



**Ricardo**  
**Energy & Environment**

## **River restoration and flood management fact or fiction: a British perspective**

Dr Jenny Mant  
Head of Water Management

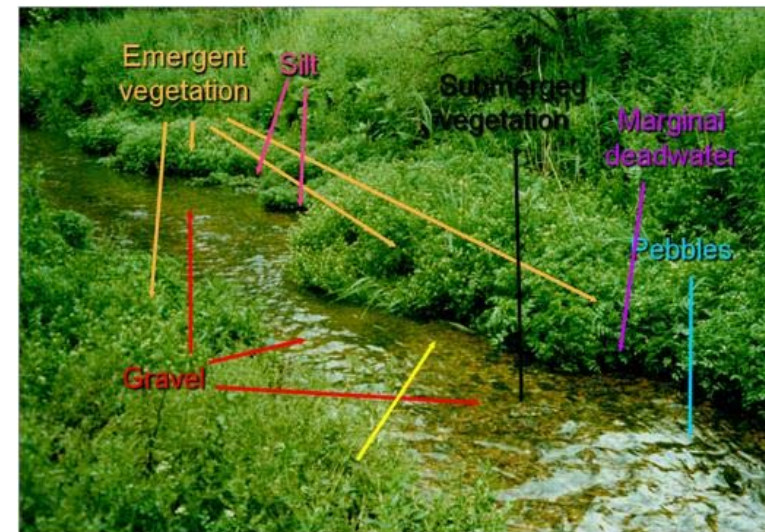
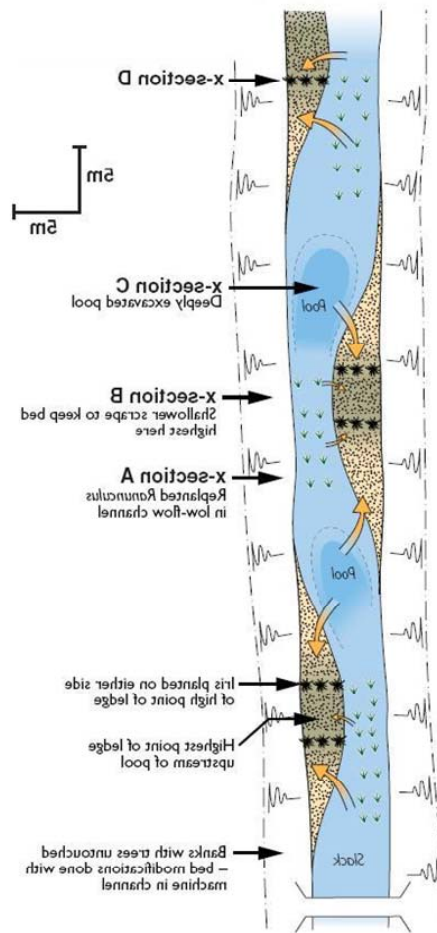
[Jenny.Mant@ricardo.com](mailto:Jenny.Mant@ricardo.com)

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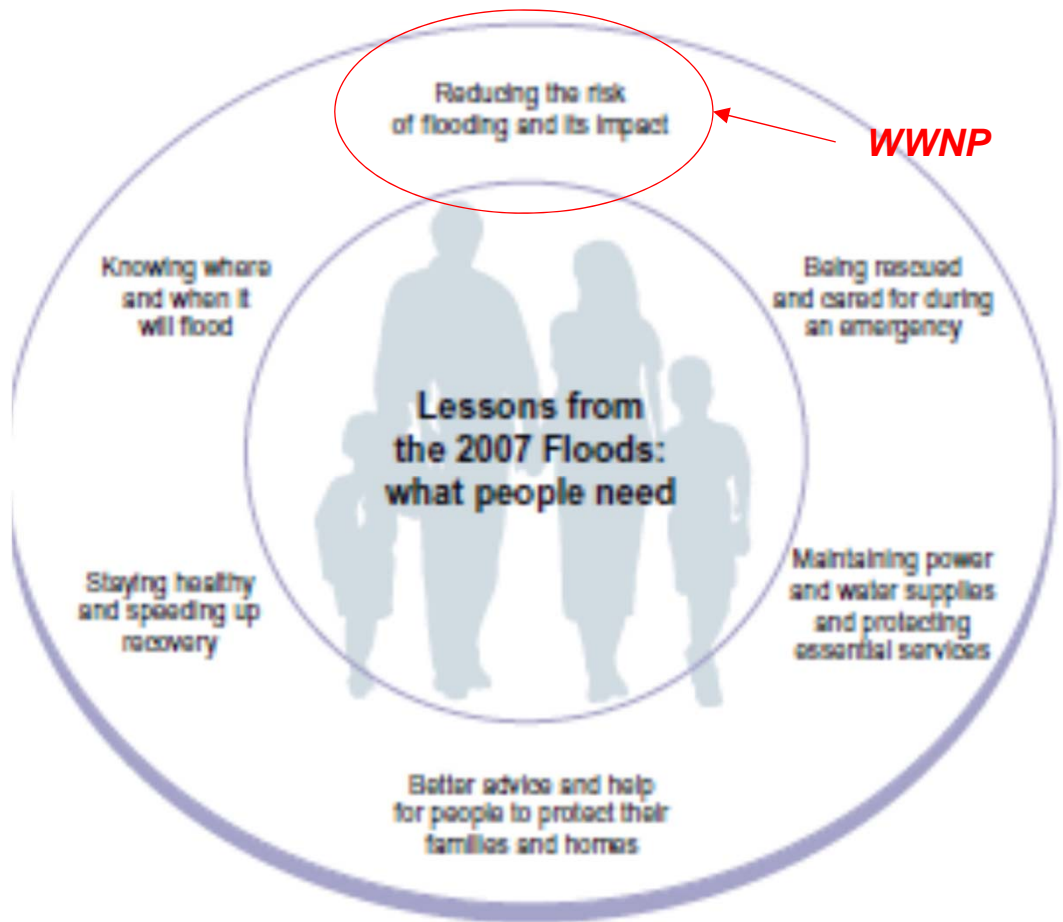
# A Retrospective Look

- 2007 – UK restoration?
- Small scale in-channel habitat restoration
- Ecology rather than process based
- Delivered in partnership with the Environment Agency or fishing clubs....
- Emergence of the River Trust to support land management



## Natural Flood Management/Working with Natural Process: UK context

- The Pitt Review (2008): UK Government review following major floods in 2007
- ‘Flood risk cannot be managed by simply building ever bigger hard defences’
- ‘Softer approaches are often more sustainable; they complement and extend the lifetime of more traditional defences’ – the beginning of WwNP



- 2010 – Cameron’s Big Society ‘empowering people and the start of the Catchment Based Approach
- Aim to deliver multiple benefits





# What does WWNP include?



**River and floodplain management**



**Woodland management**



**Run-off management**



**Leaky dams**

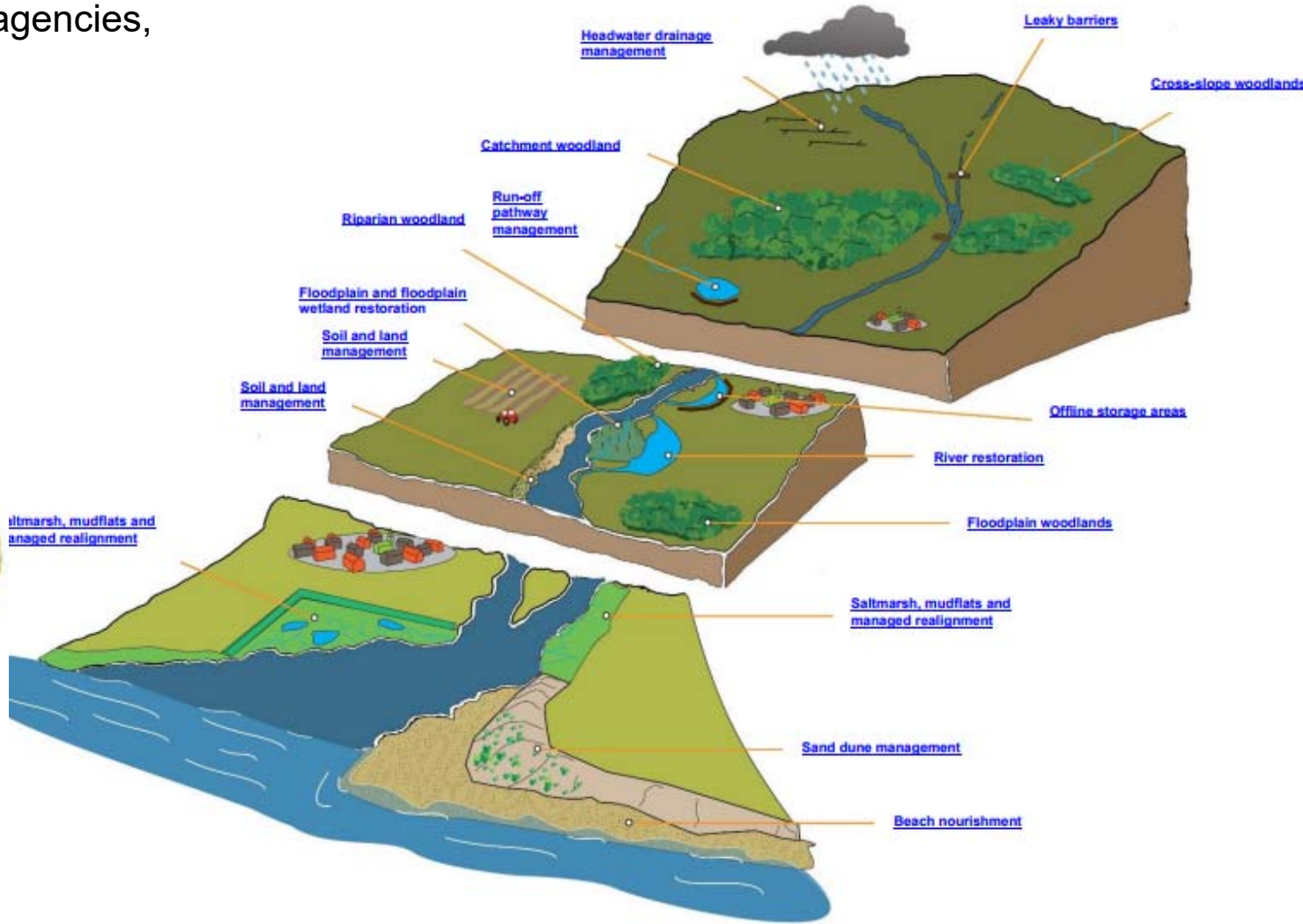
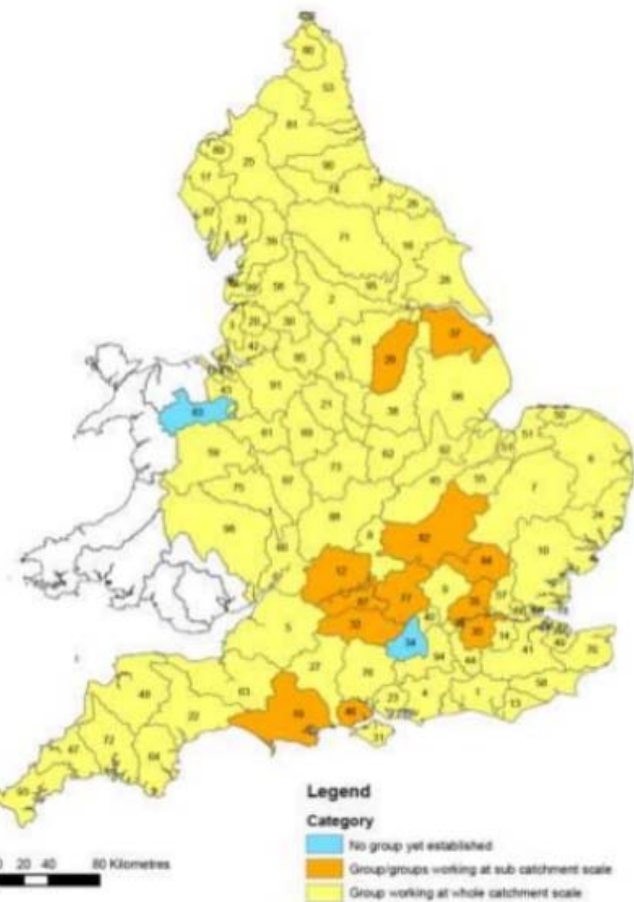


**Coastal and Estuarine Management**

*Thinking about Source to Sea*

# The Catchment Based Approach (CaBA)

- 108 partnerships in England
- Developing plans at the catchment scale with partners from the water industry, agencies, and landowners.....







**Drought  
Planning  
and Water  
Use**

**Climate  
variability &  
change**



**Land use  
changes**



**River  
management &  
health**



**Catchment  
Management  
for floods and  
water quality**



**Land  
degradation**



**Irrigation  
water use**

**Flood  
Plains**



**Storage  
management**



**Wastewater  
treatment &  
reuse**

**Contaminants**



**Urban/  
Industrial  
water use**



**Working with natural  
processes for flood and  
drought management  
and environmental  
resilient catchment**

**Land/  
Ocean  
Links**

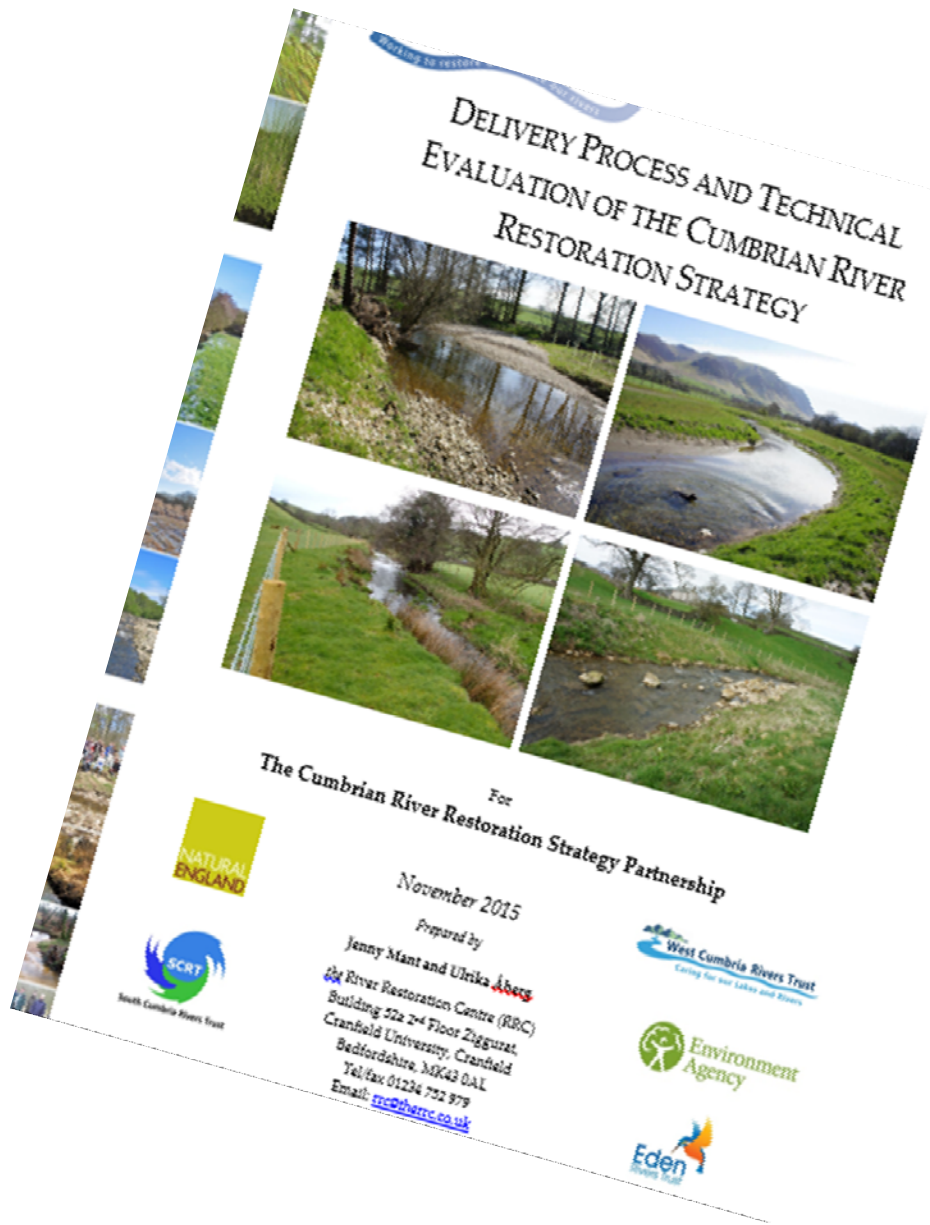


**Estuary  
Health**

**Groundwater  
use and  
condition**



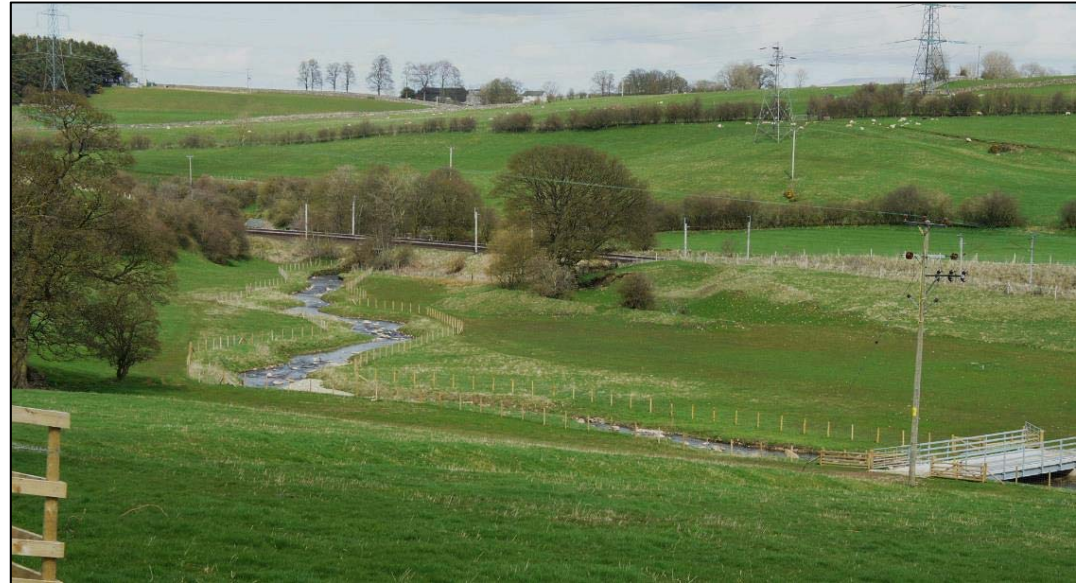
# What is the Evidence AND What are the Benefits?



[www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/654431/Working with natural processes evidence directory.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/654431/Working_with_natural_processes_evidence_directory.pdf)

## Cumbrian Case Study

- Three rivers – Rivers Lyvennet and Leith and the Whit Beck/River Cocker
- Review of issues and post restoration appraisal
- All are designated sites for ecology (especially Salmonids)
- All in the Lake District National Park area
- All in extremely flood prone areas
- Different land management and constraints

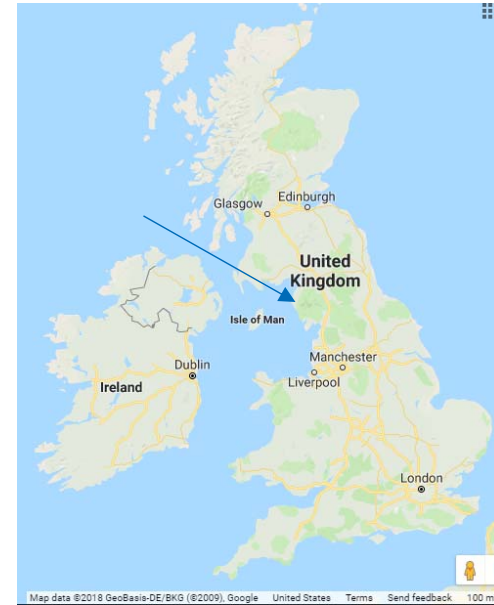
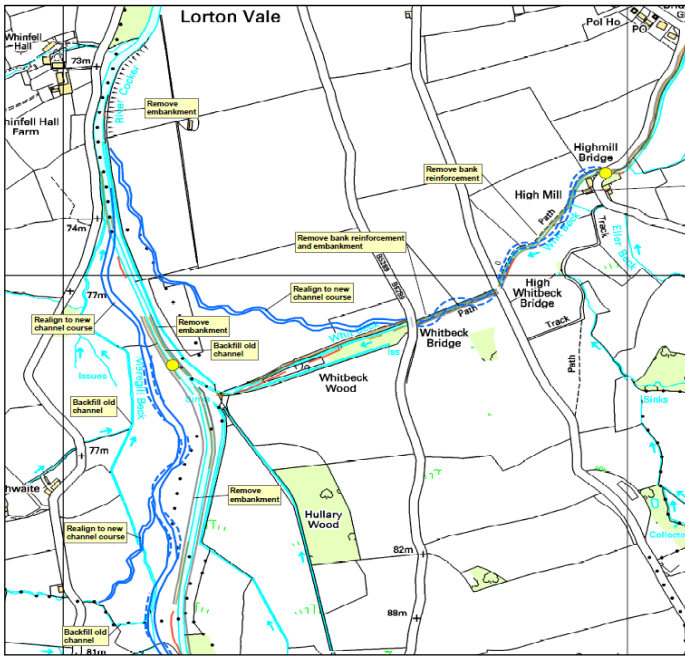




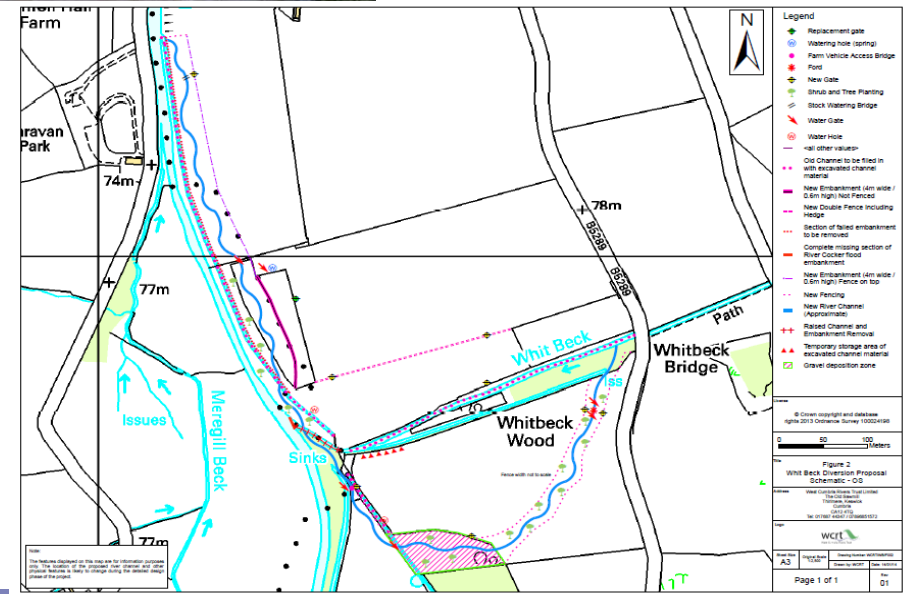
# Whit Beck – Tributary River Cocker, Derwent Catchment Cumbria



- Heavily modified - moderate biology (WFD)
- Atlantic Salmon and lamprey
- Flooding downstream at Lower Lorton 2005 ,2009
- Water quality moderate



- West Cumbria Rivers Trust partnership
- Working in agreement with Landowner
- Confined areas
- Livestock and fodder crop
- Prime field
- Flooding at times critical to crops
- Marginal Faming

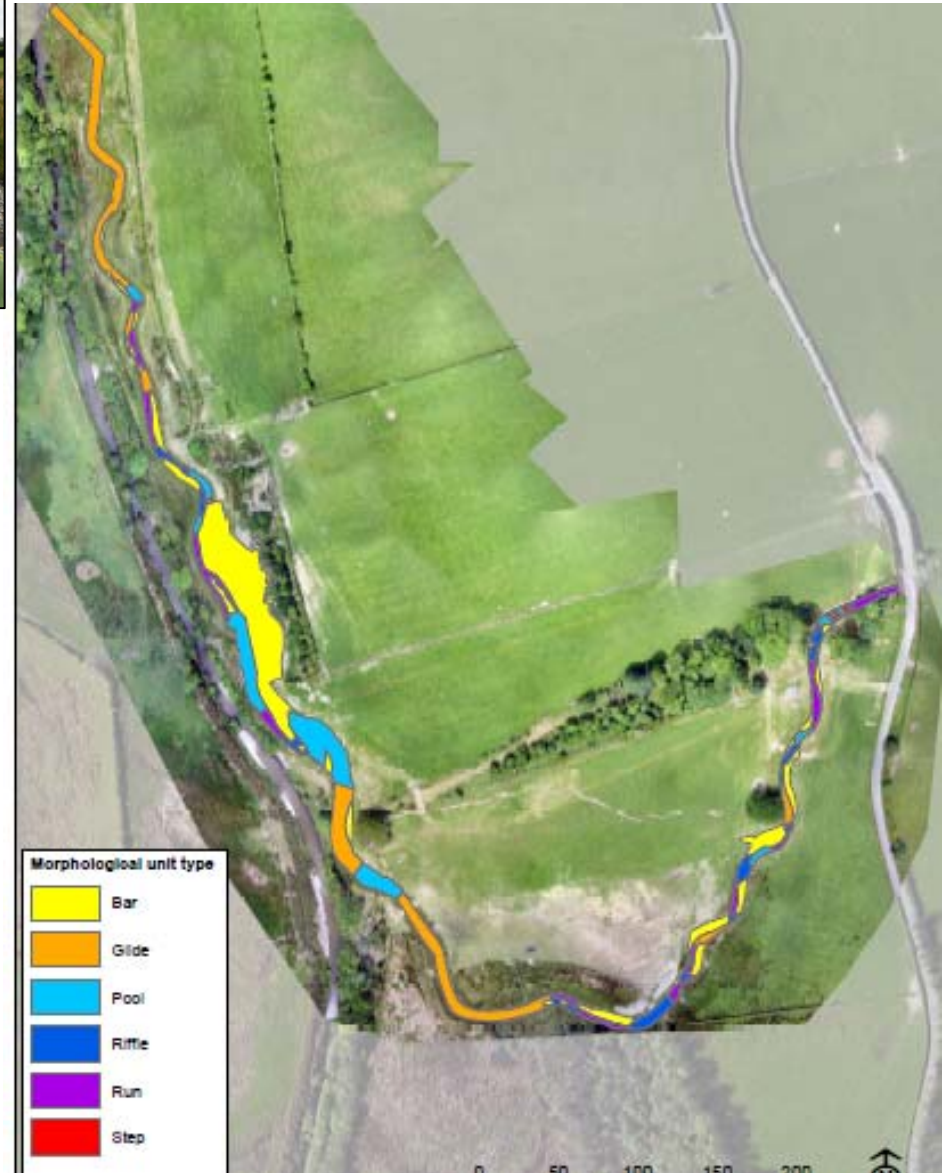


# Construction Summer 2014 : Has it Delivered Multiple Benefits?





# Morphological Change and Associated Species improvements (2017)



Courtesy of Glasgow University

- 20 Salmon Reds by Autumn 2014
- The following year 100s juveniles counted – Salmonids, eels, lamprey and stickleback
- Continues to support these species
- WFD fish moderate now high
- Hydro morphology – supporting element good
- Biology/chemical moderate now good

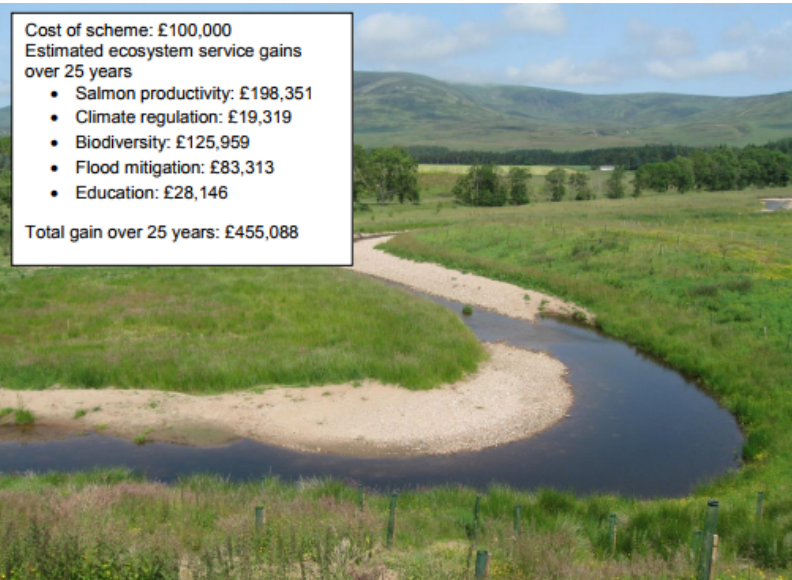
## Examples of Natural Flood Management – WwNP guide

Location	Intervention	Impact
1. New Forest , South UK	10km river/floodplain restoration and woodland planting	21% reduction in flood peak magnitude
2. Mayes Brook, London	Approx 1.2km river/floodplain restoration	reduced peak flow by around 10–15% and increased peak water levels within the floodplain by 0.5–1.6m
3. Debenham, Suffolk	Multiple SuDs and ‘leaky dams’ or large wood	Significant reduction in flooding with estimate 30% reduction in costs associated with land and property repairs.
4. Whit Beck	Slowing the flow by increasing the channel length ( 350m – 1250m). Reconnection to floodplain and woodland planting	Floods in 2005 and 2009 = 0.02% (annual exceedance probability) ~ 170cums. 2015 (post restoration) No flooding under condition similar conditions (Storm Abigail). BUT storm Desmond 0.01% (AEP) flooded.





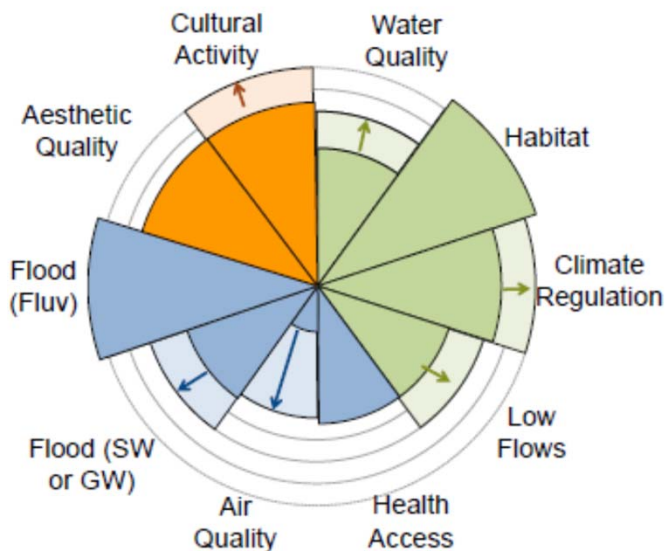
# Next Steps – Valuing the Multiple Benefits – joining it all up



- ‘1ha of restored floodplain provides £52 per tonne of carbon sequestration benefits’
- Nearly 60% reduction in social behaviour (Chinbrook Meadow, London) + flood storage



## Benefits wheel



- Peat bogs have been valued at approximately £300 per ha per year (2008 values) using Natural Capital Accounting tools: they contribute to water quality improvement, hold back water, increase recreation, biodiversity and aesthetic amenity (eftec, 2010)

## Research gaps – A lot of information and understanding BUT

- **Flood risk impact of WWNP measures at different scales – it works BUT** effectiveness of WWNP measures alone / clusters or in combination with other forms of FCRM still unknown and which events it cant work - *CaBA working on catchment flood planning*
- **Performance & design life** - whole life performance and engineering design standard of WWNP measures needs to be better understood - *Can't walk away*
- **Typology, geology, sediment management & conveyance** - how do WWNP measures function in different catchment typologies/geologies and what effect do they have on sediment management and conveyance? - *Building in resilience for floods and wider ecological social benefits*
- **Wider benefits** - ecosystem service benefits of different measures - *Monitory and non- monitory*
- **10 years on?** – will we have fully demonstrated that river restoration at part of catchment management that provides habitat resilience, healthy and unpolluted water courses, can manage floods and droughts and works with natural processes? - *Post-Brexit policy! I'll let you know if 2028!!*