

RIVER BASIN MONITORING PLAN

# WATER FRAMEWORK DIRECTIVE 1<sup>ST</sup> CYCLE CLASSIFICATION SUMMARY

2009-2015

Coastal Water Body – Belfast Lough  
Outer

31/05/2015

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	<table border="1"> <tr> <td>Version Date:</td> <td>31/05/2015</td> </tr> <tr> <td colspan="2" style="text-align: center;"><b>MONITORING &amp; ASSESSMENT TEAM</b></td> </tr> </table>	Version Date:	31/05/2015	<b>MONITORING &amp; ASSESSMENT TEAM</b>
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**BELFAST LOUGH OUTER**

Water body Information

- River Basin District: NE
- Water Body Code: UKGBNI6NE080
- Water body type: CW5
- Water body characteristics: Euhaline, mesotidal, moderately exposed
- Water body area: 137.27 km<sup>2</sup>
- Heavily Modified Water Body: No
- 2015 Classification Objective: Good

<b>FINAL CLASSIFICATION</b>	<b>GOOD</b>	<b>PASS/FAIL 2015 OBJECTIVE</b>	<b>PASS</b>
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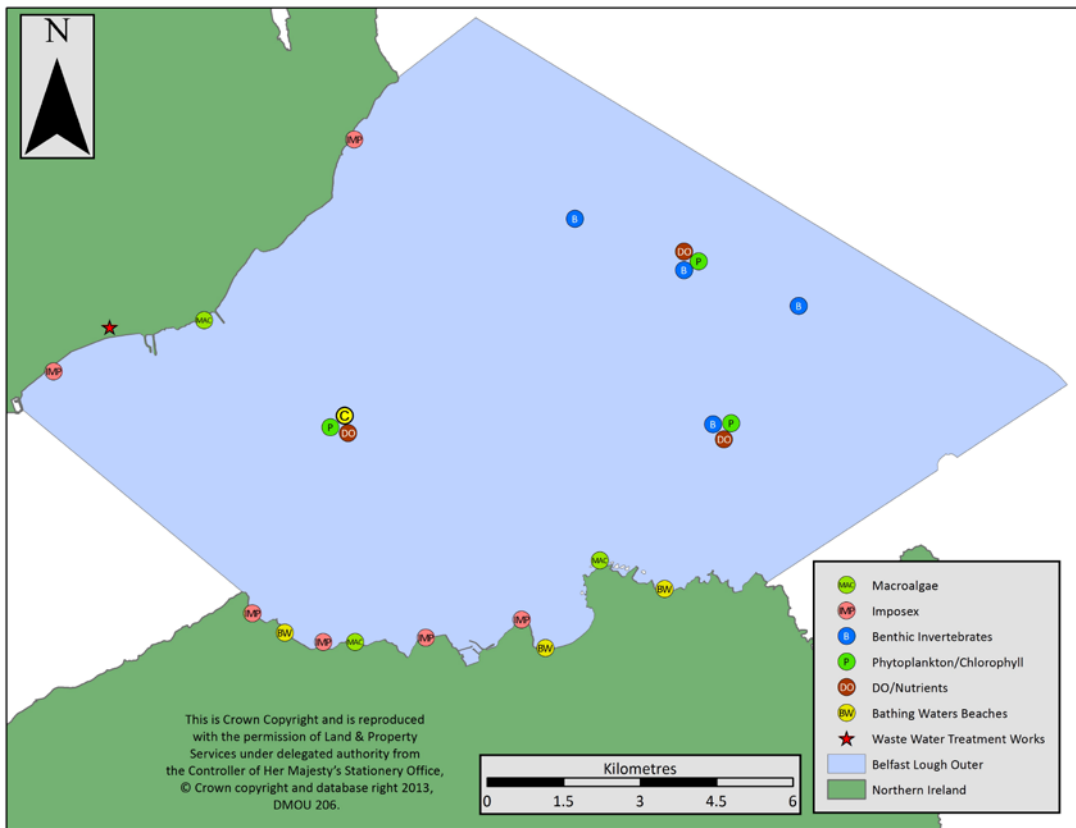


Figure 1: Waste water treatment pressures and monitoring points within Belfast Lough Outer (Coastal Water).


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Table 1: Parameters for which classification systems are available and have been used in this round of classification. Some biological assessment tools are not suitable for all water bodies due to habitat type.

Ecological Quality Element			
<i>Main Element</i>	<i>Sub-Element</i>	<i>Applied</i>	<i>Comment</i>
<b>Phytoplankton</b>	Biomass	✓	
	Elevated Taxa Count Index	✓	
<b>Macroalgae (Seaweeds)</b>	Opportunistic Macroalgae	<input checked="" type="checkbox"/>	Tool not suitable.
	Reduced Species List	✓	
<b>Angiosperms</b>	Seagrass	<input checked="" type="checkbox"/>	Tool not suitable.
	Saltmarsh	<input checked="" type="checkbox"/>	
<b>Benthic Invertebrates</b>	Infaunal Quality Index	✓	
	Imposex	✓	
<b>Physico-chemical (Water)</b>	Dissolved Oxygen	✓	
	Nutrients	✓	
	Specific Pollutants (Annex VIII substances)	<input checked="" type="checkbox"/>	No Data
<b>Hydromorphological Quality Elements</b>	SEPA Rapid Designation	✓	
	TraC MIMAS	✓	
Chemical Status			
<b>Priority Hazardous Substances</b>	Annex X substances	<input checked="" type="checkbox"/>	No Data


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Table 2: Sampling frequency for each quality element.

*Monitoring Level: Surveillance*

Quality Elements		Data years contributing to classification	No. of sites/samples
<b>Biological</b>			
Phytoplankton		2009-2014	18 sites
Macroalgae (Seaweeds)	Reduced Species List	2010-2014	3 sites
Benthic Invertebrates	Infaunal Quality Index	2010-2013	24 sites
	Imposex	2010,2013	5
<b>Physico-chemical</b>			
Nutrients		2010, 2012-2015	12 sites 110 samples
Dissolved Oxygen (DO)		2010-15	133 daily averages
Specific polluting substances (Annex VIII)		No Data	
<b>Hydromorphology</b>		2007	
<b>Water chemistry</b>			
(Annex X)		No Data	

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Biological Quality Elements											
Flora					Fauna						
Phytoplankton	H				Benthos	G			Biological Quality	G	
Macroalgae	H				Fish						
Angiosperms											

Physico-chemical Elements						
General conditions						
Oxygen (DO)	H			Nutrients (DIN)	H	
					Status	H
Specific pollutants (Annex VIII)						
NO DATA					Status	

Hydromorphological Quality Elements		
	Status	G

Chemical Status		
Priority hazardous substances (Annex X)		
NO DATA	Good	
	Fail	

High Impact Invasive Species	
None recorded	
Established	G
Impacting	


  

Ecological Status	
	High
G	Good
	Moderate
	Poor
	Bad

Surface Water Status	
	High
e	Good
	Moderate
	Poor
	Bad

Figure 2: Overall classification of Belfast Lough Outer (Coastal Water)

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## ANNEX A: Classification of Biological Quality Elements

### QE: Phytoplankton

QE phytoplankton assessment (+ Data confidence):	<b>HIGH (84.4%)</b>	
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#### Classification tools:

1. Chlorophyll biomass index (90%ile)
2. Elevated taxa count index

#### Data store (classification):

[..\Coastal data\Belfast Inner&Outer 90th Percentile.xls](#)

[M:\Projects 14\Phycology 2014\MM14-14 Phytoplankton and Chlorophyll\classification 15\Coastal data\BELFAST OUTER 2015.XLS](#)

- **Data Availability (spot & continuous samples):**  
Phytoplankton = NA  
Chl = spot (2009-2014) NIEA/MD

#### 1. Chlorophyll Biomass Index - 90%ile (Chl $\mu\text{g l}^{-1}$ ) (Growing Season 1<sup>st</sup> Mar – 31<sup>st</sup> Oct)

#### Waterbody Chl. biomass assessment

**GOOD (95.0%)**

- **Thresholds:**


Water Ref. Area		Status				
		High	Good	Moderate	Poor	Bad
North/Irish Sea	Chl $\mu\text{g l}^{-1}$	<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

#### Results:

90%ile	Status	EQR	Data Years	No. of Sites	No. of Samples	Data Confidence
5.66	<b>GOOD</b>	0.77	2009-2014	3	79	95.0%

Data confidence: 95.0%

Data analysed using [M:\Projects 14\Phycology 2014\MM14-14 Phytoplankton and Chlorophyll\classification 15\2015CW Phytoplankton CoC tool v107 UKTAG.xls](#)

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## 2. Elevated Taxa Count Index Waterbody Elevated Taxa Assessment

### Thresholds:

Tool	Thresholds	
	North/Irish Sea	Atlantic
I <sub>1</sub> - Individual Species Count (excl. Phaeocystis) (%)	500,000 (cells l <sup>-1</sup> )	
I <sub>2</sub> - Total Taxa Count (%)	10 <sup>7</sup> (cells l <sup>-1</sup> )	
I <sub>3</sub> - Elevated Biomass Count (%)	>10 (µg l <sup>-1</sup> )	>5 (µg l <sup>-1</sup> )

### EQR Boundaries:

Class	% Exceedance	EQR
High	0-15	0.67-1.0
Good	15-30	0.33-0.67
Moderate	30-40	0.28-0.33
Poor	40-50	0.20-0.33
Bad	>50	0-0.20

### Results % Exceedance:

I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	Elevated Count EQR	Status	Data Years	No. of phytoplankton samples	Data confidence
17.2%	1.7%	1.7%	0.868	HIGH	2009-2014	58	93.5%


Data confidence: 93.5%

Data analysed using [M:\Projects 14\Phycology 2014\MM14-14 Phytoplankton and Chlorophyll\classification 15\2015CW Phytoplankton CoC tool v10 7 UKTAG.xls](#)

Presence of alien/ nuisance species: *none*

### Overall Waterbody Status

HIGH (84.4.%)

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### QE: Macroalgae Belfast Lough Outer

QE macroalgal assessment (+ data confidence):	<b>HIGH (99.9%)</b>	
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Classification tools:

1. Reduced species list (RSL).
2. Macroalgal Blooming Tool (MBT) – not suitable.
3. Angiosperms – not suitable

#### Reduced Species List (RSL)

- **WFD surveillance monitoring:** 2010, 2014
- **Data Availability (classification):** 2010, 3 Sites, 2014 – 3 sites
- **Data Store:** [M:\Projects\\_14\Phycology\\_2014\MM14-12 Intertidal Rocky Shore\FSL-RSL Classification update 2015 \(09-14\)\Datasheet.xls](M:\Projects_14\Phycology_2014\MM14-12 Intertidal Rocky Shore\FSL-RSL Classification update 2015 (09-14)\Datasheet.xls)


#### Boundaries:

Parameters	Quality Status	Bad	Poor	Moderate	Good	High
	Sub-metric quality status	0.0 – 0.2	0.21 – 0.4	0.41 – 0.6	0.61 – 0.8	0.81 – 1.0
Species richness (adj. for shore)		0 – 3	3 – 10	10 – 20	20 – 34	34 – 68
Proportion of Chlorophyta (% G)		80 – 100	45 – 80	30 – 45	20 – 30	0 – 20
Proportion of Rhodophyta (% R)		0 – 10	10 – 25	25 – 35	35 – 45	45 – 100
Ecological Status Group ratio (ESG)		0.0 – 0.2	0.2 – 0.4	0.4 – 0.6	0.6 – 0.8	0.8 – 1.2
Proportion of opportunists (% opp)		50 – 100	35 – 50	25 – 35	15 – 25	0 – 15

#### Results:

Shore	Sub-Metric EQR							RSLE QR	Status
	Shore desc.	Sp. richness	Adj. Sp. Richness	% G	% R	ESG	% Opp		
Ballymacormick 10	14	64	68	14.06	53.13	1.00	10.9	0.87	HIGH
Salt Mines 10	12	49	59.3	16.33	49.0	1.23	14.3	0.85	HIGH
Swinley Pt 10	17	50	43.5	14.00	56.00	1.08	10.0	0.86	HIGH
Ballymacormick 14	18	54	57.78	12.96	51.85	1.35	9.26	0.873	HIGH
Swinley Point 14	17	53	46.11	16.98	52.83	0.96	13.21	0.817	HIGH
Salt Mines 14	12	49	59.29	12.24	57.14	1.23	14.29	0.860	HIGH
Mean								0.85 +/- 0.02	HIGH



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### Macroalgae (cont'd)

#### Data Confidence: High (99.9%)

- Data analysed for Confidence of Class using [M:\Projects 14\Phycology 2014\MM14-12 Intertidal Rocky Shore\PIRATES\\_v04 - Class update 2015 \(09-14\) for UKTAG.xls](#)
- Standard deviations ( $\pm$ ) are included with the mean EQR
- Data QA (expert team)
- WFD specific data (Reduced species list completed; Full species list not yet carried out).
- Three shores (good spatial coverage) over two years (moderate temporal trend assessment).

**Alien taxa:** *Sargassum muticum* and *Colpomenia peregrine* present.

#### QE: Angiosperms Belfast Lough Outer – Tool not applicable

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**QE: Benthic Invertebrates**

<b>QE benthic invertebrate assessment (+ Data confidence):</b>	<b>GOOD (L)</b>	
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Classification tools: 1. Infaunal Quality Index (IQI)  
2. Imposex tool (VDSI)

1. *IQI (UKTAG v01 20140228)*

Water body IQI assessment:

**Good (Low)**

WFD surveillance monitoring:


- **Data store:** [..\Belfast Lough Outer water body\Belfast Lough Outer water body 08-13 fauna data 1mm.xlsx](#)
- **Benthic invertebrates** UNICORN (NMMT) Database
- **Supporting Parameters** Water Quality Data Set
- **Digital images** AMAP Project folder
- **Data Availability (classification):** 24 sites, 5, 3 & 1 reps, 4 years, Day Grab, 1 mm sieve, n= 74.
- **Boundaries (Intercalibrated NEAGIG):**

Class	Bad	Poor	Moderate	Good	High
<b>IQI</b>	>0.0 ≤0.24	≥0.24 <0.44	≥0.44 <0.64	≥0.64 <0.75	≥0.75

**Results**

Year	Survey	Station	n	Annual Mean	Annual ± S.D	Status
2010	MM-CSEG, FEPA	IS1(5), F1(3), F2(3), F7(3)	14	0.73	0.08	Good
2011	MM-CSEG, FEPA	IS1(3), F1(3), F2(3), F7(3)	12	0.74	0.05	Good
2012	MM-CSEG, FEPA, BParker12	IS1(5), F1(3), F2(3), F7(3), P4,9,10,14,16, 17,31-44	34	0.76	0.05	High
2013	MM-CSEG, FEPA	IS1(5), F1(3), F2(3), F7(3)	14	0.74	0.03	Good
2014	MM-CSEG, FEPA	IS1(5), F1(3), F2(3), F7(3)	-	-	-	-
2015	MM-CSEG, FEPA	IS1(5), F1(3), F2(3), F7(3)	-	-	-	-
<b>Overall 6 year waterbody means</b>			<b>18.5</b>	<b>0.74 (*0.69)</b>	<b>0.05</b>	<b>Good</b>

\* IQI derived from data averaged minus Standard Deviation (see issues with tools paper). This figure is used for classification.

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**Data confidence:**

**Low**

- Sample analysis QA'd through NMBAQC (Good)
- Database QA'd (Good)
- No specific WFD data (4 single points with reps and additional spatial coverage in 2012 with 20 sites)

Alien taxa present: *Crepidula fornicata* (Slipper limpet) recorded as present in AFBNI survey - 2009.

2. *VDSI (Nucella lapillus)*

**Waterbody VDSI assessment:**

**High (H)**

- **Data store:** [..\..\BIOEFFECTS\Imposex\Imposex 2013\Report\IMPOSEX MASTER DATA SHEET TEMPLATE.xls](#)
- **Data availability:** 2004/2007/2010/2013 NI survey

**Boundaries:**

Class	Good	High
VDSI	≥0.3 to <4.0	<0.3
EQR	≥0.34 to <0.95	≥0.95


**Results:**

Year	Shore	VDSI	EQR	Status
2013	Clachan Rock	0.44	0.93	Good
2013	Helen's Bay	0.11	0.98	High
2013	Lukes Point	0.10	0.98	High
2013	Smelt Mill Bay	0.00	1.00	High
2013	Swinley Point	0.00	1.00	High
	<b>Mean</b>	<b>0.13</b>		<b>High</b>

**Data confidence:**

**High**

- Sample analysis QA through QUASIMEME (High)
- ≥3 sites (High)

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## ANNEX B: Classification of physico-chemical Quality Elements: General

### QE: Dissolved Oxygen

<b>Dissolved oxygen (+ data confidence):</b>	<b>HIGH (High 100%)</b>	
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Classification tools: Comparison of 5% ile against reference standards

- Data Availability: 2010-15
- Data Store: [..\DO Classification 2012\Shortcut to DO FIELD VALUES 2006 -2010.Ink](#)
- Data Availability (spot & continuous samples): Spot


#### Thresholds:

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-salmonids 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

#### Results:

5% ile DO (mg/L)	Status	Data years	Data Quality	No. of daily averages	Data Coverage (proportion of possible months with data*)
7.92	HIGH	2010-15	**	133	

\* Proportion of possible months for which data are available

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**QE: Nutrients – N regulation**

<b>QE N regulation assessment (Data confidence):</b>	<b>HIGH (100%)</b>	
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- **Data store:** [..\Coastal WB inc AFBI 15.xls](#)
- **Data Availability:** 2010, 2012-15  
DIN & salinity (Nov to Feb)
- **Data Source (spot & continuous samples):** spot & continuous

**Thresholds:**


Area	Salinity range	DIN (uM) Winter mean H	DIN (uM) Winter mean G	DIN (uM) Winter mean M
Coastal (at salinity 32)	30-34.5	<12	12-18	18+

**Results:**

Mean Winter DIN (uM) (Avg DIN)*	Winter DIN Daily average (n)	No. of samples (n)	No. of sites	Data Years	Data Quality	Status
9.26		110	12 (inc con mon)	2010, 2012-15	Database not yet QA'd	HIGH

\*Average DIN used as  $r^2$  value of regression model is less than 0.75

**Data confidence source:** [..\CofCDINth.xlsx](#)


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**ANNEX C: Classification of physico-chemical quality elements: Specific Pollutants  
(Annex VIII)**

<b>Specific pollutants assessment (+data confidence)</b>	<b>NO DATA</b>	
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Classification tools: Comparison with EQS levels.

Data Availability: NO DATA


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**ANNEX D: Hydromorphological quality elements**

Overall hydromorphology assessment	G <sub>H</sub>	
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Classification tools:

1. TRaC Hydromorphology metrics
2. MIMAS

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### ANNEX E: Chemical Status – Annex X Chemicals

<b>Priority hazardous substances (+data confidence)</b>	<b>NO DATA</b>
<b>Annex X: Overall Compliance</b>	No data
<b>Annex X: Pass/Fail</b>	No data

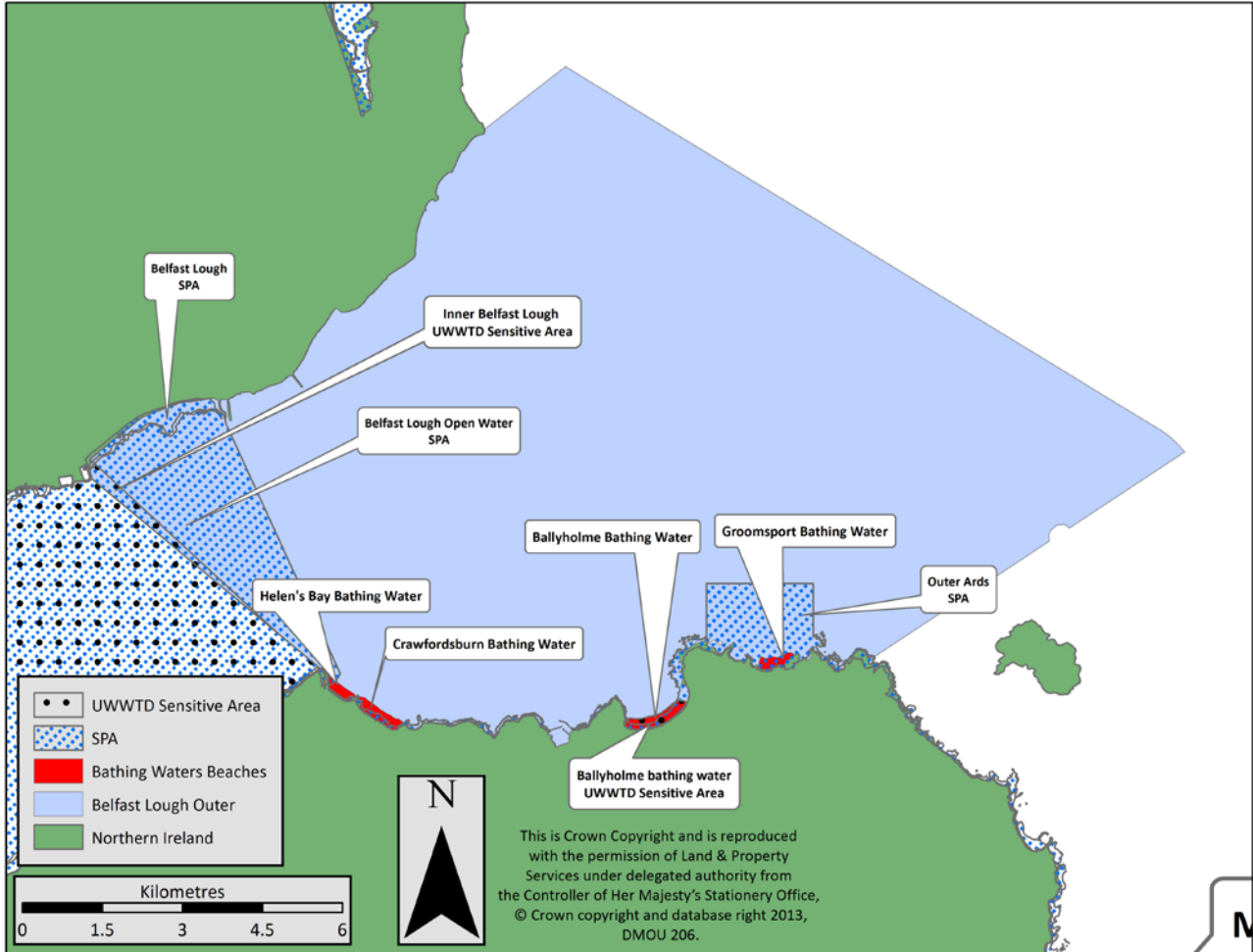
**Classification tools:** Comparison with EQS levels.

**Data Availability:** NO DATA




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### ANNEX F: Protected Areas



Protected areas within Belfast Lough Outer (Coastal Water).

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The following Protected Areas are situated either wholly or partly within the Belfast Lough Outer water body:

**Natura 2000 sites (Habitats Directive and Birds Directive):**


Site Name	2014 Condition Status	Designated Water Dependant habitat/species	Feature(s) not meeting objective	Reason for not meeting objective
Outer Ards SPA	Unfavourable	Arctic Tern; Golden Plover; Light Bellied Brent Goose; Ringed Plover; Turnstone	Ringed Plover	Non marine water quality related
Belfast Lough Open Water SPA	Favourable	Great Crested Grebe	None	n/a

**Bathing Waters Directive Beaches:**

Beach	2011-2014 Revised Bathing Waters Classification
Helen's Bay	Excellent
Crawfordsburn	Excellent
Ballyholme	Sufficient
Groomsport	Excellent

**Nitrates Directive/ Urban Waste Water Treatment Directive Sensitive Areas:**

- Inner Belfast Lough UWWTD Sensitive Area
- Ballyholme Bathing Water

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### ANNEX G: High Impact Invasive Species

High Impact Invasive Species check	<b>GOOD</b>
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#### Ecoregion 17 Marine High Impact Invasive Species List


Phylum	Species	P	E	I	Record
<i>Chordata</i>	<i>Didemnum spp.</i>				
<i>Chordata</i>	<i>Styela clava</i>				
<i>Crustacea</i>	<i>Eriocheir sinensis</i>				
<i>Mollusca</i>	<i>Crassostrea gigas</i>				
<i>Mollusca</i>	<i>Crepidula fornicata</i>		Y		W
<i>Phaeophyceae</i>	<i>Sargassum muticum</i>		Y		W
<i>Angiosperms</i>	<i>Spartina anglica</i>				

P= Present; E= Established; I= Impacting

NB Established populations of high impact species automatically downgrade overall surface water classification from 'high' to 'good'.

Record should be inputted as follows. PO= personal observation outside of surveys; W= WFD survey; M= museum / institute records.

RIVER BASIN MANAGEMENT PLAN

 <p>Department of the <b>Environment</b> www.doeni.gov.uk <b>Marine Environment Division</b></p>	<b>WFD COASTAL WATER BODY CLASSIFICATION</b> Belfast Lough Outer	
	<b>Version Date:</b>	31/05/2015
	<b>MONITORING &amp; ASSESSMENT TEAM</b>	

**GLOSSARY**

<b>AFBI</b>	Agri-Food and Biosciences Institute (under contract to NIEA)
<b>AMBI</b>	AZTI Marine Biotic Index
<b>Annex X</b>	Annex 10 Priority Hazardous Substances
<b>Annex VIII</b>	Annex 8 Specific Pollutants
<b>Article 5</b>	Characterisation, typology, pressures and impacts analysis
<b>ASSI</b>	Area of Special Scientific Interest
<b>DIN</b>	Dissolved Inorganic Nitrogen
<b>DO</b>	Dissolved Oxygen
<b>EQR</b>	Ecological Quality Ratio
<b>EQS</b>	Ecological Quality Status
<b>EUNIS</b>	European Nature Information System
<b>FSL</b>	Full Species List
<b>GEP</b>	Good Ecological Potential
<b>gH</b>	Good/High status
<b>H/G/M/P/B</b>	High/Good/Moderate/Poor/Bad (Classification Status)
<b>H/M/L</b>	High/Medium/Low (Confidence)
<b>HMWB</b>	Heavily Modified Water Body
<b>IQI</b>	Infaunal Quality Index
<b>IRBD</b>	International River Basin District
<b>LOD</b>	Limit of Detection
<b>MBT</b>	Macroalgal Blooming Tool
<b>MEP</b>	Moderate Ecological Potential
<b>NB</b>	Neagh Bann
<b>ND</b>	No data
<b>NE</b>	North Eastern
<b>NEAGIG</b>	North Eastern Atlantic Geographical Intercalibration Group
<b>NIEA</b>	Northern Ireland Environment Agency
<b>N-regs</b>	Nitrogen Regulation
<b>NVZ</b>	Nitrate Vulnerable Zone
<b>NW</b>	North Western
<b>Physico-chem</b>	Physical and chemical monitoring
<b>RSL</b>	Reduced Species List
<b>SAC</b>	Special Area of Conservation
<b>SEPA</b>	Scottish Environment Protection Agency
<b>SPA</b>	Special Protected Area
<b>TNA</b>	Tool Not Applicable
<b>TraC MImAS</b>	Transitional and Coastal Morphology Impact Assessment System
<b>TUD</b>	Tool Under Development
<b>UKAS</b>	United Kingdom Accreditation Service
<b>UKTAG</b>	United Kingdom Technical Advisory Group for Water Framework Directive
<b>UNICORN</b>	Database for marine organisms.
<b>UWWTD</b>	Urban Waste Water Treatment Directive (91/271/EEC)
<b>VDSI</b>	Vas Deferens Sequence Index
<b>WFD</b>	Water Framework Directive
<b>WWTW</b>	Waste water treatment works