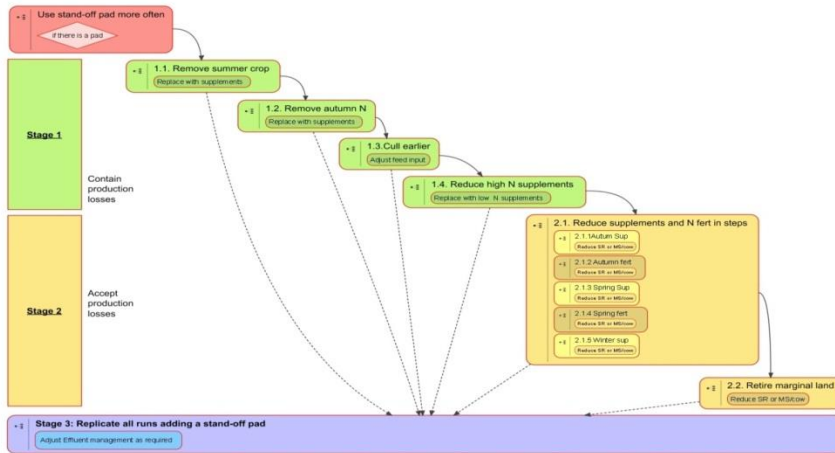


Rotorua allocation modelling



Understanding mitigation - 23 June 2015

Mitigation protocols



Standardised practices to reduce N were applied to farms – based on real farms in the catchment.

Assume farmers already doing their best.

NO heroic productivity gains.

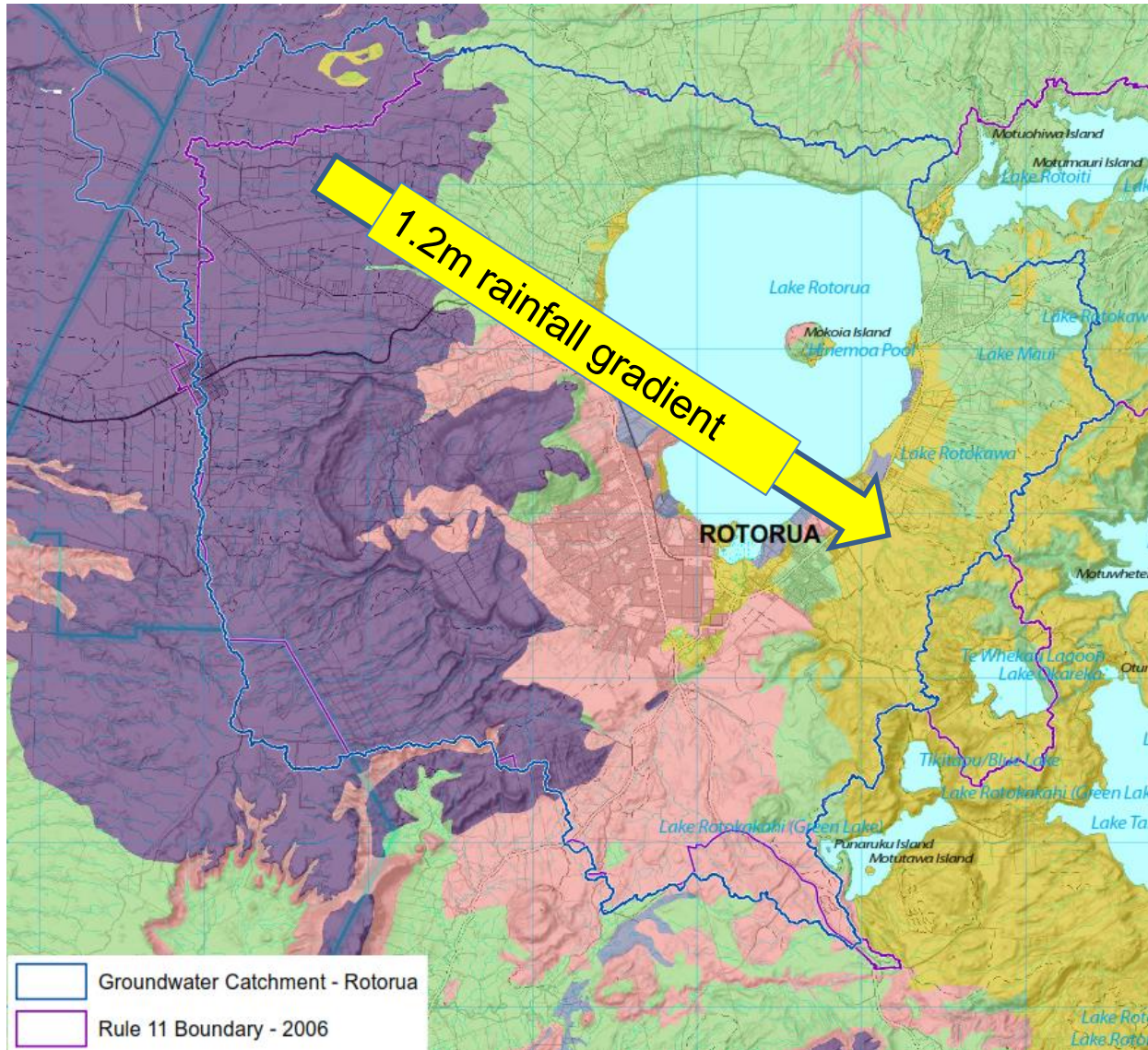
Decrease farm inputs, retaining the existing policy mix. An example is decreasing N fertiliser application used to support capital stock.

Change policy mix to meet leaching targets. This involves retaining the stock that provide most profit per kg N leached within a N limit. An example is moving away from dairy support to a farm with a high sheep:beef ratio, as this may allow a farm to most profitably meet a limit.

Decrease intensity of policy to reduce N leaching. For example, reduce stocking rate of cattle and sheep, holding sheep:beef ratio fixed.

STOP. Next step is to change land use to meet leaching limit. Harms the continuity of farm management (e.g. moving from sheep and beef farming to forestry). Land use change will be handled within the catchment model.

Zooming in on some farms



Geophysical zones

Different areas of the catchment are represented by different farm systems in the modelling. These are coded by soil type and rainfall band in these results.

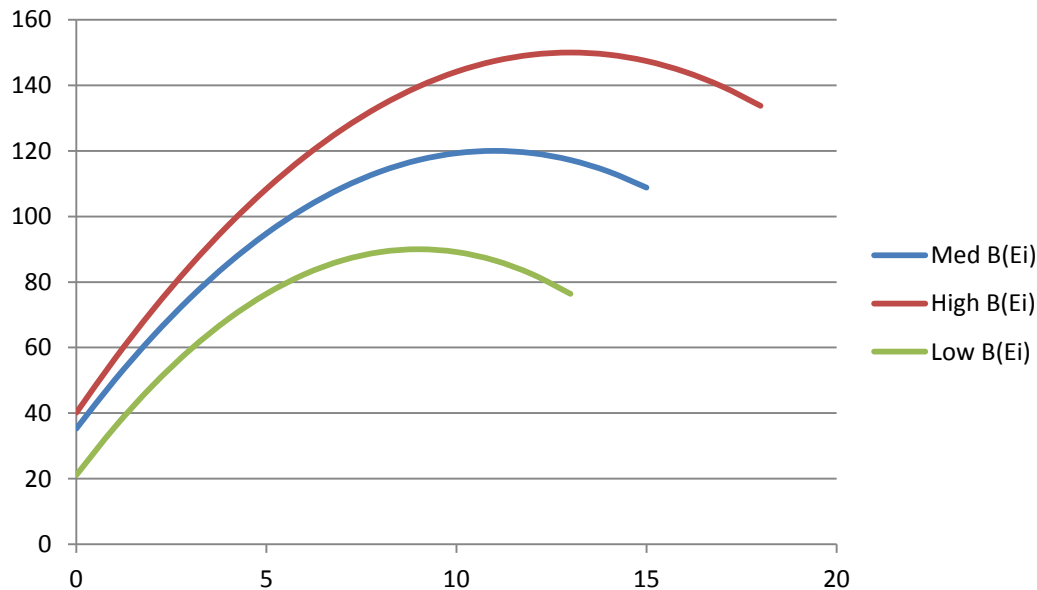
Pu – Pumice

Po – Podzol

Al – Allophanic

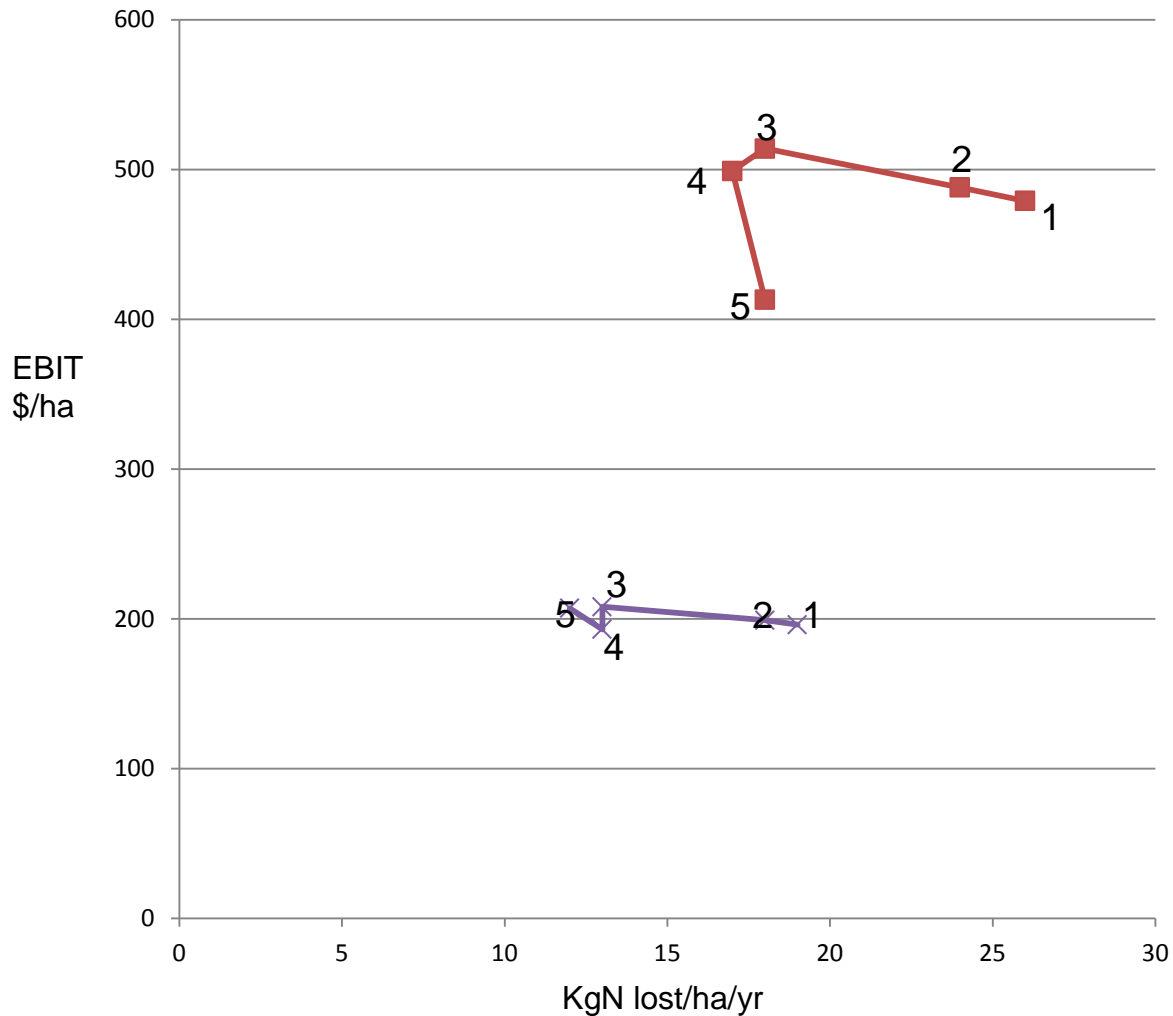
Re - Recent

Theoretical mitigation curves are smooth – real ones are ugly



We used ugly ones.

Sheep and beef

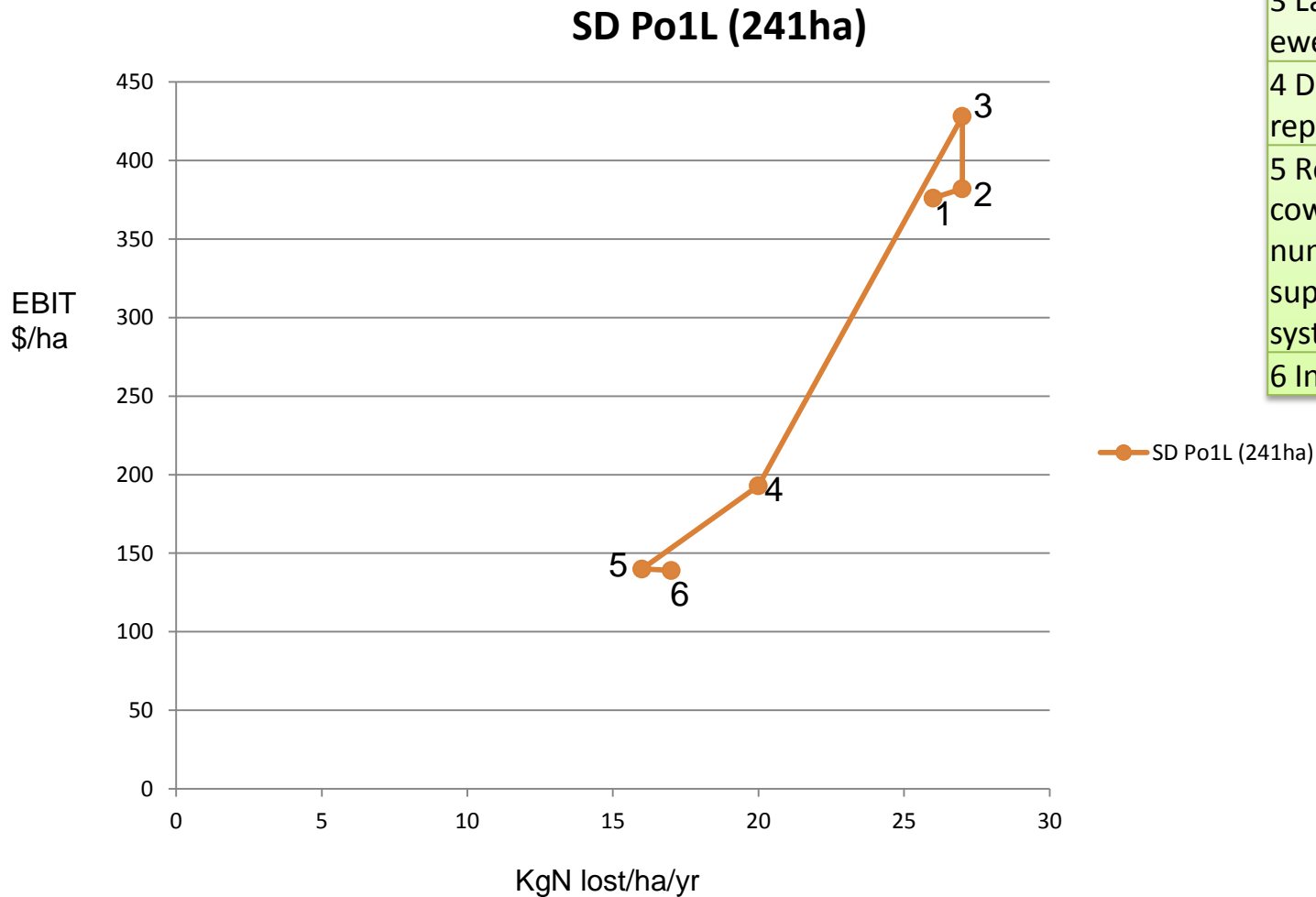


Po1L
1 Baseline
2 Drop N (10 units)
3 Reduce winter cropping (2.2-1.9)
4 Graze dry hoggets off
5 Increase sheep 60-70%

■ SB Po1L (320ha)
× SB Po2L (535ha)

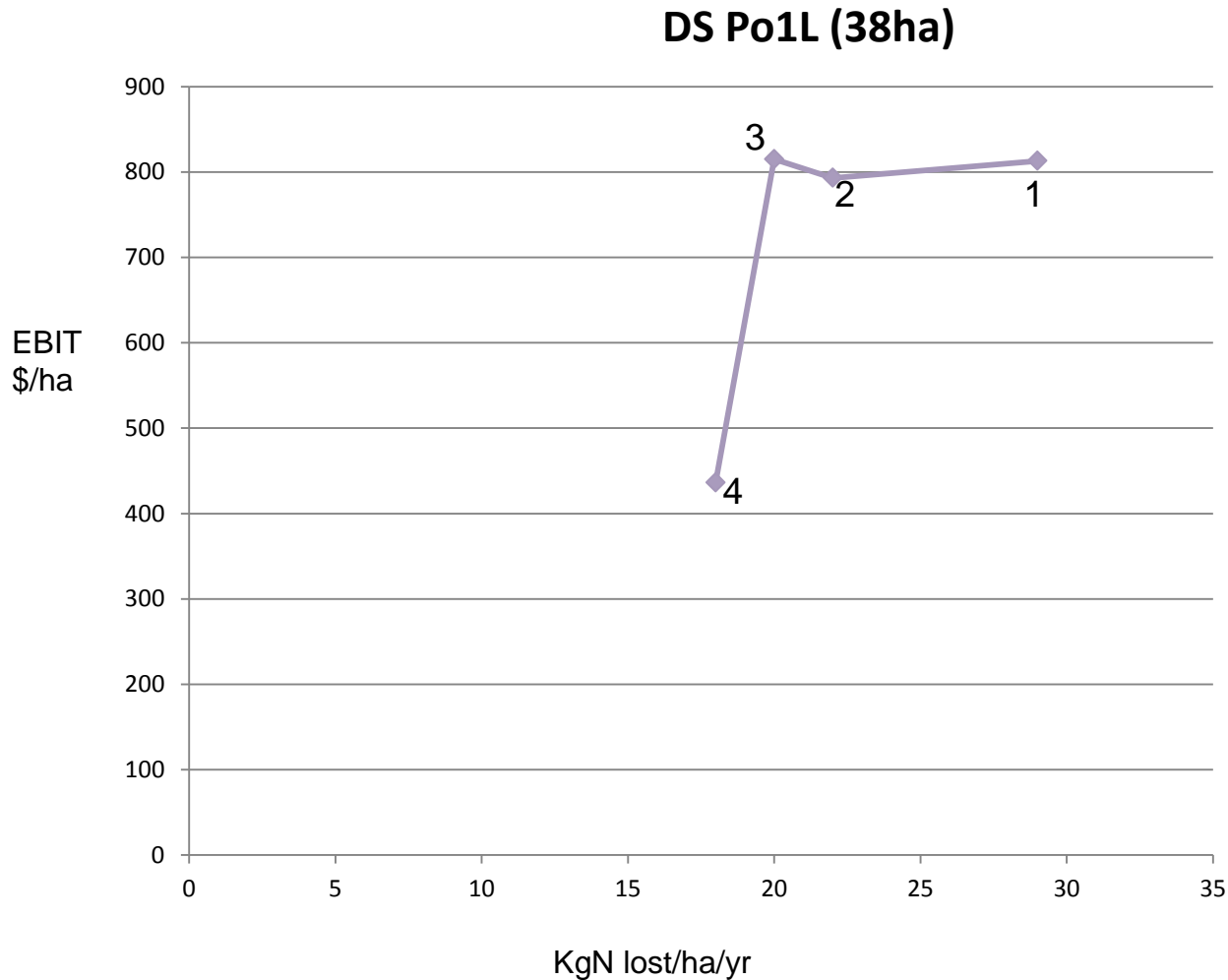
Po2L
1 Baseline
2 Drop N (5 units)
3 Reduce winter cropping (0.7-0.5)
4 Graze dry hoggets off
5 Increase sheep 65-70%

Sheep and dairy



- 1 Baseline
- 2 Drop N (7-0)
- 3 Lamb hoggets and decrease ewe numbers
- 4 Drop calves and yearlings, replace with bulls or steers
- 5 Remove wintering dairy cows. Increase other stock numbers consistent with feed supply and production system.
- 6 Increase sheep to 70%

Dairy support



- 1 Baseline
- 2 Drop N (30-0) and reduce stock to match
- 3 Remove calf grazing
- 4 Remove wintering dairy cows. Increase yearlings consistent with feed supply and production system.

—◆— DS Po1L (38ha)

Drop N - \$2.86/kg/ha/yr
- 7kg

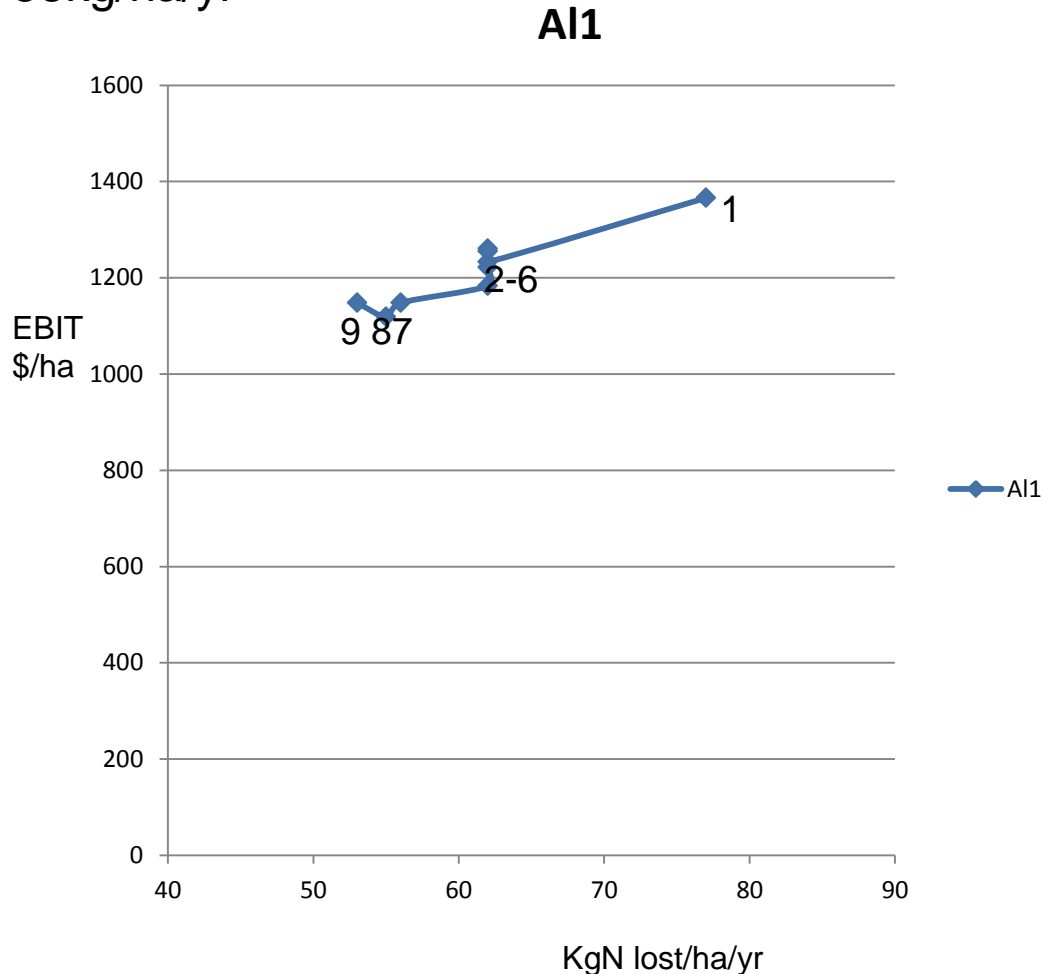
Remove wintering cows - \$189/kg/ha/yr - 2kg!

A podzol dairy support farm

- Leaches 29kg/ha/yr, makes \$813/ha/yr - allocated 19kg/ha/yr
- Step 1 – remove N use?
 - Cost \$20/ha to reduce to 22kg/ha...YES
- Step 2 – remove calf grazing?
 - Profit \$22/ha to reduce to 20kg/ha...YES
- Step 3 – remove winter cows?
 - Cost \$379/ha to reduce to 18kg/ha...NO
- Buy N?
 - Cost \$22/ha/yr to increase allocation to 20...YES
- Net profit \$793/ha/yr

Allophane dairy farm

Can mitigate
all the way to
53kg/ha/yr



1 Baseline

2 Reduce autumn N application, replace with lower N feed

3 Cull early as feed demand allows (10% culls early Feb, 10% culls early March)

4 Replace high N feed (imported pasture, PKE) with low N feed (maize silage) as appropriate

5 20% autumn feed reduction

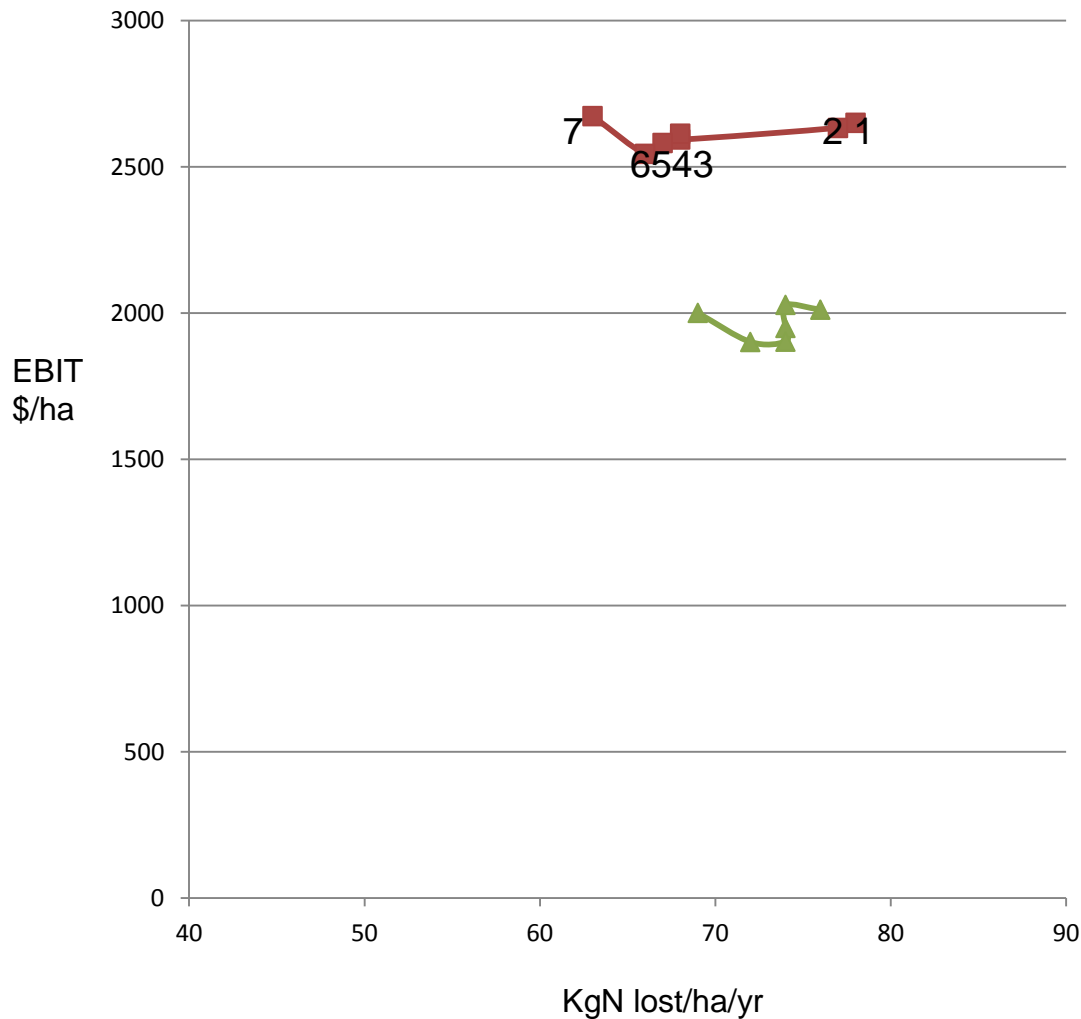
6 20% spring supplement reduction

7 Reduce spring fert to deliver annual N use to 100kg N/ha

8 Reduce winter supplement by 20%

9 Retire marginal land and decrease stock

Podzol dairy farms



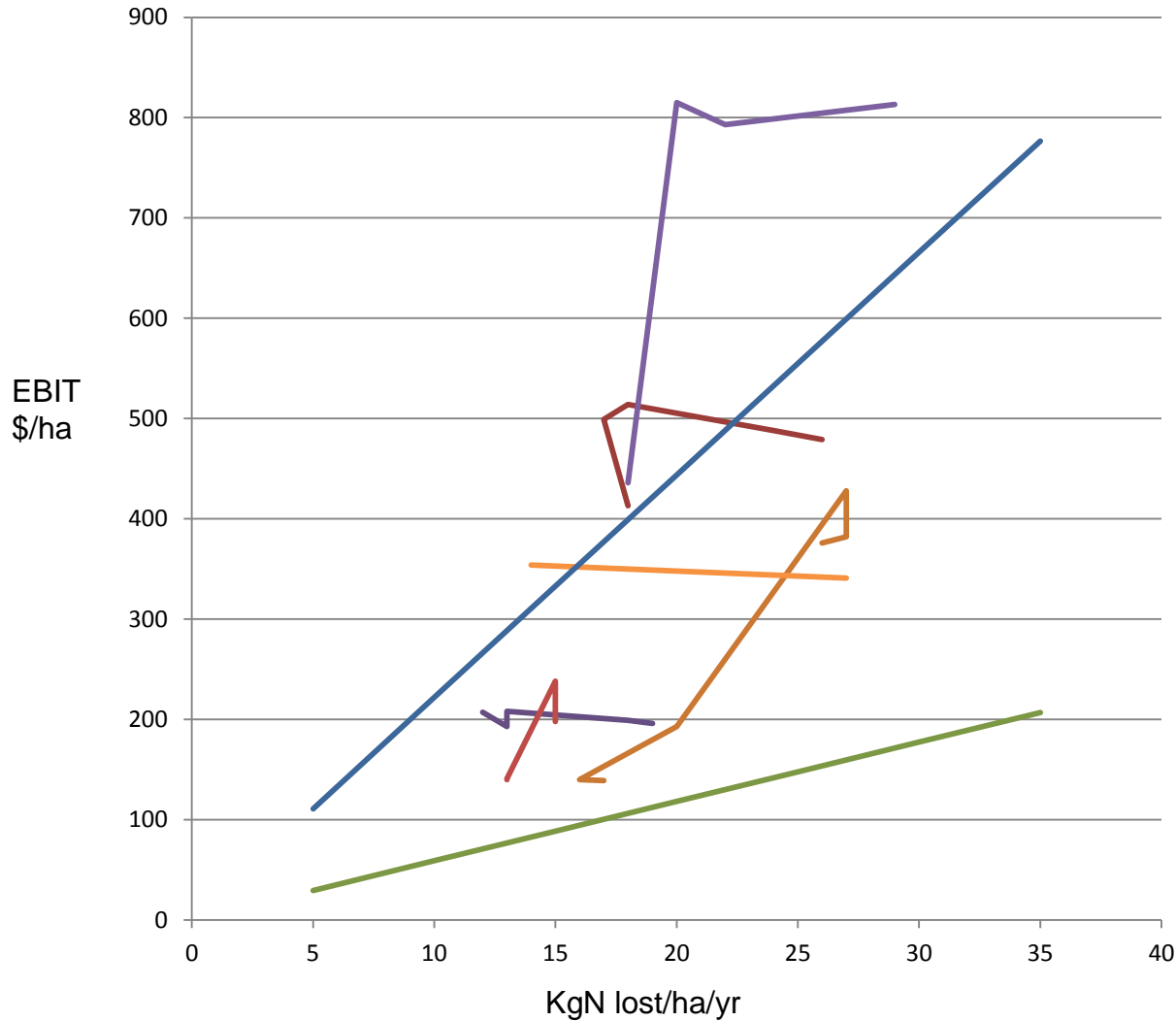
Curve flattish but struggling into the 60s – needs to buy N.

- | |
|---|
| 1 Baseline |
| 2 Remove summer crop, replace with supplements |
| 3 Reduce autumn N application, replace with lower N feed |
| 4 Cull early as feed demand allows (10% culls early Feb, 10% culls early March) |
| 5 20% autumn feed reduction |
| 6 Reduce spring fert to deliver annual N use to 100kg N/ha |
| 7 Retire marginal land and decrease stock |

A (high rainfall) pumice dairy farm

- Leaches 84kg/ha/yr, makes \$934/ha/yr - allocated 58kg/ha/yr
- Mitigation?
 - Can go as low as 73kg making \$812/ha
- Buy N?
 - Needs 15kgN (\$330 @ \$22/kg/yr)
 - Residual profit \$482/ha
- Land use change?
 - Costs of infrastructure change, benefits of selling stock and coop shares
 - Dairy support on same land - \$954/ha leaching 36
 - Plus selling 22kgN (\$484/ha/yr @ \$22/kg/yr)
 - \$1438/ha/yr
- An extreme example and will depend on N price and availability

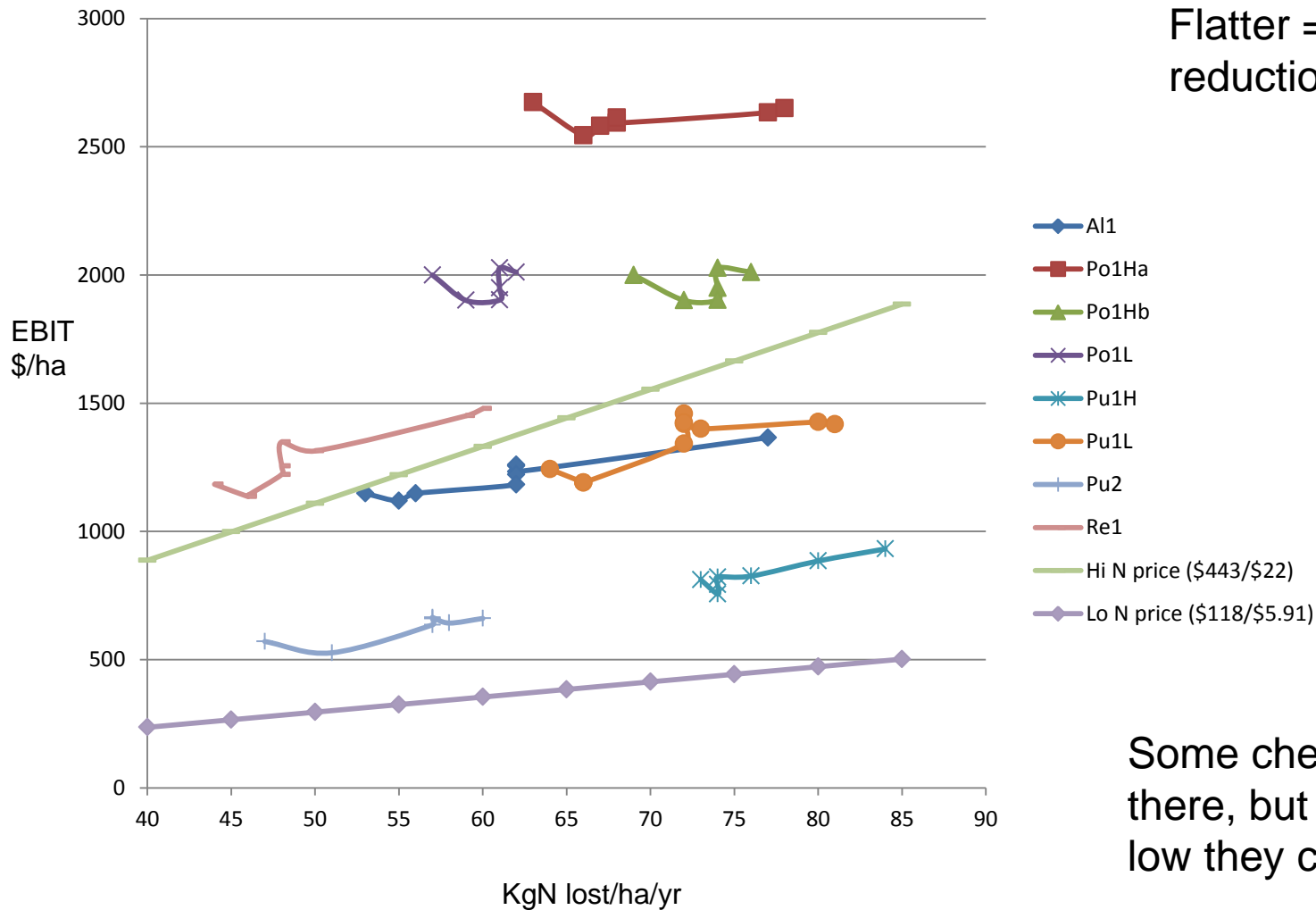
Drystock in SW catchment



Flatter = cheaper reductions

Some can do mitigations for cheaper than the N price

All dairy farms



Flatter = cheaper reductions

Some cheap reductions there, but limits to how low they can go.

Questions?