


RIVER BASIN MONITORING PLAN

WATER FRAMEWORK DIRECTIVE 1ST CYCLE CLASSIFICATION SUMMARY

2009-2015

Coastal Water Body – Lough Foyle

31/05/2015

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	Version Date: 31/05/2015
	MONITORING & ASSESSMENT TEAM

LOUGH FOYLE

Water body Information

- River Basin District: North Eastern
- Water Body Code: UKGBNI6NW250
- Water body type: CW8
- Water body characteristics: Euhaline, mesotidal, sheltered
- Water body area: 165.73 km²
- Heavily Modified Water Body: No
- 2015 Classification Objective: Moderate

FINAL CLASSIFICATION	GOOD	PASS/FAIL 2015 OBJECTIVE	PASS
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RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
MONITORING & ASSESSMENT TEAM	

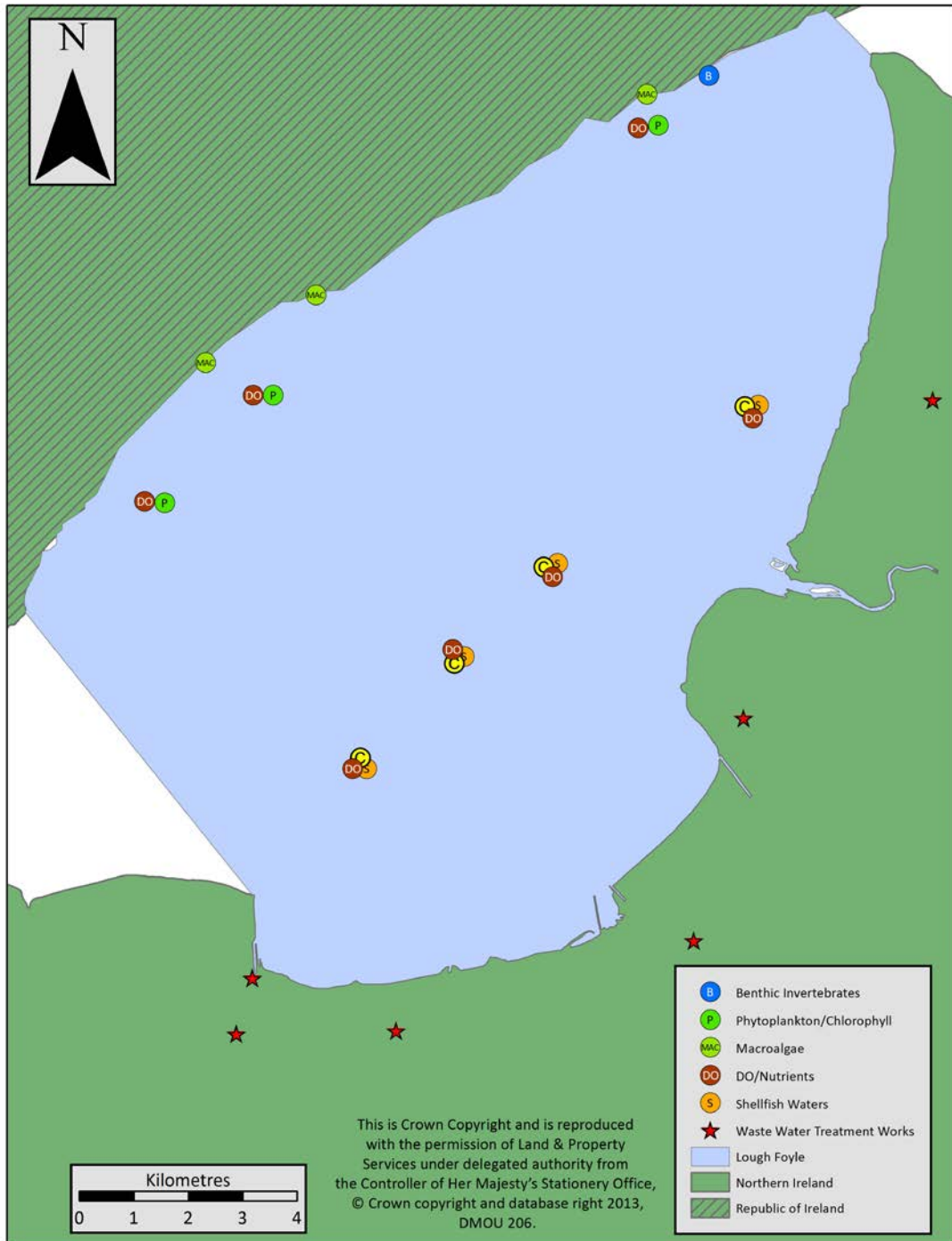


Figure 1: Waste water treatment pressures and monitoring points within Lough Foyle (Coastal Water).

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

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

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
	MONITORING & ASSESSMENT TEAM

Table 2: Sampling frequency for each quality element

Monitoring Level: *Surveillance and operational*

Quality Elements	Data years contributing to classification	No. of sites/samples
Biological		
Phytoplankton	2009-2014	13 sites 62 samples
Macroalgae	Reduced Species List 2011-2013	3 sites
Angiosperms	Seagrass 2009, 2014	n/a*
Benthic Invertebrates	Infaunal Quality Index 2010-2013	7 sites 24 samples
Physico-chemical		
Nutrients	2010-2014	15 sites 24 samples
Dissolved Oxygen (DO)	2010-2015	126 daily averages
Specific polluting substances (Annex VIII)	2010-2014	
Hydromorphology	2007	
Water chemistry		
(Annex X)	2010-2014	

*Assessment made at a whole water body level

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015 MONITORING & ASSESSMENT TEAM

ANNEX A: Classification of Biological Quality Elements

QE: Phytoplankton

QE phytoplankton assessment (+ Data confidence):	GOOD (90.6%)	
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Classification tools:

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

- **Data store (classification):** [M:\Projects 14\Phycology 2014\MM14-14 Phytoplankton and Chlorophyll\classification 15\Coastal data\Foyle Coastal 90th Percentile.xls](#)
- [M:\Projects 14\Phycology 2014\MM14-14 Phytoplankton and Chlorophyll\classification 15\Coastal data\FOYLE COASTAL 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 1st Mar – 31st Oct)

Waterbody Chl. biomass assessment

GOOD (90.6%)

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
9.87	GOOD	0.61	2009-2014	13	62	59.5%

Data confidence: 59.5%

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

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
	MONITORING & ASSESSMENT TEAM

2. Elevated Taxa Count Index

Waterbody Elevated Taxa Assessment

Thresholds:

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

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 ₁	I ₂	I ₃	Elevated Count EQR	Status	Data Years	No. of phytoplankton samples	Data confidence
15.8%	0	13.2%	0.857	HIGH	2009-2014	38	85.7%


Data confidence: 85.7%

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

Presence of alien/ nuisance species: *Karenia mikimotoi*

Overall Waterbody Status

GOOD (90.6%)

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
	MONITORING & ASSESSMENT TEAM

QE: Macroalgae

QE macroalgal assessment (+ data confidence):	HIGH (61.2%)	61.2%
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Classification tools: 1. Reduced species list (RSL)
2. Macroalgal Blooming Tool (MBT)

1. Reduced Species List assessment:

WFD surveillance monitoring: 2011, 2013

- Data Availability (classification): 2011- 3 sites, 2013- 2 sites
- Data Store: [M:\Projects 14\Phycology 2014\MM14-12 Intertidal Rocky Shore\FSL-RSL Classification update 2015 \(09-14\)\Data sheet.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							RSL EQR	Status
	Shore desc.	Sp. richness	Adj. Sp. Richness	% G	% R	ESG	% Opp		
Moville 2011	15	55	55.00	14.55	50.91	1.20	5.45	0.898	HIGH
Redcastle 2011	14	42	44.94	19.05	45.24	0.91	14.29	0.792	GOOD
Vances Point 2011	12	43	52.03	20.93	41.86	0.79	13.95	0.772	GOOD
Moville 2013	14	57	60.99	17.54	50.88	0.84	14.04	0.81	HIGH
Vances Point 2013	14	40	42.80	20	45	0.82	17.5	0.76	GOOD
Mean								0.807 ±0.05	HIGH

Confidence of Classification: High (61.2%)

- 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 Deviation (±) is included with the mean EQR.
- Data QA (expert team).
- WFD specific data (Reduced species list completed; FSL carried out at two sites).
- 3 shores (good spatial coverage) over three years (good temporal trend assessment).

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015 MONITORING & ASSESSMENT TEAM

2. Macroalgal Blooming Tool

QE macroalgal blooming tool assessment (+ data confidence):	HIGH NO DATA (LOW)	
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- WFD surveillance monitoring: 2009-2014
- Data Store:
- Data Availability

Boundaries:

Parameters	Quality Status	High	Good	Moderate	Poor	Bad
	Sub-metric EQR	$\geq 0.8 - 1.0$	$\geq 0.6 - 0.8$	$\geq 0.4 - 0.6$	$\geq 0.2 - 0.4$	$0.0 - 0.2$
Available Intertidal Habitat (AIH) %		0 – 5	5 – 15	15 – 25	25 – 75	75 – 100
Affected Area (ha)		0 – 10	10 – 50	50 – 100	100 – 1000	1000 – 2000
Biomass of AIH (g m ²)		0 – 100	100 – 500	500 – 1000	1000 – 3000	3000 – 6000
Biomass of affected area -AA (g m ²)		0 – 100	100 – 500	500 – 1000	1000 – 3000	3000 – 6000
Presence of entrained algae (% of quadrats)		0 – 1	1 – 5	5 – 20	20 – 50	50 – 100


Results:

Year	Sub-metric EQR					Mean EQR	Status
	% cover of AIH	Affected Area	Biomass of AIH	Biomass of affected area	Entrained algae		
2009	<5%						
2014	<5%						
Mean							

Data Confidence: Low

A visual assessment was made throughout the waterbody to identify if there was any evidence of macroalgal blooms accounting for >5% of the intertidal area. In 2009 & 2014, the intertidal area was assessed using a hovercraft while carrying out an assessment for Angiosperms in this waterbody. The assessment is a rough guide and was repeated in 2014 to increase data confidence.

Alien taxa: *Spartina anglica* patches in front of Bellerena Gliding club.

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
MONITORING & ASSESSMENT TEAM	

QE: Angiosperms

Waterbody Angiosperm Classification + (data confidence):	HIGH (High 55%)	
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Classification Tools:

1. Seagrass
 - A. Taxonomic composition
 - B. Shoot density
 - C. Bed spatial extent

1. Seagrass

Data store: <M:\Projects 14\Phycology 2014\MM14-15 Intertidal Seagrass Assessment\Foyle Seagrass 2014\Foyle 2014 template.xls>

<Foyle Seagrass 2014\Foyle 2014 Survey.mxd>

Data Availability (classification): 2009 and 2014


EQR Boundaries:

Status	Mean Score Ranges
High	0.8-1.0
Good	0.6-0.79
Moderate	0.4-0.59
Poor	0.2-0.39
Bad	0.0-0.19

Sub-Metric Boundaries:

A. Taxonomic composition

Disturbance	Change in taxonomic composition	Metric score (mid-point of EQR range)
No detectable change	All taxa present	0.9
Slight signs of disturbance	Loss of 1/4 to 1/3 of species	0.7
Moderate distortions	Loss of 1/2 of species	0.5
Major distortions	Loss of 2/3 to 3/4 of species	0.3
Severe distortions	Loss of all species	0.1

RIVER BASIN MANAGEMENT PLAN		
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle	
	Version Date:	31/05/2015
	MONITORING & ASSESSMENT TEAM	

B. Shoot Density

Disturbance	% Shoot Loss		Score
	Annual	5 Year Mean	
No detectable change	0-10	0-5	0.8
Slight signs of disturbance	11-30	6-15	0.6
Moderate distortions	31-50	16-25	0.4
Major distortions	51-70	26-35	0.2
Severe distortions	70-100	36-100	0.1

Angiosperms (cont'd)

C. Bed spatial extent

Disturbance	% Area Loss	Score
No detectable change	0-10	0.8
Slight signs of disturbance	11-30	0.6
Moderate distortions	31-50	0.4
Major distortions	51-70	0.2
Severe distortions	70-100	0.1


Results:

Site	Tool			Mean Metric Score	Mean Status
	Taxonomic composition	Shoot Density	Bed Spatial Extent		
Foyle 2009	0.9	1	0.81	0.90 (+/- 0.05)	HIGH
Foyle 2014	0.9	0.77	0.75	0.81 (+/-0.07)	HIGH

- Data confidence: HIGH (55%) Good (44.1%)
- Parentheses refer to the Standard Error of the final EQR.

Data Analysed using [M:\Projects 14\Phycology 2014\MM14-15 Intertidal Seagrass Assessment\SAILOR v2.3 CLASSIFICATION2015.xlsx](#)

Alien taxa: *Spartina anglica* present

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015 MONITORING & ASSESSMENT TEAM

QE: Benthic Invertebrates

QE benthic invertebrate assessment (+ Data confidence):	GOOD (L)	
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Classification tools: 1. Infaunal Quality Index (IQI) – MODERATE (Low)
2. Imposex tool (VDSI) – Not applied

1. IQI (UKTAG v01 20140228)

Water body IQI assessment: Good (Low)

WFD surveillance monitoring:

- **Data store:** [Lough Foyle coastal water body\Lough Foyle Coastal water body 08-13 fauna data.xlsx](#)
- **Benthic invertebrates** UNICORN (NMMT) Database
- **Supporting Parameters** Water Quality Data Set
- **Digital images** AMAP Project folder
- **Data Availability (classification):** 7 sites, 1,3,5 reps, 4 years, Day Grab, 1 mm sieve, n=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	Annual Mean	Annual ± S.D	Status
2010	MM-Benthos	LF6 (3), FSp (6)	9	0.68	0.09	Good
2011	MM-Benthos	LF6 (5)	5	0.80	0.01	High
2012	MM-Benthos	LF6 (5)	5	0.76	0.03	High
2013	MM-Benthos	LF6 (5)	5	0.76	0.04	High
2014	MM-Benthos	LF6 (5)	-	-	-	-
2015	MM-Benthos	LF6 (5)	-	-	-	-
Overall 6 year waterbody means			6.0	0.75 (*0.71)	0.04	Good

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

Data confidence:

Low

- Sample analysis QA'd through NMBAQC (Good)
- Database QA'd (Good)
- No specific WFD data (single point with reps and additional spatial coverage in 2010 with 6 additional sites)

Alien taxa present: *Crassostrea gigas*

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
	MONITORING & ASSESSMENT TEAM

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

QE: Dissolved Oxygen

Dissolved oxygen (+ data confidence):	HIGH (100%)	
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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 & Continuous


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-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

Results:

5% ile DO (mg/L)	Status	Data years	Data Quality	No. of daily averages	Data Coverage (proportion of possible months with data*)
7.65	HIGH	2010-15	**	126	

* Proportion of possible months for which data are available

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
MONITORING & ASSESSMENT TEAM	

QE: Nutrients – N regulation

QE N regulation assessment (+ Data confidence):	GOOD (100%)	
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- **Data store:** [..\Coastal WB inc AFBI 15.xls](#)
- **Data Availability:** 2010 to 2014
DIN & salinity (Nov to Feb)
- **Data Source (spot & continuous samples):** spot


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) (normalised to salinity 32)	Winter DIN Daily average (n)	No. of samples (n)	No. of sites	Data Years	Data Quality	Status
14.05	8	24	15	2010 - 2014	Database not yet QA'd	GOOD

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

RIVER BASIN MANAGEMENT PLAN		
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle	
	Version Date:	31/05/2015
	MONITORING & ASSESSMENT TEAM	

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

Specific pollutants assessment (+data confidence)	GOOD/HIGH	
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Classification tools: Comparison with EQS levels.

Data assessed for 2013 Update:

Specific Pollutants

Suite	Parameter	Data Availability
Trace Metals	Chromium	SWMP 2012
Trace Metals	Iron	SWMP 2012
Trace Metals	Copper	SWMP 2012
Trace Metals	Zinc	SWMP 2012
Trace Metals	Arsenic	SWMP 2012
Nutrients (Winter Nutrients)	Unionised Ammonia (at pH8)	WIN NUTS 2012-2013

Link to Data, Assessment and EQSs

<G:\MARINE\Water Framework Directive\WFD ANNUAL CLASSIFICATION UPDATE 2013\Chemistry>

Data assessed for 2014 Update:

Suite	Parameter	Data Availability
Trace Metals	Chromium	SWMP 2013
Trace Metals	Copper	SWMP 2013
Trace Metals	Zinc	SWMP 2013
Trace Metals	Arsenic	SWMP 2013

No EQS failures

Link to Data, Assessment and EQSs

<..\Data>

Data assessed for 2015 Update:

No new data assessed for 2015 classification update.

Link to Data, Assessment and EQSs

<G:\MARINE\Water Framework Directive\WFD ANNUAL CLASSIFICATION UPDATE 2015\2015 QE sheets>


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

ANNEX D: Hydromorphological quality elements

Overall hydromorphology assessment	GH	
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Classification tools:

1. TRaC Hydromorphology metrics
2. MIMAS

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
	MONITORING & ASSESSMENT TEAM

ANNEX E: Chemical Status – Annex X Chemicals

Priority hazardous substances (+data confidence)	GOOD	
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Classification tools: Comparison with EQS levels.

Annex X: Overall Compliance	Pass
Annex X: Pass/Fail	Pass

Data Assessed for 2013 Update:

Suite	Parameter	Data Availability
Trace Metals	Nickel	SWMP 2012
Trace Metals	Cadmium	SWMP 2012
Trace Metals	Lead	SWMP 2012
Trace Metals	Mercury	SWMP 2012

No EQS Failures

Link to Data, Assessment and EQSs:

<G:\MARINE\Water Framework Directive\WFD ANNUAL CLASSIFICATION UPDATE 2013\Chemistry>

Data Assessed for 2014 Update:

Suite	Parameter	Data Availability
Trace Metals	Nickel	SWMP 2013
Trace Metals	Cadmium	SWMP 2013
Trace Metals	Lead	SWMP 2013
Trace Metals	Mercury	SWMP 2013

No EQS failures

Link to Data, Assessment and EQSs:

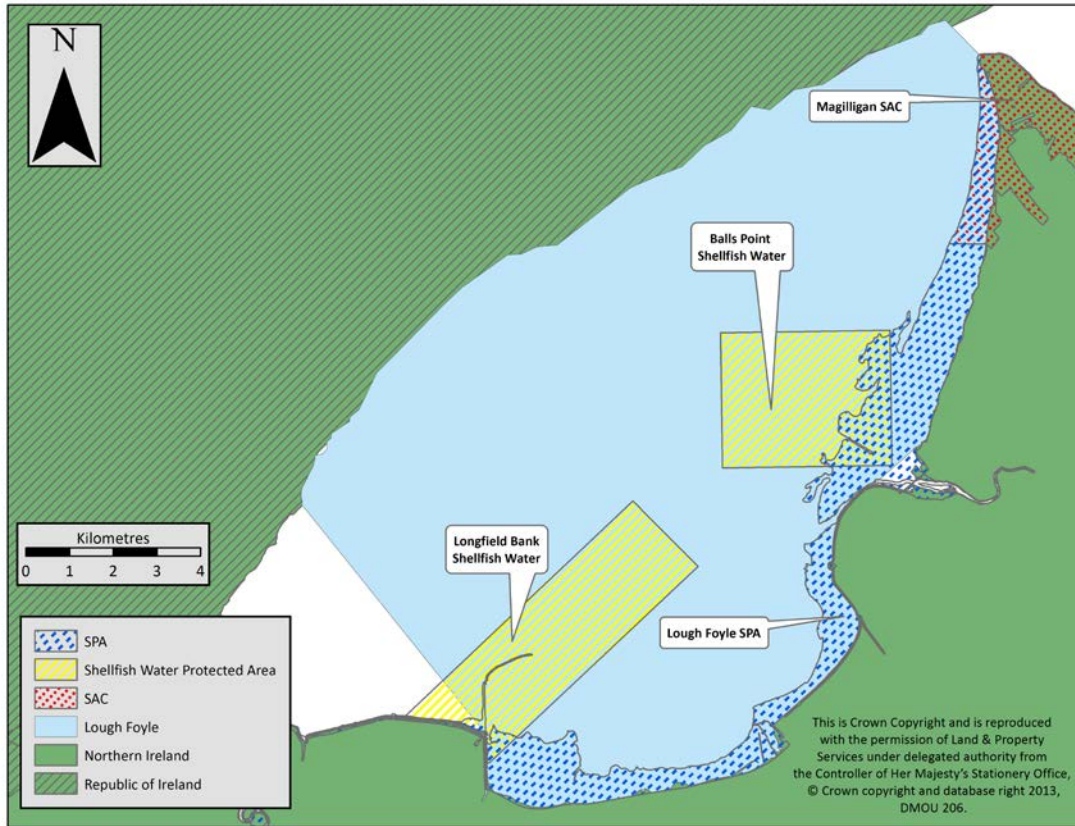
<..\Data>

Data Assessed for 2015 Update:


No data assessed for 2015

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
	MONITORING & ASSESSMENT TEAM

ANNEX F: Protected Areas



Protected areas within Lough Foyle (Coastal Water).

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
MONITORING & ASSESSMENT TEAM	

The following Protected Areas are situated either wholly or partly within the Lough Foyle 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
Magilligan SAC	Unfavourable	Fixed dunes with Herbaceous vegetation ('grey dunes'); Humid dune slacks; Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>); Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes'); Embryonic shifting dunes	Fixed dunes with Herbaceous vegetation ('grey dunes'); Humid dune slacks; Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')	Non marine water quality related
Lough Foyle SPA	Favourable	Bar tailed godwit; Bewick's swan; Golden plover; Light bellied brent goose; water bird assemblage	Bewick's swan	Non marine water quality related

Shellfish Water Protected Areas:

Shellfish Water Protected Area	Met Guideline Microbiological Standard* in 2014
Longfield Bank	No (n=22)
Balls Point	No (n=22)

*75% of samples contain ≤ 230 *E. coli*/100ml of shellfish flesh and intervalvular liquid

RIVER BASIN MANAGEMENT PLAN	
 <p>Department of the Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle
	Version Date: 31/05/2015
	MONITORING & ASSESSMENT TEAM

ANNEX G: High Impact Invasive Species

QE High Impact Invasive Species assessment		GOOD
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Ecoregion 17 Marine High Impact Invasive Species List


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

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 Environment www.doeni.gov.uk Marine Environment Division</p>	WFD COASTAL WATER BODY CLASSIFICATION Lough Foyle	
	Version Date:	31/05/2015
	MONITORING & ASSESSMENT TEAM	

GLOSSARY

AFBI	Agri-Food and Biosciences Institute (under contract to NIEA)
AMBI	AZTI Marine Biotic Index
Annex X	Annex 10 Priority Hazardous Substances
Annex VIII	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
gH	Good/High status
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
WWTW	Waste water treatment works