



Natural Water Retention Measures

Web-based knowledge
Community of practice
NWRM practical guide



Pilot Project - Atmospheric Precipitation - Protection and efficient use of Fresh Water: Integration of Natural Water Retention Measures in River basin management

Service contract n°ENV.D.1/SER/2013/0010

Experiences from the UK: Upstream Flood Management in Belford Catchment

Heather Williams
AMEC





The A3

Efforts to pump water off the Levels and back into the rivers are under way around the clock

Fourteen severe flood warnings are in place in Berkshire and Surrey

Flooded homes along the River Thames are being evacuated and thousands more are at risk, with water levels expected to keep rising for the next 24 hours.

Residents in one Berkshire village say the scenes are from a "horror movie".

Fourteen severe flood warnings are in place in Berkshire and Surrey

UK Winter Storms

River dredging 'to start in March'

Flood grants



29 January 2014 Last updated at 1

How do you stop

With parts of the UK continuing to experience severe winter floods in years, how can flooding be prevented or reduced?

Here are some of the main methods



The Somerset Levels have been flooded for several weeks



supported by
the Blueprint for Water

Floods and Dredging – a reality check

February
2014



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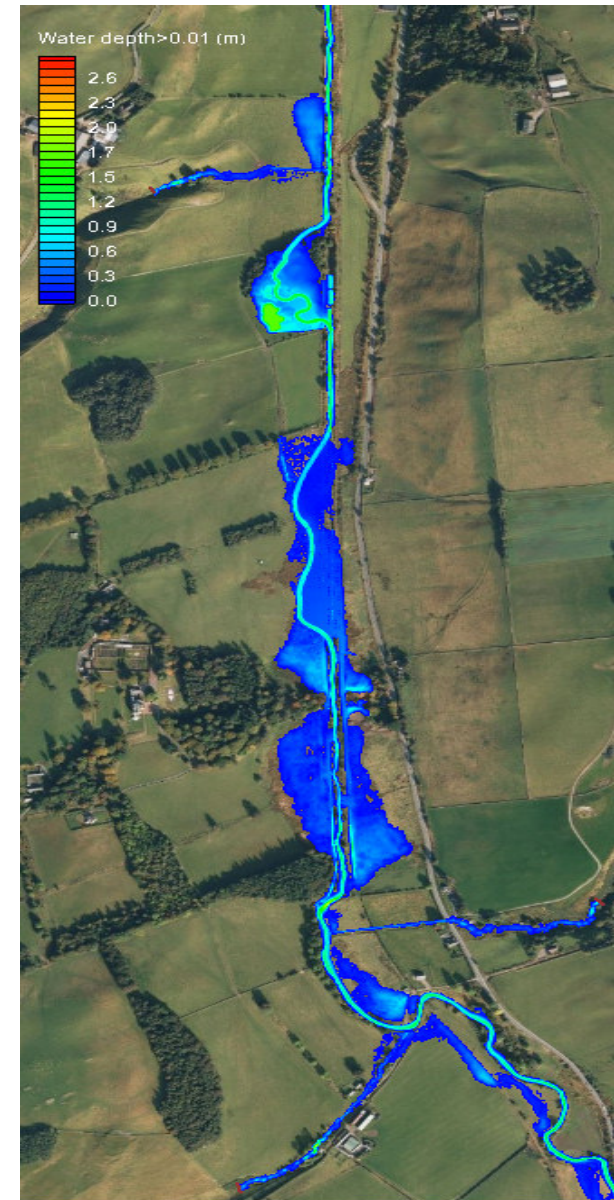
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Related Stories

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could stop

Examples of Upstream NFM: Eddleston Water



Re-meandering for river restoration and flood management
Photos courtesy of Chris Spray, University of Dundee

Examples of Upstream NFM: Trees on the Uck



www.treesontheriveruck.org.uk

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Trees on the River Uck Project

Trees on the River Uck is a new and innovative project that hopes to decrease the impacts of flooding in Uckfield town, by restoring natural river features such as floodplain woodlands.

**Trees on the River Uck
Project - Blog**

Examples of Upstream NFM: 'Upstream Thinking'

[Home](#) | [Site Map](#) | www.upstreamthinking.org



UPSTREAM
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A South West Water Initiative

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What is Upstream Thinking?



Where does your tap water come from? After the rain falls from the skies, what happens to it?

Here in the South West, many of our reservoirs are up on the moors, and we transport raw water

Peat bog work holds water

Restoration of peat bogs on Exmoor has resulted in a third less water leaving the moorland during heavy rainfall compared with three years ago, a new study shows.



South West Water and its partners are in the process of restoring the peat bogs of Exmoor, which had previously been drained.

By blocking up drainage ditches, the moorland can now hold more water and release it more slowly, reducing potential flooding elsewhere and improving water quality.

In order to evaluate whether the restoration

Did you know?

Worldwide peatlands are huge carbon stores, but damaged areas release carbon dioxide (CO₂) into the atmosphere through oxidation processes.



Restoration halts oxidation and promotes active peat growth thus increasing the absorption of CO₂ from the atmosphere.

The restoration of peatlands could play a major role in mitigating against atmospheric CO₂ rises.



The ongoing mapping of peatland ditches and cuttings from



Case Study: Natural Flood Management in Belford Catchment

UK case study: Information provided by Mark Wilkinson, James Hutton Inst.

Managing flood risk to Belford village, northeast England

Had a history of flooding, but traditional flood defences were not cost effective

Upstream scheme cost approx €250000, compared to hard engineering defences estimated at €3 million

Implemented by:

- Environment Agency
- Newcastle University
- Farmers (landowners)

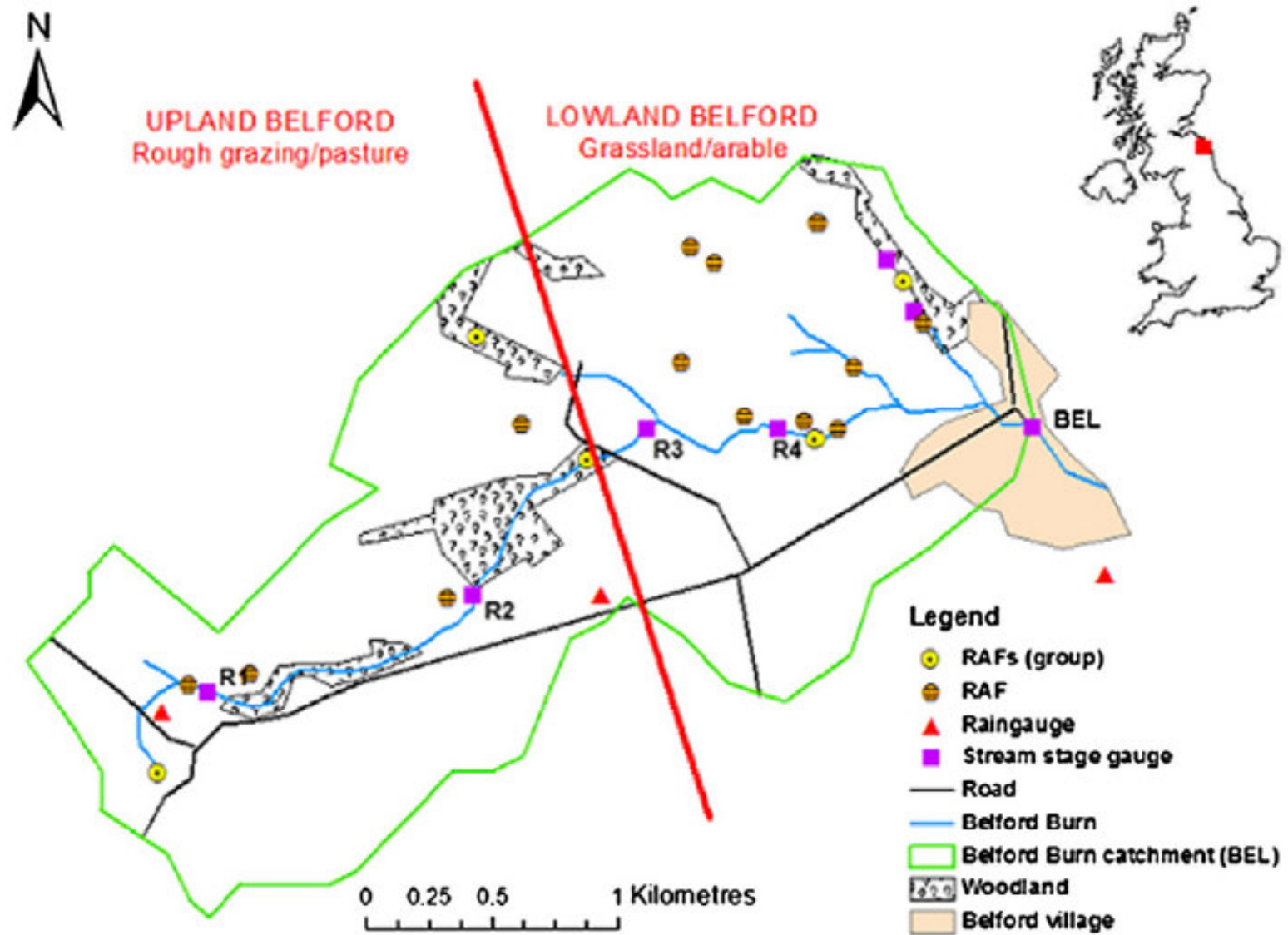


Fig. 2. The Belford Burn catchment showing the hydrometric network and Runoff Attenuation Feature (RAF) sites.



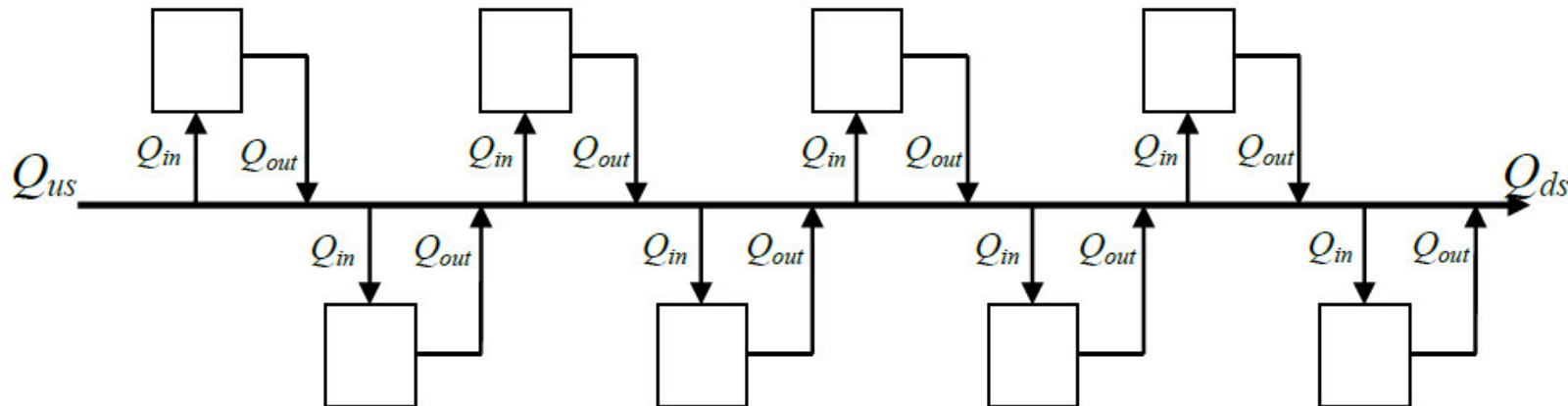
Small-scale Runoff Attenuation Features
 Photos courtesy of Mark Wilkinson, James Hutton Institute

Quantifying effectiveness (1)

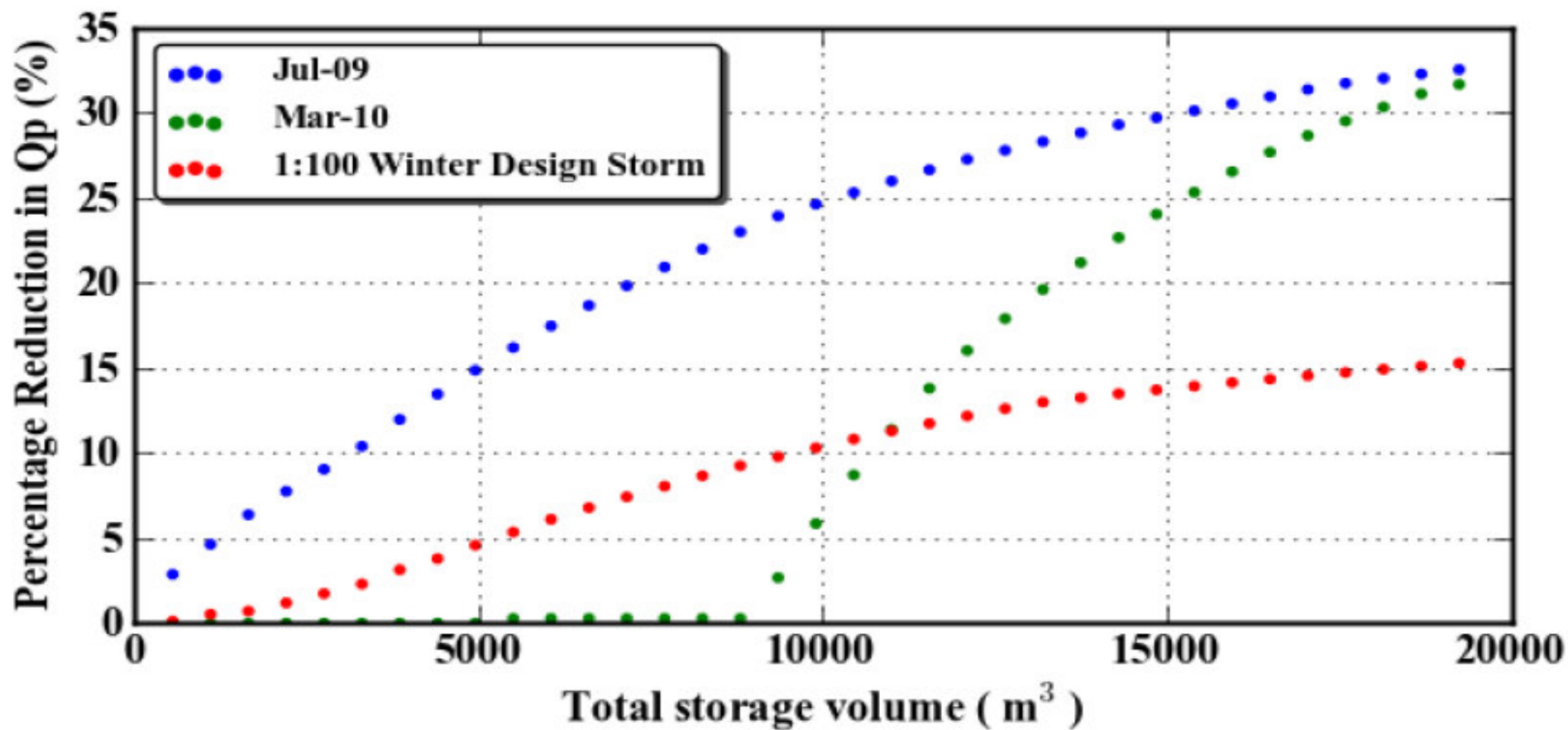
Detailed monitoring network provides 'before' and 'after' data

Modelling allows more flexibility in assessment

Understand effects of network of measures



Quantifying effectiveness (2)



Quinn *et al* (2013) Potential use of runoff attenuation features in small rural catchments for flood mitigation.

Quantifying effectiveness (3)

Not only hydrological effectiveness: also water quality benefits

Sediment retention:

- SS: 40% net retention
- TP: 25% net retention
- NO₃: 15% net retention

(Nicholas Barber PhD)

Different measures may be more effective for flood and water quality management

Sediment management is crucial to maintain effectiveness. Sediment can be re-used





Implementation and maintenance

Stakeholders:

- Environment Agency
- Northumbrian Regional Flood Defence Committee
- Newcastle University
- Farmers (landowners)
- Northumberland Rivers Trust

Financing:

- Public funding from Environment Agency (raised by Local Levy, though Local Authorities)
- No compensation to land-owners, except one-off payment for land access. Land take relatively small

Maintenance:

- Currently carried out by Environment Agency and local Rivers Trust
- Long-term agreements needed



Key Points

Effectiveness:

- Both monitoring and modelling provide evidence of effectiveness
- Individual measures are small: it is a network, not an individual measure, that can be effective
- Most appropriate measure will vary with location and intended purpose
- Be realistic- it can't prevent all flooding!

Implementation:

- Engaging stakeholders is key: landowners and local residents
- Timescales can be long
- Implementation helped in this case by research institute
- Long-term maintenance agreements and funding needed

More information can be found at: <https://research.ncl.ac.uk/proactive/belford>

Thank you for your attention

