

How can we enhance the role of local land and water users in delivering catchment scale water ecosystem services ?



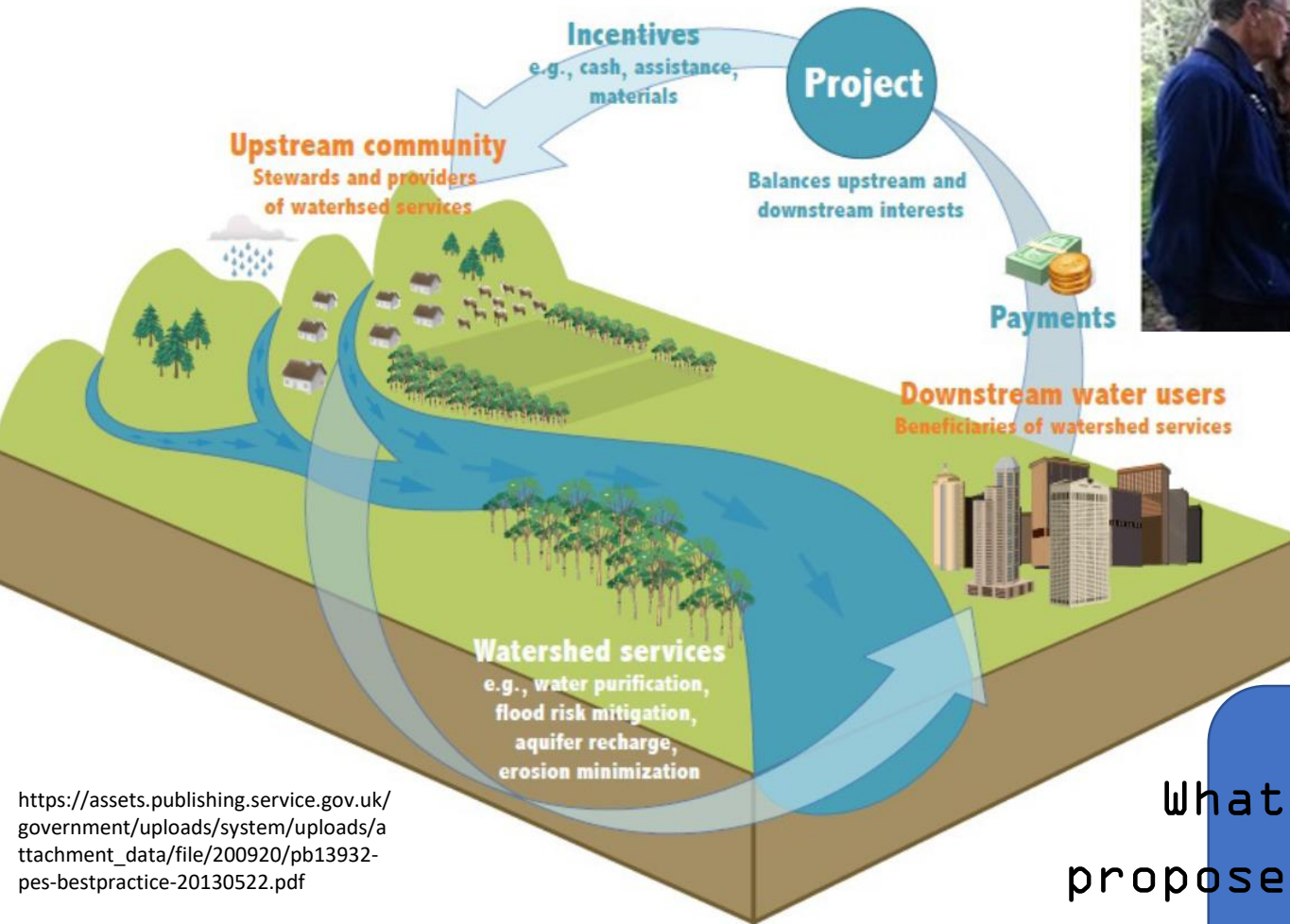
Andy Vinten, Orla Shortall
and Laure Kuhfuss
James Hutton Institute



Scottish Government
Riaghaltas na h-Alba
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Payments for Ecosystem Services – Lessons (PES-LES)



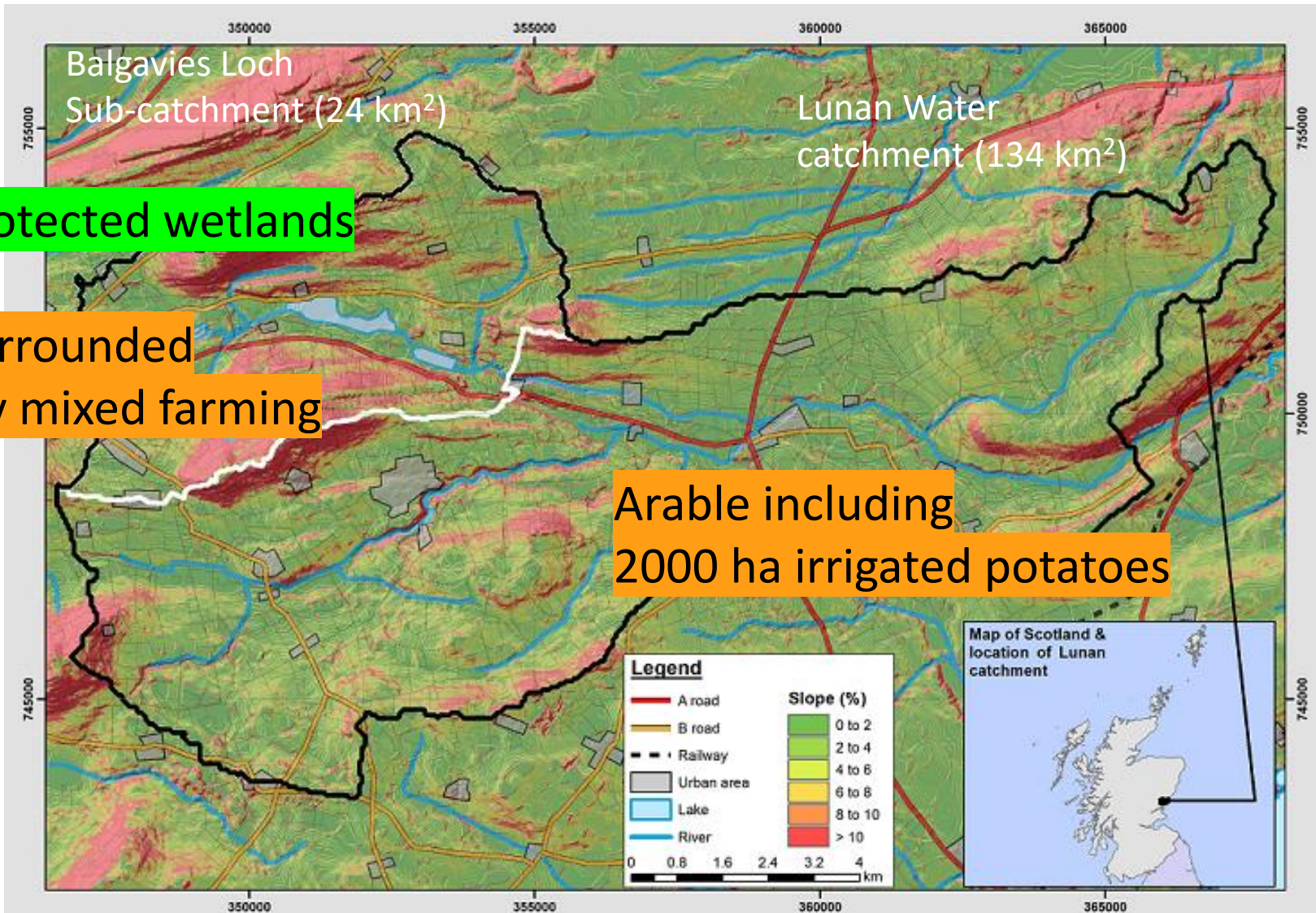
What happens when we propose PES schemes for water management?

Lunan Water catchment Eastern Scotland

Protected wetlands

Surrounded
by mixed farming

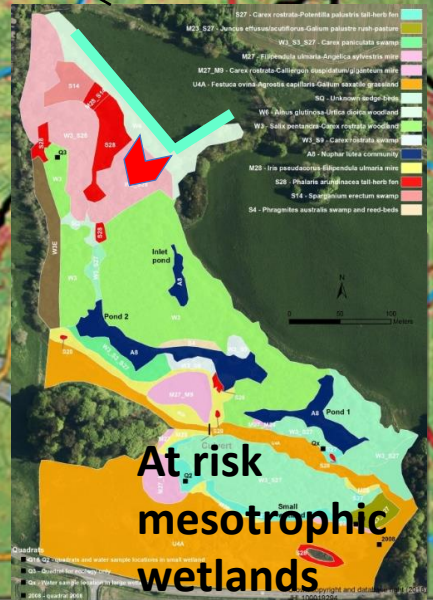
Arable including
2000 ha irrigated potatoes



Water issues and PES schemes



Upward trends
in water levels



Potential irrigation
restrictions
4 years in 10



Two schemes



*Upper Lunan Water
Catchment – Eastern Scotland*

1. Water for all

Issues: Irrigation restrictions, wetland conservation, flood risk

Scheme: improved hydraulic management via smart weir

Payments: survey of willingness to pay x governance

2. Fishing for farmers

Issues: Erosion and nutrient runoff to lochs, rivers and wetland

Scheme: rural Sustainable Drainage Systems

Payments: AECS, SNH or local fishing agreements

Water for All : Improve water ecosystem services by smart control of water flows

Impact at low flows

2014 interviews Local concerns :

flooding, wetland ecology, irrigation, fisheries and water quality

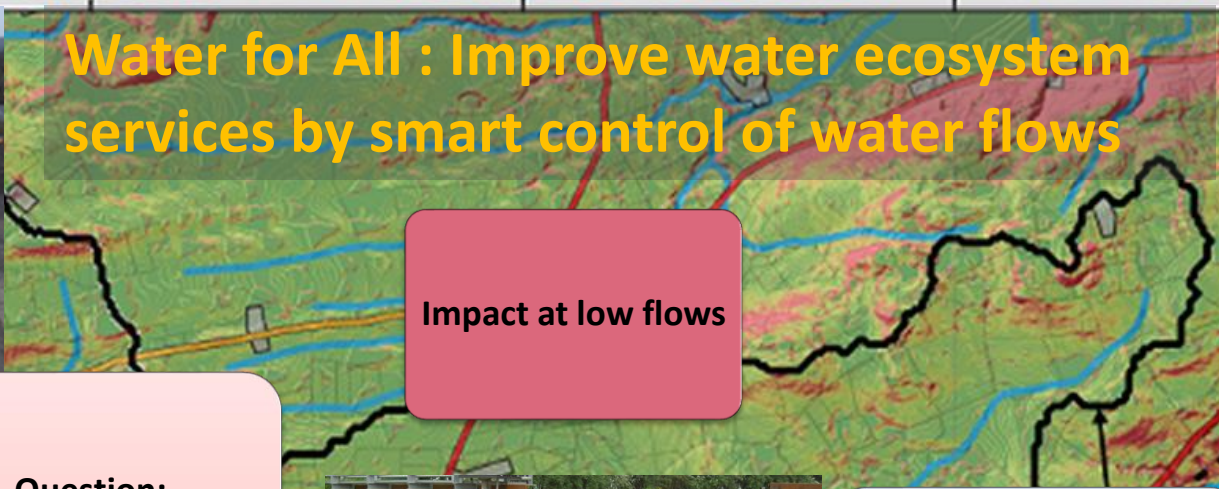
Question:

Could water levels in lochs and wetlands be managed to give better ecosystem services across the catchment using smart hydraulic controls?

Impacts on wetland ecology

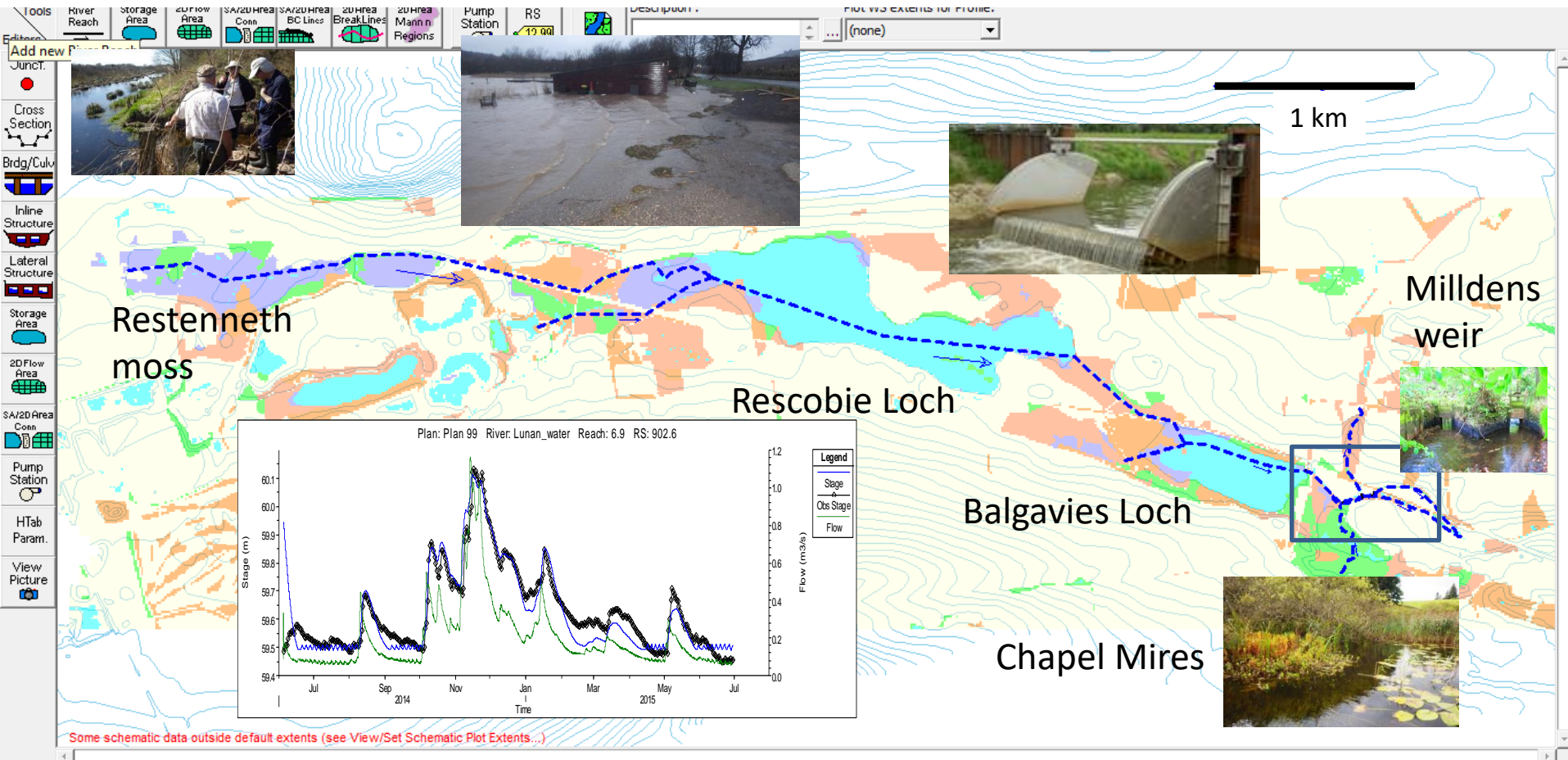
Lunan catchment group

Flooding impacts

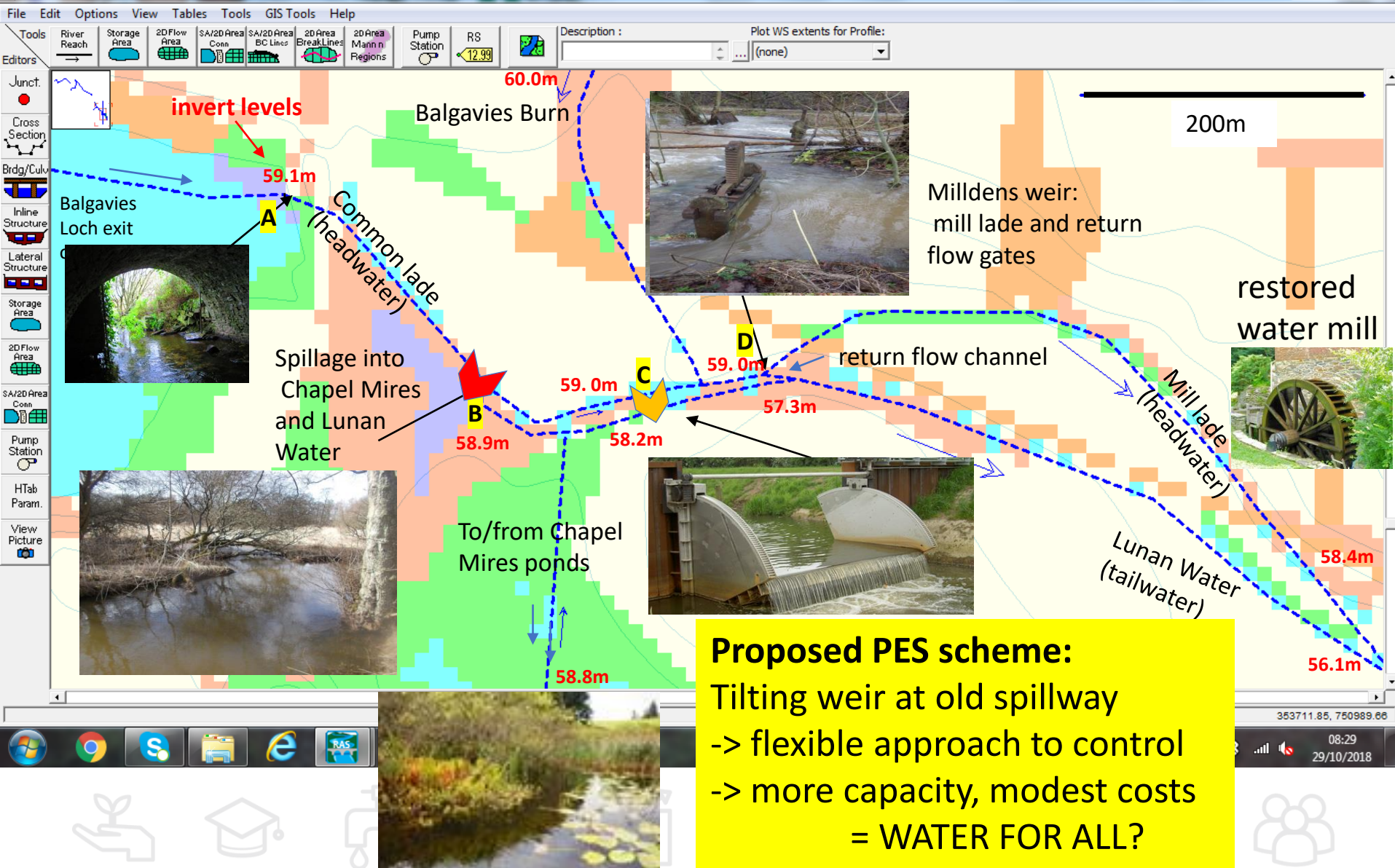


Hydraulic model of upper catchment

HECRAS 5.0.1



Historical hydraulic controls d/s Balgavies Loch





Water for All : Improve management of water by flexible control of water flows

Local stakeholder concerns identified:

flooding, wetland ecology, irrigation, fisheries and water quality

Question:

Could water levels in lochs and wetlands be managed to give better ecosystem services across the catchment using smart hydraulic controls

Impact at low flows

Smart weir at loch outlet

Delays restricted irrigation;
annualised benefit of ca £30k

Impacts on wetland ecology

Smart weir on mill lade d/s Loch

Diverts sediment and nutrients from Chapel Mires at critical times

Flooding impacts

Smart weir at loch outlet/dredging

Lower upstream flood risk



Local Survey on attitudes

Wetland and biodiversity conservation
(Choices: ++,+ ,0,-,--)

Willingness to pay
X
Governance method

*Participants
weight their choices
of objectives*

Reduction of low flow risk
(Choices: ++,+ ,0,-,--)

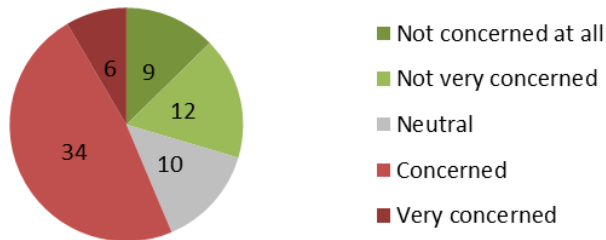
Reduction of flood risk
(Choices: ++,+ ,0,-,--)

“Benign neglect”

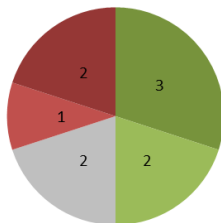
Survey – concerns and priorities

- implemented July - August 2017
- Postal + internet survey
- 73 responses (farmers + residents)

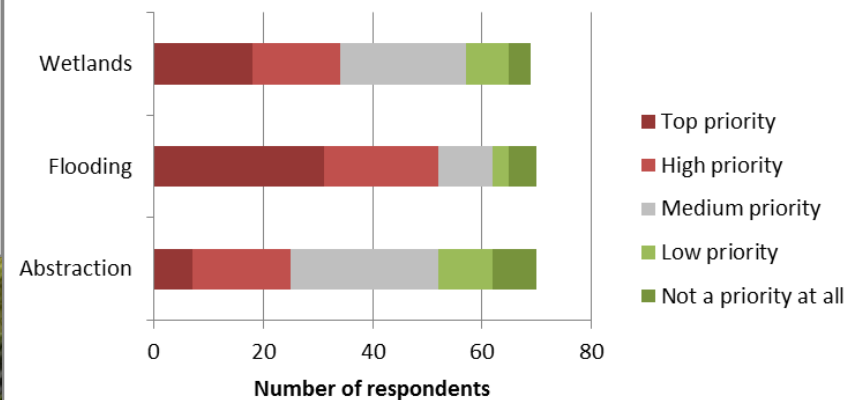
Concern regarding flooding



Concern about restrictions on abstraction



Priorities



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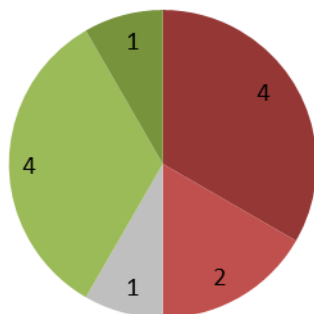
Survey – acceptance of project

- A controversial project ?

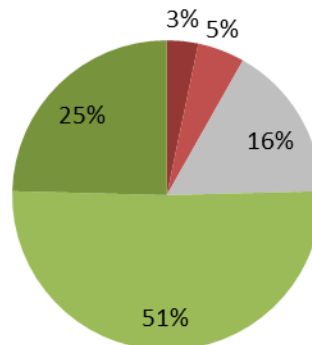
a) Should the project be implemented?



b) Should the project be implemented?
Farmers



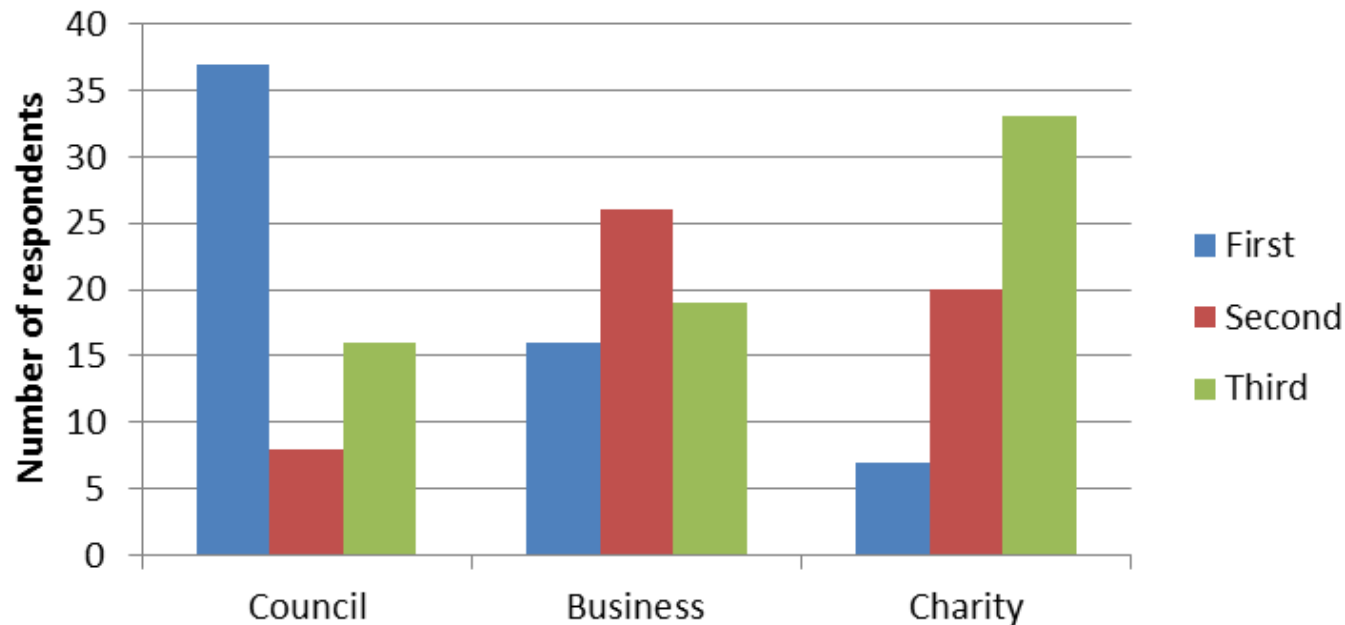
c) Should the project be implemented?
Residents



- 2 types of concern:
- About the project itself
 - About its governance

Survey – governance

Order of preference for governance



Developing management instruments



Riparian owner concerns:

Will it work?
Will I get the blame if it doesn't?
Who's responsible?
Will I get my say?

Agency concerns:

SNH- wetland ecology
SEPA – WFD / low flows
Angus Council – floods
Who will run it?
Rivers Trust?
Community Interest Company?
Agency?

Governance evidence

SURVEY:
Willingness to pay
X
governance

Local share offer?
Public finances
Charitable trust?

Eco-hydrological and hydraulic model evidence

What are the changes in delivery of benefits and risks?

Benefits spread across users
Multiple intervention points

Robust long term funding streams

Capital (<50k) and running costs <10k pa relatively minor

Business plan and liability agreed **before** consent application to SEPA

*Everyone should be quick to listen, slow to speak and slow to become angry
James 1,19*

<http://www.hutton.ac.uk/research/projects/payments-ecosystem-services-lessons>

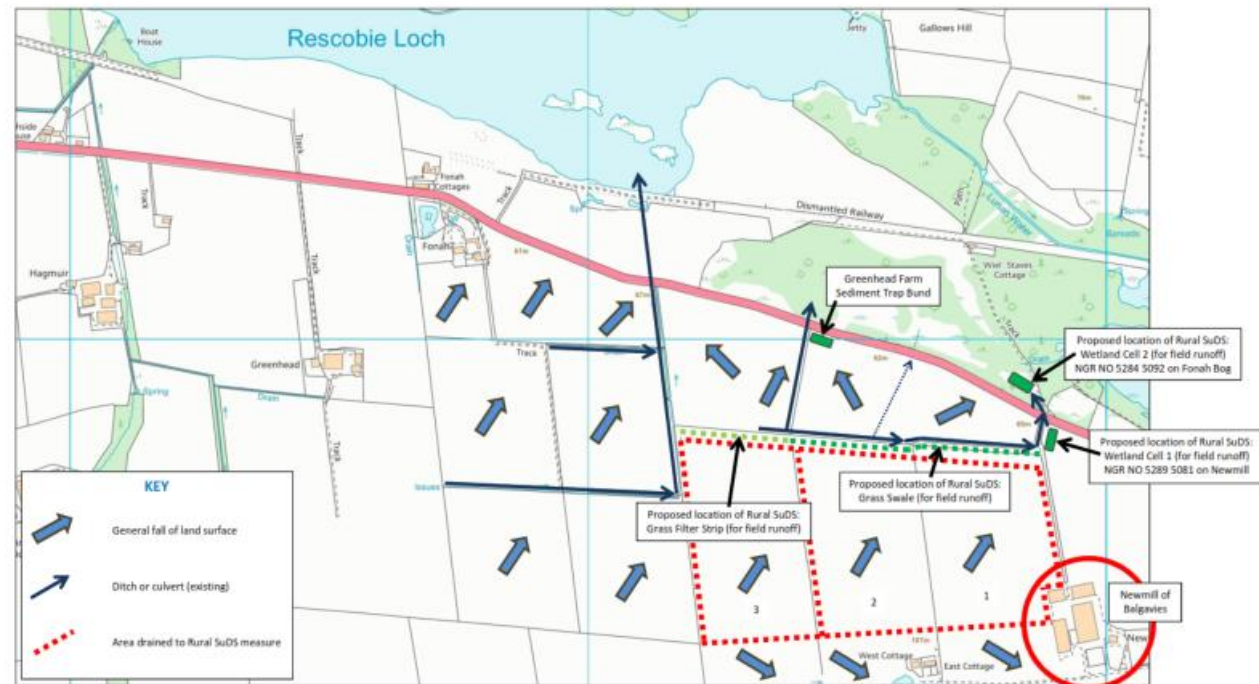
Comment from a farmer at Glensaugh event:
"Farmers will never seek collaboration unless it is mandatory"

Barriers to implementation

- Challenging to demonstrate technical feasibility on paper
- Predicted benefits thinly spread across users
- Strong concerns on long term management/legal issues
- No clear champions of the scheme
- Onerous to pursue approval for installation/management
- Benefits perceived to be insufficient or uncertain
- Lack of precedence for PES
- Need for drainage boards in Scotland?



Fishing for farmers



Barriers to implementation

- Cross-boundary issues
- Interaction of rural SUDS with roads
- Soil management before edge of field measures
- Preference for local solutions vs government schemes
- Inertia and process fatigue

A close-up photograph of a brown, oval-shaped egg and a grey, textured, irregular object, possibly a piece of wood or a piece of bark, lying on a bed of green grass. The egg is positioned in the upper left, and the grey object is in the lower right. The grass is vibrant green and appears to be a type of grass with long, narrow leaves. The lighting is natural, suggesting an outdoor setting.

What happens when we
propose PES schemes for
water management?

*Look for thirst,
not water!*

Thank you



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**More information for
later questions if needed**



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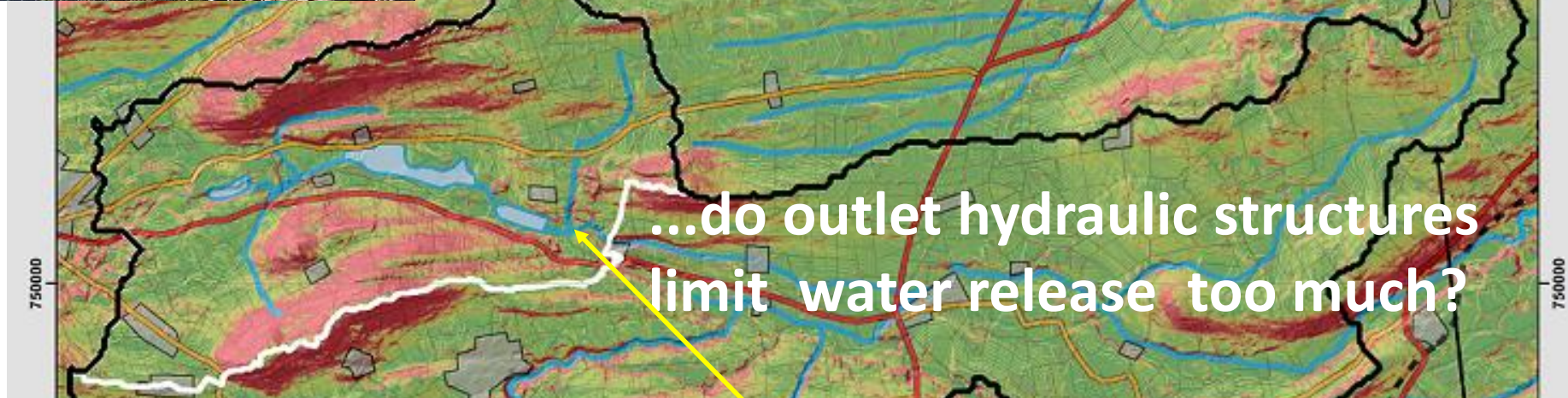
- <https://www.hutton.ac.uk/research/projects/payments-ecosystem-services-lessons>
- <https://www.hutton.ac.uk/research/projects/lun-an-water-diffuse-pollution-monitoring-project-first-10-years>



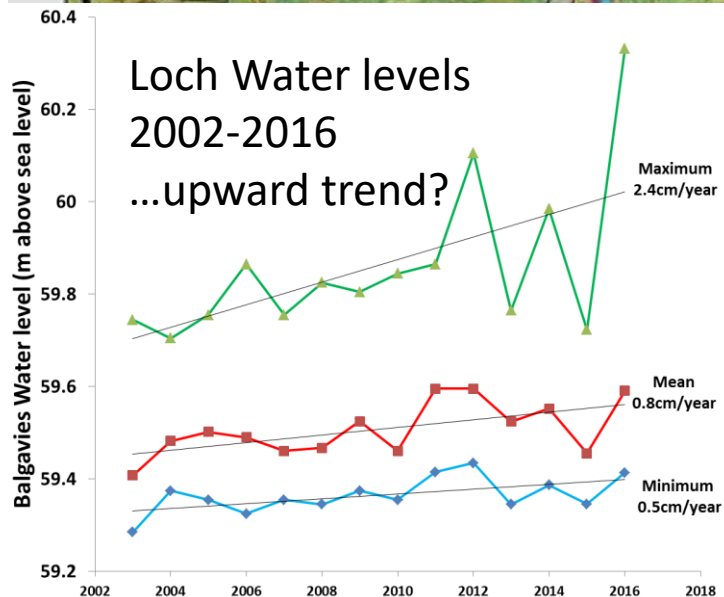
Wetland services at high flows



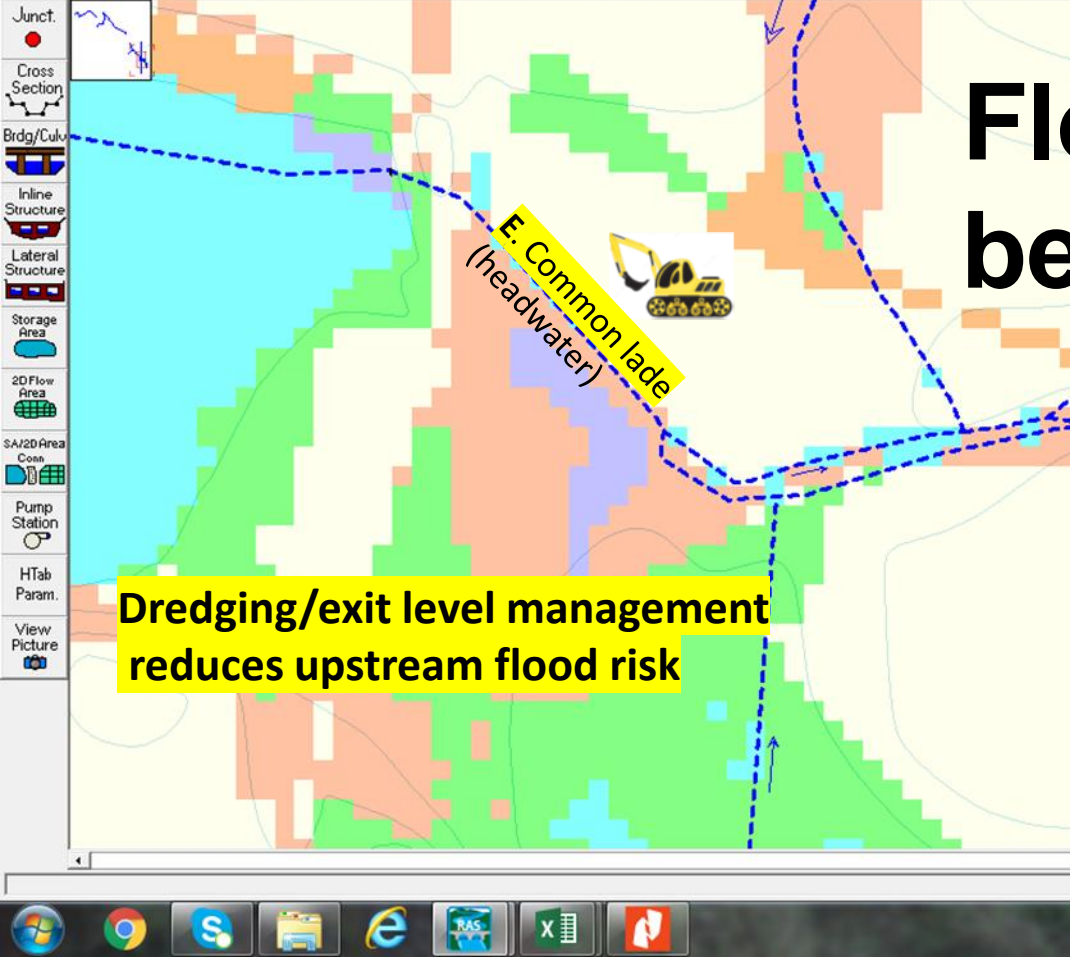
Upper catchment wetlands
slow floodwaters but...



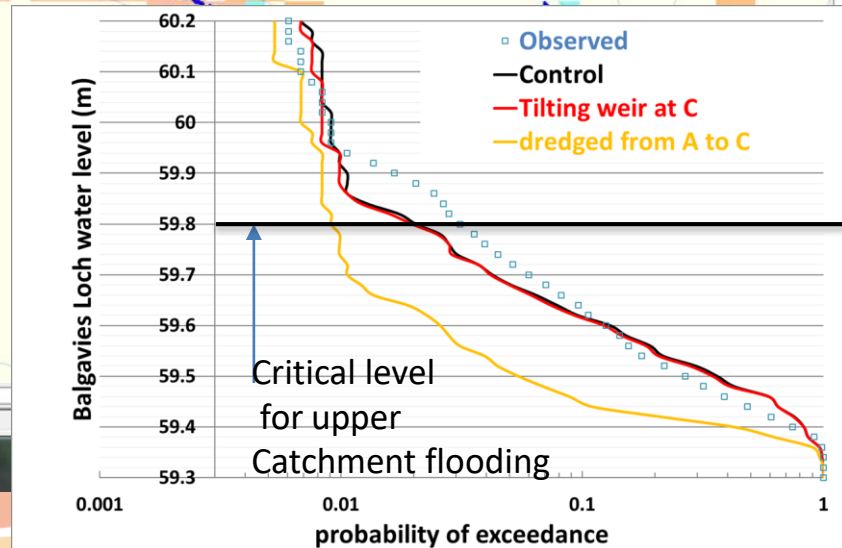
...do outlet hydraulic structures
limit water release too much?



Water for all



Flood risk benefits

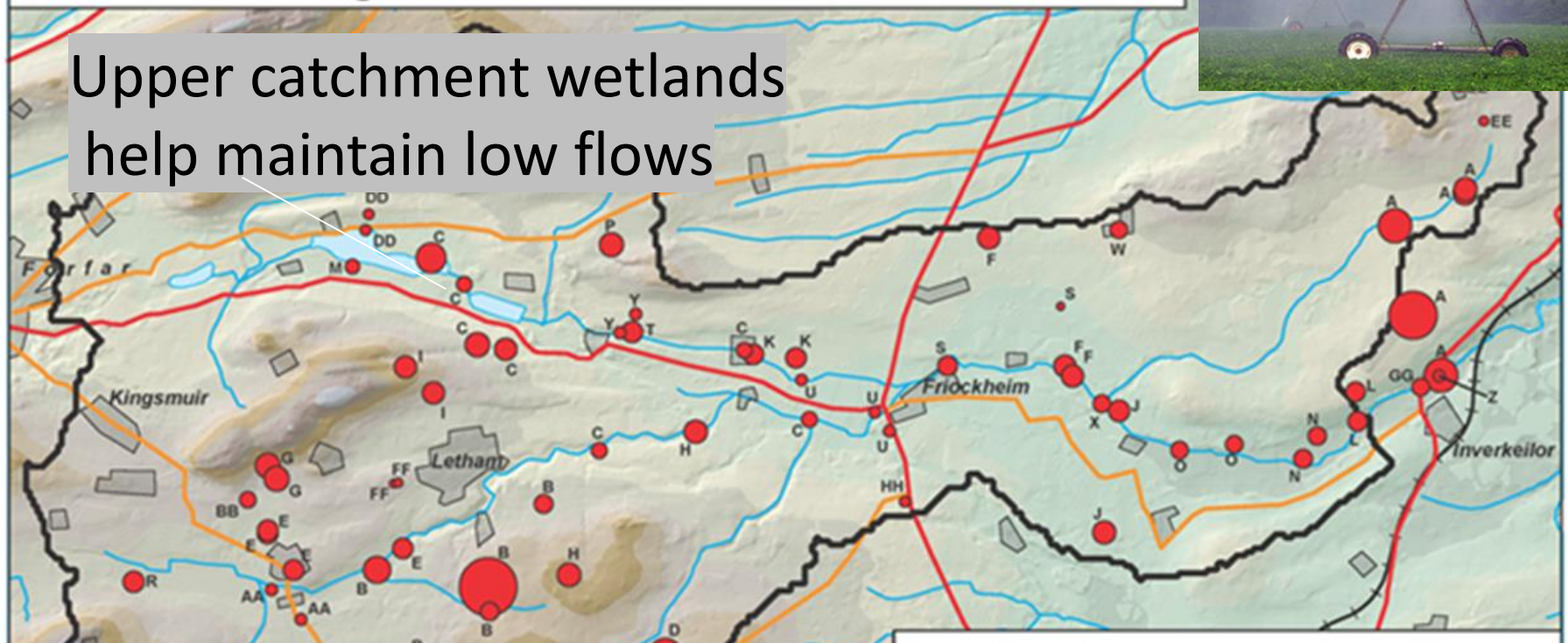


Wetland services at low flows

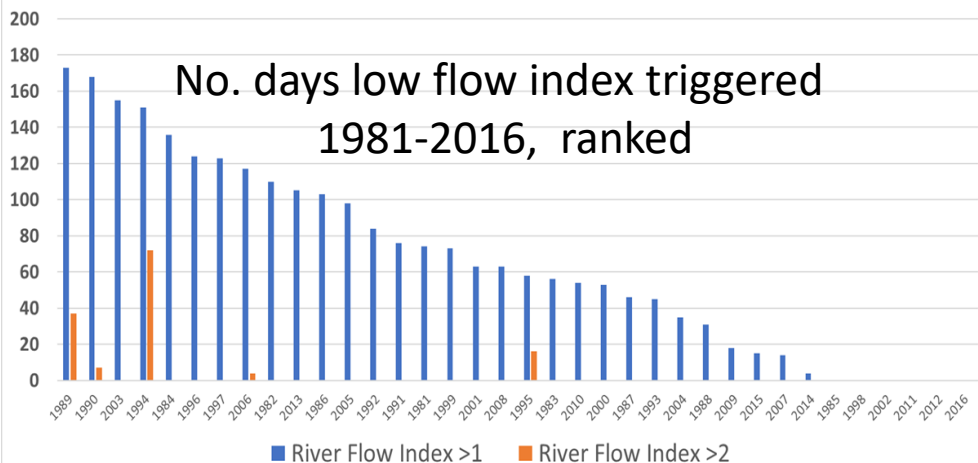


Lunan Water irrigation: maximum licensed abstractions

Upper catchment wetlands
help maintain low flows



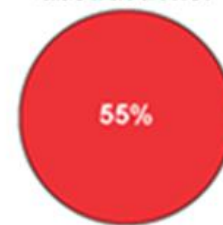
No. days low flow index triggered
1981-2016, ranked



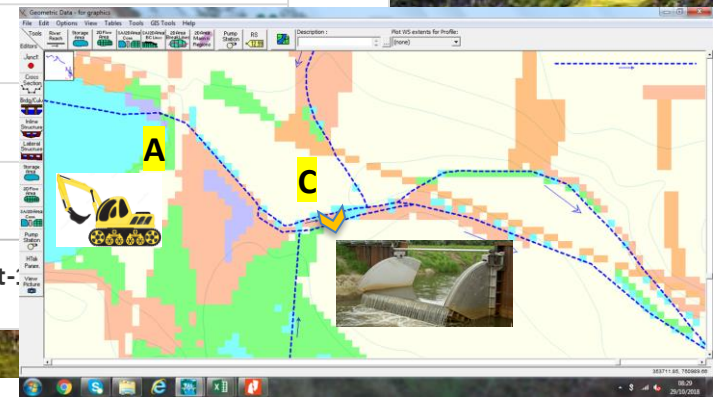
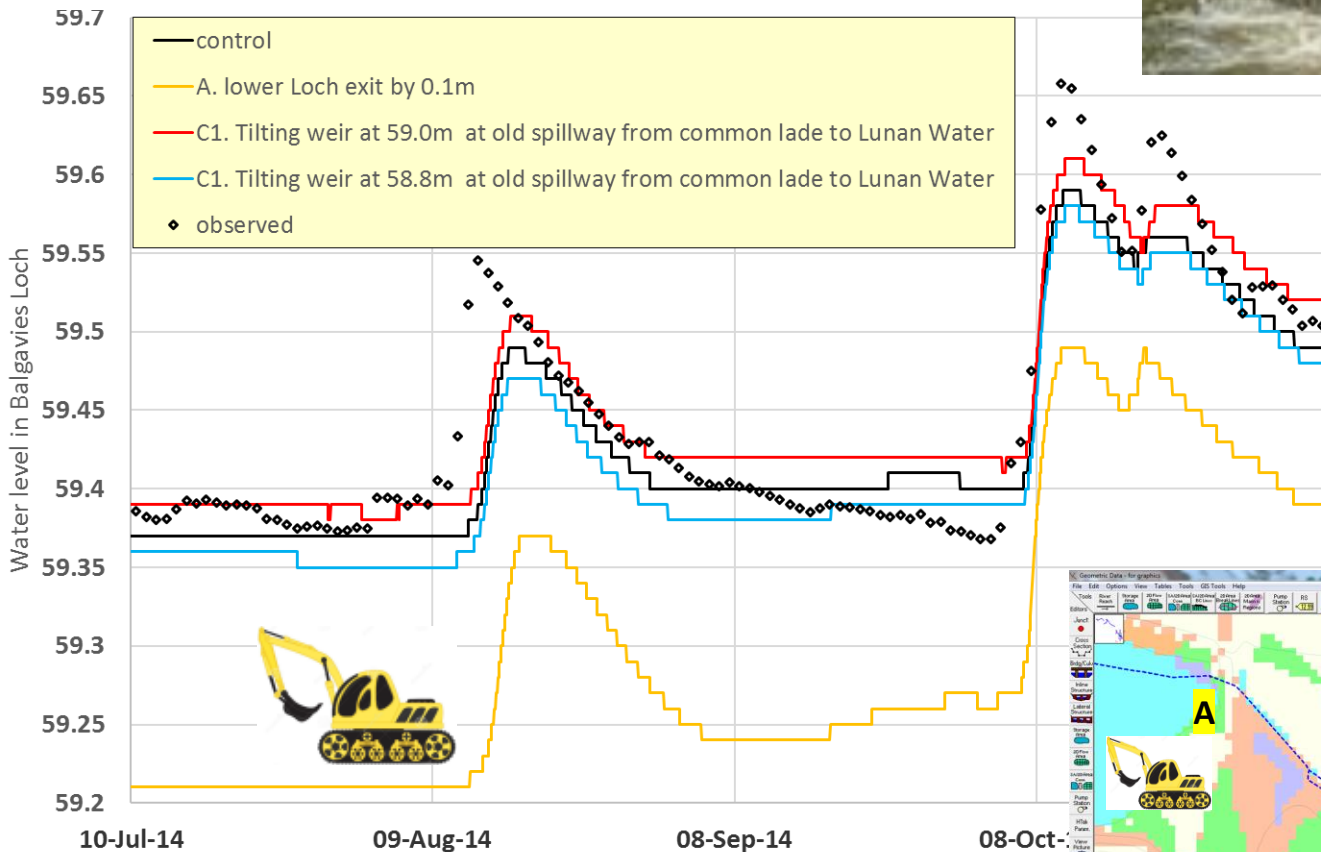
Size of abstraction
(percentage of Q95)



Total for all
abstractions:



Impacts on upper catchment flood risk



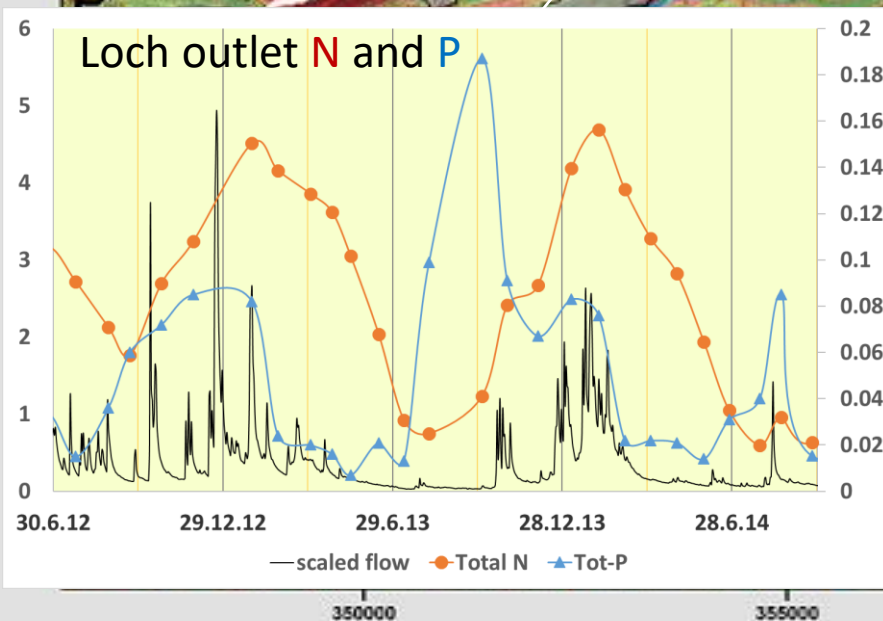
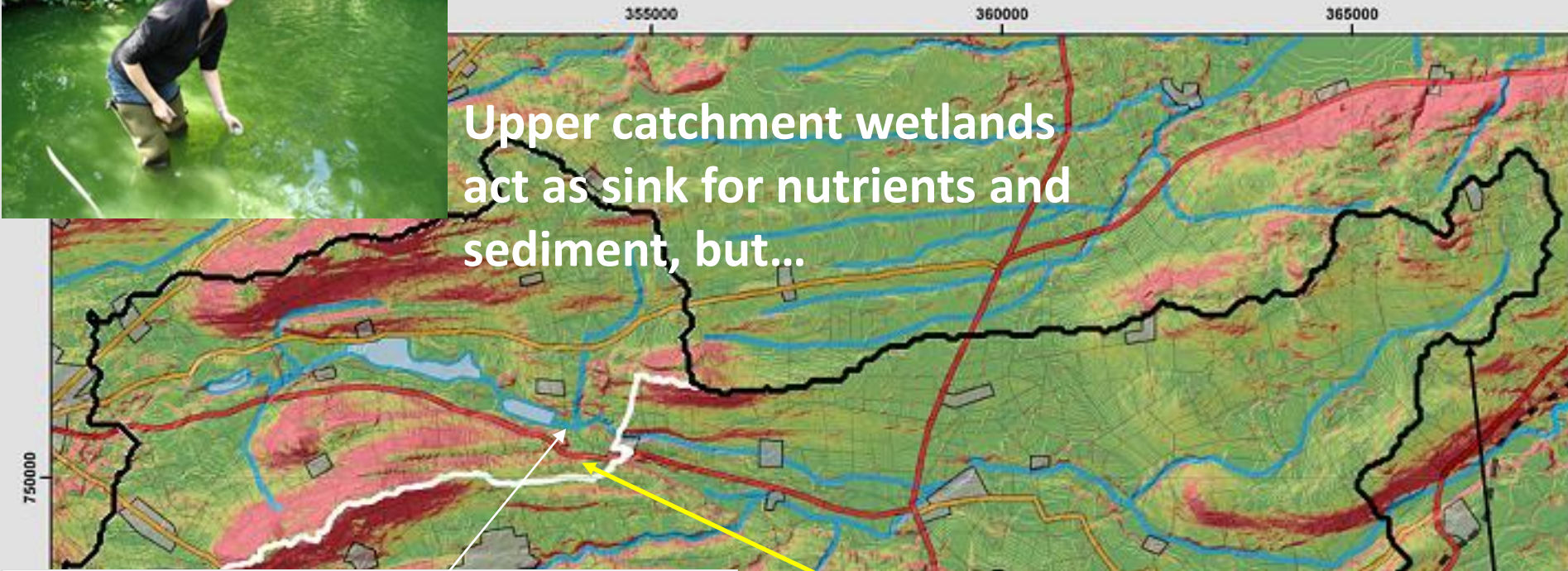
Tilting weir at C.

Tilting weir at A. or dredging.

Wetland services for nutrie



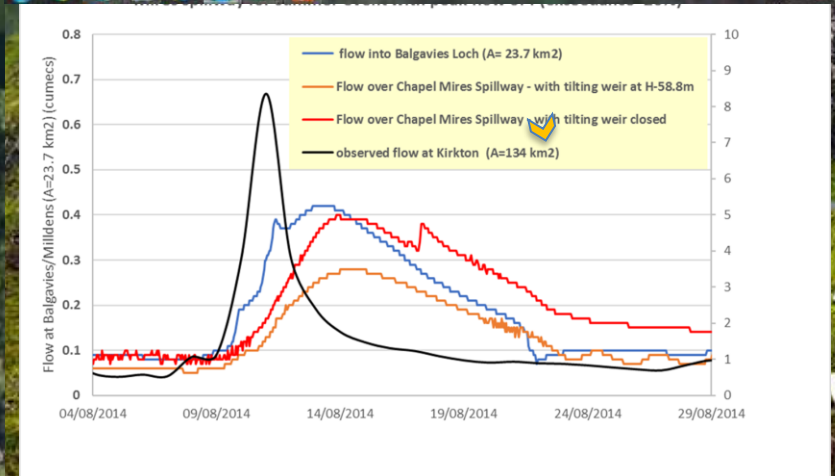
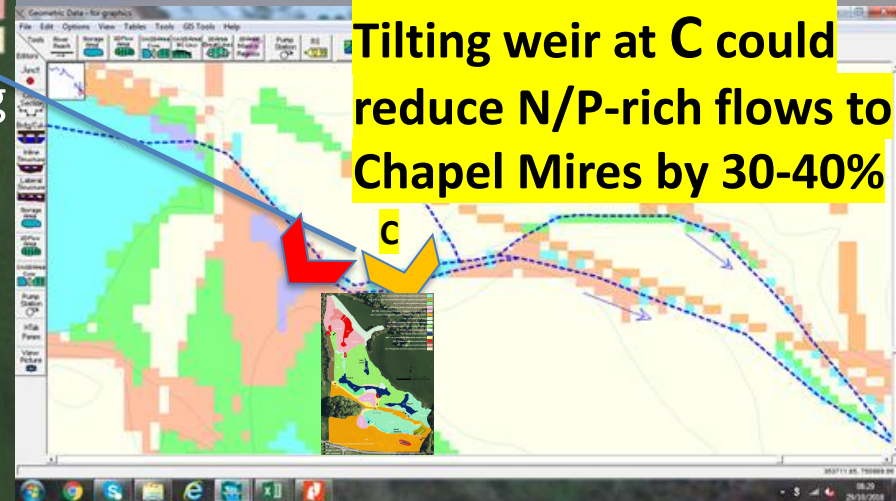
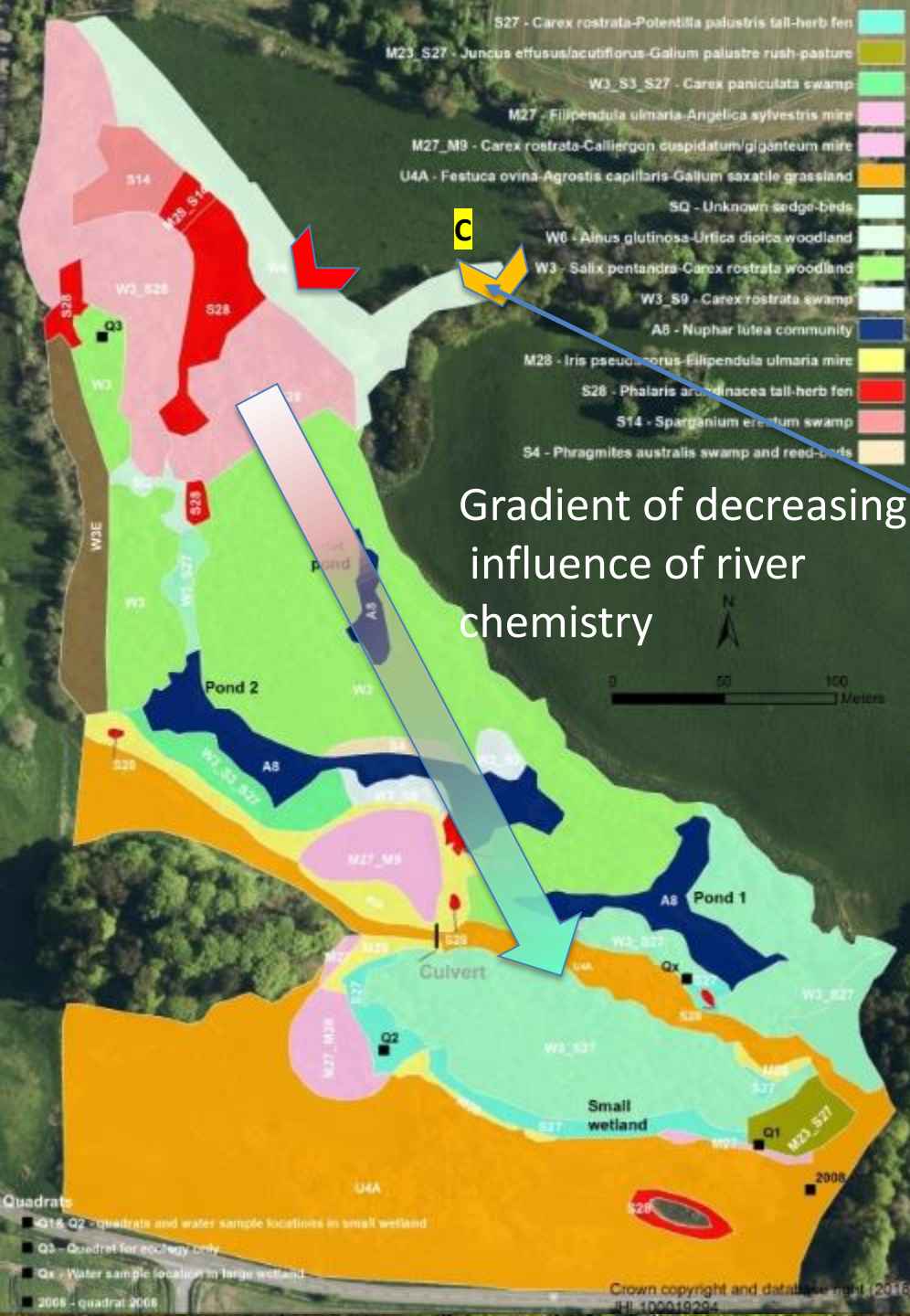
Upper catchment wetlands
act as sink for nutrients and
sediment, but...



Impacts on Nutrient loads management benefits

**Tilting weir at C could
reduce N/P-rich flows to
Chapel Mires by 30-40%**

Gradient of decreasing
influence of river
chemistry

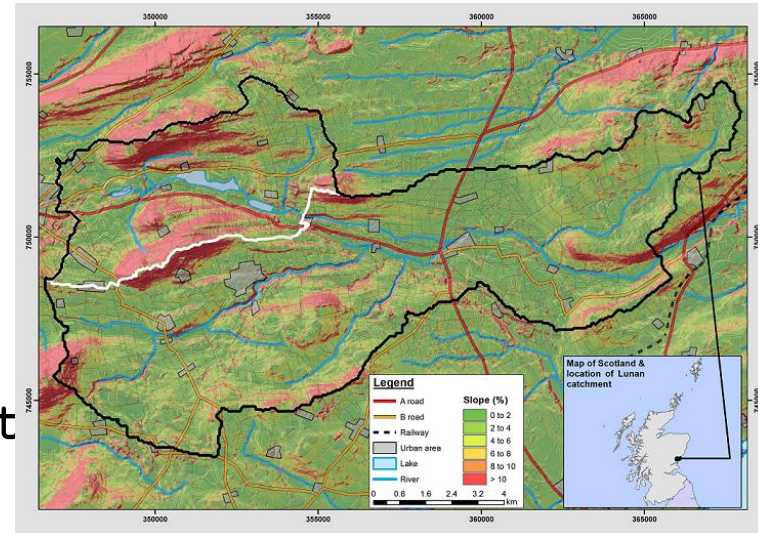


Lunan Catchment Management Group (2016- present)



- Angus Council (chair)
- Scottish Natural Heritage
- Scottish Wildlife Trust
- Scotland Environment Protection
- Esk Rivers and Fisheries Trust
- James Hutton Institute
- National Farmers' Union for Scotland

- Technical proof of concept for PEV scheme
- Survey of attitudes in catchment
- Approaches to governance and regulation
- Other management issues



Low flow benefits

