Irrigation for a thriving and sustainable New Zealand

SUBMISSION

Action for Healthy Waterways

Date:	31 October 2019
Name of Submitter:	Irrigation New Zealand Incorporated
Postal Address:	PO Box 69119
	Lincoln 7640
Telephone:	03 341 2225
Mobile:	021 454 615
E-mail:	esoal@irrigationnz.co.nz

Elizabeth Soal, Chief Executive Officer, Irrigation New Zealand

About Irrigation New Zealand

1. Irrigation New Zealand (INZ) represents over 3,500 members nationally, including irrigation schemes, individual irrigators, and the irrigation service sector. Our irrigator members include a wide range of farmers and growers – sheep and beef, dairy and cropping farmers, horticulturalists, and winegrowers. We represent over 120 irrigation service industries – manufacturers, distributors, irrigation design and install companies, and irrigation decision support services.

2. We are a voluntary-membership, not-for-profit organisation whose mission is to create an environment for the responsible use of water for food and fibre production.

3. As an organisation we actively promote best practice irrigation and carry out a range of training and education activities. Over the last five years we have trained over 3,000 irrigators on different aspects of irrigation best practice to improve water use efficiency and better manage environmental effects.

4. INZ members share many of the same goals as other New Zealanders:
   - to reduce their environmental footprints and see improvements in the health of our waterways
   - to contribute to the wellbeing of their communities
   - to provide for a sustainable future for New Zealand.

5. INZ appreciates the opportunity to provide feedback on this critically important package of proposed freshwater proposals. Whatever the final outcomes of this process at the national level, implementation "on the ground" will be a crucial factor in their success or otherwise, and what the outcomes for communities are – both positive and negative.

6. INZ would therefore urge consideration to be given to implementation when making decisions on this package. Capacity and capability to roll out some of these measures and regulations is a real concern – both for those working in the sector and for regional authorities, who are already under considerable pressure in relation to the levels of service they provide with a very limited source of funding.

7. INZ recognises the need to improve and maintain our water quality. We wish to work alongside government (both central and local) in the attainment of this goal. However, the good work that has already been done by irrigators, farmers, and communities in many parts of the country, both in relation managing environmental risks at the farm and catchment-scale, and significant community participation in freshwater planning processes, should not be undone or replaced by nationally-set standards and regulations.

8. Effective planning that allows regional, catchment-scale, and farm-level innovation will lead to better water quality outcomes as well as supporting the contribution farming and growing makes to our country's wellbeing.

1. Proposal - Te Mana o te Wai

INZ's position

Oppose in part

Reasoning

1.1. Irrigation New Zealand (INZ), supports the submissions of Opuha Water Limited in relation to the proposed broadening of Te Mana o te Wai, as set out below.

1.2. Te Mana o te Wai, as conceptualised by Policy AA1 of the current National Policy Statement for Freshwater Management (NPSFM), recognises the connection between water and the broader environment – Te Hauora o te Taiao (the health of the environment), Te Hauora o te Wai (the health of the waterbody) and Te Hauora o te Tangata (the health of the people). Underpinning it is the requirement for regional councils to set freshwater objectives and limits that are informed by community-led discussion and decision-making about the values of freshwater in their area or rohe.

1.3. INZ is concerned about the proposals to significantly broaden the NPS-FM17's concept of Te Mana o te Wai to include a "hierarchy of obligations", comprising a prioritisation of stated freshwater functions/uses. The hierarchy, which is embedded in the proposed NPSFM as its primary objective, Objective 2.1, utilises non-Resource Management Act (RMA) terminology and phrases and is inconsistent with Part 2 of the RMA, particularly section 5. As a subsidiary instrument of the RMA, the Proposed NPS cannot change core elements of the RMA and must achieve the purpose of the RMA. We therefore question whether this aspect of the proposals is intra vires the RMA.

1.4. INZ is also concerned that the implications of implementing Objective 2.1 have not been fully considered. In INZ's view, Objective 2.1 would have the effect of undermining the community-led freshwater values identification processes by predetermining the outcomes of such processes, and related decisions on freshwater objectives and limits.

1.5. It would also undermine existing freshwater plans that have been promulgated under the current NPSFM, including those with region-specific priority policies that have informed freshwater objectives and limit setting processes (for instance, in Canterbury). Retrofitting such existing plans to ensure alignment with Objective 2.1 would come at significant cost to regional councils and affected communities, many of which are already experiencing considerable fatigue from ongoing freshwater plan and plan change processes necessitated by a continually evolving national freshwater policy framework.

2. Proposal - New planning process for freshwater through amending the RMA

INZ's position

Support in part

Reasoning

2.1. INZ supports the proposed mixed model for the appointment of hearing panels, which will include accredited freshwater specialists and tangata whenua appointments, along with local representation.

2.2. INZ supports the submission of Environment Canterbury (ECan), that consideration be given to elected councillors not being appointed to hearing panels, at paragraph 28 of its submission which states:

We support…a mixed model for the appointment of hearing panels — a mix of government, and tangata whenua appointments. We suggest that elected councillors are not appointed to freshwater panels to provide for greater independence in the process.

2.3. However, INZ is concerned about the limitations on appeal rights as proposed, particularly only allowing appeals on points of law to the High Court as the highest appeal authority in the case of councils rejecting a decision of a hearing panel. Having a higher appeal authority when a council has rejected a hearing panel decision is critical to ensuring that we continue to maintain and grow our body of case law and jurisprudential guidance and reasoning, given that the first level of appeal under this avenue is on merit to the Environment Court.

2.4. INZ is also cautious about limiting or curtailing merit appeals to the Environment Court even when a Council has adopted the recommendations of a hearing panel. Merit appeal processes have proved to be an important area for the development of case law and interpretation of planning instruments. High Court appeals are more costly and generally more complex than Environment Court processes and so removing this appeal avenue could curtail stakeholders' participation in these important matters. We are also concerned about the policy driver behind curtailing appeal rights for the purpose of expediency or the need to meet prescribed timeframes.

2.5. INZ supports the submission of ECan at paragraph 30 which states:

We propose that the new planning process apply to all plans (not just freshwater). In practice, it is difficult to ring-fence freshwater issues. Doing so could lead to less integration. For example, near the interface with the coastal environment it would be difficult to compartmentalise freshwater matters.

3. Proposal - Exceptions for major hydro schemes

INZ's position

Oppose in part, support in part

Reasoning

3.1. INZ does not support the principle of allowing nationally-set exceptions to water quality bottom lines to provide for the operational requirements of *one type of industry* and not others. However, we recognise the importance of hydroelectricity generation in order that New Zealand maintain its high levels of renewable energy production.

3.2. INZ also recognises that the exception is already provided for in the current NPSFM (and that this also provides for the National Policy Statement on Renewable Energy Generation) and that uncertainty currently exists as to which hydro schemes the exception would apply to. Therefore, the proposed wording clarifies to which catchments and hydro schemes these exceptions apply, which is a good thing for planning certainty.

3.3 So, although opposed to the general principle, INZ supports the need for certainty in the application of the exception if it is to remain within the NPSFM.

Changes sought to proposal

Remove exception, or if exception is to remain, list the major schemes it applies to, as drafted.

4. Proposal - New attributes and national bottom lines – dissolved inorganic nitrogen (DIN) and dissolved reactive phosphorous (DRP)

INZ's position

Oppose in part

INZ submits that nationally-set bottom lines for DIN and DRP are not appropriate. Instead, DIN and DRP attribute indicators should be maintained at current levels or improved, until regionally-set, site-specific levels are put in place, as has already been done in some areas.

Reasoning

4.1. In principle when setting national bottom lines, the following should be true:

- The attribute and its level should be effects-based.
- for a single attribute to be set as a national bottom line, the resulting effect or risk of effect should be consistent across New Zealand.

4.2. It is our view that a number of national bottom lines do not meet the above principles while others do. The attributes that *do*, in our opinion, are:

- *E. coli* for contact recreation
- Dissolved Oxygen (DO) for ecological health
- N toxicity for ecosystem health
- Sediment effects on aquatic habitat.[1]

4.3. It is our understanding that the relative effects of the proposed national bottom line concentrations for DIN and DRP can range from benign to severe[2] depending on the receiving environment and ecosystem health can vary widely with the same nutrient concentrations in different parts of the country.[3]

4.4. Physical habitat measures have been left out of the NPSFM which we considered unfortunate. This is because physical habitat is a significant driver of ecological outcomes. The quality of the different habitats in streams is defined by the relative abundance of animals in them. Usually, animals will be most abundant where habitat quality is best, in lesser numbers where habitat is poor and absent from unsuitable habitat.[4] There is significant risk that without understanding the physical habitat status of rivers and thereby ignoring it to focus on nutrients that no significant ecological gains will be made even with significant improvements in nutrient concentrations.

4.5. Our view is that physical habitat quality assessment should be made to determine if it would adequately provide for the species expected to be present. If physical habitat is degraded it should be given precedence for action.[5] This would encourage restoration of wetlands and natural stream channels.

4.6. We understand that the policy direction is that all water ways in New Zealand are to be covered by FMU limits for water quality and quantity by 2025. We agree that existing water quality should be maintained[6] and where water quality is not meeting specific limits it is to be enhanced.

4.7. Our view is that national bottom lines with specific values should be set for attributes that have consistent effects across New Zealand for the desired outcomes (e.g. *E. coli* for contact recreation). However, where different attribute concentrations achieve different outcomes across New Zealand, we believe these should be set as specific

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[1] We agree that sediment standards (both suspended and deposited) should be referenced to specific catchment sediment class via the River Environment Classification.

[2] For instance, in rivers with warm temperatures and long accrual times.

[3] Waipahi River at Cairns Peak has a median DIN level of ~1mg/L and a median MCI score of 108.3 while Waiwera at Maws Farm has a median DIN level <1mg/L and a median MCI score of 84.5. State of the Environment Surface Water Quality in Otago 2006 to 2017. ORC report available at www.orc.govt.nz/media/6957/final_orc_soe_report_2006_to_2017.pdf

[4] Jowett, I.G., Hayes J.W. and Duncan, M. J. 2008. *A guide to instream habitat survey and methods*. NIWA Science and Technology Series No. 54.

[5] https://www.cawthron.org.nz/coastal-freshwater/news/2016/community-action-brings-river-back-life/

[6] We know that observed water quality now may deteriorate due to practices some decades ago in some catchments.

measures on a site-specific scale, based on site-specific science through the imminent or completed FMU process.[7]

4.8. Sediment is recognised as a leading cause of biological impairment in rivers and streams of many countries.[8] We have confidence in the cause and effect science behind the effects of sediment on rivers, lakes and estuaries. We would support the government to focus strongly on measures that reduce sediment input to streams where it is identified as an issue, as sediment input is generally more deleterious to the health of grassland streams than augmented nutrient concentrations.[9]

4.9. Though the attempt to set a single combination of DIN and DRP as a bottom line across New Zealand is commendable and it would surely make monitoring consistent and simple the issue we have is that the expected outcomes are not predictable.[9,10] For this reason, we have less confidence in the science for setting DIN and DRP concentration limits for causal effects on ecosystem health at a national scale. We are aware of casual links to nitrogen regarding toxicity[11] but not with respect to DRP. Some science suggests that where sediment is controlled then some elevation in nutrients can increase invertebrate abundance.[9]

4.10. The proposed DIN and DRP limits have been based on correlations between measured ecological outcomes and nutrient concentration.[12] We note the proposed standards were inspired by Death 2018 *et al,* but no reference was cited.[13] Having searched to find weighted line of evidence criteria by Dr Death we found two papers with links provided below.[14,15] Immediately we find recommended ecosystem health bottom lines from these two sources with differing ecosystem health bottom lines (despite the papers being titled the same) of 1.66 mg/L for nitrate and 0.054 mg/L for DRP[14] and 1.33 mg/L for nitrate and 0.068 mg/L for DRP.[15]

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[7] All councils to notify FMU plans by 2023 and be operative by 2025.

[8] USEPA (U.S. Environmental Protection Agency). 2000. *The quality of our nation's waters: a summary of the National Water Quality Inventory*. 1998 report to Congress. EPA-841-S-001. Office of Water, U.S. Environmental Protection Agency, Washington, D.C., USA.

[9] Matthaei, C.D., Piggott, J.J., and Townsend, C.R (2010) 'Multiple stressors in agricultural streams: interactions among sediment addition, nutrient enrichment and water abstraction.' *Journal of Applied Ecology*. Vol 47:3.

[10] For example, see Townsend, C.R., Uhlmann, S.S., and Matthaei, C.D. *Individual and combined responses of stream ecosystems to multiple stressors*. Journal of Applied Ecology. Vol 45 Issue 6.

[11] Hickey, C.W. 2013. *Updating nitrate toxicity effects on freshwater aquatic species*. Prepared for Ministry of Building, Innovation and Employment: Funded by Envirolink.

[12] 3rd bullet point of Appendix 4 of Freshwater Science and Technical Advisory Group Report to the Minister for the Environment. 2019

[13] Appendix 4 of above.

[14] http://pnrp.gw.govt.nz/assets/Uploads/HS4-S308-Fish-and-Game-Russell-Death-Expert-evidence-26-January-2018-Attachment2.pdf.

[15] Page 10 of Feedback on the "clean water" discussion document and the proposed freshwater reforms 2017 from Choose Clean Water NZ.
https://www.mfe.govt.nz/sites/default/files/media/Choose%20Clean%20Water.pdf

CASE STUDY - WAIKAKAHI STREAM: THE IMPORTANCE OF HABITAT

For full information, see Cawthron Institute Reports numbers 2230 and 2350, available at https://www.cawthron.org.nz/publications/?q=waikakahi

The Waikākahi stream in South Canterbury is an example of a waterway high in nitrogen, but improvements made to its habitat over time have returned it to being a healthy ecosystem.

The need to reduce nutrient levels in the stream was recognised by Environment Canterbury (ECan) in the first iteration of its Land and Water Regional Plan (LWRP), where the stream catchment area was designated as one where water quality outcomes are not being met (a "Red Zone").

The current 5-year medians for DIN and DRP show that the stream would not comply with the proposed bottom lines for these attributes.

Site name	DIN 5-yr med. (monitored)	NPSFM 2019 DIN	LWRP ann. Med.	DRP 5-year med. (monitored)	NPSFM 2019 DRP	LWRP ann. med
Waikākahi Stream at Te Maiharoa Rd	3.105	1.0	2.652	0.0605	0.018	0.06

In order to address the high levels of nitrogen in the stream, ECan has set policies, rules, and limits for the catchment through the extensive community-consultation process undertaken through Plan Change 5 to the LWRP, through a community collaborative process led by the Lower Waitaki-South Coastal Canterbury Zone Committee.*

Policy 15B.4.22 of the Canterbury Land and Water Regional Plan provides that:

Water quality is maintained within the Greater Waikākahi Zone by:

a. *avoiding from 1 July 2020, the granting of a resource consent that will allow the nitrogen loss calculation from a farming activity within the Greater Waikākahi Zone to exceed the Baseline GMP Loss Rate, except where Policy 15B.4.24 applies; and*
b. *requiring, from 1 July 2020, farming activities in the Greater Waikākahi Zone to operate at the Good Management Practice Loss Rate, in any circumstance where that Good Management Practice Loss Rate has not been influenced by severe extraordinary events (including but not limited to droughts or floods) and is less than the Baseline GMP Loss Rate.*

The rules for the sub-catchment to implement these policies include audited Farm Environment Plans that require nutrient budgeting, the avoidance of adverse effects on water quality, and compliance with the GMP loss rates for nitrogen.

*Note that Section 15B of the LWRP sets limits based on annual medians and annual maximum values, as opposed to the proposed national bottom line attributes which are based on 5-year medians.

The stream had previously been highly regarded as a brown trout fishery, and was also an important habitat for indigenous biodiversity, including tuna (eels), bully, koura (freshwater crayfish), and kākahi (freshwater mussels).

Habitat declined over time due to land-use intensification, particularly due to stock access and overland sediment flows caused by the stream being largely unfenced and heavy grazing of the riparian margins occurring.

The local community has responded by implementing a stream improvement programme over the last decade. Well over 90 per cent of the stream has been fenced and extensive areas have been planted in native vegetation.

Since then, there has been a fourfold reduction in suspended sediment. Large areas provide adequate or good adult trout habitat – "good quality physical in-stream habitat can occur in areas of dairy streams where good riparian management practices are applied. This finding is made more noteworthy when considered in light of anecdotal reports describing the ubiquitously degraded state of habitat quality in the Waikākahi stream prior to the fencing initiative. It appears that physical habitat quality has improved considerably as a result of the community-led stream rehabilitation initiative" (Cawthron Institute Report No. 2350, December 2013).

Planting and shading on the Waikakahi Stream

Photo courtesy of Caswell Images

Understanding the Waikākahi Stream at a local scale and having good science allowed scientists and the community to focus on physical habitat to achieve significant ecological gains (improved trout and eel populations) which also resulted in improved water clarity and a reduction in bacteria. Good planning will allow decreases in nutrients to occur over time, but the underpinning science means nutrient targets won't act as an unnecessary distraction to remedial work that improves ecosystem health.

4.11. Despite the obvious difference between nitrate and DIN,[16] the concerning aspect is the proposed NPSFM ecosystem health bottom line values are 1 mg/L for DIN and 0.018 mg/L for DRP, both much lower than apparently recommended by Dr Death above. Because there does not appear to be a published peer review of the method outlines in the STAG report[17] for the decision to adopt the proposed DIN and DRP numbers it is not possible to reconcile these (significant) differences.

4.12. We are of the view that the foundation science in determining the DIN and DRP bottom lines[12] for the proposed NPSFM is not of a standard adequate for setting national bottom lines. The process described in the STAG report[12] shows that a regression between national datasets of ecosystem health metrics and nutrient concentrations was performed. This process assumes the observed ecosystem outcome (recorded by the ecosystem metric) was caused by the observed nutrient concentrations. We don't agree that this assumption is valid. Simply, the DIN and DRP concentrations represent correlative, not causative, relationships.

4.13. This issue has been highlighted recently for MCI which is one of the ecosystem measures used to arrive at the proposed DIN and DRP bottom lines. It was recently described as being only *one* indicator and cannot be used to identify specific stressors nor inform catchment and in-stream resource use.[18]

4.14. We have reservations that the Fish Index of Biotic Integrity (F-IBI) has been included in the methodology to determine DIN and DRP concentrations for ecosystem health. Of most concern is the DRP figure. Our expectation is that the effects of DRP on fish is over-stated and therefore the relative scales are overly conservative. We say this because it is widely documented that barriers to fish passage (via dams and culverts), commercial harvest of eel, habitat degradation and predation from introduced sports fish (trout) significantly reduces the expected distribution and abundance of native fish in New Zealand, even in pristine water quality catchments.

4.15. INZ's concern is that lowland rivers, which tend to have higher DIN and DRP concentration[19] also have native fish populations that are significantly affected by the above factors not water quality per-se. Again, the relationship observed between water quality and fish diversity and abundance is likely correlative not causative. The same issue is likely true for the ecosystem processes and periphyton (we have already explained MCI in paragraph 4.12 above).

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[16] Dissolved inorganic nitrogen (DIN) is comprised of nitrate *plus* nitrite *plus* ammonium.

[17] Freshwater Science and Technical Advisory Group Report to the Minister for the Environment. 2019.

[18] Clapcott J, Wagenhoff A, Neale M, Storey R, Smith B, Death R, Harding J, Matthaei C, Quinn J, Collier K, Atalah J, Goodwin E, Rabel H, Mackman J, Young R 2017. *Macroinvertebrate metrics for the National Policy Statement for Freshwater Management*. Prepared for the Ministry for the Environment. Cawthron Report No. 3073. 139 p. plus appendices.

[19] Larned, S.T., Snelder, T., Unwin, M.J., and McBride, G.B. 2016. *Water Quality in New Zealand Rivers: Current State and Trends*. New Zealand Journal of Marine and Freshwater Research, DOI:10.1080/00288330.2016.1150309

4.16. Further to this the ecosystem process component of the DIN and DRP concentrations is only based on 84 samples. We do not believe that a sample size this low can be representative on a national scale and therefore should not have been incorporated.

4.17. We are aware that impacted streams are often degraded for sediment, physical habitat, nutrients and bacteria but it may only be one of these stressors that caused the measured ecological impact[10] and in such a stream sediment is likely the dominant driver[20]. We are concerned that the recognised problem with aligning proposed national bottom lines for DIN and DRP to effects is downplayed on the need to recognise multiple stressors.[21]

4.18. Our view is that there is no robust way for single national bottom lines to account for the effects of site-specific multiple stressors. Trying to explain the lack of correlation of the proposed national bottom lines for DIN and DRP levels for local scale effects based on multiple stressor effects does little to provide confidence in the numbers proposed. Clearly DIN and DRP levels need to be set at a site-specific scale, accounting for other variables affects ecosystem health and how those variables interact.

4.19. The lack of correlation between the national numbers and local observed effects in our view undermines the concept and will simply reduce confidence in the NPSFM process by those most affected.

4.20. We note that the STAG group recommend that for DIN and DRP for the:

- "Recognition in narratives that nationally correlative relationships do not always translate to site-specific thresholds."[22]

4.21. Our view is that because the nationally correlative relationships do not reliably translate to site-specific thresholds, they should not be used to set site-specific limits or targets (which national bottom lines are) under the NPSFM. We contend that without knowing the finer detail of the receiving environment and values present setting DIN and DRP bottom lines at a national scale may not lead to expected ecological outcomes.

4.22. Instead, this should be done at the regional or sub-regional scale, when setting limits for specific FMUs.

4.23. It is INZ's belief that it would be more accurate to reflect if a river fails the national bottom line by assessing the biologically relevant metrics (such as MCI) or human health metrics (*E.coli*) than to rely on a single attribute such as DIN or DRP.

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[20] Matthaei, C.D., Piggott, J.J., and Townsend, C.R 2010. 'Multiple stressors in agricultural streams: interactions among sediment addition, nutrient enrichment and water abstraction.' *Journal of Applied Ecology* Vol 47 Issue 3

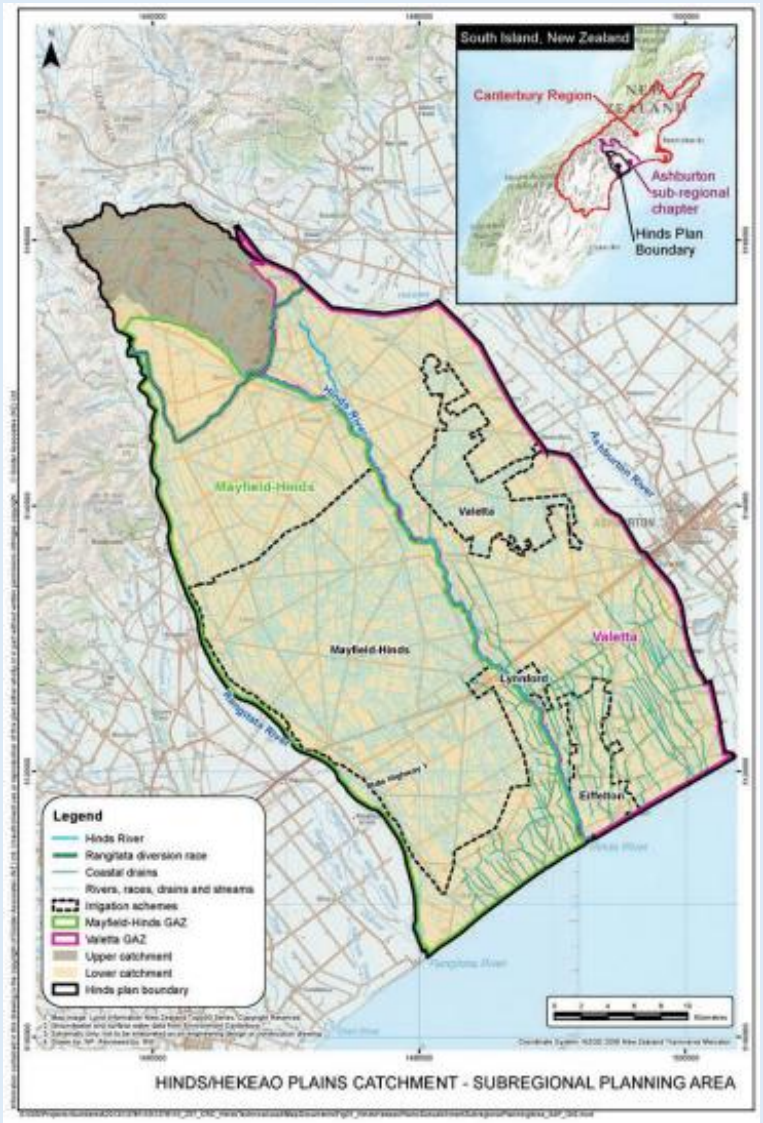
[21] Freshwater Science and Technical Advisory Group Report to the Minister for the Environment. 2019.

[22] Pg 55, second bullet point of Freshwater Science and Technical Advisory Group Report to the Minister for the Environment. 2019

CASE STUDY - IMPACT OF PROPOSED DIN BOTTOM LINE IN THE HINDS/HEKEAO PLAINS

The Hinds/Hekeao Plains covers approximately 1,375 km^2 between the Ashburton and Rangitata Rivers in Mid-Canterbury (Figure 1). The hydrology is characterised by high rainfall and stony, free draining soils near the foothills, and low rainfall and heavy soils in the historic swamp land near the sea. Rainfall in the foothills and plains and recharge from the Ashburton/Hakatere and Rangitata rivers feed into groundwater system, which in turn can be seen as springs further down the plains (Figure 2**Error! Reference source not found.**).

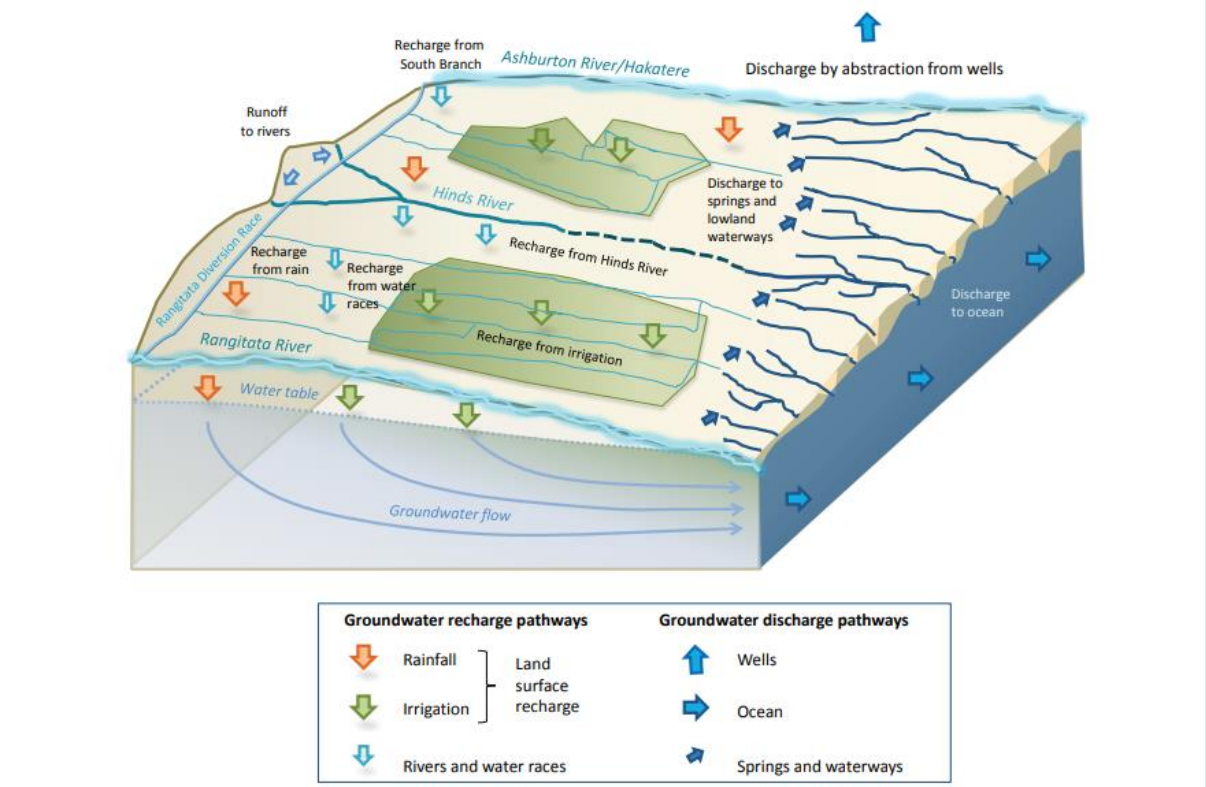
Figure 1: Boundary of the Hinds/Hekeao Plains



Historically, the land between State Highway 1 and the sea was a series of swampy wetlands fed by springs and the Hinds River and was an important source of mahinga kai for Te Rūnanga o Arowhenua. In the 1800s, European settlers saw the potential for using this land for production

and drained the wetlands, creating what is now known as the Hinds/Hekeao Drains. Early European settlers also channelised the Hinds River to create an outlet to the sea.[23]

Figure 2: Conceptual block diagram of the groundwater system in the Hinds/Hekeao Plains (not to scale)



The benefits of irrigation for the area were identified as early as the 1880s and the Rangitata Diversion Race (RDR) was established in the 1930s.[24] Irrigation has been in place for over 75 years, with the majority of the catchment irrigated by either irrigation schemes, or individual groundwater or surface water takes.

Land use has changed considerably in the area, with low intensity sheep, deer and beef systems dominating until the 1980s, moving to irrigated dairy and dairy support after the economic reforms of the 1980s and improvements in irrigation technology became available (Figure 3).

Due to the connectivity between the groundwater and lowland springs feeding the Hinds/Hekeao Plains, nitrate levels in the groundwater will drive nitrate levels in the lowland drains[25]. Under the historic border-dyke irrigation, low-intensity livestock farming systems common pre-1980s, nitrate levels in the groundwater averaged ~3.3 ppm (Figure 4) and have increased significantly over the past 20 years (Figure 5)..

[23] Bower, R. *Hinds/Hekeao Technical Overview – Subregional Plan Development Process*, Environment Canterbury Technical Report R14/79 (2014)

[24] Body, A and Cushnie, C. *Water, Farming and Families – the Mayfield Hinds Irrigation Scheme*, Mayfield Hinds Irrigation (2015)

[25] Note Nitrate levels will be a good approximation for Dissolved Inorganic Nitrogen (DIN) as sources of ammonia and nitrite are limited.

Figure 3: Land Use in the Hinds Hekeao Plains[26]

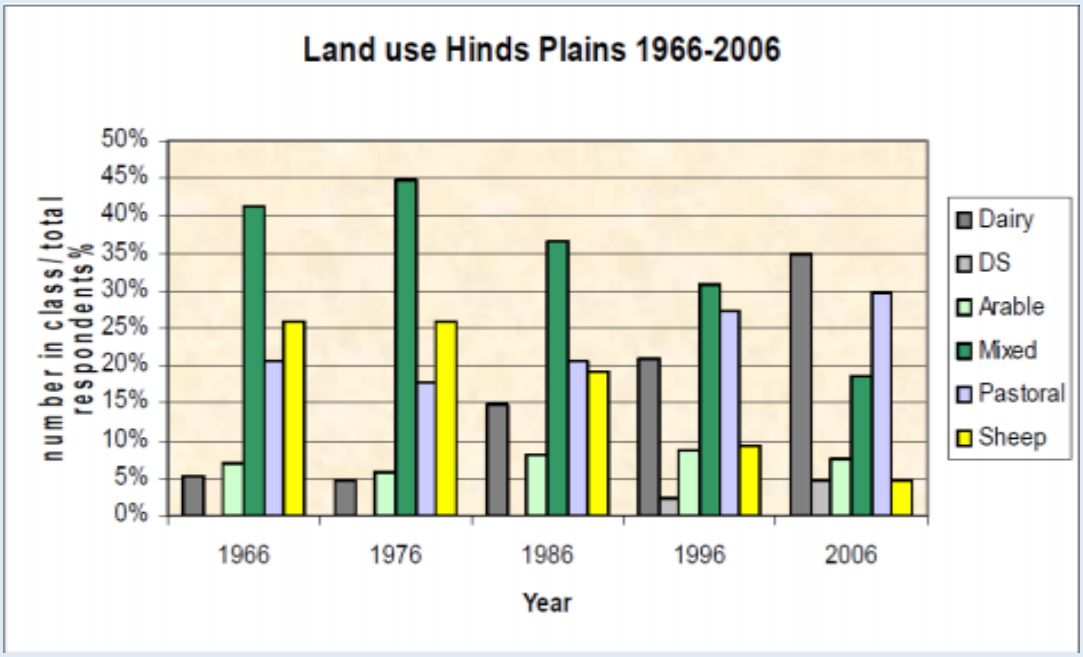


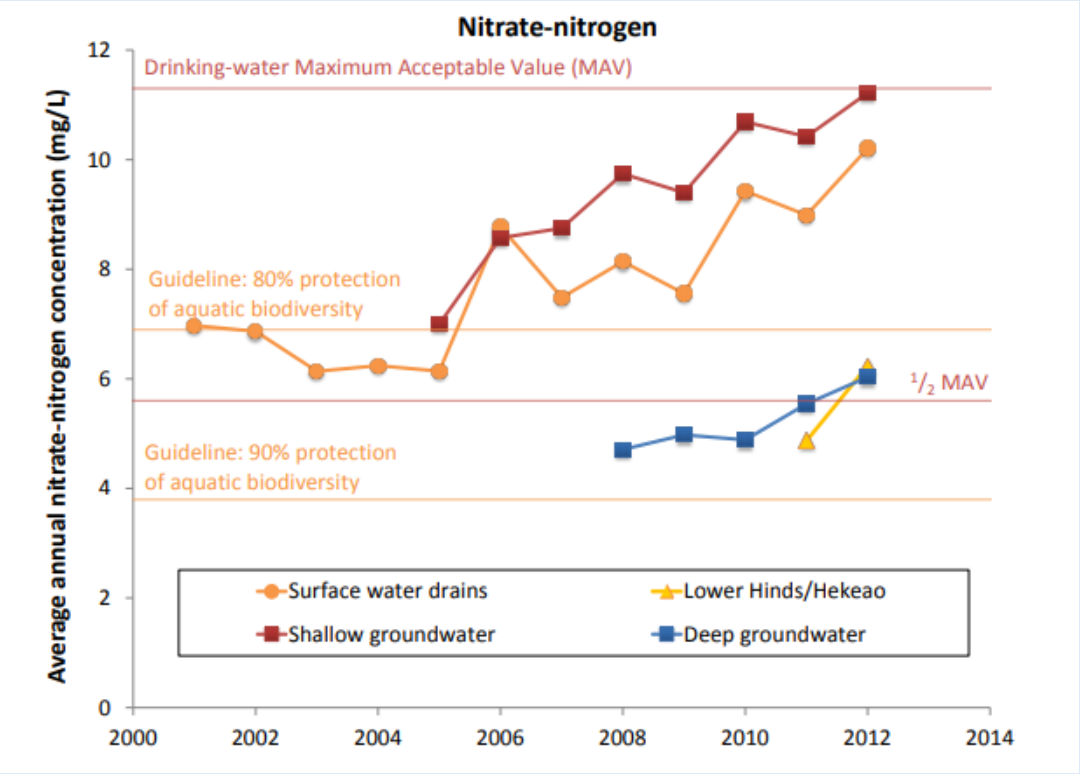
Figure 4: Nitrate nitrogen concentrations measured in groundwater samples collected on the Ashburton-Hinds prior to 2004[27]

Well No	Well depth (m)	Samples collected			Nitrate nitrogen (mg/L)
		Count	First	Last	
K36/0118	11.3	12	1992	2003	2.2 - 8.1
K37/0028	5.1	1	1994	1994	1.9
K37/0087	16	1	1995	1995	3.5
K37/0088	10.1	1	1995	1995	11
K37/0114	9.3	7	1991	1997	5 - 8.5
K37/0147	9.8	10	1995	2003	0.6 - 13
K37/0216	9.5	12	1992	2003	4.5 - 10.3
K37/0222	18.7	5	1988	1993	1.6 - 3.9
K37/0358	15.6	9	1995	2003	11 - 12.8
K37/0466	6	13	1991	2003	1.3 - 6.3
K37/0467	8.2	7	1991	1997	1.1 - 4.3
K37/0468	9.1	13	1991	2003	1.6 - 6.5
K37/0516	46.9	1	1995	1995	0.6
K37/0563	0	2	1994	1995	0.9 - 1.9
K37/0619	55	7	1997	2003	2.6 - 3.3
K37/0833	10	6	1998	2003	4.3 - 8

[26] Durney, P. et.al. *Integrated Catchment Modelling of the Hinds Plains* Environment Canterbury Technical Report No. R14/64 (2014)

[27] Hanson, C., Abraham, P. *Nitrate contamination and groundwater chemistry – Ashburton-Hinds Plain*, Environment Canterbury Technical Report R10/143 (2010)

Figure 5: Annual Average Concentrations of Nitrate in Monitoring Wells and Spring-Fed Waterways in the Hinds/Hekeao Plains[28]



In response, ECan initiated a sub-regional planning process to set nitrogen loss reduction targets to achieve an average nitrate concentration of 6.9 ppm in the lowland streams. This process involved extension community engagement, including with Te Rūnanga o Arowhenua, Fish and Game and community representatives. Through this process, new rules were introduced to reduce nitrogen losses on the plains by 36%, with implementation of Managed Aquifer Recharge (MAR) to further reduce nitrate levels, under Plan Change to the LWRP.

As part of the sub-regional process, numerous scenarios were proposed to understand the reduction required and the impact these reductions would have on the community and what benefit these changes would have to water quality. The on-farm nitrogen loss scenarios were assessed by Mark Everest of Macfarlane Rural Business in the document titled *Hinds Catchment Nutrient and On-Farm Economic Modelling (2013)* and included:

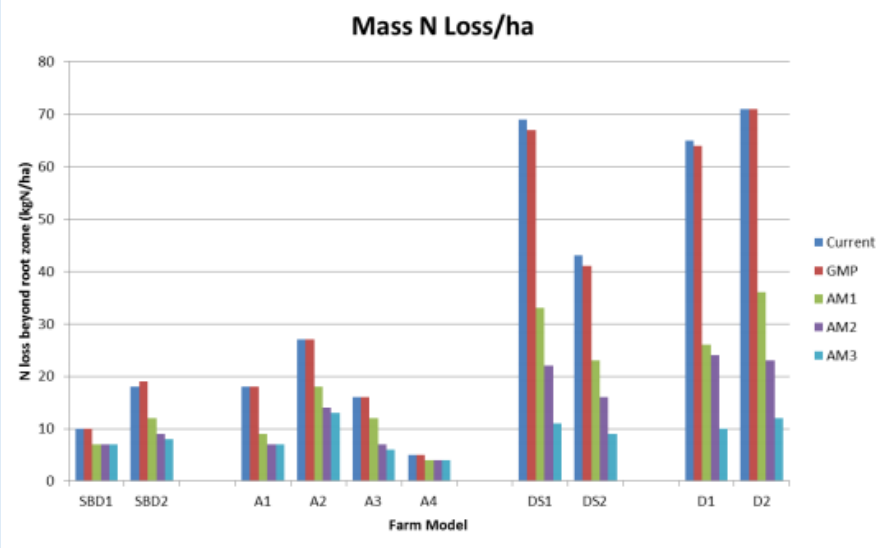
1. Baseline (no change in land use)
2. Good Management Practice (GMP)
3. Advanced Mitigation 1 (AM1)
4. Advanced Mitigation 2 (AM2)
5. Advanced Mitigation 3 (AM3)

Advanced Mitigation 3 (AM3) was considered the *"beyond optimism"* scenario that deliberately modelled extreme nitrogen loss reductions to understand the economic impact. Nitrogen loss

[28] Scott, Lisa *Hinds Plains Water Quality Modelling for the Limit Setting Process*, Environment Canterbury Technical Report No. R13/93 (2013)

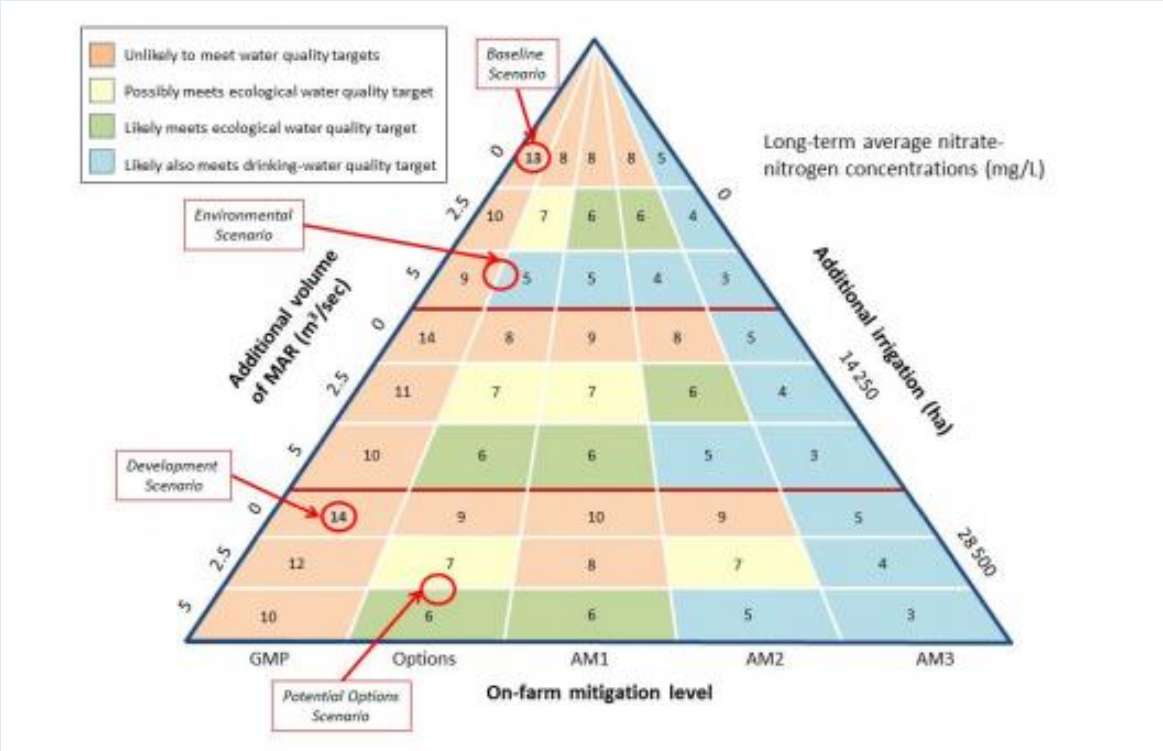
reductions modelled varied from between a 20% reduction for dryland arable properties to up to 85% reductions for intensive dairy systems (Figure 6).

Figure 6: Modelled Nitrogen Loss by Farm System Type and Mitigation Level[29]



When the estimated catchment loads were modelled assuming AM3 practices and MAR were implemented, nitrate levels in the Hinds/Hekeao Drains could still only achieve 3ppm (Figure 7) - three times the proposed 1 ppm national bottom line limit.

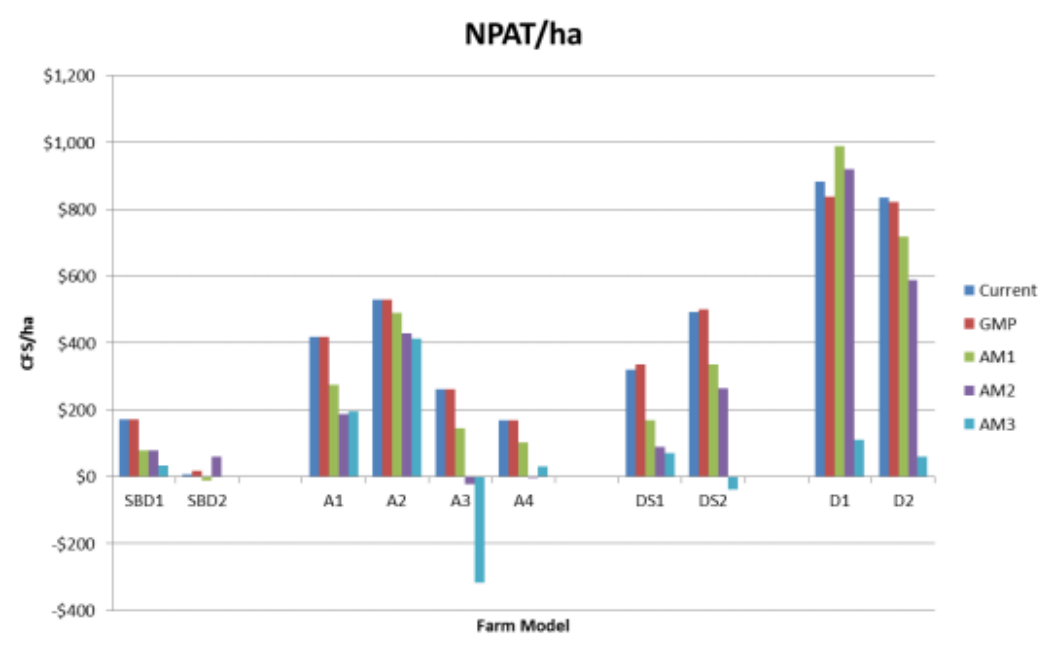
Figure 7: Summary of estimated average nitrate concentration from various permutations of intensification, on-farm mitigation and augmentation[1]



[29] Everest, M. *Hinds Catchment nutrient and on-farm economic modelling*, Environment Canterbury Technical Report R13/109 (2013)

To understand the economic implications of these changes, Everest (2013) modelled the impact on Net Profit After Tax (NPAT) for each of the modelled farm systems at the different mitigation levels. Overall, implementation of AM3 farm systems would result in reductions of NPAT of between 22% and 221% (Figure 8).

Figure 8: Modelled results for whole farm nitrate concentrations in soil drainage and net profit after tax for ten farm systems under five different levels of management[30]



For MHV Water shareholders, who account for approximately 42% of the Hinds/Hekeao zone, the modelled reduction to Nitrate leaching to achieve 3 ppm resulted in a reduction of NPAT of 90% from current levels, removing approximately $36.7m per year out of the Ashburton and wider economies. This significantly reduces funds available for debt repayment and environmental mitigations to an unsustainable level.

The results of the above analysis was used for the Hinds/Hekeao planning process and the community agreed the impacts of achieving the 3ppm at the AM3 mitigation standards were too significant and therefore set the expectation to achieve 6.9 ppm instead.

Impact on Community of 1 ppm DIN

The analysis completed by Everest for the Hinds/Hekeao sub-regional planning process demonstrates the potential economic impact of on-farm reductions needed to achieve a 3ppm DIN limit in this catchment. We also note historic extensive livestock operations under border-dyke irrigation also resulted in average nitrate levels of 3.3 ppm.

[30] Everest, M. *Hinds Catchment nutrient and on-farm economic modelling*, Environment Canterbury Technical Report R13/109 (2013)

If a 1 ppm DIN bottom line limit was implemented under the proposed NPSFM, there will need to be a wholesale change in land use on the Hinds/Hekeao plains, potentially to forestry. We are not aware of any other land use capable of nitrogen loss reductions sufficient to meet the standard. Effectively, the National Bottom Line Standard of 1ppm for DIN in the Hinds/Hekeao Drains is unachievable, and there is evidence to suggest the macroinvertebrate health of the waterway will not materially improve with a lower DIN to the current toxicity limit of 6.9 ppm[31].

The farmers in the catchment are actively engaged with the planning process and are on-board with meeting the targets set in Plan Change 2. Overriding the limits set through that process to implement an unachievable DIN bottom line would undermine this farmer engagement across the Hinds/Hekeao Plains.

The impact on the communities within the catchment will also be detrimental. Conversions of productive land to, say, forestry would result in a reduction of employment opportunities, population size, fewer schools, teachers, and social services. Furthermore, as income reduces, farmers will be under pressure to reduce their staff numbers and take on more work themselves. By spending more time on the farm, there is less capacity to engage with the wider community, volunteer and provide support to others, creating isolation and reducing the strength of rural support networks.

Ultimately, a reduction in income of this scale removes the dignity of self-sufficiency and being able to provide for oneself, one's children and one's community. Farmers are intimately connected with their land and the pride of being able to pass on a sustainable business to their children is an integral part of their self-identity. Removing all potential for livestock grazing of any sort on the plains will mean passing on the family farm is no longer an option.

Stress, isolation and a loss of connection will result in a deterioration of mental health and wellbeing of the 4,500 people[32] who live in this catchment. Many thousands more are dependent on the success of this area for their livelihoods and acceptance of DIN bottom lines which can have these impacts seems be at odds with the values of the government who *"have put the wellbeing of New Zealanders at the heart of everything we do"*.[33]

[31] See Waikakahi Stream Case Study from IrrigationNZ NPS Submission.
[32] http://archive.stats.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-a-place.aspx?request_value=14916&parent_id=14909&tabname=#14916
[33] https://www.labour.org.nz/wellbeingbudget2019-ataglance

Changes sought to proposal

INZ submits that, to ensure better water quality outcomes are achieved in an efficient[34] way:

A. The National Bottom lines specific values should be set for attributes that have consistent effects across New Zealand for the desired outcomes, these are:
    - *E. coli* for swimming/recreation
    - Sediment for aquatic habitat[35].
    - Dissolved oxygen for ecosystem effects
    - N for toxicity
B. Existing states for water quality across the following attributes should be set as local bottom lines by December 2020[36] where they are higher than the national bottom lines.
    - *E. coli*
    - Sediment
    - Dissolved oxygen
    - Nitrate[37]
    - Turbidity[38]
    - MCI

C. Through the NPSFM process (by 2025) the DIN and DRP attributes that are contained in the NOF must be set as site-specific values to:
    - Maintain existing DIN and DRP levels at 2020 levels or set more stringent DIN and DRP targets to provide for ecosystem health of the local receiving environment.
    - Where turbidity is elevated for natural reasons,[30] maintain existing turbidity levels as at 2020 or set more stringent turbidity targets to provide for ecosystem health of the local receiving environment.

Setting site-specific dissolved nutrient attribute limits allows for targeted management of the key drivers affecting ecological outcomes. It also allows specific hydrology (accrual time), receiving environment sensitivity and ecological values to be considered appropriately. It also allows case-by-case transition times to achieve targets to be set and monitored.

[34] By efficient we mean lowest input – greatest outcome, where input can be money, time or expertise.
[35] sediment standards (both suspended and deposited) should be referenced to specific catchment sediment class via the River Environment Classification to account for national variation.
[36] We would envisage all Regional Councils having to notify the existing state of their water quality by December 2020 through a formal process to make it legally binding.
[37] We recognise that in most cases the new DIN limits will mean nitrate toxicity is inconsequential as existing DIN levels for most New Zealand Rivers are lower than the nitrate toxicity levels.
[38] Many streams, often draining native forest or wetlands have naturally higher turbidity due to tannin stains, or glacial rivers can be turbid due to naturally occurring glacial flour.

5. Proposal - Improving protection for threatened indigenous species

INZ's position

Support in principle

Reasoning

5.1. INZ recognises the Importance of our indigenous species protection and the need to align freshwater policies with the National Policy Statement on Indigenous Biodiversity currently being developed.

5.2. We have reservations about the threatened species bottom lines. In principle we agree native fish should be prioritised for management. However, the effects of barriers to fish passage (via dams and culverts), commercial harvest of eel, habitat degradation and predation from introduced sports fish (trout) is of far more consequence than water quality on native fish values. In some cases, the primary driver[39] of native fish presence and abundance is the presence of trout[40]. Our point is that a lot of money could be spent on improving water quality in a catchment for threatened native fish but if the key driver of native fish presence and abundance is sports fish it will not improve the outcome[41]. We recommend some further guidance on how to assess and address these wider effects in limits-setting for the national value of threatened indigenous fish.

6. Proposal - Providing for fish passage

INZ's position

Support

Reasoning

6.2. INZ supports the need to providing appropriate infrastructure to allow for the passage of migratory indigenous fish species, as per our discussion above, this can be a critical factor in supporting indigenous fish populations.

[39] Non migratory galaxiids have been extirpated by trout in many rivers in New Zealand.
[40] The link to the following article gives a good general overview of the effects of trout on native fish https://www.stuff.co.nz/the-press/news/100983463/beloved-brown-trout-damage-native-fish-insects-and-waterways
[41] Para. 172 and 212 of the recent Environment Court Decision on the Lindis River - *Lindis Catchment Group v Otago Regional Council* (ENV-2016-CHC-61).

7. Proposal - No further loss of streams

INZ's position

Support in principle

INZ supports the principles of ensuring that there is no further net loss of streams. As a means to achieve this, consideration should be given to enabling, facilitating and supporting the easier and simpler transfer of water takes from small streams to other water sources where these options exist.

8. Proposal – *wetlands, earth disturbance, and drainage*

INZ's position

INZ's supports the protection and enhancement of wetlands. However, the formulation of rules should not lead to perverse incentives, particularly in relation to promoting the construction of wetlands as areas for indigenous biodiversity habitat as well as a method of improving water quality.

INZ supports the submission of Horticulture New Zealand in relation to wetlands, earth disturbance, and drainage.

9. Proposal - *Higher standards for swimming water quality*

INZ's position

Support

Reasoning

9.1. INZ supports the need to ensure New Zealanders can continue to enjoy swimming and other recreation in our freshwater bodies. The proposed limit for *E. coli* of 540 cfu/100ml at freshwater places where people popularly swim, is appropriate, as it allows councils to adopt a more stringent level (e.g. 260 cfu/100 ml) if deemed appropriate.

9.2. As sources of *E. coli* can vary depending on the catchment (e.g. avian, bovine, human etc.), it will be important for authorities to determine the source of *E. coli* in any given waterbody to enable them to take appropriate action through planning and other instruments to address contamination issues.

10. Proposal - Real time water use monitoring (telemetry)

INZ's position

Support in principle

INZ is supportive in principle of mandatory telemetry. There is a need to improve the current quality of data around water-use reporting and it is also important to ensure proper management and use of this data for future demand planning.

However, it may be appropriate in a limited number of circumstances for regional authorities to allow discretion in telemetry requirements. We also consider that regional discretion should be provided to allow for the roll-out of telemetry requirements.

Reasoning

Data quality and data management

9.3. Since 2012, INZ has championed the use of best practice in irrigation and water management through the facilitation of our Blue Tick accreditation programme. The aim of Blue Tick is to provide national consistency and minimum standards which industry professionals must meet - in relation to water measurement installation, verification, and data management.

9.4. By regional authorities adopting these standards, usually through consent requirements, water users are expected to engage Blue Tick accredited companies to carry out initial works, as well as provide an ongoing service, such as data management and monitoring. Though inarguably fundamental for regional authorities for compliance and (resource) decision-making purposes, for many water users, costs across the board can be significant.

10.4. It is important to highlight the responsibility and challenge that authorities will face in light of this proposal. Firstly, in terms of staff and/or resource capacity to handle the increased volume of data, and secondly, councils' ability to appropriately sight and effectively manage the quality of the data.

10.5. Ideally, effective management would involve administering and sorting data, so they are appropriately 'quality coded' according to the National Environment Monitoring Standards (NEMS).[42] Few Councils are currently working to NEMS guidelines, with some yet to develop sound systems and methods for handling and managing current data imports. A focus on this should be considered in light of changes to the current legislative framework for water use reporting.

10.6. The use of training and information platforms such as council sessions and workshops, similar to what has been led in the past between the Ministry for the Environment and

[42] National Environment Monitoring Standards for Water Metering (Measurement Processing and Archiving of Water Meter Data) Version 2.0.

INZ, would be a good start for addressing these challenges. This may assist in ensuring systems, and staff, are better prepared to capably handle the increase in work, and to introduce a measure of accountability for authorities to appropriately use the data when making informed decisions on water availability and allocation.

10.7. For example, the Northland Regional Council has a total of eight consents currently on telemetry and reporting water use information from a total of 558 other water take consents.[43] This demonstrates that many Councils are still in the early phase of development and/or set up of their internal systems, let alone the management of the data. This stems from limited staffing capacity and prioritisation of other work streams within councils.

10.8. The priority should be in ensuring the data are actually being sent in correctly, before any analysis or degree of management can take place. This requires good working relations between Council is occurring, water users and third-party data providers. It would then be expected that once set-up and reporting to Council, data is appropriately sighted, sorted, and stored to enable meaningful use when implemented at a regional scale for allocation, as well as State of the Environment reporting (for example) as well as analysis of historical use in future years.

10.9. It is essential that until Regional Councils can prove effective management and use of their data, and illustrate how it is being used for wider regional benefit, then there should be a cap on any increases in annual consent holder charges, set out in regional long term plans.

10.10. In addition to this, there needs to be more robust measures for how Councils deal with data providers working in their region, to ensure delivery of service by these companies. Facilitated workshops could give guidance for this. This is to ensure providers who are offering a service to users are actually delivering to industry standards for data management, for example through INZ's Blue Tick programme.

Allowing regional council discretion

10.11. There are a number of factors that make regional discretion in exceptional circumstances for telemetry requirements desirable. The first consideration is in relation to initial upfront cost, and ongoing annual costs, to resource users. Figures from the *Action for Healthy Waterways* Discussion Document state that a telemetry unit costs between $600 and $1800 to install, with monthly charges ranging from $20 - $99.[44] INZ considers these figures considerably underestimate the costs associated with the proposal considerably.

10.12. Figures obtained from two (Blue Tick accredited) telemetry providers quoted costs ranging from $1250 to $1700 for straightforward sites, while remote, less accessible

[43] Information from Northland Regional Council on current uptake of telemetry.

[44] Ministry for the Environment. 2019. *Action for Healthy Waterways – A discussion document on national direction for our essential freshwater*. Wellington: Ministry for the Environment.

sites can cost anywhere between $2200 - $3000 and subsequently $120 - $180 per month for monitoring.[45] This includes the need for satellite services, more complex cabling, and/or the installation of a base station which can host/service multiple sites.

10.13. Depending on the level of investment and cost, allowance and consideration for the uniqueness of each site and set-up should be considered when applying telemetry requirements to individual consents. Discretion should be allowed for authorities to decide whether cost - in some circumstances - outweighs the benefit and/or requirement for telemetry. This could be depending on the significance of the take in terms of total volume and abstracted rate, and/or the frequency at which water is taken.

10.14. Depending on such factors, the consent holder could submit a case to demonstrate why installing telemetry would not be economically viable and could prove how the use of a data logger for example, especially for low to medium sized takes, would be sufficient. On the basis of ongoing good compliance, backed up with adequate photos of the water meter for ground-truthing, quality data can still be achievable.

10.15. Discretion for constant telemetry requirements on small-scale growers or infrequent users of water, for example those turning their frost protection system on a few occasions over an entire season, should be determined at a council level. Paying initial upfront costs (as outlined above), and at least $28[46] per month for monitoring, on top of annual consent related charges (as discussed below), is difficult to justify when the permit may only be exercised seven days of the year.

10.16. Annual costs to users must also be weighed up, with respect to monthly monitoring costs from third party providers, and annual consent holder charges set out by Regional Councils for data mangement and monitoring. It is estimated that in the Waikato, if all takes between 5 to 10 litres per second were required to install telemetry, this would add roughly $1 million in annual charges for water users in that region alone. It is likely that the costs associated with managing this by the Regional Council would be at least as much again. If costs of this order are being imposed then there is a need to ensure that the tangible benefits outweigh the cost. From a water user's perspective there is currently a lack of evidence to illustrate this.

10.17. Data from Hawkes Bay Regional Council (HBRC) show that if all water consents above 20 litres per second were telemetered and implemented on their existing site, this would encompass 89 per cent[47] of the total consented volume in Hawkes Bay. This alone, (when considering direct electronic reporting to Council) makes up a significant portion of takes across the region. Currently, HBRC have 64 per cent of consented takes above 20 litres per second on telemetry. An increase of 25 per cent would therefore be expected in the first two years of the roll-out.

[45] Figures obtained by Harvest Electronics (NZ) Ltd. Note prices vary for each individual site and include unit installation, but do not include water meter purchase and installation.
[46] Figure obtained by Electrical Process Development Ltd (EPD), state monthly monitoring costs for telemetry start at $28.29 (inclusive of gst).
[47] Hawkes Bay Regional Council statistics, obtained from their Data Management team.

10.18. The size of consented takes will vary significantly across each region and not necessarily paint the same picture as Hawkes Bay. Some regions will be made up mainly of smaller takes which will come into effect years after the regulations are in place, for example the Waikato region. Priorities and focus will therefore shift from region to region, generally determined by the types of prevalent land use, soils, climate, current allocations, and average sizes of takes. The roll-out of regulations should therefore be determined by regional councils.

10.19. Telemetry provides a huge number of benefits when installed correctly and is working properly. From a regulatory point of view, it allows for accurate, timely, and reliable data management as well as much closer compliance, particularly in periods of water-take restrictions when users are prohibited from taking water. From a user's point of view, it takes the onus away from having to regularly record and send in water-use information, which for many can be a struggle to do correctly or may otherwise get side-lined during a busy season. It also provides for more accurate data to assist with irrigation scheduling and staying within consent limits, which is essential for efficient and effective resource management.

10.20. Behind the scenes, however, if telemetry is not set up and data reported correctly it can be a huge burden for users as well as council staff to follow up. Issues can range from pulse counts being incorrectly reported to council (which can mean lost data until discovered and corrected), cables being chewed by stock, ant infestations, batteries running flat, and exposure to bad weather conditions.

10.21. Communication between data provider companies and regional council staff is also a crucial factor to ensuring accurate and reliable data and in particular, its management. For Councils to maintain an accurate handle on water use information, regular communication (often daily) is required with third party telemetry hosts/ providers. This is typically done to resolve issues in reporting (caused by such examples as above), which often take time to correct and modify.

10.22. This emphasises the importance of Regional Councils needing to be better resourced to handle this large increase in work, and the support needed for them to become better equipped in managing their water use information. If regulations are imposed on users to install telemetry, then Councils must treat these data with the level of respect they need, while accepting there needs to be mechanisms to support them in doing so.

10.23. INZ is keen and willing to work alongside officials in relation to this issue and the future implementation of resulting regulations.

Changes sought to proposals

Regional authorities be provided discretion to make exceptions in certain circumstances telemetry requirements. We also consider that regional discretion should be provided flexibility to allow for variable roll-out of the telemetry requirements, based on regional requirements.

12. Proposal - Drinking water

INZ's position

Support

13. Proposal - Storm water and waste water (urban)

INZ's position

Support

14. Proposal - Immediate action to reduce nitrogen loss in specified catchments

INZ supports Option 3 – farm plan-based reductions

Reasoning

14.1. INZ does not support Option 2 as the use of nitrogen fertiliser is just one reason that nitrate leaching through the root zone occurs. It also relates to land-use type (including excretion from stock), soils, rainfall, attenuation factors in the receiving environment and so on, and often these other factors will contribute to nitrate leaching to a greater degree than fertiliser use.

14.2. For this reason, an input control on fertiliser use in the specified catchments is unlikely to have the immediate desired effect. It also does not focus on the outputs – that is, the leaching itself, which is the cause of increased nitrate levels and concentrations. Having a *nationwide* limit will also potentially negatively impact productivity in areas where there are not elevated nitrate levels.

14.3. Option 1 is not supported, as the use of OVERSEER as a means for modelling and therefore controlling nitrate loss for some farm systems, including cropping and horticulture, is not appropriate.

14.4. Option 3, however, allows for responses to reduce nitrate losses to be tailored to the farm and its soil types, irrigation system, environmental factors and so on. The use of farm plans for this purpose is forward-looking and will encourage improvements to continue in perpetuity, rather than resulting in one-off reductions.

14.5. What "rapid" reductions look like will also vary from farm-to-farm, and the farm plan process takes this into account, through its tailored, bespoke approach to managing environmental risks and effects.

CASE STUDY OF A HIGH-NITRATE CATCHMENT - VEGETABLE PRODUCTION IN THE WHANGAMAIRE

Vegetable production on the highly-productive soils of the Whangamaire began during the Second World War. The New Zealand government took over 800 acres of land and converted it from pasture into intensive vegetable production in order to supply nutritious food to Allied troops serving in the Pacific. This effectively signalled the start of modern, mechanised, large-scale vegetable production in New Zealand.

The Upper Pukekohe volcanic aquifer feeds the Whangamaire stream. This aquifer has been high in nitrate concentrations for at least 40 years, likely contributed to by the intensive vegetable production in the area. This vegetable production has been recognised as of being critical importance to the country under the provisions of the proposed National Policy Statement for Valuing Highly Productive Land. The area produces high quality fresh greens, onions, carrots, potatoes, pumpkins, and other vegetables.

As recognised by the government in the 1940s, many other areas around New Zealand are not suitable for vegetable production, whereas the Whangamaire is particularly suited due to its soils, climate, and water availability, so moving to areas with lower nitrogen levels is not feasible. An analogy is that one can't pan for gold in any old stream.

However, rapid reductions in the use of fertiliser under an inputs-limit system is likely to result in losses of production and will unlikely result in rapid declines in nitrate concentrations in groundwater. Instead, this highly productive land would likely be taken out of production. The ability of these growers to contribute to national wellbeing through the production of nutritious, locally grown produce would be severely curtailed.

Although it is recognised by the community that water quality should improve, the farming and growing systems in the catchment (particularly horticulture and cropping farms), are unlikely to have adequate "baseline" data from which to calculate reductions, due to the absence of accurate modelling or measuring tools to calculate this. Therefore, reductions using bespoke FEPs that will be tailored for each farming or growing operation is the most preferable response.

15. Proposal - Restrictions on further intensification of rural land use (including irrigation)

INZ's position

Oppose in part

Reasoning

15.1. INZ understands the policy driver and intent behind the proposal – to restrict intensification of land-use, including irrigation development – to prevent further degradation of water quality through controlling what are considered to be "high risk" activities.

15.2. However, INZ is concerned about the proposed mechanisms, which control the activity rather than the *effects* of the activities themselves. Whilst this might be necessary in some places, INZ submits that such "hold the line" controls are not required in areas where there are appropriate planning mechanisms in place to manage the effects of these activities.

15.3. INZ is also concerned that the proposed restrictions on intensification (particularly irrigation development) could lead to 'planning blight'. Planning blight is defined within the Oxford dictionary as: "the reduction of economic activity or property values in a particular area resulting from expected or possible future development or restriction of development."

15.4. Planning blight can arise where the possibility of expected or possible future regulation hinders the use and development opportunities of land for a significant period of time. This can be caused by matters such as a change in function of an area or uncertainty over an area's future use. The lack of a firm timeframe for proposed changes inherit with the suggestion of a "generational timeframe" creates uncertainty over the interim use of properties. This results in a devaluation of the property asset, as the economic use of the property into the future becomes uncertain. It can also result in a lack of investment on farm due to future uncertainties.

15.5. The government has clearly signalled its intention to support and enable horticultural production in areas of highly productive land (through its proposed National Policy Statement on this issue), which includes land that has access to water – in other words, irrigation potential. As 90 per cent of New Zealand's vegetables, and many types of other horticulture are grown using irrigation, INZ has real concerns that this policy will prevent growth in this sector.

15.6. These systems typically will not have baseline data from which to determine that they are not increasing discharges (as would be required to gain a resource consent under the proposed policies) as appropriate modelling tools are not available.

NES Clause 31(2)

15.7. Clause 31 provides that the standards in subpart 2 regarding intensification only apply in FMUs where the current NPSFM or proposed NPSFM 2019 have not been fully implemented.

15.8. We address the definition of "full implementation" below, however INZ's general submission is that this approach fails to recognise catchments where comprehensive measures to manage effects on freshwater have been included in regional plans, and this appears inconsistent with the approach taken in other parts of the proposals.

15.9. In particular, the discussion document identifies that Subpart 4 – Nitrogen Cap does not apply in Canterbury, Otago, Tukituki catchment, Manawatu and the Waikato/Waipa catchment, (what we are calling "Managed Catchments") because their regional council plans/proposed plans set out a pathway for reducing leaching. INZ considers that the Managed Catchments (and any other catchments identified as meeting the same standard) should also be excluded from Subpart 2 – Intensification.

15.15. In some cases it might be argued that (on current drafting) that Subpart 2 will apply to the Managed Catchments, because they will not meet the requirements for "full implementation" of a NPSFM. For example, the Canterbury LWRP contains comprehensive water quality objectives, policies, and limits, and rules to control land use. Those rules set requirements for consents dependent on a number of criteria including: whether freshwater objectives in relation to nutrient management are currently being met in the area; farm size; intensive winter grazing area; irrigation area; adherence to a nutrient baseline, with progressive requirements for the baseline to be set based on losses that would occur under good management practice; and implementation of Farm Management Plans.[48]

15.16. However (with the exception of several of the more recent sub-regional plan changes) these provisions were not developed to give effect to the NOF and the limits set were based on the physical/ecological attributes of the waterbodies, rather than by FMU. It appears unclear as to whether or not they meet the standard for "full implementation" of the current NPSFM or proposed NPSFM 2019.

15.17. Application of additional consenting requirements for intensive winter grazing, irrigated farming, high-risk land use changes and land use change to commercial vegetable production to these Managed Catchments is not warranted given the existing regional plan mechanisms to manage these activities and their effects on water quality.

[48] The criteria listed are those found in the region wide rules. Some sub-regional chapters contain more specific variations of the rules which prevail over the region wide rules.

15.18. INZ submits that Clause 31 be amended to provide that subpart 2 does not apply in Canterbury, Otago, Tukituki catchment, Manawatu and the Waikato/Waipa catchment [and any other catchments identified], or in other freshwater management units where national policy statements for freshwater management have been fully implemented.

15.19. INZ has several additional comments in relation to the definition of "full implementation", as it applies to regional plans that have been prepared under the NPSFM 2014.

15.20. Clause 31(2) currently provides (our emphasis added):

> (2) For the purposes of subclause (1), full implementation by a regional council means, in relation to a freshwater management unit, that:
>
> (a) in relation to the National Policy Statement for Freshwater Management 2014 (as amended 2017), the regional council has:
>
> (i) defined limits for the defined attributes and included them **in rules** in the regional plan; and
>
> (ii) included any required objectives and policies in the regional policy statement or plan; or
>
> (b) in relation to the National Policy Statement for Freshwater Management 2019, the regional council has:
>
> (i) defined limits and action plans for the defined attributes and included them in the regional plan; and
>
> (ii) included any required objectives and policies in the regional policy statement or plan; and
>
> (iii) published all required action plans.

15.21. Our primary concern when assessing whether existing regional plans fully implemented the NPSFM 2014 was that water quality limits are generally not included or referred to in rules, but are implemented through strong policy direction that must be considered when determining an application for a resource consent.

15.22. Removing the words "in rules" from (a)(i) (consistent with (b)(i)) would address the issue, so that limits given effect to through policies would be sufficient to meet this part of the test for full implementation.

15.23. The second issue identified is uncertainty about what "defined limits for defined attributes" means. We have assumed that it means only the compulsory attributes in Appendix 2 of the current NPSFM. A potential issue arises where some limits do not use the same metrics as set out in Appendix 2 (for example, for the Waitaki and Waiwera catchments, the LWRP limits for Cyanobacteria in rivers are set as a

percentage mat cover, but Appendix 2 provides attribute states for biovolume, in mm^3/L; and there are other examples).

15.24. Some land use change, extension of irrigation, or other types of "intensification" may have already been consented, under regional plans. In some areas, the development is allowed to occur under planning frameworks where nutrient load limits and caps have been established that will protect good water quality.

15.25. The RMA provides that water permits, discharge permits, and land use consents granted in relation to a regional rule prevail over a National Environmental Standard (NES). However, we have identified that issues may arise for consent holders seeking to rely on unimplemented consents where:

(a) The consent held is a different type to that required under the NES;
(b) The consent held does not expressly authorise the activity which requires consent under the NES;
(c) The consent is reviewed by a regional authority as a result of the NES; or
(d) The consent expires and a replacement consent is required by the authority fully implements the NPSFM 2014 or NPSFM 2019.

15.26. INZ submits that the wording is amended to "included limits for the attributes in Appendix 2 of the National Policy Statement for Freshwater Management", or similar.

Changes sought to proposal

In summary, INZ submits that clause 31(1) and (2)(a) be amended as follows:

(1) The requirements of this subpart do not apply ~~only~~ in Canterbury, Otago, Tukituki catchment, Manawatu and the Waikato/Waipa catchment, or in freshwater management units where national policy statements for freshwater management have ~~not~~ been fully implemented.

(2) For the purposes of subclause (1), full implementation by a regional council means, in relation to a freshwater management unit, that:

(a) in relation to the National Policy Statement for Freshwater Management 2014 (as amended 2017), the regional council has:

(i) ~~defined~~ included limits for the ~~defined~~ attributes in Appendix 2 of the National Policy Statement for Freshwater Management 2014 (as amended 2017) ~~and included them in rules~~ in the regional plan; and

(ii) included any required objectives and policies in the regional policy statement or plan; or

Existing consented activities

15.27. Some land use change, extension of irrigation, or other types of "intensification" may have already been consented, under regional plans. In some areas, the development is allowed to occur under planning frameworks where nutrient load limits and caps have been established that will protect good water quality.

15.28. The RMA provides that water permits, discharge permits, and land use consents granted in relation to a regional rule prevail over a National Environmental Standard (NES). However, we have identified that issues may arise for consent holders seeking to rely on unimplemented consents where:

(e) The consent held is a different type to that required under the NES;
(f) The consent held does not expressly authorise the activity which requires consent under the NES;
(g) The consent is reviewed by a regional authority as a result of the NES; or
(h) The consent expires and a replacement consent is required by the authority fully implements the current NPSFM or the proposed NPSFM 2019.

15.25. We have obtained information from our members on their current consenting arrangements. The various consenting arrangements confirms that there is potential for issues to arise as a result of the different types of consent held.

15.26. In some cases the current consents may be sufficient – for example, one irrigation scheme's consent is described as consent to "use land for farming and to discharge nutrients to water arising from the use of land for farming", with the consent prescribing "the use of land and discharge" shall only occur within a maximum of 40,000ha. That aligns with the consent to take and use surface water for irrigation that the scheme also holds over a maximum area of 40,000ha. It is our view that these consents should be sufficient to expressly authorise the irrigation area, so that the consents prevail over the proposed NES clause 34 for increased areas of irrigated farming, if any of that 40,000ha is developed after the NES comes into force.

15.27. However, in other areas, such as Otago, irrigation is occurring on the basis of consent to take and use water (which may not specifically refer to the land to be irrigated), coupled with permitted activity rules for land use. There is real uncertainty, as to whether extensions of irrigated areas would need further consents under the NES, to manage activities and effects already addressed and controlled through regional planning, as rules to control leaching and other contaminant discharges are already in place. This is again relevant to INZ's submission above that Subpart 2 should not apply in those catchments where there are already appropriate planning mechanisms in place to manage effects.

Changes sought to proposal

INZ seeks amendment to clause 34 (irrigated farming) to ensure that where consent is held which would otherwise provide all necessary approvals for the increase in irrigation area, that consent prevails over the NES. INZ suggests that this be achieved by amending the reference to land area in clauses 34 to include the area of land that could be used in accordance with consent(s) held at the commencement date (water permit, discharge permit, or regional consent for land use). For example, clause 34(1) would be amended as follows:

> *(1) Any increase in the amount of land used on a farm (where no relevant consent is held), or any increase in the amount of land that could be used for irrigated production (other than production from effluent irrigation) in accordance with consent(s) (water permit, discharge permit authorising discharges resulting from irrigated production, or a regional consent for land use) held at the commencement date is a permitted activity…*

This amendment would address concerns regarding the type of consent held, as well as uncertainty that would otherwise arise in relation to the description of the activity, potential for review and implications on expiry/renewal.

INZ also seeks corresponding changes to clauses 33 (intensive winter grazing) and 35 (high risk land use changes) to ensure that where consents are held which anticipate those activities, those consents prevail and there is no additional requirement for consent under the NES.

Permitted increases in irrigation

15.28. Clause 34 provides that an increase in the area of land irrigated is permitted if the increase since the commencement date is 10ha or less. INZ considers that this threshold is too low. In some cases, this can be less than the size of a single paddock.

15.29. INZ seeks that this be amended to 50 hectares or a percentage of a farm property.

16. Proposal - Compulsory farm environment plans with a freshwater module

INZ's position

INZ supports the proposal that Farm Environment Plans (FEPs) with a freshwater module become compulsory.

However, we are concerned about the capacity and capability within the sector to develop and audit the large number of plans that will be required across the country. INZ recommends that the roll-out be targeted to at-risk catchments first, in order that the gains from FEP implementation will be realised most quickly where it is most needed.

Reasoning

16.1. The irrigation sector has been a leader in the development of Audited Self-Management processes (ASM), that involve the use of FEPs nested within environmental strategies and supported by contractual arrangements between irrigation schemes and their farmer/grower shareholders.

16.2. For example, the North Otago Irrigation Company was the winner of the 2012 INZ Innovation in Irrigation Award for its Audited Self-Management programme.[49] This was the first irrigation scheme to use FEPs as a means of ensuring farms continually improve their environmental practices. A dedicated full-time environmental manager works alongside farmers to assist in the development of FEPs which include six key objective areas: irrigation system design and installation, irrigation management, dairy effluent management (where applicable), soil management, nutrient management, and waterway and riparian management.

16.3. INZ does not consider that the FEP process somehow privatises or devolves functions in environmental management away from regulators to private individual and companies, which has been a criticism levelled at the process. FEPs are not a substitute for the important role of regulations which will always be required to prevent, prohibit, or manage certain activities or their effects. Instead, FEPs are an effective mechanism for addressing farm-specific issues or risks that cannot be captured through region-wide (or even sub-regional) rules whilst encouraging continuous improvement over time and still allowing the development of innovative solutions.

16.4. There are many examples of industry-led processes to ensure public safety, standards implementation and so on, which require external auditing and verification by private individuals as the safeguard for public issues. An example of this is the recently-released proposed regulatory framework for dam safety, which will require dam owners to undertake risk assessments and safety assurance processes, using privately-contracted engineers, in order to protect property, the environment, and people from the consequences of dam breaches.[50]

16.5. Nobel-prize winning political scientist Elinor Ostrom researched extensively the formation of groups to sustainably manage common pool resources (CPRs), and concluded that such group-led processes can result in good environmental outcomes:

Policymakers responsible for the governance and management of small-scale CPRs should not presume that the individuals involved are caught in an inexorable tragedy [of the commons] from which there is no escape. Individuals may be able to arrive at joint strategies to manage these resources more efficiently. To accomplish this task, they

[49] See https://www.noic.co.nz/environment

[50] https://www.mbie.govt.nz/dmsdocument/5731-proposed-regulatory-framework-for-dam-safety

must have sufficient information to pose and solve the…problems they face. They must also have an arena where they can discuss joint strategies and perhaps implement monitoring and sanctioning.[51]

16.6. FEPs are now used by all properties with more than 50 hectares of irrigation or more than 10 per cent of the farm area winter grazing in Canterbury (covering at least two thirds of the region), and to different degrees in other regions.

16.7. Small farms are also considered very low risk. In Canterbury for example, if a property is less than 10 hectares, then the use of land for farming is a permitted activity and no FEP is required. INZ considers that setting such a threshold for which an FEP is not required is also sensible at a national level.

16.8. INZ supports the use of certified auditors, but considers there should not be a certification requirement for those developing farm plans. It could be that a certification system for those preparing farm plans is required at some future date, but the current capacity and capability issues associated with the implementation of this policy will mean there could be a large shortage of certified advisors, given that an auditor should not be able to audit a plan they prepared.

16.9. The audit grade received should also determine the frequency by which re-audit is required. In Canterbury, an audit is graded A, B, C or D. An A grade requires re-audit in three years' time, a B grade in two years' time, a C grade in one year's time and a D grade in 6 months' time. This rewards the really good farmers, and creates a sense of pride and achievement when a high audit grade is achieved.

16.10. It is also important to ensure that the policy setting allow for regional and catchment-level flexibility around the requirements of FEPs to ensure that they can be tailored to address specific risks and farm systems, and ensure that other already-existing planning or best practice assurance programmes can align with the mandatory requirements, without duplicating or replicating effort and resources.

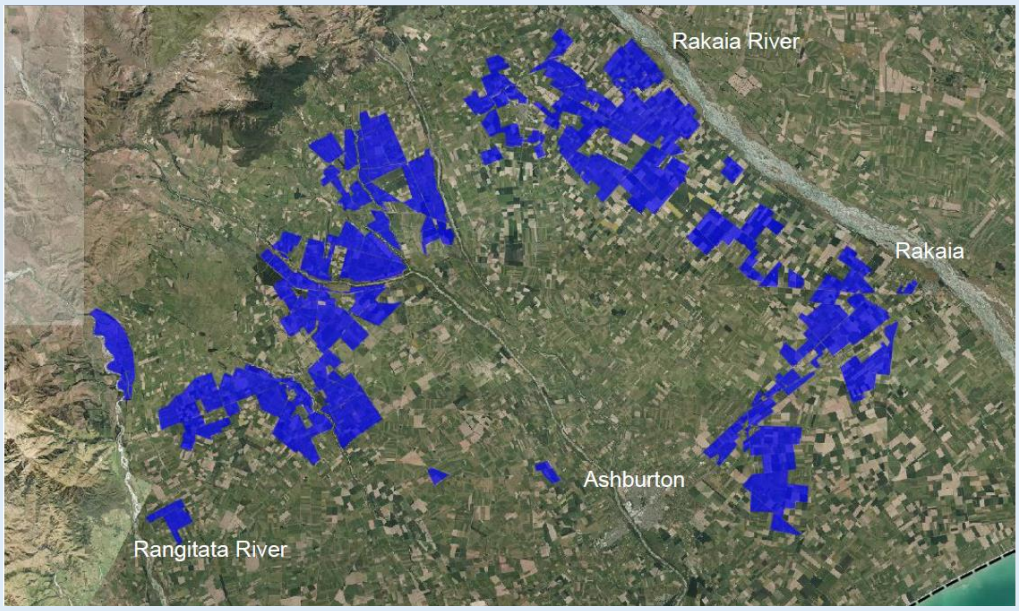
16.11. INZ submits that for such a wide-scale programme to be implemented effectively, its implementation needs to be considered as well as the formation of the policy itself. We submit that the programme should be rolled-out to high-risk catchments first, where water quality outcomes are not being met. This would help address the capacity and capability issue and align with the high-risk catchment regulatory reforms signalled by the Government in 2018, and the philosophy behind the high nitrate catchments discussed above.

[51] Ostrom, E.; Walker,J.; and Gardner, R. (1992) 'Covenants with and without a sword: self-governance is possible' *The American Political Science Review*, Vol. 86, No. 2:414. Although here referring to issues of allocation, the conclusions reached are applicable to ASM systems at the farm, scheme, and catchment-scales.

Case Study - FEPs in Action - BCIL Audited Self-Management

Barrhill Chertsey Irrigation Limited (BCIL) is an irrigation scheme located between the Rakaia and Rangitata Rivers in Mid-Canterbury (Figure 1). BCIL provides water to 130 shareholders to irrigate 23,000 hectares. Its shareholders are a mix of arable farms, vegetable growers, small seed producers, dairy, dairy support and sheep, beef and deer properties.

Figure 1: BCIL command area



BCIL was issued a resource consent in 2013 to manage the discharge of nutrients from shareholder properties. The resource consent requires the development of an Environmental Management Strategy (EMS); a nutrient cap and annual reporting against it; FEPs; and auditing of the FEPs.

As part of its EMS, BCIL not only ensures all shareholders have FEPs, it also provides extension services to support FEP implementation. For example, they update FEPs annually, offer a range of targeted workshops to address knowledge gaps, and provide support with meeting other areas of Good Management Practice, such as bucket-testing to ensure efficient and effective use and distribution of irrigation water.

Through this process, BCIL has seen improved uptake of Good Management Practices, particularly in areas where extension services have been targeted. An example of this is in irrigation management. Through this programme, there has been a year-on-year improvement in training, irrigation performance, and the uptake of irrigation scheduling tools (see Figure 2).

Nitrogen (N) loss in the area is strongly driven by drainage caused by irrigation, therefore these changes will result in meaningful improvements in not only irrigation efficiency, but also a reduction in N losses.

The programme has also improved performance through the auditing process. In the first season of audits, shareholders achieved 12% "C" or "D" (fail) grades and 12% "A" (Good Management Practice or better) grades (see Figures 3 and 4).

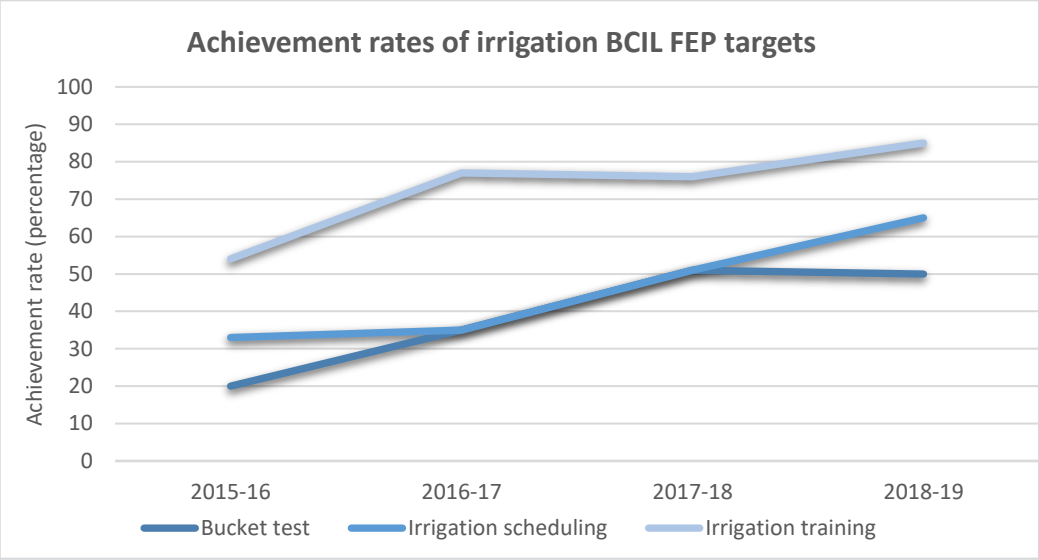
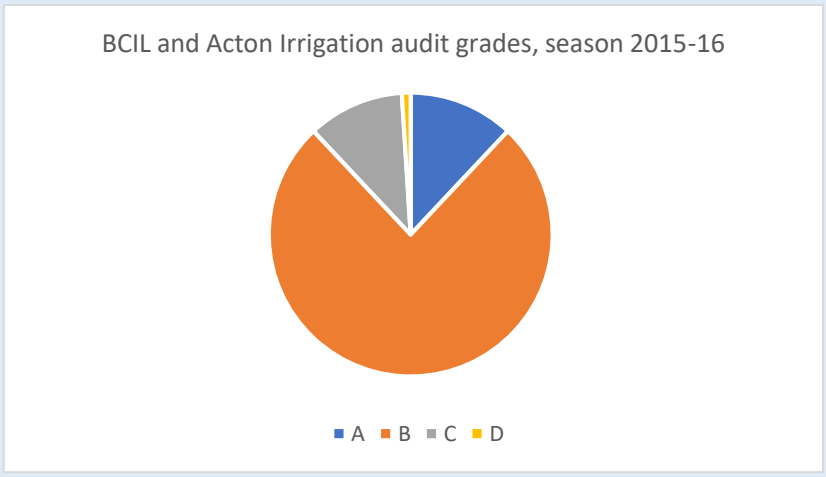
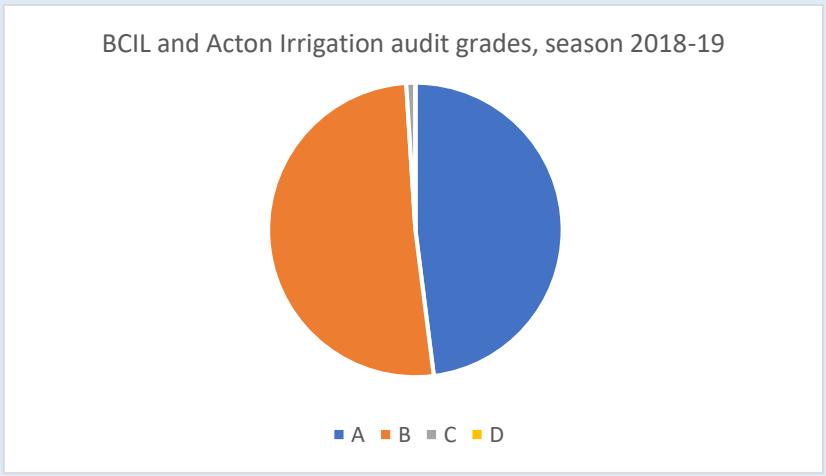


Figure 2: BCIL achievement rates of irrigation management targets

Figures 3 and 4: BCIL and Acton FEP audit grades





BCIL shareholders report that they want to be held to account for their *actions*, not to their Overseer "number" and strongly prefer the FEP and auditing processes over chasing a modelled number as a proxy indicator for environmental performance.

Proposal

Stock exclusion

INZ's position

Support in part

Reasoning

INZ recognises the need to exclude stock from waterways, where stock access is a risk to good water quality outcomes being met. Therefore the exclusion rules and setback distances must be *appropriate* for the particular catchment, farming systems, environmental and ecological values in the area, and so on.

Therefore, INZ supports the submission of Dairy Holdings Limited (DHL) on this point.

Proposal

Controls on winter grazing

INZ supports the implementation of Good Management Practice across all aspects of farming, including managing the risks associated with winter grazing.

Therefore, INZ supports the submission of Dairy Holdings Limited (DHL) on this point.