OSPAR Common Procedure for the Identification of the Eutrophication Status of the UK Maritime Area: Northern Ireland assessment 2006-2014.

Recommendation:

This report recommends that six water bodies are classified as *problem areas* (PA). **Newry River** and **Inner Dundrum Bay** to be added to the four previously reported.

Four water bodies are to be classified as *potential problem areas (*PPA); and seventeen coastal water bodies assessed as *non problem areas* (NPA).

Introduction:

This report presents the outcome of the third application of the Comprehensive Procedure assessment to OSPAR maritime waters under the jurisdiction of the United Kingdom. The purpose was to assess the status of waters, on the basis of a harmonised set of assessment criteria to provide an *initial* classification and, using further supporting evidence, to produce a *final* classification, as either Non Problem Area or Problem Area with respect to eutrophication. Where there was uncertainty a further assessment category of Potential Problem Area has been assigned.

The first application of the Common Procedure in 2002 applied the agreed Screening Procedure to define obvious Non Problem Areas and focused attention and resources on those areas to which the Comprehensive Procedure was subsequently applied. In the second application, the *screening review* was repeated to confirm Non Problem Areas and areas to which the Comprehensive Procedure would be applied. In this, the third application, a further screening review was carried out to determine areas to which the Comprehensive Procedure should be applied.

The first application of the Common Procedure resulted in identification of most of the UK maritime area as Non Problem Area status with 12 estuaries/embayments identified as Problem Areas and 4 estuaries/embayments as Potential Problem Areas. There were 5 Non Problem Areas downstream of catchments with a size of population and/or level of agricultural activity that were of continuing interest and required monitoring to assure their continuing NPA status. The overall UK eutrophication monitoring programme was modified providing additional surveillance in particular areas of concern.

The second application of the Common Procedure broadly confirmed those of the first application. Coastal and marine waters around the UK were identified as being Non Problem

Areas with respect to eutrophication and showing no signs of undesirable disturbance. However, a number of small estuaries, loughs and harbours were identified as Problem Areas with respect to eutrophication, or at risk due to factors such as restricted circulation. The third application of the Common Procedure has taken account of approaches developed, lessons learned during the previous applications of the Common Procedure, and assessment outcomes. For marine waters, all assessment results have been included in this report, rather than in a series of individual reports per assessment region, and are given per region in the Annexes to this report. For areas assessed under EU Directives such as the Urban Wastewater Treatment Directive (UWWTD, EC 1991a), the Nitrates Directive (ND, EC 1991b) or the Water Framework Directive (WFD, EU 2000), the assessment outcomes are reported here, with further detail given in tables in the annex to this document.

Background:

DOE Marine Division carries out monitoring of causative and biological response parameters in transitional and coastal waters on behalf of DOENI.

Increased inputs of nutrients to estuaries can lead to undesirable effects associated with eutrophication, including algal blooms, changes in species composition and bottom anoxia. Several estuaries and coastal areas around the UK have increased nitrogen concentrations, elevated concentrations of chlorophyll *a* and changes in algal community composition and abundance. Through four yearly reviews, the pressures that lead to high nutrient concentrations in estuaries are assessed along with the likely effectiveness of current and proposed regulatory actions.

The OSPAR Riverine Inputs and Direct Discharges monitoring programme (RID) estimates the riverborne and direct inputs of nutrients to the waters covered by the marine review. This gives an overview of annual loadings to receiving marine waters and can provide a confirmation of data assessments and a focus for monitoring. The main pressures covered are nutrients arising from agriculture, wastewater treatment plants and industrial installations and aquaculture.

Significant reductions in N and P inputs have been realized in recent years following application of the EU's Urban Waste Water Treatment Directive. Atmospheric Nitrogen and Ammonia emissions have also decreased and are expected to decrease further in future as implementation of existing legislation continues, and new controls are introduced for activities such as shipping.

Description of assessed area:

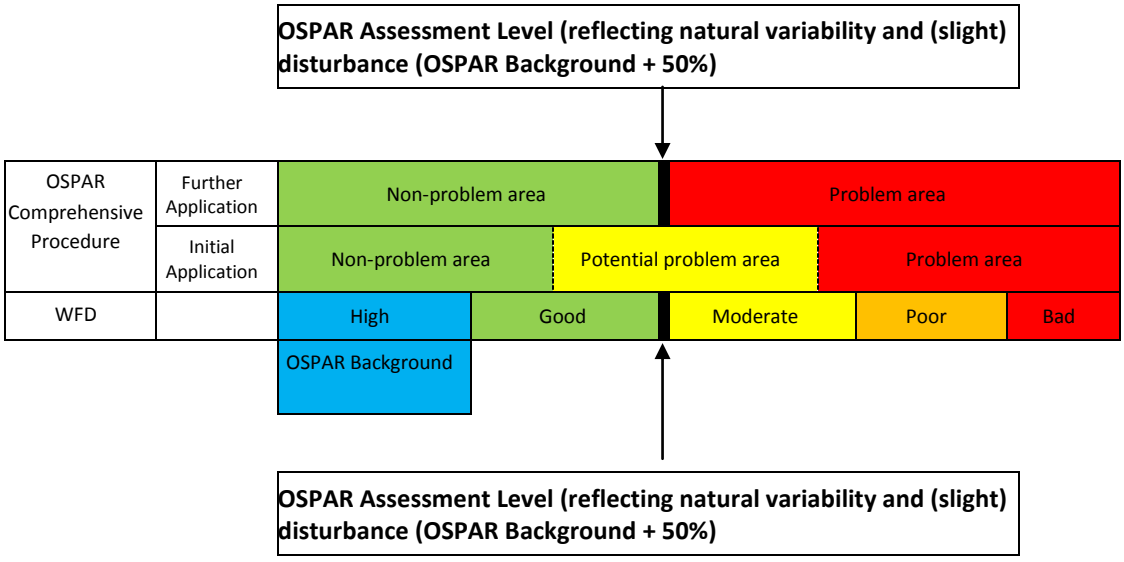
OSPAR adopted the Common Procedure for the Identification of the Eutrophication Status of the Maritime Area of the OSPAR Convention in September 1997 (OSPAR 97/15/1, Annex 24). This procedure comprises two steps. The first step is a Screening (“broad brush”)

Procedure to identify areas which in practical terms are likely to be non-problem areas with regard to eutrophication. The second step is the Comprehensive (iterative) Procedure which should enable the classification of the maritime area in terms of problem areas, potential problem areas and non-problem areas with regard to eutrophication.

Following application of the Screening Procedure, the Western Irish Sea and the offshore marine areas to the north of Northern Ireland (Minch-Malin) were not considered to be eutrophic, leaving only the inshore coastal and transitional water bodies described in the Water Framework Directive to be assessed via the Common Procedure.

Approach:

A strategic objective of the OSPAR Commission is to reduce eutrophication in the OSPAR maritime area to achieve and maintain a healthy marine environment where anthropogenic eutrophication does not occur (OSPAR agreement 2010-3). The procedure to assess progress towards this objective this is known as the Common Procedure (COMP; OSPAR Agreement 2013-8), which takes into account the causes and direct and indirect effects of eutrophication. Eutrophication assessments previous to 2006 had been carried out to address the requirements of UWWT/Nitrate Directives and OSPAR, and used UK criteria for this work. Reviews under these drivers are still required, but assessing eutrophication is now part of WFD ecological status assessment. An integrated approach has subsequently been developed for Northern Irish coastal and transitional WFD water bodies to contribute to national assessments. Guidance on harmonising eutrophication assessments under the key drivers was developed at EU level.



Harmonisation of OSPAR Comprehensive Procedure classification and Water Framework Directive status class.

Water Framework Directive (WFD):

To meet the aims of the EU Water Framework Directive, for at least 'good' ecological status, more rigorous application and implementation of the Nitrates Directive, together with changes in the Common Agriculture Policy and farming practice have been required. Even then, the slow response of the natural environment to change and the inherent variability of estuaries means that their responses may not be as predicted. Focussed monitoring plans are needed into the relationship between policy drivers and environmental responses to ensure actions taken will achieve the planned results.

Despite differences in the process of the overall quality classification of a water body with regard to its eutrophication status, a considerable degree of coherence has been achieved in setting the relevant boundaries for quality classes in OSPAR and under the Water Framework Directive for the purpose of identifying the eutrophication status of a water body.

The Water Framework Directive does not specifically mention eutrophication. Yet, the "good ecological status", one of the two elements of "good water status" to be achieved, is primarily concerned with the biological balance of organisms which is also relevant in the eutrophication context. There are other EC Directives that specifically address eutrophication and the release of nutrients to the environment. These include:

• the Urban Waste Water Treatment Directive (UWWT Directive) (91/271/EEC).

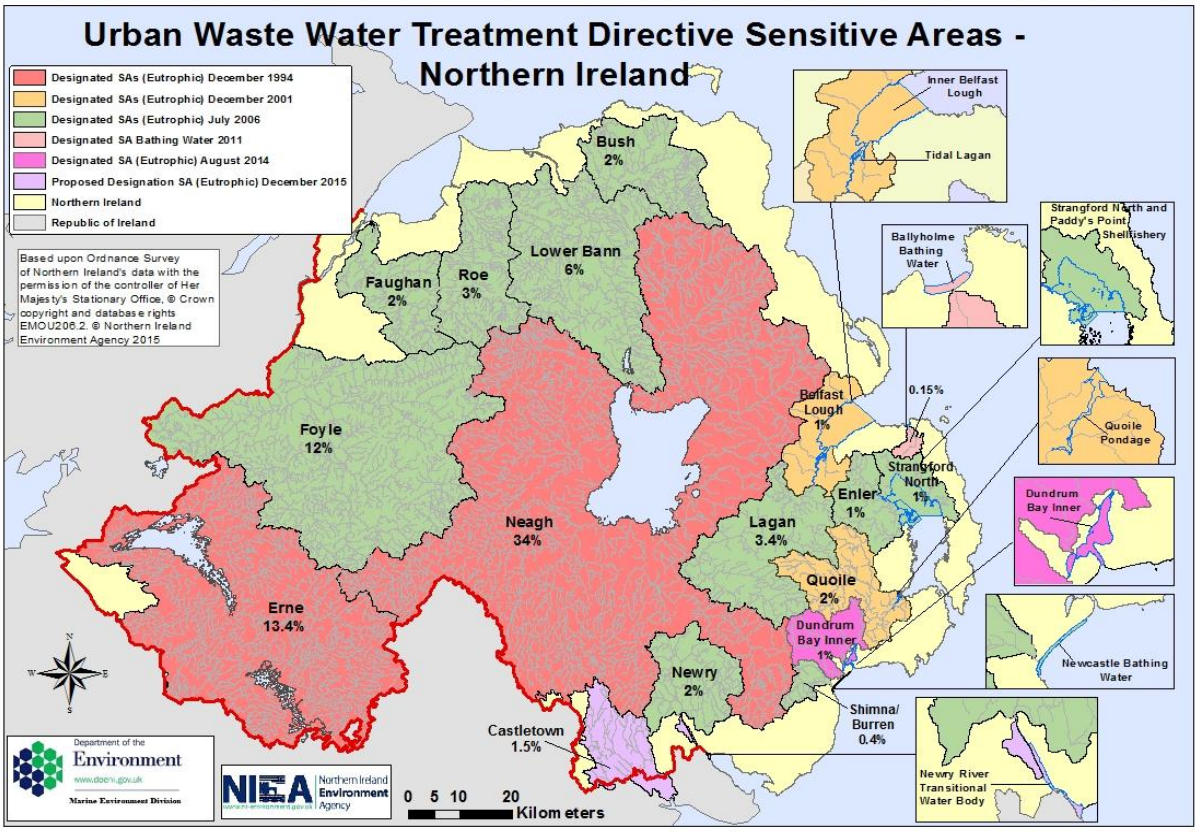
• the Nitrates Directive (91/676/EEC).

Urban Waste Water Treatment Directive (UWWTD):

The WFD since its adoption in 2000 has introduced additional controls over nutrients. This includes compliance with nutrient standards and ecological standards. Sensitive areas (eutrophic) under the UWWTD are Protected Areas under WFD and compliance with the UWWTD is a basic measure under the WFD River Basin Management Plans. WFD nutrient and biology standards are being applied to identify eutrophic water bodies. Sources of nutrients can then be controlled via measures under the UWWTD, action programmes under the ND and/or by other measures under the WFD.

The UWWTD review for the 2008–2013 period provided a trophic status assessment of the marine and freshwaters of Northern Ireland using the WFD assessment methods, as agreed by the UK Technical Advisory Group (UKTAG) in 2008. In Northern Ireland the approach for sensitive area identifications is on a catchment basis but the review detail is on a water body basis as defined under the WFD. The review is also based on a 'weight of evidence approach' in deciding whether the surface waters in a catchment should be recommended

for identification as a sensitive area (eutrophic). The results presented under the WFD assessment of marine water bodies in Northern Ireland are broadly in agreement with previous assessments carried out under the ND and UWWTD to date.



Map reflecting outcome of Urban Waste Water Treatment Directive Sensitive Area Review 2008-2013

Nitrates Directive (ND):

In Northern Ireland (NI), following extensive consultation in 2004 and 2005, the total territory approach was adopted to establish Northern Ireland as an area to which an action programme should be applied. This approach was supported by a scientific report, which identified eutrophication as the major pollution problem throughout Northern Ireland's water environment and highlighted the extent of the agricultural contribution to the problem.

A Nitrates Action Programme (NAP) has been in place across Northern Ireland since 2007. The NAP implements the EU Nitrates Directive and is supported by local legislation regulating the construction and management of farm storage and the use of chemical phosphorus fertiliser. The Directive requires that the action programme must be reviewed at least every four years. The most recent review was carried out in 2014/15. The results presented via assessment of marine water bodies using WFD tools corroborate previous and

subsequent assessments carried out for WFD and UWWTD to date. Following discussion with stakeholders and the European Commission, DOE and DARD (who are jointly responsible for NAP) proposed a number of revisions to the action programme in order to ensure that progress continues in the reduction of nutrient inputs from agriculture to the water environment. This review was completed in 2014 and the revised NAP was introduced in January 2015 to cover the period 2015-2018.

WFD assessment methods:

Degree of Nutrient Enrichment: Dissolved Inorganic Nitrogen (DIN)

Nutrient inputs to marine waters are assessed using the winter mean of DIN. The thresholds for high and good status are based on the thresholds developed for UK assessments made for the OSPAR Convention. The boundary between high and good status is given as OSPAR's "background" value. The boundary between good and moderate is OSPAR's "Assessment Level". This reflects the natural variability in water quality, plus a "slight" disturbance, as defined by OSPAR. This has been used to define offshore thresholds and reference conditions for the WFD. The UK WFD technical advisory group (UKTAG) proposed inshore and offshore thresholds related to salinity for the assessment of transitional and coastal marine waters. DOE Marine Division have used the UK WFD DIN classification tool to place water bodies in high, good, moderate, poor and bad status using the boundaries in the threshold table below.

Area	Salinity range	DIN (µM) HIGH	DIN (µM) GOOD	DIN (µM) MODERATE	DIN (µM) POOR	DIN (µM) BAD
Coastal (at salinity 32)	30-34.5	<12	≥12 ≤18	>18 ≤27	>27 ≤40.5	>40.5
Transitional (at salinity 25)	<30	<20	≥20 ≤30	≥30 ≤45	≥45 ≤67.5	>67.5

WFD Dissolved Inorganic Nitrogen (DIN) thresholds for Coastal and Transitional waters.

The distribution of inorganic nitrogen and phosphorus, and bioassay experiments specific to both shows that nitrogen is the critical limiting factor to algal growth and eutrophication in coastal marine waters, and that any ecological impact in coastal waters is less likely to be caused by phosphorus. In transitional waters, the growth limiting nutrient can fluctuate between nitrogen and phosphorus, and in these situations, nitrogen and phosphorus removal need to be considered. DOE Marine Division monitors nitrogen only during the winter period defined as November – February. This is in the form of on winter dissolved inorganic nitrogen (DIN = NO_2 + NO_3 + NH_4) which is assessed in the winter period in the presumed absence of significant plant growth. This is the primary criterion and is used in each assessment area/salinity regime, normalised to the relevant salinity. We have used winter dissolved inorganic phosphorus historically as a primary criterion, but only when assessment of the winter DIN/DIP (DIP = Dissolved Inorganic Phosphorus) ratio suggested phosphorus limitation.

The boundary between good and moderate WFD status is OSPAR's “Assessment Level”. This reflects the natural variability in water quality, plus a “slight” disturbance, as defined by OSPAR (It is actually OSPAR’s “background”, increased by 50 per cent). The UKTAG used this to define offshore thresholds and reference conditions for the WFD.

The UKTAG then derived standards for coastal and transitional waters that are related to salinity. This provides single values for UK offshore, coastal and transitional waters (normalised for salinity) for:

- Reference values (or the boundary between high and good status);
- Threshold values (or the boundary between good and moderate status).

Direct Effects: Chlorophyll-*a*

Measurements of chlorophyll-*a*, used as an estimate of phytoplankton biomass, are included in most eutrophication assessment monitoring programmes. Chlorophyll-*a* biomass is assessed as a 90th percentile against accepted threshold standards. Elevated chlorophyll biomass (moderate or worse status) can be indicative of nutrient enrichment, as increased chlorophyll-α concentrations mainly occur in nutrient-enriched waters.

Water Ref. Area		Status				
		High	Good	Moderate	Poor	Bad
North/Irish Sea	Chl ug l^{-1}	<5	5-10	10-15	15-20	>20
	EQR	0 -1.0	1.0-0.8	0.8-0.6	0.6-0.4	0.4-0.2

Reference Thresholds for WFD Coastal Chlorophyll tool

		EA Boundaries				
		High	Good	Moderate	Poor	Bad
10 (5 sub-metrics for each zone) (2 salinity zones present) 1-25psu & >25-35psu	Face Value (passes)	9	7	5	3	<2
	EQR	0.9	0.7	0.5	0.3	0
5 (only 1 salinity zone present)	Face Value (passes)	4	3	2	1	0
	EQR	0.8	0.6	0.4	0.2	0

Reference Thresholds for WFD Transitional Chlorophyll tool

Assessment methods for macroalgae :

The assessment methods for macroalgae were developed for the WFD. Status is classified into five categories from high to bad status. Moderate to bad status is indicative of pressure such as nutrient enrichment and eutrophication. The **Reduced and Full Species List (RSL)** for marine macroalgae uses basic indices to assess nutrient enrichment and disturbance pressures. The use of this tool is restricted to rocky shore environments. The indices are:

- Shore description;
- Species richness;

- Proportion of chlorophyta (green seaweed);
- Proportion of rhodophyta (red seaweed);
- Ecological Status Group Ratio – ESG ratio indicates shift from a pristine state (EGS1 – late successionals or perennials) to a degraded state (ESG2 – opportunistic or annuals); and
- Proportion of opportunists.

The Macroalgal Blooming Tool (MBT) is designed to determine the extent of algal cover and associated biomass of green algal species which develop in response to local nutrient enrichment pressure. The use of this tool is restricted to specific sedimentary habitats which favour the growth of green algal species which form dense mats in response to localised nutrient enrichment. The indices are:

- Total extent of macroalgae bed;
- % cover of available intertidal habitat at site (derived measure) and at quadrat level;
- Biomass of opportunistic macroalgal mats (g m-2);
- Biomass over available intertidal habitat; and
- Presence of entrained algae.

Direct Effects: Macroalgal Blooming Tool (MBT).

Plant tools are utilised to monitor the growth of green algal species which can form dense mats in response to localised nutrient enrichment. The tool for marine macroalgae uses basic indices to assess nutrient enrichment and disturbance pressures; and specifically the Macroalgal Blooming Tool (MBT) is designed to determine the extent of algal cover and associated biomass of green algal species which develop in response to local nutrient enrichment pressure.

Direct effects: Angiosperms (Seagrass).

This is reported as an Ecological Quality Ratio (EQR). An EQR with a value of one represents reference conditions and a value of zero represents a severe impact. The EQR is divided into five ecological status classes (high, good, moderate, poor and bad) that are defined by the changes in the biological community in response to disturbance. Once the EQR score and ecological status class have been calculated an assessment must be made to consider the certainty of the classification (i.e. confidence in the assigned class).

The basic indices are:

- Taxonomic composition – seagrass species present.
- Shoot density – measured as the estimated percentage cover of seagrass using ≤1m2 quadrates in a sampling grid.
- Bed extent – measured as area cover in m2 of the continuous bed (deemed to be at >5% shoot density) and, where possible, the whole bed (<5% shoot density).

The secondary response measurement of Dissolved Oxygen concentration is also used in the assessment of trophic status. The DIN thresholds are useful for targeting and prioritising biological monitoring. The biological tools can also be used to help show in general terms whether water bodies that are at worse than good status are improving.

Indirect effects: Dissolved Oxygen (DO).

The amount of oxygen dissolved in a water body is an indication of the degree of health of the area and its ability to support a balanced aquatic ecosystem. The discharge of an organic waste or nutrient to a water body imposes an oxygen demand on it. If there is an excessive amount of organic matter, the oxidation of waste by microorganisms will consume oxygen more rapidly than it can be replenished. When this happens, the dissolved oxygen is depleted and can have detrimental effects on the higher forms of life. DO classification is based on comparison of a 5th percentile against WFD reference standards.

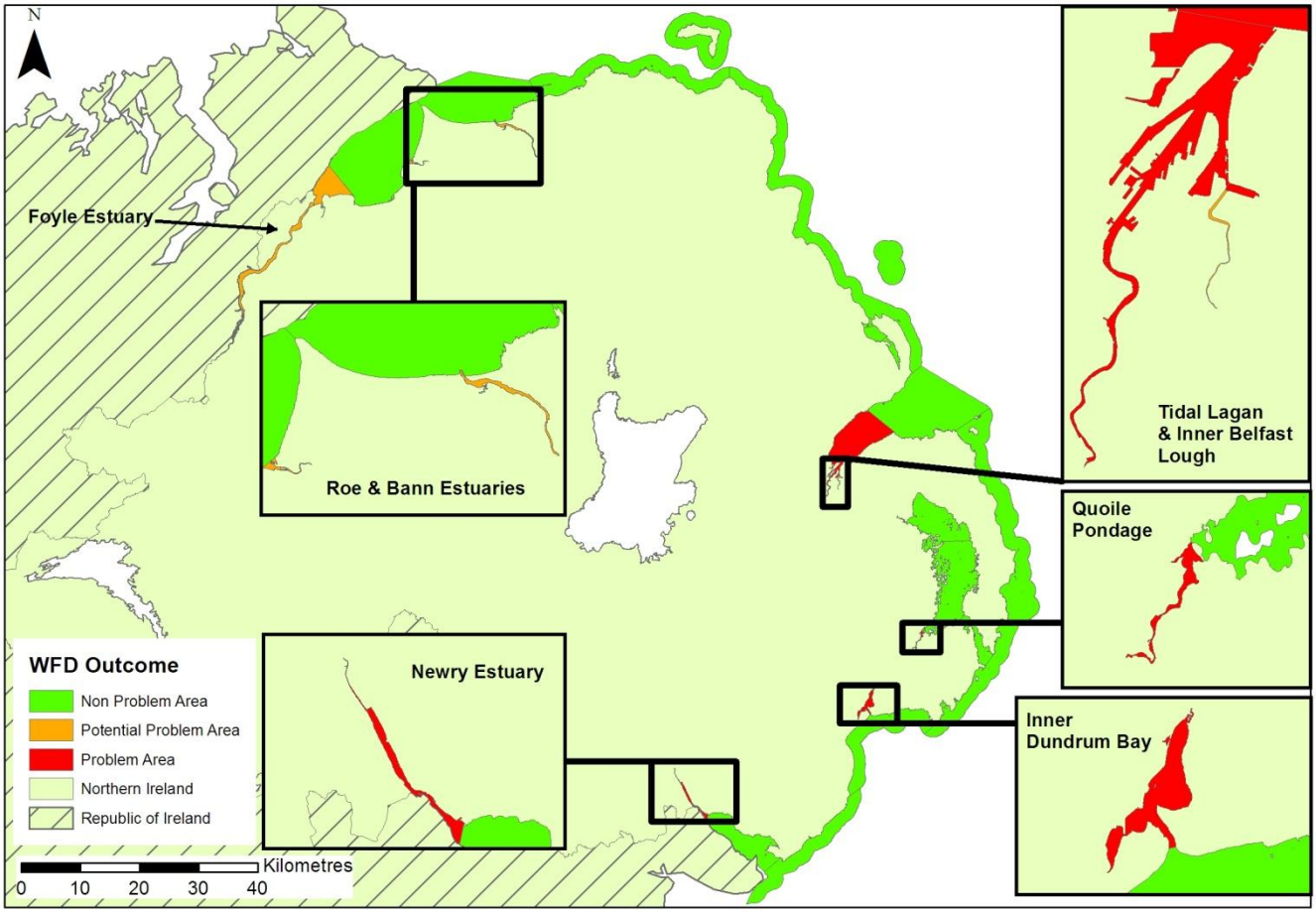
WFD Status	Marine 5%ile	Objectives
HIGH	≥5.7 mg/L	All life stages of salmonids and transitional fish
GOOD	≥4.0 <5.7 mg/L	Presence of salmonids and transitional fish
MODERATE	≥2.4 <4.0 mg/L	Most life stages of non-salmonid adults
POOR	≥1.6 <2.4 mg/L	Presence of non-salmonids, poor survival of salmonids
BAD	<1.6 mg/L	No salmonids present, marginal survival of resident species

DO thresholds for transitional and coastal marine waters

Other possible effects: Algal toxins (DSP/PSP mussel infection events).

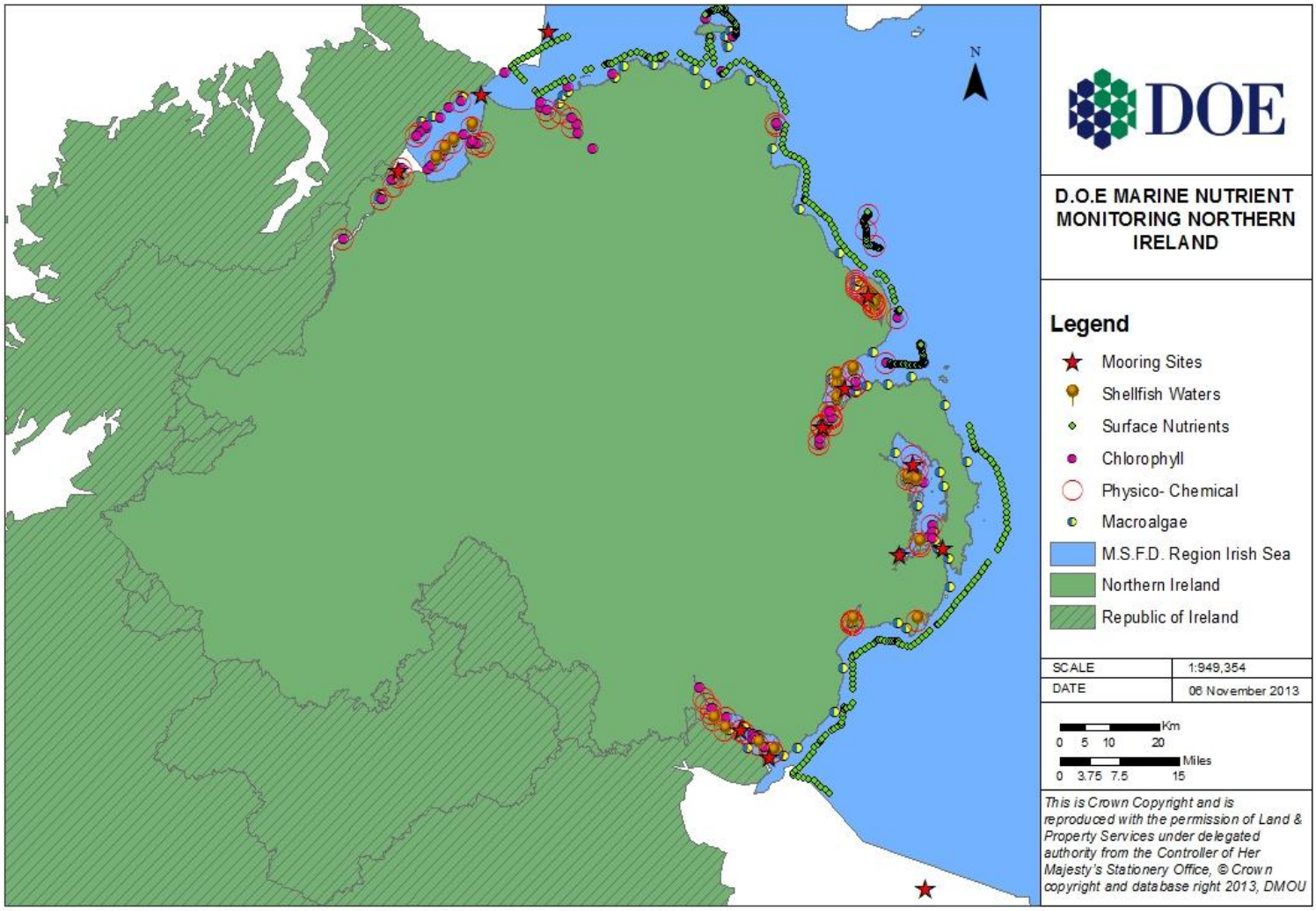
An integrated joint programme of annual monitoring managed by AFBI and FSANI was in place over the duration of the report assessing Paralytic, Diarrhetic and Amnesic shellfish producers against statutory levels. The abundance of nuisance species and any deleterious effects were also recorded.

Outcome of Eutrophication Assessment for OSPAR 2006-2014.

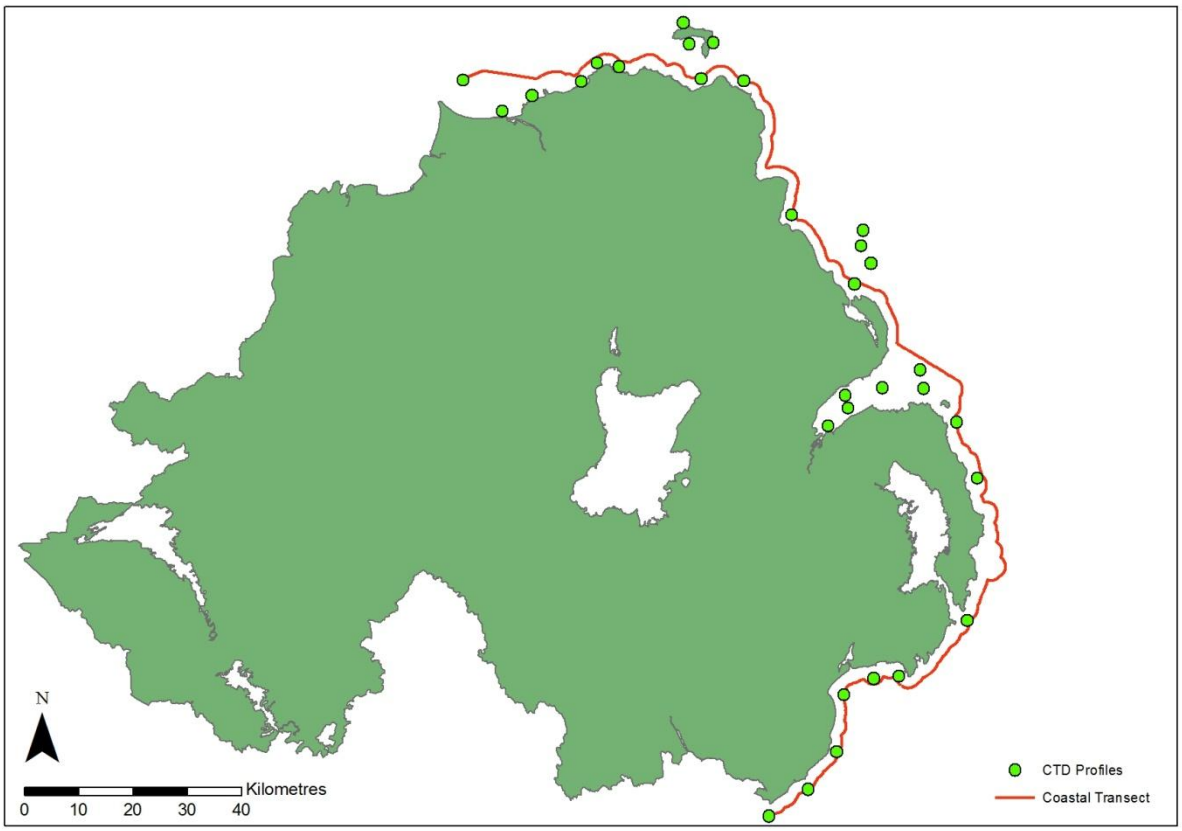


Northern Ireland assessment of coastal and transitional water bodies against Water Framework Directive tools 2006 – 2014

For the purposes of this report all data relevant to the eutrophication related parameters within Water Framework Directive were assessed for NI coastal and transitional water bodies. All of the available data was collated for the period 2006-2014.



Map showing Eutrophication Related Marine Monitoring Network over Reporting Period 2006-2014



Coastal nutrient monitoring transect and CTD profiling sites during January 2011- January 2014.

Nutrient assessment (Winter DIN):

Over the assessment period of the report, three coastal water bodies (Belfast Harbour, Belfast Lough Inner and Carlingford Lough) fell below good status for DIN.All of the transitional water bodies monitored failed the nutrient standard significantly and consistently.

Chlorophyll-*a* assessment:

One coastal water body (Belfast Harbour) failed the chlorophyll standard with two transitional areas (Lagan and Bann Estuaries) falling below good status annually and repetitively. In the case of the Bann the nutrient enrichment and subsequent failures in the biological response are attributed to upstream freshwater nutrient sources (>90% of total). Adjustments to sampling methods around salinity have provided corroborative chlorophyll failures in recent years.

Macroalgal assessment:

Belfast Harbour and Inner Dundrum bay are the only water bodies (where the tool was applicable) to fall below good status for the Macroalgal tool. In the case of Belfast Harbour this may be equally due to the physical characteristics of the harbour as much as nutrient enrichment.

Angiosperms:

Inner Dundrum bay was the only area where the tool was applicable to fail WFD tool assessment. The 2012 seagrass assessment found that large areas where seagrass had been previously been reported (2003), were no longer present. Instead, these areas were covered in opportunistic algae which have in all likelihood smothered the underlying seagrass.

Dissolved Oxygen:

In general, DO levels tend not to be an issue in coastal marine waters; however some transitional and heavily modified water bodies have exhibited short lived and intermittent yet still significant DO depressions e.g. the barraged Quoile, and the impounded River Lagan.

Paralytic Shellfish Producers:

Alexandrium spp. – during period 2006-15 204 water samples contained Alexandrium spp. cells. The maximum cell abundance was 1560 cell L^{-1} recorded in a Belfast Lough sample during May 2009.

No shellfish samples from the official control programme contained PST's (Paralytic Shellfish toxins) above the statutory level of 800µg/kg during the period 2006-2015.

Diarrhetic Shellfish Producers:

Dinophysis spp. – during the period 2006-2015 255 water samples contained Dinophysis spp. above the set trigger level of >=100 cells L^{-1}. The maximum abundance recorded during the same period was 15,660 cells L^{-1} in a sample from Belfast Lough in 2011.

Okadaic acid was recorded above the statutory level of 160µg/kg on 9 occasions. All nine were recorded during the period 26/7/11-23/8/11 and were associated with high numbers of *Dinophysis* spp. in Belfast Lough.

Prorocentrum lima- has been recorded on 10 occasions (2006-2015) above its set trigger level of >=100 cells L^{-1}. The maximum abundance recorded was 22,620 cells L^{-1} in a water sample taken from a Carlingford Lough site on 24/1/12. No toxicity or deleterious effects were reported at the time.

Amnesic shellfish producers:

Pseudo-nitzschia spp. has been recorded above the trigger level of 150,000 cells L^{-1} on 37 occasions during the period 2006-2015. The maximum cell abundance recorded was 633,200 cells L^{-1} on 6/7/15 from a site in Belfast Lough. This was accompanied by toxicity of mussels in the lough.

Domoic acid has been recorded above the statutory level of 20µg/g 41 times during the period 2006-2015 (a large proportion of these associated with the presence of domoic acid in whole scallops).

Toxicity in mussels has been linked to high *Pseudo-nitzschia* cell counts on 2 occasions.

1. During July 2012 in Belfast Lough when cell counts peaked at 258,520 cells L^{-1} with an associated toxicity in mussels of 28µg/g domoic acid.

2. During July 2015 in Belfast Lough when cell counts peaked at 633,200 cells L^{-1} with an associated toxicity in mussels of 58 µg/g domoic acid.

Nuisance species:

Noctiluca scintillans – recorded on 102 occasions during the 10 year period 2006-2015. Maximum abundance recorded was 560 cells L^{-1} in a sample from Carlingford Lough in August 2006. No reports of any deleterious effects.

Karenia mikimotoi – recorded 351 times in the 10 year period 2006-15. Maximum abundance recorded was 61,220 cells L^{-1} in a water sample from Lough Foyle in July 2012. No reports of any deleterious effects.

Phaeocystis spp. - recorded 100 times in the period 2006-2015. Maximum abundance recorded was 193,520 cells L^{-1} in May 2014 in a water sample from Dundrum Bay. No deleterious effects were reported.

Summary: Coastal Waters

Four coastal water bodies failed good status when assessed against all eutrophication related parameters. The adjacent Belfast Harbour and Inner Lough confirmed their previously confirmed status as UWWTD Sensitive Areas and OSPAR problem areas. Inner Dundrum Bay and Carlingford Lough also failed to achieve good status over the assessment period.

Inner Dundrum Bay was not identified as a Sensitive Area under the 2009 UWWTD review, although it did fail the WFD assessment on 2 criteria; winter nutrients (DIN) and the Macroalgal Blooming Tool (MBT). The report recommended further monitoring and assessment be carried out. The 2012 seagrass assessment found that large areas where seagrass had previously been

reported (2003), were no longer present. Instead, these areas were covered in opportunistic algae which have in all likelihood smothered the underlying seagrass. The bay also provided the highest recorded abundance of *Phaeocystis* spp. in NI waters over a ten year period.

In 2012 an Interim Sensitive Area Review of Inner Dundrum Bay was conducted and identified both the Bay and its catchment area as a Sensitive Area. Inner Dundrum Bay was found to be eutrophic and was subsequently designated after an interim review of the trophic status was carried out in 2013. **It is recommended that it now be designated as a Problem Area.**

Carlingford Lough received an overall moderate WFD classification as DIN results fluctuated between the upper limits of a good to a significant poor within the period of the report. This is consistent with previous assessments which also showed no biological response across plant tools. Carlingford was not considered a Problem Area in the two previous procedures and with several plant assessments displaying no evidence of undesirable disturbance; **it is recommended that it remain a Non Problem Area.**

Strangford Lough North was designated as a Sensitive Area via UWWTD review in 2006 and assessed as a Potential Problem Area in the 2008 OSPAR Comp. Subsequently reviews under different EU Directives have shown no evidence of either nutrient enrichment or detrimental biological response and **therefore it is recommended that it be designated Non Problem Area from evidence 2006-2014.**

Lough Foyle and the transitional Foyle Estuary were assessed previously as Potential Problem Areas in OSPAR 2008 based on nutrient failures but without any related plant response data, other than Chlorophyll-*a*. The estuary in particular still displays considerable DIN failures and **it is recommended that the designation remain Potential Problem Area.**

Summary: Transitional Waters

All of the Northern Ireland WFD Transitional water bodies failed overall good status when assessed against WFD eutrophication related parameters.

Newry River has shown a fall from moderate to poor status for DIN since the previous assessment and a failure year-on-year against Chlorophyll standards not observed in previous reporting cycles. This shows an overall deterioration in trophic status since the previous WFD report (2009). Whilst the overall WFD classification of chlorophyll-*a* status of the receiving water body (Carlingford Lough) during the 2009-2015 period remains at Good status, it is clear from the data that there are pronounced short-lived blooms. Newry River Sensitive Area (Eutrophic) designation was made in 2014 in order to prevent the further deterioration of Newry River transitional water body. . **It is recommended that it now be designated as a Problem Area.**

The Lower **Bann Estuary** fails on DIN and Chlorophyll-*a* assessment. However, earlier studies have shown that the nutrient enrichment is associated with the Lough Neagh and Lower Bann

freshwater catchment which are already identified as a sensitive area (eutrophic). Although failing nutrient and plant standards consistently; no action is recommended based on the justification for non-designation given in previous reports i.e. over 90% of nutrient loadings are attributable to upstream sources, notably Lough Neagh. The potential for undesirable disturbance therefore remains and **it is recommended that the designation remain Potential Problem Area.**

Roe Estuary received an overall poor classification with substantial and repeated failures against WFD DIN standards. This assessment is consistent with previous assessments for other directives which indicated no biological response across plant tools. The Roe **is therefore recommended as Potential Problem Area** due to the scale and the duration of the nutrient failures and the potential for undesirable disturbance.

Connswater Estuary (like the Roe) has failed significally and consistently over time against the DIN standard with no observed plant response detected and **is therefore recommended as Potential Problem Area** due to the scale and the duration of the nutrient failures and the potential for undesirable disturbance.

Quoile Pondage is an impounded estuary dominated by freshwater and the absence of a significant or sustained saline influence in the Quoile prevented the use of WFD marine assessment tools (which are salinity calibrated) however moored instrumentation has documented some catastrophic dips in dissolved oxygen levels (occasioning recorded fish kills), and there have been numerous records of large scale algal blooms within the impoundment historically. The Quoile Pondage was identified as being eutrophic and was designated as Sensitive (Eutrophic) under the UWWTD in December 2001 and assessed as a Potential Problem Area in the 2008 OSPAR Comp. **It is recommended that it remain a Problem Area.**

Note:

In spite of nutrient reduction programmes, a number of the small marine eutrophication problem areas in coastal and transitional waters are likely to remain at their current status. Revisions of the Directives and ongoing refinements to approaches to implementation can mean that revised standards might be adopted, particularly where there is no biological response to nutrient failures and which then might require adjustments to existing status. The UK Water Framework Directive Technical Advisory Group (UKTAG) has prioritised addressing concerns about some of the existing standards, and gaps in our understanding of the relationships between pressures and ecological impact. This work is proposed to take place over the next 2-3 years with the latest deadline for standards work being late 2016 / early 2017 in order to feed into the 3rd river basin planning cycle. This would reduce the mismatches between chemical standards and biological tools, particularly N in estuaries, to align standards in a better way, improve validation and reduce the need for derogations/ alternative objectives. Further refinements to the existing standards are likely to have a significant beneficial impact.

Tables:

Country	Assessment area	OSPAR 2016	OSPAR 2008	OSPAR 2002
Northern Ireland	Inner Belfast Lough & tidal Lagan impoundment	PA	PA	PA
	Carlingford Lough	NPA	NPA	NPA
	Larne Lough	NPA	NPA	NPA
	Strangford Lough North	NPA	PPA	
	Strangford Lough South	NPA	NPA	NPA
	Outer Belfast Lough	NPA	NPA	NPA
	Foyle estuary and Lough	PPA	PPA	
	Dundrum Bay Inner	PA		
	Newry Estuary (HMBW)	PA		
	Roe Estuary	PPA		
	Bann Estuary (HMBW)	PPA		
	Connswater (HMBW)	PPA		
	Quoile Pondage	PA	PA	

Final classifications in transitional and coastal waters in Northern Ireland (HMWB = heavily modified water body).

Water Body	WFD Type	Nitrates Directive	Designated SA	2008 Comp.Proc.	PA/NPA 2014
Lough Foyle	Coastal	NVZ (Total Territory)		PPA	NPA
Portstewart Bay	Coastal	NVZ (Total Territory)			NPA
Rathlin	Coastal	NVZ (Total Territory)			NPA
North Coast	Coastal	NVZ (Total Territory)			NPA
North Channel	Coastal	NVZ (Total Territory)			NPA
Maidens	Coastal	NVZ (Total Territory)			NPA
Larne Lough North (HMWB)	Coastal	NVZ (Total Territory)		NPA	NPA
Larne Lough Mid	Coastal	NVZ (Total Territory)		NPA	NPA
Larne Lough South	Coastal	NVZ (Total Territory)		NPA	NPA
Belfast Lough Outer	Coastal	NVZ (Total Territory)		NPA	NPA
Belfast Lough Inner	Coastal	NVZ (Total Territory)	2001	PA	PA
Belfast Harbour (HWMB)	Coastal	NVZ (Total Territory)	2001	PA	PA
Ards Peninsula	Coastal	NVZ (Total Territory)			NPA
Strangford Lough North	Coastal	NVZ (Total Territory)	2006	PPA	NPA
Strangford Lough South	Coastal	NVZ (Total Territory)		NPA	NPA
Strangford Lough Narrows	Coastal	NVZ (Total Territory)			NPA
Dundrum Bay Outer	Coastal	NVZ (Total Territory)			NPA
Dundrum Bay Inner	Coastal	NVZ (Total Territory)	2014		PA
Mourne Coast	Coastal	NVZ (Total Territory)			NPA
Carlingford Lough	Coastal	NVZ (Total Territory)		NPA	NPA
Foyle and Faughan (HMWB)	Transitional	NVZ (Total Territory)		PPA	PPA
Roe Estuary	Transitional	NVZ (Total Territory)			PPA
Bann Estuary (HMWB)	Transitional	NVZ (Total Territory)			PPA
Lagan Estuary (HMWB)	Transitional	NVZ (Total Territory)	2001	PA	PA
Connswater (HMWB)	Transitional	NVZ (Total Territory)			PPA
Quoile Pondage (HMWB)	Transitional	NVZ (Total Territory)	2001	PA	PA
Newry Estuary (HMWB)	Transitional	NVZ (Total Territory)	2014		PA

WFD water bodies in Northern Ireland, and final classifications under the OSPAR Common Procedure for the assessment period, 2006-2014. All water bodies have been designated as Nitrate Vulnerable Zones (NVZ), and some have been designated as Sensitive Areas (SA). Classifications during the second application of the Comprehensive Procedure (COMP) in 2008 are shown. Blank areas indicate where water bodies were not classified. PA = Problem Area, NPA = Non Problem Area, PPA = Potential Problem Area.

	OSPAR Comprehensive procedure 2006-14						
	2006-14	2006-14	2006-14	2006-14	2006-14	2006-14	2006-14
Water Body	**DIN**	**DO**	**Chpl-a**	**MBT**	**RSL**	**Seagrass**	**Overall**
Lough Foyle	Good	High	Good	High	High	High	Good
Portstewart Bay	High	High	High		High		High
Rathlin	High	High	High		High		High
North Coast	High	High	High		High		High
North Channel	High	High	High		High		High
Maidens	High	High	High		High		High
Larne Lough North (HMWB)	High	High	High		High		High
Larne Lough Mid	High	High	High		Good		Good
Larne Lough South	Good	High	Good	High	High	Good	Good
Belfast Lough Outer	High	High	Good		High		Good
Belfast Lough Inner	Moderate	High	Good		Good		Moderate
Belfast Harbour (HWMB)	Bad	High	Bad		Moderate		Bad
Ards Peninsula	High	High	High		High		High
Strangford Lough North	High	High	Good	Good	Good	Good	Good
Strangford Lough South	High	High	High		High		High
Strangford Lough Narrows	High	High	High		High		High
Dundrum Bay Outer	High	High	High		High		High
Dundrum Bay Inner	High	High	High	Moderate		Moderate	Moderate
Mourne Coast	High	High	High		High		High
Carlingford Lough	Moderate	High	Good	Good	High	High	Moderate
Foyle and Faughan (HMWB)	Poor	High	High				Poor
Roe Estuary	Poor	High	High		High		Poor
Bann Estuary (HMWB)	Poor	High	Moderate				Poor
Lagan Estuary (HMWB)	Bad	Moderate	Bad				Bad
Connswater (HMWB)	Poor	Good	High		High		Poor
Quoile Pondage (HMWB)		Moderate					Moderate
Newry Estuary (HMWB)	Poor	High	High		High		Poor

WFD water bodies in Northern Ireland, showing WFD assessment outcomes per element and overall.

	Assessment against WFD eutrophication related tools only			
	ND 2012	2006-14	UWWTD 2015	WFD 2015
Water Body	Overall	OSPAR Comp.	Overall	Overall
Lough Foyle	Moderate	Good	Good	Good
Portstewart Bay	Good	High	High	High
Rathlin	High	High	High	High
North Coast	High	High	High	High
North Channel	High	High	High	High
Maidens	High	High	High	High
Larne Lough North (HMWB)	Good	High	Good	High
Larne Lough Mid	Good	Good	Good	High
Larne Lough South	Good	Good	Good	High
Belfast Lough Outer	Good	Good	Good	High
Belfast Lough Inner	Moderate	Moderate	Poor	Moderate
Belfast Harbour (HWMB)	Moderate	Bad	Bad	Bad
Ards Peninsula	Good	High	High	High
Strangford Lough North	Good	Good	Good	Good
Strangford Lough South	Good	High	Good	High
Strangford Lough Narrows	Good	High	Good	High
Dundrum Bay Outer	Good	High	Good	High
Dundrum Bay Inner	Moderate	Moderate	Poor	Moderate
Mourne Coast	Good	High	Good	High
Carlingford Lough	Moderate	Moderate	Moderate	Moderate
Foyle and Faughan (HMWB)	Moderate	Poor	Moderate	Poor
Roe Estuary	Moderate	Poor	Moderate	Moderate
Bann Estuary (HMWB)	Moderate	Poor	Poor	Poor
Lagan Estuary (HMWB)	Moderate	Bad	Bad	Bad
Connswater (HMWB)	Moderate	Poor	Poor	Poor
Quoile Pondage (HMWB)	Moderate	Moderate	Moderate	Moderate
Newry Estuary (HMWB)	Moderate	Poor	Poor	Poor

WFD water bodies in Northern Ireland and timeline of overall assessment outcomes under the different EU Directives.WFD terminology is used here for status. OSPAR Non Problem Area status is generally assigned to areas where WFD status is above moderate (i.e. good or high against all assessments. ND = Nitrates Directive, UWWTD = Urban Waste Water Treatment Directive. OSPAR COMP = Comprehensive Procedure.