NUTRIENT TRADING
IN THE
LAKE ROTORUA CATCHMENT

Report prepared for

BAY OF PLENTY REGIONAL COUNCIL

by
Robin Connor
Resource Policy Directorate
Ministry for Primary Industries
Wellington, New Zealand.

Email: robin.connor@mpi.govt.nz

EXECUTIVE SUMMARY AND RECOMMENDATIONS

The Bay of Plenty Regional Council is developing a nutrient allocation scheme for Lake Rotorua catchment that aims to cut nitrogen discharges from pastoral farming by slightly more than 50% by 2032. Responsibility for the costs of making these large reductions is to be shared 50:50 between the Council and landholders. Two types of entitlements will be used to control nitrogen discharges: long-term nutrient discharge allowances (NDAs) and "above-the-line" short term entitlements (STEs). The sum of the two types of entitlement for each property will start out at current levels of discharges, and the STEs will be reduced over time to zero at 2032. Landholders need to reduce discharges over that time to match their NDAs at their own cost. The council will establish an Incentives Entity to administer a fund of $40 million that will be used to buy 100 tonnes of long-term NDAs from landholders. The expectation is that this will be achieved primarily by conversion of large amounts of dry-stock farmland to plantation forests.

This report provides analysis and recommendations for considering trading of nutrient discharge entitlements in this context. It provides background information on the potential benefits of trading regimes for natural resource access and use rights and the requirements for such systems to function well. The specific circumstances of the Lake Rotorua catchment, the policy objectives being pursued and the current implementation proposals are used to develop specific recommendations on the potential adoption of transfer and trading mechanisms with the scheme.

The first general conclusion of the report is that an open trading scheme for NDAs would be inappropriate at this stage for several reasons; the key one being the risk it would pose to achievement of the core goals of the scheme to reduce nitrogen discharges through retirement of 100 tonnes of NDAs. This is a relatively short term goal, however, and once it has been achieved a trading regime is likely to increase economic performance from the use of the remaining available resource. The costs of establishing such a regime would be significantly reduced through the provision of an improved national framework for transfer of entitlements for both water abstraction and nutrient discharges. It is likely that policy to provide for this will be considered by central government in the near future.

The second group of recommendations concerns the definition of the short term entitlements, their systematic reduction over time, and enabling their transfer and trade during the transition period. In essence, NDAs are baseline rights unlikely to become "surplus to requirements" anytime soon for anyone intending to continue pastoral farming in the catchment. STEs however, are specifically destined to become redundant as farmers work to reduce their discharges from current levels to NDA levels by 2032. In that transition some farmers will achieve reductions faster than others for a range of reasons such as the particular conditions on their properties or timing of investments. If STEs are well defined, particularly in terms of their duration, and transferable, they could provide some flexibility to individual farmers in achieving required nutrient discharge reductions without jeopardising the objectives of the overall programme.

Lastly, recommendations are made in respect of support for the Incentives Scheme through development and promotion of low discharge activities. The Incentive Scheme is a trading scheme of sorts albeit limited, but it is clear that the success of the reduction programme as a whole and the prospects for future trading in entitlements are to a large degree dependent on the success of the Scheme's purchase of NDAs. It will be important to the success of this scheme that there are flexible and economically attractive options for change available for farmers to consider. Factors of commitment to lifestyle, pre-conceived ideas about alternative land use, and limited availability of information on innovative activities need to be actively addressed and countered in order to achieve the goals of the programme.

Recommendations:

1. A general "free market" scheme for trade in long-term NDAs should not be implemented at this stage because:
    a. There is no urgent need for marginal trading in NDAs due to the slow ramp down in above the line entitlements to 2032;
    b. In the period to 2022, private bulk trades in NDAs resulting from major farm system change could undermine the Incentives Scheme efforts to acquire 100 tonnes of NDAs from existing allocations;
    c. Systems for trading long term rights need to be robust and stable. Central government is currently developing thinking around how a national statutory framework could provide this certainty. This should be resolved before 2022 and a national framework would reduce the costs of both providing for trading at the regional level, and of individual trades.

2. An open transfer system for long-term NDAs should be enabled once the 2022 reduction targets have been achieved. If this policy is adopted, it should be publicly notified as soon as possible.

3. Above-the-line short term entitlements (STEs) should be formalised on consents with stepped 3 yearly reductions defined through dated expiry of blocks of entitlements, and transfers between consent holders allowed. Step down and allocation of STEs could be based on:

    Steps defined by a ramp from the **original property baseline benchmark** through the 2022 target, and down to zero at 2032; and

    EITHER
    a. Allocation based on the most recent assessment of discharges from the property or the original – whichever is the lowest; and
    b. Transfers should not be allowed of first 3 year block, so that those who have already lowered their discharges before the system commences are not disadvantaged;

    OR
    a. Allocation based on the overall percentage reduction in discharges achieved for the catchment from the 2004 benchmarks to the latest assessment, applied to each property's original baseline; and
    b. Transfers allowed from the start of the scheme.

4. Transfers of STEs:
    a. Low cost transfer and consent change methods should be defined with minimal requirements to provide evidence of changed practice or ability to meet the changed constraints, backed by significant consequences for not doing so;
    b. Powers should be provided to request more information for any proposals for transfer considered to be high risk;
    c. In addition to enabling bilateral transfer of STEs at any time, a proposal for a regular mediated transfer event based on the clearing house model should be developed. This could be run annually or at the three yearly points of reductions in entitlements depending on demand. Demand should be assessed during the first few years of the scheme.

5. Investment should be made in development of practical tools to support planning for farm system change to low nitrogen discharge land uses. Such tools should provide for financial cash-flow analysis of a range of potential activities independently and in combination, such as dry-stock, dairy goats, plantation forestry, forestry co-products such as high value fungi, and manuka planting for honey production.

6. Capability should be established, potentially through the Incentives Entity, to disseminate practical information and economic analysis on alternative farm systems, to target owners with land best suited for conversion, and to assist interested farmers to develop farm plans for conversions to low nitrogen discharge land uses.

TABLE OF CONTENTS

EXECUTIVE SUMMARY AND RECOMMENDATIONS 2

1. INTRODUCTION 6

2. BACKGROUND 7

3. KEY ELEMENTS TO SUPPORT TRADING 11

4. THE PRACTICALITY OF TRADING 13

5. COMPATIBILITY WITH THE RULES FRAMEWORK 14

6. ACHIEVING THE TARGETS 16

7. TRADING OPTIONS SUMMARY 18

8. CONCLUSIONS 19

9. RECOMMENDATIONS: 20

APPENDIX 1: FREQUENTLY ASKED QUESTIONS ABOUT TRADING 22

APPENDIX 2: FEATURES OF A TRADING SCHEME 26

APPENDIX 3: CLEARING HOUSE PROCESS 27

1. INTRODUCTION

The need for improved management of diffuse sources of contamination of water from agriculture has been recognised for some time but has proved difficult to implement. A number of measures have been put in place around the world from taxing fertiliser inputs to erosion control programmes, fencing of waterways and infrastructure improvements. Ultimately, the efficacy of most measures is dependent on the behaviour of farmers, their commitment to the desired outcomes and the economic drivers bearing on them.

The allocation of shares of a total catchment nutrient load to individual farmers is relatively new. In New Zealand, as a result of the provisions of the National Policy Statement on Freshwater Management, allocation of nutrients is now being considered by regional councils around the country. This follows the generally successful implementation of resource sharing rights to other common pool natural resources such as fisheries, water abstraction and air pollutants. Many schemes for these other resources include the ability to trade the rights to resource access and use.

Trading regimes have been adopted for the flexibility they provide in resource sharing under scarcity and the efficiencies that this sharing can deliver to the economy. Markets offer the ability for resource users to compare their marginal value for the resource with that of others and make decisions on whether to use more or less of the resource in order to maximise their economic position. This enables the resource to be used in the combination of ways that has the highest overall value to society.

Bay of Plenty Regional Council (BOPRC) staff have sought engagement of the Ministry for Primary Industries to support development of options for a practical trading regime appropriate to the circumstances of the Lake Rotorua catchment. The key stakeholders in the design and funding of the Lake Rotorua nutrient management scheme – the Stakeholder Advisory Group (StAG), Bay of Plenty Regional Council, and Central Government – are currently all understood to be willing to consider the potential for using nutrient trading to enhance outcomes. This report is intended to support that consideration.

A working paper was provided to the StAG in June 2014, and supplementary materials to StAG and council staff in September. This report makes recommendations based on consideration of the policy context and objectives, and of the potential interactions of trading with other components of the proposed regime. It draws upon the author's experience in institutional design and implementation, particularly in fisheries individual transferable quota systems, and involvement with recent central government fresh water policy development.

This work has not included a detailed economic analysis of conditions in the catchment, but has been informed by previous work on allocation and trading schemes, information provided by regional council staff, and reports on associated issues of the policy development such as on the use of Overseer in regulation (Park 2014)[1] and an NDA impact analysis (Perrin AG 2014)[2].

[1] Park, S. 2014. Using Overseer within Rules for the Lake Rotorua Catchment. Report prepared for Bay of Plenty Regional Council, March 2014, Headway Ltd.

[2] Perrin Ag Consultants Ltd, 2014. Rotorua NDA Impact Analysis: Phase 1 Project, Final Report 16 June 2014.

2. BACKGROUND

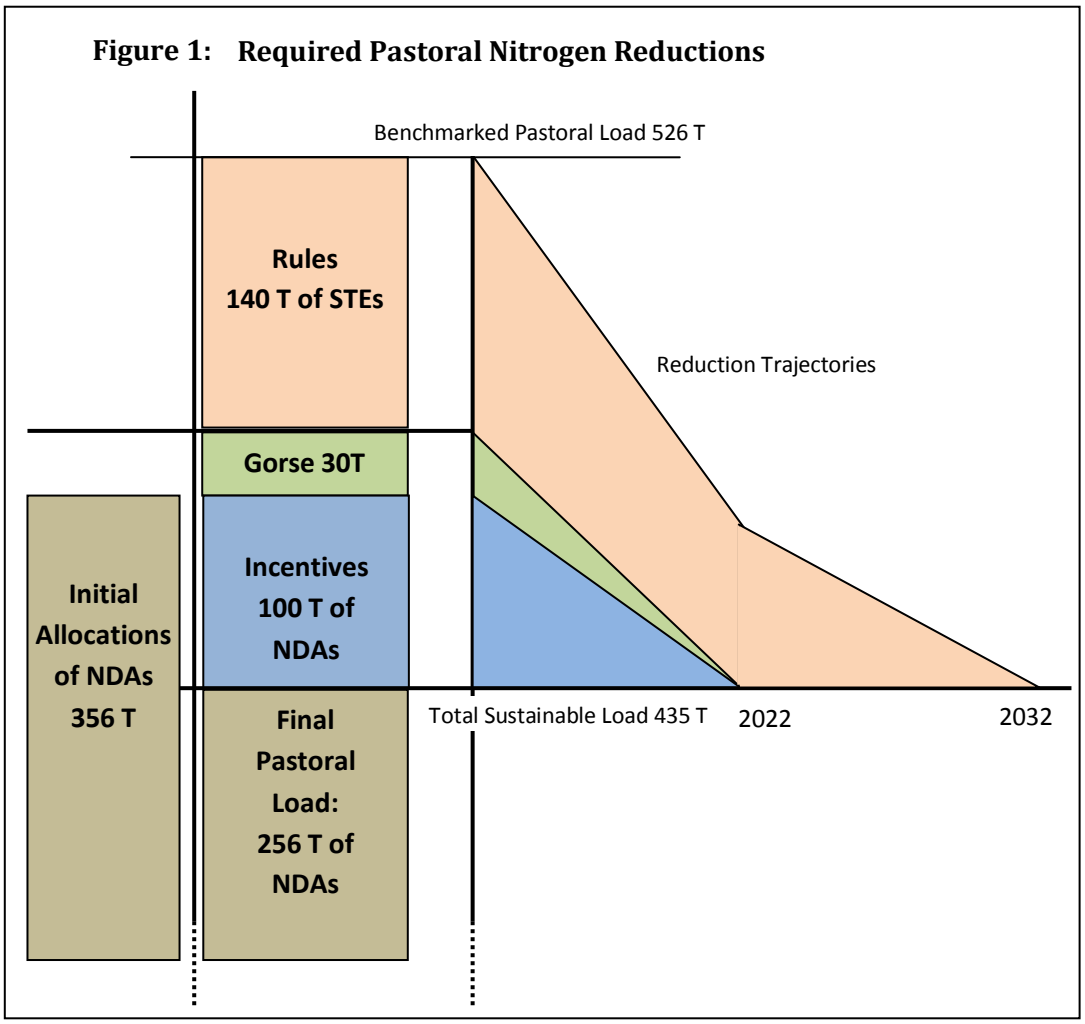
Policy Context

The problems caused by nutrient enrichment of Lake Rotorua have been recognised and have been the subject of research, policy development and practical action by the regional council and other stakeholders for more than a decade. Decisions have been made on the need to reduce the load of nitrogen leached from pastoral agriculture by 51%. Agreed policy splits the economic responsibility for achieving this reduction between pastoral landholders and a funding mechanism supported by the regional council and central government. A body to administer the funding (Incentives Entity) will be established by the council to negotiate and contract with pastoral landholders to make reductions to nitrogen discharges additional to their baseline obligations. Much of this reduction is expected to be achieved through conversion of pasture to plantation forestry.

In order to track progress and appropriately share the burden of the task of reducing the nitrogen load on the Lake, allowances that limit permissible nitrogen discharge levels for each property will be issued to land holders by the council. Annual discharges from properties can be estimated using the OVERSEER nutrient budget model, and these results would allow assessment of performance against allowances held. **Figure 1** illustrates the split in responsibilities for reductions and the ideal reduction trajectories.

In effect, two types of entitlements will be held by consented land users: long-term Nutrient Discharge Allowances (NDAs), and "above-the-line" short term entitlements (STEs). STEs will assist the transition from current discharge levels to those required by the targets, and will reduce to zero by 2032.

Figure 1: Required Pastoral Nitrogen Reductions



Why Consider Nutrient Trading

The consideration of trading systems for natural resource access can be controversial. It generally happens where resource use has already become a problem for one reason or another and therefore current users may need to reduce their use. Allocation involves debates over equity that are usually not able to be fully resolved. Regulatory intervention is mostly not welcomed in situations that have not been subject to it previously. Trading can seem like an unnecessary complication in an already fraught situation.

The reasons for considering trading of nutrient allowances are primarily economic, as they are for any trade. A system of transfer or trading enables scarce resources to move to the combination of uses that is most highly valued, by allowing different potential users to compare the values that they hold for resources through market prices. Nutrient trading becomes an option that stakeholders may choose to use as part of their business decision-making, if it provides a benefit.

Regardless of how initial allocations are carried out, trading will allow nutrient discharge targets to be achieved at a lower cost than is possible without it. A well-designed trading system with low transactions costs will enable the least-cost reductions in discharges to be made at any point of the load reduction programme. Trading will allow the same (least cost) measures for mitigation to be taken in the same places, regardless of the initial distribution of entitlements. Trading allows a resource to move to its highest valued use.

A key factor in the success of regulation is an acceptance that those affected are treated fairly. In moving from a situation of unconstrained resource use to restricted access, changes in allocation of resources will determine who bears the costs of achieving the objectives of the scheme. Allowing trading of allowances will ensure that the equity decision of initial allocation (the distribution of costs and benefits) can be made without compromising the efficiency of the scheme. To reiterate, regardless of initial allocations, trading will allow the overall costs of meeting the objectives of the scheme to be minimised.

In short, under such “cap and trade” programmes, the key equity issues are determined in the initial allocation of allowances because this determines who bears the costs of mitigation. With trading, the distribution of allowances can adjust so that the lowest cost mitigations can be carried out first.

Trading is important when costs of mitigation vary. If we consider the catchment as a whole, per kilo costs of reducing N discharges will vary from place to place, across farm systems, and will depend to some extent on how much mitigation or good practice has already been adopted in each circumstance. The greater the variation in costs, the greater the overall savings from trading will be. In a catchment with a diversity of farm types and environmental conditions, we can expect considerable cost savings from trading when compared with a system that required significant reductions from all farms without the ability to transfer entitlements.[3]

If large reductions are required, with trading the lowest cost measures will be taken first and costs of mitigation per kg/ha will rise as the total amount of mitigation increases. That is, we can expect, under full allocation and a requirement for reductions, that the price of Nutrient Discharge Allowances (NDAs) will rise over time.

Why does trading in any commodity or service occur? Because both parties believe they will be better off. The green-grocer or supermarket sells fruit and veges at a price that is greater than the cost to them, and we buy them because this is cheaper than growing them ourselves. Our calculation takes into account what else we want to do with our time, costs of land and other inputs for growing the

[3] Analysis of economic impacts of a currently proposed scheme in a NZ catchment that needs to reduce discharges indicates annual net revenue to the farm sector is likely to drop by $46 million (14%). This could be reduced to $28 million (8%) through the introduction of nitrogen trading.

food, and the value we place on the ability to decide on a week-to-week basis what we want to eat. Still, some people like to grow their own food, or at least some of it. Again, there are a number of reasons for that: they like the activity, assurance about use of sprays, nutritional status, and so on.

In these decisions there are personal value judgements involved as well as just cash totals. That makes it very difficult for someone else to decide what the best thing is for you, or what the most efficient distribution of NDAs will be in a catchment. Someone who holds NDAs in a scheme where trading is possible may choose to keep them despite someone offering to buy them for more than the value they represent in terms of extra income received from their current use. The current owner may value the lifestyle activity that the use of the NDAs allows more than the difference in income they could have by selling, a choice that still represents the highest valued use of the resource. In the end, income is a contributor to well-being, not the sole determinant. This balancing of values is something we all do every day.

In a trading system for NDAs there is no compulsion to trade, and therefore trading will only occur where both parties believe there is a gain for them from the transaction. This does not mean that a nutrient management scheme for Rotorua that includes trading will necessarily result in everyone being better off. Large reductions in resource use are required, and this is likely to involve an overall reduction in production and annual income for the catchment, offset to some extent by the incentives scheme. However, adding trading to the mix of measures taken to achieve the goals should result in no-one being worse off than they would otherwise be, and those that trade will end up better off than without trading. The key result from trading is that total costs of achieving the desired reductions will be significantly lower.

Nutrient Trading Elsewhere

New Zealand has only one comparable example of nutrient trading, and this is one of the few in existence anywhere in the world that enables trading among diffuse nutrient emitters. The experience with the Lake Taupō catchment nitrogen cap and trade system is reviewed in Barns & Young 2013[4] and is clearly a learning opportunity. There have been some private trades in each year from 2009 to 2013, with a total of 13 such trades to June 2013, compared with 24 trades made by the Trust buy-back scheme. Most of the private trades have been small and the total amount traded was only 12% of the total amount transferred including the buy-back.

There are a number of factors that may limit market trading in such schemes. Key issues are the opportunities for win-win transactions, and the transactions costs faced by prospective traders. Win-win opportunities in this case will depend on variation (heterogeneity) in the catchment in terms of the diversity of farms systems with different cost structures and profitability. Because profitability is not directly correlated with nitrogen discharges across different farm systems, soil types and so on, some farms will have more profitable uses for NDAs than others. The other side of this coin is that some farms have lower costs of nitrogen discharge abatement than others. Where such diverse conditions exist in a catchment, trading is more likely to occur because it offers clear gains to both parties.

"Search costs" – the time, effort and expense required to find someone to trade with and negotiating a price that is acceptable, and other costs associated with carrying out a transaction such as fees for drafting and legal checking of contracts, charges for changing consents, and so on, are referred to as "transactions costs." Where these costs may be acceptable for a single transaction where the seller and buyer have matching needs, it may not work in practice where a farmer needs to find several sellers/buyers and negotiate deals with each of them. In addition, farmers will not be well informed about the "true market value" of NDAs; something that can only be determined in a situation where the

[4] Barns, Sandra & Justine Young, 2013. Cap-and-trade of diffuse emissions of nitrogen in Lake Taupō Catchment. Reviewing the policy decisions and the market. Waikato Regional Council Technical Report 2013/34. Available online at http://www.waikatoregion.govt.nz/tr201334/

supply and demand for NDAs is out in the open. Transactions costs need careful consideration in system design so that they are minimised.

In their analysis of the Taupō scheme Barns and Young point out that historical allocation (or grand-parenting) allowed farmers to continue with business as usual, and that trading was not necessary to maintain normal operations. Thus only those changing farm systems (e.g. converting to forestry) were in a position to sell NDAs and these were bought up by the Trust. This has worked to reduce the overall nitrogen load to the target level fully funded by the Trust.

In the Rotorua case, in addition to reductions funded by the Incentives Scheme, the pastoral sector will be required to reduce the load significantly without compensation. This is a significant driver for trading, as minimisation of costs to businesses will be critical. In addition, the sector averaging approach adopyted for allocation for the Lake Rotorua catchment will mean that without some rebalancing of NDA holdings through transfer approaching 2032, economic losses are likely to be significantly greater, and some farm business may just not be viable at the level of discharges allocated to them.

The international experience with nutrient trading has been reviewed in Greenhalgh and Selman 2012.[5] They found that water quality trading is being widely explored and increasingly implemented as a means of providing flexibility and lowering costs of meeting water quality goals. Of the 63 programmes that were reviewed, 33 were currently active with the others either being in planning and development stages or having been active in the past but no longer trading. Only 9 of the reviewed schemes were outside the United States, in New Zealand, Australia and Canada.

Very few of the schemes involved non-point source to non-point source trades. Most schemes in the USA are either set up for trading between point sources or for point sources to buy reduction credits from non-point sources, usually farms. Reduction credits are earned by farmers through developing plans for farm system changes that will reduce discharges and having these approved. The amount of reduction is assessed and credits issued which can then be sold to point source emitters.

These schemes are voluntary for the non-point sources. New Zealand is currently unique in regulating non-point source emissions of nutrients into waterways directly. However, lessons from other schemes are relevant to the application of trading in non-point source markets. A range of trading models has been used including bilateral negotiation, clearing house, third party brokerage, and exchange markets. Some schemes have frequent trades but some have little or none. The study found many point sources in the schemes are allocated caps that are higher than their current discharge levels, resulting in no incentive to trade. Greater numbers of trades are found in schemes where scarcity is higher and limits are enforced.

Some sort of mechanism for managing “unders and overs” in holdings at the point of assessment has been found to be useful in freeing up the market. If stakeholders feel they will be in full violation of their consents if they are found to not have quite sufficient entitlements when their actual emissions are assessed then they are more reluctant to trade down. Having a period for balancing after assessments can help with this issue.

[5] Greenhalgh, S. and M. Selman 2012. Comparing Water Quality Trading Programs: What Lessons Are There To Learn? Journal of Regional Analysis and Policy 42(2): 104-125.

3. KEY ELEMENTS TO SUPPORT TRADING

Trading of any sort is driven by a few basic factors.

- First, **scarcity** is critical – there must be potential for greater demand than there is supply, and this means supply must be constrained.
- Second, **well defined rights** provide certainty over what is being traded and what it enables the holder of those rights to do.
- Thirdly, **heterogeneity** (diversity in activities, systems, knowledge, etc.) is what creates the difference between stakeholders in marginal value of nutrient use.

Without these basic underpinnings, creating institutional arrangements to enable trading is pretty much pointless. In the Lake Rotorua catchment, the first two of these conditions need to be established through policies and rules in the regional plan.

Scarcity

Scarcity, or constrained availability, in this case is based on the load limits and timeframes set for the catchment in the RPS, but will only be scarcity in reality when a credible reduction programme with an effective audit and compliance system to hold resource users to account is specified and made operational.

The two components that constrain resource availability are the long-term NDAs and the "above-the-line" STEs. At any point where a farm may be subject to compliance audit there needs to be a specific total discharge constraint that the farm needs to meet (total allocation), or the equivalent in defined management practices for the farm. Until 2032 this will be the consent holder's NDAs plus their STEs.

The STEs are allocations of temporary rights to each landholder based on their historical benchmark discharges. Without formal definition and sequential reduction of those rights, scarcity will not be a reality before 2032 and little trading would occur regardless of whether it is provided for. So, in part, scarcity relies on well defined rights. Current proposals are for consents that require farm nutrient plans that demonstrate (proposed) reduction of discharges to 2032 targets. How such progress will be assessed and what the process steps and consequences will be if these reductions are not achieved progressively over time should be made clear from the start of the scheme.

Definition

A recent paper to the StAG from BOPRC staff put forward a proposal for the improved definition and reduction of above the line entitlements. This report supports that proposition and recommends adding regular reductions of these rights at the intervals that compliance audits are proposed – e.g. every 3 years – so that these allocations ramp down predictably over time. This could be achieved by writing them into consents as several lots of short term NDAs that disappear on particular dates, together with plan rules that trigger additional requirements if discharge constraints are not met (e.g. reduced stocking rates). This would increase certainty for farmers around their obligations and deliver predictable reductions in discharges over time.

Clearly defined future reductions in allowances and potential consequences for failing to meet targets should drive practice change and innovation to reduce discharges. This focus on improving farm management practice will raise prospects for more significant changes to farm systems than might otherwise arise, potentially leading to increases in nitrogen use efficiency and raised profitability.

Some farms may be able to reduce discharges more quickly than strictly required by the reduction schedule, enabling the release of allowances for use by those unable to meet their targets on time. This suggests that in the initial stages of the reduction programme, marginal trading is more likely to be useful for above the line entitlements than for long-term NDAs. If trading of STEs is enabled, transactions should be made as easy and as low cost as possible to encourage efficient distribution.

However, there should be clear consequences for consent holders that breach their allowance holdings on annual assessments or audit, particularly if they have previously transferred entitlements to others.

Heterogeneity

The third requirement to drive trading – heterogeneity – should be easily satisfied in this catchment. Studies including the recent report from Perrin Ag Consultants show that large differences in discharges from farms in the catchment cannot be accounted for by natural conditions such as rainfall and soil type for the same farm type. This indicates that operators are at different stages of improving management practices to control discharges and are likely to be facing different marginal costs. In combination with this situation, the sector averaging allocation scheme that has been chosen will create significant diversity in the challenges faced by farmers to reduce their discharges across the period to 2032.

Characteristics of Entitlements

The way that rights to natural resources such as those represented by NDAs and STEs are defined has been recognised for some time as being critical to their effectiveness. As described in Barns & Young 2013, the Canadian fisheries economist Tony Scott developed a framework for characterising such rights (Scott 1988[6]) in six dimensions (Table 1). This provides a useful framework and these dimensions should be carefully considered in the specification of entitlements and the supporting rules and regulations. Transferability is only one dimension of resource use rights and the larger set of characteristics is important to whether the rights are effective for their intended purpose regardless of the adoption of trading.

Table 1: Dimensions of Rights to Natural Resources

Dimension	Description
Quality of title	Enforceability – rights must be socially sanctioned, legally defined and protected through effective enforcement
Exclusivity	Ability to exclude others from using the resource – well quantified, described and measurable share of resource use
Duration	Duration and rights to and processes for renewal. Perpetual rights are the most secure. Shorter duration should be for a defined time and renewal processes specified, with care to avoid uncertainty about short term renewal outcomes
Transferability	The ability to transfer the right to others. Delivers flexibility in re-allocation of resources to their highest valued use through trading.
Flexibility	Ability to use the resource as and when required; e.g. to change land uses within the constraints of their discharge entitlement
Divisibility	Ability to divide the right held into smaller parcels for transfer, contributing to efficient distribution of resource use

As summarised by Barns & Young (p. 18) *"Ensuring compliance through effective monitoring and enforcement is essential. If the expected benefits of non-compliance are such that it is worth taking a risk, the environmental objective may be compromised..."* The risk is that of getting caught, and that depends on the compliance regime. Compliance is costly in time and resources but not investing in this early is likely to be more costly in the long term. Cost recovery for this activity should be applied with a risk based approach as has been used in the Taupō situation. That is, the closer you are running to your total allocation the more compliance attention you will receive. Through this approach those that abide by the rules and take a risk-averse approach will benefit through reduced compliance charges.

[6] Scott, A. 1988. Development of Property in the Fishery. Marine Resource Economics, 5:289-311.

A matter that impacts on several of these dimensions is the process of renewal of resource consents where entitlements are a condition of the consent. The Taupō framework incorporates a mid-term review of maximum term (35 year) consents. This could be extended to incorporate "evergreen contracting,"[7] which would include an option to reissue a full-length consent at the review point, potentially with changed conditions. This provides ongoing certainty over the ability to operate into the future as long as consent conditions are met, and the potential impacts of larger changes at the end of the full term of a consent are avoided.

4. THE PRACTICALITY OF TRADING

Where NDAs are required to be legally binding conditions of land use, enabling trading at low cost is currently difficult under the RMA because of the need to alter resource consents for each trade. For a trade to be made the consents of both the buyer and the seller would need to be changed to reflect the adjusted levels of NDAs held, and/or to incorporate or reference a modified farm plan specifying practices that must be in place. Consent fees and process tasks such as preparation of a modified farm plan and Overseer checking will be a disincentive to trading small amounts.

On the other hand, at $400/kg of long-term NDAs, trading of say 5 kgs per ha from a 100 ha dairy farm would yield $200,000 making the consent change fee look trivial. STEs will be lower in value (e.g. $60/kg for 3 year entitlements), but in the same scenario – 5kgs/ha across 100ha – a block of 3 year rights is still worth $30,000. These figures suggest that costs of changes to consents would be affordable and should not be a barrier for transactions that represent significant adjustments in holdings.

Considering the likely frequency of transfers, there would be little point in trading small amounts of entitlements throughout the year. The long term NDAs required for compliance will generally only change with significant practice change on the farm. In the transition period, much of the demand for transfers is likely to be for STEs. Variation in approaches to investment in mitigation or system change will mean some may have surplus STEs for the next 3 year period while others may not be able to reduce above the line discharges within the required time. Transfers of these entitlements would allow adjustment to proceed in the most economical way.

Despite the above, means for minimisation of the costs of transactions should be carefully considered. A coordinated system such as an annual "clearing house" (double call auction)[8] run by the council or a service provider could reduce costs of trades by collating buyer and seller requirements and providing for consent changes in a batch, with reduced fees charged by the council. Such a system would reduce or eliminate search costs for buyers and sellers looking for someone to deal with. However, costs also depend on whether farmers are ultimately accountable for practice as specified in an approved farm plan, or are permitted to trade and are just assessed for discharges against entitlements during compliance checks. The latter approach would eliminate the need to check revised plans with Overseer at the time of the trade, and leave the farmer to manage their own risk of holding less or more entitlements than are required when compliance checks are carried out. A lower risk approach could pay closer attention to specification of ongoing practice in farm plans and ensuring farmers have access to expert advice when required.

Potential disadvantages of the annual clearing house approach include the fact that those wanting to buy or sell would need to have worked out in advance how they were going to save or use the traded entitlements, and then may fail to obtain or sell them in the auction. Alternatively, one-to-one arrangements between farmers can be worked up over time. Once the potential for a trade is established, each party can work on the required farm system changes to meet their new levels of

[7] Townsend R.E. & M. Young 2005. Evergreen Leasing of Aquaculture Sites. Marine Resource Economics 20: 203-210.

[8] See Appendix 3 for details of a clearing house mechanism.

entitlements following the trade with some certainty that this will eventuate. So there is some risk of having a clearing house as the only mechanism, and a combination of allowing one-to-one arrangements and providing the clearing house service may be the best overall option.

The other disadvantage of providing the clearing house service is the cost of that provision which would need to be recovered from participants (not so hard) and the diversion of human resources from other work. The HR issue suggests contracting out the service rather than running it within the council, but this is likely to push costs up. In the end it is the amount of detail required by the council for a transfer to be approved that is likely to determine the overall costs of processing a transfer, and the degree of flexibility the council has to reduce consent change fees for this type of change. Mechanisms such as the clearing house process will help reduce search costs and are likely to encourage more use of transfers as a flexibility mechanism.

The Ministry for Primary Industries is working with the Joint Water Directorate at the Ministry for the Environment to raise the prospect of amending the Resource Management Act 1991 (RMA) to lower the costs of trading through approaches such as being able to reference external entitlement registers from resource consents. A new Part in the Act could set out a robust framework that defined the nature of entitlements and provided the flexibility required to enable flexible trading in water quantity and quality factors while maintaining legally robust links to the consent.

The conclusion here is that nutrient trading is currently practical but would benefit from a specified national approach in the RMA. Costs of revising consents and nutrient plans will mean that trading is likely to be approached cautiously and should involve significant planning by farmers and real improvements being made to farm systems. The prospect of being able to realise significant amounts of capital to pay for those improvements by selling surplus entitlements is likely to drive innovative approaches to practice change.

5. COMPATIBILITY WITH THE RULES FRAMEWORK

A major issue in considering inclusion of trading in the Lake Rotorua scheme is the challenge faced by the Incentives Entity to buy out 100 tonnes of allocated NDAs. A full free market trading scheme for these NDAs from the beginning of the scheme would add to the already significant risk of the scheme failing to meet its target. This is where the rules need to reflect the commitment of the Council to achievement of the 2022 target for the Incentive Scheme.

Current proposals include different consent types depending on whether they have a farm nutrient plan that demonstrates managed reduction to target levels in 2032 represented by allocations of NDAs. In the initial period most farms will be operating at discharge levels in excess of their NDA holdings and farmers will be focused on whether they have enough STEs on top of their NDAs to allow them to continue as they are, rather than on their NDA holdings. The requirement for reduced discharges by all farms from the total of 2004 benchmarks by 2022 without compensation is 44 tonnes – about one third of the 2032 total requirement – and this does not take into account reductions already made over the last 10 years. There will be little incentive for purchase of NDAs earlier than needed – that is, while you still have STEs that will cover your needs. Therefore a trading scheme for NDAs is unlikely to be needed for **marginal** trading before 2022.

The other potential source of demand for NDA trading in the period before 2022 would be for large transfers from farms converting to low N discharge uses, to farms wanting to intensify production and consequent discharges. Allowing full trading in this period could result in the Incentives Entity identifying properties and putting considerable efforts into convincing owners of the integrity of the business case for conversion, only to be effectively outbid for the NDAs by a farmer wanting to intensify.

The achievement of the 100 tonne target solely through conversions of dry-stock land to forestry would radically change the nature of land use in the catchment by removing two thirds of dry-stock grazing

and is a very significant challenge. Even a single large transaction moving **bulk** NDAs from dry-stock to a dairy operation (for example) would make this task harder, more expensive, and may have significant consequences for farmers in terms of required contingency measures if the target is to be finally met.

For any trading of entitlements to work, a primary requirement of the rules structure would be to allow for different levels of discharges per hectare to apply on each farm. Clearly, a fixed cap on discharges per hectare provides no rationale or incentive to trade. Thus a framework that requires a long-term farm plan that locks properties into particular practices or fixed discharge constraints should be avoided if trading is to be contemplated.

The most flexible arrangement (accepting that an external registry is not currently viable) would be to specify both types of entitlements on resource consents and require that (modifiable) farm nutrient/environment plans specify the practices that will constrain discharges to the required amount. In addition, if STEs are "ramped down" through breaking them into 3 year blocks that reduce in a stepwise manner, the farm plan would specify how to stay within the total entitlements for at least the current and the next 3 year period. When the current period expires, the plan would need to be developed further to ensure the next block is covered. The number of periods in a plan should not be constrained but should include a minimum period of 3 – 6 years of planned actions. This would provide assurance about progress toward the long-term reduction goal without forcing consent holders to provide plans for ten years or more ahead, which are likely to be unrealistic.

Enabling trading of STEs would then provide flexibility to farmers in timing their investments in improved practices and infrastructure during the transition. For example, one farmer may be at the point where they need to renew or extend some infrastructure such as milking sheds or effluent ponds and can make a step change improvement in discharge outcomes, making some or all of their next 3 year block of STEs surplus to requirements. Another may need some more time for planning and raising capital to make their commitment to required changes, or have some sunk costs that would be lost if change was initiated too early. Allowing transfers in this type of situation would reduce overall costs without adding risk to achievement of the overall targets of the reduction programme. With predictable declines in their allocations of STEs, and trading enabled, farmers would be considering potential changes to management against the potential to buy or sell STEs.

Catchment wide, there may come a time when the price of STEs gets so high that farmers will try to source NDAs to build their base allocation. The redistribution inherent in the sector averaging allocation of NDAs will start to bite between 2022 and 2032 as high base-lined operators struggle to get down to their allocated levels. As soon as the objectives of the incentive scheme have been met it would be useful to enable a trading regime for NDAs. Stakeholders should be notified of this intent at the commencement of the new rules – or it could even be written into the rules at this stage. However, anticipating the details of a potential national scheme at this stage would be risky, so a policy statement would probably do just as well, with plan provisions added (if required) closer to the intended commencement of trading.

Based on having entitlements as conditions on resource consents, support in the rules for trading through the standard RMA process of consent changes needs to take into account the dimensions of effective rights as described above in section 3. In defining rights or entitlements rules and consents need to be as explicit as possible about the nature of these in the dimensions discussed in Table 1, and the implementation should ensure a monitoring and compliance regime is established that minimises the risks of stakeholders gaming the system.

6. ACHIEVING THE TARGETS

The targets set for nitrogen discharge reductions for 2022 and 2032 are ambitious and represent significant increases in scarcity of the resource (51% reduction in supply). Seventy percent of this reduction (35% reduction in total N discharges) needs to occur by 2022. However, this resource scarcity is being imposed rather than being intrinsic or naturally pertaining to the resource.

The amount of resource available for use is a value judgement made by the community about an acceptable state for the environment. The scarcity therefore needs to be created by effective restrictions on use, and because of the significant value of resource use (e.g. $400 per kg of leached N) compliance will need to be carefully monitored. The trade-offs between likely outcomes and costs of compliance will need to be balanced carefully but if the targets are to be met on time then a workable system will be needed that is understood by all.

The first requirement for a workable system is the clear definition of rights to operate within it. To date, policies have defined the long term entitlements – NDAs and how they will be allocated. The default option for making these binding is to write them into resource consents as conditions, along with requirements for farm plans that demonstrate how they will be achieved over time. In reality, NDAs do not become binding until 2032 after all reductions are due to have been completed. The constraints that create the scarcity required for reductions in the transition period are therefore not NDAs but the availability of STEs. Definition of STEs on consents with requirements for reductions to be met by 2022 has been mooted by BOPRC staff.

2022 Target

Responsibility for meeting the RPS 2022 target lies largely with the councils (180 t reduction) through engineering solutions, gorse conversion and buying NDAs through the incentives scheme. Farmers must collectively reduce STEs by 44 t over the same period to meet the overall 70% target. Although mechanisms such as the incentives programme and gorse conversion are planned, detail needs to be agreed as to how the actual targets will be secured.

A key issue is whether there is a firm commitment to achieving the 2022 target on time. If the answer to this question is yes, then it is time to consider how this will be achieved, including contingency plans and timing for changes in approach if these are required.

To reduce uncertainty for council staff and stakeholders, a strategy is required that sets out how each component of the 2022 target will be achieved. This needs to address the risk that some measures may not yield the desired results. To engender cooperation and provide options, a flexible framework is desirable. However, the RPS has set binding targets for 2022. A useful approach would provide incentives and flexibility for the main programme, but incorporate contingency plans that can be activated at a specified time before the deadline (e.g. 2020) in the event that initial approaches are not delivering on their targets. Each component of the target should be assessed.

Table 2: Components of the Reduction Programme

Component	Comment
Engineering Solutions	Most likely component to be achieved in a predictable way. Costing and timeframes can be defined ahead of time with contingencies for overruns built-in. Assume the analysis has been done already and 50t is achievable.
Incentives	The economic outcomes for forestry conversion under the incentives programme look encouraging (twice the average returns of dry-stock). However, to achieve a 100 t reduction will require 10,000 of about 16,000 ha of dry-stock land to move to forestry. There is no guarantee that the target will be met voluntarily. Flexibility could be increased to encourage uptake. For example, allowing blocking of farms for partial conversion would enable farmers to continue grazing stock on

	better land and maintain their lifestyle values while planting steeper areas. Targeting farm planning support assistance to those interested in potential conversion, and incorporating analysis of low nitrogen discharge land use such as forestry into all farm planning support is likely to enhance up-take. However, contingency plans are needed for ensuring the target is met if enough is not achieved voluntarily. Having agreed to responsibility for achieving this target and having appropriated funding for it, Council should not consider transferring the costs of this to farmers if it cannot be fulfilled under the proposed scheme. The agreement is that these NDA reductions will be compensated from the incentives fund, so all options should include this. Ultimately, revising the RPS to extend the timeframe is a possibility, but if this is part of the plan from the start then it may serve as a disincentive for farmers to act earlier.
Gorse	The 30 t to be removed by gorse conversion is based on the total area of suitable gorse. If this target is to be achieved then consideration might be given to the option of making it a rule that specified areas making up the 870 ha must participate in the scheme, or that such a rule becomes operative in 2020. Such an approach may aggravate land-owners, so there is a balance to be struck with how important it is to fully achieve the goal on time, the incentives being offered, and the necessity for a backup rule.
Above line reductions	Council staff have outlined an option to allocate specific reductions/levels that must be achieved by 2022 for each property. This is equivalent to issuing time-bound NDAs for the above line reductions, some of which expire in 2022 and some in 2032. This will give each landholder a specific target, and provide the ability to make these enforceable through the rules and consents. However, having a single target constraint will provide less motivation to act soon than a series of shorter term binding constraints. A stepped reduction of STEs every 3 years would provide farmers with goals for progressive change of their farm management systems.

2032 Target

After the initial 70% has been achieved, the remaining required reductions for the 2032 target will need to be made by farmers. A general rule is that it will become progressively harder to achieve reductions because the easiest and cheapest actions will be taken first. Therefore it will be this period when the greatest flexibility will be required to find the most efficient approach to discharge reductions across the catchment. The increasing difficulty of finding reductions will also mean well defined rights and progressive reductions of STEs will be critical to drive innovation and changed management behaviour.

During this period is when trading of NDAs is likely to become useful. Up to 2022, farmers considering major system changes to low discharge land uses have the option of selling NDAs to the Incentive Scheme. After 2022 they will lose that option. An NDA trading regime at this point would serve the needs of potential bulk sellers, and would generally allow the reconfiguration of long-term nutrient discharge to its most efficient use. At this point it is difficult to imagine what may happen over the next 10 to 15 years that will transform farming systems. However, nothing is surer than change and technology is continuously accelerating– change will get faster. That change is likely to alter the way farming is carried out in the Lake catchment by 2030 and new configurations of NDAs are likely to be required to provide for more efficient use of the resource and increased profitability of farming.

7. TRADING OPTIONS SUMMARY

Trading Option	How would it work?	What would it mean?
Free market NDA trading now	NDAs as conditions on consents with consent changes on trade – increased council workload	Little need for marginal trading before 2022; potential for bulk trades to undermine 100T target; no great advantage
Free market NDA trading post-2022	Likely national framework to enable legal link to external registries as consent conditions	Flexibility for adjustment of farm systems as STEs run down, conversions to low N land use, and to maintain high-value high-discharge farms within the cap
Investment Entity mediated trading	Entity only can purchase NDAs but then have the option to re-sell "surplus" NDAs to farmers	Very unlikely to be required as Entity will likely struggle to acquire enough NDAs
Two tier trading for (%)NDAs plus derived annual allowances	Set up NDAs as entitlements to a percentage share of the total nitrogen discharge load, and each year issue shareholders allowances in kg valid for that year only. Both could be tradable. Tradable annual allowances equivalent to leasing NDAs.	If annual leasing was advantageous then this system is preferable as it is more secure for vendor. Based on fisheries ITQ/ACE model which replaced leasing. Desirability depends on compliance system but unlikely to provide any advantage in Rotorua during the period to 2032.
Soft/no short term targets on STEs	Don't define STEs as such on consents but only identify baseline cap and 2032 NDAs. Rely on plans to show how 2032 target will be achieved.	Less certainty for farmers about expectations; may lead to putting action off until later; can't accommodate STE trading; likely more costs for compliance and support for farm planning which may be done reluctantly as a compliance exercise
Hard targets on STEs; STE trading; NDA trading post-2022	Define NDAs and STEs on consents with 3 yearly declining blocks of STEs to zero at 2032. Allow trading of STEs from start but not of initial 3 year block. NDAs not transferable before 2023 except to Incentives Entity	Certainty about requirements and ability to adjust STE holdings to manage the reduction of discharges. Prevents undermining of 100T target. Provides learning period for "low risk" trading for stakeholders before looking at trades of permanent NDAs.
Clearing House support	Council or contract provider runs annual or multi-year interval double call auction to facilitate trade of entitlements. (See appendix for details.)	Lower search and negotiation costs for buyers and sellers thereby facilitating trading. If using consent changes, these can be done as a batch, potentially lowering costs.

8. CONCLUSIONS

Active management of diffuse nutrient discharges from agriculture through regulation is a big challenge for regional councils across New Zealand, and NDA trading for non-point source discharges is relatively new. Trading such allowances can provide flexibility and reduce costs where resources are scarce or over-allocated, and where adjustments are needed to current practice. However, conditions apply.

The Lake Rotorua catchment differs significantly from the only existing nutrient trading scheme in New Zealand, in Taupō . The key difference is the need for major reductions in discharges by both farmers and through the incentives scheme. Not only will there need to be major changes in land uses within the catchment, but there will be very few farms able to continue with business as usual. There is time to make the adjustment, but change must occur in current farm practice.

Even in a relatively small catchment such as this, with a lengthy history of consideration of this issue, there will be farmers who will not see it coming and will feel blind-sided by new rules and requirements. There will be confusion and resistance that will require clearly defined rules and messages, as well as tactful and proactive communication.

Creating as much certainty as possible about processes, rules and rights early in implementation of a new management framework is important for alignment of expectations, forward planning for change, and building trust. Making the rules clear from the beginning and sticking to them (tough love) will generate more respect and compliance in the long run than being vague and ill defined and then imposing potentially draconian rules at the last minute.

A key component is clearly defining the nature of the long and short-term constraints, rights, entitlements or privileges that stakeholders need to comply with and can use. This includes defining contingency plans that will be invoked if targets are not met, and that would impact on those constraints or entitlements.

Under the progressive implementation of reductions planned for the Lake Rotorua catchment it is unlikely that there will be any demand or necessity for trading of NDAs for marginal adjustment of holdings before 2022. Enabling a trading regime for NDAs during this period is only likely to undermine the objectives of the Incentive Scheme by allowing the possibility of new users or existing farms to compete with the Scheme for bulk transfers of NDAs from farms converting to low nitrogen discharge land uses. However, the ability to transfer STEs would be useful where the availability of these is reduced in a defined stepwise manner from initiation of the scheme through to zero in 2032, and this would pose no threat to the objectives of the scheme.

Meeting the Incentives Scheme target of 100 tonnes by 2022 is likely to be difficult. This needs to be addressed positively and with significant investment in the promotion of alternative land uses. The campaign needs to take into account the predictable reluctance of dry-stock farmers to convert their entire property to forestry due to the significant lifestyle change involved. To convert two thirds of all dry-stock land in the catchment to low-N uses will require creative thinking and mixed farm systems that allow farmers to change their operating model without having to entirely give up farming as they know it.

Alternative options should also be explored for current dairy properties. The success of the targeted marketing approach used by the Dairy Goat Cooperative and Synlait, makes it clear that there is plenty

of potential in the value chain. These approaches place higher demands for precision management on farmers but this can result in win-wins for environment, farm profits and the regional economy.

Such change and adjustment to farm systems to make them more efficient and to comply with consumer and market preferences will very likely benefit from an ability to transfer constraining resource use entitlements in the future. Potential changes to systems may mean either less or more nutrient discharges from particular operations, and once the major reductions in over-allocation are completed the ability to freely transfer permanent entitlements will enable innovation and growth in the catchment's economy.

9. RECOMMENDATIONS:

1. A general "free market" scheme for trade in long-term NDAs should not be implemented at this stage because:
    a. There is no urgent need for marginal trading in NDAs due to the slow ramp down in above the line entitlements to 2032;
    b. In the period to 2022, private bulk trades in NDAs resulting from major farm system change could undermine the Incentives Scheme efforts to acquire 100 tonnes of NDAs from existing allocations;
    c. Systems for trading long term rights need to be robust and stable. Central government is currently developing thinking around how a national statutory framework could provide this certainty. This should be resolved before 2022 and a national framework would reduce the costs of both providing for trading at the regional level, and of individual trades.

2. An open transfer system for long-term NDAs should be enabled once the 2022 reduction targets have been achieved. If this policy is adopted, it should be publicly notified as soon as possible.

3. Above-the-line short term entitlements (STEs) should be formalised on consents with stepped 3 yearly reductions defined through dated expiry of blocks of entitlements, and transfers between consent holders allowed. Step down and allocation of STEs could be based on:

    Steps defined by a ramp from the **original property baseline benchmark** through the 2022 target, and down to zero at 2032; and

    EITHER
    a. Allocation based on the most recent assessment of discharges from the property or the original – whichever is the lowest; and
    b. Transfers should not be allowed of first 3 year block, so that those who have already lowered their discharges before the system commences are not disadvantaged;

    OR
    a. Allocation based on the overall percentage reduction in discharges achieved for the catchment from the 2004 benchmarks to the latest assessment, applied to each property's original baseline; and
    b. Transfers allowed from the start of the scheme.

4. Transfers of STEs:
    a. Low cost transfer and consent change methods should be defined with minimal requirements to provide evidence of changed practice or ability to meet the changed constraints, backed by significant consequences for not doing so;
    b. Powers should be provided to request more information for any proposals for transfer considered to be high risk;
    c. In addition to enabling bilateral transfer of STEs at any time, a proposal for a regular mediated transfer event based on the clearing house model should be developed. This could be run annually or at the three yearly points of reductions in entitlements depending on demand. Demand should be assessed during the first few years of the scheme.

5. Investment should be made in development of practical tools to support planning for farm system change to low nitrogen discharge land uses. Such tools should provide for financial cash-flow analysis of a range of potential activities independently and in combination, such as dry-stock, dairy goats, plantation forestry, forestry co-products such as high value fungi, and manuka planting for honey production.

6. Capability should be established, potentially through the Incentives Entity, to disseminate practical information and economic analysis on alternative farm systems, to target owners with land best suited for conversion, and to assist interested farmers to develop farm plans for conversions to low nitrogen discharge land uses.

APPENDIX 1: FREQUENTLY ASKED QUESTIONS ABOUT TRADING

This section discusses some of the questions that arise in considering trading schemes in general as well as in the specific context of the Lake Rotorua catchment. Most risks can be managed adequately in institutional design if they are thought through before becoming wedded to a particular solution. Such possible outcomes as "Queen Street lawyers" swooping in to buy up NDAs and monopolising trade to make money can be easily designed out of the system from the start. Even the potential for landowners within the catchment to play monopoly games with the system can be constrained by limiting the maximum holdings of NDAs per hectare of land owned.

Market risks: Will trading compromise our ability to meet the "buy-back" target of 100 tonnes by competing with the incentives programme?

This is definitely one of the challenges of system design. If the Incentives Programme is not successful in meeting its target by 2022 it risks losing access to government funding provided for this purpose and not achieving the water quality goals for the lake. However, trading is not inherently in conflict with the incentives scheme, which is in fact a trading scheme in its own right.

The question needs to be considered as part of the overall design of a system of rules and mechanisms that sets out to achieve a defined set of objectives. If these objectives include concluding the 100 tonne incentives scheme "buy-back" by 2022 as is current policy, then mechanisms need to be developed as part of the programme to ensure this is achieved.

Potential design features that could guarantee that this objective is met will need to be tested against the broader legal framework and stakeholder views. One possible approach is for the regional plan to set N load targets for 2022 and potentially for other intermediate dates that automatically become binding limits on the specified dates. Rules could then specify how NDA holdings will be reduced, if required, to match those limits at the time they come into force, and specify how compensation (if any) would be made.

Under such a scheme the Incentives Programme could operate in the period up to 2022 to buy back NDAs in "the market" or through negotiated contracts over mitigation actions with land-owners. If the 100T reduction has not been fully achieved by the due date, the reduction rules would kick in to acquire the remainder. The rules would need to set out how this would happen in an equitable and predictable manner.

In combination with other aspects of the programme that have yet to be decided, it may well be advisable to delay trading of long-term NDAs until they become binding at the margin of farms ability to operate. That is, the existence of above-the-line entitlements until 2032 means that NDAs are unlikely to be in demand for marginal trading until after 2022.

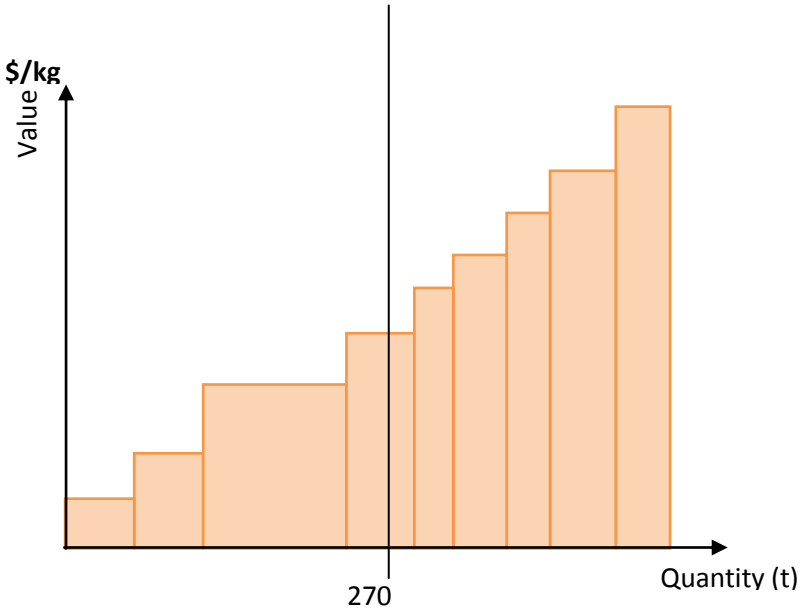
Is there enough N for both trading and the buy-back?

The issue is that there is too much N. The objective is to reduce this by a specified amount in a particular timeframe (2022/32).

Trading is about flexibility and cost minimisation in the adjustment. The ideal is that the reductions in N are from the lowest valued uses in the catchment. That is, there will be a range of values for the ability to discharge a kilogram of N. From an economic perspective we want the available resource to be used in the most highly valued way, whether that is purely financial value or a combination of financial and other values such as lifestyle. At the end of the reductions we want the low valued uses to have disappeared not the high valued ones. Trading allows the holder of these values to decide what they are worth in monetary terms, and for highest valued uses to prevail.

The incentives scheme is actually a trading scheme whether or not other trading is permitted: you are seeking agreements for farmers to give up the ability to discharge N in exchange for monetary consideration.

If an existing or a new farmer in the catchment (as in the Taupō case) buys up some N from a low valued use and puts it to work in a higher valued use, that is a good thing. It doesn't change the amount of N discharge that needs to be reduced. It is possible – but not inevitable – that such trades could make the buy-back slightly more expensive due to the fact that some N is being moved to higher valued uses.



To understand how trading might interact with the buyback we can use this simple diagram that shows blocks representing all the N discharged in the catchment. The width of the block represents the quantity being discharged and the height represents its value to production. The vertical line marks the lowest valued 270 tonnes of N in the catchment. This is the overall reduction target (incentives, gorse, and on-farm reductions).

A voluntary trade between farmers would shift a block of N to the right – from a lower value towards the higher end of the scale. If we imagine lifting a block from the left hand side of the diagram and inserting it back into the diagram to the right of the 270t line, this will shift the lower valued blocks to left to fill the space the traded block came from, and higher valued blocks may shift to the left of the line. This could make removing the 270t marginally more expensive than before, but this will be more than compensated for by the increase in value generated by the traded block in its new use. In addition, if the incentives scheme is buying the lowest valued N, it shouldn't be buying blocks at the 270t line. These should be the last uses to be removed in 2032.

The Incentives Entity will be operating under the constraint of its available budget. Without general trading of NDAs available, the Entity will be the only buyer in the market for bulk trades where farms are converted to low nitrogen discharge uses. If general NDA trading is allowed in the pre-2022 period, the Entity will need to match the value of NDAs to the highest bidder in the market and this may be higher than the budget will provide for, risking running out of funds before the job is done.

Did trading work in Taupō and what is different here? Are the drivers actually in place for a functioning trading system?

The Taupō experience is clearly a learning opportunity. There have been some trades in each year from 2009 to 2013, with a total of 13 trades to June 2013, compared with 24 trades made by the Trust buy-back scheme. Most of these have been small and the total amount traded privately was only 12% of the total amount transferred including the buy-back.

In their analysis of the Taupō scheme Barnes and Young point out that "historical allocation" (or grand-parenting) allowed farmers to continue with business as usual, and that trading was not necessary to maintain normal operations. Thus only those changing farm systems (e.g. converting to forestry) were in a position to sell NDAs and these were bought up by the Trust. This has worked to reduce the overall nitrogen load to the target level fully funded by the Trust.

In the Rotorua case, the pastoral sector will also be required to reduce the load significantly without compensation. This is a significant driver for trading, as minimisation of costs to businesses will be

critical. In addition, the sector averaging approach to allocation will mean that without some rebalancing of NDA holdings through transfer, economic losses are likely to be significantly greater, and some farm business may just not be viable at the level of discharges allocated to them.

A key to success with a scheme for Rotorua will be to make what is going to happen along the way as clear and as certain as possible through plan rules, and to have good information availability and easy low cost means of trading. Given a degree of heterogeneity and a scheme that minimises transactions costs, trading should be an attractive option in meeting reduction targets.

Do farmers even want to trade?

Farmers are in business and are therefore traders. NDAs are really no different to any other input to farming; they are just a new requirement. A few years ago, palm kernel was not something that farmers bought and nor was GPS guidance for tractors or a number of other inputs that are now becoming more widespread.

People trade because there is an advantage to them – it is the classic mechanism for "win-wins." I buy something at the supermarket because I value it more than the cash I give up to get it. The seller is happy because they get more money than it cost them to provide the goods. We both win.

In the case of N mitigation, let's consider 2 farmers Alan and Ben in a catchment where there is a need to reduce N discharges due to a cut in the cap. If Alan can mitigate to satisfy all the required reductions for $80 /kg, but Ben's cheapest option is $120 /kg then it makes sense from a total cost point of view for Alan to do the mitigation. Assuming a "user pays" approach – meaning the farmers need to bear the costs of mitigation – how should the costs of Alan's mitigation be shared?

Without going to the method of initial allocation of the required reduction, we assume that both Alan and Ben must contribute to reductions in specified amounts. Without some method of cost sharing, Ben will have to spend a minimum $120 /kg. If they are allowed to trade (not compulsory) Alan would likely be interested in reducing his costs by selling NDAs to Ben for more than his own costs of mitigation, and Ben is likely to be interested in buying NDAs off Alan for less than it would cost him to mitigate. They should be able to negotiate a price between $80 and $120 where they both will be better off after a trade.

Clearly the transactions costs of trading will be important. If mitigation costs are not that different for Alan and Ben, and/or if the costs of negotiation, registration of the trade and so on, are significant, there may be no net benefit. Also the costs of learning how to negotiate and execute a secure trade will be something of a barrier at the start up of a trading system. These issues need to be analysed, clarified and options for addressing them evaluated.

The bottom line is, if there are significant differences in mitigation costs then trading should be attractive to farmers. If everyone had the same costs there would be no dollar advantage from trading (although there may still be some demand for trading due to differences between farmers in values placed on lifestyle). The analysis of the catchment to date suggests that costs for dairy will be significantly higher than for marginal dry-stock areas. This should create an environment conducive to trading.

Is there potential for third parties to be involved in trading as brokers or as buyers/sellers - those without a connection to the issue who could benefit at expense of the locals/lakes?

Arbitrage (ticket clipping) can be perceived as a negative or predatory activity, but some say it makes the world go round! Brokers are one means to assist information flows between buyers and sellers, but there are other ways. The key issue here is transactions costs. Stock brokers, for example, employ staff to research company backgrounds, history, operating models and prospects so they can provide this information to a number of clients. This saves those people from having to do that work themselves individually, duplicating effort and wasting resources. The broking firm may have several hundred clients they can inform with the same information. The clients will be able to access it more cheaply

than doing it themselves and overall the firm charges out more than their costs by re-using the same information over their client base. Of course the firms also provide convenient and legally secure access to the stock transactions for the client, again reducing transactions costs, and encouraging confidence in using the system.

It would not be necessary to have a competitive brokerage system to service an NDA trading system for Rotorua. Values for NDAs will not change from one day to the next. However, options are needed to minimise the information search costs and other transactions costs for potential participants and build confidence in the system.

The number of players in the market: will we have enough to make certain approaches work?

In the end you only need one willing buyer and one seller with a need for a trade. There are more than 160 potential traders here with lots of adjustment required. If there is an easy and cheap way to transact then trading is very likely. There is also a question to consider about the application of trading to what are, in effect, temporary NDAs during the transition period to 2032. The arguments for trading apply just as much if not more so to these "rights" as to the long-term NDAs, which are likely to form the "base load" for all farms that remain with current farm systems. Flexibility will be a key factor in the adjustment period, and the ability to move NDAs around provides one degree of flexibility in an uncertain environment.

What about the administration costs of more complex trading arrangements – we just don't have the resources available to run a costly scheme

This is a transactions costs issue. If this is "user pays" then an expensive system will discourage trading. The challenge is to reduce costs to a minimum so there is a net benefit from trading. There are clearly options for a low cost trading scheme, but with or without trading, the costs of implementation, monitoring, accounting and auditing need to be taken seriously if the regime is to be effective.

Will the simplicity of rules/arrangements be compromised by trading?

Trading may involve more complex rules but the extra rules would only apply if a farmer wanted to trade. On the other hand, to achieve the ambitious reduction targets that have been set without trading, the rules may need to quite complex, or risk imposing very significantly higher costs than necessary on farmers.

The risk of trading 'nothing' given Overseer uncertainty

The uncertainty around Overseer is not really about whether it is "right" in its predictions – it's a model and therefore by definition is not a true representation of reality. The uncertainty at present is about how potential changes in the model as it is further developed will be dealt with by the system of rules, and whether that will be "fair." This issue is closely related to the initial allocation problem in that it is unlikely that all parties can be satisfied as to the equity of any particular arrangement, but it is equity that needs to be the focus of the policy decisions and these decisions need to be clearly stated at the beginning of the regime. The recent advice on the treatment of Overseer in the system provides a sound basis for considering these issues.

APPENDIX 2: FEATURES OF A TRADING SCHEME

Feature	Comment	Preferred Arrangement
Infrastructure		
Governance and Management	Current framework a bit clunky but can work.	Specific framework required in legislation to lower costs
Sources of N	Different sources will have different mitigation costs and time frames for adjustment. These differences provide the value driver for trade	Ideally, a trading regime should include all major N source categories – diffuse and point source, urban and rural
Units of allocation	Kg of N per year is what is estimated by Overseer	Define discharges in terms of kg of N per year
Responsible party	Allocations will generally be linked to consents. Some problems will arise in leased horticultural land. Could involve "group consents"	The consent holder should be held responsible for activities resulting in discharges
Measurement tool	Overseer is key platform for estimation of N discharges	Overseer as primary tool; other models may be required as supplementary tools.
Nature of the right	The way the right is defined will allocate risk associated with changes to limits and model output	Rights defined as a percentage of the available resource allocates risk to rights holders; Rights defined as kgs of N allocates risk of change to regulator/public
Resource unit	Resource units available annually to rights holder	kgs of N
Elements of Scheme		
Measurement and reporting	Overseer should be used to estimate diffuse discharges	Reporting of Overseer data/results as often as is practical but minimum of once per year
Verification	Audits carried out for each farm every 3 years with provision for spot audits at any time	Regular checks for all and focus spot checks on least progressive
Transparency	Exposure of performance and peer pressure may improve performance and reduce the need for auditing	Publish reports on discharges by landowner and aggregate discharges in the catchment on a regular basis
Enforcement	Have a range of tools available but try to operate at the least draconian end of the range	Move reluctantly from encouragement and persuasion to enforcement of clearly defined rules for non compliance, such as reduced stocking rates.
Specifics of Transfer		
Market Risks	Constrain transfers to those that intend to use the resource – cut out speculators	Requirement on acquirer to demonstrate a productive need for more N.
Transparency	Inform the market of holdings and any transfers occurring	Ensure public availability of data on holdings and sales of rights

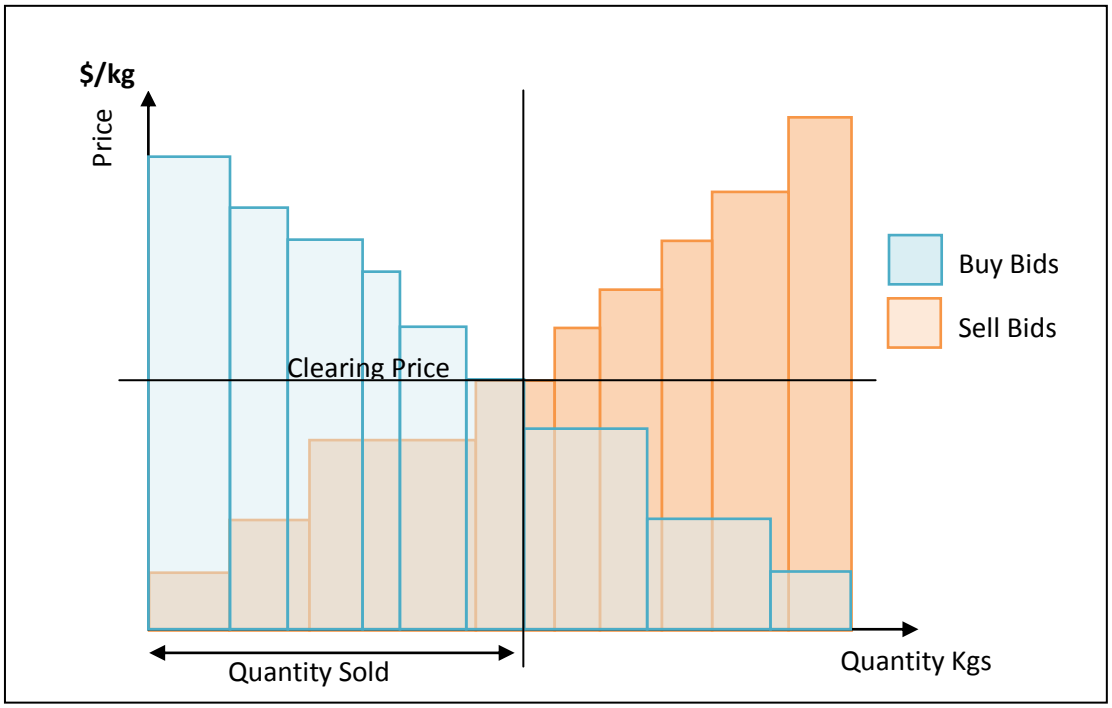
Source: Adapted from John Scott paper to Land & Water Partnership, April 2014

APPENDIX 3: CLEARING HOUSE PROCESS

Trading schemes for NDAs and/or STEs may permit bilateral trading at any time, but in nutrient discharge schemes with annual assessments and rolling averages for assessment of discharges, the need for trading will be periodic and infrequent. Transactions costs and process complexity could be significantly reduced by a centralised "clearing house" approach that collates the requirements of all participants in one operation. This can be run every year or just as often as necessary.

Under this mechanism, bids for buying and selling specific amounts of entitlements would be collected together by the clearing house. These would be assessed collectively as supply and demand schedules to strike one clearing price that would be paid for all transactions. In this process, all sellers (bar those right at the clearing price) will be paid more than their bids and all buyers will pay less than theirs. This will encourage participants to participate and to bid the real value of the NDAs to them, generating accurate market price signals.

Figure: Striking the Clearing Price



Those who find mitigations at costs significantly below the market clearing price will incentivised to do more in the following years, while those with profitable uses for additional N will only pay the "going rate" and should also profit. This system would prevent coercion or bluffing in private transactions that might see some parties profiting unfairly at the expense of less powerful players.

This type of system should be simple to understand and operate, would eliminate most costs of search and negotiation for individuals, and would be low risk for participants. By aggregating the buy and sell offers, each successful bidder is only involved in one transaction to buy what they need, or to sell their surplus allowances.