Sources of Manageable Phosphorus losses in the Hurunui and Waiau catchments

Presentation to the Science Stakeholder Group:
Adrian Meredith, November 2017, Amberley.

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Outline topics for today

1. State of previous water quality review: P
2. Current evidence of manageable P losses
   - Tributaries versus rivers
   - ‘Natural’ versus ‘observed’ losses
3. Evidence of the most manageable sources of P for reduction
   -

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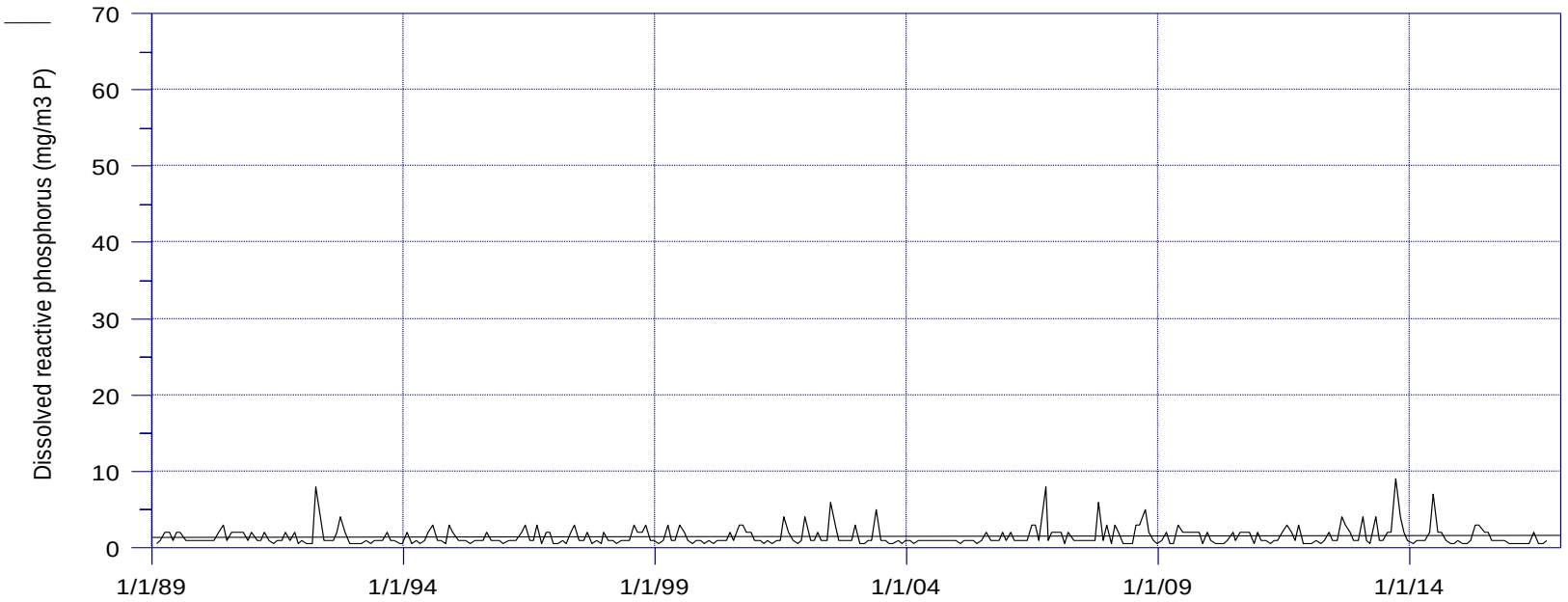
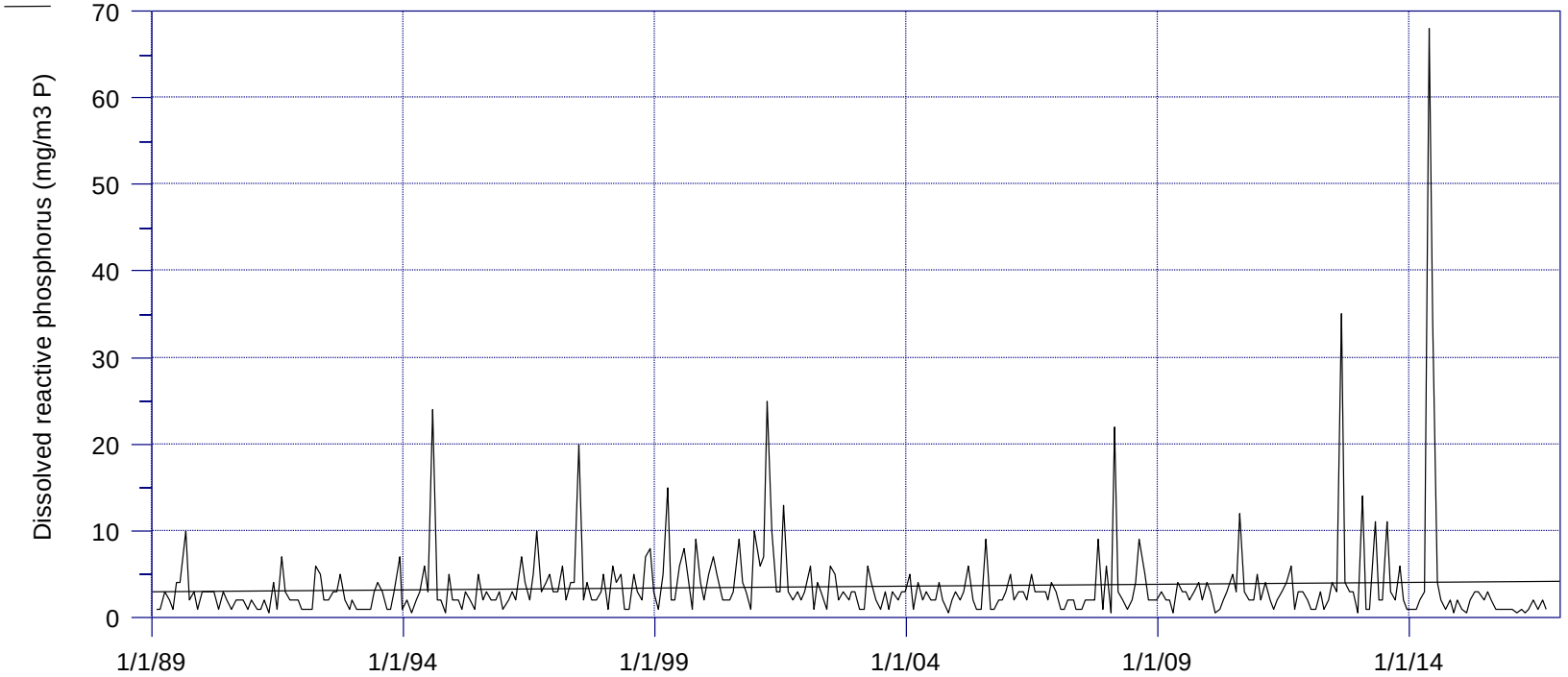
No significant trends in mainstem, however slight decrease for SH1 when flow is taken into consideration

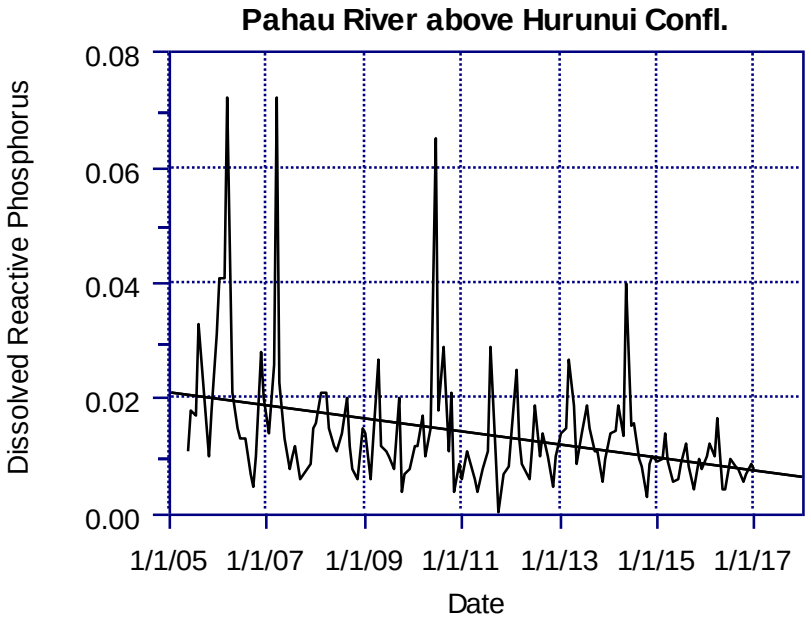
Mandamus

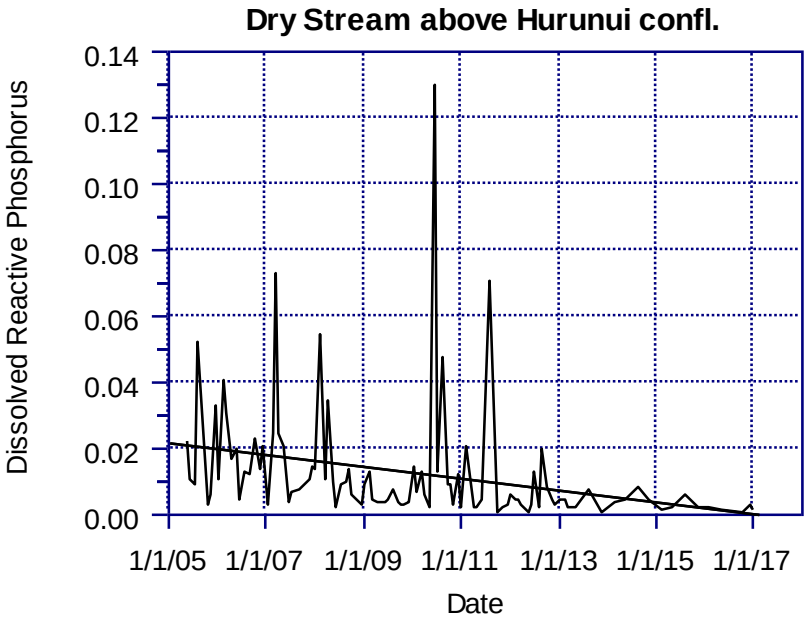


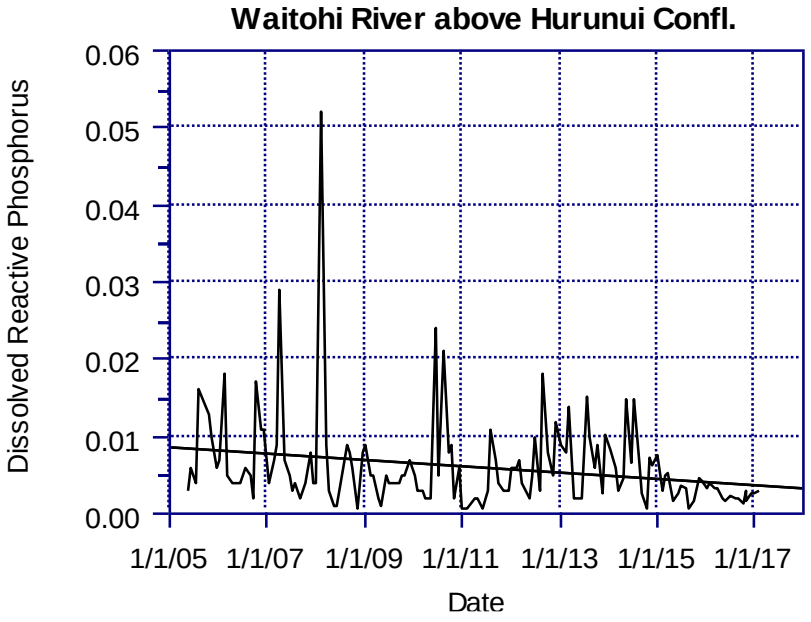
SH1

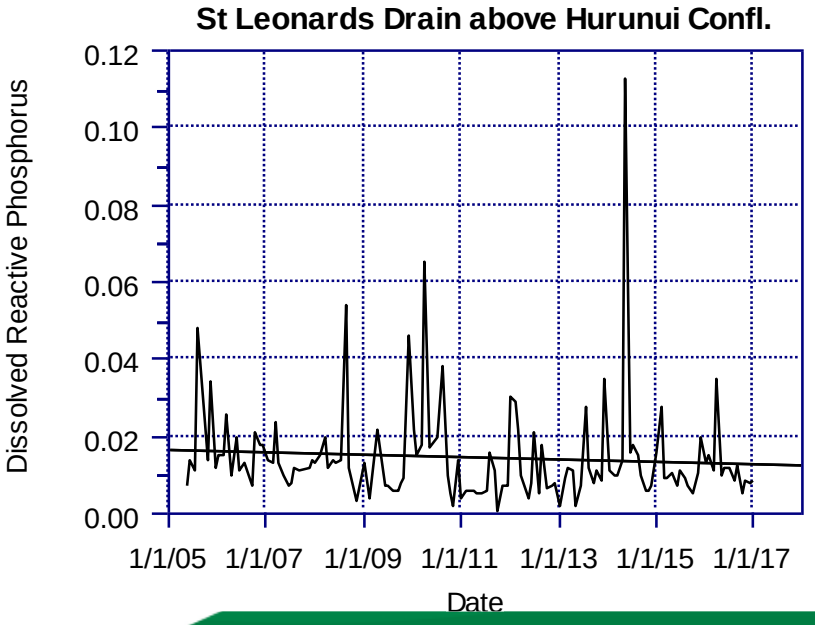


- Decreasing trends for Waitohi, Pahau, and Dry Stream

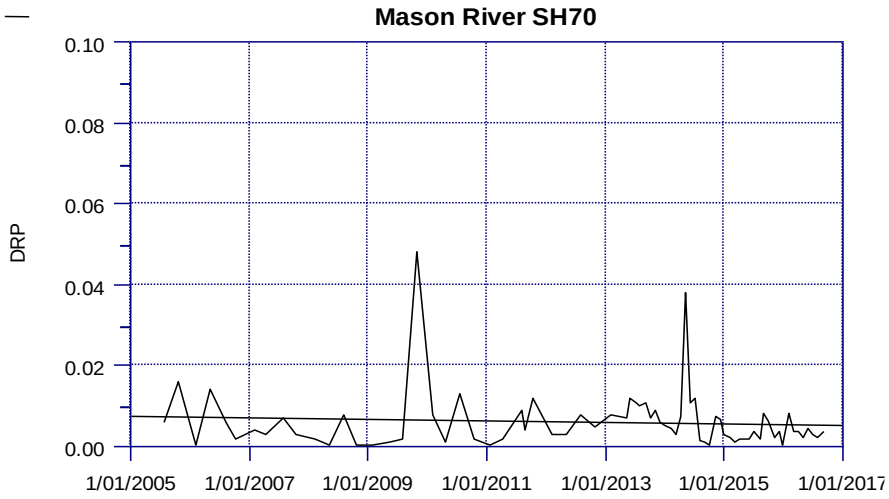


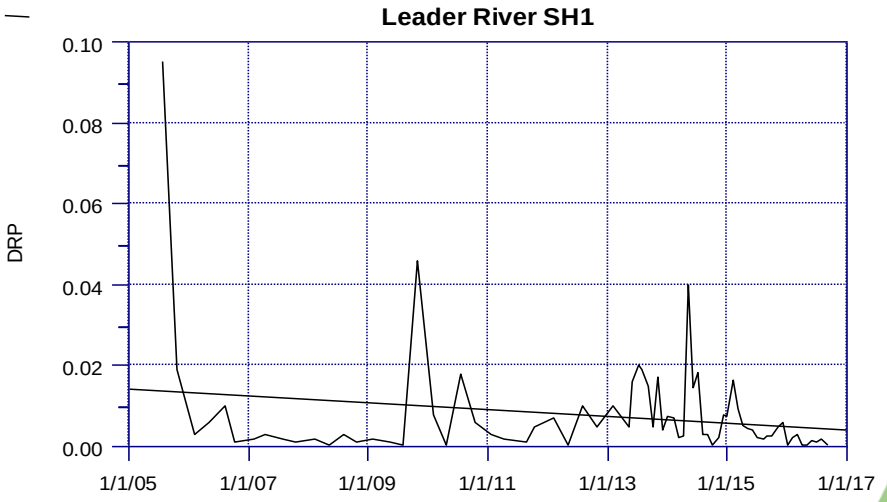


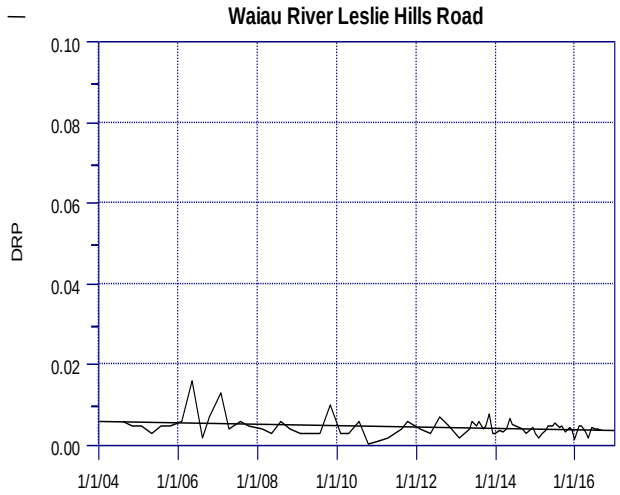


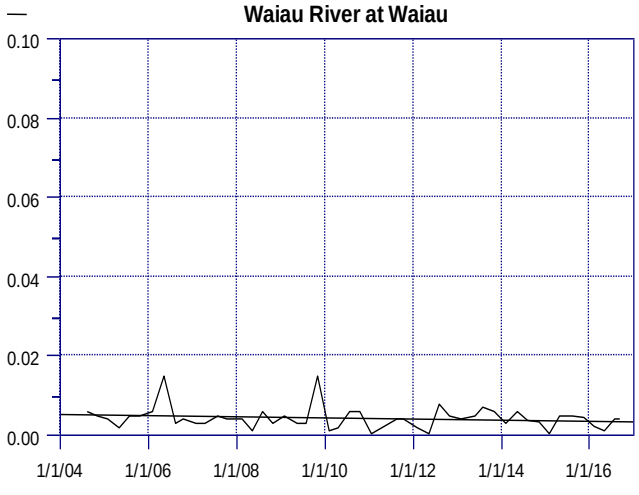


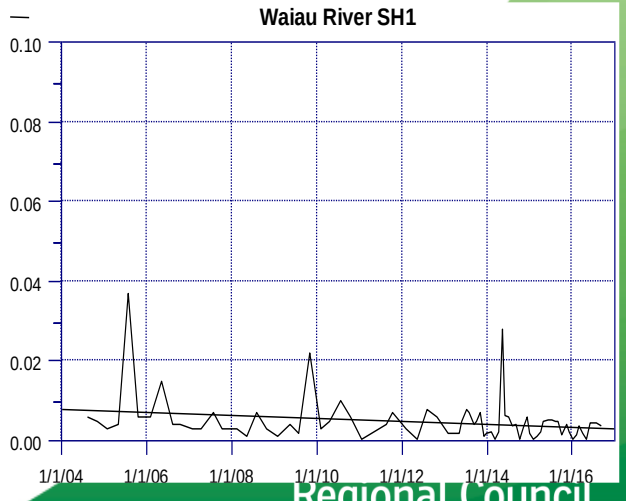
- No significant Phosphorus trends in the Waiau River catchment











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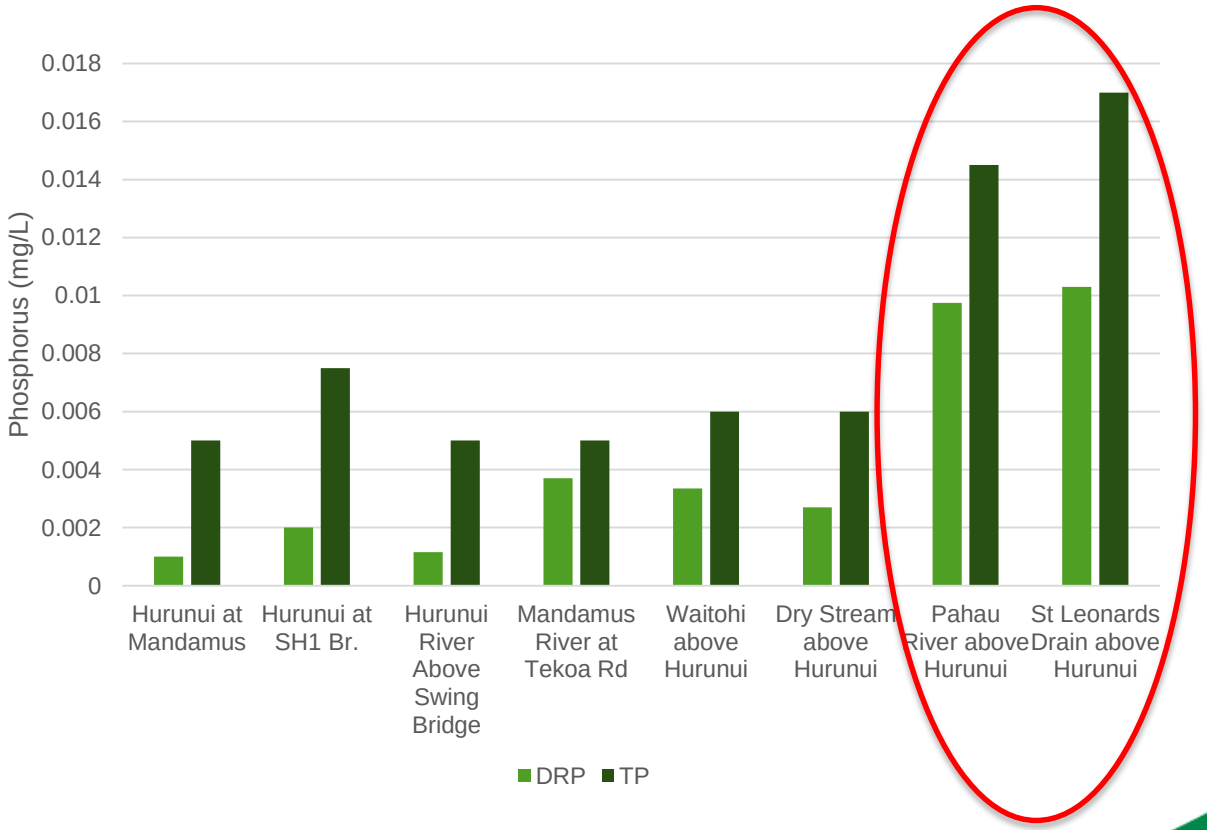
Mandamus River
Hurunui at Mandamus
St Leonards Drain
Dry Stream
Pahau River
Waitohi River
Waikari River
Kaiwara River
Hurunui at SH1
Greta River
Hurunui River - Swing Bridge
DRP
<0.0005
0.0005-0.003
0.003-0.006
0.006-0.015
>0.015
Kilometers
2 1 0 2 4 6
Land Information New Zealand; Environment Canterbury;

Both Pahau River and St Leonards Drain still have high Phosphorus concentrations

Particularly ‘Dissolved Reactive Phosphorus’ (available P)

More gains still to be made



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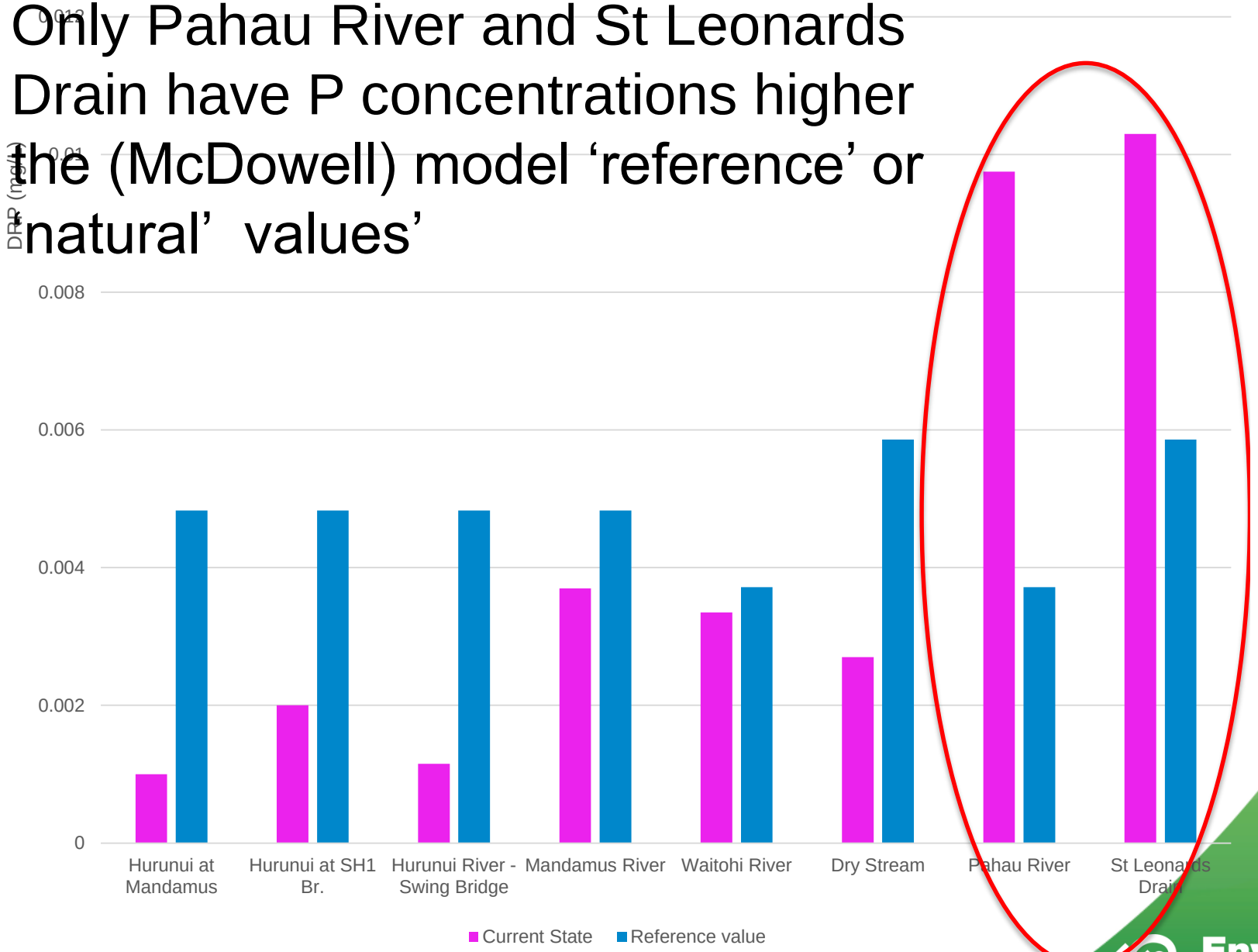
Only Pahau River and St Leonards Drain have P concentrations higher the (McDowell) model 'reference' or 'natural' values'



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Hurunui:

Previous and current evidence still all point to further Phosphorus gains still to be made in Pahau and St Leonards catchments.

And Waikari River?

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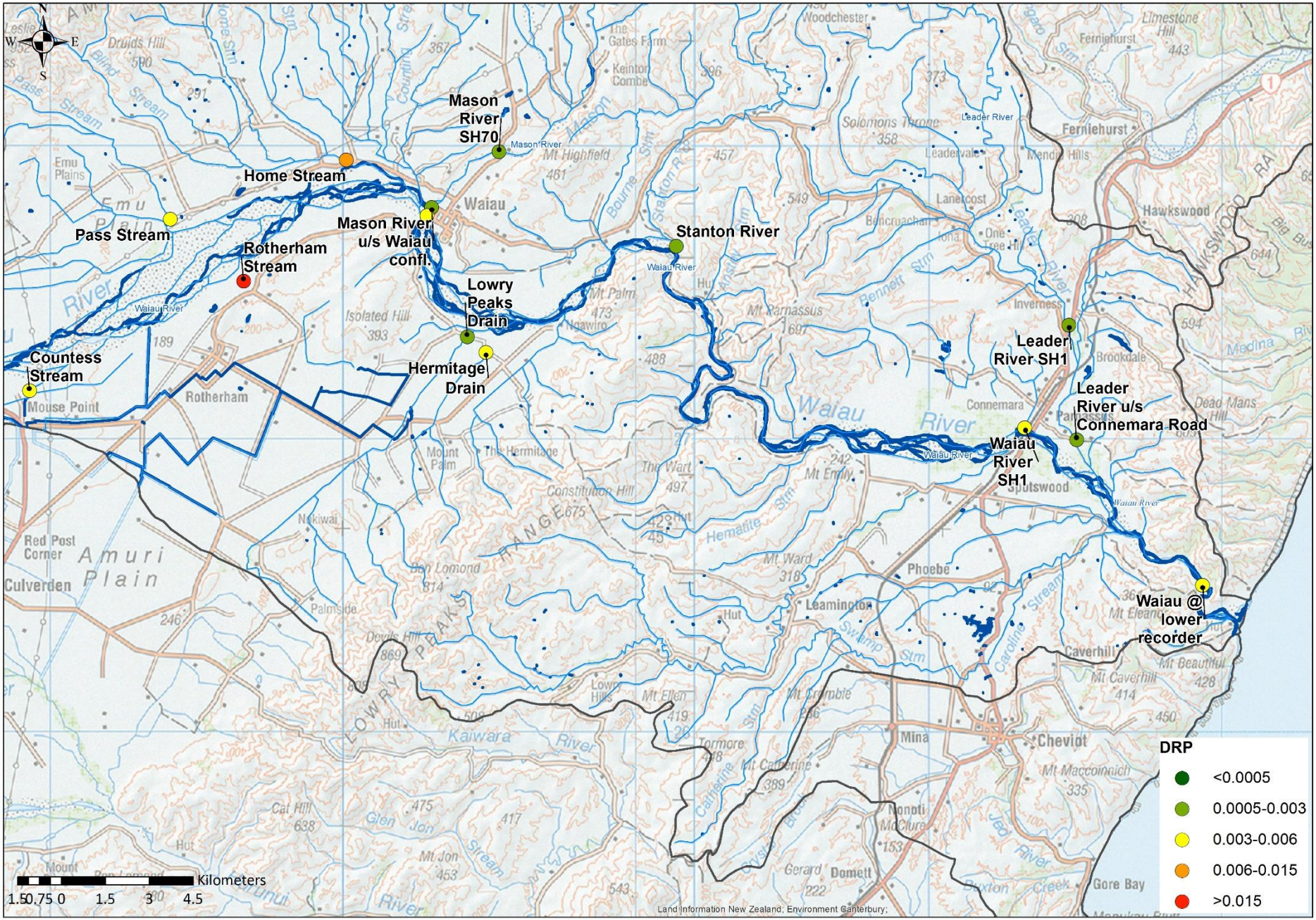
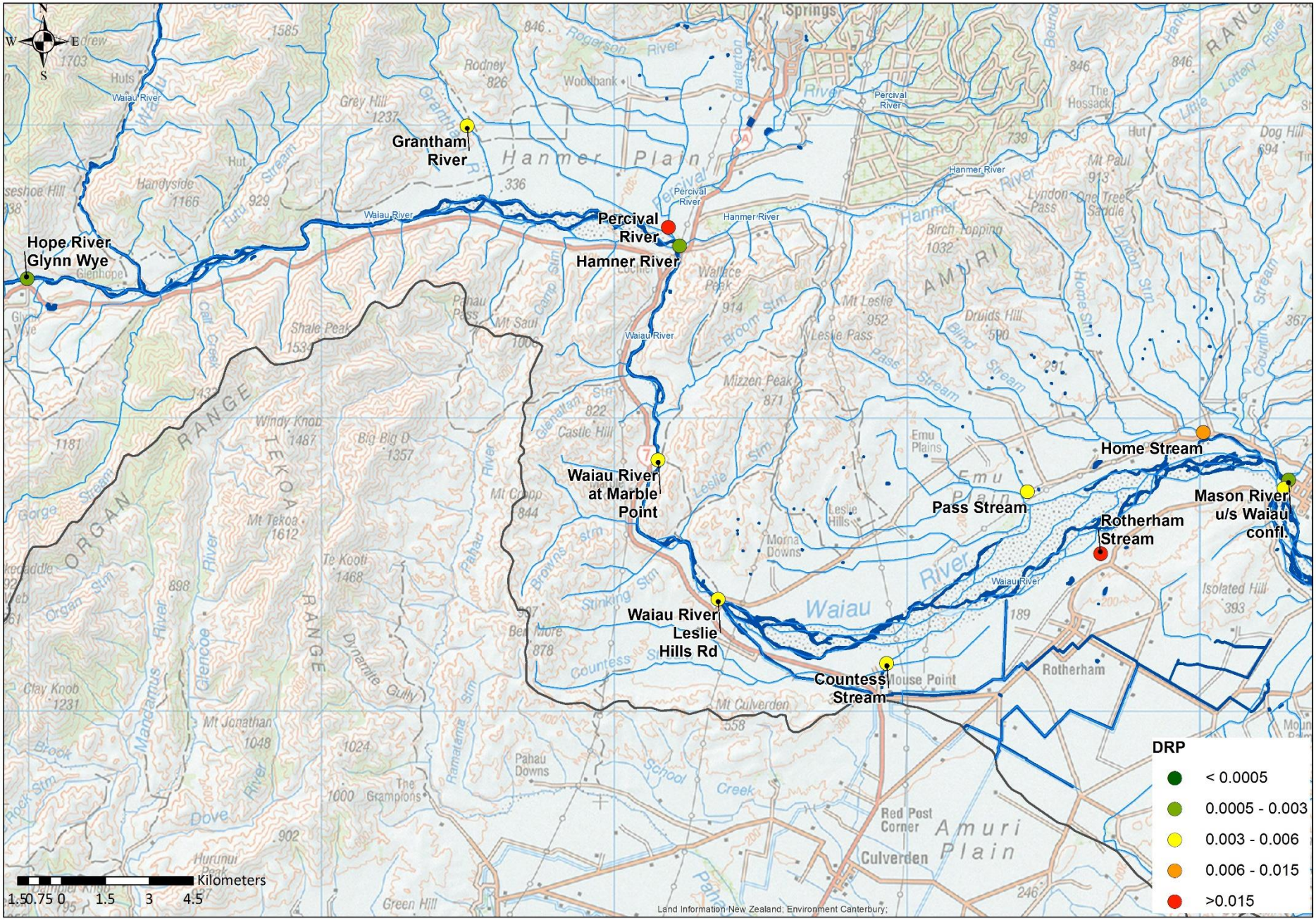
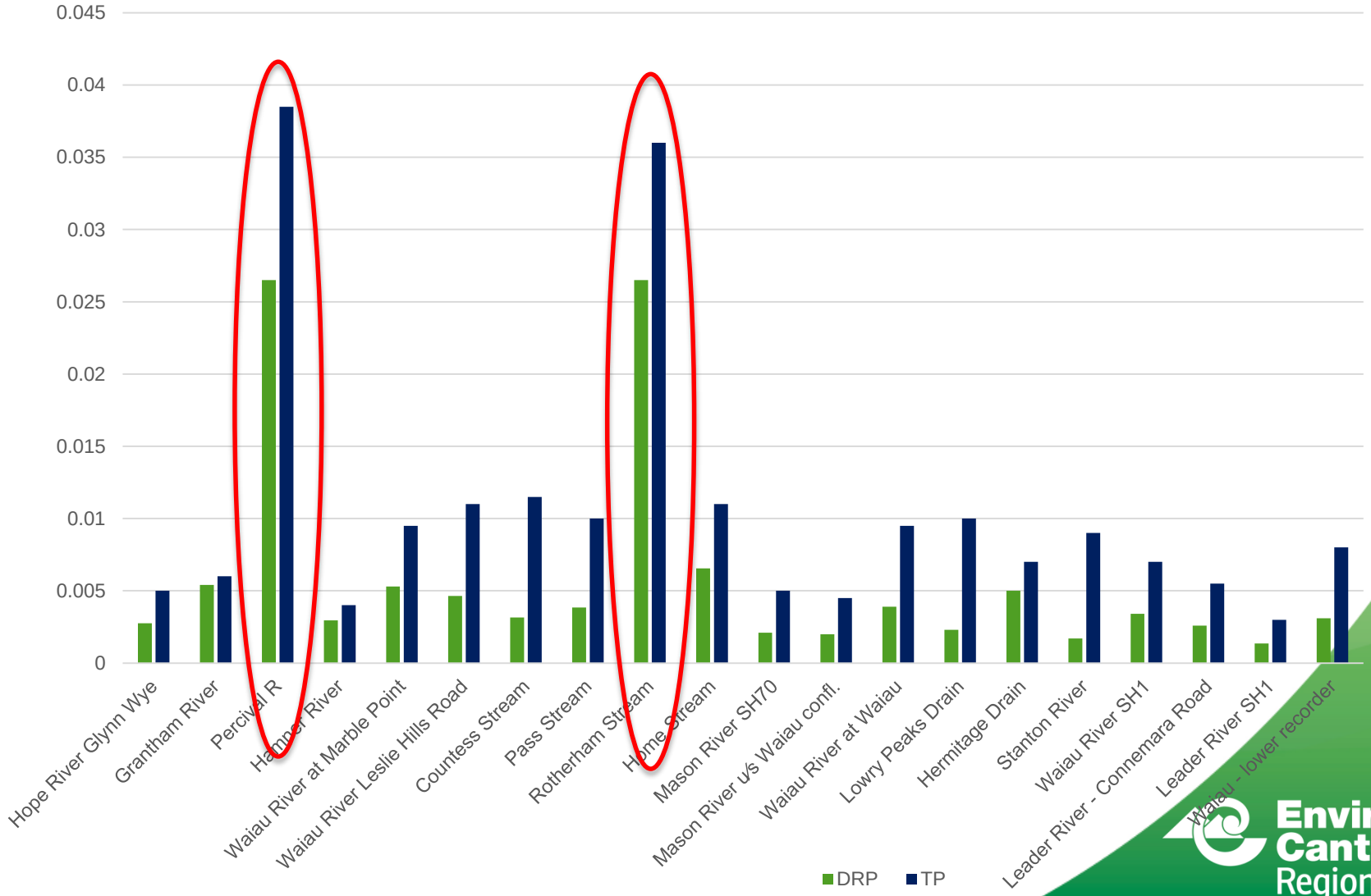

Mason River SH70
Home Stream
Pass Stream
Rotherham Stream
Mason River u/s Waiau confl.
Stanton River
Lowry Peaks Drain
Hermitage Drain
Countess Stream
Leader River SH1
Leader River u/s Connemara Road
Waiau River SH1
Waiau @ lower recorder
DRP
<0.0005
0.0005-0.003
0.003-0.006
0.006-0.015
>0.015
Kilometers
1.5 0.75 0 1.5 3 4.5
Land Information New Zealand; Environment Canterbury;


Grantham River
Percival River
Hamner River
Hope River
Glynn Wye
Waiau River at Marble Point
Waiau River Leslie Hills Rd
Countess Stream
Home Stream
Pass Stream
Rotherham Stream
Mason River u/s Waiau confl.
DRP
< 0.0005
0.0005 - 0.003
0.003 - 0.006
0.006 - 0.015
>0.015
Kilometers
1.5 0.75 0 1.5 3 4.5
Land Information New Zealand; Environment Canterbury;

Waiau River: Two Waiau streams stand out:
Percival River Rotherham Stream

Also to a lesser extent some of the drains such as Home Stream.



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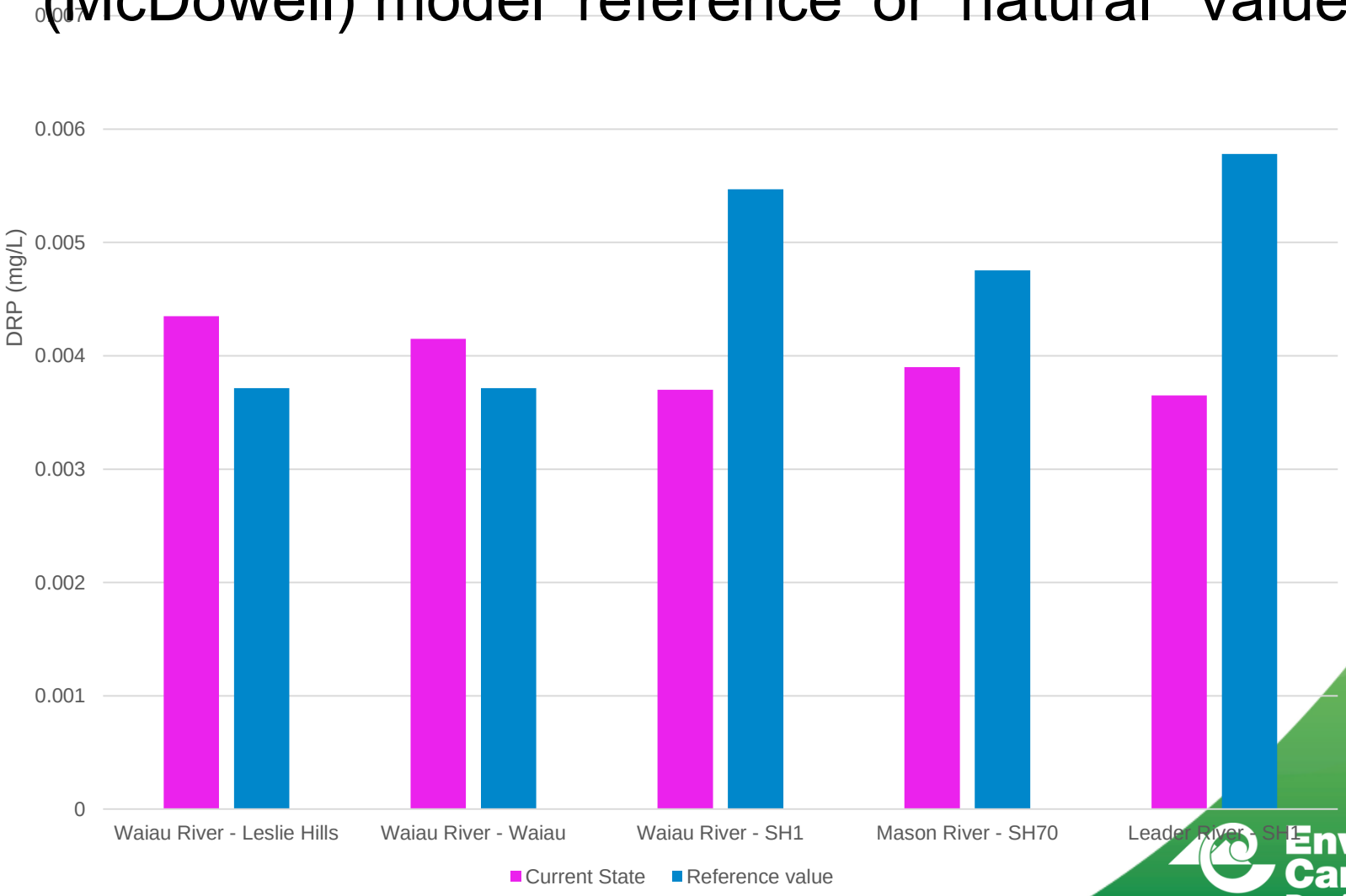
No long term monitoring Waiau catchments stand out as having P concentrations higher the (McDowell) model ‘reference’ or ‘natural’ values’



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Waiau:

Previous and current evidence point to greatest potential Phosphorus gains in:

Percival and Rotherham Streams

Other Amuri Plains streams not as equivocal but ‘data poor’?

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McDowell and Nash 2012

"A Review of the Cost-Effectiveness and Suitability of Mitigation Strategies to Prevent Phosphorus Loss …."

Three categories to approach this:

1. On Farm Management
   - Managed soil P, fencing off streams, low solubility fertilizers

2. Amendments
   - Binding agents in soil surface, tile drains,

3. Edge of Field strategies – wetlands etc.

Assessed "suitability" and "cost effectiveness" of each category of mitigation strategies, and individual mitigations.

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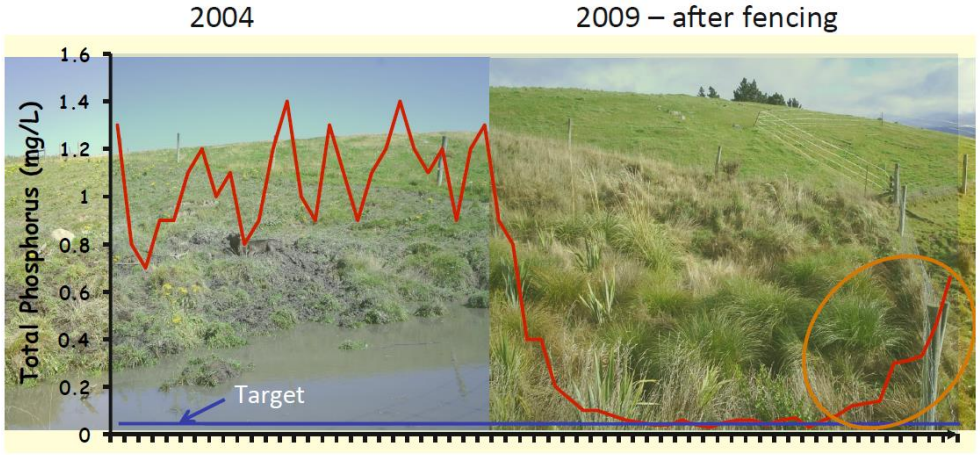
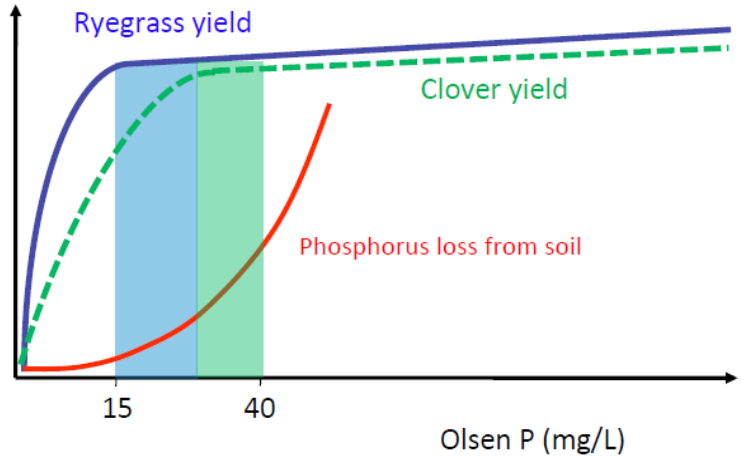
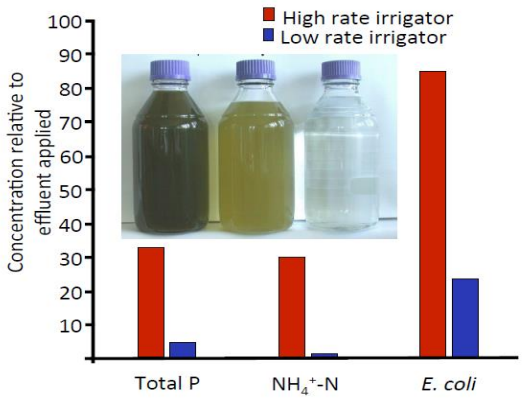




- Optimal location
  focal point
- Size vs. production
- Longevity
- Alternatives?
  advanced pond system



Apply Mitigation in CSAs on Cost-Effectiveness

Strategy		Effectiveness (%)	Cost ($/kg P conserved)
Optimum soil test P	Management	5-20	highly cost-effective
Split grass-clover pastures		0-40	Highly cost-effective
Low solubility P fertilizer		0-20	0-25
Restricted grazing		30-50	125-200
Tile drain	Amendment	50	20-75
Alum to pasture / cropland		5-30	125->400
Buffer strips	Edge of field	0-10	>200
Stream fencing		10-30	4-55
Sorbents in and near streams		20	300
Natural and constructed wetlands		-426-77	>400

There are always potential gains to be made:

“suitability” and “cost effectiveness”

Questions?

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