

An aerial photograph of a lush green field, likely a pasture, with numerous sheep scattered across it. Several people are also visible, some standing and some moving, possibly herding the sheep. The scene is captured from a high angle, showing the layout of the field and the distribution of the animals and people.

Overseer the story of a New Zealand decision support tool supporting sustainable farming practice

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Aotearoa – New Zealand

26.8M hectares

Mountains cover over half the south island area

FARMING



Area of farming land 2016

14.0	million hectares, of which:		
7.7	in grassland	1.6	in plantations
2.3	in tussock or danthonia	2.3	in other land or holdings

Farm holdings 2016

In 2016, there were 55,473 holdings, irrespective of size or location, with an average area of 252 hectares. Approximately, 93% of commercial sheep and beef farms are owner-operated.

Source: Source: Beef + Lamb New Zealand Economic Service, Sheep & Beef Farm Survey, Statistics New Zealand, 2016 Agricultural Production Survey

Farms by farm type 2012

	NUMBER OF FARMS ¹	AGRICULTURAL AREA (000 HA)
Sheep & Beef Farming	25,113	9,328
Dairying	12,150	2,415
Cropping	3,297	284
Deer Farming	1,128	287
Pig Farming	225	11
Poultry	135	3
Total	42,048	12,327
Other (including forestry)	16,020	2,067
TOTAL ALL FARM TYPES	58,068	14,394

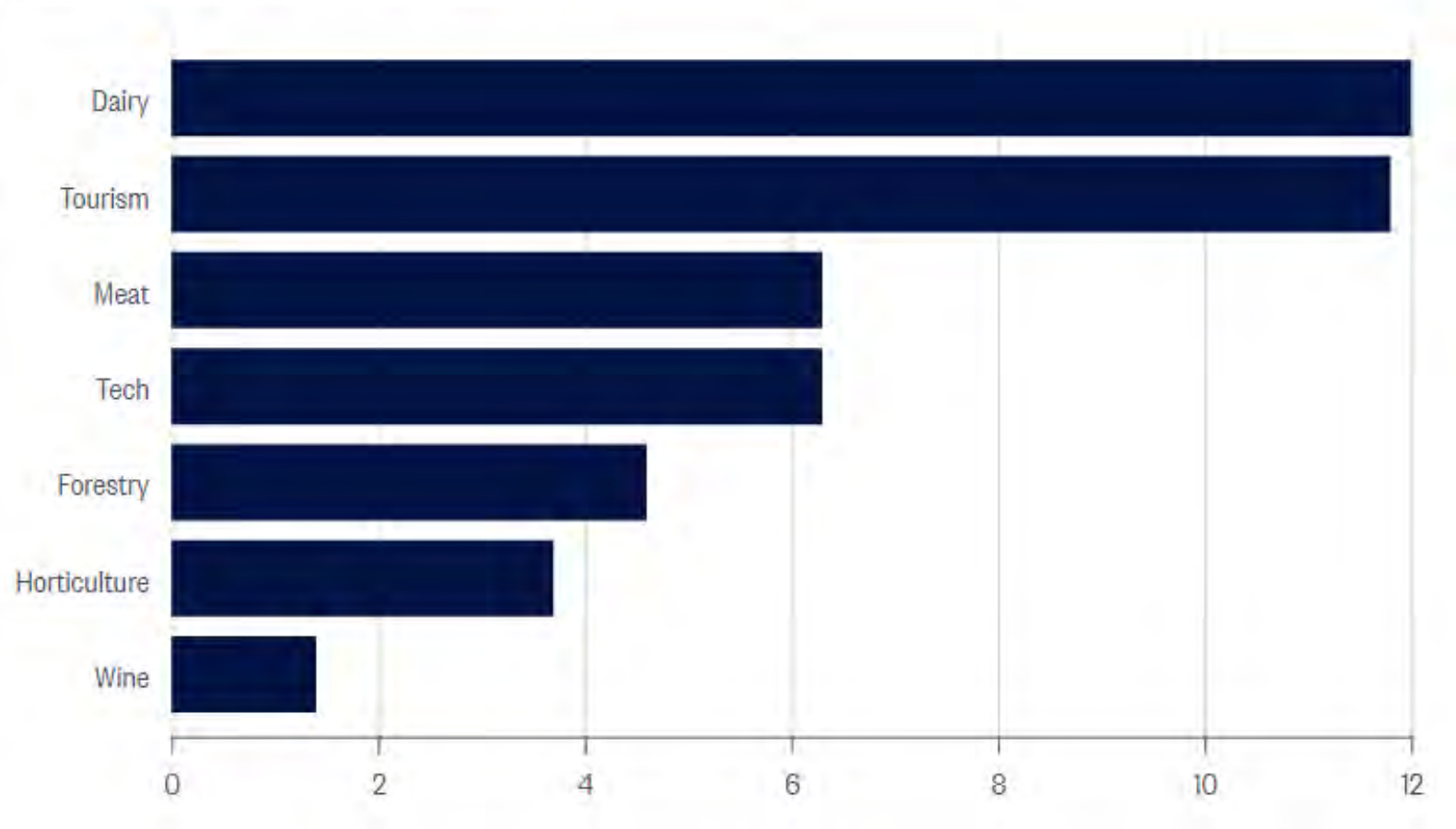
¹ Includes non-commercial smallholding farms.

Source: Statistics New Zealand, 2012 Agricultural Census

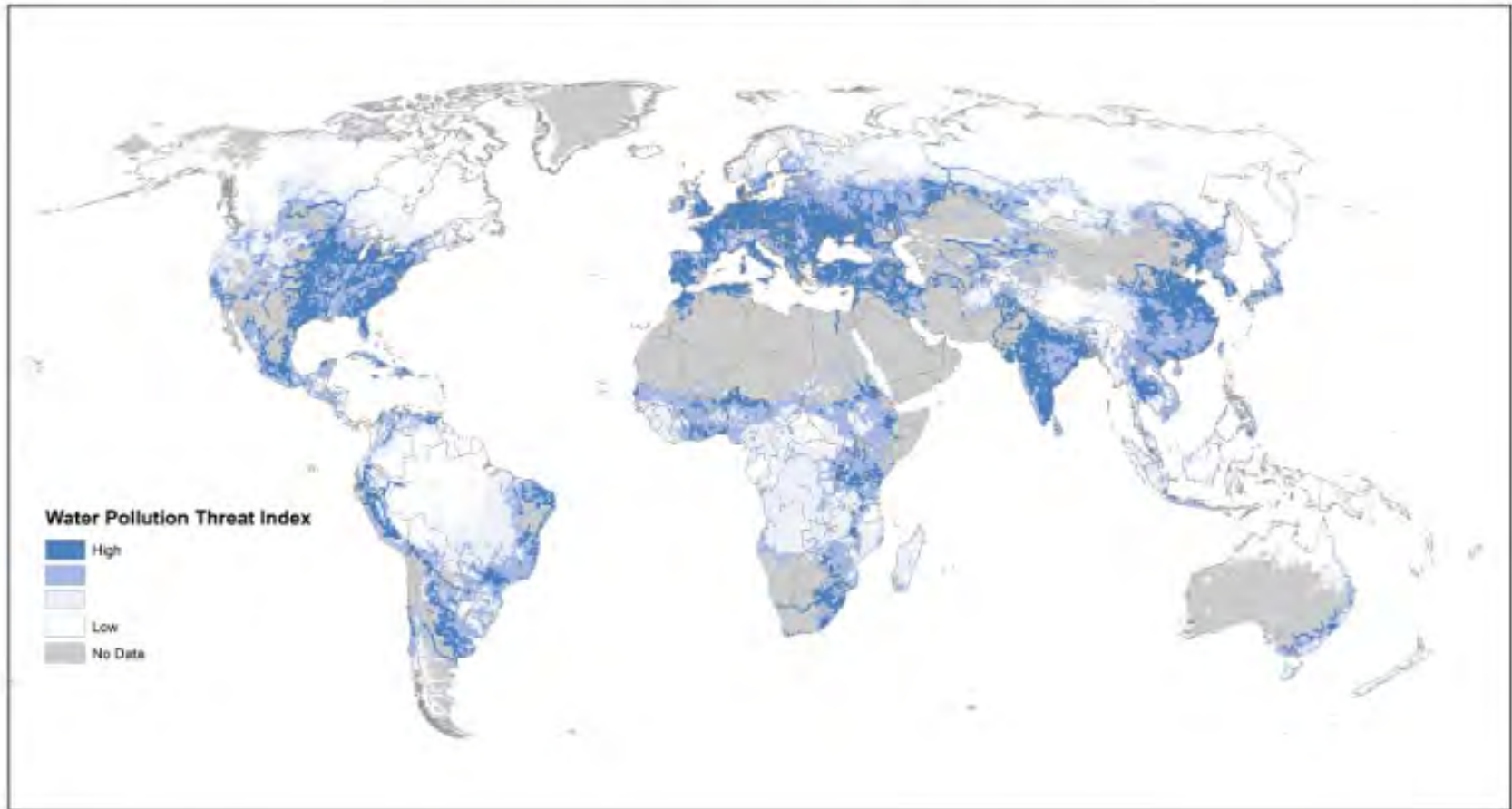
NZ Exports

Year to June 2015, NZD billions

Provider: New Zealand Institute of Economic Research (NZIER)



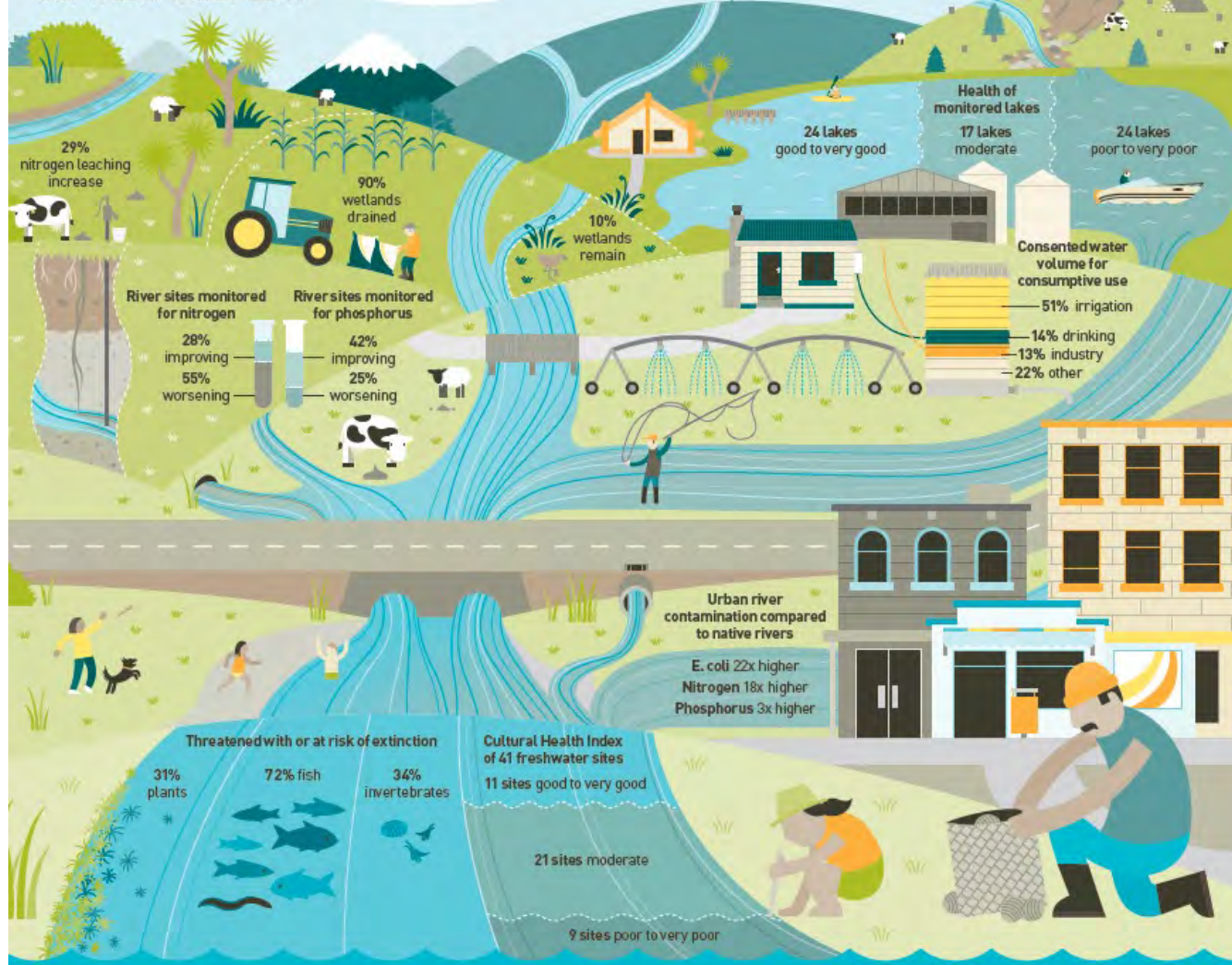
Global distribution of water pollution hazard, 2000



Note: Map includes the effects of nutrient and pesticide loading, mercury deposition, salinisation, acidification, and sediment and organic loading.
Source: Sadoff et al. (2015); based on data from Vörösmarty et al. (2010).

New Zealand's fresh water at a glance

Our fresh water 2017



Hydro and geothermal power make up 80% of electricity in NZ

Tourism \$15.9 billion, or 6.1% of GDP

Agriculture \$10.6 billion, or 5% of GDP

The reliable supply of good **water** is an important economic advantage for **New Zealand**, but its quality and availability is declining

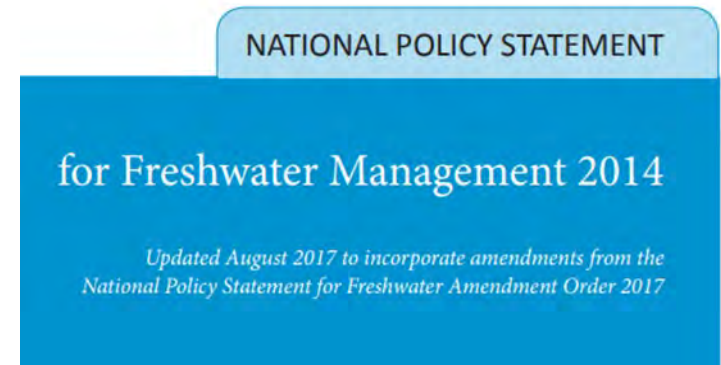
An aerial photograph showing a wide, light-colored river or stream flowing through a dense, green forest. The river has a braided pattern with many sandbars and islands. A small white airplane with blue and red markings is flying over the river. The text "Environmental Regulation in Aotearoa New Zealand" is overlaid in white.

Environmental Regulation in Aotearoa New Zealand

Water quality management

Putting responsibility for compliance on losses not controlling input

- Stimulates innovation (for long-term prosperity of industry)
- Allows tailored approaches in different environments



Determining diffuse nutrient losses from a farm is hard

- Especially when your trying to capture the impact of different management practices.
- Level of specificity – where do you draw the line?

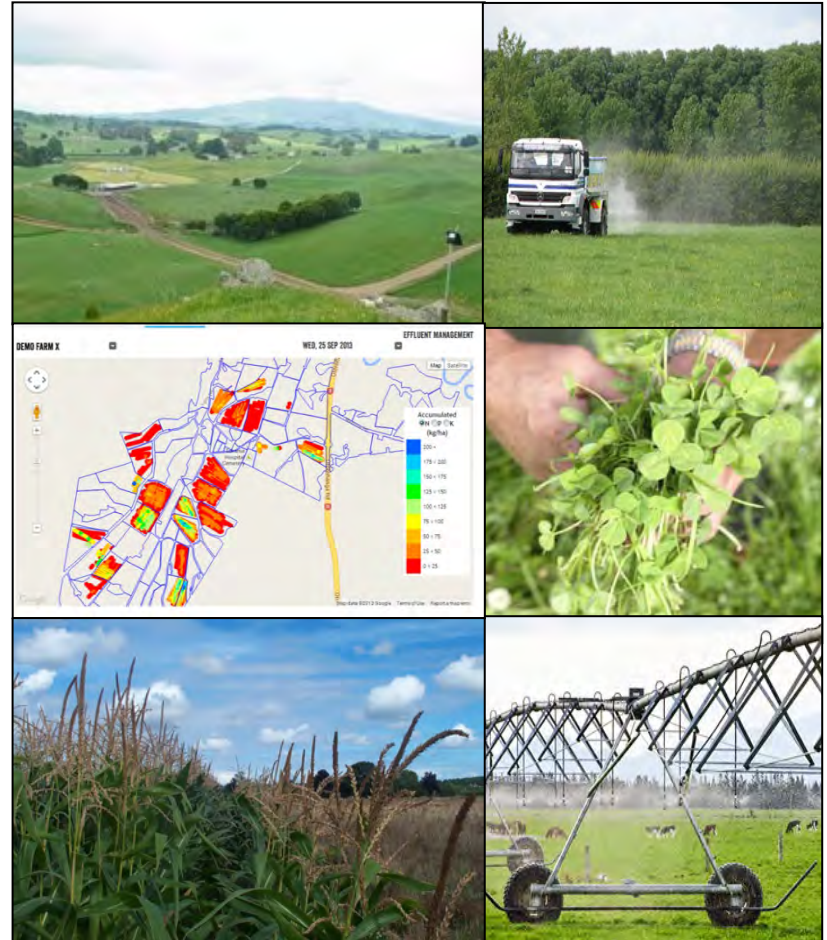
Overseer nutrient model

- **Developed by AgResearch over 20 years**
 - Initially block scale – expanded to farm scale to consider nutrient transfers within the farm.
 - Includes budgets for 7 farm nutrients and models GHG emissions
 - Modelling approach - assess the impact of different management practices to inform farm nutrient management planning
 - Uses a long-term climate profile to enable relative change assessment between management practices.
 - Uses only data easily available to farmer (or adviser) or defaults
 - Based on limited calibration data from NZ field trials



Overseer analyses farm practices

- Captures most farm types and practices in New Zealand
- How efficiently nutrients are used (budget)
- Levels of nutrients needed to maintain soil fertility to existing production levels
- Expected nutrient (N & P) and greenhouse gas losses into the environment
- Likely impacts of changes in management practices or farm systems/land use.



Advantages - why use Overseer to control diffuse N-loss?

- It provides assessment of individual farms
- Government ownership stake and established industry use
- It enables aggregated analysis to set limits
- It supports tailored rules to meet environmental needs directly
- It helps farmers meet the rules by identifying the impact of different possible approaches to drive sustainable change



Early challenges in using Overseer

1. Rules were set that couldn't deal with changing numbers as the model evolved
2. High costs of auditing farm analyses to ensure no one is “gaming” the system
3. Conflict over prioritising model development – concern over different sectors being “favoured” at the expense of others
4. A poor software approach created a fragmented ecosystem making it difficult to monitor change

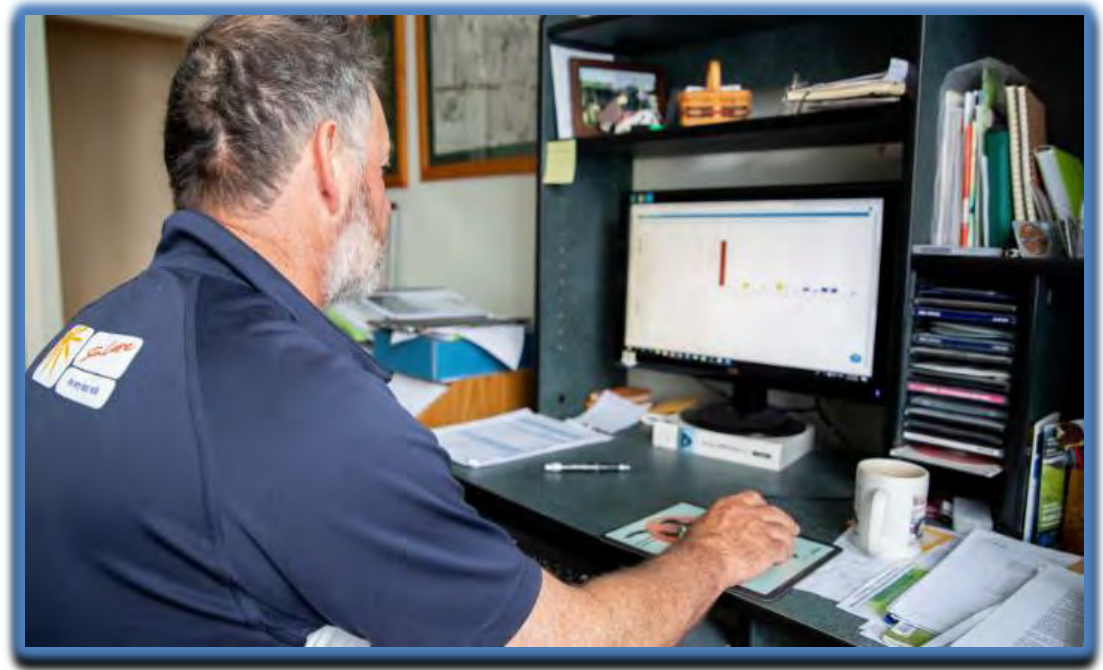
Leading to loss of confidence in the model.

Overseer entity formed

- ✓ Corporate Governance approach with non-profit constitution
- ✓ Direct engagement with regulators and farmers

Business Plan

New decision support software that supports compliance



New focus – farmer as the user

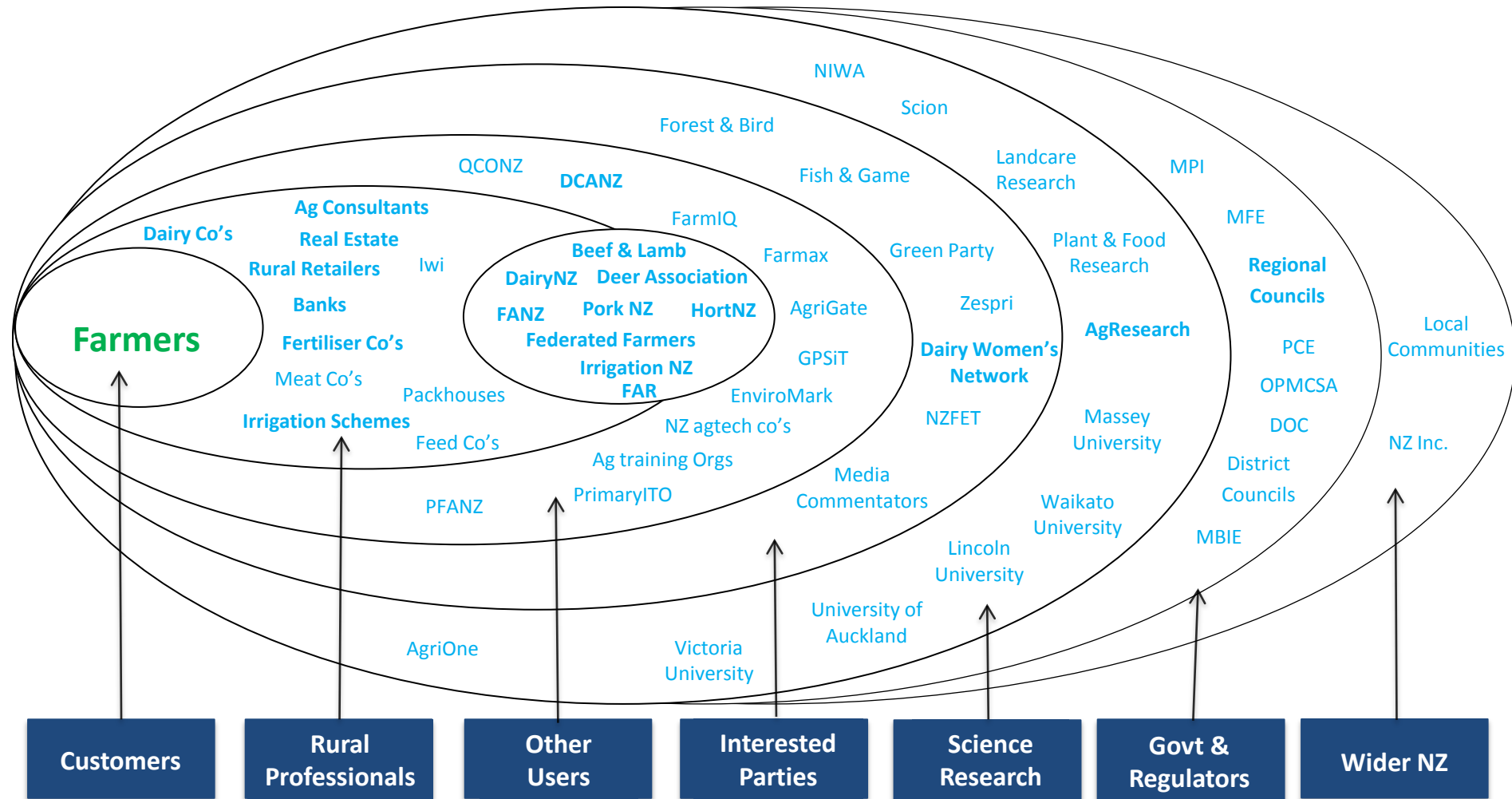
- Increasing regulation and a need to change – but HOW?
- **Complete overhaul of the software and services to support farmer use**

Approach

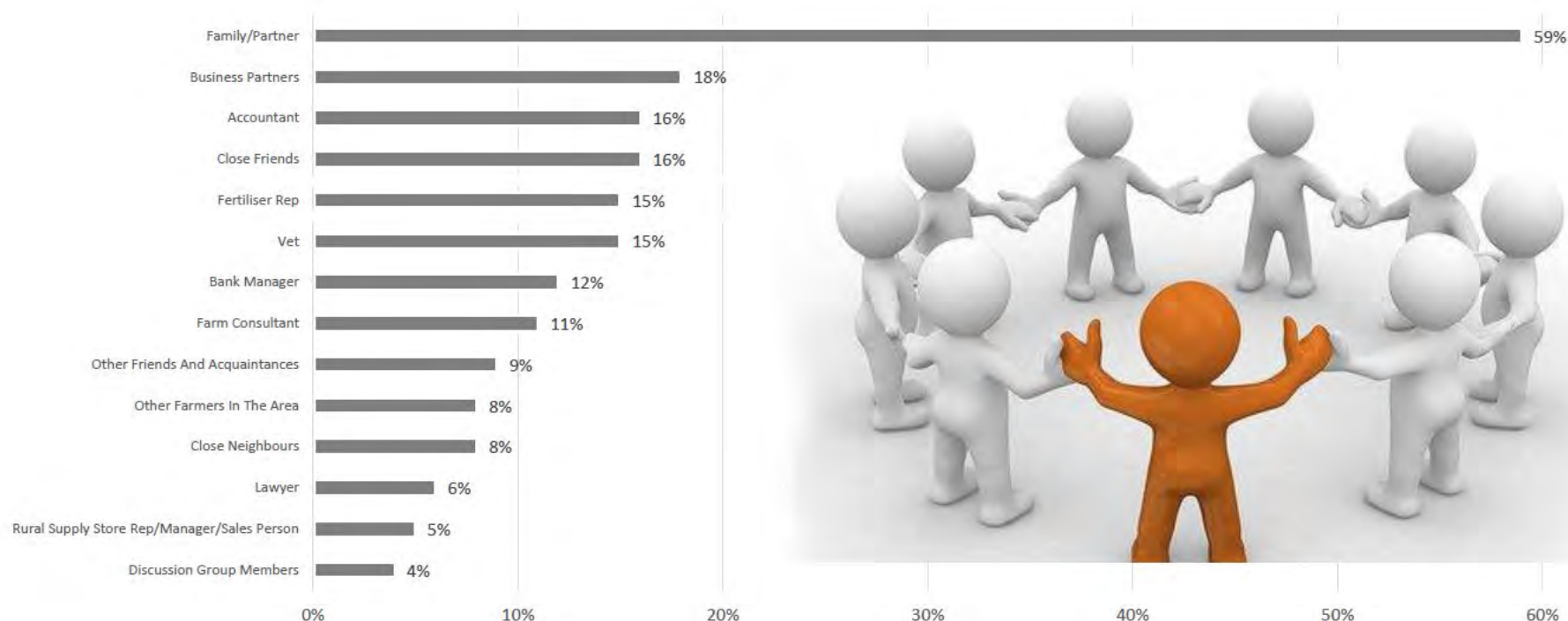
- ✓ Focus on supporting Farmers to engage with nutrient budgeting
- ✓ Direct engagement with regulators to improve use in regulation
- ✓ Develop software to maximize the insights derived by the modelling (e.g. benchmarking)
- ✓ Develop partnerships with certification programs – value add opportunities for products



Overseer's Customers & Stakeholders



Farmers inner circle – the influencers



Source: Rural Marketing Conference 2018

OverseerFM – presents the farm as its understood by the farmer

BLOCKS

CLIMATE

SOIL

DRAINAGE

PASTURE/CROPS

ANIMALS

STRUCTURES/EFFLUENT

SUPPLEMENTS

FERTILISER

IRRIGATION

GHG

OVERVIEW

Overview

Farm Details

Block Details

Compare Blocks

Animal Reports

GHG

Comments (1)

Map

Satellite

Hills - 21.5 N/ha

Tree Block - 2 N/ha

lock - 2 N/ha

River flats - 28.1 N/ha

Google

Imagery ©2019 CNES / Airbus, Maxar Technologies, Planet.com

Terms of Use

Report a map error

SELECT A BLOCK

River flats

N loss: 2143

N loss/ha: 28.1

P loss: 96

P loss/ha: 1.2

TYPE	AREA	RAINFALL	TEMP.	PET
Pasture	76.3	ha	1124	mm/yr
			10.4	C
				780
				mm/yr

PASTURE GROWTH	UTILISATION	INTAKE
11710	kg DM/ha/yr	70
		%
		8197
		kg DM/ha/yr

4.19 rsu

4.23 rsu

6.26 rsu

Ryegrass/white clover

APPLICATIONS (KG/HA)	N	P	K	S	CA	MG	NA	LIME
Maintenance	0	13	17	2	29	13	0	126
Fertiliser applied	126	18	18	38	46	6		0.9
Irrigation	4.39		2.84	4.39	15.93	3.78	16.48	

Is this a good description of my farm?



Block 5
Crop

YEAR 1

APR

MAY

JUN

JUL

AUG

SEP

OCT

NOV

DEC

JAN

FEB

MAR

REPORTING YEAR

APR

MAY

JUN

JUL

AUG

SEP

OCT

NOV

DEC

JAN

FEB

MAR



Oats and rye

Oats (autumn)

Potato (long)

[EDIT CROPS](#)



carrots
Crop

YEAR 1

JAN

FEB

MAR

APR

MAY

JUN

JUL

AUG

SEP

OCT

NOV

DEC

REPORTING YEAR

JAN

FEB

MAR

APR

MAY

JUN

JUL

AUG

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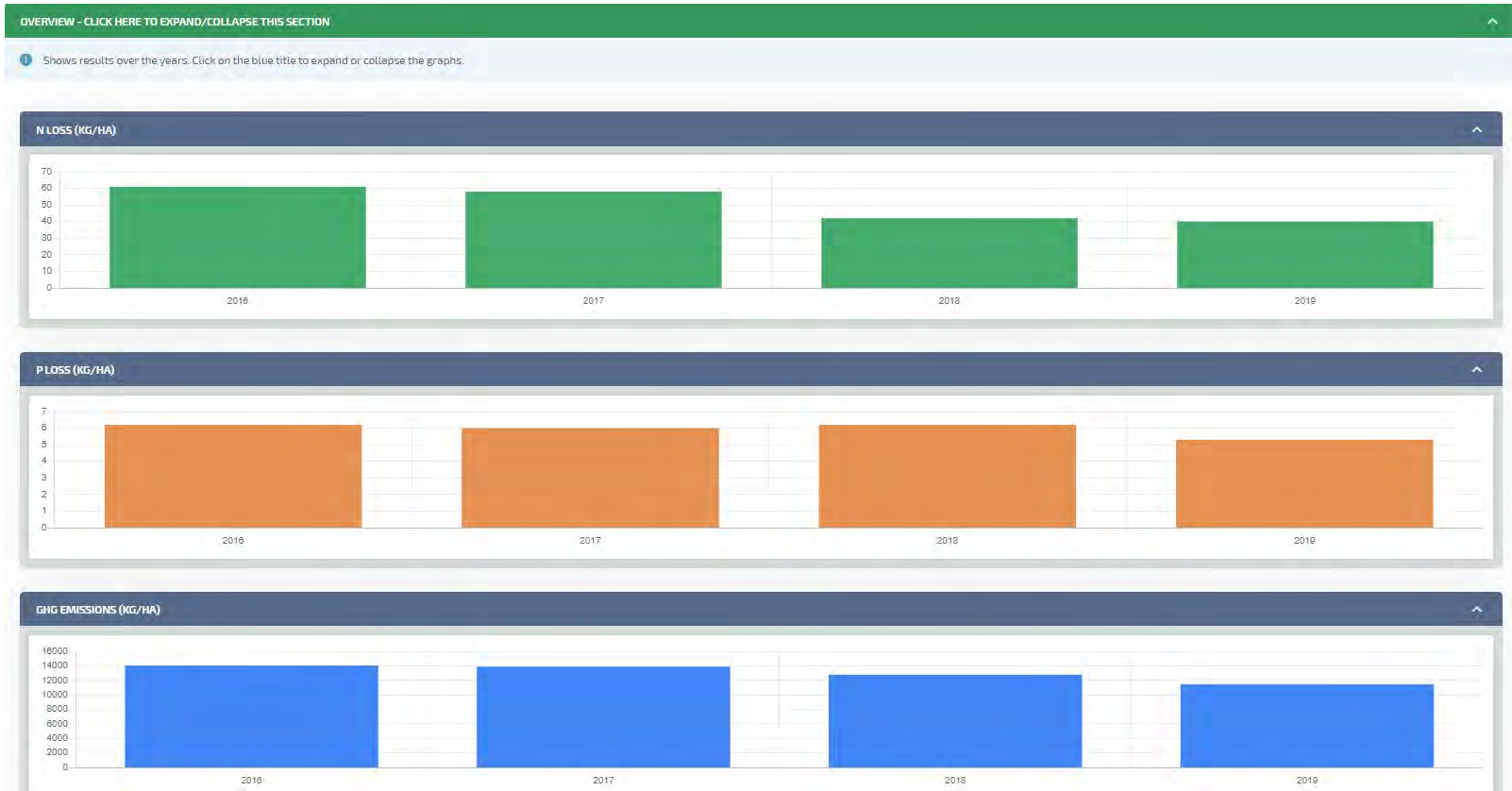
Potato (short)

Peas (green)

Wheat (autumn)

[EDIT CROPS](#)

How am I doing - trends over time – N, P, GHG?



Year ending 2018

CREATED
31 Jul, 2018, 4:29PM

MODIFIED
30 Jan, 2019, 2:09PM

VISIBILITY
Farm

v6.3.2: N/ha: 42 P/ha: 6.2 GHG/ha: 12775

SYNCHED 1 ATTENTION PUBLISHED V6.3.1: N/HA: 41 GHG/HA: 12935

SHOW PUBLICATIONS AUDIT LOG COMMENTS (0) PUBLISH COPY

Year ending 2017

CREATED
31 Jul, 2018, 4:13PM

MODIFIED
10 Jan, 2019, 3:09PM

VISIBILITY
Farm

v6.3.2: N/ha: 58 P/ha: 6 GHG/ha: 13885

SYNCHED 2 ATTENTION PUBLISHED V6.3.1: N/HA: 57 GHG/HA: 14345

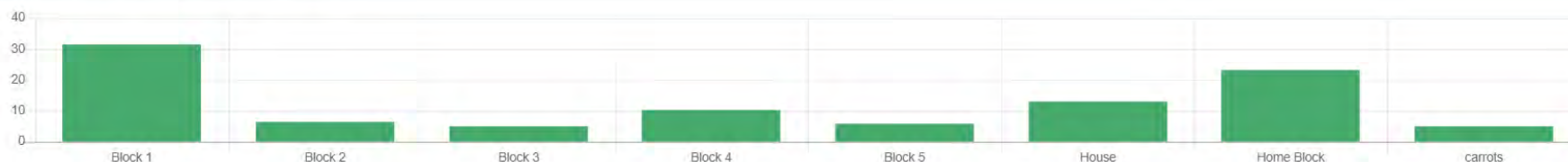
SHOW PUBLICATIONS AUDIT LOG COMMENTS (0) PUBLISH COPY

Where are my hotspots?

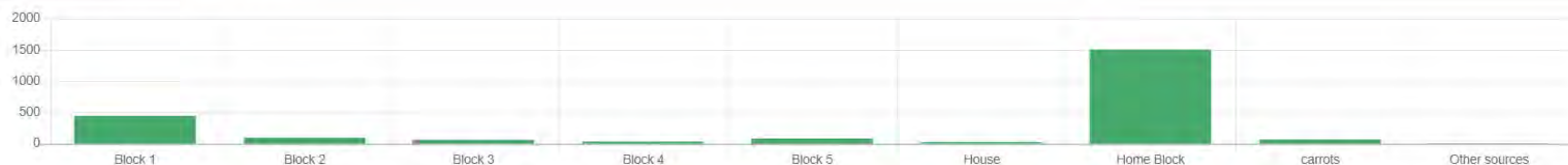
Overview Farm Details Block Details Compare Blocks Animal Reports GHG Comments (0)

! You can print this page by selecting print under the browser menu. For PDF, change the destination to PDF. Portrait is recommended for this report.

N LOSS FROM ROOT ZONE PER HECTARE (KG/HA)



TOTAL N LOSS FROM ROOT ZONE (KG)



LOSS FROM ROOT ZONE	BLOCKS (KG/YR)	OTHER SOURCES (KG/YR)	TOTAL FARM (KG/YR)	REMOVED BY WETLANDS (KG/YR)	FARM (KG/YR)
Nitrogen	2,323	8	2,331	0	2,331
Phosphorous	8	13			21

How does it look across the year?

RESULTS BY SOIL AND IRRIGATION - BLOCK 1

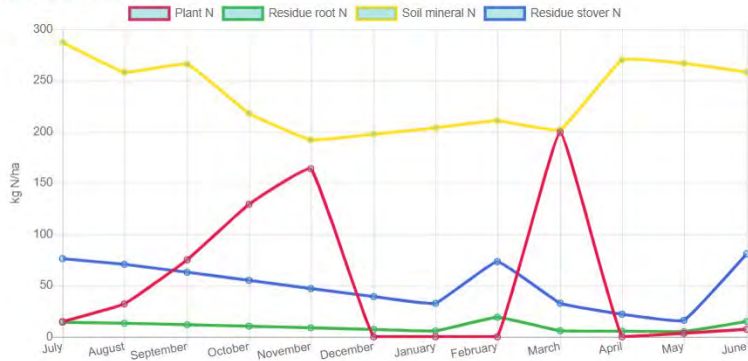
SOIL	IRRIGATOR	PERCENTAGE	AREA	TOTAL LOST	NITROGEN			PHOSPHOROUS		P LOSS CATEGORIES		
					LOST	DRAINAGE	SURPLUS	ADDED	TOTAL LOST	LOST	SOIL	FERTILISER
Temp_4a.1	Pivot 1	36%	5.1 ha	234 kg	46 kg/ha	35.9 ppm	-62 kg/ha	146 kg/ha	0 kg	0 kg/ha	N/A	N/A
	No irrigation	15%	2.1 ha	77 kg	37 kg/ha	37.6 ppm	-63 kg/ha	146 kg/ha	0 kg	0 kg/ha	N/A	N/A
Temp_3a.1	Pivot 1	21%	3.0 ha	138 kg	46 kg/ha	35.9 ppm	-62 kg/ha	146 kg/ha	0 kg	0 kg/ha	N/A	N/A
	No irrigation	9%	1.3 ha	48 kg	37 kg/ha	37.5 ppm	-63 kg/ha	146 kg/ha	0 kg	0 kg/ha	N/A	N/A
Temp_2a.1	Pivot 1	14%	2.0 ha	91 kg	45 kg/ha	36.4 ppm	-62 kg/ha	146 kg/ha	0 kg	0 kg/ha	N/A	N/A
	No irrigation	5%	0.7 ha	26 kg	37 kg/ha	37.9 ppm	-63 kg/ha	146 kg/ha	0 kg	0 kg/ha	N/A	N/A

SOIL	IRRIGATOR	PERCENTAGE	TO 60CM				TO 150CM			
			DRAINAGE	RUNOFF	FIELD CAPACITY	WILTING POINT	SATURATION	PAW	FIELD CAPACITY	WILTING POINT
Temp_4a.1	Pivot 1	36%	128 mm	0 mm	192 mm	90 mm	255 mm	102 mm	318 mm	117 mm
	No irrigation	15%	98 mm	0 mm	192 mm	90 mm	255 mm	102 mm	318 mm	117 mm
Temp_3a.1	Pivot 1	21%	128 mm	0 mm	189 mm	87 mm	258 mm	102 mm	396 mm	150 mm
	No irrigation	9%	98 mm	0 mm	189 mm	87 mm	258 mm	102 mm	396 mm	150 mm
Temp_2a.1	Pivot 1	14%	125 mm	0 mm	195 mm	93 mm	258 mm	102 mm	294 mm	129 mm
	No irrigation	5%	97 mm	0 mm	195 mm	93 mm	258 mm	102 mm	294 mm	129 mm

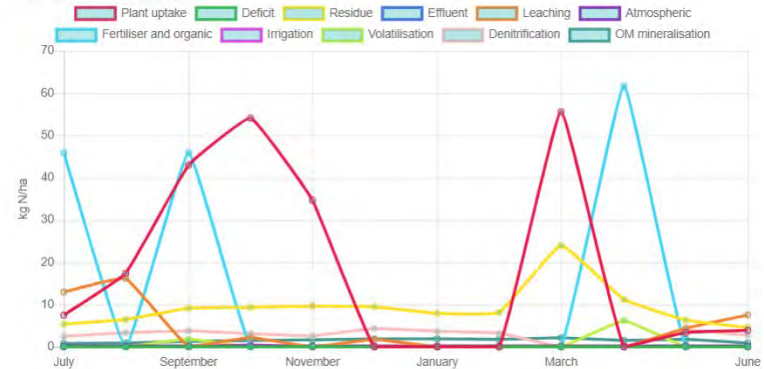
N POOL GRAPHS - BLOCK 1 (BACKGROUND ONLY)

These are the N pool and change in N pool graphs for the background model. You can click on each of the labels (eg. Plant uptake label) to add or remove it from the graph.

Nitrogen pools



Change in nitrogen pools



Supporting compliance reporting

PUBLISH ANALYSIS - YEAR ENDING 2015 (V2)

*

PUBLISH TO

Waikato Regional Council

*

STATUS

Submitted

PUBLISHEE'S FARM IDENTIFIER

638299



The identifier for this farm as defined by the organisation being published to

PUBLISHEE'S REFERENCE

216321361236



The reference for this publication as defined by the organisation being published to



Add consent applicant's name

*

CONSENT APPLICANT'S NAME

John Smith

COMMENTS

2015 Farm Plan compliance report



Our Rural Professional workshops

Collaborative model development

The screenshot shows the Loomio web interface. At the top, the browser address bar displays the URL: <https://www.loomio.org/d/x2zsMmcl/adding-urease-inhibitors-to-overseer>. The Loomio logo is centered in the header. On the left, a sidebar lists navigation options: Decisions, Recent threads, Unread threads (0), Muted threads, New thread, Organizations, Overseer science discussion (selected), Public groups, and New organization. The main content area features a header image of silhouetted trees at sunset. Below this, a discussion thread titled 'Adding urease inhibitors to Overseer' is shown, created by Antony Williams 7 months ago, with 102 views. The thread text explains the purpose of the discussion and invites comments. On the right, a 'Decision tools' panel lists various options: Proposal, Check, Poll, Dot vote, Score poll, Time poll, and Ranked choice, each with a brief description.

← → ↺ 🏠 🔒 <https://www.loomio.org/d/x2zsMmcl/adding-urease-inhibitors-to-overseer> ☆ S U A

☰

🗨️ Decisions

🗨️ Recent threads

📄 Unread threads (0)

🔇 Muted threads

+ New thread

Organizations

🗨️ Overseer science discussion

🌐 Public groups

+ New organization

Overseer science discussion

Adding urease inhibitors to Overseer

AW Antony Williams · 7 months ago · 🌐 Public · Seen by 102

This discussion thread has been created to discuss the attached plan for adding urease inhibitors to Overseer.

We have invited experts or companies known to be involved in the supply of urease inhibitors, or have undertaken research or have expertise in the use of urease inhibitors (the group). Please advise of additional people who should be part of this group.

We are asking that you review this plan and add any comments to this discussion, particularly any that relate to errors or additional information that would materially change the implementation. Others in the group can see these comments and additional responses added so that a consensus is arrived before voting on the plan.

If you are not an invited reviewer but have comments that may materially affect the implementation plan, please leave a comment.

Once you are ready to vote please review the proposal on the right of this discussion and vote accordingly.

Decision tools

🗨️ **Proposal**
Seek collective agreement

✅ **Check**
Track participation and find volunteers

📊 **Poll**
Measure popularity or offer a choice

📊 **Dot vote**
Prioritise options

🗨️ **Score poll**
Score each option

📅 **Time poll**
Find a time to meet

📊 **Ranked choice**
Rank options in order

[Help](#)



Overseer

**Enabling farms to be environmentally
and economically sustainable**