

**Progress on the implementation of the Water Framework
Directive in Coastal and Transitional waters of Northern Ireland**

Final Report

November 2004

Summary

The Water Framework Directive (WFD) will form the basis for the statutory monitoring of water quality in the future. This report details the work carried out for the requirements of WFD up to November 2004 and in particular the risk assessment for Article 5. System B was used to define typology for transitional and coastal waters. 20 coastal waters and 7 transitional water bodies have been delineated in 3 river basin districts and a unique code applied to each water body. Each water body has been assessed if it is likely to fail its environmental objectives in 2015 under a range of criteria. 60% and 57% of all coastal and transitional water bodies respectively are at significant risk (1a) of failing objectives in 2015 and a program of measures must be considered to improve water quality. In a number of cases the measures required will address localised impacts, which for the purposes of this risk assessment have been considered as putting the whole water body at risk. 95% of all coastal water bodies are at significant risk (1a) or probably at significant risk (1b). All transitional water bodies are at 1a or 1b. Point source discharge consents, and the risk of failing Bathing Water Directive objectives are the most frequent pressure causing a water body to be categorised as at significant risk (1a). This reflects the inadequate sewerage infrastructure and treatment of sewage that is discharged to Northern Ireland coastal waters. Five water bodies have been put forward for the intercalibration process.

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1.0 Introduction

The Water Framework Directive (WFD) was transposed into Northern Ireland legislation in December 2003. WFD will eventually supersede many other EU Directives and will form the basis for the statutory monitoring of water quality in the future. Previous EU legislation has been directed at controlling specific discharges or activities in the marine environment (eg. Urban Waste Water Directive, Bathing Water Directive), whereas the WFD aims to take a holistic view of all activities in the aquatic environment. To facilitate this approach the emphasis has been put on measuring the biological status of organisms rather than physiochemical parameters in discharges or receiving waters. In marine waters the biological status for WFD is calculated by measuring the following elements:

- benthic invertebrate fauna
- macroalgae and angiosperms
- phytoplankton
- fish fauna (transitional waters only)

Ecological status is composed of the biological elements, hydromorphology and physiochemical elements, and is classified as high, good, moderate, poor or bad. The aim of WFD is to achieve at least good ecological status by 2015 and ensure that there is no downward movement between classes. Ecological status is compared to reference conditions. Reference conditions are the status of water bodies that are considered to be 'undisturbed'.

The WFD also aims to link the ecological status back to anthropogenic pressures so that management and monitoring programs can be focused. Thus, the pressures on the marine environment are also monitored.

To further aid the holistic approach to management under the WFD, emphasis is put on catchment management whereby the reporting and management is undertaken in River Basin Districts (RBDs). To facilitate this approach, the implementation of WFD in Northern Ireland has been completed in communication with colleagues in the Environmental Protection Agency (EPA) and the Marine Institute in the Republic of Ireland

2. River Basin Districts

Figure 2.1. shows the river basin district (RBD) and international river basin districts (IRBDs) that have been identified. These are based on river basins that have been determined by catchment drainage characteristics. The three IRBDs are: Neagh Bann IRBD, North Western IRBD and Shannon IRBD. The North Eastern RBD is contained entirely in Northern Ireland. These districts will form the basis of management programs and reporting.

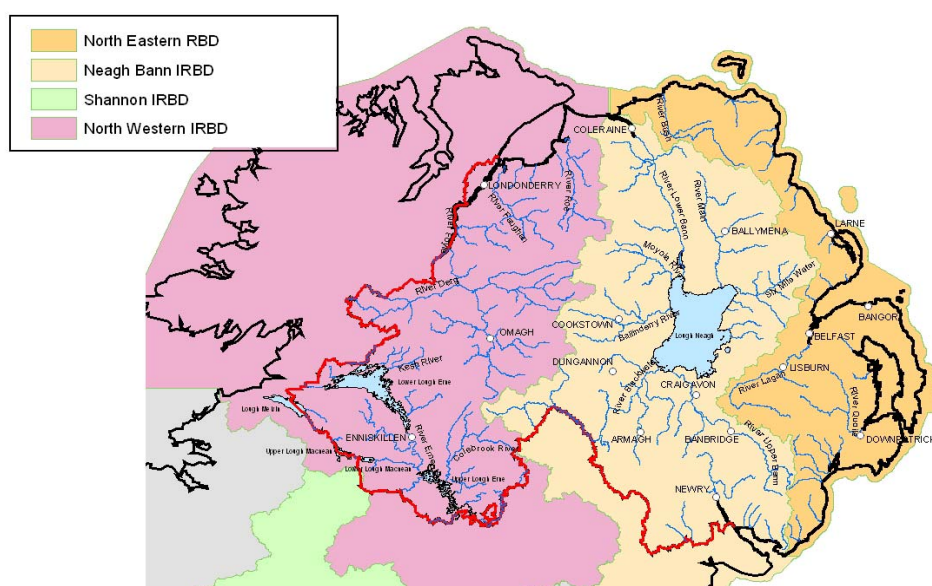


Figure 2.1. River Basin Districts

3. Categories

The WFD requires that surface water categories are split into lakes, rivers, transitional (TW) and coastal waters (CW). Transitional waters have been identified following [Common Implementation Strategy \(CIS\) Guidance \(COAST\)](#) and [UK Technical Advisory Group \(TAG\) guidance](#) on small water bodies as summarised below.

Transitional waters (TWs) are defined by the WFD as: ‘bodies of surface water in the *vicinity of river mouths* which are *partly saline in character* as a result of their proximity to coastal waters but which are *substantially influenced by freshwater flows*’. When defining TWs, the criteria used must be ecologically relevant. The predominant difference between evaluating the ecological quality of transitional and coastal waters is that a fish fauna biological quality element is included in the former.

Defining Boundaries

The seaward boundary of TWs has been defined using:

- Boundaries defined under the Urban Waste Water Treatment Directive (UWWT)
- Salinity gradient
- Physiographic features
- Modelling

The most ecologically relevant of one or more of these approaches has been used.

The freshwater boundary of TWs has been defined by the fresh/salt boundary or the tidal limit.

Minimum size of TWs

The WFD does not state a minimum size for surface water categories so the size criteria given in the United Kingdom Technical Advisory Group (UKTAG) for the identification of water bodies has been used to for the identification of transitional waters. The Directive states that a water body must be ‘discrete and significant’.

United Kingdom Technical Advisory Group (UKTAG) guidance suggests that transitional waters should be identified as water bodies if:

- a) their surface area is greater than 0.5 km²
- b) they are longer than 1 km; or
- c) one of the following criteria apply:
 - (1) it is designated under conservation objectives (SPA, SAC, ASSI) and therefore of ecological significance within the river basin district

- (2) it is of such significance in the river basin that it risks impacting an adjacent water body, or designation as a water body is believed to be the most effective way of highlighting and managing the risks
- (3) it is selected to give an indication of the general status of small water bodies in the river basin district
- (4) the element of surface water is designated as a nutrient sensitive area under UWWTD or Nitrates Directive; a bathing water under Bathing Waters Directive; or a shellfish water under the Shellfish Waters Directive.

Where a small estuary does not meet any of the above criteria, it has been incorporated into the adjacent river or coastal water body to avoid discontinuity in maps.

If a large number of discrete surface waters are smaller than these thresholds then it is possible to

- include the small element of water as part of a contiguous larger water body of the same surface water category and of the same type.
- small elements of water may be grouped together for assessment and reporting purposes if they a) belong the same type and category, b) are influenced by the same pressure category and level and c) have an influence on another well-delimited water body.

UK TAG Guidance suggests that ‘estuaries with surface areas less than 1 hectare should not normally be identified as separate water bodies unless this is deemed to be essential for management purposes’.

Following from this guidance the following transitional waters have been identified as shown in Figure 3.1. In addition the Comber Estuary which discharges to Strangford Lough is undergoing further research to investigate the saline limits which will determine if it requires designation as a separate water body.

- Foyle and Faughan Estuaries
- Roe Estuary
- Bann Estuary
- Lagan Estuary
- Quoile Estuary
- Newry Estuary
- Conn's Water Estuary

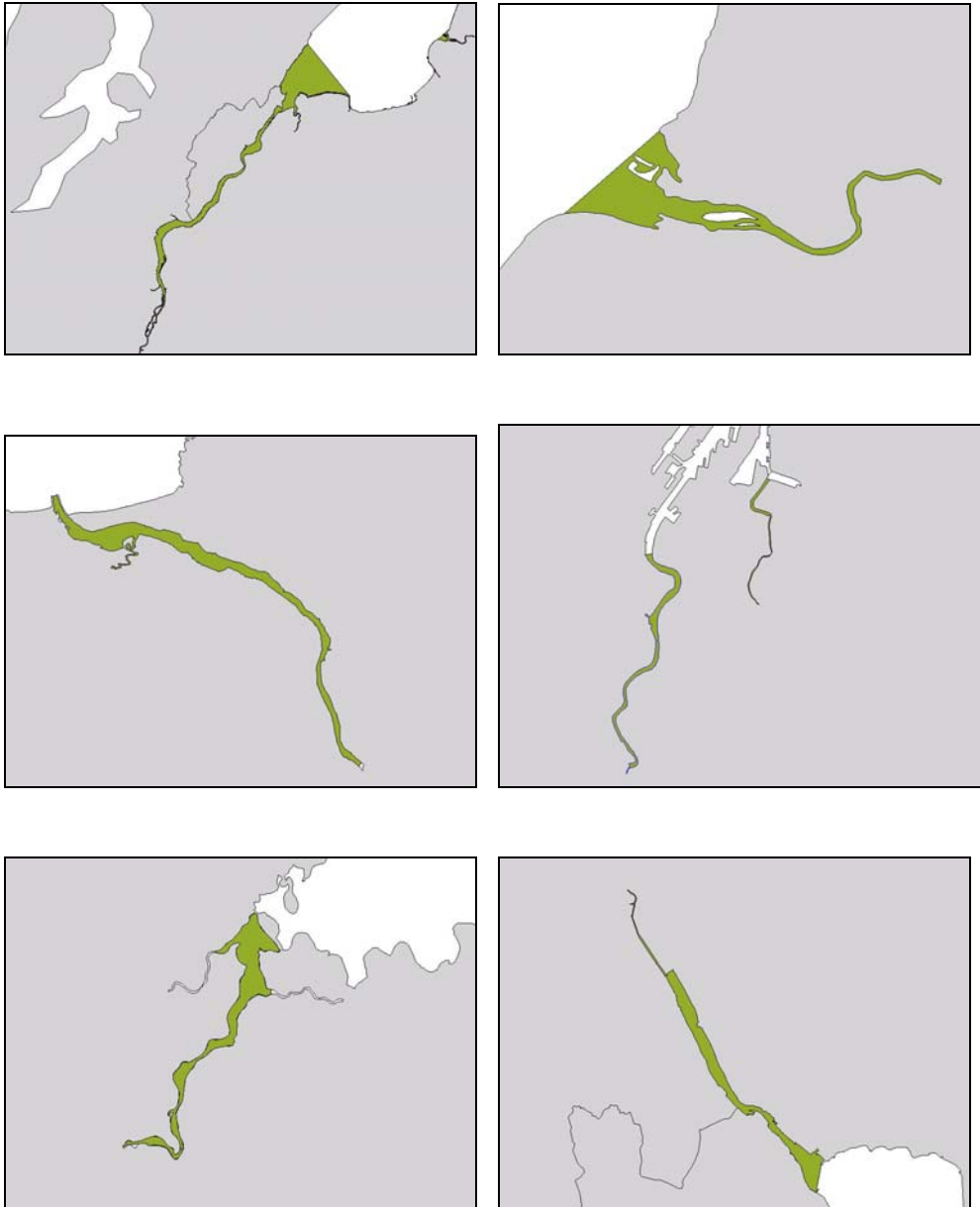


Figure 3.1. Identified transitional waters. Clockwise from top left: Foyle and Faughan Estuaries, Roe Estuary, Lagan and Conn's Water Estuaries, Newry Estuary, Quoile Estuary, Bann Estuary.

Saline and brackish lagoons are water bodies that must be identified for the WFD. Biodiversity Action Plans define lagoons as ‘areas of shallow, coastal salt water which are wholly or partially separated from the sea by sandbanks, shingle or, less frequently, rocks or other hard substrata’. They retain a proportion of their water at low tide and may develop as brackish, fully saline or hyper-saline water bodies. The critical factor for saline lagoons is their tidal restriction or low hydrodynamic state. Sea water enters through a narrow channel, or by percolation through a barrier, or by tidal/storm inundation over a barrier of some sort (Sheader, 1986). 25 lagoons have been identified from Carroll (1994), Donnon (1994), Gorman (1994) (Table 3.1). The information that is available on these lagoons suggests that most are transitional in character. All identified lagoons are less than 50 ha in size and almost all are designated under conservation objectives. It is envisaged that these small water bodies will be grouped together for assessment and reporting purposes. The lagoons at Dorn (Strangford Lough) have not been identified as they form salt pans and creeks as part of the wider saltmarsh in the area and are not marked on OS maps, however will be identified under the WFD.

Coastal waters are defined in the Directive as between mean high water mark and 1nm from baseline. The 1nm from baseline boundary has been determined by the UK Hydrographic Office. The extent of the coastal waters can be seen in combination with typology in Figure 4.1.

Table 3.1. Identified transitional lagoons. Where a number of lagoons are geographically close together (Glynn, Granagh, East Down Yacht Club) these have been individually identified using alphabetical suffixes. Information taken from Carroll (1994), Donnon (1994), Gorman (1994); size calculated by GIS.

Name	Region	Size (ha)	Mean Salinity (psu)	Consevation Status	Salt water inflow	Freshwater inflow
Mahee	Strangford Lough	0.56	5.5	ASSI/SAC/SPA	Pipe	Rain
Castle Espie	Strangford Lough	4.98	19	None	Pipe	Rain
Glynn	Larne Lough	5.48+2.93	31	ASSI/SPA	Tidal channel & percolation	Rain
Belfast Harbour	Belfast Lough	14.7	29.5	ASSI/SPA	Percolation	Rain
Cadew Point	Strangford Lough	1.57	20.5	ASSI/SAC/SPA	Percolation	Rain
Granagh	Strangford Lough	0.23+0.09+0.14	31.5	SAC	Tidal overtopping	Rain
Quarterland	Strangford Lough	0.46	31.5	ASSI/SAC/SPA	Tidal channel	Rain
Blackcauseway	Strangford Lough	0.23	25	ASSI/SAC/SPA	Tidal channel	Rain
Rathgorman	Strangford Lough	0.11	27	SAC	Tidal	Rain
Victoria Park	Belfast Lough	5.63	7	ASSI/SPA	Percolation	Rain
Whitehouse	Belfast Lough	8.89	27.5	ASSI/SPA	Sluice gates & percolation	River
Dorn	Strangford Lough		33	ASSI/SAC/SPA	Tidal	Rain
Ballycarry	Larne Lough	8.82	32.5	ASSI/SPA	Tidal channel	Rain
Oldmill	Larne Lough	5.17	31	ASSI/SPA	Tidal channel & percolation	Rain
Longfield	Lough Foyle	9.14	30.4	ASSI/SPA	Percolation & sluices	Rain
Donnybrewer	Lough Foyle	9.49	28.5	ASSI/SPA	Percolation & sluices	Rain
Blackbrae	Lough Foyle	8.17	30	ASSI/SPA	Percolation & sluices	Rain
Myroe	Lough Foyle	5.90	7.4	ASSI/SPA	Percolation & sluices	River
Castleward	Strangford Lough	0.24	30.4	ASSI/SAC/SPA	Pipe	Rain
Ballyaghan	Bann Estuary	0.37		ASSI/SAC		
Larne	Larne Lough	9.17		None		
Dundrum South	Dundrum Bay South	2.59		ASSI/SAC		River
Gransha	Lough Foyle	9		None		
Strand Lough	Killough Bay	4		ASSI	Sluice gates	River
Rosemount	Strangford Lough	3.75		ASSI		

4. Typology

The task of creating a typology of transitional and coastal waters (TraC) of the United Kingdom and Ireland for the purposes of the Water Framework Directive was put out to contract. The final report on the proposed Typology for the UK and Republic of Ireland was published by SNIFFER in April 2003 (Rogers *et al.*, 2003). The typology produced for the transitional and coastal waters was based on a multi-element analysis of exposure, salinity and current velocity. Following publication of the report it became clear that although the data gathered and subsequent analysis had been extremely useful, the full range of physical types in UK and ROI waters had not been described adequately. In particular the differentiation between macrotidal and mesotidal waters was needed as a mandatory component in the Directive and that this did produce an ecologically relevant split. During the biological validation of the physical typology it became clear that the physical types were not ecologically valid using the JNCC Marine Nature Conservation Review biotope data.

Following a review, it became clear that it was not possible to represent the diverse array of habitats within an estuary or sea area with one physical type due to the complex mosaic of marine habitats. Since typology is the basis of defining reference conditions and an anchor for high status and classification, the consequence of adopting these types is that reference conditions will cover a wide range of habitats within each type.

The concept of habitat specific reference conditions within broader physical types defined under Annex II of the WFD using system B has been agreed as the approach to be taken. Deriving habitat specific reference conditions would allow the development of appropriate reference conditions for each quality element within each type. For example, the physical types to which phytoplankton communities relate will be different to those of invertebrates and macroalgae, with invertebrates and macroalgae relating more to substrate and phytoplankton to water column.

4.1. Coastal Waters

It was considered that a broad typology using tidal range and exposure were to be used for coastal waters as detailed in [UK TAG Guidance](#). Each factor has 3 classes as shown below:

Tidal Range

Microtidal	<1m
Mesotidal	1-5m
Macrotidal	>5m

Exposure

Exposed	(western Atlantic sea board)
Moderately Exposed	(regional seas)
Sheltered	(bays, loughs, estuaries etc sheltered from prevailing winds)

There is a small area of coastline near Ballycastle that has a tidal range of 0.9m and thus is micro-tidal whereas the remainder of the coast is mesotidal. It was considered that for such a small area of coastline that the biology is unlikely to be significantly different particularly as exposure is a more important factor than tidal range in determining the biology in this area. Therefore the whole of the Northern Ireland coastline has been considered as meso-tidal, thus exposure is the factor that distinguishes types (Figure 4.1).

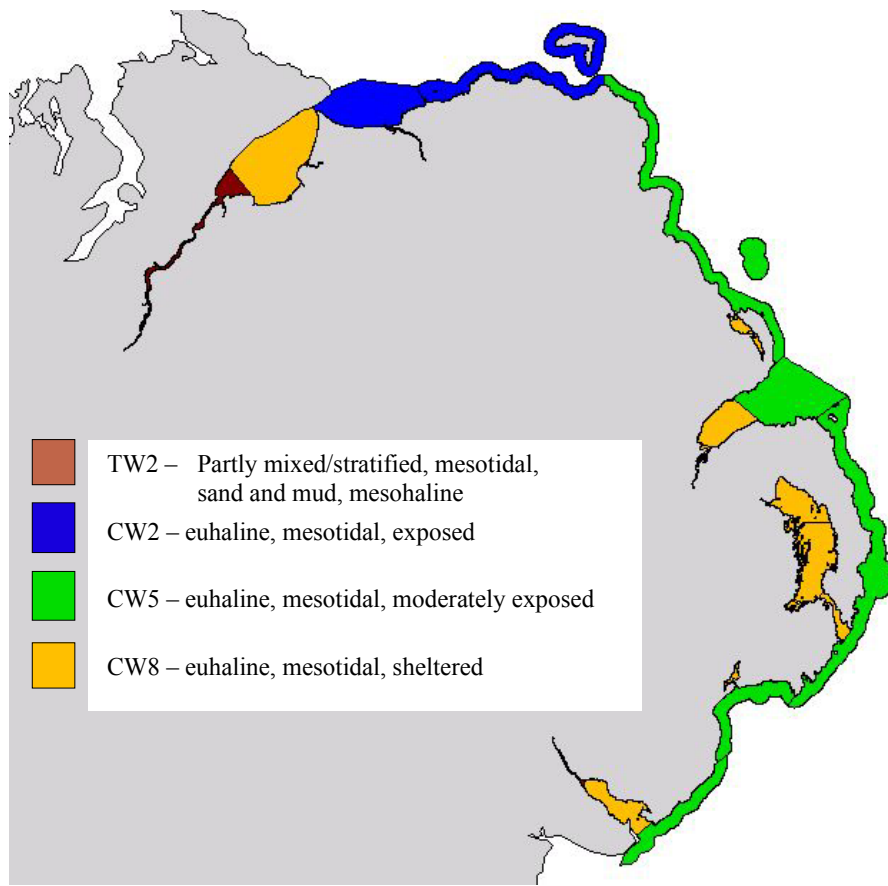


Figure 4.1. Transitional and coastal water typology.

4.2. *Transitional Waters*

The typology for transitional waters created by the original study was retained with the exception that tidal range was added as an additional factor to produce the types below.

TW Group 1. Estuaries that are generally partly mixed or stratified, with a tendency for salinity to be mesohaline or polyhaline. They are strongly macrotidal. They are sheltered, intertidal or shallow subtidal estuaries that have a predominantly sand and mud substratum.

TW Group 2. Estuaries that are generally partly mixed or stratified, with a tendency for salinity to be mesohaline or polyhaline. They are strongly mesotidal. They are

sheltered, intertidal or shallow subtidal estuaries that have a predominantly sand and mud substratum.

TW Group 3. These are fully mixed, polyhaline or euhaline estuaries. They are mesotidal. They are sheltered, generally have a sand or mud substratum and tend to have extensive intertidal areas.

TW Group 4. These are fully mixed, polyhaline or euhaline estuaries. They are macrotidal. They are sheltered, generally have a sand or mud substratum and tend to have extensive intertidal areas.

TW Group 6. Brackish Lagoons.

All transitional estuaries in NI and NI/ROI surface waters fall into TW Group 2. All lagoons fall into TW Group 6.

5. Water Bodies

Water bodies (WB) are the management units in which monitoring programmes will be implemented. The monitoring programmes will be determined by the level and type of risk that a water body has of failing good ecological status (Section 6). Water bodies have been delineated using the following guidelines which have been derived from [CIS Guidance](#) and [UK TAG Guidance](#):

- Each water body must be of one typology
- A water body may fall into more than 1 river basin district
- Water bodies ‘cut’ according to pressures and draft ecological status.
- Boundaries of protected areas also considered

Figure 5.1 and 5.2 shows the transitional and coastal water bodies in NI and water bodies shared between NI and ROI. All transitional surface waters remain as

individual water bodies. There are 6 water bodies that are shared between NI and ROI.

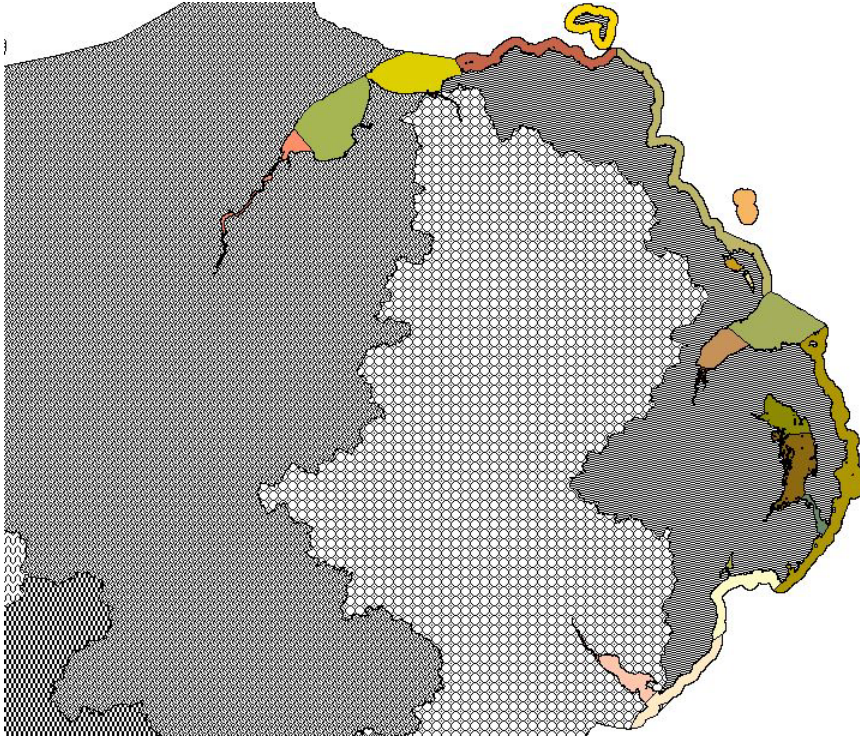


Figure 5.1. Water bodies. Grey shading represent RBDs. Different colours are used to distinguish between water bodies and do not reflect any classification.

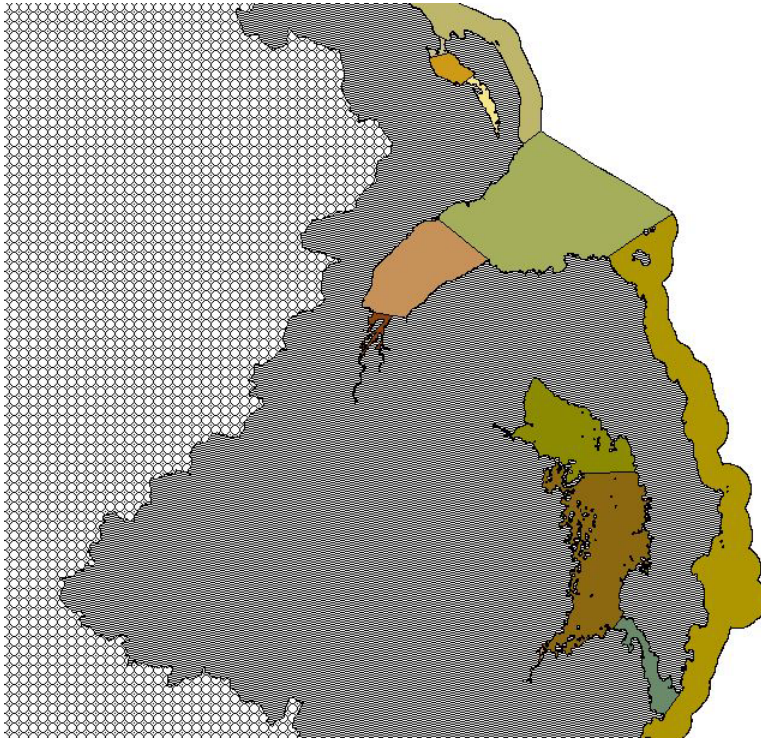


Figure 5.2. Water bodies. Grey shading represent RBDs. Different colours are used to distinguish between water bodies and do not reflect any classification.

Table 5.1 and 5.2 detail the WB type, code, name and RBD(s), which the WB is associated with. Water bodies have been intuitively named. Water body codes have been determined in consultation with colleagues in EPA as follows:

Coastal Waters: eg GBNI6NE010

GBNI	Member State Code: GBNIIE for international water bodies
6	Surface water category: 6 for coastal, 5 for transitional
NE	River basin: NE, North-eastern; NB, Neagh Bann; NW, North-western
10	Unique water body identifier: Increases by multiples of 10 in geographic sequence clockwise in each river basin district.

Transitional waters have the same code system as the coastal water body to which it flows into, except an additional 3 number digit is added as a suffix which is the unique water body identifier which as for coastal waters increases in multiples of 10.

Table 5.1. Transitional water body details.

Name	Code	RBD	Type	Area (Ha)
Foyle and Faughan Estuaries	GBNIIIE5NW250010	NW	TW2	3429
Roe Estuary	GBNI5NW250020	NW	TW2	77
Bann Estuary	GBNI5NB010010	NB	TW2	250
Lagan Estuary	GBNI5NE100010	NE	TW2	33
Conn's Water Estuary	GBNI5NE100020	NE	TW2	7
Newry Estuary	GBNIIIE5NB030010	NB	TW2	256
Quoile Estuary	GBNI5NE130010	NE	TW2	59

Table 5.2. Coastal water body details

Name	Code	RBD(s)	Type	Area (ha)
Rathlin Island	GBNI6NE020	NE	CW2	5616
Maiden Islands	GBNI6NE040	NE	CW5	2999
Lough Foyle	GBNIIIE6NW250	NW	CW8	16573
Dundrum Bay Inner	GBNI6NE160	NE	CW8	392
Carlingford Lough	GBNIIIE6NB030	NB	CW8	4469
Strangford Lough North	GBNI6NE140	NE	CW8	4755
Strangford Lough South	GBNI6NE130	NE	CW8	8633
North Channel	GBNI6NE030	NE	CW5	14191
Larne Lough North	GBNI6NE050	NE	CW8	129
Larne Lough Mid	GBNI6NE060	NE	CW8	652
Larne Lough South	GBNI6NE070	NE	CW8	410
Belfast Lough Outer	GBNI6NE080	NE	CW5	13727
Strangford Lough Narrows	GBNI6NE120	NE	CW8	1335
Ards Peninsula	GBNI6NE110	NE	CW5	18573
Mourne Coast	GBNIIIE6NB020	NB, NE	CW5	4738
Dundrum Bay Outer	GBNI6NE150	NE	CW5	5943
Belfast Lough Inner	GBNI6NE090	NE	CW8	4995
North Coast	GBNI6NE010	NE	CW2	8862
Portstewart Bay	GBNIIIE6NB010	NB, NW, NE	CW2	12209
Belfast Harbour	GBNI6NE100	NE	CW8	344

6. Risk Assessment

Risk assessment (RA) is part of the WFD process required for Article 5 whereby a water body is assessed to determine if it is likely to fail or achieve WFD objectives in 2015. This assessment *is not* a water quality classification scheme but *is* used to focus management and monitoring programmes in the future. UK TAG have identified 4 risk categories which are based on the amount of information available to calculate risk, which then determines the management and monitoring actions as shown in Table 6.1.

Table 6.1. Data requirements, risk categories and actions.

Risk category	Data requirements	Actions
1a – At significant risk of failing objectives	Good impact and pressure information	Consider program of measures
1b – Probably at significant risk of failing objectives	Impact, pressure information and expert judgement	More detailed RA by 2007
2a – Probably not at significant risk of failing objectives	Information not comprehensive but expert judgement	Improve information and move category by 2013
2b – Not at significant risk of failing objectives	Good impact and pressure information	Review in 2013

Water bodies classified as 1a or 1b lend themselves to operational monitoring whereby the water body will be monitored for the biological elements that respond to the pressure. For example where nutrient inputs are calculated to be at high pressure, macroalgae, phytoplankton and physiochemical parameters will be measured. Water bodies classified as 2a or 2b will be surveillance monitored.

The characterisation process of WFD (Annex II), requires an assessment of both pressure and impact information. It can be difficult to link pressure information to impacts in coastal waters as the likelihood of an input (pressure) causing an effect (impact) is largely dependent on the dispersive capacity of the water body in which it occurs. For this reason, it is more accurate to assess 'impact' information to determine a risk, when available, than estimate impact indirectly from pressure information. However, there are categories of risk where impact information is not available. In these cases, the water body has been classified using an assessment of the available pressure information and expert judgement. Water bodies can only be classified as 1a or 2b if suitable data is available, there is confidence in the assessment method and there is confidence in how that assessment method relates to ecological quality.

The DPSIR (Driving Force-Pressures-State-Impacts-Response) model has been used where possible to assess pressure and impact information. However, it is acknowledged that it is difficult to be consistent in the definition of the component terms and often this approach has been reduced to defining:

Pressure

State

Impact

The approach taken in Northern Ireland is similar to that taken in England, Wales and Scotland and follows UK TAG guidance on risk assessment for all [surface water categories](#) and [specifically in TraC waters](#). There is more impact information available in Northern Ireland and a greater emphasis has been made on using impact information rather than pressure information for risk assessment

A number of pressures have been identified by UK TAG under which risk assessment has been made. These are:

- Nutrients and eutrophication
- Organic enrichment
- Hazardous substances

- Alien species
- Point source discharge consents
- Fish impingement on power station screens
- Hydromorphology – fishing, aquaculture, dredged areas, dredge disposal, land reclaim, shoreline reinforcement, morphological barriers, and flow abstraction.
- Protected areas – shellfish waters, bathing waters, SACs and SPAs.

Often there are not reliable assessment methods for these pressures or it is uncertain how these methods relate to ecological status. A number of projects are ongoing to build new methodologies, which will allow a correct assessment of how pressures relate to ecological status. Risk assessment on the above categories has been conducted on all transitional estuaries and coastal water bodies. The transitional lagoons have been assessed separately (see 6.9).

6.1. Nutrients/Eutrophication/Organic Enrichment

Nutrient and organic loading pressures often occur in combination and result in increased primary productivity, a change to zoobenthos, potential fish kills and other secondary effects and so have been considered together. The schematic below shows how these pressures act to cause an impact in the marine environment.

An impact approach has been taken for the assessment of trophic status. The OSPAR Comprehensive Procedure (OSPAR, 2002) has already established a framework to identify eutrophication, which closely aligns with the DEFRA (2002) criteria to identify sensitive areas under the UWWT Directive. These criteria are based upon 3 categories as follows:

Category 1: Nutrient inputs, concentrations and ratios

Category 2: Phytoplankton biomass and macroalgae

Category 3: DO, fauna, toxic algae

Pressure

Nutrient inputs to water body
(Point and diffuse)

Organic inputs to water body
(Point and diffuse)

State

Elevated nutrient concentrations

Elevated Carbon concentrations

Impacts (Direct)

Elevated Chlorophyll 'a' concentrations
Macrophyte composition changes

Decreased oxygen levels

Impacts (Indirect)

Changes in zoobenthos and fish kills
Algal toxins

These criteria have been applied to the data and been related to risk assessment under the WFD to both transitional and coastal waters whereby:

Category 1	Category 2	Category 3	OSPAR	NI WFD RA
-	-	-	Non-problem area	2b
+	-	-	Potential problem areas	2a
+	+	+/-	Problem area	1a

It is envisaged that ECOSTAT guidance will align the assessment of trophic status for WFD, Urban Waste Water Treatment Directive and OSPAR allowing the water bodies classified as 1b or 2a to be moved to 1a or 2b. Where monitoring information is not available the result has been based on the available pressure information and expert judgement and those water bodies placed at 1b or 2a. Details of the assessments are presented in WMU (2004). The results are shown in Figure 6.1 and

Table 6.2. The Lagan and Quoile estuaries have been assessed to be at risk category 1a- ‘at risk’ which aligns with their designation as Sensitive Areas under the UWWT. Inner Belfast Lough has been assessed at risk category 2a-‘probably not at risk’ because current studies suggest that is no longer eutrophic, however further information is required to confirm this. Belfast Harbour and the Conn’s Water Estuary have been judged to be at risk category 1b –‘probably at risk’ on the basis of expert judgement.

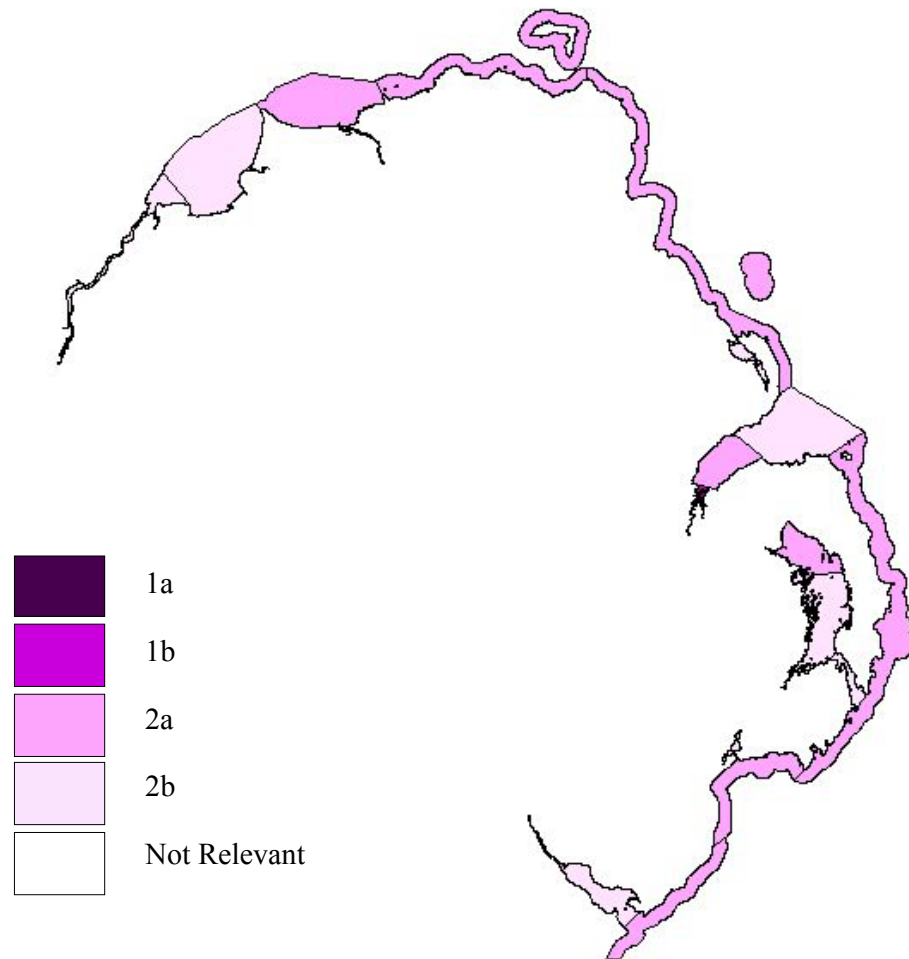


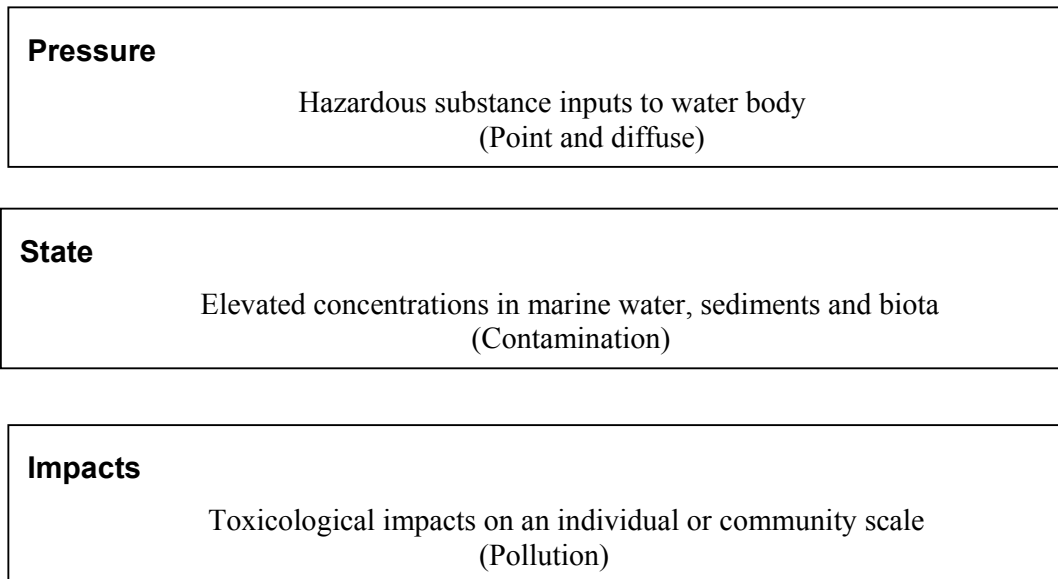
Figure 6.1. Results of risk assessment for trophic status.

Table 6.2. Risk assessment of trophic status, hazardous substances, alien species, and point discharge consents.

	Trophic status	Hazardous substances - imposex	Hazardous substances - BRC/EAC	Hazardous substances - overall	Alien species	Power station abstraction	Point discharge consents
Rathlin Island	2a	ND	ND	2a	2a	2b	2a
Maiden Islands	2a	ND	ND	2a	2a	2b	2b
Lough Foyle	2b	2b	1b	1b	1b	2b	2a
Dundrum Bay Inner	2b	ND	1b	1b	1b	2b	1a
Carlingford Lough	2b	2b	1b	1b	1b	2b	1b
Strangford Lough North	2a	2b	1b	1b	1b	2b	1b
Strangford Lough South	2b	2b	1b	1b	1b	2b	2a
North Channel	2a	2b	ND	2b	2a	2b	1b
Larne Lough North	2b	2b	1b	1b	2a	2b	1b
Larne Lough Mid	2b	ND	1b	1b	1b	2b	1b
Larne Lough South	2b	ND	2b	2b	1b	2b	2a
Belfast Lough Outer	2b	1a	1b	1a	1b	2b	1a
Strangford Lough Narrows	2b	2b	2b	2b	2a	2b	1a
Ards Peninsula	2a	2b	1b	1b	2a	2b	1a
Mourne Coast	2a	ND	ND	2a	2a	2b	1a
Dundrum Bay Outer	2a	ND	ND	2a	2a	2b	1a
Belfast Lough Inner	2a	1a	1b	1a	1b	2b	1a
Belfast Harbour	1b	2b	1b	1a	2a	2b	1a
North Coast	2a	ND	ND	2a	2a	2b	1b
Portstewart Bay	2a	ND	ND	2a	2a	2b	1a
Foyle and Faughan Estuaries	2b	2b	1b	1b	2a	2a	1b
Bann Estuary	2a	ND	1b	1a	2a	2b	1b
Lagan Estuary	1a	ND	1b	1a	2a	2b	1a
Newry Estuary	2a	2b	1b	1b	2a	2b	1b
Roe Estuary	2a	ND	ND	1b	2a	2b	2a
Quoile Estuary	1a	ND	ND	1b	2a	2b	1b
Conn's Water Estuary	1b	ND	1b	1a	2a	2b	1a

6.2. Hazardous substances

Hazardous substances vary widely from chemicals that are found naturally in the environment (e.g. zinc) to those that are entirely synthesized by human activity (eg PCBs). A schematic of their pressures and impacts in the environment is shown below.



Two impact approaches have been used to assess the level of risk associated with hazardous substances in transitional and coastal waters. Firstly, a measure of imposex in Dog Whelks caused by Tributyltin (TBT). The approach follows an agreed UK approach whereby vas deferens sequence index (VDSI) of > 4 is 'at risk' and $VDSI < 4$ is 'not at risk'. The results can be seen in Figure 6.2 and Table 6.2.

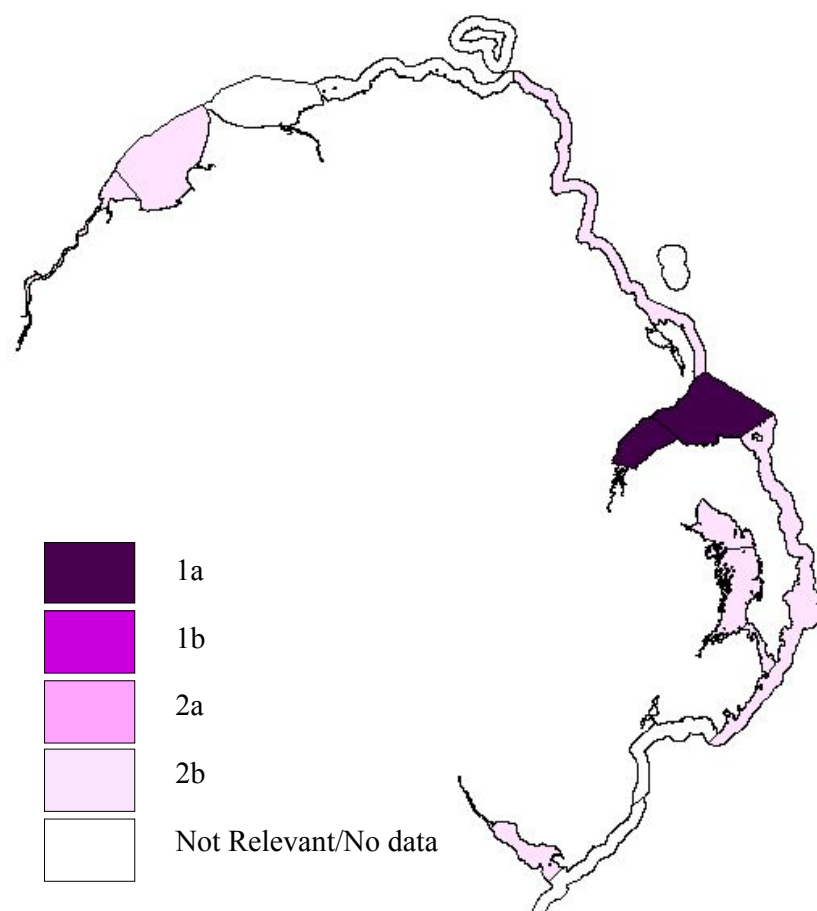


Figure 6.2. Results of risk assessment for hazardous substances using imposex in Dog Whelks approach.

Secondly, concentrations of trace metals, Polychlorinated biphenyls (PCBs) and Polyaromatic hydrocarbons (PAHs) in sediments and *Mytilus edulis* have been compared to Background Reference Concentrations (BRCs) and Ecotoxicological Assessment Concentrations (EACs). This is the approach that was used to assess contaminant concentrations by the UK in marine waters for the 2nd National Marine Monitoring Programme report (NMMP, 2004). BRCs are the concentration at which contaminants are close to, or at levels that would be expected in the absence of anthropogenic impacts ie 'background'. EACs are the concentration of contaminants at which a ecotoxicological response would be expected. The BRCs and EACs are derived from OSPAR and can be seen in the NMCAQC 2004 report (NMPAQC, 2004).

Concentrations of contaminants in water have also been compared to the proposed Environmental Quality Standards (EQSs). The results were interpreted in terms of risk as follows:

- Chemical concentrations in water, sediment and biota that exceed the EQS or EAC – risk category **1b or 1a**
- Chemical concentrations below twice the BRC – risk category **2b**
- Concentrations between twice the BRC and EAC – risk category **1b**

EACs are not specific to Northern Ireland coastal sediments and it is not known at present how the approach relates to ecological status. Therefore any water bodies whose concentrations are above the EAC have been designated as 1b until further information becomes available. The last 3 years data from NMMP and Estuarine Coastal Waters Monitoring Programme (ECWMP) sediment sites, and sites at which mussels are measured for contaminants by EHS have been used for the assessment. Data from NMMP and Shellfish Water monitoring sites have been used to compare against EQSs. To gain a greater spatial coverage published material was also used for the assessment (Charlesworth and Service, 2000; Giunan *et al.*, 2001; Charlesworth and Service, 2002; Charlesworth, 2003). Where information was not available, expert judgement was used. The results can be seen in Table 6.2 and Figure 6.3.

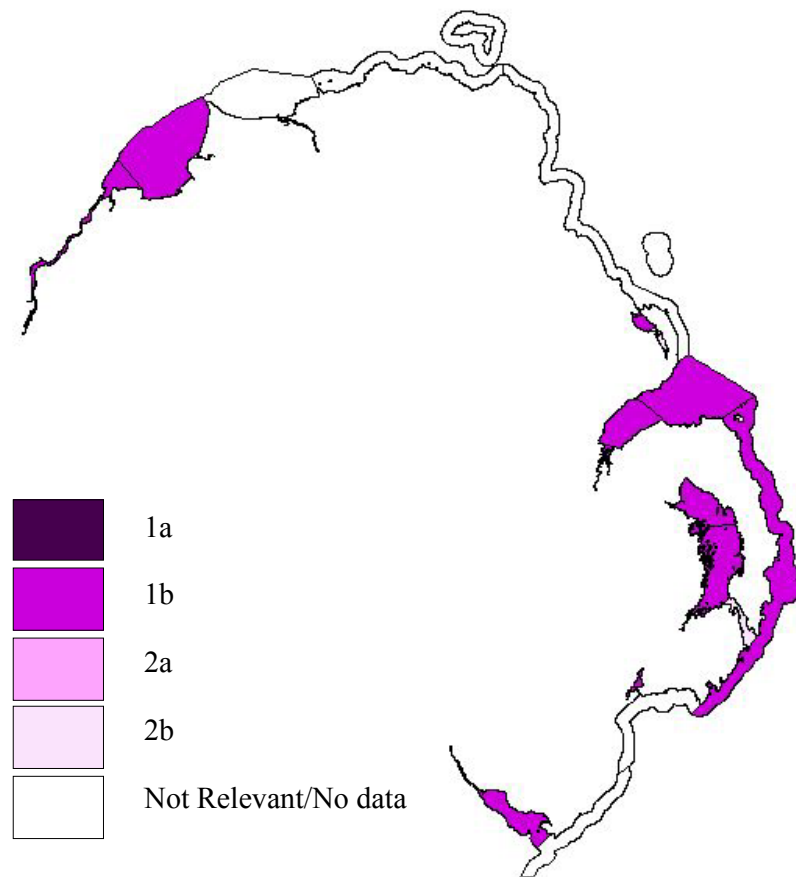


Figure 6.3. Results of risk assessment for hazardous substances using BRC/EAC and EQS approach.

The two approaches to risk assessment of toxic substances were then combined to give an overall assessment (Figure 6.4). Where both methodologies were conducted on the same water body a precautionary approach was taken and the higher risk category was defaulted to. Using expert judgement contaminant concentrations in 4 water bodies were considered to be likely to result in the ecological status to be less than good and so were moved from risk category 1b to 1a . These were:

Bann Estuary

Lagan Estuary

Conn's Water Estuary

Belfast Harbour

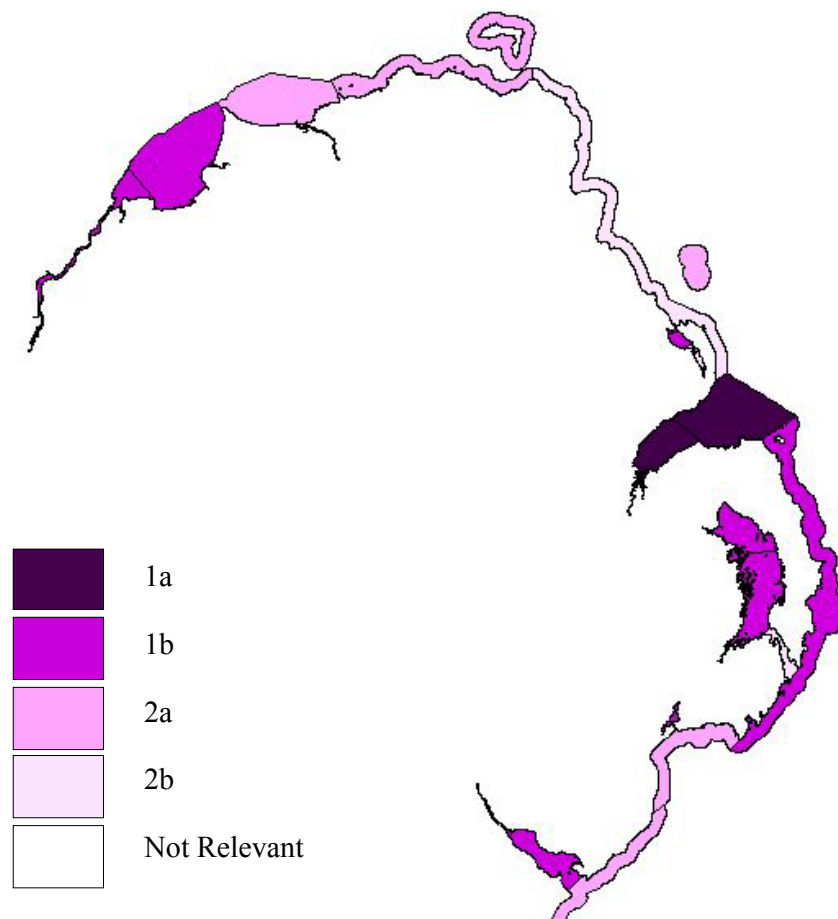


Figure 6.4. Results of risk assessment for overall hazardous substances.

6.3. Alien Species

UK TAG guidance has detailed 10 species for which a risk assessment should be conducted. Of these 10 species, only *Spartina* and *Sargassum* are present in Northern Ireland coastal waters. *Spartina* is present in all Northern Ireland sea-loughs and *Sargassum* is present in Strangford and Carlingford Loughs. It is not known at present how the presence of these species effects ecological status and also the potential of these species to colonise other water bodies is unknown. Therefore water bodies at which these species have been recorded have been classified as risk category 1b and all other

water bodies have been classified as 2a. The results can be seen in Table 6.2 and Figure 6.5.

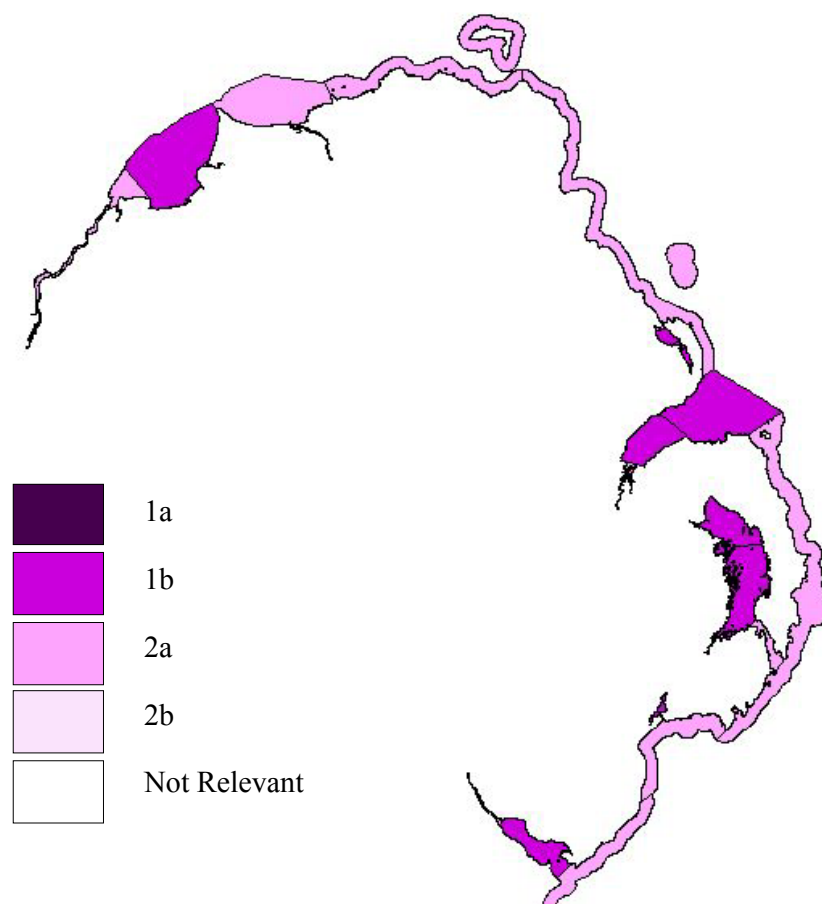


Figure 6.5. Results of risk assessment for alien species.

6.4. Point Discharges

The preliminary assumption in UKTAG guidance that authorisations meet current standards, cannot be applied to Northern Ireland. To address this, the approach that has been taken is to use information on the location of discharges and their compliance record to identify water bodies at risk from point sources. Given the uncertainties even in using this approach, the more detailed assessments were not believed to be

scientifically robust enough at this time based on the data available. Therefore the results of the analysis were reviewed by expert opinion.

Data was collected from discharges with a compliance history for water treatment works and waste water treatment works with a population equivalent (PE) of greater than 250. Data was also collected from any consented industrial discharge with a compliance history. Combined sewage overflows data and expert opinion was used in the analysis. Each point source discharge is linked to the water body that it resides in or may cause a risk to. The risk applied to each point source discharge has therefore been applied to the whole water body it is associated with. This means that even though there may be only be a localised impact the whole water body is considered to be at risk. Given that the programme of measures required under the WFD will target management action for those point discharges it is likely that smaller water bodies will be delineated around these discharges. If there is more than one point source discharge then the worst risk category has been applied to the water body.

Industrial Discharges

Any discharges passing their discharge consents were categorised as not at significant risk – 2b. All failing consented discharges were analysed using expert opinion to categorise the risk to the associated water body.

Water Service Discharges

Any discharges passing their registered standards were categorised as not at significant risk – 2b. All failing discharges were analysed using expert opinion to categorise the risk to the associated water body. The expert opinion included consideration of the likelihood of discharges meeting environmental needs standards and lack of suitable treatment. Consideration was also given to the Water Service Capital Works Programme in place to improve waste water treatment discharges to coastal waters. If work is planned to start on or before December 2005 then the water body linked the point discharge was not considered to be at ‘at risk’ based on its compliance history.

The results of the analysis can be seen in Figure 6.6 and Table 6.2.

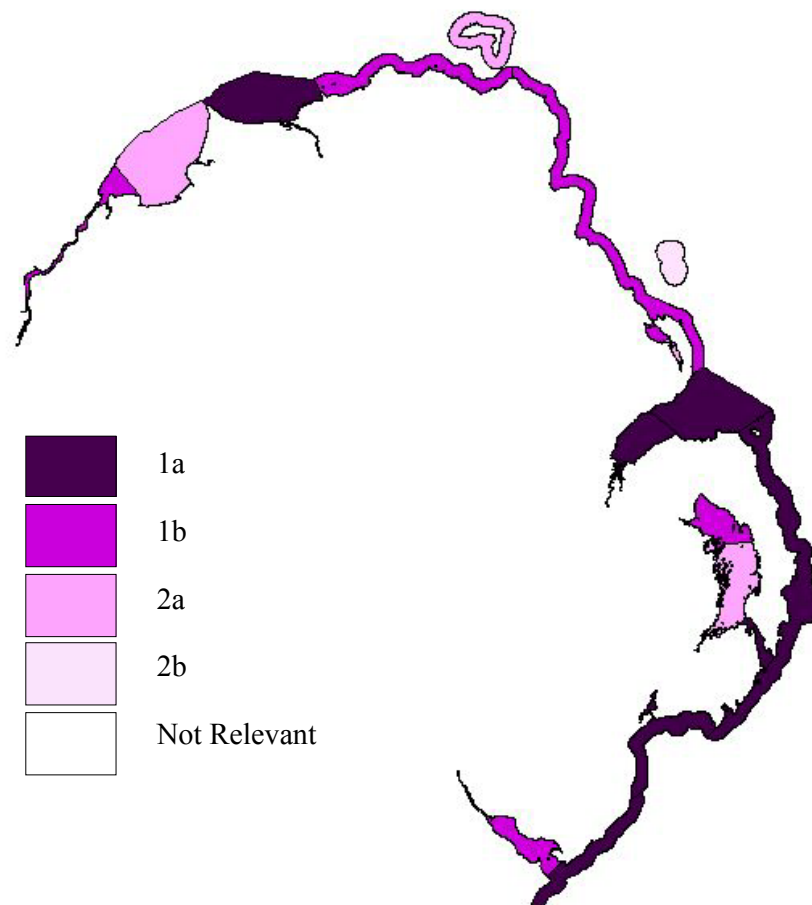


Figure 6.6. Results of risk assessment for point discharges

6.5. Fish Impingement on Power Station Screens

The impingement of fish on power station screens by the abstraction of cooling water has the potential to impact fish communities. The Foyle Estuary is the only water body which has a power station that abstracts water from a transitional water and has been designated as risk category 2a.

6.6. Hydromorphology

The WFD requires that the impact of hydromorphology on ecological status to be considered. This has not previously been a requirement under European legislation and therefore there is a lack of robust assessment methodologies. There are a number of

ongoing projects that are focusing on developing methodologies to assess hydromorphological pressures and linking the pressures to ecological status, however these are not projected to deliver until 2005. It is envisaged that all hydromorphological pressures will be reassessed in all water bodies once the methodologies become available.

6.6.2. Morphology

To fill the requirements of Article 5, morphological pressures have been assessed using [UK TAG guidance](#) where applicable. The pressures assessed are:

Dredging
Dredge spoil disposal
Land reclaim
Shoreline reinforcement
Aggregate extraction
Fishing
Aquaculture
Morphological barriers
Water flow regulation and abstraction

UK TAG guidance assesses morphological pressures on a percentage (%) area of impact of the pressure, to area of water body whereby

<5% - high ecological status
5-15% - good ecological status
>15% - moderate ecological status

This approach is not robust because by changing the boundaries of a water body the result may change, and it takes no account of an 'ecosystem' approach which is widely agreed as the approach to environmental management in marine waters. However, the UKTAG approach does form a basis from which future assessments may be built. Using this approach the following criteria have been applied:

- >15% impact area to water body – 1b
- < 15% impact to water body area – 2a
- No pressure in water body – 2b

The results of the morphological pressures are detailed in Table 6.3.

Dredging

The Food and Environment Protection Act 1985 (FEPA) records of areas of the seabed that are regularly dredged were drawn in GIS and the % area of impact to area of the water body calculated (Figure 6.7). The Lagan Estuary and Belfast Harbour were classified as risk category -1a, as dredging in these water bodies is regular and covers almost the entire water body area.

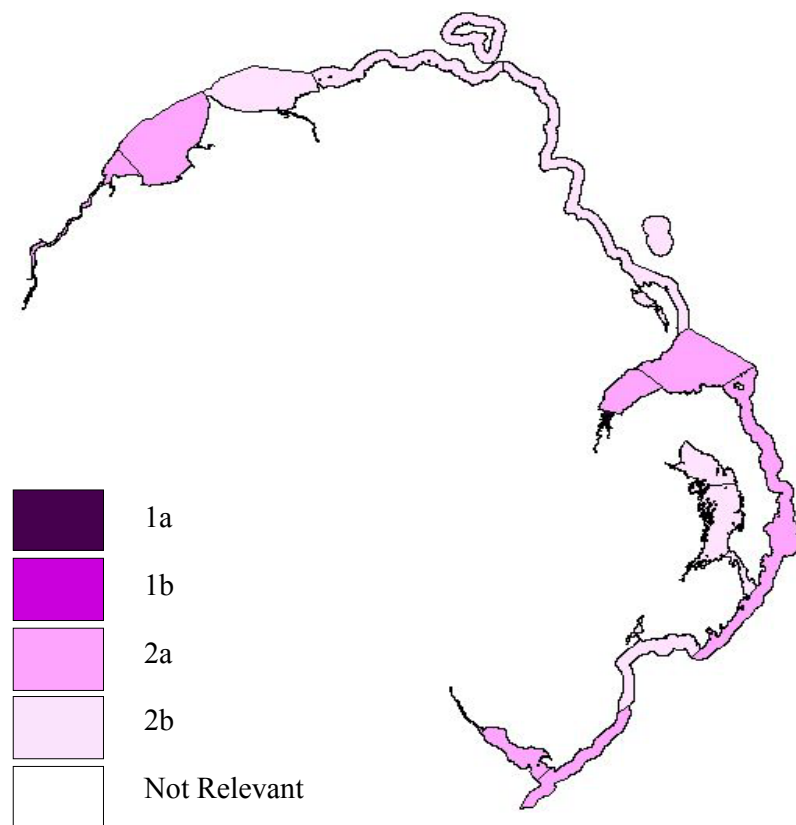


Figure 6.7. Results of risk assessment for dredging.

Table 6.3. Results of hydromorphology risk assessment.

Water Body	Land Reclaim	Dredge spoil disposal	Dredged areas	Aggregate Extraction	Shoreline reinforcement	Fished areas	Aquaculture	Barriers	Water abstraction and regulation	Hydromorphology overall
Rathlin Island	2b	2a	2b	2b	2a	1b	2b	2b	2b	1b
Maiden Islands	2b	2b	2b	2b	2b	2a	2b	2b	2b	2a
Lough Foyle	2a	2a	2a	2a	1b	2a	1b	2b	2b	1b
Dundrum Bay Inner	2a	2b	2b	2b	1b	2a	2a	2b	2b	1b
Carlingford Lough	2a	2b	2a	2b	1b	2a	1b	2b	2b	1b
Strangford Lough North	1b	2b	2b	2b	2a	2a	2a	2b	2b	1b
Strangford Lough South	2a	2b	2b	2b	2a	1b	2a	2b	2b	1b
North Channel	2a	2a	2b	2b	1b	1b	2a	2b	2b	1b
Larne Lough North	1b	2b	2b	2b	1b	2a	2b	2b	2b	1b
Larne Lough Mid	1b	2b	2b	2b	1b	2a	2a	2b	2b	1b
Larne Lough South	1b	2b	2b	2b	1b	2a	1b	2b	2b	1b
Belfast Lough Outer	2a	2a	2a	2b	1b	2a	2a	2b	2b	1b
Strangford Lough Narrows	2a	2b	2b	2b	2a	2a	2a	2b	2b	2a
Ards Peninsula	2a	2a	2a	2b	2a	1b	2a	2b	2b	1b
Mourne Coast	2a	2b	2a	2b	2a	1b	2b	2b	2b	1b
Dundrum Bay Outer	2a	2b	2b	2b	2a	2a	2b	2b	2b	2a
Belfast Lough Inner	2a	2b	2a	2b	1b	2a	1b	2b	2b	1b
Belfast Harbour	1b	2b	1a	2b	1b	2a	2b	2b	2b	1a
North Coast	2a	2a	2b	2b	2a	2a	2b	2b	2b	2a
Portstewart Bay	2a	2a	2b	2b	2a	2a	2b	2b	2b	2a
Foyle and Faughan Estuaries	1b	2b	2a	2a	1b	2a	2a	2b	2b	1b
Bann Estuary	2a	2b	2a	2b	1b	2a	2b	1b	1b	1b
Lagan Estuary	1b	2b	1a	2b	1b	2b	2b	1b	2b	1a
Newry Estuary	1b	2b	2a	2b	1b	2a	2b	2a	2b	1b
Roe Estuary	2a	2b	2b	2b	1b	2b	2b	2a	2b	1b
Quoile Estuary	1b	2b	2b	2b	1b	2b	2b	1b	2b	1b
Conn's Water Estuary	1b	2b	2b	2b	1b	2b	2b	2a	2b	1b

Dredge spoil disposal

FEPA records of sites currently used for dredge spoil disposal were drawn in GIS and the % area of impact calculated (Figure 6.8) and applied to the above categories. A water body that has a site that has historically been used for disposal but has ceased in the last 5 years has been designated as 2a.

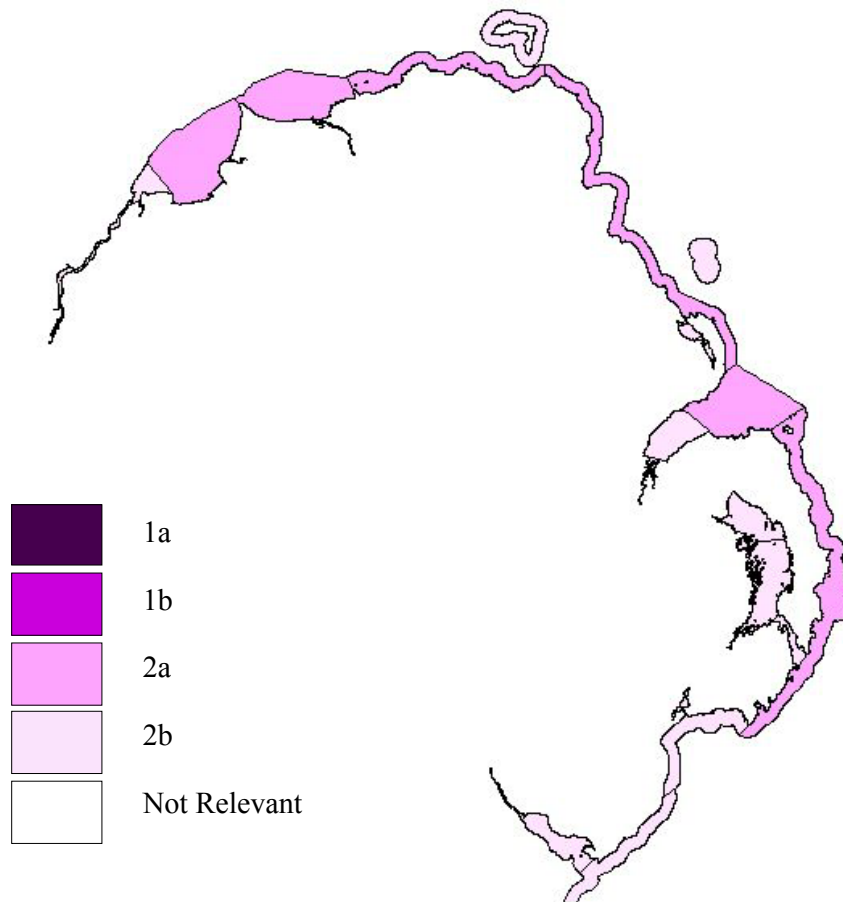


Figure 6.8. Results of risk assessment for dredge spoil disposal.

Land Reclaim

Areas of the seabed that have been reclaimed for land were identified by the word 'intake' after the townland on 1:10,000 OSNI maps. This information was supplemented by expert opinion and historical maps. Water bodies were then classified using expert

opinion (Figure 6.9). It was considered that Rathlin and the Maiden Islands are not at risk (2b) to land reclaim.

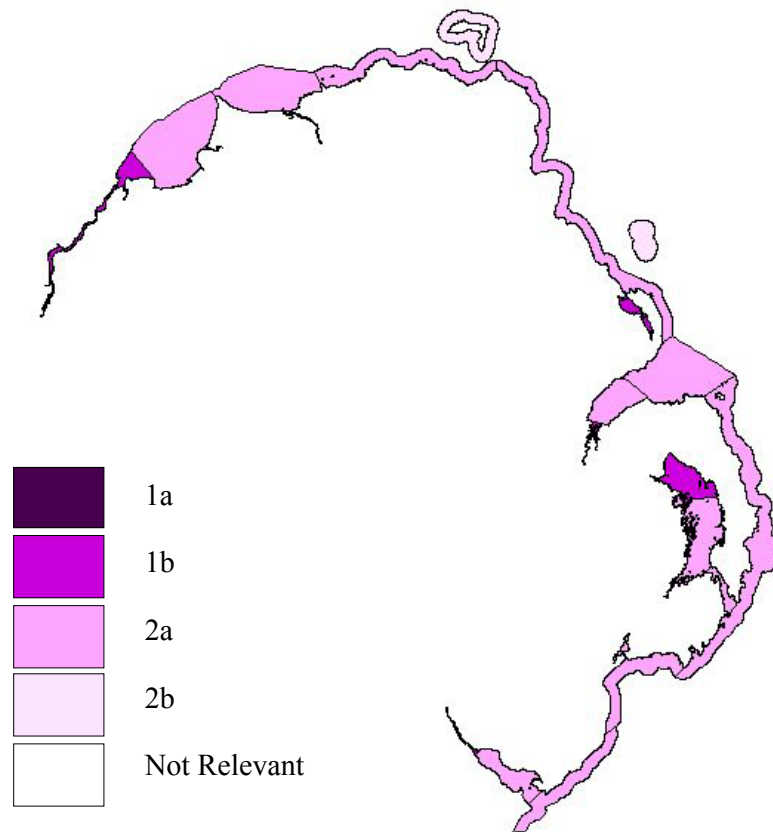


Figure 6.9. Results of risk assessment for land reclaim.

Shoreline Reinforcement

Areas of the coast that are reinforced were identified in GIS using records from the Road Service and expert opinion. These distances were then compared to the distance of the coastline and classified accordingly (Figure 6.10.).

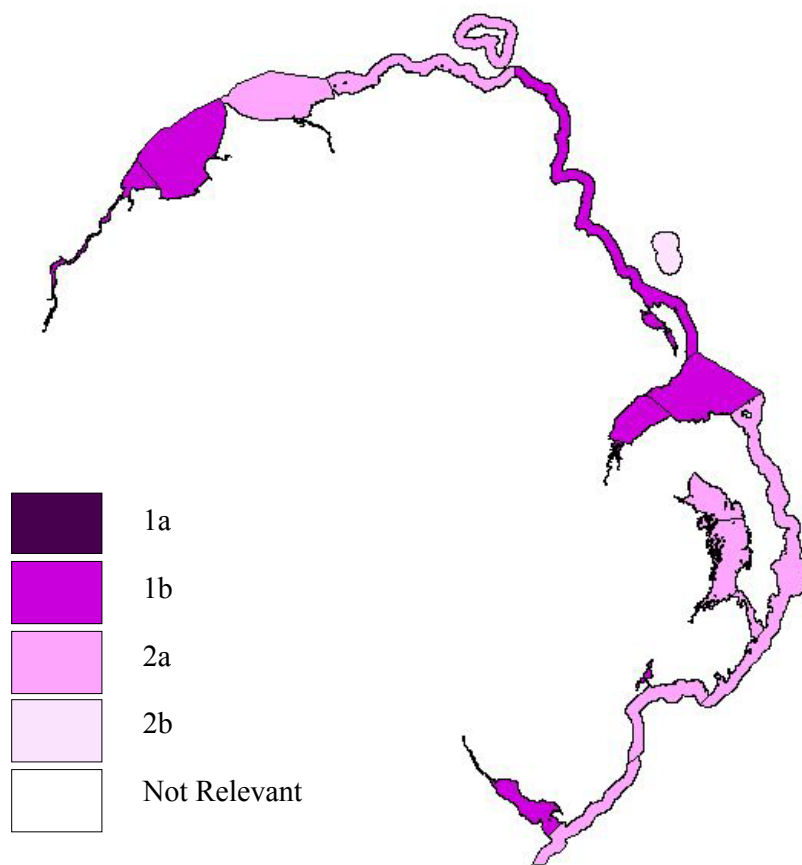


Figure 6.10. Results of risk assessment for shoreline reinforcement.

Aggregate extraction

Sand extraction operates in Lough Foyle and the Foyle Estuary. This activity is currently unregulated due to jurisdictional issues. Lough Foyle and the Foyle Estuary have been categorised at 2a for aggregate extraction and will be moved categories once further information becomes available. There is no other aggregate extraction in Northern Ireland coastal waters.

Fishing

Fishing pressures arise from trawling and dredging for fish or shellfish that are associated with the seabed. The main fishery of this type within 1nm of the Northern Ireland coast is for scallops. In consultation with DARD the main areas of scallop fishing were drawn in GIS and the areas compared to water body area. Water bodies at which scallop dredging is not currently practised have been classified as 2a as pot fishing, trawling and dredging for other species occurs throughout the Northern Ireland coast and may potentially have an impact. Results can be seen in Figure 6.11.

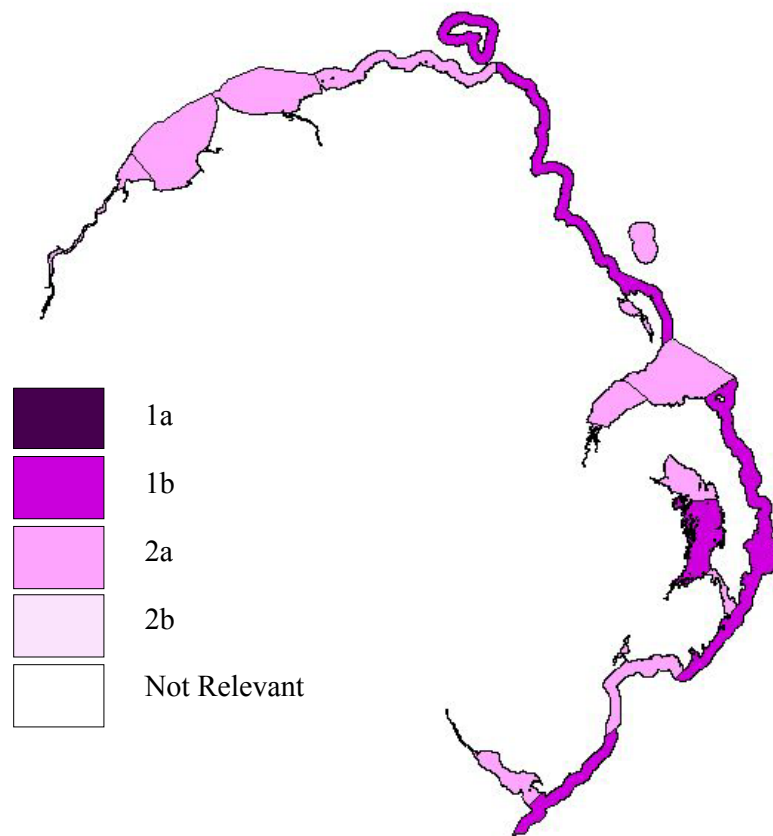


Figure 6.11. Results of risk assessment for fishing.

Aquaculture

Aquaculture pressures arise from both suspended and bottom culture of shellfish and finfish. In particular the bottom culture of *Mytilus edulis* has rapidly expanded in the last 5 years in Northern Ireland sea-loughs. Areas that have been licensed for shellfish culture were mapped in GIS and water bodies classified accordingly (Figure 6.12). The North Channel water body was categorised as risk category - 2a due to the presence of a fish farm. Details of aquaculture sites in Lough Foyle and the southern half of Carlingford Lough were not available but are believed to be extensive and have been categorised as 1b.

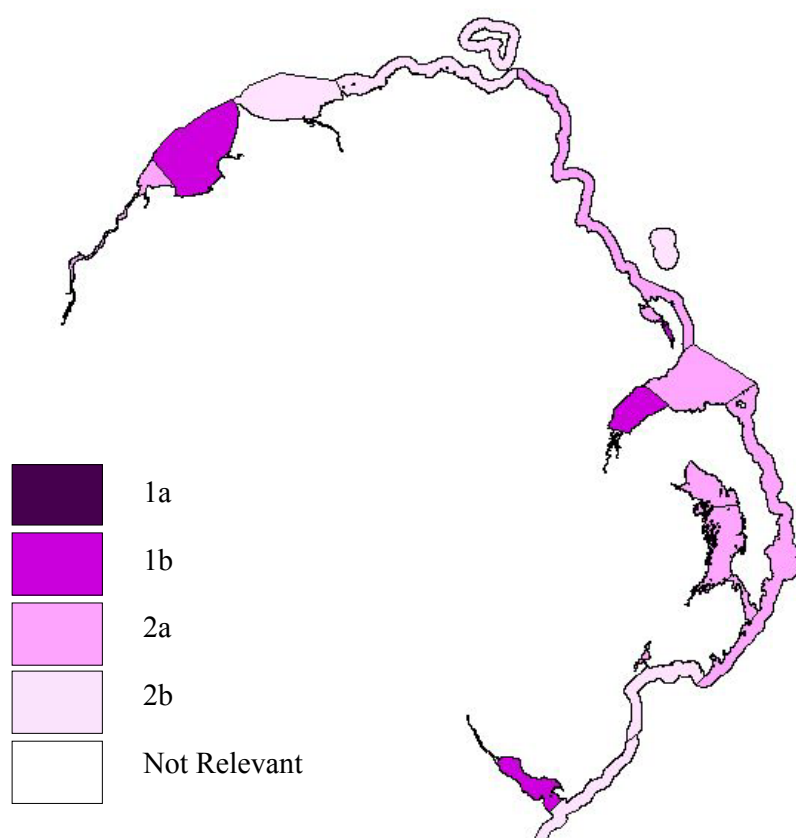


Figure 6.12. Results of risk assessment for aquaculture.

Morphological barriers

Regulation of tidal flows may cause a decline in ecological status. Water bodies that are impounded by a barrage or whose flow is regulated by sluice gates have been classified as 1b. Specifically these are the Lagan, Quoile and Bann Estuaries. The Roe, Newry and

Conn's Water estuaries have been classified as 2a as weirs limit the tidal intrusion near the freshwater limits of these estuaries.

6.6.3. Hydrology

Water Abstraction and Flow Regulation

Water abstraction and flow regulation upstream of a transitional water has the potential to reduce the natural flows within an estuary. On the basis of calculating the percentage water abstraction to the natural flow, the Bann Estuary is the only water body which is considered to be probably at risk from this pressure and has been categorised as 1b.

6.6.4. Hydromorphology Overall

Defaulting to the higher risk category for hydromorphology results in all transitional water bodies being categorised at 1a or 1b and 75% of all coastal water bodies at 1a or 1b (Table 6.3; Figure 6.13). All water bodies categorised as 1a or 1b under hydromorphology will be provisionally designated as heavily modified water bodies.

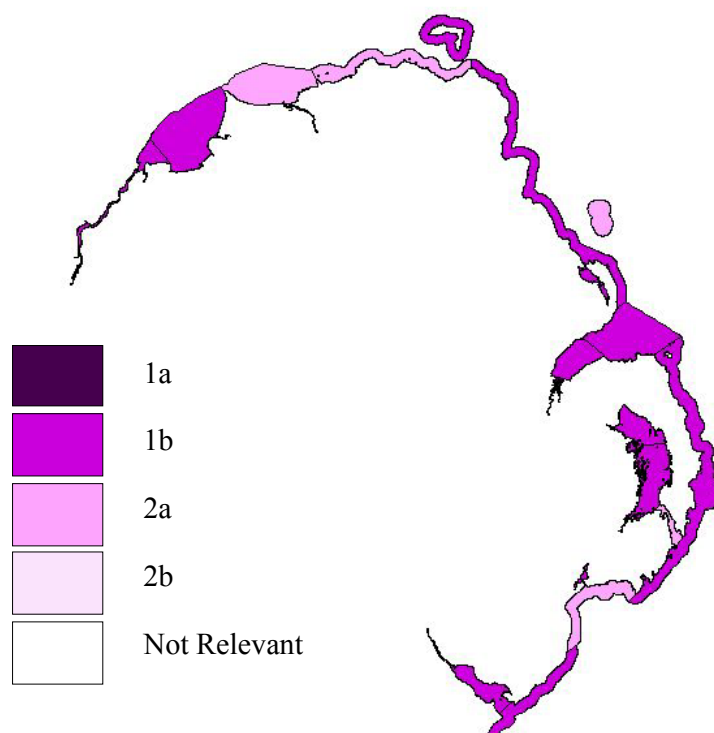


Figure 6.13. Results of risk assessment for hydromorphology.

6.7. Protected areas

Protected areas include those designated under the Shellfish Waters Directive (79/923/EEC), Bathing Water Directive (76/160/EEC), Birds Directive (79/409/EEC) and Habitats Directive (92/43/EEC).

6.7.1. Birds and Habitats Directive

Water bodies in which there is a SAC or SPA present have been categorised as 2a unless there is evidence to show that the SAC or SPA is at less than favourable condition which results in a 1a categorisation. It has been demonstrated that Strangford Lough is at less than favourable condition (Roberts *et al.*, 2004) and so has been categorised as 1a. The results can be seen in Table 6.4 and Figure 6.14.

Table 6.4. Protected area risk assessment. NP = not present in water body.

Water Body	Habitats Directive	Bathing Water Directive	Shellfish Water Directive
Rathlin Island	2a	NP	NP
Maiden Islands	NP	NP	NP
Lough Foyle	2a	NP	2a
Dundrum Bay Inner	2a	NP	2a
Carlingford Lough	2a	NP	2a
Strangford Lough North	1a	NP	2b
Strangford Lough South	1a	NP	2a
North Channel	NP	1a	NP
Larne Lough North	2a	NP	NP
Larne Lough Mid	2a	NP	2a
Larne Lough South	2a	NP	2a
Belfast Lough Outer	2a	1a	NP
Strangford Lough Narrows	1a	NP	NP
Ards Peninsula	NP	2b	NP
Mourne Coast	NP	2b	NP
Dundrum Bay Outer	2a	1a	NP
Belfast Lough Inner	2a	NP	NP
Belfast Harbour	2a	NP	NP
North Coast	2a	2a	NP
Portstewart Bay	2a	1a	NP
Foyle and Faughan Estuaries	2a	NP	NP
Bann Estuary	2a	NP	NP
Lagan Estuary	NP	NP	NP
Newry Estuary	NP	NP	NP
Roe Estuary	2a	NP	NP
Quoile Estuary	2a	NP	NP
Conns Water Estuary	NP	NP	NP

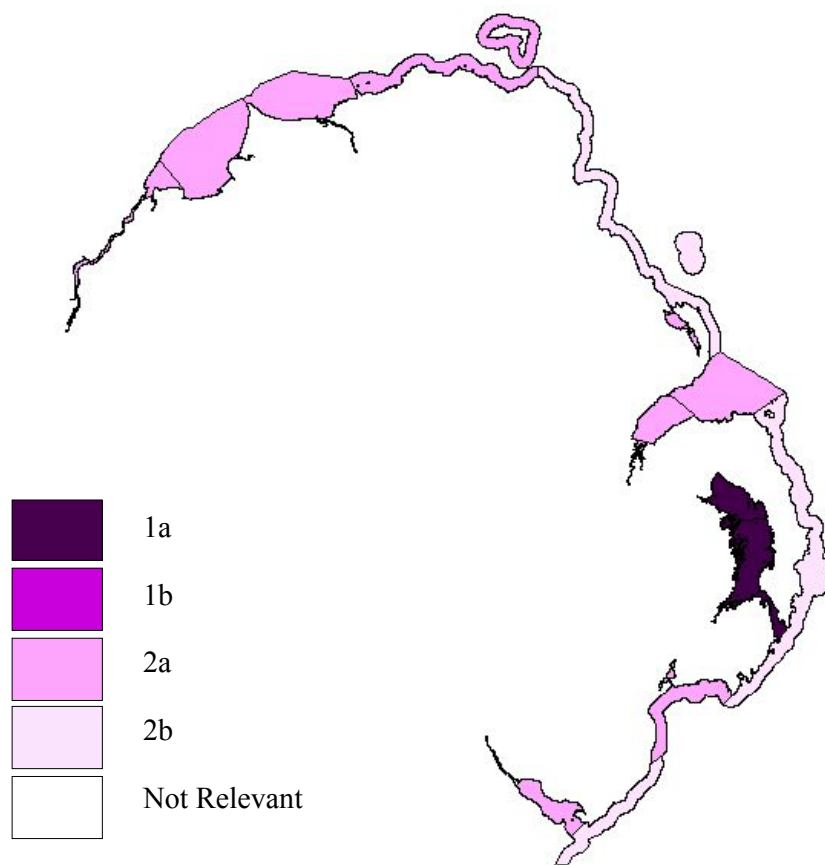


Figure 6.14. Results of risk assessment for Habitats Directive.

6.7.2. Bathing and Shellfish Water Directives

Designated Bathing and Shellfish Waters have been assessed using the following criteria and the 2001, 2002 and 2003 results:

Failure of mandatory standards – 1a

Pass mandatory standards but fail guideline standards – 2a

Pass guideline standards – 2b

The whole water body in which the protected area falls is categorised the same as the protected area. The results of the assessment can be seen in Table 6.4 and Figures 6.15 and 6.16 for Bathing and Shellfish Waters respectively.

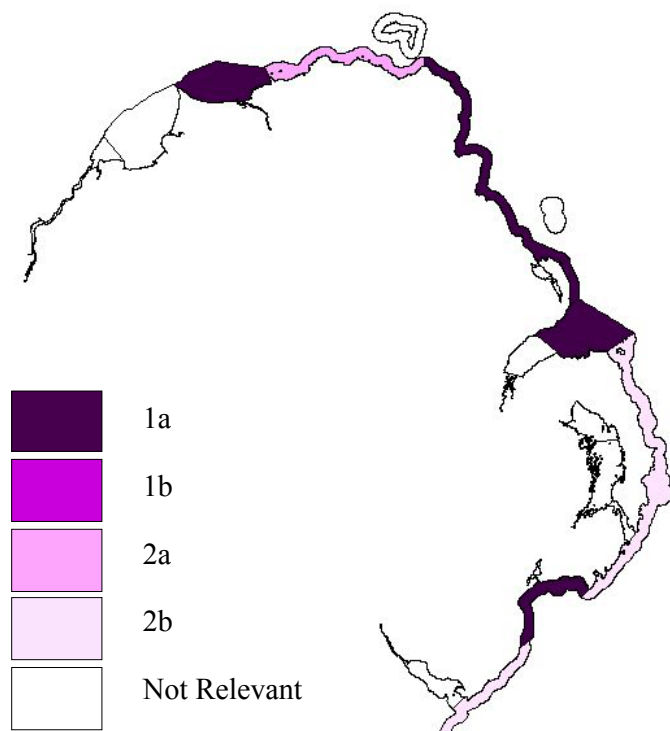


Figure 6.15 Results of risk assessment for Bathing Waters Directive.

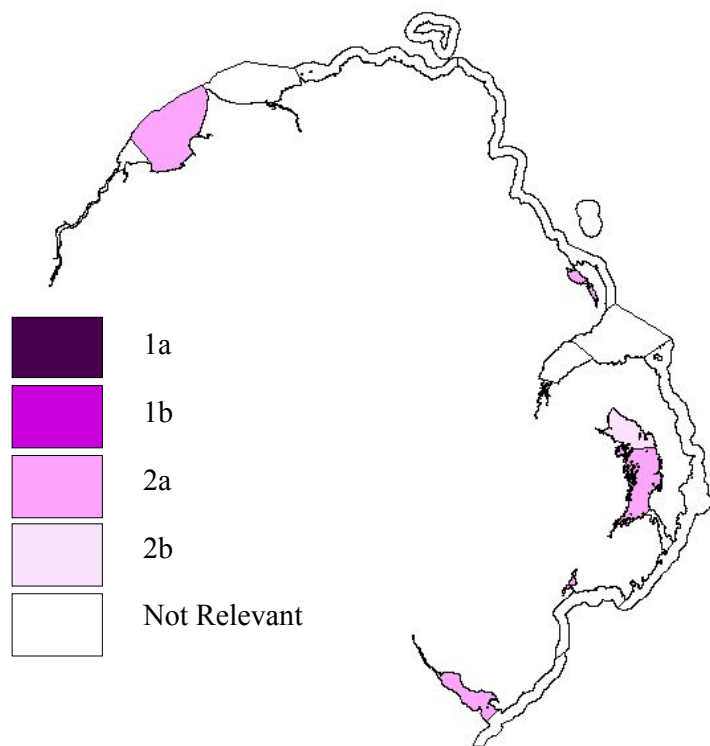


Figure 6.16. Results of risk assessment for Shellfish Waters Directive.

6.8. Overall Risk Assessment

Applying the precautionary principle and defaulting to the higher risk category for all pressures the overall risk assessment results can be seen in Table 6.5 and Figure 6.17. 95% of all coastal water bodies are at risk category 1a or 1b, and all transitional water bodies are at 1a or 1b. 60 and 57% of all coastal and transitional water bodies respectively are at significant risk (1a) and a programme of measures must be considered. Point source discharges and a risk of failing Bathing Waters Directive objectives are the most frequent pressure causing a water body to be categorised as at significant risk (1a). This reflects the inadequate sewerage infrastructure and treatment of sewage discharged to Northern Ireland coastal waters.

Table 6.5. Overall risk assessment for TraC waters.

Water Body	Overall Risk Assessment	Main Pressures on water bodies at 1a (in no order of priority)
Rathlin Island	1b	
Maiden Islands	2a	
Lough Foyle	1b	
Dundrum Bay Inner	1a	Point discharge consents
Carlingford Lough	1b	
Strangford Lough North	1a	Habitats Directive
Strangford Lough South	1a	Habitats Directive
North Channel	1a	Bathing Water Directive
Larne Lough North	1b	
Larne Lough Mid	1b	
Larne Lough South	1b	
Belfast Lough Outer	1a	Bathing Water Directive, hazardous substances, point discharge consents
Strangford Lough Narrows	1a	Habitats Directive, point discharge consents
Ards Peninsula	1a	Point discharge consents
Mourne Coast	1a	Point discharge consents
Dundrum Bay Outer	1a	Bathing Water Directive, point discharge consents
Belfast Lough Inner	1a	Hazardous substances, point discharge consents
Belfast Harbour	1a	Dredging, hazardous substances, point discharge consents
North Coast	1b	
Portstewart Bay	1a	Bathing Water Directive, point discharge consents
Foyle and Faughan Estuaries	1b	
Bann Estuary	1a	Hazardous substances
Lagan Estuary	1a	Nutrients/Eutrophication, dredging, point discharge consents, hazardous substances
Newry Estuary	1b	
Roe Estuary	1b	
Quoile Estuary	1a	Nutrients/Eutrophication
Conns Water Estuary	1a	Point discharge consents, hazardous substances

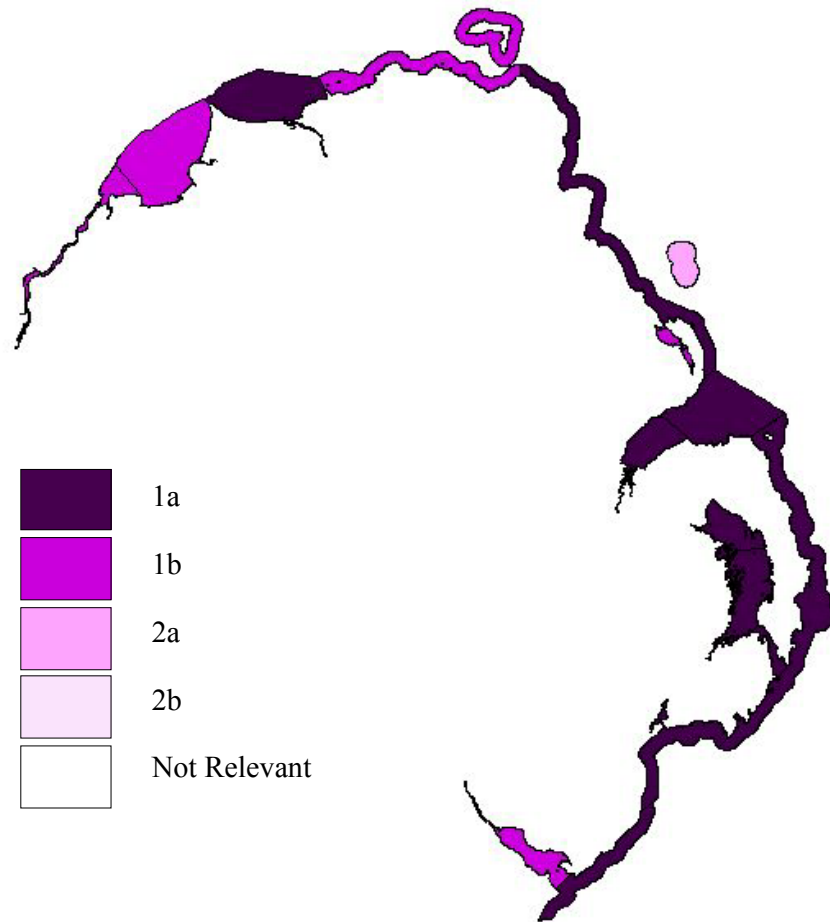


Figure 6.17. Results of overall risk assessment.

6.9. Risk Assessment for Lagoons

Risk assessment for transitional lagoons has been difficult as the information that does exist is not complete or quality assured. Most of the lagoons in Northern Ireland have been formed by cutting off inlets of water by the construction of railway lines or roads and most are considered to be at risk under hydromorphological pressures. Also by their very nature lagoons have a restricted exchange with surrounding water bodies and therefore have the potential to accumulate contaminants and nutrients that can give rise to algal growth. These combined factors have resulted in all identified transitional lagoons to be categorised as risk factor 1b. As small water bodies it is envisaged that these lagoons will be grouped together and a selection assessed for ecological status.

6.10. Reporting of Risk Assessment for Article 5

The Article 5 report requires that pressures (nutrients/eutrophication, hazardous substances etc) are categorised into the following:

- Diffuse
- Point
- Abstraction and flow regulation
- Morphology
- Other human pressures

Point sources are considered to be those directly discharging from a single point to a water body. Diffuse sources are those which come from a multiplicity of sources within a catchment. Table 6.6 details which pressure assessments have been applied to which pressure categories. Where a number of different pressure assessments have been applied to the same pressure category the highest risk category has been defaulted to (Table 6.7).

Table 6.6. Application of pressure assessments to pressure categories

Pressure category	Pressure assessments
Diffuse	Nutrients/eutrophication; hazardous substances
Point	Nutrients/eutrophication; hazardous substances; point discharges, bathing water compliance, shellfish water compliance
Abstraction and flow regulation	Abstraction and flow regulation
Morphology	Morphology
Other Human Pressures	Alien species

In a similar manner UKTAG requires that Standard Industry Codes (SIC) that reflect the type of pressure (e.g. industry, agriculture etc) must be allocated to each category. SIC codes are only applied to water bodies considered to be ‘at risk’ or ‘probably at risk’ which then allows management actions to be focused. The application of SIC codes is described below and shown in Table 6.7.

SIC Codes are as follows:

- A Agriculture, forestry and hunting
- B Fishing
- C Mining and Quarrying
- D Manufacturing
- E Electricity, gas and water supply
- F Construction
- G Wholesale and retail trade
- H Hotels and restaurants
- I Transport, storage and communication
- O Other community and personal
- U Land drainage, land claim, flood defence, urbanisation

Foy and Girvan (2004) have demonstrated that the source of nitrogen to coastal waters of Northern Ireland is predominantly from agriculture with additional significant contributions from Waste Water Treatment Works some of which directly discharge to transitional and coastal waters. Therefore the nutrients pressure has been allocated to both diffuse and point sources and the SIC codes A and O allocated for diffuse sources and the SIC code O for point sources. The application of the SIC O to diffuse sources is in recognition that a number of WWTWs discharge to a catchment which then may drain into a transitional or coastal water body

Different hazardous substances could be allocated to diffuse or point sources. For example, pesticides used in agriculture are predominantly a diffuse source, whereas some trace metals such as cadmium (Cd) are predominantly from industrial point sources. Therefore, hazardous substances have been allocated to both the diffuse and point source categories. Waste Water Treatment Works (WWTWs) and industrial sources were considered to be the greatest point source of hazardous substances and the SIC codes O and D have been applied to the point source category. Agriculture, WWTWs and urban run off were considered to be the greatest diffuse sources of hazardous substances and therefore the SIC codes A, O and I have been applied for the diffuse source category. Manufacturing industries (SIC D) discharging to rivers and lakes may

also contribute a small degree to diffuse sources of hazardous substances but it is believed to be relatively small. It is envisaged that further characterisation will identify the significance of manufacturing sources of hazardous substances in catchments discharging to transitional and coastal waters.

The point discharges pressure assessment has been allocated to the point source category. Bathing and Shellfish Water Directive compliance has also been allocated to the point source category as it was considered that point discharges were the predominant factor which influences the compliance of these directives. Point source pressures have been allocated to the SIC code ‘other community and personal (O)’ which includes pressures associated with Waste Water Treatment Works.

All of the morphological pressures have been included in the morphology category. Fishing pressures have been identified as the most likely cause of the conservation status of Strangford Lough SAC to be less than favourable and therefore at risk of failing the WFD. Risk assessment of the Habitats Directive has also been included under morphological pressures. Two SIC codes have been used for the morphological pressures which are ‘fishing (B)’ and ‘land drainage, land claim, flood defence, urbanisation (U)’.

Flow regulation and abstraction has been allocated the SIC code ‘electricity, gas and water supply (E)’.

Alien species and power station abstraction has been categorised as other human pressures. Alien species has been allocated the SIC code ‘other community and personal (O)’.

Table 6.7. Application of categories and SIC codes for reporting purposes of Article 5.

Name	Point source	SIC	Diffuse source	SIC	Abstraction and Flow Regulation	SIC	Morphological Alterations	SIC	Other	SIC	Overall
Rathlin Island	2a		2a		2b		1b	B	2a		1b
Maiden Islands	2b		2a		2b		2a		2a		2a
Lough Foyle	1b	O	1b	A,O,I	2b		1b	B,U	1b	O	1b
Dundrum Bay Inner	1a	O	1b	A,O,I	2b		1b	U	1b	O	1a
Carlingford Lough	1b	O	1b	A,O,I	2b		1b	B,U	1b	O	1b
Strangford Lough North	1b	O	1b	A,O,I	2b		1a	U	1b	O	1a
Strangford Lough South	1b	O	1b	A,O,I	2b		1a	B	1b	O	1a
North Channel	1a	O,D	2a		2b		1b	B,U	2a		1a
Larne Lough North	1b	O	1b	A,O,I	2b		1b	U	2a		1b
Larne Lough Mid	1b	O	1b	A,O,I	2b		1b	U	1b	O	1b
Larne Lough South	2a		2b		2b		1b	U,B	1b	O	1b
Belfast Lough Outer	1a	O	1a	A,O,I	2b		1b	U	1b	O	1a
Strangford Lough Narrows	1a	O	2b		2b		1a	B	2a		1a
Ards Peninsula	1a	O	1b	A,O,I	2b		1b	B	2a		1a
Mourne Coast	1a	O	2a		2b		1b	B	2a		1a
Dundrum Bay Outer	1a	O	2a		2b		2a		2a		1a
Belfast Lough Inner	1a	O	1a	A,O,I	2b		1b	B,U	1b	O	1a
Belfast Harbour	1a	O,D	1a	A,O,I	2b		1a	U	2a		1a
North Coast	1b	O	2a		2b		2a		2a		1b
Portstewart Bay	1a	O	2a		2b		2a		2a		1a
Foyle and Faughan Estuaries	1b	O	1b	A,O,I	2b		1b	U	2a		1b
Bann Estuary	1b	O,D	1a	A,O,I	1b	E	1b	U	2a		1a
Lagan Estuary	1a	O,D	1a	A,O,I	2b		1a	U	2a		1a
Newry Estuary	1b	O	1b	A,O,I	2b		1b	U	2a		1b
Roe Estuary	2a		1b	A,O,I	2b		1b	U	2a		1b
Quoile Estuary	1b	O	1a	A,O,I	2b		1b	U	2a		1a
Conn's Water Estuary	1a	O	1a	A,O,I	2b		1b	U	2a		1a

7. Intercalibration

Each member state is required to devise classification tools to assess ecological status that are applied to water bodies within their national boundaries. There is a risk that there will not be a common agreement on the boundaries between the biological element classes throughout Europe. Intercalibration is the process whereby this is achieved on a European wide level by assessing data gathered within a water body of the same type with assessment tools derived from different member states. Sites that may be used for this process are put forward to the intercalibration network.

Table 7.1 details Northern Ireland sites that have been put forward for the intercalibration network. Provisional ecological status is given for the pressure for which that water body is being tested not overall ecological status. This provisional status has been estimated for eutrophication from applying OSPAR criteria to current data, and for habitat degradation by expert judgement using current species lists.

As provisional status of the Foyle Estuary for both habitat and eutrophication pressures cannot be differentiated on the electronic forms, a good status has been given for both pressures. However, the provisional status for Foyle Estuary under habitat degradation should be considered as moderate.

Table 7.1. Transitional and coastal sites submitted to the intercalibration network.

Water Body	Pressure	Biological element	Provisional Status (for the pressure)	Boundary
Outer Belfast Lough	Eutrophication	Physiochem+macroalgae+phytoplankton	Good	G/M
Lough Foyle	Eutrophication	Physiochem+macroalgae+phytoplankton	Good	H/G
Strangford Lough	Eutrophication	Physiochem+macroalgae+phytoplankton	Good	H/G
Carlingford Lough	Habitat Degradation (aquaculture)	Benthic invertebrate fauna	Moderate	G/M
Foyle Estuary	Eutrophication	Physiochem+macroalgae+phytoplankton	Good	G/M
Foyle Estuary	Habitat Degradation (fishing)	Benthic invertebrate fauna	Good	G/M
Foyle Estuary	Habitat Degradation	Fish	Good	G/M

8. Reference Conditions

Reference conditions are the ecological quality of a type specific water body in the absence of any anthropogenic pressures. It is these reference conditions that ecological status will be assessed against. Qualitative type specific reference conditions have been derived for coastal and transitional waters by the UK/ROI Marine Task Team working groups for each of the biological elements and are detailed on the [UKTAG website](#). It has not been possible to derive reference conditions for each type as some biological elements respond to a number of different habitats within each type. In these cases the concept of habitat specific reference conditions within broader physical types defined under Annex II of the WFD using system B has been agreed as the approach to be taken. Deriving habitat specific reference conditions allows the development of appropriate reference conditions for each quality element within each type. The descriptions are qualitative at this stage and will be the subject of further review and validation in the future.

9. Conclusions

Progress has been made on the implementation of the Water Framework Directive in Northern Ireland's transitional and coastal waters. Water bodies have been delineated, and assessed for the likelihood of failing good ecological status in 2015. Work over the next 5 years will be directed at further risk assessment using improved methodologies, development of the classification tools and implementation of monitoring programmes.

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