Presentation on Blue Green Algae to Mid Ulster District Council

September 2023

Sustainability *at the heart of a living, working, active landscape valued by everyone.*

NIEA Northern Ireland Environment Agency
www.daera-ni.gov.uk

An Agency within the Department of Agriculture, Environment and Rural Affairs
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Role of NIEA

'*To protect and enhance Northern Ireland's environment, and in doing so, deliver health and well-being benefits and support economic growth'*

Role of Water Management Unit

Freshwater and marine environment at "good status"

Monitor, Protect and Improve our aquatic environment

- Water Framework Directive monitoring
- Pollution / Emergency Response
- Cross Compliance Inspections
- Catchment Investigations & Pollution Prevention
- River Basin Management Planning
- Administration of Water Quality Improvement Grant
- Major Client Interface & Sustainable Development

What is Blue-Green Algae?

- Blue-green algae (cyanobacteria) are microscopic plant-like organisms that occur naturally in ponds, rivers, lakes and streams.
- Some blooms can produce toxins which are harmful.
- Suitable conditions for ‘blooms’ to occur include sufficient levels of nutrients (nitrogen and phosphorus), bright sunlight, warm water temperatures in still or slow-flowing water.
- Algal blooms can occur throughout the year, but they are most common from May through to September when suitable weather conditions combine with a ready supply of nutrients.
- Bloom decomposition can lead to odour issues.

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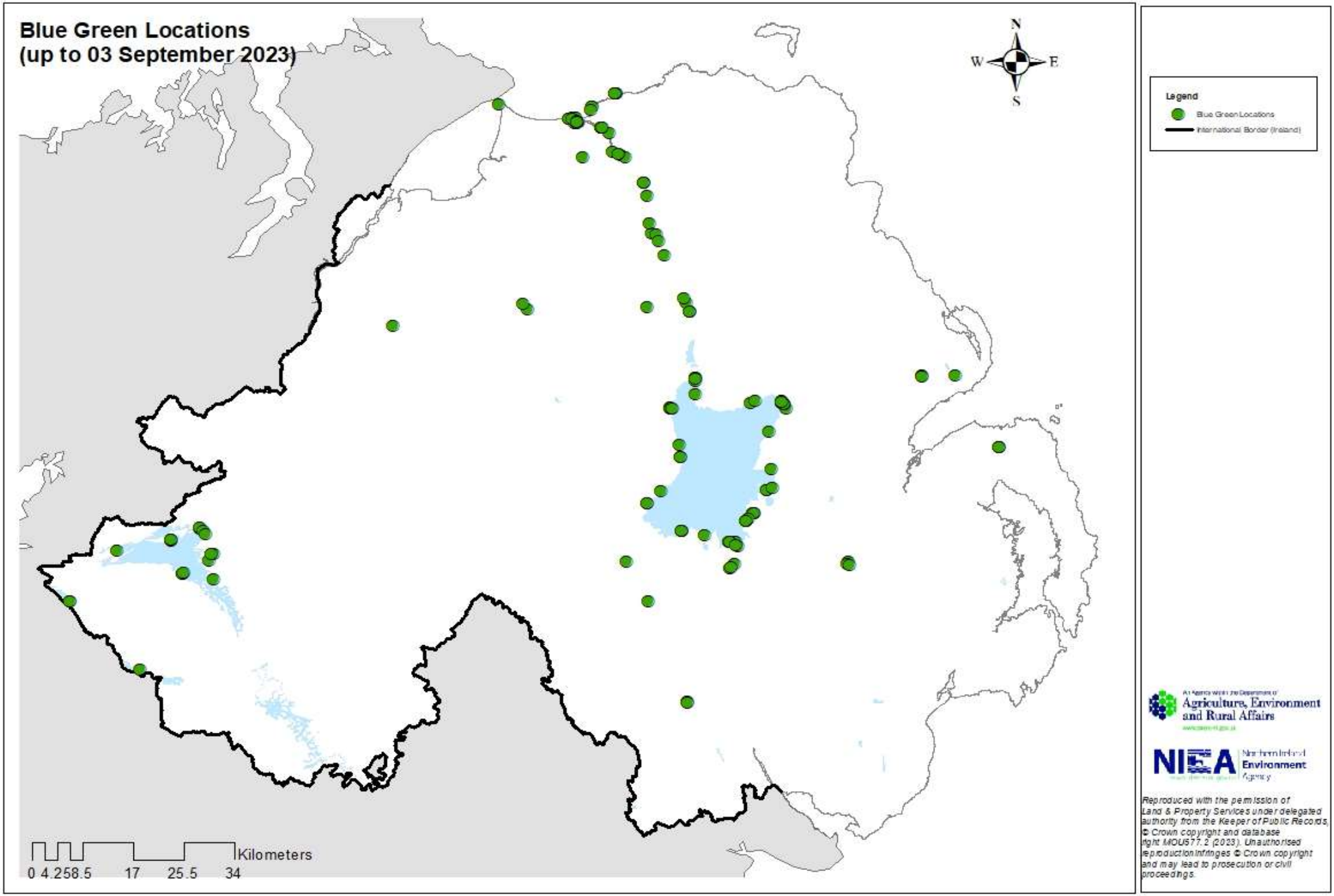
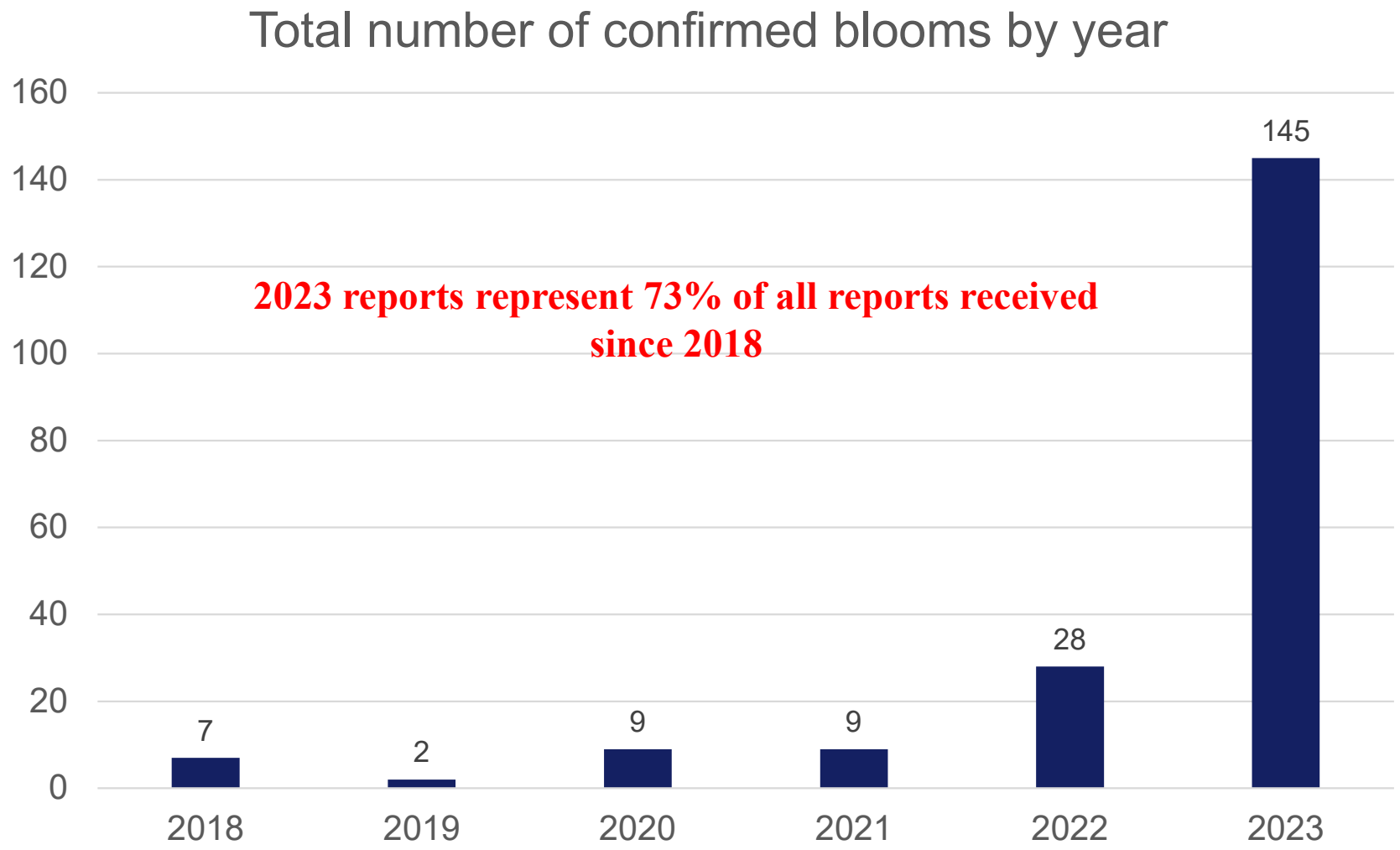
Map of Reports




Total number of confirmed blooms by year
160
140
120
100
80
60
40
20
0
2023 reports represent 73% of all reports received since 2018
7
2
9
9
28
145
2018
2019
2020
2021
2022
2023

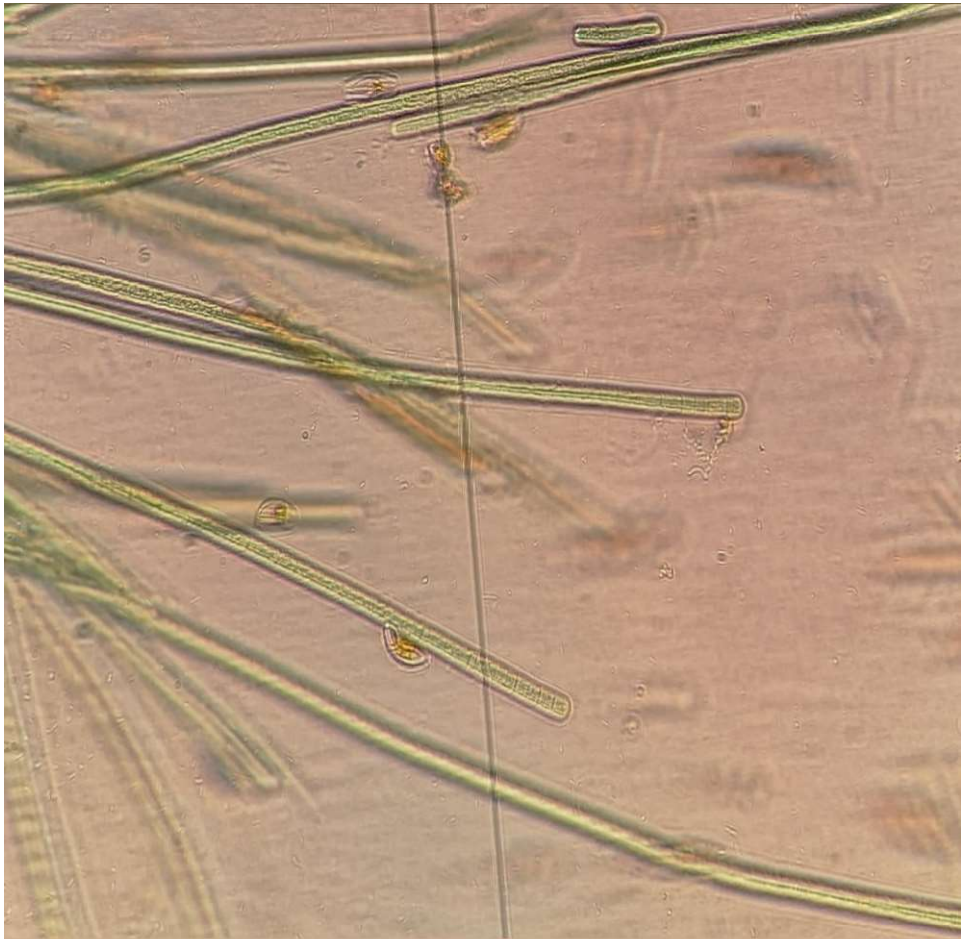
What has happened in Lough Neagh this year?

BG algae blooms are common in Lough Neagh (not all are seen from shore or on surface)

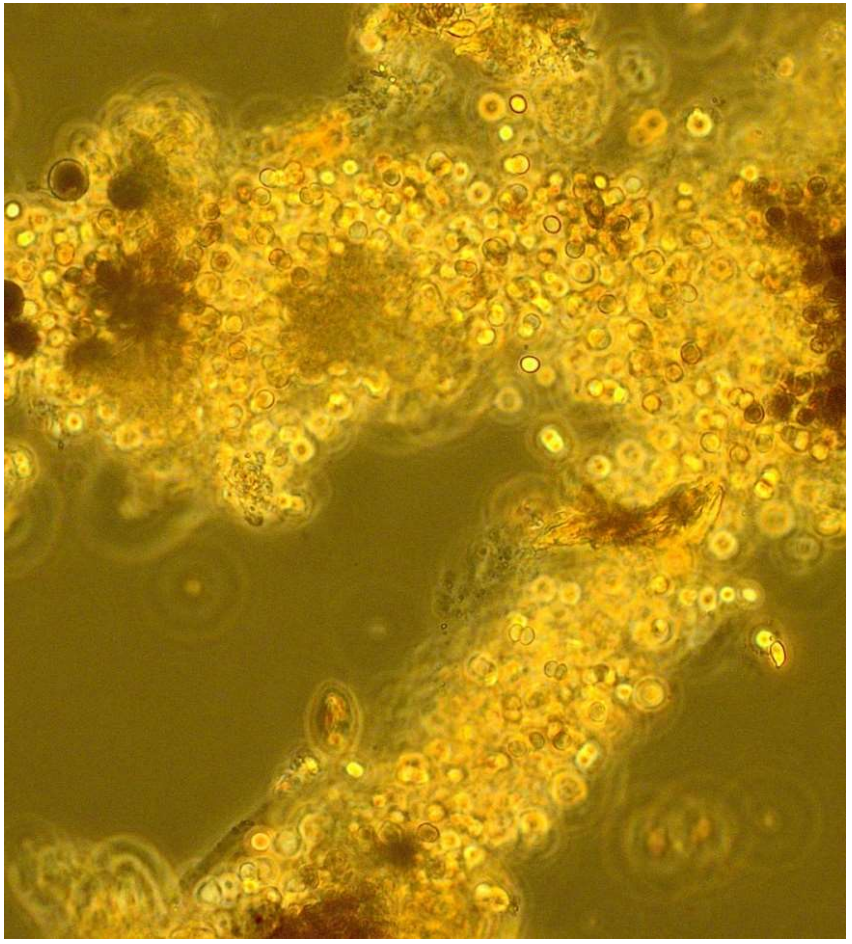
What occurred this year?

- High nutrient levels (increasing trend since 2019)
- High Water clarity (3 times clearer since 2019)
- High Water Temperature (average 17.4^{o}C, highest ever recorded)
- Switch in dominant taxa strain (from one suited to turbid conditions)

Planktothrix

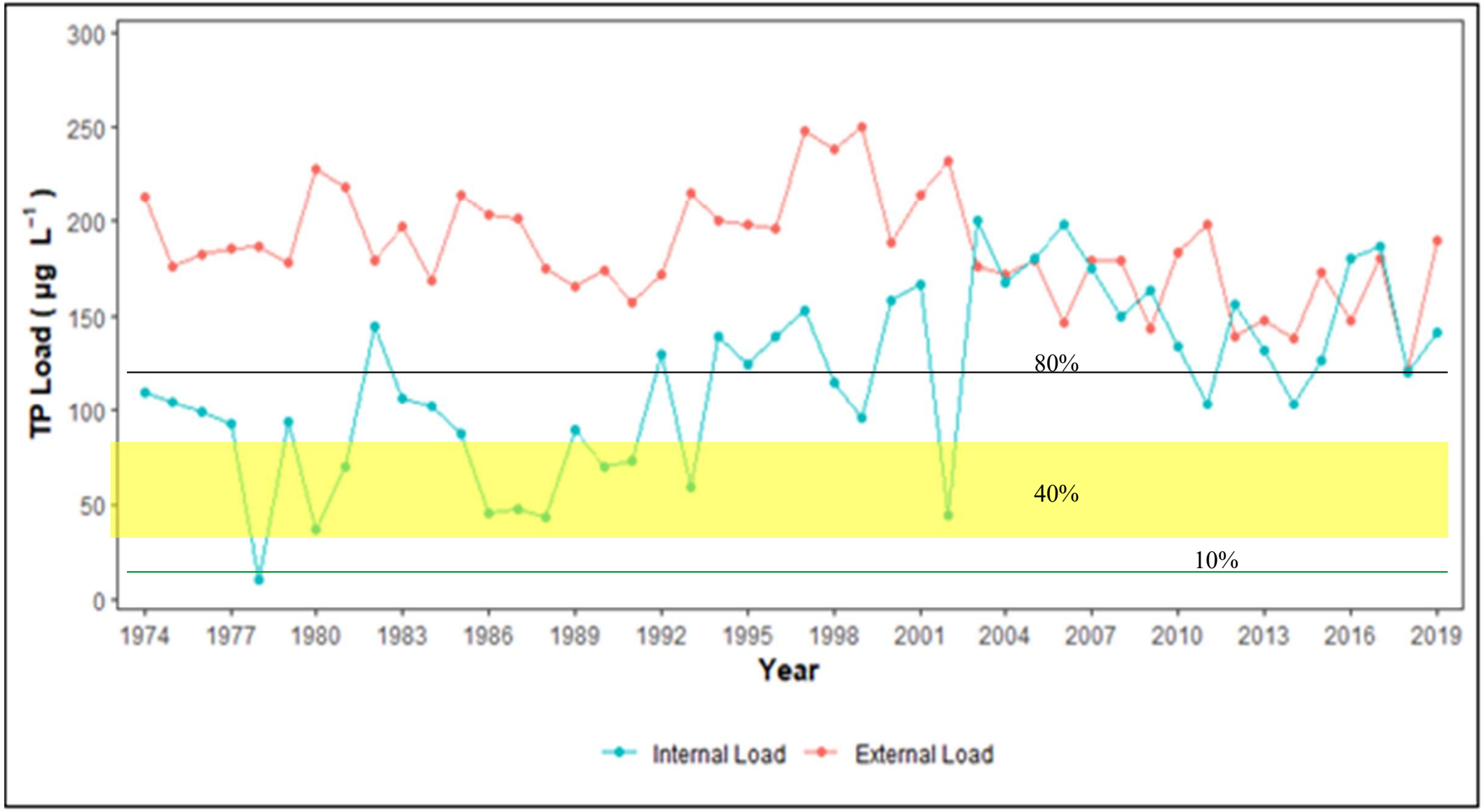


Microcystis



Lough Neagh Recent WFD Classification

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



Credit - James Thompson UU PhD research

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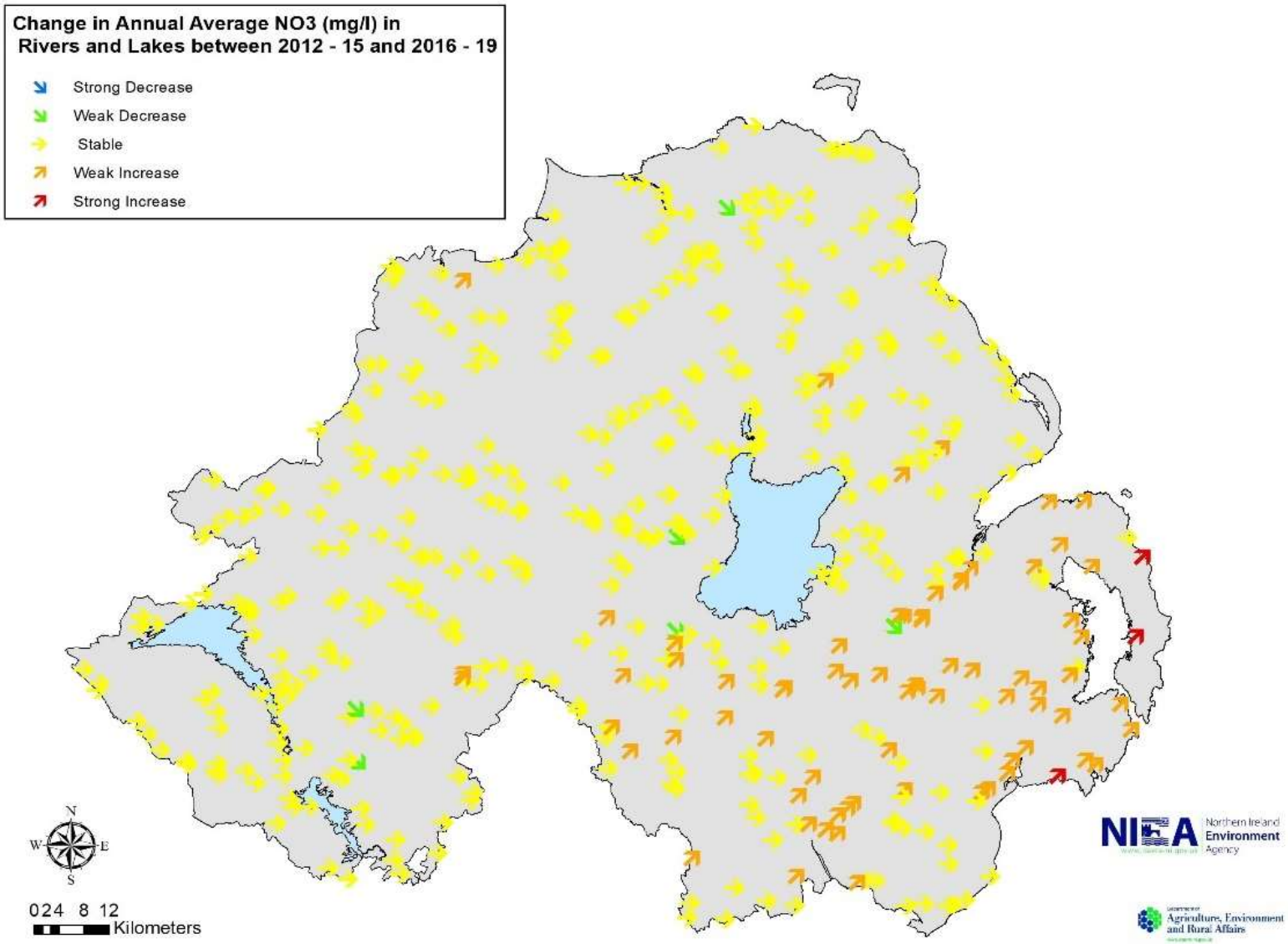

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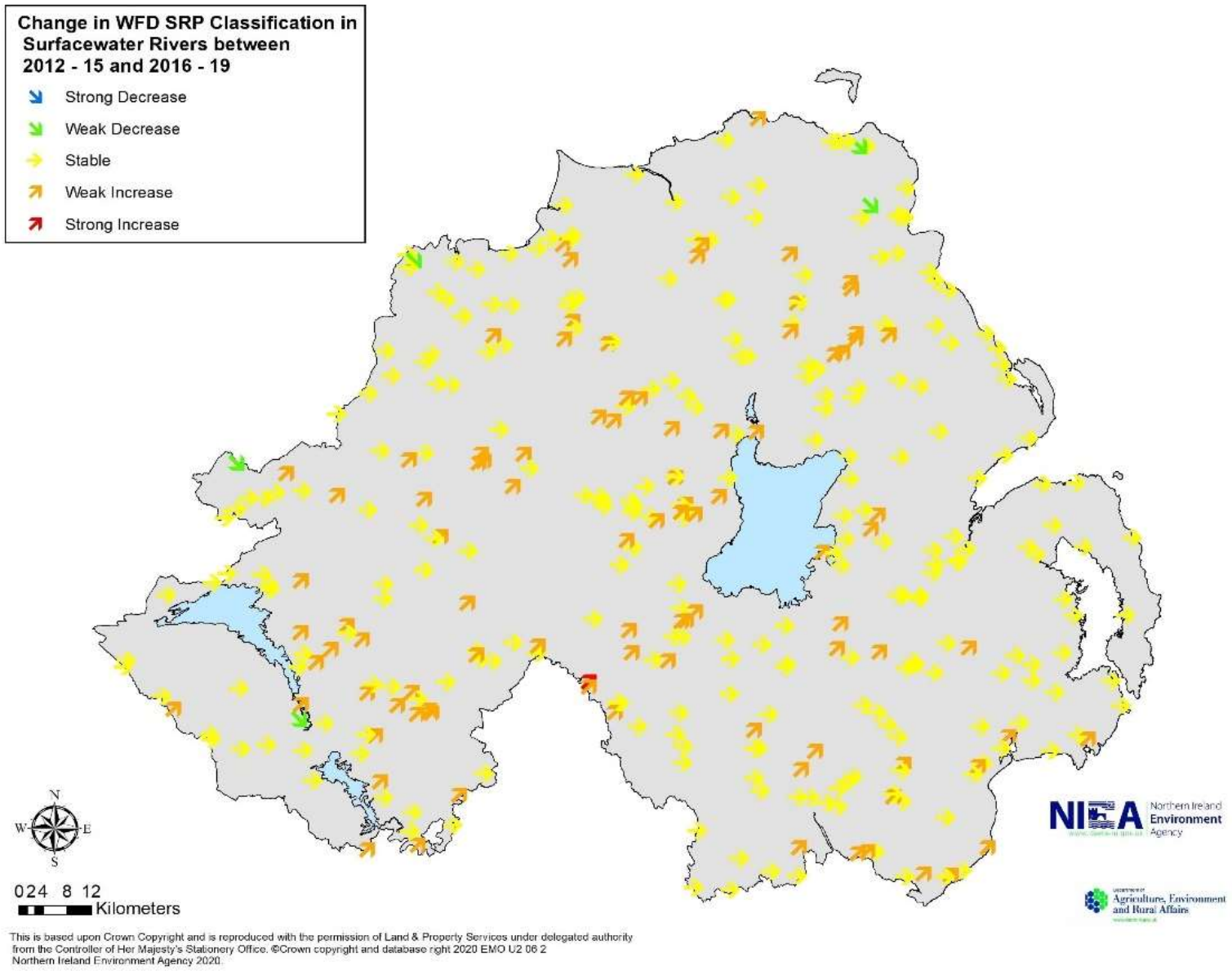

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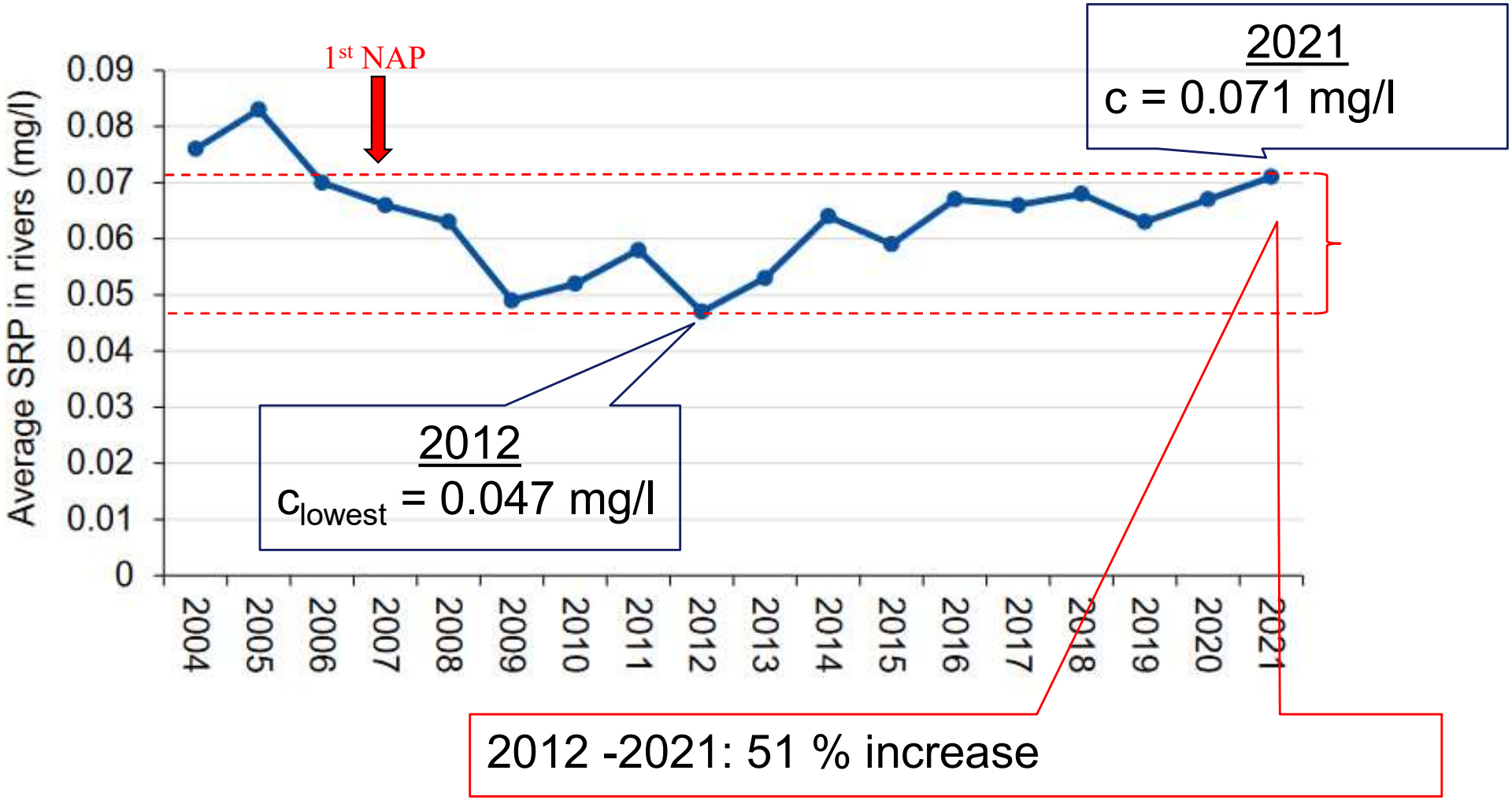
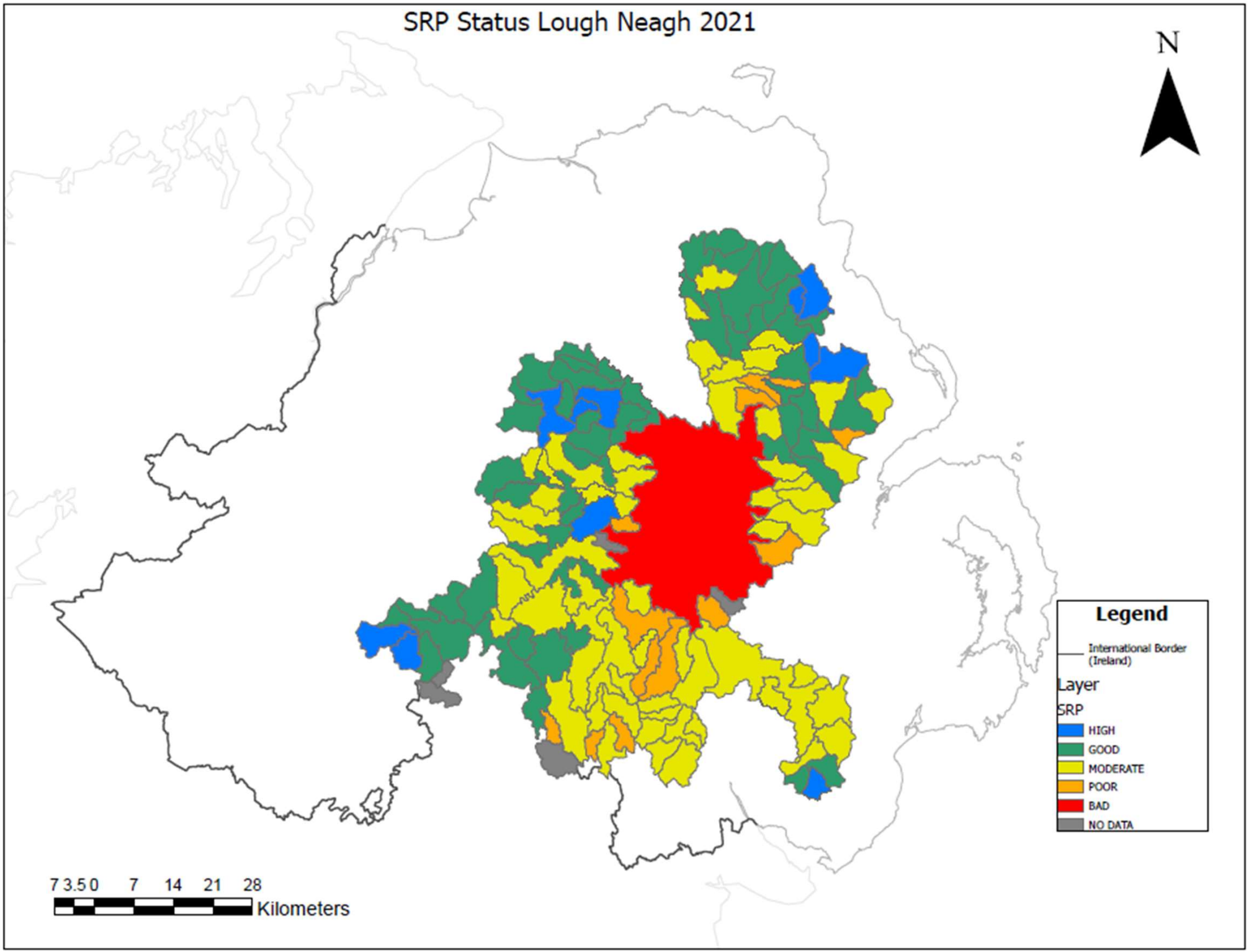
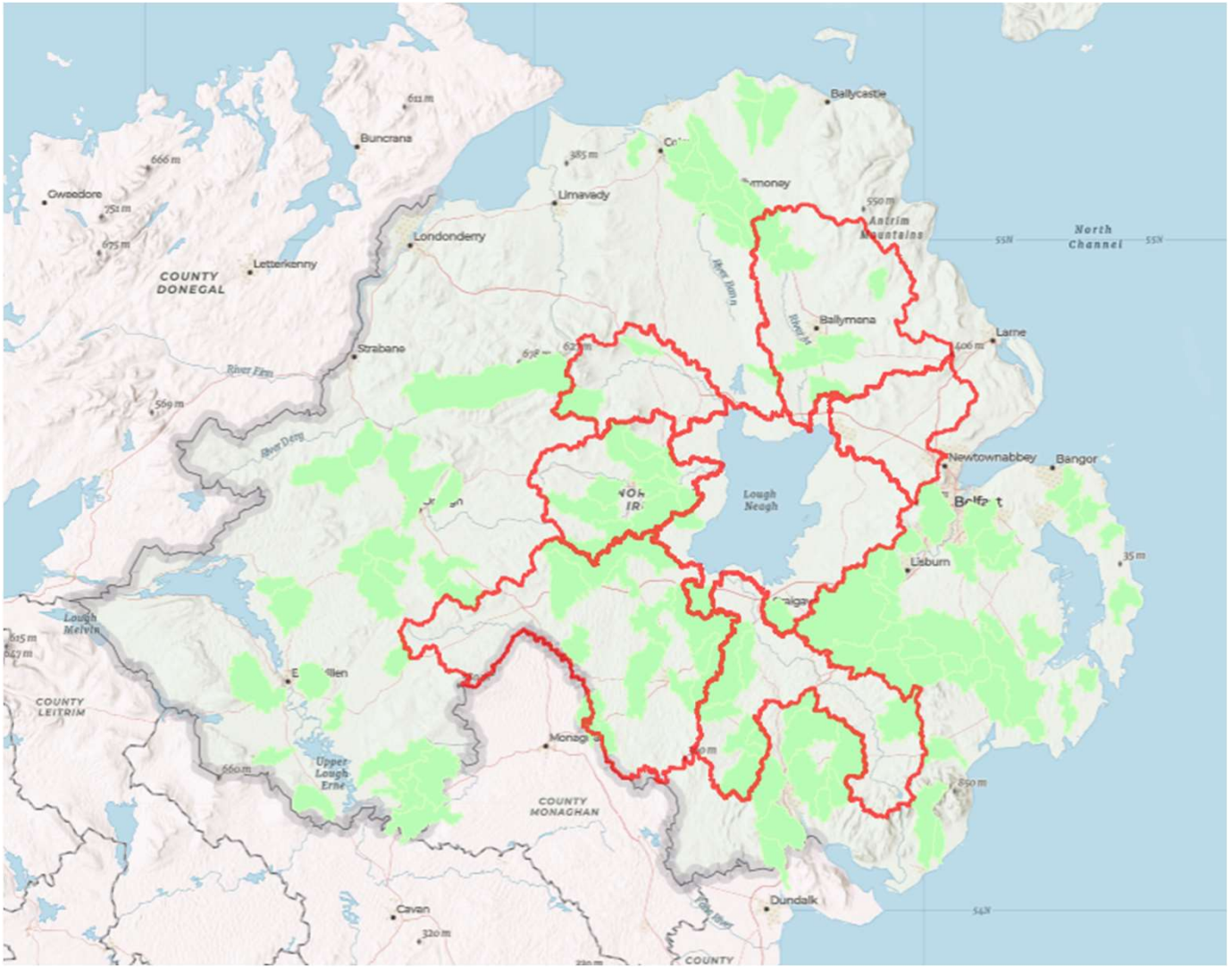
Soluble Reactive Phosphorus (SRP)



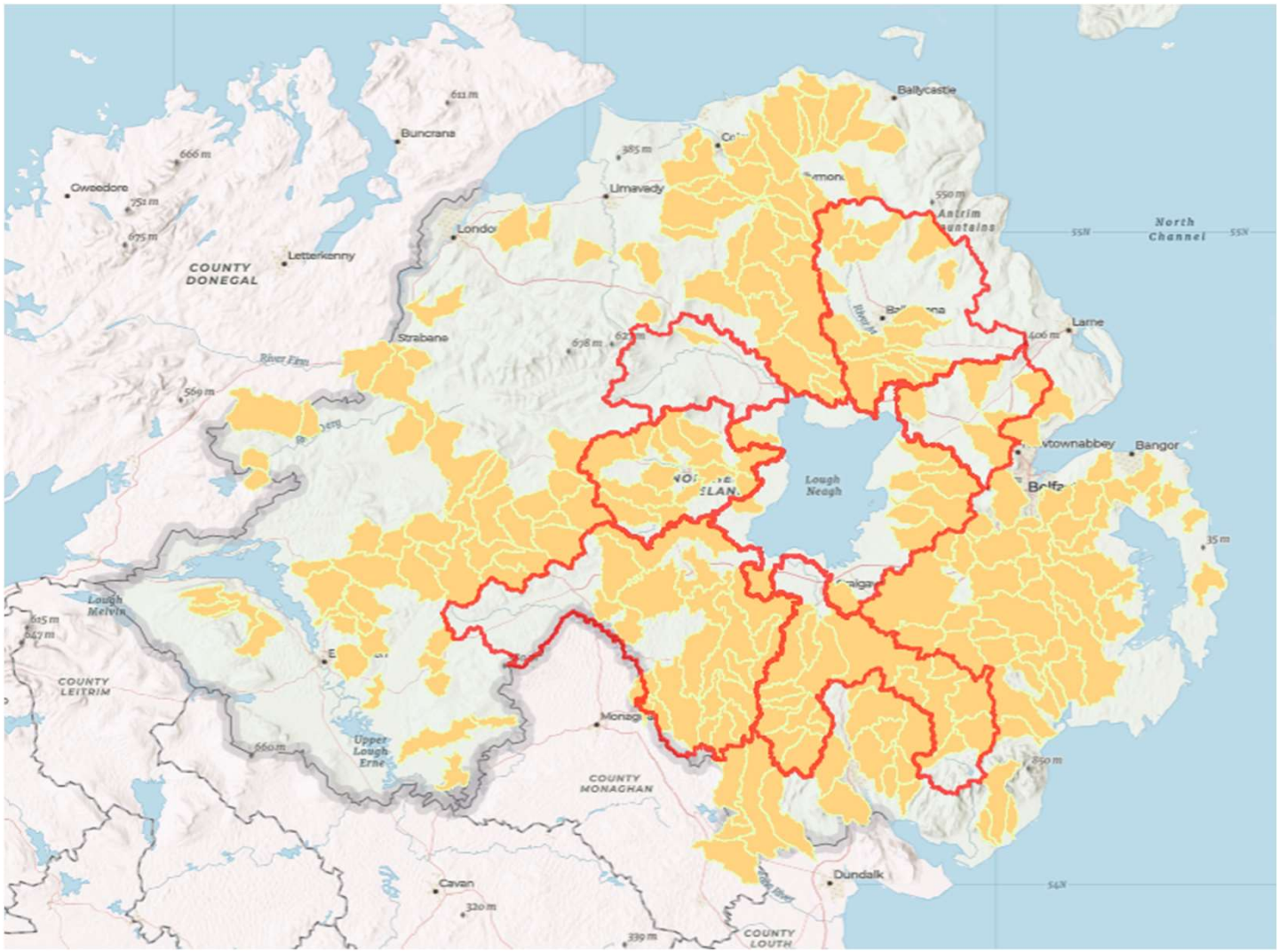

SRP Status Lough Neagh 2021
N
Legend
International Border (Ireland)
Layer
SRP
HIGH
GOOD
MODERATE
POOR
BAD
NO DATA
7 3.5 0 7 14 21 28
Kilometers

Point source Pressure Indicators



Ammonia
Invertebrates
Dissolved oxygen

Diffuse Pressure Indicators



SRP
Diatoms
Macrophytes

Where is the Phosphorus coming from?

Sector	P lost to waterways (tonnes)	% of total
Agriculture	940t	62%
Wastewater	360t	24%
Septic tanks	184t	12%

RePhoKUs project report Oct 2020

- 7,300 t of P accumulated in NI soils in 2017, which equates to a surplus of 8.5 kg ha-1 compared to a P surplus of 6.2 kg ha-1 for the whole of the UK
- Nitrogen also important in which BG strain dominates

Management Options

Fall into two categories:

- **Catchment control**: Nutrient reductions (most successful but long term to take effect)

- **In lake management**: Physical / Chemical / Biological – Each dependent on specific circumstances of the waterbody but with variable costs / success

DAERA Actions

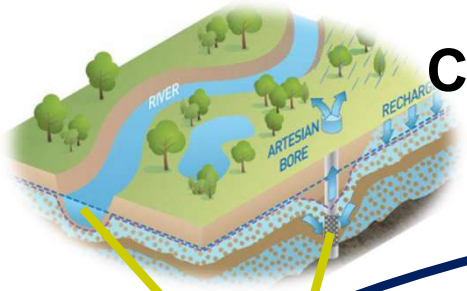
- Continue operational response to reports
- Review of Nutrient Action Programme Regulations (Agriculture)
- Review NIW discharges and address unsatisfactory intermittent discharges
- Progress Soil Nutrient Health Scheme (SNHS)
- Develop Agri environment measures via Farming With nature (FWN)
- Environment Fund
- Support commissioned research into impact of climate change on Lake Ecosystems (including cyanobacterial blooms) (started Feb 2023)

Questions

DRINKING WATER INSPECTORATE (DWI)

- Small unit within the Northern Ireland Environment Agency
- Independent role in regulation of drinking water in Northern Ireland

"To protect public health and maintain consumer confidence through effective regulation of drinking water quality"



Catchment

Environmental Regulation

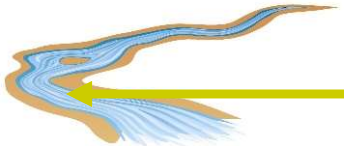
Drinking Water Regulation

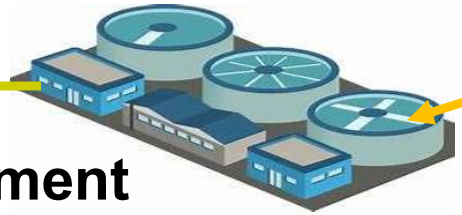
Treatment

Storage and Distribution

Consumer tap

Wastewater Regulation





Wastewater treatment

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Drinking Water Regulation

- DWI regulates the public drinking water supply provided by NI Water
- Regulations set standards for a range of microbiological and chemical parameters
- NI Water monitor these parameters to ensure compliance with the regulations
- DWI investigates any breaches of the drinking water standards
- Drinking Water Safety Plans in place for each water supply system include potential risks and control measures
- DWI publish an annual report on the quality of drinking water in NI, independent assurance

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Blue Green Algae and Drinking Water

- Risk-based approach to drinking water regulation, source to tap
- Algae identified as a potential risk in Drinking Water Safety Plans
- Range of control measures in place include:
  - ➢ Abstraction
  - ➢ Treatment
  - ➢ Monitoring

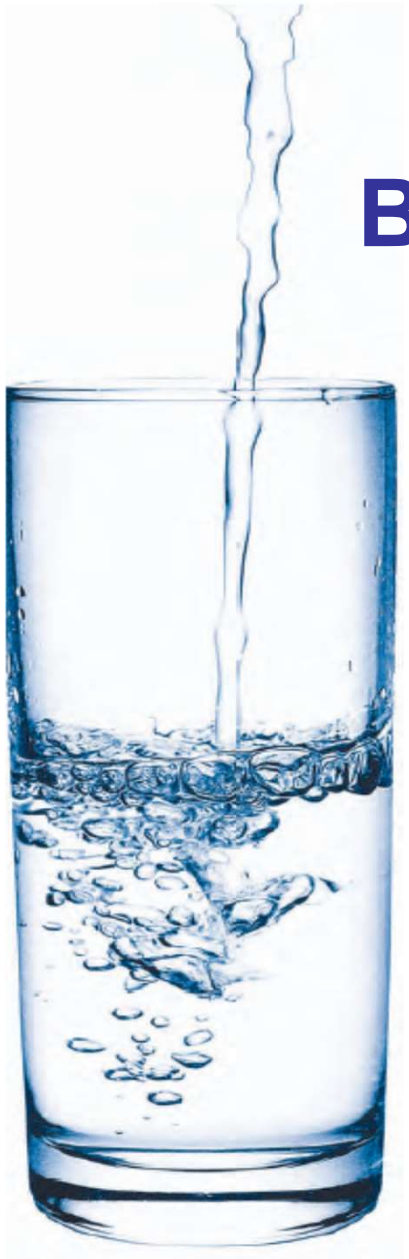
Blue Green Algae and Drinking Water

Multiple abstraction points

Treatment works are designed based on risks in raw water quality, including algae

Ozone Dosing

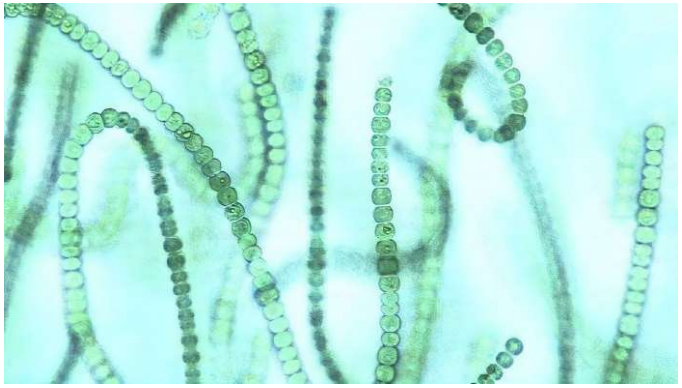
Granulated Activated Carbon filters



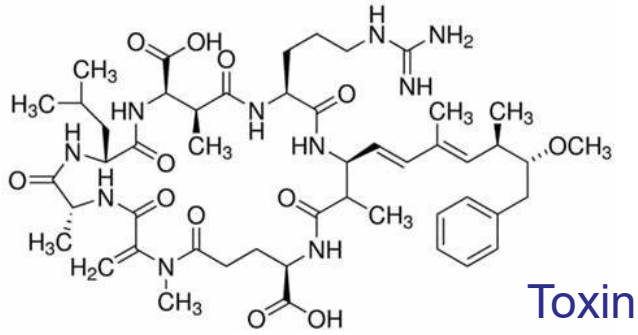
Blue Green Algae and Drinking Water

- Enhanced drinking water quality monitoring

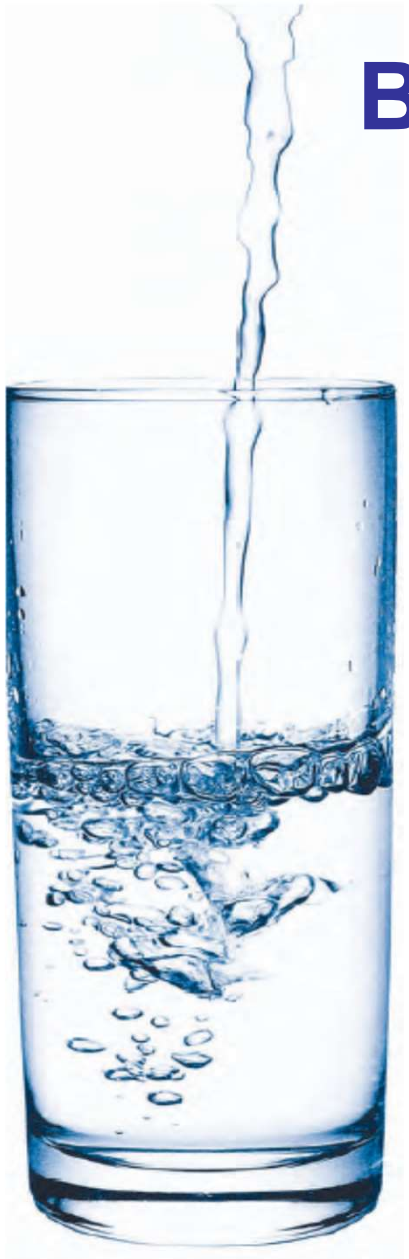
Use of smell bells



Algal counts



Toxin analysis



Blue Green Algae and Drinking Water

Drinking Water Inspectorate has verified:

- Risks appropriately identified in Drinking Water Safety Plans
- Treatment designed for algae removal, operating effectively
- Enhanced water quality monitoring in place
- Levels of toxin, Microcystin LR, <0.38 ug/l (Health Guideline Value 1 ug/l)
- No reports of drinking water quality issues associated with blue green algae
- No water quality complaints reported
- Situation will remain under review

Questions