A JOINT INDUSTRY APPROACH TO MONITOR AND REPORT ON FARM PROGRESS TOWARDS CATCHMENT ENVIRONMENTAL TARGETS

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Abstract

A Rotorua collaboration of industry and sustainable farming advisor representatives has initiated the concept of the 'EMS Dashboard'. This is a new approach to monitoring and reporting nutrient loss mitigations using the existing (non-regulatory) primary sector owned environment management system (EMS) tools. If the proposed concept is adopted, the EMS Dashboard will enable the Lake Rotorua catchment farmer Collective to manage and demonstrate continuous improvement in environmental performance.

The EMS Dashboard is proposed as a joint sector owned initiative that is still essentially a non-regulatory vehicle for transferring key performance indicators (KPIs) from the farm to other agencies e.g. the regulator, the market place, other organisations and wider public interests in monitoring farming's environmental performance. Some of these other agencies, e.g. the regulator or market place, may have minimum requirements that require an external audit process. If adopted, both the contributing EMSs and the proposed EMS Dashboard may be subject to some form of audit. This should not preclude the setting up of an essentially non-regulatory and voluntary farmer-owned process to aid continuous improvement and demonstration of excellence in the first instance.

The decline of water quality is an important challenge to many rural and urban communities in New Zealand. Nutrient loads can directly govern aspects of water quality related to algal and plant growth, and indirectly, aspects of water quality related to oxygenation and geochemistry. Consequently, nutrient loads can be important determinants of a range of water values throughout New Zealand, ranging from recreation to ecosystem health. Where nutrients are linked to declining water value, regional councils are charged with setting water quality targets or limits either through traditional mechanisms or collaborative decision-making. Community sewage is one of several contributors to catchment nutrient loads, including other land uses like intensive agriculture. In pastoral catchments with nutrient loss targets, the adoption of good management practices will be important in ensuring the future sustainability of agricultural land use.

Lake Rotorua Catchment Background

Farming in the Lake Rotorua catchment has been constrained since 2005 by 'bench marking' regulation (Rule 11) that caps nutrient loss from farm land at 2001-2004 levels. New regulations are being drafted to bring about nutrient loss reductions that will require all farms in the catchment to collectively reduce nitrogen loss to the lake by 140 tonnes by 2032. In addition, an accompanying $40m incentive fund (subject to approval of the 50% Government share) and a gorse removal project have been established targeting 100 tonne and 30 tonne reductions respectively. See illustration in Figure 1 below.

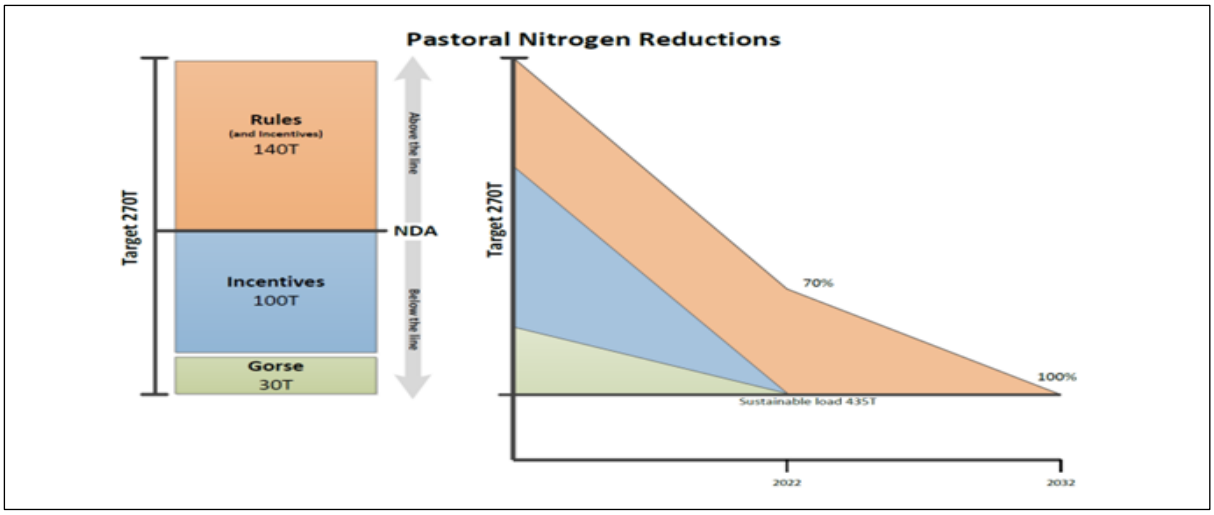

Figure 1: Proposed progressive (2015 – 2032) nitrogen reduction targets for land use activity in the Lake Rotorua catchment (BOPRC, 2013a).

The 2013 draft policy framework endorsed by Bay of Plenty Regional Council states that Lake Rotorua catchment farms are to apply for a Resource Consent to farm by December 2017. The individual farm Resource Consent will likely contain conditions that require a farm to show progressive improvement managing nutrient losses to 2032 by which time the farm's nutrient discharge allowance will need to have been achieved to satisfy the nutrient reduction targets needed for sustained water quality improvement in Lake Rotorua.

A schedule with staged nitrogen loss reduction targets has been established in conjunction with the Rotorua Stakeholder Advisory Group (StAG). This schedule is known as the Rules and Incentives Framework and was developed after the Oturoa Agreement (BOPRC and the Collective 2013) resolved farmer appeals on the Proposed RPS - see figure 2 below.

Rules Programme – 140 Tonne Reduction		
By 2015	Farm Nutrient plans	Plans will be put in place for every farm, setting out a practical pathway of staged nutrient reductions
By 2017	Resource consents	Farms will be consented, with nutrient reduction plans as a consent condition
By 2032	Nitrogen Discharge Allowances	Average of 35kg N/ha for dairy and 13kg for drystock, with adjustments made for geophysical and farm system characteristics
Incentives programme – 100 tonne reduction		
By 2022	Incentives Fund	$40m "below the line" to remove 100 tonnes of N $5.5m "above the line" to get to the NDAs
Gorse Programme – 30 tonne reduction		
By 2022	Gorse Fund	Separate funding to remove 30 tonnes of N from gorse

Figure 2: The Rules and Incentives Framework (adapted from BORPC, 2013)

Environment Management System (EMS)

The term "Environment Management System" (EMS) is based on the internationally recognised ISO 14001 standard for environment management (Carruthers 2007).

A well designed EMS reflects and supports the goals (or mission) of the farmer by making the farm operation more efficient and cognizant of issues that could hamper the goals. In the Rotorua catchment, we are assuming the individual farmer mission statements will align with the catchment Regional Policy Statement (RPS, BOPRC 2010) targets and the Oturoa Agreement. An EMS always looks to improve efficiency and effectiveness of the host farm. Because an EMS is a process that is designed for long-term review and planning, it allows the farm operators to address improvement over a manageable timeframe.

The possible and actual application of EMS or EMS-like templates in New Zealand agriculture for improving environmental sustainability was the subject of joint agricultural industry collaboration in 2002, leading to the formation of the Sustainable Agriculture Management Systems Network (SAMsn 2002). This group sought to provide a framework that adds value to the Sustainable Management Systems being developed by different sectors and individual farms. It encouraged a degree of commonality and completeness between those efforts on the basis of practical experience of cost-effective programmes. EMS development and adoption in New Zealand agriculture has progressed since 2002 with several reviews undertaken (Parminter 2004, Paterson 2009, Carruthers 2011, Paterson 2011 and Synge 2013). During this same period (2002-2013) the three major pastoral industries – sheep and beef, deer and dairy – have trialled and adapted EMS-like templates.

The Beef + Lamb New Zealand EMS is called the ***Land and Environment Planning Toolkit*** (LEP) which is also now used by the deer industry. The dairy industry's farm environmental management system is DairyNZ's ***Sustainable Milk Plan*** (SMP). The LEP and SMP have fundamental principles that align with most aspects of ISO 14001 (Paterson 2011 and Synge 2013) along with a particular focus on water quality. Both reflect EMS procedure and principles such as:

- Voluntary origins, ongoing life span with regular review
- Mission statement and targets that align catchment water quality goals with the farmers goals
- A process of risk assessment and prioritised scheduling of actions to address issues
- An ethic of continuous improvement
- Encourage and build farmer pride in environmental performance excellence
- Flexible, transparent and useful to the farmer and aligning with farmer goals
- Self-management with the potential for external audit.

The non-regulatory EMS format is also suitable for those outside of the farm (public and regulators) to have an opportunity to understand the pursuit of excellence going on within the farm via its EMS.

The DairyNZ Environment Management System

The DairyNZ Sustainable Milk Plan (SMP) was initially developed and used as a reporting tool to support farmers in the Waituna Catchment in 2010. It evolved from earlier work by the industry on an EMS model called the Farm Environment Action Plan (FEAP) (Bramley 2009). The FEAP model was a farm-scale EMS designed to provide individual farmers with

an action plan to implement industry good management practices that meet environmental, social and economic objectives of the farm business. The SMP version provides a simple process to help farmers assess the current status of their farming system and identify risks in the key areas of nutrient, effluent, waterways and land management, as well as water use efficiency. The plan complements other initiatives that are already in place, such as milk supply company improvement plans, fertiliser company nutrient budgets and a range of nutrient management plan recommendations.

Local rural professionals provide support throughout the SMP process, using a structured questionnaire for the assessment, and one on one support to formulate a farm specific good practice plan for continual improvement. Based on the initial assessment, an action plan can be implemented to improve environmental practices and meet environmental targets, sustainable dairy water accord commitments and regional compliance rules.

The SMP sets out the farmer's own time bound action plan that will accelerate the adoption of good environmental practice. The content and process for delivery of the Sustainable Milk Plan is described in more detail by Brocksopp, et al (2014) within these proceedings.

SMPs enable farmers to prioritise their existing and proposed activities into one simple document while confirming that industry expectations are being met. The rural professional continues to support the farmer to complete the actions, through providing analysis, advice and information. Where required, the rural professional will also act as a broker to ensure the right specialised advice is made available e.g. accredited effluent system designers.

Originally the SMP was designed as a voluntary process to facilitate farmers in their assessment and continual improvement of their environmental risks. However, as we move through regional limit-setting processes driven by the National Policy Statement for Fresh Water Management, there is an opportunity for the SMPs to be used more widely to meet the local regulatory requirements. For example the SMP is being adapted to meet the requirements of an Industry Certification System within the Hurunui-Waiau Regional Plan in Canterbury, where such systems are defined as:

> "...a system approved by Canterbury Regional Council that identifies actions to be undertaken to actively manage the use of natural resources in order to achieve high standards of environmental management and optimise production from all properties within an industry class" (Ecan 2013).

In the lower North Island, the dairy industry is working with the Manawatu-Wanganui Regional Council to integrate the SMP process into the One Plan consenting process for dairy farmers. The aim is to minimise the level of paper work and administration to meet both the milk supply company and regional council compliance and consent requirements. Other regions in New Zealand are just at the start of their regional collaborative stakeholder process to meet the requirements of the NPS. The DairyNZ SMP can feed into this NPS-driven policy development at the catchment level.

Beef + Lamb New Zealand's Environment Management System

Beef + Lamb New Zealand's form of EMS is known as the Land and Environment Plan (LEP) and was refreshed in 2012 with supporting website information (Beef + Lamb New Zealand 2012). The LEP is a tool that guides farmers through a recorded assessment of a farm's land environmental assets and issues and helps farmers to develop a written plan outlining how those issues will be managed. It involves a stock-take of land, soil and water resources, an assessment of production opportunities and environmental risks and the

development of a plan showing what actions are going to be undertaken, where they being targeted and when they will be implemented.

In effect it's an environment management system that asks and records the farmer's response to three questions:

1. What are the good environmental things you have done? This results in a list of environmental services.
2. What else could you do?
3. Where do you want to go with it? This enables the development of a plan to capture opportunities and address any environmental challenges.

There are three levels to the LEP programme. Level 1 is designed to raise awareness and should be relatively easy for most sheep, beef and deer farmers to complete. Level 2 is useful in understanding the farm in more detail by breaking it down into land management units based on physical land properties as well as management components such as proximity to the main woolshed. Level 2 is also valuable in advancing soil and nutrient management aspects of the farm. Level 3 requires the inclusion of detailed resource information and allows for a comprehensive analysis of the farm. Level 3 assembles an inventory of the farms physical resources, lists the strengths and limitations and develops an understanding of how the farm system and management decisions impact on the farms resources and the wider environment.

Beef + Lamb New Zealand are actively promoting Land and Environment Plans and have a target of approximately 60 Level 1 workshops to deliver by 30 Sept 2014. They will be conducted by more than 25 trained facilitators from across New Zealand. Each workshop will have between 10 and 15 farmers attending with the majority finishing their Level 1 Land and Environment Plan during the workshop. Progression to higher levels will be rolled out from October 2014.

The Level 3 is regarded as the most suitable level for environmental reporting purposes (Beef + Lamb New Zealand 2012, Synge et al 2013) and contains features most compatible with standard EMS.

Role of the EMS Dashboard

The purpose of the EMS Dashboard is to monitor the continuous gains of farm-based EMS programmes by progressively displaying Key Performance Indicators (KPI's) that are generated with the EMS programmes and populated into the EMS Dashboard. Figure 3 below illustrates the intermediary position of the EMS Dashboard© and the conduit lines for co-ordination of water quality targets and transfer of information relating to KPI reporting.

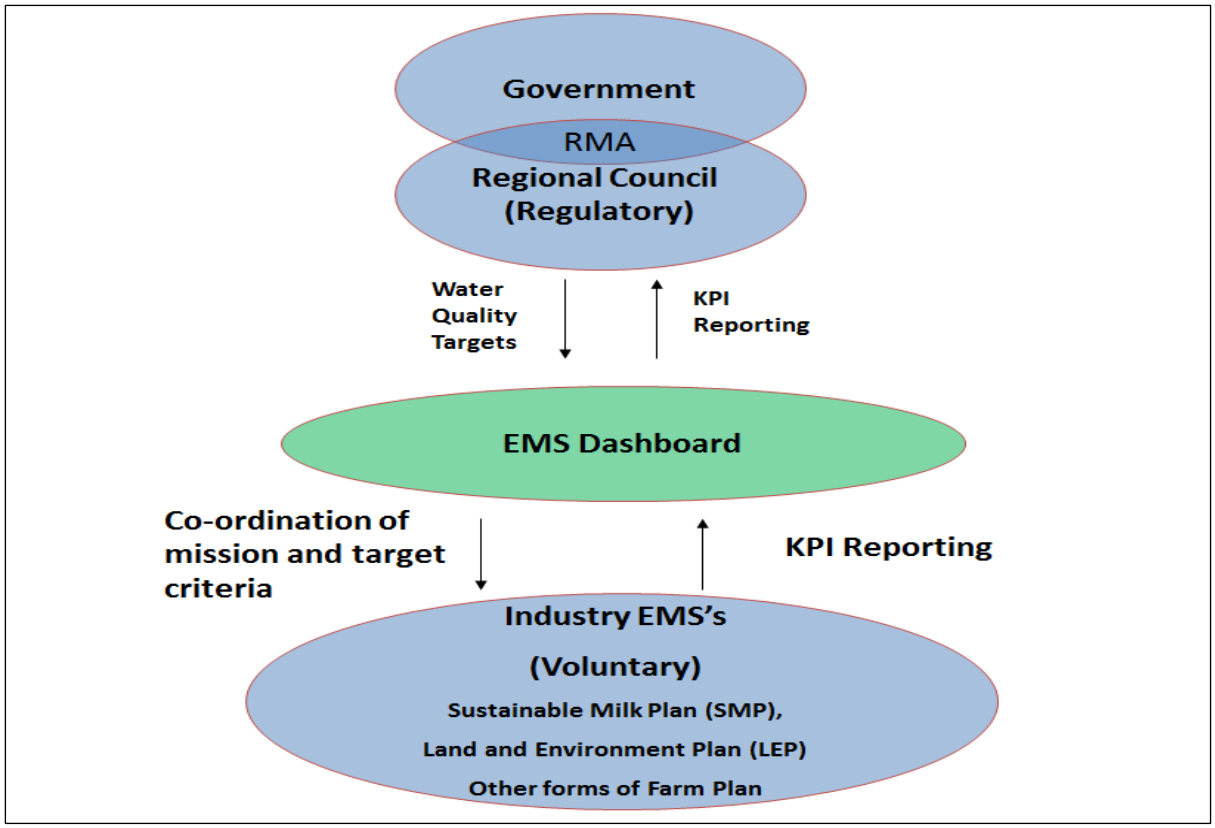

Figure 3. Intermediary position of the EMS Dashboard

Reporting the Key Performance Indicators

The EMS Dashboard aims to simply link to, and display key performance indicators (KPIs) from the two key industry's operating EMS's in the Rotorua catchment. As the primary focus is on-farm performance as it pertains to water quality and water quality is primarily exacerbated by nitrogen and phosphorus loss, there are two fundamental areas of the dashboard designed to reflect progress in these areas:

- Reduction of nitrogen leaching over time indicated by a **Nitrogen Leaching Graph** that is populated regularly by result data directly from Overseer updates
- Reduction in phosphorus loss via an **Environmental Practice** bar graph populated by results derived from the EMS Dashboards underlying environmental practice calculator

The EMS Dashboard is able to be delivered from the farmer to any person or agency **without** the farm's EMS document attached to it. The dashboard in effect is a one page summary of the farm's environmental performance data. This is an important attribute as farm industry owned EMS's are **non-regulatory** facilities and the farmer may wish to use his EMS Dashboard to report KPI aspects of the farm to actually serve a **regulatory** purpose at some point.

To enable this independent reporting function the EMS Dashboard reporting page contains essential title data about the property owner, property address, some key environmental measures relating to existing consents and a small location and farm block layout map as shown in figure 4 below .

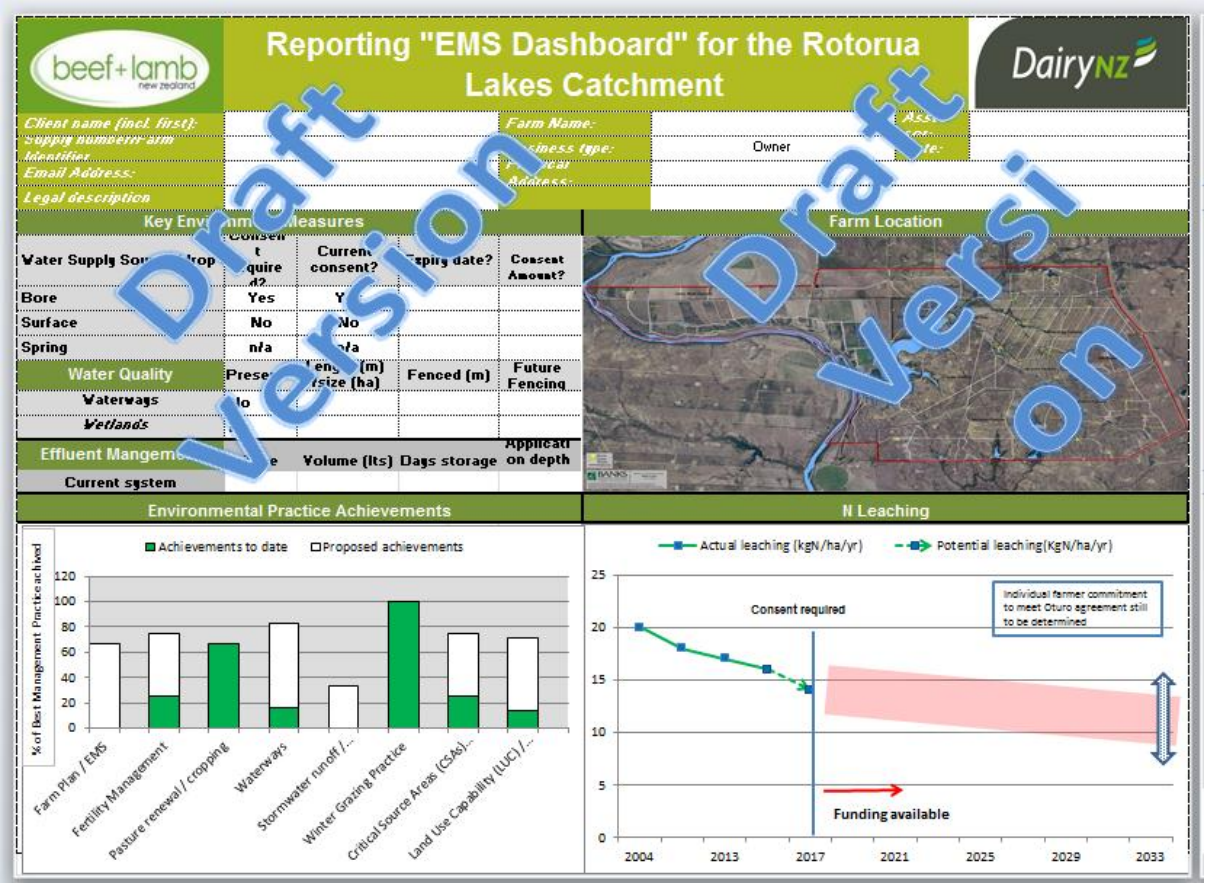

Figure 4 – Draft version of the reporting or front page of the EMS Dashboard

In the Lake Rotorua context, farmers will in the future be required implement nitrogen reduction activities to meet the farm's nutrient discharge allowance commitments by 2032 (figure 1) , The dashboard will display the progress from past assessments through to the current position, as well as one or more future projections based around proposed N-loss reduction mitigation actions.

N-Loss Display on the EMS Dashboard - a Nitrogen Leaching Graph

Figure 5 below (a detail section of Figure 4 above) shows progress to date (actual leaching) proposed reductions through agreed farm change (potential leaching) and a 'pink zone' where the farms future N-loss mitigation predictions can be plotted. Progress in this zone towards the actual target (not defined in this example) may be displayed as a series of steps as each N-loss mitigation prediction is reported and later confirmed. This would be displayed as an extension of the "actual leaching" line, as a N loss is confirmed through a retrospective nutrient budget reflecting confirmed farm system and input changes.

In this example, N loss reductions have been achieved since 2004 (20 kgN/ha/yr) and the most recent predicted step (dotted green line) is illustrated as a reduction from 16kg to 14kgN/ha/yr by 2017.

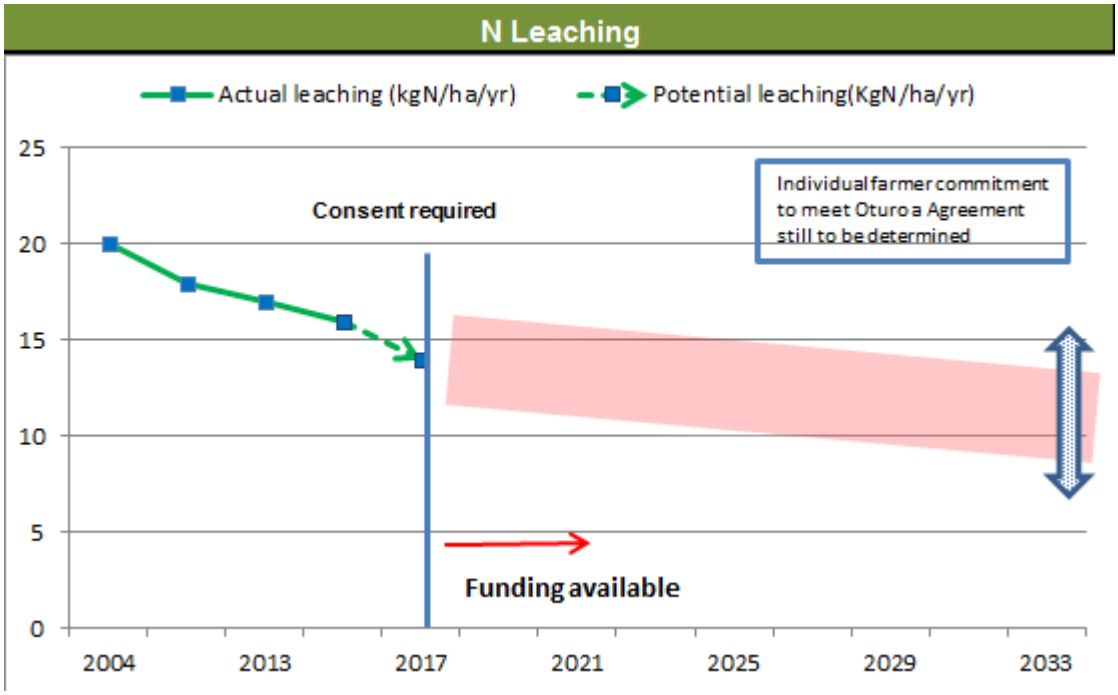

Figure 5. Detail of the N Leaching display section of the EMS dashboard

P-Loss Display on the EMS Dashboard an Environmental Practice Achievements bar graph

While the EMS Dashboard simply accepts a N-loss calculation from Overseer as described above, it is recognised that simply adopting a P-loss figure from Overseer would not adequately reflect the reality of P-loss. Overseer assumes "best practice" on the ground but in reality there are often occasional practices that result in large P-loss events that are not captured by the Overseer model. Considerable improvement in consistent good management practice needs to be encouraged and the purpose of the P-loss display on the dashboard and its underlying scoring system is to aid and encourage "continuous improvement" in this area.

Improvements in Good Management Practices that mostly impinge on the farms phosphorus loss performance, that show progress over time is illustrated by figure 6 below. In this example of the concept, eight possible areas are illustrated and scored on the basis of how effective the farmer's practices are in each of these P-loss risk attribute areas. While this example shows 8 areas to illustrate the concept, this area and its scoring system is still being developed and the final version may have more or less areas of measurable good management practice achievement. This development of the matrix will take into account current industry work looking at on-farm practice, past research in this area and locally recognised practice change.

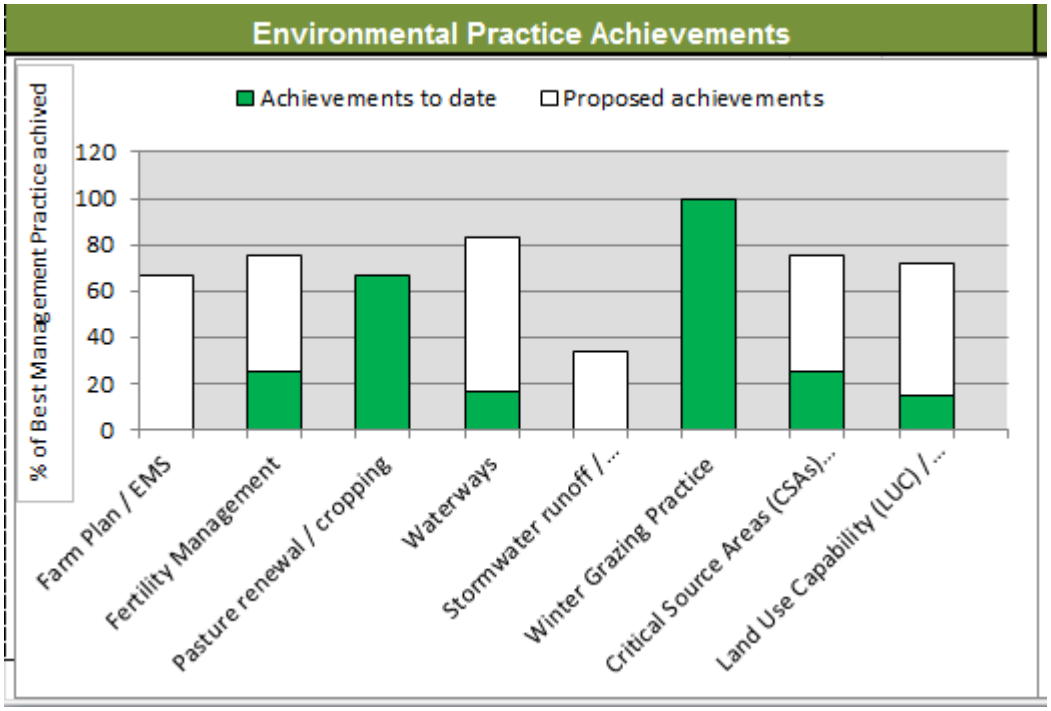

Figure 6. Detail of the Environmental Practice Achievements display section of the EMS dashboard.

The Good Management Practice (GMP) scoring calculator

Each farm will be assessed as to their current status of achievement of known environment practices and processes in each of the categories within an LEP or a SMP. Future practice change will also be noted to demonstrate continual improvements in the areas assessed. Once completed, these proposed achievements will be confirmed, with the dashboard being updated (figure 6)

Each category will contain known environmental practices that have specific criteria that need to be met to be achieved (e.g. winter crop on a slope is grazed from the top of the slope, down). Each category will have a different number of possible environmental practice achievements according to recognised practices that are available to the farmer, as the knowledge and understanding around these practices changes, this will be updated. A 100% achievement of these, would indicate that the farmer is currently undertaking all of the known environmental practices available to them in the category. In some cases, a farmer may not be able to achieve 100% as not all practices will be able to be achieved by all farmers. For example, a feed pad may not be a viable option for all beef farmers. Figure 6 demonstrates that for winter grazing practices – the possible score is 7 and the farmer has achieved 3 of the 7 possible measures of best practice and another 4 scheduled in his 'to do' list. The definition of 'Good Management Practice' is likely to move as science and understanding evolves. The Dashboard will be adapted to accommodate this and farmers will be supported as this occurs.

The EMS Dashboard concept currently is displayed and reported using a spreadsheet function. However, the use of other electronic platforms will be considered to aid use, compatibility and reporting requirements.

Conclusions

The concept of The EMS Dashboard may be developed in Rotorua to supply a suitable vehicle for reporting farmer progress towards eventually meeting the required nutrient-loss targets (by 2032) for the sustained improvement of water quality in Lake Rotorua. The dashboard concept provides a visual representation for farmers to assess their progress towards in water quality due to on-farm practice change. It may also provide a bridge between non-regulatory, industry-owned environment management systems and the need for reporting of a farm's environmental performance to a regulatory authority.

In the Lake Rotorua catchment, the EMS Dashboard has the potential to serve the monitoring and reporting needs of the proposed Resource Consent requirements by linking with current industry EMS templates (SMP and LEP) to co-ordinate target-setting and achievement at farm level. It contains farm identity and location details, together with key performance indicators that are scored and displayed in simple graphics that will track improvements over time. The display page is underpinned by a scoring system for good management practices that is still being developed.

Increased reporting and monitoring requirements for the Lake Rotorua catchment farmers is inevitable and utilising the existing industry tools to help meet these pending accountability requirements, will hopefully ensure that more farmers are positively engaged and able to make informed business decisions.

The EMS Dashboard has the potential to be useful in other catchments around New Zealand where farmers are engaged in farming within catchment limits for nutrient losses. Also in the future it could have the potential to become a reporting tool for farmers and market assurances related to sustainability of farming practices.

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