EVOLVING TO NITROGEN DISCHARGE ALLOCATIONS FOR THE LAKE ROTORUA CATCHMENT

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Abstract
The Lake Rotorua catchment benefits from significant scientific research and modelling. The May 2011 NIWA 'ROTAN' report provides information on nutrient sources and mitigation potentials; and benchmarking by the Bay of Plenty Regional Council (BoPRC) establishes assessed nitrogen (N) discharge levels for each farm property during 2001-2004.

The new partially operative Bay of Plenty Regional Policy Statement (2010) provides for 435t/annum sustainable N load to Lake Rotorua by 2032, with 70% of the required reduction to be achieved by 2022. This represents a 270tN (51%) reduction by 2032 from the ROTAN estimate of current pastoral load (526tN), equivalent to a per hectare pastoral reduction from 25kgN/ha to 12kgN/ha, averaged across all pastoral land. On a sector basis with a 51% reduction, dairy would need to reduce from 54kgN/ha to 28kgN/ha, and drystock (including dairy support) would need to reduce from 16kgN/ha to 8kgN/ha, both with potential incentive support.

A collaborative Stakeholder Advisory Group (StAG) was established in late 2012 to advise on policy to achieve the required nutrient reductions. This group includes representatives from the Lake Rotorua Primary Producers Collective, Federated Farmers, Dairy NZ, Iwi landowners, LakesWater Quality Society, and other stakeholder entities.

This paper traces the assessment of nitrogen discharge allowances (NDA) allocation options considered by StAG to December 2013, including reductions based on pastoral averaging, land use capability, grand-parenting, sector averaging and input/output bases. Sector averaging was the preferred basis throughout much of 2013. A desire to recognise geophysical and farm system variance prompted development of a hybrid model which uses discounted benchmarking values between maximum and minimum NDA limits. This latter approach does not appear to be a close proxy for geophysical attributes but does seem to be a pragmatic policy option.

Significant progress was made following a Farmer Collective proposal for a sharing of N reduction responsibilities. The current draft N reduction framework is for 140tN to be achieved by farmers via a Rules Programme (mainly land management change); 100tN to be achieved via an Incentives Programme (mainly significant land use change); and a further 30tN to be achieved by an incentivised gorse re-vegetation programme.

Introduction

The Lake Rotorua catchment benefits from significant scientific research and modelling. The May 2011 NIWA 'ROTAN' report (Rutherford, Palliser, Wadhwa. 2011) provides information on nutrient sources and mitigation potentials; and benchmarking by the Bay of Plenty Regional Council (BoPRC) established assessed nitrogen (N) discharge levels for each farm property during 2001-2004.

Lake Rotorua Catchment Context

The new partially operative Bay of Plenty Regional Policy Statement (2010) provides for 435t/annum sustainable N load to Lake Rotorua by 2032, with 70% of the required reduction to be achieved by 2022. This represents a 270tN (51%) reduction by 2032 from the ROTAN estimate of current pastoral load (526tN), equivalent to a per hectare pastoral reduction from 25kgN/ha to 12kgN/ha, averaged across all pastoral land. On a sector basis with a 51% reduction, dairy would need to reduce from 54kgN/ha to 28kgN/ha, and drystock (including dairy support) would need to reduce from 16kgN/ha to 8kgN/ha, both with potential incentive support.

Total load = 755 tN Sustainable N load = 435 tN
Required total N reduction = 320 t

Pastoral load	= 526 tN
Sustainable pastoral load	= 256 tN
Required pastoral reduction	= **270 tN** (51%)

	Area (ha)	N loss	51% Redn
Pastoral Catchment	21,175ha	25kgN^{av}/ha	12kgN^{av}/ha
• Dairy	5,050ha	54kgN /ha	28kgN /ha
• Drystock incl. lifestyle	16,125ha	16kgN /ha	8kgN /ha

Figure 1: N assessments for Lake Rotorua catchment

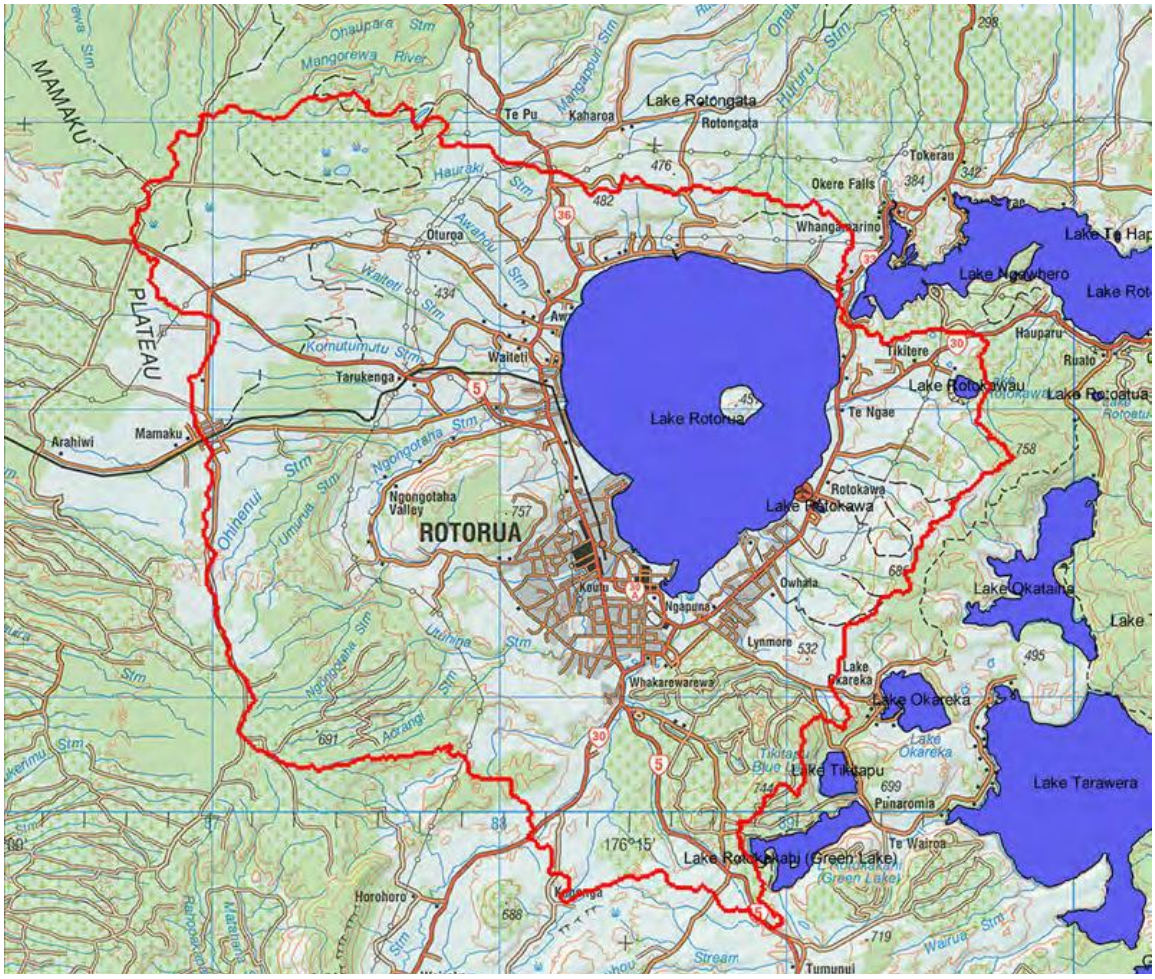

Figure 2: Schematic representation of the Lake Rotorua Catchment

A collaborative Stakeholder Advisory Group (StAG) was established in late 2012 to advise on policy to achieve the required nutrient reductions. This group includes representatives from the Lake Rotorua Primary Producers Collective, Federated Farmers, Dairy NZ, Iwi landowners, LakesWater Quality Society, and other stakeholder entities.

These stakeholder entities have worked together in a collaborative framework to evolve various agreements over time, including the Waiora Agreement (agreed sustainable loads for N and P), and the Oturoa Agreement (agreed timelines to achieve catchment nutrient reduction targets).
The Lake Rotorua Primary Producers Collective has also facilitated the Farmers Solutions Project (Perrin Ag Consultants, 2012) to analyse and report on nutrient mitigation options and impacts on pastoral farming within the Lake Rotorua catchment.

Benchmarking by the BoPRC established average nitrogen discharge levels for each farm property during 2001-2004. *Figure 3* plots the twenty-six benchmarked dairy farms (milking platforms only) by soil type, N discharge (kgN/ha) and rainfall (mm). There is an apparent poor correlation between N discharge and either soil type or rainfall.

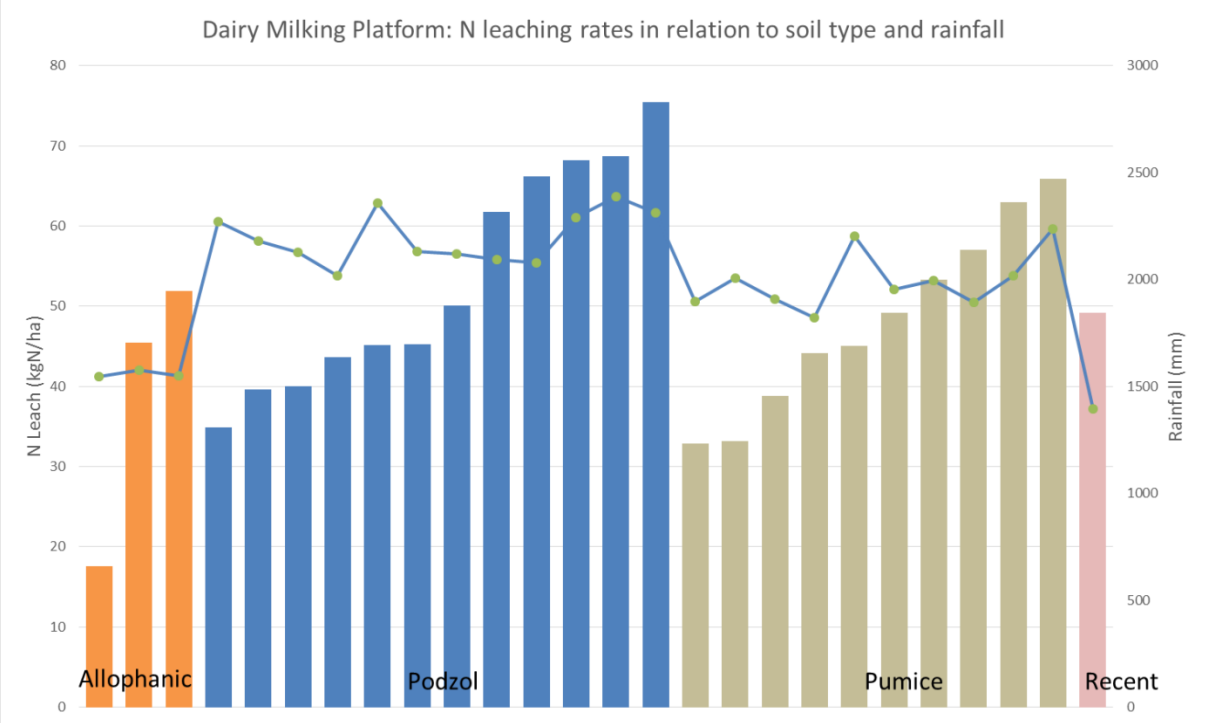

Figure 3: N discharge vs soil-type and rainfall for benchmarked dairy platforms

Nitrogen Discharge Allocation Mechanism

The choice of a Nitrogen Discharge Allocation (NDA) mechanism was a significant challenge. The task was to find a mechanism which would most equitably allocate responsibility for the agreed 270tN pastoral reduction, and hence establish an NDA for each farm platform.

Options considered included:

1. Pastoral averaging across the catchment
2. Land Use Classification (LUC) basis
3. Grand-parenting with clawback from the 2001-2004 benchmark
4. Sector averaging across the catchment

There was an evolved preference for sector averaging on the basis of two main industry sectors (dairy and drystock). Average sector NDAs were mooted for dairy at 28kgN/ha and drystock at 8kgN/ha.

Land Use Classification

The May 2011 NIWA 'ROTAN' report (Rutherford, Palliser, Wadhwa. 2011) estimates 21,175ha of pastoral land within the Lake Rotorua catchment. There is relatively little Class II (ca. 291ha) and Class III (ca. 3,005ha) pastoral land, and a predominance of Class IV (ca. 5,498ha) and Class VI (ca. 8,239ha) pastoral land. Together, these latter two classes account for 81% of dairy and 73% of drystock land. *(Refer Fig.4)*

The translocation of all existing dairy infrastructure is not a tenable option; irrespective, there would be insufficient Class II and Class III pastoral land to accommodate the estimated 5,050ha of current dairy platform.

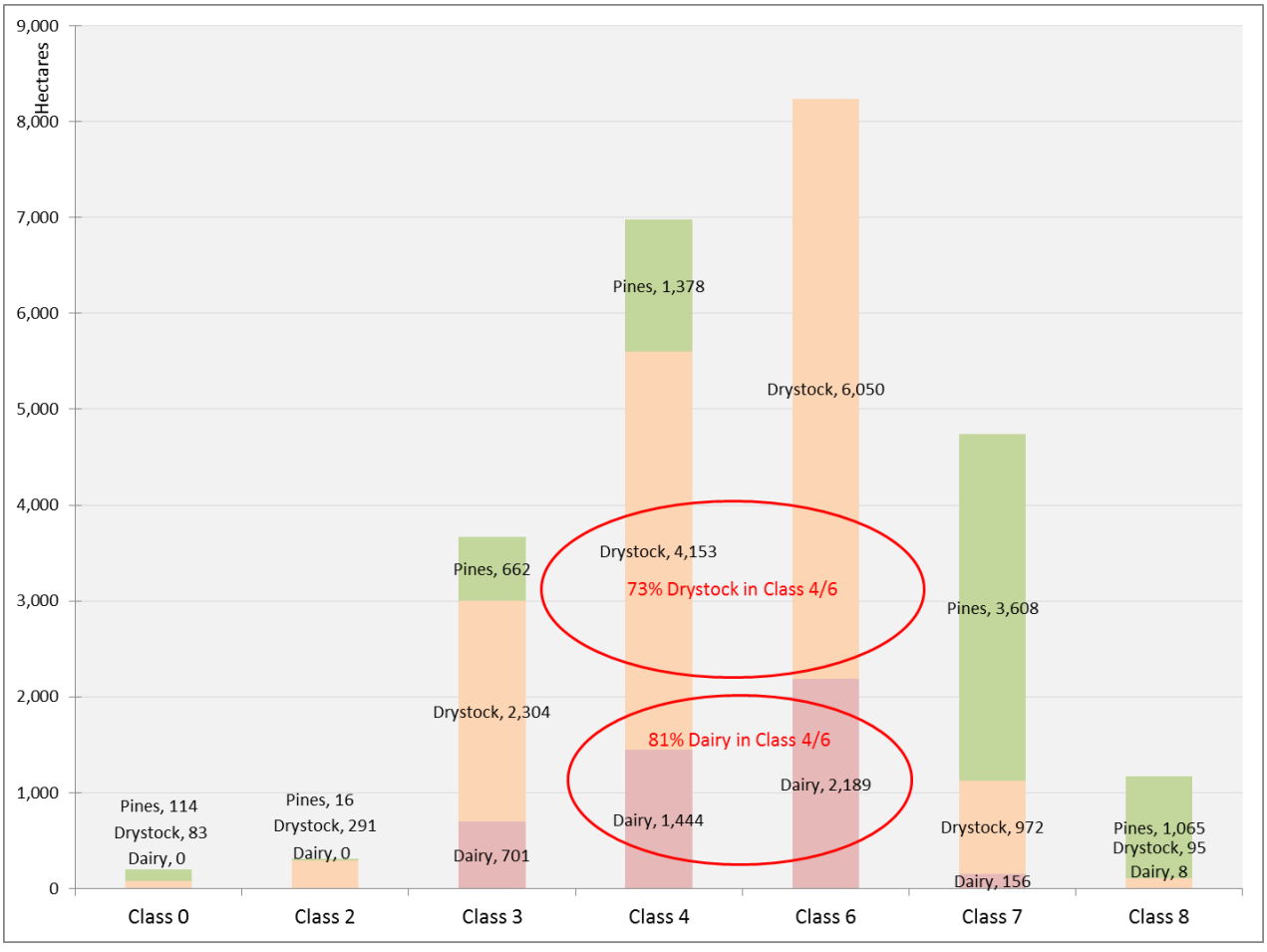

Figure 4: LUC and land use in the Lake Rotorua catchment

Grand-parenting vs. Sector averaging

For dairy platforms within the catchment, grand-parenting (with clawback from the 2001-2004 benchmark) is compared to industry sector averaging (with claw-back) in *Figure 5* below. The key message is that, at a dairy sector NDA of 28kgN/ha, 58% of dairy farmers and 63% of the dairy area would be better-off with sector averaging than with grand-parenting.

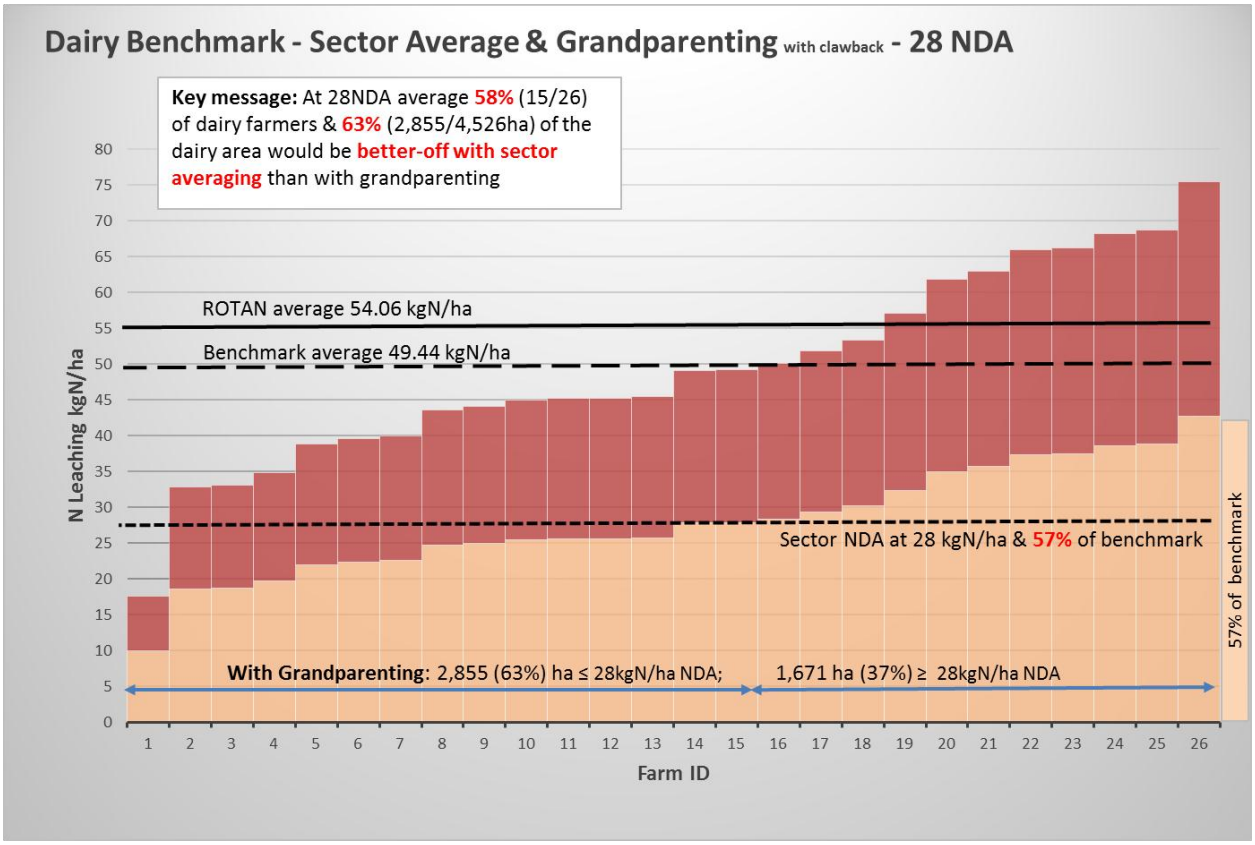

Figure 5: Grand-parenting vs. Sector averaging for dairy

Proposed Policy Framework

An NDA allocation mechanism which delegates to farmers the full responsibility for achieving the required 270tN pastoral reduction, puts at risk the economic viability of pastoral farming in the Lake Rotorua catchment. The attainment of 28kgN/ha on average for the dairy sector, and 8kgN/ha on average for the drystock sector, would probably oblige significant land-use change across both sectors.

Significant progress was made in late-2013 following the Lake Rotorua Primary Producers Collective (Farmer Collective) proposal for the sharing of N reduction responsibilities (Omundsen, 2013). The current draft N reduction framework is for 140tN to be achieved by farmers via a Rules Programme (mainly land management change); 100tN to be achieved via an Incentives Programme (mainly significant land use change); and a further 30tN to be achieved by an incentivised gorse re-vegetation programme.

The approach includes a strong focus on the monitoring and review of progress – both by landowners in meeting their NDAs, and the Lakes Programme in meeting the Incentives Scheme and Gorse Programme targets. Reviews are proposed from 2017, and every five years thereafter. Decisions will need to be made if targets aren't met or lake water quality dynamics

change. The way in which these decisions are made, and the choices available, will be addressed through the design of the rules, incentives and gorse programmes.

Regular review of the relevant land and water science is also proposed, to ensure targets and actions remain appropriate. This review process is yet to be developed.

Programme	tN	Actions and Accountability
1. Rules Programme Farmer responsibility	140tN	- Approved Farm Nutrient Plans (FNPs) - which will include specific plans for N reduction - Implemented for individual farmers over 40ha in size by 01 December 2015 - requires obligatory achievement by 01 December 2032 of 35kgN/ha (dairy) and 13kgN/ha (drystock and dairy support). Ranges may be applied subject to economic work outcomes
2. Incentives Programme Council responsibility	100tN	- Regional Council accountability, to be achieved by 01 December 2022 through the proposed Incentives Programme
3. Gorse Re-vegetation Programme	30tN	- Regional Council responsibility through a catchment gorse elimination programme to be achieved, in collaboration with farmers and landowners, by 01 December 2022 using separate funding

Figure 6: Proposed Policy Framework

A Hybrid Model for Nitrogen Discharge Allocation

Stakeholder concerns persisted that a sector-based allocation mechanism did not have sufficient regard for either farm systems differences or the impact of geophysical factors (eg. soil type, rainfall).

Grand-parenting with claw-back was reviewed again on the premise that a minimum and maximum threshold might be established for each sector, between which would fall many properties retaining a fixed percentage of their 2001-2004 benchmark.

For the dairy sector it seemed possible to achieve the targeted 35kgN/ha mooted under the proposed policy framework by setting a minimum NDA of 30kgN/ha and a maximum of 40kgN/ha, between which properties would retain 75% of their benchmark values.

This hybrid model represented in *Figure 7* is probably **not** a good proxy for geophysical factors such as soil type and rainfall. Nonetheless, this approach may be a pragmatic solution to the NDA dilemma, and to date has received considered support from farmers on the StAG, but does require further work.

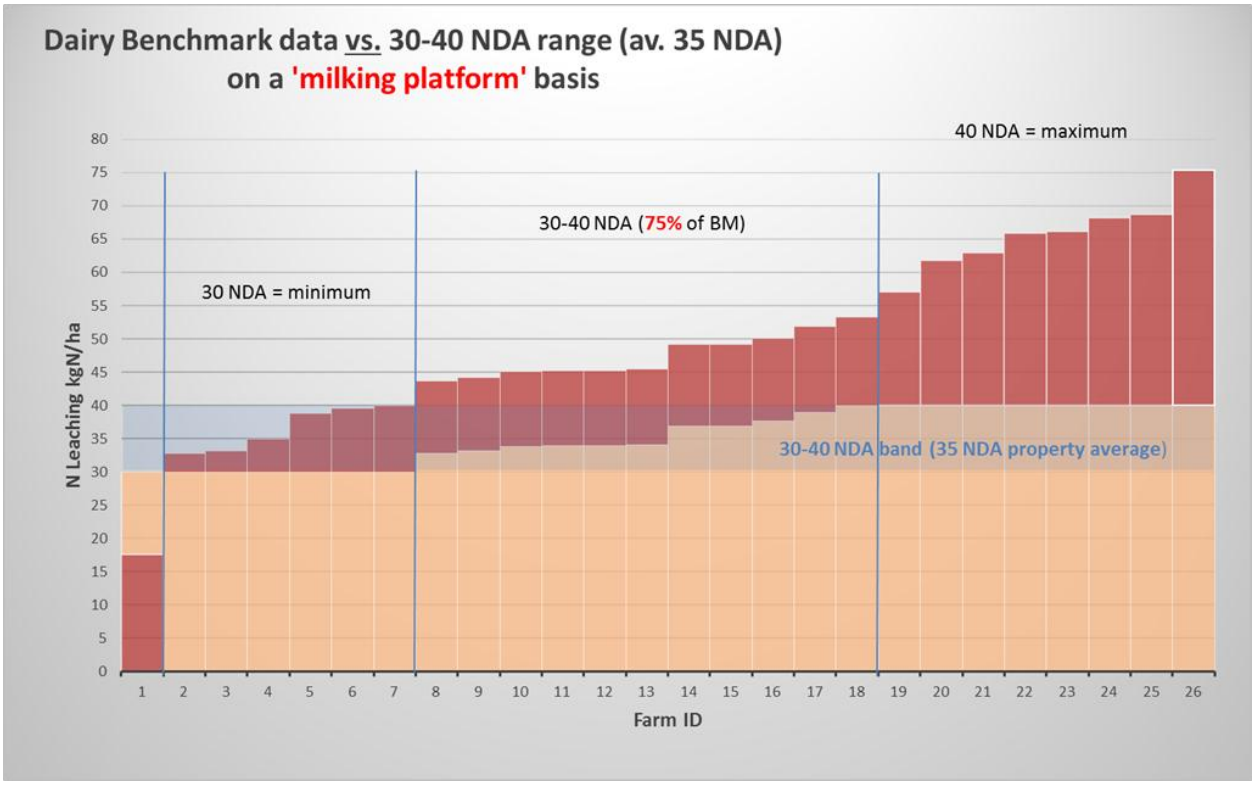

Figure 7: NDAs based on a proposed hybrid approach

Conclusions

There are also other key considerations as policy is developed and refined:

1. ROTAN Report estimates assumed that 21,175ha of pastoral land would contribute to catchment N mitigation. There is some database finessing required to ensure that these initial area estimates remain valid for an implementation programme which is dependent upon sufficient land area to which N mitigation will apply.
2. The 2001-2004 benchmark data has been the basis upon which NDA mechanisms and the policy framework have been proposed to date. Whilst much effort has been applied to optimise the integrity of this data, unavoidably subjective elements remain which may require further validation.

The proposed N mitigation programme is predicated by the computer-modelling of pastoral systems using OVERSEER®. Refinements to this model result in version changes which have challenged - and probably will continue to challenge - future policy and implementation.

Much analysis and discussion remains ahead for stakeholders as they embrace a significant challenge to reduce pastoral nitrogen discharge by 51% for the Lake Rotorua Catchment.

However, there is a real sense of purpose and progress within the Stakeholder Advisory Group – the collaborative process does seem to be working.

References

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