



# Natural Flood Management

## *A National Trust perspective*



25<sup>th</sup> February 2021

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@fluitans





# Outline

- National Trust context for NFM
- How are we implementing NFM?  
Examples from a continuum...
  - Runoff attenuation features
  - Restoring natural processes (Riverlands)
- Influencing NFM policy and funding
- Conclusions



A photograph of a small, clear stream flowing through a dense forest. The water is dark and reflects the surrounding greenery. The banks are covered in thick, vibrant green vegetation, including various shrubs and grasses. In the background, tall trees with thin trunks are visible, partially obscured by the undergrowth. The overall scene is a lush, natural landscape.

*“Slow, Store, Filter”*



# The National Trust context

Major landowner (250,000ha): catchment management and landscape scale solutions are within grasp

43% England and Wales drains to NT boundary; 28% NT land is high erosion risk

Our focus – nature, people & climate

Our ambitions – work with our tenants to get 50% of our farmland ‘nature friendly’; 25,000ha new priority habitat





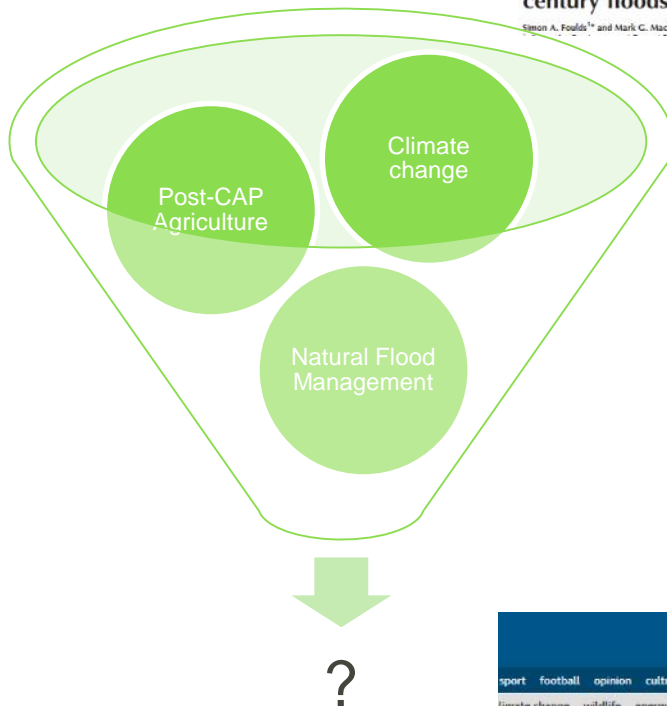


Department  
for Environment  
Food & Rural Affairs

## Farming is Changing



# A critical window



## A hydrogeomorphic assessment of twenty-first century floods in the UK

Simon A. Foulds<sup>1\*</sup> and Mark G. Macklin<sup>1,2</sup>



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## Tree planting 'can reduce flooding'

By Roger Hamblin  
BBC environment analyst

11 March 2016 | Science & Environment

f t b e s

## Government commits £15m to natural flood management

Natural management is 'vital' as well as other flood defences says environment secretary, reports [The Ends Report](#)

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# Natural Flood Management – a continuum





# How do we see NFM playing a role?



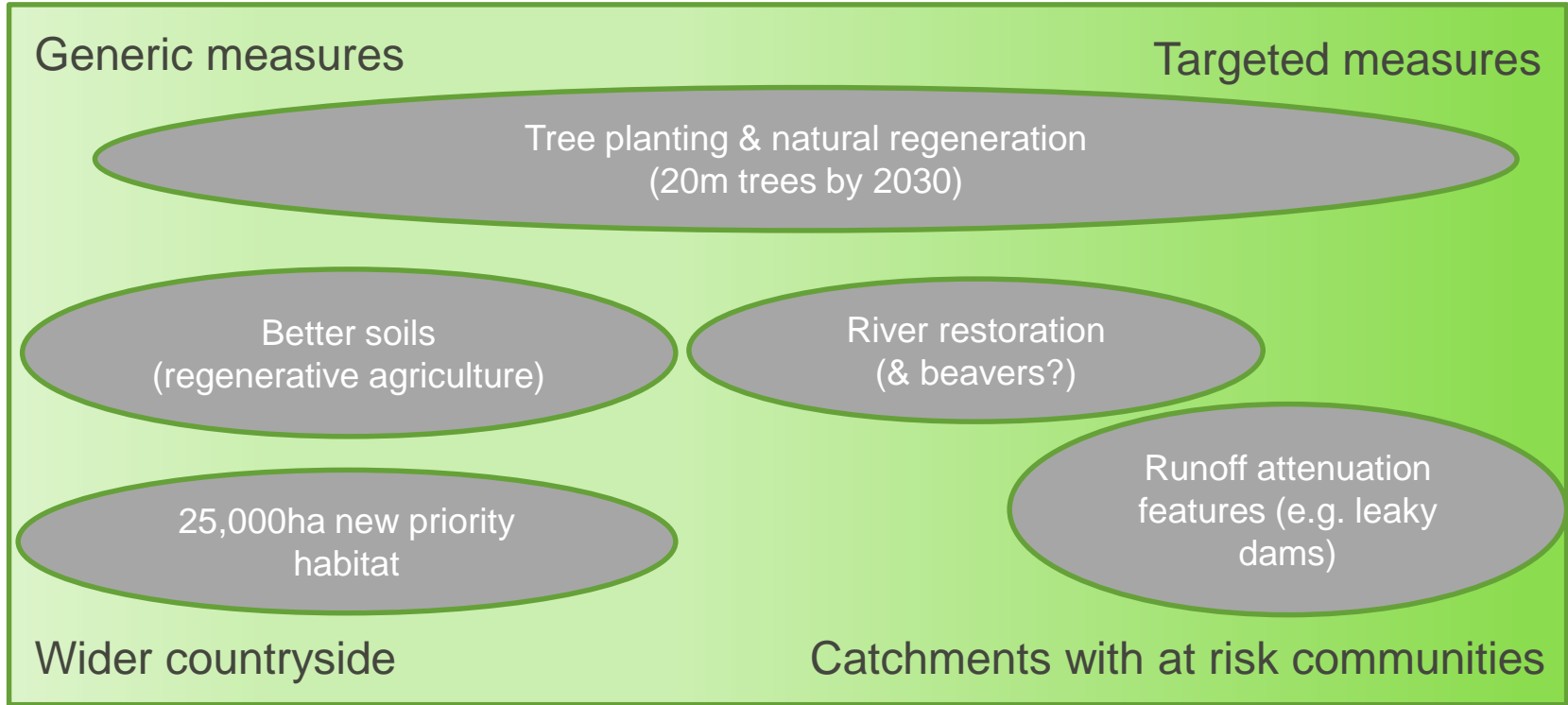
As part of an integrated approach to flood risk management NFM could:

- Reduce flood risk for smaller, more frequent floods (e.g. 1-10 yr return periods);
- Complement hard engineering structures for areas of high risk;
- Help reduce the need for raising or upgrading existing flood defences in the face of climate change;
- Increase the resilience of communities to withstand more extreme events (e.g. buying time);
- Complement working with natural processes to manage flood and coastal erosion
- Provide a range of additional environmental and social benefits (e.g. healthier soils, better water quality, habitat for wildlife, spaces for recreation).



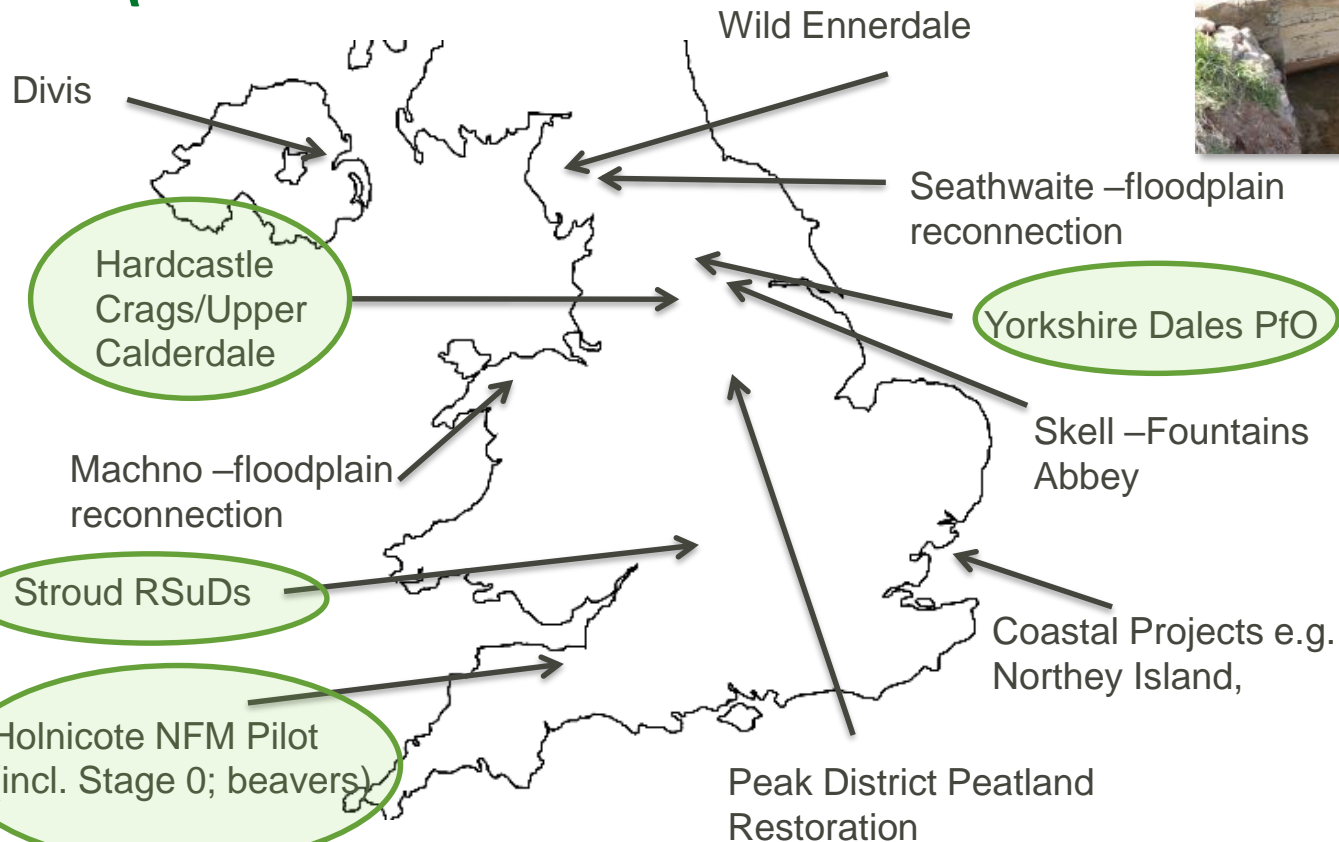


# How do our plans deliver NFM?





# National Trust NFM





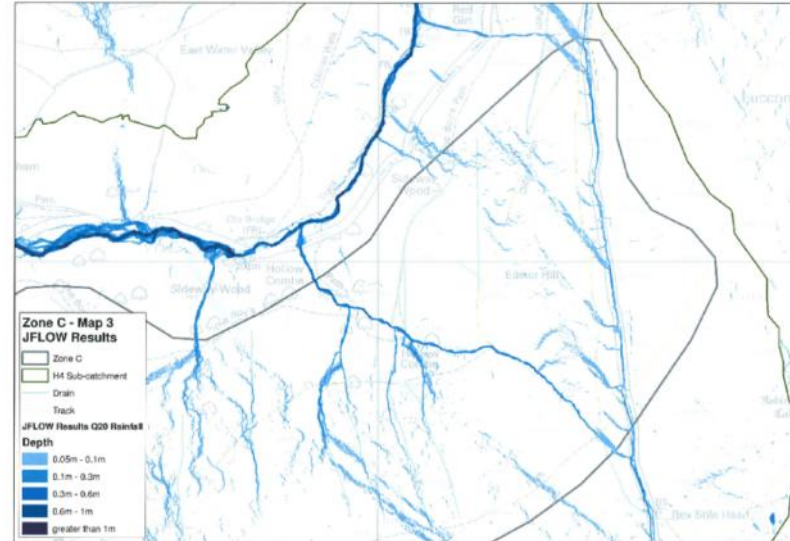
# NFM – Runoff Attenuation Features





# Holnicote NFM Pilot

- One of three Defra pilots arising from Pitt Review of 2007 summer floods
- 2 rivers NT own 90% of catchment
- Landscape scale – floods, soil conservation and other benefits
- Actions in four areas: uplands, coombes, lowland meadows, intertidal
- Intensively monitored





# The power of monitoring...



2013/14 winter rainfall event – 10% reduction in flood peak; no flooding of properties





# Stroud RSuDs Project (Chris Uttley) Funded by RFCC

Natural debris dam augmented with logs

Engineered debris dam – flood and water quality benefits alongside woodland habitat management





# From Hardcastle Craggs to Leeds City region

## Part of 'Slow the Flow' project

- £50k initial grant from Environment Agency
- 50 volunteer days per month
- Local residents tackling their own flood risk



Leaky dam structure



Gully 'stuffing' – slow the flow plus dead wood habitat

## £2.6m NT led project

Helping with flood risk in Calderdale:

- 151ha new woodland
- 85ha upland habitat restoration
- 650 'leaky dams'







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# West Yorkshire NFM: Numbers so far...



- 630 Small Log Dams
- 7 Large Log Dams
- 102,000 Native Trees
- 9km Stock Fencing
- 297 Living Willow Dams

- 2570m<sup>2</sup> SuDS Car Park
- 25 monitoring stations
- 600m Contour Logs
- 47ha Rhododendron Clearance
- 15 new track drains

- 100 Turf Dams
- 136 Stone Dams
- 162,500 Sphagnum Plugs
- 100m of Peat-hags reprofiled
- 1700m<sup>2</sup> ephemeral ponds & scrapes
- 2,533 Living Willow Fascines
- 600 Brushwood Fascines



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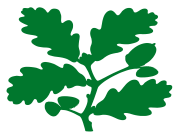
WOODLAND  
TRUST

YorkshireWater

SLOW THE FLOW  
CALDERDALE

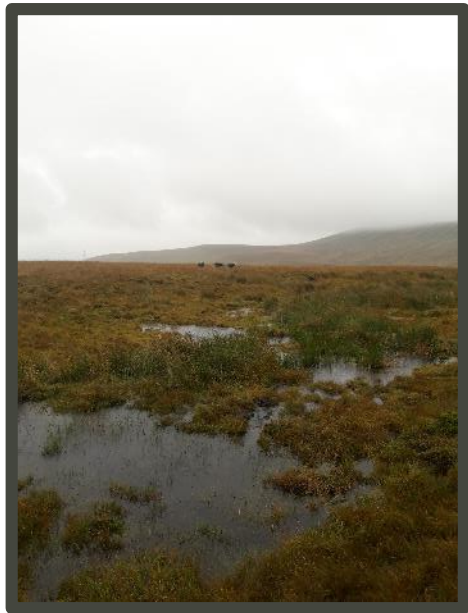
WHITE ROSE  
FOREST





# West Yorkshire NFM

Landscapes for Water Project Potential...



- £12.5M, 5 year delivery project
- c500ha of new broadleaf woodland
- c950ha of land restored or improved through woodland creation and peat and heathland restoration.
- c7,000 leaky dams
- c110 volunteer days
- 5 year NFM monitoring project



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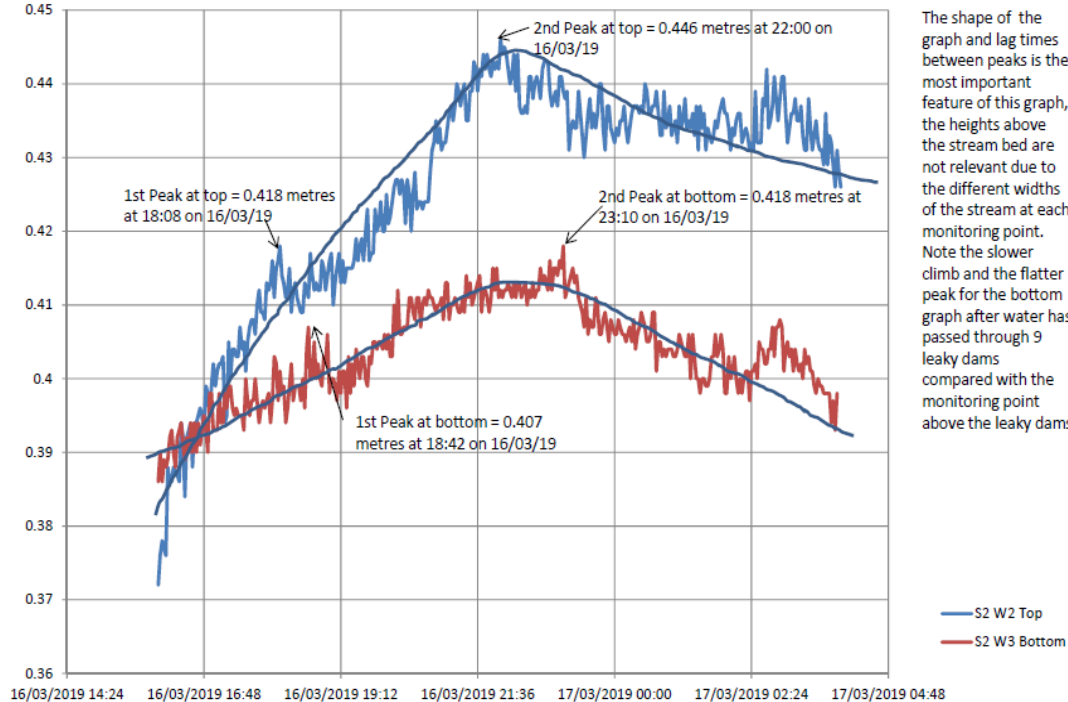
SLOW THE FLOW  
CALDERDALE

WHITE ROSE  
FOREST



# Some evidence of effectiveness from monitoring

Figure 6: Crimsworth Dean Beck Stream Monitoring (Stream 2 - Leaky Dams)



The shape of the graph and lag times between peaks is the most important feature of this graph, the heights above the stream bed are not relevant due to the different widths of the stream at each monitoring point. Note the slower climb and the flatter peak for the bottom graph after water has passed through 9 leaky dams compared with the monitoring point above the leaky dams



**SLOW THE FLOW**  
— CALDERDALE —



# Stage 0 River Restoration

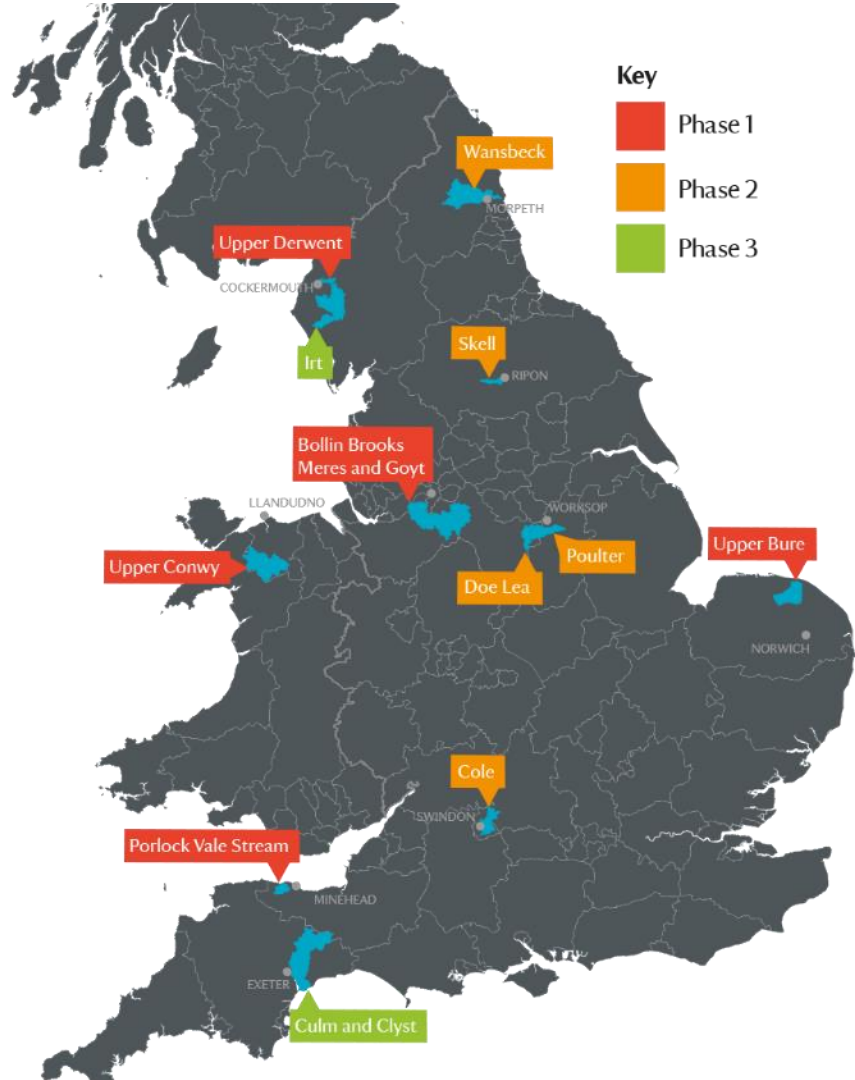
(~ floodplain reconnection)

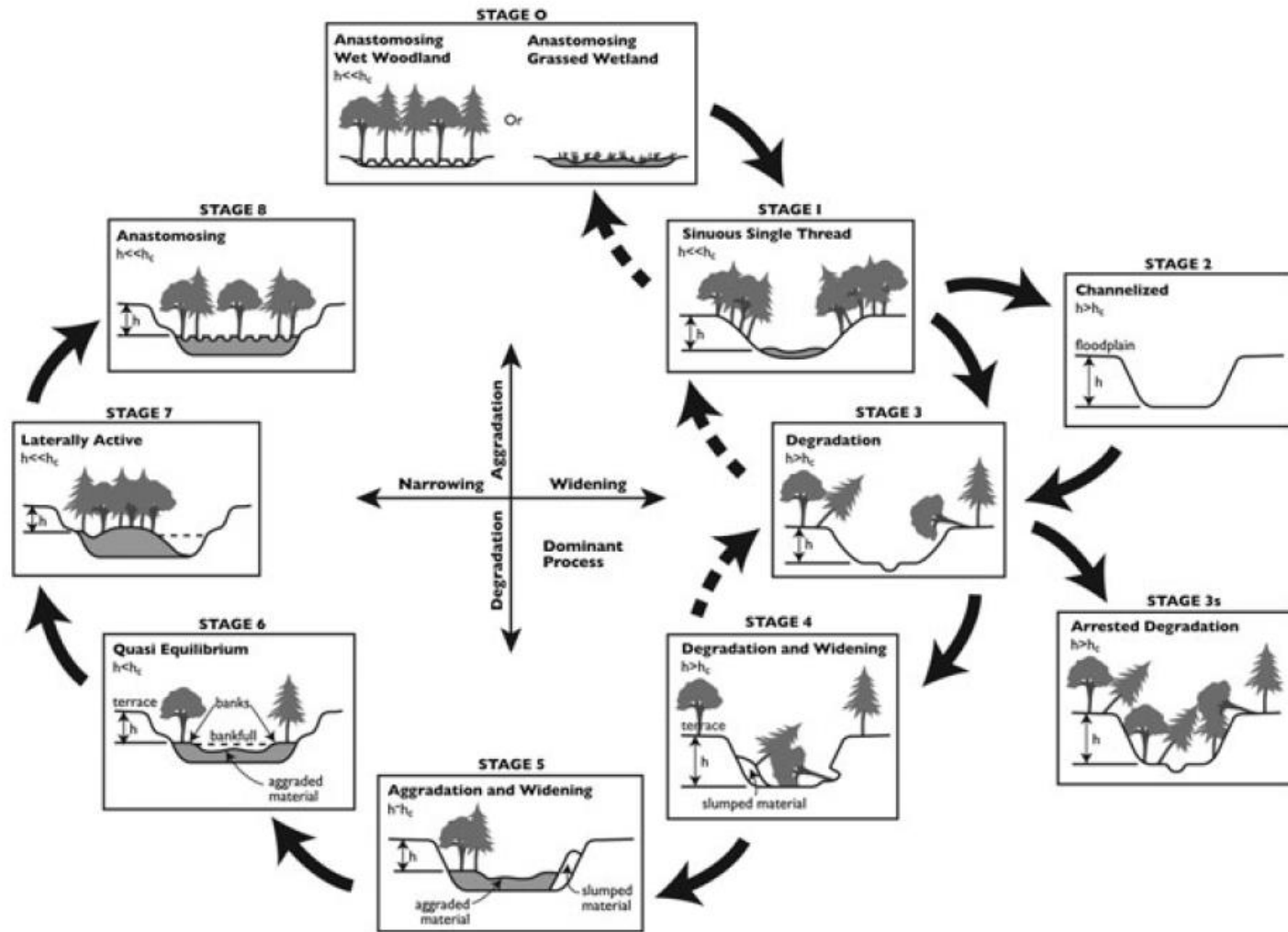


# Riverlands

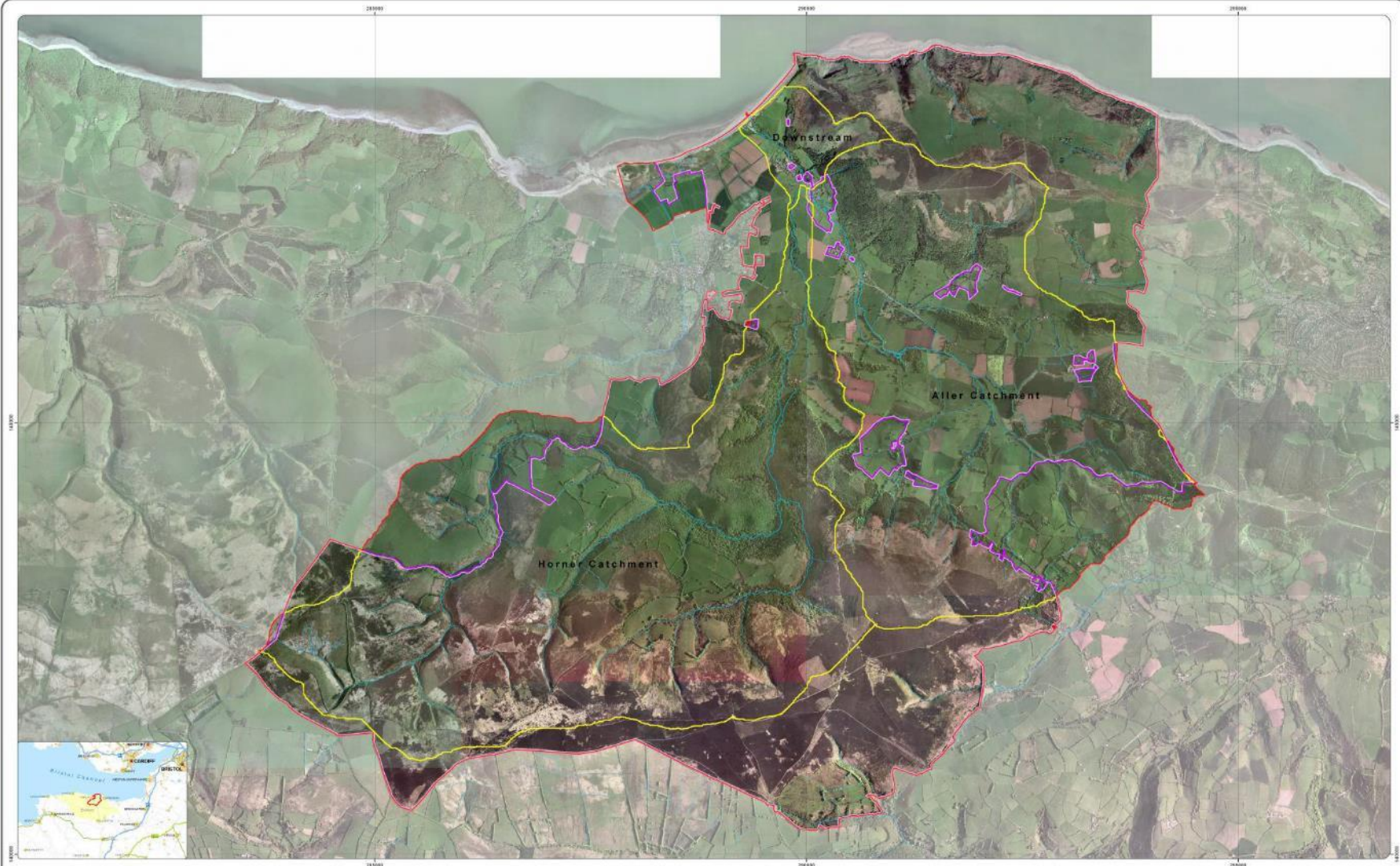
## Porlock Vale Streams

- Natural process-led restoration
- Builds on previous NFM pilot
- Stage 0, beavers and beaver 'analogues'





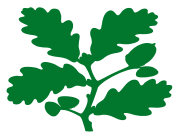




























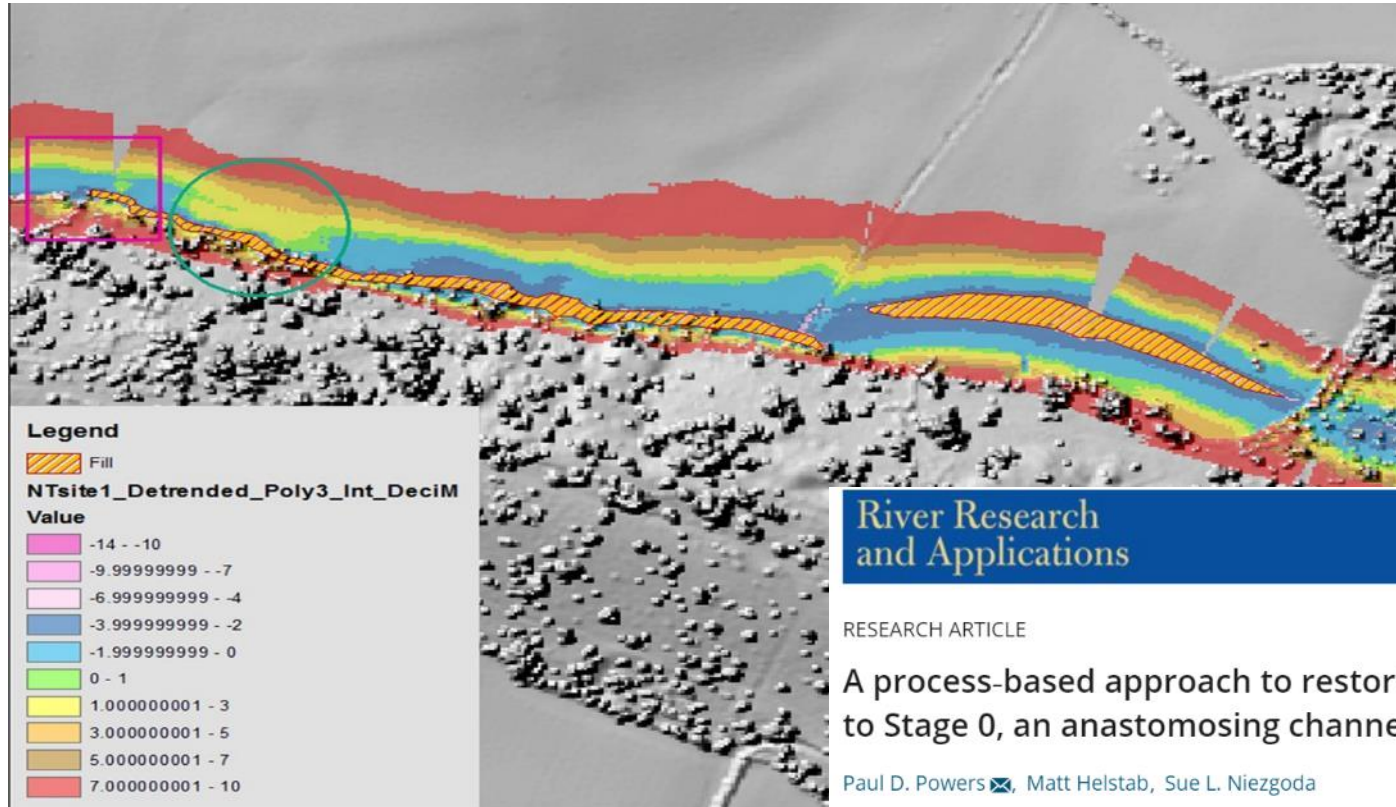








# Geomorphic grade line (GGL) approach



## River Research and Applications

RESEARCH ARTICLE

A process-based approach to restoring depositional river valleys to Stage 0, an anastomosing channel network

Paul D. Powers✉, Matt Helstab, Sue L. Niezgoda



# Mud Pool Meadow – Stage 0



Land Drainage Consent obtained and the work was completed during 2 weeks in autumn 2019.

Local contractor used (2 people plus digger and tipper)

After the regrading of the site woody material was scattered across it. All obtained from estate – all shapes and sizes!



Mud Pool Meadow site  
immediately after works



Aller restoration site – existing channel and habitat. Single channel, simple hydrology, poor biodiversity.  
Channel transports water and sediment quickly through the landscape.





Aller restoration site – 5 years post restoration – complex hydrology and ecology fully established. Grazing by large extensive livestock maintains complex variety of habitat.







# Beaver Reintroduction







# Beaver reintroductions

Two sites in Porlock (other NT projects in progress e.g. South Downs)

Why?

- Unparalleled wetlands and pond habitats created through beaver activity
- Other benefits (water management, fire and drought resilience, water quality...)
- Huge public interest







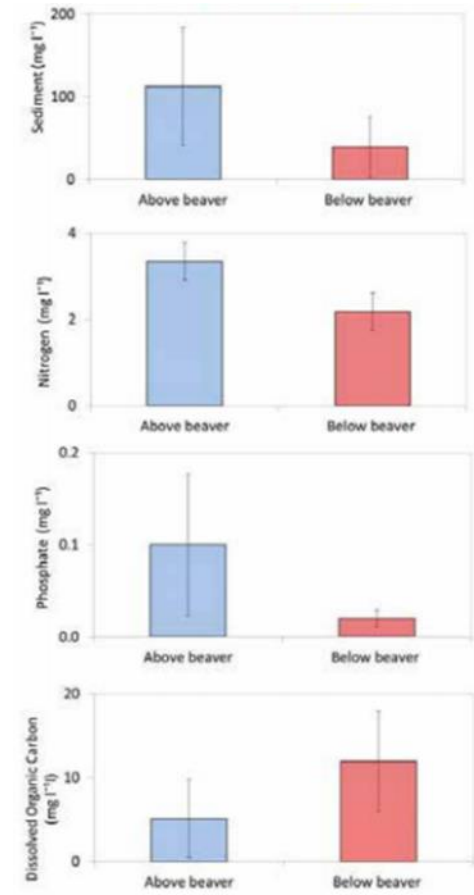
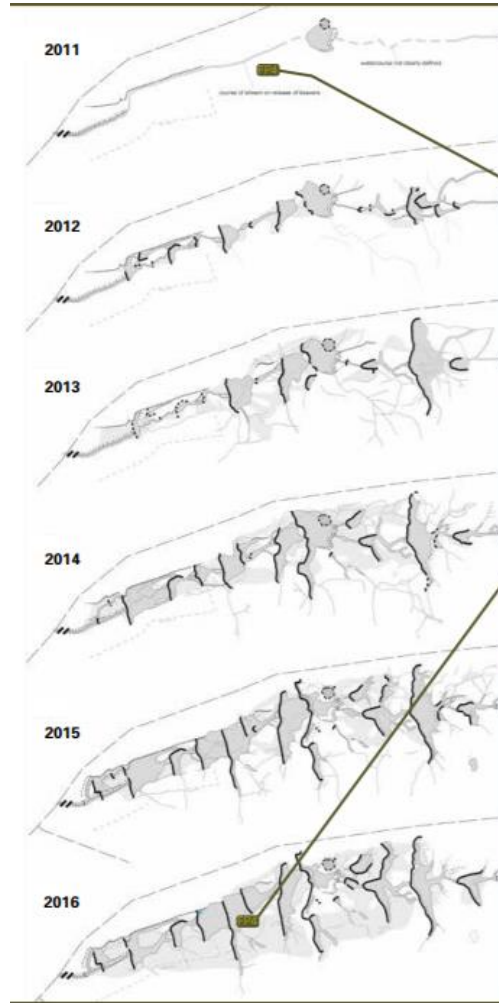








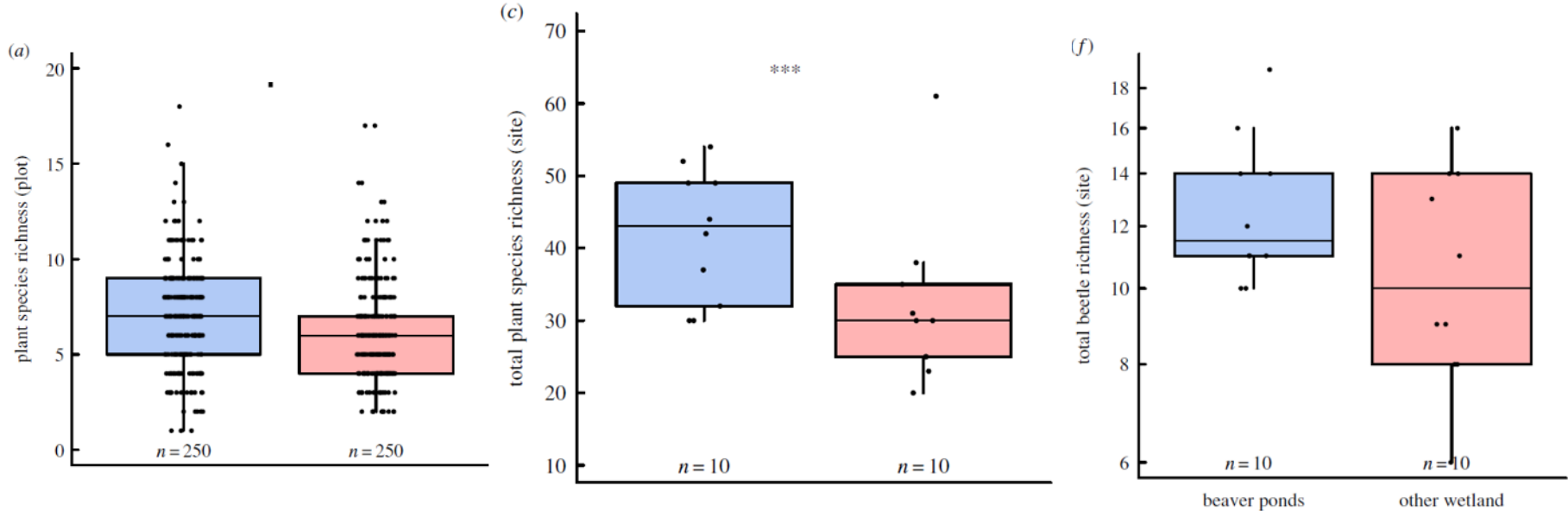
# Devon Wildlife Trust – enclosed beaver trial



**Figure 3.** Results of sampling the watercourse above and below the beaver enclosure.



# Are beavers better at building wetlands?



**Cite this article:** Willby NJ, Law A, Levanoni O, Foster G, Ecke F. 2018 Rewilding wetlands: beaver as agents of within-habitat heterogeneity and the responses of contrasting biota. *Phil. Trans. R. Soc. B* **373**: 20170444. <http://dx.doi.org/10.1098/rstb.2017.0444>

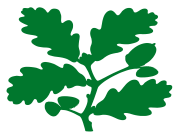






# Influencing policy and funding





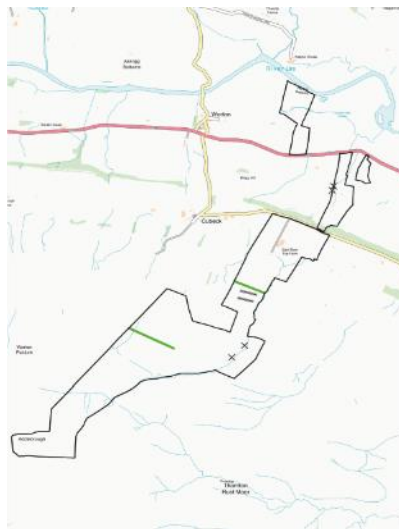
# Yorkshire Dales: Payments for Outcomes



Parallel project to Defra ELM  
Test project (PfO) looking at soils  
and pollinators

Co-design with group of NT  
tenant farmers

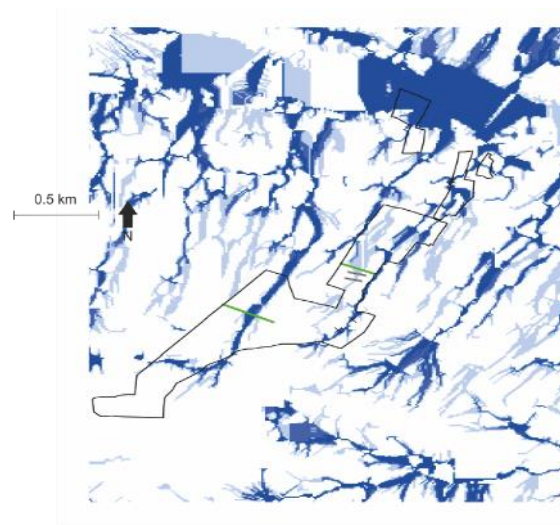
Exploring attitudes and  
constraints to installing NFM at  
farm level



Key opportunities:

- × Large Woody Debris
- Cross drain
- Hedgerow planting
- Drainage Network

Opportunity maps  
generated through  
SCIMAP and site visits





# Yorkshire Dales PfO - Reflections



Our farmers were keen on NFM; they wanted to know how they could help people downstream

Modelling and opportunity maps are a starting point for a conversation.

NFM interventions need to work within the constraints and context of the existing farm business.

Farmers want some control over water storage options e.g. an ability to release water from storage.

Monitoring is a key part of NFM but, if farmers are expected to participate (as in PfO), this requirement needs to be costed into any payment schemes.







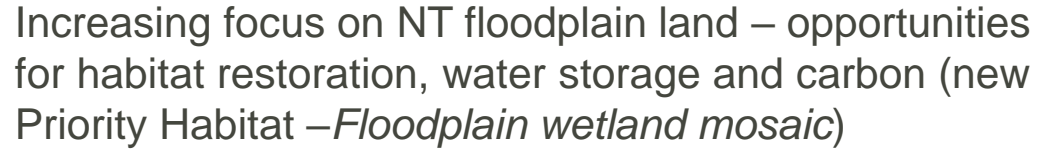
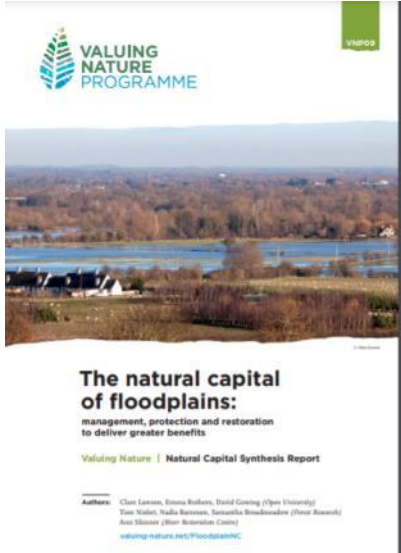
# Natural Infrastructure Scheme



Market-based mechanism: private contracts for farmers to improve the ecosystem services provision

- Market in avoided costs
- Multi-buyer, multi-seller model
- Farmer-led
- Payments incentivise change
- Sells a service based on results
- Designed for catchment scale delivery
- Stackable benefits / scope as part of post-CAP funding model





Work through Floodplain Meadows Partnership looking for opportunities to restore species-rich floodplain meadows (~ 2300ha remaining)

Asking for floodplains to have distinct status in future agri-environment schemes (and more widely as in development planning)

*...we need to rethink our relationship with floodplains...*





## Conclusions

- 'Window of opportunity' for NFM (post CAP land management, enthusiasm for delivery)
- Lots of NFM being pursued around NT estate. Key ingredients: seed corn funding and committed individuals
- SLOW, STORE & FILTER across the whole NT estate and beyond our boundaries
- Bespoke interventions to protect communities and our own assets
- Restoring natural processes for multiple benefits which include reducing flood risk

# Acknowledgements

National Trust

Exmoor: Ben Eardley, Nigel Hester

Upper Calderdale Craig Best, Rosie Holdsworth

NT Riverlands Partnership (Environment Agency & Rivers Trusts)

Floodplain Meadows Partnership

