Improving Water Quality with Particular Focus on the Munster Blackwater River Catchment

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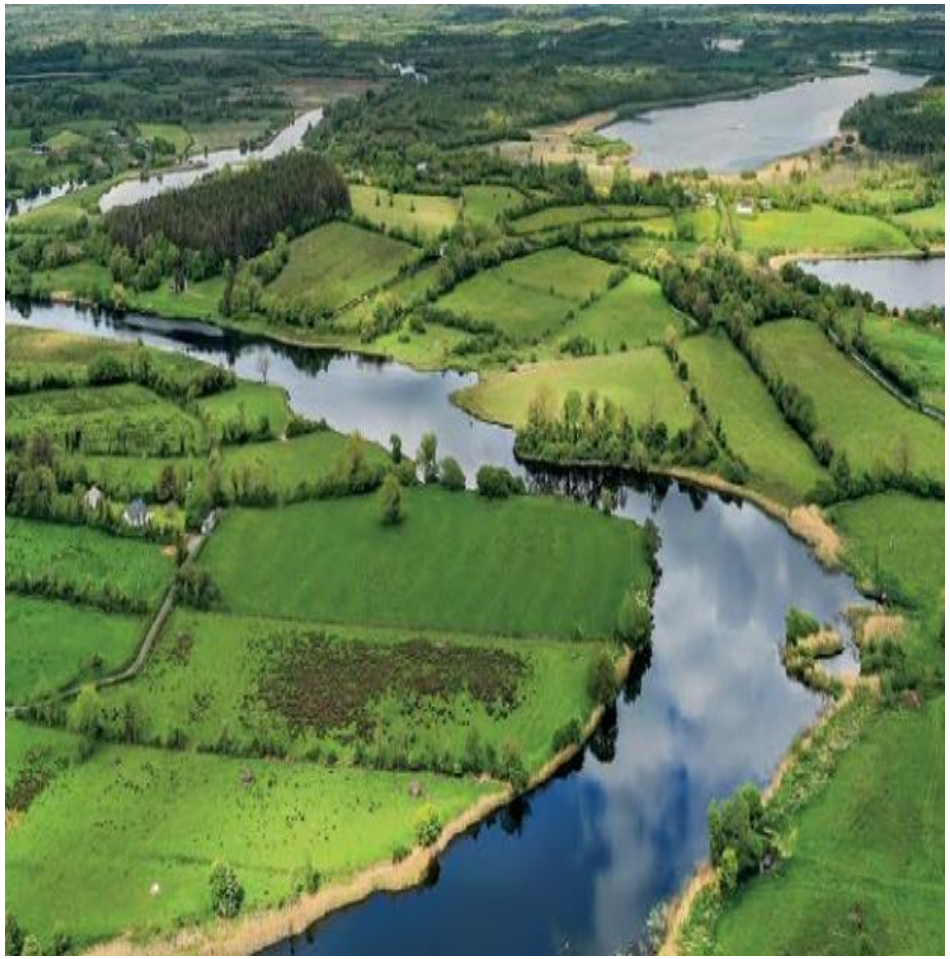
Outline

- Role of agriculture in improving water quality
- Recent trends in water quality
- River catchment ecological status and N reduction targets
- Recent trends in fertilizer use and soil fertility
- Munster Blackwater river catchment
- Improving water quality at farm level

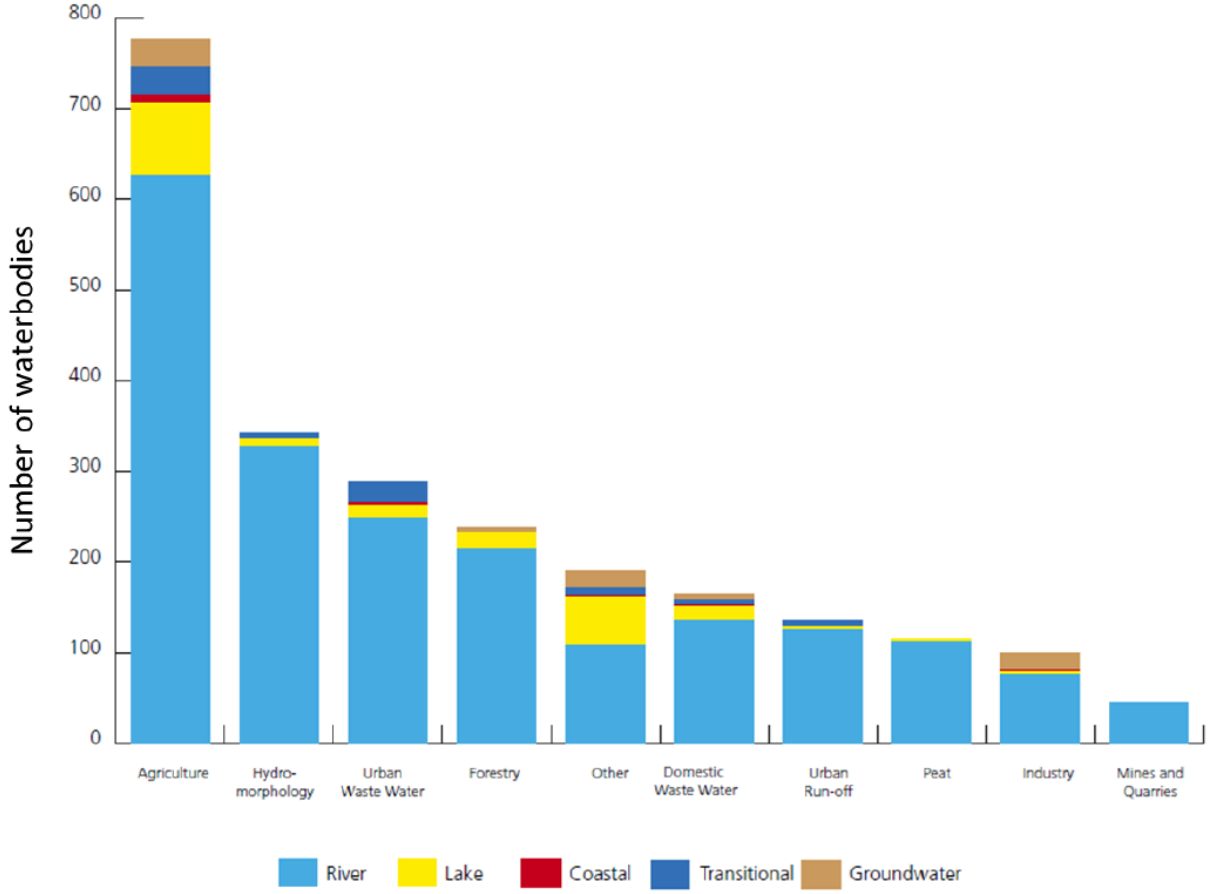


Pressures Influencing Water Quality

- Water Framework has a target that all water bodies are in Good/High ecological status by 2027

- Main pressures are Agriculture, Hydro morphology, Urban Waste Water and Forestry
- Agriculture is a significant pressure in 1,023 of the1,649 water bodies that are ‘at risk’ to water quality or 62%

- 54% of Irish water bodies are of Good/High Ecological Status



(Adapted from EPA, 2019)

What is Water Ecological Status?

Surface waters

Rivers

Lakes

Estuaries

Coastal waters

Ecological status or potential

Biology

+

Water quality

+

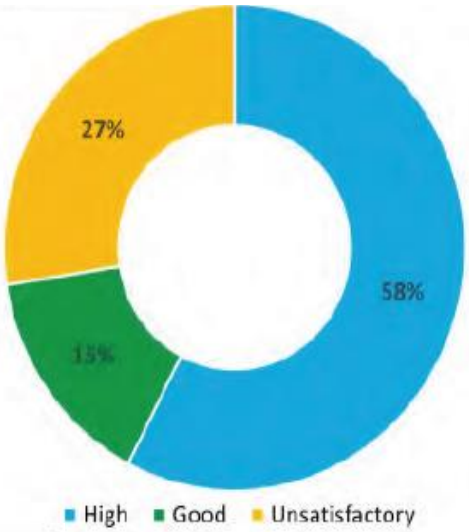
Hydro morphology

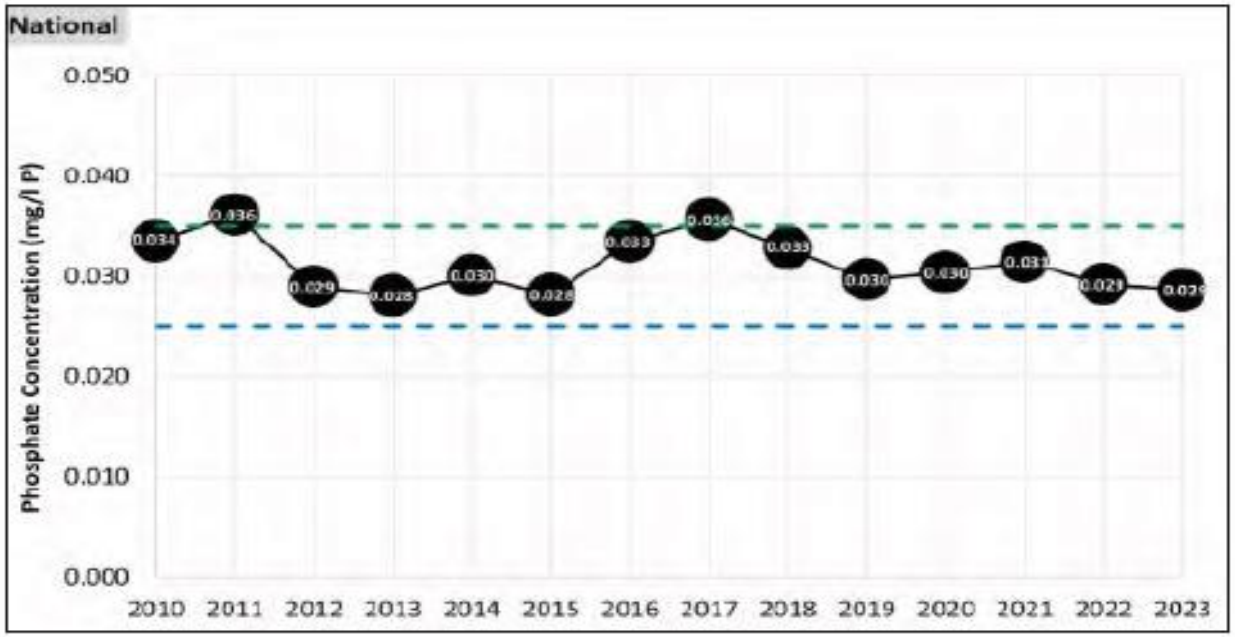
- High
- Good
- Moderate
- Poor
- Bad

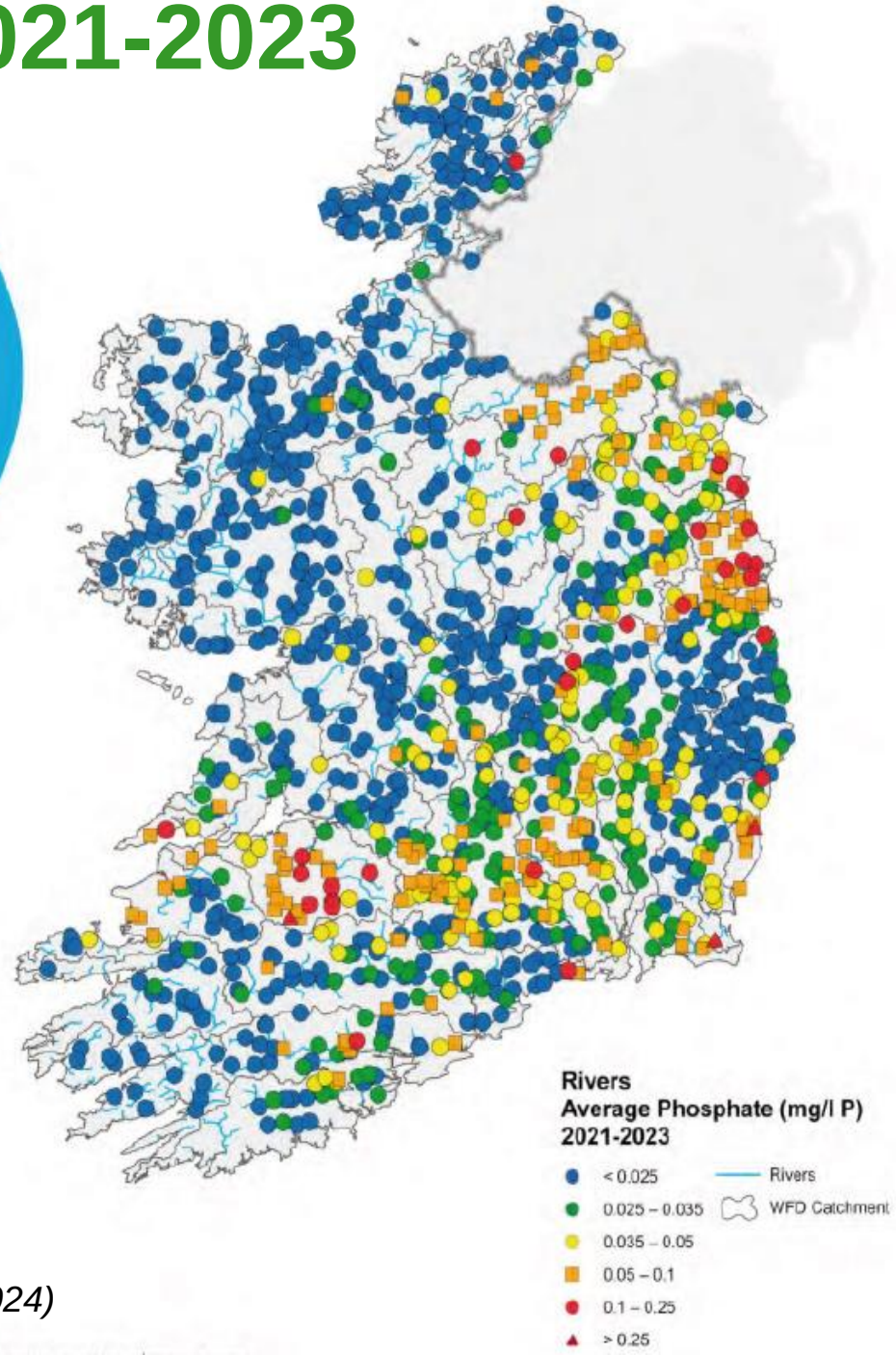
(Adapted from EPA, 2023)

River Phosphate Concentrations 2021-2023

During 2021-2023, 27% of Irish rivers had unsatisfactory phosphate concentrations >0.035 mg/l P



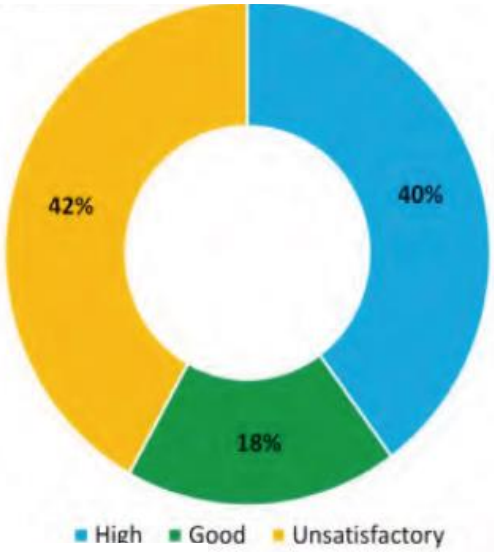




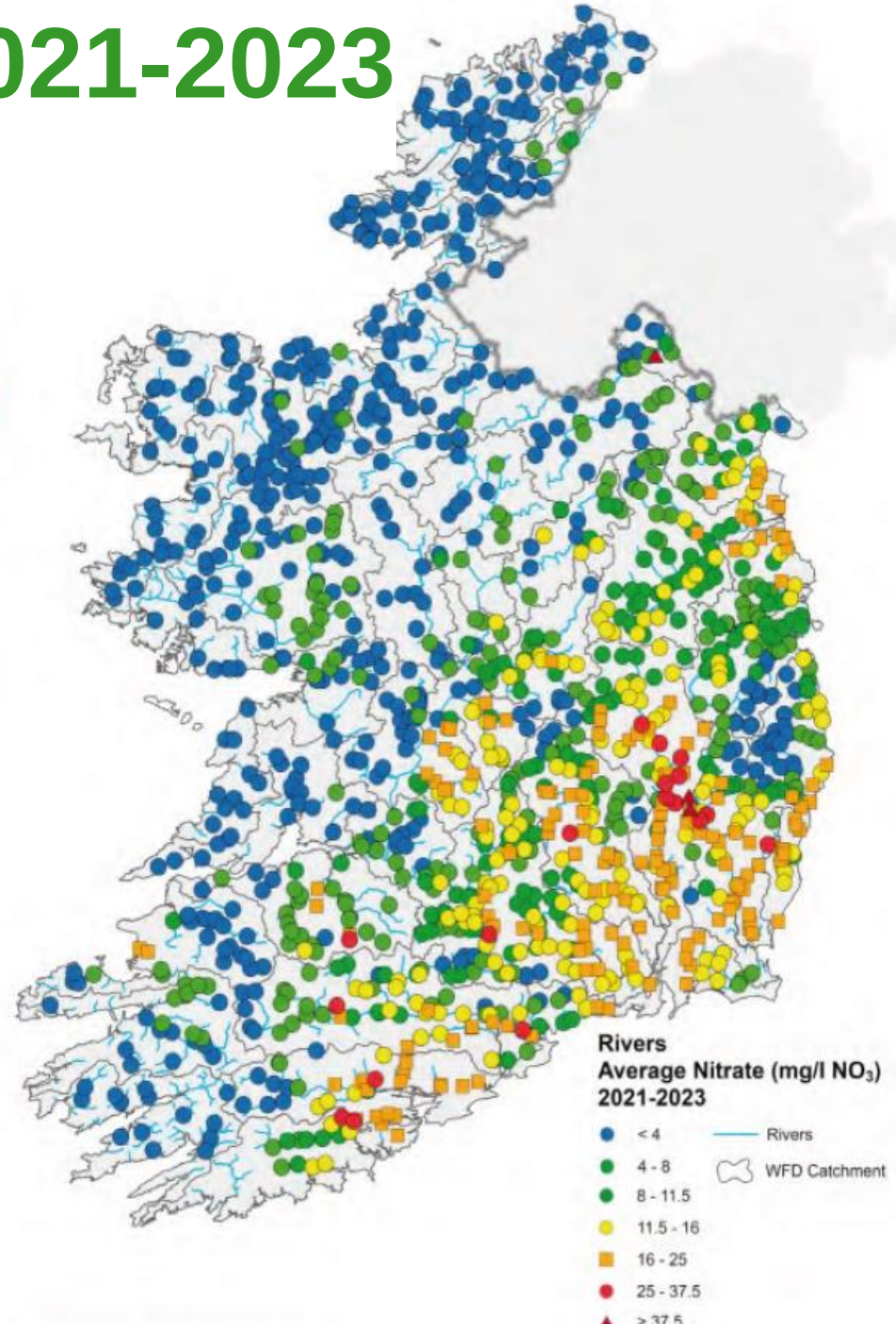
(EPA, 2024)

River Nitrate Concentrations 2021-2023

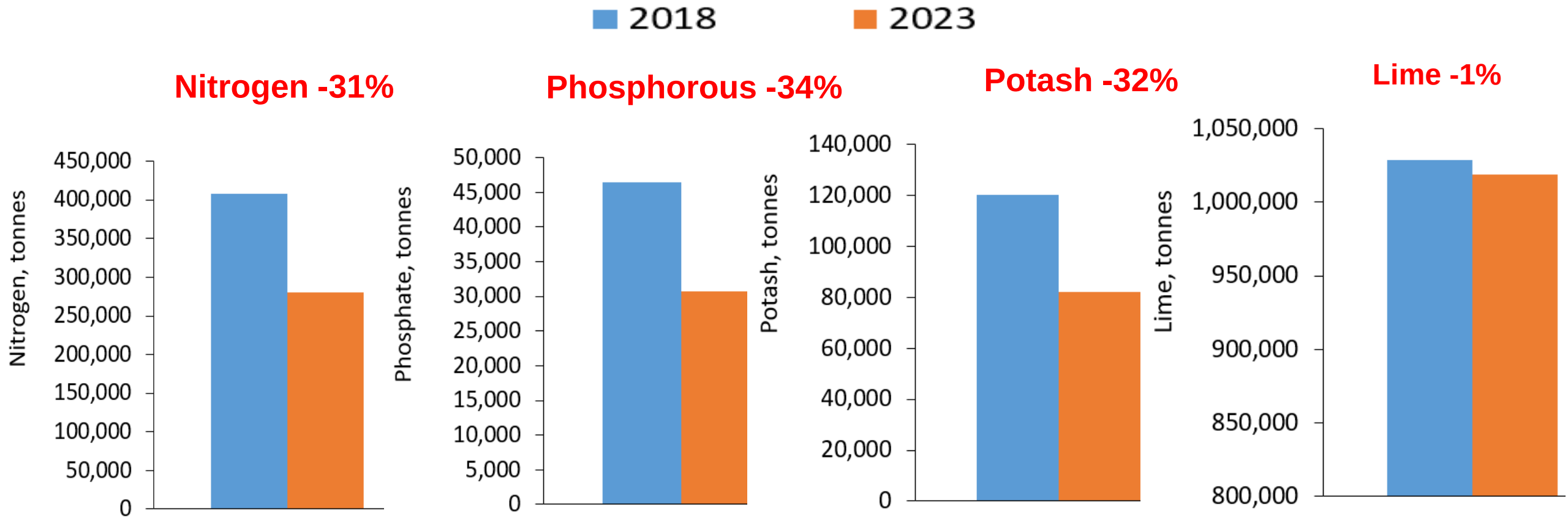
During 2021-2023, 42% of Irish rivers had nitrate concentrations >1.8 mg/l N



(EPA, 2024)



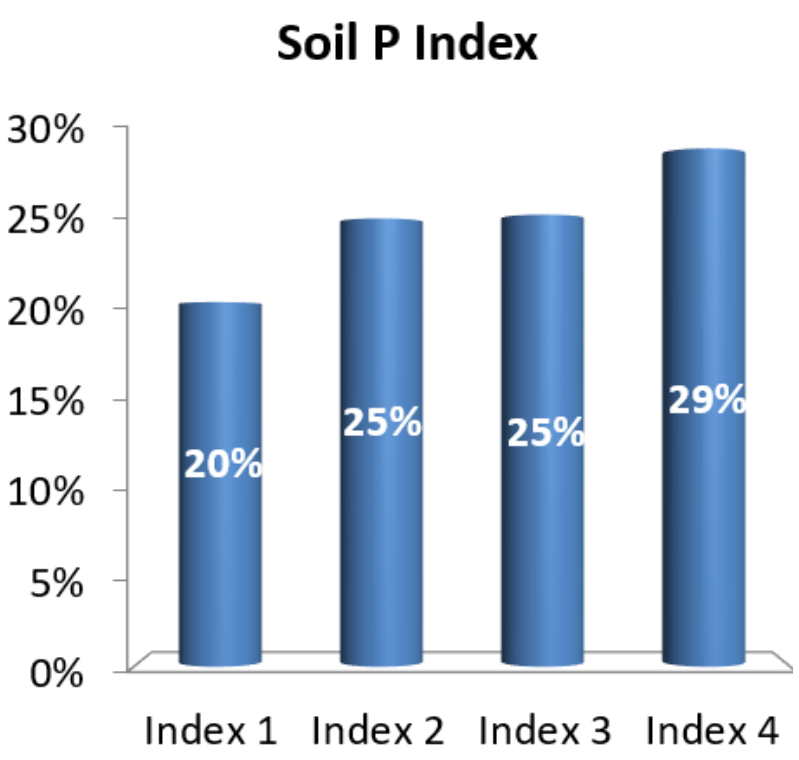
Recent Trends in Fertilizer Sales & Use

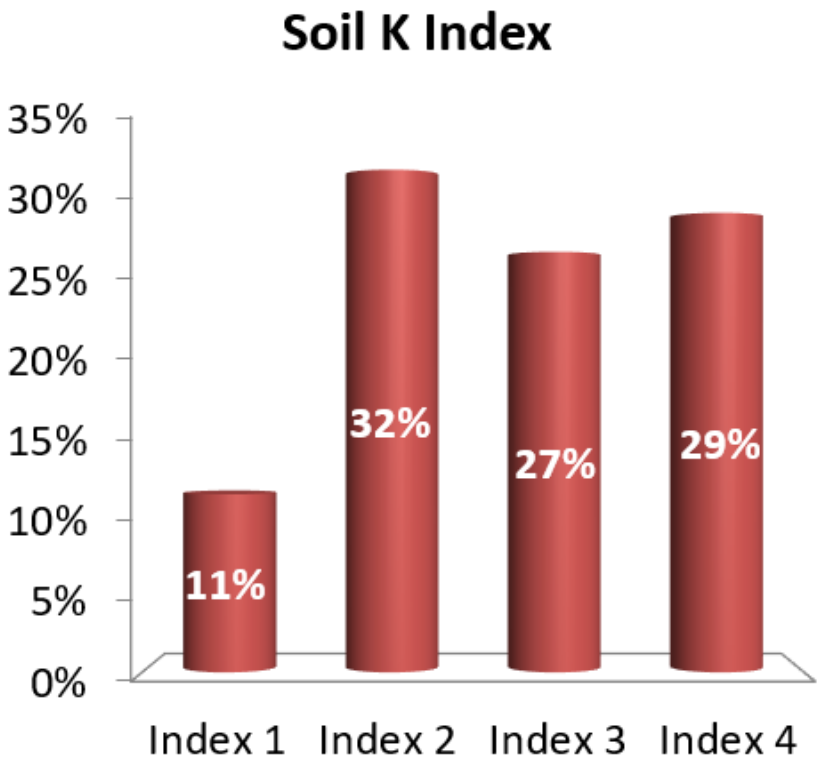


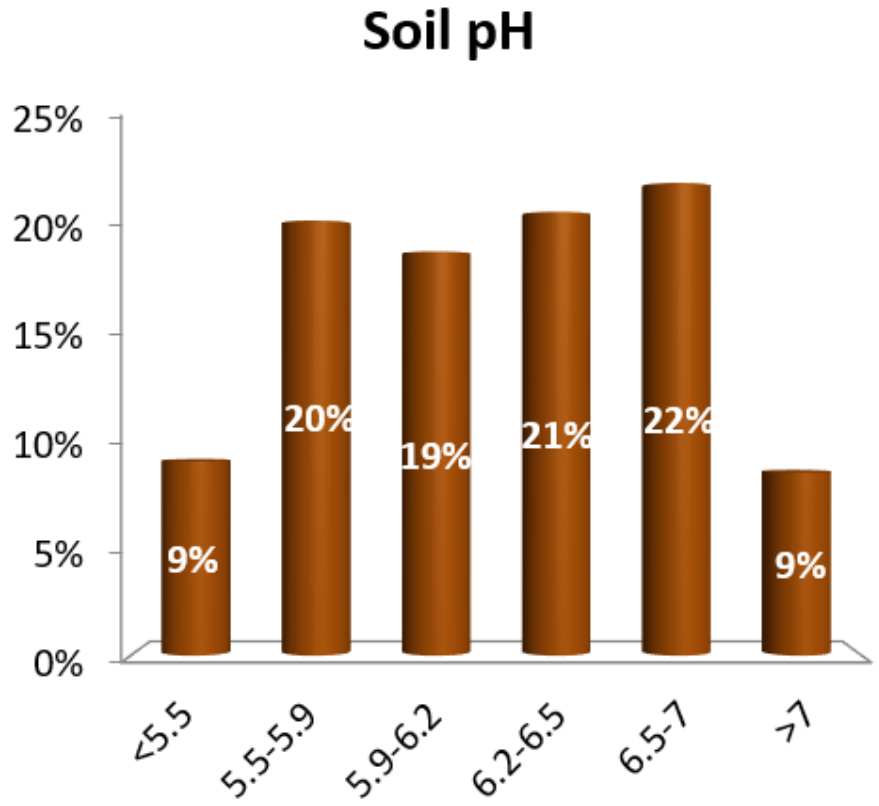
- On all farms application rates of N, P, and K have reduced by 21% (16.5 kg/ha); 25% (2.3 kg/ha) & 22% (5.3 kg/ha) since 2020;
- On dairy farms application rates of N, P, and K have reduced by 19% (34.7 kg/ha); 28% (3.8 kg/ha) & 25% (9.3 kg/ha) since 2020;

(CSO, 2024; NFS, 2024)

Soil Analysis Indices for 2023







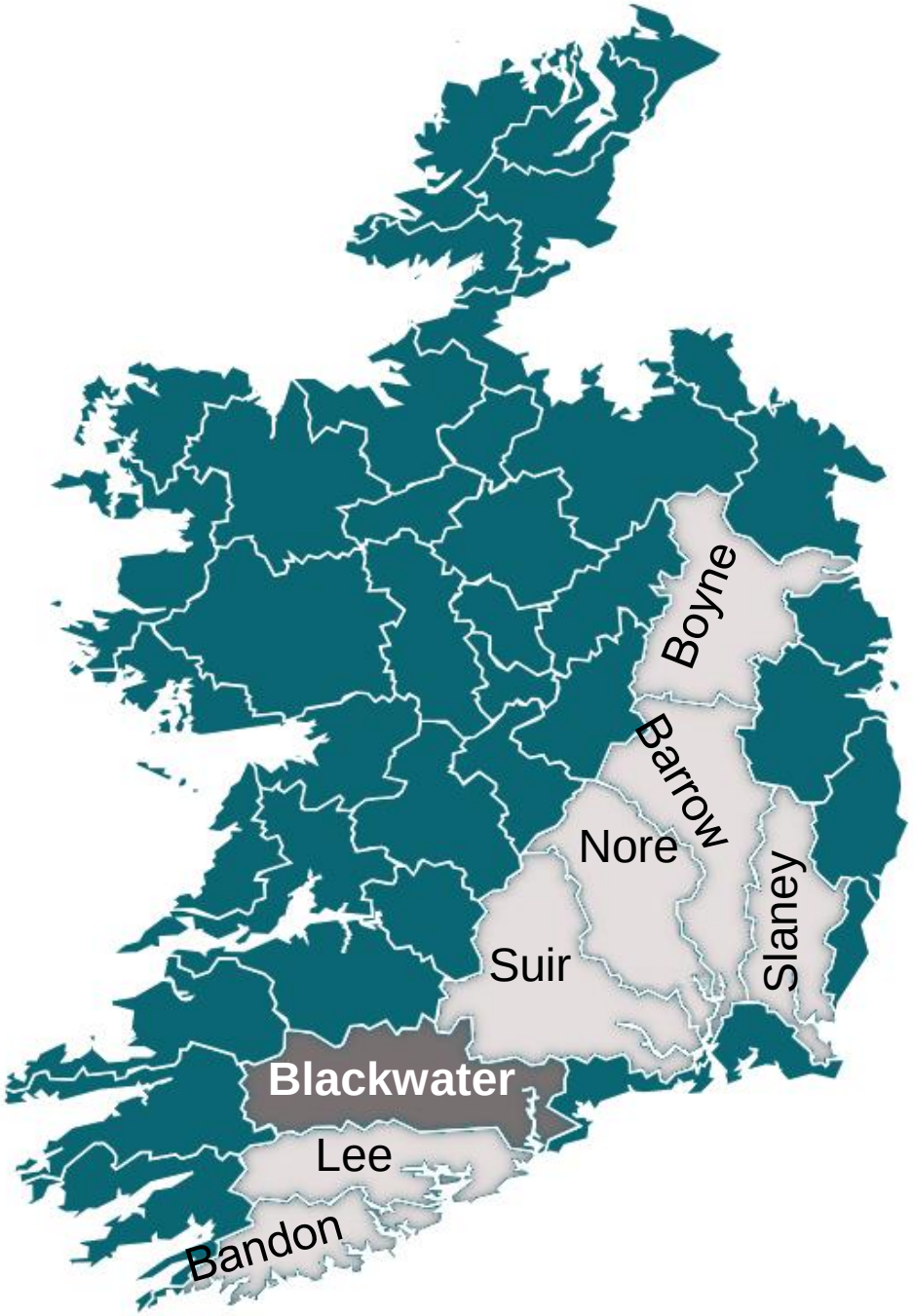
- Increasing soil pH >6.2 will increase P availability and increase fertilizer N use efficiency; also really important for clover establishment;
- Prioritise slurry to low P soils and supplement with chemical P & K

River Catchment Map

- Catchments: 46
- Sub catchments 583
- Waterbodies: 4,842

- Waterbodies
  - Rivers 3,192 (66%)
  - Lakes 812 (17%)
  - Groundwater 514 (11%)
  - Transitional 196 (4%)
  - Coastal 112 (2%)

- Current priority catchments as part of the Better Farming for Water campaign



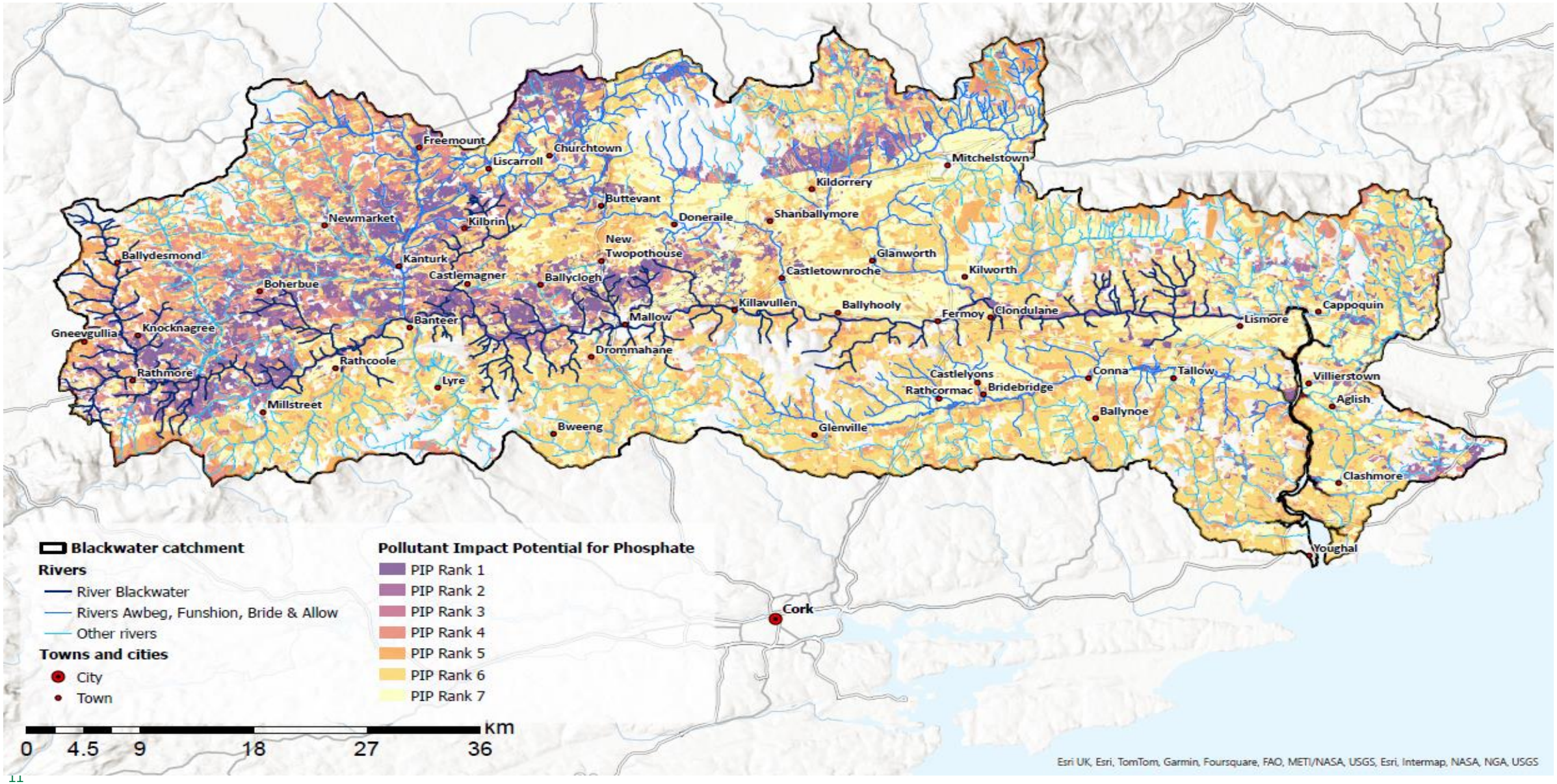
(Adapted from https://www.catchments.ie)

Ecological Status of Surface Water Bodies

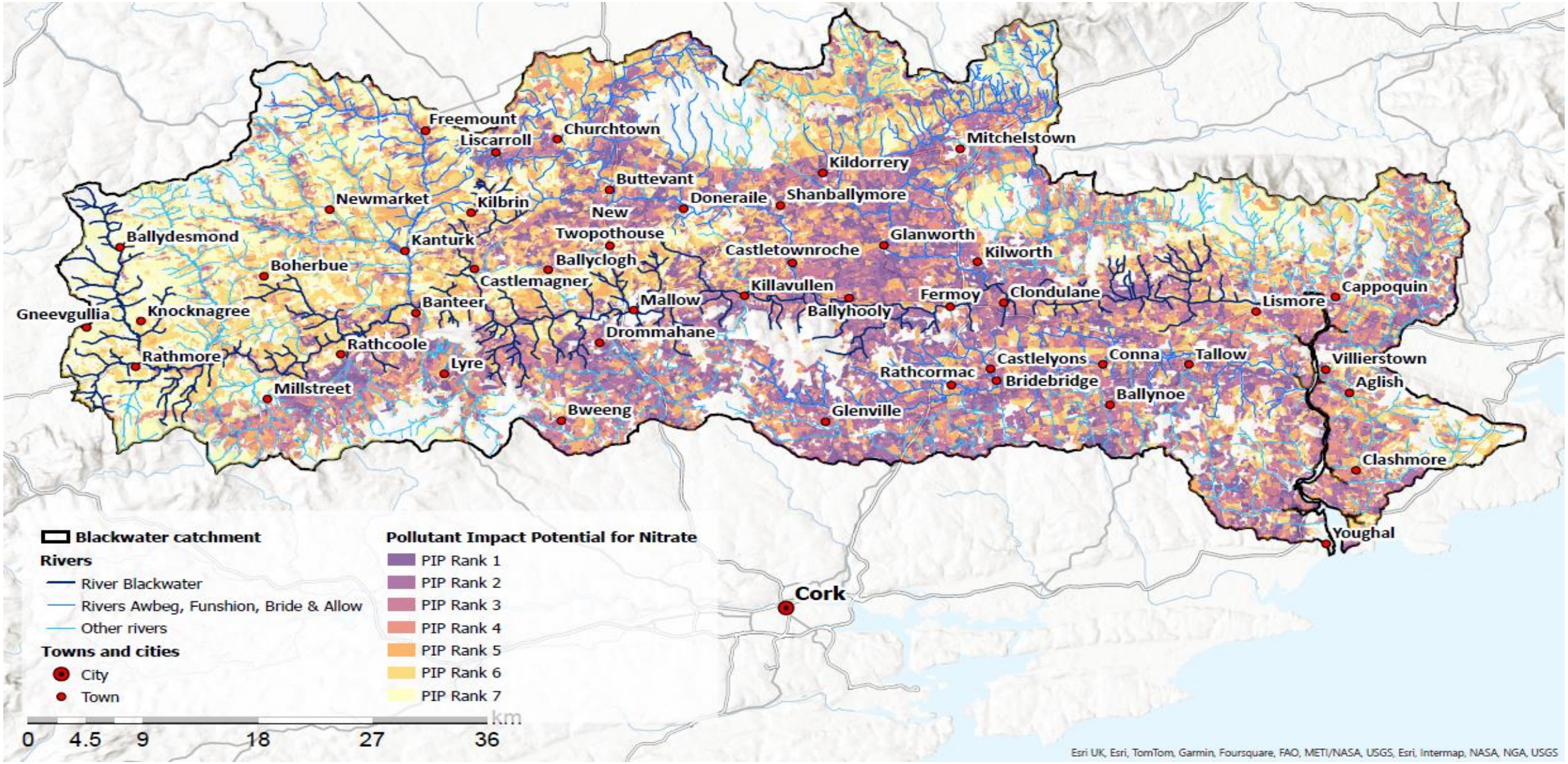
Catchment	Monitoring Cycle	Status					High + Good
		High	Good	Moderate	Poor	Bad	
M. Blackwater	**2016-2021**	**12**	**54**	**29**	**4**	**0**	**66**
Bandon/Ilen	2016-2021	18	49	25	7	1	**67**
Barrow	2016-2021	4	32	41	23	0	**36**
Boyne	2016-2021	3	29	36	32	0	**32**
Lee	2016-2021	21	41	33	2	2	**62**
Nore	2016-2021	3	38	37	21	1	**41**
Slaney	2016-2021	11	51	32	6	0	**62**
Suir	2016-2021	2	34	41	22	1	**36**

(https://www.catchments.ie)

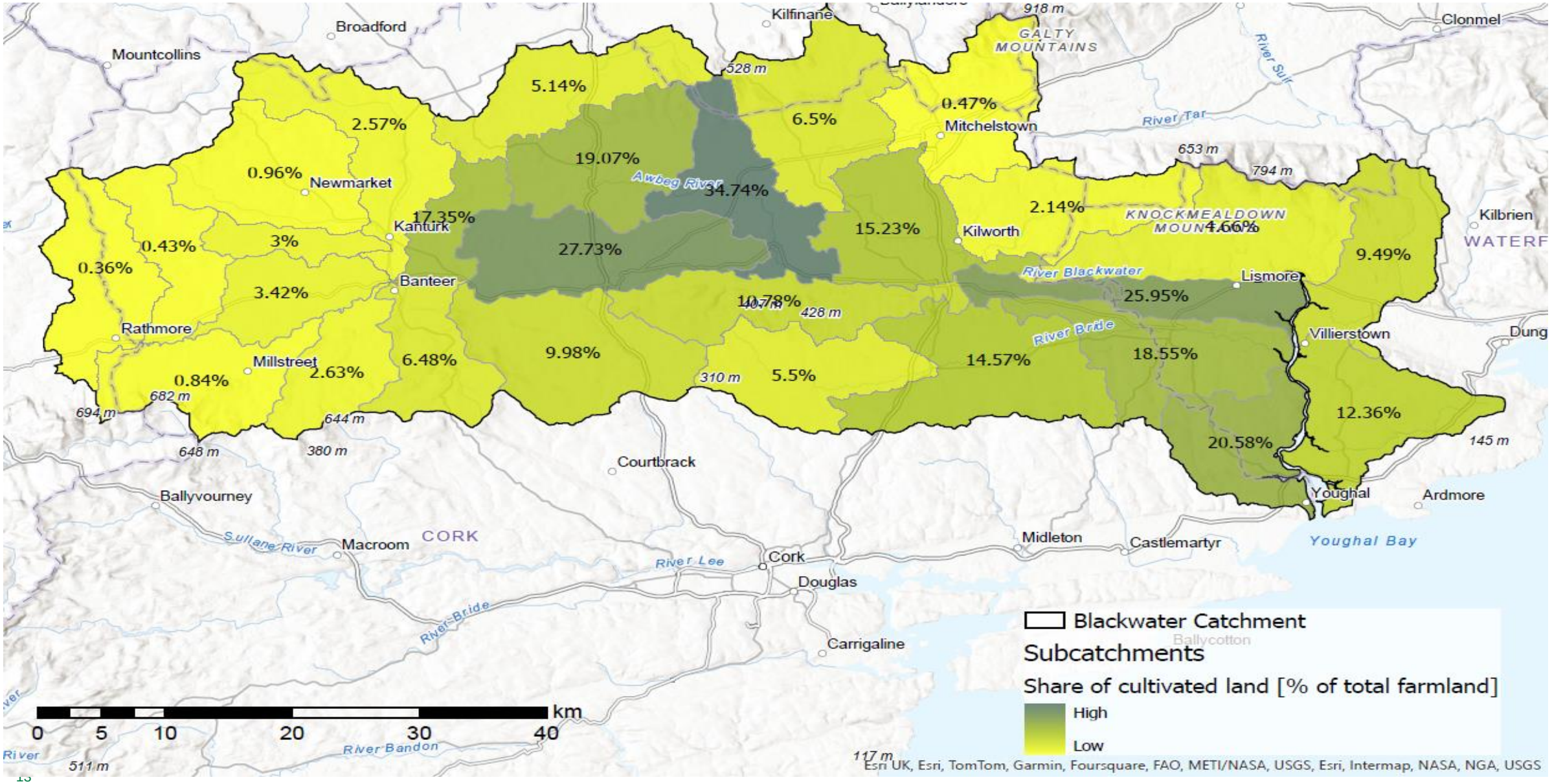
Pollution Impact Potential for Phosphorus (PIP-P)



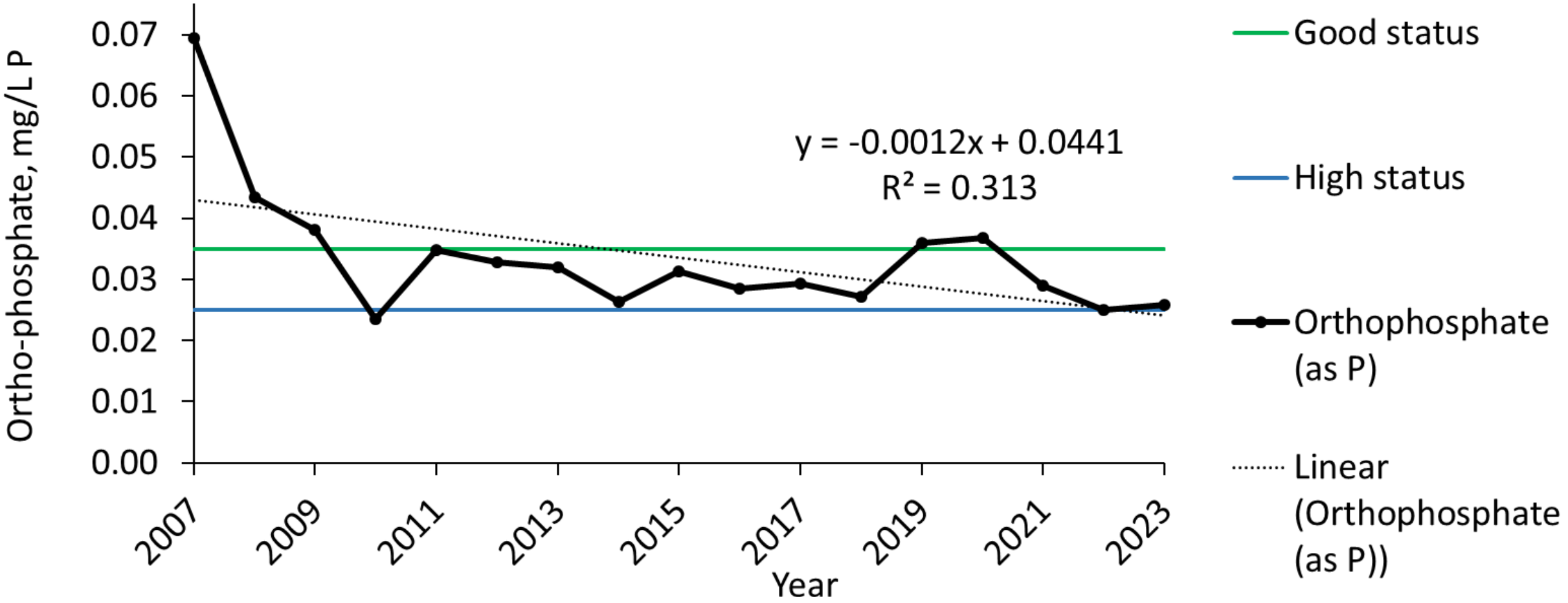
Pollution Impact Potential for Nitrate (PIP-N)



Cultivated Land in Each Sub-catchment

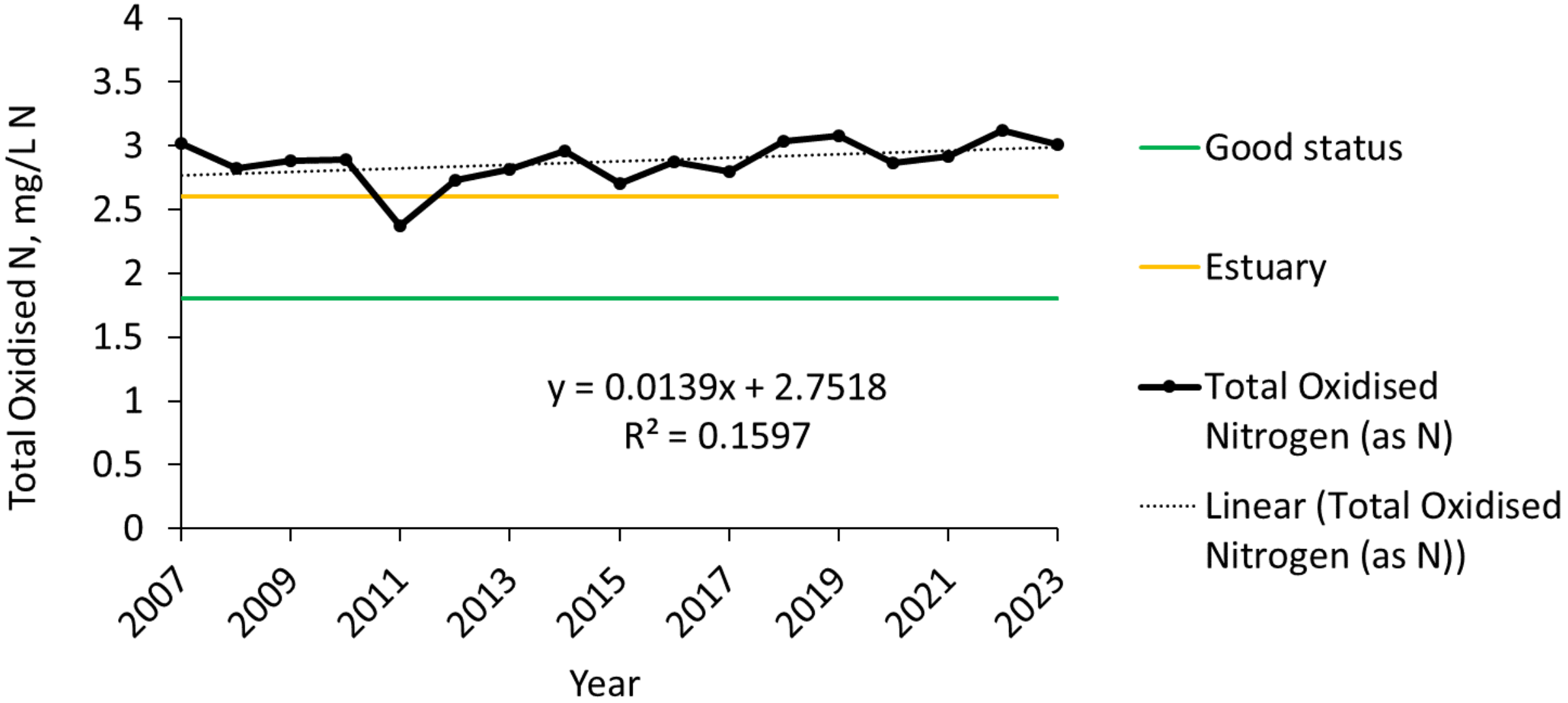


River Ortho-Phosphate (mg/l P) at Lismore Bridge



[14] *(adapted from https://www.catchments.ie)*

River Total Oxidised N (mg/l N) at Lismore Bridge

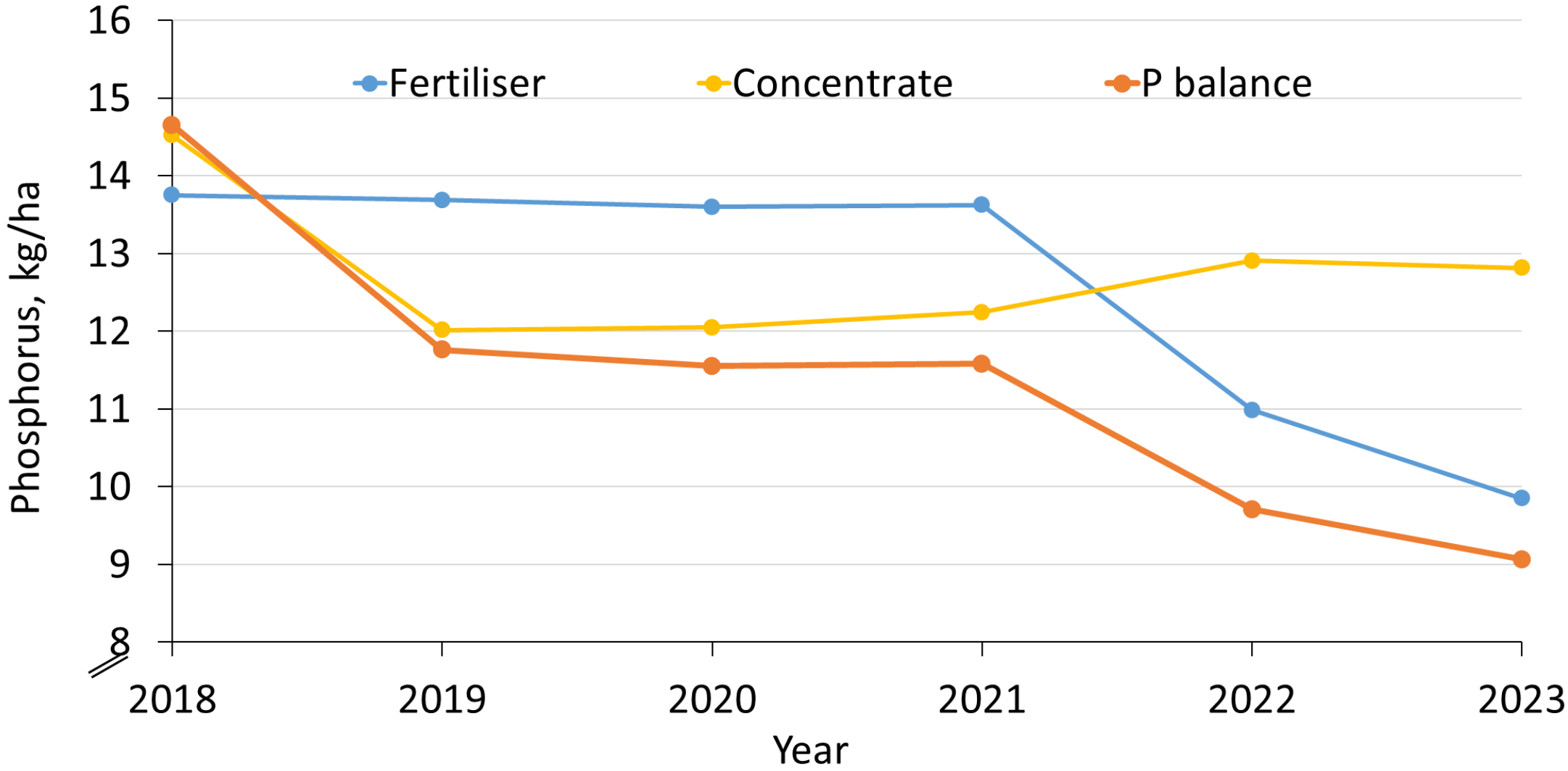


[15] *(adapted from https://www.catchments.ie)*

Improving Water Quality at Farm Level

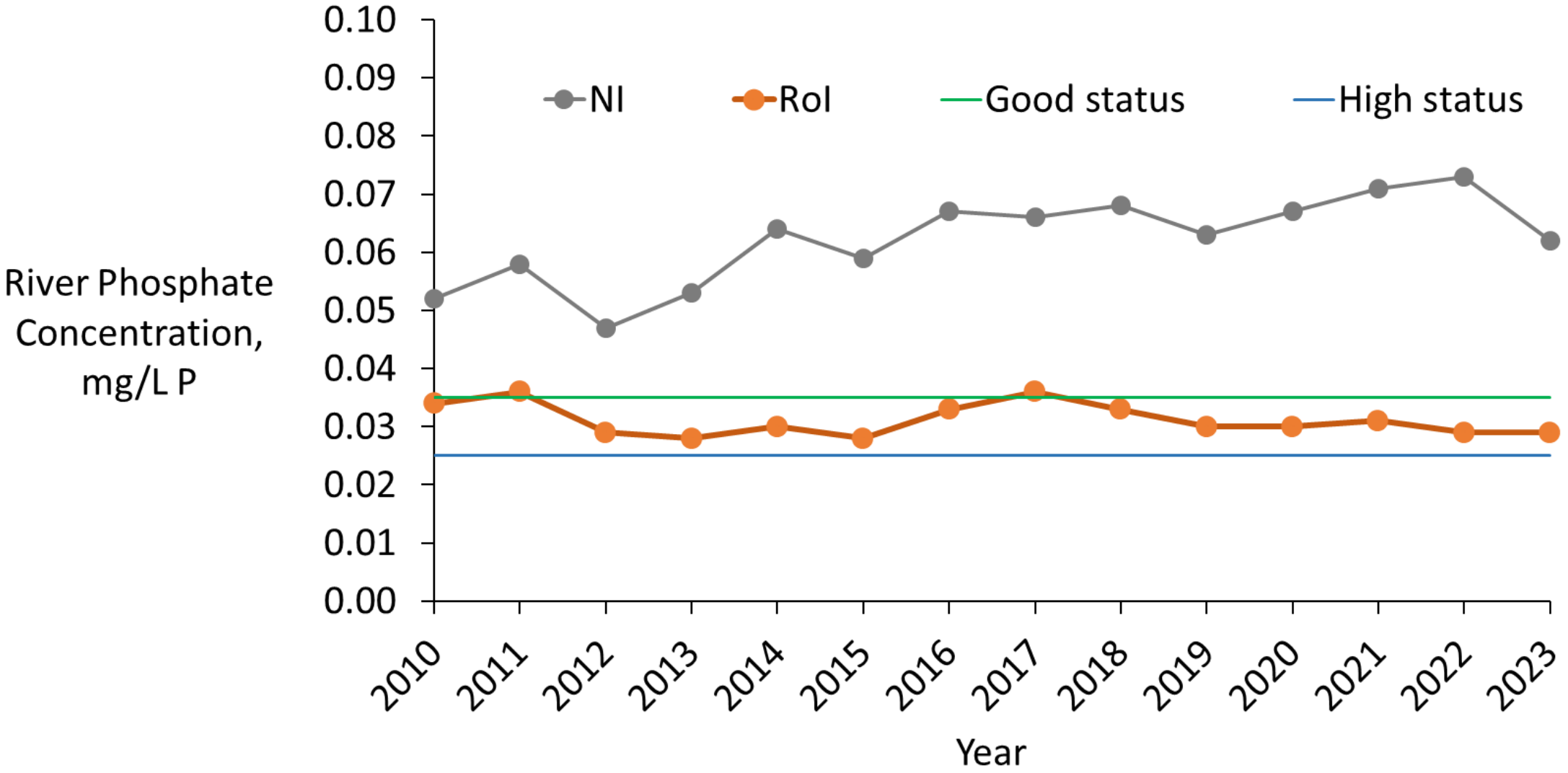
Reduced Phosphorous and Nitrogen Balance on Dairy Farms

Reduced P Balance (kg/ha) on Dairy Farms



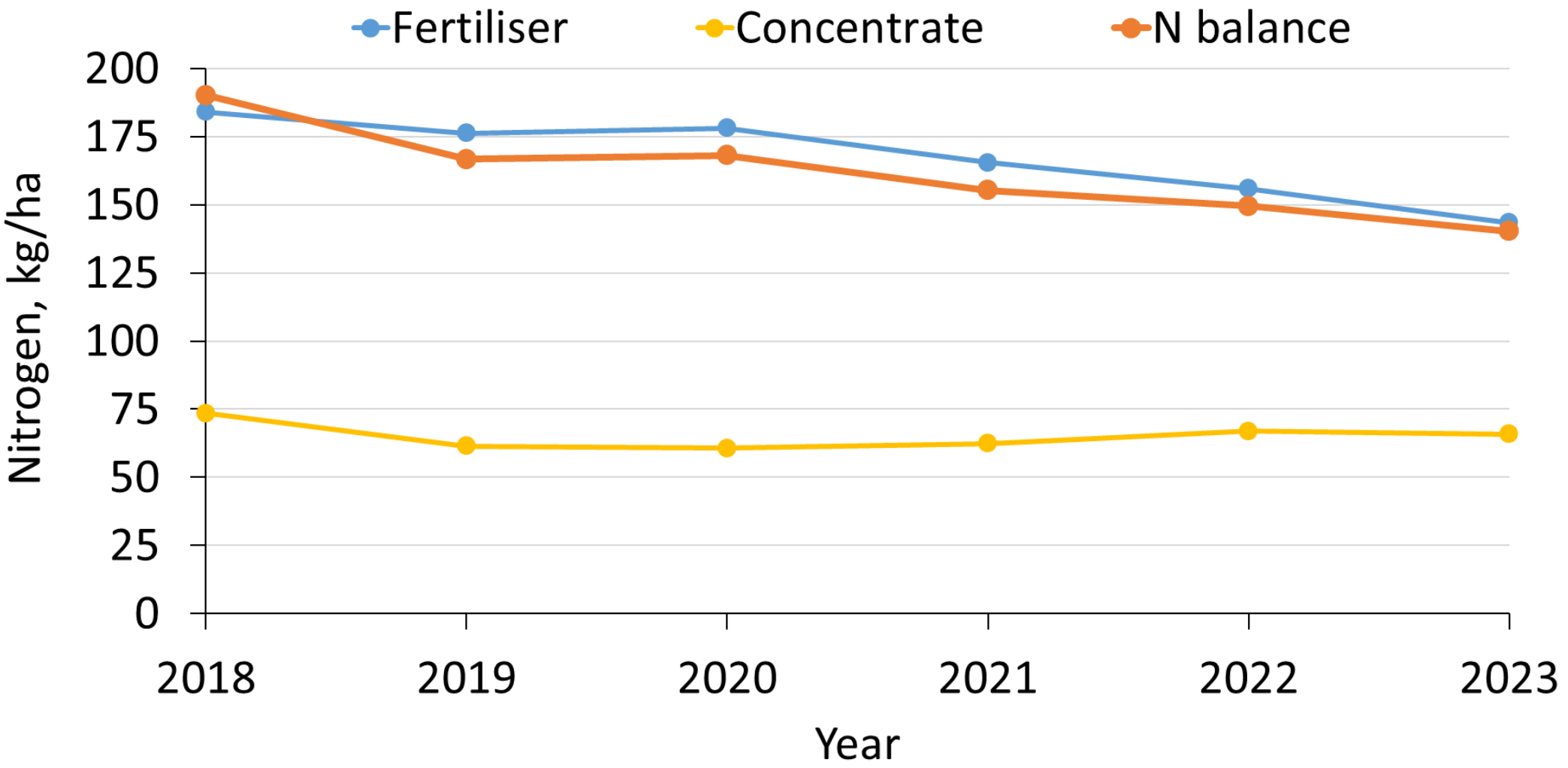
(Adapted from NFS 2024)

NI and RoI River Phosphate Concentration



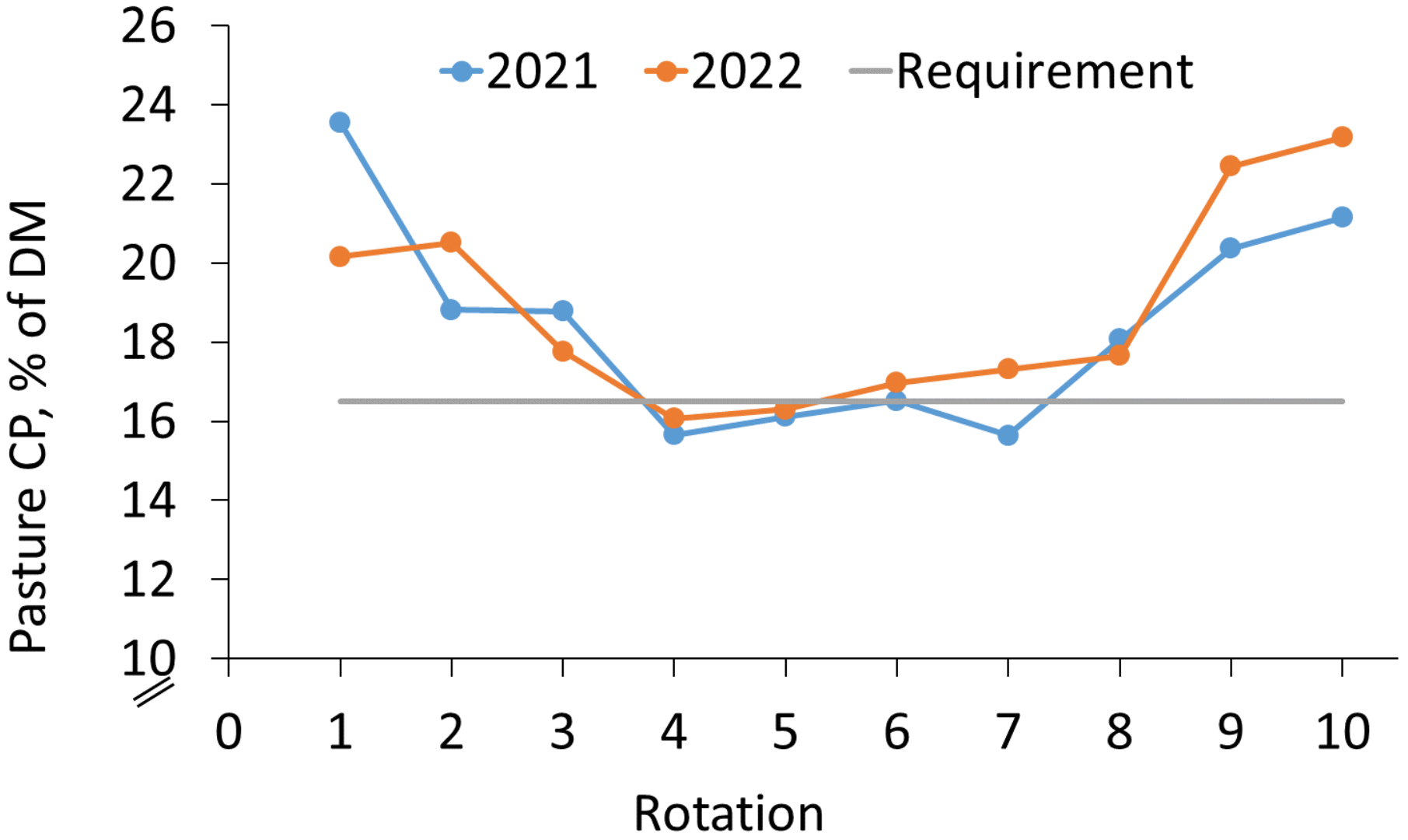
(EPA, 2024; DAERA, 2024)

Reduced N Balance (kg/ha) on Dairy Farms



(Adapted from NFS 2024)

Pasture Crude Protein on 28 Commercial Farms



Month	CP, %
March	21.8
April	19.7
May	18.2
June	16.1
July	16.7
Aug	17.9
Sept	21.4
Nov	22.2
Ave	18.6

(van Emmenis et al., in preparation)

Increase Slurry Storage

- Current Regulations Require 0.33 m³ of Slurry Storage per cow/week
- Preliminary findings from Teagasc National Slurry Storage Monitoring Programme indicate a requirement of 0.41 m³ per cow/week

This equates to an increase requirement of ~20%

- Advantages of Increase Slurry Storage:
  - Maximise the fertiliser replacement value, N, P and K.
  - Reduced nutrient losses to water
  - Reduced N surplus on farms by replacing chemical N fertiliser
  - Essential to use low emissions slurry spreading technology
  - Investment in increase Slurry Storage requires financial support

Reduce Point Source Pollution

- Point source pollution from farm yards and roadways can be a significant source of nutrients and sediment to water

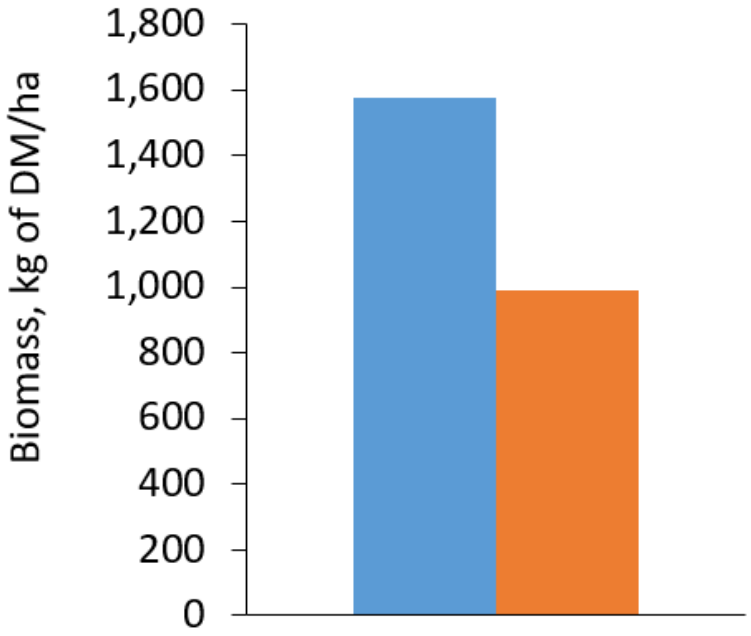
- Preliminary findings from Teagasc National Slurry Storage Monitoring Programme indicate that significant amounts of water are entering storage tanks → 20 to 40 l/cow/week

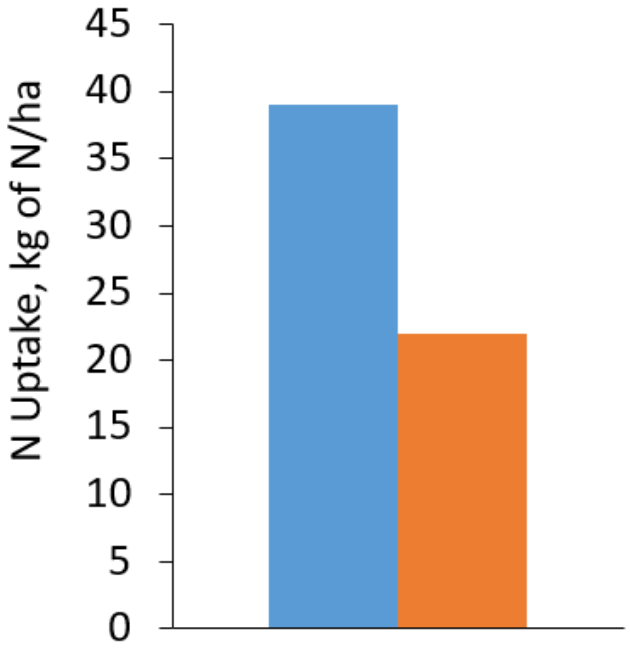
- Improved management:
  - Gutters and downpipes in good working order & pipe rainwater directly to soakaways
  - Divert clean rain water away from yard/concrete areas
  - Restrict farm 'traffic' to certain parts of the yard
  - Reduce soiled yard area by regularly cleaning dirty areas

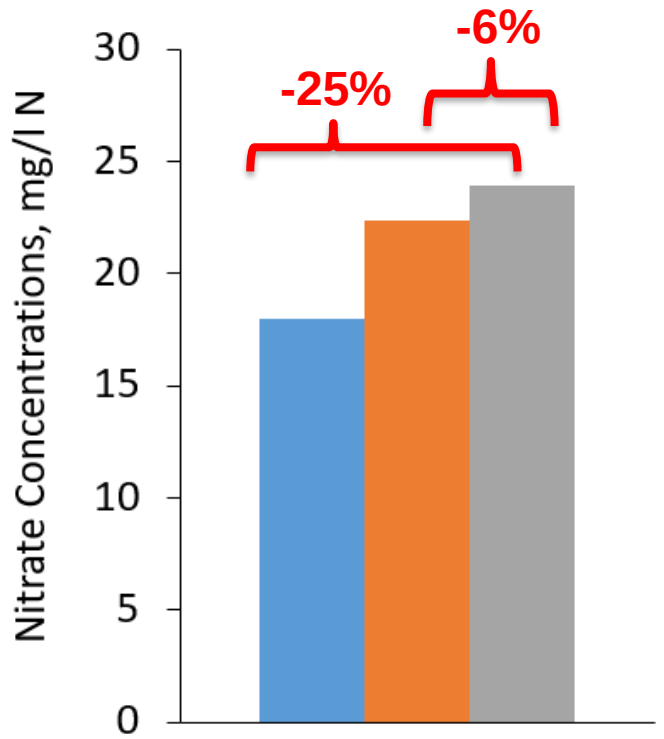
Dry-stock

- Adequate slurry storage and reduced point source pollution from farm yards and roadways is important on dry-stock farms
- In low stocked beef and sheep farms the risk associated with N loss is much less, but the risk from P loss is important
- Many low stocked beef and sheep farms are located on heavy soils in areas where High water quality is a requirement. There is a requirement to reduce P and sediment loss to water on these farms.
- Mitigation measures will include:
  - Preventing access by livestock to streams
  - Positioning of riparian buffers zones adjacent to water bodies
  - Only carrying out drain maintenance during the months of July to September

Tillage Farm: Over-Winter Green Cover







Mustard Cover Crop Natural Regeneration Green Cover No Green Cover

Advantages

- Reduced N leaching;
- Improved soil structure;
- Sowing date and choice of cover crop important

(Adapted from Premrow et al, 2012)

Pigs

- Currently there are approximately 23 pig farmers in the Blackwater River Catchment comprising of approximately 19,000 sows
- The 23 farms produce approximately 380,000 cubic meters of pig slurry valued at €2.6 million (€32 per 1,000 gallons) at current fertiliser prices
- Pig slurry can be applied on grassland with stocking rates <170 kg of organic N/ha or tillage lands
- Applying pig slurry to grassland and tillage crops in spring enable the organic fertilizer to deliver a greater proportion of crops requirement and reduces possible losses to the environment
- Greater integration between pig and tillage farmers capitalising on the new Importation Storage Scheme could provide the extra slurry storage required

Summary

- Water quality in Ireland is good in EU context but there significant opportunities for improvement
- Actions required are increased slurry storage, reduced nutrient losses from yards & roadways, increased use of over-winter cover crops and increase use efficiency of organic manures from intensive farming systems
- A river catchment approach will be preferable that will target specific mitigation taking cognisance of current ecological status, known pressures and farm management practices
- An intensive farm extension programme will be required to assist farmers to change farm practices using the 8-Action for Change
- The Better Farming for Water Campaign will require strong collaboration with existing water quality programmes such as ASSAP, Farming for Water EIP as well as strong stakeholder engagement (farmers, DII, MII, LAWPRO, EPA)

Thank you!