

An aerial satellite view of Ireland, showing the island's green terrain and surrounding waters. The water is depicted with various shades of blue and cyan, indicating different depths and possibly water quality variations. A black text box with a white border is overlaid on the top left corner of the image.

**Ireland's National Transitional and
Coastal Waters Monitoring Programme**

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Environmental Protection Agency**

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Outline of Talk

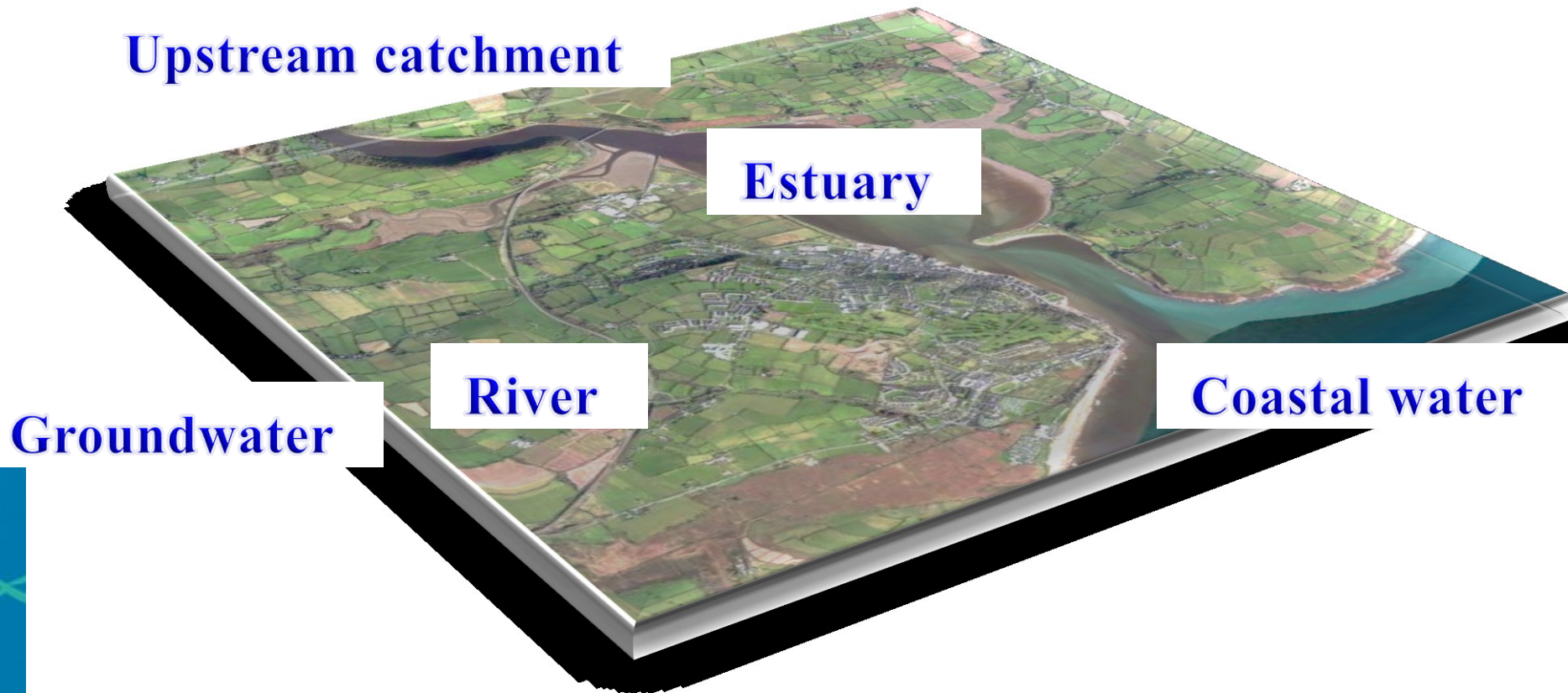
- 1. The Water Framework Directive
- 2. The national monitoring programme
- 3. Roles and responsibilities
- 4. Structure of the national monitoring programme
- 5. Status of Ireland's transitional and coastal waters
- 6. Programmes of measures
- 7. Integrated catchment management
- 8. Resources

1. The Water Framework Directive

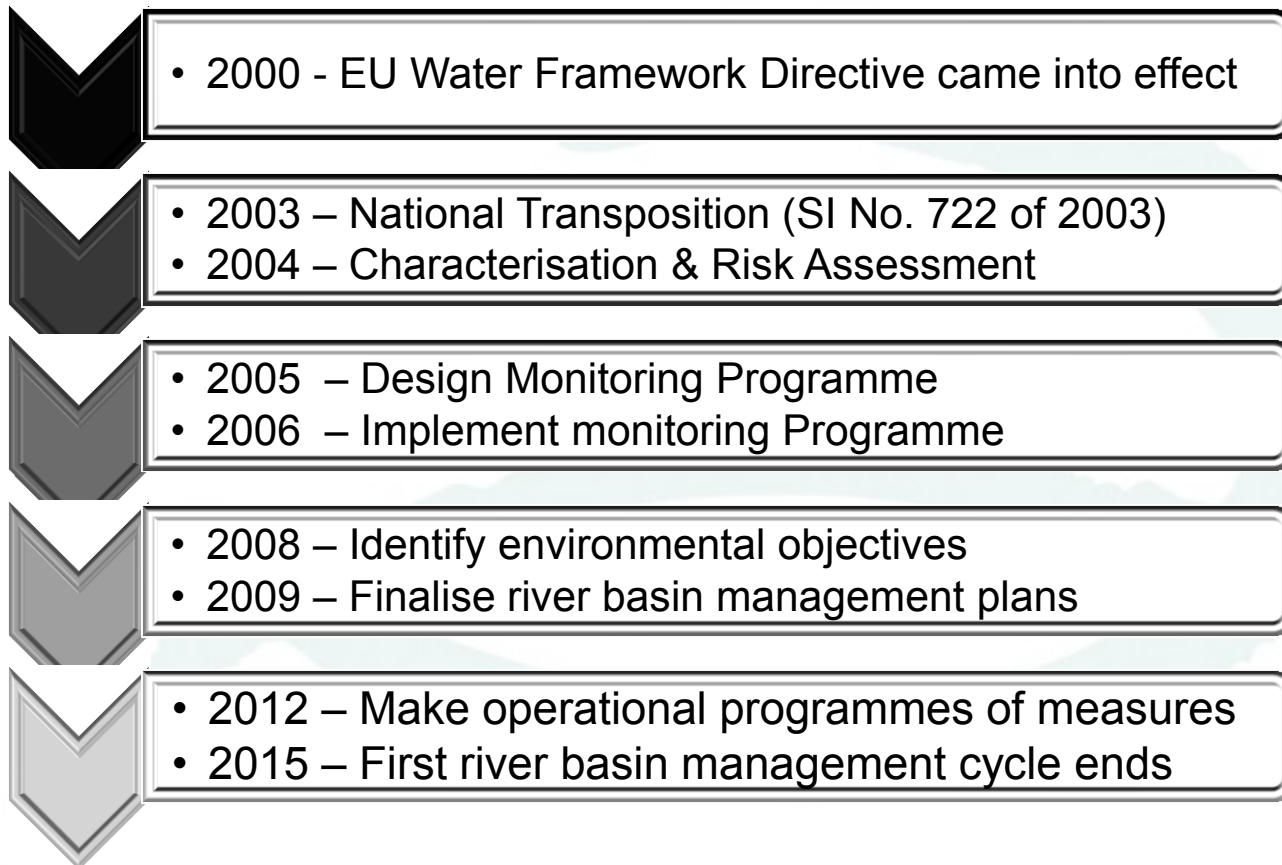
- WFD is a ***catalyst for Water management*** in Europe since 2000
- EU Commission is ***pushing Member States hard*** for implementation
- EU is carrying out its own ***3rd Assessment*** of RBM Plans
- ***EU Blueprint, 2012*** will gauge progress across River Basins
- The EU followed up with ***Marine Framework Directive*** in 2006
- ***Integration*** is a key idea underlying these 2 Frameworks

Integrated focus of the Water Framework Directive

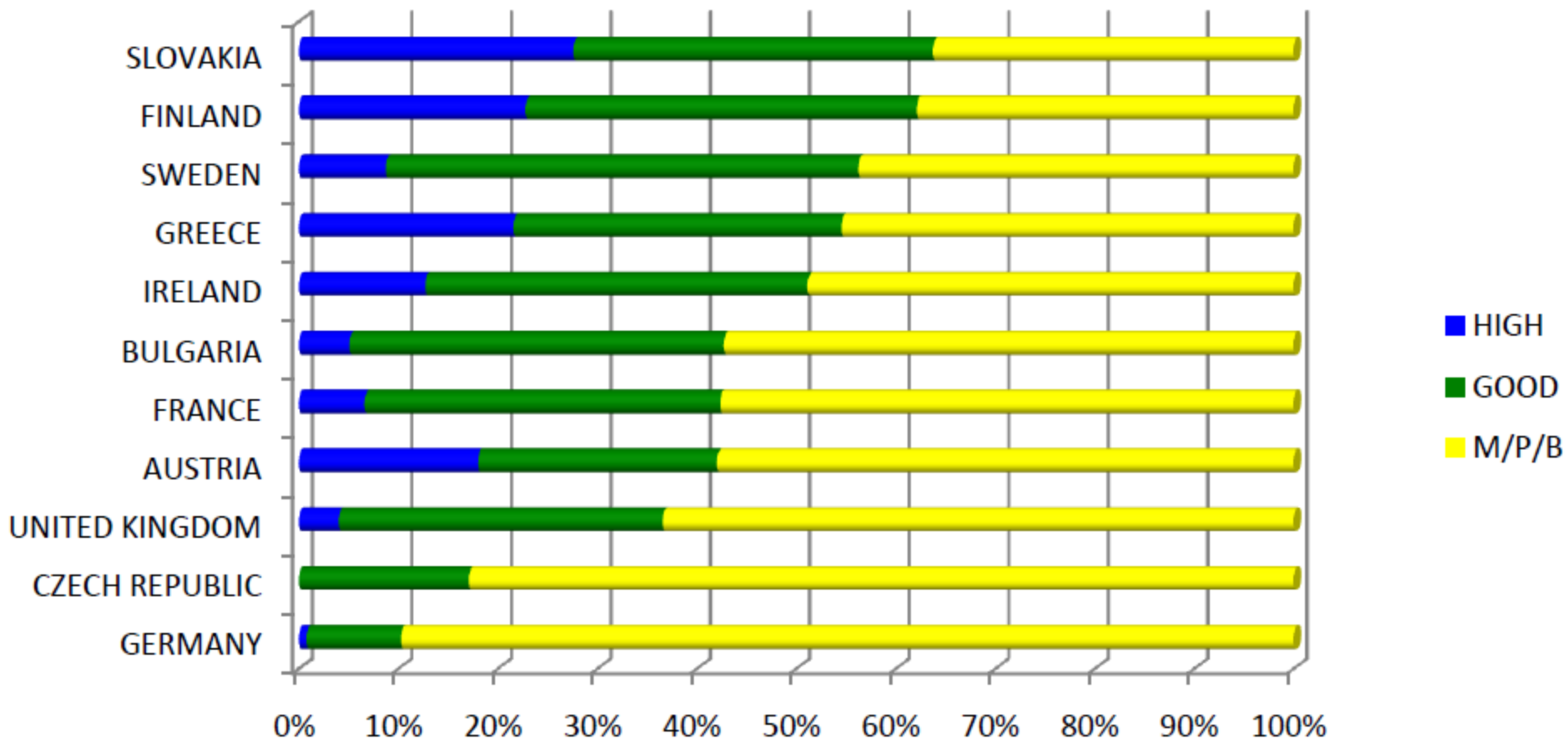
WFD is a Europe-wide **Framework** for the protection of the biology, chemistry, and natural physical form of all surface and groundwaters and dependent water bodies.



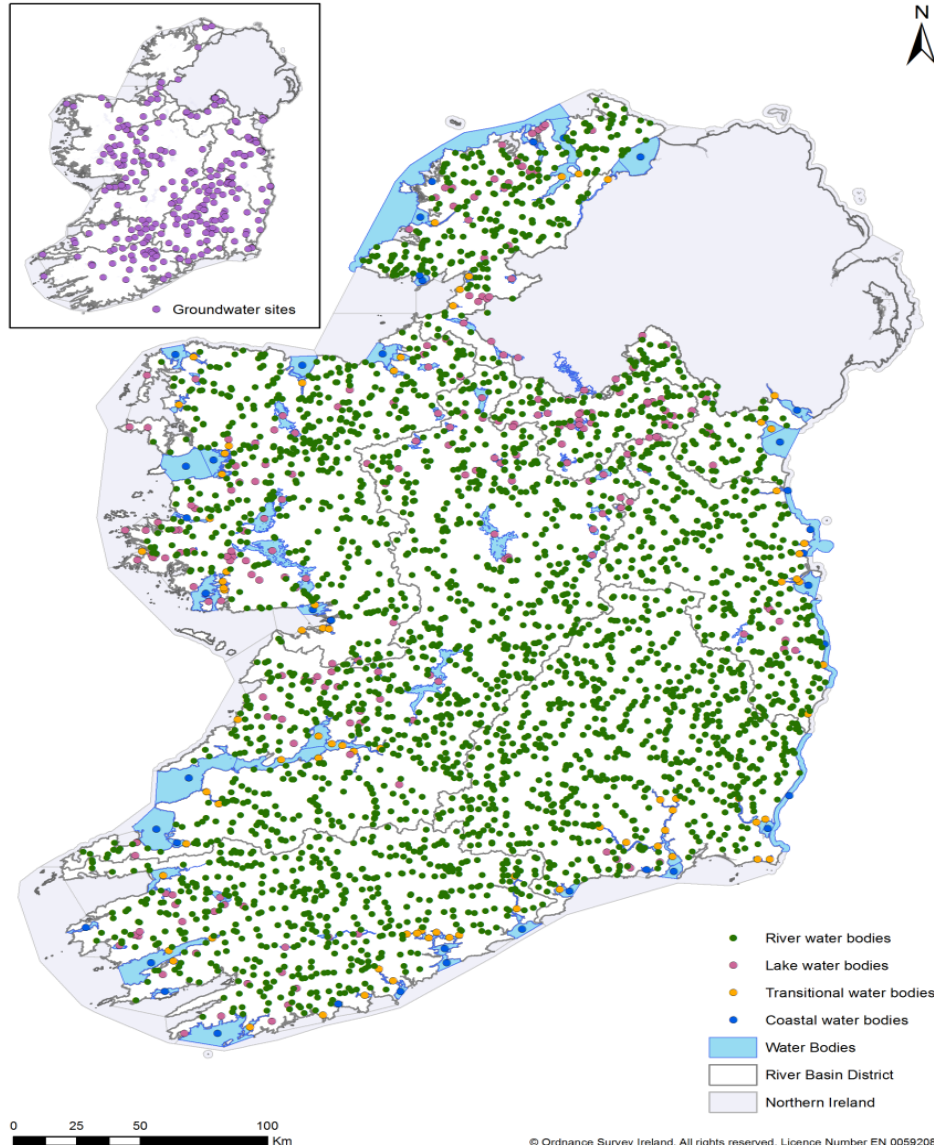
The WFD process



Comparison of Ecological Status in Ireland with other countries (based on EEA website data)



2. National WFD Monitoring Programme



2, 180 river water bodies
224 lakes
80 transitional waters
41 coastal waters
260 groundwater sites
140 quantitative sites

3. Roles and Responsibilities

	Biology	Fish	Hydromorphology	Physico-Chemistry	Chemistry
Rivers	EPA	CFB	EPA/OPW/LA	EPA/ LAs	EPA
Lakes	EPA	CFB	EPA/OPW/LA	EPA/ LAs	EPA
Groundwater	N.A.	N.A.	EPA/OPW/LA	EPA	EPA
Transitional	EPA/MI	CFB	EPA/OPW/MI	MI/EPA/LA	MI
Coastal	EPA/MI	N.A.	EPA/OPW/MI	MI	MI

N.A. = not applicable; IFI = Inland Fisheries Ireland; LA = Local Authority, OPW = Office of Public Works; WI = Waterways Ireland; IFI = Inland Fisheries Ireland

Certain elements have been outsourced (e.g., monitoring of lagoons)

4. The structure of the national monitoring programme

- ❑ The structure of the programme is divided into three main monitoring programmes
 - ❑ 1. The surveillance programme
 - ❑ 2. The operational programme
 - ❑ 3. The investigative programme

- ❑ The design of the monitoring programme was based on the outcome of Article 5 Characterisation (i.e. physical typology) and Risk Assessment (risk of failing to meet environmental objective).

- ❑ The risk assessment divided each water body into 4 risk categories: At Risk; Probably At Risk; Probably Not At Risk; Not At Risk.

4. Surveillance monitoring programme

Subnet Name	Aim of Subnet
SM Subnet 1	Representative of the overall surface water status
SM Subnet 2	Detection of long-term trends as per WFD requirement – long-term changes in natural conditions and long-term changes resulting from widespread anthropogenic activ
SM Subnet 3	Supplementing and validating risk assessments particularly at those sites where the degree of uncertainty is greatest
SM Subnet 4	Water bodies that are stipulated in the text of the WFD: <ul style="list-style-type: none">– the rate of water flow is significant within the river basin district as a whole; including points on large rivers where the catchment area is greater than 2500 km²,– the volume of water present is significant within the river basin district, including large lakes and reservoirs,

4. Operational monitoring programme

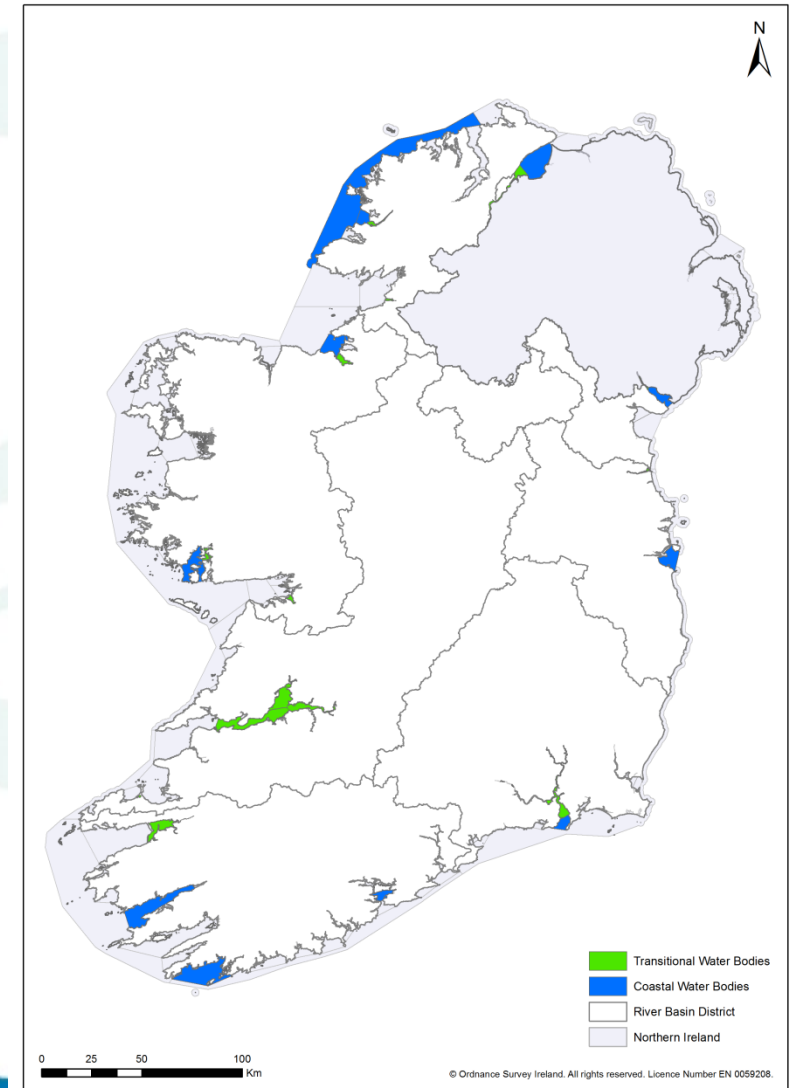
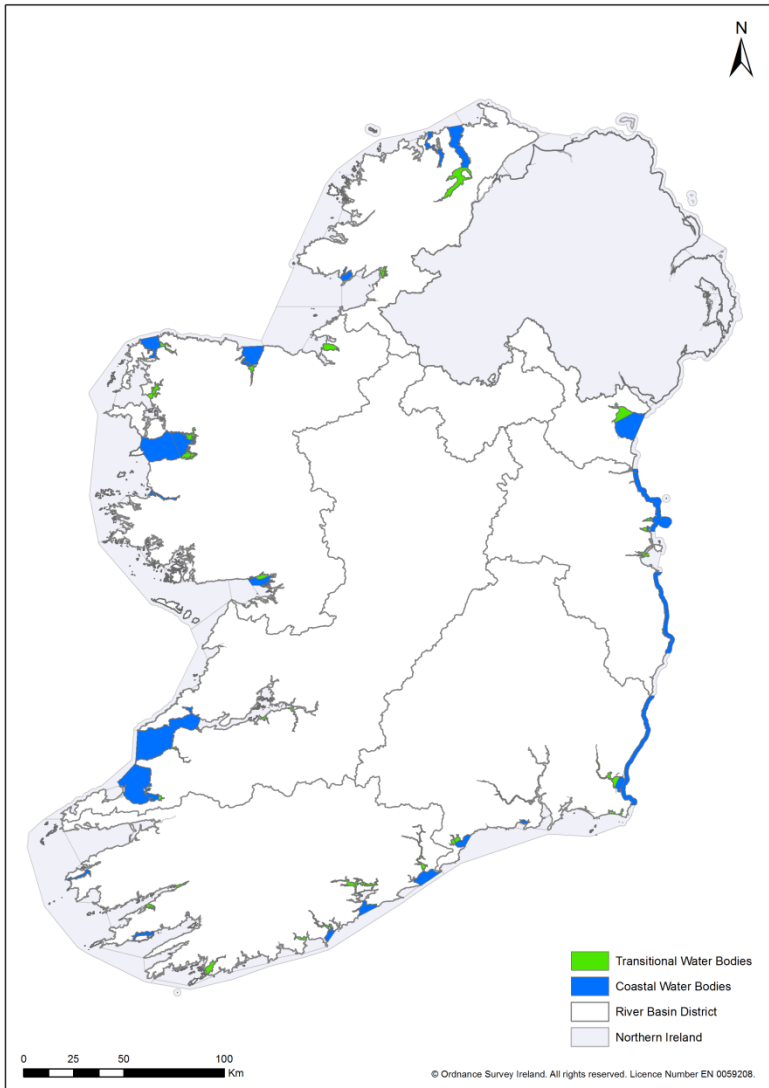
Subnet Name	Aim of Subnet
OM Subnet 1	Monitoring to assess whether the measures aimed at improving the impact of individual and combined point sources are successful. This includes assessment of ambient levels of organic pollution, eutrophication impacts and priority substances.
OM Subnet 2	To assess effectiveness of diffuse pollution control measures
OM Subnet 3	To assess effectiveness of measures to reduce hydromorphological pressures and impacts
OM Subnet 4	To monitor high and good status sites currently not deemed to be at risk in order to assess the effectiveness of POMs aimed at maintaining high and good status sites.
OM Subnet 5	To monitor species and habitat protected areas that are at risk

4. Investigative monitoring programme

The WFD states that this type of monitoring is required for situations:

- ❑ where the reason for any exceedances is unknown;
- ❑ where surveillance monitoring indicates that the objectives set under Article 4 for a body of water are not likely to be achieved and operational monitoring has not already been established;
- ❑ in order to ascertain the causes of a water body or water bodies failing to achieve the environmental objectives;
- ❑ or to ascertain the magnitude and impacts of accidental pollution;
- ❑ and shall inform the establishment of a programme of measures for the achievement of the environmental objectives and specific measures necessary to remedy the effects of accidental pollution.”

TraCs Monitoring Programme – operational and surveillance water bodies



Monitoring methodologies and intercalibration

Water Category	GIG	BQE	Tool	H/G	G/M
Annex 1					
Coastal	NEA	Macroalgae and Angiosperms	RSL - Rocky Shore Reduced Species List	0.8	0.6
Transitional	NEA	Fish	TFCI – Transitional Fish Classification Index	0.8	0.6
Annex 2					
Coastal	NEA	Benthic invertebrate fauna	IQI	0.75	0.64
Coastal	NEA	Phytoplankton	Chlorophyll A	0.67	0.33
Coastal	NEA	Macroalgae and Angiosperms	OGA Tool - Opportunistic Green Macroalgal Abundance	0.8	0.6
Coastal	NEA	Macroalgae and Angiosperms	Intertidal Seagrass Abundance and Species Composition	0.8	0.63
Transitional	NEA	Macroalgae	OGA Tool - Opportunistic Green Macroalgal Abundance	0.8	0.6
Transitional	NEA	Angiosperms	Intertidal Seagrass Abundance and Species	0.83	0.7

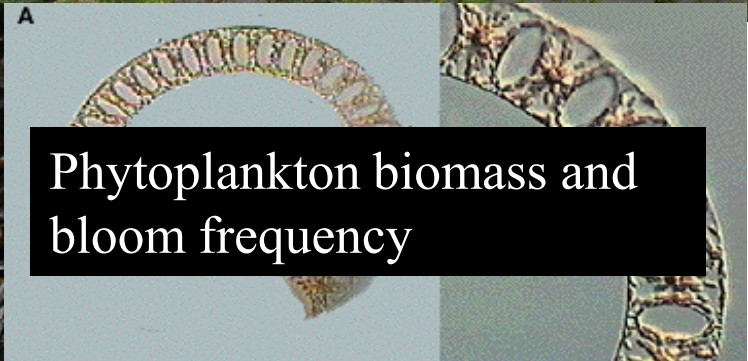
Temperature
Salinity
pH
Turbidity
Dissolved oxygen
Secchi Depth
Nutrients
BOD



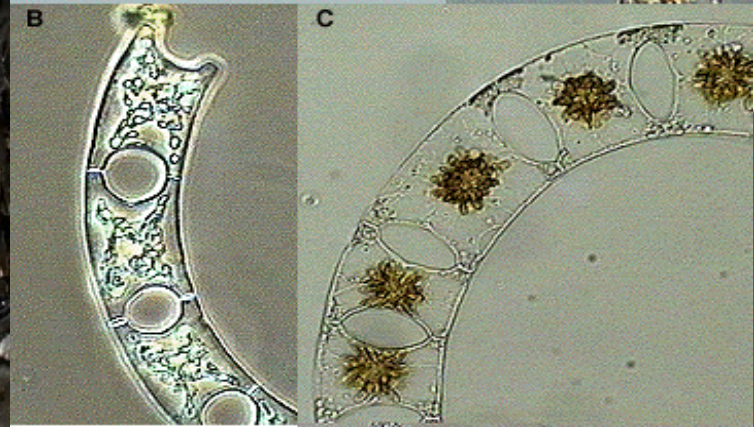
Angiosperms (seagrass and saltmarsh)



Macroalgae on rocky shores)



Phytoplankton biomass and bloom frequency



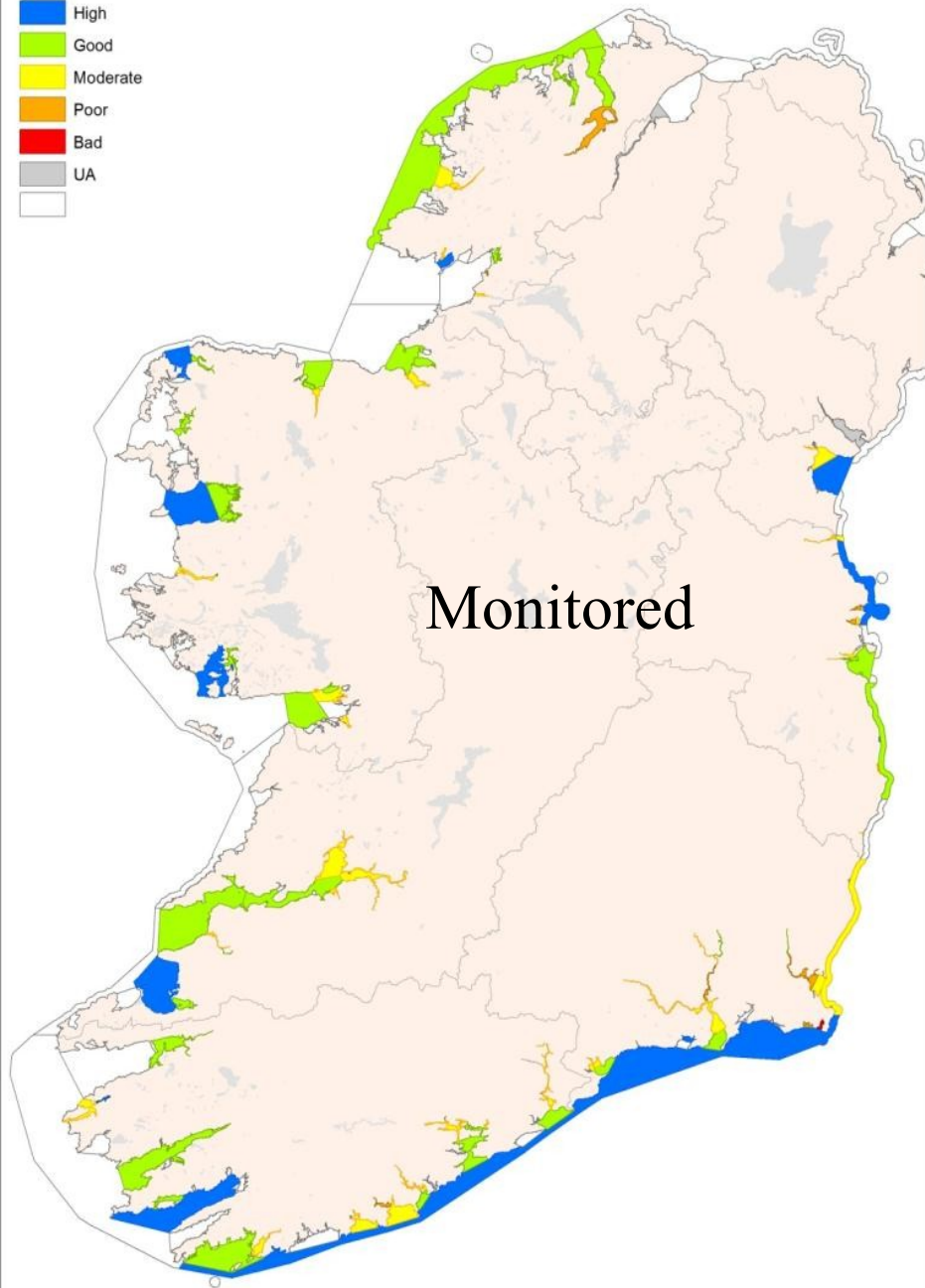
Opportunistic macroalgae on mudflats and sandflats





Monitored WFD Status

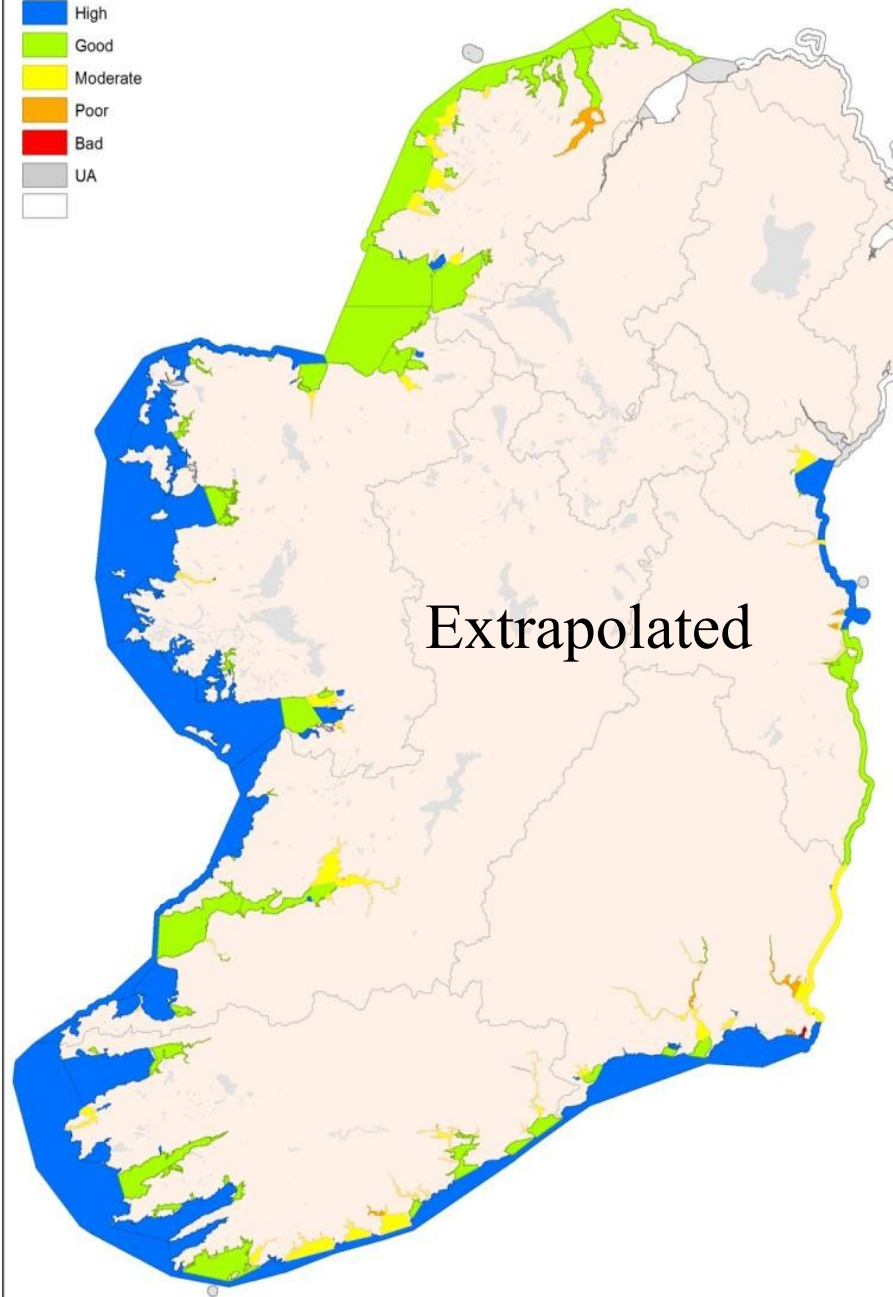
- High
- Good
- Moderate
- Poor
- Bad
- UA



Monitored

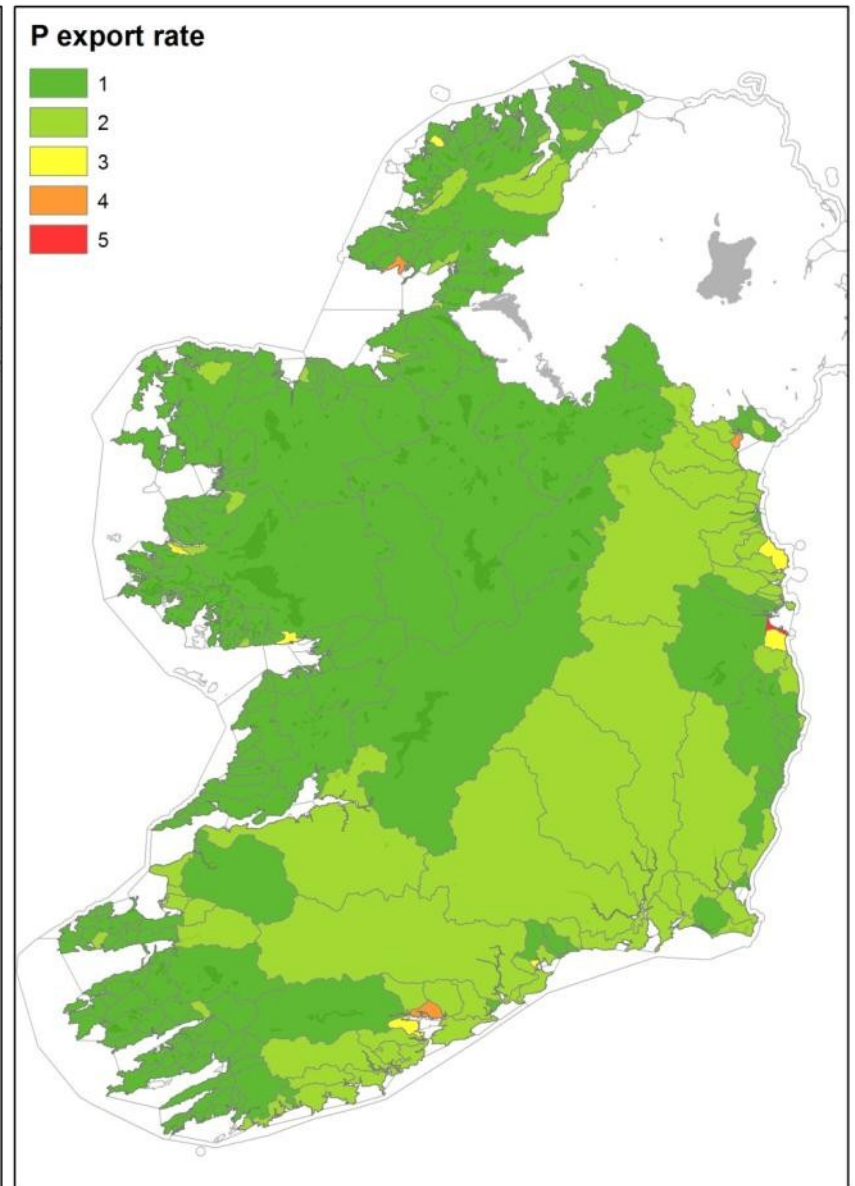
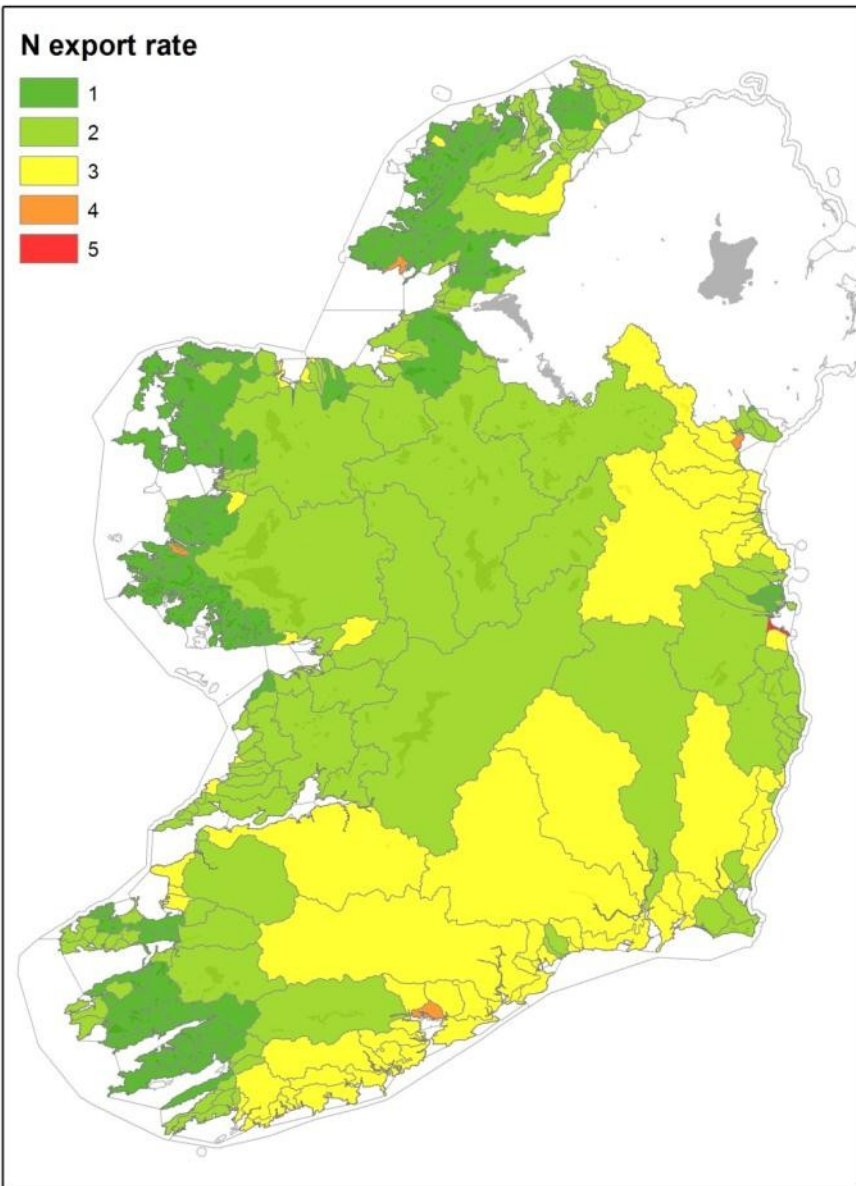
Monitored WFD Status

- High
- Good
- Moderate
- Poor
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- UA



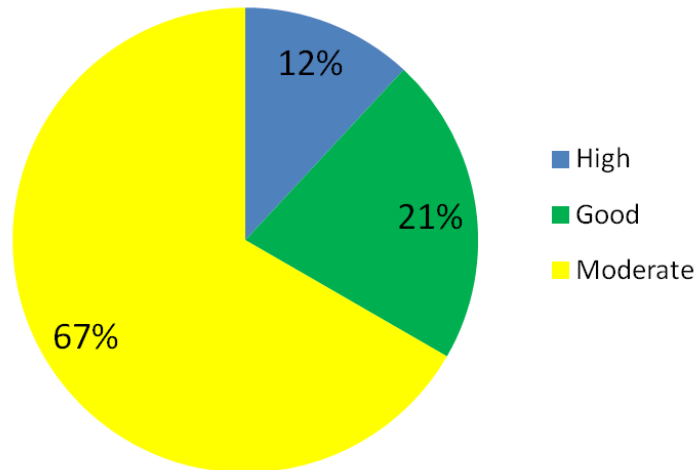
Extrapolated

PARCOM Source Apportionment (PSA)-estimates of Nitrogen & Phosphorus loading from various sources such as agriculture, urban waste water treatment, industry, unsewered populations and forestry.

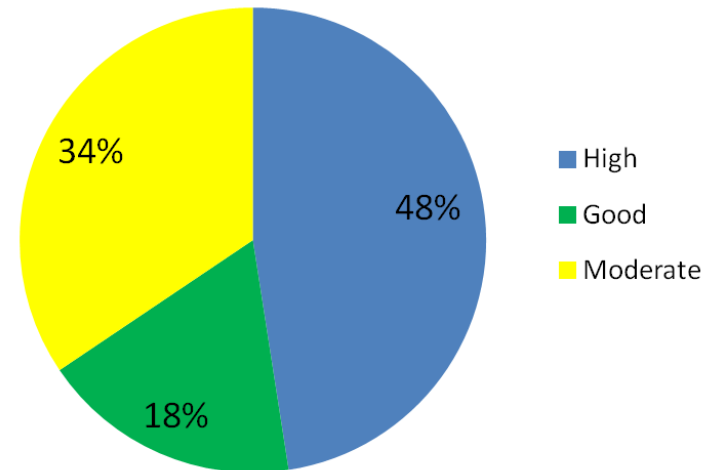


5. Ecological status – TraCs 2007-2009

Transitional Waters 2007-2009



Coastal Waters 2007-2009



6. Programmes of measures

- ❑ Programmes of measures are required to meet the environmental objectives of the Directive by 2015 (2021).
- ❑ Measures identified in first river basin management plans took a “business as usual approach” – some success, e.g., provision of WWTP, but dealing with diffuse sources remains a challenge.
- ❑ Measures identified in the second plan will have to be more focused and fit for purpose.
- ❑ This will require a more integrated catchment approach and better understanding of relationship between source, pathway, input, receptor and response.



THE QUESTION?

In keeping our focus on -
- good environmental outcomes for water - how can we achieve our objective of prioritising measures, targeting the correct measures to the most beneficial areas via the catchment characterisation process?

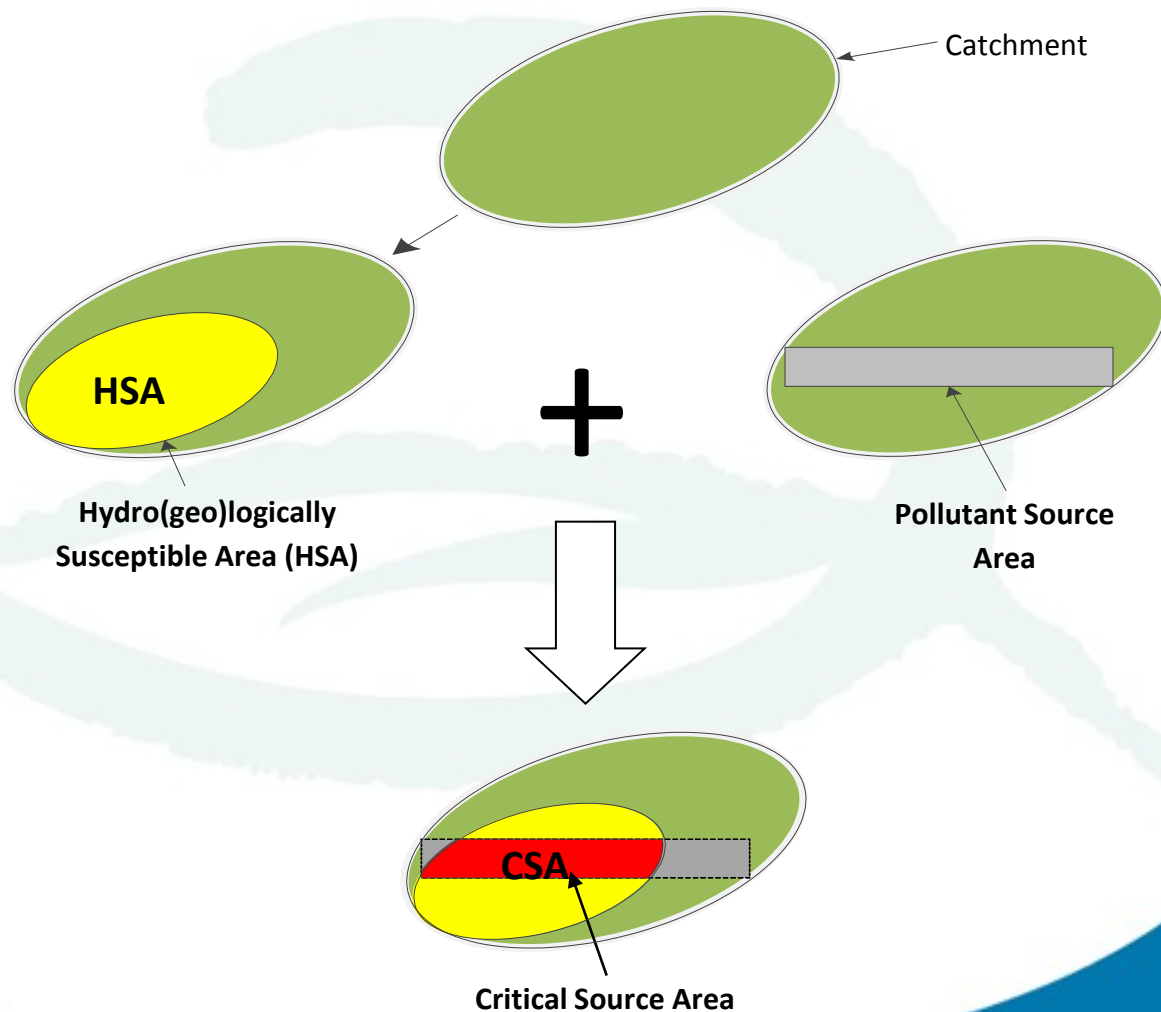
The ICM Toolbox?

- Pressures info
- Monitoring data
- Status assessments
- Characterisation
- Modelling
- Licensing
- Inspections/compliance
- Education/awareness
- Public involvement/consultation
- Programmes of measures**



Critical Source Areas (CSAs)

- Most diffuse pollution arises in a small proportion of the catchment area





Thick subsoil on poorly productive aquifer

+

denitrification in bedrock

+

Free-draining soils & subsoils

=

good natural protection



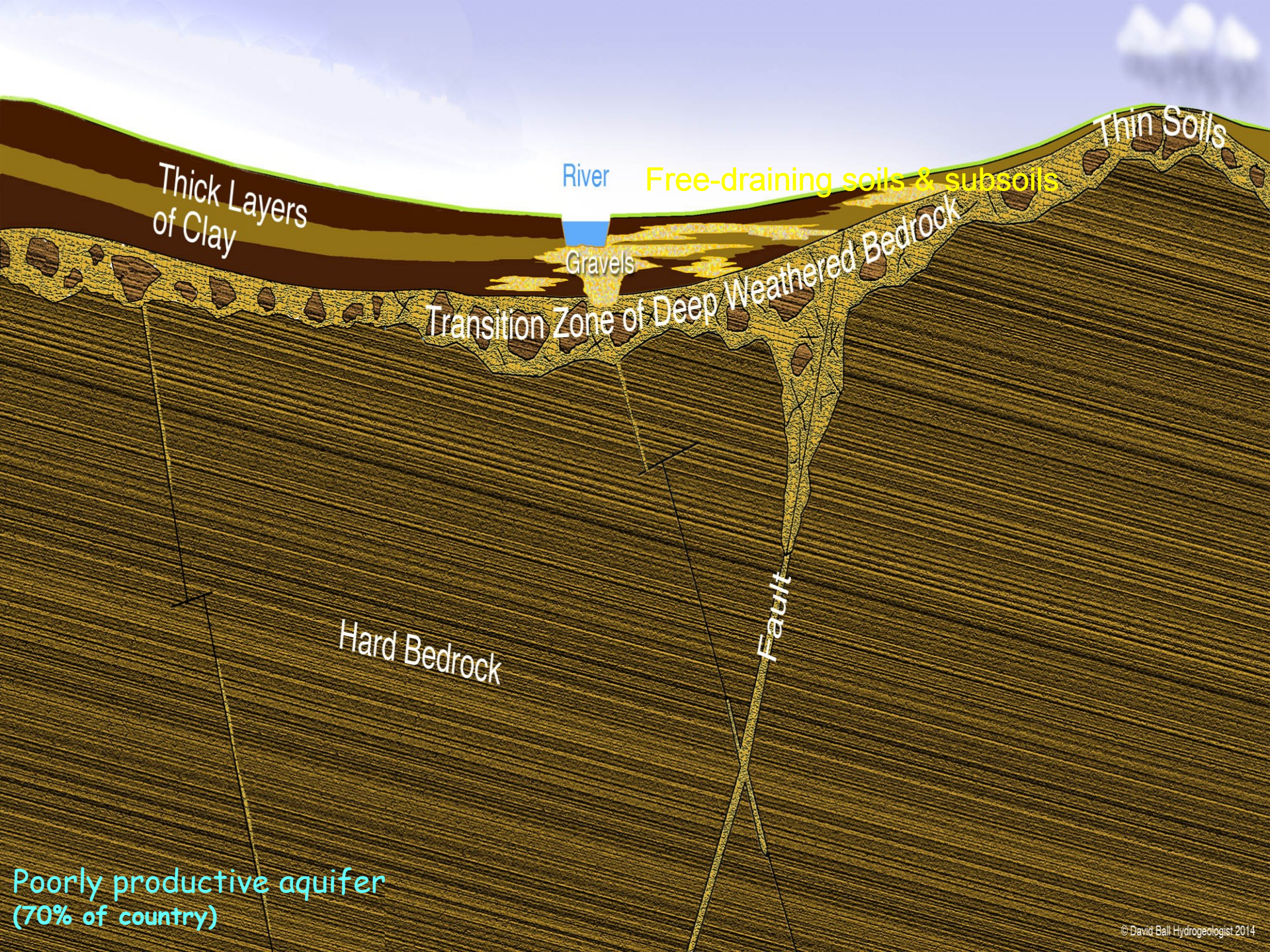
Not a hydro(geo)logically susceptible area

**Thin soil, no subsoil on karstic
bedrock = minimal natural protection**

A hydrogeologically susceptible area



**For effective, focussed decision-making, consideration must
be given to the contrasting physical settings present in
Ireland and the associated variation in risk to water**



Thick Layers of Clay

River

Free-draining soils & subsoils

Thin Soils

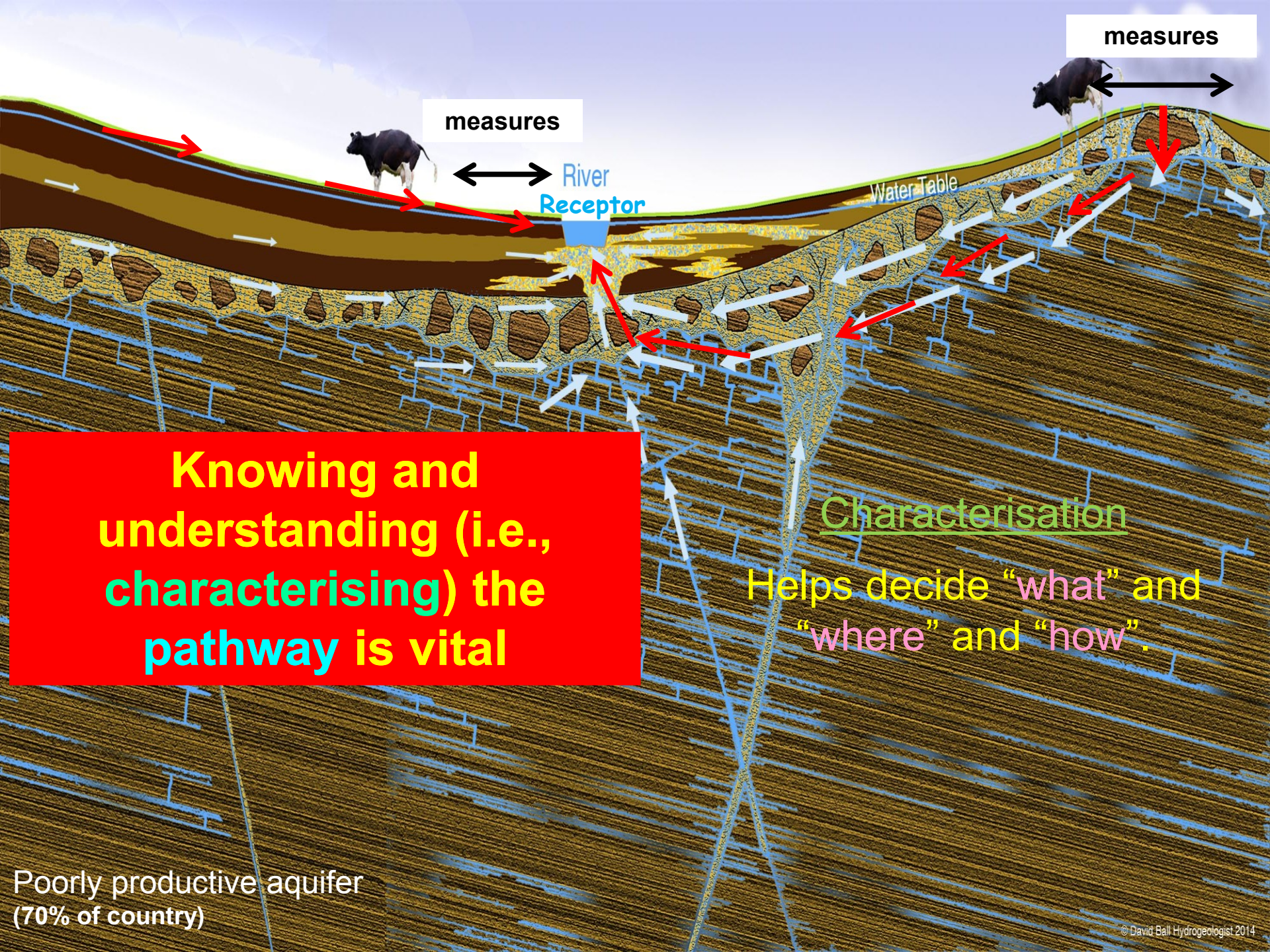
Gravels

Transition Zone of Deep Weathered Bedrock

Hard Bedrock

Fault

Poorly productive aquifer
(70% of country)



measures

measures

River Receptor

Water Table

Knowing and understanding (i.e., characterising) the pathway is vital

Characterisation

Helps decide "what" and "where" and "how".

Poorly productive aquifer (70% of country)

Characterisation Approach

Three **TIERS** of risk characterisation so that the level of assessment is commensurate with the risk posed

Tier 1: Screening; identifies “at risk” or “not at risk” water bodies (using EPA water body risk assessment tool (WRAT))

Tier 2: Identifies susceptible areas & significant pressures (using EPA catchment characterisation tool (CCT))

Tier 3: Detailed investigations (including EPA catchment modelling tool (CMT))

Tier 1 Characterisation

Waterbody Risk Assessment Tool (WRAT)

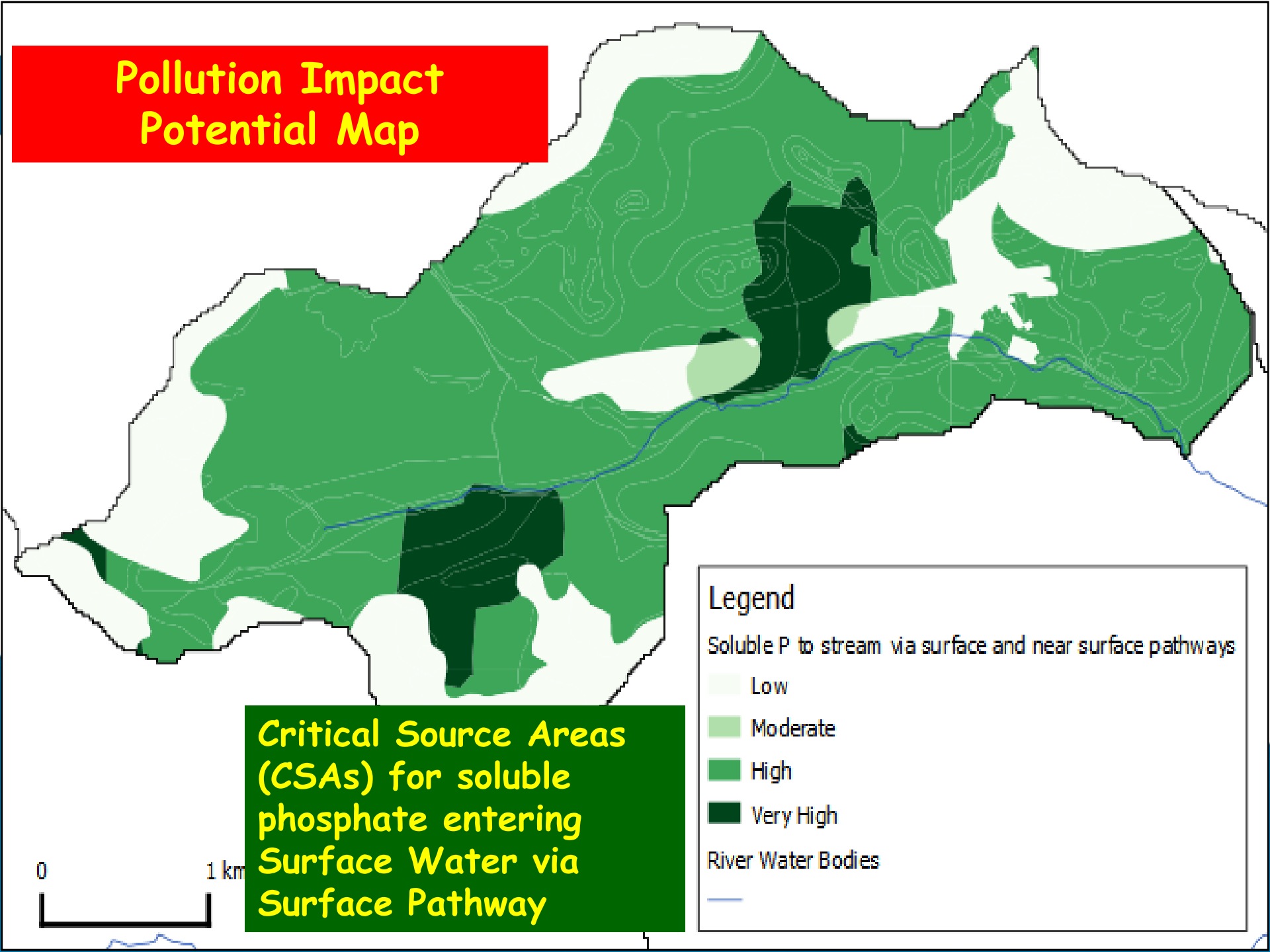
Based on a combination of the following factors:

1. **Status**
2. Whether **pressure is mitigated** or not?
3. **Trends**
4. **Distance to threshold** (or environmental capacity)
5. The **resilience** and **sensitivity** of the associated aquatic ecosystems

Benefits of Tier 1 Assessment & WRAT

- We know:
 - the **pollutants** causing concern
 - the **pressure** – agriculture largely in these WBs
 - the **trends**
 - The **distance to threshold**
 - The **risk category**
- But, this is not enough to enable **targeting** of measures

Pollution Impact Potential Map



Critical Source Areas (CSAs) for soluble phosphate entering Surface Water via Surface Pathway

Legend

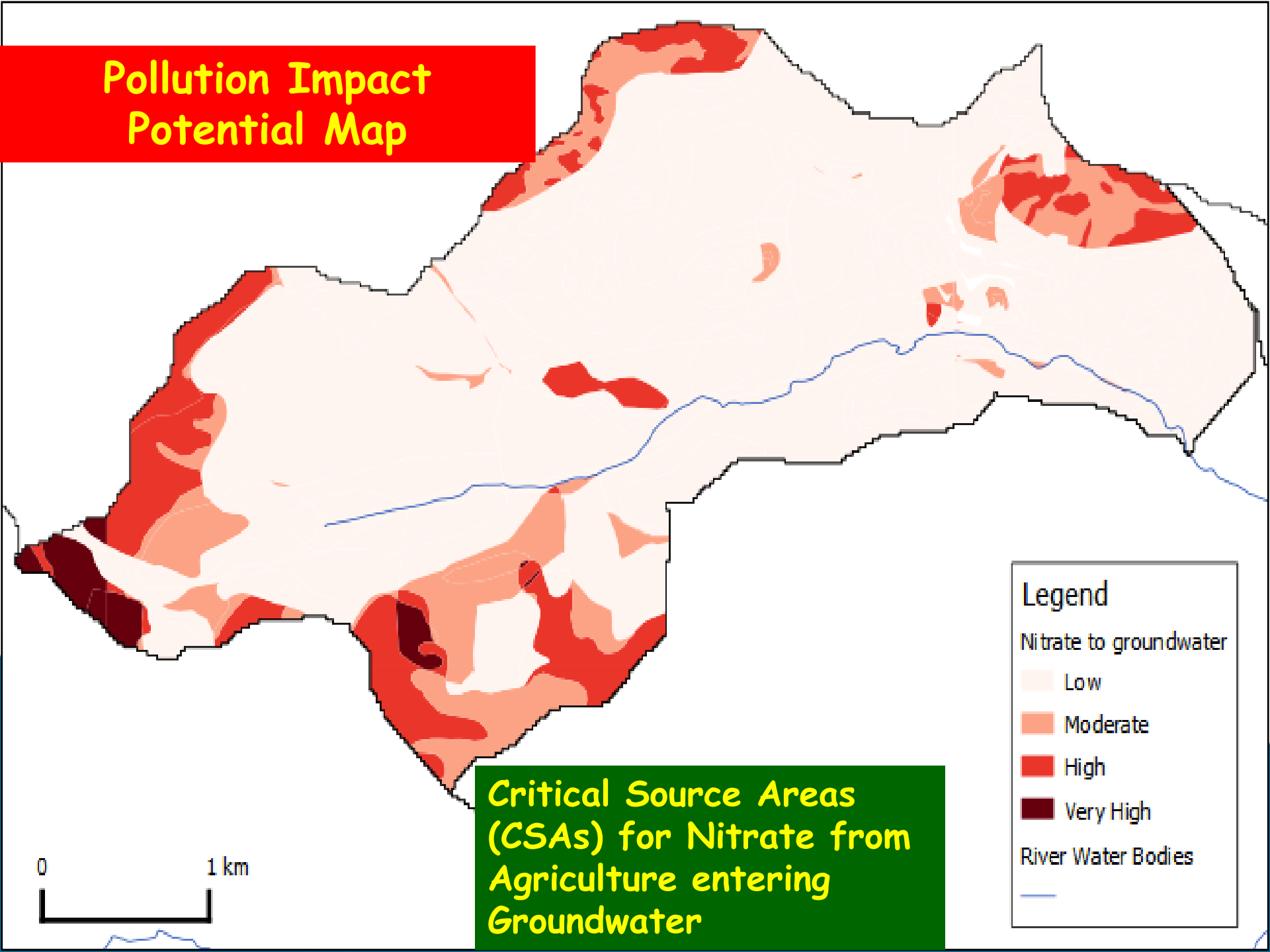
Soluble P to stream via surface and near surface pathways

- Low
- Moderate
- High
- Very High

River Water Bodies

0 1 km

Pollution Impact Potential Map



Critical Source Areas (CSAs) for Nitrate from Agriculture entering Groundwater

Legend

Nitrate to groundwater

- Low
- Moderate
- High
- Very High

River Water Bodies

0 1 km

Tier 2 Characterisation Catchment characterisation tool (CCT)

Outcome

- ❑ We can 'model' all of the country and predict the 'pathway' for pollutants to water (gw & sw)
- ❑ **Pollution impact potential maps** are being produced
 - ❑ For PO_4 & NO_3 via **surface** pathway
 - ❑ For PO_4 & NO_3 via **subsurface** pathway
 - ❑ For Sediment?
- ❑ These maps provide the basis for measures – **what? & where? & how?**

7. Resources

- ❑ The EPA's work on the WFD is supported by funding from the Department of Environment, Community and Local Government under the Environment Fund. In the period from 2009 to 2011, the EPA received a total allocation of €13.1 million for WFD programme activities. The DCELG funding was supplemented by EPA's contributions to staff costs and overheads which brought the overall costs to €20.6 (\$28.2) million.
- ❑ Environment fund (€65.7 (\$90.0) million in 2012) is derived from levies on plastic bags (€13.9 million) and the land-filling of waste (€51.8 million).
- ❑ The TraC Team monitoring costs are approximately €1.5 (\$2.1) million per annum. Three core staff supported by fellows, interns and other EPA staff on seasonal basis. Similar staff complement in Marine Institute.
- ❑ WFD Integration and Co-ordination unit being established in 2014.

Thank you

