

Factors Affecting Nutrient Transfers to Agricultural Headwater Streams

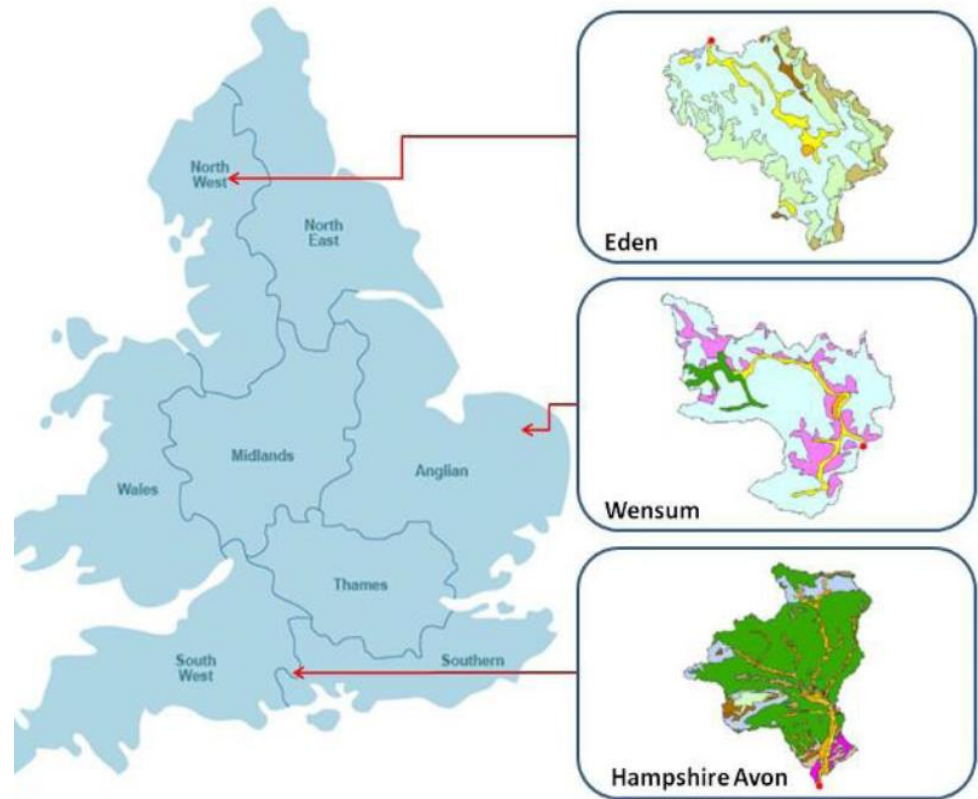
Faye Outram | [Richard Cooper](#) | Gilla Sünnerberg | Kevin Hiscock | Andrew Lovett | Lister Noble



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The Demonstration Test Catchments (DTC)

- Established in 2010
- Joint initiative between Defra, EA and the Welsh Assembly Government working in three river catchments – **Wensum, Eden, Avon**.
- “evaluate the extent to which on-farm **mitigation measures** can cost effectively reduce the impacts of **diffuse agricultural pollution** on river ecology whilst maintaining food production capacity”.



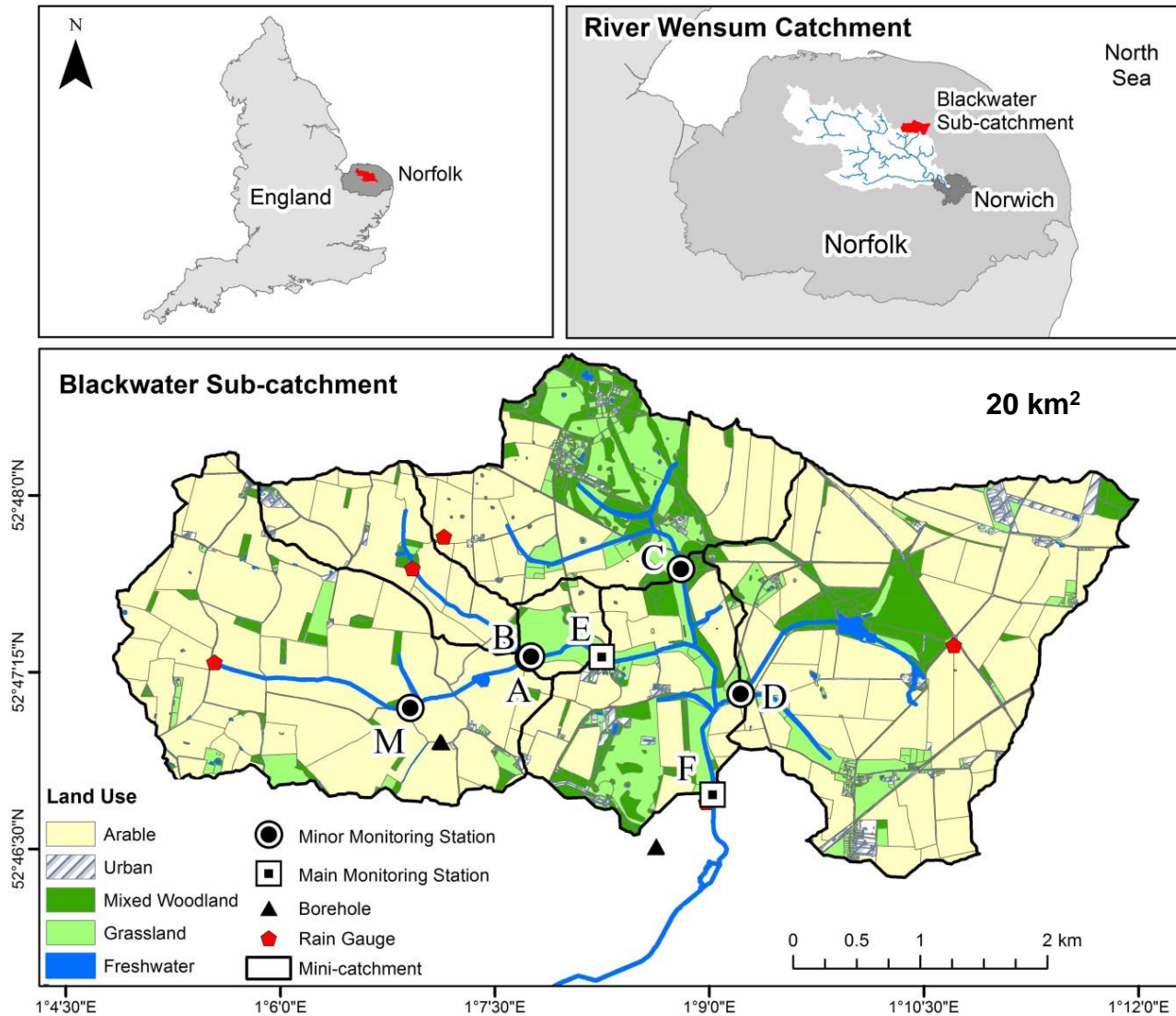
ENVIRONMENT
AGENCY



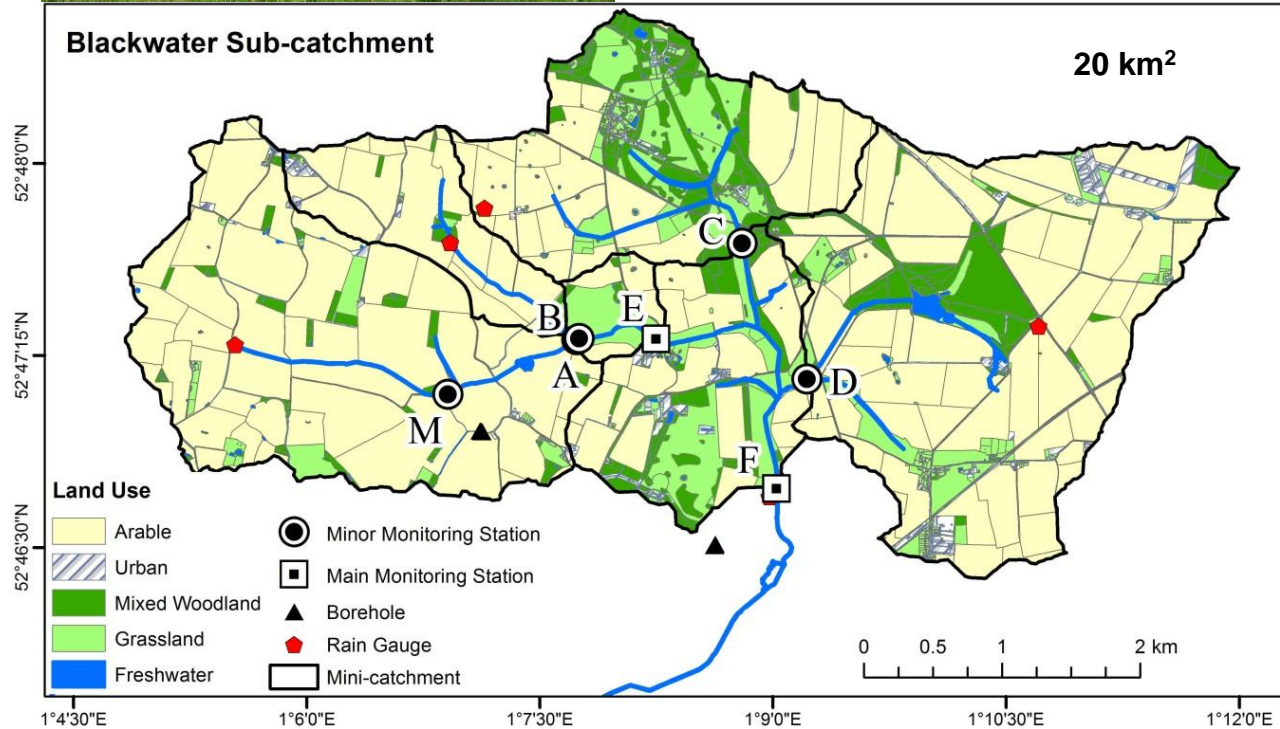
Llywodraeth Cynulliad Cymru
Welsh Assembly Government



The River Wensum DTC



The River Wensum DTC



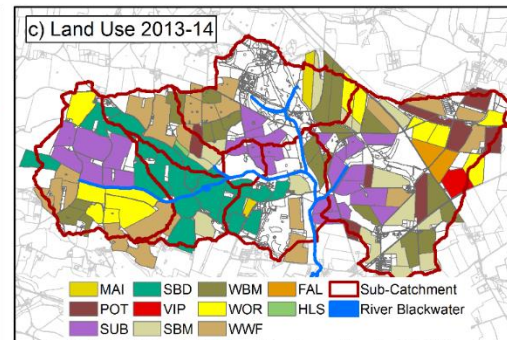
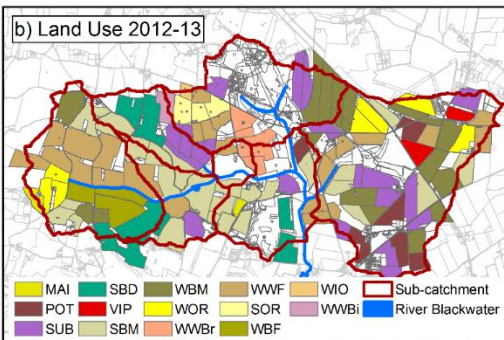
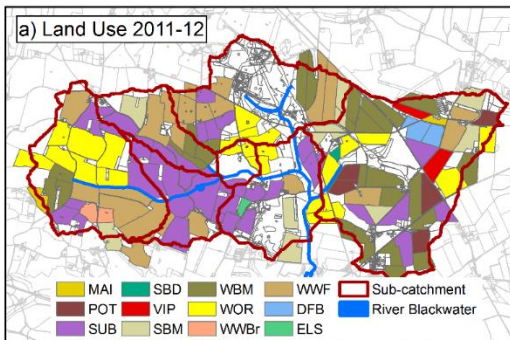
Fertiliser: when, where, how much?

2011/12

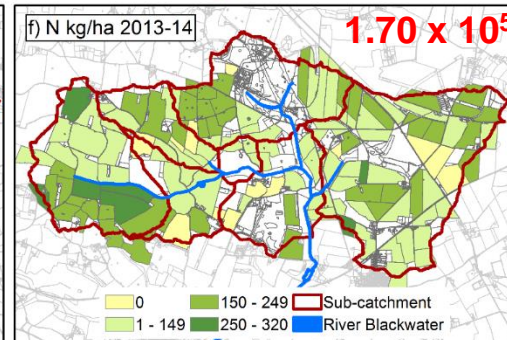
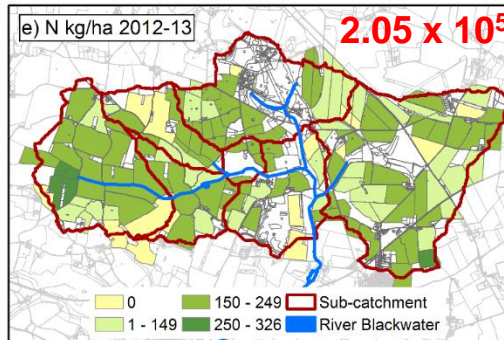
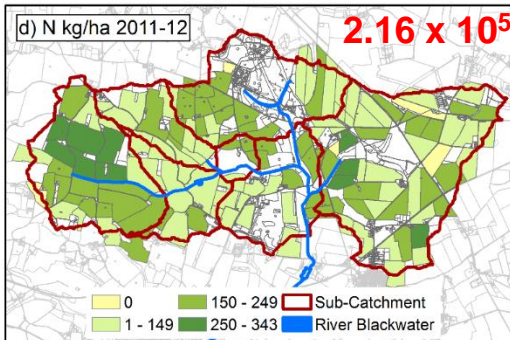
2012/13

2013/14

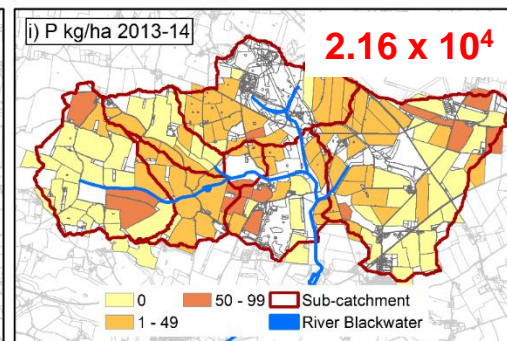
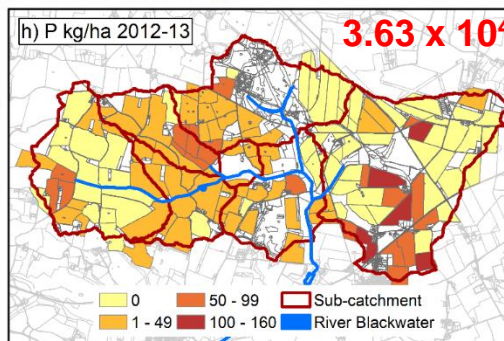
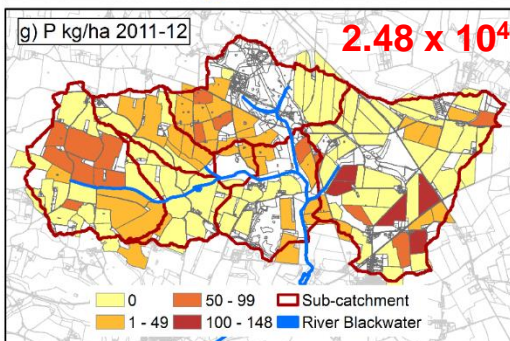
Crop Types



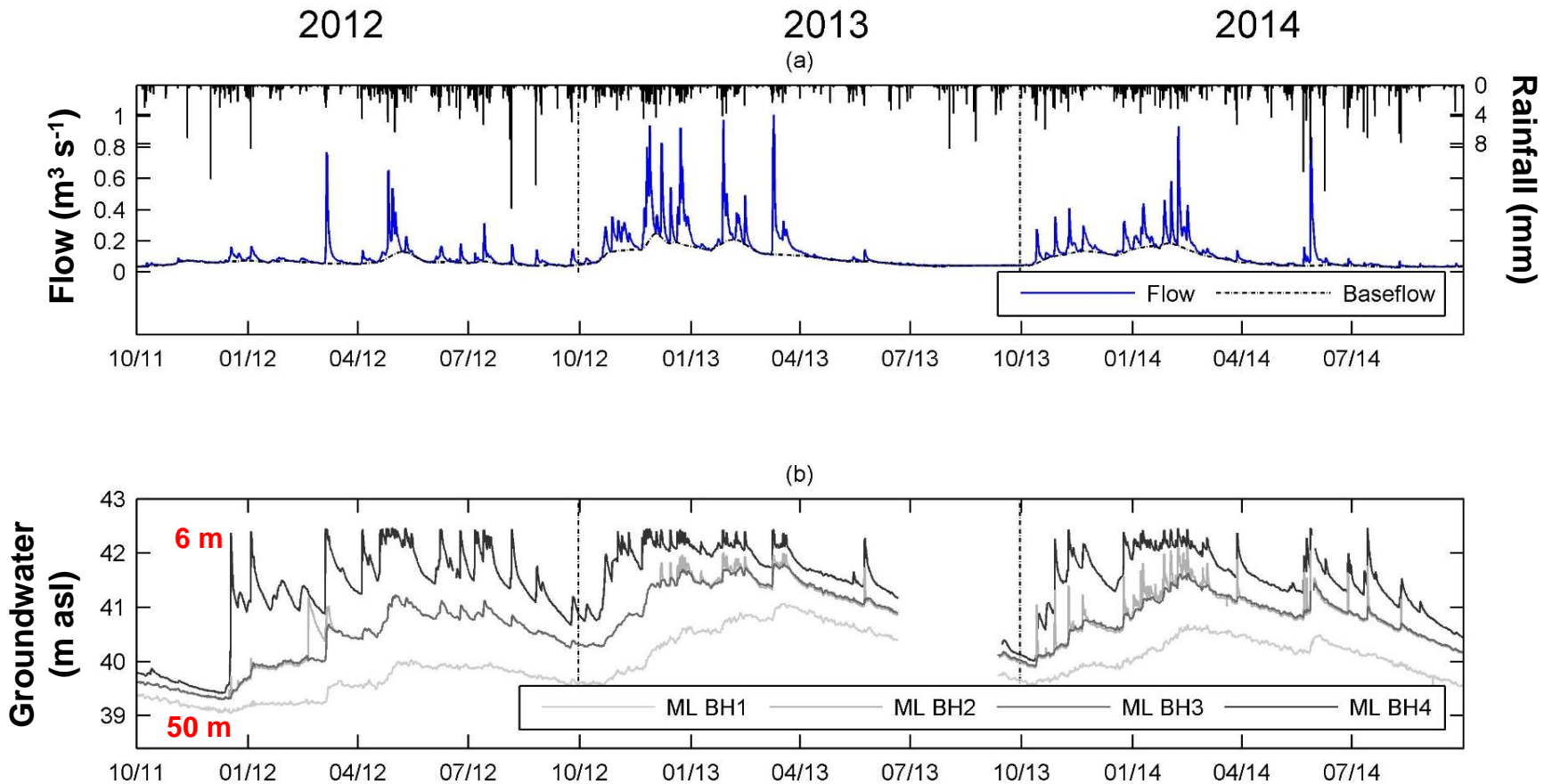
Nitrogen



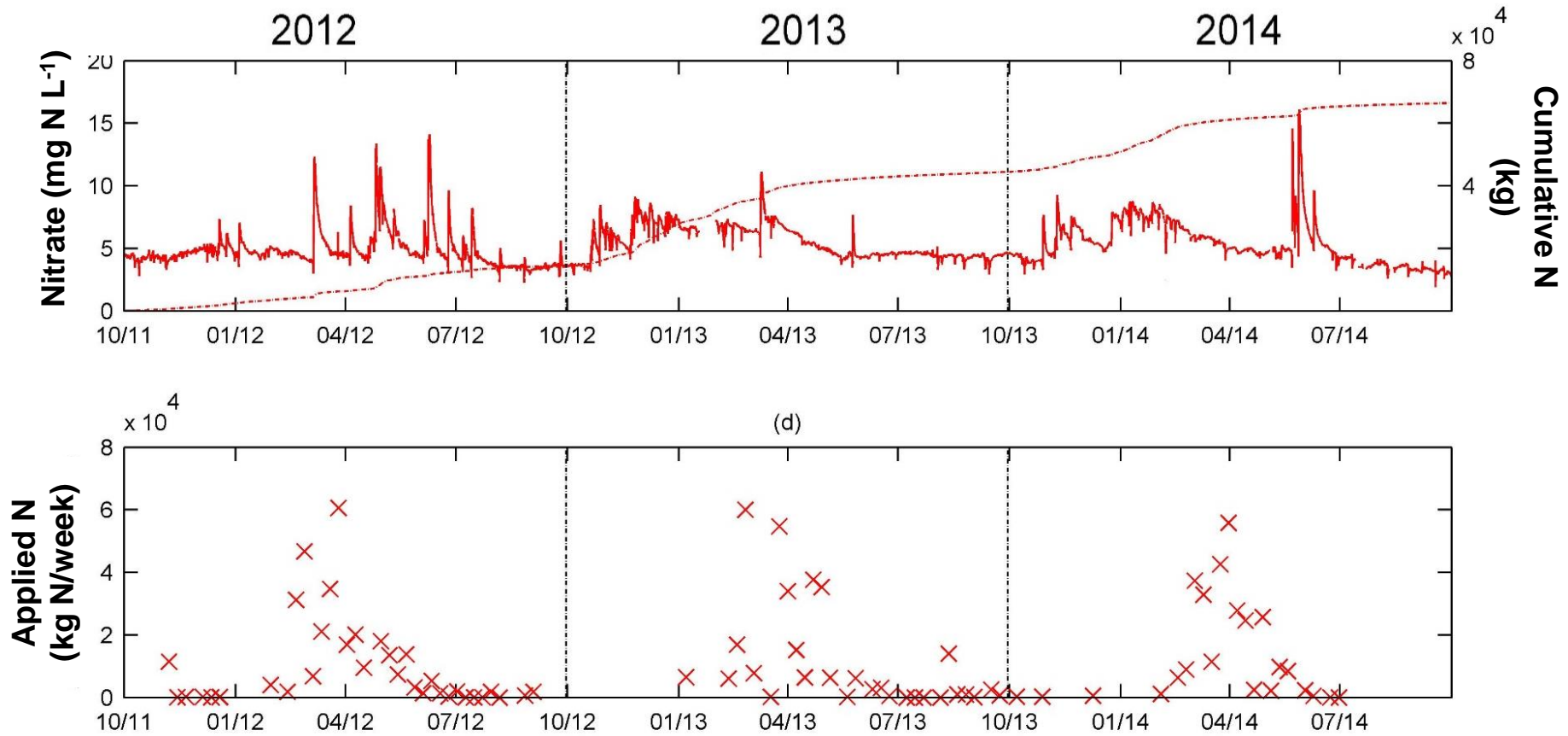
Phosphorus



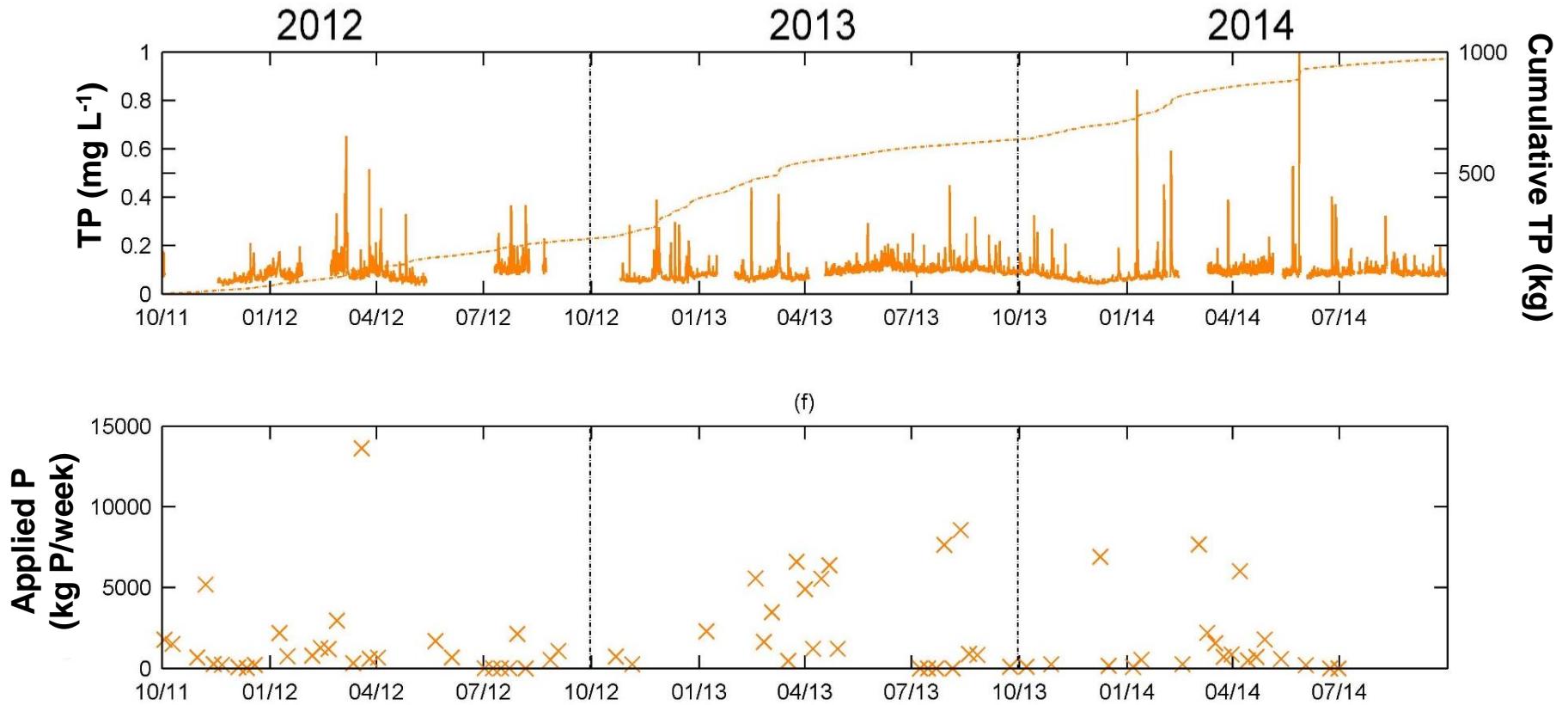
Hydrological monitoring: rainfall, flow, groundwater



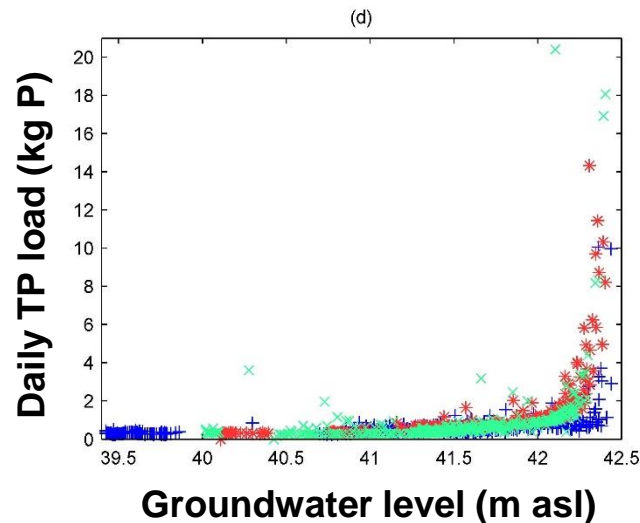
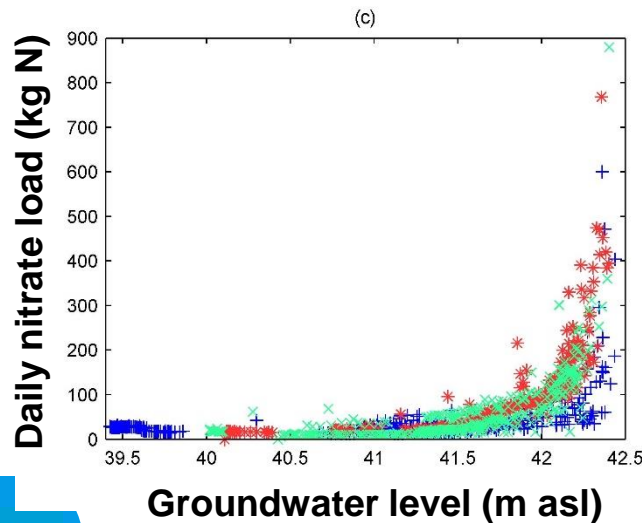
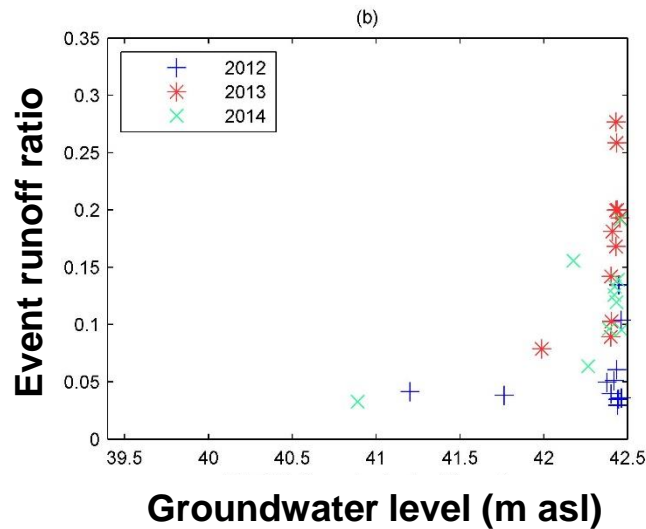
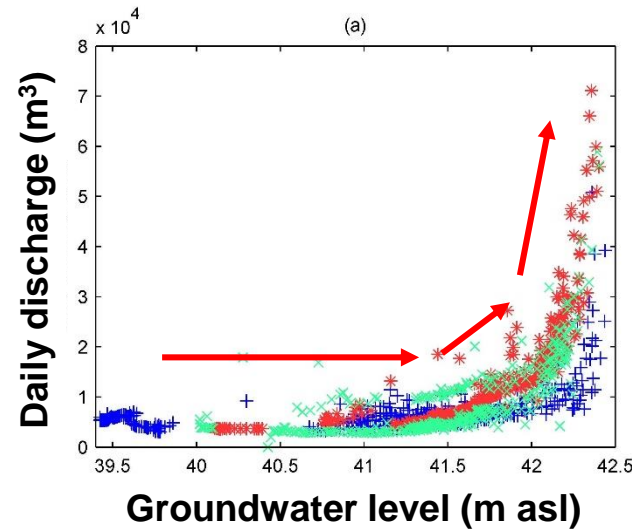
Hydrological monitoring: nitrate



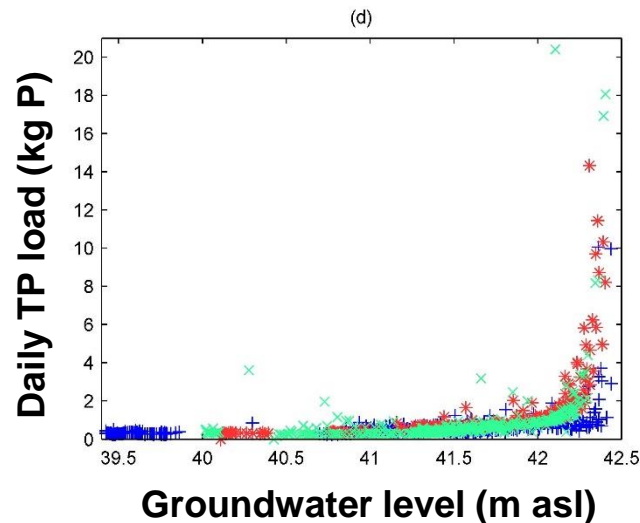
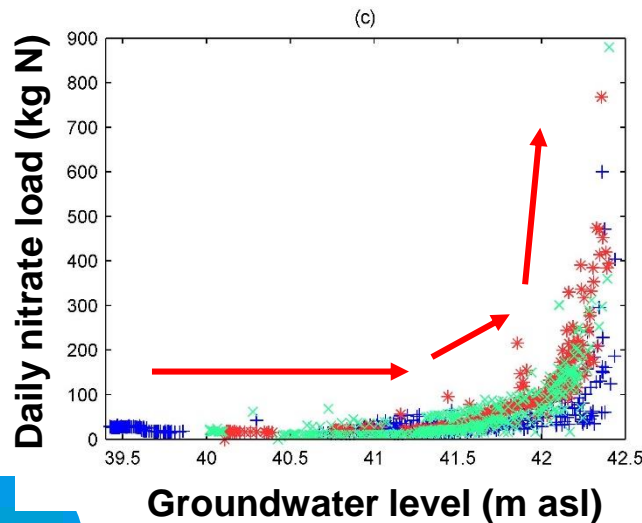
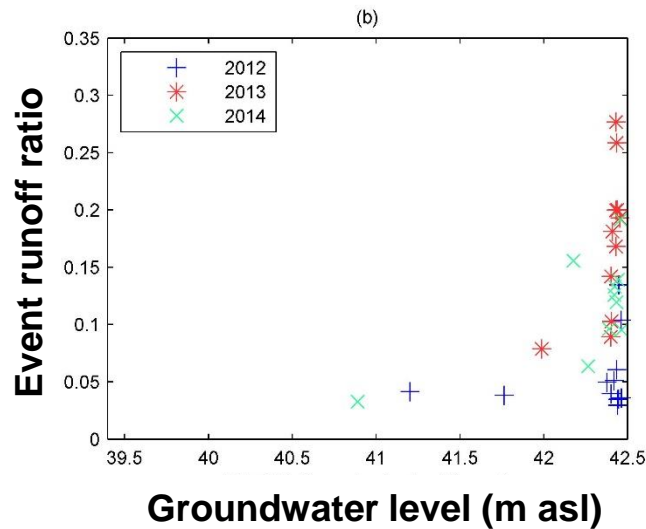
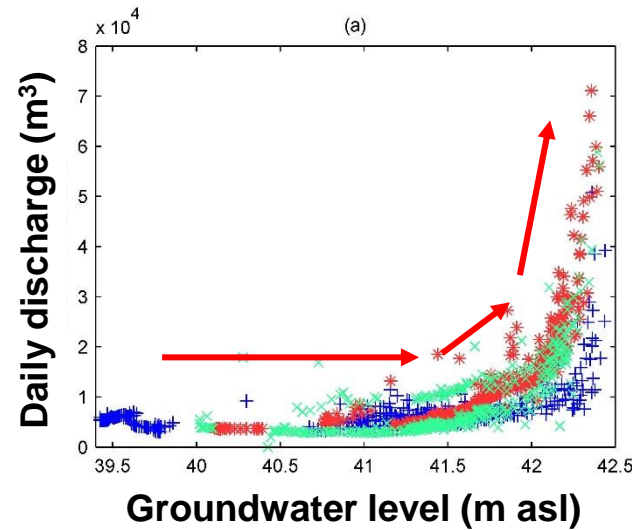
Hydrological monitoring: phosphorus



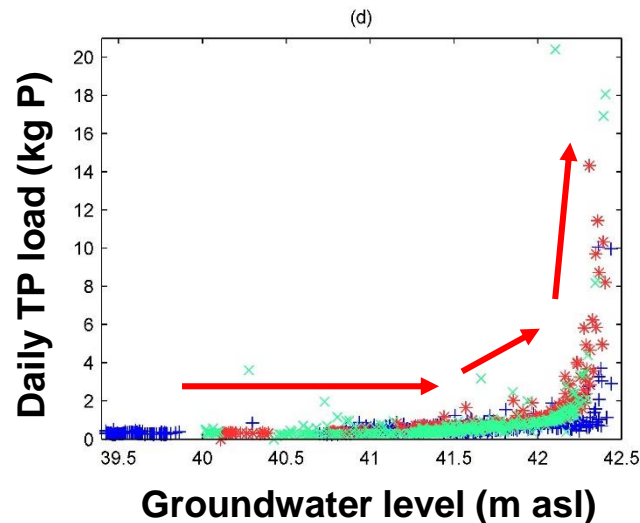
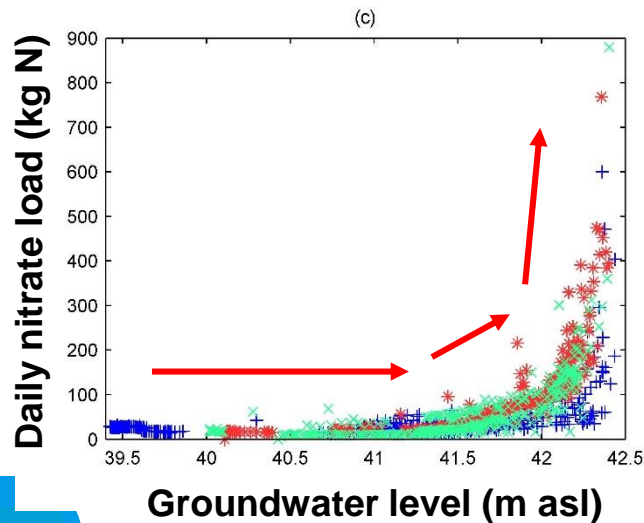
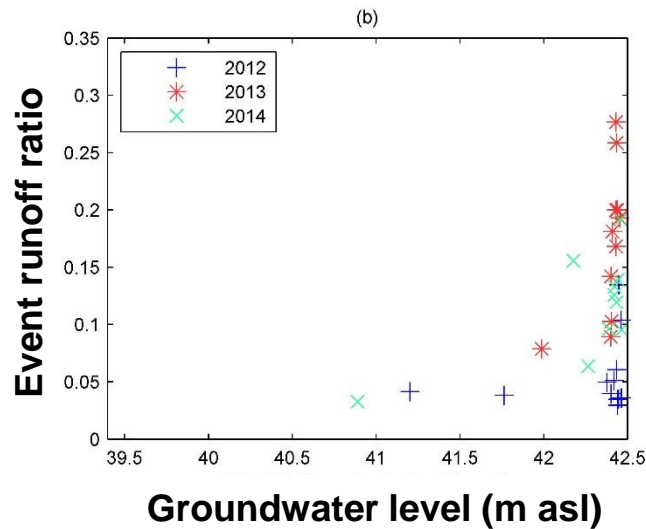
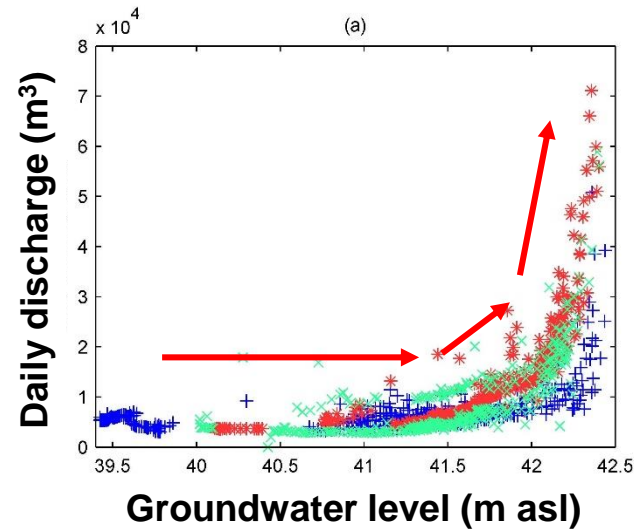
Finding 1: activation of subsurface flow paths when groundwater within 0.6 m of the surface



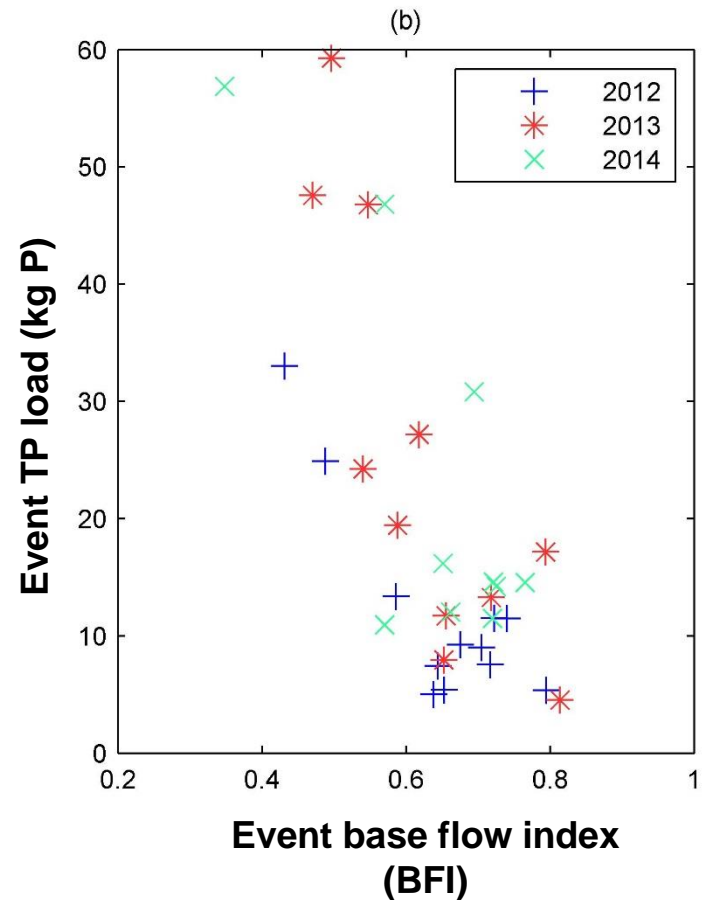
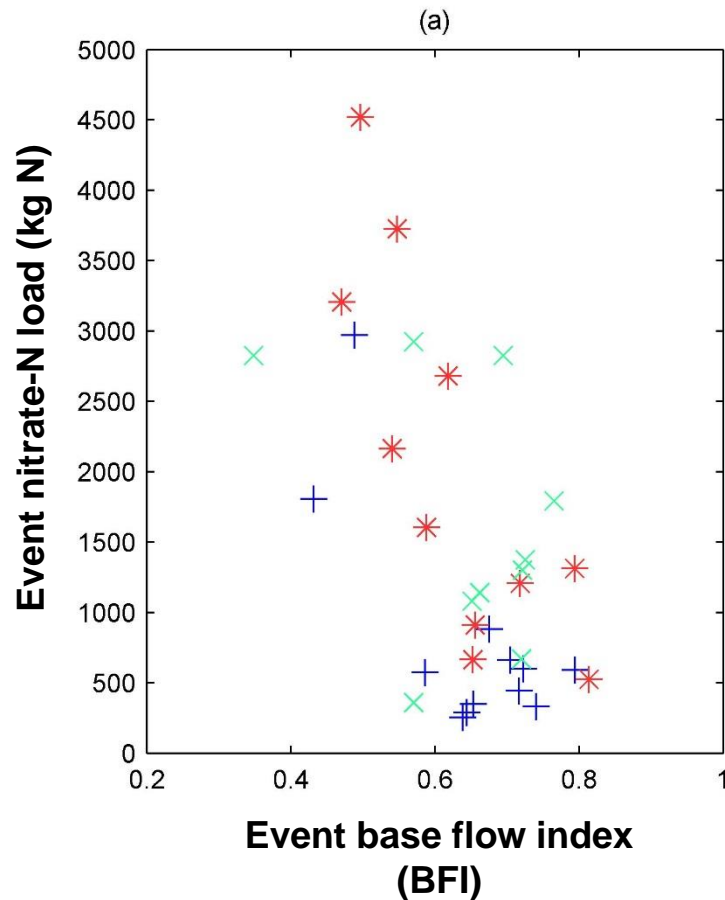
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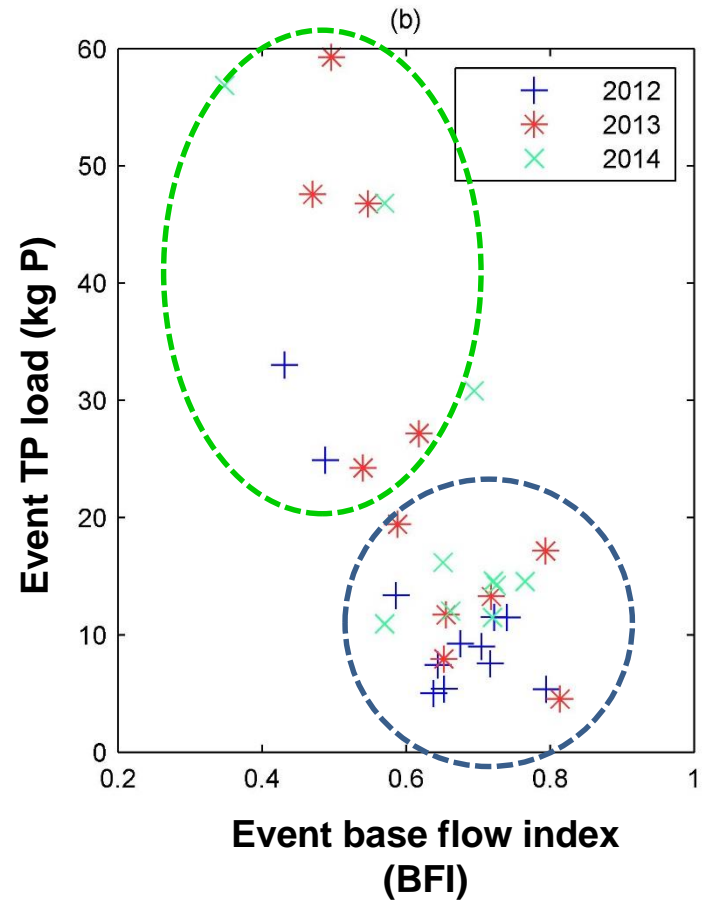
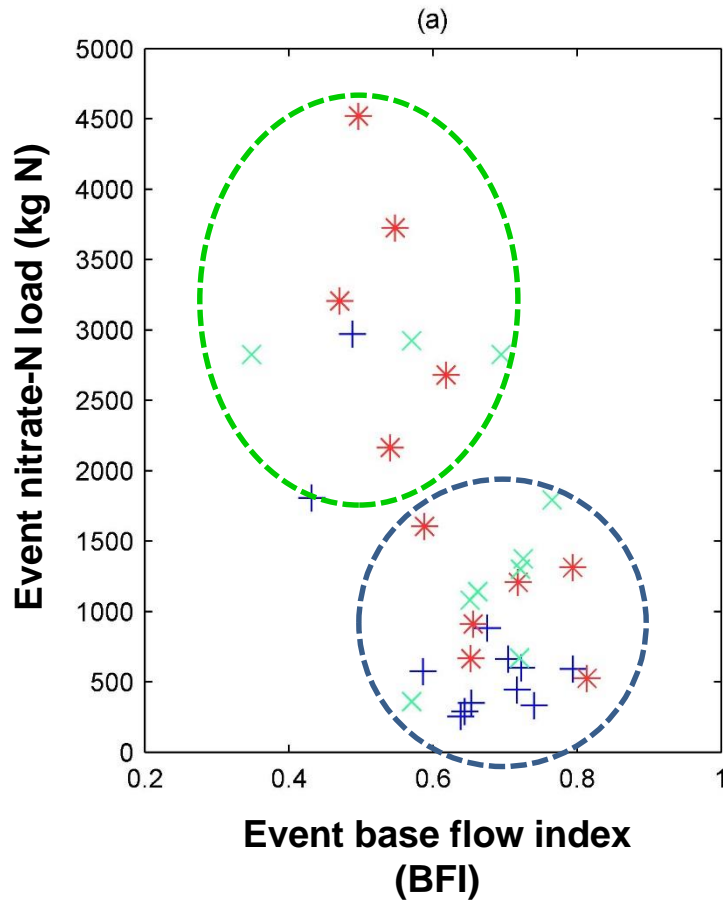
Finding 1: activation of subsurface flow paths when groundwater within 0.6 m of the surface



Finding 2: storm events with a high proportion of quickflow transport the most nutrients



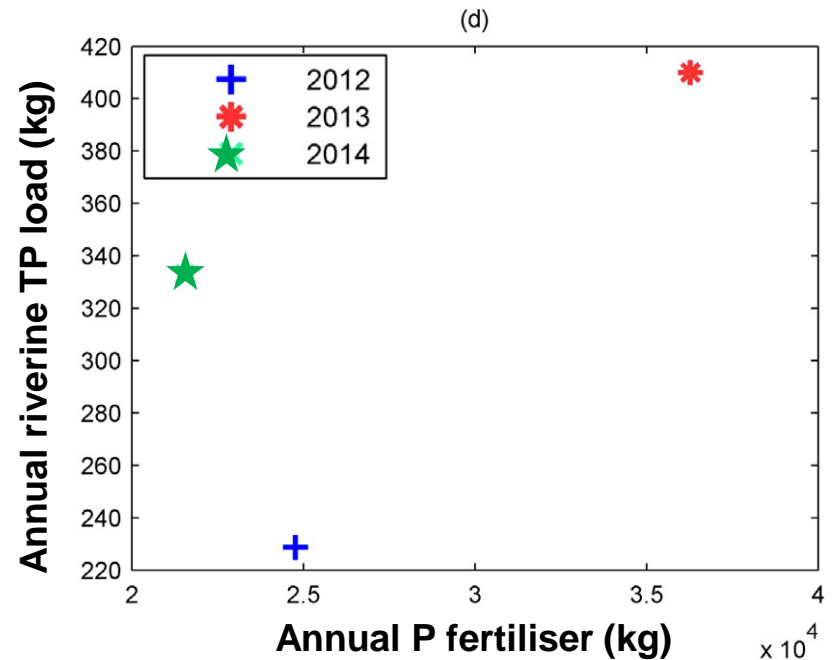
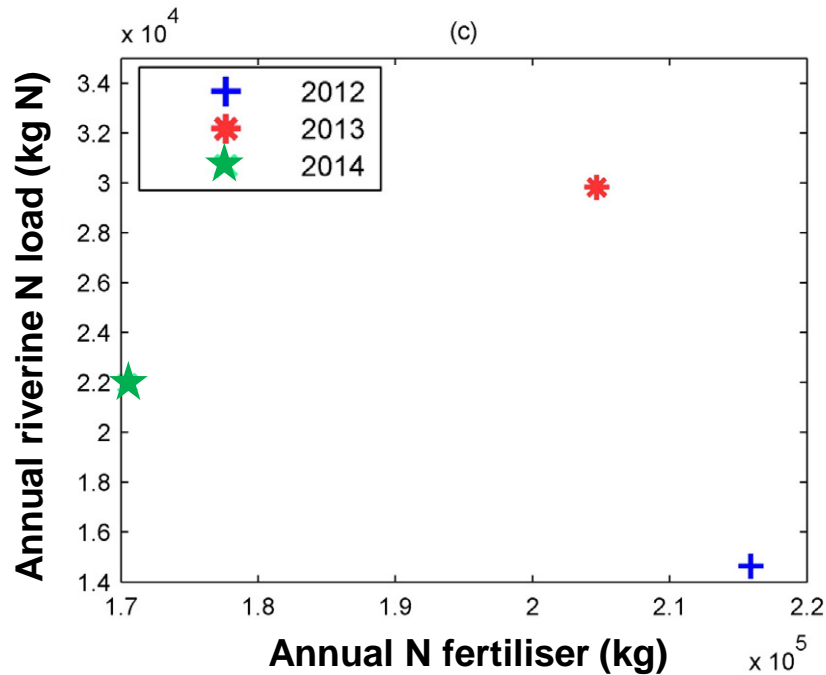
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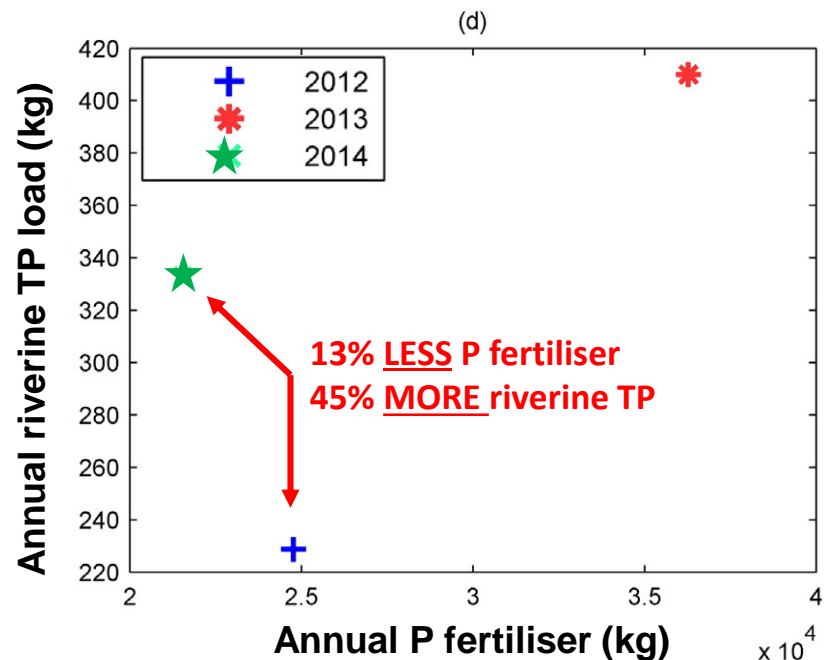
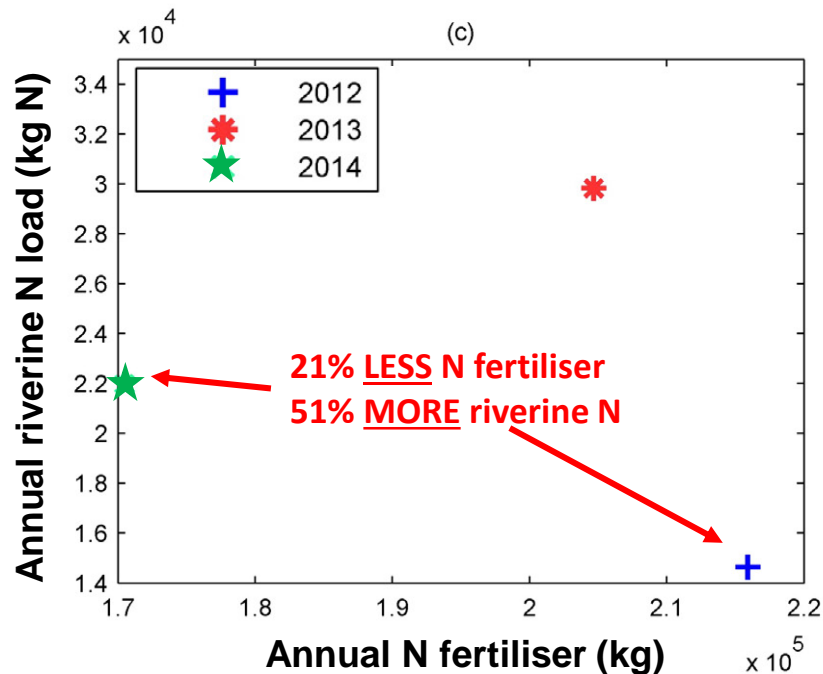
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Finding 3: no positive relationship between fertiliser application and riverine nutrient load



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- Catchment may be in a state of ***biogeochemical stationarity***
- ***Legacy stores*** of nutrients are buffering the stream against annual changes in fertiliser nutrient inputs.
- This has important implications for meeting water quality directives – ***no quick fix.***
- Decades to deplete nutrient stores?





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Antecedent conditions, hydrological connectivity and anthropogenic inputs: Factors affecting nitrate and phosphorus transfers to agricultural headwater streams



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HIGHLIGHTS

- Hydrometeorological, hydrochemical and agricultural input data were examined.
- Nitrate-N and TP fluxes doubled in a wet year compared with a dry year.
- Dry antecedent conditions temporarily raised TP fluxes.
- Large reductions in annual fertiliser application did not reduce riverine loads.
- Substantial legacy stores of N and P likely exist in the landscape.

GRAPHICAL ABSTRACT

