







North South Shared Aquatic Resource (NS Share)

North-Western International River Basin District Article 5 Characterisation - Technical Summary Report (NS Share T9 (1) - 1.2)







An Agency within the Department of the Environment







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North South Shared Aquatic Resource (NS Share)

Water Framework Directive

А Directive establishing а new framework for Community action in the field of water policy (2000/60/EC) came into force in December 2000. This Water Framework Directive (WFD) existing rationalises and updates legislation and provides for water management on the basis of River Basin Districts (RBDs). The WFD was transposed into national law in Northern Ireland by the Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003 and in the Republic of Ireland by the European Communities (Water Policy) Regulations 2003. The primary objective of the WFD is to maintain the "high status" of waters where it exists, prevent deterioration in existing status of waters and to achieve at least "good status" in relation to all waters by 2015. **NS Share Study Area**

NS Share is a cross border project and incorporates three River Basin Districts as set out in the joint North/South Consultation paper *Managing our Shared Waters*:

- 1. North Western International River Basin District (NWIRBD);
- 2. Neagh Bann International river Basin District (NBIRBD);
- 3. North Eastern River Basin District (NERBD).

The NW and NB are International River Basin Districts as they share their waters between Northern Ireland (NI) and Republic of Ireland (ROI). The NERBD is contained wholly within NI.

NS Share Project

The overall objective of the project is to strengthen inter-regional capacity for environmental monitoring and management at the river basin district level, to improve public awareness and participation in water management issues, and to protect and enhance the aquatic environment and dependent ecosystems.

The NS Share project aims to facilitate delivery of the objectives of the WFD within the project area between August 2004 and March 2008.

The NS Share project is funded by the EU INTERREG IIIA Programme for Ireland / Northern Ireland. The Department of the Environment (NI) and the Department of the Environment, Heritage and Local Government (ROI) are implementing agents for the project. Donegal County Council is the project promoter. Technical support is proivded by the Environment and Heritage Service an agency within the Department of the Environment (NI), and the Environmental Protection Agency (ROI). RPS Consulting Engineers in association with Jennings O'Donovan are the principal consultants.

Assistance was also provided by the Marine Institute, Central Fisheries Board, Geological survey Ireland, Geological survey Northern Ireland, Loughs Agency, North West Regional Fisheries Board, and Cavan, Leitrim, Longford, Louth, Meath, Monaghan, and Sligo County Councils.

Project publications are available at www.nsshare.com/publications

PREFACE

The work presented in this paper was carried out as part of the NS SHARE project, which is funded by the European Union INTERREG IIIA programme for Ireland/Northern Ireland. The implementing agents for the NS SHARE project are the Department of Environment (DOE), Northern Ireland, and the Department of Environment Heritage and Local Government (DEHLG), Republic of Ireland. Donegal County Council (DCC) is the project promoter.

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NS SHARE PROJECT

Characterisation Summary Report – North Western International River Basin District (NWIRBD)

DRAFT

This is a	This is a report which summarises the WFD Article 5 characterisation for the NWIRBD. It draws on the results of the					
characte	erisation process carried out in the	e Republic of Irelar	nd and Northern Irelan	d for the NWIRBD	and provides a	
summar	y of the respective national report	s, dealing specifical	lly with the NWIRBD.			
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Executive Summary

A Directive establishing a new framework for Community action in the field of water policy (2000/60/EC) came into force in December 2000. The Directive, generally known as the Water Framework Directive (WFD) rationalises and updates existing water legislation and provides for water management on the basis of River Basin Districts (RBDs). The WFD was transposed into national law in Northern Ireland by the Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003 and in the Republic of Ireland by the European Communities (Water Policy) regulations 2003. The primary objective of the WFD is to maintain the "high status" of waters where it exists, prevent deterioration in the existing status of waters and to achieve at least *"good status"* in relation to all waters by 2015.

The North Western International River Basin District (NWIRBD) is one of three shared river basin districts (IRBDs) within the island of Ireland. The basin was delineated jointly by the Department of the Environment (DOE) in Northern Ireland (NI) and the Department of the Environment, Heritage and Local Government (DEHLG) in the Republic of Ireland (RoI).

Article 5 of the WFD required that each member state carry out an assessment of and report on the characterisation of the RBDs in their jurisdiction, a review of the impacts of human activity on all waters and an economic analysis of water use within each district. This report represents a summary of the characterisation process for the NWIRBD and is based national reports prepared by the competent authorities in each jurisdiction, i.e. the Environment and Heritage Service (EHS) in Northern Ireland (NI) and the Environmental Protection Agency in Republic of Ireland (Rol).

All waters have been classified into types (e.g. different river types based on physical attributes such as geology and slope), and grouped into management units called water bodies which form the basic management unit for reporting and assessing compliance with the WFD's objectives. The NWIRBD has 855 river water bodies, 236 lake water bodies, 23 transitional water bodies, 23 coastal water bodies and 88 groundwater bodies.

An assessment of the impacts of human activity on all waters was undertaken for the NWIRBD. Impacts were assessed based on known impact results (e.g. river monitoring programmes in both jurisdictions) and through predictive impact assessments i.e. looking at human activities that cause pressures on water bodies. A wide range of pressures were assessed, e.g. abstractions, morphology (e.g. physical alterations such as the dredging of rivers, flood control), point, diffuse pressures and the impact of alien species (i.e. non native species). All waters were then placed in one of 4 risk categories on the basis of this assessment: 1a – at risk, 1b – probably at risk, 2a – probably not at risk, and 2b – not at risk. These categories indicate the risk of a water body not achieving the Directive's objectives by

2015. This assessment was based on the best information currently available and does not take account of future changes for any pressures assessed.

The risk assessment for rivers indicates that of the 855 water bodies assessed in the NWIRBD almost two thirds are considered to be at risk of not achieving their good status objectives. The main sources of human pressures acting onr rivers are from diffuse such as agriculture and unsewered populations and morphological pressures including channelisation and intensive land use. This assessment is supported by impact data.

The lake risk assessment has established that, for the most part, diffuse source pollution associated with intensive land use practices is the most significant pressures in relation to the lake water bodies contained within the NWIRBD. Morphological pressures and water abstraction also contribute to those lakes considered at risk.

Just under half of the transitional water bodies in the NWIRBD are considered at risk. Morphological pressures are the main pressure source with dredging (channelisation) posing the greatest threat to transitional waters.

The effects of pollution from diffuse and point sources (as indicated by the marine impact assessment) represent the main pressure on coastal water bodies, however morphology, particularly built structures and shoreline development, also represent a pressure on the marine environment.

Two species of concern are present in the NWIRBD; in particular the Zebra Mussel has been found on both the upper and lower Lough Erne, and common cord grass has been found in the coastal waters of Lough Foyle.

One quarter of groundwater bodies in the NWIRBD are at risk or probably at risk of failing to meet the objectives of the WFD. The main pressures on groundwater bodies are chemical pollutants from both point and diffuse source pollution.

The next activity of the WFD, further characterisation, will involve collection of additional datasets to fill data gaps and additional monitoring and use of modelling techniques in order to improve confidence in the risk assessment process and identify the significant water management issues with the RBD.

The next major reporting deadline under the WFD is the publication of a "significant water issues report" in 2007. The report will further inform the public of the water management priorities in the NWIRBD. The first River Basin Management Plan (RBMP) for the NWIRBD will be drafted during 2008 and finalised after a year's consultation in 2009.



1.0 Introduction

1.1 Water Framework Directive

As part of a substantial restructuring of European Union (EU) water policy and legislation, a Directive establishing a new framework for Community action in the field of water policy (2000/60/EC) came into force in December 2000. The Directive, generally known as the Water Framework Directive (WFD) rationalises and updates existing water legislation and provides for water management on the basis of River Basin Districts (RBDs).

The WFD is a wide ranging and ambitious piece of European environmental legislation setting clear objectives to ensure that all waters achieve at least "good status" by 2015; "high status" is maintained where it exists and any deterioration in the existing status of waters is prevented. The initiative applies to all Europe's groundwaters, rivers, lakes, transitional waters (estuaries) and coastal waters.

The WFD sets common EU wide objectives for water. It provides for a new, strengthened system for the protection and improvement of water quality and dependent ecosystems. The overall ethos of the Directive is to bring about the effective co-ordination of water environment policy and regulation across Europe in order to:

- protect and enhance the status of aquatic ecosystems (and terrestrial ecosystems and wetlands directly dependent on aquatic ecosystems);
- promote sustainable water use based on long-term protection of available water resources;
- provide for sufficient supply of good quality surface water and groundwater as needed for sustainable, balanced and equitable water use;
- provide for enhanced protection and improvement of the aquatic environment by reducing / phasing out of discharges, emissions and losses of priority substances;
- contribute to mitigating the effects of floods and droughts;
- protect territorial and marine waters and;
- establish a register of 'protected areas' e.g. areas designated for protection of habitats or species.

Article 3 of the WFD requires individual river basins to be identified and assigned to **river basin districts**, which, for the purposes of the Directive, are then used as the main unit for managing the water environment. A river basin can include several individual river catchments and is defined as:

"The area of land from which all surface run-off flows through a sequence of streams rivers, and possibly lakes into the sea at a single river, mouth, estuary or delta."

River basins refer to the natural, environmental unit rather than to administrative or legal boundaries and as such, can cross international borders. The WFD permits two

or more river basins to be combined into one River Basin District (RBD). Coastal and groundwater bodies are also assigned to river basin districts.

The River Basin Management Planning process requires the preparation, implementation and review of a river basin management plan (RBMP) every six years for each RBD identified. This requires an approach to river basin planning and management that encompasses all relevant factors in addressing issues. There are four main elements of the process:

- 1. **Environmental** and **economic assessment** or **'characterisation'** of the river basin district and the pressures and impacts on the water environment;
- 2. Environmental **monitoring** based on river basin characterisation;
- 3. Setting of environmental **objectives**; and
- 4. Design and implementation of a **programme of measures** to achieve environmental objectives.

A timetable for the Directive's main requirements is shown in Table 1.1 (Ref 1).

The RBMP will ensure that the management of our waters are planned and implemented in a way that achieves the best possible balance between the protection and improvement of the water environment and the interests of those who depend on it for their livelihood and quality of life.

Within the European Union there are many "international river basin districts" which are shared between Member States. An important feature of the WFD is a planning mechanism, which requires co-operation between Member States to ensure that water quality targets for shared waters are met.

1.2 Implementation of the WFD in Ireland

The WFD was transposed into national law in Northern Ireland by the Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003 and in the Republic of Ireland by the European Communities (Water Policy) regulations 2003. Both these statutory instruments provide for essential, technical transposition of the Directive (Table 1.1).

These regulations established river basin districts for the whole island of Ireland. The North Western International River Basin District (NWIRBD) is one of three shared or "international" river basin districts (IRBDs) within the island of Ireland (Map 1.1). The basin was delineated jointly by the Department of the Environment (DOE) in Northern Ireland (NI) and the Department of the Environment, Heritage and Local Government (DEHLG) in the Republic of Ireland (RoI). These authorities are responsible for the implementation of the WFD and are co-operating to ensure the co-ordinated sustainable management of our water environment.

Table 1.1 Timetable of Directive's Requirements (Ref 1)

Year	Requirement			
2000	Directive entered into force			
	Transpose Directive into domestic law			
By 2003	• Identify river basin districts (RBDs), International River Basin Districts			
	(IRBDs) and Competent Authorities empowered to implement the Directive			
	Complete first characterisation and assessment of impacts on RBDs			
By 2004	Complete first economic analysis of water use			
	Establish a register of protected areas in each RBD			
	 In the absence of a groundwater daughter directive (Article 17) being agreed at European Commission (EC) level, establish criteria for: 			
By 2005	 assessment of good groundwater chemical status; and 			
	- identification of significant upward trends and starting points for trend			
	reversal			
	Establish water monitoring programmes			
	Publish a timetable and work programme for producing the first River Basin			
By 2006	Management Plans (RBMPs) including consultation measures			
	 Establish environmental quality standards for priority substances and 			
	controls on principal sources			
By 2007	Publish, for consultation, interim overview of the significant water			
By 2007	management issues in each RBD			
By 2008	Publish draft RBMP for consultation			
	Publish first RBMP to include:			
	- Environmental objectives			
By 2009	- Programme of measures			
By 2003	- Monitoring networks			
	- Register of protected areas			
	 Heavily modified and artificial water designations 			
By 2010	Ensure water pricing policies meet WFD requirements			
	Ensure programme of measures is operational			
By 2012	 Publish timetable and work programme for second RBMPs 			
	Report progress in implementing measures			
	Review for the first RBMP:			
By 2013	- Characterisation assessments			
By 2013	- Economic analysis			
	Consult on significant water management issues overview for second RBMP			
By 2015	Achieve environmental objectives of first RBMP			
By 2015	Publish second RBMP and thereafter every six years			





Map 1.1 River Basin Districts and International River Basin Districts delineated for Ireland and Northern Ireland



The main competent authorities as required under Article 3 of the Directive in relation to the international river basin districts are –

(a) the relevant local authorities acting jointly for the purposes of the establishment of environmental objectives and programmes of measures and the making of river basin management plans in accordance with articles 12 and 13 of the Directive, respectively, and

(b) the EHS/EPA for the purposes of reporting to the European Commission and for such other functions as are assigned under the Water Policy Regulations and the Water Framework Directive Regulations, e.g. the characterisation of the river basin districts, the economic analysis of water use, the compilation of a register of protected areas, the development of a programme for monitoring watr status and development of environmental objectives and a programme of measures to be applied in order to achieve those objectives.

1.3 North Western International River Basin District

1.3.1 Background

The extent of the NWIRBD, showing the main population centres and county boundaries, is illustrated in Map 1.2. The NWIRBD drains significant portions of counties Cavan, Donegal, Fermanagh, Londonderry, Monaghan and Tyrone, whilst counties Leitrim, Longford and Sligo have smaller drainage areas. The NWIRBD covers an area of approximately 14,730 km², including the marine areas. It is bounded to the north and west by the Atlantic Ocean, to the south by the Western RBD and Shannon International RBD and to the east by the Neagh-Bann RBD.

The main catchments within the NWIRBD include the Foyle and the Erne systems and the main lakes include Upper and Lower Lough Erne, Lough Macnean and Lough Melvin. The Sperrin Mountains delineate the eastern boundary whilst the Blue Stack Mountains and the Derryveagh Mountains lie within county Donegal

The NWIRBD has a population of 483,156 persons. The RBD as a whole has a low population density however, there are some urban population clusters including the City of Derry and the main towns of Letterkenny, Enniskillen, Cavan, Omagh and Ballybofey. In total it is estimated that less than 2% of the RBD is urbanised.

1.3.2 Land Use

Agricultural and natural areas represent the main land-use within the NWIRBD. Towards the north of the NWIRBD the fertile Foyle basin and valley supports intensive and arable farming. Intensive farming mainly consists of beef, dairy, sheep and pig farming In the Erne catchment the predominant land use is pasture, reflecting the rural nature of the catchment and subsequent reliance on livestock farming. The upland regions of the NWIRBD support coniferous forest plantations, as well as sheep and cattle grazing.



1.3.3 Geology

The western portion of the district, namely Donegal, is dominated by glacial deposits of schist, quartzite and granite. The northeast-southwest quartzite strip, due to its erosion resistant properties, has resulted in ridges of mountains such as Errigal, Muckish and Crocknafarragh. Glaciated inlets such as Lough Swilly characterise the northwest coast of the district. To the northeast of the district, Lough Foyle is formed by sedimentary rocks and a long history of subsidence. Metamorphic basement rocks dominate the northern portion of the district although younger Carboniferous and Triassic sandstones and mudstones occur to the east. Carboniferous and Devonian mudstones, limestones and sandstones form the majority of the southern portion including the area around the Lough Erne system. To the south east, older Ordovician/ Silurian greywackes and mudstones occur. There is extensive coverage of superficial deposits, mainly glacial till, but also sand and gravels.

With relatively high rainfall, upland areas suitable for the collection and storage of water and the presence of numerous surface water lakes of varying size, surface water is the dominant source of water supply in the NWIRBD. Groundwater nevertheless is still an important source of water for public drinking water and for industrial, agricultural and domestic supply. For the most part the NWIRBD is underlain by poorly productive aquifers however modest and occasionally more significant supplies can be obtained from the Devonian sandstone and karstified limestone sequences located in the southern portion including the area around the Lough Erne system.

1.3.4 Relief

The relief over the extent of the NWIRBD is wide ranging. The lowlands in the immediate hinterland of Lough Foyle and Lough Erne are at an elevation less than 20m Above Ordnance Datum (AOD) whilst the upland areas and in particular the Derryveagh Mountains, Bluestack and Sperrin Mountains extend to an elevation of over 650m AOD.

The NWIRBD is flanked by numerous mountainous and upland regions including:

- The Sperrins to the north east (maximum elevation Sawel Mountain 678m AOD);
- The Derryveagh Mountains to the north west (maximum elevation, Mount Errigal 751m AOD);
- TheBluestacks in Co. Donegal(maximum elevation, Bluestack Mountain 674m AOD);
- The Dartry Mountain Range (maximum elevation Truskmore 647 mAOD);
- Cuilcagh Mountains to the south west maximum elevation Cuilcagh Mountain 647 mAOD).

Due to the varied nature of the terrain, the different river basins range from lowland rivers with wide valleys and slow discharge velocities to upland rivers with steep valley slopes and a flashy flow regime.



1.3.5 Climate

The climate is temperate, rainfall exceeds 2000 mm per year in the upland regions of Donegal, compared to annual rainfall of approximately 1000 mm in the low lying areas.







1.4 The NS Share Project

The North South SHared Aquatic REsource (NS Share) Project is jointly funded by the EU INTERREG IIIA Programme for Ireland/Northern Ireland (refer to Chapter 8.0); the DOE, Northern Ireland, and the DEHLG, Ireland. The overall objective of the Project is to strengthen inter-regional capacity for environmental monitoring and management capacity at the river basin district level, to improve public awareness and participation in water management issues and to protect and enhance the aquatic environment and dependent ecosystems. The Project's study area includes three RBDs, two of which are international (the NWIRBD and the Neagh-Bann IRBD), whilst the third is contained within Northern Ireland (the North-Eastern RBD).

The summary list of NS Share Project tasks, set to support the WFD's objectives, is as follows:

- 1. **Develop an Ecological Classification System.** This task will involve the development of ecological classification tools to define the water quality status of aquatic ecosystems having regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystem.
- 2. Develop a mechanism to define Heavily Modified Waterbodies (HMWBs) and Artificial Waterbodies (AWBs). HMWBs are waterbodies that have been altered due to human pressures to an extent where they can no longer achieve the maximum ecological status that would be expected for a natural waterbody. AWBs are those waterbodies that are totally man made, e.g. canals. For both designations it is necessary to define the maximum ecological potential achievable and whether restorative procedures are feasible based on an economic analysis.
- 3. Address the discharge, control and monitoring of Dangerous Substances. A list of relevant dangerous substances including information on their source and usage must be prepared for the study area. Those waterbodies that are at risk of failing to achieve good ecological status as a result of the dangerous substances should be identified. Environmental Quality Standards have to be assigned to each of the relevant dangerous substances which involves the identification of an acceptable concentration of the dangerous substance within the waterbody. The analytical capabilities of the agencies also have to be assessed to provide an indication of the monitoring capabilities within both jurisdictions.
- 4. **Initial Characterisation of the study area**. The initial characterisation of the study area requires the identification of the various waterbodies and their typology (physical characteristics). The study includes groundwater bodies, all surface waterbodies and groundwater dependent terrestrial ecosystems and their interaction.
- 5. **Compile, maintain and update a Register of Protected Areas.** All member states must establish a register of protected areas lying within each river basin district which have been designated as requiring special



protection under European legislation for the protection of surface of groundwaters or the conservation of habitats and species directly dependant upon water. The register of protected areas will be kept under review and up to date.

- 6. Undertake Pressures and Impacts Analysis. The principal aim of the pressures and impacts analysis is to identify where and to what extent human activities are placing the achievement of the Directive's environmental objectives at risk.
- 7. **Prepare an Economic Analysis.** This task will include an economic analysis of water use and non-use and will make an assessment of the most cost effective way to implement a programme of measures to address water quality issues in the RBD.
- 8. **Production of a GIS and Data Management System**. The project requires the collation of many different data types from disparate sources. It is essential that this information is managed in an efficient and appropriate manner through GIS compatible databases. It is therefore necessary to develop a system to store this data which will allow the two way transfer of data back to the data owners. This system will act as a depository for data and is not intended to replace existing systems.
- 9. **Prepare a Characterisation Report.** This report will be based on the work undertaken in tasks 2-8 for each RBD. The report will detail the characteristics of the RBD; a review of the impact of human activity on the status of surface waters and groundwaters and a summary of the economic analysis of water use.
- 10. **Review of monitoring needs**. This involves a technical review of the existing monitoring programmes and will identify data gaps and make recommendations to improve inter-regional capacity for environmental monitoring and management.
- 11. Undertake Further Characterisation to identify Significant Water Management Issues. Following the completion of the initial characterisation report, there is a need to further characterise the significant water management issues, through refining the pressure and impacts analysis undertaken under task 6. This will be carried out for those waterbodies identified as being 'at risk' or 'probably at risk' in order to establish a more precise assessment of the significance of such risk and the identification of any measures required to achieve the environmental objectives of the WFD.
- 12. Develop a Programme of Measures. Taking into account the work carried out under the foregoing tasks it is necessary to develop a programme of measures to address the environmental objectives specific to each RBD in the attainment of the requirements of the WFD. The programme of measures will be developed after consideration of all water uses and impacts. Any management options will be subject to a cost benefit analysis before being taken forward to the programme of measures. The integrated programme of measures will be open to debate and agreed with all interested parties. The objectives of each management

option and the agency responsible for each will be clearly stated in the programme.

- 13. Produce a River Basin Management Strategy for each RBD. The strategy will incorporate all the elements outlined in the above tasks and will advise on major issues within cross border catchments and on the measures that must be implemented if agreed objectives are to be achieved. The strategy will explore all of the ecological expectations, water uses and management opportunities within each cross border catchment. The strategy will need to be developed as a building block to contribute to the management of the river basin districts and will lead to the production of a River Basin Management Plan by the respective Governments.
- 14. **Interested Party Participation.** The public participation strategy should make use of a wide range of media and techniques to involve the public in raising awareness of the WFD in the RBD and to ensure the integrated involvement of all relevant parties.
- 15. **Printed Reports.** Reports will be prepared and required in both printed and electronic format. It will be necessary to produce reports that are for both technical and non-technical audiences depending on specific deliverables within the project.
- 16. **Capacity Building**. It will be necessary to develop the capacity for a joint understanding of the technical systems developed across the RBD for each of the jurisdictions involved. This will include joint training and capacity building for the participating agencies and the development of operating procedures/protocols for ongoing support and maintenance of the systems developed.

In addition, the NS Share Project has an overall responsibility to ensure harmonisation of the activities undertaken throughout the study area and to ensure compliance with the objectives of the WFD.

1.5 Purpose of this report

One of the first major milestones required of Member States by the WFD was the preparation of Summary Characterisation Reports (under Article 5) for each River Basin District (RBD) in their jurisdiction. The reports for Northern Ireland and Republic of Ireland can be found at the following websites:

- <u>http://www.ehsni.gov.uk/pubs/publications/article5report.pdf;</u>
- <u>http://www.wfdireland.ie</u>.

The Article 5 characterisation reports required:

- an analysis of RBD characteristics,
- a review of the impact of human activity on the status of waters, and
- an economic analysis of water use.



This document provides the general public with summary characterisation information extracted from the above reports specifically by outlining those waterbodies in the NWIRBD that fall into each of the risk categories. These categories indicate the risk of a waterbody not achieving the Directive's objectives by 2015 and are listed below:

- At Risk
- Probably at Risk
- Probably not at Risk
- Not at Risk

The report also highlights the key pressures acting in the basin. Information relating to the results of the pressure and impact assessment can be reviewed on the NS SHARE website (www.nsshare.com). The NS SHARE project has developed an interactive map and database system for use by the public and specialist users alike. The Reporting Tool provides point-and-click access from River Basin District maps to risk assessment data and results prepared under Article 5 of the EU Water Framework Directive. This can be accessed via the NS SHARE website at the following link: <u>http://www.nsshare.com/reportingtool.html</u>

Figure 1.1 illustrates the reporting tool Map Selection web page. The user can point and select an area of interest on the map of Ireland and access the risk assessment data for a particular waterbody.

Further characterisation is currently underway to refine the results summarised in this report and the NS SHARE interactive reporting tool. Work tasks currently being undertaken include refinement of freshwater morphology risk assessments; refinement of diffuse source pollution risk assessments; and refinement of point source pollution work packages. In addition, work on cross-border waterbodies is being undertaken relating to their characterisation.



Figure 1.1 NS SHARE Interactive Reporting Tool – Map Selection Web Page



2.0. Typology

2.1 Surface Waters

The WFD requires the surface waters of a RBD to be placed into one of four natural categories – river, lake, transitional (estuaries) or coastal, or alternatively, identified as an artificial or heavily modified. Artificial Water Body (AWB) is defined as a body of surface water created by human activity. Heavily Modified Water Body (HMWB) is a body of surface water which as a result of physical alterations by human activity is substantially changed in character, and as such is designated under Annex II of the WFD.

Each water category is further split into "waterbodies" which form the basic management unit for reporting and assessing compliance with the WFD's objectives. The WFD recognises that important physical factors (such as altitude, depth, size, flow, catchment rock type and tidal regime), dictate the plants and animals that would typically be found within a waterbody. For example the type of insects found in a fast flowing hard water river will be very different from those supported by a sluggish siliceous river. Consequently, the Directive requires that surface waterbodies are differentiated according to "type" using appropriate physical characteristics. A more detailed description of the typology processes can be obtained from the Article 5 characterisation reports for Ireland (Ref 2) and Northern Ireland (Ref 1).

2.1.1 Rivers

Irish rivers have been allocated to one of twelve primary types, which have been shown to be ecologically meaningful in unimpacted river systems. The Irish typology system is based on geology (associated with its impact on water hardness) and channel slope (representative of water velocity). There are 665 river waterbodies in the Republic of Ireland portion of the NWIRBD, approximately half of these are siliceous (or soft water) types covering a range of channel slope conditions.

The current typology of rivers in the Northern Ireland portion of the RBD uses a system based on altitude, catchment size and geology to define river types. The application of this typology has identified 12 types in Northern Ireland. There are 190 river waterbodies in the Northern Ireland portion of the NWIRBD; just under half of these are low altitude, small, calcareous waterbodies.

There are 151 draft cross-border river waterbodies within the NWIRBD. This figure is subject to approval from Environmental Protection Agency (EPA) and the Environment and Heritage Service, Northern Ireland (EHS).

The Irish river typology system has been tested by NI authorities and is at present being applied to Northern Ireland's waterbodies. This will achieve full harmonisation of the typology system across all river waterbodies within the entire NWIRBD.



2.1.2 Lakes

The typology system for lakes in the Republic of Ireland (Rol) has identified 13 general types using alkalinity (as a surrogate for geology), depth and size as the determining parameters. There are 227 lake waterbodies in the Republic of Ireland portion of the NWIRBD. Typology information is available for 49 large lakes (above the WFD reporting threshold of 50 hectares) which places them into eight different types (mainly low and moderate alkalinity groups).

The lake typology system applied in Northern Ireland (NI) has identified 20 different types using altitude, depth, size (based on surface area) and geology. Application of this typology to the nine large lakes in the Northern Ireland portion of the NWIRBD results in two types with the majority of the waterbodies described as low altitude, calcareous, non peat lakes.

There is one cross-border lake in the NWIRBD, which spans across the Northern Ireland/Republic of Ireland border. This is Lough Melvin in County Leitrim (RoI) and County Fermanagh (NI).

A harmonised lake typology system will also be applied to all lake waterbodies within the NWIRBD including those that are cross-border.

2.1.3 Transitional and Coastal Waters

A common typology system was applied to all transitional and coastal waterbodies in both Northern Ireland and the Republic of Ireland. The typology scheme uses the factors of tidal range, salinity and exposure with special categories for coastal and transitional lagoons. Applying the typology factors to the waterbodies within the NWIRBD has resulted in 23 transitional waterbodies (falling into two types) and 23 coastal waterbodies (falling into four types). Lough Foyle is a cross-border coastal waterbody. There are two cross-border transitional waterbodies, the Foyle and Faughan estuaries.

2.2 Groundwaters

The island of Ireland has a diverse, complex bedrock and subsoil geology. Consequently, the groundwater flow regime varies from inter-granular flow in subsoils to fissure flow in bedrock and karstic (conduit) flow in limestones. Groundwater body typology is based on the flow regime of the aquifer. Boundaries between different waterbodies are delineated where there is little or no flow across them. The same system was used in both NI and the Rol. There were four groundwater body types identified, based on flow regime, namely karstic, productive fissured bedrock, gravel and poorly productive bedrock. This work was carried out jointly by the Geological Survey, Ireland (GSI) and the Geological Survey, Northern Ireland (GSNI).

This resulted in the delineation of 88 groundwater bodies in the NWIRBD, 29 of these are cross border bodies. Ongoing delineation and characterisation of these border groundwater bodies may result in some redefining of waterbody boundaries.



2.2.1 Groundwater Dependent Terrestrial Eco-Systems

Traditionally, study and management of water resources has largely focused on surface water or groundwater as if they were separate entities. However almost all surface water features (streams, lakes, wetlands and estuaries) interact with and are hydraulically connected to groundwater (Ref 3). While many aquatic eco-systems depend on the quality of groundwater bodies, many terrestrial eco-systems depend on them also. Examples include turloughs, fens and dune slacks whereby groundwater either discharges to the surface or to the rooting zone of vegetation. Consequently, the ecological potential of the eco-system is determined by the associated groundwater body. For the purposes of the River Basin projects, the consideration of terrestrial ecosystems dependent on groundwater has been carried out on sites within European designations, i.e. SACs and SPAs as these areas, by their designation, have been classed as high value. Further characterisation activities in Northern Ireland will assess other nationally and locally important sites within Northern Ireland (Ref 1).



3.0 Register of Protected Areas

Protected areas are defined as those requiring special protection of their surface water or groundwater or for the conservation of habitats and species directly depending on those waters. Protected areas are being captured under the WFD in order to bring all water related EC legislation under one umbrella. Article 6 of the WFD requires each Member State to establish a register of protected areas. Environment and Heritage Service, Northern Ireland (EHS) and the Environment Protection Agency (EPA) have established registers for the waters within the NWIRBD¹. The protected areas are divided into six main categories as follows.

Areas designated for the abstraction of water intended for human consumption

Currently rivers and lakes providing water supply intended for human consumption are protected under the Surface Water Abstraction Directive. Protected areas were also identified in relation to groundwater abstraction; in fact all groundwater bodies were included because they are all potentially drinking water supplies.

Areas designated for the protection of economically significant aquatic species

These protected areas are previously designated under EC directives aimed at protecting shellfish and freshwater fish. These areas are currently under review. They include the EHS recommendations for Salmonid species in Northern Irish waters.

Areas designated as recreational & bathing waters

These are bathing waters which have been designated under the Bathing Waters Directive.

Nutrient Sensitive Areas

Nutrient sensitive areas have been designated under the Urban Waste Water Treatment Directive (UWWT). Within Northern Ireland, Nitrate Vulnerable Zones have been designated under the Nitrates Directive, whilst in the Republic of Ireland a Nitrates Action Programme has been prepared in accordance with Article 5 of the Nitrates Directive and is to be applied to the state as a whole.

Areas designated for the protection of habitats (including birds)

These are areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection. These include Salmonid waters (Rol only), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). SACs are strictly protected sites designated under the EC Habitats Directive. The objective of such designation is to protect some of the most seriously threatened habitats and species across Europe. SPAs are designated under the European Commission Directive on the Conservation of Wild Birds (The Birds Directive). All European Community Member States are



¹ http://www.ehsni.gov.uk/environment/waterManage/wfd/register/RegProtArea.shtml

required to identify internationally important areas for breeding, over-wintering and migrating birds and designate them as SPAs.

Table 3.1 summarises the existing Protected Areas throughout the RBD. Work is currently being progressed on harmonising the registers to facilitate the maintenance of the Article 6 register.

Table 3.1	Areas	designated	under	the	Register	of	Protected	Areas	in	the
NWIRBD		-			-					

Protected Area	River Water bodies	Lake Water bodies	Transitional Water bodies	Coastal Water Bodies	Ground water Bodies	Number of Designated Areas	
Drinking Waters	44	75			79	119	
Economically	172	9					
Significant	(Salmonid	(Salmonid		1		181	
Aquatic Species	sp. EHS)	sp. EHS)					
Recreational							
and Bathing				22		22	
Waters							
Nutrient							
Sensitive	40	3		1		43	
Waters							
Protection of Habitats	7 (Salmonid sp Rol)	1 (Salmonid Sp, Rol)				8	
Water Dependent	Water Dependent Special Areas of Conservation (SAC) 77						
Water Dependent Special Areas of Protection (SPA) 27							



4.0 Risk Assessment

4.1 Introduction

The WFD required each Member State to complete an analysis of pressures and impacts (P & I) by December 2004 and report on the findings by March 2005. The competent authorities of both jurisdictions within the NWIRBD achieved these deadlines. The analysis results are presented in the corresponding national characterisation reports and synthesis reports which were submitted to Europe. The relevant national documents are available, to those who want to explore technical detail on Ireland's WFD website (Ref 2) (www.wfdireland.ie) and the Environment and Heritage Service's website (Ref 1) (www.ehsni.gov.uk).

The NS Share Project undertook a comparison of the P & I analysis applied in each jurisdiction. The agencies involved carried out the analysis independently and communicated to ensure, where possible, that the work would be consistent when joined together. Despite best efforts, there were slight differences in approach, dataset availability and interpretations. Consequently, the reflection of this in the P & I analysis results will be continuously reviewed and addressed through the River Basin Management Planning Process. This section of the NWIRBD summary report aims to extract the key findings of the P & I analysis and to highlight what issues need to be focussed on to prepare a River Basin Management Plan for the district.

The P & I analysis considered water status issues from the top down (looking at drivers which cause **pressures** on waters) and from the bottom up (looking at what we know today about **impacts** on water status). The pressure analysis uses predictive techniques and available information on the extent of human activities, e.g. land use mapping to identify water bodies experiencing significant pressures and therefore with a water quality status that is potentially at the greatest degree of risk of failing to achieve the objectives of the WFD. The impacts analysis incorporates knowledge from provided by existing monitoring activities and identifies any water bosies that exhibit what is currently considered as deteriorated water status.

Four categories have been used to describe the P & I analysis results (Table 4.1). The analysis is a risk based assessment, which means that it deals with the likelihood that a waterbody will meet its WFD status objectives. This framework coincides with that used by the competent authorities in both the UK and Ireland as a whole. For example the waterbodies experiencing the greatest degree of a pressure are least likely to achieve the target of at least good status and likewise any waterbody already impacted (that is failing existing environmental targets) is unlikely to achieve good status in WFD terms. The P & I analysis identifies areas where additional information or investigation is needed to improve confidence in the risk assessment.

Table 4.1 Risk Categories

Reporting Risk Categories

(1a) Waterbodies at significant risk – "At Risk"

Action: Identifies waterbodies for which consideration of appropriate measures to improve status can start as soon as practical

(1b) Waterbodies probably at significant risk but for which further information will be needed to confirm that this view is correct – "Probably at Risk"

Action: Focus for more detailed risk assessments (including, where necessary, further characterisation) aimed at determining whether or not the waterbodies in this category are at significant risk in time for the publication of the interim overview of significant water management issues in 2007

(2a) Waterbodies probably not at significant risk on the basis of available information for which confidence in the available information being comprehensive and reliable is lower – "Probably not at Risk"

Action: Focus for more detailed risk assessments aimed at improving the quality of information and determining whether or not the waterbodies in this category are not at significant risk in time for the publication of the draft River Basin Management Plan due to be completed in 2008.

(2b) Waterbodies not at significant risk on the basis of available information for which confidence in the available information being comprehensive and reliable is high – "Not at Risk"

Action: Consideration of appropriate measures to ensure no deterioration in status can start as soon as practical

Member States must investigate a variety of pressures ranging from familiar point and diffuse pollution issues to abstraction, flow regulation and morphology (together known as hydromorphology) pressures which might impact on the flow or physical regime of the waterbody and consequently affect the natural flora and fauna. The range of pressures considered in the P & I analysis covers all those identified by the European WFD implementation guidance.

Within the NWIRBD the collation of data detailing which pressures and where these pressures exist in the district has been carried out by the Environment and Heritage Service (EHS) for the Northern Ireland portion of the RBD and by the NS Share Project team for the Republic of Ireland portion of the RBD. During the data collection process it was necessary to collaborate with many Agencies to collect, or where necessary, generate this information and to assemble it into a geographical database. This means that there is comprehensive data available throughout the district and that pressures such as physical alterations to waters are being systematically addressed for the first time.

Risk assessment methods were developed and applied to all groundwaters, rivers, lakes, transitional (estuaries) and coastal waterbodies within the study area. The purpose of applying risk assessments was to assess the degree or significance of pressure on a waterbody. It was important that all assessments were applied in a

consistent way throughout the shared waters within the NWIRBD. Consequently in an effort to harmonise the P & I approach, the methodologies developed by the UK Technical Advisory Group and applied by EHS to Northern Ireland's waterbodies were adapted and applied throughout the Republic of Ireland portion of the NWIRBD. The detail behind the risk assessment methodologies is contained in background documents which support the respective national characterisation reports. The results of the P & I risk assessments applied in the NWIRBD are contained in the following sections of this chapter.

It is important to note that significant WFD related work is still ongoing to establish exactly how pressures are linked to impacts and also just what WFD status means. However, the P & I analysis that has been undertaken makes use of the best information available to identify what issues we need to know more about and to prioritise the key issues for water management. For the most part the analysis is based on today's situation, further studies will be undertaken to look at how changes in drivers and pressures could affect water management issues. The P & I assessment is an iterative procedure (forming part of a management cycle). The first analysis presented in this NWIRBD Summary Report must be thought of as an "initial characterisation" which provides an appropriate basis to develop the next phase of the river basin management planning process.

4.2 Rivers Risk Assessment

The purpose of the risk assessment is to identify waterbodies at risk of failing to achieve good ecological or chemical status due to the effect of human activities. The river risk assessment involved identification and assessment of the significance of pressures from water abstractions, water flow regulations, morphological alterations, point sources and diffuse sources. Impact data was also considered in the assessment.

4.2.1 Significant Abstraction and Flow Regulation Pressures

The abstraction risk assessment methodology is based on water balance, with nett abstraction compared to natural low flow characteristics. The presence of significant flow regulations was also considered in the assessment in both jurisdictions.





Figure 4.1 Flow regulation and water abstraction risk assessment for NWIRBD rivers

Figure 4.1 presents the abstractions and flow regulation risk assessment results for the 855 river waterbodies in the NWIRBD. Significant abstraction and flow regulation pressures are more significant in the NWIRBD than in most other RBDs on the Island of Ireland due to the large number of drinking water supplies from small surface water catchments, particularly in counties Cavan and Monaghan. Of the waterbodies that are considered at risk the predominant pressure is abstraction for public water supply with both domestic and commercial users generating demand for supply.

4.2.2 Significant Morphological Pressures Assessment

The significant morphological pressures assessment addresses physical alterations made on rivers to support human activities such as navigation, urban development or agriculture. The morphological assessment for rivers includes: channelisation and dredging, river straightening, flood protection and embankments, impoundments, water regulation and intensive land use.

The results for the morphological risk assessment for river waterbodies within the NWIRBD are illustrated in Figure 4.2. Over one third of the rivers assessed in the NWIRBD are at risk or probably at risk due to morphology pressures. The main activities that river waterbodies are subjected to are land drainage pressures (associated with agriculture and intensive land use) and channelisation works.



Flood walls on River Mourne, Strabane, County Tyrone





Figure 4.2 Morphological pressures risk assessment for NWIRBD rivers

4.2.3 Significant Point Source Pressures

The significant point source pressures addressed in the river risk assessment include discharges from Urban Wastewater Treatment Plants (UWWTP), storm overflows, sludge treatment plants and industries. Other point source pressures including landfills, quarries and mines were also addressed where they were considered significant at an (I)RBD level.

The results for the point source risk assessment of river waterbodies within the NWIRBD are presented in Figure 4.3. Point source pressures place around 10% of river waterbodies at risk or probably at risk. The main sectors affecting those waterbodies are waste water treatment plants, combined storm overflows and industrial discharges. The assessment highlights that point source discharges, for the most part, are centred around population clusters. This is consistent with the assessments in other (I)RBDs and reflects the challenges required to regulate facilities through out the island of Ireland.



Figure 4.3 Point source pressures risk assessment for NWIRBD rivers



4.2.4 Significant Diffuse Source Pressures

Diffuse pollution pressures arise from widespread rural and urban land use activities. The diffuse pollution risk assessment considers a variety of activities which potentially give rise to various pollutants to aquatic systems, such as agriculture, non-sewered population, urban land use, transport, some industrial activities and other main land uses which in the NWIRBD include peat exploitation and forestry activities. The diffuse source risk assessment used impact data (collected by monitoring programmes in both jurisdictions in the NWIRBD) supplemented by expert knowledge and predictive modelling to provide assessment of the diffuse pollution pressures in the absence of known impact status.

The pressure datasets used in the predictive diffuse assessments included land management practices, infrastructure details, forestry inventories, in addition to physical attributes such as soil and sub-soil coverage, a digital terrain model, the extent of urbanised areas and agricultural statistics.

The results for the diffuse source risk assessment of river waterbodies within the NWIRBD are illustrated in Figure 4.4. The assessment highlights the significance of diffuse pressures, with just less than half of the river waterbodies in the NWIRBD at risk or probably at risk due to diffuse source pollution. The waterbodies at least risk are mainly located in the upland areas of county Donegal. Agriculture and forestry are the general industry sectors found to be the largest contributors to diffuse source pollution pressures in the NWIRBD. Whilst the extent of diffuse pressures is lower in the NWIRBD than in other basins in Ireland the assessment is consistent with the findings for the entire island of Ireland where diffuse pollution is associated with the majority of moderate pollution incidences.



Figure 4.4 Diffuse source pressures risk assessment for NWIRBD rivers



4.2.5 River Impact Assessment

Impact data was obtained from monitoring programmes carried out by EPA and EHS on an ongoing basis throughout the study area. The Q system and the distribution of the freshwater pearl mussel *Margaritifera margaritifera* were used in the Republic of Ireland portion of the NWIRBD. The Q system is implemented by EPA, which is a biological monitoring programme that occurs on a three year cycle. Q Values indicating water quality are assigned to more than 1000 river sites throughout Rol each year. Assessments of the status of individual rivers are given and the causes of pollution are indicated. In each three-year cycle approximately 13,200 km of river channel is surveyed at 3200 different locations.

In NI, chemical and biological monitoring is carried out under the General Quality Assessment (GQA) by EHS. This assessment, in conjunction with trophic status surveys, is used to determine river water quality. The Biological GQA is based on comparison of the macro-invertebrate fauna found at a sampling site with the expected condition in the absence of pollution. The chemical grade of the GQA scheme is defined by standards for the concentrations of BOD, ammonia and dissolved oxygen. These have been selected as indicators of the extent to which waters are affected by wastewater discharges and rural land use run-off containing organic, biodegradable material.

This monitoring data indicates where pressures are impacting water quality, regardless of the source of the pressure. These monitoring datasets are supplemented by various monitoring programmes established to assess specific legislative requirements. The results of the river impact data risk assessment for the NWIRBD are illustrated in Figure 4.5. The results indicate that of the 372 river waterbodies that have available impact data, 152 are at risk - this equates to some 18% of the NWIRBD river waterbodies.



Figure 4.5 Impact risk assessment for NWIRBD rivers

4.2.6 River Waterbodies Risk Assessment Summary

The overall risk assessment process is precautionary in that a single pressure can cause a waterbody to be classified at risk. Where a waterbody has more than one pressure associated with it, the worst case will be used to classify the overall risk assessment results for the waterbody.

Map 4.1 illustrates the combined risk category associated with the NWIRBD river waterbodies. The waterbodies at risk tend to be located in areas where land use is intensive, such as urban areas and fertile agricultural area such as the Foyle and Erne systems. The upland areas of west Donegal are less intensively exploited and this is reflected in the risk assessment with a greater number of waterbodies classified as not at risk.

Table 4.2 and Figure 4.6 summarise the risk assessment combined results. Table 4.2 indicates that of the 855 waterbodies assessed in the NWIRBD almost two thirds are considered to be at risk of not achieving their good status objectives. Figure 4.6 demonstrates that the main sources of human pressures in the district are from diffuse and morphological pressures. This assessment is supported by impact data.

Table 4.2	River waterbodies risk assessment summary
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Reporting Category	Number of Waterbodies	% of Number	km Affected	% area of RBD
1a at risk	269	31.5	4257.1	50.2
1b probably at risk	275	32.2	3593.4	42.2
2a probably not a risk	168	19.6	536.0	4.1
2b not at risk	143	16.7	386.0	3.5
Total at risk (1a + 1b)	544	63.7	7850.5	92.4



Figure 4.6 Overall risk assessment results for NWIRBD rivers



Map 4.1 River Combined Risk Assessment – NWIRBD



4.3 Lakes Risk Assessment

The lake risk assessment closely parallels the analysis applied to rivers, involving both predictive pressures and impact assessments. The lake analyses includes abstraction; flow regulation; morphology; point and diffuse source pressures and also incorporates impact data from lake monitoring datasets. The European threshold for reporting lakes is a surface area greater than 0.5 km. In Northern Ireland only those lakes that meet this size threshold are reported on, whilst in the Rol all lakes above the reporting threshold and some small lakes associated with drinking water supplies and some associated with protected areas, i.e. Special Areas of Conservation, were included in the risk assessment.

4.3.1 Significant Abstraction and Flow Regulation Pressures

The risk assessment of abstraction pressures the and flow regulations mirrored river assessment process comparing nett abstraction with low flow characteristics. The results of the assessment, presented in Figure 4.7, indicate that 22% of NWIRBD lakes are "at risk" or "probably at risk" due to abstraction and flow regulation pressures. These pressures are localised, particularly in the interdrumlin lakes of Cavan and Monaghan. Public water supply to both the domestic and commercial markets is the main abstraction activity that potentially impacts upon lake waterbodies in the NWIRBD.



Cathleen Falls – Flow Regulation at Assaroe Lough



Figure 4.7 Flow regulation and water abstraction pressures risk assessment for NWIRBD lakes



4.3.2 Significant Morphological Pressures Assessment

The morphological pressures assessment considered the extent of various known significant alterations within each lake waterbody, similar to the river morphological risk assessment. Figure 4.8 summarises the findings of the morphological pressures and illustrates that morphological pressures are not generally a significant pressure for lake waterbodies within the NWIRBD. Intensive land use practices are the main source of morphological pressures on lakes of the NWIRBD.



Figure 4.8 Morphological pressures risk assessment for NWIRBD lakes

4.3.3 Significant Point Source Pressures

The significant point source pressures methodology applied in the lakes risk assessment considered facilities such as Urban Waste Water Treatment (UWWT) & sludge treatment plants; storm overflows; industries with licensed discharges. Figure 4.8 illustrates the results of the point source pressures analysis for lakes within the NWIRBD. Less than 17% of the lakes assessed are at risk from point sources of pollution. The main pressures associated with the lake waterbodies considered to be at risk are from industrial discharges and water and wastewater treatment works.



Figure 4.9 Point source pressures risk assessment for NWIRBD lakes



4.3.4 Significant Diffuse Source Pressures

The significant diffuse pressures assessment of lakes was based on the risk associated with the rivers inflowing into the lake. Impact data, derived from monitoring data from national lake surveys, was used to supplement the predictive modelling of pressures associated with diffuse source pollution for lakes. Figure 4.10 summarises the results of the diffuse source pollution risk assessment for lake waterbodies. The main sources of diffuse pollution to lakes are, as for rivers, associated with intensive land use practices predominantly intensive agriculture.



Figure 4.10 Diffuse source pressures risk assessment for NWIRBD lakes

4.3.5 Lake Impact Assessment

The lake impact assessment is similar to the river impact assessment in that it is based on national monitoring data provided by EPA and EHS. The impact data used relates predominantly to the identification of eutrophication pressures including phosphorus concentrations and mean and maximum Chlorophyll *a* values. Expert judgement was used to refine the risk category. Figure 4.11 illustrates the NWIRBD lake risk assessment results. Impact data is available for 200 lakes in the NWIRBD. The results indicate that just over 10% of the lake waterbodies are considered to be at risk based on the impact data available.



Figure 4.11 Lake Risk Assessment for NWIRBD



4.3.6 Lake Risk Assessment Summary

As is the case with all waterbodies the process employed to obtain the overall lake risk assessment is precautionary in that a single pressure can cause a waterbody to be classified at risk. The component elements for the lakes risk assessment (abstraction, morphology, point, diffuse and impact data) are considered and the worst case scenario is selected.

Map 4.2 illustrates the combined lake risk assessment summary results. Table 4.3 and Figure 4.12 summarise the NWIRBD lake waterbodies assessment results. The lake risk assessment has established that, for the most part, diffuse source pollution associated with intensive land use practices is the most significant pressure in relation to the lake waterbodies contained within the NWIRBD. Morphological pressures and water abstraction also contribute to those lakes considered at risk. This assessment is supported by impact data.

Table 4.3 Lake waterbodies risk assessment summary

Reporting	Number of	% of	% area of
Category	Waterbodies	Number	RBD
1a at risk	61	25.8	63.6
1b probably at risk	31	13.1	17.3
2a probably not a risk	27	11.4	11.9
2b not at risk	117	49.6	7.2
Total at risk (1a + 1b)	92	38.9	80.9



Figure 4.12 Overall risk assessment results for NWIRBD lakes



Map 4.2 Lake Combined Risk Assessment – NWIRBD



4.4 Transitional Waterbodies Risk Assessment

The risk assessment for transitional waterbodies incorporates abstraction and flow regulation, morphological and direct point pressures. The assessment also includes marine monitoring impact data to address indirect pollution from both diffuse and point sources in the upstream catchment of the estuary.

4.4.1 Significant Flow Regulation and Abstraction Pressures

The risk assessment of significant abstraction pressures on transitional waterbodies considered water balance in a similar manner to the rivers and lakes assessments. There are no major flow regulations structures present in transitional waters in the NWIRBD. Figure 4.13 presents the risk assessment results for the 23 transitional waterbodies in the NWIRBD. A small number of transitional waterbodies are identified as probably at risk due to water abstraction.



Figure 4.13 Flow regulation and water abstraction pressures in the NWIRBD transitional waterbodies

4.4.2 Significant Morphological Pressures

This assessment addressed significant alterations to the waterbody including channelisation, dredging and disposal of dredged spoil, flood protection, embankments, land reclamation, morphological barriers, fishing activities and built development on the shoreline. Figure 4.14 shows the results for the morphological risk assessment for transitional waterbodies. Over one third of the transitional waterbodies within the NWIRBD are at risk or probably at risk



Mid Foyle Estuary



from morphological pressures. The analysis indicates that channelisation and shoreline reinforcement are the main pressures acting on transitional waterbodies in the NWIRBD. Intensive land use practices are also a potential impact.



Figure 4.14 Morphological pressures risk assessment in NWIRBD transitional waters

4.4.3 Significant Point Source Pressures

The point source assessment, similar to the lake and river point source assessments, considers direct discharges to the marine environment from municipal plants and licensed industries. Figure 4.15 presents the point pollution assessment results. Effluent discharge from waste water treatment plants are the most significant point source pressure affecting the NWIRBD's transitional waterbodies.



Figure 4.15 Point pressure risk assessment in NWIRBD transitional waters

4.4.4 Transitional Impact Assessment

The marine impact assessment comprised of two elements, nutrient/organic enrichment and hazardous substances. Available monitoring datasets were obtained from the relevant competent authorities to identify impacted marine waterbodies. There is limited marine impact data available for the NWIRBD's transitional waterbodies. The Foyle/Faughan Estuaries and the Roe Estuary are the only



transitional waterbodies within the NWIRBD where impact data is available. These estuaries are all considered probably at risk based on hazardous substances impact data.

4.4.5 Transitional Waterbodies Summary

The overall risk category was obtained by taking the worst case risk category for the abstraction and flow regulation, morphology, point and impact assessment for each of the 23 transitional waterbodies (Map 4.3). Table 4.4 and Figure 4.16 summarise the combined risk assessment results for the NWIRBD. Just under half of the transitional waterbodies are considered at risk. Morphological pressures are the main pressure source with dredging (channelisation) posing the greatest threat to transitional waters.



Figure 4.16 Overall risk assessment results for NWIRBD transitional waters

Transitional waterbodies risk assessment summary

Reporting Category	Number of Waterbodies	% of Number	% area of RBD trans wb's
1a at risk	2	8.7	0.2
1b probably at risk	8	34.8	77
2a probably not a risk	9	39.1	10.3
2b not at risk	4	17.4	12.5
Total at risk (1a + 1b)	10	43.5	77.2





Map 4.3 Transitional Combined Risk Assessment – NWIRBD



4.5 Coastal Waterbodies Risk Assessment

The risk assessment for coastal waterbodies addresses morphological pressures and marine impact data.

4.5.1 Coastal Waterbodies Significant Morphological Pressures

The significant morphological pressures for coastal waterbodies includes dredging activities, coastal defences, morphological barriers, fishing activities, intensive land use and built development on the coastline.



Slieve League: Donegal Bay North coastal water body

Figure 3.17 presents the results of the morphological pressure assessments. Significant morphological pressures are not widespread in the NWIRBD. Only two of the 23 coastal waterbodies in the NWIRBD are at risk or probably at risk. The morphological activities which place coastal waterbodies at risk are coastal defences and shoreline development, i.e. ports and marinas.



Figure 4.17 Morphological pressures risk assessment for NWIRBD coastal waters

4.5.2 Coastal Waterbodies Marine Impact Assessment

The marine impact assessment for coastal waterbodies, similarly to the transitional waters assessment, also comprised of two elements; nutrient/organic enrichment and hazardous substances. Monitoring datasets where obtained from the relevant competent authorities to identify impacted marine waterbodies Figure 4.18 presents the results of the marine impact risk assessment. Five coastal waterbodies were at risk or probably at risk based on available impact data.



Point source discharges for coastal waterbodies in the NWIRBD were assessed using expert judgement. In Northern Ireland an assessment was made of the compliance history for industrial and Water Service discharges and supplemented by expert opinion whilst in the Republic of Ireland expert judgement was applied to assess the main coastal waterbodies.



Figure 4.18 Impact risk assessment for NWIRBD coastal waters

4.5.3 Coastal Waterbodies Summary

The overall risk category was obtained by taking the worst case risk category from those assessments carried out in relation to coastal waterbodies (Map 4.4). Table 4.5 and Figure 4.19 summarise the results of the risk assessments for coastal waterbodies. Only 22% of the coastal waterbodies in the NWIRBD are at risk or probably at risk of failing to achieve the objectives of the WFD. The effects of pollution from diffuse and point sources (as indicated by the marine impact assessment) represent the main pressure on these coastal waterbodies.

Reporting	Number of	% of	% area of		
Category	Waterbodies	Number	RBD		
1a at risk	2	8.7	0.2		
1b probably at risk	3	13.0	9		
2a probably not a risk	2	8.7	1.9		
2b not at risk	16	69.6	88.9		
Total at risk (1a + 1b)	5	21.7	9.2		

Table 4.5Coastal waterbodies risk assessment summary





Figure 4.19 Overall risk assessment results for NWIRBD coastal waters





Map 4.4 Coastal Combined Risk Assessment – NWIRBD



4.6 Other Surface Water Risk Assessments

Pressures referred to as "other pressures" have also been included in the assessment.

- A catalogue of recordings of *alien species* has been generated. These alien species are non-indigenous invasive flora and fauna which threaten the NWIRBD's native ecology by competing for habitats and / or food. Two species of concern are present in the NWIRBD; in particular the Zebra Mussel has been found on both the upper and lower Lough Erne and common cord grass has been found in the coastal waters of Lough Foyle. Future management plans will have to take account of the presence of these alien species.
- Fishery activities have started to be addressed. Amongst the freshwater fish species, salmon (and trout) are subjected to the greatest fishing /angling pressures in NI and Rol. The Scientific Committee of the Salmon Commission is developing models which allow salmon conservation limits to be set for Irish rivers. The Fisheries Conservancy Board is also preparing datasets on fisheries pressures in inland waters in Northern Ireland. Loughs Agency is a cross-border organisation with legislative powers in the Foyle Catchment and Foyle and Carlingford Loughs. They have been collecting datasets on redd counts, electrofishing and salmon habitats for several years. In the marine waters of both jurisdictions commercial activities has been considered in the risk assessment, however, further work is required and will be implemented through the NS Share Project. In the NWIRBD commercial aquaculture activities are located in Killybegs Harbour, Lough Foyle, Lough Swilly and Gweebarra Bay. Further offshore, Scallop Dredging and Otter Trawling are also undertaken. Management plans will have to consider how best to control these important economic activities.
- An assessment of compliance with existing water quality standards for designated *Bathing Waters* was undertaken.



4.7 Summary of Surface Waterbodies Affected by All Pressures

Map 4.5 provides an overview of those surface waterbodies affected by all pressures in the NWIRBD. In general, the more remote upland areas of Donegal are least at risk of failing to meet the WFD's objectives by 2015. It should be noted that delineation of shared and small waterbodies is an ongoing process.



Map 4.5 Surface Waterbodies Affected by All Pressures



4.8 Artificial and Heavily Modified Waterbodies

Surface waterbodies that are unlikely to achieve good status because of physical alterations to facilitate human activities including navigation, water abstraction and regulation, flood protection and land drainage have been identified for special consideration under the WFD. The Directive recognises that there are cases where the benefits of such uses need to be retained and permits identification and designation of Artificial Waterbodies (AWB) and Heavily Modified Waterbodies (HMWB).

- A HMWB is a waterbody which, as a result of significant physical alterations by human activity, is substantially changed in character.
- > An **AWB** is a waterbody created by human activity.

Designation does not mean that mitigation measures will not be required. The procedure merely enables appropriate objectives to be set that allow the benefits of the use to be maintained but ensures that other pressures can be managed and where possible mitigated. A step by step process for the identification of these waterbodies was applied in both jurisdictions. The selection process to date has identified 'provisional' cases (pAWB and pHMWB) these waterbodies will be subjected to more detailed examination during further characterisation.

4.8.1 AWB and HMWB designation in the Republic of Ireland

Table 4.6 summarises the hydrological and morphological pressures leading to HMWB preliminary identification for river and lake waterbodies in the Republic of Ireland.

Hydrological & Morphological Pressures	Does the pressures 'substantially change' WB character and warrant further pHMWB consideration?		
Channelisation & Dredging	No		
Flood Protection & Embankments	Yes If substrate is artificial		
Impounding (dams)	Yes If ecological effects observed		
Water Regulation (Locks & Weirs)	No		
Intensive Land Use	No (Derogation for peat		
	lands)		
Abstractions	Yes If ecological effects		
	observed		

Table 4.6Pressures on River and Lake Waterbodies

In marine waters the combined affect of activities including dredging, dumping of dredge spoil, coastal defence and embankments, built structures (ports, industrial intakes), intensive land use and abstractions were considered for preliminary HMWB designation on a case by case basis.



Waterbodies at risk and probably at risk due to abstraction, flow regulation and morphology pressures were all considered as candidates for designation however expert review and consideration of water quality data screened out the majority of the candidate waterbodies. Table 4.7 summarises the pHMWBs in the NWIRBD. There are no AWB and six preliminary HMWBs in the Republic of Ireland portion of the NWIRBD – one river, four lakes and one coastal waterbody.

Jurisdiction	pHMWB River Waterbodie s	pHMWB Lake Waterbodies	pHMWB Transitional Waterbodies	pHMWB Coastal Waterbodie s	pAWB
Republic of Ireland	1	4	-	1	-
Northern Ireland	30	4	2	1	-

Table 4.7 pHMWB and pAWB in the NWIRBD

4.8.2 AWB and HMWB designation in Northern Ireland

In Northern Ireland, the "at risk" or "probably at risk" waterbodies resulting from the abstraction, flow regulation and morphology assessment were again identified as pHMWB and pAWB. The number of candidate waterbodies in each category is summarised in Table 4.7. Screening based on expert judgement was not undertaken during initial characterisation within Northern Ireland. Instead a tailored in-field investigation has already been commenced as part of further characterisation to verify the extent of pressures and impacts which will allow review of the list of candidates.

Final designation of AWB and HMWB is not required until finalisation of the RBMP. Further work is required in both jurisdictions entailing designation tests: known as 'restoration' and 'alternative means' tests, and establishing appropriate quality targets. Harmonisation of the process and development of the actual lists of AWB and HMWB in both jurisdictions will be progressed through the NS Share Project.



4.9 Groundwater Risk Assessment

The methodologies applied in the groundwater risk assessment were developed by Geological Survey of Ireland (GSI) for the Rol portion of the NWIRBD supported through the Groundwater Working Group (GWWG) which had representation from the Geological Survey Northern Ireland (GSNI). The methodologies applied by the GSNI/EHS in NI were consistent with the guidance developed by the UK WFD Groundwater Task Team and Scottish Environmental Protection Agency (SEPA) (Ref 4).

The WFD sets objectives of good quantitative and chemical status for groundwaters. Risk assessments based on the pressure, source, pathway and receptor model were used to determine the degree of risk associated with a groundwater body for a given pressure. Impact information was then used, where available, to verify the risk assessment.

Groundwaters feed surface freshwater systems such as rivers, lakes, fens and turloughs which eventually flow into transitional and coastal waters. To take account of these links between groundwater and surface waters, the environmental objectives for groundwater also considered the risk to these downstream receptors as well as to the groundwater bodies themselves. As groundwater is also an important source of drinking water supply, the risk assessment also considered human health standards.

Many chemicals from various diffuse and point sources can potentially put groundwater at risk. For the purposes of the risk assessments chemical pollutants were grouped into four categories according to similarities in behaviour as they move through groundwater pathways. The grouping also takes account of whether the substance decays or is conservative (organic or inorganic, respectively) and whether the substance is adsorbed within the structure of the soils, subsoils and aquifer (mobile or less mobile).

There was a series of separate groundwater risk assessments applied dealing with all receptors and pollutants. These were broadly categorised into three different pressure types:

- groundwater abstractions/water balance;
- diffuse source pollution and;
- point source pollution.

4.9.1 Quantitative Risk Assessment - Significant Abstraction Pressures

This assessment considered the overall water balance assessment for the groundwater body (i.e. is the level of water abstraction able to be met by the amount of water recharging the groundwater body without impacting on the water requirements of dependent systems, such as rivers and lakes and Ground Water Dependent Terrestrial Ecosystems (GWDTE), e.g., fens and turloughs). For saline

intrusion groundwater bodies were assessed in localised areas where it was considered there may be a potential impact.

There are a total of 88 groundwater bodies in the NWIRBD. The results of the significant risk assessment indicated that groundwater bodies in the RBD are not at risk as a result of abstractions or saline intrusion.

4.9.2 Chemical Risk Assessment

The groundwater risk assessment integrates pressures and impacts with the physical characterisation, using the pressure-pathway-receptor approach, i.e. the likelihood of pollutants being transmitted to a receptor.

The chemical pollutants from diffuse and point sources have been grouped into four sectors.

- Mobile nutrients e.g. Nitrates
- Certain agrochemical
- Certain pesticides
- Less mobile organic substances e.g. agrochemicals which bind to soil

4.9.3 Diffuse Risk Assessment

This assessment consisted of the examination and assessment of agricultural activities, unsewered human populations and the use of dangerous substances from all sectors. This assessment included identifying areas within a waterbodies with significant potential impact (zones where high pressures coincide with vulnerable pathways). Figure 4.20 presents the number of NWIRBD groundwater bodies impacted by diffuse source pollution. The assessment demonstrates that there are ten waterbodies considered as 'probably at risk'. The remaining groundwater bodies are not at risk from diffuse source pollution. The majority of groundwater bodies within the probably at risk category a result from the mobile organic substances assessment, e.g. certain pesticides, whilst there were two groundwater bodies probably at risk due to inorganic chemicals, nitrates and phosphates.



Figure 4.20 Diffuse pressures risk assessment for NWIRBD groundwater bodies

4.9.4 Significant Point Pressures

This assessment addressed the risk associated with point source pressures such as mines, quarries, contaminated land, landfills, oil industry infrastructure, licensed trade effluent and wastewater discharges.

In the Republic of Ireland assessment point influences were considered unlikely to exert a significant influence on an entire groundwater body, as waterbodies are relatively large units (generally over fifty square kilometres). Consequently, small waterbodies were delineated around each point pressure assigned at risk or probably at risk category to better represent the likely zone of influence of the pressure.

In Northern Ireland a more precautionary analysis of point source pressures was undertaken due to time and resource constraints and this assessment will be reviewed during further characterisation. Presence/absence of potential point sources within buffer zones of 'groundwater-dependent' rivers was used to inform the river risk assessment with most assessments coming out as probably not at risk.



Figure 4.21 Point source pressures risk assessment for NWIRBD groundwater bodies

Figure 4.21 presents the results of the point source risk assessment for groundwaters. The results indicate that a small number of groundwater bodies are at risk and probably at risk from point source pressures predominantly due to the presence of landfills but also as a result of contaminated land, industry and the presence of major towns above the groundwater body.

4.9.5 Groundwater Bodies Summary

The overall risk category was obtained by combining the various risk assessments to establish the worst case risk category (Map 4.5). Table 4.8 and Figure 4.22 summarise the findings of the risk assessments carried out for groundwater bodies throughout the NWIRBD. One quarter of groundwater bodies in the district are at risk or probably at risk of failing to meet the objectives of the WFD. The main pressures on groundwater bodies are chemical pollutants from both point and diffuse source pollution.



Table 4.0 Groundwater Risk Assessment Summary					
Reporting	Number of	% of	% area		
Category	Waterbodies	Number	of RBD		
1a at risk	3	3.4	0.1		
1b probably at risk	19	21.6	3.8		
2a probably not a risk	33	37.5	61.8		
2b not at risk	33	37.5	34.3		
Total at risk (1a + 1b)	22	25.0	3.9		





Figure 4.22 Overall risk assessment results for NWIRBD groundwater bodies

4.10 Groundwater Bodies with Less Stringent Objectives

The WFD requires groundwater bodies for which less stringent environmental objectives are to be specified to be listed in the Characterisation Report. These objectives may be set in cases where a body of water is so affected by human activity that it may be unfeasible or unreasonably expensive to achieve good chemical status within two further river basin planning cycles (i.e. by 2027). Based upon guidance developed by United Kingdom Technical Advisory Group (UKTAG) (NI) and a review by experts from the Groundwater Working Group (Rol) likely candidates for which Less Stringent Objectives (LSOs) might apply were established.

Three separate mines from the Connaught Coalfield were identified and catchments were delineated. The GWBs are Bencroy, Monesk and Slieveanierin and were designated for LSOs. The identification of such groundwater bodies should be regarded as preliminary. It is based on the best available information at the present time. Further characterisation will provide more information about groundwater characteristics and pressures and impacts.





Map 4.6 Groundwater Combined Risk Assessment – NWIRBD



5.0 Economics Baseline

The WFD requires economic analysis to be applied in three main phases:

- The overall economic characterisation of water use (2004);
- The economic analysis to compare potential programmes of measures for achieving good water status (2008);
- The assessment of cost recovery alternatives, including analysis of water services pricing policies (2010).

This summary report provides an overview of the economic characterisation (or baseline) of the NWIRBD. The baseline has been established at national level by both jurisdictions in the NWIRBD. The analysis has been carried out in accordance with EU guidance documents but is based on available datasets which differ in each jurisdiction. The baseline is a preliminary stepping stone for future analysis of the programme of measures and cost recovery assessment.

The economic characterisation is extracted from the following sources:

- The Northern Ireland Water Framework Directive Article 5 Economic Analysis
 of Water Use" (Ref 5)
 <u>http://www.ehsni.gov.uk/pubs/publications/article5ecoreport.pdf</u>
- "Economic Analysis of Water Use in Ireland which provides findings both on a national and individual Irish RBD basis (Ref 6).

5.1 Who Uses Our Water?

Households account for more than half of the water demand in both Northern Ireland and the Republic of Ireland. The balance of demand is made up from the commercial, industrial, municipal, agricultural and other non-domestic sectors. Water-use is critical to many of these commercial activities.



5.2 What is Our Water Worth?

The value of these water-using activities was assessed in terms of their monetary value added to the economy.



Figure 5.1 – Gross value by sector in Northern Ireland (Ref 7)

The Gross Value Added represents that part of production which is the actual contribution of an enterprise to the economy. Value added is calculated by deducting total value of input from the total value of output during a reference period. In Northern Ireland the overall Gross Value Added (GVA) during 2003 was estimated at nearly £19 billion (over €31 billion). The main process users of water are manufacturing, industry and agriculture (Figure 5.1).

The Irish national annual GVA is estimated at €121 billion, with the portion of NWIRBD within the Republic of Ireland estimated at nearly €3 billion. The industrial sector's gross value added is over seven times that of the agriculture sector.

5.3 What are the Recreation Benefits of Water?

The value to the public of good ecological water quality has been estimated based on the findings of international "willingness to pay" surveys (it is acknowledged that these estimates are subjective however very little local data is available on the value of water based recreation).

There is a range of water dependent activities available in the NWIRBD; activities and visitor attractions include cruiser hire and water dependent recreation on the Loughs, the Shannon-Erne navigation system and beach visits. The preliminary results indicate that the total annual value of good water quality in Northern Ireland as a whole is between £9 and £14 million. In the Republic of Ireland portion of the NWIRBD the estimated annual value of water based leisure totalled over €23 million.

5.4 How much do we pay for Our Water?

In Northern Ireland water and sewage services are delivered by a single entity, DRD Water Service, which services over 730,000 domestic, agricultural, commercial and business customers. All charges are calculated on full cost recovery basis. Domestic customers pay rates towards a water allowance; however, the overall level cost recovery for DRD Water Service is only 11%. Virtually all agricultural properties are metered and pay water charges. All industrial, trade and commercial operations are also liable to pay trade effluent charges. The level of cost recovery for metered water customers for 2003 was estimated as 81%.



Figure 5.2 Estimated Costs and Cost Recovery of Water Services for the portion of the NWIRBD within Rol

In the Republic of Ireland portion of the NWIRBD it is Government Policy to recover the cost of providing water services from all users with the exception of water services for domestic/household purposes. The estimated costs and cost recovery of Water Services (2003) in the Republic of Ireland portion of the NWIRBD are presented in Figure 5.2. Most of the expenditure and recovery is on public water supply schemes (€11 million or 50% of the total). Cost recovery varies from 8% on public sewerage schemes to 53% on public water supply schemes.

5.5 What are the Future Water Trends?

Analysis of future water demand in the Republic of Ireland portion of the NWIRBD indicates that there will be a slight increase in Customer Water Demand and a decrease in unaccounted for water (thought to be arising from pipe leakage). The overall future trend for the NWIRBD shows a decrease in total water demand; however, there may be local areas where future demand rises due to economic drivers or population growth.

5.6 What Next for Economics?

There are a number of economic data gaps that must be addressed as a priority by further study to satisfy the future economic analysis requirements of the WFD. The data gaps generally relate to the geographic scale and detail of economic data availability.

6.0 Summary of the Way Forward

6.1 Overview of the Characterisation Process

The initial characterisation process is the most comprehensive and systematic assessment of the surface and groundwater bodies undertaken yet in the NWIRBD. The process has identified surface water and groundwater bodies which are the basic management unit in reporting and assessing compliance under the WFD. An assessment of the human impacts on each water body has also been carried out to prioritise the activities and pressures within the NWIRBD that have potential to cause water bodies to fail in achieving the objectives of the WFD by 2015. This risk assessment has helped to identify and prioritise issues in relation to water quality management. The initial characterisation process represents the first phase of the River Basin District Planning cycle and will establish the best way forward in relation to monitoring programmes and the development of a programme of measures to address the main water management issues identified.

Waterbodies have been classified based on natural factors such as altitude, geology or size. This system of classifying waters according to meaningful types is called typology. Surface and groundwater bodies have been typed throughout the NWIRBD.

The key pressures on waters in the NWIRBD are:

Rivers

The risk assessment for rivers indicates that of the 855 water bodies assessed in the NWIRBD almost two thirds are considered to be at risk of not achieving their good status objectives. The main sources of human pressures acting on rivers are from diffuse such as agriculture and unsewered populations and morphological pressures including channelisation and intensive land use. This assessment is supported by impact data.

Lakes

The lake risk assessment has established that, for the most part, diffuse source pollution associated with intensive land use practices is the most significant pressures in relation to the lake water bodies contained within the NWIRBD. Morphological pressures and water abstraction also contribute to those lakes considered at risk.

Transitional and Coastal Waters

Just under half of the transitional water bodies in the NWIRBD are considered at risk. Morphological pressures are the main pressure source with dredging (channelisation) posing the greatest threat to transitional waters. The effects of pollution from diffuse and point sources (as indicated by the marine impact assessment) represent the main pressure on coastal water bodies, however morphology, particularly built structures and shoreline development, also represent a pressure on the marine environment.

Alien Species

Two species of concern are present in the NWIRBD; in particular the Zebra Mussel has been found on both the upper and lower Lough Erne, and common cord grass has been found in the coastal waters of Lough Foyle.

Fisheries Activities

In the NWIRBD commercial aquaculture activities are located in Killybegs Harbour, Lough Foyle, Lough Swilly and Gweebarra Bay. Further offshore, Scallop Dredging and Otter Trawling are also undertaken.

Bathing Waters

An assessment of compliance with existing water quality standards for designated *Bathing Waters* was undertaken.

Heavily Modified Water Bodies (HMWB) and Artificial Water Bodies (AWB)

The NWIRBD has identified 43 pHMWBs; 31 river, 8 lakes, 2 transitional and 2 coastal. There are no pAWB.

Groundwaters

One quarter of groundwater bodies in the NWIRBD are at risk or probably at risk of failing to meet the objectives of the WFD. The main pressures on groundwater bodies are chemical pollutants from both point and diffuse source pollution.

6.2 Further Characterisation and the Development of a Programme of Measures

The next activity of the WFD, further characterisation, will involve collection of additional datasets to fill data gaps and additional monitoring and use of modelling techniques in order to improve confidence in the risk assessment process. However, the next phase is to deliver decision making tools to support the implementation of the WFD. Targeted studies (e.g. fieldwork and modelling exercises) will be undertaken to verify the linkages between pressures and impacts, to enable environmental objectives to be set and to establish a rigorous basis for the development of programmes of measures. The scope of these studies will be directed by the results of the risk assessments. The NS Share project will facilitate this process in the NWIRBD through the collection of new data and the development of catchment models to allow a better understanding of the water quality issues.



Monitoring programmes must be established by 2006 for surface waters, groundwaters and protected areas. The objectives of the monitoring programmes are to determine the status of waterbodies by validating and supplementing the initial risk assessments; to assess the effectiveness of measures and to contribute to the development of programmes of measures within RBMPs. The design of these monitoring programmes will be assisted by the output of the characterisation process. The intention is that further characterisation will have addressed many of the uncertainties identified by the initial characterisation by mid-2006 before WFD monitoring programmes are designed and implemented. The outputs of the monitoring programmes will direct the development of a programme of measures aimed at achieving the WFD's objective of at least good status.

Identified water management issues represent a challenge for WFD implementation. Pressures that have been identified as posing significant risk to the attainment of WFD objectives are in many cases, the result of established human activity and practices. Proposed mitigation measures aimed at achieving "good status" for water quality may instigate changes to these practices and as a result raise social, economic and technical issues. Therefore, all mitigation proposals should be thoroughly reviewed with respect to their feasibility and implications.

Basic measures are the minimum requirements to be complied with and consist mainly of measures required to implement EU legislation in relation to the protection of water. In addition to the basic measures, supplementary measures will be designed and implemented in order to achieve the objectives of the WFD. Most importantly the further characterisation process will involve rigorous detailed studies which will verify the linkages between pressures and impacts. The subsequent activity will deliver decision making tools to support regulators with the implementation of the WFD.

The NS SHARE project will seek to improve inter-regional capacity for environmental monitoring and management at the river basin district level through a technical review of the existing monitoring programmes/arrangements and ecological classification tools.

The involvement of all stakeholders in the river basin management process is also critical to the overall success of the project and the full implementation of the WFD. It is essential that a common integrated approach to a programme of participation with interested parties is developed throughout the entire NWIRBD. This will be achieved by communication of the significant water management issues within the study area through various media including the internet, reports and local meetings aimed at raising the awareness of the project and the WFD.

This summary report has attempted to make the findings of the characterisation process available to all parties within the NWIRBD. Public participation is a cornerstone of the WFD and the next deliverables are geared towards strengthening this role. The next major reporting deadline under the WFD is the publication of a



"significant water issues report" in 2007. The report will further inform the public of the water management priorities in the NWIRBD. The first River Basin Management Plan (RBMP) for the NWIRBD will be drafted during 2008 and finalised after a year's consultation in 2009.

7.0 References

- 1. Environment and Heritage Service, 2005. Water Framework Directive Northern Ireland Article 5 Characterisation, Summary Report (<u>http://www.ehsni.gov.uk/pubs/publications/article5report.pdf</u>).
- The characterisation and analysis of Ireland's river basin districts in accordance with Section 7 (2&3) of the European Communities (Water Policy) Regulations 2003 (SI 722 of 2003). National Summary Report (Ireland). 2005. (<u>http://www.wfdireland.ie/</u>)
- 3. Working Group on Groundwater, 2005. Water Framework Directive (WFD) River Basin District Management Systems, Technical Requirements for Groundwater and Related Aspects.
- 4. SEPA, 2004. Environmental Characterisation of Scotland's water environment. Supporting information for groundwaters.
- 5. NS SHARE (2006). Northern Ireland Economics Report
- 6. Blacklocke, S. 2004, Camp Dresser &McKee (Ireland) Ltd, Economic Analysis of Water Use in Ireland. Dublin
- 7. ENTEC (2005) Valuing water use in Scotland and Northern Ireland for WFD Implementation Purposes. Scotland and Northern Ireland Forum for Environmental Research



8.0 Abbreviations & Glossary of Terms

Aquifer	Water-bearing sand, gravel, or rock layer yielding usable water quantities
AWB	Artificial Water Body (pAWB indicates provisional AWB)
Calcareous	Geological term for rocks containing calcium carbonate
Carboniferous	A major geological time period between 300 – 360 million
	years ago producing or containing carbon or coal
Devonian	Of or belonging to the geologic time, system of rocks, or
	sedimentary deposits of the fourth period of the Paleozoic Era,
	characterized by the development of lobe-finned fishes, the
	appearance of amphibians and insects, and the first forests.
EHS	Environment and Heritage Service
EU	European Union
EU INTERREG IIIA	A €182 million programme which addresses the economic and
	social disadvantages that can result from the existence of a
	border. It does this by promoting the creation of cross border
	networks involving, and benefiting local communities. The
	Ireland/Northern Ireland INTERREG IIIA Programme covers all
	of Northern Ireland and the six border counties of Ireland. The
	NS SHARE project is funded by EU INTERREG IIIA. (Website
0)//	reference <u>http://www.seupb.org)-</u> definition???
GVA	Gross Value Added
GWWG	Groundwater working Group
НММВ	Heavily Modified Water Body (pHMWB Indicates provisional HMWB)
Karstic	Heavily eroded & channelled outcropping limestone rocks
	(Origin: Kras, Slovenian limestone plateau region)
Mesozoic	Period of geological time 245–65 million years ago
NERBD	North Eastern River Basin District
NS Share	North South Shared Aquatic Resources
NWIRBD	North Western International River Basin District
Ordovician	Period of geological time 510–439 million years ago
P&I	Pressures and Impacts
RBD	River Basin District
RBMP	River Basin Management Plan
RPA	Register of Protected Areas
SAC	Special Area of Conservation
Silicoous	Special Protection Area
Sinceous	silica
Triassic	Of or belonging to the geologic time, system of rocks, or
	sedimentary deposits of the first period of the Mesozoic Era,
	characterized by the diversification of land life, the rise of
	dinosaurs, and the appearance of the earliest mammals.



Transitional Trophic	Term referring to estuarine waters (Water Framework Directive) Of or involving the feeding habits or food relationship of different organisms in a food chain.
Typology	Differentiation of surface waters into types based on predefined descriptor specified in the WFD
UWWTP	Urban Wastewater Treatment Plant
Waterbody	The basic compliance, reporting and management unit for the Water Framework Directive into which all rivers, lakes, ground, transitional and coastal waters are divided.
WFD	Water Framework Directive
WTP	Water Treatment Plant
WWTP	Waste Water Treatment Plant