

# Analysis of purchased nitrogen surplus proposal

14 October 2019

## Overview

1. The objective of sub-part 4 of the NES is to reduce nitrogen losses, caused by poor on-farm practice<sup>1</sup>, in catchments identified in Schedule 1 as high risk for nitrogen.
2. Utilising nitrogen surplus to establish farm nutrient thresholds was thoroughly considered as part of the Draft Regulatory Impact Statement (RIS); in the context that once established, Farm Environment Plans would be the mechanism through which to meet these thresholds within a prescribed timeframe (Option 3).
3. The effectiveness of utilising nitrogen surplus to represent reduction in nitrogen loss from farm; and drive on-farm change is well summarised in the RIS. Additionally, there are significant cost and time savings that this approach would realise.
4. This proposal was rejected largely on the basis that it would not result in the creation of Overseer nutrient budgets on farm, which may be needed for future allocation regimes; and utilising FEP's as the mechanism to implement reductions was less reliable from an implementation/enforcement perspective.
5. The proposed approach addresses these concerns by:
  - a. Utilising the same proposed consent framework to provide rigour around implementation (substituting Overseer nitrogen losses for purchased nitrogen surplus).
  - b. Utilising a Nitrogen Risk Scorecard to guide farmers towards on-farm changes; which utilises a dataset that much more closely reflects Overseer (than a purchased surplus metric). i.e. all key annual farm data is still required to be collected to populate the Scorecard calculation engine.
6. We believe that a hybrid approach (regulated purchased nitrogen surplus thresholds and all farmers assessed against a Nitrogen Risk Scorecard) will be more effective both in achieving the changes in on-farm practices whilst providing significant cost savings and reducing complexity of implementation. The key data that might be required to allow for allocation frameworks to be considered in the future, would be collected and recorded as part of this proposal.
7. Fonterra has analysed its farmer dataset as it pertains to the Schedule 1 catchments to establish this position; a summary of this analysis is described as follows.

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<sup>1</sup> Draft Regulatory Impact Statement; Essential Freshwater Policy Package for consultation. August 2019.

## Summary of analysis

1. Based on previous Overseer nutrient budget dataset<sup>2</sup>, the average total nitrogen load reduction that would be achieved across all Schedule 1 catchments by setting a threshold at the 75<sup>th</sup> percentile is 8%. This is consistent with Waihou catchment data which is set out below. Refer to table 1.

Table 1. Reduction in (Overseer) estimated nitrogen loss in Schedule 1 catchments based on 75th percentile threshold.

	Schedule 1 Catchments	Waihao River Catchment
Total N Loss Loading kgN	12,934,308	2,385,817
Reduced N Loss Loading kgN	995,348	191,941
%	8%	8%

2. Utilising the same dataset, the average purchased nitrogen surplus reduction that would be achieved across all Schedule 1 catchments by setting a threshold at the 75<sup>th</sup> percentile is 15%. This reduction is significantly greater for the Waihou catchment at 23%. Refer to table 2.

Table 2. Reduction in nitrogen surplus in Schedule 1 catchments based on 75th percentile threshold

	Schedule 1 Catchments	Waihao River Catchment
Total Surplus Loading kgN	29,980,900	4,835,206
Reduced Surplus Loading kgN	4,359,597	1,107,685
%	15%	23%

3. It is important to recognise the difference represented by the two measurement metrics (estimated nitrogen loss using Overseer vs calculated purchased surplus).
  - a. A 75<sup>th</sup> percentile nitrogen loss represents a modelled reduction of 8% nitrogen below the root zone, and potentially available to enter waterbodies (without any knowledge of attenuation or lag-times)
  - b. A 75<sup>th</sup> percentile nitrogen surplus represents a calculated reduction of 15% of all surplus purchased nitrogen in the farm system, with unknown attenuation to below the root zone (and potentially available to enter waterbodies).
  - c. The two approaches are measuring the amount of nitrogen available to be lost from the farm system at two different points (of the farm system).
4. It is important to recognise the fact that whilst focussing on purchased nitrogen surplus has the effect of identifying those farms which are less efficient at converting nitrogen into product, there is significant overlap between these farms and those who are estimated to be high leachers of nitrogen (using Overseer). However, purchased nitrogen surplus identifies that a number of high emitting farms are actually very efficient at converting nitrogen into product, and therefore have less opportunity to improve via implementing changes to farm practice. This is demonstrated in Table 3, where it can be seen that 52% of farms who are above the 75<sup>th</sup> percentile for estimated nitrogen loss are also over the 75<sup>th</sup> percentile for purchased nitrogen surplus.

<sup>2</sup> Fonterra Nitrogen Programme dataset for 17/18 season; participation rate >90%.

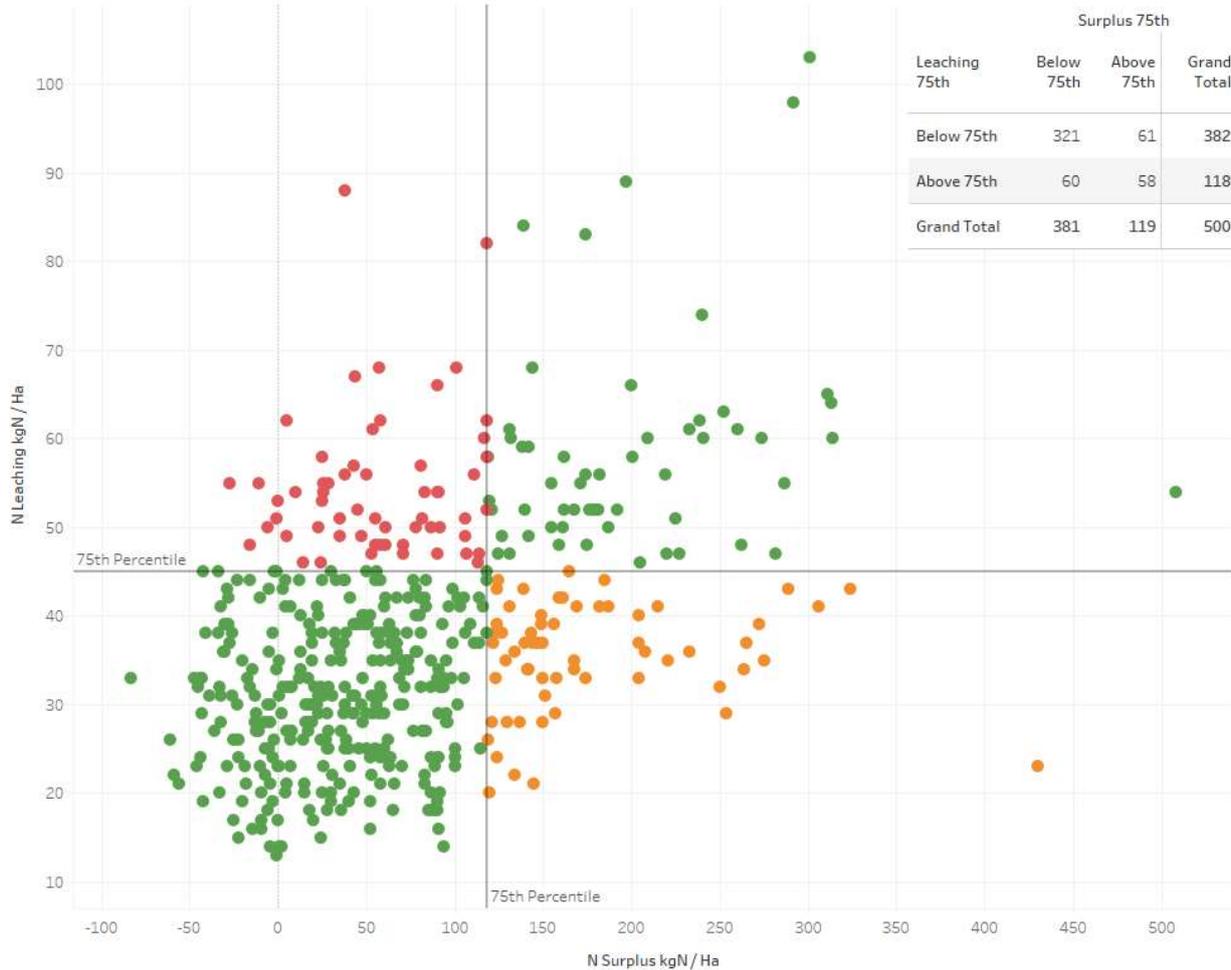
Table 3. Segmentation of farms in Schedule 1 catchments based on purchased nitrogen surplus vs (Overseer) estimated nitrogen loss thresholds.

		N Surplus	
		Below 75 <sup>th</sup> (1,419 farms)	Above 75 <sup>th</sup> (465 farms)
N Leaching	Below 75 <sup>th</sup> (1,446 farms)	<b>1,210</b> (these farms are not required to reduce under either approach)	<b>236</b> (these farms are required to reduce under a surplus approach)
	Above 75 <sup>th</sup> (438 farms)	<b>209</b> (these farms are required to reduce under an Overseer approach)	<b>229</b> (these farms are required to reduce under either approach)

5. Displaying this quadrant approach (estimated nitrogen loss and purchased nitrogen surplus) at a catchment scale, clearly shows how the different thresholds identify sub-groups of farmers. Chart 1 shows that the proportion of dairy farmers who are above the 75th percentile for estimated nitrogen loss and also over 75th percentile for nitrogen surplus (in the Waihou catchment) is very similar (52%) to the total Schedule 1 catchment dataset. In effect this is demonstrating the ability to identify those farms who:
  - a. Are identified as both high nitrogen loss risk and high surplus; as well as
  - b. Those who are lower nitrogen loss risk, but have some clear inefficiencies within those farm systems;

- This approach is preferable to focussing solely on nitrogen loss; which poses a significant risk to those farmers represented in red at Chart 1. Whilst being high emitters, this subset of farms are significantly more efficient than their peers; and therefore any reductions from this group would not be achieved from on-farm practices, being more likely come at significant cost/change to those farm systems in the short term.

Chart 1. Nitrogen surplus vs estimated nitrogen loss in Waihou catchment.



- The key point of shifting the focus (over the short term at least) towards purchased nitrogen surplus; is that it enables farmers to focus on a simple efficiency metric that is within the influence of farm management decisions and not significantly influenced by geographic factors. Findings have shown that purchased nitrogen surplus is more likely to increase awareness of potential environmental impact and ultimately lead to practice change because it is easier to interpret<sup>3</sup>.

<sup>3</sup> Pinxterhuis et al, 2019. N Surplus shows performance. <https://www.dairynz.co.nz/news/latest-news/nsurplus-shows-performance>.