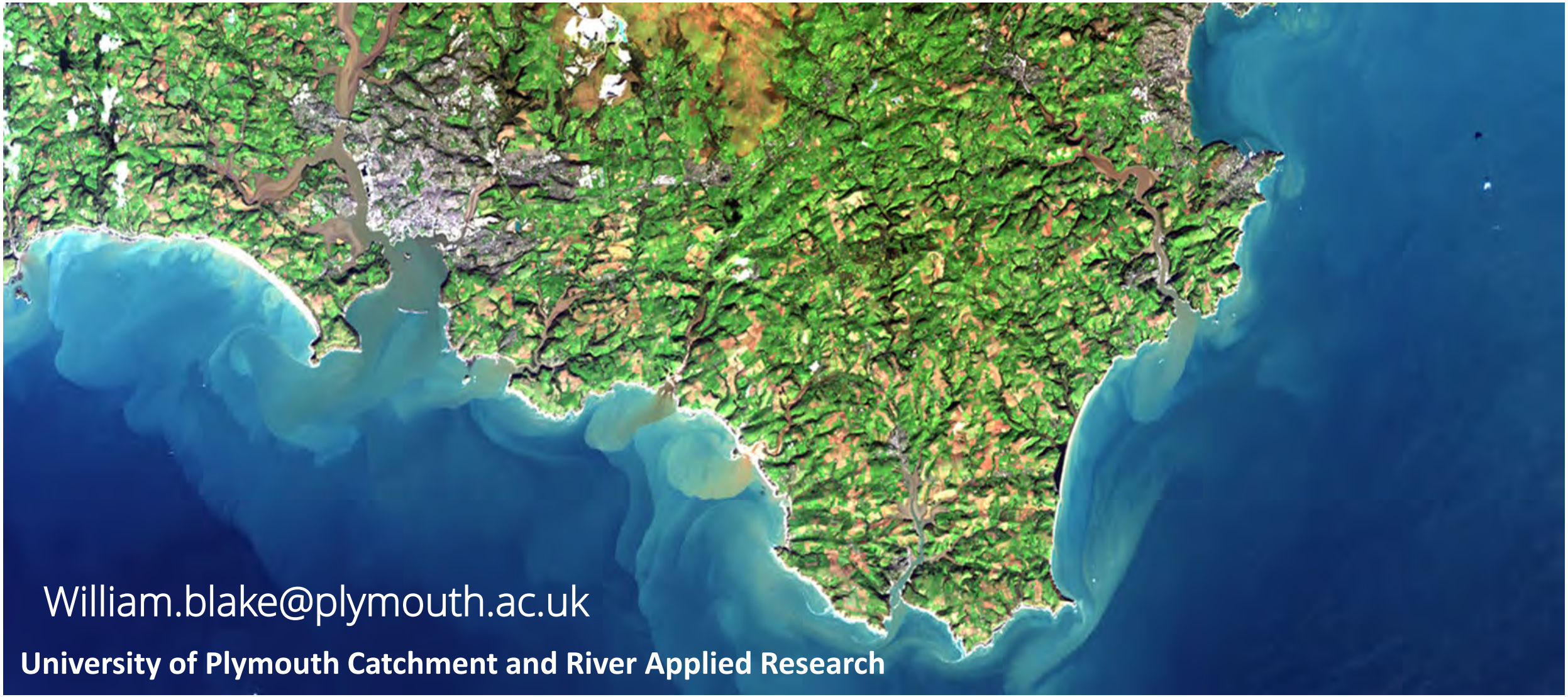
Professor Will Blake
University of Plymouth

Understanding sediment sources and pathways in mixed agricultural catchments

UNDERSTANDING SEDIMENT SOURCES AND PATHWAYS IN MIXED AGRICULTURAL CATCHMENTS

Will Blake - University of Portsmouth

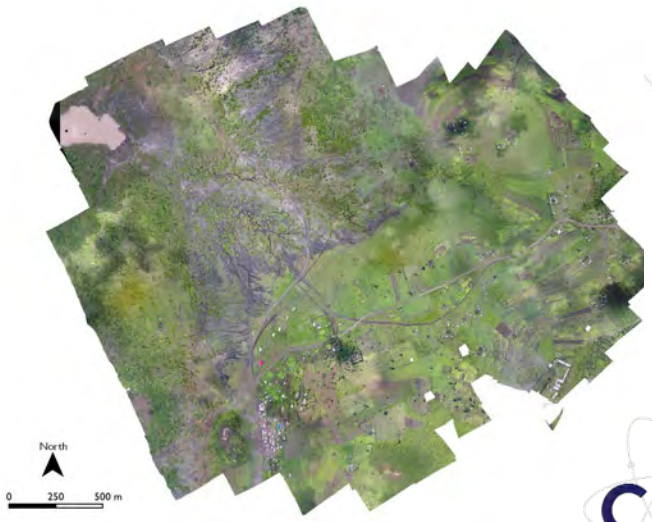


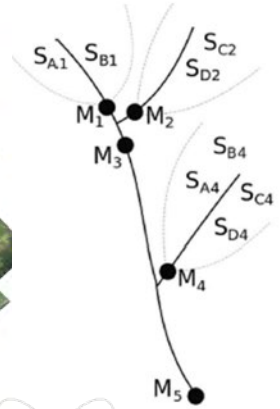
William.blake@plymouth.ac.uk

University of Plymouth Catchment and River Applied Research

Research group overview

- Applied research to support sustainable environmental [land & water] management decision making
- Catchment to coast; whole systems approach
- Land-water connectivity (structural and process)
- Soil health (structure; carbon; microbes etc) and ecosystem service provision
- Downstream impacts of land degradation (e.g. siltation, DWPA etc)
- Sensor tech development, comms and automated platforms





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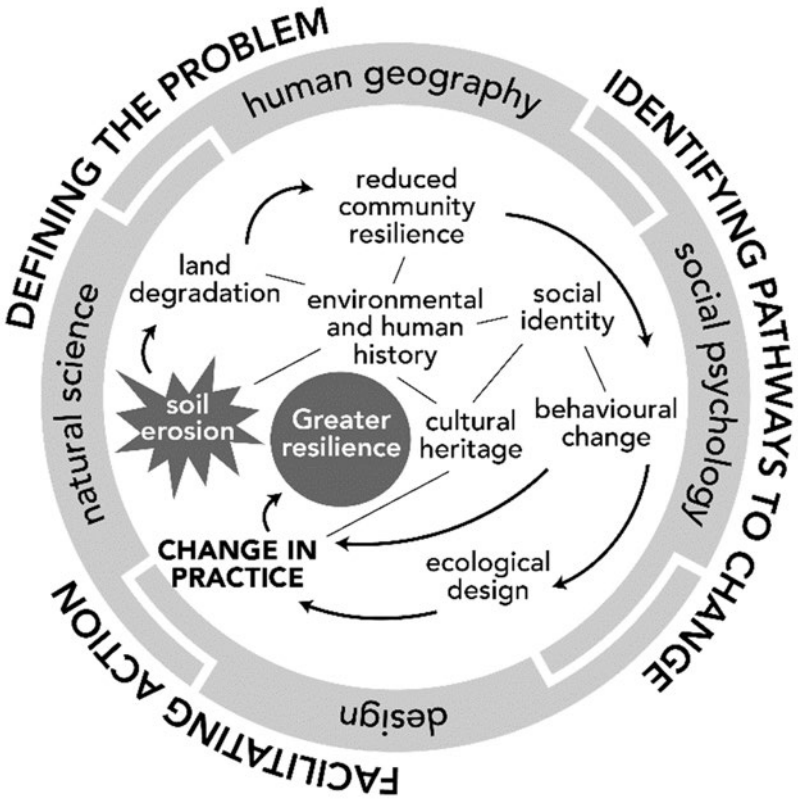
Strong international steer: environmental diagnostic/forensic tools to tackle soil erosion and sediment problems



Whole system approach… integrated upstream and downstream thinking

Some example applications to unravel fine sediment problems in SW

Origins and dynamics of sediment delivered to a restored wetland

Sedimentary evidence of change in sediment flux

Role of sediment as a vector for phosphorus transfer and storage

Dynamics of fine sediment storage and residence time in gravel bed rivers

Determining sediment sources to a restored wetland

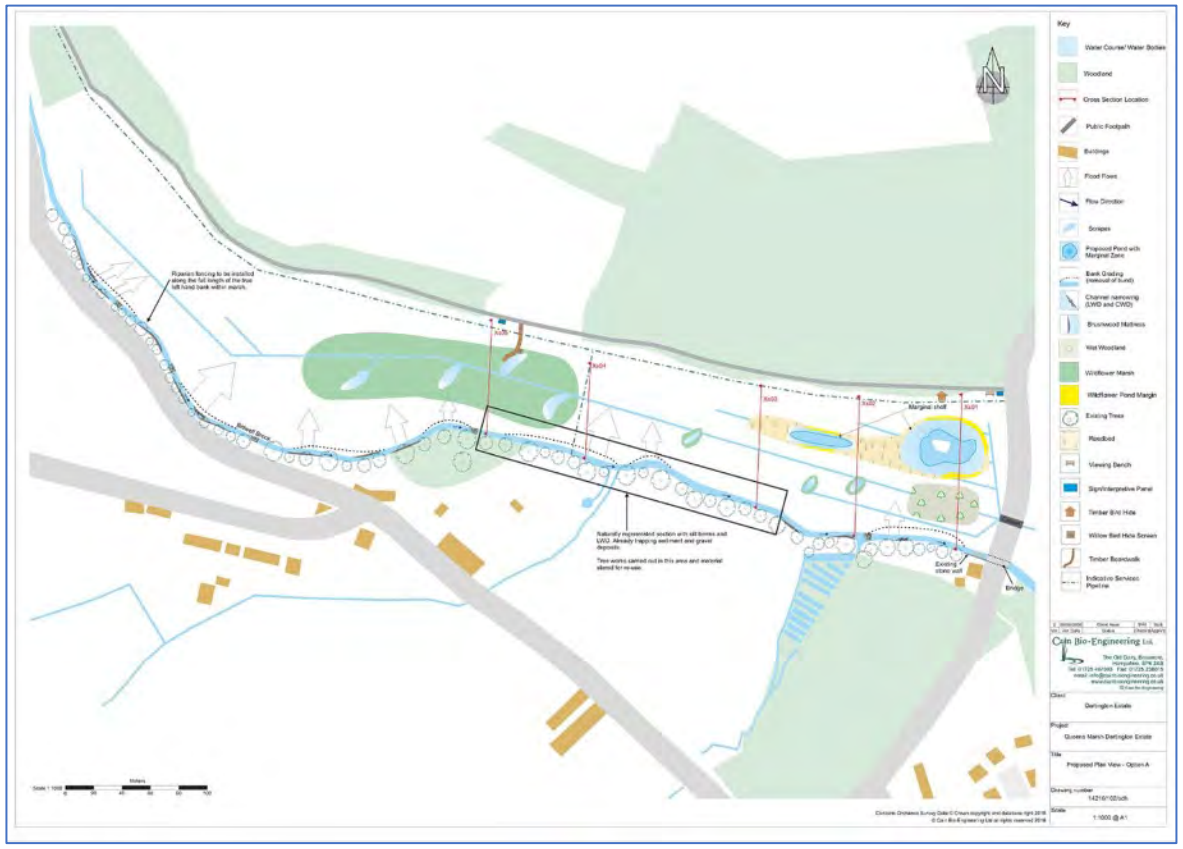
Westcountry Rivers Ltd

thomas | mackay
environmental solutions

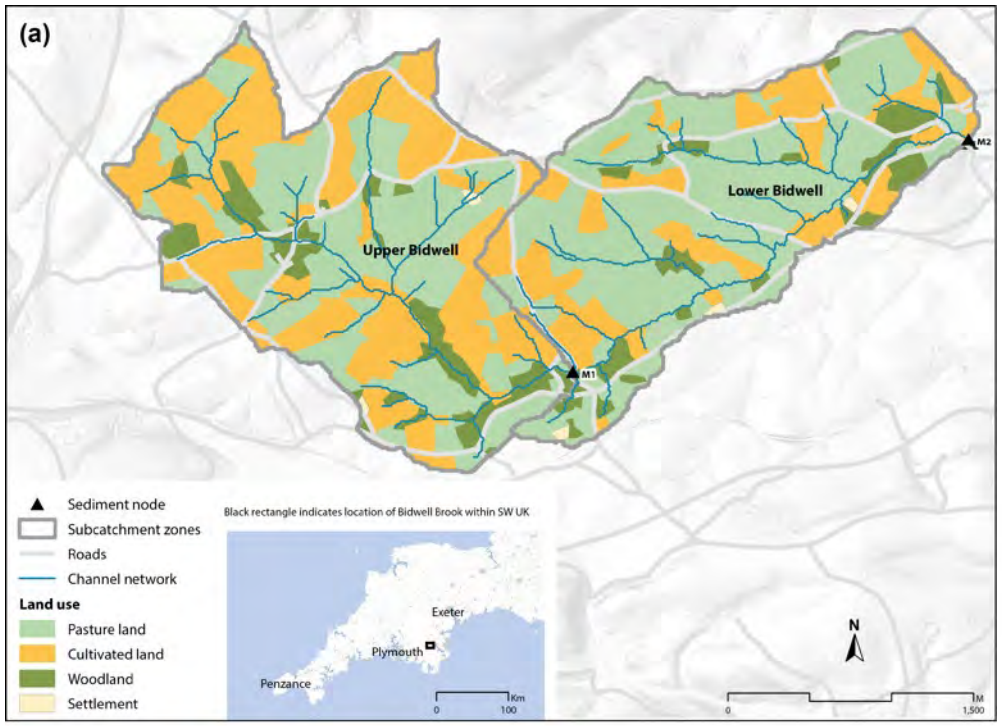
Queen's Marsh Feasibility Study

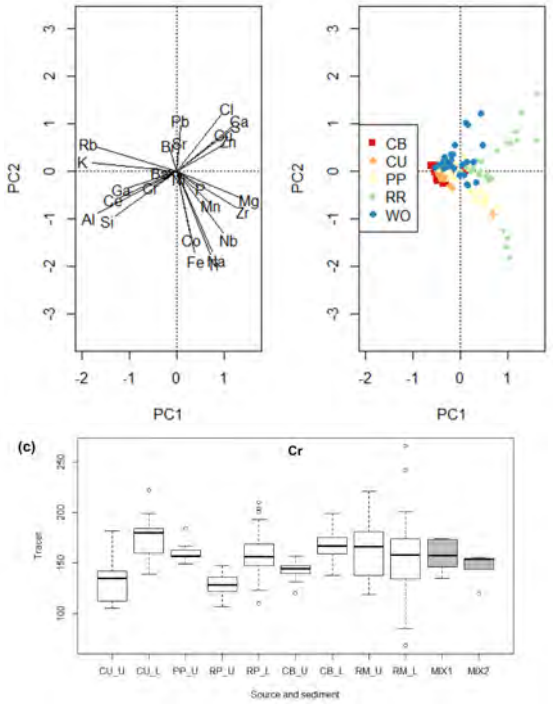
Dartington Hall Trust

Report compiled by Olivia Cresswell, Jo Neville and Alastair Morriss
Checked by Russell Smith
November 2015



Bidwell Brook, Dart tributary

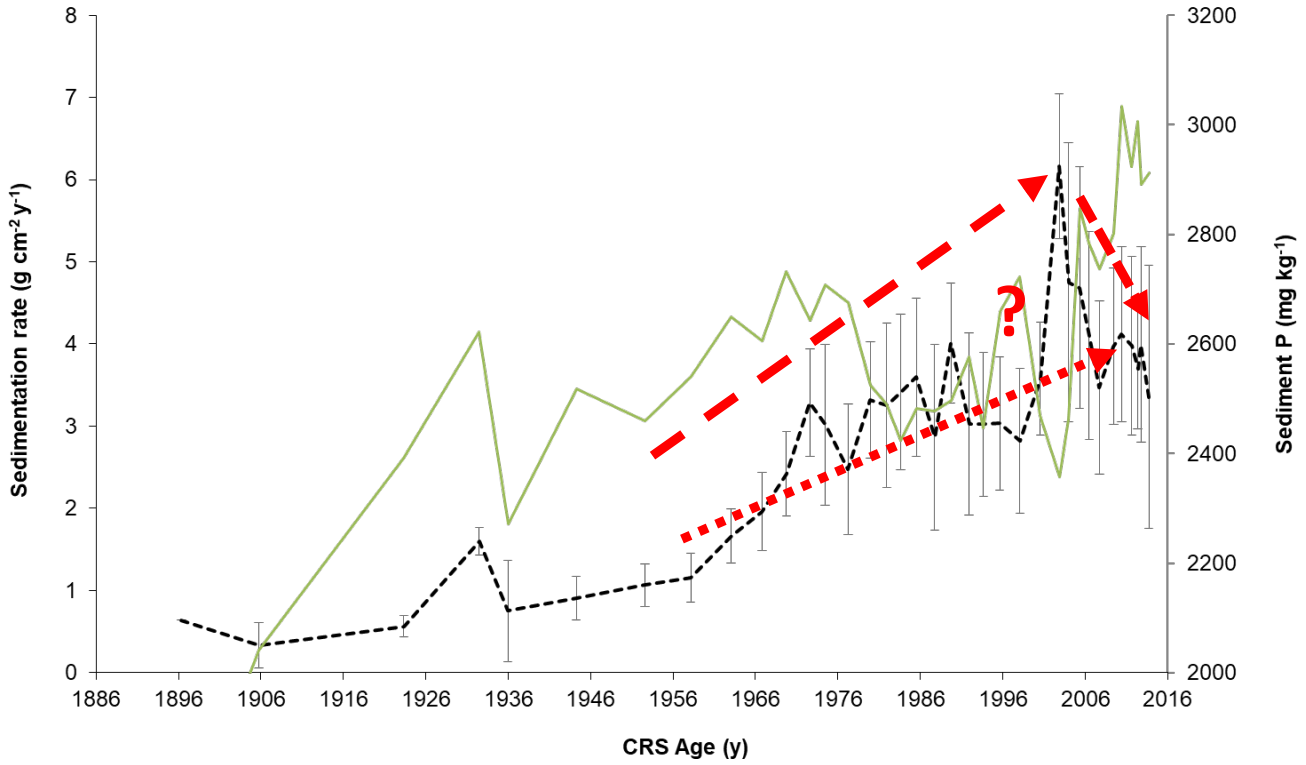




Model unit	Source	D-MixSIAR (factor = type)		Pooled-MixSIAR (factors = node and type)
		Susp. Sed	*Bed sed.*	
Upper Bidwell (Node M1)	CB	0.00 ± 0.03	0.00 ± 0.02	0.02 ± 0.03
	CU	0.13 ± 0.08	0.13 ± 0.07	0.55 ± 0.19
	PP	0.51 ± 0.10	0.55 ± 0.08	0.24 ± 0.19 (P)
	RP	0.19 ± 0.11	0.15 ± 0.08	
	RM	0.16 ± 0.05	0.17 ± 0.04	0.19 ± 0.13
Lower Bidwell (Node M2)	CB	0.04 ± 0.06	0.18 ± 0.11	0.30 ± 0.15
	CU	0.24 ± 0.11	0.23 ± 0.14	0.51 ± 0.18
	PP	0.37 ± 0.13	0.34 ± 0.07	0.07 ± 0.12 (P)
	RP	0.21 ± 0.10	0.15 ± 0.08	
	RM	0.13 ± 0.04	0.11 ± 0.03	0.12 ± 0.09

Distinct organic versus conventional CU signatures required careful data structuring

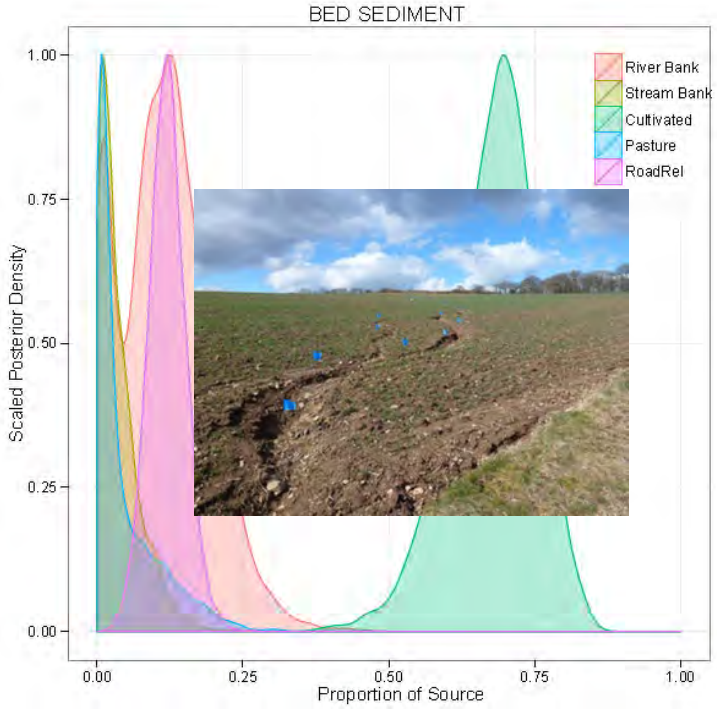
Compacted pasture dominant sediment source (60-70%) with cultivated land (10-25%)

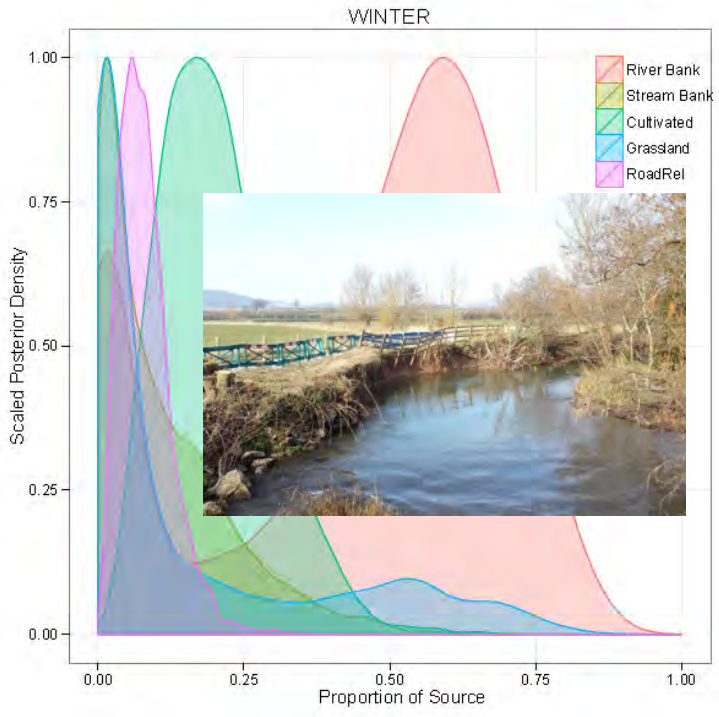


Sedimentary evidence of changes in siltation rates and phosphorus content of deposited sediment

Evaluating the provenance of fine sediment in degraded river shellfish habitats

Elucidating seasonally dependent land use controls on downstream main-stem channel stability





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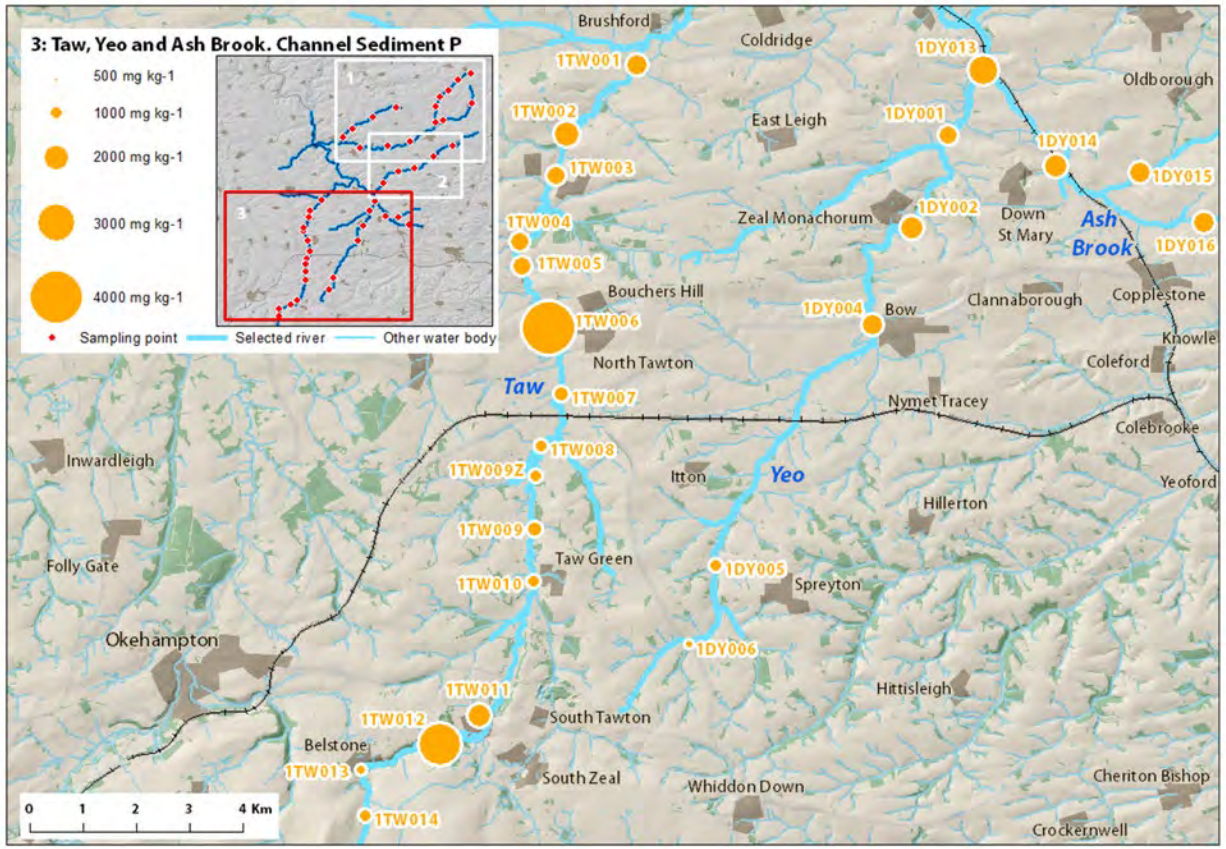
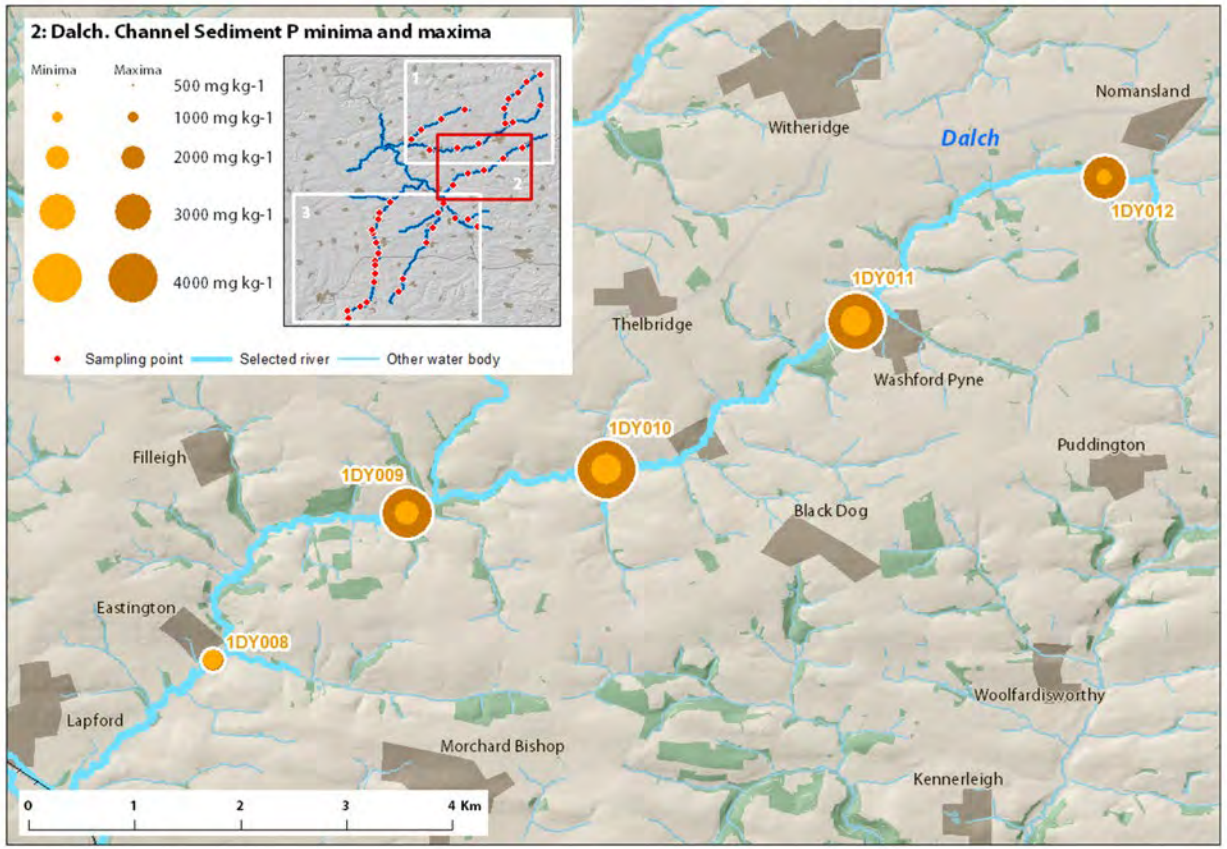
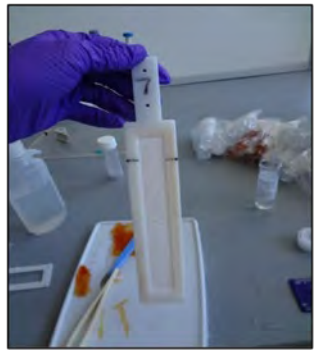
APEM AQUATIC SCIENTISTS

NATURAL ENGLAND

WRT Taw River Improvement Project – evaluating source [DWPA vs WWT] controls on particulate phosphorus storage in the river network

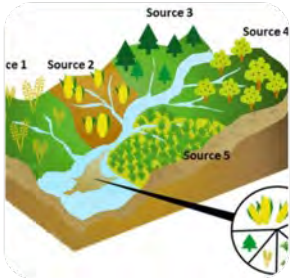


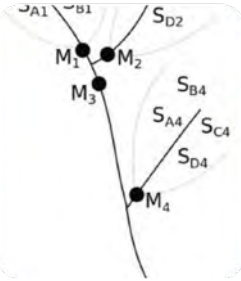




Geochemical evaluation (Emily Burns MSc) suggested that even though P concentrations in some sediments were significantly elevated, mobility between the sediment and overlying water was restricted by Ca content of the sediment.

Evaluating fine sediment residence time in the gravel bed for improved management of aquatic habitats and river basin pollution





Enrique Munoz-Arcos – PhD student

Agencia Nacional de Investigación y Desarrollo
Ministerio de Ciencia, Tecnología, Conocimiento e Innovación
Gobierno de Chile

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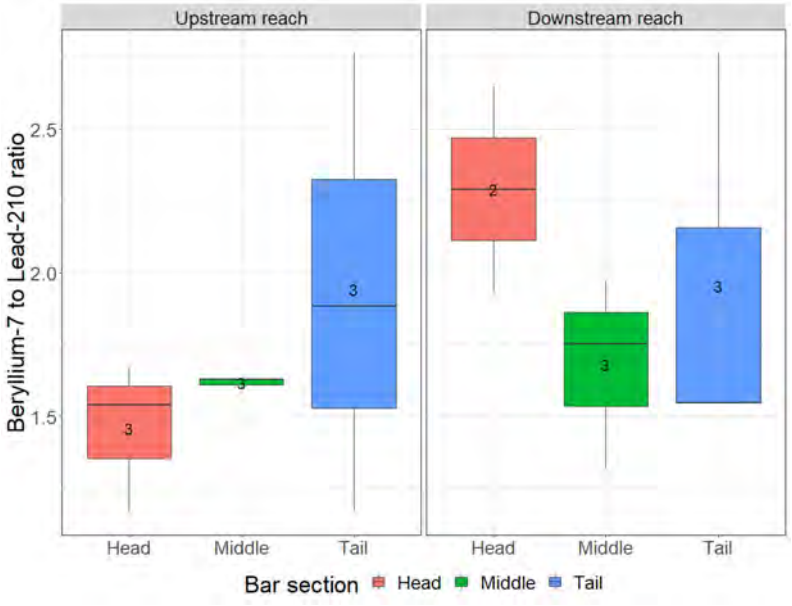
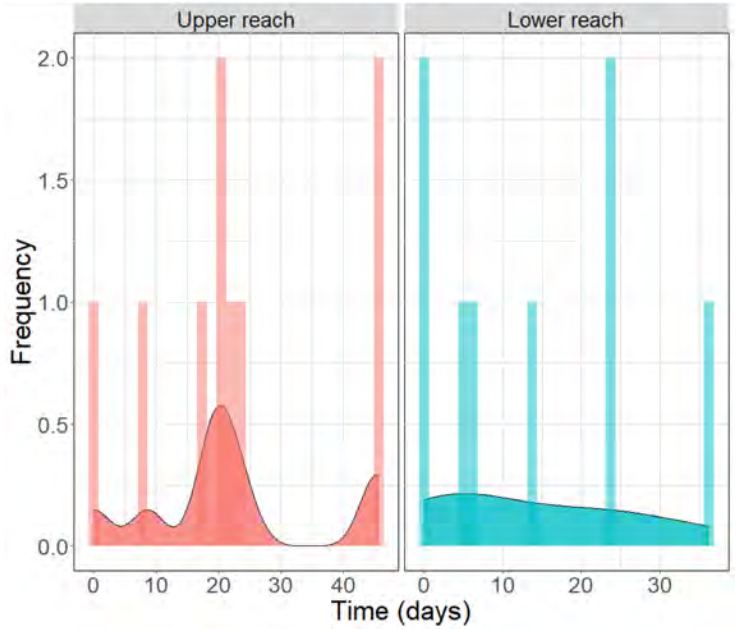
School of Geography, Earth and Environmental Sciences

Evaluating potential for $^{7}Be/^{210}Pb_{ex}$ ratios to evaluate fine sediment residence time in gravel bars SW RBM context



Location	Mean	SD	Median	Min	Max	n
Upper reach	23	15	20	0	46	9
Downstream reach	12	13	7	0	36	9



Preliminary data reveal within bar differences in load and turnover and reach scale differences linked to channel morphological diversity

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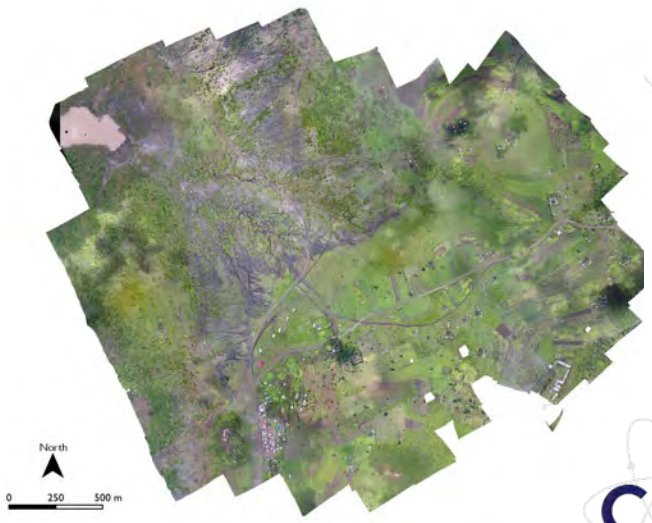

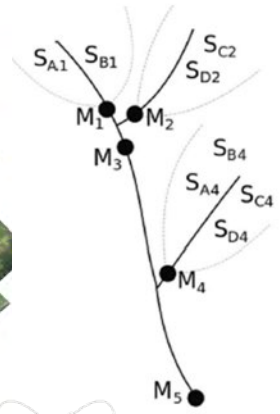

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Thank You

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