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

• 2000 - EU Water Framework Directive came into effect

• 2004 – Characterisation & Risk Assessment

• 2005 – Design Monitoring Programme
• 2006 – Implement monitoring Programme

• 2008 – Identify environmental objectives
• 2009 – Finalise river basin management plans

• 2012 – Make operational programmes of measures
• 2015 – First river basin management cycle ends
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

<table>
<thead>
<tr>
<th></th>
<th>Biology</th>
<th>Fish</th>
<th>Hydromorphology</th>
<th>Physico-Chemistry</th>
<th>Chemistry</th>
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</thead>
<tbody>
<tr>
<td>Rivers</td>
<td>EPA</td>
<td>CFB</td>
<td>EPA/OPW/LA</td>
<td>EPA/ LAs</td>
<td>EPA</td>
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<tr>
<td>Lakes</td>
<td>EPA</td>
<td>CFB</td>
<td>EPA/OPW/LA</td>
<td>EPA/ LAs</td>
<td>EPA</td>
</tr>
<tr>
<td>Groundwater</td>
<td>N.A.</td>
<td>N.A.</td>
<td>EPA/OPW/LA</td>
<td>EPA</td>
<td>EPA</td>
</tr>
<tr>
<td>Transitional</td>
<td>EPA/MI</td>
<td>CFB</td>
<td>EPA/OPW/MI</td>
<td>MI/EPA/LA</td>
<td>MI</td>
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<tr>
<td>Coastal</td>
<td>EPA/MI</td>
<td>N.A.</td>
<td>EPA/OPW/MI</td>
<td>MI</td>
<td>MI</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Subnet Name</th>
<th>Aim of Subnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM Subnet 1</td>
<td>Representative of the overall surface water status</td>
</tr>
<tr>
<td>SM Subnet 2</td>
<td>Detection of long-term trends as per WFD requirement – long-term changes in natural conditions and long-term changes resulting from widespread anthropogenic activ</td>
</tr>
<tr>
<td>SM Subnet 3</td>
<td>Supplementing and validating risk assessments particularly at those sites where the degree of uncertainty is greatest</td>
</tr>
<tr>
<td>SM Subnet 4</td>
<td>Water bodies that are stipulated in the text of the WFD:</td>
</tr>
<tr>
<td></td>
<td>- 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,</td>
</tr>
<tr>
<td></td>
<td>- the volume of water present is significant within the river basin district, including large lakes and reservoirs,</td>
</tr>
</tbody>
</table>
### 4. Operational monitoring programme

<table>
<thead>
<tr>
<th>Subnet Name</th>
<th>Aim of Subnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>OM Subnet 1</td>
<td>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.</td>
</tr>
<tr>
<td>OM Subnet 2</td>
<td>To assess effectiveness of diffuse pollution control measures</td>
</tr>
<tr>
<td>OM Subnet 3</td>
<td>To assess effectiveness of measures to reduce hydromorphological pressures and impacts</td>
</tr>
<tr>
<td>OM Subnet 4</td>
<td>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.</td>
</tr>
<tr>
<td>OM Subnet 5</td>
<td>To monitor species and habitat protected areas that are at risk</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Water Category</th>
<th>GIG</th>
<th>BQE</th>
<th>Tool</th>
<th>H/G</th>
<th>G/M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annex 1</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Coastal</td>
<td>NEA</td>
<td>Macroalgae and Angiosperms Fish</td>
<td>RSL - Rocky Shore Reduced Species List</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Transitional</td>
<td>NEA</td>
<td>Fish</td>
<td>TFCI – Transitional Fish Classification Index</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Annex 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal</td>
<td>NEA</td>
<td>Benthic invertebrate fauna Phyto plankton</td>
<td>IQI</td>
<td>0.75</td>
<td>0.64</td>
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<td>Coastal</td>
<td>NEA</td>
<td>Phytoplankton</td>
<td>Chlorophyll A</td>
<td>0.67</td>
<td>0.33</td>
</tr>
<tr>
<td>Coastal</td>
<td>NEA</td>
<td>Macroalgae and Angiosperms Fish</td>
<td>OGA Tool - Opportunistic Green Macroalgal Abundance Intertidal Seagrass</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Coastal</td>
<td>NEA</td>
<td>Macroalgae and Angiosperms</td>
<td>OGA Tool - Opportunistic Green Macroalgal Abundance Intertidal Seagrass</td>
<td>0.8</td>
<td>0.63</td>
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<tr>
<td>Transitional</td>
<td>NEA</td>
<td>Macroalgae</td>
<td>OGA Tool - Opportunistic Green Macroalgal Abundance Intertidal Seagrass</td>
<td>0.8</td>
<td>0.6</td>
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<tr>
<td>Transitional</td>
<td>NEA</td>
<td>Angiosperms</td>
<td>Intertidal Seagrass Abundance and Species</td>
<td>0.83</td>
<td>0.7</td>
</tr>
</tbody>
</table>
Angiosperms (seagrass and saltmarsh)

Phytoplankton biomass and bloom frequency

Temperature
Salinity
pH
Turbidity
Dissolved oxygen
Secchi Depth
Nutrients
BOD

Macroalgae on rocky shores
Opportunistic macroalgae on mudflats and sandflats
PARCOM Source Apportionment (PSA)-estimates of Nitrogen & Phosphorus loading from various sources such as agriculture, urban waste water treatment, industry, unsewered populations and forestry.

Transitional Waters 2007-2009:
- High: 12%
- Good: 21%
- Moderate: 67%

Coastal Waters 2007-2009:
- High: 48%
- Good: 18%
- Moderate: 34%
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
Poorly productive aquifer (70% of country)
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))

Acknowledgement: Based on Deakin (2013).
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
Critical Source Areas (CSAs) for soluble phosphate entering Surface Water via Surface Pathway
Critical Source Areas (CSAs) for Nitrate from Agriculture entering Groundwater
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