

Memo

Date	12 April 2018
To	Lisa Jenkins,
CC	Ian Whitehouse
From	Ned Norton

Summary of process to estimate the nitrogen load increase that would need to be offset in the Hurunui catchment as part of fixing the dryland farming “10% rule” issue

Purposes

1. Briefly document the process that led to the identification of the nitrogen load tonnage required to be offset as part of fixing the “10% rule”.
2. Further examine the technical justification for using so-called “Method 2” rather than “Method 1” for calculating the required offset nitrogen tonnage. This is specifically in response to queries from Fish and Game on the relative merits and environmental precaution of the two methods as they were summarised in the previous technical paper on the topic (Norton, 16 March 2018).
3. Clarify why it is important that the identified required offset nitrogen tonnage is stated together with the method of its derivation.
4. Confirm the Environment Canterbury (ECan) technical team’s suggested pragmatic way forward by identifying a nitrogen tonnage required for offset.

Summary of key messages

- i) The process for identifying the nitrogen load tonnage required for offset has evolved systematically over more than twelve months. The process has been demonstrably open with numerous opportunities for interested parties to contribute via 15 open meetings of the Hurunui Science Stakeholder Group (SSG) and other break-out group discussions as summarised in this memo.
- ii) The justification for using the so-called “Method 2” to calculate the nitrogen load offset reported previously (Norton, 16 March 2018) is still valid and does explicitly incorporate an element of environmental precaution.
- iii) It is important to communicate the required offset nitrogen tonnage together with the method of derivation because there is more than one arguably valid way to estimate nitrogen load. It is most important that the method used to identify the offset tonnage requirement is equivalent to the method used for accounting the nitrogen load reductions to achieve that offset. In other words ‘apples’ should be compared with ‘apples’.
- iv) On behalf of the ECan technical team I still suggest a pragmatic way forward is to identify the required offset nitrogen tonnages of 8 or 38 tonnes/year source nitrogen

load, depending on the outcome of a planning argument described elsewhere as to whether the current permitted “10% increase” allowance is considered to amount to an over-allocation of the current plan load limits, or if it is an allocation provided for by the plan.

Process to identify the nitrogen load tonnage to offset

The process leading to identifying the nitrogen load tonnage required for offset has been an open process involving numerous interested parties invited to be part of the Hurunui SSG¹ and has evolved systematically over more than twelve months².

The purpose of the SSG process included helping to ensure that the Hurunui Waiau Zone Committee’s (HWZC) decision-making was informed by information from multiple sources and that there would be “no surprises” amongst the SSG members and HWZC around technical information³. The purpose of the SSG was specifically not to advise or advocate for particular water management policies, rules or limits³.

During the SSG process many parties have offered information and suggestions of both an objective technical nature and of a value-driven advocacy nature. The ECan technical team’s role has included objectively assimilating the multiple sources of technical information, testing interpretations with the SSG, and then communicating findings through to the Zone Committee for their consideration in decision-making.

Some of the key steps in the SSG process that have contributed to identification of a nitrogen load offset to help with fixing the “10% rule” issue include:

- SSG Meeting 8 March 2017, including presentations and discussion on the difference between ‘in-river’ nitrogen loads and ‘source’ nitrogen loads and the different methods of estimating these.
- SSG Meeting 8 November 2017, including following papers:
 - i) Hurunui and Waiau catchment nutrient calculators* (Peter Brown, 6 November 2017)
 - ii) Estimates of area for winter forage crops in Hurunui and Waiau catchments* (Mojsilovic, 6 November 2017)
- SSG Meeting 29 January 2018, including following papers:
 - i) Dryland farming research summary* (Josh Brown, 29 January 2018 (finalised into a report referenced as J. Brown February 2018))

¹ See Attachment 1 for a list of parties invited under the Terms of Reference for the Hurunui Science Stakeholder Group.

² The first meeting of the SSG was 20 October 2016 and the fifteenth meeting was 7 March 2018.

³ Hurunui Science Stakeholder Group Term of Reference (Agreed at December 2016 Zone Committee meeting following changes requested by Science Stakeholders Group 20 October 2016).

- ii) *What do we know about future nutrient losses in the Waiau catchment from both irrigated and dryland development, and under different assumed amounts of permitted winter grazing of forage crops?* (Norton, 29 January 2018)
- iii) *Modelling changes in Hurunui and Waiau catchment root zone nitrogen losses from hypothetical scenarios of permitted winter forage development* (Mojsilovic, 25 January 2018)
- SSG Meeting 7 March 2018, including following presentations:
 - i) *What is the risk of increase to the area of winter grazing of forage crops if “normal dryland farming” is permitted?* (Norton 7 March 2018a)
 - ii) *What is the “plausible worst case” increase in N load from permitting “normal dryland farming” – and thus what tonnage needs offsetting to stay within the Hurunui catchment N load limit?* (Norton 7 March 2018b)
- Sub-group meeting to discuss the subject of “*Fixing the 10% rule and offsetting the load to come from dryland farming*” on 12 March 2018⁴.
- Paper circulated to the Sub-group, SGG and Zone committee titled “*Estimating the ‘plausible worst case’ increase in nitrogen load from a new way of permitting ‘normal dryland farming’, that would need to be offset by decreases elsewhere in order to stay within the Hurunui Waiau River Regional Plan (HWRRP) nitrogen load limit*” (Norton, 16 March 2018).
- Second sub-group meeting to discuss the subject of “*Fixing the 10% rule and offsetting the load to come from dryland farming*” on 28 March 2018⁵

Further examination of the merits of two methods for calculating the load to offset

In the paper by Norton (16 March 2018) two methods for calculating the offset load were discussed (i.e., Methods 1 and 2 based on the approach of Mojsilovic (2018) and Brown (2018) respectively) and it was suggested that a pragmatic way forward in the circumstances would be to adopt Method 2, which calculates an offset nitrogen load of 38 t-N/yr of source N load. The reasons for this approach were discussed including that Method 2 is based on in-river load estimates and the HWRRP Schedule 1 in-river load limit, converted to an equivalent source load by calculating the equivalent proportion of Amuri Irrigation Company’s (AIC) allocated N load, and is thus then directly relevant and relatable to the nutrient management system used by AIC. Discussions occurring at the time (e.g., at the Sub-group meeting on 12 March 2018) suggested that AIC, possibly in cooperation with the other irrigation schemes, was the most likely source of relinquished nitrogen load to meet the required offset. It therefore made sense to define the offset load requirement in terms that

⁴ Attendees were: Lisa Jenkins, Ian (Whit) Whitehouse, Andrew Parrish, David Just, Ned Norton, Ben Ensor, Josh Brown, Andrew Barton, Bianca Sullivan Chris Pile, Christina Robb, Rhys Narbey, Lauren Phillips, Helen Marr.

⁵ Attendees were: Lisa Jenkins, Ian (Whit) Whitehouse, Ned Norton, Josh Brown, Andrew Barton, Bianca Sullivan Chris Pile, Rhys Narbey, Lauren Phillips. Apologies were sent by Ben Ensor, Andrew Parrish, David Just and Scott Pearson.

were relatable to AIC's allocation and nutrient management system. This still makes sense now.

After the Norton paper (16 March 2018) was circulated to the SSG and HWZC, some feedback was received by ECan from Fish and Game via an email from Scott Pearson dated 23 March 2018. Scott clarified that no consensus was reached at the 12 March 2018 Sub-group meeting on whether Method 1 or 2 should be used, and he made the point that if an environmentally precautionary approach were taken one would not opt for the lower offset tonnage figure of 38 t-N/yr source load (i.e. the Method 2 result). This feedback prompted further discussion at the subsequent Sub-group meeting on 28 March 2018 where it was identified that the higher offset tonnage figure of 70 t-N/yr source load generated by using Method 1 was not directly relatable to AIC's nitrogen load allocation and nutrient management system. These matters are given further technical consideration below.

First, on the matter of taking a precautionary approach, a level of precaution has already been deliberately and explicitly built into the approach before getting to the point of employing either Method 1 or 2 to make the final calculation. This is because the offset tonnage has been based on the "*plausible worst case*" increase in N load from permitting normal dryland farming, based on "*plausible worst case*" increases in area of winter grazing of forage crops. This has been systematically assessed and discussed in multiple SSG meetings as indicated in the titles of the papers listed under key steps of the process in the previous section. That technical work suggests, using multiple intersecting lines of evidence, that the increase in N load from permitting normal dryland farming is likely to be less than the "*plausible worst case*" used for calculating a required offset tonnage (e.g., J. Brown February 2018; Norton 29 January 2018; Norton 7 March 2018b).

Second, on the merits of using Method 1 or 2 to make the final calculation, it is true that the Method 1 offset tonnage figure of 70 t-N/yr source load is not directly relatable to AIC's nitrogen load allocation. This is because the 70 t-N/yr figure is from a GIS-based method that uses nutrient loss rates from the latest Matrix of Good Management (MGM) dataset (Mojsilovic 25 January 2018), whereas the AIC consented nitrogen load allocation (956 t-N/yr) is based on nutrient loss rates from an older "lookup table" (Lilburne et al., 2013, in P. Brown 1 November 2017), a system that is also used by Hurunui Water Project and Ngai Tahu Properties for catchment accounting of their consented nitrogen loads. For the 70 t-N/yr to be directly relatable to the AIC (and HWP and NTP) consented nitrogen load allocations it would be necessary to either convert the irrigation schemes consented loads over to MGM equivalent loads or convert the 70 t-N/yr to a "lookup table" equivalent which would be likely to result in a smaller number nearer to the 38 t-N/yr figure. I have not attempted to make these conversions because they would be complicated and involve further contentious assumptions. Because AIC and the other schemes are the most likely source of relinquished nitrogen load to meet the offset it seems pragmatic and technically valid in the circumstances to use the calculation method that is relatable to their consented allocation system. The Method 2 calculated 38 t-N/yr source load is directly relatable to the AIC, HWP and NTP consented loads (i.e., is 'apples to apples') as already noted above.

Finally, it is noted that Scott Pearson's feedback on behalf of Fish and Game (email 23 March 2018) also questioned the validity of the planning argument that had been raised at

the 12 March 2018 Sub-group meeting which contemplated that a load allowance for dryland farmers under the existing 10% rule could partially satisfy the offset and thus leave a smaller load to be relinquished by the irrigators (i.e., $38 - 30 = 8$ t-N/yr using Method 2). The validity of that planning argument is a planning matter and is not considered further in this memo.

Stating the offset nitrogen tonnage and its method of derivation together

It is clear from the discussion above that it is important to communicate the required offset nitrogen tonnage together with the method of derivation because there is more than one arguably valid way to estimate nitrogen load and the different methods give different absolute tonnages. It is most important that the method used to identify the offset tonnage requirement is equivalent to the method used for accounting the nitrogen load reductions to achieve that offset. In other words 'apples' should be compared with 'apples'.

Suggested pragmatic way forward to identify the nitrogen offset tonnage required

On behalf of the ECan technical team I still suggest a pragmatic way forward is to identify the required offset nitrogen tonnages of 8 or 38 tonnes/year source nitrogen load, depending on the outcome of a planning argument described elsewhere as to whether the current permitted "10% increase" allowance is considered to amount to an over-allocation of the current plan load limits, or if it is an allocation provided for by the plan.

References

- Brown, J. (February 2018). "Likely trends for dryland farming as a permitted activity in the Hurunui and Waiau Zone: In the context of water quality discussions". On behalf of Hurunui District Landcare Group. Prepared for Environment Canterbury, February 2018; 49p. "
- Brown, P. (6 November 2017). "Hurunui and Waiau catchment nutrient calculators". Memorandum dated 6 November 2017. Prepared for Ned Norton and the Hurunui Science Stakeholders Working Group.
- Brown, P. (1 November 2017). "Amuri Irrigation nutrient loads and management". Memorandum dated 1 November 2017. Prepared for Ned Norton and the Hurunui Science Stakeholders Working Group.
- Brown, P. (2015). "Hurunui River nutrient modelling: impact of dryland intensification". Memorandum dated 15 March 2015. Prepared for the Hurunui, Waiau and Jed Nutrient Working Group.
- Brown, P. (2014). "Statement of evidence of P Brown for Ngai Tahu Properties consent application CRC144606", 20 May 2014"

Mojsilovic, O. (6 November 2017). "Estimates of area for winter forage crops in Hurunui and Waiau catchments". Environment Canterbury Memorandum dated 6 November 2017. 5p.

Mojsilovic, O. (25 January 2018). "Modelling changes in Hurunui and Waiau catchment root zone nitrogen losses from hypothetical scenarios of permitted winter forage development. Memorandum dated 25 January 2018. Prepared for Environment Canterbury. 3p.

Norton, N. (7 March 2018a). What is the risk of increase to the area of winter grazing of forage crops if "normal dryland farming" is permitted? Presentation to the Hurunui Science Stakeholders Group workshop hosted by the Hurunui Waiau Zone Committee, St Johns Hall, Amberley, 7 March 2018. Prepared for Environment Canterbury

Norton, N. (7 March 2018b). What is the "plausible worst case" increase in N load from permitting "normal dryland farming" – and thus what tonnage needs offsetting to stay within the Hurunui catchment N load limit? Presentation to the Hurunui Science Stakeholders Group workshop hosted by the Hurunui Waiau Zone Committee, St Johns Hall, Amberley, 7 March 2018. Prepared for Environment Canterbury

Norton, N. (29 January 2018). "What do we know about future nutrient losses in the Waiau catchment from both irrigated and dryland development, and under different assumed amounts of permitted winter grazing of forage crops?". Agenda paper presented to a public workshop hosted by the Hurunui Waiau Zone Committee and Science Stakeholders Group, Hurunui District Council Chambers, Amberley, 29 January 2018. Prepared for Environment Canterbury. 7p.

Norton, N. (16 March 2018). "*Estimating the 'plausible worst case' increase in nitrogen load from a new way of permitting 'normal dryland farming', that would need to be offset by decreases elsewhere in order to stay within the Hurunui Waiau River Regional Plan (HWRRP) nitrogen load limit*" Paper circulated to the Hurunui Waiau Zone Committee and Hurunui Science Stakeholders Group by email on 16 March 2018. 8p.

Attachment 1: Invited organisations listed in the Terms of Reference for the Hurunui Science Stakeholders Group (as agreed by the Group and Hurunui Waiau Zone Committee in December 2016)

- Te Rūnanga o Ngāi Tahu (TRoNT);
- Kaikōura Rūnanga;
- Ngāi Tūāhuriri;
- Amuri Irrigation Company;
- Ngai Tahu Farms;
- Hurunui Water Project;
- Cheviot Irrigators Group;
- Fish and Game;
- Forest and Bird;
- Department of Conservation;
- North Canterbury Landcare Group;
- Federated Farmers;
- Rural Advocacy Group;
- Beef and Lamb;
- Deer NZ;
- Dairy NZ;
- Fonterra;
- Foundation for Arable Research;
- Horticulture NZ;
- Balance;
- Ravensdown;
- Whitewater NZ;
- Whitewater Canoe Club;
- Jet Boating NZ;
- Canterbury Tourism;
- Hurunui District Council;
- Canterbury District Health Board;
- Environment Canterbury.