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Integrated Catchment Management and the WFD

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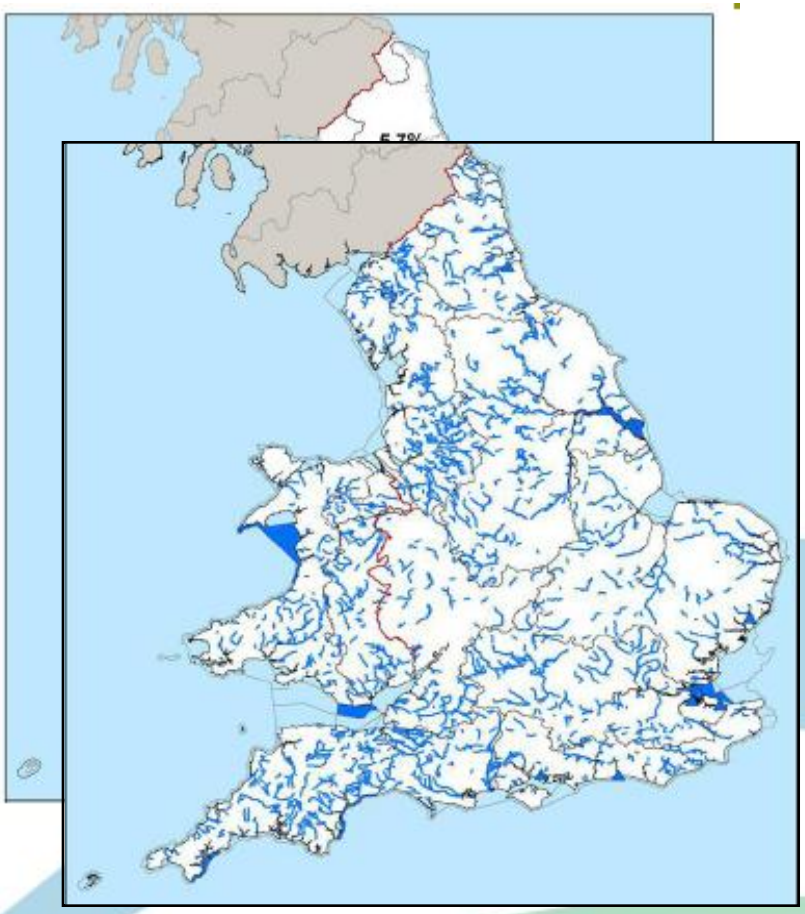
Outline

- Reality of where we are
- What ICM is and is not
- Current Cascade experience:
  - WFD measures
  - HMWB measures
- Potential solutions
- Looking forward

Reality of where we are

- Taken 200 years+ to degrade
- 3% improvement by 2015
- Will need significant improvement thereafter to 2027
- Costs for improvements:
  - UK plans to spend £31billion
  - Polish RBMPs at £5million



Need to ensure that expenditure correctly targeted……

What ICM is and is not

- ICM is:
  - multi-sectoral activities at a catchment scale
  - cohesive consideration of water resources, wastewater, agriculture, urban etc. effects and mitigation measures
  - integration of investigations for multiple benefit
  - catchment-scale solutions that are cost beneficial
- It is not:
  - water body scale planning
  - a SIMCAT model of point sources
  - single substance investigation (e.g. metaldehyde)

What do we need to make sound decisions?

Understanding of the problems:

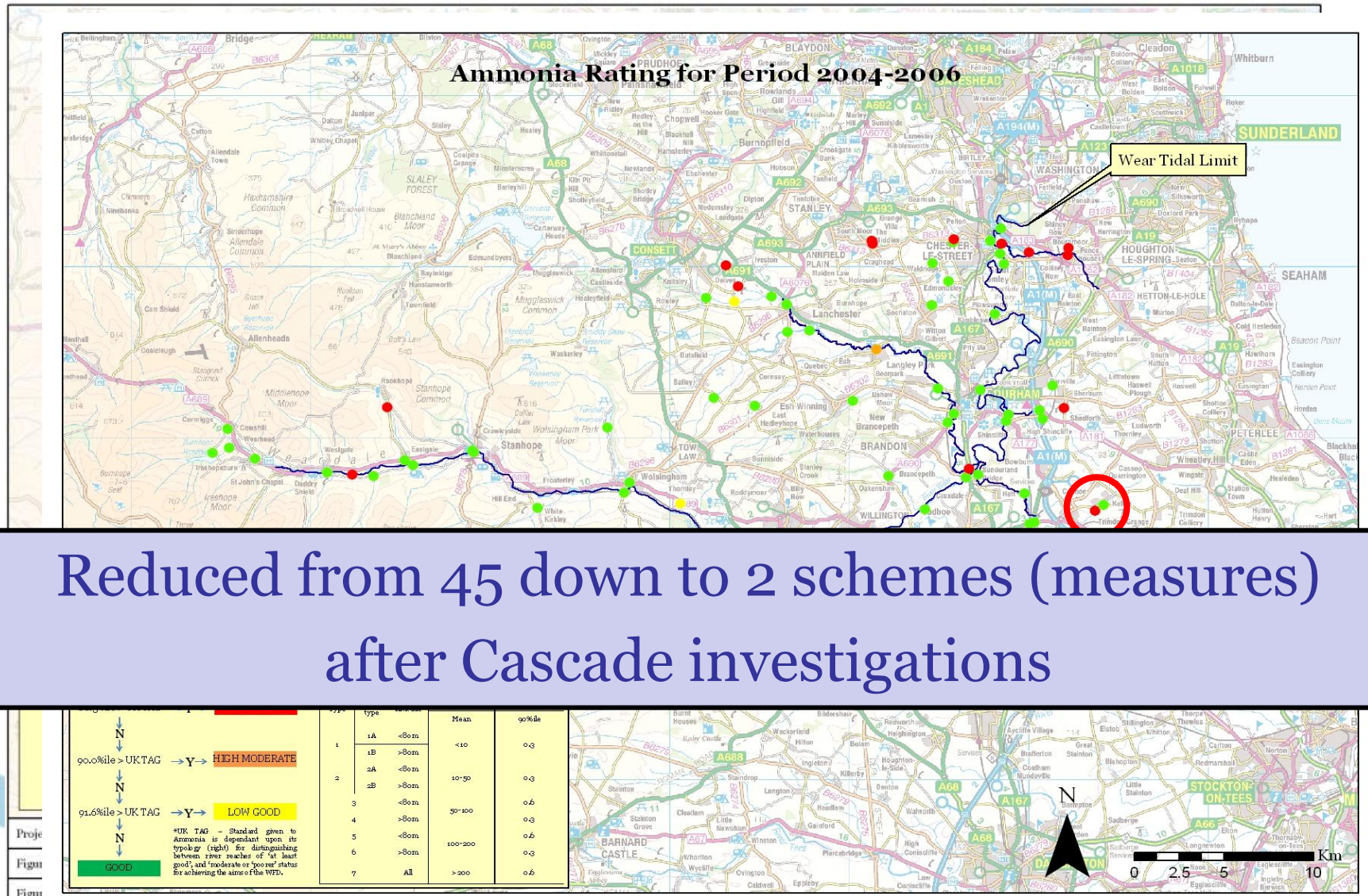
- 8000 “problems” identified in RBMPs (currently being audited by the EA)
- Need to establish why “failures” of WFD standards:
  - GES - for example Phosphorus
  - GEP - for example HMWB measures
- Require evidence to understand cause and effect relationships and reasons for failure

Need to better define the problems in order to indentify appropriate solutions.

Cascade Experience of Measures Identification

- Colossal job for EA in “constrained” timescale
- Programmes of Measures currently incomplete
- Major issues with current basket of measures:
  - WFD GES measures
  - HMWB GEP measures
- Possible difficulties for Cycle 2 RBMP submissions?

WFD Investigations Measures Identification



Reduced from 45 down to 2 schemes (measures) after Cascade investigations

Example of Difficulties:– Diatom Quality Correlation to Macrophytes, Invertebrates and Fish

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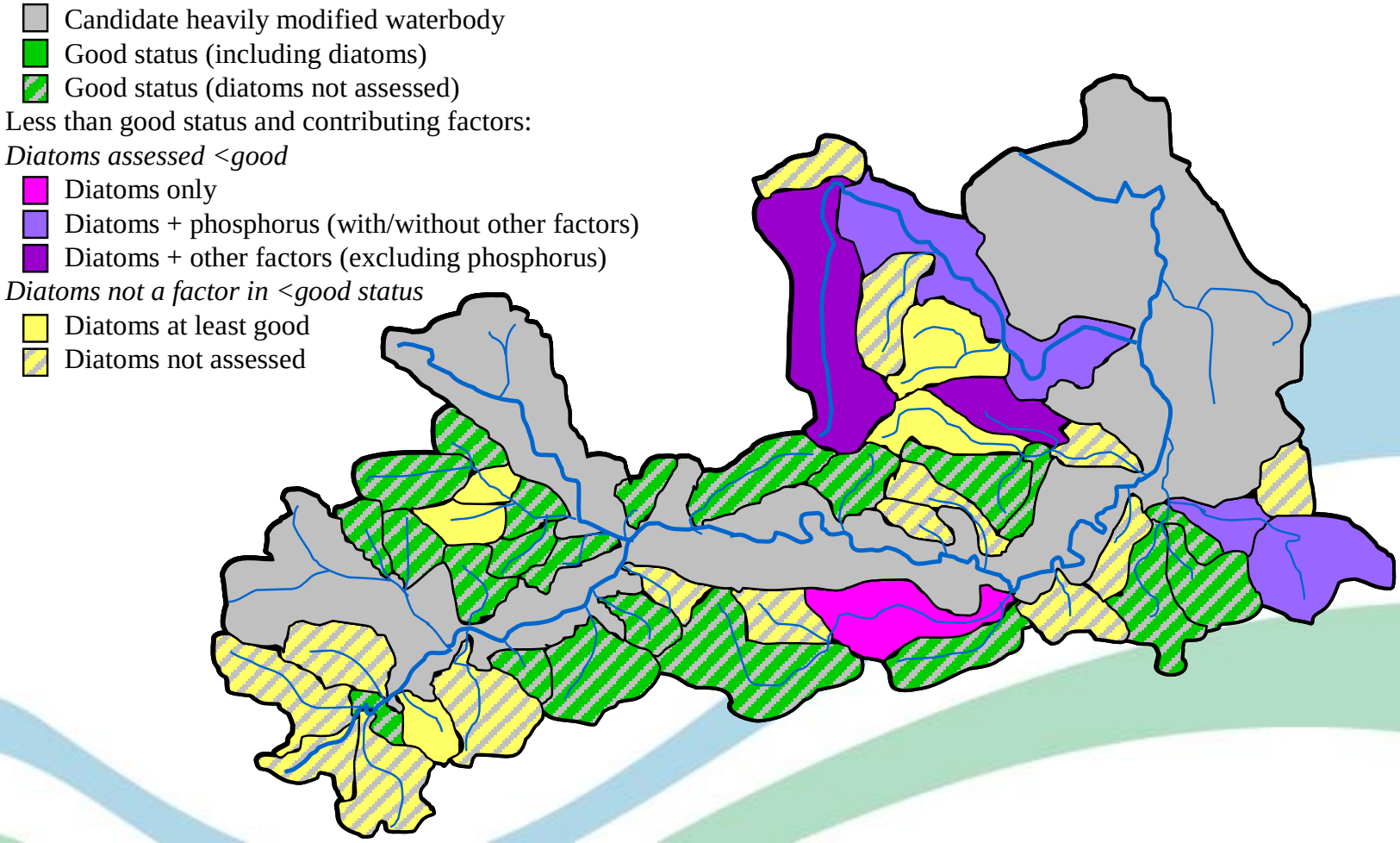
- 3,000 waterbodies have phosphorus and 300 with diatoms!
- Example of the Dee catchment – one of first Water Protection Zones……



Findings of Analysis

1. If the diatoms and phosphorus statuses are **both less than Good** in a waterbody, (3 waterbodies) then measures could be targeted at improving phosphorus concentrations in the waterbody (or upstream) with an anticipated improvement in diatom status.

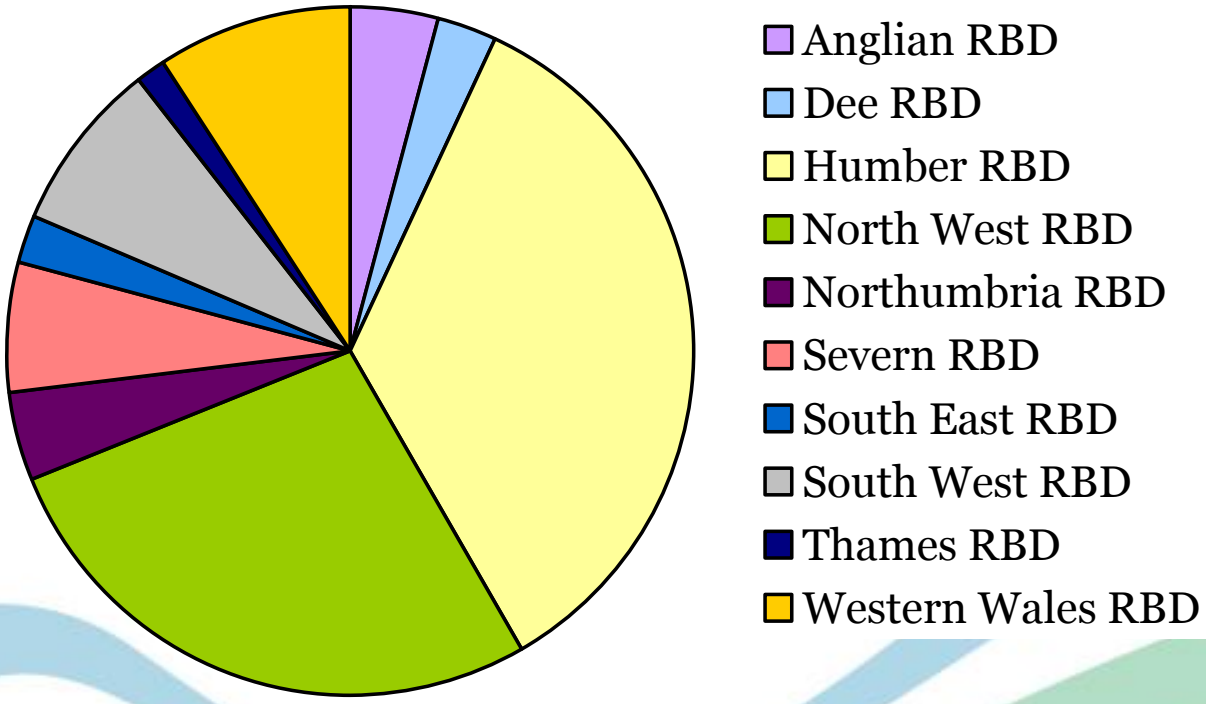
2. But if the **diatoms status is less than Good** and the **phosphorus status at least Good** (none reported, but potentially in 22 waterbodies where diatoms have not been assessed), what measures would be appropriate? There may be no data for other parameters from which to make an assessment.

3. Or if the **diatoms status is at least Good**, but the **phosphorus status is less than Good** (three waterbodies) what measures are appropriate, and why bother?

Very confusing for solution planners

UKWIR HMWB Measures Assessment Guidance and Toolbox

216 HMWB/AWB designated for water companies with mitigation measures "not in place".



UKWIR Project WR06
HEAVILY MODIFIED WATER BODIES

Need for Project

With the advent of the Water Framework Directive (WFD), and more specifically with River Basin Management Plan (RBMP) reporting in December 2009, there has been a material shift in the emphasis on ecosystem protection and enhancement in the UK.

Natural waterbodies with substantial changes to their physical character (resulting from physical alterations caused by human activity) are designated in accordance with criteria specified in the WFD as "heavily modified" (HMWB). Artificial waterbodies (AWB) are man made where no waterbody previously existed. Many water company water assets (e.g. reservoirs) and standing water systems used for water resources (e.g. lakes with managed water levels) are designated as HMWB/AWB.

The distribution between RBDs of the 266 UK HMWB/AWB designated for features relevant to water companies (water storage, drinking water, water regulation) with mitigation measures not in place

The WFD classification process for HMWB/AWB is based on the presence or absence of mitigation measures. To achieve 'Good Ecological Potential' (GEP) under WFD HMWB/AWB must have appropriate mitigation measures in place. Water companies will have a significant role in delivering these mitigation measures.

It is important to deliver GEP in a cost effective, consistent and sustainable manner across the UK. The water companies and their regulators need to understand the hydro-ecological impacts of water company assets and determine costs and benefits of proposed mitigation measures before they are included in RBMPs. GEP may not be achievable in all waterbodies - because of issues around the technical feasibility, disproportionate cost of available mitigation measures and the significant impact on use (i.e. as a water resource asset) of changes to management.

Objective

The objective of the project is to produce a framework methodology for both water companies and their regulators which allows a consistent approach to the understanding of mitigation measures that might be required for HMWB/AWBs' controlled by water companies. This will involve the following sub-objectives:

- An understanding of the relationships between ecology and the anthropogenic pressures caused by HMWB/AWBs
- A better understanding of the costs & benefits and technical feasibility of mitigation measures that may support GEP
- Clarify the relation between heavily modified status, morphology of a water body and other parameters of the classification scheme
- Collating existing data and using gap analysis to design more focussed water company field trial pilots during AMP5
- Derive best practice from existing trials
- A guide for water company practitioners and their regulators to enable formulation of action programmes for individual sites without the need to undertake many site specific detailed investigations/ trials
- A generic toolbox to make site specific impact assessments, identifying appropriate mitigation measures and their feasibility, that feeds into, cross-sector, cost benefit analysis.

Actions to Achieve Good Ecological Potential (1)

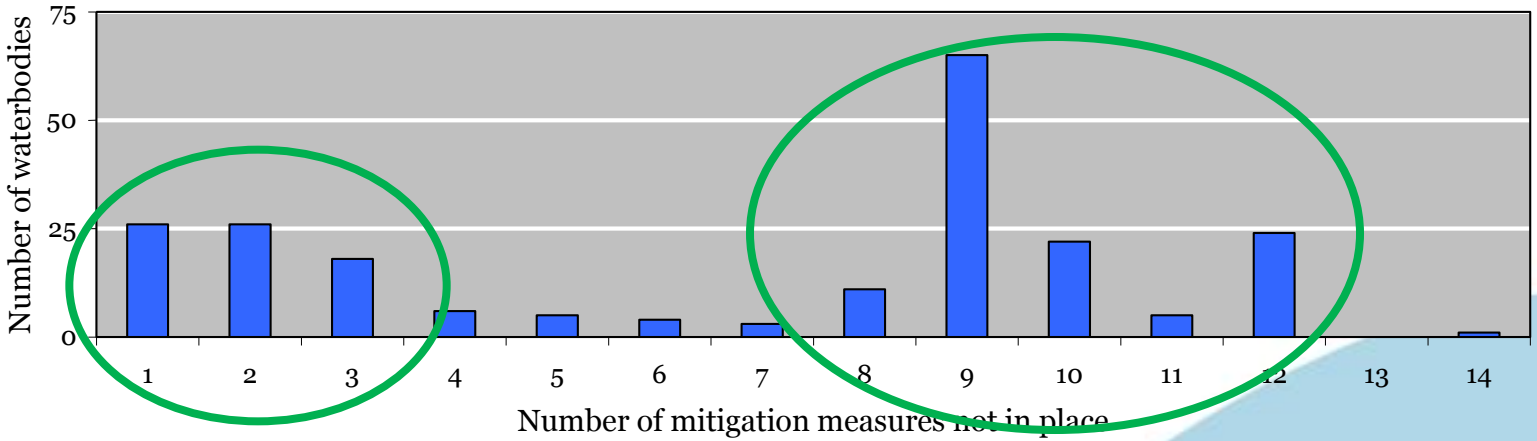
FISH MIGRATION				RIVER FLOW	
Structures	**Mitigation & Flow**	**Entrainment**	**Feeder Streams**	**Baseline Flow**	**Engineering**
Fish pass d/s	Freshets	Divert fish	Not covered by WFD29 - needs mitigation actions proposed	Alter flow rates	Multistage channels
Fish pass u/s		Behavioural barriers		Set min flow rates	Habitat modification
		Physical screens		Set max flow rates	Habitat restoration
		Fish friendly turbines		Env. acceptable flows	Bank protection
				Seasonally variable flows	
				Night time releases	
				Controlled spill	
				Real time operation	

Consolidated Measures

Mitigation Measure		Number of Waterbodies	
		Not in place	In place
A	Ensure there is an appropriate baseline flow regime downstream of the impoundment	162	17
B	Maintain sediment management regime to avoid degradation of the natural habitat characteristics of the downstream river	156	0
C	Provide flows to move sediment downstream	153	9
D	Re-engineering of the river where the flow regime cannot be modified	148	2
E	Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works	144	18
F	Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works	143	1
G	Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	139	15
H	Enable access to relevant feeder-streams draining into the reservoir at appropriate times for spawning and migration	123	18
I	Where structures or other mechanisms are in place to enable fish to access waters upstream of the impounding works, the volume and timing of flow releases is sufficient to enable and, where relevant, trigger fish migration	100	2
J	Ensure the rate and range of any artificial drawdown is appropriately managed to maintain aquatic plant and animal communities in the shore zones of water storage and supply with gently shelving shore zones	78	2
K	Ensure the seasonal pattern of water levels during each year is managed so as to enable the establishment and retention of aquatic plant and animal communities in the shore zone of the impoundment	76	3
L	Management of the risk of fish entrainment in intakes for hydropower turbines or water resource purposes (or pumping stations) where there is downstream fish migration	44	15

Number of Measures per RDB

- 1,500 mitigation measures not (yet) “in place”



- Two clusters between few measures (1-3) or many (9-12)

- North-West RBD averages 10 mitigation measures per waterbody; Humber RBD 8 measures; Western Wales 6 measures; all other RBDs average fewer than 4 measures.

Preliminary Findings

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Key findings from liaison with water companies/EA to date:

- Uneven knowledge in water companies of HMWB commitments
- Inconsistencies in application of HMWB methods
- Differences between activities requested of different water companies

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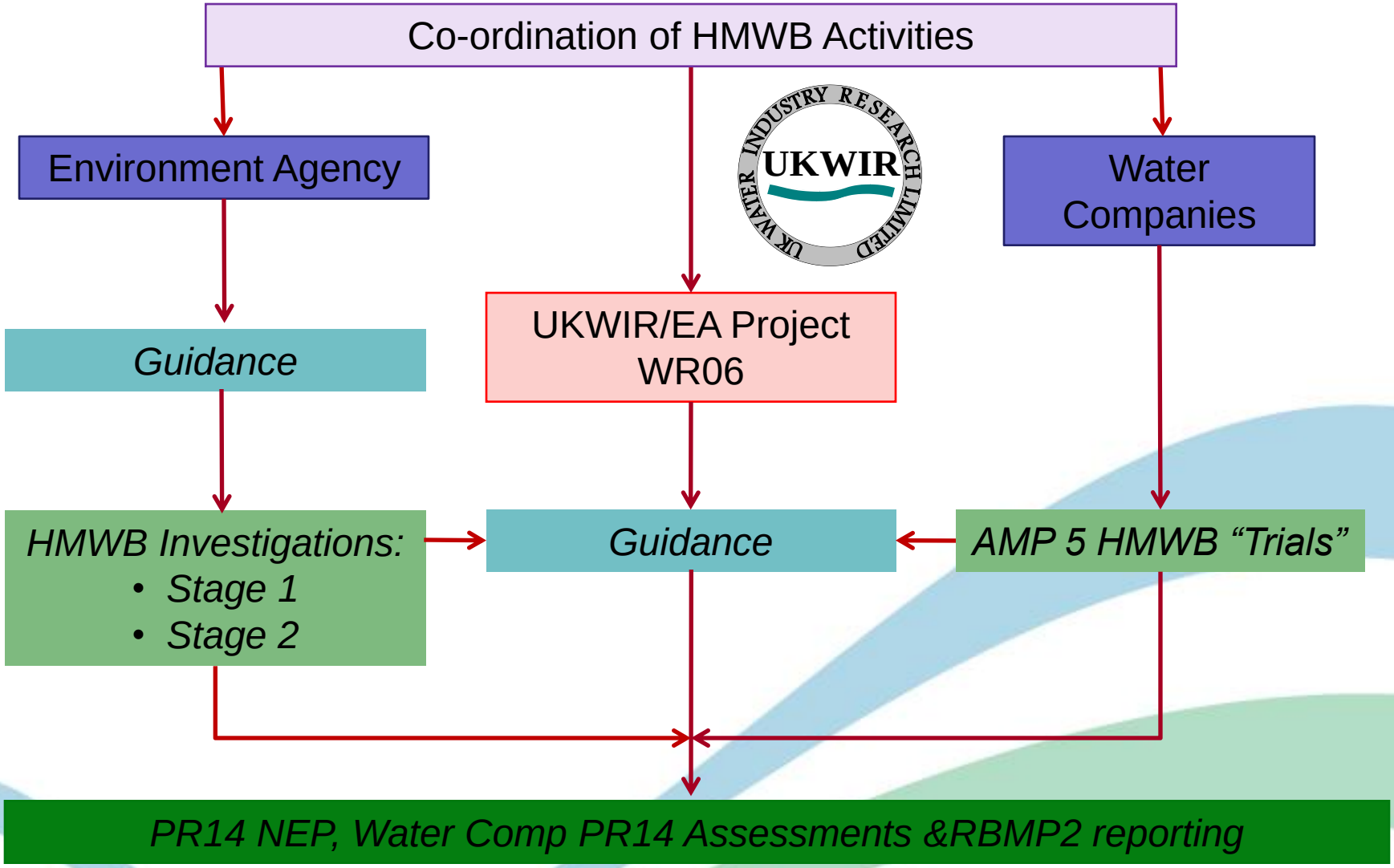
- Consolidation of approaches required
- Unclear on guidance & implementation
- Requirement for sector co-ordination to extract maximum value out of investigations
- Potential overlap of work carried out by EA and water companies

Ecological Efficacy of Measures

	Mitigation measure	Fish migration (access/entrainment)				River flow		River sediment		River WQ		Lake level	
		Structures	Migration & flow	Entrainment	Feeder streams	Baseline flow	Engineering	Management	Flushing flow	DO	Temperature	Level management	Seasonality
River	Diatoms					X	X	?	?	?	?		
	Macrophytes					X	X	X	X	X	X		
	Macroinvertebrates					X	X	X	X	X	X		
	Fish	X	X	X	X	X	X	X	X	X	X		
Lake	Phytoplankton											X	X
	Macrophytes											X	X
	Phytobenthos											X	X

Co-ordination of HMWB Activities



What we need

Certainty of solutions:

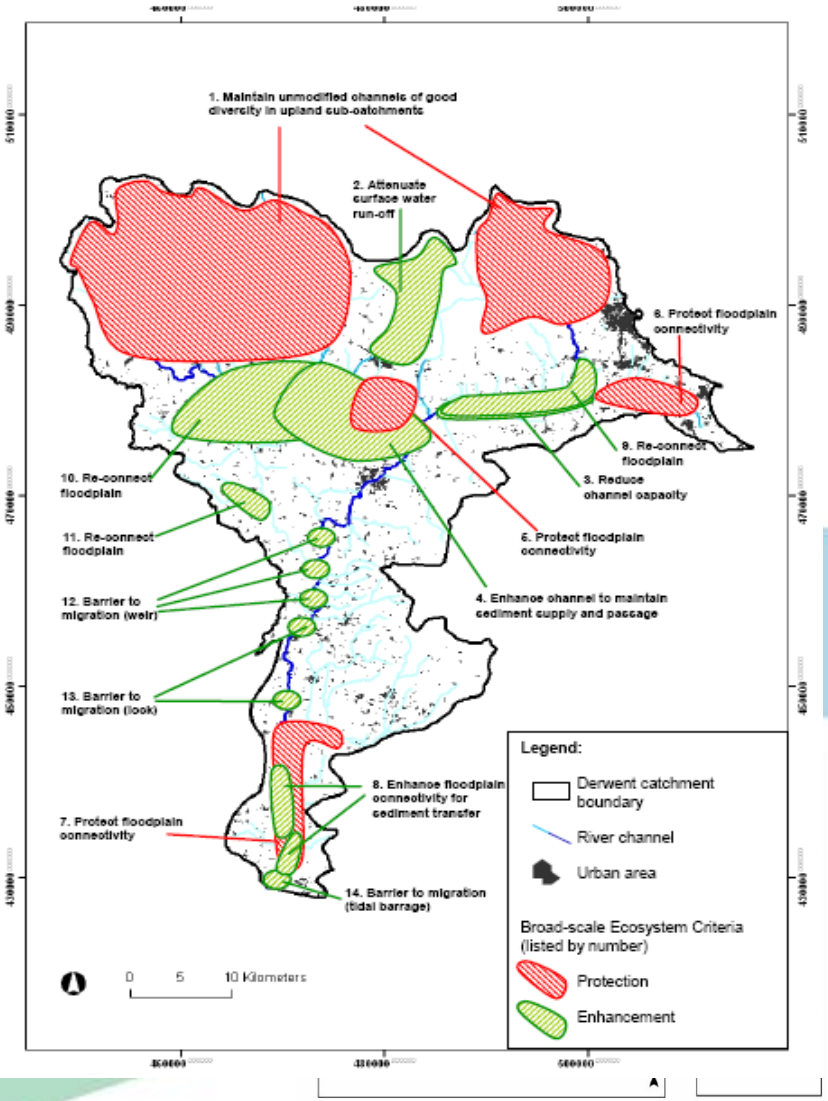
- Will they work?
- How long before the ecological responses are evident?
- What are the main sources of uncertainty in the outcome?
- Are they the right solutions for the job?
- Are there better +/or cheaper cumulative solutions available?

A multi-sectoral catchment-based approach is the best way to develop appropriate solutions.

Potential Solutions

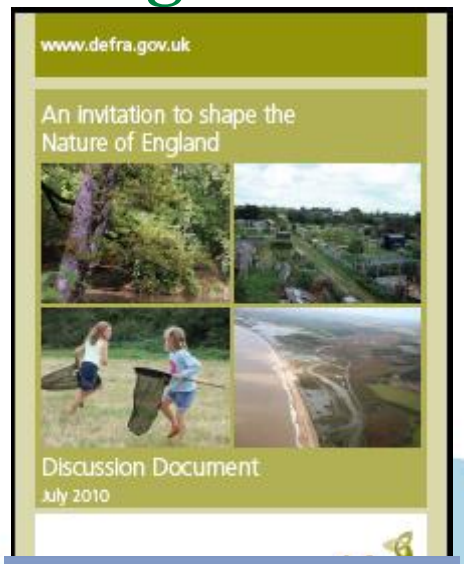
- Better guidance, with guaranteed delivery, to provide consistent evidence for decisions
- Monitoring and modelling tools
- Consolidated evidence bases
- Rely on expert judgement, and integrate local knowledge
- Integrate water industry, agricultural, hydropower and other sector responsibilities
- Strategic thinking is difficult, needs new type of catchment planner.....

Top down rules with bottom up application.....



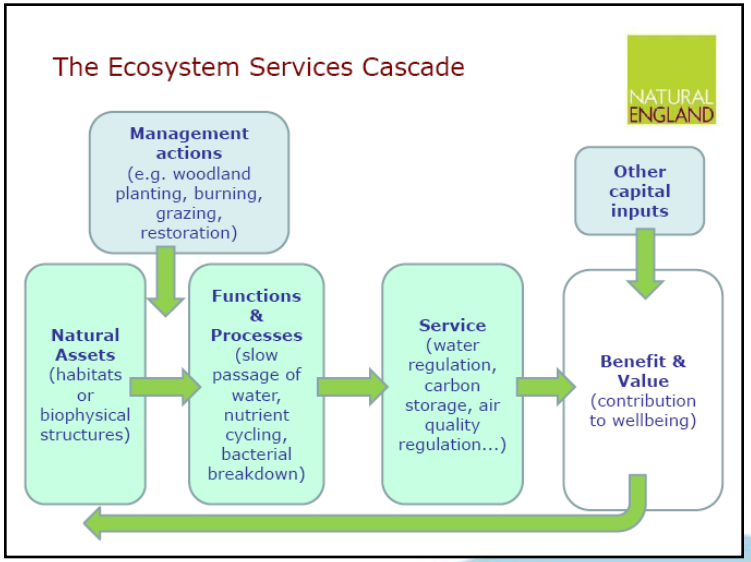
Looking Forward

- Timescales are very difficult and do not align…
  - Many investigations by Dec 2012
  - Draft Cycle 2 delivery programme?
  - but WRMP, PR14, CAP different
- Ecosystem services:
  - Water White Paper
  - Natural Environment White Paper



Ecosystem Services Approach

- **Treasury and Ofwat language**
- Establish the costs of potential solutions (e.g. increased water treatment vs catchment management activity)
- Understand the potential benefits of solutions:
  - Direct benefits e.g. water treatment savings



We know how to do it, but will need fundamental shift in attitude

How much will it cost?

- Example from water resource sustainability reductions:

  1 Ml/d = approx **£1 to 3 million** (for a new source)

- Will the water "saved" for the environment provide a value/ecosystem service of more than this?

- Initial projections of up to 600 Ml/d from EA *region*

- **Consider what society can afford !**

Integrated Catchment Management

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Overarching Guidance

communication

data sharing

comfortable with expert judgement

“just do it” mentality

Local Actions

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