



Data for Nature

Integrated catchment management and the
Water Framework Directive

One of the circa 20 Q5 (very highest quality) sites left in 2020

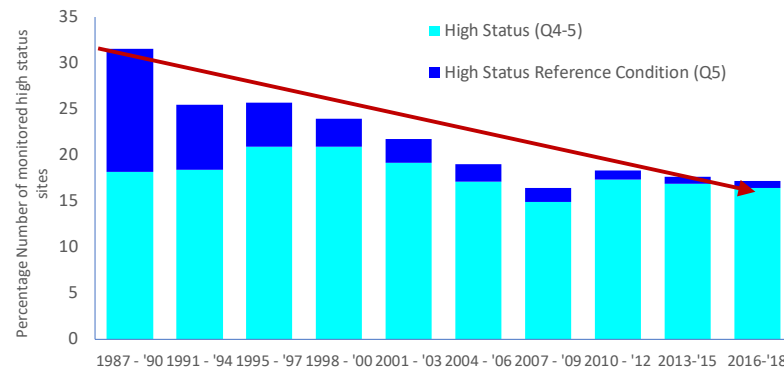


Photo: Hugh Feeley

Biological Q Values: 1971-2021

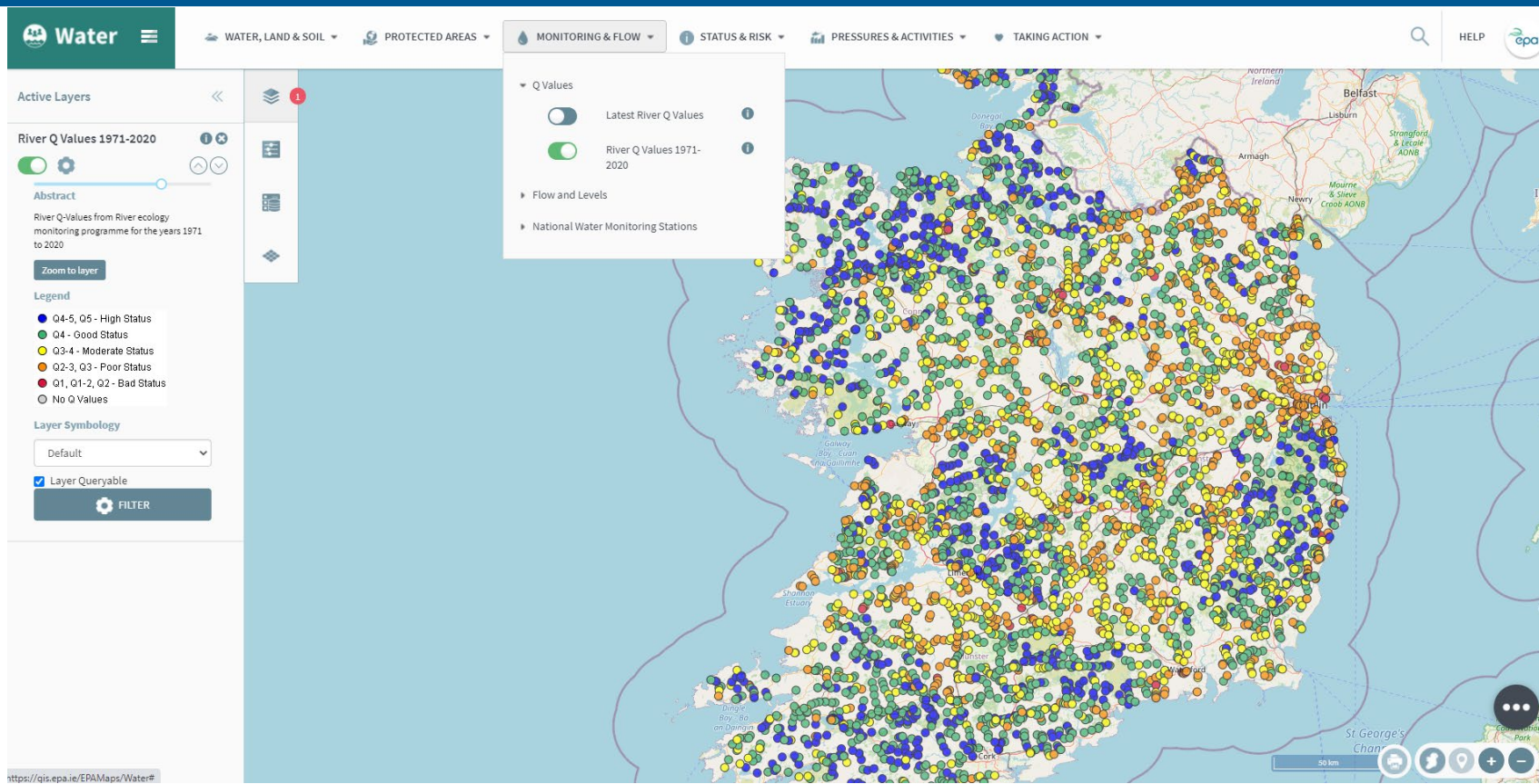


- **50 year anniversary this year** – long term trends
- Highest quality 'Blue Dot' Q5 sites which are generally in upland areas in catchments can act as biodiversity reservoirs
- Long term decline: only circa 20 left now
- What is happening:
 - A new Waters of LIFE (€9m) project
 - Blue Dots programme (LAs/LAWPRO and other stakeholders)



High status waters in decline

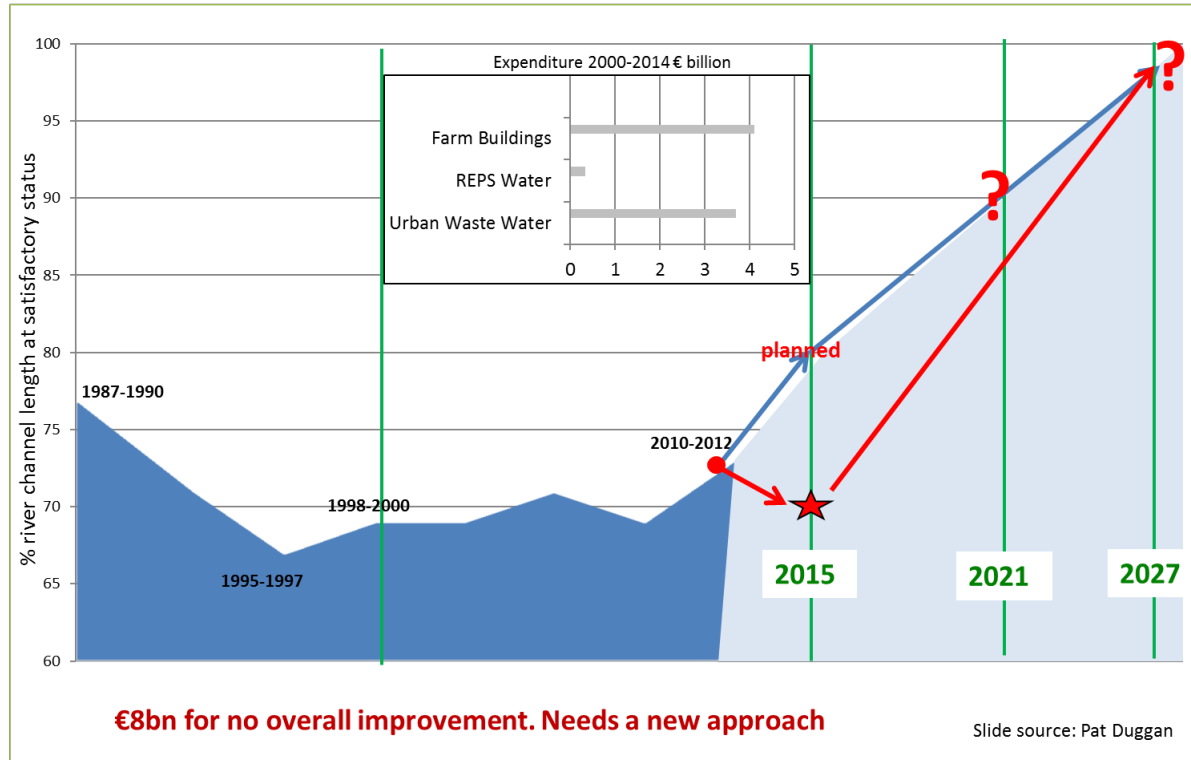
All results 1971-2020 on EPA Water Map

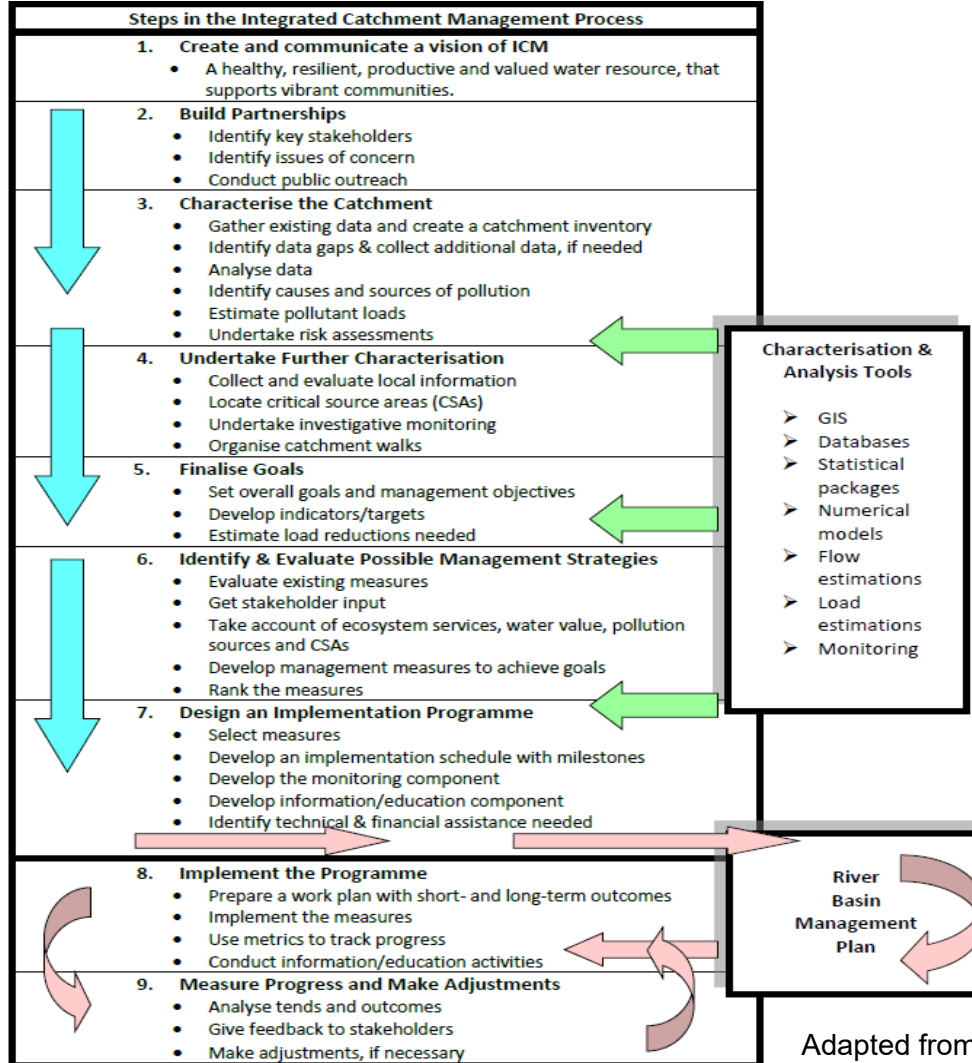


The Water Framework Directive



2000-2014: expenditure versus water quality improvements





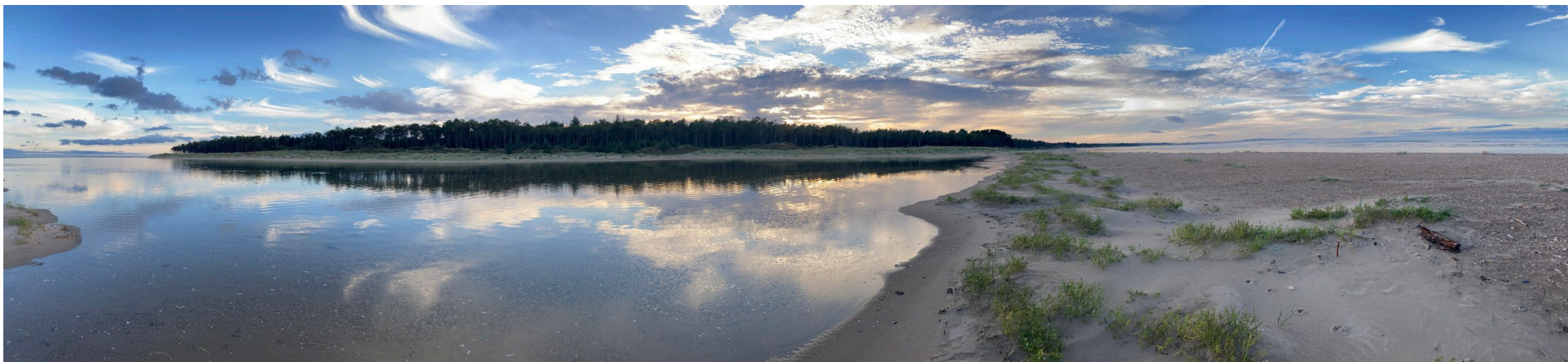
1. Build partnerships

- **Working together**, both internally and externally
- Catchments Unit – a cross disciplinary team: has included a catchment scientist, hydrogeologist, hydromorphologist, ecologist, chemist, planner, GIS specialist, communications, business analyst...
- Local and regional workshops with **all** local authorities and WFD implementing bodies – learning from local experts while building relationships
- Listening (and learning others languages) is vital...

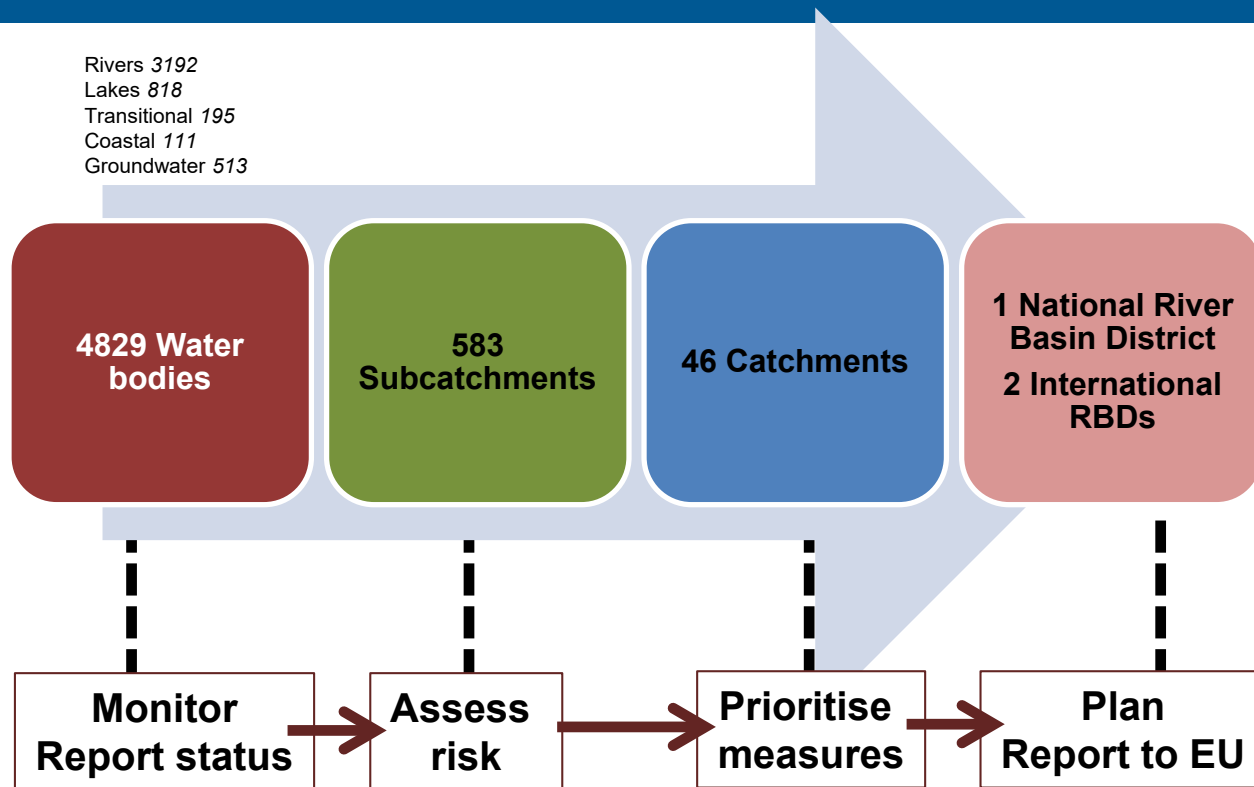
2. Develop a vision



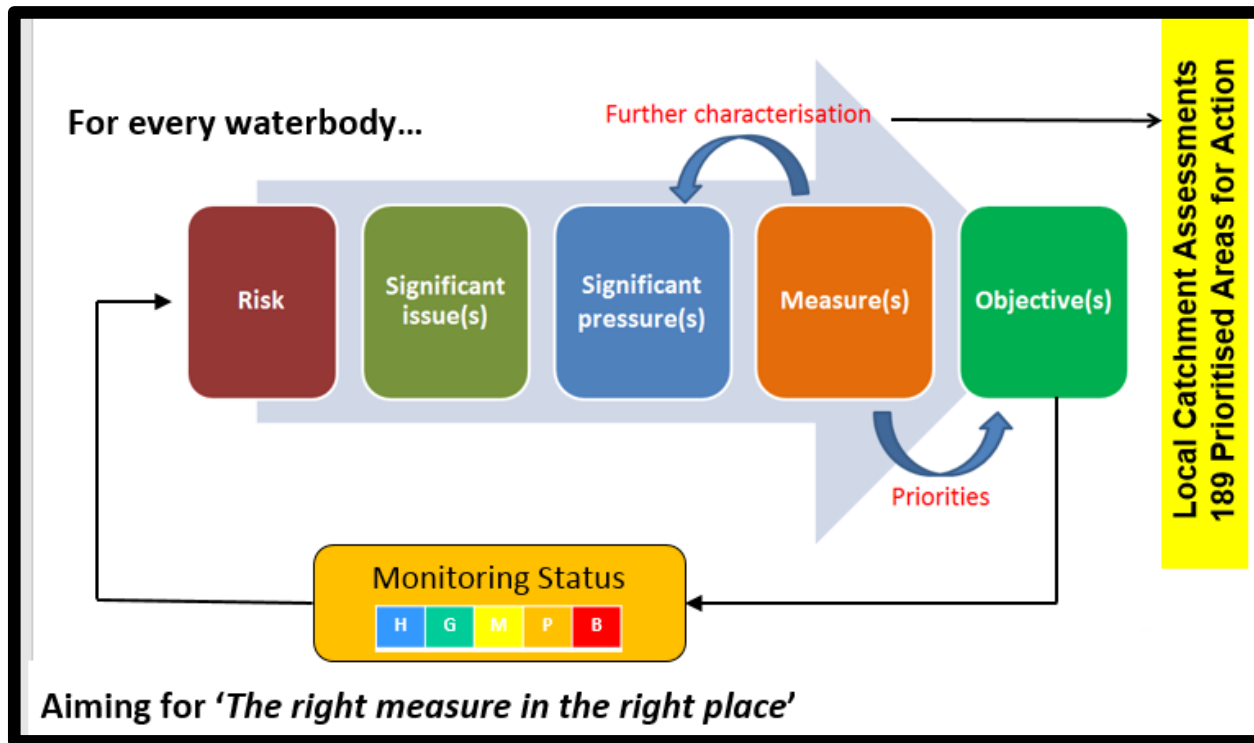
- **Working together** for healthy, resilient, productive and valued water resources supporting vibrant communities



3. Characterise the catchment



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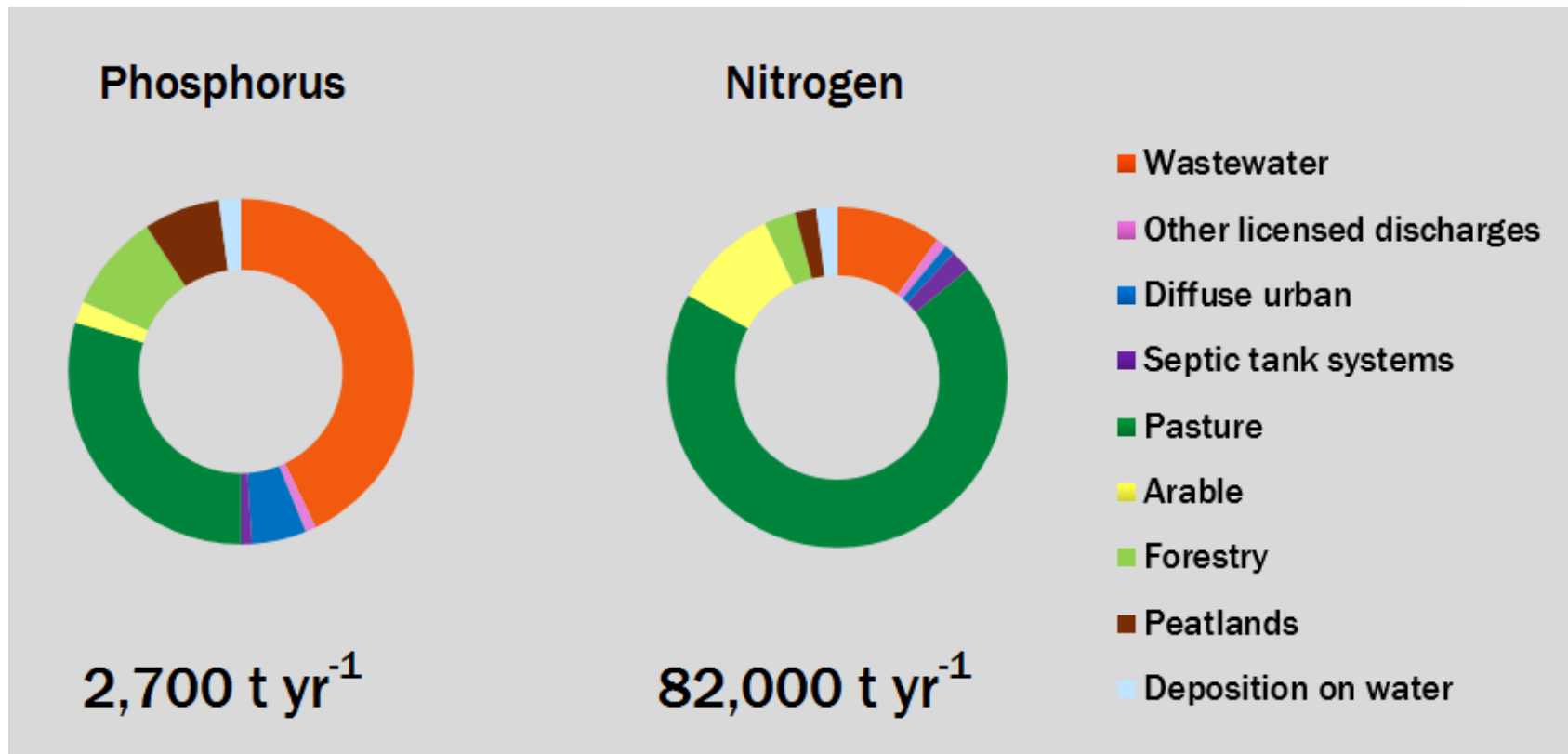
“Risk” is ‘risk of not meeting WFD objectives’ unless appropriate measures are taken

- Automated calculation determines a water body to be *At Risk*, *Review* or *Not at Risk* using:



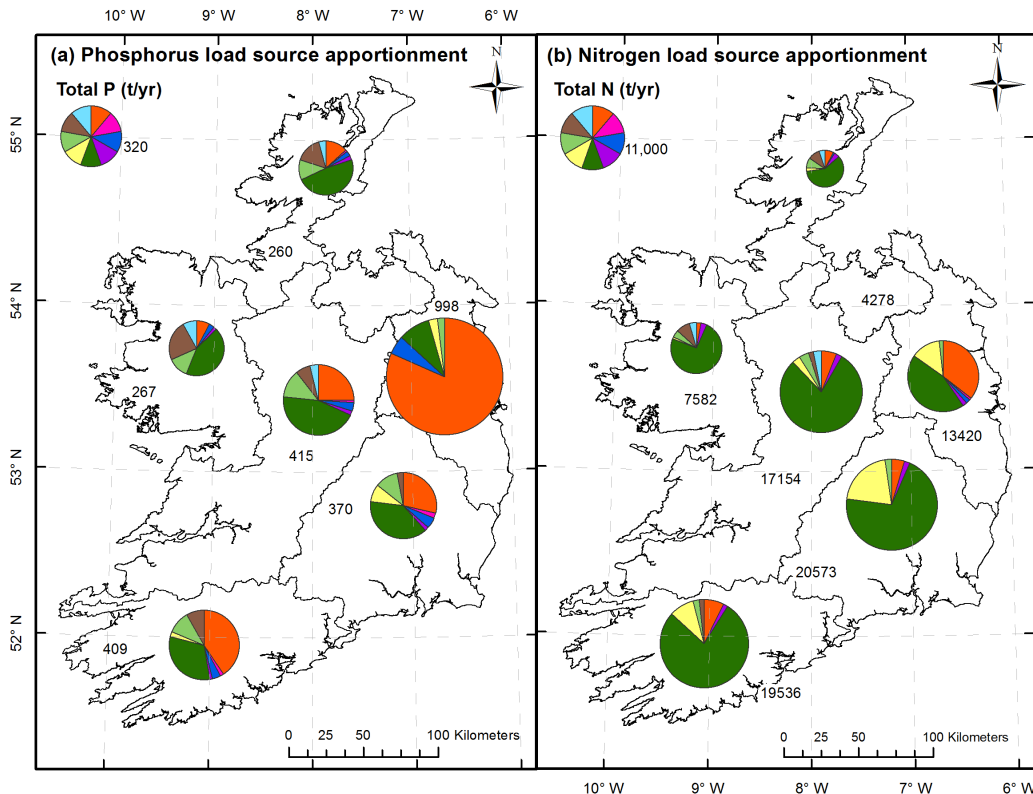
- Further assessment is carried out on water bodies *At Risk and Review* before publication to the WFD App and catchments.ie using:
 - 140+ datasets** from numerous organisations
 - Outputs from tools such as the **Source Load Apportionment Model** and Critical Source Areas mapping tools (**Pollution Impact Potential (PIP) Maps**)
- This results in the identification of **Significant Pressures**

National Source Apportionment – emissions to water



Based on 2012 DAFM data + 2014 UWW. Currently being updated

Phosphorus sources Nitrogen sources



Urban sources of P are large but are most important in the coastal settlement areas. Elsewhere its mainly diffuse agricultural sources.

Diffuse agricultural sources of nitrogen are much larger than urban sources.

Key impacts



Phosphorus



Nitrogen



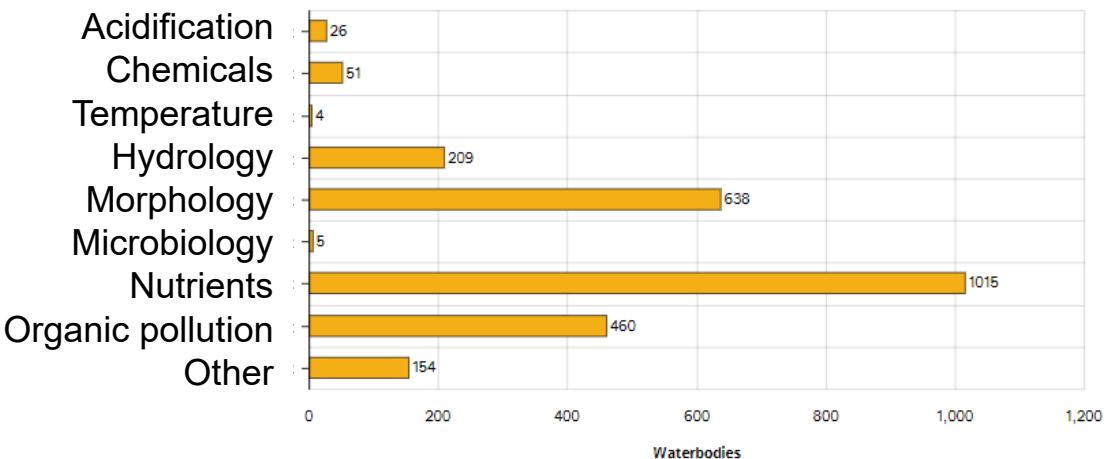
Drainage and
sediment



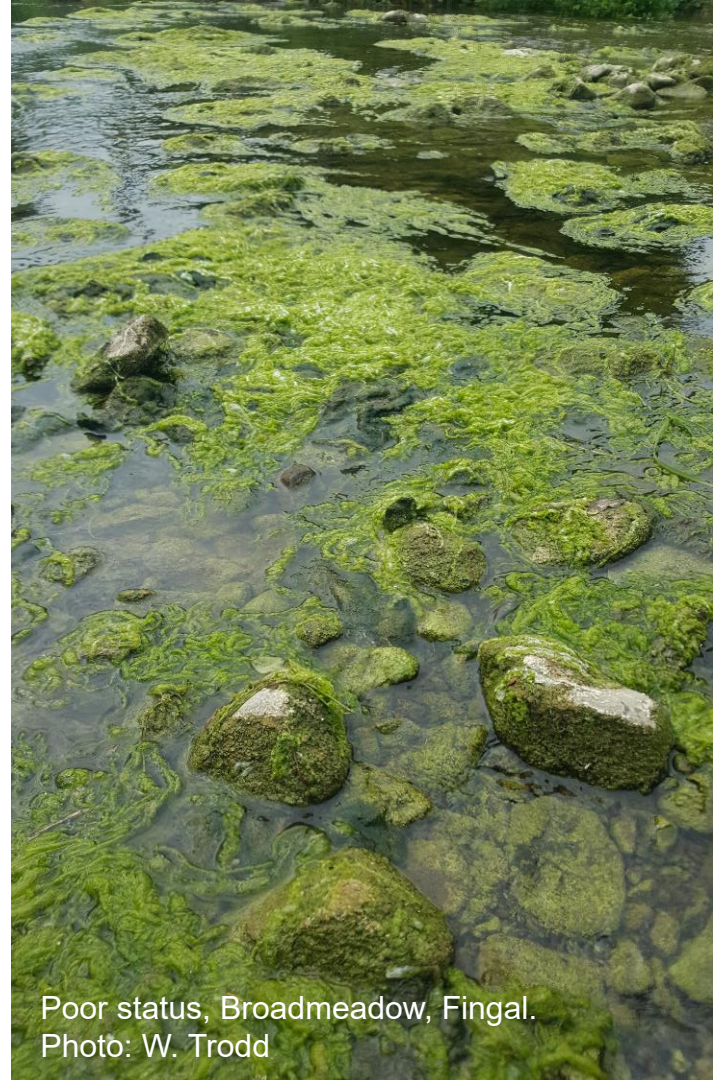
Chemicals



Impacts to waters that are At Risk

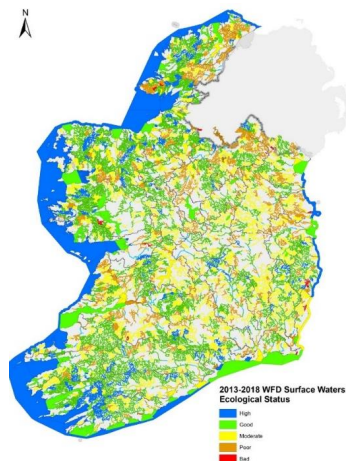


Excess nutrients (nitrogen and phosphorus) are the most widespread problem.

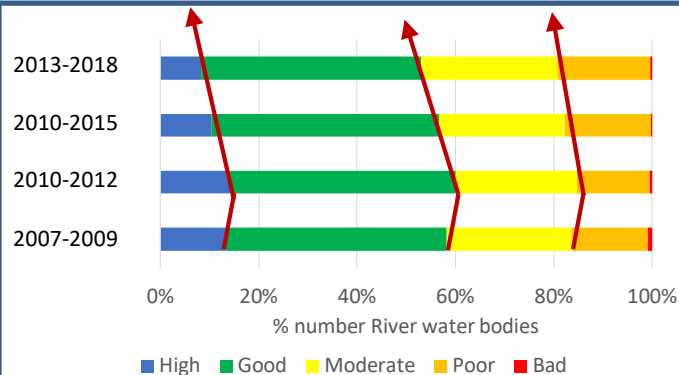


Poor status, Broadmeadow, Fingal.
Photo: W. Trodd

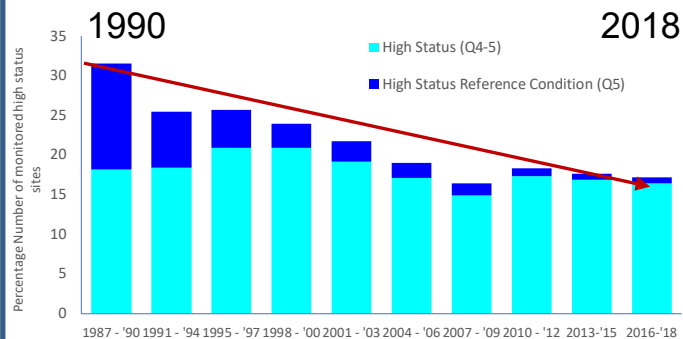
Water quality (ecological status) – condition and trends



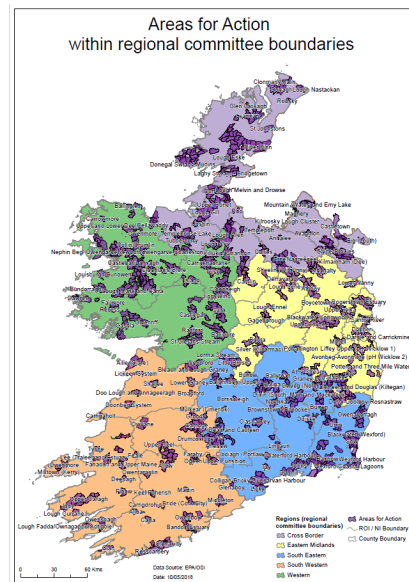
47% rivers and 62% estuaries unsatisfactory. Problems are widespread.



Increase in Moderate and Poor



High status waters in decline



Net improvement in Priority Areas for Action in 2018, and 2019 (River biology only).

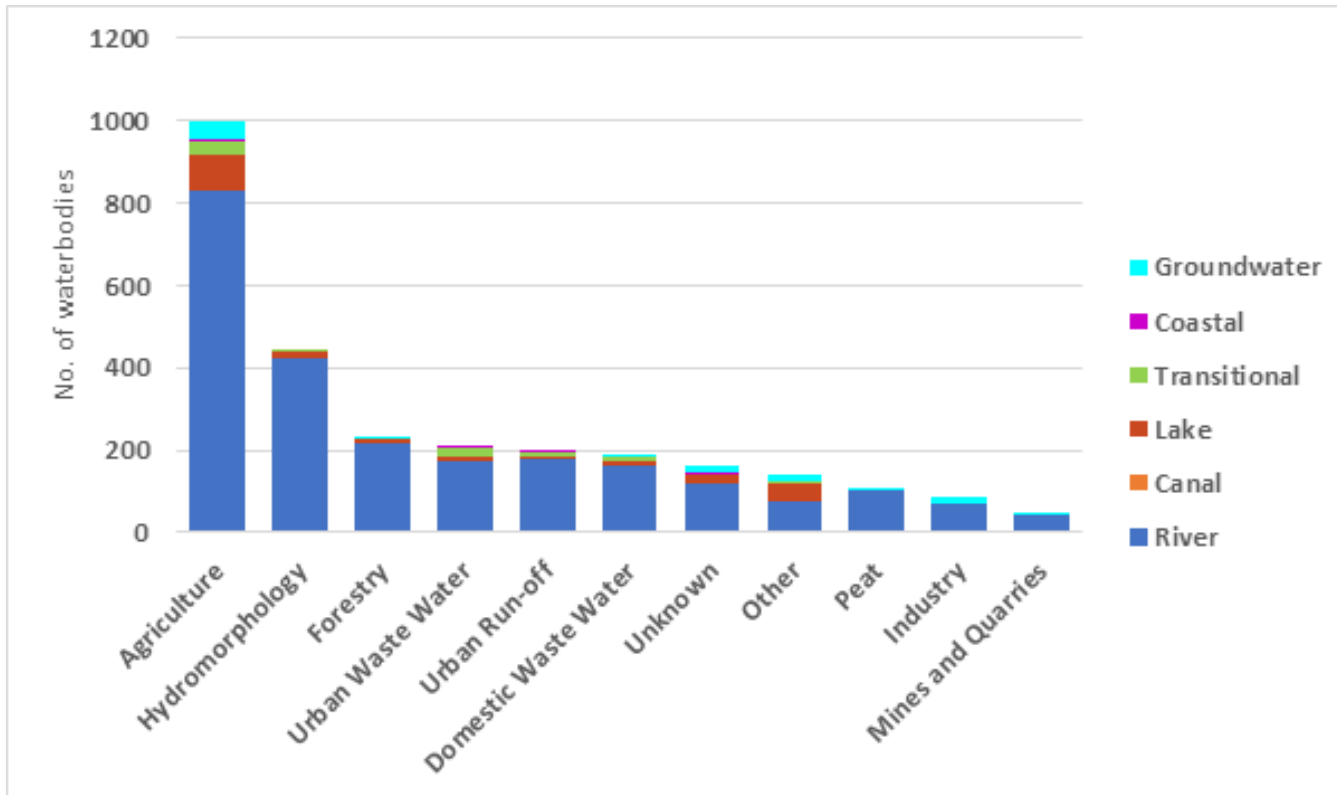
Significant pressures causing impacts – 3rd cycle

Note:

1603 waterbodies are impacted (out of 4842)

Agriculture accounts for the greatest number, but is also the most widespread landuse

Hydromorphology pressures are attributable to multiple sectors



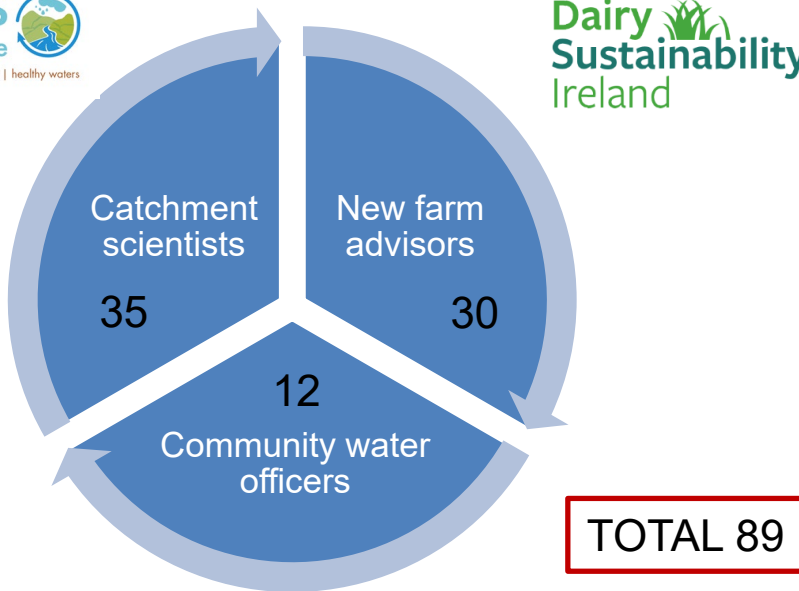
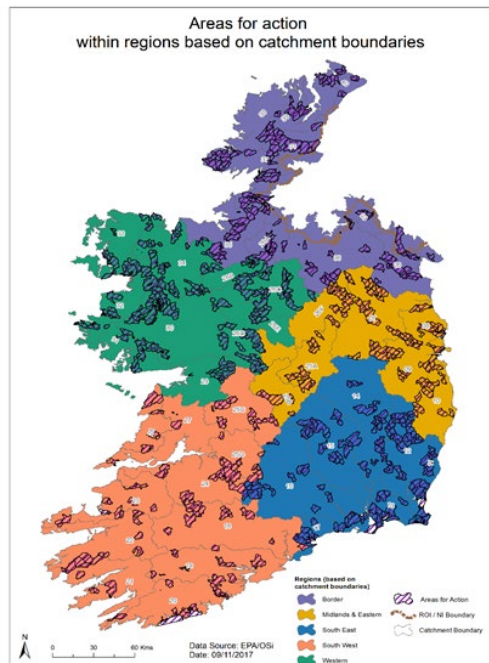
Targeting Areas for Action

- Prioritised Areas for Action for 2018-2021
- Quantified the person years required for further characterisation i.e. local catchment assessments
- New Local Authority Waters Programme working together with other WFD implementing bodies in these areas
- Teagasc ASSAP Advisors work on a voluntary and confidential basis with farmers in these area

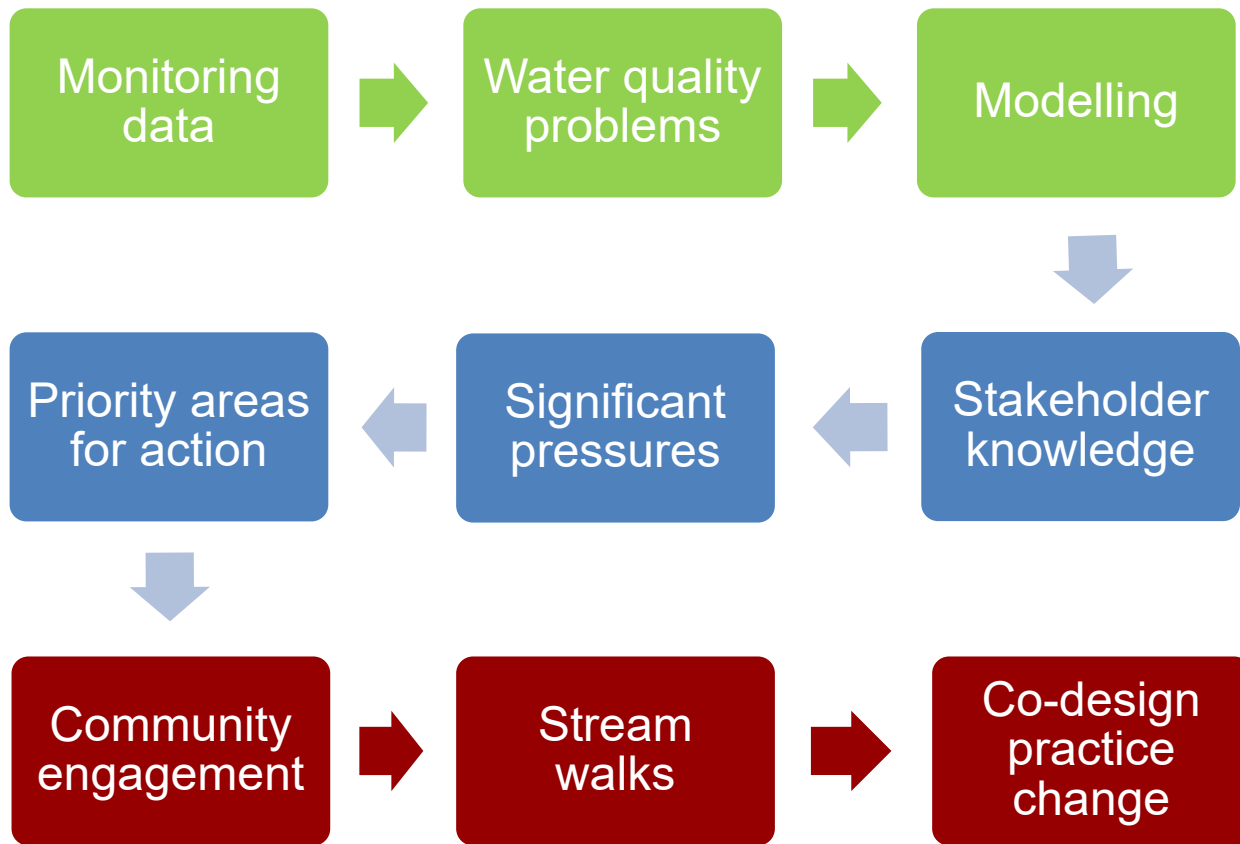


WFD River basin management plan – a targeted approach

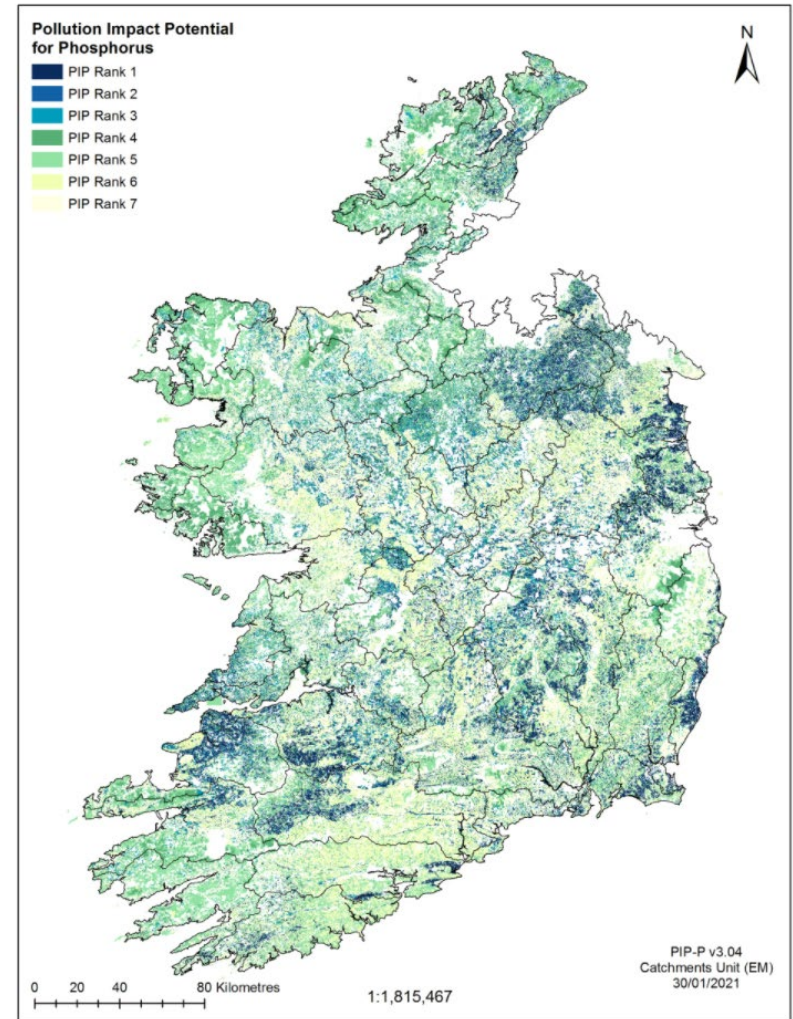
190 Priority Areas for Action



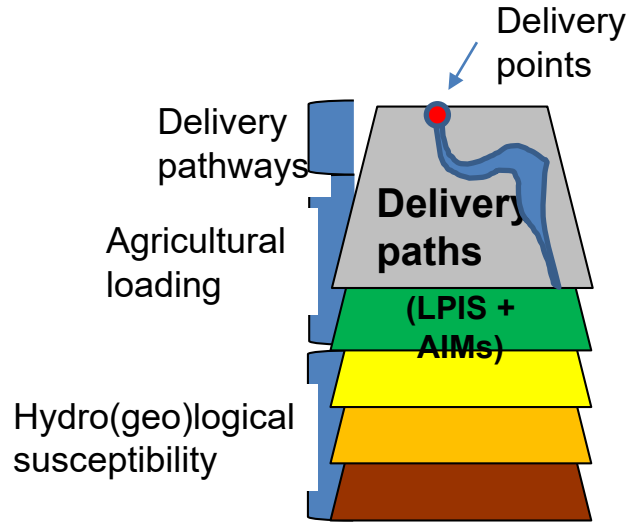
Areas for Action process – all pressures together



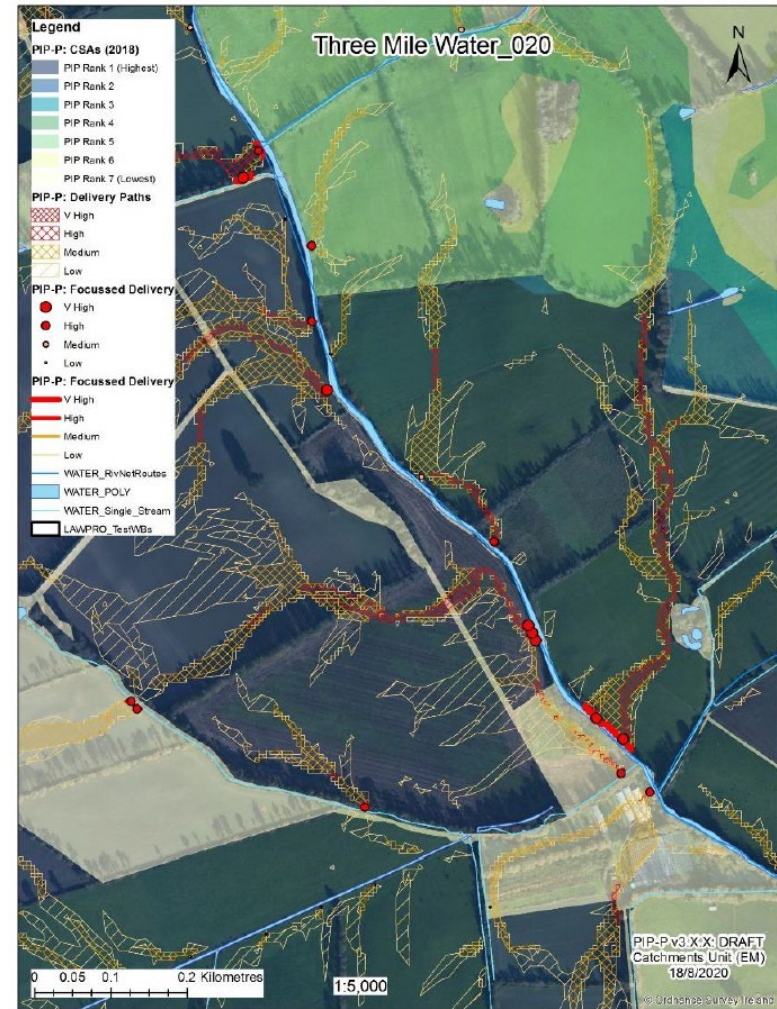
Mapping the highest risk areas for Phosphorus loss from diffuse agriculture



The Phosphorus Pollution Impact Potential map (PIP-P) Model structure



Mockler, et al (2016); Mockler, et al (2017); Thomas et al (2016);



Measures for phosphorus

Issue

1007 waterbodies (60% of waters needing measures) are impacted by excess **phosphorus**, fine sediment, and/or chemical pollution from agriculture.

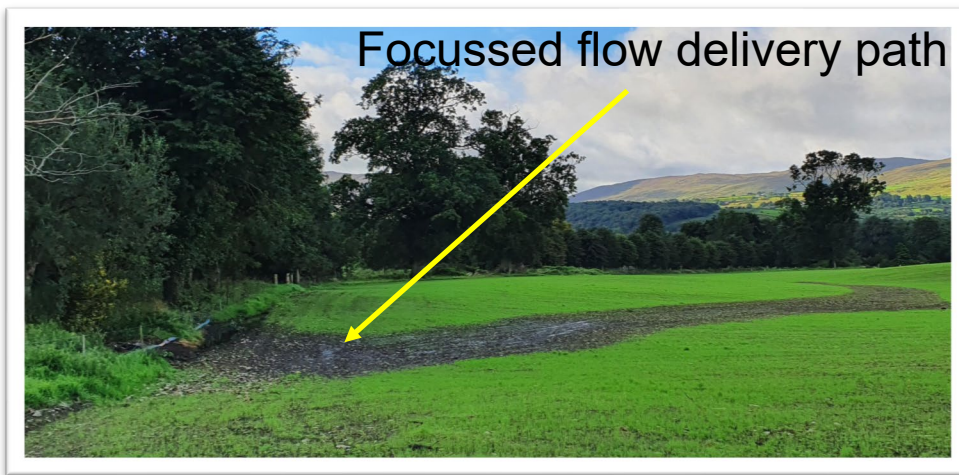
Targeting Action

- Critical source area maps developed (using DAFM data)
- Can pinpoint 2400 km of river bank (<2%) that needs pathway interceptions measures.

Co-Benefits

Biodiversity and Water.

ASSAP programme are using these tools



Targeting measures for phosphorus:

Riparian/buffer zones, woodlands, engineered ditches, wetlands, ponds. **Co-benefits for biodiversity, sediment, pathogens**



Photo: Newcastle University



Photo: R Little



Photo: Allerton farm

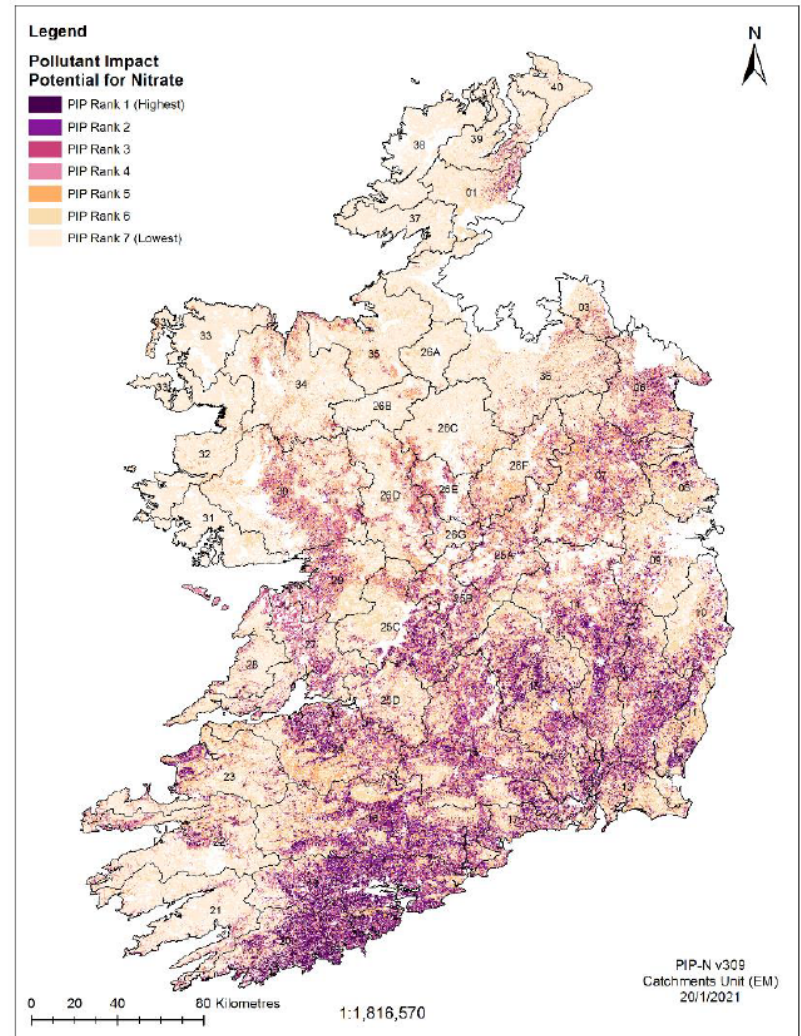


Photo: Woodlands Trust UK



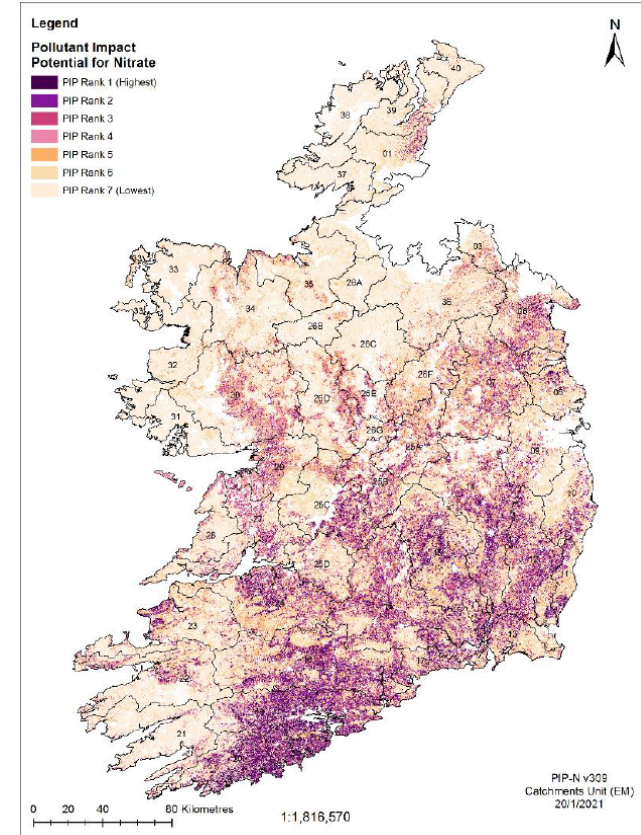
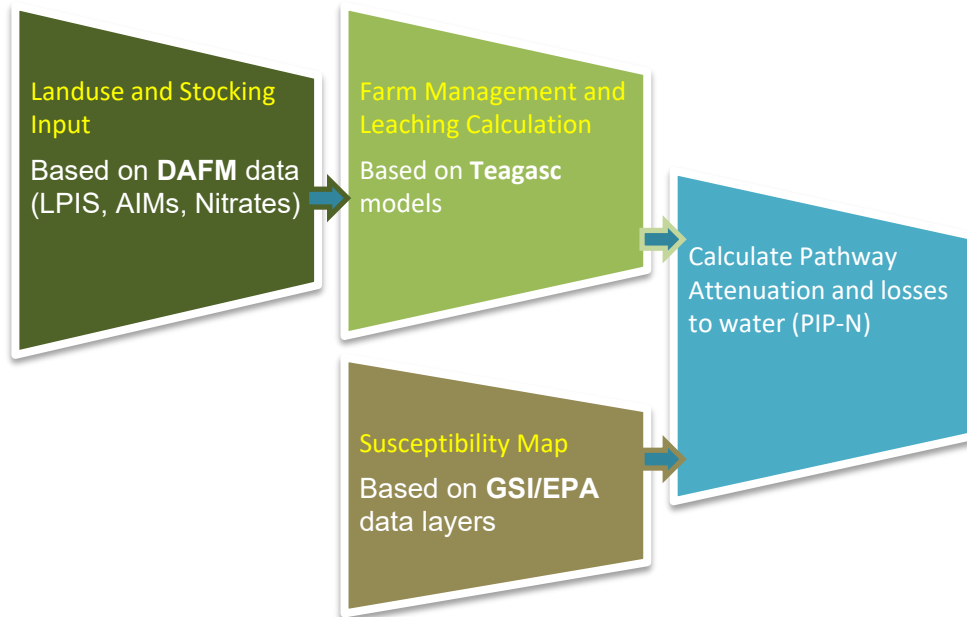
Photo: B Kennedy

Mapping the highest risk areas for Nitrate loss from diffuse agriculture



The Nitrate Pollutant Impact Potential map (PIP-N)

Model structure



Mockler, et al (2016); Mockler, et al (2017); Packham et al (2020)

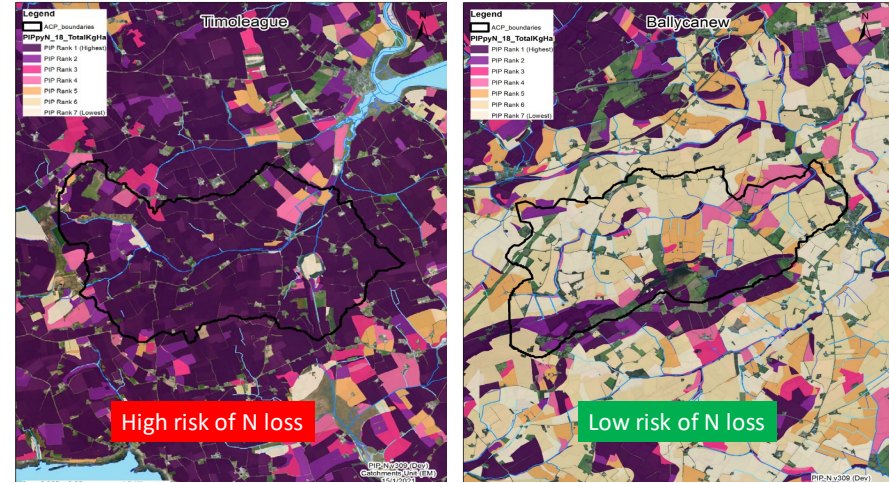
Measures for Nitrate

Issue

535 waterbodies (32% of waters needing measures) are impacted by excess **nitrate**.
18 drinking water supplies are impacted by nitrate and trends are increasing elsewhere.

Targeting Action

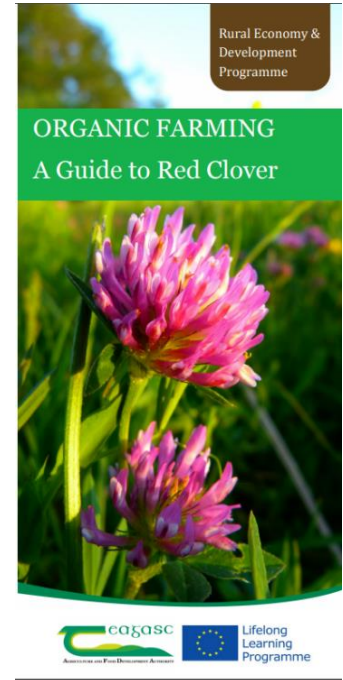
We have mapped 6900 km² of highest risk Critical Source Areas, where nitrate losses from farms are highest in South and SE.
Can now use these to target nitrogen reduction measures.



Targeting measures for nitrogen:

Nutrient management planning, soil fertility, protected urea, mixed swards, reduce application of chemical N, use of LESS.

Co-benefits for ammonia, green house gases



Key messages



- We need to take action to improve water quality – but not all catchments need the same actions
- We have the science and tools to better target **the right measure in the right place**
- Need to join up the policy, messaging, actions and supports
- Target measures with multiple benefits
 - for water quality, biodiversity, climate, natural flood mitigation, amenity, air quality and health / well-being
- **www.catchments.ie – sharing science and stories**
 - *Weekly water news email updates, Catchments Newsletter, Dashboards, Data, Maps, 46 Catchment Assessments, 583 Subcatchment Assessments, 4829 water body pages (with chemistry downloads available where we've data)*