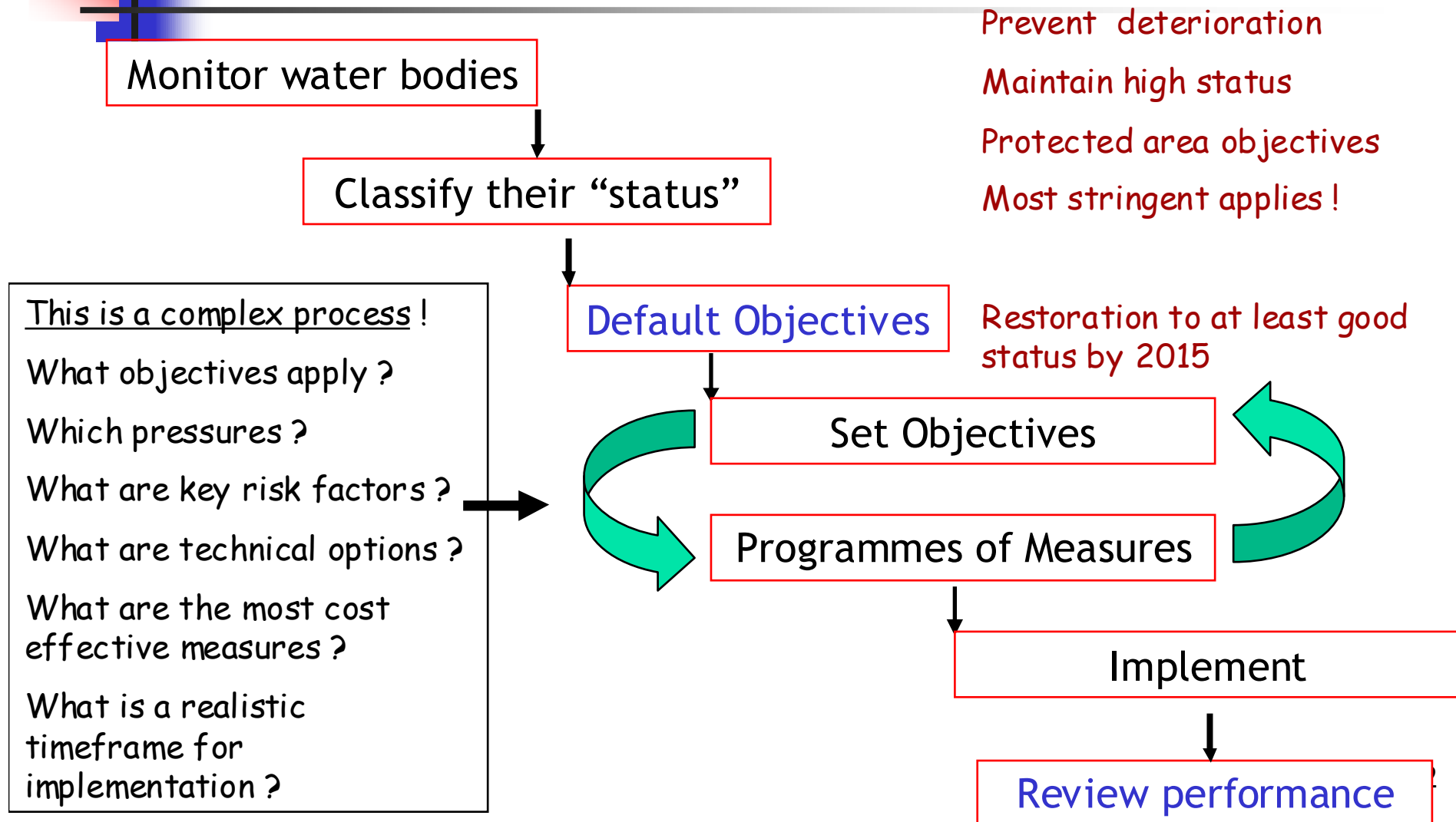


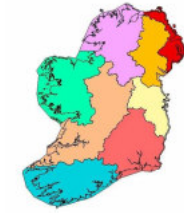
Monitoring, Classification & Standards

WFD & Irish Ports,
Dublin
13 December 2007

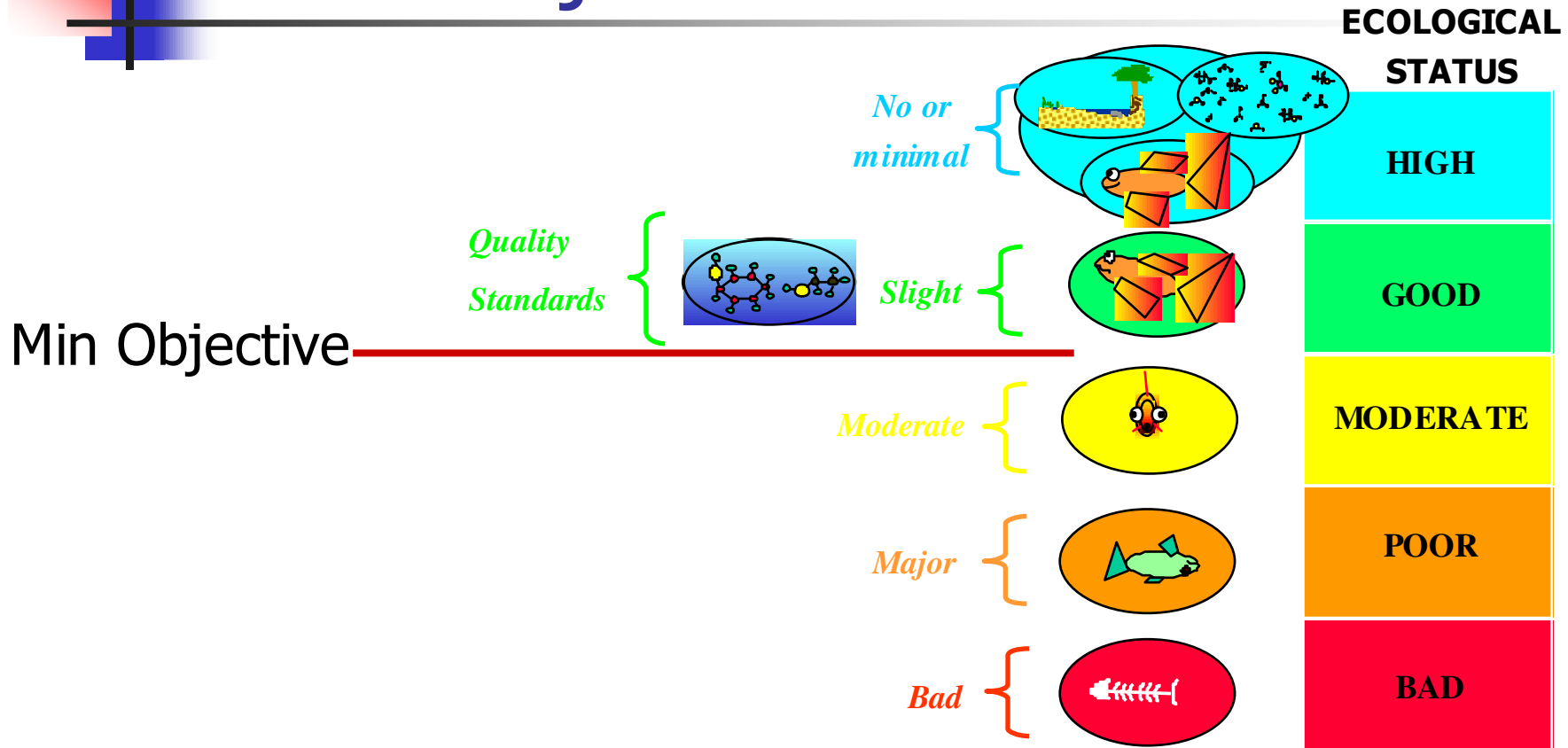


The Planning Process

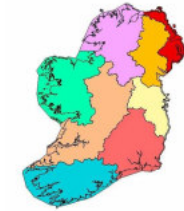




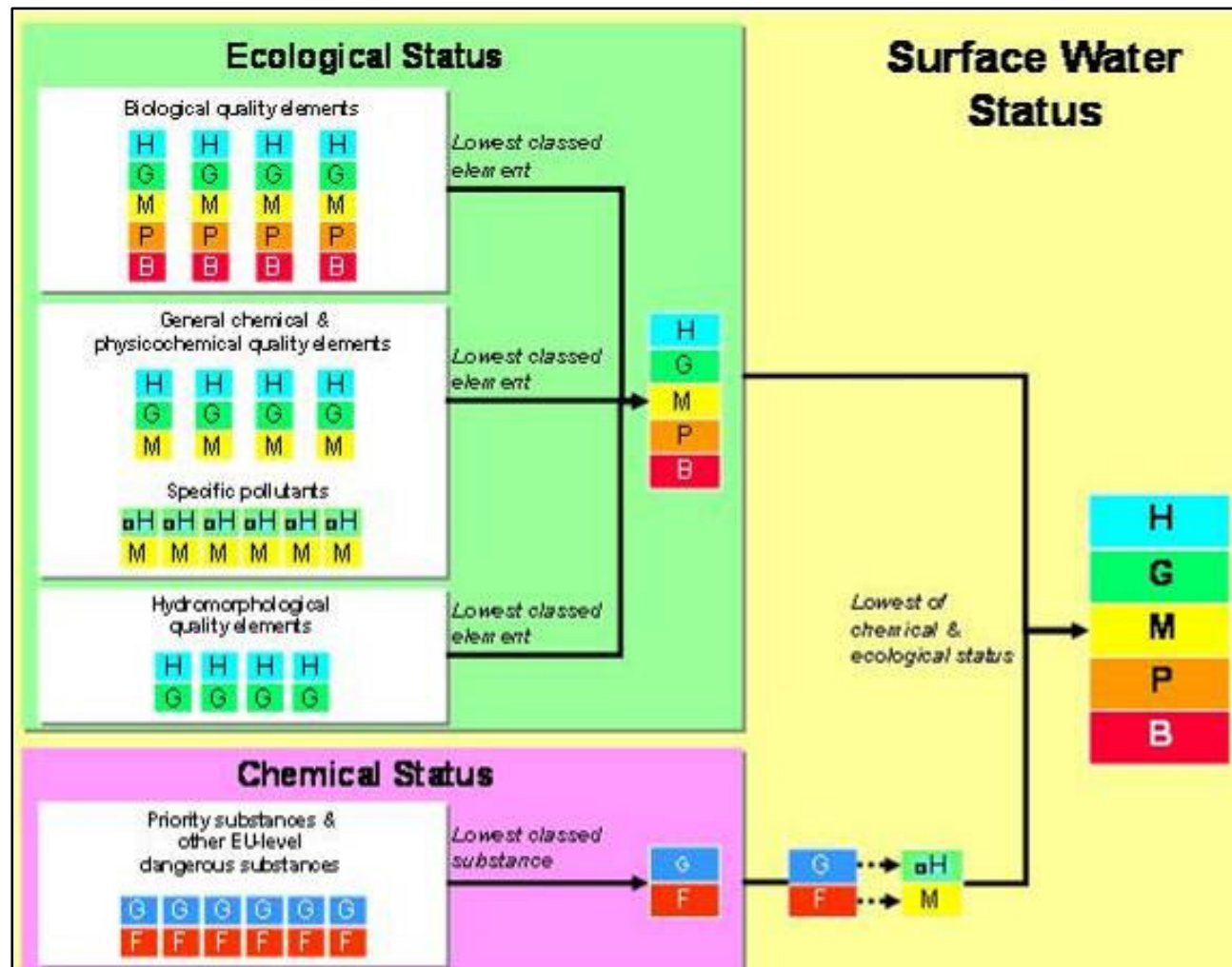
WFD Objectives

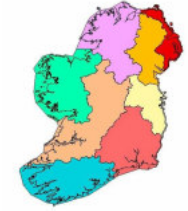


Good Status = Good ecological status & good chemical status



Status Classification





Classification - Standards

- 5 Biological Elements

- Fish (Transitional Waters Only)

- Benthic Invertebrates

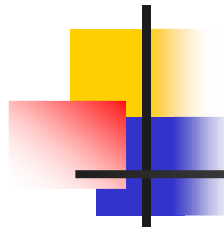
- Phytoplankton

- Macrophytes/macroalgae

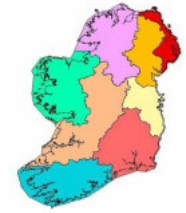
- Angiosperms



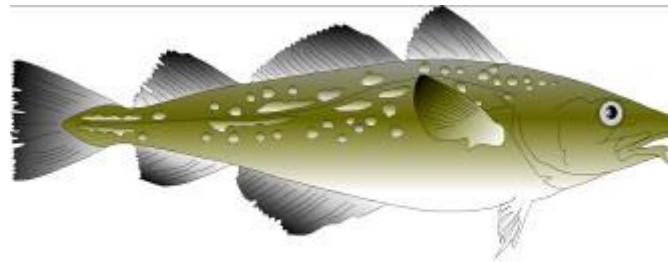
Plants



Fish

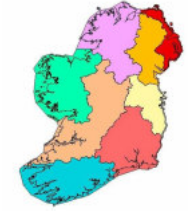


The **fish** subgroup have developed a single tool that is composed of 10 individual metrics



Atlantic Cod *Gadus morhua*

Metrics look at species composition, presence of indicator species, species abundance, number of estuarine resident taxa, number of benthic feeding taxa, number of fish-eating taxa, etc.



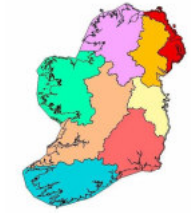
Benthic Invertebrates



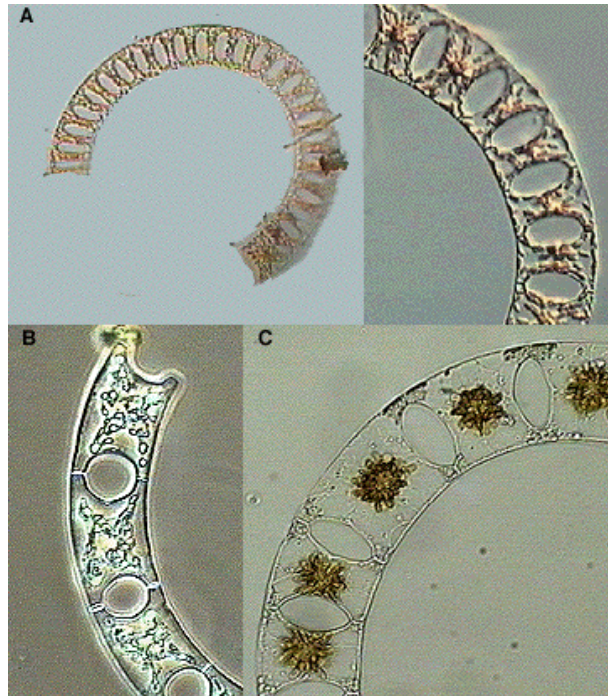
The **benthic** sub group have developed a multi metric which looks at the composition of organisms in soft sediments – known as the IQI (Infaunal Quality Index) index

Also developing tools:

- imposex in dogwhelks (*Nucella* sp.)
- sensitive species
- megafauna tool for hard substrates (e.g., Metric project)

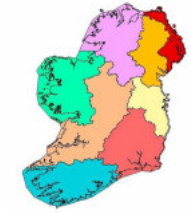


Phytoplankton



Phytoplankton, metrics are based on assessing phytoplankton biomass (as measured using chlorophyll) and measuring the frequency, composition and intensity of phytoplankton blooms.

- The chlorophyll metric will work by comparing the value of the 90th percentile and median over a 5-year period against reference based classification boundaries.
- The second metric works by recording the number of events, defined as occasions when values based on individual phytoplankton species counts exceed a predefined threshold



Macroalgae – 3 main tools

1.) **Reduced species list:**

This tool works by recording the number of species present on a rocky shore and the ecological status of these species.

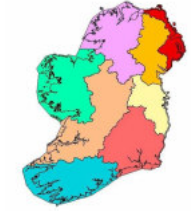
Changes in the numbers of species present or a shift to more opportunistic algae will indicate changes in the ecological status of the area.

A reduced list has been developed for shore classification.

2.) **Opportunistic Algae**

A tool has been developed to monitor the spatial extent and biomass.





Macroalgae – 3 main tools

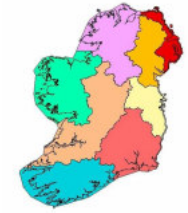


3.) **Fucoid extent**

The distribution upstream of low-salinity tolerant marine algae has been shown to respond to certain environmental pressures, in particular stresses from toxic compounds.

A tool based on the upstream extent of Fucoid algae is being developed.

Angiosperms – Seagrass and Saltmarsh

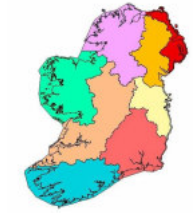


The classification tool for **seagrass** uses information on species composition, spatial extent and bed density

For **saltmarsh** habitat extent and diversity of beds will be taken into consideration. Still some development required.



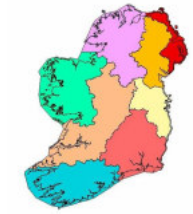
Zostera noltii in Ballysadare Bay, Co. Sligo



Supporting Standards

General Component Standards		Ireland			
Conditions	Parameter	Rivers	Lakes	Transitional	Coastal
Thermal	Temperature	✓	✓	✓	✓
Oxygen	DO	✓	✓	✓	✓
	BOD	✓		✓	
Acid	pH	✓	✓		
Nutrient	Ammonium	✓	✓		
	DIN			✓	✓
	MRP	✓		✓	
	Total Phosphorus		✓		

- Proposed standards for 18 Specific Relevant Pollutants
- Hydromorphology tool – TraC MIMAS
- Proposed standards for 41 Priority Substances - chemical status

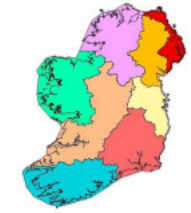


Pressure responses

Quality Element	Pressure
BENTHIC MACROINVERTEBRATES	
Soft sediment multi-metric	Hazardous substances, TBT, organic enrichment, dredging, aggregates extraction, spoil disposal
Sensitive species/megafauna tool (TBD)	Commercial fishing & shellfish
Hard substrate tool (TBD)	TBT, disposal
MACROALGAE	
Opportunistic species tool	Nutrient enrichment
Reduced species list	Nutrient enrichment, disposal, hydromorphological change
Furoid extent (TW only)	Hazardous substances



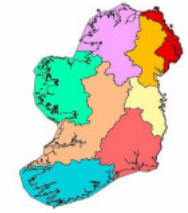
Pressure responses



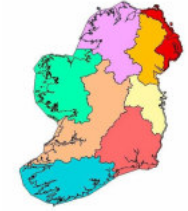
Quality Element	Pressure
SEAGRASS	
Intertidal spatial extent, density and diversity	Hydromorphology and nutrient enrichment
SALTMARSH	
Spatial extent	Hydromorphology
PHYTOPLANKTON	
Bloom frequency, composition and biomass	Nutrient enrichment
FISH	
Transitional multi-metric	Ammonia, hazardous substances, catchment abstraction, fishing, shellfish, landclaim, shoreline, barrages (TBD), weirs/sluices (TBD)



Pressure responses

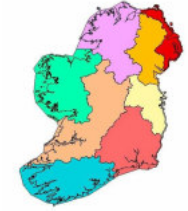


Quality Element	Pressure
PHYSICO-CHEMICAL	
Nutrients	Nutrient enrichment, Industrial abstraction, catchment abstraction
Dissolved oxygen	Nutrient and organic enrichment
Temperature	Industrial abstraction/discharges



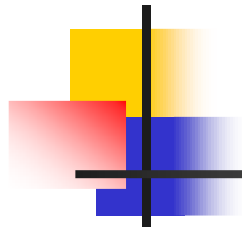
Status Classification

- Combination of elements
- Confidence in classification
- Grouping of water bodies
- Alien species – impact on status
- Setting of status objectives (good ecological potential) in heavily modified water bodies

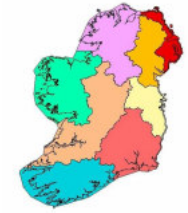


Status Classification - GEP

- Good Ecological Potential (GEP) differs from Good Ecological Status (the objective for natural water bodies) by making allowances for the ecological impacts resulting from physical alterations that are necessary to support a specified use
- This means that adverse ecological effects of the physical alteration should be appropriately mitigated only when possible without undermining the benefits they serve
- However Good Ecological Potential is only slightly short of the best that could be achieved if all practicable mitigation were taken



Status Classification - GEP



Generic mitigation measures list

Measures must:

- Be practicable – i.e. feasible in principle
- Not have a significant adverse impact on the designated use
- Not have a significant adverse impact on the wider environment
- Mitigate significant impacts on the water environment

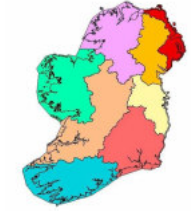
Screen out measures listed for impacts that are not associated with the use at the site



Screen out measure that are impracticable given the characteristics of the site



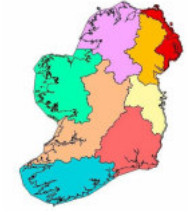
Check whether remaining listed mitigation is in place & adequate



Status Classification - GEP

Possible Ports and Harbours Mitigation Measures

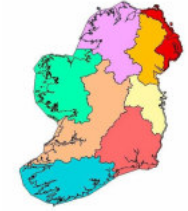
- Avoid need to dredge (minimise underkeel clearance; fluid mud navigation; flow manipulation or training works)
- Prepare dredging strategy (consider frequency and quantity of dredging; phasing; forward planning)
- Reduce impact of dredging (dredge smaller area; shallower depth; dredger type)
- Reduce sediment resuspension (minimise bucket release; use visor; silt curtains; manage overspill)
- Timing of dredging (seasonal or tidal restrictions)
- Sediment management (trickle recharge; sediment bypass; water column recharge)
- Indirect or offsite mitigation (beneficial placement; training works; wave screen; shore protection; erosion minimising structures; habitat enhancement; re-oxygenation of water column; fish or shellfish stocking)



Monitoring

Ireland's National Surface & Groundwater Monitoring Programme

- Prepared to meet the requirements of
 - EU Water Framework Directive (2000/60/EC)
 - National Regulations implementing the WFD (SI No 722 of 2003)
 - National Regulations implementing the Nitrates Directive (SI No 788 of 2005)



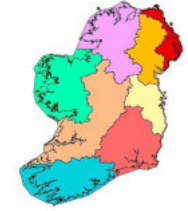
Monitoring

- The Marine Working Group (EPA, MI, NPWS, CFB, BIM) followed the process of site selection based on guidance from the UK-ROI Marine Task Team on site density and coverage.

- Representation of
 - Typology
 - Protected area status and
 - Risk assessment results

- Sites with existing historical monitoring data were also chosen to facilitate the assessment of long-term trends.

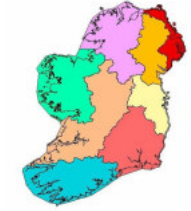
- Expert knowledge on individual biological elements and habitat variation was also used.



Monitoring

Programme priorities

- **Surveillance**
 - long term trends - range of status conditions
 - all quality elements have to be recorded
- **Operational**
 - record improvements due to measures - at risk sites
 - targeted quality elements
- **Investigative**
 - unpredicted water quality problems or pollution events
 - targeted quality elements



Monitoring

Programme Priorities – Transitional & Coastal

Surveillance Subnets

- SM Subnet 1: 'Representative' Subnet for Status
- SM Subnet 2: Long-Term Trend Monitoring (high, flux & interaction)
- SM Subnet 3: Supplementing and Validating the Risk Assessments
- SM Subnet 4: Stipulated Sites (international, OSPAR)

Operational/Investigative Subnets

- OM Subnet 1: Status of at risk waterbodies
- OM Subnet 2: Effectiveness of Diffuse & Point Source Pollution
- OM Subnet 3: Effectiveness of Hydromorphological Measures
- OM Subnet 4: Measures aimed at retaining High & Good status
- OM Subnet 5: Electronic Alert & Remote Sensing (pilot)
- OM Subnet 6: Species and Habitat Protected Areas

Monitoring

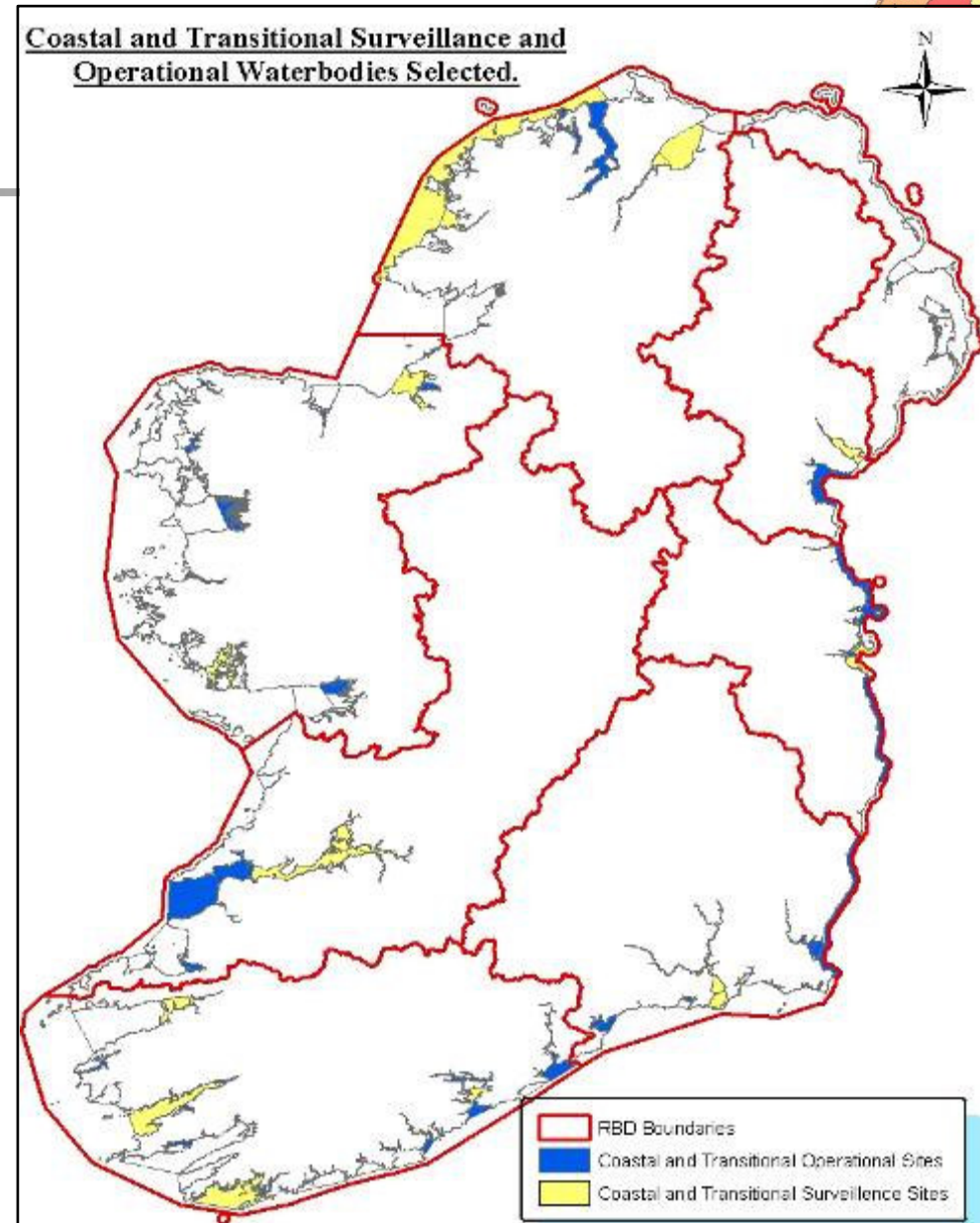
Ireland's Marine Monitoring Network

Transitional water bodies

- 25 surveillance sites
- 57 operational sites

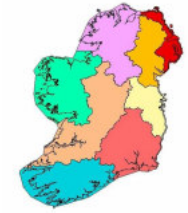
Coastal water bodies

- 12 surveillance sites
- 23 operational sites





Monitoring

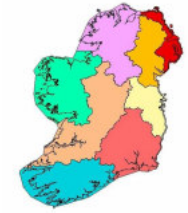


	Phyto-Plankton	Macro algae	Angio-sperm	Benthic Invertebrate	Fish	Hydro-morph	Physio-chemical	Specific Pollutants	Priority Substances	Total
Coastal Operational	16	41	26	96		10	92	1	0	282
Transitional Operational	53	42	30	74	##	38	191	13	13	454
Coastal Surveillance	21	44	23	53		12	48	12	12	225
Transitional Surveillance	27	28	45	36	##	22	61	23	23	265

Total Number of Marine Monitoring Points = 1,226



Monitoring

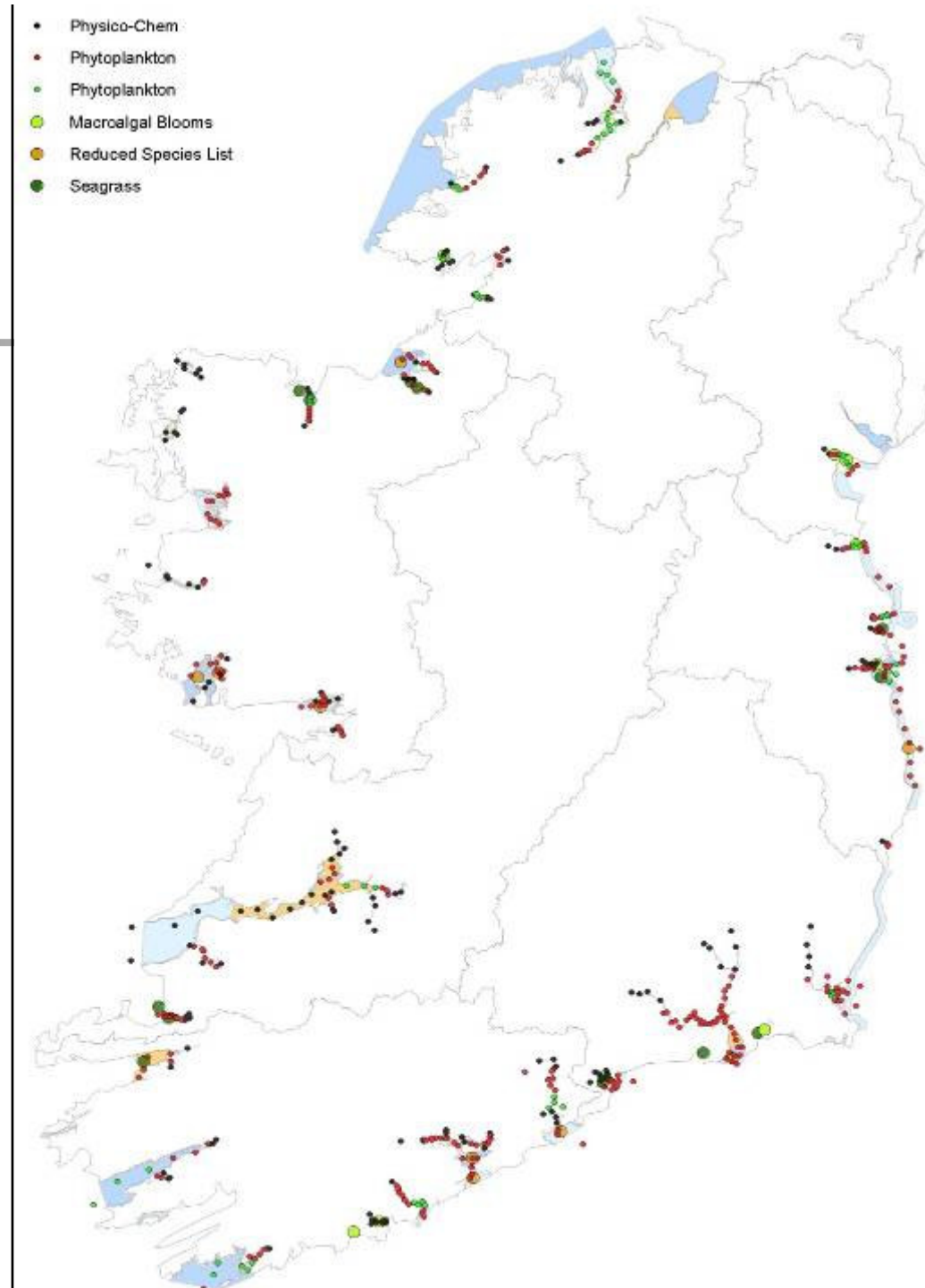


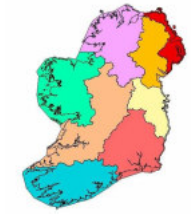
	Transitional & Lagoons	Coastal & Lagoons
■ Phytoplankton	EPA	MI
■ Macroalgae	EPA	EPA
■ Angiosperms	EPA	NPWS
■ Benthic invertebrates	MI	MI
■ Fish	CFB	-
■ Hydromorphology	EPA/MI	EPA/MI
■ Physico-chemical	MI/EPA/LA	MI/EPA/LA
■ Priority Substances	MI	MI
■ Relevant Pollutants	MI	MI
■ Processing and interpretation of results		EPA/MI/CFB
■ Reporting to EU		EPA

Monitoring

2007 Progress

- EPA plants and nutrients programme
- NPWS salt marsh programme
- CFB fisheries survey – SE estuaries
- MI Metrics project





Thank you

