Ensuring NFM investment mitigates floods

UKRI Natural Environment Research Council

Nick Chappell

n.chappell@lancaster.ac.uk

Lancaster University

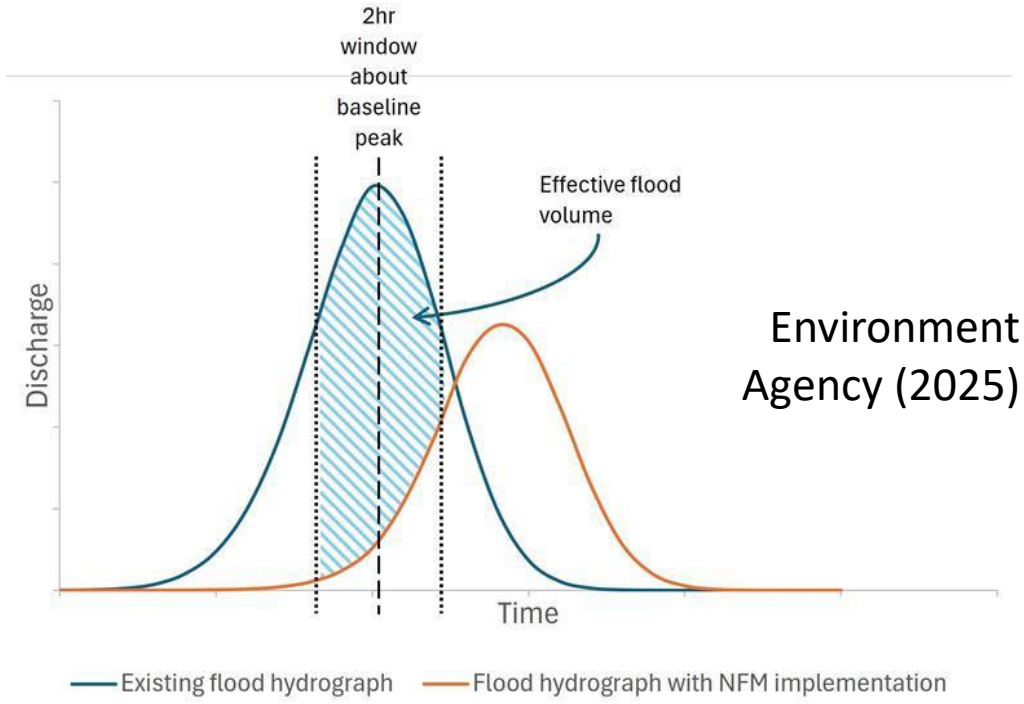
Environment Agency

10 years of visionary investment

objective-based monitoring-analysis

How much temporary storage* needed at flood peaks?

Chappell et al (2023)
Chappell & Beven (2024)



Environment Agency (2025)

* dynamic equivalent storage

guide : 1,000 $m^3/km^2/\pm 2hrs$

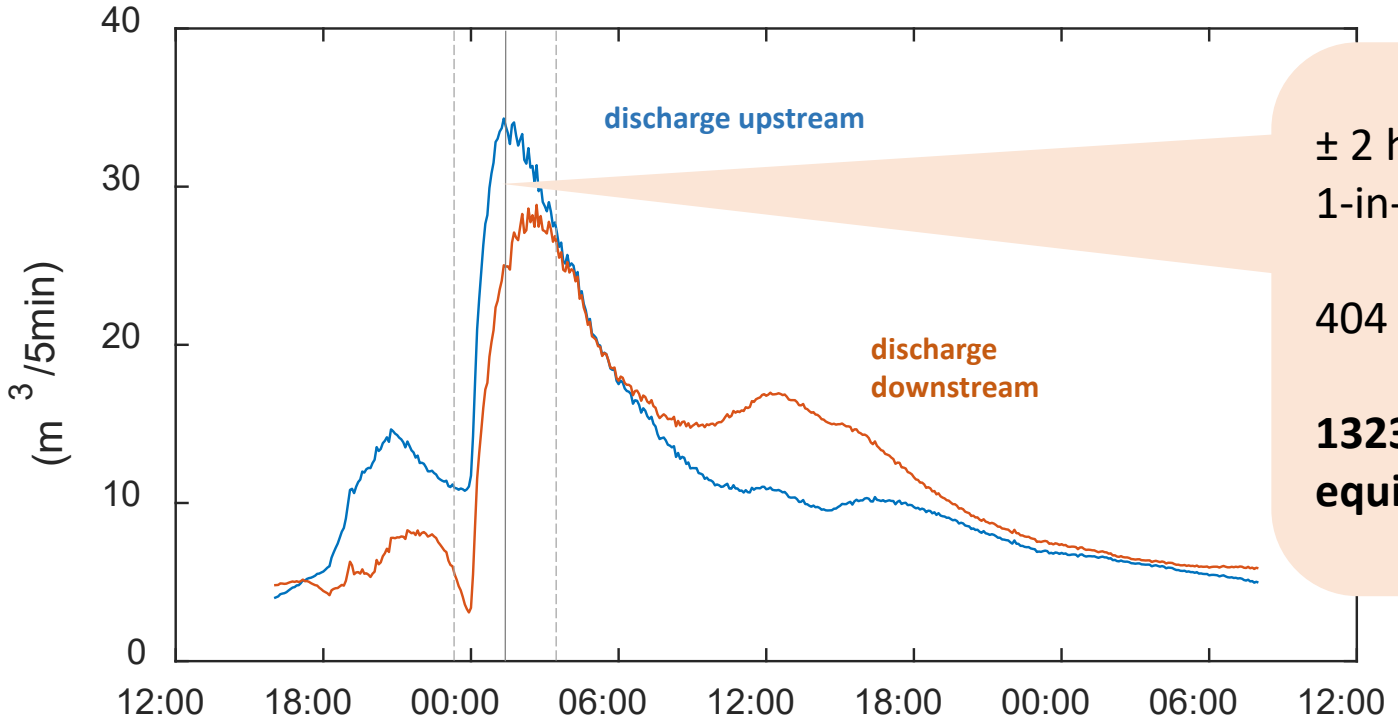
Q1: Is it working at flood peaks?

unchanging channel bed & level control

Find out :

volume change (m^3)
@ peak levels (m) in local watercourse

Q2: Is it delivering sufficient volume (m^3) at flood peaks?



± 2 hr window around 1-in-1 yr flood peak

404 m^3

1323 m^3/km^2 equivalent volume

Alt: upstream-downstream high-fidelity discharge

Find out :

volume change (m^3/s) per high fidelity discharge @ peaks (m^3/s)

Map: Cumbria County Council

Stockdalewath

Cockermouth

Warcop

Grasmere

Innovation development

Innovation development

CiFR-Lancaster

SMART monitoring

This project is funded by Defra as part of the £200 million Flood and Coastal Innovation Programmes which is managed by the Environment Agency. The programmes will drive innovation in flood and coastal resilience and adaptation to a changing climate.

Working for Cumberland Council and Westmorland & Furness Council

Reference stream monitors

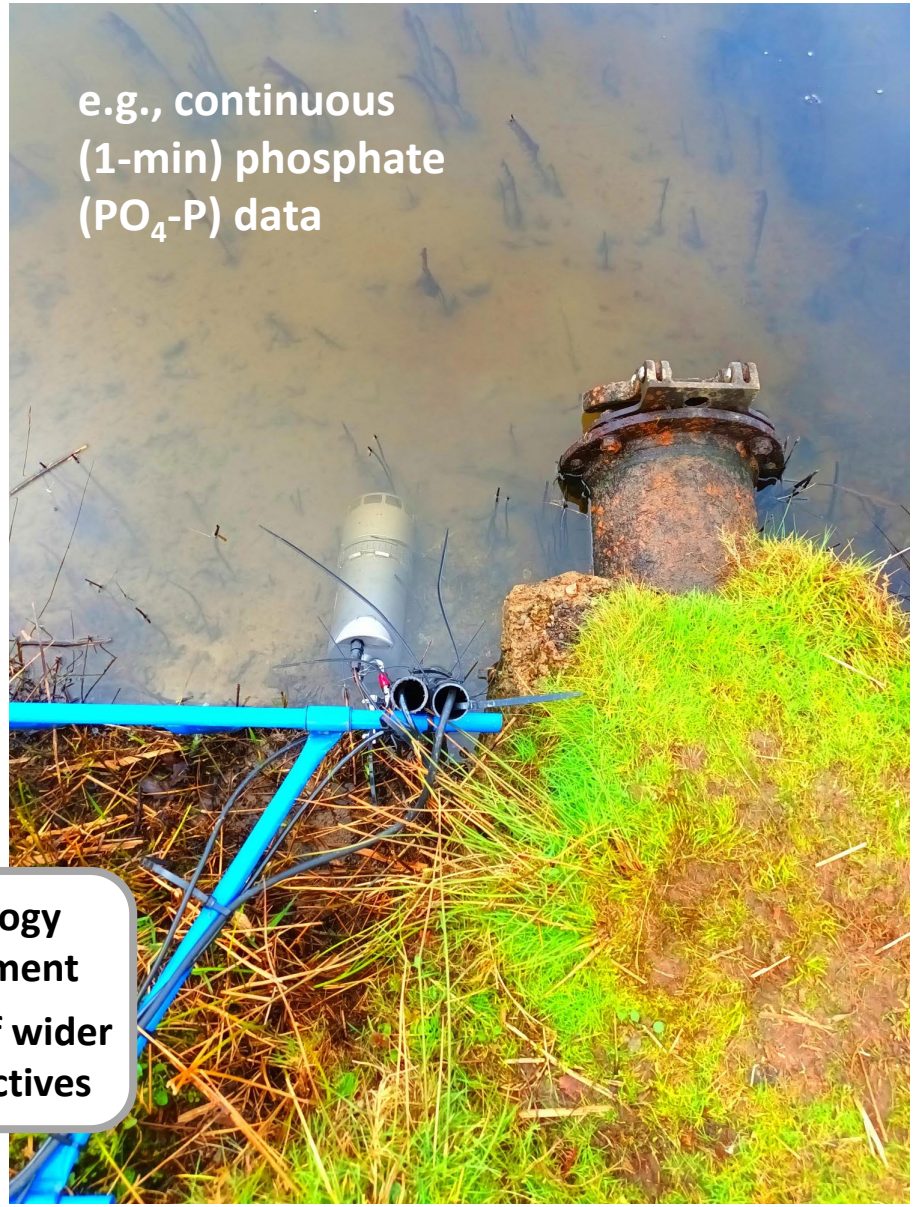
Cockermouth

Grasmere

Stockdalewath

Warcop

Technology development systems



Technology development

efficacy of wider NbS objectives