Sources of Manageable Phosphorus losses in the Hurunui and Waiau catchments

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
No significant trends in mainstem, however slight decrease for SH1 when flow is taken into consideration.
• Decreasing trends for Waitohi, Pahau, and Dry Stream
• No significant Phosphorus trends in the Waiau River catchment
Both Pahau River and St Leonards Drain still have high Phosphorus concentrations

Particularly ‘Dissolved Reactive Phosphorus’ (available P)

More gains still to be made
Only Pahau River and St Leonards Drain have P concentrations higher than the (McDowell) model ‘reference’ or ‘natural’ values’.
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?
**Waiau River:** Two Waiau streams stand out: Percival River  Rotherham Stream

Also to a lesser extent some of the drains such as Home Stream.
No long term monitoring Waiau catchments stand out as having P concentrations higher the (McDowell) model ‘reference’ or ‘natural’ values’
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’?
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.
**2004 to 2009 – after fencing**

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

**Ryegrass yield**

**Clover yield**

**Phosphorus loss from soil**

**Olsen P (mg/L)**

**Decreases DRP loss by 45%**

**Convergence**

**Stream**
### Apply Mitigation in CSAs on Cost-Effectiveness

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Effectiveness (%)</th>
<th>Cost ($/kg P conserved)</th>
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<tbody>
<tr>
<td>Optimum soil test P</td>
<td>5-20</td>
<td>highly cost-effective</td>
</tr>
<tr>
<td>Split grass-clover pastures</td>
<td>0-40</td>
<td>Highly cost-effective</td>
</tr>
<tr>
<td>Low solubility P fertilizer</td>
<td>0-20</td>
<td>0-25</td>
</tr>
<tr>
<td>Restricted grazing</td>
<td>30-50</td>
<td>125-200</td>
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<tr>
<td>Tile drain</td>
<td>50</td>
<td>20-75</td>
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<tr>
<td>Alum to pasture / cropland</td>
<td>5-30</td>
<td>125-400</td>
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<tr>
<td>Buffer strips</td>
<td>0-10</td>
<td>&gt;200</td>
</tr>
<tr>
<td>Stream fencing</td>
<td>10-30</td>
<td>4-55</td>
</tr>
<tr>
<td>Sorbents in and near streams</td>
<td>20</td>
<td>300</td>
</tr>
<tr>
<td>Natural and constructed wetlands</td>
<td>-426-77</td>
<td>&gt;400</td>
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</tbody>
</table>
There are always potential gains to be made:

“suitability” and “cost effectiveness”