Lough Neagh
the story so far

Dr Stephen Prentice

NIEA - Lake Monitoring & Evidence

UKILN Conference 2025

14th October 2025

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Northern Ireland Environment Agency
Gníomhaireacht Comhshaoil Thuaisceart Éireann
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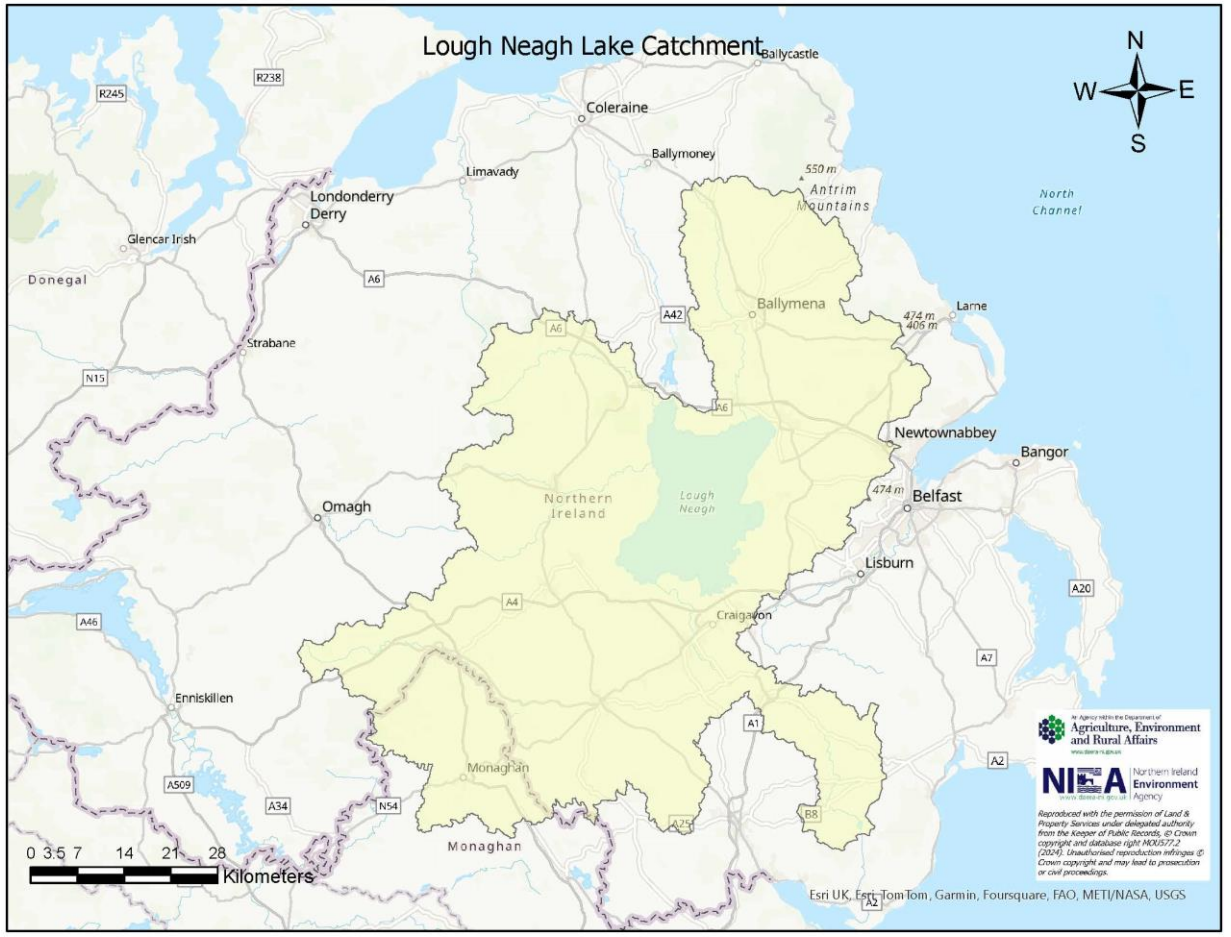
UK & Ireland
United Kingdom & Ireland Lakes Network

Background

- Area - 383km^2
- Avg depth - 8.9m
- Deepest point - 34m
- 40% of NI drinking water
- Catchment - 43% of NI
- ASSI, SPA & Ramsar
- Pollan, European eel & Dollaghan trout



Belfast Telegraph News Opinion Business Sport Life Entertainment

Blue-green algae is back on Lough Neagh after warm and wet weather

Blue-green algae bloom can be seen at Lough Neagh on July 19, 2025 in Toomebridge

'It's dying in front of our eyes': how the UK's largest lake became an ecological disaster

Why is Lough Neagh dying? Northern Ireland's most precious wildlife site is facing disaster

Menace of blue-green algae returns to Lough Neagh prompting fears over future of fish stocks

UTV | NORTHERN IRELAND | LOUGH NEAGH | ENVIRONMENT | Tuesday 19 August 2025 at 6:12pm

NEWS

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Blue-green algae could pose serious 'health risks'

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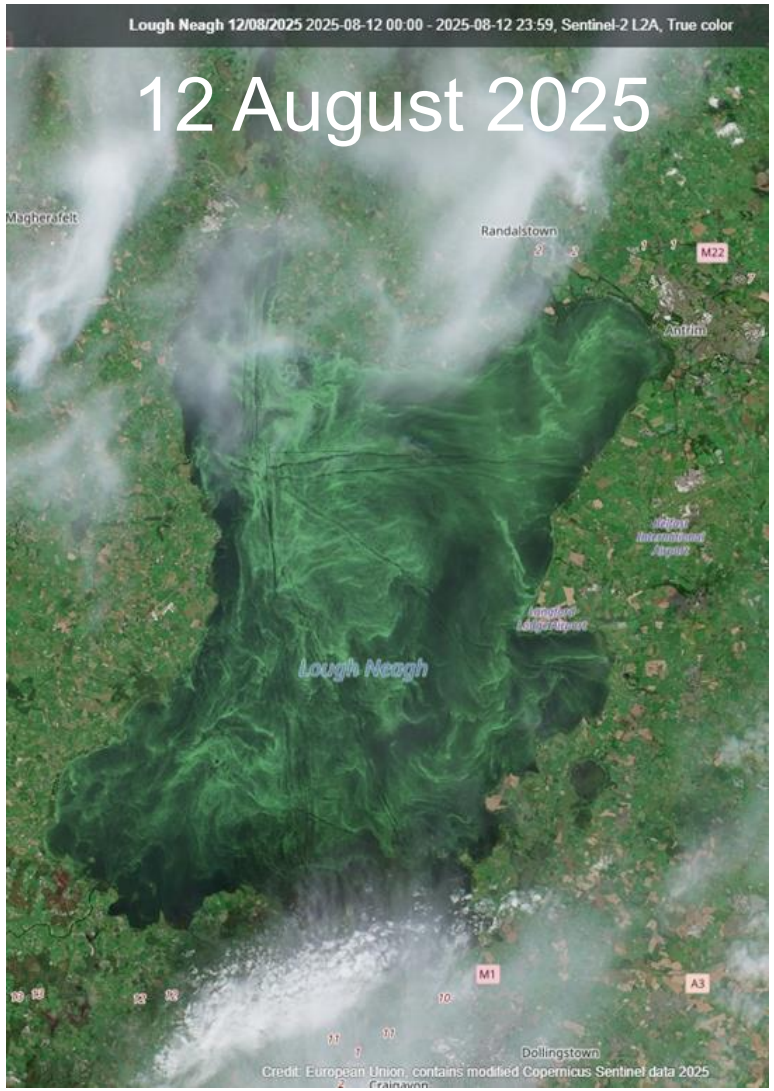

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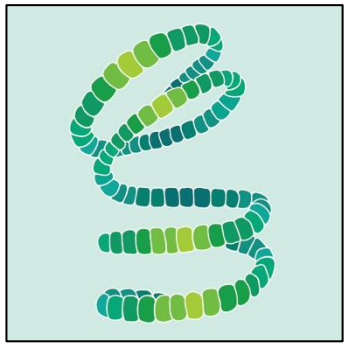
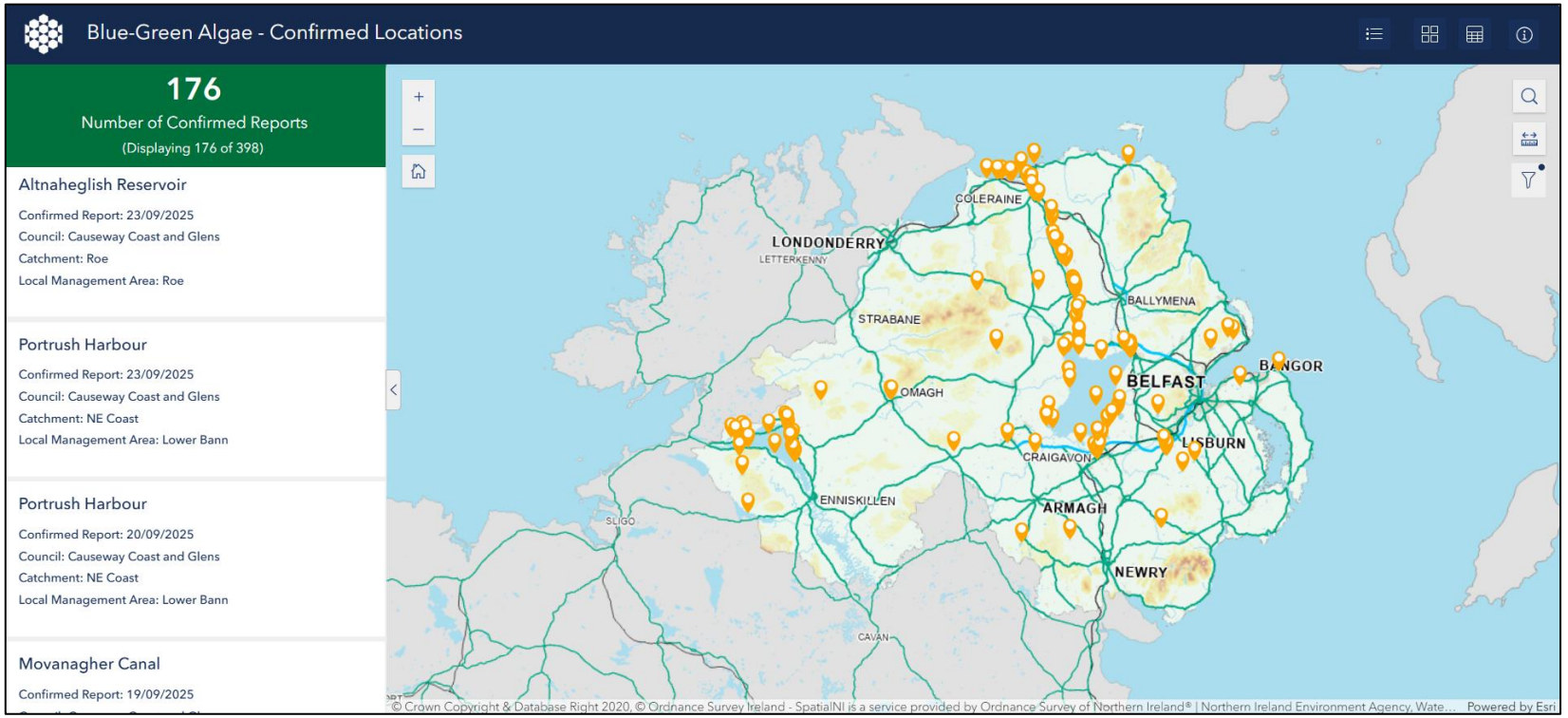
Blue green algae reporting

176 confirmed reports of blue green algae from 85 unique locations (up to and including 25/09/2025).





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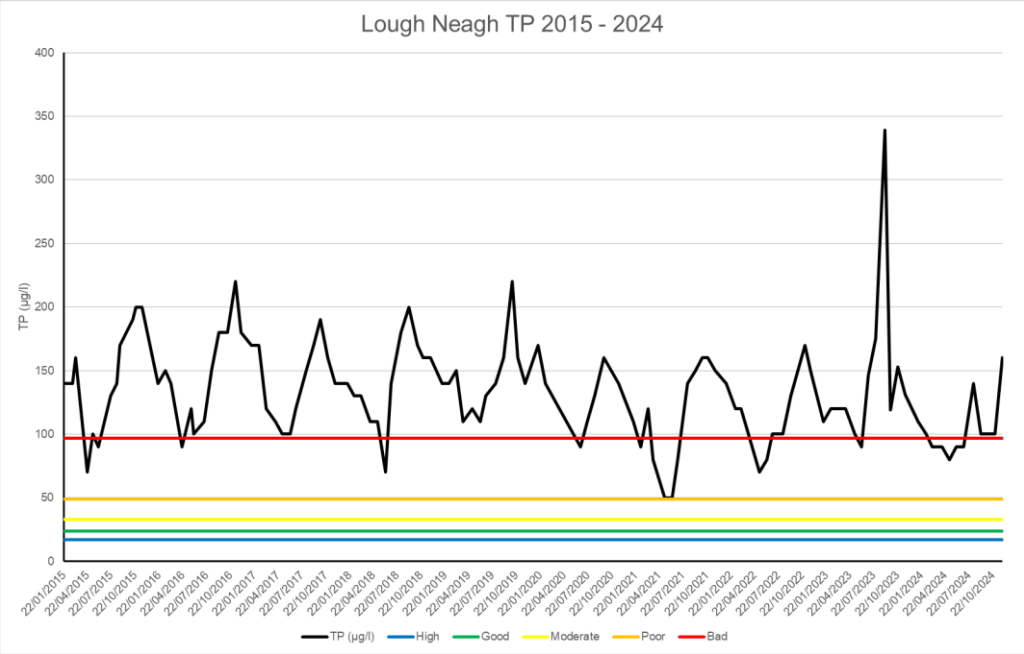
Nutrients and Lough Neagh



- Source apportionment models for Lough Neagh[1] estimate 61% P inputs are from agriculture, 29% from networked wastewater and 1.3% from septic tanks.
- Reducing TP to below 24 µg/L (good status) will take at least 20 years due to legacy P stored in the lake sediment and only if catchment P is greatly reduced (Rippey et al. 2022).

Recovery targets and timescales for Lough Neagh and other lakes

Brian Rippey [a,*], Yvonne McElarney [b], James Thompson [b], Michelle Allen [b], Mary Gallagher [c], Richard Douglas [a]

[a] School of Geography and Environmental Sciences, Ulster University, Coleraine, UK
[b] Agri-Food and Biosciences Institute, Newforge Lane, Belfast, UK
[c] Northern Ireland Environment Agency, Antrim Roasrd, Lisburn, UK

Timescale of reduction of long-term phosphorus release from sediment in lakes

Brian Rippey [a,*], Julie Campbell [a], Yvonne McElarney [b], James Thompson [b], Mary Gallagher [c]

[a] School of Geography and Environmental Sciences, Ulster University, Coleraine, UK
[b] Agri-Food and Biosciences Institute, Newforge Lane, Belfast, UK
[c] Northern Ireland Environment Agency, Antrim Road, Lisburn, UK

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[1] https://www.linkedin.com/posts/new-harmonica_the-new-harmonica-project-team-have-produced-activity-7310292981926744064-EFX2/

Nutrients and Lough Neagh

THE LONG-TERM RESPONSE OF LAKE NUTRIENT AND CHLOROPHYLL CONCENTRATIONS TO CHANGES IN NUTRIENT LOADING IN IRELAND'S LARGEST LAKE, LOUGH NEAGH

Yvonne McElarney, Brian Rippey, Claire Miller, Michelle Allen and Antony Unwin

- McElarney et al. (2021) - Lake water concentrations of TP increased since the 1990s but weren't correlated with catchment inputs, highlighting the role of internal P loading.
- However, catchment NOx and lake concentrations were highly correlated (R=0.88).
- N and P inputs both need to come down in long term but a reduction in catchment N is likely to have more effect in short term due to legacy P and impacts internal P loading.
- N:P ratios will be important in determining future species composition.

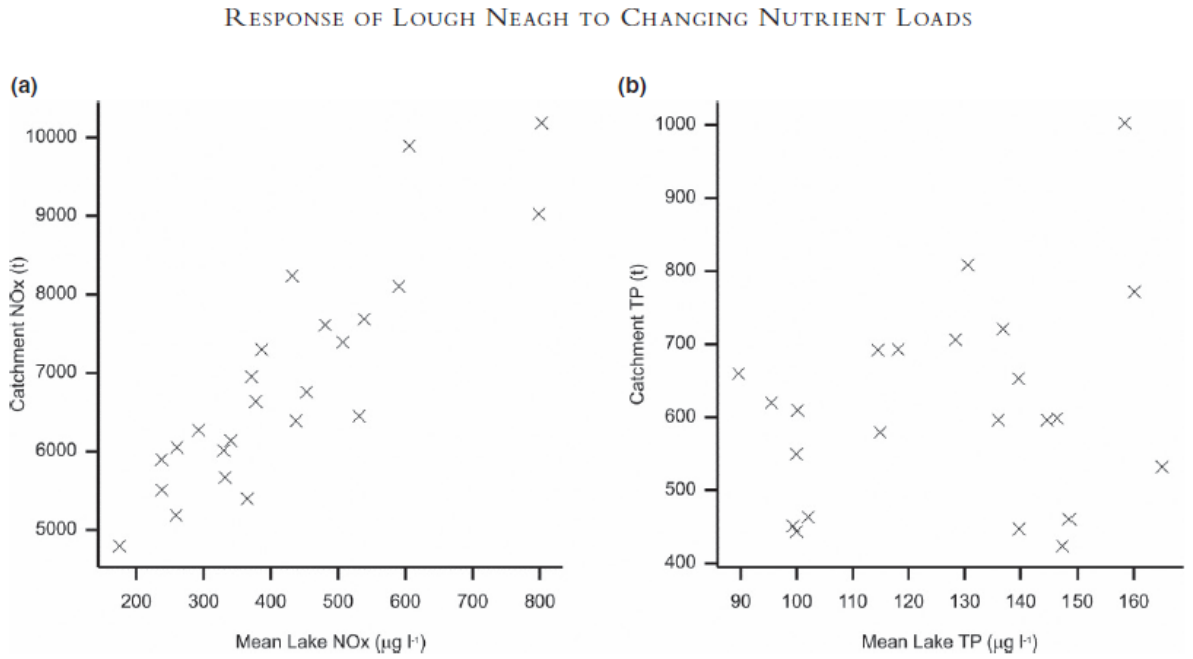

Fig. 4—Annual mean lake water concentration for total oxidised nitrogen (NOx; µg/L) and catchment loading of NOx tonnes (T) per year (a) and annual mean lake water concentration for total P (TP; µg/L) and catchment loading of TP (T) per year (b).

Lough Neagh Ecological Status

Element	2015	2018	2020	2021	2024
Phytoplankton	Poor	Poor	Poor	Poor	Moderate
Macrophytes	Bad	Poor	Bad	Bad	Poor
Diatoms	Poor	Poor	Poor	Poor	Poor
Fish	High	High	High	High	High
DO	Good	Good	Moderate	Moderate	Good
TP	Bad	Bad	Bad	Bad	Bad
Salinity	High/Pass	High/Pass	High/Pass	High/Pass	High/Pass
Specific pollutants	High	High	High	High	High
Physicochemistry	Moderate	Moderate	Moderate	Moderate	Moderate
Hydromorphology	Less than Good	Less than Good	Less than Good	Less than Good	Less than Good
Ecological status	Bad	Poor	Bad	Bad	Poor
Chemical status	High	High	High	Moderate	Moderate
Surface Water status	Bad	Poor	Bad	Bad	Poor

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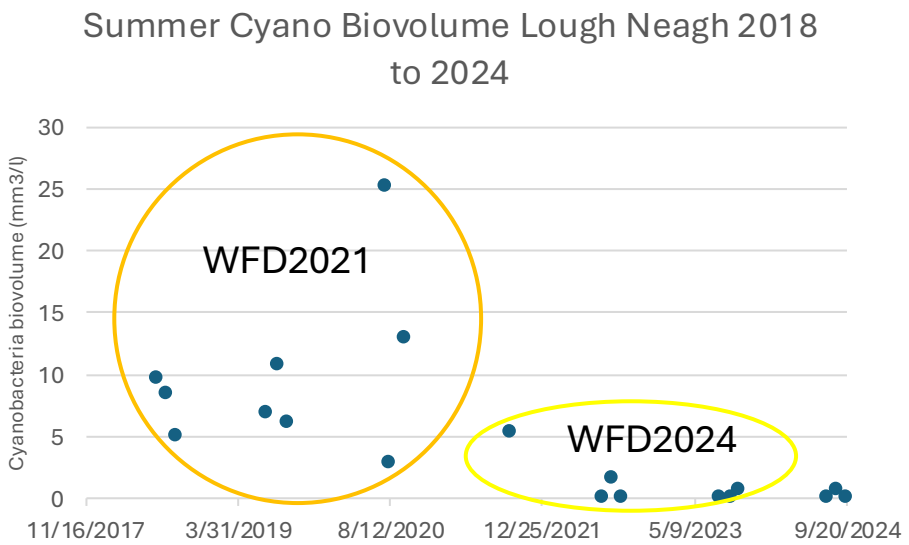
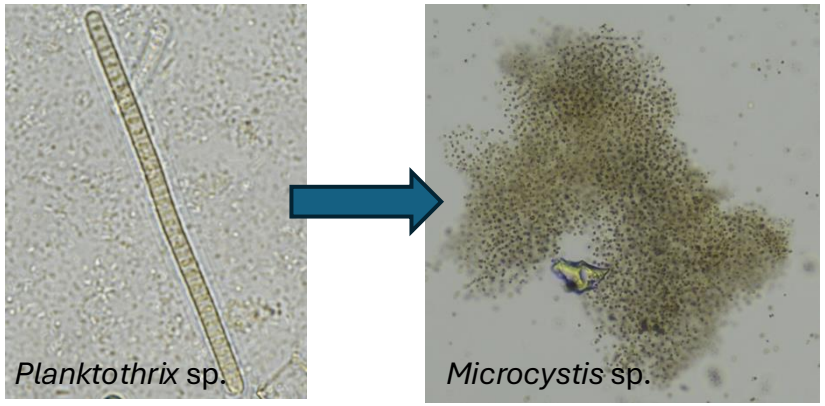
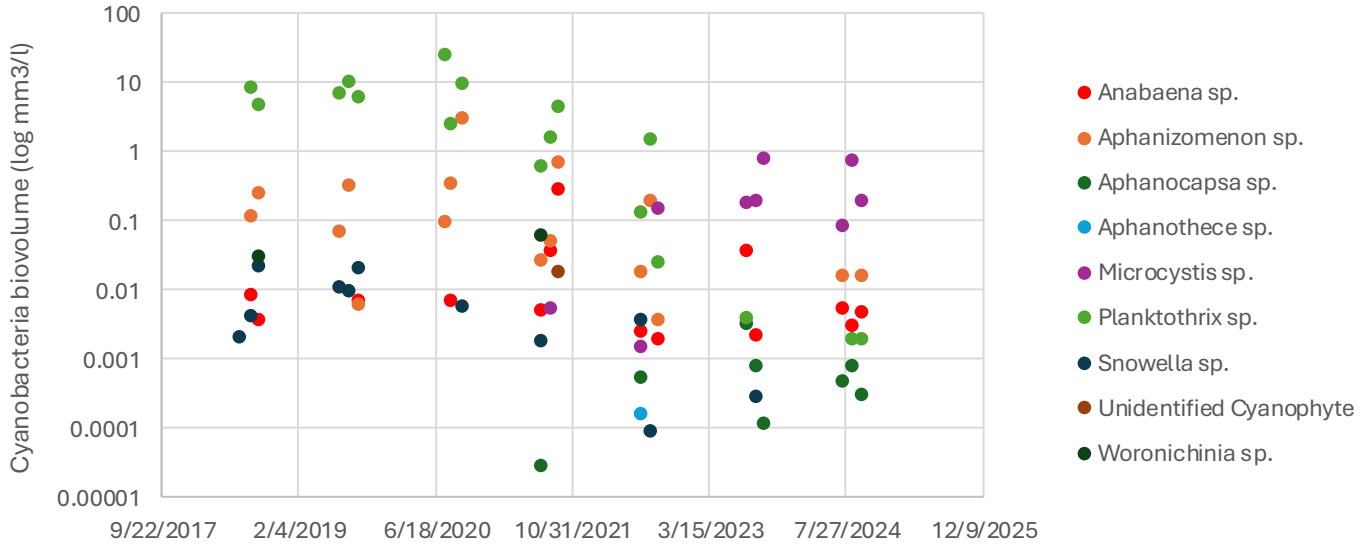
Phytoplankton





Lake Name	Year	Years Taxa Data Used	EQR	Class	High	Good	Moderate	Poor	Bad
Neagh	2014	2011, 2012, 2013	0.307	Poor					
Neagh	2015	2012, 2013, 2014	0.343	Poor	0.00	0.00	0.04	0.96	0.00
Neagh	2016	2012, 2013, 2014	0.334	Poor	0.00	0.00	0.02	0.98	0.00
Neagh	2017	2014, 2015, 2016	0.356	Poor	0.00	0.00	0.13	0.87	0.00
Neagh	2018	2015, 2016, 2017	0.324	Poor	0.00	0.00	0.02	0.97	0.00
Neagh	2019	2016, 2017, 2018	0.300	Poor	0.00	0.00	0.00	1.00	0.00
Neagh	2020	2017, 2018, 2019	0.232	Poor	0.00	0.00	0.00	1.00	0.00
Neagh	2021	2018, 2019, 2020	0.226	Poor	0.00	0.00	0.00	0.98	0.02
Neagh	2022	2019, 2020, 2021	0.269	Poor	0.00	0.00	0.00	1.00	0.00
Neagh	2023	2020, 2021, 2022	0.389	Poor	0.00	0.00	0.31	0.69	0.00
Neagh	2024	2021, 2022, 2023	0.448	Moderate	0.00	0.00	0.97	0.03	0.00



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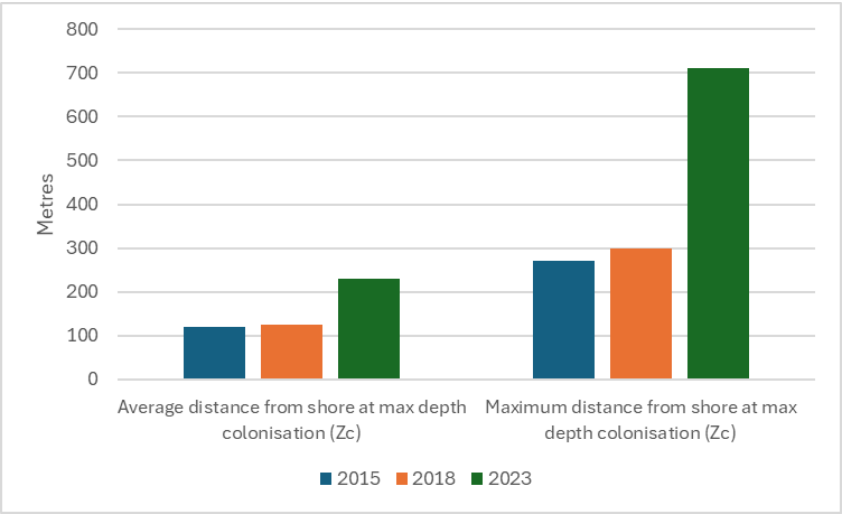
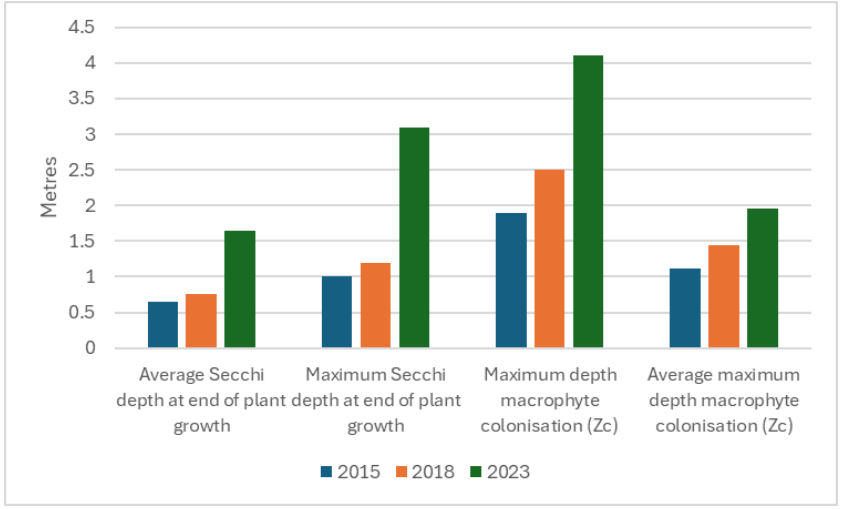
Macrophytes

- Increased max depth colonization
- Increased Secchi depth
- Macrophytes extending further offshore into deeper water



Lake	Year	Metric 2-%RF Elodeids	Metric 4-Plant Trophic Score	Metric 5-Zc Score	Metric 6-Avg Depth of Presence	Free Index	EQR	Ecological Class
Neagh	2009	0.1	0.1	0.7	0.2	0.300	0.380	Poor
Neagh	2012	0.1	0.1	0.3	0.2	0.167	0.208	Bad
Neagh	2015	0.1	0.1	0.7	0.2	0.267	0.333	Poor
Neagh	2018	0.1	0.1	0.5	0.2	0.217	0.271	Bad
Neagh	2023	0.1	0.1	0.9	0.2	0.267	0.333	Poor



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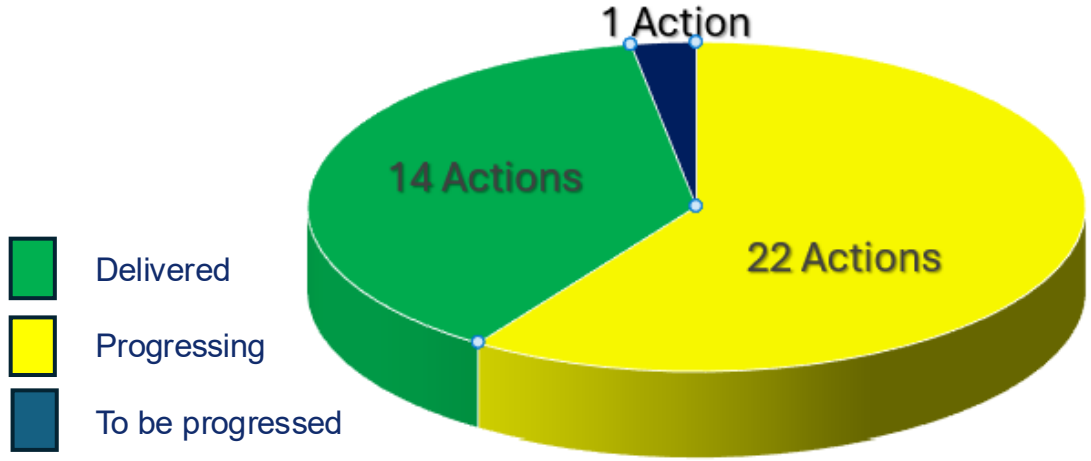
Lough Neagh Report and Action Plan

Delivered (14)
13. Commence a SBRI to investigate solutions to reduce Blue Green Algae blooms
37. Implement the Inter Agency Blue-Green Algae monitoring protocol.

Progressing (22)
2. Develop a Lough Neagh science platform.
31. Scope the provision of a dedicated team for poorest water quality catchments



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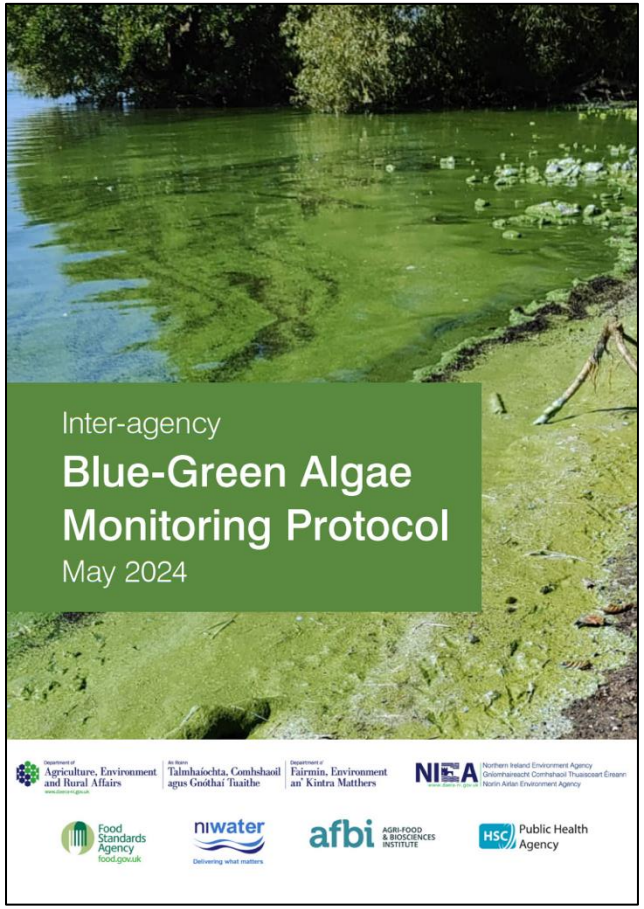
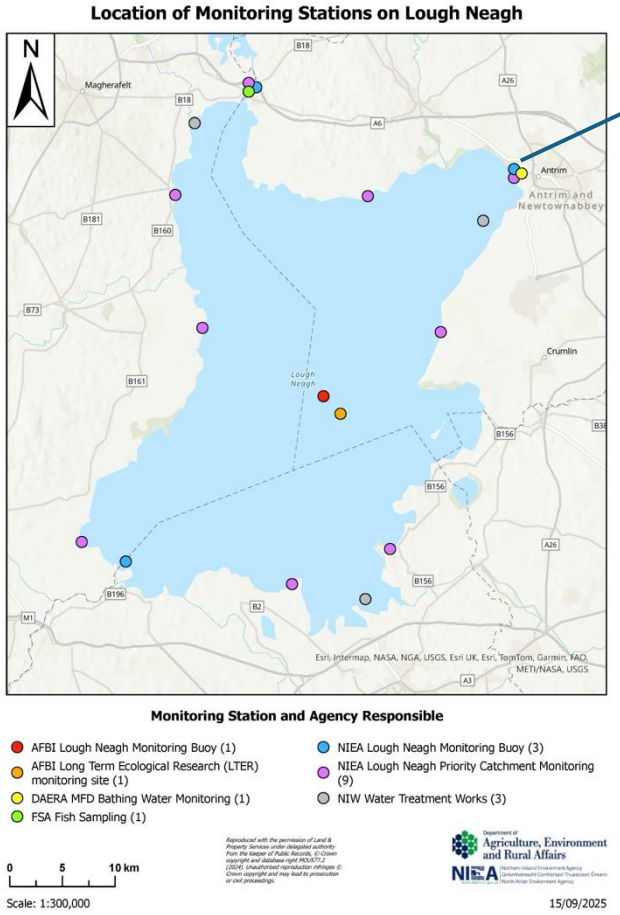
Inter-agency blue green algae monitoring protocol

A **tiered approach to monitoring** and surveillance based on water use categories and public health guidance.

1. Sites with little or no recreational activity
2. Sites with high recreational activity which are not candidate/identified bathing waters
3. Identified or candidate bathing waters
4. Commercial and recreational sites producing primary products (food/feed)
5. Drinking water abstraction waters

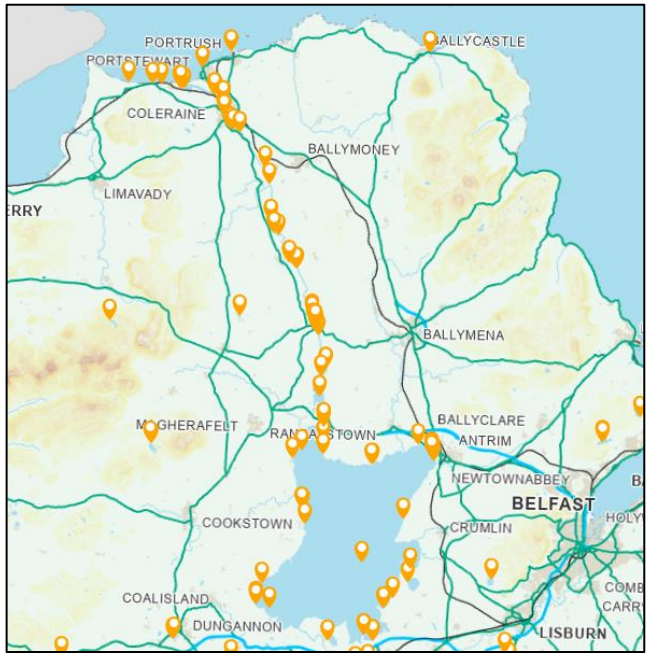


Inter-agency monitoring



Alert Level Framework

	Green level - surveillance mode	Amber level – alert mode	Red level – action mode
Monitoring requirements:	Fortnightly visual assessment*, water sample ELISA analysis and biovolume analysis to establish a baseline.	Weekly visual assessment, water sample ELISA analysis and biovolume analysis. Cyanotoxin concentration corroboration at accredited laboratory.	Weekly visual assessment, water sample ELISA analysis and biovolume analysis. Cyanotoxin concentration corroboration at accredited laboratory.
Results:	No presence of microcystins. Biovolume of all cyanobacteria below 1 mm^3/L.	Some visual evidence of patchy scum/mats/potential material. AND Presence of microcystins. Microcystin concentration below 10 µg/L. AND/OR Biovolume of all cyanobacteria between 1 and 4 mm^3/L.	A visible, thick scum covering most of the water surface. AND/OR Microcystin concentration at or above 10 µg/L. AND/OR Biovolume of all cyanobacteria exceeds 4 mm^3/L.
Advice to bathing water operators:	Bathing water operators informed at surveillance mode.	Bathing water operator and public informed to watch out for scums and when in doubt, stay out (encourage vigilance).	Bathing water operator to issue '**advice against bathing**' and public warned of risk to public health.



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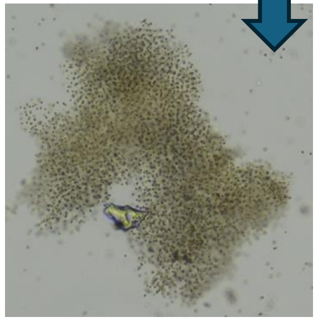
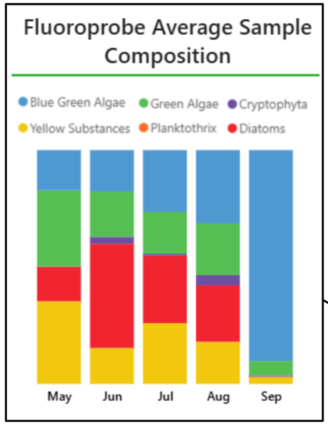
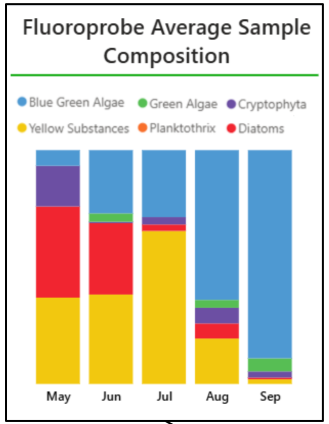
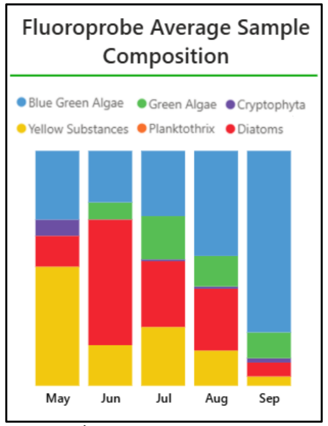
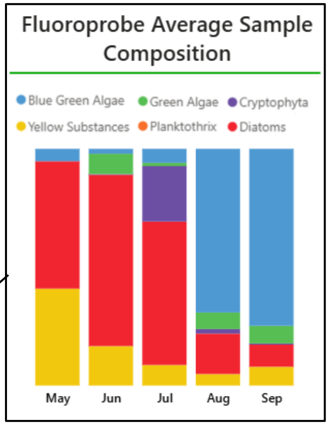
Lough Neagh Priority Catchment Monitoring Programme

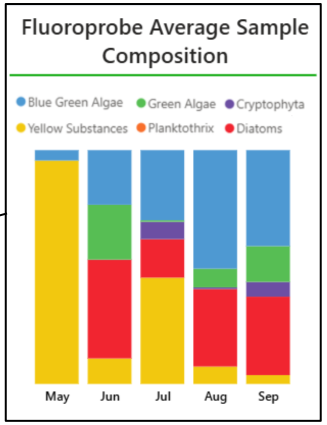


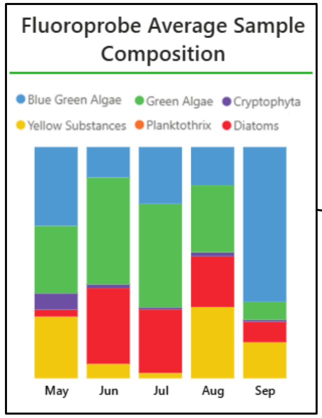


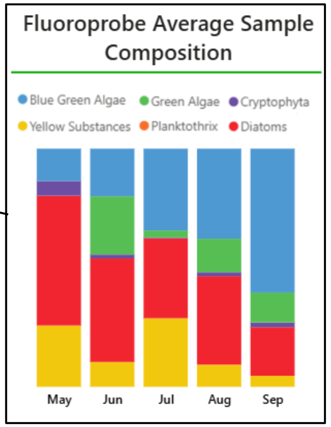


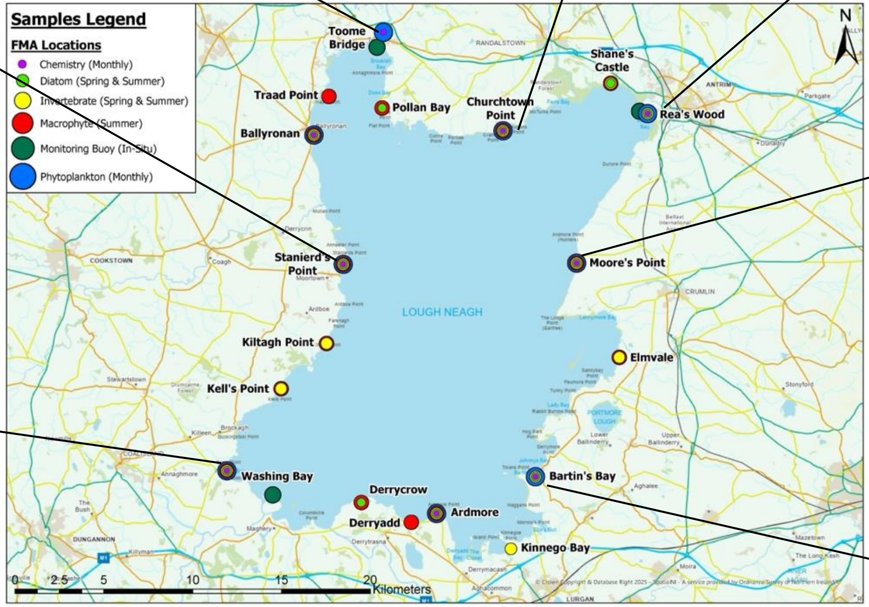












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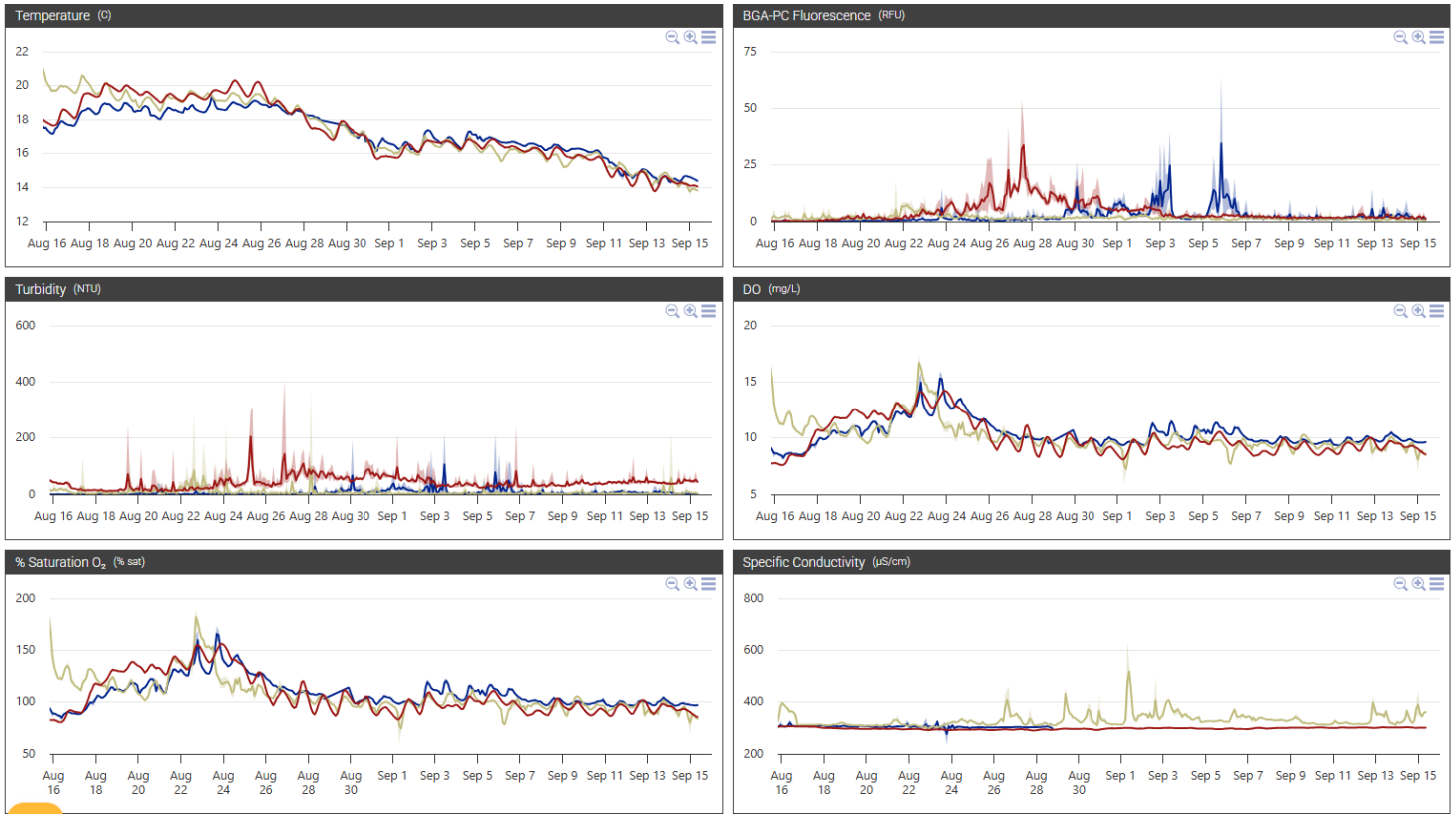
In-situ monitoring



Rea's Wood (North-East) – Blue line

Toome Bridge (North-West Outlet) – Red line

Washing Bay (South-West) – Gold line

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LOUGH NEAGH SBRIS

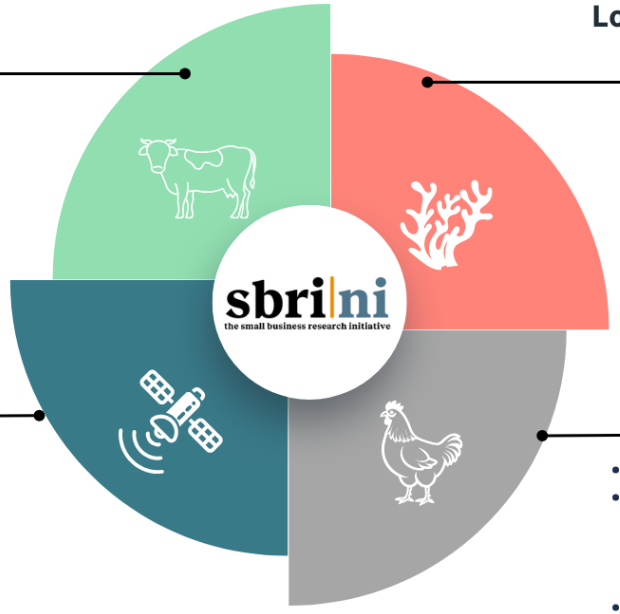
SBRI NI are currently working on a portfolio of SBRIs that play a pivotal role in supporting DAERA's strategic response to the environmental crisis in Lough Neagh. The SBRIs are complimentary, addressing the immediate need to mitigate the algae in situ, responding to the causes of the algae and developing the methods to predict and monitor algal blooms.

Sustainable Utilisation of Livestock Slurry- Phase 2

- 3 pilot projects- demonstrating a range of management solutions of livestock slurry.
- To reduce P runoff & improve water quality.
- By removing P from NI Agri-nutrient cycle.
- £12million over 3-4 years
- Funded (Phase 1 DfE) Phase 2 DAERA

Using Space based technology to predict and monitor blue green algal blooms- Phase 2

- After a successful Phase 1, 2 suppliers are developing solutions providing DAERA with integrated, satellite modelling and monitoring of algal blooms.
- £620,000 across 7 months
- Funded by UK Space Agency



Lough Neagh: Blue Green Algae- Phase 2

- Phase 2 is approaching contract award.
- 5 suppliers from Phase 1 were invited to bid.
- A range of innovative solutions to manage and reduce blue green algae in Lough Neagh will be tested and the environmental impact carefully monitored and managed prior to full deployment.
- £2 million across 2 year, 4 suppliers .
- Funded (Phase 1) DfE & DAERA Phase 2 DAERA

Sustainable Utilisation of Layer Manure-Phase 1

- Phase 1 has recently gone into contract.
- 5 suppliers are developing proof of concepts for circular economy approaches to transform layer manure management and processing, creating sustainable alternatives to land spreading in NI.
- £250,000 across 7 months.
- Funded CAFRE/DAERA


Lough Neagh – Rea's Wood

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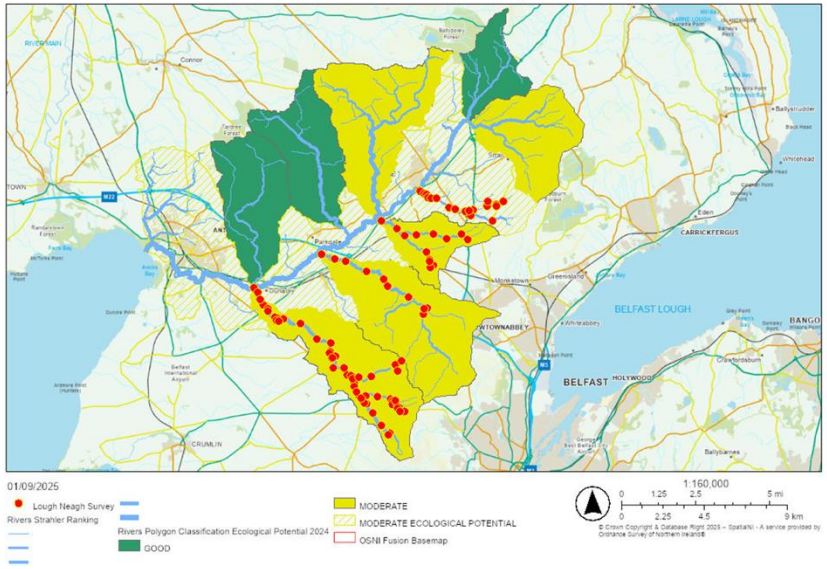
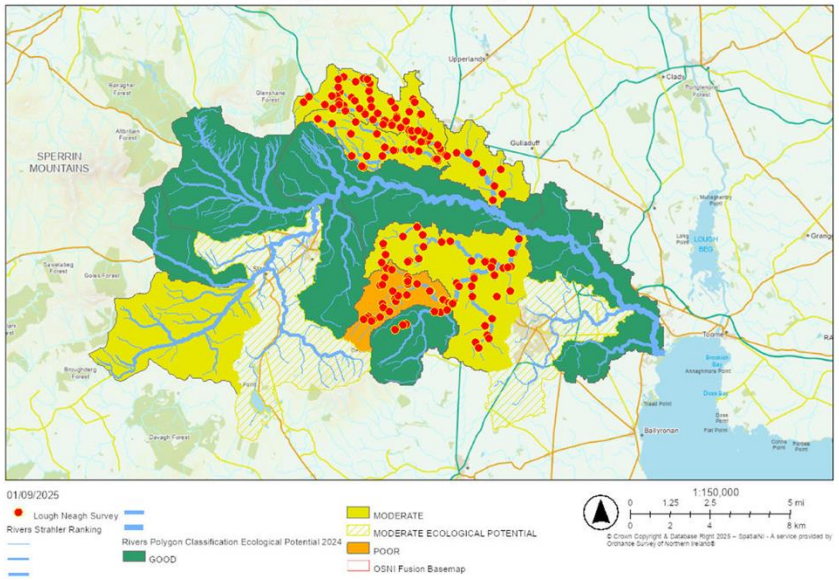
Catchment investigations

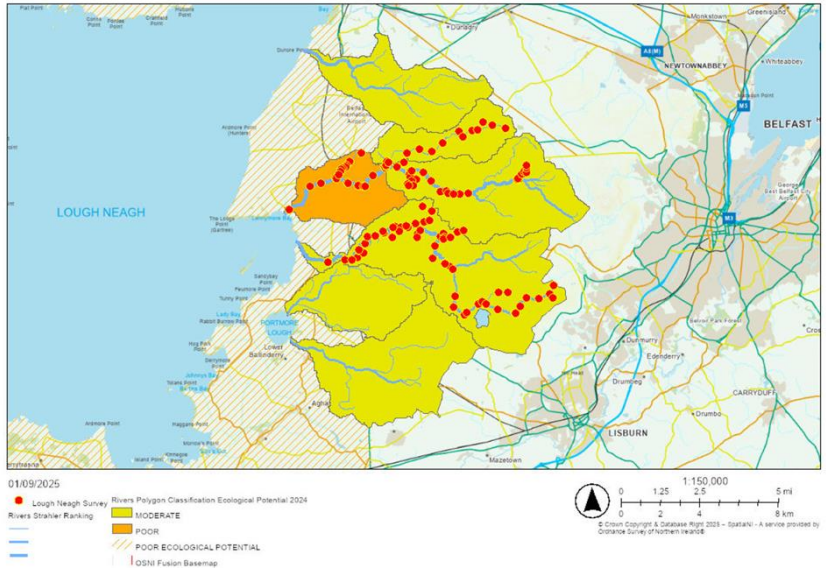
Six Mile Water Catchment Investigations



Moyola Catchment Investigations



Crumlin Glenavy Catchment Investigations



Inspection Type	Number of sites
Initial walkover/ Baseline	68
Further investigation	48
River Walk	3
Follow up	27

Referrals Type	Number of referrals
Pollution Incident	4
Abstractions	1
Agriculture	1
Changes to river channel	1

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Ulster University

Thanks

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