

draft RIVER BASIN MONITORING PLAN

CLASSIFICATION PAMPHLET

Coastal Waterbody Belfast Lough Outer

22nd December 2008



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Environment
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Northern Ireland
Environment
Agency

BELFAST LOUGH OUTER

Water body Information

- River Basin District: NE
- Water body type: CW5
- Water body characteristics: Euhaline, mesotidal, moderately exposed
- Water body area: 137.27 km²
- Heavily Modified Water Body: No

**OVERALL WATERBODY CLASSIFICATION: MODERATE
(PASS/FAIL): FAIL**

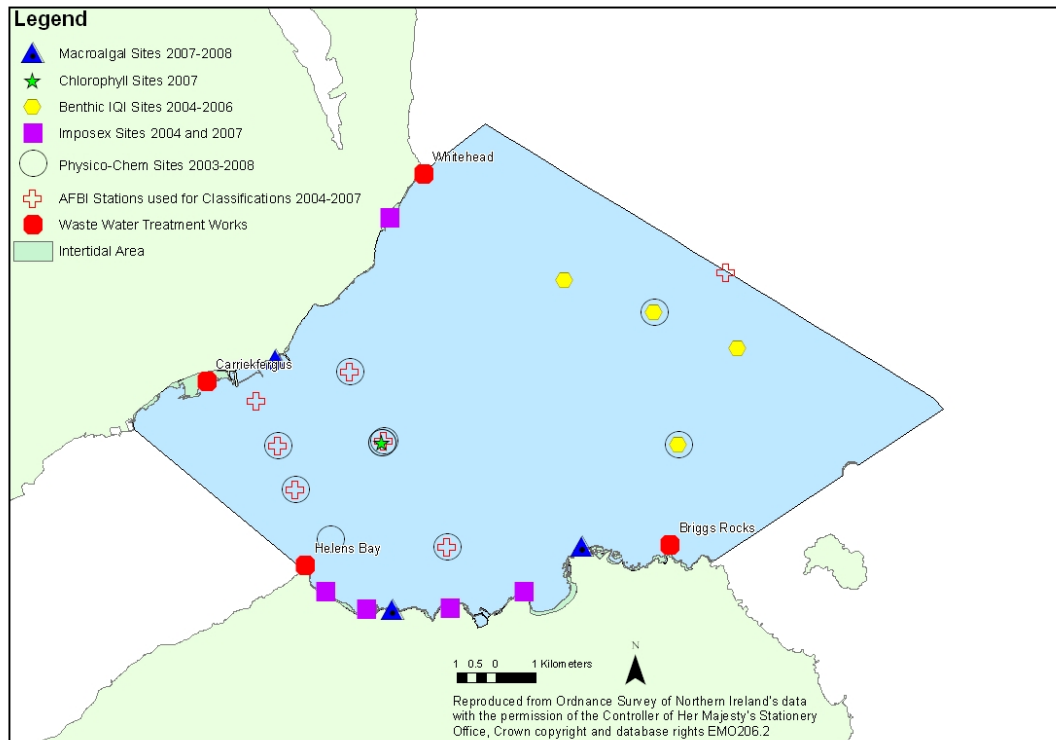


Figure showing pressures and monitoring points within Belfast Lough Outer (Coastal Water).

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Belfast Lough Outer

Version Date: 22/12/08

MARINE ASSESSMENT AND LICENSING TEAM

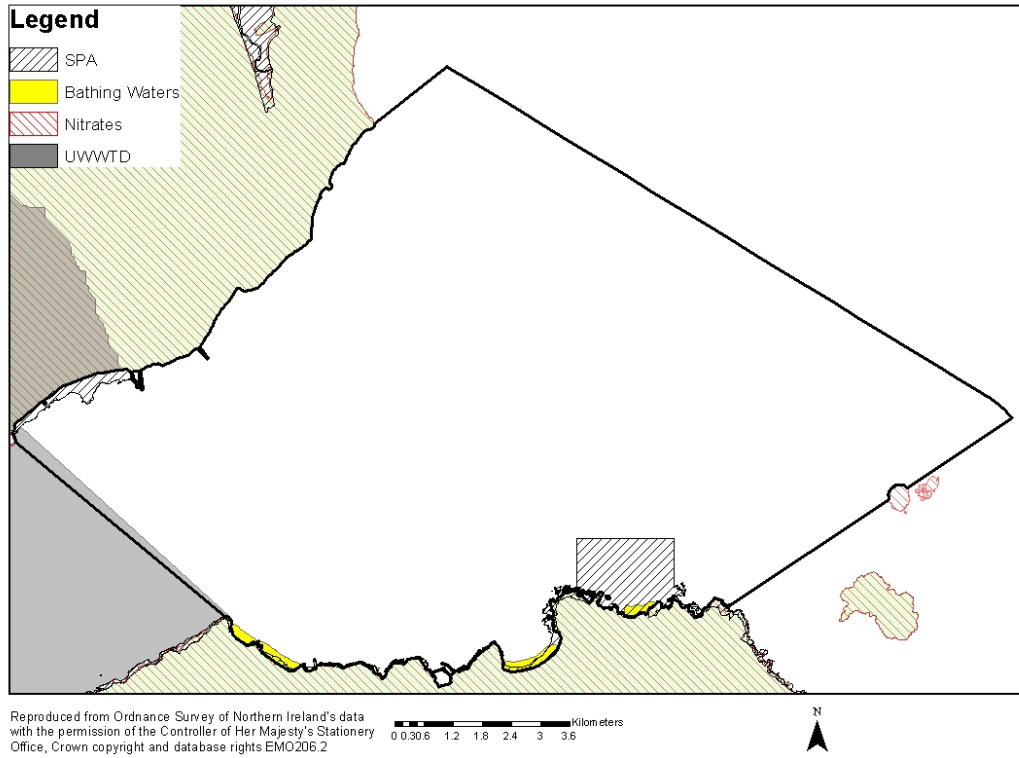



Figure of protected areas within Belfast Lough Outer (Coastal Water), see Annex F.

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PARAMETERS TABLE

(Parameters for which classification systems are available and have been used in the first round of classification. Note: for some parameters data is not yet available hence the tools have not been applied).

Ecological Quality Element			
Main Element	Sub-Element	Applied	Comment
Plants	Macro Algae	✓	
	-Opportunistic Macroalgae	☒	Tool not applicable
	-Reduced Species List	✓	
	Angiosperms	☒	Tool not applicable
	Phytoplankton	✓	
Benthic Invertebrates	Infaunal Quality Index	✓	
	Imposex	✓	
Fish	Transitional Fish Classification Index		
Physico-Chemical	General Conditions	✓	
	-Dissolved Oxygen	✓	
	-Nutrients	✓	
	Specific Pollutants (Annex VIII subs)	☒	Data not available until 2009
Hydromorphological Quality Elements	SEPA Rapid Designation	✓	
	TraC MIMAS	✓	
Chemical Status			
Priority Hazardous Substances (Annex X)	Annex X Substances	☒	Data not available until 2009

Waterbody Classification

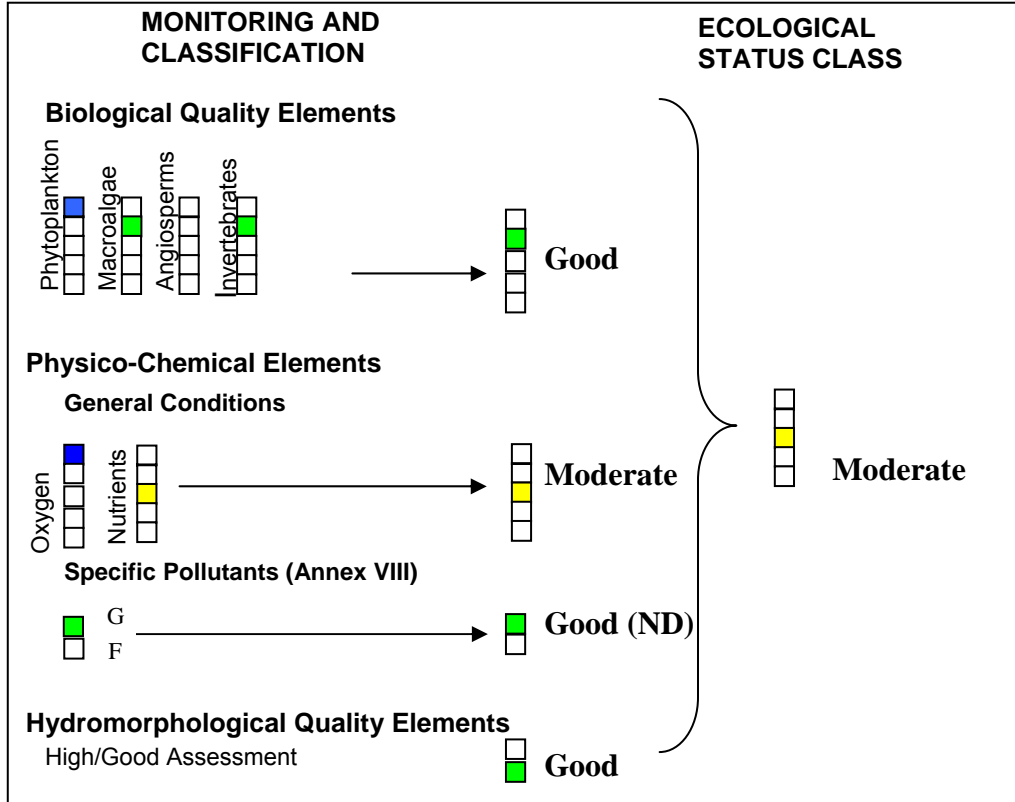


Figure showing ecological classification of Belfast Lough Outer (Coastal Water)

Ecological Status

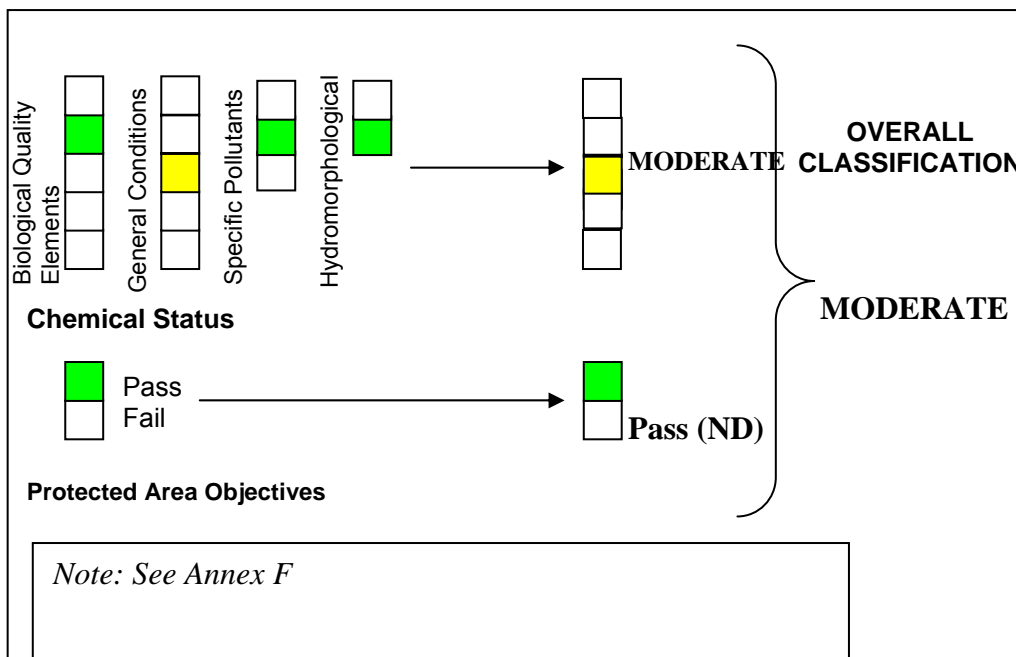


Figure showing overall classification of Belfast Lough Outer (Coastal Water)

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First River Basin Cycle (2004 – 2008)

Monitoring Level:

Surveillance

Sampling frequency for each quality element

Quality Elements	Surveillance		
	Year (if 1 in 3 yrs)	Frequenc y (if p.a.)	No. of sites
Biological			
Phytoplankton	2004-8		18 sites 105 samples
Macroalgae	Reduced Species List	2007	3 sites
Benthic Invertebrates	Infaunal Quality Index	2004-2006	1
	Imposex	2007	
Physico-chemical			
Nutrients	2002-4		
Salinity			
Temperature			
Dissolved Oxygen (DO)	2002-3, 2007-8		9
Suspended particulate matter (SPM)			
Light (Kd)			
Other polluting substances (Annex VIII)	ND(2009)		
Hydromorphology			
Water chemistry			
(Annex X)	ND(2009)		

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ANNEX A: Classification of Biological Quality Elements

QE: Phytoplankton

QE phytoplankton assessment (+ Data confidence): HIGH (M)

Classification tools:

First round reporting now

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

- Data store (classification):
MARINE\Water Framework Directive\DRAFT WFD CLASSIFICATION REPORTS\QE Phytoplankton\Chlla 90th Percentile\Final 90th Percentile
- Data Availability (spot & continuous samples):
Chl = spot (2004-2007) AFBINI & NIEA

1. Chlorophyll Biomass Index - 90%ile (Chl $\mu\text{g l}^{-1}$)
(Growing Season 1st Mar – 30th Sept)

Waterbody Chl. biomass assessment

HIGH (M)

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	Data Years	Data Quality	No. of daily averages	No. of Sites	No. of Samples	Data Confidence (proportion of possible months with data*)
3.99	HIGH	2004-2007	Medium	9	8	57	57.1%

* proportion of possible months (of growing season in years assessed) for which data are available

Data confidence:

Medium

- The proportion of possible months sampled yields reasonable temporal coverage, and spatial coverage is also limited.
- Data from two different Agencies NIEA and AFBINI

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2. Elevated Taxa Count Index

Waterbody Elevated Taxa Assessment: Good (ND)

- Thresholds:

Tool	Thresholds	
	North/Irish Sea	Atlantic
I ₁ - Individual Species Count (excl. Phaeocystis) (%)	250,000 (cells l ⁻¹)	
I ₂ - Phaeocystis Counts (%)	10 ⁶ (cells l ⁻¹)	
I ₃ - Total Taxa Count (%)	10 ⁷ (cells l ⁻¹)	
I ₄ - Elevated Biomass Count (%)	>10 (µg l ⁻¹)	>5 (µg l ⁻¹)

Waterbody Elevated count (%) = [I₁ (%) + I₂ (%) + I₃ (%) + I₄ (%)] / 4


- 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

I ₁	I ₂	I ₃	I ₄	Elevated Count Mean	Status	Data Years	No. of sampling occasions	No. of phytoplankton samples

Data confidence: No data

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QE: Macroalgae Belfast Lough Outer

QE Macroalgae assessment (+ Data confidence): GOOD (M)

Downgraded due to presence of *Sargassum muticum*, awaiting further guidance on alien species from UKTAG.

Macroalgal Blooming Tool – not applicable

Classification tools:

Reduced species list (RSL)

Reduced Species List (RSL)


Waterbody RSL assessment: High (Medium)

Reduced Species List (RSL)

- WFD surveillance monitoring: 2007
- Data Availability (classification): 2007, 3 Sites
- Data Store: G:\MARINE\Projects 07\MM07-03 Marine Plants\Macrophyte Survey 07
- G:\MARINE\Projects 08\Marine Macrophytes

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

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Results

Shore	Sub-Metric EQR							RSLE QR	Status
	Shore desc.	Sp. richness	Adj. Sp. Richness	% G	% R	ESG	% Opp		
Ballymacormick Pt 2007	18	55	44	12.73	56.36	1.20	9.09	0.878	HIGH
Swinley Pt 2007	17	51	44	15.69	54.90	1.13	11.76	0.846	HIGH
Salt Mine Jetty 2007	13	34	39	8.82	55.88	1.27	11.76	0.862	HIGH
Mean								0.86 ±0.02	HIGH

Data Confidence:


Medium

- 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, tool not yet completed)
- Three shores (good spatial coverage) over single year (poor temporal trend assessment)
- FSL not yet carried out

Alien taxa present: (*Sargassum muticum*)

Yes

QE: Angiosperms Belfast Lough Outer – Tool not applicable

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QE: Benthic Invertebrates – Belfast Outer

Overall benthic invertebrate assessment: GOOD (Medium)

Classification tools: 1. Infaunal Quality Index (IQI)
2. Imposex tool (VDSI)

1. IQI (v4)

Water body IQI assessment: Good (Medium)

- WFD surveillance monitoring: 2008
 - Data store: Benthic invertebrates: UNICORN (NMMT) Database
 - Supporting Parameters: Particle size analysis (PSA), Water Quality Data Set
 - Digital images: AMAP Project folder
- Data Availability (classification): 3 sites, 5 reps, 3 years + 1 site, 5 reps, 2 years, Day Grab, 1 mm sieve
- Habitat max values (sub-tidal mud): $1-(AMBI/7) = 0.78$, $1-\text{Lambda}' = 0.72$, Taxa = 24
 - Boundaries (Intercalibrated NEAGIG):

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

Results

Year	Survey	Station	n	Mean	± S.D	Status
2004	MM-benthos	IS1, F1, F2 & F7	14	0.68	0.05	Good
2005	MM-benthos	IS1, F1, F2 & F7	14	0.67	0.05	Good
2006	MM-benthos	IS1, F1 & F7	11	0.71	0.02	Good
Overall Mean			3	0.69	0.02	Good

Data confidence: Medium

- Sample analysis QA'd through NMBAQC (Good)
- Database QA'd (Good)
- Single point with 5 replicates rather than spatial coverage
- F2 was not within EUNIS classification in 2006

Alien taxa present:

<i>Eriocheir sinensis</i> (Chinese mitten crab)	Not present
<i>Crepidula fornicata</i> (Slipper limpet)	Not present

2. VDSI (*Nucella lapillus*)

Waterbody VDSI assessment:

Good (H)

- Data store: NIEA imposex shoreline data.xls; MERMAN
- Data availability: 2004/2007 NI survey

Boundaries:

Class	Moderate	Good	High
VDSI	≥4.0	≥0.3 <4.0	<0.3
EQR	<0.33 -0	≥0.33 <0.95	0.95 – 1.0


Results:

Year	Shore	VDSI	EQR	Status
2007	Clachan Rock	1.46	0.76	Good
2007	Helen's Bay	1.78	0.70	Good
2007	Lukes Point	2.81	0.53	Good
2007	Smelt Mill Bay	1.31	0.78	Good
2007	Swinley Point	1.22	0.80	Good

Data confidence:

High

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

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

Dissolved Oxygen

Waterbody DO assessment: HIGH (L)

Classification tools: Comparison of 5% ile against reference standards

- Data store: \\marine on ehslis2k \Water Framework Directive\DRAFT WFD CLASSIFICATION REPORTS\Dissolved Oxygen
- Data Availability: 02,03,07,08
- 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*)
6.78	HIGH	02,03,07,08	**	7	13.3%

* Proportion of possible months for which data are available

**Data Quality

Low

- Instruments subject to regular calibration checks and quality assurance programme, but databases not QA'd.
- Low = ≤ 4 daily averages x n (no. of assessment years)

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Nutrients – Winter DIN

Winter DIN assessment Moderate (L)

- Data store: \\marine on ehslis2k \Water Framework Directive\Nuala-Lesley Nutrients\DIN for Classification\Coastal Water
- Data Availability: 2002 to 2004, DIN & salinity (November to February)
- Data Availability (spot & continuous samples): spot
- N regulation thresholds:

Area	Salinity range	DIN (uM) Winter mean H/G	DIN (uM) Winter mean G/M	DIN (uM) Winter mean M/P	DIN (uM) Winter mean P/B
Coastal (at salinity 32)	30-34.5	12-18	18-30	30-40.5	>40.5


Results:

Mean Winter DIN (uM) (normalised to salinity 32)	Winter DIN Daily average (n)	No. of samples (n)	No. of sites	Data Years	Data Quality	Status
20.44	9	15	9	2002 - 2004	Database not yet QA'd	Moderate

Data confidence:

Low

- Database not QA'd.

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

Overall specific pollutants assessment (ND)

gH

Annex VIII: Overall Compliance


PASS-No Data.

Annex VIII: Pass/Fail

PASS-No Data.

Classification tools: Comparison with EQS levels.

Data Availability: WFD Dedicated data to be available 2009.


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ANNEX D: Hydromorphological quality elements

Overall hydromorphology assessment: Good

Classification tools:
metrics

1. TRaC Hydromorphology
2. MIMAS

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ANNEX E: Chemical Status – Annex X Chemicals

Overall water chemistry assessment:

Good (No Data)

**Annex X: Overall
Compliance**


PASS-No
data

Annex X: Pass/Fail

PASS-No
data

Classification tools: Comparison with EQS levels.

Data Availability: WFD Dedicated data to be available 2009.

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ANNEX F: Protected Area Objectives

Water body	Protected area	Designation	Status	Reason for non-compliance
Belfast Lough Outer	Belfast Lough Outer	SPA	Favourable	

Bathing Water Directive


Water Body		2008	2007	2006	2005	2004	2003
Belfast Lough Outer	Helen's Bay						
Belfast Lough Outer	Crawfordsburn						
Belfast Lough Outer	Ballyholme						
Belfast Lough Outer	Groomsport						

	Compliance with Guideline standards
	Compliance with Mandatory standards
	Failure to comply with Mandatory standards
	Not on monitoring programme

Ballyholme Bathing Water suffers from intermittent bathing water quality. This has been attributed to inadequate sewage treatment and sewerage infrastructure in Bangor. As of December 2007, Bangor and Donaghadee have a new waste water treatment works with full secondary treatment. However, Ballyholme bathing water still failed to meet the mandatory standards in 2008. The primary reason for failure has now been attributed to inadequate sewerage infrastructure, and Northern Ireland Water has a proposal for an interim solution by 2011.

Nitrates Directive

Until 1 January 2007, Northern Ireland had designated seven NVZs on the basis of elevated nitrate levels in groundwaters. These NVZs were very small and covered less than 1% of Northern Ireland's area. However, Northern Ireland also has a widespread problem of eutrophication of surface waters and a large proportion of this nutrient enrichment is attributable to agriculture. Following extensive consultation, the total territory of Northern Ireland was established as the area to which an action programme would be applied under the Protection of Water Against Agricultural Nitrate Pollution Regulations (Northern Ireland) 2004 with effect from 29 October 2004.

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Glossary

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