Essential Freshwater 84, Event note – meeting with Greenpeace 12 March 2020

Date Submitted:	10 March 2020	Tracking #: 2020-B-06544	
Security Level	Unclassified	MfE Priority:	Non-Urgent

	Action sought:	Response by:
To/CC Hon David Parker, Minister for the Environment	Agree to release of this brief when the NES-FW is gazetted	

Actions for Minister's Office Staff	**Return** the signed report to MfE.
Number of appendices and attachments 1	Title of attachment: 1. Greenpeace's briefing paper "A fertiliser cap in the NES-FW

Ministry for the Environment contacts

Position	Name	Cell phone	1st contact
Principal Author	Irene Parminter	s 9(2)(g)(ii)	
Responsible Manager	Nora Burghart		
Director	Martin Workman		✓

Essential Freshwater 84, Event note – meeting with Greenpeace 12 March 2020

Key Messages

1. The purpose of this briefing is to provide information to support your discussion with Greenpeace staff scheduled for Thursday 12 March 2020, particularly focusing on the issues raised in Greenpeace's paper "A fertiliser cap in the NES-FW" (Attachment 1).

Greenpeace's proposals seek to reduce the impact of nitrogen fertiliser on water quality

2. Greenpeace's paper proposes a sinking per hectare fertiliser cap, starting at 60 kg of nitrogen per hectare and falling to zero by 2025.
3. Officials share Greenpeace's view that farm systems must change to achieve water quality outcomes, and decisive action by the Government is needed. Fertiliser use is part of the overall system that needs to change.
4. However, officials' view is that the proposal appears to be based on an under-estimate of current fertiliser application rates; and takes insufficient account of the impacts on consumers, animals, farmers, employment and the economy of a rapid reduction in nitrogen fertiliser use from current levels to zero over five years.
5. Reduction at the rate sought by Greenpeace, with zero nitrogen fertiliser use by 2025, would result in:
    a. shortages of vegetables and arable crops which need synthetic nitrogen fertiliser to produce sufficient crops for New Zealand consumption, resulting in an increase in imported produce,
    b. feed shortages for livestock, resulting in animal welfare issues and/or increased imports of feed crops such as palm kernel; particularly in the interim until stock numbers are culled, but also in the longer term when climatic conditions such as droughts create temporary feed shortages,
    c. financial difficulties for intensive dairy farms in the transition to a pastoral system which depends on legumes for all its nitrogen inputs, and
    d. flow-on impacts to the wider economy, exports and employment.

A broader approach to achieve change on farm is more likely to be successful

6. The Essential Freshwater package has a broader focus on all inputs, farm management practices and discharges. This broader approach enables identification of the most effective ways to reduce the impacts of agriculture and horticulture, and improve water quality, rather than focusing on a single input.

Recommendations

7. We recommend that you:

   a. **Agree** that this briefing and its attachment will be released proactively on the Ministry for the Environment's website to coincide with gazetting of the NES-FM

Yes/No

Signature

Martin Workman
Director, Water

Hon David Parker
Minister for the Environment **Date**

Essential Freshwater 84, Event note – meeting with Greenpeace 12 March 2020

Supporting material

Purpose

1. The purpose of this briefing is to provide information to support your discussion with Greenpeace staff scheduled for Thursday 12 March 2020, particularly focusing on the issues raised in Greenpeace's paper "A fertiliser cap in the NES-FW" which was sent to the Ministry for the Environment and your office in February 2020 (Attachment 1).

Context

2. Greenpeace Aotearoa New Zealand is an Environmental Non-Government Organisation, and states that it has 175,000 active members. The Executive Director is Russel Norman.
3. The organisation provided a submission on Essential Freshwater, as well as providing a form-submission that was used by almost 3500 people. Greenpeace's submission states that their three key issues are:
    a. A ban on synthetic fertiliser, implemented via a sinking cap, set low initially, with elimination to be achieved by 2025
    b. A ban on further intensification of dairy farming, including a ban on new dairy conversions and a stocking rate limit
    c. Protecting and restoring wetlands.
4. Greenpeace also sought the phase out of imported animal feed in their submission.
5. Greenpeace have provided you with a paper (Attachment 1), outlining the case for a sinking cap for nitrogen (N) fertiliser, proposing an initial cap of 60 kg of N/ha/year, falling to zero in five years. The paper includes draft regulations to achieve this via a consent requirement for all farms applying nitrogen fertiliser at the cap or less. Applying rates over the cap would be a prohibited activity.
6. On 5 March this year, Greenpeace protested outside Ravensdown's Christchurch Head Office, with 350 litres of 'slime'[1] applied to the entranceway and surrounding areas, to highlight their concerns about nitrogen fertiliser and water quality. In February, the organisation erected billboards in a Christchurch waterway highlighting the January 2017 promise made by the Prime Minister to clean up New Zealand's rivers.

Nitrogen fertiliser use in the primary sectors has risen since 1990 but is expected to fall over the next ten years

7. Pastoral farming pre-1990 was largely dependent on legume sources of nitrogen, with trials in the 1980s indicating that such pastures were nitrogen-deficient. Nitrogen fertiliser use has subsequently increased as a cost-effective way to increase pasture production, especially in spring, when clover growth is slow. Some dairy farmers use nitrogen in

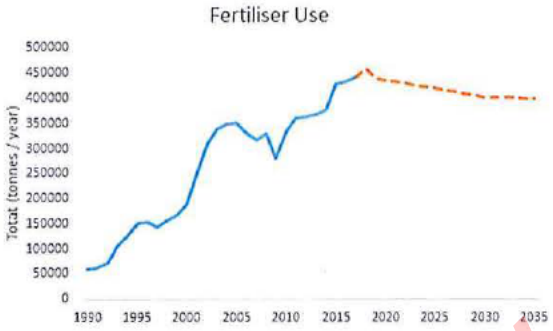
[1] The slime was made of water, psyllium husk and spirulina powder.

spring and autumn to extend the season, and some intensive farms use it routinely throughout the growing season.

8. Nitrogen use in the dairy sector varies. System 1 (low intensity) farms use an average 45 kg of nitrogen/ha/year; whereas system 5 (highest intensity) farms use an average of 126 kg/ha/year. Dairy research indicates that nitrogen-use efficiency is highest at 100-200 kg N/ha/year, and a reduction in nitrogen fertiliser use is likely to increase profit if applications are in excess of 200 kg/ha/year[2].

9. Most arable and vegetable-crop growing is dependent on synthetic nitrogen fertiliser, with recommended applications rates for some crops well in excess of dairy rates.

10. Nationally, nitrogen fertiliser use is projected to fall under current policy settings:



Source: Climate Change Inventory

11. We expect nitrogen fertiliser use to decline faster than the projections in the graph above as the NPS-FM is implemented. Climate change pricing proposals may also drive reductions in nitrogen fertiliser use.

Analysis and Advice

Essential Freshwater Package included a fertiliser cap option

12. As part of the Essential Freshwater package, we proposed a per hectare fertiliser cap or caps as one of the options for addressing excessive nitrogen losses from farms, in the interim period before regional plans implement the NPS-FM. As noted in our earlier advice (Essential Freshwater 81, 2019-B-06271), there are significant disadvantages in a fertiliser-cap based approach. The disadvantages include the following:

    a. A single national cap across all land uses would either be set so high that it affects very few producers, or set at a lower level that would preclude production of essential food crops (including many vegetables).

    b. A single cap could become a "government-sanctioned" application rate, with those below the cap able to increase fertiliser inputs up to the cap, regardless of whether it is appropriate for the soil, climate, land use, crop or catchment.

    c. If multiple caps were set, it would be infeasible to determine and enforce appropriate caps across the range of land uses, crops, climates, and soils; except through a farm-by-farm assessment (using soil tests and nutrient budgets). The

[2] https://www.dairynz.co.nz/news/latest-news/tactical-use-of-nitrogen-fertiliser/

farm-by-farm approach would best be accomplished through audited freshwater farm plans.

d. Fertiliser caps would target only one input (fertiliser volumes) whereas a much wider set of inputs and management practices affect nitrogen losses. Farmers could substitute bought-in feed for fertiliser, resulting in no net decrease in nitrogen losses, and an increase in farm costs.

The Greenpeace proposal would have negative impacts on consumers, animals and farmers as well as the economy

13. We have reviewed the paper by Greenpeace and note the following in relation to key premises and conclusions in the paper:

    a. **The baseline application rates calculated by Greenpeace appear too low**: Greenpeace used the official Agricultural Production statistics to estimate 2017 nitrogen fertiliser application rates per hectare in a range of agricultural and horticultural sectors. The estimated rates appear to be significantly lower than other sources of data. The reason for this is unclear, although we note that the fertiliser volume statistics are obtained through farmer declaration, and viewed as of 'medium' quality by Statistics NZ. Fertiliser sales data collected for climate change reporting is of high quality according to Statistics NZ. Examples of lower than expected estimates of fertiliser rates are as follows:

        i. dairy farm application rates are calculated by Greenpeace at 89 kgN/ha, whereas DairyBase data indicates that average rates were 126 kg N/ha[3] in 2015/16;

        ii. Recommended fertiliser rates for vegetable crops are 100 - 230 kg N/ha when residual nitrogen soil levels are low[4], whereas Greenpeace calculates that vegetable growing uses 54 kg N/ha;

        iii. Based on data in the fourth New Zealand report to the UNFCCC, the average fertiliser rates across dairy, sheep/beef/deer, arable and horticultural land in 2017 was almost 43 kg N/ha, and this total includes sheep/beef/deer land which covers the majority of New Zealand's farmed area, and applies low rates of nitrogen fertiliser.

    b. **Setting a cap of 60 kg/ha/year would preclude production of some important crops:** as outlined above, recommended fertiliser rates for many vegetable crops are well over 60 kg/ha (an extreme example is winter cauliflower where recommended rates are 230 kg N/ha when soil nitrogen levels are low). In many cases, two or even three vegetable crops are grown a year on the same area, meaning that multiple fertiliser applications are made.

[3] Pinxterhuis, 2019. *Tactical use of nitrogen fertiliser*. Dairy New Zealand Technical Series, December 2019. In both the Greenpeace calculation and the Dairybase data, the application rates are of Nitrogen itself, rather than the weight of fertiliser (the latter includes other elements). DairyBase is an opt-in database managed by DairyNZ and is used by farmers for benchmarking performance.

[4] Reid and Morton, 2019. *Nutrient Management for Vegetable Crops in New Zealand.* The exceptions are legume crops such as process peas which do not require nitrogen fertiliser.

c. **Zero nitrogen fertiliser would not be feasible for most horticultural and arable cropping:** providing sufficient nitrogen for arable and horticultural crops through bought-in organic sources such as manure or compost, or through growing legumes, would be very difficult and expensive, with significant reductions in yield likely[5]. Costs of these products would rise for consumers. Animal feed costs from the arable sector (cereals, maize) would also rise, exacerbating the impact of the fertiliser cap on dairy farmers, who would be growing less pasture and facing increased costs for bought-in feed.

d. **Cutting application rates to 60 kg/ha/year or less would have significant implications in the dairy sector:** dairy farming can be (and is) carried out at low nitrogen fertiliser rates (around 45 kg N/h), but has lower profitability at a range of milk solid prices[6]. Stocking rates would have to be reduced on most farms under this nitrogen fertiliser cap. In the transition, many cows would need to be culled, and this would take time due to capacity constraints in the meat-processing sector, with feed shortages on farms until stocking rates are optimised. In addition, there may be years when more fertiliser is needed to overcome a shortage of feed eg, following a drought, to avoid animal welfare problems in the winter. While an exceptions regime allowing for additional fertiliser use in such years could be developed, it would undermine the fertiliser cap by creating an incentive to apply all the 60 kg early in the season, and apply for a top-up allocation in late summer on animal welfare grounds. An alternative would be to import feed such as palm kernel, which is viewed as undesirable due to the link with deforestation in tropical countries.

e. **There would be significant economic impacts on farmers and growers, as well as wider New Zealand:** the impacts outlined above would affect farmer and grower production and profitability, with flow-on effects on exports and employment. A 2019 report estimated the impacts of reducing nitrogen fertiliser to zero at $1.7 billion at the farm gate, reducing GDP by $6.7 billion and employment by over 70,000 FTEs[7]. At the farm-scale the paper found that under a zero nitrogen fertiliser regime, a "representative" dairy farm in Canterbury and Northland would have insufficient earnings to cover debt at a milk solids price of $6.00/kg[8].

14. Greenpeace provided international references in support of state-regulated fertiliser/manure caps (the EU) and organic farming (Sikkim in North India). In the EU, caps are set at 180 kg N/ha, with 'derogations' enabling the Netherlands to apply up to 230 kg N/ha in some areas, well above the levels envisaged in the Greenpeace paper. In addition, there is significant bureaucracy associated with manure caps in the EU. In the

[5] There is an inadequate supply of manure and compost in New Zealand to meet the needs of such crops. Legume crops as part of an arable or vegetable rotation could provide nitrogen for subsequent crops, but would reduce overall production of crops for human consumption, and increase costs. Legumes would be difficult to maintain under tree or vine canopies.

[6] Clark et al, 2019. Production and profit of current and future dairy systems using differing nitrogen leaching mitigation methods: the Pastoral 21 experience in Waikato. *NZ Journal of Agricultural Research* https://doi.org/10.1080/00288233.2019.1577276

[7] Journeaux et al, 2019. *The Value of Nitrogen fertiliser to the New Zealand Economy*. This report was prepared for the Fertiliser Association, so may be seen as biased, however the authors are from independent and reputable consultancies.

[8] The representative farms are based on statistics from DairyNZ.

Netherlands, it was found that raising farmer awareness of fertiliser wastage was a more effective policy than manure caps to reduce fertiliser use[9].

15. Greenpeace is supportive of regenerative agriculture and organic farming approaches that are less dependent on nitrogen fertiliser. Officials are aware of organic and regenerative farming approaches and consider them to be two of many potential system changes that would improve water quality. However regenerative farming has not been adequately researched in New Zealand (or in fact, globally[10]). We understand that the Our Land and Water Science Challenge is preparing a White Paper on regenerative farming and that LandCare Research is planning to apply to MPI's SFFF for funding to investigate further. We consider that independent research of this nature is critical.

The Essential Freshwater package takes a more effective approach to reducing nitrogen losses

16. Like the Greenpeace proposal, the Essential Freshwater package aims to achieve improved water quality within five years. However the proposals we recommend achieve this efficiently and effectively, with less impact on consumers, animal welfare, farmer livelihoods and the wider economy than the Greenpeace proposal would. The proposals recognise that nitrogen losses to water can be more effectively achieved through a broad range of approaches that go beyond simply controlling inputs or stocking rates. The package includes both national regulations; *and* requirements that are tailored to the farm and catchment (ie, farm plans). However, Greenpeace is not supportive of a farm plan-based approach to reducing the impact of farming on the environment.

17. A fertiliser cap relies on controlling a single input, whereas our advice is that a strong regulatory system for managing nitrogen *discharges* is needed, along with a tailored farm plan-based approach, to achieve the outcomes that Greenpeace is seeking (a sustainable agriculture sector in New Zealand). For example, in the Canterbury region the approach underway caps nitrogen losses, and requires audited farm plans. This is already generating significant reductions in nitrogen losses (including through reduced use and better timing of fertiliser inputs[11]).

Other Essential Freshwater topics likely to be raised

18. Greenpeace's submission sought stronger constraints on intensification of existing dairy farms including a stocking rate limit. Greenpeace are likely to be broadly supportive of the Essential Freshwater proposals covering the protection of wetlands.

---

[9] Van Grinsven et al, 2016. Evaluation of the Dutch implementation of the nitrates directive, the water framework directive and the national emission ceilings directive. NJAS - Wageningen Journal of Life Sciences 78 (2016) 69–84. Online:https://www.sciencedirect.com/science/article/pii/S1573521416300100; Klootwijk et al, 2016. *Dutch dairy farms after milk quota abolition: Economic and environmental consequences of a new manure policy.* Online: https://www.journalofdairyscience.org/article/S0022-0302(16)30480-5/pdf

[10] Merfield, 2019. An analysis and overview of regenerative agriculture. Report 2-2019, the Biological Husbandry Unit Future Farming Centre, Lincoln New Zealand.

[11] A recent media article included an example of reductions in nitrogen losses of 17% on a very large dairy farm in Canterbury, largely through reduced fertiliser use and improved timing.

Talking points

19. You may like to:

    a. Thank Greenpeace for providing the paper, including the references they drew on

    b. Acknowledge a shared conviction that farm systems must change if water quality outcomes are to be achieved

    c. Discuss the likely impacts of the Greenpeace proposal outlined above

    d. Outline the broader approach being taken by the Government as a more effective and efficient approach to reducing the impact of farming on the environment.

Attachment: Greenpeace's briefing paper – A fertiliser cap in the NES-FW

Briefing Paper - A fertiliser cap in the NES-FW

Prepared by Greenpeace NZ for the Minister for the Environment and Ministry officials.

The Government proposed a nationwide cap on fertiliser as part of the 2020 freshwater reforms. Greenpeace NZ along with thousands of New Zealanders submitted in support of the proposed cap. The following briefing is designed to aid officials in the development of this cap. It includes:

a. International examples of synthetic fertiliser caps or prohibitions and their success in delivering water quality outcomes
b. A summary of the water quality impacts of synthetic fertiliser, the economic benefits of lowering its use and other matters relevant to the need for a cap.
c. The amount being used by primary production land-uses, and the average per hectare.
d. How a synthetic fertiliser cap could be applied.
e. How such a cap would be efficiently and effectively monitored and enforced.

INTERNATIONAL REVIEW

Many jurisdictions have adopted synthetic fertiliser caps or prohibitions to avoid adverse effects to water. The following outlines some of these international examples and associated improvements in water quality.

a. ***The European Union:*** The European Union (EU) Nitrates Directive[1] came into force in 1991 and requires EU Member States **prohibit application of nitrogen above 170 kg/ha in NVZs (applies to synthetic and organic fertiliser) in** designated Nitrate Vulnerable Zones **(NVZs).** It also allows States to **completely prohibit fertiliser use** in certain periods in NVZs**.** The data on nitrate concentration shows that **water quality has improved** in 2012-2015 compared to previous reporting period (2008-2011).[2]
b. Denmark presents a case study that is very relevant to the New Zealand Government's proposal for a nationwide cap as the whole agricultural area in Denmark is a NVZ. **There has been a 40% reduction in the nitrogen surplus of the country by 2010 from its peak in the 1980s.**[3] Danish rules considered successful with

[1] European Commission: The Nitrates Directive. URL: http://ec.europa.eu/environment/water/water-nitrates/index_en.html

[2] Report from the Commission to the Council and European Parliament on implementation of the Nitrates Directive (article 11 report) 2012-2015 Report {SWD(2018) 246 final} found at: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52018DC0257

[3] Dalgaard, T., Hansen, B., Hasler, B., Hertel, O., Hutchings, N. J., Jacobsen, B. H., Jensen, L. S., Kronvang, B., Olesen, J., Schjorring, J. K., Kristensen, I. S., Graversgaard, M., Termansen, M. and Vejre, H. (2014) Policies for

regard to the input control of fertiliser have included farm monitoring and obligatory reporting from fertiliser suppliers.[4]

c. ***The state of Sikkim in Northern India***: Completely **prohibited not only the use of but also the import and sale of chemical fertilisers and pesticides** in 2014. Sikkim began its program to go fully organic, state-wide, in 2003. It started by reducing government subsidies on synthetic inputs by 10% each year coupled with major public funding, education and investment in transitioning its 66,000 farmers to certified organic. It has now achieved this transition, all farmers are certified organic and synthetic inputs are banned. **There has been a marked increase in water quality, which has in turn led to a significant rise in tourism, as the state now successfully markets itself as a health destination**[5].

d. ***Minnesota:*** Minnesota has **prohibited the use of synthetic fertiliser** in Autumn and when the ground is frozen in designated "vulnerable groundwater areas" and "drinking water supply management areas.[6] It also allows for the Government to set regional **caps and other controls on fertiliser** in areas with consistently high nitrate levels in groundwater.[7] It is applicable to synthetic fertiliser only[8]. The rule came into effect in January 2020 so we are not able to report water quality benefits yet.

e. ***Nebraska:*** The state of Nebraska has set up 23 Natural Resource Districts (NRD), organized around river basin boundaries, with locally elected governing bodies. Eight of the NRDs have **prohibited the use of synthetic nitrogen fertiliser in the autumn and/or winter.** Monitoring shows that "in some areas, **water quality has improved significantly after the initiation of governance actions by the NRDs to reduce fertilizer applications."**[9]

THE NEW ZEALAND SITUATION

Water Quality impacts of synthetic nitrogen fertiliser use.

In essence, the research on water quality impacts shows that:

a. The use of synthetic nitrogen fertiliser has enabled the intensification of dairy farming, and led to higher stocking rates. This has increased pollution from dairying and particularly diffuse nitrogen pollution from urine patches.[10]

---

agricultural nitrogen management - trends, challenges and prospects for improved efficiency in Denmark. Environmental Research Letters 9, 115002. URL: http://iopscience.iop.org/article/10.1088/1748-9326/9/11/115002/meta

[4] *A case study of agricultural nitrogen management policy in Denmark, Vera Eory, Scotlands Rural College; N.J Hutchings, Aarhus University* (March 2017).

[5] Ibid.

[6] With higher nitrate levels than 5.4 mg/L in the last ten years.

[7] For a level 2 area Subp7,

[8] With higher nitrate levels than 5.4 mg/L in the last ten years.

[9] Bleed, A. and Babbitt, C.H., 2015. Nebraska's Natural Resources Districts, University of Nebraska.

[10] Parliamentary Commissioner for the Environment 2013: Water quality in New Zealand: Land use and nutrient pollution

b. Synthetic nitrogen fertiliser is a water pollutant itself, notwithstanding its effect on intensification.[11]
c. The largest sources of nitrogen pollution into New Zealand's rivers, in order of magnitude, are; urine from dairy cattle, urine from sheep and synthetic nitrogen fertiliser itself.[12]
d. The nitrogen balance 1998 - 2009 has worsened more than in any other OECD country,[13] primarily due to expansion and intensification of dairy.
e. According to MFE,[14] *"Between 1990 and 2012, the estimated amount of nitrogen that leached into soil from agriculture increased 29 percent. This increase was mainly due to* ***increases in dairy cattle numbers (and therefore urine which contains nitrogen) and nitrogen fertiliser use."***
f. Nitrogen pollution has a significant negative impact on water quality in New Zealand and this pollution is worsening, overall.[15]
g. Nitrate levels drinking water have an impact on human health at elevated levels. Recent research has indicated that nitrate levels much lower than the WHO limit are associated with an increased risk of colorectal cancer. [16] [17]

The use of synthetic fertiliser in New Zealand

In essence, the publicly data available on synthetic fertiliser use in NZ shows that:

a. Since 1990, the annual application of synthetic nitrogen fertiliser has increased 627% from 59,000 tonnes in 1990 to 429,000 tonnes in 2015.[18]
b. New Zealand has the highest rate of synthetic nitrogen fertiliser use in the OECD and currently there are no regulations on the amount that can be applied.[19]
c. Synthetic nitrogen is applied through various fertilisers, the majority is applied via urea followed by, diammonium phosphate (**DAP**) and ammonium sulphate (**SOA**).
d. In 2017, 597,492 tonnes of urea, 190,701 tonnes of DAP and 86,652 tonnes of SOA was applied to land.[20]
e. Urea contains 46% synthetic N, DAP 17.6% and SOA 20%.

---

[11] Ministry for the Environment & Stats NZ 2017b: New Zealand's Environmental reporting series : Freshwater and nitrogen leaching. http://archive.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Fresh%20water/nitrogen-leaching-agriculture.aspx

[12] Ibid

[13] OECD (2017), OECD Environmental Performance Reviews: New Zealand 2017, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264268203-en.

[14] Ministry for the Environment & Statistics New Zealand (2015). New Zealand's Environmental Reporting Series: Environment Aotearoa 2015. Page 54. At. https://www.mfe.govt.nz/publications/environmental-reporting/environment-aotearoa-2015

[15] Ministry for the Environment & Stats NZ 2017a: New Zealand's Environmental Reporting Series: Our fresh water 2017

[16] Espejo- Herrera, et al. "Colorectal Cancer Risk and Nitrate Exposure through Drinking Water and Diet." International Journal of Cancer, vol. 139, no. 2, 2016, pp. 334–346.

[17] Schullehner, J., Hansen, B., Thygesen, M., Pedersen, C.B. and Sigsgaard, T., 2018. Nitrate in drinking water and colorectal cancer risk: A nationwide population-based cohort study. *International journal of cancer*, *143*(1), pp.73-79.

[18] https://www.stats.govt.nz/indicators/nitrogen-and-phosphorus-in-fertilisers

[19] OECD 2008 Environment Performance of Agriculture in OECD countries

[20] Agricultural Production statistics, final results by farm type accessed via Stats NZ at https://www.stats.govt.nz/information-releases/agricultural-production-statistics-june-2017-final

f. By volume the dairy industry was by far the largest user of all three fertilisers. It used 70% of the urea (418,468 tonnes), 42% of the DAP (80,271 tonnes) and 59% of the SOA (50,787 tonnes).[21]
g. Urea contributed 84.4% of the synthetic N applied to land in 2017, DAP contributed 10.3% and SOA 5.3%.[22]*
h. *However, 288,621 tonnes of the "other fertilisers" category were applied in 2017.[23] Stats NZ and MfE have not collected the data on the synthetic N content of these fertilisers. This information is held by the fertiliser association and the vendors who record N content of these fertilisers and list them on their websites.
i. The fertiliser association reports that 429,000 tonnes of synthetic N were applied to land in 2015, while Stats NZ data only shows 325,739 was applied in 2017 (not inclusive of "other fertilisers"). So, it should be assumed that around 100,000 tonnes of synthetic N is applied as "other fertilisers". The data on these other fertilisers containing synthetic N would need to be gathered in future in order to successfully implement the fertiliser cap.

Rates of application by land use

Stats NZ collects data on the volume of urea, DAP and SOA by land-use and the hectares farmed by land-use. From this data the following average kgs per hectares of synthetic nitrogen by land-use are calculated. (**IMPT NOTE**: These figures are not the amount of fertiliser used, but rather the amount of synthetic N used, based on the synthetic N content of Urea, DAP and SOA):[24]

a. In terms of total volume of synthetic N used dairy uses 67%, grain growing 4%, grain-fed sheep and beef 2% and outdoor vegetable growing 1%.
b. The vast majority of land-uses in New Zealand apply under 40 kg/ha synthetic nitrogen per year. Of the 29 primary production land-uses identified by Stats NZ[25], 25 used under 40 kg/ha and 18 of these used less then 20 kg/ha.
c. Only three use over 80 kg/ha:
    a. Dairy (89 kg/ha), grain-fed sheep and beef (82 kg/ha) and grain (106 kg/ha). Note: The grain category does **not** include all arable cropping - "Other cropping" uses only 37 kgs/ha.
d. Dairy is the second highest per hectare user after grain growing but it should be noted that dairy occupies 2.4 million ha of land and grain only 119,067 ha.
e. Outdoor vegetable growing is the fourth highest per/ha user, using 54 kg/ha.
f. Three land uses use between 30-40 kg/ha:
    a. Citrus (32kg/ha), indoors floriculture (37 kg/ha), other arable crop growing excluding grain (37 kg/ha) poultry (26 kg/ha) and Other livestock (26 kg/ha)

[21] Ibid
[22] https://www.stats.govt.nz/indicators/nitrogen-and-phosphorus-in-fertilisers
[23] Ibid
[24] Agricultural Production statistics, final results by farm type accessed via Stats NZ at https://www.stats.govt.nz/information-releases/agricultural-production-statistics-june-2017-final
[25] Turf growing has been excluded from these calculations as it only occupies 20 ha of land in NZ in total

g. Four land uses use between 20-30 kg/ha:
    a. Kiwifruit (28 kg/ha), poultry (26 kg/ha), other livestock (26 kg/ha) and the "other" category (23 kg/ha).
h. The remaining 18 land-uses use less than 20 kg/ha.
i. The average use in horticulture and berry growing is 13 kgs/ ha. With citrus growing being the only land-use within this category using more than 30kg/ha.
j. The average use of the largest land-user in New Zealand, pastoral sheep and beef farming (excluding grain-fed), is 9 kg/ha.
k. As these are averages, there are users applying much more than the averages listed here and those applying much less. Ravensdown cites on its website that "Urea is usually spread between 40 and 300 kg/ha". That translates to between **18 kgs/N and 138 kgs/N** per ha/year .[26]
l. According to AgResearch "more than 400 kg N/ha is used on some (dairy) farms."[27]

Economics and yield – Reducing N is a Win/Win for farmers and the environment

a. A recent economic model done by the NZ Landcare Trust compared farms with varying stocking rates, fertiliser use and imported feed. It found that:
    a. **The farm with the lowest synthetic fertiliser use and the second smallest herd had the largest increase in profitability (29%)** and the lowest environmental footprint, **a 13% reduction in nitrate leaching** and an 18% reduction in GHG emissions.
b. A ten year in-field study by DairyNZ compared a farm with no synthetic nitrogen application and a farm using 181/kg/ha/yr of urea. It found that in a system using no synthetic n at all:
    a. "**profitable milk production systems can be achieved without N fertiliser applications**"
    b. At lower milk price ($4.60 kg/MS) the farm using no synthetic N **was more profitable** than the one using 181 kgs. [28]

It is important to note that the above studies simply measured the economics of removing synthetic fertiliser and continuing to farm in a conventional way, without any accompanying shifts to regenerative practices. Shifting to regenerative practices such as pasture diversification have been shown to increase yield, profitability and environmental benefits.

[26] https://www.ravensdown.co.nz/products/fertiliser/urea
[27] Glassey, C.B., Roach, C.G., Lee, J.M. and Clark, D.A., 2013. The impact of farming without nitrogen fertiliser for ten years on pasture yield and composition, milksolids production and profitability; a research farmlet comparison. In *Proceedings of the New Zealand Grasslands Association* (Vol. 75, pp. 71-78)
[28] Glassey, C.B., Roach, C.G., Lee, J.M. and Clark, D.A., 2013. The impact of farming without nitrogen fertiliser for ten years on pasture yield and composition, milksolids production and profitability; a research farmlet comparison. In *Proceedings of the New Zealand Grasslands Association* (Vol. 75, pp. 71-78)

a. An international study found that a farm can reduce 100 kg/ha of nitrogen fertiliser by simply increasing the varieties of pasture crops used in the field from 1 to 16 species, and still produce the same yield as the farm using the 100 kgs/N/ha.[29]

Other matters relevant to the cap:

Notwithstanding the above evidence regarding the water quality impacts of unrestricted synthetic fertiliser use and the economic benefits of lowering its use, the following additional arguments support the case for a cap on synthetic fertiliser use in the NES-FW:

a. Over the last two decades there has been inadequate quantitative, enforceable water quality limits set, coupled with slow adoption in the majority of regional plans, slow application of these limits to resource users and poor monitoring and enforcement. This has allowed water quality to degrade and continue to degrade in many places. For example, just recently the Bay of Plenty Regional Council completely pulled its plan change 9 water reforms which will mean that the temporary conservative measures put in place are withdrawn and the region reverts to their old rules.[30]

b. The adoption of the new NPS-FW is likely to be subject to further delays due to appeal timelines. There needs to be a more precautionary response to water management which fills this regulatory gap and halts decline in waterway health.

c. Due to the long lag times to implement the NPS and the issues measuring nutrient loss (detailed below), the effects-based approach most commonly used under the RMA should be coupled with input controls when there is substantive evidence of a pollutant causing environmental harm, as is the case for synthetic fertiliser.

d. Nutrient loss is difficult to measure.[31] This creates another time lag for farm management plans to be completed and compliant with NPS-FW limits.

e. The main software used to measure nutrient loss on farms and increasingly being used in monitoring and enforcement, Overseer, is partially owned by the fertiliser industry. These companies have a vested financial interest in maintaining and growing the use of large volumes of synthetic fertiliser, one of the main causes of nutrient pollution into New Zealand's waterways.

f. Furthermore, these companies are often involved in inputting data into Overseer and producing the files on behalf of farmers. There is very little, if any, regulatory oversight over this process despite the clear conflict of interest these companies have in ensuring the continuation of high fertiliser sales.

---

[29] Tilman, D., Reich, P.B. and Isbell, F., 2012. Biodiversity impacts ecosystem productivity as much as resources, disturbance, or herbivory. *Proceedings of the National Academy of Sciences*, *109*(26), pp.10394-10397. http://www.pnas.org/content/109/26/10394.full.pdf

[30] https://www.boprc.govt.nz/your-council/plans-and-policies/plans/regional-plans/regional-natural-resources-plan/region-wide-water-quantity-plan-change-plan-change-9/

[31] *Overseer and regulatory oversight: Models, uncertainty and clianing up our waterways*, Parliamentary Commissioner for the Environment, December 2018.

APPLICATION OF A SYNTHETIC FERTILISER CAP IN NEW ZEALAND

The fertiliser supply chain

There are only two companies selling 98% of all the fertilisers used in New Zealand, Ravensdown and Agri-Ballance. Both are co-operatives that hold substantial information about their shareholders (fertiliser users) and the amount sold to them. They are selling both imported and domestically produced synthetic fertiliser. This is purchased by fertiliser users and picked up from various distribution centres around the country. It is then applied by the user themselves or through an aerial or ground spreading company.

Capping synthetic fertiliser use

Internationally there are various parts of the fertiliser supply chain that have been regulated, some have capped and controlled only at the point of use (on-farm), some have done so at the point of sale, and some at the point of import. The nationwide fertiliser cap has been proposed in the NES-FW, where it will be regulated at the point of use and monitored and enforced by Regional Councils. This is appropriate as it is at the point of applying fertiliser to land where most of the pollution issues arise, especially when high rates are used.

However, when considering how to apply a fertiliser cap in a jurisdiction it is appropriate to consider the "narrowest" part of the process. Regulating this narrow part enables clear regulations for control and easy parameters for monitoring, enforcement and compliance mechanisms. In New Zealand the narrowest point is clearly at the point of sale given the market is dominated by two companies.

Recommendations

a. Greenpeace supports the current proposed nationwide cap on the use of fertiliser to be applied per/ha at the point of use.
b. Alongside this, we support regulating synthetic fertiliser use at the point of sale with a central government agency carrying out monitoring and enforcement on vendors.

Capping the application of synthetic fertiliser to land

NES standards under the RMA may prohibit an activity, or restrict the granting of a resource consent to matters specified in a NES.[32] Therefore, the NES-FW is the appropriate mechanism in which to place a mandatory cap on the application of synthetic fertiliser. In order to ensure compliance with and effectiveness of the cap, application of synthetic fertiliser under the threshold cap should be **a controlled activity** with application of synthetic fertiliser above the threshold cap **a prohibited activity**.

[32] S 43A(1)(d) RMA.

The cap should be set on the amount of synthetic nitrogen allowed to be applied per year, rather than the amount of fertiliser, given the differing synthetic N content of the various fertilisers used in New Zealand.

The Government aims to halt further degradation. Allowing for any increase in total synthetic N used would create further degradation so the cap must be set no higher than the current average used. A cap set below the average use will reduce pollution and start to clean up our rivers while the long lag time between now and regional plans become operative under the new NPS. In order to continue to drive down synthetic fertiliser use further during this lag-time, a sinking cap, which is reduced annually over the next five years should be put in place.

Given different land-uses use different amounts there are two options to for the cap. The first is to set a universal cap, regardless of land-use. If this was set at the highest average use 106 kg/ha (Grain) then it would still bring down the use of the most egregious users in dairy and grain-fed sheep and beef even though the cap would be higher than their average. The second option is to set three different limits for the top three users based on their averages which would bring down the use of the most egregious users and allow for no further increase in total N from these land uses.

In order to ensure degradation is halted, the fertiliser cap would have to apply nationwide with no regional exceptions. Current regional plans are unlikely to be in line with a revised NPS-FW. For example the plan change for Selwyn/Te Waihora, one of the most severely polluted catchments in Canterbury, is operative. However, ECan did not set a goal of reducing pollution in this plan. Instead, it set a target of 300 tonnes more nitrogen pollution per year by 2037 than what was being polluted when the plan change was made. This is clearly counter to the Government's intention to halt further degradation. Also, in this context, where regional plans are currently inadequate, setting a fertiliser cap with regional exceptions would be anti-competitive.

Recommendations

a. A nationwide and universal cap of **60kg / synthetic N / per ha** is set in the NES-FW. This will **only** affect three land-uses in New Zealand, and many operators within those land-use categories will already being using less than this.
b. Application of synthetic fertiliser under the threshold cap (60kg) should be a **controlled activity** with application of synthetic fertiliser above the threshold cap a **prohibited activity.**
c. Furthermore, Greenpeace recommends that this cap is a sinking one which is set annually by MfE, at a threshold lower than the previous year, with the intention to transition all land-users completely away from synthetic fertiliser over the next five years.

Monitoring, compliance and Enforcement of cap in the NES-FW

Any enforcement of controls on the application of fertiliser to land through the RMA falls squarely into the jurisdiction of regional councils.[33] [34]. However, there are mechanisms in

[33] S 30(c) RMA
[34] S 30(c)(i).

which MfE and the Minister for the Environment to monitor and ensure regional councils fulfil their duties. The Minister can have direct oversight and reporting on how certain instruments under the proposed NPS-FW and NES-FW are being implemented.

Farmers are able to purchase fertiliser multiple times in any week or any given day and once applied to land there is presently little immediate evidence available enforcement officers could use to monitor a breach of the cap. The most obvious measure to monitor compliance with a fertiliser cap is by including reporting requirements for synthetic fertiliser application plus an auditing mechanism. This should be combined with a requirement to report stocking rates. High stocking rates being an indication of fertiliser application and potentially a trigger for more in depth auditing of an operator's management plan and expense receipts.

Recommendations

a. Include a requirement to report on synthetic fertiliser application and stocking rates as part of resource consents for application of fertiliser or in farm plans.
b. Monitoring should be undertaken by check of consent or farm- plan reporting against reviewing of expense receipts and other auditing.
c. Auditing should be undertaken when; complaints by public are made, there is an irregularity of stocking rates versus synthetic fertiliser application in consent or farm plans, or when nutrient loss triggers are surpassed.
d. The Minister and MfE should monitor all Regional Councils performance in fulfilling their duties under the NES-FW, particularly the fertiliser cap.

Capping the sale of synthetic fertiliser

A cap on the sale of synthetic fertiliser could be done in two ways. Both of them also require the per hectare cap to be put into the NES-FW to be cross-referenced.

a. The first option is to change the RMA to allow for controls on the sale of environmental pollutants, which should be enforced by a central government agency.
b. The second option is for the Minister for the Environment to draft a regulation under the Hazardous Substances and New Organisms Act 1996 (**HSNO**). This regulation should require that for synthetic fertiliser to be supplied/sold to a farm operator, that farm operator must be crossed checked against a register to ensure that they are not exceeding their quota threshold of synthetic N per hectare (quota would need to match threshold in the NES-FW).

Monitoring and compliance parameters

To place a cap on synthetic fertiliser supply would require a registry to be centrally held which lists all farm operators of a certain size and their available hectarage for fertiliser application. Cross reference with a NES standard and recording of holders of controlled resource consents for fertiliser application would also keep the two mechanisms (NES-FW and any mechanism under HSNO) aligned if both were applied. There is public institutionally held information that would assist this process including land titles and hectarage held by LINZ, farm operators are required to supply expenditure records for tax purposes, which includes their receipts for synthetic fertilisers and in some regions farmers already have to supply the per/ha/year volume of synthetic fertiliser they are using.

Recommendations

Greenpeace recommends one of these options is pursued in combination with the NES-FW cap on the per / ha use in the NES-FW in order to ensure best compliance with the cap.

Draft wording for a fertiliser cap in the NES-FW
This wording applies a number of the recommendations outlined above.

PART 3 Farming (Pg 12 Draft NES-FW)

.....

Subpart 5- Synthetic Nitrogen cap

48 Application of subpart 5

Nothing in this Part applies to the following:

a) pastoral farms of less than 20 hectares;
b) arable farms of less than 20 hectares;
c) horticultural farms of less than 5 hectares.

49 Definitions for subpart 5

In this subpart:

Fertiliser means[35]— any material (whether in solid or liquid form) which is described as or held out to be for or suitable for sustaining or increasing the growth, productivity or quality of plants or animals through the application of the following essential nutrients to plants or soils: nitrogen, phosphorus, potassium, sulphur, magnesium, calcium, chlorine, sodium, as major nutrients or manganese, iron, zinc, copper, boron, cobalt, molybdenum, iodine, selenium, as minor nutrients or additives.

Synthetic Nitrogen Fertiliser any material which falls in the definition of Fertiliser, and contains synthetic nitrogen (produced using the Haber-Bosch process).

Synthetic Nitrogen – Manmade nitrogen, generally produced using the Haber-Bosch process.

Organic Fertiliser any material which falls into the definition of Fertiliser and is derived from plant and animals parts or residues.

Threshold Cap is the synthetic nitrogen cap per hectare which is set annually by public gazette notice

50 Controlled activity

(1) Application of Synthetic Nitrogen to land is a controlled activity.
(2) For the purpose of granting a resource consent for the controlled activity, the matter over which control is reserved is the amount of Synthetic Nitrogen that is applied per hectare in accordance with the Threshold Cap.

[35] Fertiliser (Subsidiary Hazard) Group Standard 2017, Fertilisers Corrosive Group Standard 2017 HSR002569; Fertilisers (Oxidising [5.1.1]) Group Standard 2017 - HSR002570, Fertilisers (Toxic [6.1C]) Group Standard 2017 - HSR002572

(3) An application for a resource consent for the purposes of this clause will not be publicly or limited notified.

(4) A resource consent granted for the controlled activity must include at least the following condition:

(a) the farm must:

i. annually report on date, volume and location of Synthetic Fertiliser application; and

ii. annually report on stocking rates.

(b) the farm must hold on site records of date and location of Synthetic Fertiliser application; and

(c) by 30 September in each year the farmer must provide the relevant local authority with documentation certified by an approved auditor that cross references reporting mechanisms at clause (4)(i) and (ii) against expenditure returns.

(6) An enforcement office has the discretion to require an audited report at any stage but must request one where there is an unexplained inconsistency between stocking numbers and recorded Synthetic Fertiliser application.

(7) The consent expires on a specified date no later than 5 years after the date it is granted.

51 Prohibited activity

(1) Application of Synthetic Nitrogen above the threshold cap is a prohibited activity.

52 Ministry for the Environment to annually reduce the threshold cap

(1) Recommendations for the setting of the annually reduced Threshold Cap will be provided by the Ministry of the Environment to the Minister for the Environment. When considering the annual reduction the following must be taken into account:

(a) The level must be lower than the previous year

(b) The level should be set in a way that provides for a gradual but definitive transition away from synthetic nitrogen fertilisers altogether by 2025.

(2) The Ministry for the Environment will publicly notify by way of a gazette notice the annual threshold cap.

(3) When considering the annual Threshold Cap the Minister for the Environment must take into account:

(a) The level must be lower than the previous year

(b) The level should be set in a way that provides for a gradual but definitive transition away from synthetic nitrogen fertilisers altogether by 2025.