Yorkshire Dales Rivers Trust

Yorkshire Dales Rivers Trust

www.yorkshiredalesriverstrust.com

More specific NFM information can be found at:
www.yorkshiredalesriverstrust.com/natural-flood-management

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Interreg North Sea Region WaterCoG
European Regional Development Fund
EUROPEAN UNION

Available Resources

Working with Natural Process to reduce Flood Risk- Environment Agency

https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk

Working with Natural Processes – Evidence Directory

Department for Environment Food & Rural Affairs

Llywodraeth Cymru Welsh Government

Cyfoeth Naturiol Cymru Natural Resources Wales

Environment Agency

Working with Natural Processes – the evidence base

Project Summary SC150005

Background

Working with Natural Processes (WWNP) to reduce flood and coastal erosion risk (FCRM) involves implementing measures that help to protect, restore and emulate the natural functions of catchments, floodplains, rivers and the coast. WWNP takes many different forms and can be applied in urban and rural areas, and on rivers, estuaries and coasts.

Rivers and floodplain management	Woodland management
• River restoration • Floodplain restoration • Leaky barriers • Offline storage areas	• Catchment woodlands • Floodplains woodlands • Riparian woodlands • Cross-slope woodlands
Run-off management	**Coast and estuary management**
• Soil and land management • Headwater drainage • Run-off pathway	• Saltmarsh and mudflats • Sand dunes • Beach nourishment

Why was the study needed?

There has been much research on WWNP, but it has never been synthesised into one location. This has meant that it has been hard for flood risk managers to access up-to-date information on WWNP measures and to understand their potential benefits.

What did the study include?

This study is made up of 3 interlinked projects which together make up the WWNP evidence base (see figure).

The Evidence Directory summarises the effectiveness of WWNP measures from a FCRM perspective as well as the wider ecosystem service benefits they may deliver. It is underpinned by:

- a detailed literature review
- Guidance on project monitoring
- 65 standalone case study examples
- 14 one-page summaries of each of the WWNP measures, which provide a high level summary of the material included in the directory

We have mapped the potential for WWNP. These maps are intended to be used alongside the Evidence Directory to help practitioners think about the types of measure that may work in a catchment and the best places in which to locate them. It is a useful tool to help start conversations with key partners. The maps are provided in spatial data and PDF format, and are supported by a user guide and a detailed technical guide.

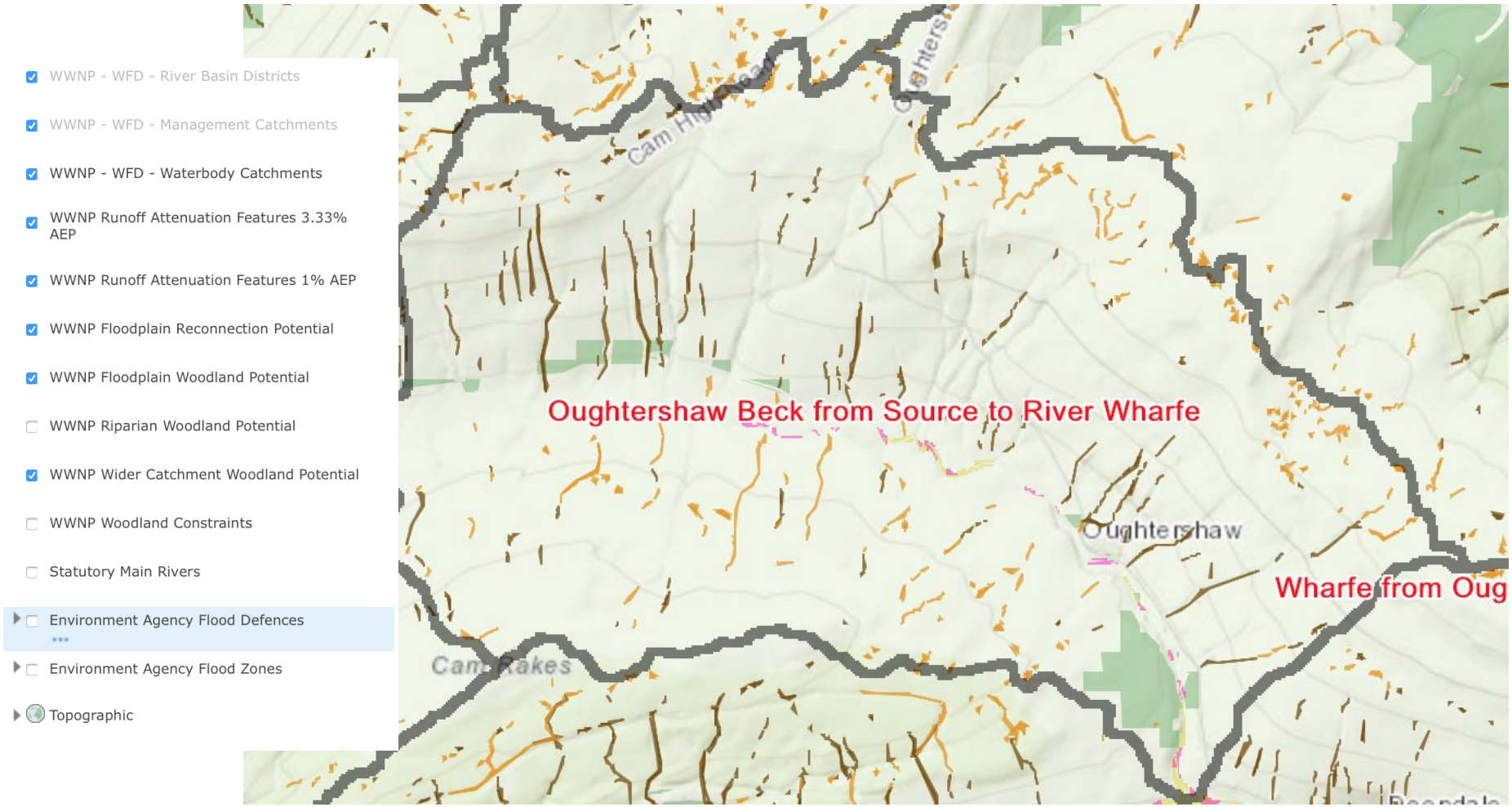
We have written a guide which sits alongside the Evidence Directory and the Maps, and explains how to use them to help make the case for implementing WWNP when developing business cases. It also includes guidance on implementing WWNP in areas at risk of groundwater flooding.

The **research gaps** that need to be addressed to move this form of FCRM into the mainstream are identified in the Evidence Directory. To help fill these gaps we have:

- worked with the Natural Environment Research Council to develop a £3.4 million research call to address some of these gaps with the aim of working in partnership with projects funded through this call to help advance science in this field
- shared the list of research gaps with catchment-scale Defra-funded natural flood management projects so they can address research gaps through long-term monitoring
- developed an evaluation plan to capture the outcomes of the monitoring conducted as part of Defra-funded catchment-scale projects so that learning can be shared across the WWNP community

Available Resources

Working with Natural Process to reduce Flood Risk- Environment Agency



Available Resources

Working with Natural Process to reduce Flood Risk- Environment Agency

Things to be aware of:

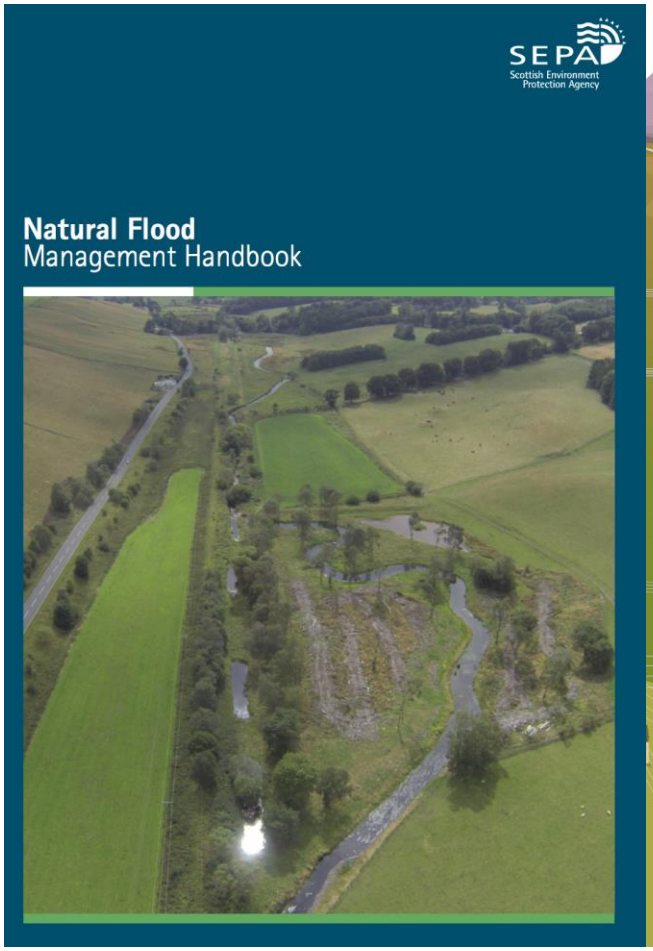
- **Not ground tested**
- **Limited constraints**, *i.e doesn't take into account Historic Environment, Argri Schemes*
- **Coarse resolution**, *only to 5 meters*
- **Not measure off effectiveness**

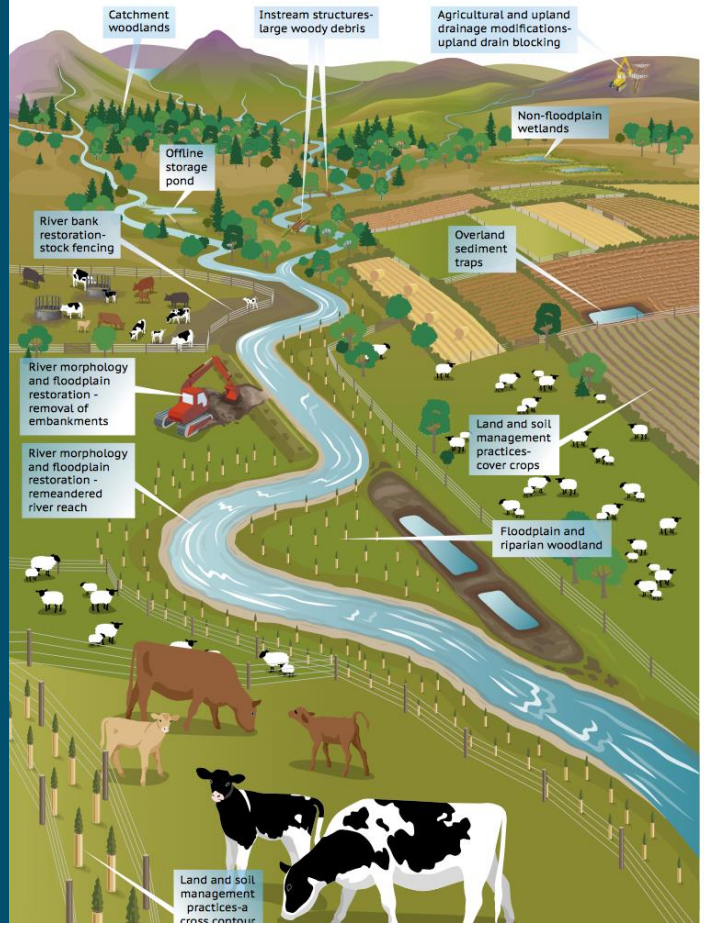
However is a good starting point

Available Resources

Natural Flood Management Handbook, SEPA

https://www.sepa.org.uk/media/163560/sepa-natural-flood-management-handbook1.pdf





2.2. WOODLAND CREATION

WHAT IS IT?

The planting and management of woodland areas at a range of scales throughout the catchment from floodplains to headwaters.

Woodland cover in Scotland has decreased greatly over the past few centuries, reflecting pressures for timber and to clear land for agriculture and built development. This decline has been reversed in recent decades, and there is now a commitment in the Scottish Forestry Strategy[22] for the area of land under woodland cover to increase from 17% to 25% by the second half of the 21st Century. This, and our improved understanding of how to manage Scotland's diverse forests sustainably, provides an opportunity for woodland creation to play an important role in benefiting the environment.

Well-sited and well-managed floodplain and riparian woodland can contribute to the delivery of a host of outcomes (Figures 2.8 and 2.9). They provide important wildlife habitat and increased canopy shade and shelter for water-based flora and fauna. They can also provide shelter and shade for livestock and prevent damage to crops and soil erosion. Trees absorb and lock up carbon thus helping to reduce net carbon emissions, while riparian woodland can stabilise banks and help prevent excessive deposition of sediment instream. Strategically placed woodland can also reduce diffuse pollution by intercepting pollutant laden runoff.

Figure 2.8. Native woodland in Glen Afric, Inver
copyright).

Although the effects of trees on hydrological processes such as interception are well documented, the effects on flood risk are less well studied. This is partly due to the relatively short data records available and the difficulty with isolating any effect of woodland from the effects of varying land uses and climate change. However, while the effects of woodlands on large scale floods are very unclear, modelling data suggests that woodlands may have an effect on local flooding (catchments less than 100km²) or more frequent flood events[23]. This appears to be particularly true for floodplain woodlands.

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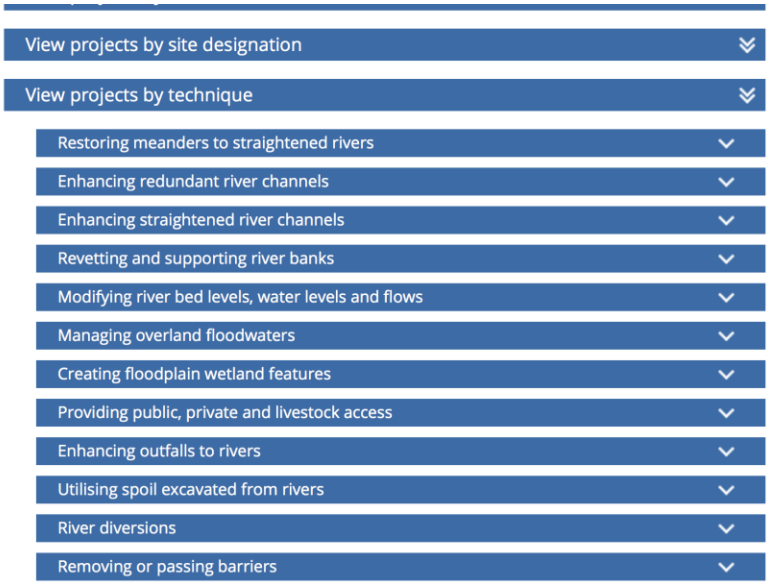
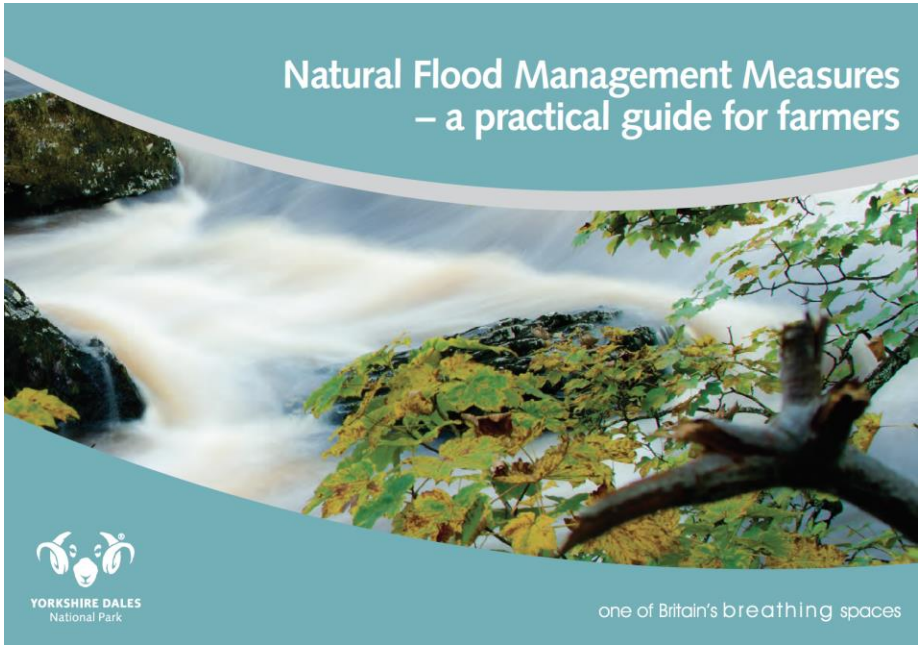
Available Resources

Manual of Techniques
River Restoration Centre
www.therrc.co.uk/manual-river-restoration-techniques



NFM Measures- a Practical guide for farmers
YDNPA/YDRT
www.yorkshiredalesriverstrust.com/natural-flood-management/



Opportunities

What options do we have?

Intercepting water before it gets to a pathway.

Slowing the pathways of water, both instream and overland.

Storing or holding water within the catchment, often referred to as RAF's.

Opportunities

Interreg
North Sea Region
WaterCoG
European Regional Development Fund
EUROPEAN UNION

Naturally Resilient

Intercepting water

- Catchment Tree Planting
- Moorland restoration
- Soil Management

Slowing Water

- Riparian Woodland; Wet woodland, floodplain planting etc.
- Riparian Buffer Strips
- Targeted Hedge planting
- Large Woody Debris
- Cross drains
- Cover crops

Holding Water

- **RAF's- Run Off Attenuation features**
- Scrapes and offline pond
- Low level Earth Bunds
- Sediment traps
- Wetland features
- Field corners

- Removal of flood banks or artificial structures
- Restoring natural features; restoring meanders or old paleo channels.

Natural Flood Management

Catchment Tree Planting

NFM Benefits
Retain water
Increase roughness
Slow the flow of water

Farm Business Benefits
Possible income
Shelter

Biodiversity Benefits
Shading
Cover
Habitat

Natural Flood Management

Riparian Buffer Strips

NFM Benefits
Retain water
Increase roughness
Slow the flow of water

Farm Business Benefits
Reduced liver fluke?
Stabilises river banks
Stock management

Biodiversity Benefits
Cover for all species
Good for invertebrates
Pollution buffer

"Changes in the land cover in riparian zones have the potential to make very large differences to flood peaks" by "Placing denser vegetation in these areas could potentially reduce flood peaks by 12 % during a 15 mm per hour rainfall event"

Natural Flood Management

Large Woody Material

NFM Benefits
Increase channel roughness
Slow the flow of water
Encourage water on to the floodplain

Farm Business Benefits
It should effect a farm business

Other benefits
Cover
Sort gravels
flow diversity

Natural Flood Management

Soil Health

NFM Benefits
Increase the ability to hold water

Farm Business Benefits
Increase yield and fertility
Increase profit

Biodiversity Benefits
Reduced soil loss

Natural Flood Management

Wetland features

NFM Benefits
Hold back flood waters
Regulate a more natural water flow

Farm Business Benefits
Options under new stewardship

Other benefits
Wetland habitat

Natural Flood Management

Cross Drains

NFM Benefits
Intercepts run off pathways

Farm Business Benefits
Better maintenance of tracks

Natural Flood Management

Hedge Planting

NFM Benefits
Help intercept overland run-off
Locally reduce soil compaction
Intercept rainfall

Farm Business Benefits
Shelter
Long term boundary solution

Other benefits
Linking up habitats
Habitat corridors

Natural Flood Management

Leaky Dams

NFM Benefits
Hold back flood waters
Replicate natural processes
Increase catchment roughness

Farm Business Benefits
Doesn't effect a business?

Other benefits
Reconnection with the floodplain
Instream flow diversity
Good instream habitat

Natural Flood Management

Sediment Traps

NFM Benefits
Hold back flood waters

Farm Business Benefits
Longer term sediment management

Other benefits
Reduces the need for dredging

Thing to remember

Things to be aware of when considering opportunities:

The Check list

- Planning Permission
- Land drainage Consent
- Historic Environment
- SSSI, SACS, BAP and other designations
- Public rights of way
- Landowner consent
- Tenant consent

Other opportunities

- **Business benefits**; shelter, soil improvements, yield improvements, bank stabilization, potential stewardship schemes
- **Other Wildlife benefits**; breeding waters, linking up habitat, encouraging natural processes.