Classification Schemes and Environmental Standards for Water Framework Directive

Richard Hemsworth, Environment Agency, EMCAR project manager

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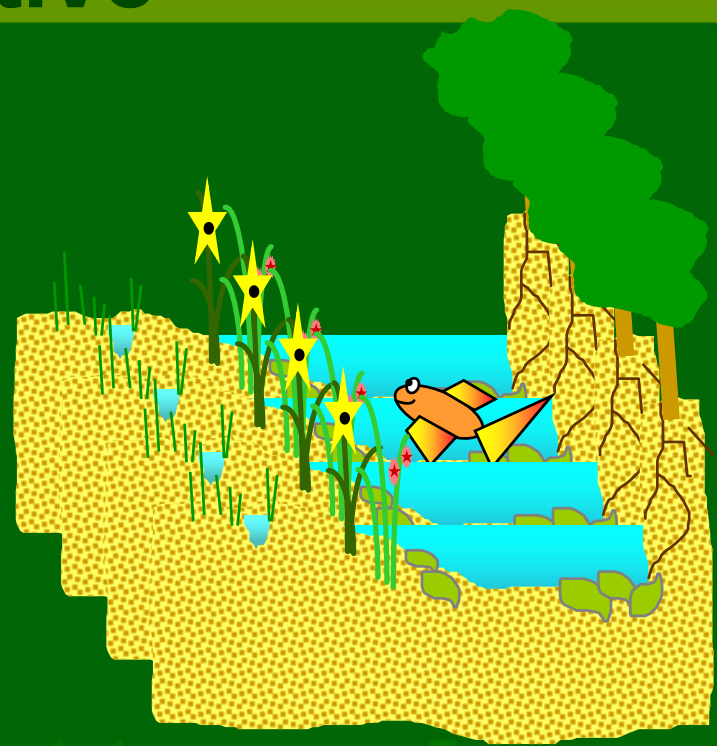
Ecology-based Directive

Good ecology is determined by four key aspects of the environment;

- biology
- chemical water quality
- morphology (physical structure)
- hydrology (quantity)



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Managed through the WFD classification schemes and setting environmental standards

Fundamental Pressures

and management opportunities

Environment Agency

Physical Habitat

Water Quality

Flow Regime

WFD Classification Framework

Classification schemes

- Describe the state of the water environment
- Confirm effectiveness of measures

Environmental Standards

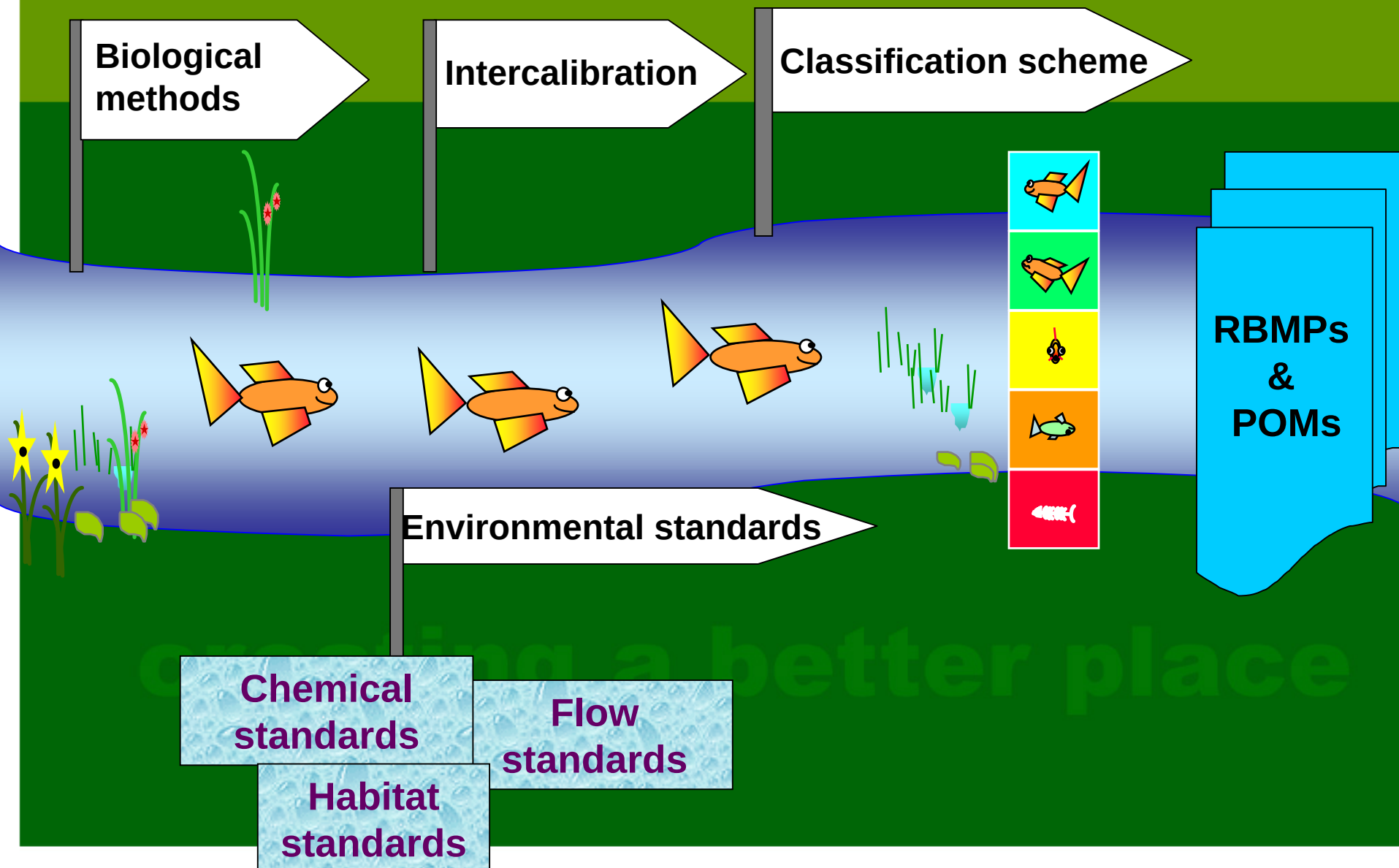
- Define water quality, hydrology & morphology conditions needed to support biology
- Used to identify measures (e.g. licensing)
- Help to set objectives for water bodies

Supported by data from monitoring and risk assessments

Classification - why change?

- Current range of chemical & biological indicators is limited
- UK consistency
- Look beyond rivers
- Integrate water quality, quantity and morphology to assess ecosystem health
- Develop more effective measures

WFD classification and environmental standards



Classification outcomes
(deviation from reference/high status)

- Ecological (surface waters) - high, good, mod, poor, bad
  - Biology
  - Supported by water quality, morphology and hydrology + UK standards for pollutants
- Chemical (surface waters) - pass, fail
  - European standards for priority list pollutants
- Groundwater Classification (Quantitative + Chemical) - good, poor
  - Water quality, quantity and significant damage to dependent ecosystems

How will classification work?

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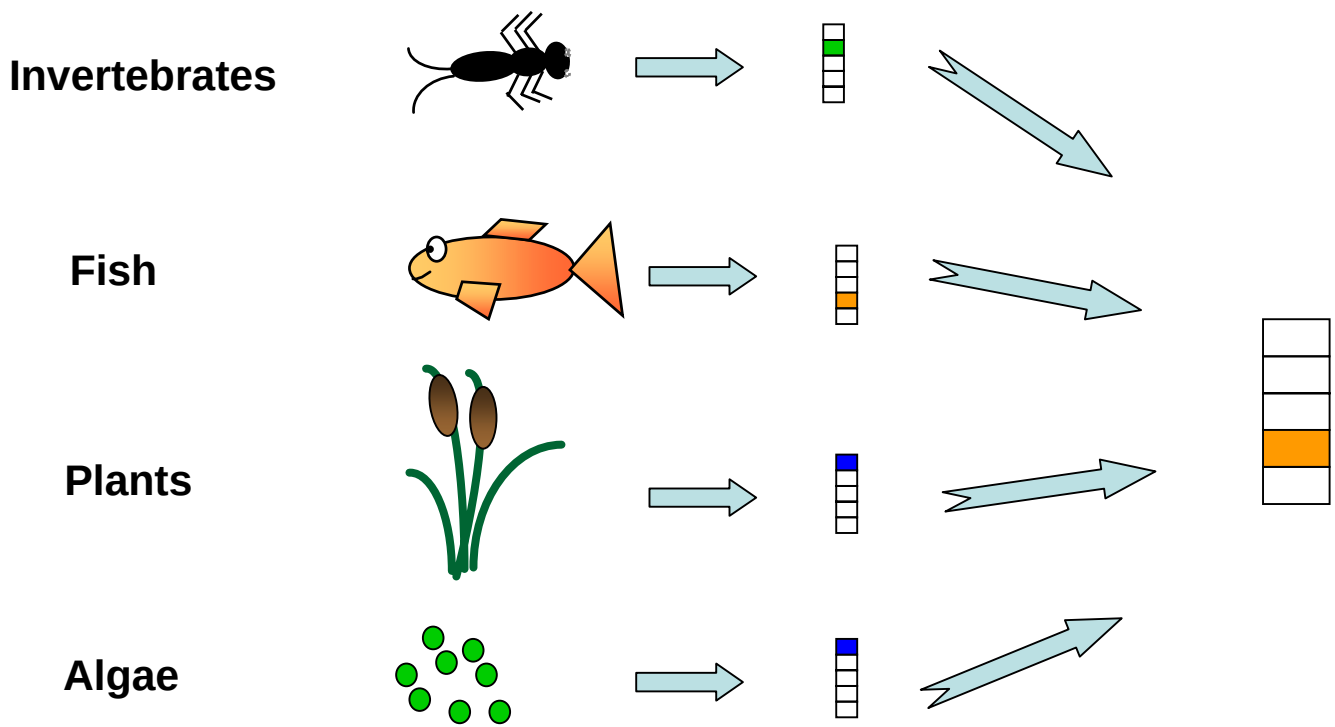
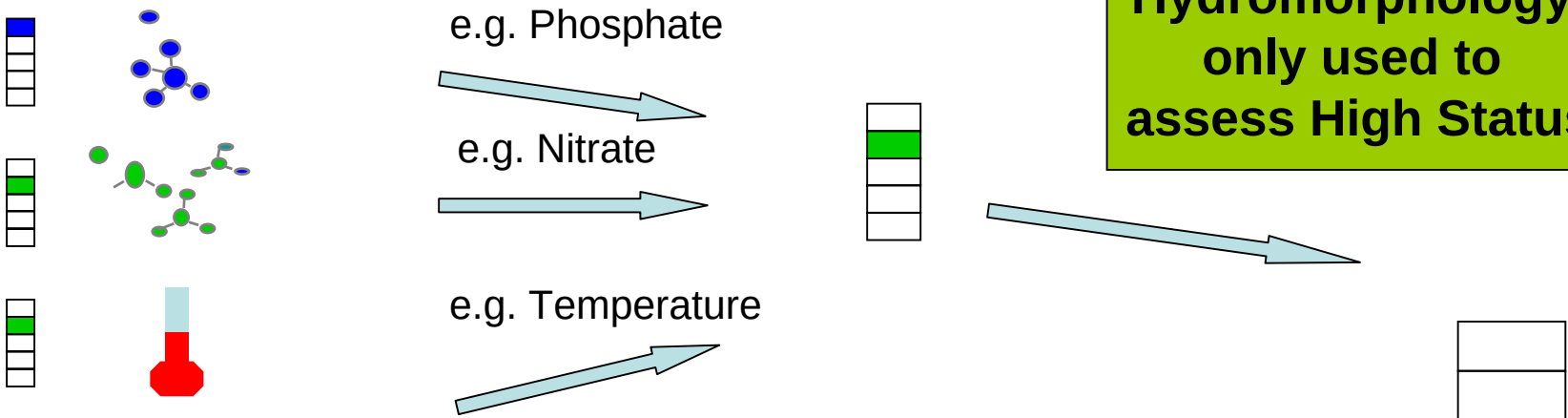
Biological Classification



Water Quality Classification

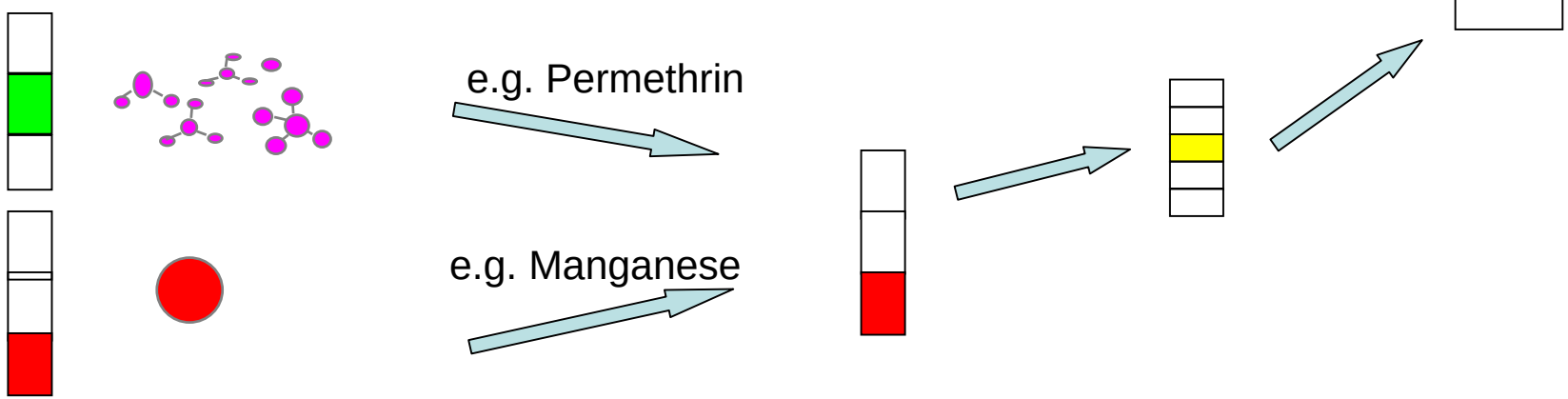
Environment Agency

General physico-chemical elements

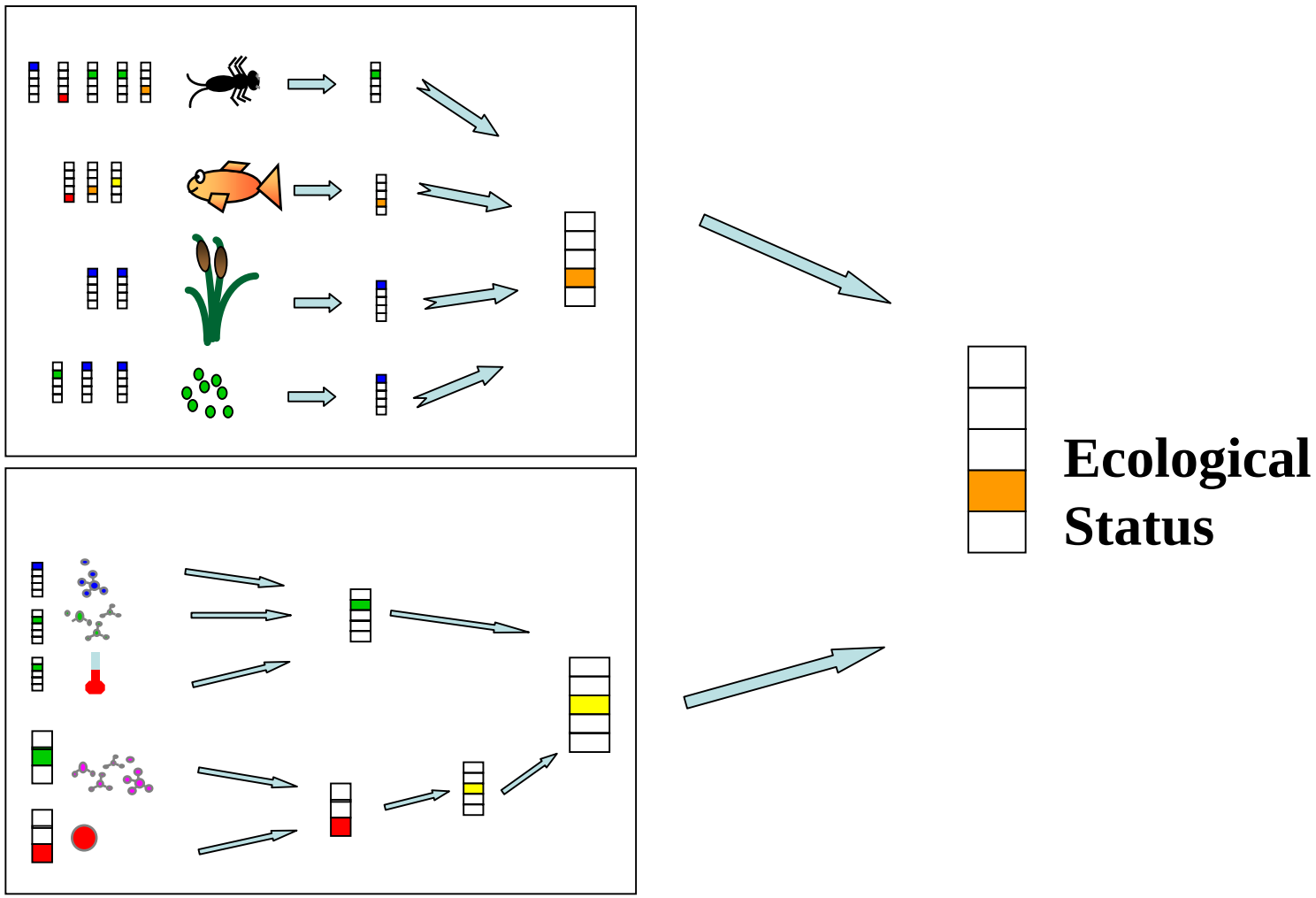


Hydromorphology only used to assess High Status

Specific polluting substances (Annex VIII)



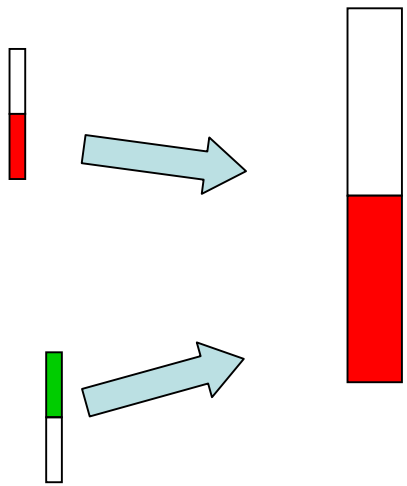
Ecological Status Classification



Chemical Status

Priority List Substances

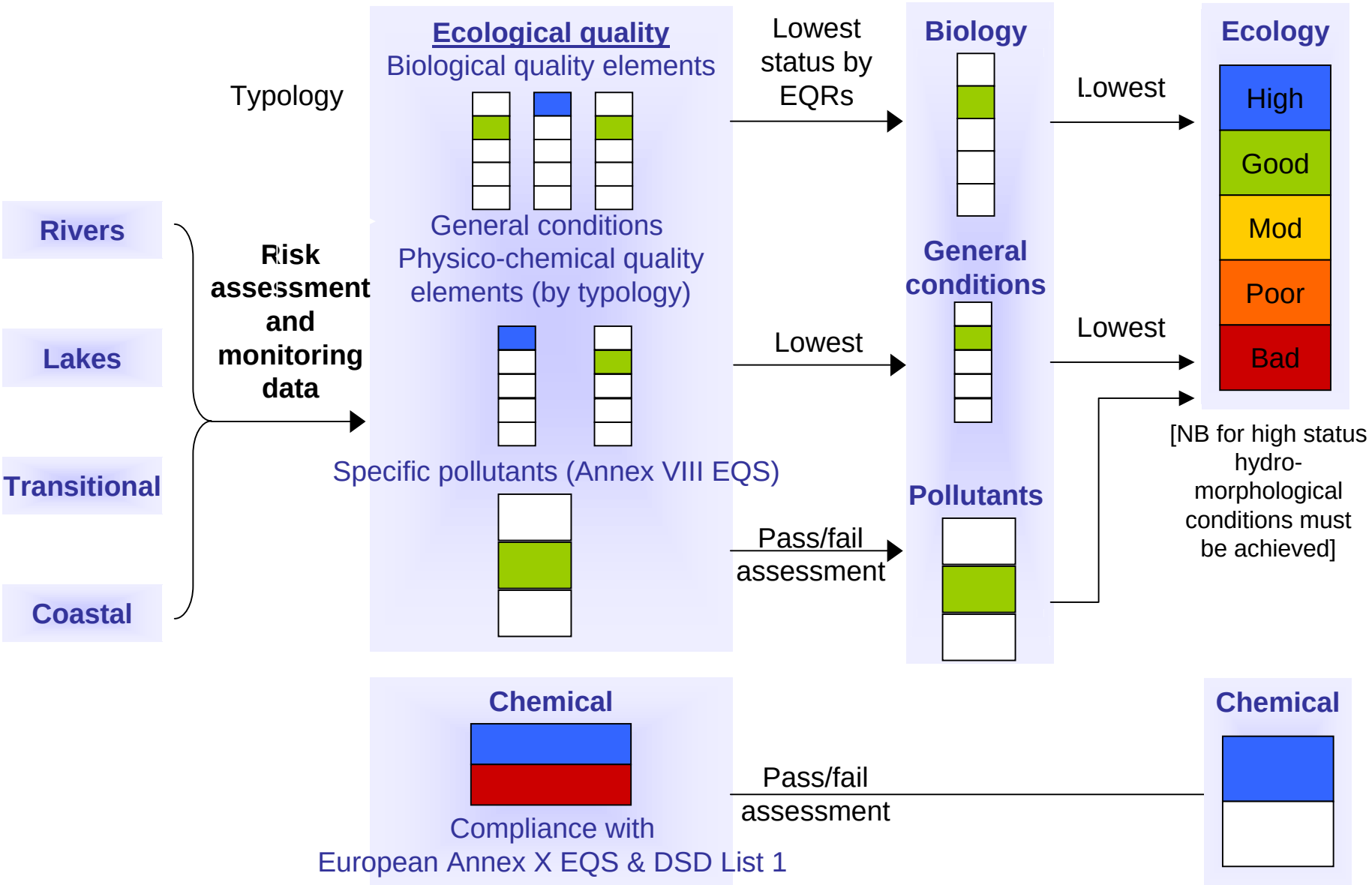
(Including Priority Substances and Priority Hazardous Substances)



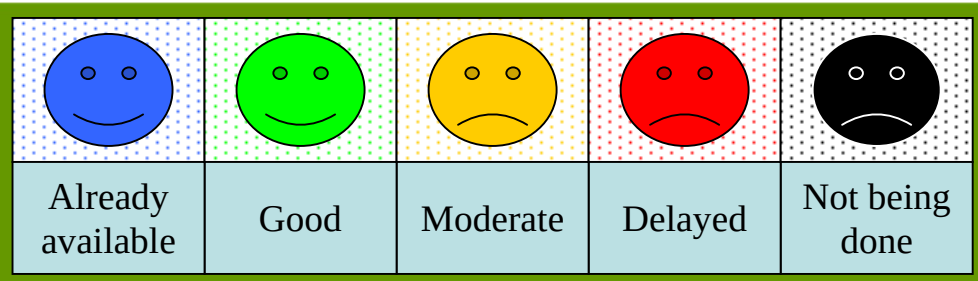
Chemical Status

Characterisation

Surface Water Classification



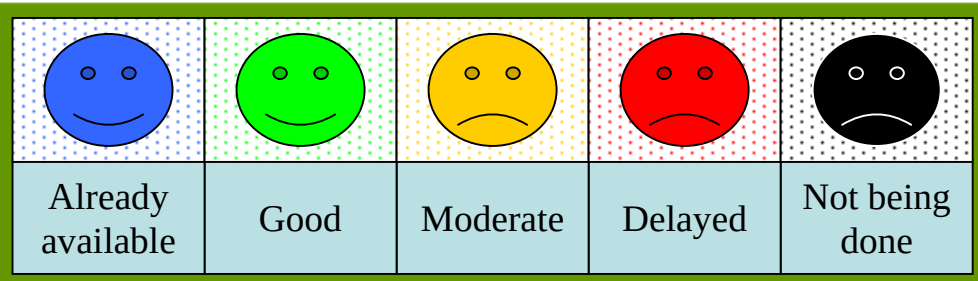
Water Category: River



Phytoplankton	
Phytobenthos	
Macrophytes, macroalgae, angiosperms and saltmarshes	
Benthic invertebrate fauna	
Fish fauna	

Hydrological regime	
River Continuity	
Tidal Regime	N/A
Morphological conditions	
General physico-chemical conditions	
Specific pollutants	

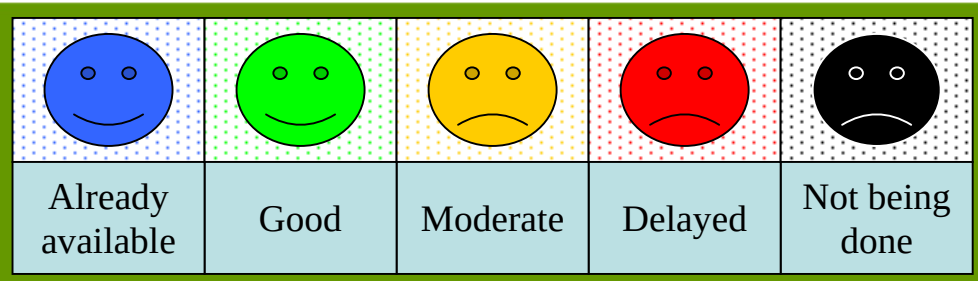
Water Category: Lake



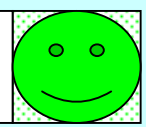
Phytoplankton	
Phytobenthos	
Macrophytes	
Benthic invertebrate fauna	
Fish fauna	

Hydrological regime	
River Continuity	N/A
Tidal Regime	N/A
Morphological conditions	
General physico-chemical conditions	
Specific pollutants	

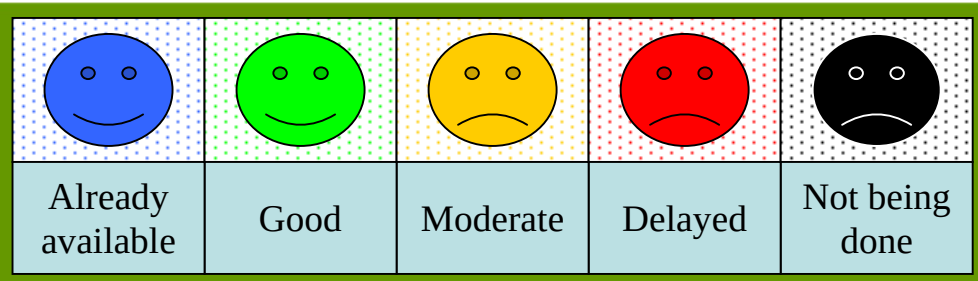
Water Category: Transitional



Phytoplankton	
Phytobenthos	N/A
Macrophytes, macroalgae, angiosperms and saltmarshes	
Benthic invertebrate fauna	
Fish fauna	

Hydrological regime	N/A
River Continuity	N/A
Tidal Regime	
Morphological conditions	
General physico-chemical conditions	
Specific pollutants	

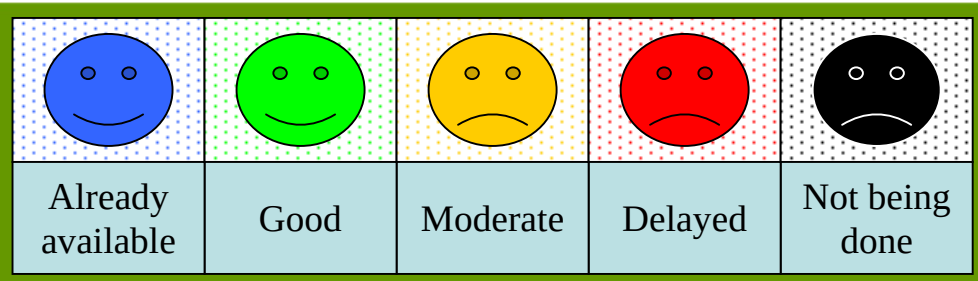
Water Category: Coastal



Phytoplankton	
Phytobenthos	N/A
Macrophytes, macroalgae, angiosperms and saltmarshes	
Benthic invertebrate fauna	
Fish fauna	N/A

Hydrological regime	N/A
River Continuity	N/A
Tidal Regime	
Morphological conditions	
General physico-chemical conditions	
Specific pollutants	

Water Category: Groundwater



Phytoplankton	N/A
Phytobenthos	N/A
Macrophytes, macroalgae, angiosperms and saltmarshes	N/A
Benthic invertebrate fauna	N/A
Fish fauna	N/A

Hydrological regime	N/A
River Continuity	N/A
Tidal Regime	N/A
Morphological conditions	N/A
General physico-chemical conditions	N/A
Specific pollutants	N/A

Quantitative status (includes trends and GWDTEs)	
Chemical status (includes trends and GWDTEs)	

GROUNDWATER CLASSIFICATION

Environment

DEVELOP CONCEPTUAL MODEL

Identify the key processes, pathways and receptors

MODEL

Input results from characterisation, monitoring and etc on:
e.g. recharge
e.g. baseline water quality/quantity
e.g. flow directions

STATUS CLASSIFICATION

Quantitative Status
Chemical Status

⇔

- Saline or other intrusions
- Article 4 objectives
- Significant damage to GWDTEs
- Resource Balance (Quantitative)
- Article 17 Pollutants (Chemical)

Determine monitoring/assessment requirement

Assess status

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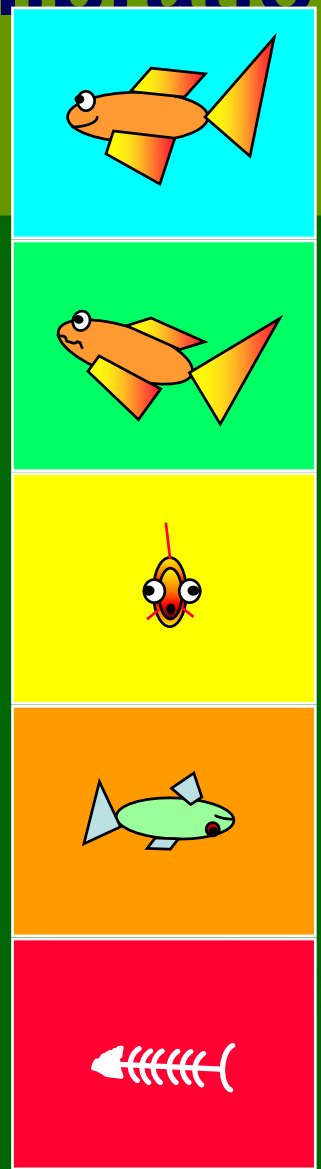
WATCH FOR: UKTAG GUIDANCE
11b) Groundwater classification

European Intercalibration Exercise

Inform class boundaries (equal levels across Europe)

Identify how pressures (e.g. nutrients) affect biology



Complete mid 2007

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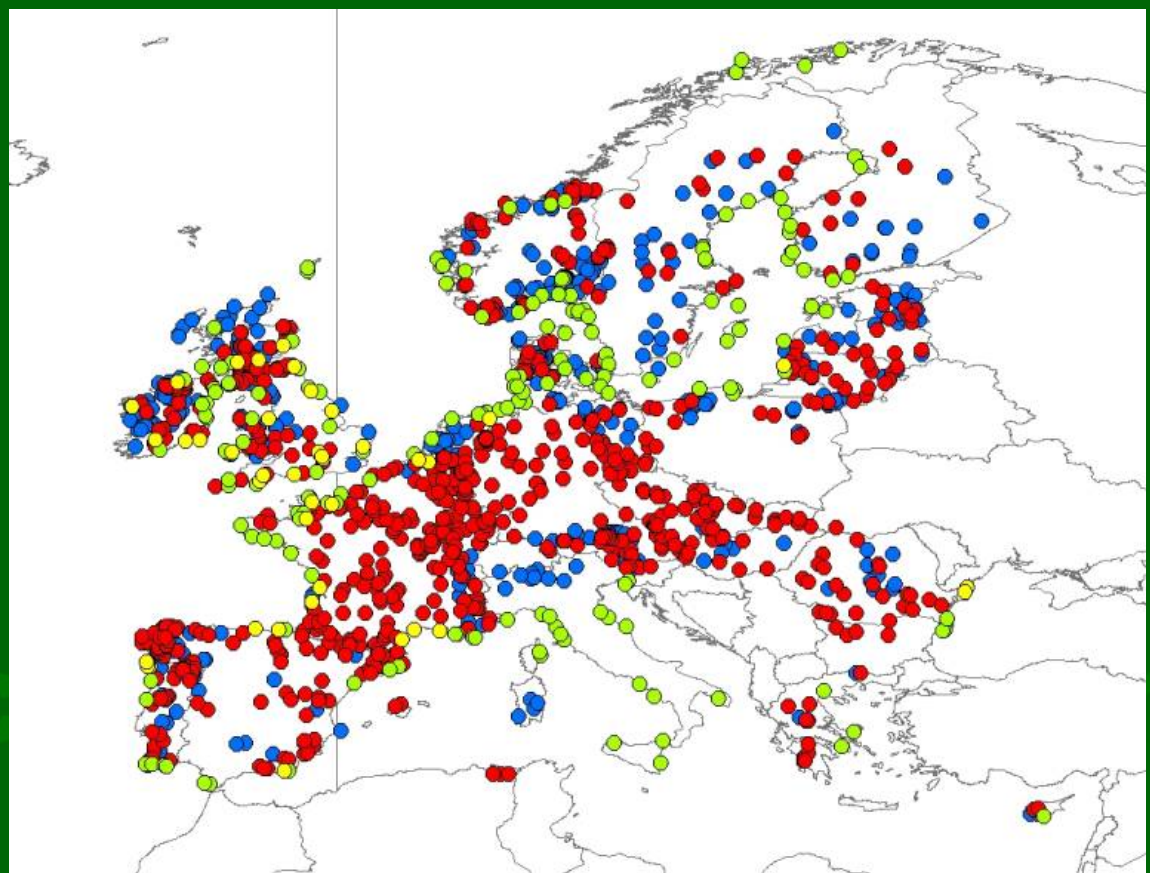
Objectives of Intercalibration

- **To set harmonised ecological quality criteria for the protection and restoration targets for all surface waters (inland and coastal) in EU**
- **Common interpretation of "good ecological status"**
  - consistent with normative definitions in the *Annex V*
  - and comparable between MS
- **Harmonized classification based on Ecological Quality Ratios (EQR)**

Intercalibration register



997 Rivers

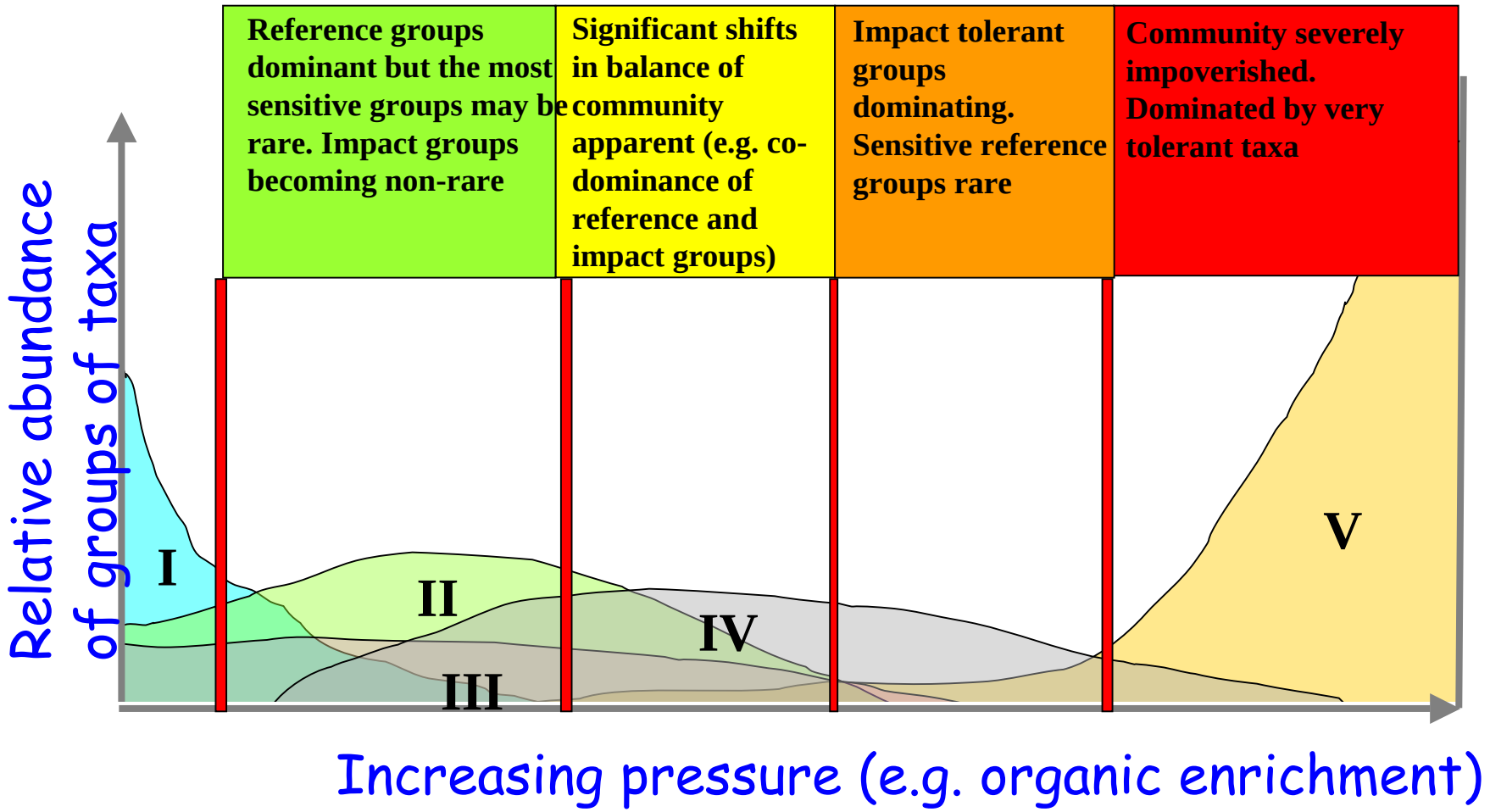
327 Lakes

184 Coastal

38 Transitional

Geographical intercalibration groups

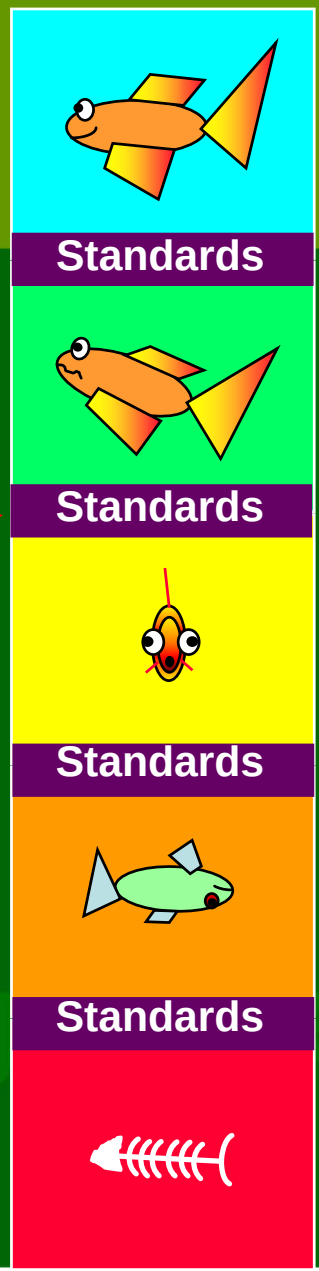
R- Northern	5	Sweden
R- Central	19	steering group: FR, GE, UK, JRC
R- Alpine	6	Austria
R- E. Cont.	8	ICPDR (Danube Basin)
R- Med.	8	Portugal
L- Northern	5	Sweden
L- Atlantic	4	Ireland
L- Central	13	steering group: DK, NL, PL, UK, JRC
L- Alpine	4	Austria
L- E Cont.	8	ICPDR (Danube Basin)
L- Med.	8	Spain
CT- Baltic	8	Denmark
CT- NE Atl.	11	UK
CT- Med.	7	Italy
CT- Black Sea	2	Romania



I, II, III, IV, V = Groups of invertebrate taxa. Taxa assigned to groups according to sensitivity/tolerance

Environmental Standards

Environment Agency



Establish measures

Establishing licensing on new and existing activities

(take effect from 2009)

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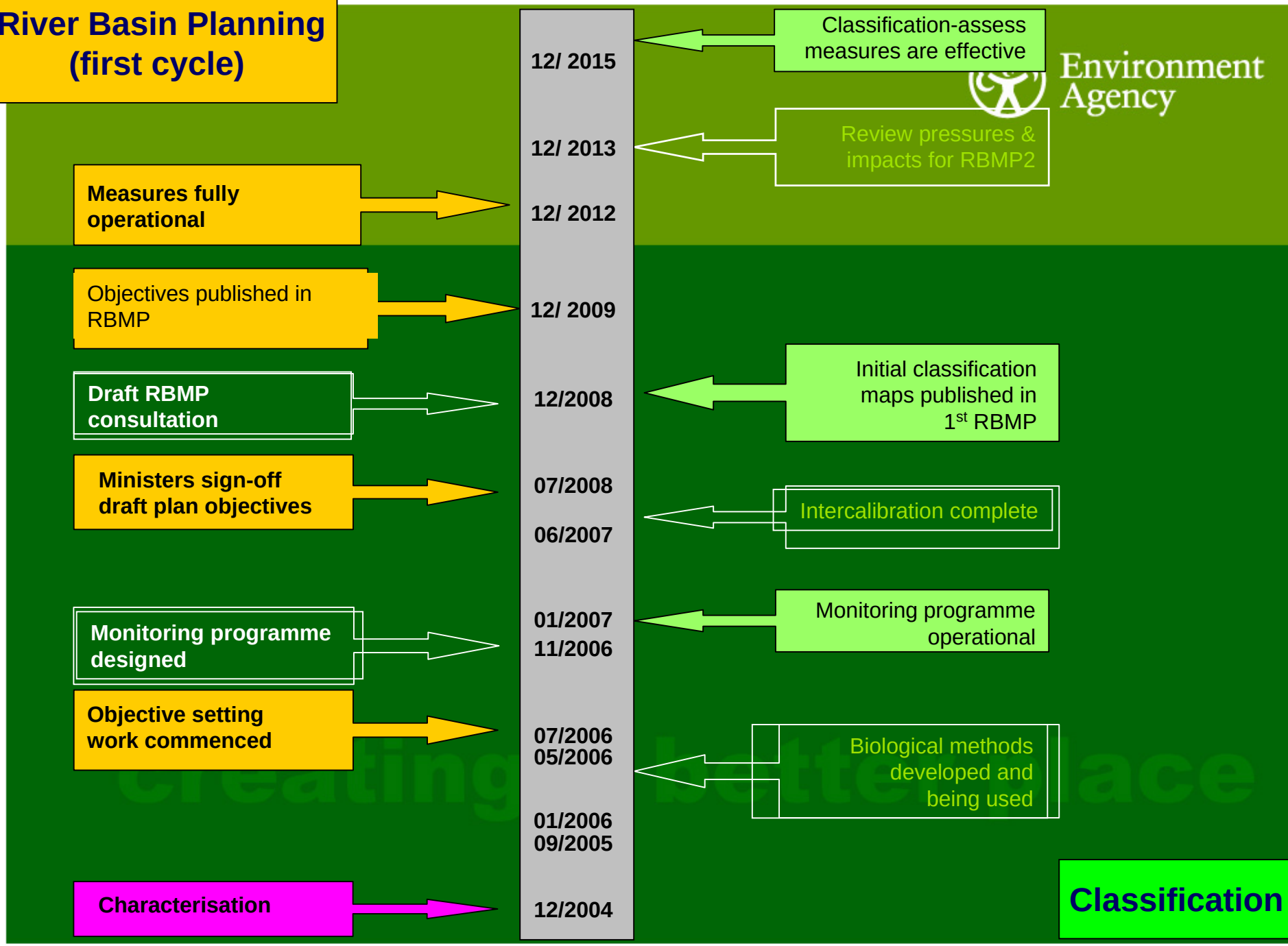
River Basin Planning (first cycle)



Environmental Standards

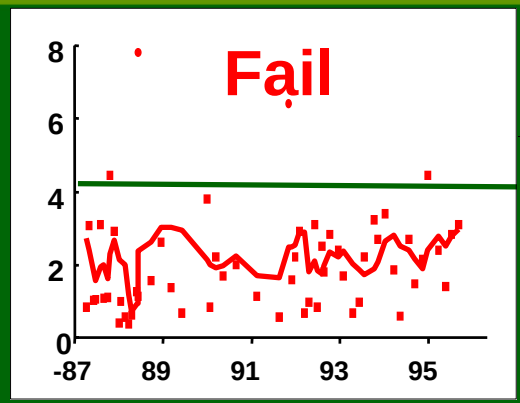
Exceeding these standards represents a risk to biology

Currently use;

EQS for pollution control in rivers and tidal waters

CAMS for flow regimes in rivers

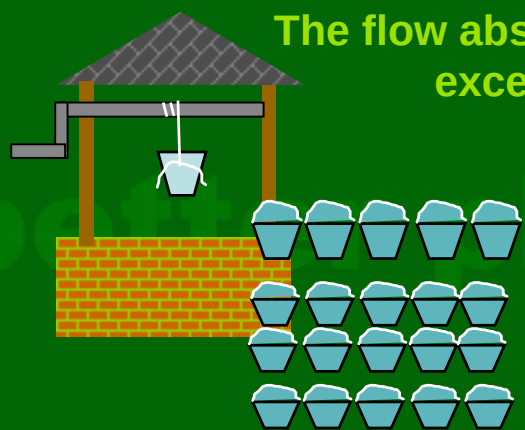
Chemical standards



90%ile

Flow standards

The flow abstracted shall not exceed 20m/h



Environmental Standards

Ecological Classification;

Define right environmental conditions for biology

- Water quality, morphology, hydrology

Chemical Classification;

EU standards for toxic pollutants including priority and priority hazardous substances

Groundwater Classification;

Quantitative (e.g. water body balance)

Quality - EU Daughter Directive e.g. saline intrusions and chemical pollutants

Water Quality Environmental Standards

- Most sensitive group
- Dissolved Oxygen - BOD,Temperature, pH,Nutrients, Salinity, ANC
- Typology
  - Rivers - Altitude, Alkalinity
  - Lakes - Alkalinity, Depth
- Specific pollutants - prioritized - discharges, Dangerous substances,

Water Quantity Standards

- Change from “natural” flow conditions
- Change in lake inflow
- Typology
  - Alkalinity/Geology
  - Gradient
  - Altitude

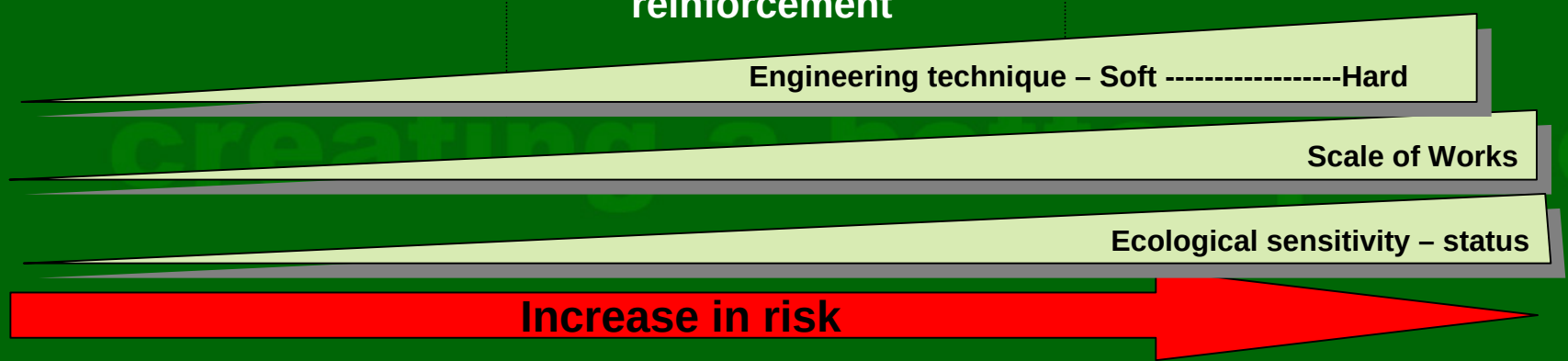
Morphology Standards

- Change in morphological attributes
  - Channel
  - Bank
  - Flow
  - Floodplain
  - Continuity

Risk-based approach to regulation

Environment Agency

Registration	GBR's	Licence
Maintenance of existing structures	Bridging culverts	Culverts
Bridges (no construction in channel)	Small scale agricultural ditch clearing	Canalisation
Willow spiling	Medium scale unconsolidated bank reinforcement	Weir construction/removal
		Flood protection works



Development of environmental standards

Environment Agency

Phase One

Endorsed as best current science

- Water Quality (rivers, lakes, TRAC)
- Morphology (rivers)
- Hydrology (rivers, lakes)
- Specific pollutants EQS Annex VIII
- Groundwater quality- quantitative standards

Phase Two

More R&D required…… likely for:

- Water Quality (TRAC-Transparency)
- Morphology (TRAC, lakes)
- Specific pollutants EQS Annex VIII

Will classification schemes and environmental standards change?

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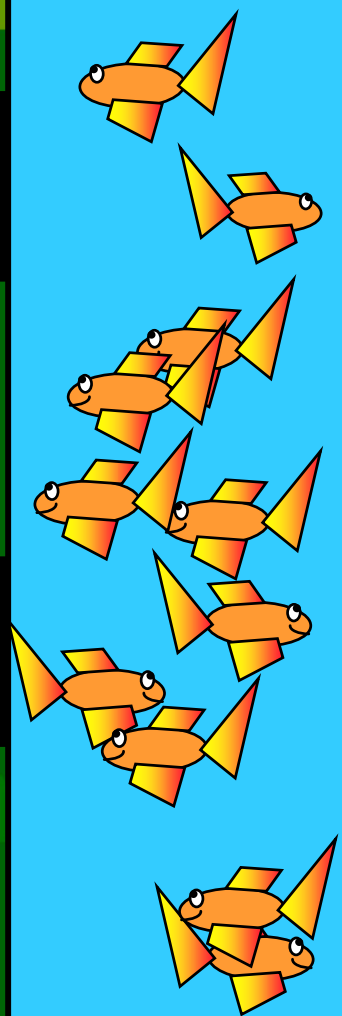
When are UK standards reviewed ?

Environment Agency

2009 classification

2015 classification

Environmental monitoring



UKTAG environmental standards - 2006

Measures for first river basin plan

Environmental standards reviewed for second cycle - 2012

Revision of measures for second river basin plan

Environmental standards reviewed for third cycle - 2018

Revision of measures for third river basin plan

UK working together

- UK agreed approach based on UKTAG advice
- Implementation may vary across administrations
- Build on existing systems where possible
- Schemes and standards based on best current science and knowledge
- Scientific and stakeholder reviews
- Refined over river basin planning cycles

Participation

- Proposed technical review in early 2006?
- Phase One environmental standards
- Enhance understanding of how the standards were derived
- Seek input on technical and scientific aspects
- Influence refinement of standards
- Classification mid 2007?

Further Information

UKTAG website - technical guidance

www.wfduk.org

Environment Agency briefing note - with minutes of meetings

SNIFFER website - research & development

www.sniffer.org.uk

Defra website - WFD info, Article 5 reports, economics research

www.defra.gov.uk