



Key messages for lowland stream restoration

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Why do freshwater restoration projects fail?

Issues with:

- Goal setting
- Implementation
- Multiple stressors
- Local context
- Monitoring
- Scaling/transfer
- Expectations



CAREX

FACTS & FIGURES

23 Landowners

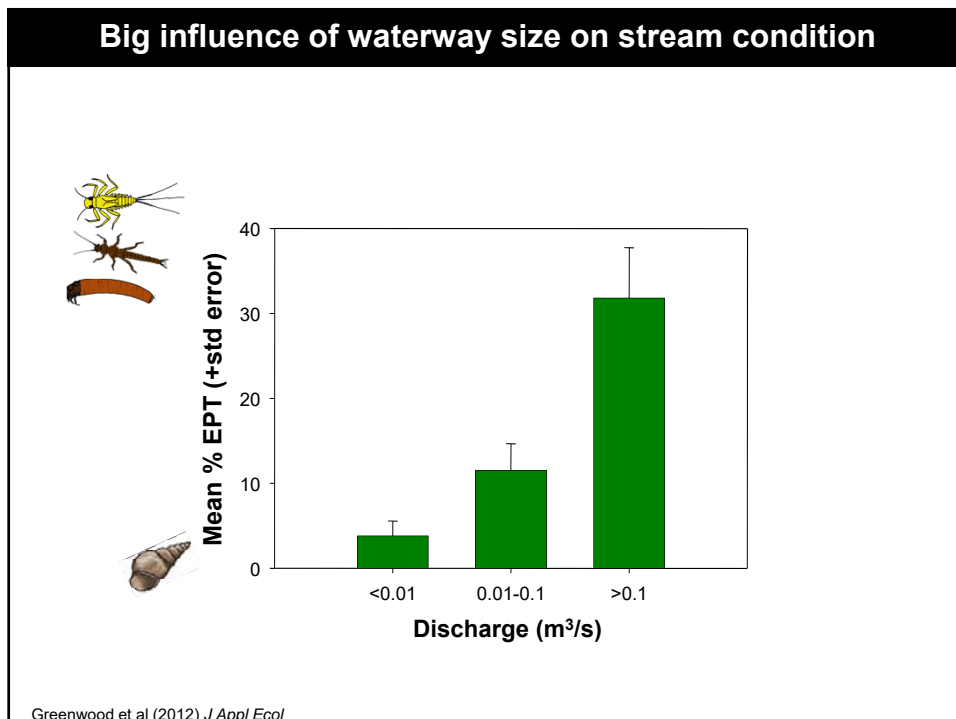
9 km of waterways across 14 farms

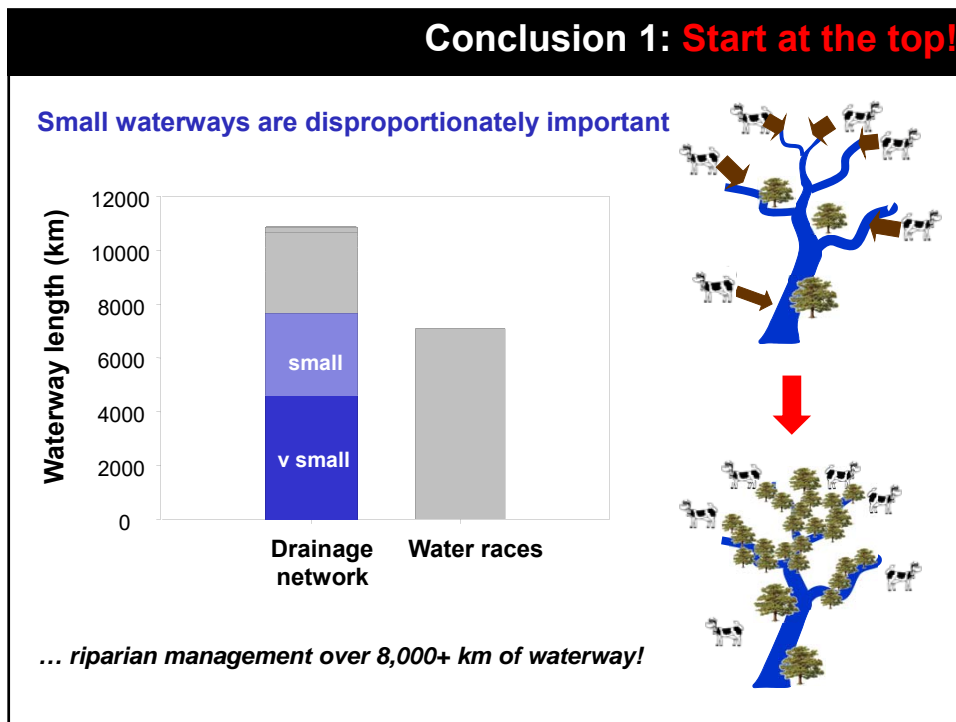
Instream tools tested with more to add **14**

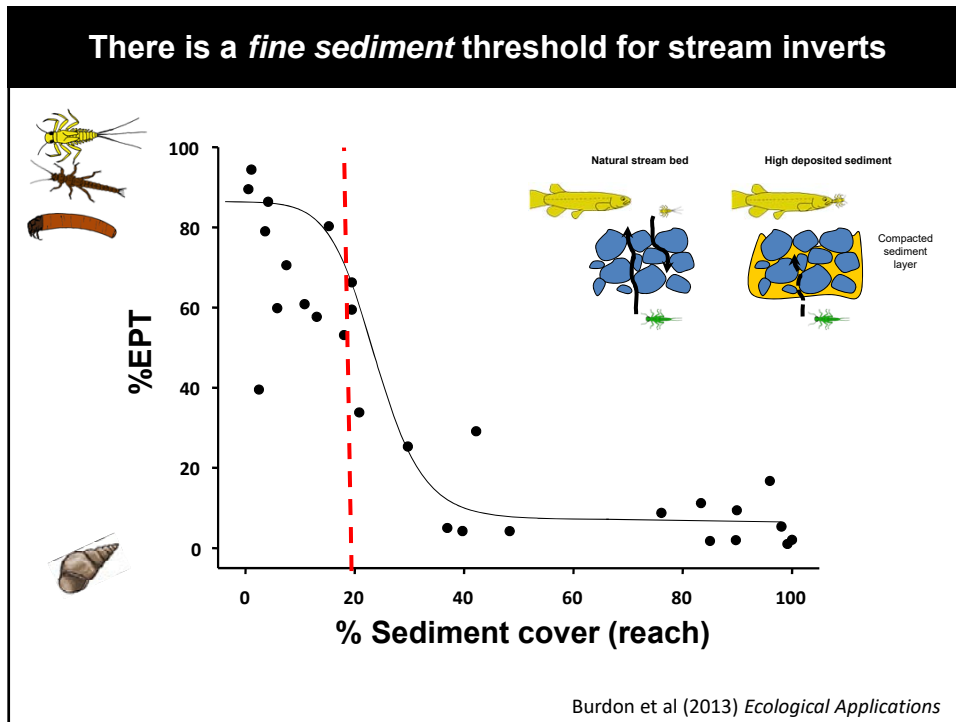
40+ Stakeholders involved and **four** councils

Fifteen researchers

ONE EXPERIMENT







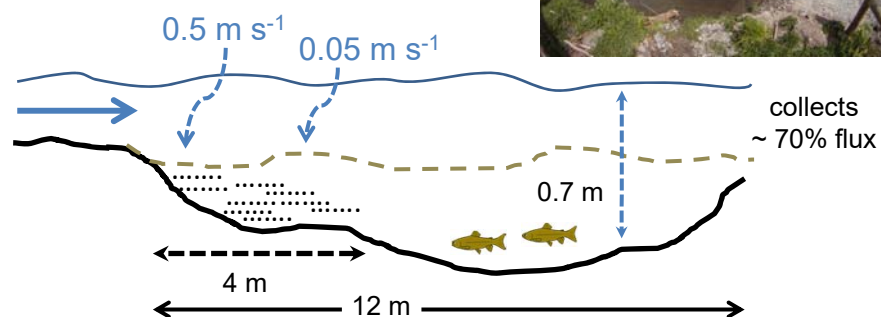
Conclusion 2: Fix 'leaky plumbing'!

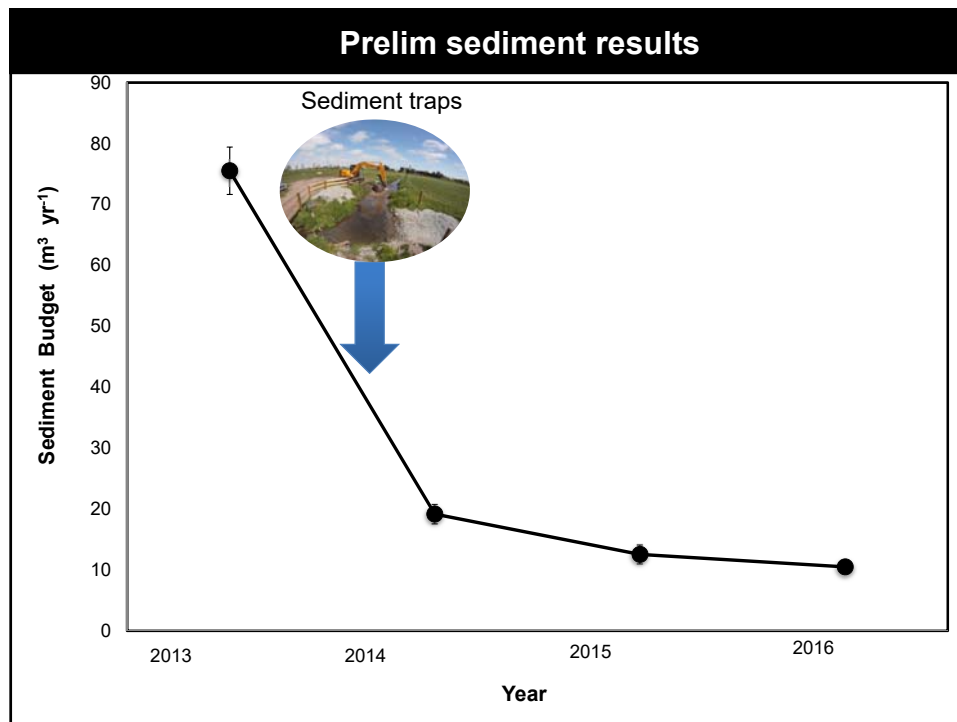
Have *complete* riparian protection systems in place.

Eliminate slumps, rills & bank collapse and manage intermittent channels, tile & open drains that circumvent riparian protection systems.

Sediment Traps: remove legacies

Sediment size classes:
68% <63 μm – 1mm
13% 1-2 mm
20% > 2 mm





Conclusion 3: Remove sediment legacies

Recovery unlikely unless instream fine sediment cover is less than 20%

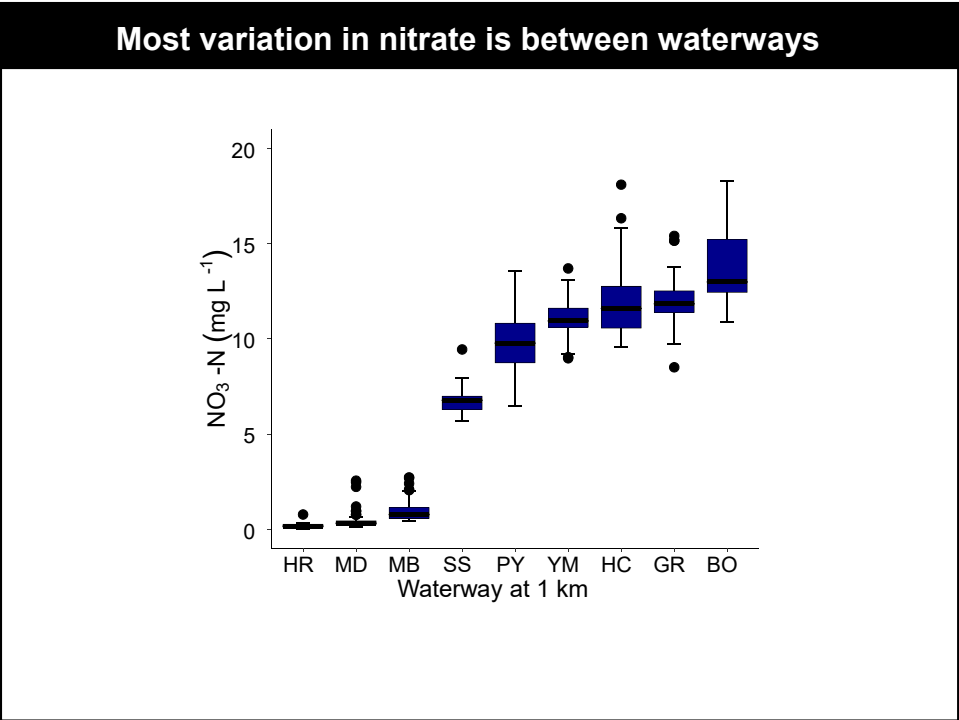
C. Dealing with aquatic WEEDS





Conclusion 4: Shade = ultimate solution for weeds

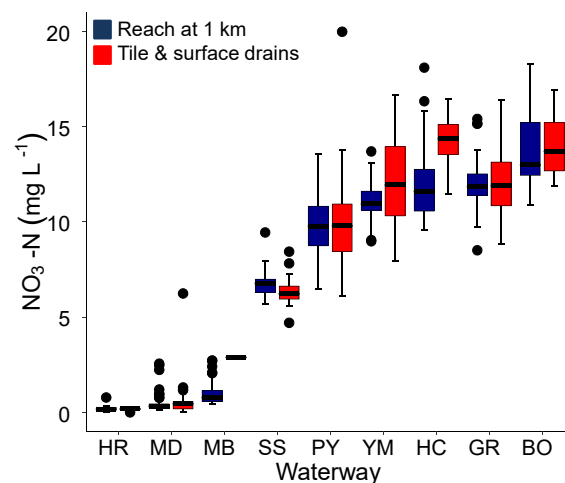
Find the shade 'sweet spot' and implement long-term control techniques

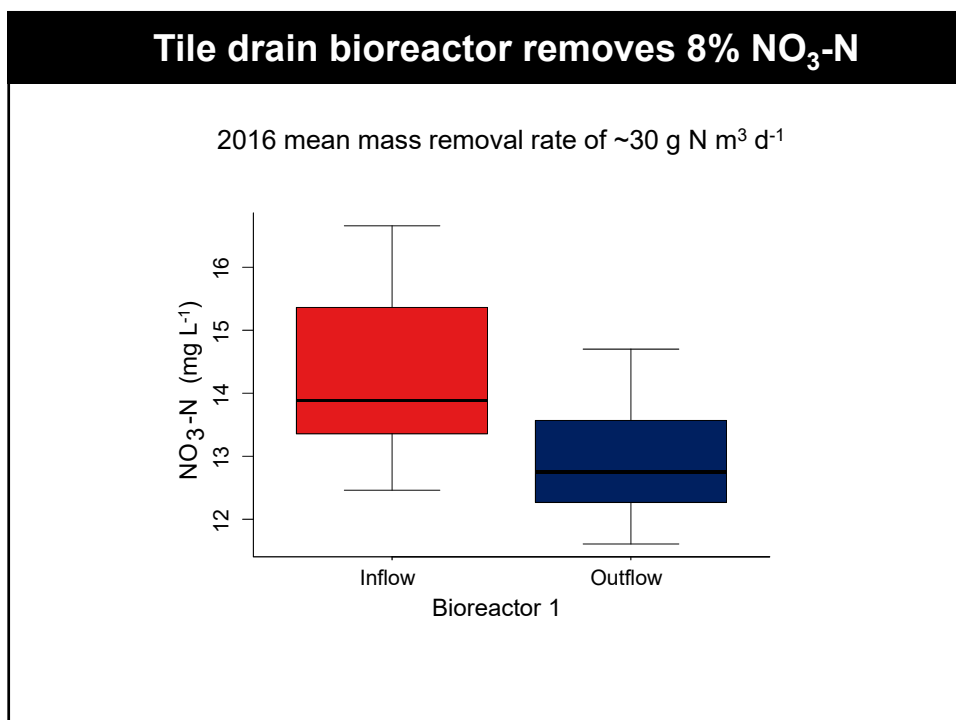


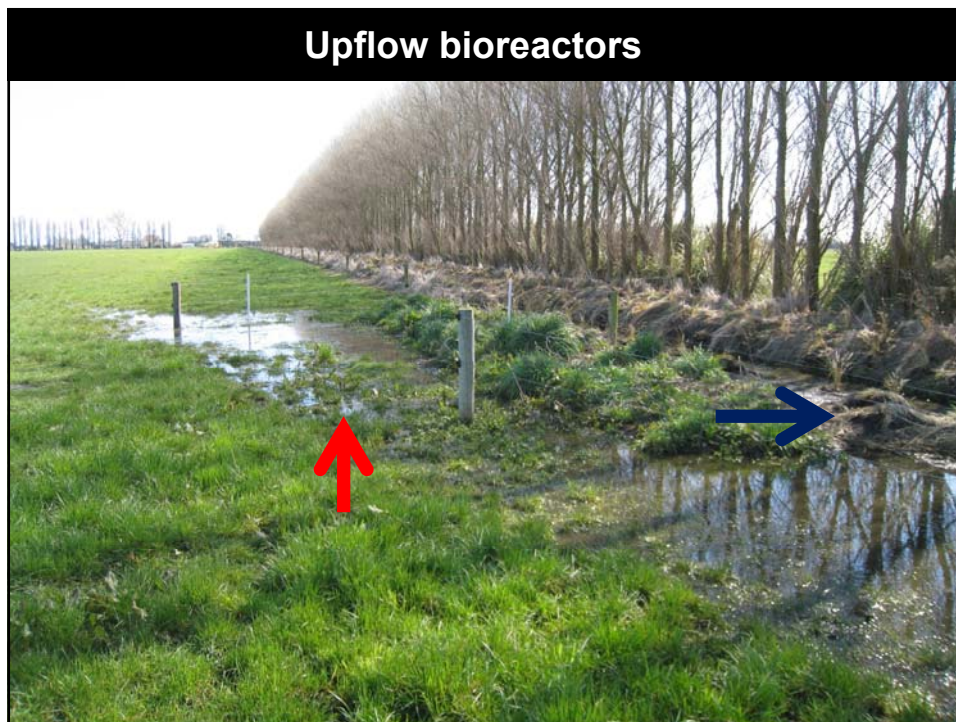
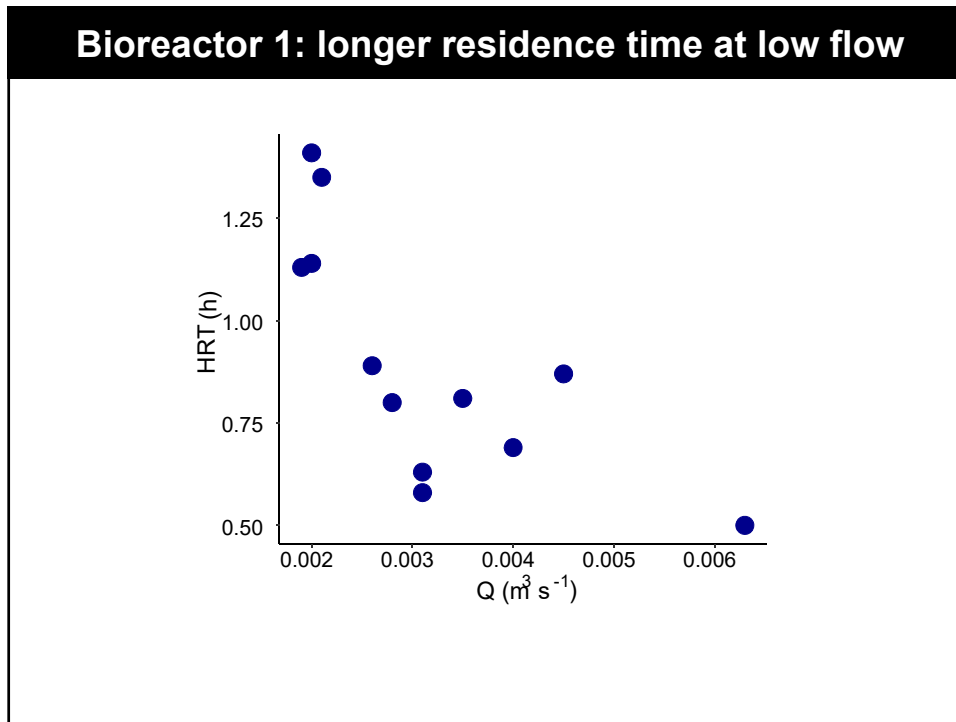
Conclusion 5: Stream nutrient problems ultimately need to be solved mainly at catchment levels

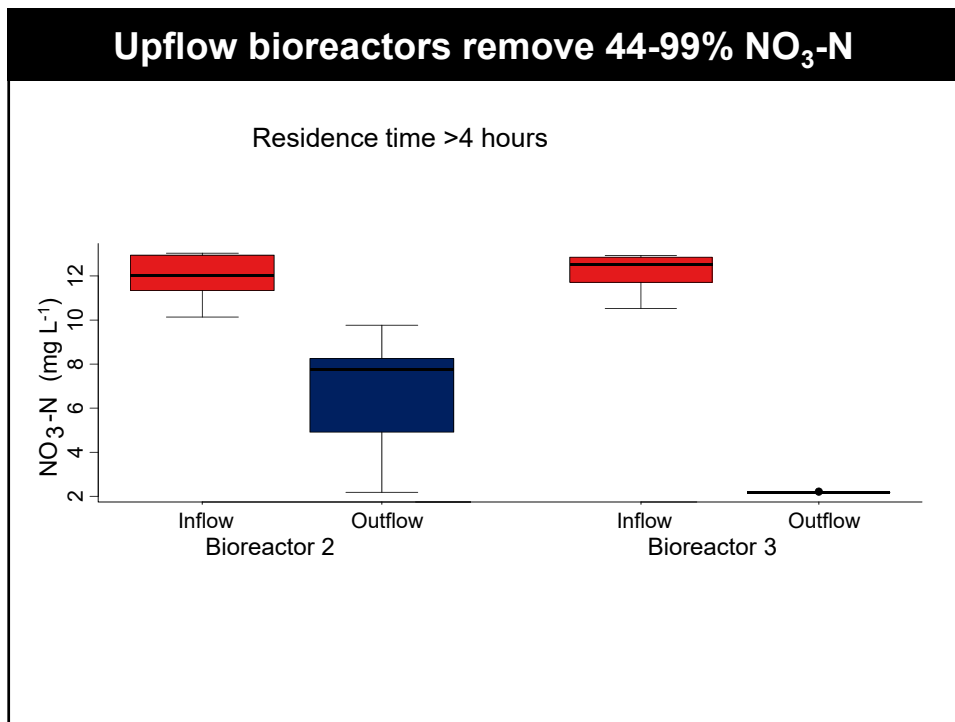
Be involved in the community decision making processes around catchment nutrient levels

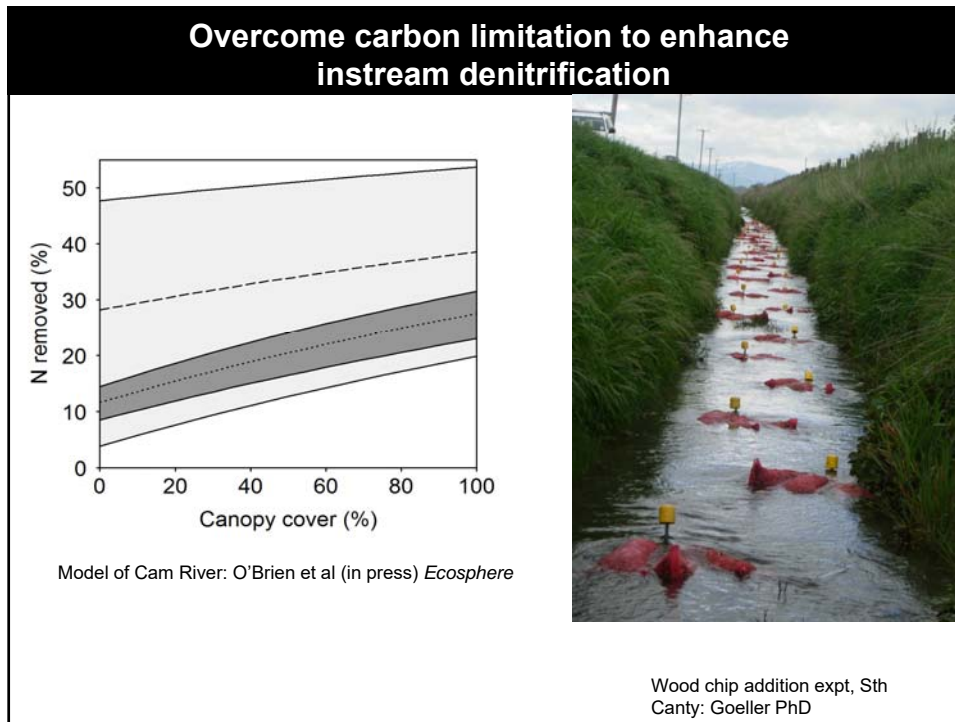
High NO₃ in connecting tile/surface drains = hot spots









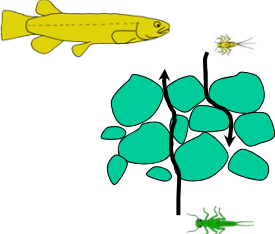






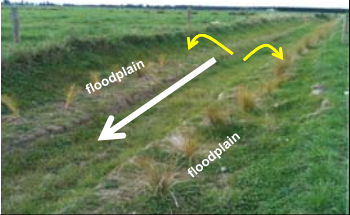
Conclusion 6: **Implement downstream tools**

Match nutrient tools to local situation & with long-term focus

Summary & take home messages

1. Start at the top

2. Fix leaky plumbing

3. Remove sediment legacies


Summary & take home messages

4. Shade out macrophytes

5. Negotiate on-land nutrient inputs at catchment level

6. Implement end-of-pipe solutions in the interim




 **CAREX** Canterbury Waterway Rehabilitation Experiment
UC SCIENCE

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 **UC** UNIVERSITY OF CANTERBURY
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CHRISTCHURCH NEW ZEALAND

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 **Whakaora Te Waihora**
Te Whare Wānanga o Wāitaha

 **LIVING WATER**

 **IPENZ** ENGINEERS NEW ZEALAND

 **WAIMAKARIRI** DISTRICT COUNCIL

 **Fonterra** Dairy for life

 **Department of Conservation**
Te Papa Kaitiaki

WORKING TOGETHER TO CARE FOR FIVE KEY CATCHMENTS