cymru Welsh Water	
5. Structure/Local Plan Proposals	
Gwynedd County Council Structure Plan	-with Secretary of State for modifications
Aberconwy Borough Council District Wide Local Plan	-Draft 1993
Snowdonia National Park Park Wide Local Plan	-Draft late '93 or early '94.