Submission on Land Use in Tairawhiti

To the Ministerial Inquiry Panel on Land Use in Tairawhiti

Personal details

My name is Cecelia Kamizona and 9(2)(a) . Our whanau have lived in this area for generations. I am of Ngaitai descent and moved home permanently in 2020 after working in Kawerau for 30+years.

Submission

The devastation of multiple cyclones since Bola is overwhelming and its heart wrenching to see the impact on our whenua, our rivers, our roads, our people, our homes, our livelihoods. Even when the roads are patched up the ongoing affect on our people's mental wellbeing will impact on generations to come.

Reflections

Pine afforestation has a part to play in the negative impact on our land resulting in forests on marginal land washing downhill sides flooding and damaging vast areas.

In Torere I remember when my parents being coerced into accepting pine afforestation as a way forward for marginal land promising jobs for locals, contributions to the marae, land stability etc etc but I don't recall anyone considering any negative impacts on the land.

I worked in the forest industry paying logging contractors for many years but never thought about the impact of forestry on the land. In Kawerau there was no impact cos its all flat land 'the creme' unlike the rude awakening in Ngati Porou forests.

Recommendations

No more pine forests on marginal land in Ngati Porou
Better management of our rivers to include stabilising the river banks to minimise the impact of flooding.

Date 23/3/2023

Submission on Land Use in Tairawhiti

To the Ministerial Inquiry Panel on Land Use in Tairawhiti

Personal details

My name is Daynah Olliver I reside in Te Araroa and descend from Ngati Awa & Ngati Porou.

I have lived in Te Araroa for 1 year and have found myself finding my roots within this community, bringing an abundance of passion towards the wellbeing of whanau and the environment.

9(2)(a) *Bringing a plethora of my passion to the forefront of my everyday tasks and connections to the whanau' here.*

My submission represents the views of my whanau unit and what we have witnessed since moving here, as well as over the past 20 odd years of coming here for whanaungatanga.

Submission

Reflections

1. *Forestry slash is abundant amongst the hillsides heading towards Tikitiki, this concerns us as climate change has already shown that rain volumes are on the rise. We feel this is a ticking time bomb for this area and the results could be catastrophic.*
2. *The driftwood fayed across our beaches, although can be a good day's hunt for a beautiful treasure for garden art, also restricts whanau from safe entry onto the beach itself. Safety is a big concern.*
3. *Our rivers are inundated with pine trees, bringing structural damage to our bridges, in-turn, restricting access to some remote parts of our community, such as East Cape Road. Restricting access to approx. 37 homes on that road alone.*

4. *A lot of the focus for this topic seems to remain within the Turanga (Gisborne township) area, leaving the coastal communities to essentially watch the devastation unfold.*

Recommendations

1. *I would like to see some accountability for the current situation by forestry corporations, firstly by eradicating the current slash build up around the whole of Te Tairawhiti (North of Tokomaru Bay).*
2. *And secondly, for procedures to be put in place so that slash will NEVER remain within our lands if forestry continues to happen in Te Tairawhiti. Perhaps enabling whanau to make use the wasted wood for fires at home to keep warm.*

3. *And the planting of native trees, as their roots grow deeper, meaning a more solid foundation of trees, as well as bringing an abundance of native birds and insects back into our rohe.*

6 April 2023

Ministerial Inquiry Panel
C/- Ministry for the Environment
Wellington

Lincoln University
PO Box 85084, Lincoln University,
Lincoln 7647, New Zealand
0800 10 60 10
www.lincoln.ac.nz

Tēnā koutou

Submission on the Ministerial Inquiry into Tairāwhiti/Gisborne and Wairoa land-use

Thank you for the opportunity to submit to this inquiry.

I note that: "*The purpose of this inquiry is to: describe the history of land uses associated with the mobilisation of woody debris (including forestry slash) and sediment in the Tairāwhiti/Gisborne District and Wairoa District, and to make recommendations about the further work needed to address land use impacts of storms*."

I preface my submission by describing my experience relevant to, and with, the forestry industry:

- 2000: PhD Lincoln University in indigenous forest ecology. I mapped and aged over 1000 trees to investigate disturbance effects on canopy tree recruitment across a soil drainage gradient.
- 2011-2013: consent and compliance monitoring of post-harvest earthworks and water controls on steepland forests, as an Environmental Protection Officer for Marlborough District Council.
- 2013-2018: scientific research on causes and consequences of sedimentation into coastal waters of the Marlborough Sounds as Marlborough District Council's coastal Environmental Scientist.[1]
- 2018-current: research into opportunities to better manage forestry activities on steepland forests, and into the performance of the National Environmental Standards for Plantation Forestry (NES-PF) as a Senior Lecturer in Environmental Management at Lincoln University.[2]

I have separately appended my 2020 article in the New Zealand Journal of Forestry on opportunities to manage sediment more effectively, as it will be publicly available on the journal's website later in 2023.

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[1] Urlich, SC. 2015. Mitigating fine sediment from forestry into coastal waters of the Marlborough Sounds. MDC Technical Report 15-009. Marlborough District Council, Blenheim. 164 p. This includes a peer-review undertaken by Manaaki Whenua Landcare Research (within Appendix 3): Marden M, Phillips C. 2015. *A review of 'Mitigating fine sediment from forestry in coastal waters of the Marlborough Sounds: options for determining plan rules' prepared by Marlborough District Council*. Manaaki Whenua Landcare Research report 2414. Gisborne. www.marlborough.govt.nz/environment/coastal/sedimentation

[2] Urlich SC, 2020. Opportunities to manage sediment from forestry more effectively in the Marlborough Sounds and contributing catchments. *New Zealand Journal of Forestry* 65(2) 28-35.

Urlich SC, Handley SJ. 2020. History of pine forestry in the Pelorus/Te Hoiere catchment and the Marlborough Sounds. *New Zealand Journal of Forestry* 65(3) 30-35.

Urlich SC, Handley SJ. 2020. From 'clean and green' to 'brown and down': a synthesis of historical changes to biodiversity and marine ecosystems in the Marlborough Sounds, New Zealand. *Ocean and Coastal Management* 198: 105349. https://doi.org/10.1016/j.ocecoaman.2020.105349.

My submission is targeted at section 12.3.7 of the Ministerial Inquiry's terms of reference:

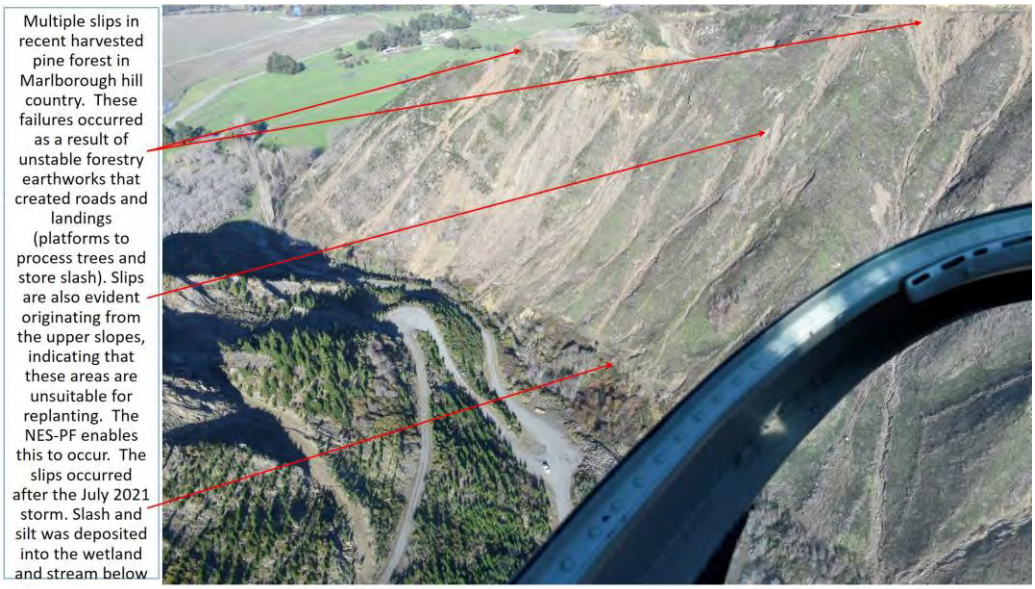
> **12.3.7 Make recommendations to improve land use outcomes including preliminary advice as to:**
>
> > **12.3.7.1 changes needed to land use management including, but not limited to, afforestation and harvesting practices**
> >
> > **12.3.7.2 changes needed to regulatory settings including, but not limited to, plan rules and national direction under the RMA (or its replacement).**

At the outset, I wish to state that I have no familiarity with the region. My submission relates to steepland pine plantation forestry practices drawn from my experiences in Marlborough. These forests are typically on highly erodible soils subject to debris flows after intense rainfall events during the window of vulnerability. Therefore, my recommendations to minimise and mitigate such effects are generalisable to other regions with steepland forests, on soils that perform poorly after deforestation.

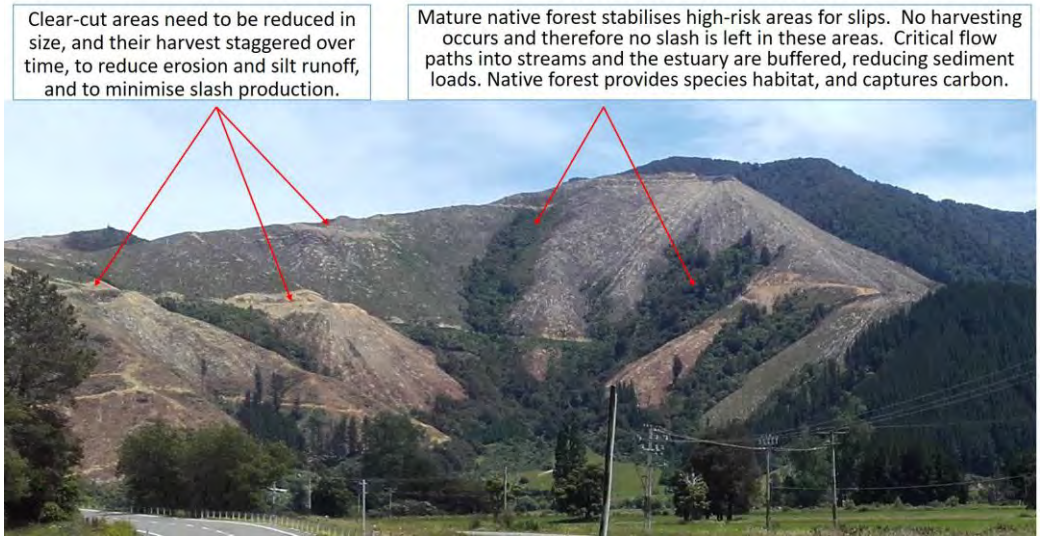
I begin by showing examples of issues and potential solutions, in a series of explanatory photos. These demonstrate the need for strategic retirement in the most erodible landforms within forest blocks by replanting management controls, along with smaller harvest sizes, and a higher standard of engineering.

The **'ugly'**:

The **'bad'**:



The **'good'** (although improvement still needed):



The **'dangerous'** (current practice harvesting in overly steep areas and leaving slash = recipe for disaster)

The photos above are not unusual, and reflect an industry that is poorly regulated regionally and nationally. To assist the Inquiry, I now set out a series of integrated recommendations:

Recommendation 1: The policy imperative is the urgent need to stabilise the landscape, under increasingly intensive and more frequent rainfall events as climatic changes unfold. This objective should be propagated through the Tairāwhiti/Gisborne District Council's Regional Policy Statement, and into the methods and rules within the Tairāwhiti Resource Management Plan (TRMP) for freshwater and land management. This is also necessary to achieve the hierarchy of objectives in the National Policy Statement for Freshwater Management, as expressed by the concept of Te Mana o te Wai.

Most importantly, it will enable Council to comply with Section 5 of the Resource Management Act (RMA) 1991, which it is systemically failing to do. This is evidenced by repeated catastrophic failures of land management in the region after large storms. The Council's regulation is maladaptive to both the geomorphology and land use, and to climate disruption. Section 5 RMA requires the Council to protect the community's health and safety, whilst avoiding adverse effects on the natural environment and safeguarding the life-supporting capacity of ecosystems. Section 17 RMA enables Council to act now.

Council may blame the NES-PF, and certainly changes need to be made to that instrument as outlined in my recommendations below. However, Regulation 6 (1) of the NES-PF enables the Council to exercise greater stringency of regulation to more effectively prevent and mitigate the effects of forestry on freshwater ecosystems and on the coastal environment. One of my student's wrote to the Council about their exercise of greater stringency, and in replies in 2021 and 2023, she was advised that it will be the end of 2024 before changes to the freshwater provisions of the TRMP may be notified. Potential changes to give effect to the NZ Coastal Policy Statement sediment management policy may also occur. What these changes may encompass may also now depend on the outcome of the Ministerial Inquiry.

Recommendation 2: That environmental bottom-lines be developed for the NES-PF to give effect to existing high-order policy statements under the RMA, and to meet the requirements of the recently introduced Natural and Built Environments (NBE Bill). These may include, but are not limited to: land stability, soil conservation, water quality, biodiversity, biosecurity, and climate mitigation.

Recommendation 3: That the NES-PF be amended with the objective to stabilise landforms at high risk of debris flows, accelerated erosion, and excessive sedimentation under increasing intense and frequent rainfall events. Steepland forestry is currently maladaptive to climate change.

Recommendation 4: That the request that the erosion susceptibility classification in the NES-PF be urgently reviewed and refined to a finer scale (e.g., 1: 5,000 to 1:10,000) for areas currently zoned yellow and orange in steepland areas, along with the current NES-PF permitted activity standards.

Recommendation 5: The NES-PF be amended to include mandatory replanting controls in high risk erosion-prone landforms on slopes <25 degrees to retire areas from future harvesting.

Recommendation 6: Ensure that the ETS does not penalise but incentivises the retirement of these areas.

Recommendation 7: The NES-PF be amended to include mandatory planting controls for afforested land to avoid planting in high-risk erosion-prone landforms.

Recommendation 8: The NES-PF be amended such that earthworks on slopes >25 degrees be designed for stability and certified as built by a Chartered Professional Engineer.

Recommendation 9: The NES-PF be amended so that all slash and sediment need to be retained within the boundaries of the forest. The exception for slash is if it can, in the certified opinion of a Chartered Professional Engineer, be left on the property in locations where it is environmentally safe to do so.

Recommendation 10: The NES-PF regulations 5, 20, 46, 47, 48, 69, 86 be amended to a 200 year ARI and a 0.5% annual exceedance probability. There current 5% AEP is inappropriate and maladaptive to the climate disruption that is upon us. If land stability is not the overriding aim to underpin regulations and management then we can expect to see more cataclysmic events, such as Cyclone Gabrielle.

My final recommendation is in reference to section 12.3.3 of the terms of reference for the Inquiry. It is within scope for the Inquiry to recommend the development of **a sustainability transitions plan.** This plan needs to set out how the forestry industry can be supported by central and local government to change practices in the face of more stringent and necessary regulations.

This may be through a range of mechanisms such as (but not limited to): research and development incentives, adequate adjustment time; retraining and relocation assistance; and compensatory tools for stranded assets, invested under the current and previous regulatory regimes that permitted and encouraged the environmentally maladaptive situation to develop. This is a question of social justice.

Ngā mihi

Dr Steve Urlich (he/him)
Senior Lecturer | Pūkeka Matua
Department of Environmental Management | Te Tari Whakahaere Rawa Pūtaiao
PO Box 85084, Lincoln University | Te Whare Wānaka o Aoraki
Lincoln 7647, Christchurch, New Zealand
steve.urlich@lincoln.ac.nz

SUBMISSION TO MINISTERIAL INQUIRY INTO LAND USES ASSOCIATED WITH THE MOBILISATION OF WOODY DEBRIS (INCLUDING FORESTRY SLASH) AND SEDIMENT IN TAIRĀWHITI / GISBORNE DISTRICT AND WAIROA DISTRICT

on behalf of

THE ENVIRONMENTAL DEFENCE SOCIETY and PURE ADVANTAGE

Submitter Details

Full Name	Environmental Defence Society Incorporated
Address	PO Box 91736, Victoria Street West, Auckland 1142
Phone	09 302 2972
Contact	Gary Taylor
Email	gary@eds.org.nz
Date	5 April 2023

Full Name	Pure Advantage
Address	PO Box 99421, Newmarket, Auckland 1149
Phone	09 600 6408
Contact	Simon Millar
Email	simon@pureadvantage.org
Date	5 April 2023

1 Introductory comments

1.1 This is a joint submission on behalf of the Environmental Defence Society (**EDS**) and Pure Advantage (together, 'we') to the *'Ministerial Inquiry into Land Uses associated with the mobilisation of woody debris (including forestry slash) and sediment in Tairāwhiti / Gisborne District and Wairoa District'* (**Inquiry**).

1.2 Pure Advantage is a registered charity led by business leaders and supported by a collective of researchers and writers who investigate, communicate and promote opportunities for Aotearoa New Zealand to fulfil its potential for green growth.

1.3 EDS is a not-for-profit, non-government national environmental organisation. It was established in 1971 with the objective of bringing together the disciplines of law, science, and planning to promote better environmental outcomes in resource management.

1.4 We welcome this Inquiry into land use, the mobilisation of forestry slash and sediment, and forestry practices generally, on the East Coast. Although well overdue, it presents an opportunity to clearly (and impartially) identify the causes of adverse effects associated with forestry activities so that these can be properly and swiftly addressed, albeit - and crucially - with *long term* ecological, climate and community resilience as the central focus.

1.5 It is a tragedy for the communities of Tairāwhiti and Wairoa that a series of forestry policy failures borne out of visionless, short-term, siloed thinking, together with poor industry practice – plainly evident for many years – have resulted in utter devastation of their lands, coasts, rivers, homes, livelihoods, and community infrastructure, and worse, the loss of lives.

1.6 With effective regulatory settings that take an intergenerational, integrated and precautionary approach to sustainable land use and landscape stewardship, and a genuine commitment by the industry to vastly improve its operational standards and regulatory compliance, this could - and should - have been avoided.

1.7 The focus of this Inquiry is understandably on the Tairāwhiti and Wairoa districts. However, its findings should necessitate a more comprehensive national strategy for ecological, climate and community-resilient land use across Aotearoa New Zealand within which biodiverse productive and permanent native forests thrive. That is because the issues we raise are not locationally-specific. Significant adverse environmental impacts from exotic forestry activities and other inappropriate land uses are happening across the whenua. We need to get the settings right nationwide, and to this end our submission has been drafted with both the local and wider national context in mind.

1.8 To be clear, it is our view that native forests, (as well as, *to an* extent (and subject to meeting ecological objectives and bottom lines),[1] diverse, well managed, properly located exotic plantation forests) should - indeed, must - play an integral role in securing and defining Aotearoa New Zealand's long-term prosperity. They are currently the only way to remove emissions from the atmosphere at scale, and we will need them to meet our emissions budgets, 2050 emissions reduction targets, and as permanent regenerative carbon sinks in perpetuity.[2]

1.9 Forests also fulfil a multiplicity of roles beyond just carbon sequestration, from erosion control, water purification, and climate regulation to habitat for endemic flora and fauna, and places of cultural and spiritual connection and significance.

[1] For example, compliance with the National Policy Statement for Freshwater Management, New Zealand Coastal Policy Statement, Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy, the draft National Policy Statement for Indigenous Biodiversity, and the Climate Change Commission's advice and recommendations for a low emissions future.

[2] He Pou a Rangi | The Climate Change Commission|Ināia tonu nei: a low emissions future for Aotearoa, Chapter 18, at 315, https://www.climatecommission.govt.nz/public/Inaia-tonu-nei-a-low-emissions-future-for-Aotearoa/Chapter-18-inaia-tonu-nei.pdf.

1.10 Like the rest of nature, forests should be viewed as vital infrastructure[3] and insurance against future risks. But those forests must be planted and managed so as to create an intergenerational, resilient, socio-ecological *asset*, not the social, economic and ecological liability they present for some communities today, and for others in the future.

1.11 Right tree, right place, right purpose. This oft-repeated mantra is simple and sound enough in principle. In practice, however, the proliferation of *Pinus radiata* and other exotic monocrops has continued unabated due to the permissive regulatory context, fuelled by a rising price on carbon and, therefore, an increasingly higher rate of return from the cheapest, easiest, and fastest growing (and sequestering) species. This outcome is not surprising given most production and carbon forests are managed (and incentivised) according to the singular lens of optimising profitability.

1.12 But if we are to ensure the right trees are indeed planted in the right place for the right purpose, we need more nuanced and carefully designed regulatory settings (including well-targeted incentives) that secure a much more holistic set of values and encourage an interwoven land use approach. Such settings should ensure that forests are planted and managed with a view to optimising ecological integrity, flora and fauna biodiversity and habitat protection, long-term climate (and hazard) resilience, soil health and stability, water purification and secure yields, temperature management, recreation and amenity values, and spiritual connection alongside carbon sequestration, sustainable timber and bioenergy production.

1.13 With the increasing frequency and intensity of severe weather events, and social trust in the forestry industry tenuous, it is essential that this Inquiry marks a clear turning point for the future of forestry in Aotearoa New Zealand.

2 Structure of submission

2.1 Our submission is structured around the Inquiry's Terms of Reference (**ToR**) as follows:

(a) History of failed land use strategies on the East Coast (ToR 12.3.1);

(b) Why this is a national problem and how climate change will make it worse (ToR 12.3.2);

(c) The need to ensure that the less visible and sometimes longer term effects of sedimentation are not overlooked nor underestimated (ToR 12.3.2.7 - 9);

(d) Regulatory failure under the National Environmental Standards for Plantation Forestry (**NESPF**) (ToR 12.3.4), including:

i) A baseline of permitted activity status that is irreconcilable with a high-intensity, high-risk industry;

[3] The Editors, "Use Nature as Infrastructure", Scientific American, 1 April 2023.

ii) Limitations of the Erosion Susceptibility Classification (**ESC**) system as an accurate risk assessment tool;
iii) Misalignment of controls relative to erosion risk zone;
iv) Lack of regulatory nuance in relation to harvesting methods such that clear felling is a widespread practice;
v) Weak and inappropriate slash management controls;
vi) Vague and unenforceable permitted activity conditions;
vii) An inexplicable management accountability gap, giving rise to primary sector inequities;
viii) Poor industry compliance and limited monitoring;
ix) Wholly inadequate penalties for non-compliance that are entirely disproportionate to (and thereby permitting the externalisation of) the cost of harm;

(e) The challenge of overcoming economic incentives for *Pinus radiata* and other exotic species under the New Zealand Emissions Trading Scheme (**ETS**) (ToR 12.3.3);

(f) The need for broader policy coherence (ToR 12.3.7.2); and

(g) How systemic change is necessary to achieve land use aligned with long term national prosperity (ToR 12.3.7.1).

2.2 We then briefly outline some initial recommendations that would address these.

3 ToR 12.3.1 | Inherited problems: Legacy issues of failed land use strategies on the East Coast

3.1 Sustainable land stewardship on the East Coast is subject to significant physical constraints. The region is predisposed to regular high intensity rainfall events and cyclonic storms,[4] and

[4] The East Coast's predisposition to regular high intensity rainfall events and cyclonic storms is not a recent phenomenon (Office of the Parliamentary Commissioner for the Environment, Sustainable Land Management and the East Coast Forestry Project, December 1994, (**PCE, 1994)** refers.) Writing in 1995, Bergin et al observed: "*The region has a history of extreme floods, generally resulting from high intensity rainfall during tropical storms. These storms have been a major feature contributing to the unstable nature of the hill country, east of the Raukumara Range. Although commonly considered to be infrequent, there were four East Coast rainfall events within the 1980s that resulted in considerable damage from landsliding*." (Bergin, D.O., Kimberley, M.O. , "Protective Value of Regenerating Tea Tree Stands on Erosion-Prone Hill Country, East Coast, North Island, New Zealand", New Zealand Journal of Forestry Science 25(1): 3-19 (1995), (**Bergin et al**) at 5.) Based on an analysis of storm frequencies, they concluded that "the rationale for promoting conventional plantation forestry establishment techniques on the East Coast hill country currently under regenerating forest should be reassessed." (At 15).
An investigation into the causes of slash damage from Cyclone Cook completed in October 2017 similarly noted that "storm-induced forestry slash events have occurred regularly in the region since 2012 and sporadically before then" (Cave, M., Davies, N., and Langford, J, "Cyclone Cook Slash Investigation" (Gisborne District Council), October 2017 (**Cave et al**), at 3) and that "[i]t seems clear from [historical events] that on average a significant event can be expected somewhere in Tairawhiti every two years but that an event might well occur in any one year based on current harvest volumes." (Cave et al, at 4).

has a geologic and geomorphic risk profile characterised by soft sedimentary rocks and medium to very steep slopes. As a result, the region is highly susceptible to erosion.

3.2 Historic land use patterns have made "[t]he extent and severity of erosion in the [East Coast] region … unique."[5] The conversion of land to pastoralism, mainly between the 1880s and 1920s, resulted in extensive clearance of native vegetation.[6] Decades of intensive grazing gave rise to increased erosion, culminating in significant landslide damage to hill country throughout the region from Cyclone Bola in March 1988.

3.3 Surveys of damage soon after Cyclone Bola showed a strong correlation between the type and extent of vegetation cover and the degree of shallow landsliding.[7] In light of this, and the severity of the erosion problem, the Government established the East Coast Forestry Project (**ECFP**) in 1992.

3.4 It is useful to outline the course of the ECFP as it exemplifies the short-term, profitability-first approach to land use stewardship in Aotearoa New Zealand. This is symptomatic of the 'Siloed World' described by David Hall in his paper, "*The Interwoven World*", and must be understood as a systemic problem which needs to be acknowledged and addressed if our policy strategies and regulatory frameworks are going to achieve long term prosperity. We cover this further in section 9 below.

3.5 The ECFP was a 28 year afforestation project designed to promote large-scale commercial forestry with the objectives (originally) of controlling soil erosion, providing employment and regional development, and to recognise the environmental needs of individual properties.[8] Forestry companies and landowners competitively bid for the opportunity to plant forests, with bids ranked and accepted – *cheapest first* – until the limit of the annual budget was reached.[9]

3.6 In 1994, the Parliamentary Commissioner for the Environment reviewed the ECFP against the context of "sustainable land management". Among the concerns expressed in that review were:

When reviewing the East Coast Forestry Project in 1994, the Parliamentary Commissioner for the Environment observed that the East Coast would be subject to more frequent ex-tropical cyclones, as well as droughts (and thus fire risk). (PCE, 1994, at 74)
In further support of this prediction, a recent study on the causes of Cyclone Gabrielle found that, as a result of anthropogenic climate change, the East Coast's exposure to such events is likely to increase in frequency and intensity. (Harrington, L. J., Dean, S. M., Awatere, S., Rosier, S., Queen, L., Gibson, P. B., ... & Otto, F. "The role of climate change in extreme rainfall associated with Cyclone Gabrielle over Aotearoa New Zealand's East Coast", 2023)

[5] PCE, 1994, at 107.
[6] Ibid, at 6.
[7] Bergin et al, at 4.
[8] Bayfield, M. A. and Meister, Professor A. D., Report to the Minister of Agriculture and Forestry, 2005, at v (**Bayfield and Meister**).
[9] Bayfield and Meister, at 37.

(a) That the development of the ECFP and its decision-making processes were driven by the perceived need to facilitate *commercial* forestry, with limited assessment of its environmental implications;[10]

(b) There were frequent conflicts between the multiple objectives, including the notion of dual-purpose forests, which were to have a productive value as well as a protective one;[11]

(c) The resilience of pines to major pest or disease outbreaks, compared to mixed species forests, preferably indigenous, was untested;[12] and

(d) The difficulties of reducing the erosion impacts of forestry operations to satisfactory levels "in this difficult steepland environment",[13] with the need for "careful planning, early identification of environmental values and hazards, and considerable flexibility of operations to cope with site specific hazards."[14] Materially, the review noted:[15]

> "on some highly erodible sites, **there may have to be a move away from clearcutting and planting toward selective harvesting and more natural systems of replenishment and growth.** In some sensitive sites **detailed zoning may be necessary to delineate areas where permanent retention of vegetation may be warranted.**";

and similarly:[16]

> "Because of the primary importance of erosion as a constraint to land use in the region, and the clear reduction in mass movement erosion resulting from forest establishment, on balance it would seem that the net biophysical impacts of large-scale forest establishment projects in the extensive steeper areas of the region will be favourable. However, **potential detrimental impacts of commercial forestry, particularly those associated with harvesting in fragile steepland environment, may be significant** and will require good planning and implementation of best practices to be minimised. **There may be some very steep slopes or gully bottoms where alternative species are more suitable than pines or on which harvesting should not take place**."

3.7 Changes to the ECFP were implemented in 2000 following a first review in 1998. These included refocusing the objectives of the project to a primary goal of sustainable land management, targeting the worst 60,000 hectares of severely eroding land, and the extension of treatment options from commercial afforestation only, to include (among others) indigenous reversion as well.[17]

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[10] PCE, 1994, at 109.
[11] PCE, 1994, at 11, 94.
[12] PCE, 1994, at 73-74.
[13] PCE, 1994, at 70.
[14] PCE, 1994, at 70.
[15] PCE, 1994, at 70.
[16] PCE, 1994, at 75, 110.
[17] Bayfield and Meister, at v.

3.8 By the time of the second review, which commenced in June 2005, most of the planting to date had used *Pinus radiata*.[18] The sustainability of commercial *Pinus radiata* plantation forestry was (again) questioned "given the need for clear fell harvesting"[19] and the resulting window of vulnerability to erosion, during which the tensile strength provided by rotting stumps and roots is lost and that provided by new plantings is not yet established.[20]

3.9 In response, the second review considered that "[t]he use of species with longer rotations would mean fewer harvests and less frequency of soil disturbance over time. There could also be less disruptive harvest techniques (compared with clear felling *Pinus radiata*), for example using mixed species plantations with selective harvesting at differing times ensuring a continuous canopy cover."[21]

3.10 In support of this, the authors of the second review noted - under the telling heading "*Long Term View*" - a 2002 report by the Parliamentary Commissioner for the Environment, "which discussed the potential for weaving resilience into our working lands including recommendations for the future roles of native plants."[22] Resilient forestry could use longer rotation high timber value indigenous species like totara, which would foster biodiversity and resilience, and could "be selectively harvested by helicopter logging."[23]

3.11 However, the authors concluded that alternative species had "not been taken up by landowners because of the lack of technical expertise in forestry with alternative species, greater costs involved in the[ir] establishment and longer rotations meaning costs are carried over a longer period of time."[24] Ultimately, and although mixed species plantations with variable harvesting would provide more effective long term erosion protection, "the economics of this type of proposal are unlikely to be attractive to landowners."[25] To overcome this, additional support and encouragement would be necessary to ensure the most effective, long term solution is implemented, not the cheapest.[26]

[18] Ibid, at 12.
[19] Ibid, at 13.
[20] Ibid.
[21] Ibid.
[22] Ibid, at 26.
[23] Ibid.
[24] Ibid, at 13.
[25] Ibid, at 26.
[26] Ibid, at 40.

3.12 But, short term economic considerations prevailed,[27] and by 2016 the East Coast had a total of 141,581 hectares in exotic forestry.[28] And "with these forests now ready to harvest has come the problem of slash mobilisation in the forests of Tairāwhiti."[29]

3.13 Forecast harvest volumes over the coming decades (as at 2018) are set to grow, with harvest pressures (and their associated risks) expected to rapidly increase from around 2026, and not likely to peak until around 2036.[30] This presents a very limited intervention window within which regulators and industry can formulate a genuinely effective management response[31] that will address both the immediate risks of adverse environmental effects whilst also securing sustainable, long term resilience.

4 ToR 12.3.2 | Geographic scope: Significant adverse environmental effects from plantation forestry activities is a national problem - and climate change will only exacerbate these effects

4.1 The exacerbation of significant adverse environmental effects associated with clear felling exotic monocrops planted on erodible steeplands and hill country is not a uniquely East Coast problem:

(a) Cave et al noted: "Tairāwhiti is also not the only region with problems with forestry slash. A storm in the Marlborough Sounds in early November 1994 resulted in eight landslides in an area that had been harvested over the previous months. The storm was not particularly intense compared with what the area can receive but the damage was locally significant. It was observed that slope failures in forested land will be an issue during intense rain events and that harvest on slopes of 30 degrees will need to be managed in a way that it does not seriously disturb the soil."[32]

(b) Visser similarly records that "In New Zealand, post-harvest landslides and debris flows that transport large quantities of woody residue have been recorded in Northland, Coromandel, Bay of Plenty, Gisborne/East Coast, and Nelson-Marlborough, whereby it was reported that they are usually caused by storms with return periods greater than 20 years, though smaller events have occasionally caused problems."[33]

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[27] Reminiscent of Aldo Leopold's observation in "The Land Ethic" (in *A Sand County Almanac* (1949)), whereby he lamented "Some species of trees have been 'read out of the party' by economics-minded forests because they grow too slowly, or have too low a sale value to pay as timber crops…. In Europe, where forestry is ecologically more advanced, the non-commercial tree species are recognized as members of the native forest community, to be preserved as such, within reason. Moreover some … have been found to have a valuable function in building up soil fertility. The interdependence of the forest and its constituent tree species, ground flora, and fauna is taken for granted."

[28] Cave et al, at 2.

[29] Ibid, at 93.

[30] Ibid, at 2.

[31] Ibid, at 2.

[32] Ibid, at 93.

[33] Visser, R., "Best practices for reducing harvest residues and mitigating mobilisation of harvest residues in steepland plantation forests", 2018, prepared for Gisborne District Council (**Visser**), at 26.

(c) At the national scale, at least 24% of the current plantation forest estate is rated either high or very high under current ESC mapping;[34]

(d) Writing in relation to the impacts on marine and freshwater environments from plantation forestry in the Marlborough and Tasman districts, Bright notes that the area is characterised by steep topography that is exposed to high intensity rainfall;[35]

(e) The second review of the ECFP referred to "**lessons from other regions**" subject to flooding that "demonstrates **how vulnerable New Zealand's hill country is** to storm-initiated erosion and the damages that follow."[36] It also acknowledged that:

i) "[c]limate change will increase the frequency and magnitude of future storm events" and that "**New Zealand** can expect to sustain further loss of steep hill country soils and off-site damage to property";[37] and

ii) "**It is important to address soil erosion throughout New Zealand**. Not dealing with the issue today will only increase the magnitude of the disaster that will occur in the future after a severe rain storm or a cyclone event."[38]

4.2 The geographic spread of prosecutions for slash discharges in breach of the Resource Management Act 1991 (**RMA**) further demonstrate that the adverse effects of plantation forestry on erodible slopes is a national problem, and must be addressed accordingly.

4.3 That is also because, as noted in the second review of the ECFP, the increasing frequency and intensity of extreme weather events are predicted to be experienced across the country. Indeed, "unprecedented weather events are becoming the norm."[39] Very extreme precipitation, defined as events with a recurrence interval of 2 years or greater, are projected to increase *throughout* the country.[40]

4.4 We also note that the incidence and intensity of precipitation and storm events, though clearly relevant to the mobilisation of slash and sediment, are not the only climate change effects of significance to sustainable forestry policy and regulation. Increasing mean temperatures, extreme winds, and prolonged droughts, which will increase the risk of wildfire and wilding spread in even-aged, single species coniferous forests, as well as

[34] See https://www.mpi.govt.nz/dmsdocument/29804-Erosion-Susceptibility-Classification-by-class-area-of-plantation-forestry-excluding-Department-of-Conservation-Land.
[35] Bright C. E. 2021 Impacts on Marine and Freshwater Environments from Plantation Forestry. Prepared for Marlborough District Council and Tasman District Council. Envirolink Report 2118-MLDC 158 (**Bright**), at 19.
[36] Bayfield and Meister, at 35.
[37] Ibid.
[38] Ibid.
[39] Norton, D., "We planted pine in response to Cyclone Bola, it is now time to invest in natives", 23 February 2023, https://www.stuff.co.nz/environment/climate-news/300814466/we-planted-pine-in-response-to-cyclone-bola-it-is-now-time-to-invest-in-natives
[40] Ministry for the Environment 2018. *Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment, 2nd Edition*. Wellington: Ministry for the Environment, at 15.

pressures on freshwater resources (for example, where afforestation occurs too close to wetlands and other waterbodies), must also inform what we plant, where, and for what purpose to achieve climate resilient and adaptable forests and landscapes. The potential for adverse effects from forestry activities, and adequacy of the NESPF to regulate for these, must be considered with all climate risks in mind.

5 ToR 12.3.2.7 - 9 | Slash damage effects are obvious, but sedimentation effects are as significant and ubiquitous

5.1 Footage of the catastrophic scale of devastation wrought by the mobilisation of woody debris on the East Coast makes plain many of the resultant adverse environmental effects from plantation forestry, and it would be understandable for the Inquiry to focus on these.

5.2 However, the effects of accelerated sedimentation (associated with earthworks, vehicles and machinery, river crossings, harvesting and the post-harvest window of vulnerability) are no less damaging to receiving environments. Those from Cyclone Gabrielle will be extensive and long-lived. Sedimentation effects are clearly articulated by Professor Simon Thrush's statement prepared in support of this submission (**Appendix A**).

5.3 The table below also summarises some of the environmental and biophysical effects of both sediment and debris flows on freshwater and marine environments.[41] In short, "[e]xcess sediment in freshwater and marine environments reduces the growth of plants, damages fish gills, and can smother riverbed and seabed ecosystems."[42] In the case of *Gisborne District Council v Aratu Forests Limited*, J Dwyer concluded that:[43]

> "the discharge of forestry debris into the streams on the Wakaroa block had a range of identifiable adverse impacts on those water bodies. Sediment discharges smother stream beds, destroying invertebrate, fish and plant life. They cloud the water column making it difficult if not impossible for some fish species to see and breath. They can settle and accumulate so that their effects are repeated and add to the effects of other sometimes naturally occurring sedimentation. Slash destroys stream edges and beds and blocks water bodies it enters…. The combination of slash and sediment interferes with the natural processes and flow of the water it enters."

5.4 Further, unlike slash, sediment is hard to remove. And because sediment can be readily resuspended, its effects on receiving waterbodies are more acute and long-lived, with the risk of repeated harm during successive storm events. These factors make sedimentation effects particularly significant.

[41] Sources: Ryan (1991); Gillespie (2007); Bilotta and Brazier (2008); Geertsema *et al.* (2009); Davies Colley *et al.* (2015); Visser and Harvey (2020); Urlich (2015, 2020), cited in Bright, at 21.
[42] Bright, at 20.
[43] [2020] NZDC 2808, at para [18].

Summary of environmental effects of sediment and debris flows on receiving freshwater and marine environments

	Deposited Fine Sediment	Suspended Sediment	Debris Flows
Marine Environment Coastal/Estuary/ Lagoons	Smother benthic habitats and thereby change ecological composition by killing and displacing macrofauna. Seagrass reduced in extent and fine sediment coating on the leaves. Effects of changing sediment fluxes are frequently observed at the coast, as excessive loading of riverine sediment can cause smothering of estuaries and the seafloor and can cause beach erosion or aggradation. Fine sediments on the relatively flat seabed surface can be readily resuspended by tidal and wave-generated currents to the extent that they interfere with the growth/survival of suspension-feeding shellfish.	Increase turbidity and reduce light transmission in the water column and thereby affect photosynthesis; change biogeochemical gradients and cause negative effects to benthic microalgae; clog fish gills and the feeding parts of sediment-dwelling filter-feeders, and cause chronic effects on macrofauna physiological condition and behaviour. Excess fine sediment in the nearshore zones is a natural hazard and can silt up harbours and estuaries affecting shipping and navigation.	Debris flows deposit material at the coast typically in fans. Boulders and logs deposited in washouts and flooding. Forestry waste and slash washing up on beaches and log debris clogging river outflows to coast. Sediment-laden plumes can extend over large areas of coastline. Very fine-grained sediments can be carried tens of kilometres, or much further, offshore and transported along the coast by wave action and tidal currents. Foreshore and seafloor smothering with logs and forestry slash, mud and silt.
Freshwater Rivers/Lakes/ Wetlands	Deposited sediment affects the substrate composition of a waterway and therefore changes the coverage of fines and bed stability. Deposited sediment provides a readily available in-stream source of sediment that can have flow-on effects downstream. Fine deposited sediment has a complex relationship with periphyton and macrophytes. Affects fish habitat and food supply. Increased drift and decreased abundance of benthic invertebrates. In lakes, deposit sediment causes benthic smothering, sediment resuspensions and alteration to sediment oxygen demand.	Deposits sediment into a stream or pollutes a drinking water source with sediment and fine organic debris. Clogging riverbed sediments and reducing habitat function. Reduce light transmission in the water column and thereby affect light penetration, suspended sediment concentration, the visual clarity, and sediment budget of a waterway. In lakes light transmission, oxygen demand, conveyance of sorbed contaminants is affected by sediment concentration, visual clarity and photosynthesis, depth limit for benthic plants, foraging efficiency, food quality.	Exacerbate flood hazard and potentially cause severe impacts for downstream infrastructure and communities. Debris flows have a very high sediment concentration by weight and are more powerful and destructive than water alone and may carry woody material and boulders. Damage to river channels by filling and/or eroding the stream channel for great distances. Capable of relocating and depositing large amounts of material from the slopes to the valley bottoms. Dam streams and rivers impacting both water quality and fish habitat.

6 ToR 12.3.4 - 7 | Why is this happening? Permissive regulatory regime irreconcilable with such a high intensity, high risk industry

6.1 The inability of the NESPF settings to ensure that significant adverse effects from forestry activities are avoided is attributable to a raft of regulatory flaws that are well documented in EDS's comprehensive review of the NESPF (**EDS NESPF Review**),[44] and EDS and Pure Advantage's recent joint submission on the Ministry for Primary Industries' (**MPI**) consultation on extending and amending the NESPF for permanent exotic forestry.[45]

6.2 These pieces of work (attached as **Appendix B** and **C** respectively) inform, and should be read in conjunction with, this submission, and we cross-reference them where appropriate.

6.3 This submission does not cover all of the issues traversed in those pieces of work. However, they both conclude that review and strengthening of the NESPF is necessary, including because of the specific shortcomings outlined below.

Activity status: presumption of permitted activity status for plantation forestry activities irreconcilable with risk of significant adverse effects

6.4 The NESPF are regulations promulgated under the Resource Management Act 1991 (**RMA**). Their origin came at the behest of industry, which claimed that regional variances to planning controls were a threat to forestry investment and that a consistent management framework was required to reduce any actual or perceived barriers to future investment.[46]

6.5 The industry's influence over the formulation of policy and regulatory settings has been highlighted in recent media coverage, revealing the persistence and extent of industry capture.[47] Perceptions of privileged influence also arise in relation to the appropriateness of Te Uru Rākau's (as a business unit of MPI) lead role in relation to administering the NESPF. As an RMA and environmental regulatory instrument, the NESPF should fall primarily within the Ministry for the Environment's remit, as is the case for other resource management instruments in which other agencies have big stakes (for example, the Ministry for Business, Innovation and Employment vis-à-vis the National Policy Statement for Renewable Energy Generation).

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[44] Wright, M., Gepp, S., and Hall, D., A Review of the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017 - Are the settings right to incentivise "the right tree in the right place", and is a high trust regulatory model the right fit for a high risk industry? Environmental Defence Society Inc and Royal New Zealand Forest & Bird Protection Society of New Zealand, April 2019 **(EDS NESPF Review)**.

[45] Environmental Defence Society and Pure Advantage, *Joint Submission on Discussion Document "National direction for plantation and exotic carbon afforestation"*, 11 November 2022.

[46] Gisborne District Council Report to Council for decision on "Implications of the Proposed National Environmental Standard for Plantation Forestry", 30 September 2010 (**GDC Report to Council on proposed NESPF**), at 3.

[47] https://www.rnz.co.nz/news/lobbying/486670/lobbyists-in-new-zealand-enjoy-freedoms-unlike-most-other-nations-in-the-developed-world

6.6 As a result, the NESPF established a permissive approach to a highly intensive industry, which some saw as "an attempt to 'front load' the plantation forestry regulatory regime … [such that] once a plantation forest is established, management and harvesting rights are secure."[48]

6.7 The NESPF came into force on 1 May 2018 with the objectives of:[49]

(a) ***maintaining or improving*** *the environmental outcomes associated with plantation forestry activities*; and

(b) ***increasing the efficiency*** and certainty ***of managing plantation forestry activities***.

It is worth observing that these two objectives will seldom align.[50]

6.8 The NESPF regulates eight core plantation forestry activities: afforestation, pruning and thinning, earthworks, river crossings, harvesting, forestry quarrying, mechanical land preparation, and replanting.

6.9 To encourage commercial afforestation (following a period of net deforestation in Aotearoa New Zealand), most of these activities enjoy permitted activity status by default (meaning no resource consent is required),[51] subject to compliance with conditions.

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[48] GDC Report to Council on proposed NESPF, ibid, at 4.

[49] https://www.mpi.govt.nz/forestry/national-environmental-standards-plantation-forestry/

[50] The same is true of the 2013 Forest Stewardship Council's (**FSC**) National Standard for Certification of Plantation Forest Management in New Zealand, Principle 5 – Benefits from the Forest, which provides that "Forest management operations shall **encourage efficient use** of the forest's multiple products and services **to ensure economic viability and a wide range of environmental and social benefits**"; and Criterion 5.1, which states that "Forest management should **strive towards economic viability, while taking into account** the full environmental, social, and operational costs of production, and ensuring the investments necessary to maintain the ecological productivity of the forest." By comparison, Preface A1 of the 2023 FSC Forest Stewardship Standard for New Zealand (2023 FSC Standard), which will come into effect on 15 April 2023, states that "Economically viable forest management means that forest operations are structured and managed so as to be **sufficiently profitable, without generating financial profit at the expense of the forest resource, the ecosystem, or affected communities.** The tension between the need to generate **adequate financial returns** and the principles of responsible forest operations can be reduced through efforts to market the full range of forest products and services for their best value." (at 15). However, Principle 5 of the 2023 FSC Standard still requires efficient management "to maintain or enhance long-term economic viability **and** the range of social and environmental benefits."

[51] Councils *can* apply greater stringency in their plans that that applicable under the NESPF to: achieve an objective of the National Policy Statement on Freshwater Management (**NPS FM**); give effective to Policies 11, 13, 15 and 22 of the New Zealand Coastal Policy Statement (**NZCPS**); protect outstanding natural features and landscapes and significant natural areas (**SNAs**); and manage activities in certain unique and sensitive environments. Accelerated sedimentation in the marine environment and woody debris deposited on the coast is inconsistent with several policies in the New Zealand Coastal Policy Statement. Similarly, accelerated sedimentation in freshwater environments is inconsistent with several National Policy Statement for Freshwater Management policies and with meeting relevant freshwater national bottom lines. Bright queries whether it would be possible to meet national bottom lines related to sediment in freshwater in light of the predisposition to slope failures in areas where plantation forestry is situated. Bright, at 36, 44.

6.10 A presumption that it is appropriate for large scale, intensive plantation forestry activities to be "permitted" is irreconcilable with the high risk of significant adverse environmental effects associated with these activities, particularly earthworks and harvesting. It also puts the forestry sector at odds with more stringent regulatory regimes that apply to other primary sectors. As Gisborne District Council outlined in its reservations regarding initial proposals for an NESPF:[52]

> "Forestry harvesting and associated earthworks are large scale activities involving large areas and large volumes of material. Both are potentially conducive to large scale erosion and adverse downstream effects. **No other land use carries out such activities at this scale, so the risks are high.** The proposed NES lowers the permitted activity baseline; that **is it permits environmental effects from plantation forestry that would not be permitted for other land uses.**"

6.11 It is therefore unsurprising that the EDS NESPF Review concluded that:[53]

> "… the NESPF's presumption that plantation forestry activities should be a permitted activity needs to be revisited. A complex, intensive activity that not only has immediate impacts but contributes to diffuse pollutants does not easily lend itself to the certainty and specificity required for a permitted activity standard of national application. This is particularly so when that activity occurs across a national landscape that is extremely diverse and which, in many areas, is reaching environmental limits."

6.12 The inappropriateness (and illegality) of the NESPF's permissive approach to forestry activities is informed by a combination of regulatory flaws. These include:

(a) Reliance on the ESC, which does not accurately map site-specific risks;
(b) Inadequacy of controls relative to erosion risk zoning;
(c) Absence of regulatory nuance in relation to harvesting systems;
(d) Weak and inappropriate slash management provisions; and
(e) Vague, ineffective and unenforceable permitted activity conditions.

I. Erosion risk mapping: Inadequacy of primary risk assessment tool

6.13 The NESPF relies on the ESC to determine the level of regulation applicable to certain plantation forestry activities, and therefore how any associated environmental effects are managed. Its accuracy is critical since "[a]bout one-third of the New Zealand plantation forest estate is located on steeplands with fragile erodible soils, where many of the forests were originally planted as protection forests to control erosion and are now managed almost exclusively for wood production."[54]

[52] GDC Report to Council for decision on "Implications of the Proposed National Environmental Standard for Plantation Forestry", 30 September 2010, at 7.
[53] EDS NESPF Review, at 2.
[54] Raymond, K. "Crisis. What crisis? Maintaining our social licence to harvest steepland forests" NZ Journal of Forestry, August 2015, Vol. 60, No. 2, at 43.

6.14 The ESC ascribes an *erosion* susceptibility profile to all land across Aotearoa New Zealand, which is depicted on a map according to four colour-coded risk zones: green (low risk), yellow (moderate), orange (high), or red (very high risk).

6.15 Developed as an initial screening tool, the ESC applies an erosion risk assessment scale of 1:50,000. At such a coarse scale of granularity, it is unable to determine site-specific risk accurately or, therefore, to assign appropriate regulatory controls. Steep slopes within an area of gentler topography may be highly susceptible to erosion but will not be depicted at a scale of 1:50,000. As a result, most hill country and steeplands are classified as orange or yellow, but there are also significant areas of hill country and steeplands classified as green, mainly in the South Island. It is also informed by out-dated data in some areas.

6.16 A 2020 research article published in the New Zealand Journal of Forestry Science stated that "the coarse spatial resolution of the ESC may be ill-suited to managing forestry activities at the scale of forestry operations"[55] and:[56]

> "… in our study **the ESC failed to reliably discriminate areas of high landslide occurrence from areas of low landslide occurrence**. This probably relates to the resolution of the ESC and the New Zealand Land Resource Inventory (NZLRI) (Newsome et al. 2008) on which it is based, as **the scale (1:50000) of these data layers may be too coarse to adequately represent local scale (1:10000) variation** in land cover, climate, or topography. Deficiencies in the ESC could also be due to the **quality of the data contained in the NZLRI, which in some areas is 40 years out of date** (Bloomberg et al, 2011). The potential shortcomings of the ESC are well recognised (Basher et al. 2015a; Bloomberg et al. 2011; Marden et al. 2015) and it was intended as a regional rather than local land use management tool (Bloomberg et al. 2011). Nevertheless, the failure of the ESC to discriminate areas of high landslide occurrence from areas of low landslide occurrence in our study area, which covers almost 20,000 ha, raises questions about the reliability of the ESC as a regional land management tool in Tasman, New Zealand, and may warrant investigation elsewhere."

6.17 Although the NESPF requires that earthworks management and harvest plans include maps at "a scale not less than 1:10,000",[57] the provision of these plans is only required in accordance with permitted activity conditions or as a matter of control/discretion for controlled or restricted discretionary activities.[58] Thus, the finer scale assessment is not the information basis for determining what regulatory controls should apply in the first place.

[55] J Griffiths, C Lukens, R May, 2020, *Increased forest cover and limits on clear felling could substantially reduce landslide occurrence in Tasman, New Zealand*, New Zealand Journal of Forestry Science, 50:13, p 2.
[56] Ibid, p 9.
[57] NESPF, Schedule 3(2).
[58] We also understand, anecdotally, that mapping at this scale is not commonly undertaken as many New Zealand forestry companies do not have the in-house skills to undertake assessments at this scale or do not do so properly.

II. Inadequacy of ESC zoning controls relative to risk

6.18 In addition to recalibrating the scale at which an ESC assessment is undertaken, and as foreshadowed in the preceding paragraph, the distinctions made between, and thresholds and controls applied to, the various ESC zones should better reflect relative risk.

6.19 Very little distinction is made between the yellow zone, where the erosion susceptibility risk is moderate, and the orange zone, where the risk is high. Indeed, for harvesting, no distinction is made at all. And because the NESPF does not differentiate between harvesting systems, this means that clear felling in green, yellow **and orange** zones is permitted **without any spatial or temporal limitations**.

6.20 Clear felling on red zoned land is also permitted, subject to a 2-hectare cutover limit in any three month period.[59] In light of the erosion risk on such land, plantation forests should not be permitted there at all. Whilst there may be some short-term stabilisation benefit (around 28 years for a standard *Pinus radiata* rotation), the erosion and sediment discharge that follow harvesting (particularly clear felling) can be significant, even from smaller areas.[60] The NESPF should better reflect that:[61]

> "the erosion-control benefits of plantation forests are short-lived, lasting only as long as the trees are in the ground. On extraction, the benefit is gone and the bare face that remains can itself result in significant amounts of sediment ending up in sensitive receiving environments. This issue is particularly acute in respect of clear fell extraction as this opens a window of vulnerability between when new trees replace the rotting roots from the previous rotation."

During this window, which can last between 3 and 8 years from the time of harvest,[62] the site is vulnerable to landslides, mobilisation of slash, debris, and sediment. Radiata pines are associated with a longer window due to inferior root strength and their rapid decay. Indeed, "[t]he length of time between the death of trees and the onset of root decay is species dependent with *Pinus radiata* losing half its tensile strength in 15 months compared with more than 30 months for native trees."[63]

6.21 Ultimately, the NESPF should not be permitting plantation forestry in areas where the risk of adverse environmental effects from tree removal is high.[64] These are areas where permanent native forests should be nurtured due to their superior and multiple long-term benefits, which we outline further in this submission.

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[59] NESPF, Reg 63(2)(b).
[60] EDS NESPF Review, at 2.
[61] EDS NESPF Review, at 25.
[62] EDS NESPF Review, at 17.
[63] Amishev, D., Basher, L., Phillips, C., Hill, S., Marden, M., Bloomberg, M., Moore, J.,*"New Forest Management Approaches to Steep Hills"* (MPI Technical Paper No. 2014/39) November 2014, at 23, (citing Philips and Watson, 1994), at 32.
[64] EDS NESPF Review, at 2.

III. Tacit acceptance of clear fell harvesting contrary to avoidance of adverse effects

6.22 Designed with "a focus on managing the effects of clear fell harvest, which is the dominant harvest model in Aotearoa New Zealand",[65] the NESPF does not differentiate between harvesting methods. Consequently, clear fell harvesting in green (low risk), yellow (moderate risk) and orange (high risk) erosion susceptibility zones is permitted *at any scale*: no spatial or temporal limitations apply. Clear felling on red zoned land is also permitted, subject to a 2 hectare cutover limit in any three month period.

6.23 Clear cut harvest systems involve felling an entire forest at once, making (m)any of the environmental benefits of exotic forests temporary: stored carbon is released, biodiversity is lost,[66] soil is destabilised and prone to erosion and subsequent weed invasion, and the quantity and turbidity of rainwater run-off increases.[67]

6.24 Furthermore, our commonly used cable harvesting systems rely on "rigging configurations [that] tend to pull the trees with only one end slightly suspended in the air while yarding and the rest of the tree [is] dragged on the ground because of insufficient clearance. This usually results in increased ground disturbance and when deflection is poor these configurations lead to significant gouging of the terrain."[68] Amishev et al also observed that:[69]

> "In order to achieve suitable deflection for maximising payload and hence system productivity, cable harvesting crews in New Zealand almost exclusively use the "ridge-to-ridge" setup where landings are located on a ridge-top and the mobile tailhold is located on the next ridge across a gully bottom and often across several smaller gullies. Thus **the whole area between the two ridges is harvested and extracted at once**. ... When extracting trees for the opposite (to the yarder) face of the gully, they are **pulled across the gully bottom (often through riparian vegetation if there is a riparian streamside zone)** and extracted up to the landing. During this process, the so called "**sweeping" occurs where broken tops and pieces from the felled trees are swept into the gully bottom leading to substantial accumulation of woody residue in these places."**

Retrieving this woody debris from steep gullies is often too difficult and unsafe.

6.25 Clear felling large areas of a catchment in this way will increase the hydrological response from a rainfall event,[70] as well as the availability of harvest residues and movement of soil. In recently harvested areas, even small rainfall events can lead to significant erosion,

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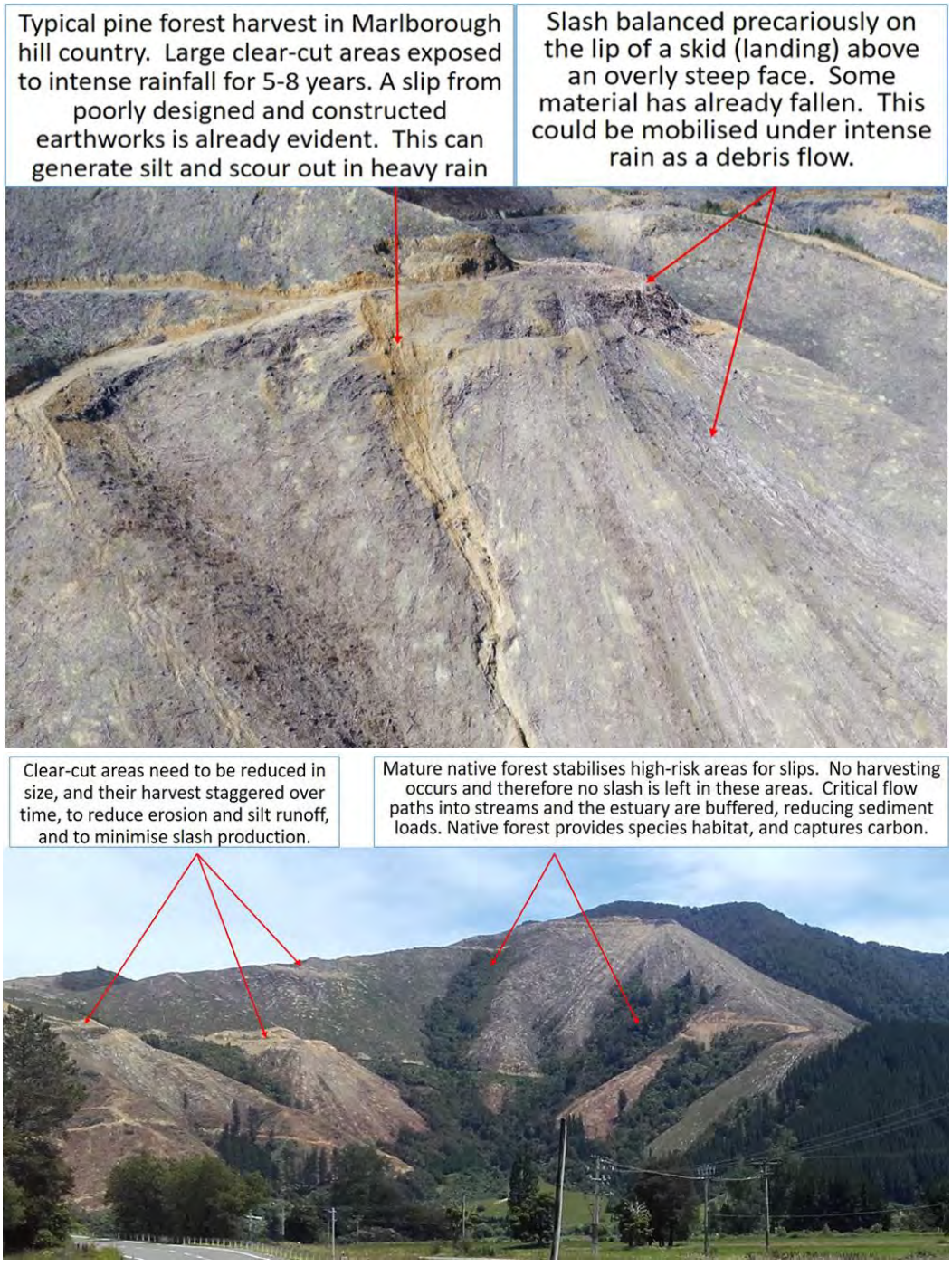
[65] Ministry for Primary Industries, "*National direction for plantation and exotic carbon afforestation",* MPI Discussion Document 2022/10, at 16.
[66] We discuss the impacts of harvest methods on biodiversity at paras 9.22 – 9.24 in our joint submission on MPI's "National direction for plantation and exotic carbon afforestation"
[67] PCE, "Seeding the carbon storage opportunity in indigenous forests – Comments on the draft Climate Change (Forestry Sector) Regulations 2008", June 2008, at 5.
[68] Amishev, D., Basher, L., Phillips, C., Hill, S., Marden, M., Bloomberg, M., Moore, J.,*"New Forest Management Approaches to Steep Hills"* (MPI Technical Paper No. 2014/39) November 2014, at 23 (**Amishev et al, 2014**).
[69] Ibid, at 25.
[70] Visser, at 37.

sedimentation and debris flow events.[71] These adverse environmental effects are more severe on steep slopes, as evidenced by the following images.[72]



6.26 New Zealand's permissive approach to clear fell harvesting, particularly in high erosion risk zones, is misaligned with international best practice precedents, where clear cut limits and alternative silvicultural and harvest systems have been implemented to secure better environmental outcomes.

[71] Visser, at 29.
[72] Images provided courtesy of Dr Steve Urlich / Marlborough District Council.

6.27 In support of this, Visser notes that "Austria, with a large forest industry, **legally restricts clearcuts** to 0.5 ha. with an exception allowing a harvest up to 2 ha".[73] Germany, Italy and Switzerland all champion **continuous cover forestry** and "in principle restrict all 'clearcuts', allowing only patch-cuts, thinning or single tree selection."[74]

6.28 Exclusive use of **multi-span extraction systems with intermediate supports**, **"gully-to-ridge"** harvesting setups, and a prohibition on extraction through **permanently planted and protected riparian zones** apply in Chile.[75]

6.29 **Small coupe harvesting with adjacency constraints** apply in North America,[76] "which prevent a stand from being harvested before all adjacent stands are well established and "free to grow", which usually means having well developed root systems."[77]

6.30 Raymond points out that:[78]

> "The Pacific Northwest region of the United States and Canada has had its **harvesting volumes drastically curtailed due to environmental issues and strong public reaction against the forest industry.** In the very steep terrain countries of Europe (Germany, Austria, Italy and Switzerland) **they use silvicultural systems, hazard planning processes and harvest engineering technologies to protect the environment that are very different to those in New Zealand**. **Very steep terrain forests (over 80% slope) are managed primarily for watershed protection and recreation, and timber harvesting is secondary. Continuous cover forestry is the silvicultural system of choice with partial or selective tree harvesting**."

6.31 In light of these alternative and less ecologically destructive forestry practices overseas, it is unclear:

(a) Why these are perceived or presented as 'niche' in Aotearoa New Zealand;[79] nor

(b) Why the NESPF:

i) only applies a harvest limit on red zone land;[80]

ii) permits plantation forestry on vulnerable slopes at all given the challenges of managing significant adverse effects on and from such land;[81] and

iii) does not distinguish between harvesting systems.

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[73] Visser, at 38.
[74] Visser, at 38, citing Spinelli et al, 2015.
[75] Amishev et al, at 63.
[76] Visser, at 38, citing Amishev et al, 2014.
[77] Visser, at 38.
[78] Raymond, K. "Crisis. What crisis? Maintaining our social licence to harvest steepland forests" NZ Journal of Forestry, August 2015, Vol. 60, No. 2, at 43.
[79] Indeed, the Forests Act 1949 requires such methods for the sustainable management of indigenous forests – see Schedule 2, clause 10.
[80] A 2 hectare limit in any 3 month period.
[81] EDS NESPF Review, at 26.

6.32 Based on what was observed in the countries visited by Amishev et al on their benchmarking study tour of forest management approaches to steep hills, they saw "at least two possible trajectories for future forests that have a production element on steep erosion-prone land" for Aotearoa New Zealand. These are worth repeating here:[82]

> "One sees a continuation of the current "corporate" forestry model of mostly larger-scale "mono-cultural" commercial plantation forests. The other could see the development of smaller-scale forests that might be managed as continuous cover forests (single or multiple species), multifunctional forests (ecosystem service forests), or approaches similar to many farm forestry activities seen in many parts of New Zealand.
> In the second "type" of forest there is likely to be **more species diversity** with "forests" or groups of trees occupying landscape niches within a pastoral agricultural system that target land not directly suited to pastoral agriculture. The **wood produced could be high value single trees for specialist markets** or for use on the farm itself. **Harvesting would likely be on a single tree or group section basis** and in many cases the timber would be sawn on the property. This type of forestry **would not require substantial investment in roading or earthworks** and **may be able to use smaller less capital-intensive forms of harvesting technology.**
> A further possibility exists for land that has a high risk of debris flows. **Areas identified as being of high risk of landslide-debris flows on steeplands could be "abandoned" and allowed to revert to scrub and or native forest.** Weed control and some management may be required for this option to succeed."

6.33 The Forestry and Wood Processing Industry Transformation Plan, in identifying the promotion of continuous cover forestry as an action point,[83] may indicate a softening of attitudes to alternative silvicultural systems. But facilitating the transition to continuous cover forestry should be *prioritised*, in respect of which continuity of canopy cover and root structure is retained, helping to preserve (rather than periodically disrupt) biodiversity habitats and improve ecosystem functionality and resilience,[84] and to significantly reduce the incidence of sedimentation and erosion.

6.34 Alternative silvicultural and harvesting systems can have higher operational costs[85] and may impact profitability.[86] However, the economic expediencies of clear fell harvesting rely on the externalisation of downstream costs facing communities and receiving environments. We have seen as a consequence of Cyclone Gabrielle that those costs can be extreme. Accepting the possibility of a reduced economic return in the short term (which the industry

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[82] Amishev et al, at 74.
[83] Action 7.2.
[84] Due to uneven-aged forest structure and the use of diverse tree species.
[85] Hall, D. (June 2018). The Interwoven World | Te Ao i Whiria: Toward an Integrated Landscape Approach in Aotearoa New Zealand. Discussion paper. Auckland: The Policy Observatory. Retrieved from https://thepolicyobservatory.aut.ac.nz/ (**Hall, Interwoven World**), at 47.
[86] Although higher costs may be somewhat compensated for by larger piece sizes and higher log quality extracted: see https://nzjf.org.nz/free_issues/NZJF63_4_2019/E24BCB64-19DE-476d-8A15-3F4B3A74E4B0.pdf, at 25, 28. Note also references to no run-off after heavy rain. There will also be lower replanting costs due to reliance on natural regeneration for replacement trees, together with broader environmental and social benefits (some of which may be monetized, for example, by way of a biodiversity payment scheme).

has been unwilling to do)[87] may be a necessary price of transitioning to a truly sustainable and prosperous forestry model in Aotearoa New Zealand for the long term.[88]

6.35 Clear policy direction, regulatory measures and transitional support are essential to facilitate a shift to ecologically superior silvicultural systems and lower impact harvesting methods here.[89] Evidently this is how plantation forestry is undertaken now in many countries with similar characteristics, where the downstream social, economic and ecological costs associated with more damaging harvest methods are internalised. It is past time for Aotearoa New Zealand to catch up.

IV. Weak and inappropriate slash management controls

6.36 Because the NESPF are essentially designed around the expectation that plantation forests will be clear felled, they anticipate the generation of, and therefore need to manage, slash.

6.37 However, the regulations simply assert that:

(a) slash from harvesting is to be placed on stable ground;

(b) slash piles "*on the edge* of landing sites must be managed to avoid collapse"; and

(c) that harvesting slash should not be deposited into a water body or onto land that would be covered by water during a 5% AEP event - or if it does, it must be removed to avoid blocking or damming water bodies; eroding river banks; significant adverse effects on aquatic life; and damaging downstream infrastructure, property, or receiving environments.[90] (Of course, by the time it is removed, the damage to be avoided is likely already done).

6.38 In light of the extent to which unconstrained clear fell harvesting is permitted on steep erodible slopes, and the prevalence of "gully-to-ridge" cable harvesting systems, these regulatory settings are simply not fit for purpose. The volume of woody debris accumulation of slash piles ("birdsnests") on gully heads and erodible slopes present a significant mobilisation risk and should not be permitted on-site, let alone "*on the edge* of landing sites". For as long as clear felling persists, associated slash should be processed promptly on-site if feasible or trucked off-site for appropriate disposal, to avoid the risk of mobilisation, collapse or spontaneous ignition.

6.39 Reliance on slash traps, which are permitted under the NESPF,[91] should also be revisited. Slash traps anticipate the deposition of harvesting slash into water bodies, contrary to regulation 69(3), and the avoidance of associated adverse effects listed in regulation 69(4).

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[87] Bloomberg, M. "Cyclone Gabrielle triggered more destructive forestry 'slash' – NZ must change how it grows trees on fragile land", The Conversation, 17 February 2023.

[88] Hall, The Interwoven World. Amishev et al note that in Germany, Switzerland, Italy and Chile "***very low rates of return are accepted and sometimes zero or negative remain acceptable because of the other values attributed to the forest***." Amishev et al, at 67.

[89] EDS NESPF Review, at 2.

[90] NESPF, Reg 69.

[91] NESPF, Reg 83.

This internal inconsistency should be addressed, particularly in light of their questionable efficacy and appropriateness, which are considered further at paras 6.55 – 6.56 below.

V. Vague and inadequate permitted activity conditions

6.40 Although permitted activity status is subject to compliance with specified conditions, many are inadequate to achieve the necessary level of environmental protection in all situations, or are uncertain and subject to value judgement on the part of the forest operator, making them difficult to translate into appropriate site-specific management responses or to enforce.[92]

6.41 For example, sediment controls require the management of sediment originating from applicable forestry activities to ensure that "after reasonable mixing" it does not give rise to "any conspicuous change in colour or visual clarity", the rendering of fresh water unsuitable for consumption by farm animals, or any significant adverse effect on aquatic life in the receiving waters. Although the phrase "reasonable mixing" derives from the RMA's provisions regarding discharges, it is unclear how to determine the point at which "reasonable mixing" may have occurred, nor indeed what would constitute "any conspicuous change in colour or visual clarity", making implementation, compliance with, monitoring and enforcement of this standard challenging.

VI. Permissive approach therefore in breach of s 43A(3) of the RMA

6.42 Section 43A(3) of the RMA does not allow national environmental standards to state that an activity that has significant adverse effects on the environment is permitted. Yet the NESPF's permissive approach to intensive forestry activities, particularly harvesting (in respect of which there is no regulatory nuance in relation to systems), together with its reliance on the ESC as a risk assessment tool, does precisely that.

6.43 Provided a forest operator is of the view that the relevant permitted activity conditions can be met (which are often vague, subject to value judgement, and unenforceable), clear felling (and associated earthworks) can occur on highly erodible land with significant and inevitable adverse effects as a result. In these respects, the NESPF are contrary to the RMA.

Management accountability gap, contrary to obligations on other primary sectors

6.44 Forest operations in Aotearoa New Zealand enjoy a very high trust management regime, with "heavy reliance on industry self-policing the implementation of permitted activity

[92] EDS NESPF Review, at 2. A different set of effects must be managed in relation to "disturbed soil" from harvesting, which "must be stabilised or contained to *minimise* sediment entering into any water and resulting in (a) the diversion or damming of any water body; or (b) degradation of the aquatic habitat, riparian zone, freshwater body, or coastal environment; or (c) damage to downstream infrastructure and properties.[92] The term "minimise" is inherently subjective and there are no clear baseline attributes, nor measurable quantitative or qualitative level of 'acceptable' effects, against which to assess compliance.[92] Clear standards are essential, providing how and where to measure an acceptable percentage change in visibility, and within what time periods.

standards."[93] The NESPF requires the promulgation of earthworks and harvest management plans. However, there is no requirement for these to be independently verified, peer-reviewed or qualitatively assessed in any way. Compliance is achieved simply by preparing and submitting the plan.

6.45 This unverified management plan approach:[94]

> "assumes that forestry operators will submit management plans that are high quality, and which adequately address the environmental risks that they are intended to manage. That assumption is untested, and this 'high trust' model of regulation is unlikely to be warranted across the board."

6.46 As we have noted previously:[95]

> "Using management plans that cannot be certified or rejected relies heavily on foresters designing adequate management plans and complying with vague permitted standards. This is **a very high trust model, which may not be warranted given the seriousness of potential environmental impacts, variability in practice around the country, and poor compliance outcomes in some areas**."

6.47 This contrasts starkly with the new obligations for Farm Management Plans that are compulsory and are subject to a strict regulatory regime requiring certification and independent auditing. It is anomalous for a land use that carries with it potentially worse adverse environmental effects to be exempt from such obligations.

6.48 Furthermore, the management plans that *are* required are limited in scope to specific time and effects related activities (harvesting and earthworks only). Such a narrow approach to forest management gives rise to a significant accountability gap in relation to how forest operators are identifying and assessing risks, and selecting appropriate management actions in relation thereto.

6.49 A comprehensive forest lifecycle management plan should be mandatory for all forests. However, the efficacy of such plans depends on the scope and quality of content; the translation of clearly identified risks to specific, measurable, proportionate, and effective responses; and proper implementation and monitoring.

6.50 Forestry Stewardship Council (**FSC**) certified forests are required to have management plans appropriate to the scale, intensity and risk of their operations.[96] And given that "[t]here are 22 FSC certified exotic plantations in New Zealand, consisting of a total of roughly 1.22 million hectares (72% of the total productive plantation forest area)",[97] a high proportion of

[93] Bright, at 17.
[94] EDS NESPF Review, at 32.
[95] EDS NESPF Review, at 2.
[96] The FSC Forest Stewardship Standard for New Zealand, 2023, Principle 7.
[97] FSC Forest Stewardship Standard for New Zealand, 2023, C.3.

plantation forest operators are, or should be, operating pursuant to an FSC-compliant management plan.

6.51 Among other things, FSC-aligned management plans must provide the rationale for the selection of species, regime, and harvesting rates of timber.[98] However, as we note below in relation to industry compliance, there is reason to question the rigour of the FSC certification scheme and management planning thereunder given that convictions for slash damage associated with poor management practices do not seem to preclude ongoing FSC certification.

Poor industry compliance monitoring and enforcement

> *"[T]he overall performance of the forest industry in managing the environment for future generations (kaitiakitanga) is in my view rather mediocre. This is confirmed every time a group of non-forestry members of the public, or overseas visitors, goes out to a logging site anywhere in New Zealand and comments on the impact that harvesting methods have on soil disturbance, erosion potential and the landscape in general."*[99]

6.52 Recent slash event investigations and prosecutions reveal a trend of poor industry practice,[100] further demonstrating the inappropriateness of the current high trust regulatory settings.

6.53 Following ex-tropical Cyclone Cook in 2017, Gisborne District Council initiated an investigation into slash mobilisation events after high intensity rainstorms (**Cyclone Cook Slash Investigation**).[101] Cyclone Cook was a "relatively small storm with an average recurrence interval of between 1 and 8 years depending on location."[102] It followed Cyclone Debbie, which had occurred just over a week earlier.

6.54 The Cyclone Cook Slash Investigation found:

(a) **Storm-induced forestry slash events have occurred regularly in the East Coast region since 2012** and sporadically before then;[103]

(b) "[O]n average a significant event can be expected somewhere in Tairāwhiti every two years but **an event might well occur in any one year based on current harvest volumes**"[104] and **that risk "becomes extreme in the decade between 2026 and 2036"** due to the area of plantation forestry due for harvest during that period;[105]

(c) F**orestry operations were not aligned with best practice**:

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[98] Ibid, Annex D.
[99] Raymond, K. "Crisis. What crisis? …", at 43.
[100] We acknowledge that not all forest operators fall into this category.
[101] Cave, M., Davies, N., and Langford, J, "Cyclone Cook Slash Investigation" (Gisborne District Council), October 2017.
[102] Cave et al, at 1.
[103] Cave et al, at 3.
[104] Cave et al, at 3.
[105] Cave et al, at 4.

i) earthworks were observed adjacent to streams without suitable safeguards to stop sediment generation reaching the stream;[106]

ii) a significant number of landing / landing edge failures occurred where they were situated close to river level making them vulnerable to flooding;[107] and

iii) forestry roads and access tracks were poorly designed and associated with landslides (albeit these were not extensive or numerous).[108]

6.55 In relation to slash specifically, the investigators observed that:

(a) Pine was the predominant material in the woody debris mobilised based on empirical data of the material involved;[109]

(b) Forestry operations had resulted in **slash being retained in locations vulnerable to mobilisation** in high stream flows.[110] **Gullies and flood plains with accumulations or pine slash were ubiquitous in all forests**.[111] Slash was observed scattered throughout the river systems within forest areas;[112]

(c) At the time of investigation, replacement slash catchers were already accumulating significant woody debris, while some were holding slash despite there being no major floods since Cyclone Cook. This indicated that "clearing slash catchers needs to be a regular maintenance activity within catchments."[113]

(d) Slash catchers in the area of highest intensity rainfall either failed, were damaged and/or overtopped or were bypassed.[114] **This "raises questions about the effectiveness of slash catchers as a tool for mitigating against the migration of slash out of forestry catchments**."[115]

6.56 Constructing, installing, using, maintaining, or removing slash traps are permitted activities under the NESPF.[116] But reliance on improving the design, engineering and/or location of slash traps to improve their efficacy seems a distraction from the more urgent question of why slash is entering - and worse, *anticipated* - in our waterways? Indeed, it renders regulation 69(3), which prohibits the depositing of harvesting slash into water bodies, meaningless.

6.57 Dr Steve Urlich, a senior lecturer in environmental management at Lincoln University, attests to the "industry's overall poor environmental performance", enabled by a permissive regulatory regime. In his submission on MPI's "National direction for plantation and exotic

[106] Cave et al, at 5.
[107] Cave et al, at 1.
[108] Cave et al, at 1.
[109] Cave et al, at 1.
[110] Cave et al, a 5.
[111] Cave et al, at 3.
[112] Cave et al, at 5.
[113] Cave et al, at 3.
[114] Cave et al, at 3.
[115] Cave et al, at 3.
[116] Regulation 83.

carbon afforestation" consultation document, he noted that, from several years monitoring post-harvest forestry earthworks and consent conditions in Marlborough:[117]

> "even reputable companies with putative high environmental standards do not consistently meet them. In fact, the practices were such that skid failures, woody debris left in streams, and repeated heavy vehicle movements over streams with high ecological values were common. I understand this still continues in many areas and may have gotten worse in some places under the NESPF, along with defensive and resistant attitudes to compliance action."

6.58 The geographic spread of recent enforcement decisions shows that non-compliance is an industry-wide issue.[118]

6.59 We also note that some of the companies prosecuted still claim FSC forest certification, which implies that those forests are managed according to strict environmental, social and economic standards.[119] The FSC website states that certification bodies:[120]

> "will conduct audits to ensure that certificate holders continue to conform with FSC's certification requirements. If they do not conform, then their certification body may suspend or terminate their certificate, and FSC may block them from the system."

In light of the non-compliance evident from some certificate holders in Aotearoa New Zealand, we query at what point their continued certification would constitute false and misleading conduct under the Fair Trading Act 1986 worthy of Commerce Commission investigation.

6.60 Compliance monitoring by local authorities has also been called in to question. In *Gisborne City Council v Juken New Zealand*[121] the Court considered that failure by the Council to undertake compliance inspections over the five or six years the consents had been in place was "reprehensible and irresponsible, to say the least".[122] We understand, anecdotally, that at least one Council's approach to monitoring compliance with permitted activity conditions was essentially contingent upon a complaint from the public first.

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[117] Urlich, SC, Submission on National direction for plantation and exotic carbon afforestation, 18 November 2022, at 5.

[118] In addition to the 2018 enforcement proceedings taken by the Gisborne District Council (https://www.gdc.govt.nz/environment/reports-and-publications/breach-of-rma-sentencing-decisions refers), other recent cases include *Bay of Plenty Regional Council v Whitikau Holdings Ltd* [2018] NZDC 3850; *Great Wellington Regional Council v Farman Turkington Forestry Ltd* [2020] NZDC 10368; *Waikato Regional Council v Glen Martin Ltd* [2022] NZDC 17289; and *Marlborough District Council v Laurie Forestry Services Ltd* [2019] NZDC.

[119] https://anz.fsc.org.

[120] https://connect.fsc.org/certification/certification-system. The 2023 FSC Forest Stewardship Standard for New Zealand, (**FSC Standard**) which comes into effect on 15 April 2023, anticipates that a record is kept of any adverse environmental impacts and corrective actions, measures adopted to prevent further damage and negative impacts mitigated and/or repaired, and changes in future activities recorded that will prevent similar impacts occurring. Clauses 6.3.6 – 6.3.8. But it is not immediately clear from the Standard what the implications are for ongoing certification in the event of regular and/or significant non-compliance.

[121] [2019] NZDC 24075.

[122] *Gisborne City Council v Juken New Zealand Ltd* [2019] NZDC 24075 at [26], per J Dwyer.

Penalties disproportionate to harm, allowing externalisation (and socialisation) of downstream costs

6.61 The penalties imposed on forestry companies for breaching the RMA are doing little to drive industry compliance. Those imposed by the Courts to date appear disproportionately small in light of the extensive damage to land, infrastructure, housing, livelihoods, ecosystems, and financial and psychological wellbeing of downstream communities. As such, they "simply constitute a cost of doing business"[123] and thus do not present a legitimate deterrent to poor practice. Examples include:

(a) $57,000 for pollution as a result of slash following an abatement notice;[124]
(b) $51,000 for significant environmental effects as a result of slash and sediment from forestry entering a stream;[125] and
(c) $45,500 for extensive slash and sediment which would later migrate to the Waikato River.[126]

6.62 Sentencing decisions in relation to the Gisborne District Council's June 2018 slash damage prosecutions suggest a preparedness by the courts to impose slightly higher fines and reparation payments, including for emotional harm. To this end, Ernslaw One Limited (foreign-owned) was ordered to pay $355,000, comprising a $255,000 fine and reparation of $130,000 for emotional harm; Juken (foreign-owned) was fined $152,000; DNS Forest Products was ordered to pay a $124,000 fine and reparation of $6,500; PF Olson Ltd was fined $198,000; and Aratu Forests (foreign-owned) was fined $379,500.[127]

6.63 However, although a maximum fine of $600,000 can be imposed on companies for environmental offences, this often pales in comparison to the cost of downstream social, economic and ecological damage, perpetuating the industry's ability to externalise these costs.[128] This may be ameliorated under the proposed Natural and Built Environment Act, the Bill for which proposes to increase the maximum fines for companies to $10 million. It also proposes to prohibit reliance on insurance indemnities as a means to pay infringement or prosecution fines.

[123] *Gisborne City Council v Juken New Zealand Ltd* [2019] NZDC 24075 at [28], per J Dwyer.
[124] *Bay of Plenty Regional Council v Whitikau Holdings Ltd* [2018] NZDC 3850
[125] *Great Wellington Regional Council v Farman Turkington Forestry Ltd* [2020] NZDC 10368
[126] *Waikato Regional Council v Glen Martin Ltd* [2022] NZDC 17289
[127] https://www.gdc.govt.nz/environment/reports-and-publications/breach-of-rma-sentencing-decisions
[128] We note that the FSC's 2023 Forest Certification Standard now requires forest operators to "demonstrate the positive and negative externalities of operations are included in the management plan", including "costs related to preventing, mitigating, or compensating for negative social and environmental impacts of management activities are included in the management plan."

7 ToR 12.3.3 | The right tree: overcoming the ETS's economic bias towards *Pinus radiata*

7.1 The continuing proliferation of exotic afforestation, particularly *Pinus radiata*, makes plain that stronger direction and more nuanced regulatory controls should be provided around what trees should be planted where in order to achieve the right tree in the right place for the right purpose.

7.2 Of Aotearoa New Zealand's 1.74 million hectares (approx.) of plantation forests, 90% comprise *Pinus radiata*. MPI predicts a significant increase in exotic afforestation rates, largely attributable to increasing NZU prices, but also an emerging bioeconomy. With regard to the latter, MPI is already "starting to see shorter rotation exotic plantation forests to provide feedstock for the growing bioeconomy."[129] According to modelled scenarios, close to 1 million hectares could be planted between 2022 – 2050, of which around 70% would be exotic plantation, 20% permanent exotic forest, and 10% indigenous forest.[130]

7.3 Species choice has implications for a wide range of environmental effects and forest outcomes. These include longevity, stand stability, biodiversity, impacts on water yield, long-term carbon sequestration rates and volume, soil stability (including in relation to root decay during the post-harvest window of vulnerability), risk of windthrow, water purification, and resilience to pest, disease, fire and drought, as well as broader landscape, social, reputational, cultural and economic effects.

7.4 Diverse permanent native forests are superior across the board, and increasingly critical to reversing imminent extinction cascades.[131] In addition to helping regulate local climates, enhancing water quality, reducing erosion, sustaining freshwater and marine ecosystems, native forests are fundamental to conserving our unique biodiversity. They provide habitat for a vast range of plant, animal, fungal and microbial species.[132] With 4000 native species at risk of extinction,[133] it is imperative that we address short and long-term carbon sequestration *alongside* protecting and restoring our precious indigenous biodiversity. The climate and biodiversity crises are interdependent and must be addressed accordingly and urgently.[134]

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[129] MPI Discussion Document 2022/10, at 13.
[130] MPI Discussion Document 2022/10, at 8-14.
[131] Salmond, Dame Anne, "Seeing the wood for the trees", https://www.newsroom.co.nz/ideasroom/dame-anne-salmond-seeing-the-wood-from-the-trees.
[132] Norton, D., "We planted pine in response to Cyclone Bola, with devastating consequences. It is now time to invest in natives." The Herald, 23 February 2023, https://www.stuff.co.nz/environment/climate-news/300814466/we-planted-pine-in-response-to-cyclone-bola-it-is-now-time-to-invest-in-natives.
[133] https://www.stuff.co.nz/environment/300424903/this-is-how-it-ends-natures-dangerous-decline-is-accelerating-why-its-us.
[134] "In a two-way process, climate change is one of the main drivers of biodiversity loss, but destruction of ecosystems undermines nature's ability to regulate greenhouse gas (GHG) emissions and protect against extreme weather, thus accelerating climate change and increasing vulnerability to it. This explains why the two crises must be tackled together with holistic policies that address both issues simultaneously and not in silos." https://ec.europa.eu/research-and-innovation/en/horizon-magazine/climate-change-and-biodiversity-loss-should-be-tackled-together

7.5 Like exotic plantation and carbon forests, native forests are similarly subject to sudden shocks, including storm events and fire risk, as well as slower onset events like drought, disease and pest incursions. But the key difference is in their respective *resilience* to withstand, absorb and recover from these increasing climate-related risks, and their ability to naturally regenerate.[135] The natural ecology and diversity of native forests, in age and species, ensures that climate-related risks are less uniform and severe.

7.6 However, under the ETS, tree species, diversity, and forest management systems are only of subsidiary interest, insofar as such considerations will optimise short-term sequestration rates.[136] Accordingly:[137]

> "[in] Aotearoa, **this tends to recommend pines**, which [are] fast growing in a range of circumstances, highly adaptable, and well understood by forestry operators. These qualities make this species attractive for plantation forestry, but also for carbon farming, because rapid growth corresponds to rapid carbon sequestration and, consequently, rapid accrual of carbon credits."

7.7 The increasing carbon price has further cemented *Pinus radiata's* preferential status. So too has the design of the ETS carbon stocks look-up tables, which measure the relative carbon sequestration stocks accrued by different species and the rate at which they they can achieve these across 50 years. Measurement across this short-term favours *Pinus radiata*.

7.8 In adopting such a short-term approach to carbon accrual, the carbon stock look-up tables fail to recognise, and therefore secure, the much longer-term and larger carbon yields that indigenous forests deliver (let alone their multiple other benefits). Measurements for indigenous species are presented as a homogenous group, with no differentiation for individual species, for planted versus regenerating native forest, nor for regional carbon stock variances. Furthermore, the measurements are based on naturally regenerating shrubland (not, for example, planted and well managed native forest stands).[138]

7.9 Recent research has shown that, with regard to relative growth and carbon sequestration rates, "[t]he difference between pine and well managed planted native forest is much less than is often suggested."[139] But as presently designed, the carbon stock look-up tables do not present an accurate reflection of total carbon stocks to the material disadvantage of

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[135] Ogden et al 1991 J Vegetation Science https://doi.org/10.2307/3235948, Wyse et al 2019 NZ Journal of Ecology DOI: 10.20417/nzjecol.42.18

[136] EDS NESPF Review, at 9.

[137] EDS NESPF Review, at 10. Pines are relatively cheap and easy to establish, and because they grow rapidly, revenue from harvested timber can be realized quickly too. Clear felling them is permitted, which is less expensive than alternative harvesting methods, and the cost of harm associated with doing so externalised due to minimal penalties for adverse effects. If that were not the case, it is questionable whether the economics of pines would stack up since they produce a lower quality / value timber compared to other timber species. Research investment in Radiata pines has also "contributed to path-dependency, because timber and carbon yields are highly determined and thus perceived as less risky." (Hall, Interwoven World, at 47).

[138] https://pureadvantage.org/carbon-sequestration-by-native-forest-setting-the-record-straight/

[139] https://pureadvantage.org/carbon-sequestration-by-native-forest-setting-the-record-straight/

indigenous species. Nor do they account for supply chain emissions, which could be quite high for New Zealand exotic plantation forests;[140] or the limited additionality rotational clear felled exotic forests achieve: for "replanting pines only restores the carbon lost from harvesting rather than increasing our sequestration."[141]

7.10 Carbon prices, and agreement to reverse the original proposal to restrict the permanent forest category to natives only from 1 January 2023 as a result of industry lobbying,[142] are exacerbating this market distortion, with 'carbon farmers' keen to take advantage of strong carbon prices (while they last). The forecast quantum of planting is well in excess of the Climate Change Commission's net-zero modelling recommendations.[143] The resulting oversupply of ETS units and suppressing effect on carbon prices will stymy the rate of gross emissions reductions in Aotearoa New Zealand,[144] with attendant reputational and market risks.

7.11 Furthermore, referring to the 'permanence' of carbon *Pinus radiata* forests is oxymoronic given their comparatively short natural lifespan (relative to most indigenous species, and indeed many alternative exotic species)[145], increased vulnerability to fire, disease, and pest incursions, the ability to harvest ETS-registered 'permanent' forests down to just 30% canopy cover after 50 years, and regulatory proposals that anticipate end-of-life management issues, when large areas of pines present increasing stand stability, fire, weed, disease and pest risks for future generations. As Emeritus Professor David Norton recently wrote:[146]

> "For too long we have been fixated in Aotearoa with maximizing short-term returns from exotic tree crops without thinking about long-term consequences. The legacies of this fixation are now really starting to show. Poorly sited and managed exotic tree crops pose risks. And now **we are making the same mistakes with exotic carbon tree crops, again leaving unacceptable legacies for future generations to deal with all because of a focus on short-term financial gains**."

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[140] https://www.newsroom.co.nz/ideasroom/greenwashing-and-the-forestry-industry-in-nz. See also https://www.newsroom.co.nz/ideasroom/nzs-fatally-flawed-climate-change-strategy.

[141] Oram, R., "World has co-crises it must solve in tandem", https://www.newsroom.co.nz/world-has-co-crises-to-solve-in-tandem.

[142] https://www.rnz.co.nz/news/lobbying/486670/lobbyists-in-new-zealand-enjoy-freedoms-unlike-most-other-nations-in-the-developed-world

[143] The Climate Change Commission's net-zero pathway modelling estimated that Aotearoa New Zealand could meet its net-zero goals by planting around 25,000 hectares of exotics per annum (in addition to complementary actions). Current and projected exotic afforestation rates appear to be around double that.

[144] In addition to a range of ETS design (and re-design) flaws: https://www.linkedin.com/pulse/five-things-wrong-nz-ets-christina-hood, https://thekaka.substack.com/p/labours-climate-policy-bonfire-just#details and https://www.newsroom.co.nz/sustainable-future/govt-to-lower-bar-for-subsidies-for-carbon-polluters all refer.

[145] Around 80 to 90 years: https://www.nationalarboretum.act.gov.au/living-collections/forests-and-trees/forest-76.

[146] Norton, D., "We planted pine in response to Cyclone Bola, with devastating consequences. It is now time to invest in natives." The Herald, 23 February 2023, https://www.stuff.co.nz/environment/climate-news/300814466/we-planted-pine-in-response-to-cyclone-bola-it-is-now-time-to-invest-in-natives.

7.12 In combination, these factors make references to 'permanence' and to managing environmental effects "to ensure a carbon forest is sustainable in perpetuity"[147] misleading and disingenuous. It also suggests that the benefits associated with 'permanent' exotic forests, such as carbon sequestration, providing biodiversity habitats, and erosion-control are likely overstated (or certainly more temporary), particularly where harvesting occurs.

7.13 Moreover, the arguments in favour of so-called transition forests (whereby indigenous forests emerge as the exotics reach the end of their lifespans and fall over), are likely specious and unreliable. Ministers should be very wary of attempts to justify ETS revenues under an unproven forest management approach that may not work and carries with it many risks and concerns about how commitments made now can be assured over the long timeframes involved - more than 80 years.

7.14 The ETS's narrow policy and management focus on a single environmental problem to the exclusion of the broader ecological context is giving rise to 'bio-perversities'. Meanwhile, the opportunity to restore much of our lost indigenous forest cover with its multiple benefits will be lost.[148]

8 ToR 12.3.7.2 | The challenge of achieving broader policy coherence

8.1 Forests affect soil health and stability, freshwater ecology and wellbeing, water yields and quality, flood and fire management, climate resilience, carbon sequestration, air quality and biodiversity. They also provide (or detract from) visual amenity, recreational and cultural opportunities, spiritual connection, ETS revenue streams, timber, biofuels, and associated livelihoods.

8.2 As a result, the location, scale, types, and management of forestry activities directly impact whether Aotearoa New Zealand:

(a) Meets national emissions reductions targets, both in the short-term and in perpetuity, and how it does so (the Climate Change Response Act and Emissions Reductions Plan (**ERP**) relate);

[147] MPI Discussion Document 2022/10, at 20.

[148] During the development of the ETS settings for forestry, the Parliamentary Commissioner for the Environment was evidently concerned that, coupled with revenue generated from timber sale, the calibration of economic reward under the ETS for sequestration volumes and rates would incentivize the planting of exotic species at the expense of indigenous. In something of an understatement, concern was noted that this would be "unfortunate" (Parliamentary Commissioner for the Environment, "Rewarding carbon storage in New Zealand native forests" – Feedback to the Minister for Agriculture and Forestry on the Development of Regulations regarding the Indigenous Sequestration Rate under the NZ ETS, Dr Jan Wright, 29 March 2010, at 2) in light of the greater environmental benefits that accrue within an indigenous forest, and the negative environmental effects to which exotic forests can give rise (including wilding spread, and lower climate, disease and pest resilience). (Parliamentary Commissioner for the Environment, "Seeding the carbon storage opportunity in indigenous forests – comments on the draft Climate Change (Forestry Sector) Regulations 2008.) But this is precisely what has transpired.

(b) Is able to adapt to climate related risks (the National Adaptation Plan relates);

(c) Reverses biodiversity decline and leaves a legacy rich with indigenous flora and fauna (Te Mana O Te Taiao and the draft National Policy Statement for Indigenous Biodiversity (**NPS IB**) relate);

(d) Protects highly productive and erodible soils and minimises the risk of landslides in the face of increasingly frequent and severe storm events (National Policy Statement for Highly Productive Land (**NPS HPL**) and New Zealand's Climate Change Risk Assessment relate); and

(e) Avoids significant adverse effects on receiving freshwater and coastal environments (NPS FM, National Environmental Standards for Freshwater, and NZCPS relate).

8.3 Achieving such broad policy and regulatory alignment is challenging in the absence of an overarching national policy strategy for sustainable land use stewardship in Aotearoa New Zealand, within which a pathway to a prosperous forestry future could be defined.

8.4 A degree of forestry-specific guidance is set out in the Government's first ERP, which establishes a 'vision for forestry' that acknowledges the vital role forests will play as Aotearoa New Zealand transitions to a low-emissions economy:[149]

> "By 2050, Aotearoa New Zealand has a sustainable and **diverse** forest estate that provides a renewable resource to support our transition to a low-emissions economy. Forestry will contribute to global efforts to address climate change and emissions reductions **beyond 2050**, while building sustainable communities, **resilient landscapes, and a legacy for future generations to thrive**."

8.5 In support of this vision, the ERP variously articulates support for the right type, mix, scale and location of afforestation to achieve afforestation rates consistent with the bioeconomy aspirations set out in the Forestry and Wood Processing Industry Transformation Plan, whilst also seeking to balance the need for carbon removals in tandem with driving gross emissions reductions. It recognises the significance of, and expresses a desire to encourage more, permanent native forests as long-term carbon sinks;[150] the need to maintain and increase native biodiversity;[151] and that there is an opportunity to grow and manage the forestry sector in ways that secure positive outcomes for climate change, biodiversity and water quality alongside economic aspirations.

8.6 Translating these interrelated aspirations and the ERP's vision for forestry into practical outcomes appears limited to the extent that these goals are either:

(a) Influenced by the ETS settings (i.e., as a function of carbon pricing); or

(b) Regulated directly or indirectly by the NESPF.

[149] Aotearoa New Zealand's First Emissions Reduction Plan (ERP), Chapter 14.
[150] ERP, at 272 – 273, 276.
[151] ERP, at 274.

8.7 It is clear that the NESPF as currently drafted does not function as an effective cross-cutting regulatory tool in this regard. And its ability to do so is further limited by the absence of a biodiversity credit scheme capable of counteracting the ETS's economic bias towards *Pinus radiata* monocrops.

8.8 Without considerable policy and regulatory intervention to achieve broader policy coherence, we are unlikely to achieve many of the objectives set out for biodiversity, freshwater management, coastal protection, long term carbon sequestration, and climate resilience and adaptation.

9 ToR 12.3.7.1 | Systemic change: From short-term profits to long-term prosperity

9.1 In combination, the NESPF and ETS, regulatory misalignment, and indeed the harms wrought upon the communities of the East Coast from Cyclone Gabrielle, are symptomatic of the 'Siloed World' David Hall describes in his paper, '*The Interwoven World*'.[152]

9.2 Hall writes that in the Siloed World, land use choices are driven by economics, with profitability determining the 'best' use of the land, often due to the absence of prices on environmental harm and weak enforcement of environmental compliance.[153] Regulatory, research, investment, and institutional frameworks are oriented toward an approach whereby what is "more often affordable, or practicable, or feasible, is to simplify and standardize the land and to maximise its financial functions."[154] Singular functions on certain sites are thus given priority (ignoring the interrelatedness of natural systems and ecological limits),[155] encouraging intensification (with high inputs and environmental harms) and homogenisation (thereby reducing the capacity of landscapes to adapt to change or shocks).[156] With respect to forestry, Hall cites conventional reliance upon monocultures and clear-cutting as demonstrative of this.[157]

9.3 Whilst the Siloed World might be well-aligned with short-term gains in profit and productivity, these are offset by mid- to long-term environmental harms that, in turn, create economic burdens.[158] It is therefore misaligned with long-term prosperity.

9.4 Hall submits that long-term prosperity can be realised through alignment with five principles:[159]

(a) Climate alignment: which dictates that agriculture, forestry and land use more generally need to support climate mitigation outcomes;

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[152] Hall, D. (June 2018). The Interwoven World | Te Ao i Whiria: Toward an Integrated Landscape Approach in Aotearoa New Zealand. Discussion paper. Auckland: The Policy Observatory. Retrieved from https://thepolicyobservatory.aut.ac.nz/
[153] Ibid, at 15.
[154] Ibid, at 17.
[155] Ibid, at 21, 30.
[156] Ibid, at 18.
[157] Ibid, at 7.
[158] Ibid, at 6.
[159] Ibid, at 4.

(b) Sustainability: which dictates that land use choices have a responsibility to meet the needs of the present without compromising the ability of future generations to meet their own needs;

(c) Resilience: which dictates that landscapes ought to have the capacity to absorb change and shocks while still providing the same functions.

(d) Mauri ora: which dictates that the wellbeing of people is strongly correlated with the wellbeing of the land, because of the interrelationships between them.

(e) Biodiversity: which dictates that the preservation of diverse, native species of flora and fauna has both instrumental and intrinsic value.

9.5 Forestry in Aotearoa New Zealand is not presently well aligned with these principles. Of particular concern is its reliance on exotic (predominantly *Radiata* pine) monocultures, which are highly vulnerable to catastrophic loss from extreme weather events and increased risks of pests, diseases and parasites due to the absence of heterogeneity and complexity.[160]

9.6 An integrated landscape approach that fosters synergies and complementarities[161] whilst prioritising the mixing, mingling and co-existence of a diverse palette of land uses,[162] is essential to achieve a prosperous forest future in the long term. This is possible in an Interwoven World, where there is diversification in scale (whereby forests are interwoven with other land uses), in systems (beyond clear cutting to retention, selection, and continuous cover); and in species, recognising the need for long-term resilience as well short-term carbon sequestration.[163]

9.7 The Interwoven World should not be construed as economically unviable. However, economic viability in the Interwoven World is informed by a more honest and optimal balancing of economic, environmental, and social outcomes across both the short and long term.

9.8 Overcoming the entrenched extractive, growth-based economy requires transformational systemic change, political courage, and a shift in societal consciousness, tolerances and wants.[164] But it is essential for a truly prosperous future. In pursuit of this, the development of a national sustainable land use and landscape stewardship strategy aligned with Hall's five principles for prosperity would help to transcend the current siloed approach to forestry (and land use generally) in Aotearoa New Zealand, achieve policy synergies and regulatory coherence, and improve environmental outcomes. This should be underpinned by a Leopoldian land ethic that escapes economic expediency, whereby "A thing is right when it

[160] Ibid, at 27.
[161] Ibid, at 11.
[162] Ibid, at 31.
[163] Ibid, at 11.
[164] In 1933, Aldo Leopold framed the behavioural challenge this way: "The ultimate issue, in conservation as in other social problems, is whether the mass-mind *wants to* extend its powers of comprehending the world in which it lives .... I simply affirm that a sufficiently enlightened society, by changing its wants and tolerances, can change the economic factors bearing on the land." Flader & Callicott, Leopold Essays,at 192.

tends to preserve the integrity, stability, and beauty of the biotic community. … it is wrong when it tends otherwise."[165]

10 ToR 12.3.7 | Recommendations for change

10.1 Having set out a range of contributing factors why plantation forestry activities are resulting in significant adverse environmental effects across Aotearoa New Zealand, particularly on highly erodible slopes, we briefly identify some recommendations for change below.

Short term: Strengthen the NESPF

10.2 The current review of the NESPF should be expanded to address the following recommendations:

I. Activity status: From permissive to precautionary

10.3 The activity status for forestry activities under the NESPF should be recalibrated to better align with their high intensity, high risk nature such that resource consents will be required in all cases, and plantation forestry activities prohibited in areas where they are not desirable due to the risk of significant adverse effects.

10.4 Such changes should seek to ensure that plantation forest activities are considered from a lifecycle perspective, from the point of afforestation, through to harvest and replanting. Such an assessment would ensure forest operations and management are appropriately calibrated according to a more holistic risk profile.

II. Revise or replace the ESC to ascribe effective regulatory controls

10.5 Regulatory controls under the NESPF should be underpinned by an accurate hazard risk assessment, including erosion, rainfall and vulnerability to landsliding, at a site-specific scale.

10.6 At minimum, the ESC calculations that inform afforestation, earthworks, harvesting and replanting activities, should be revised so that they are informed by current data and apply a finer resolution to enable better attribution of appropriate regulatory controls according to site-specific risk.

10.7 Once remapped, the regulatory controls applicable to the erosion (or hazard) susceptibility zones should be recalibrated to better reflect relative risk (i.e. based on the current ESC traffic light system, we would expect to see a greater distinction between the regulatory controls applicable to orange zoned areas compared with yellow).

[165] Aldo Leopold, "The Land Ethic" in *A Sand Country Almanac* (New York, Oxford University Press, 1949) 201-206.

III. Introduce regulatory nuance recognising impacts of different forest management and harvesting systems

10.8 A strengthened NESPF should implement regulatory nuance that reflects the risk of adverse effects associated with a range of forest management and harvesting systems, including selective, small coupe and continuous cover systems. The regulations should introduce a moratorium on clear fell harvesting on highly erodible slopes and require:

(a) Progressive retirement of such land from plantation forestry and natural or assisted reversion to permanent indigenous forest; and

(b) Prevent future plantation afforestation on such land.

10.9 In all other cases, a reverse burden should apply for applications to clear fell harvest such that this harvesting system becomes the exception, not the norm. Clear felling would be prohibited unless it can be established that clear felling will not result in significant adverse environmental effects. Spatial and temporal restrictions should apply.

10.10 Government support may be required to facilitate the transition to alternative (less intensive harvesting) systems and methods (including research and resource). As clear fell harvesting is either discouraged or limited elsewhere, Aotearoa New Zealand runs reputational and market risks in not adopting international best practice.

IV. Review efficacy and appropriateness of slash management controls

10.11 The NESPF should not permit the accumulation of slash on erosion-prone slopes. Slash should be processed promptly onsite or removed.

10.12 This would obviate the need for reliance on slash traps, the permission of which (under regulation 83), together with NESPF regulation 69(4), entirely undermine the requirement under regulation 69(3) **not** to deposit slash into water bodies and therefore the avoidance of significant adverse effects associated therewith (which are described in regulations 69(4)(a) – (d)).

V. Strengthen accountability, compliance, and monitoring

10.13 Certified and audited forest management plans should be mandatory and must be subject to independent, expert review to ensure that forest management risks and opportunities are comprehensively identified and translated into credible management objectives and actions, with measurable outcomes. The implementation of forest management plans should be regularly monitored, periodically reviewed and updated, underpinned by a performance bond or guarantee, and enforcement action taken in the event of non-compliance.

10.14 There may be administrative costs for Councils associated with reviewing, monitoring and enforcing forest management plans. Such administrative costs are outweighed by the ecological, social and economic costs of poor forest planning and mismanagement, which are currently falling to Councils, ratepayers, local communities, and ecosystems to pay. In

any event, as for freshwater farm management plans, a number of these functions could be outsourced to independent certifiers and auditors.

10.15 Precedent for a workable, qualitatively robust management planning regime is set out in Part 9A of the RMA with respect to freshwater farm plans.[166] This regime provides a clear line of sight between regulation and management practice. Introducing a comparable regime for forest operators would also address sector equity concerns.

VI. Agency oversight

10.16 As an RMA instrument, agency oversight of the NESPF should be transferred to the Ministry for the Environment.

Short term: Other compliance tools

10.17 The draft Natural and Built Environment Bill is proposing to increase penalties for non-compliance, and prohibit the use of insurance indemnities to pay fines. This may deter non-compliance and drive the internalisation of downstream costs to the community and receiving environments. The draft bill also proposes to introduce power to revoke resource consents.

10.18 In further support of these compliance tools, consideration should also be given to:

(a) The requirement for, and design of, a performance bond or guarantee (such as holding back a proportion of payments for NZUs for ETS-registered);

(b) Investigating the integrity of the FSC-certification auditing and process and grounds for suspension or termination of such certification;

(c) Exploring whether continued FSC-certification in light of regular and/or significant non-compliance would constitute misleading and deceptive conduct under the Fair Trading Act 1989;

(d) The Overseas Investment Office's approach to enforcing the "good character" obligations to which overseas stakeholders in New Zealand forestry (who own 57% of New Zealand's commercial forests),[167] are subject, and the grounds upon which investment consents could be revoked / disposal of the asset ordered. Convictions for repeated and/or egregious regulatory offending causing harm of the scale and severity evident on the East Coast would seem to contravene the "good character" condition.

[166] Our joint submission on MPI's "*National Direction for plantation and exotic carbon afforestation"* refers, see paras 6.17 – 6.24.

[167] https://www.nzherald.co.nz/business/overseas-investment-watchdog-probes-east-coast-forestry-companies/HEMB7RDAUBADNFENJEKDLL7MQM/

Short term: Address the bio-perversities of the ETS by levelling the playing field

10.19 Recognising that the current design of the ETS and price of carbon are not ensuring the right tree in the right place for the right purpose and are instead exacerbating future climate-related risks and biodiversity losses, we recommend the following:

I. ETS amendments

10.20 The ETS carbon stock look-up tables should be revised to:

(a) Account for supply chain emissions associated with plantation forestry when calculating total carbon stocks;

(b) Recognise the carbon sequestration rates of:

i) different native species relative to age and location;

ii) planted and well managed native forest stands, not just regenerating shrubland;

(c) Extend the carbon look-up tables beyond 50 years to recognise the true total carbon stocks of native forests that accrue over a much longer timespan;

(d) Establish a premium class of NZU generated by indigenous forests to incentivise both plantation and permanent indigenous forests.[168]

(e) Reverse the egregious inclusion of exotic species in the permanent forest category.

II. Establish a complementary biodiversity payment scheme[169]

10.21 The ETS is limited in scope to incentivising carbon sequestration in the short-term. A biodiversity payment scheme is necessary to realise broader and longer-term benefits (or 'ecosystem services') that forests, particularly indigenous forests, provide. Proposals[170] and pilots[171] for this already exist. This may involve the establishment of a compliance market[172] and/or regulatory obligations to create demand. It could also support the establishment of a Continuous Cover Forestry Fund (suggested below), whereby a biodiversity payment could secure cashflow during the early phase of forest establishment when revenue from carbon sequestration is lower, but biodiversity improvements the greatest.[173]

[168] As proposed in The Aotearoa Circle's Native Forests: Resetting the balance Report, https://www.theaotearoacircle.nz/reports-resources/biodiversity.

[169] Hall suggests such a scheme could operate as a compliance market like the ETS to essentially create demand for a 'biodiversity unit.' Hall, Interwoven World, at 46.

[170] Including The Aotearoa Circle's Native Forests: Resetting the balance Report, https://www.theaotearoacircle.nz/reports-resources/biodiversity, at p 24.

[171] See for example https://www.agriculture.gov.au/agriculture-land/farm-food-drought/natural-resources/landcare/sustaining-future-australian-farming/carbon-biodiversity-pilot.

[172] Hall, Interwoven World, at 46.

[173] David Hall suggests that a "well-designed biodiversity payment could reward the rate of change in species composition toward indigenous species dominance, which means that the biodiversity payment declines while the carbon revenue increases." Hall, D, "Proposal for a Continuous Cover Forestry (CCF) Fund", prepared for the Minister for Climate Change, 2023.

III. Establish a Continuous Cover Forestry Fund

10.22 Hall and Lindsay have also proposed the establishment of a public-private Continuous Cover Forestry Fund,[174] which would acquire forestry assets for management under continuous cover forestry principles "to catalyse a nationwide shift to alternative forestry systems."[175] Through "a cornerstone investment, the government could mobilise private capital markets to support revenue-generating forestry assets that create regional economic opportunities, while also serving multiple policy objectives in climate adaptation, biodiversity enhancement, protection of freshwater and marine ecosystems, and long-lived carbon storage."[176] This proposal was presented to the Minister for Climate Change for consideration at the Minister's request, a copy of which is appended (**Appendix D**).

IV. Address other barriers

10.23 Continued research and investment to address barriers to native seedling supplies, including increasing propagation and additional funding for nurseries and research on a scale comparable to that which has been conducted for *Pinus radiata*[177] is essential.

10.24 Funding and training should be made available to overcome gaps in technical expertise associated with the establishment and management of indigenous forests.

V. Urgent scaling up of permanent indigenous forest restoration, regeneration and afforestation: Recloaking Papatūānuku

10.25 To secure a permanent, climate adaptive, biodiverse carbon sink in perpetuity, we recommend the Government supports an ambitious native restoration, regeneration and afforestation plan to restore and enhance five million hectares of native forest over the next 10 years. Pure Advantage is currently leading the development of, and rationale for, such a programme. A high-level assessment of how this could be achieved would involve:

(a) New restoration plantings (target 0.5 million ha) on farmland, in urban parks and other non-forest land, and converting exotic pine plantations located in the wrong places into native forests. The focus would be on establishing diverse native plantings with tall forest species (tōtara, rimu, kahikatea, tawa, beech etc) as well as shorter-lived nurse species (mānuka, kanuka, kōhūhū etc);

(b) Natural reversion of marginal farmland to native forest where this process is most likely to be successful (target 1.5 million ha);

(c) Enhancement of existing areas of regenerating forest (target 2 million ha), especially those dominated by seral tree species such as kānuka whose development to a taller

[174] Hall, D. and Lindsay, S (2020) "Scaling Climate Finance: Forest Finance" Mōhio Research: Auckland.
[175] Hall, D. "Proposal for a Continuous Cover Forestry (CCF) Fund", at para 19.
[176] Ibid.
[177] Consistent with Action 7.3 of the Forestry and Wood Processing Industry Transformation Plan: https://www.mpi.govt.nz/dmsdocument/54472-Te-Ara-Whakahou-Ahumahi-Ngahere-Forestry-and-Wood-Processing-Industry-Transformation-Plan.

forest state is currently compromised by livestock and feral ungulate browsing and/or lack of seed sources; and

(d) Enhancement of degraded mature forests (target 1 million ha) that have been impacted by historical logging coupled with heavy livestock and feral ungulate browsing.

Longer term

10.26 The recommendations outlined above will go a considerable way to correcting some of the current policy and regulatory failures and can all be implemented in the short term. But they will not address their root causes. This will require an understanding of, and commitment to, genuine transformational system change.

10.27 Change of this scale will take longer to implement, but is necessary if policy and regulatory failures that prioritise economic viability at the expense of ecological integrity and intergenerational equity are not to be repeated, and long-term prosperity is to be realised. To this end, we recommend the following:

I. Address systemic issues to achieve the Interwoven World: The need for a national sustainable land use and landscape stewardship strategy

10.28 A comprehensive review of land use stewardship in Aotearoa New Zealand should be undertaken and an overarching strategy prepared in light of the *Interwoven World* and other policies to which all land uses (including forestry) should be aligned. An overarching land use and landscape stewardship strategy would help identify areas, or principles that would inform, where permanent biodiverse indigenous forests and plantation forests should be located, their scale and purpose.

II. Achieve policy synergies and regulatory coherence pursuant to sustainable national land use and landscape stewardship strategy

10.29 With the benefit of a national sustainable land use and landscape stewardship strategy in place, a further review of the NESPF and ETS should be undertaken so as to better achieve the policy synergies and regulatory coherence discussed in section 8 above.

11 Concluding note

11.1 The findings and recommendations of this Inquiry present a seminal opportunity to correct a history of short-term siloed approaches to forestry management in Aotearoa New Zealand, and to galvanise the transformative change necessary to achieve truly sustainable land use and landscape stewardship for the long-term prosperity of *all* living things. We hope that the issues and recommendations outlined in this submission will inform that change and would be pleased to engage further with the Panel to this end.

APPENDIX A

Summary of adverse sedimentation effects on rivers, estuaries, the sea and fisheries – Statement of Professor Simon Thrush

I have been asked by EDS to provide a statement on the impacts of land-derived sediment and wood debris on estuarine and coastal ecosystems. I will address the two phenomena separately. I focus specifically on the consequences to marine ecosystems.
New Zealand is a signatory to international agreements and has national policies that seek to enhance or, at least, maintain biodiversity. This must include consideration of marine biodiversity in environmental management and conservation. Biodiversity has intrinsic value, but it is also linked to a range of ecosystem services (e.g., carbon sequestration, habitat provision, nutrient cycling) that underpin climate regulation, food production, productivity, limiting eutrophication. A healthy and functioning ecosystem also underpins the quality of experience many people have when interacting with the environment.

Coastal marine ecosystems are squeezed between the land and the open ocean. They encompass our estuaries, harbours, and the adjacent continental shelf. Ecosystems are the product of interactions between physical, chemical, and biological processes and do not have fixed spatial scales. Ecosystems always have imperfect or fuzzy boundaries – water, organisms, sediment and chemicals can move across these boundaries in or out of a geographically defined ecosystem. This means that we need to be aware of influences across boundaries. These connections between ecosystems are profoundly important in understanding our coasts and in managing the impacts we have on them.

Woody debris "slash"

The direct effect is accumulation of material on the seafloor and beaches. While this decreases amenity values, impacts on the seafloor are not well understood. This material does provide physical structure to the seafloor (much of which has been removed by other human activities) but at high densities this material will reduce access to the seafloor by many organisms and change the near seabed water flow. In estuaries the material will likely move around and repeatedly disturb shallow and intertidal habitats. On the open coasts floating logs are likely to batter shallow and intertidal reef habitats. Material that ends up on beaches will likely influence the suitability of beach and dune habitats as nesting and roosting sites for shore and seabirds. Across all habitats, the smaller fragments of wood, chips and bark add to the organic loading of the sediments, this is refractile material that will either degrade slowly or be buried in the sediment. In areas of low water flow and high rates of debris input hypoxic conditions could occur.

The indirect effects of this material are also potentially significant. As this material flows down the stream network it is likely to elevate bank erosion though direct physical disturbance, this may include eroding sediment but also other materials that have been historically buried or disposed of next to riverbanks. The trapping of this material by bridges

and other engineering structures leads to failure and the addition of further material that can contaminate the estuary and coasts.

Sediment impacts

Sediment is our largest and most significant contaminant to Aotearoa-New Zealand's estuaries and coasts (Thrush et al. 2004). Sediment impacts have been extensively studied here over the last 30 years. There are two types of ecological effects – smothering and decreasing water clarity.

Smothering

Most of the terrestrial sediment entering the estuary or coast occurs during 'events' associated with rainfall. Depending on where material is initially deposited in the marine environment, there is potential for tide and wave driven resuspension to increase the footprint of impact (Norkko et al. 2002). A large proportion of the sediment load is highly charged silt and clay particles which quickly flocculate and settle in seawater, smothering the seafloor. Field-based experiments have shown that once terrestrially derived sediment settles and forms a layer 2 cm thick, the sediment beneath rapidly becomes anoxic killing most of the resident animal community if the terrestrial sediment stays in place for more than about 5 days (Hewitt et al. 2003, Thrush et al. 2003). Even if less sediment settles to the benthos, as little as 2 mm of deposited silt has been shown to alter biodiversity and critical ecosystem services (Lohrer et al. 2004, Lohrer et al. 2006, Vieillard and Thrush 2021).

While seafloor communities may recover from a single deposition event, a succession of deposition events at shorter intervals than the recovery time for the sediment dwelling animals can result in cumulative effects (Thrush et al. 2006, Thrush et al. 2008a, Thrush et al. 2013). Long-term effects are associated with changes in the suspended sediment concentration, seafloor habitats, food quality and the loss of ecologically important species. As the sediment becomes muddier, lower sediment permeability limits oxygen penetration changing biogeochemical, redox, and hydrological conditions (Thrush et al. 2021). This muddying of coastal sediments changes coastal nutrient cycling making the system more prone to other stressors such as eutrophication (Thrush et al. 2008b, O'Meara et al. 2017, Thrush et al. 2020).

Decreased water clarity and elevated suspended sediment concentrations

The map "TeTairāwhiti, Tūranganui-a-Kiwa, and Te Wairoa regions" in the Ministerial Inquiry into Land Use clearly shows the plumes of suspended sediment in the region and around into the Bay of Plenty.

Increased suspended sediment concentrations decreases light reaching the seafloor, reducing primary productivity and oxygen production (Mangan et al. 2020a, Mangan et al. 2020b). This impacts on the large plants such as seagrass and kelp but also the microscopic plants (microphytobenthos) that live on the seafloor – these small plants are a particularly

important components at the base of coastal food webs and influence many critical processes in marine sediments (Hope et al. 2020, Blain et al. 2021). Increased suspended sediment can also clog the filter feeding mechanisms of suspension feeding organisms and reduce their feeding efficiency (Ellis et al. 2002, Hewitt and Pilditch 2004). Many suspension feeding organisms, especially bivalves, are key to maintaining benthic-pelagic coupling by transferring water column nutrients to the benthos via their feeding process (Norkko et al. 2001, Sea et al. 2021). Therefore, a reduction in their feeding efficiency also reduces organic carbon and nutrient delivery into the sediment, further affecting the delivery of ecosystem services from the coastal ecosystem.

The tragic and extreme weather events that hit New Zealand early in 2023 will have long term consequences for many of our coastal ecosystems. This highlights one of the major policy challenges for coastal ecosystems, much of the mess comes from the land but we do not set policy based on impacts in the coastal receiving environment (Thrush et al. 2016, Gladstone-Gallagher et al. 2022).

Professor Simon Thrush, FRSNZ

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APPENDIX B

EDS NESPF Review

[attached separately]

APPENDIX C

EDS and Pure Advantage Joint Submission on MPI Discussion Document "*National direction for plantation and exotic carbon afforestation*", 11 November 2022

[attached separately]

APPENDIX D

Proposal for a Continuous Cover Forestry (CCF) Fund – by Dr David Hall

[attached separately]

Environmental Defence Society Inc and
Royal New Zealand Forest & Bird Protection Society of New Zealand

A Review of the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017

Are the settings right to incentivise "the right tree in the right place", and is a high trust regulatory model the right fit for a high risk industry?

Madeleine Wright, Sally Gepp and David Hall

Forest & Bird
TE REO O TE TAIAO | Giving Nature a Voice

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manager@eds.org.nz

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ABBREVIATIONS

ESC	Erosion Susceptibility Calculator
ETS	Emissions Trading Scheme
FSC	Forestry Stewardship Council
LUC	land use capability
MPI	Ministry for Primary Industries
NES	National Environmental Standard
NESPF	Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017
NPS	National Policy Statement
NPSFM	National Policy Statement for Freshwater Management 2014 (as amended 2017)
NZCPS	New Zealand Coastal Policy Statement 2010
NZFFD	New Zealand Freshwater Fish Database
ONL	outstanding natural landscape
RMA	Resource Management Act 1991
SDGs	United Nations Sustainable Development Goals
SNA	significant natural area
WCC	Wilding Conifer Calculator

Ōpōtiki District

1 Introduction

PURPOSE

Planting trees is currently a live topic. The government has set a goal to plant one billion trees by 2028. While landscape-scale planting and restoration projects are increasing, water quality is getting worse, and sediment loss (which tree cover can prevent and tree removal exacerbates) is a key contributor. Aotearoa's unique biodiversity is in decline, and habitat loss continues. Climate change impacts are being increasingly felt, and emitters are looking for sequestration opportunities. Recent events in Tolaga Bay and Tasman, and the sediment issues in the Marlborough Sounds, have raised concerns about industry practice and the efficacy of management controls over plantation forestry.

We shouldn't just put trees in the ground without some forethought. Perverse outcomes are likely if we do, and so, the question is: How do we get the right tree, in the right place, for the right purpose?

Plantation forestry sits at the heart of this question. It presents a significant opportunity but also a significant risk if it isn't carefully located or managed well. The Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017 (NESPF) are the key regulatory tool for managing plantation forestry, so getting this instrument right is crucial for ensuring plantation forestry in Aotearoa is done well.

The NESPF was gazetted on 3 August 2017 and came into force on 1 May 2018.[1] At that time the government committed to a review of the document within a year. That review is kicking off in early 2019, and it is that process, together with the perfect storm of interest drivers already outlined and the indicators that issues with interpretation and implementation were already cropping up, which prompted us to undertake this analysis.

This report is intended to feed into the government-led review of the NESPF, which may be at risk of failing to address critical issues due to overly narrow terms of reference. It is also intended to feed into government and public discussions on related topics. The purpose of this document is to explore the effectiveness of the NESPF and identify issues or gaps that are resulting in, or are likely to result in, confusion and complexity in interpretation and implementation; misalignment with other national policy initiatives and instruments; misalignment or missed opportunities in developing national climate change policy and emissions reduction targets; and adverse environmental effects. That analysis is difficult, partly because of the complexity of these issues, partly because of the complexity of the NESPF itself, and partly because the NESPF has only been operational for a short period of time.

As a result, this report does not capture all possible topics, or even all possible issues under the topics that are addressed. The short time period between the NESPF's coming into force and the writing of this report means it is not possible, in most instances, to examine its efficacy on the ground. That means this analysis is something of a desktop exercise, focusing on key issues identified through interviews, background research, statutory interpretation, and the authors' experiences. It is intended to be a constructive springboard for further discussion and work.

OVERARCHING OBSERVATIONS

Managing the environmental impacts of plantation forestry isn't easy. This complexity is revealed by the many recommendations under each topic in this report. Recommendations have been made in respect of each topic, so the specific issues and possible responses are clear. It is in this section that overall observations and recommendations are made that tie these topic-specific responses together.

The first is that **the NESPF's approach to afforestation and replanting is too permissive and needs to be re-examined. Greater stringency needs to be applied.**

With many existing plantations nearing point of harvesting and the government's push to get trees in the ground, we need to make sure that decisions about where plantation forests are located and what trees are planted are subject to careful and strategic thought. Planning to identify significant environmental values or risks should be occurring *before* planting, not at the point of harvesting or on an ad hoc basis when a certain operational activity needs to occur. This goes for new plantation forests and new rotations at existing sites.

The current NESPF simply does not provide for that level of care and precision.

For example, afforestation and replanting in green-, yellow- and orange-zoned land is permitted, despite many orange-zoned and some yellow-zoned land areas being at high risk of erosion (see the 'Erosion' section). In red-zoned land both are permitted provided the area is less than 2ha in a calendar year. The question needs to be asked: Should trees that are planted specifically for removal be put in these areas? They might provide some stabilisation benefits but those are short-term and the erosion and sediment discharge that will follow on harvesting will be significant, even from smaller areas. The government's planting programme anticipates a significant portion of permanent forest, and areas where risk of adverse environmental effects from tree removal is high should be targeted. The NESPF needs to provide a robust and clear regulatory framework that is consistent with that approach.

Similarly, the NESPF's setback provisions are inadequate. These are either set at a distance for which there is no ecological justification (5m), or at a distance (10m) which, in light of damage that occurs during harvesting, will effectively be halved. This means they, too, are ecologically questionable. The provisions also only apply to a portion of water bodies, either because of size restrictions (eg wetlands) or due to exclusion altogether (eg ephemeral streams). Setback requirements at the point of afforestation and replant are critical because once a tree is in the ground it will likely be removed, meaning impacts are inevitable.

Direction around what trees can be planted is also weak. For example, a requirement to obtain resource consent is only triggered if the Wilding Conifer Calculator (WCC) gives an area a rating of 12 or 'high risk.' This is despite a 10 or 11 rating still being 'relatively high risk.' In addition, replanting the same species is permitted no matter what species was used originally, meaning that wilding conifer spread can be perpetuated on replant.

Greater stringency and careful and strategic planning at the time of afforestation and replanting could allow for more leniency during operation.

The second overarching observation is that **the NESPF's presumption that plantation forestry activities should be a permitted activity needs to be revisited.**

A complex, intensive activity that not only has immediate impacts but contributes to diffuse pollutants does not easily lend itself to the certainty and specificity required for a permitted activity standard of national application. This is particularly so when that activity occurs across a national landscape that is extremely diverse and which, in many areas, is reaching environmental limits.

The result of taking a permitted activity approach is the use of permitted standards which are either inadequate to achieve the necessary level of environmental protection in all situations, or are uncertain and subject to a value judgement. They are therefore difficult to implement or enforce.

Using management plans that cannot be certified or rejected relies heavily on foresters designing adequate management plans and complying with vague permitted standards. This is a very 'high trust' model, which may not be warranted given the seriousness of potential environmental impacts, variability in practice around the country, and poor compliance outcomes in some areas.[2]

Finding the answer is not easy. National direction has its advantages, but it only works if national standards are set at a point which will ensure protection of all environments. Failure to do that will see continued loss of, and ongoing cumulative impacts on, some of our already threatened ecosystems and biodiversity – like wetlands or estuaries. Council oversight via resource consent has its advantages in allowing site-specific assessment of risks and development of site-specific management responses. However, it isn't a silver bullet, as council rigour in approaching these types of issues is variable around the country.

The answer likely lies somewhere in the middle, with increased nuance in how plantation forestry activities (particularly harvesting) are controlled in different areas and near different, sensitive environments. Under the current NESPF, plantation forestry may end up permitted in some areas and subject to a resource consent requirement in others; however, the balance between those two tools will need to shift if the issues associated with the current approach are to be addressed. The activity status that should apply will require thought. If all potential effects are known, then restricted discretionary status is appropriate. If not, then discretionary activity status should apply. In areas where plantation forestry is not desirable, non-complying or prohibited status should be used.

In some circumstances Forestry Stewardship Council (FSC) standards provide a higher level of environmental protection and could provide guidance for improved regulatory standards in the NESPF.

The third and final overarching observation is that, **in most instances, the adverse environmental impacts of clear-fell harvesting are significant. Therefore policy needs to be developed to facilitate a transition to more sustainable methods** such as continuous cover forestry and other silviculture techniques.

In respect of many of the issues discussed in this report, the issue isn't harvesting per se. It is *how* we are harvesting. Alternative methods, like continuous cover forestry, have a whole range of benefits (eg in relation to erosion, biodiversity and water quality). This is how

plantation forestry is now undertaken in many other countries. Research needs to be carried out to examine how those methods can be applied here, and what is required to make a transition in harvesting method commercially viable for New Zealand foresters. This research needs to include implementation of alternative methods and the creation of demonstration sites to allow for rigorous analysis of outcomes.

SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONTEXT

Before human settlement, much of Aotearoa was covered in indigenous forest and shrublands. Clearance began with arrival of Māori, and accelerated with the arrival of European settlers. Indigenous forest was cleared to make way for farming, and timber was used for construction. Deforestation of indigenous forest was rapid, and in the early 1900s the government introduced incentives to create plantation forests of important species.

Today, forests cover 31% of our land surface, about 6.5% (1.70 million ha) of which are plantations of mainly exotic species, mostly *Pinus radiata*.[3] Plantation forests are distributed across the country.

In 2016/2017 the value of forest product exports was $5.47 billion, and the total contribution of the forest industry to GDP was $3.55 billion. In 2016 the number of forestry workers was approximately 11,000.[4] The sector is party to numerous Accords ranging from social to environmental matters, and is also able to become certified under the FSC certification scheme. This involves uptake of several detailed environmental management requirements.

Plantation forests have a number of environmental benefits. Trees play a stabilisation role, especially on erosion prone land, protecting soil and regulating the rate at which water and collected sediment can run off the land into fresh and coastal water. The "*vegetative litter on the forest floor also acts as a sponge – holding and slowly releasing water for many days after the last rainfall*",[5] which assists with flood and sediment mitigation. Tree cover along rivers and streams also provides shading to assist with temperature regulation.

Plantation trees also make a significant contribution to carbon sequestration, with the New Zealand exotic forest biomass carbon estimated at 283 million tonnes in 2015 (an increase of 150 million tonnes or 114% since 1990). If carbon of the exotic forest soil is included, the total biomass carbon volume is 451 million tonnes in the same period, an increase of 189 million tonnes, or 72%.[6] Under conventional carbon accounting rules, however, sequestered carbon is deemed to be mostly released on harvesting, thus the carbon sequestration benefits are only temporary, either restored if the site is replanted or lost indefinitely if the site is converted to a non-forest land use.

Plantation forests also play a role in mitigating historical indigenous deforestation, providing habitat for some indigenous fauna and the canopy cover required for growth of some indigenous understorey flora. Indigenous understorey consists mainly of vascular plants which can make up a significant part of the total understorey vegetation, such as in Kinleith Forest where the proportion of indigenous plants in the understorey of a 29-year-old stand was found to be 82%.[7]

Plantation forests can also play an important role in providing connectivity between indigenous forest remnants, and ecological buffers from adjacent non-forest land uses. A total of 118 threatened species have been recorded or observed within plantation estates, some in exotic stands and others in managed indigenous forest remnants, wetlands, and frost flats.[8] These include lizards, frogs, invertebrates, long-tailed bats, and numerous indigenous birds including the north brown kiwi (At Risk-Declining), the great spotted kiwi (Threatened-Nationally Vulnerable), and three ecologically distinct forms of kārearea (the southern form is Threatened-Nationally Vulnerable; the bush and eastern forms are At Risk-Recovering). Some operations, such as Omataroa and Te Teko, actively manage potential impacts on indigenous fauna.

However, realising these positive effects often depends on good management practice. Many benefits are only temporary and are lost during harvesting. This is particularly so when clear-fell harvesting methods are used, as is typical in Aotearoa.

Indigenous understorey and associated fauna habitat are lost on harvesting, as is habitat provided by the plantation trees themselves. Indigenous fauna can also be harmed or killed. Some of the species impacted may also be taonga, adding a cultural element of concern.

Indigenous flora and fauna can also be lost through the establishment of plantations at the expense of original indigenous habitat. Fortunately, this is no longer widespread, although issues still arise with the establishment of exotic plantations in indigenous shrublands and grasslands (eg in Otago and Marlborough).

Just as plantation forestry can assist with mitigating erosion and sediment, it can also contribute to it. Sedimentation associated with forestry activities can have significant impacts on freshwater and coastal ecosystems. This is particularly the case immediately after harvesting, especially when clear-felled, and during the seven year 'window of vulnerability' when neither the roots of harvested trees nor the roots of replanted trees are capable of stabilising soil. However, it is also an issue prior to harvesting in respect of roads, vehicle crossings, and forestry activities in steep areas (especially those with soft soils) like the Marlborough Sounds or in Gisborne.

Deposited sediment smothers benthic habitats. Suspended sediment smothers the feeding and gill structures of invertebrates and fish, is known to reduce fish diversity, reduces fish feeding ability, and "*disrupts the natural primary productivity base of the food chain in both freshwater and estuarine ecosystems*".[9] Forestry operations and harvesting can cause damage to riparian zones and wetlands, both to the ground structure and through loss of vegetation. Planting of exotic species, in particular *Pinus radiata,* in direct proximity to smaller streams and wetlands

can have significant impacts through water yield, with moisture taken from the stream or wetland and absorbed by the surrounding trees.

Similar issues to those resulting from sediment arise with slash movement, which can cause significant physical damage to habitat in the direct vicinity and in downstream environments, including the coastal marine area.

The spread of exotic trees outside the plantation site (wilding conifers) is another significant environmental issue. Wilding conifers are invasive weeds which constitute a significant economic, environmental, and cultural threat in many parts of Aotearoa. They are a major threat to non-forested indigenous ecosystems such as mineral belts and tussock grasslands, where they can modify the natural ecosystems to the point that indigenous species are lost. In indigenous forests, wilding conifers compete for space with indigenous trees and plants and discourage regeneration of the indigenous understorey. Wilding conifers also present a significant landscape risk, replacing indigenous species and unique geological formations, such as those of the Mackenzie Basin, with exotic monoculture.

Wildling pines, Mackenzie District

Whangapoua forest

2 A general outline: the current NESPF

NATIONAL ENVIRONMENTAL STANDARDS

National Environmental Standards (NESs) are one of the tools available to provide national direction on environmental management and resource use. The Resource Management Act 1991 (RMA) does not specify a purpose for NESs as it does for National Policy Statements (NPSs).[10] Instead, the purpose of a NES is effectively set by reference to scope and content: to set standards for specified resource management purposes that are to be nationally applied.[11]

The scope of what a NES can cover is wide. It can prescribe technical standards, methods, or requirements for: [12]

- Any of the matters referred to in ss 9, 11, 12, 13, 14 or 15 of the RMA, including but not limited to contaminants, water quality, water level, water flow, air quality, and soil quality in relation to discharge contaminants
- Noise
- Monitoring

Its standards may be qualitative or quantitative, relate to discharges, the ambient environment, or classification of resources, specify methods for implementation, or provide for exceptions or transitional steps.[13] A NES can prohibit an activity, require resource consent (including the parameters of that requirement) or permit an activity.[14] A NES must not permit an activity if that activity has significant adverse effects on the environment.[15]

A regional or district plan can only have a rule or rules that are more stringent or more lenient than a NES if the NES says so.[16] Such plans are also able to address the effects of activities subject to a NES where the effect is not dealt with by the NES and where the NES either "*allows an activity and states that resource consent is not required*" or "*states that the activity is a permitted activity*".[17] In that situation a regional or district plan may include permitted activity controls over and above those of the relevant NES to address those effects. On its face, it does not appear that s 43A(5) of the RMA provides regional and district plans the ability to address the effects of activities controlled by a NES if the NES classifies the activity as anything other than permitted,[18] or to control those effects using anything other than permitted standards.[19] However, breach of a permitted standard does mean that resource consent is required.

As a document made under the RMA, a NES must also align with the purpose of the RMA: to promote the sustainable management of natural and physical resources.[20] The Minister, when recommending the making of a NES to the Governor-General, must "*recognise and provide for*" the matters of national importance in s 6 of the RMA, have "*particular regard to*" the matters in s 7, and "*take into account*" the principles of Te Tiriti o Waitangi pursuant to s 8. The relationship between NESs, NPSs and the New Zealand Coastal Policy Statement 2010 (NZCPS) is not expressly described, but as the NZCPS (and, by analogy, any NPS) "*gives substance to*"[21] Part 2 of the RMA[22] in the environment they relate to, NESs could be expected to be consistent with NPSs.

RESOURCE MANAGEMENT (NATIONAL ENVIRONMENTAL STANDARDS FOR PLANTATION FORESTRY) REGULATIONS 2017

As noted above, the NESPF was published on 3 August 2017 and came into force on 1 May 2018. The objectives sought to be achieved by developing the NESPF were to:

- Maintain or improve the environmental outcomes associated with plantation forestry activities
- Increase the efficiency and certainty of managing plantation forestry activities

Those objectives are not set out in the NESPF itself.

The reason given by central government for developing the NESPF was to address difficulties for forest owners

arising from managing forests that straddled the boundary between two regions or districts, in which different planning rules applied. Some difficulties identified included increased costs and uncertainty about the plan rules that must be followed.

The NESPF's underlying premise is that plantation forestry (establishment and operation) is a permitted activity subject to compliance with standards. Inability to meet the standards in the NESPF triggers a requirement to obtain resource consent. The NESPF is intended to "*provide standardised rules for managing the environmental effects of eight main plantation forestry activities ... [which] aim to codify good management practices in a pragmatic balance between national and locational direction*."[23]

Part 2 of the NESPF is split into nine subparts. The first eight cover the main plantation forestry activities, and the last covers an assortment of specifically identified effects:[24]

- Afforestation[25]
- Pruning and thinning to waste[26]
- Earthworks[27]
- River crossings[28]
- Forestry quarrying[29]
- Harvesting[30]
- Mechanical land preparation[31]
- Replanting[32]
- Ancillary activities (slash traps; indigenous vegetation clearance; non-indigenous vegetation clearance)
- General provisions (discharges; disturbance; diversions; noise and vibration; dust; indigenous bird nesting; fuel storage and refuelling)

Regional or district plan provisions may be more stringent than the NESPF if necessary to:[33]

- Give effect to an objective developed to give effect to the National Policy Statement for Freshwater Management 2014 (as amended 2017) (NPSFM) or specified policies in the NZCPS
- Recognise and provide for the protection of outstanding natural landscapes (ONLs) or significant natural areas (SNAs)
- Manage specifically listed "*unique and sensitive environments*"

The NESPF does not allow regional and district plans to be more lenient than its standards.

The NESPF does not regulate every aspect of plantation forestry. Councils have discretion under s 43A(5) of the RMA to manage effects outside the scope of the NESPF. Effects that were recommended to be left outside its scope include the protection of sites of cultural significance and historic heritage (valued as matters of national importance under ss 6[e] and 6[f] of the RMA) and water yield.

The NESPF includes three risk assessment tools – the Erosion Susceptibility Calculator (ESC), the WCC, and the Fish Spawning Indicator – which are incorporated by reference. These are intended to enable location-specific risk assessments to be undertaken and to provide "*a more tailored approach to the management of adverse effects*" associated with erosion, wilding conifer spread, and fish spawning habitat.[34] Where a high risk of adverse environmental effects is identified under the risk assessment tools, resource consent is required.

Harvesting and earthworks, Havelock

Ōtuataua Stonefields

3 Māori cultural considerations

THE CURRENT NESPF: WHAT DOES IT SAY?

Consideration of Māori cultural issues in the NESPF is limited to papakāinga, defined as:[35]

> *a traditional layout of residential accommodation where dwellings are erected to exclusively house members of a whānau, hapū, or iwi, on land that is owned by the whānau, hapū, or iwi, and is Māori land within the meaning of section 4 of Te Ture Whenua Māori Act 1993 (including Māori customary land and Māori freehold land).*

The permitted activity standards for afforestation and forestry quarrying include a setback from the boundary of land zoned in a district plan as papakāinga.[36] Afforestation proposed within 30m of land zoned in a district plan as papakāinga triggers a requirement to obtain a restricted discretionary consent.[37] Similarly, forestry quarrying proposed within 500m of land zoned as papakāinga triggers a requirement to obtain a restricted discretionary consent.

The 'gap' relating to Māori sites of cultural significance was intentional. The Ministry for Primary Industries' (MPI) report on submissions on the draft NESPF and its 2017 NESPF s 32 RMA analysis both concluded that "*specific provisions in the NESPF to protect cultural and archaeological sites were not appropriate or practical at a national level*"[38] because "*the type and level of protection is often site specific and dependent on the values and sensitivities of the site and the knowledge and requirements of the local iwi*".[39] As a result, it was recommended that sites of cultural significance be left outside the scope of the NESPF, allowing regional and district councils to continue to manage effects of plantation forestry through plan provisions as the local context requires pursuant to s 43A(5) of the RMA.

However, there are overlaps between Māori sites of cultural significance and some of the specific areas in respect of which councils are afforded flexibility to apply greater stringency, such as:

- to give effect to an objective developed to give effect to the NPSFM; such an objective might, for example, relate to achieving Te Mana o Te Wai[40], mahinga kai[41], or a wāhi tapu site[42]
- to give effect to Policy 11 of the NZCPS, in particular Policy 11(1)(b)(iv) and the protection of "*habitats of indigenous species in the coastal environment that are important for recreational, commercial, traditional or cultural purposes*"
- to give effect to Policy 15 of the NZCPS and recognise and provide for the protection of ONLs, given cultural and spiritual values are a component of landscape[43]

It would also be possible to provide for Māori cultural considerations through applying mātauranga and tikanga to the way in which effects are assessed in determining compliance with permitted standards, and as part of assessing resource consent applications.

DOES IT WORK?

The NESPF's approach has both positive and negative features.

On the positive side, it provides for a management approach and plan provisions that are tailored to the unique circumstances of a region or district. This responds directly to submissions received during consultation on the NESPF that a 'one size fits all' approach to managing impacts of plantation forestry activities on sites of cultural significance would not work due to significant national variability in identification, sensitivity, iwi or hapū concerns, and traditional management methods.

For example, as with ONLs and SNAs, some plans identify sites of cultural significance or taonga, but many do not. In some circumstances, identification is further complicated due to iwi or hapū reluctance to specifically identify sites due to fears they will be targeted for artefacts or destroyed because of concerns over potential restrictions associated with that status. In others, complications may arise due

to significance being tied to a specific occurrence such as a certain time of day or year. Management is similarly subject to local diversity, because the mātauranga and tikanga associated with managing and protecting sites of cultural significance are locally specific and borne out of generations of observation and practice.

However, relying on s 43A(5) of the RMA to provide flexibility for regional or district specific management of plantation forestry impacts on sites of cultural significance also has its problems.

First, there is a risk that if it is not provided for in the NESPF, it isn't provided for at all. The effectiveness of councils in engaging with and providing for cultural matters is variable around the country. In areas where the council has a strong working relationship with local iwi or hapū, it is more likely that rules will be developed to address the impacts of plantation forestry on sites of cultural significance. However, in areas where the relationship between the council and local iwi or hapū is weak, or where there are competing iwi or hapū interests, it is less likely (especially given the complexity and detailed analysis likely to be involved).

Secondly, the flexibility available to councils under s 43A(5) of the RMA is not absolute. On its face, s 43A(5) only provides councils with the ability to include permitted activity standards relating to cultural effects. This means that locations or effects need to be able to be articulated with the specificity and measurability required of a permitted activity standard. This may prove difficult given the issues already discussed (see the 'Structure and Language' section).

Thirdly, it is arguable that some sites of cultural significance are within scope of the NESPF and so recourse to s 43A(5) of the RMA to adopt a regional or district-specific approach is not available. For example, could a plan rely on s 43A(5) to include additional permitted standards relating to indigenous species habitat in the coastal environment that are sites of cultural significance when those areas are expressly covered by Policy 11 of the NZCPS (which is addressed by the NESPF)? Or could a plan include additional permitted standards relating to freshwater sites of cultural significance given cultural values are captured by the NPSFM (which is also addressed by the NESPF)? And if a site of cultural significance falls within a papakāinga area, is it within scope, given papakāinga are expressly captured by the NESPF?

Whichever position is taken (ie out of scope so full discretion, or inside scope with increased stringency), councils would have the ability to include controls specific to their region or district. However, legal uncertainty risks litigation over the lawfulness of proposed rules and could result in increased hesitancy by councils to incorporate rules to address effects on sites of cultural significance.

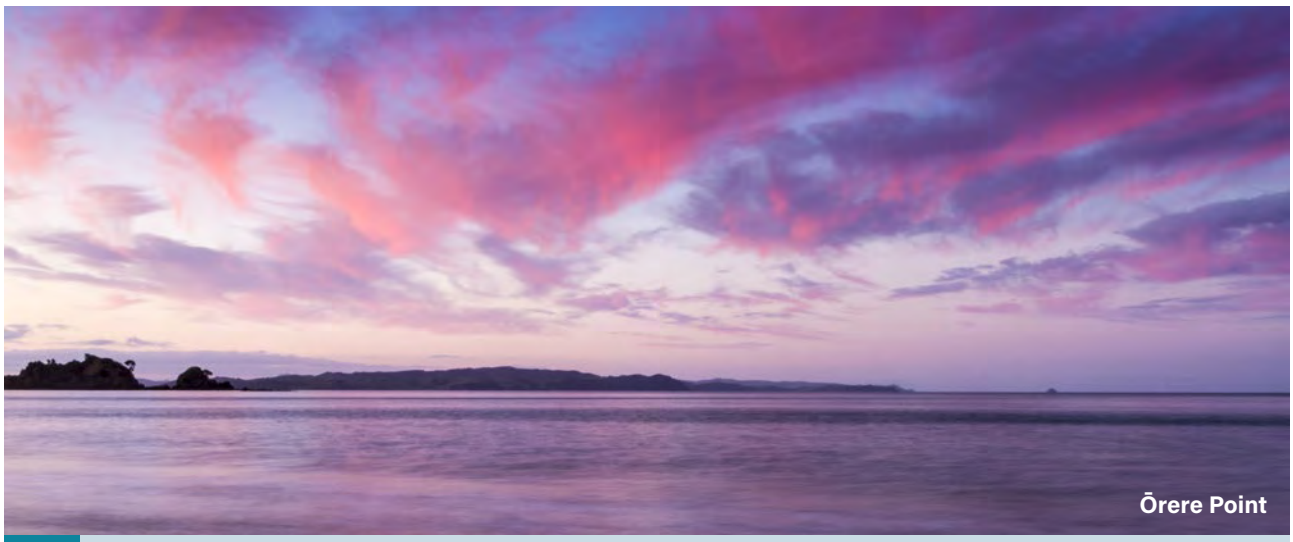
RECOMMENDATIONS

The level of complexity and local nuance associated with sites of cultural significance does not lend itself to a nationally ubiquitous approach. Providing for local flexibility in effects management is appropriate. The question – in light of the issues raised above – is whether excluding impacts on sites of cultural significance from the NESPF is the best method for achieving that. And if it is, what can be done to ensure exclusion is clear?

Recommendations to address the issues raised above are:

- Obtain feedback from regional and district councils on the development and implementation of provisions controlling the effects of plantation forestry on sites of cultural significance, including reasons for why provisions have or have not been developed and any difficulties faced.
- Obtain feedback from a cross-section of iwi and hapū on development and implementation within their rohe, including whether they think additional, specific management provisions are required, whether provisions have or have not been developed, and difficulties faced.
- Consider, taking into account the feedback received from the above steps, whether the NESPF should be amended to specifically state that the control of effects of plantation forestry on sites of cultural significance is outside scope of the NESPF, including when those sites overlap with an area/effect that is within scope.
- Consider what guidance and support measures can be developed for iwi, hapū, and councils for the identification and management of sites of cultural significance. This would likely have benefits that would extend past the NESPF.


Harataunga-Kennedy Bay



Ōrere Point

4 Climate change

THE CURRENT NESPF: WHAT DOES IT SAY?

Alignment with national climate change objectives is not an explicit outcome sought in the current NESPF. The regulatory framework of the RMA has not been seen as a tool for climate change mitigation; therefore, it is not surprising that the NESPF's objectives do not include carbon sequestration. However, the NESPF is relevant to Aotearoa's climate change strategy, given the major role of forestry (both commercial harvesting and permanent) in the government's strategy for meeting emission reduction targets.

The government recognises forestry as currently being New Zealand's most important source of short-term, domestic abatement as it can deliver carbon dioxide removals at a greater scale and lower cost than other domestic actions to reduce emissions.[44] The government's ambition for greater afforestation is currently being operationalised through the One Billion Trees Programme, changes to the Emissions Trading Scheme (ETS), and the drafting of the Zero Carbon Bill. The latter is designed to encourage afforestation and all other forms of abatement "*by providing a strong Government signal [for climate action], enduring laws and institutions, stable and predictable policy settings, and incentives for climate-friendly innovation and investment*".[45]

Insofar as the NESPF enables or hinders certain forestry activities, it may be aligned or misaligned with the government's abatement strategy. As a principle of joined-up policy-making, these (mis)alignments ought to be a matter of strategic consideration for the NESPF in the future.

DOES IT WORK?

Whether the NESPF is in alignment with climate change objectives depends on the framework for evaluating success. Alignment can be defined *narrowly* in terms of climate mitigation only, particularly with a focus on national net emissions, where all other considerations or potential impacts are put aside. Alternatively, alignment can be defined more *widely* in terms of climate change mitigation, adaptation, and broader sustainability outcomes such as those enshrined in the United Nations Sustainable Development Goals (SDGs) or in Part 2 of the RMA. These frameworks are discussed in turn.

Narrow alignment

For climate change mitigation in general (and, in particular, meeting Aotearoa's 2030 and 2050 emission reduction targets), the general principle is: the more forest the better. This principle also corresponds to the government's immediate priority for the One Billion Trees Programme.

On this narrow framing of success, the NESPF is climate-aligned only to the extent that it promotes afforestation and discourages deforestation by facilitating the replanting of sites or by limiting harvesting.[46] Tree species and forest management systems are only of subsidiary interest, insofar as they can optimise sequestration rates and increase total carbon stocks (although, as discussed below, choice of species and management system is important for climate adaptation and sustainability more broadly).

The promotion of afforestation is consistent with the original objective of the NESPF: to overcome "*the main problem ... [of] inconsistency in the management framework for plantation forestry*", which can result in "*re-litigation of the same issues across the country; inconsistent treatment of forestry operations; operational inefficiency; [and] investment uncertainty*".[47] If the NESPF has reduced this operational and investment uncertainty, and thereby encouraged forest land uses, then the maintenance and expansion of total forest carbon stocks can be included in the National Greenhouse Gas Inventory as negative emissions.

On this narrow alignment analysis, the question is whether the NESPF is facilitating land use change from exotic pasture into forestry, and discouraging decisions to shift permanently into a non-forest land use. Given that the NESPF has only been in place since 1 May 2018, it is too soon to verify whether these objectives are being fulfilled. Moreover, it will take some time for evidence to accumulate because of lead-in times required for forest planting.

Requiring resource consent for forestry activities may discourage them due to perceived time, cost, and uncertain outcomes from the consent process.[48] On a narrow alignment analysis, if this means that land remains in exotic pasture, then this outcome is misaligned with climate change mitigation objectives *unless* there are plans in place to establish non-plantation forest, such as "*long-term ecological restoration planting of forest species*", forest sinks for carbon farming, or plantation forestry managed as continuous cover forestry (see the 'Erosion' section).[49] The viability of non-plantation or non-clear-felled forestry depends on a range of factors (eg carbon price, cost of saplings, landowner aspirations) that are beyond the NESPF's remit; however, a joined-up approach to forest policy would ensure that the conditions are in place for non-plantation forestry to be viable when plantation forestry is not.

A further issue is the uneven distribution of regulatory burden across primary sector activities (henceforth, "sectoral inequity").[50] It is possible that, even for land where plantation forestry activities are permitted by the NESPF, its restrictions could disadvantage plantation forestry relative to other activities like pastoral agriculture, because the latter may not face equivalent restrictions. For example, the NESPF sets out the circumstances for which setbacks must occur, such as 10m setbacks from rivers wider than 3m, which reduces the potential productivity of that site. Such restrictions are defensible for environmental reasons (see the 'Fresh and Coastal Water' section); however, potential lack of comparable restrictions for pastoral agriculture means that the potential productivity for agricultural activities are higher for the same site. This sectoral inequity may be reduced over time, especially through the inclusion of controls in RMA plan provisions to control the water quality and biodiversity impacts of other land uses. Tools like setbacks are becoming more common for pastoral agriculture and development activities, and may become mandatory depending on changes to freshwater policy made in 2019. However, this issue points to the importance of a joined-up policy approach, which places the NESPF within its wider regulatory context (which also includes the ETS and other environmental regulation) and which indirectly influences land use choices in ways that may or may not align with climate change mitigation objectives.

Inequity does not only occur across primary sectors; it also occurs across forests of different sizes. For example, a 10m setback for a 200ha site would restrict forest activities on a relatively larger proportion of the total land area than for a 2000ha site. While there are good environmental reasons for setbacks, no matter what the scale of forest, it is important to note that they weigh heavier on small-scale foresters, thereby potentially discouraging forest activities that support climate change mitigation objectives. This is not only an issue for the NESPF, because the economics of small-scale forestry involve related hurdles, such as transport and harvesting costs that are relatively higher because of the smaller-scale yields. This also applies to seeking resource consents, which is more onerous for a small-scale forester compared to a large-scale corporate operator. From the climate change mitigation perspective this is problematic, as small-scale forestry plays an important role in establishing forests on sites that commercially driven operators might not consider because they are either too small, too remote, or too economically marginal.

Wide alignment

This section turns from *narrow alignment*, which focuses solely on mitigation outcomes, to *wide alignment*, which focuses on mitigation, adaptation, and sustainability more broadly. For simplicity's sake, we might conceive of sustainability by reference to the RMA's sustainable management purpose, or by reference to Goal 15 of the SDGs, which calls upon nations to manage forests sustainably, combat desertification, halt and reverse land degradation, and halt biodiversity loss. This wide alignment analysis is more consistent with the framing of the NESPF, which has policy objectives of "*facilitating the sustainable management of natural and physical resources*"[51] and "*maintain[ing] or improv[ing] the environmental outcomes associated with plantation forestry activities*".[52]

The first thing to note is that, by conceiving of climate action more widely, not only do we encounter a plurality of objectives, but also various internal trade-offs between them. For forestry, these trade-offs can be quite pronounced.

Consider, for example, the trade-offs between mitigation and adaptation as these relate to the choice of tree species and forest management systems. As noted above, a narrow focus on mitigation is concerned with species and systems *only* insofar as these optimise carbon sequestration rates. In Aotearoa, this tends to recommend *Pinus radiata*, which is fast growing in a range of circumstances, highly adaptable, and well understood by forestry operators. These qualities make this species attractive for plantation forestry, but also for carbon farming, because rapid growth corresponds to rapid carbon sequestration and, consequently, rapid accrual of carbon credits.

However, from an adaptation perspective, it is not clear that *Pinus radiata* monocultures are the optimal choice. Generally, diversity is the key to ecosystem resilience, both in terms of age and species diversity. Accordingly, even-aged, monoculture forests are generally regarded as more vulnerable to the impacts of extreme weather events such as drought, fire, and windthrow, as well as pests and diseases. Moreover, these risks multiply

as global mean temperatures increase, because of the increased incidence of extreme weather events. From the perspective of land resilience, *Pinus radiata* also has a disadvantage in that its roots rapidly decay after harvesting, so the soil-holding capacity of remaining roots is quickly lost. This means that clear-felled sites are vulnerable to erosion and sedimentation during this 'window of vulnerability', when new trees are yet to establish themselves. The choice of forest management system also has implications for land resilience. Clear-fell forestry leaves the land exposed to climatic impacts after harvesting, but continuous cover forestry has no window of vulnerability because a forest canopy cover is maintained continuously (see the 'Erosion' section).

Another consideration is the trade-off between climate mitigation and sustainability more generally. *Pinus radiata* is an exotic species and so is not aligned with the objective of restoring indigenous biodiversity. Moreover, while *Pinus radiata* may be an optimal choice for carbon farming, especially in the short term, there are questions over long-term sustainability, especially whether landowners would retain forest when it matures and ceases to generate carbon revenue, and whether large *Pinus radiata* forest sinks would have social licence among future generations. These tensions are captured by the idea of 'bio-perversities', which are defined as "*negative biodiversity and environmental outcomes arising from a narrow policy and management focus on single environmental problems without consideration of the broader ecological context*".[53] However, bio-perversity can cut both ways. Just as a narrow focus on climate change mitigation could be detrimental to biodiversity, so too could an overly narrow focus on biodiversity result in suboptimal outcomes by the exclusion of activities that deliver other environmental benefits, such as the use of exotic species for erosion control, carbon sequestration, or the providing of more immediate carbon benefits while simultaneously acting as a nursery for indigenous forest species that will ultimately take over.

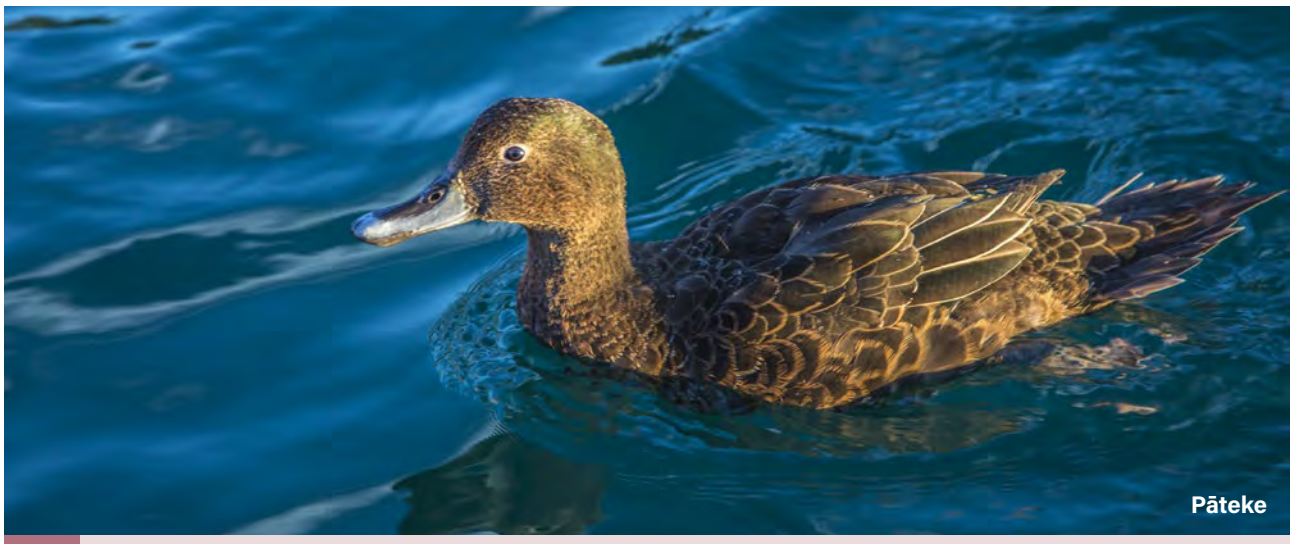
A further issue is wilding conifer spread. *Pinus radiata* has potential as a wilding conifer species, although this capacity is greater for other species such as *Pinus contorta* and Douglas fir. The spread of wilding conifers is commonly regarded as an environmental threat because of its implications for the integrity of SNAs, ONLs, visual amenity landscapes, natural character areas, sites of cultural significance, or the opportunity to preserve non-forest land uses such as high country farming (see the 'Wilding Conifers' section). On a narrow alignment analysis, the spread of wilding conifers could be seen as beneficial, because wilding conifers sequester carbon; however, on a wide alignment analysis, carbon sequestration is only one among a wider set of considerations about the environment's capacity to sustain itself. This wide analysis is more consistent with the broad sustainability objectives of the NESPF and Part 2 of the RMA.

Although, as noted, the RMA has not in practice been seen as a tool for climate change mitigation, s 70B of the Act specifically anticipates the development of NESs to "*control the effects on climate change of the discharge into air of greenhouses gases*". In that scenario, regional councils are able to make rules necessary to implement the standard. This potentially opens the door for the NESPF to address mitigation. However, this is not clear-cut, as s 70B relates specifically to a NES "*made to control the effects on climate change*", not one made for a different purpose (ie controlling forestry) which also happens to touch on climate change mitigation issues. What is clear is that there is an opportunity to address climate change-related discharges and mitigation via the RMA, including through the planting of trees. The inclusion of climate-related objectives in the NESPF or a separate but complementary NES would force the conversation on how to maximise environmental co-benefits, and where and when one objective should be preferred over another. It would, of course, add another layer of complexity, but this is a complex issue. It all comes back to the right tree, in the right place, for the right purpose.

RECOMMENDATIONS

Recommendations to address the issues raised above are:

- Include the RMA and its subsidiary instruments (like the NESPF) within the remit of the national climate strategy process. Consider *inter alia* the role of the RMA (and subsidiary instruments) in that strategy and any necessary legislative amendment to allow it to fulfil that role.
- Given the increasing risks of massive forest loss as a result of climate change, consider the role that the NESPF might play in building the resilience of future forests, in line with best practice for climate adaptation. This might include the inclusion of firebreaks, rules on slash and residue management to reduce fire risk, tighter regulation of clonal forestry, species diversification, and climate-resilient management practices for thinning, fertilising, weeding, and pest control.[54] The importance of considering firebreaks is emphasised by the recent fires in Tasman.
- Undertake a national forestry strategy and/or a national land use strategy which includes, but is not limited to, the NESPF. This strategy ought to take a holistic view, not only assessing the effectiveness of regulatory instruments (eg the NESPF, ETS, forthcoming Zero Carbon Bill, and non-climate related environmental regulation like the NZCPS and NPSFM), but also the interactions between these instruments and various market factors, and the emergence of sectoral inequities for the land sector. Investigate options for reducing inequities and establishing ubiquitous, cross-cutting controls where appropriate, such as setbacks that apply equitably to competing land uses.



Pāteke

5 Indigenous biodiversity

THE CURRENT NESPF: WHAT DOES IT SAY?

The NESPF recognises that plantation forestry activities have the potential to adversely affect indigenous flora and fauna, and aims to address this by giving particular consideration to SNAs, controlling indigenous vegetation clearance, and requiring steps to be taken to reduce impacts on some bird species when nesting and freshwater fish species when spawning.

These controls are intended to implement the directions to decision-makers in s 6(c) of the RMA (to recognise and provide for the protection of significant indigenous vegetation and significant habitats of indigenous fauna), and in ss 30 and 31 (regarding maintenance of indigenous biodiversity, and maintenance and enhancement of ecosystems in water bodies and coastal water).

Vegetation clearance

The NESPF does not apply to indigenous vegetation clearance that occurs prior to afforestation; this activity remains for regional and district councils to regulate.[55] Clearance of indigenous vegetation is otherwise provided for in Regulation 93. Outside SNAs, vegetation clearance is permitted where the vegetation is understorey, within an area of a failed plantation forest, or within an area of plantation forest that has been harvested within the previous five years. Clearance of indigenous vegetation within or adjacent to a plantation forest is also permitted where it is in the same ownership and does not exceed 1ha or 1.5% of the total indigenous area. Clearance of vegetation that is overgrowing a forestry track that has been used within the last 50 years and "*incidental damage*" to indigenous vegetation are permitted, including where the vegetation is part of a SNA.

The NESPF defines "*indigenous vegetation*" as "*vegetation that is predominantly vegetation that occurs naturally in New Zealand or that arrived in New Zealand without human assistance.*"[56]

"*Vegetation clearance*" is defined as:

> (a) the disturbance, cutting, burning, clearing, damaging, destruction, or removal of vegetation that is not a plantation forest tree; but
>
> *(b) does not include any activity undertaken in relation to a plantation forest tree.*[57]

Approach to SNAs

In addition to the vegetation clearance rule, some relevant activity-specific rules have particular controls relating to SNAs. A SNA is:[58]

> an area of significant indigenous vegetation or significant habitat of indigenous fauna that—
>
> (a) is identified in a regional policy statement or a regional or district plan as significant, however described; and
>
> (b) is identified in the policy statement or plan, including by a map, a schedule, or a description of the area or by using significance criteria.

Afforestation within a SNA or within 10m of one is a restricted discretionary activity.[59] Spoil and overburden cannot be disposed of within a SNA.[60] River crossings may not be installed within a SNA.[61] Replanting may not occur closer than the stumpline to an existing SNA.[62] Wilding conifer control is required within some SNAs (see the 'Wilding Conifers' section). Harvest plans must identify the location of SNAs that are to be protected during harvesting.[63]

There are no standards or setbacks in relation to SNAs that apply to earthworks or forestry quarries, except that:

- For earthworks where a forestry earthworks management plan is required,[64] it must identify the location of and mark on a map "*any features that are to be protected during the operation, including significant natural areas*".[65] These plans must also identify the environmental risks associated with the earthworks

and provide measures to avoid, remedy, or mitigate adverse effects on the environment.[66]

- For forestry quarries, excavated overburden must not be deposited into a SNA (however, no setback is required).[67] Where a quarry erosion and sediment management plan is required, it must identify the environmental risks associated with the quarrying activities and provide measures to avoid, remedy, or mitigate the adverse effects of the activity on the environment.[68]

Habitat, including for mobile fauna

Where certain bird species[69] nest in plantation forests, steps must be taken to identify their presence and the location of nesting sites, staff trained to identify the birds and their nests, and measures installed to avoid or mitigate impacts on the birds and their nests.[70] The NESPF does not otherwise address fauna species that may use plantation forests, such as bats, reptiles, frogs, and invertebrates.

Aquatic biodiversity

Aquatic ecosystems are adversely affected by sedimentation and loss of riparian vegetation (see the 'Fresh and Coastal Water' section). This part of the report addresses the NESPF's approach to activities that occur within water bodies.

The NESPF controls apply to perennial rivers, defined as "*a river that is a continually or intermittently flowing body of freshwater, if the intermittent flows provide habitats for the continuation of the aquatic ecosystem*".[71]

Disturbance of the bed or vegetation in the bed of a perennial river or lake is subject to controls relating to freshwater fish spawning. The Fish Spawning Indicator, incorporated by reference and available through MPI's website, provides information about freshwater fish presence, absence, and spawning periods.

Fish passage is addressed in two areas of the NESPF: fish passage must be maintained as part of river crossing construction,[72] and blockages to fish passage must be addressed in reporting on slash trap maintenance.[73]

Stringency

The NESPF allows greater stringency of rules to give effect to Policy 11 of the NZCPS (in relation to coastal and marine biodiversity), to give effect to an objective developed to give effect to the NPSFM, and rules that recognise and provide for the protection of SNAs.[74]

DOES IT WORK?

Vegetation clearance

The NESPF definition of "*indigenous vegetation*" may be problematic to apply as part of the vegetation clearance regulation, as the term "*predominantly*" is uncertain. It is unclear whether it refers to composition (eg more than 50% of individual species are indigenous), cover (more than 50% of the cover of a given area is taken up with indigenous species) or something else. This can result in uncertainty as to whether the rule applies. Furthermore, indigenous "*predominance*" can be particularly difficult to demonstrate in an enforcement context following vegetation clearance. In *Director-General of Conservation v Invercargill City Council*[75] the Environment Court declined to incorporate the term "*predominantly*" into a definition of indigenous vegetation because of its uncertainty. The definition in the NESPF was specifically noted.

In relation to the definition of "*vegetation clearance*", clause (a) is clear, but clause (b) is uncertain. It is unclear to what extent an activity that would be covered by (a) should be considered to relate to a plantation forest tree and thus be excluded by (b). For example, harvesting results in the destruction of vegetation (indigenous understorey) that is not a plantation forest tree, but is an activity undertaken in relation to a plantation forest tree.

Regulation 93 allows "*incidental damage*" of adjacent SNAs. The definition of incidental damage includes requirements that:[76]

> *(a) The damage does not significantly affect the values of the SNA; and*
>
> *(b) The ecosystem can recover to a state where it is predominately of the composition previously found at that location within 36 months.*

The need for judgement about whether the anticipated damage will "*significantly affect the SNA's values*", and whether the ecosystem will recover within 36 months makes this provision highly subjective. It is likely to be impossible to enforce except in the most egregious cases of damage. However, taking steps to minimise the risk of damage is more effective than even the best incidental damage rule.

Approach to SNAs

The NESPF appears to be premised on an assumption that SNAs are only remnant indigenous bush blocks that are readily identifiable from their vegetation. However, plantation forestry blocks themselves can provide significant habitat for indigenous fauna,[77] and the application of SNA criteria based on the ecological values present would result in some areas of plantation forestry (both forest and cutover) meeting the NESPF's definition of a SNA for that reason. Plantation forestry may also host indigenous vegetation qualifying as significant under s 6(c) of the RMA.[78]

This means that activities may require resource consent where they are undertaken within a SNA (or within the required setback from a SNA), such as harvesting of a plantation forest that is significant habitat for kiwi or bats or replanting in an area of cutover that is significant habitat for kārearea. A consent requirement is seen to be problematic by forestry operators. How to manage effects on SNAs within production forests requires careful thought, and effective management would likely demand additional and more nuanced controls than those in the current NESPF.

Afforestation may not occur as a permitted activity within SNAs, but in regions that have not identified SNAs in their regional policy statement or plans, this relies on the forestry operator proactively identifying that the area where afforestation is proposed is not a SNA. This is unlikely to be a significant issue in forested areas, but where shrublands or grasslands would meet SNA criteria, identification becomes more complex and because indigenous vegetation clearance (controlled outside the NESPF) is not necessarily required prior to afforestation, there may be no interaction with the council prior to afforestation occurring. Conversion of grassland and shrubland to exotic forestry is considered to be a significant risk, especially given anticipated forestry expansion under the One Billion Trees Programme.

Many plantation forestry activities are not required to be set back from SNAs (eg earthworks), and where setbacks are required (generally of 10m) they are likely to be insufficient to protect SNAs, particularly from the impacts of harvesting, where the trees themselves may be as tall as 50m. The Scion assessment of the environmental costs and benefits of the NESPF did not include any evidence that a 10m setback would be adequate to protect SNAs.[79]

While harvest plans must identify the location of SNAs to be protected, a requirement to proactively plan for SNA protection from the point of afforestation would be more effective in ensuring protection is achieved over time. This would require consideration of how the overall forestry operation was likely to affect SNAs and to incorporate these considerations into forest design and planning.

Habitat, including for mobile fauna

The NESPF's nesting bird regulation is unlikely to be enforceable except in very clear cases, because its requirements are too general. Compliance is achieved where (unspecified) training is provided so that operators can identify the presence of birds, and where (unspecified) steps are taken to avoid or mitigate impacts on nest sites. This level of generality is also inadequate to address what may be significant adverse impacts on threatened species.

An obvious shortcoming in the NESPF is that species other than birds are not provided for at all. Many species have lost so much of their natural, indigenous habitat that they rely on plantation forestry habitat. Nearly three-quarters of indigenous forest has been cleared in the last 1000 years, including 85% of lowland forests and wetlands. In some of the main plantation forestry regions – Gisborne, Waikato, Bay of Plenty, Hawke's Bay and Canterbury – indigenous forest losses have been high (84%, 77%, 52%, 83%, and 91% respectively). Even in areas like Gisborne that retain relatively large areas of indigenous vegetation (23%), only 15% of this is original vegetation and there are only 25ha of intact forest remaining in the lowland areas. Nearly half of all forest in the Gisborne district is now exotic. Exotic plantation forests are therefore becoming more important in some regions as habitat for helping to conserve indigenous fauna on a landscape scale. Failing to both assess the effects of forestry activities on indigenous fauna and ensure the protection of species that live in plantation forest could have significant impacts, even including species extinction.[80]

FSC's certification scheme places additional indigenous fauna management requirements on plantation forestry operators, demonstrating that management of indigenous species within plantation forests is not incompatible with forestry operations. Signatories are required to identify indigenous habitat that supports rare, threatened, or endangered species and that is important to their life cycle, and protect it in management planning. Within production areas, the presence of populations of rare, threatened, or endangered species or areas important to their life cycle is to be progressively identified and mapped as either "*known presence*" or "*reasonable expectation of finding*" before harvesting in management plans and site-specific work prescriptions.[81] Rare, threatened, or endangered species known to be present, or discovered in production areas, are to be protected and managed.[82] Management plans and work prescriptions for areas due for harvesting or silviculture are required to detail steps to be taken to protect rare, threatened, or endangered species in production areas.[83] This includes progressively training employees and contractors in recognition of these species, and in contingency planning to enable protection of located species.[84]

FSC certification also requires that a proportion of the overall forest management area be managed so as to restore the site to a natural forest cover.[85] At least 5% of the management unit must be retained in or restored to natural forest, and a minimum of 10% of the ecological district or region must be protected or restored to indigenous vegetation. However, this can be achieved through "*equivalent ecological effort*", which includes steps such as active restoration of reserves, where there is a deficit of reserve set-aside.

These measures suggest that if the objective is to conserve indigenous species that rely on plantation forests, a much more comprehensive and integrated approach is required rather than simply identifying bird nesting sites and avoiding or mitigating effects on these. The FSC certification scheme's standards indicate that foresters themselves are aware of this and are actively working to manage effects on indigenous species.

Similarly, a recent report[86] describing current knowledge of indigenous fauna within plantation forests and the impact of forest harvesting concluded that given the diverse habitat requirements, dispersal abilities, and threat status of indigenous fauna, a multifaceted approach will be required within plantation forests to help conserve indigenous biodiversity on a landscape scale. The report found this approach should include retaining areas of forest which develop high structural complexity, and maintenance of mixed-age exotic stands and individual threatened species programmes. Retention forestry, the practice of setting aside small areas within plantation forests, is noted as having emerged in recent decades as an effective, practical approach to achieve biodiversity gains internationally, and is now used in many countries

including the United States, United Kingdom, Canada, Australia, Germany, Sweden, and Argentina.

The report also includes many specific management recommendations that could be considered alongside existing FSC-based standards as part of the formulation of specific NESPF controls, rather than a generic 'avoid or mitigate' approach. It identified that few studies have been carried out on indigenous fauna in plantation forests in Aotearoa and that further information would assist to understand and provide for species conservation.

Excess sediment in estuaries and other marine ecosystems can smother habitats, such as seagrass meadows and mussel beds, and detrimentally affect water clarity[87]. Sub-tidal rocky reef systems are also at risk.[88] Some very high value areas like Mahurangi Harbour, Long Bay Marine Reserve, and Hahei Marine Reserve can be heavily impacted by sediment. In theory, the NESPF allows councils to apply more stringent rules to protect SNAs and other areas meeting Policy 11 of the NZCPS in the coastal marine area, but in practice only a few councils have identified marine SNAs. As a result, ecologically significant coastal sites may not receive adequate protection from sedimentation impacts through regional rules.

Freshwater biodiversity

Ephemeral streams only flow for part of the year, after rainfall, and so do not come within the NESPF definition of perennial river. While ephemeral streams tend to have reduced fish communities, they are highly important for invertebrate life. By not including ephemeral streams in the regulations controlling effects on freshwater, the NESPF is failing to provide protection for entire ecosystems.

Freshwater bodies can provide significant habitat for indigenous fauna. While the NESPF generally recognises SNAs on land and includes provisions to protect them, it is less effective at controlling activities within freshwater SNAs. River crossings other than fords (culverts, drift decks, and temporary river crossings) may be installed as a permitted activity regardless of the water body's significance as habitat. The Opouri River in Marlborough was given as an example where this is of significant concern. New fords are not permitted in a river listed in a regional plan or water conservation order as a habitat for threatened indigenous freshwater fish or a freshwater fish spawning area, but this does not provide any protection for indigenous freshwater fish that are at risk but not threatened, except when they are spawning. In theory greater stringency can be applied to meet SNA criteria but in the freshwater context inclusion of criteria for identifying freshwater SNAs is unusual and actual identification is even more unusual.

The NESPF focuses on streams as freshwater fish spawning habitat (using the Fish Spawning Indicator) and does not capture the broader ecosystem value of freshwater habitat, or habitat at other stages of a freshwater fish's life. The Fish Spawning Indicator itself has shortcomings, in that generally the models used are national models for freshwater fish presence and based on the New Zealand Freshwater Fish Database (NZFFD), which is more complete in some regions than others. There is a range of reasons for this, including that tangata whenua in some regions do not support publication of information about their taonga species and other natural values, which then presents as an 'absence' in the database. There is also criticism of the accuracy of the freshwater fish spawning periods used as not being regionally appropriate in some cases.

The NZFFD and Fish Spawning Indicator are excellent tools and valuable when used for the right purpose. However, that purpose is not a regulatory one, especially one where the presence or absence of data is being used to determine presence or absence of fish. Multiple submissions on the NESPF and feedback received by the reviewers raised issues with reliance on the NZFFD and Fish Spawning Indicator, due to significant gaps in data.

National Policy Statement for Indigenous Biodiversity

The government is currently developing a proposed NPS for Indigenous Biodiversity, based on the draft prepared by the Biodiversity Collaborative Group. The Group's draft NPS includes specific provisions relating to plantation forestry. Its accompanying report, which sets out complementary measures for maintaining indigenous biodiversity, identified gaps in and issues with the NESPF's management of effects of plantation forestry on indigenous flora and fauna. The content of a NPS for Indigenous Biodiversity may have implications for the NESPF, which will need to be considered.

RECOMMENDATIONS

Recommendations to address the issues raised above are:

Vegetation clearance

- Review definitions of "*indigenous vegetation*" and "*vegetation clearance*" to ensure they are sufficiently certain to be enforceable. Delete reference to "*predominantly*" in the "*indigenous vegetation*" definition.
- Amend the requirements for harvest plans to include:
  - A requirement to identify the measures that will be taken to ensure SNAs are protected during harvesting
  - Where "*incidental damage*" to SNAs is anticipated, details of how the forestry operator has determined that such damage will meet the definition of "*incidental damage*" (including that the damage will not significantly affect the values of the SNA and that the ecosystem will recover to a state where it is predominately of the composition previously found at that location within 36 months)
  - A requirement for independent expert ecological advice in relation to the above matters

Approach to SNAs

- Recognise that areas of plantation forest may qualify as a SNA due to the presence of significant indigenous vegetation, or because they provide significant habitat for indigenous fauna. Tailor the NESPF controls relating to SNAs to address these circumstances. This will require a much more comprehensive approach to controlling the effects of plantation forestry activities on indigenous fauna species within plantation forests than is currently provided for under the NESPF.
- Require a new forestry plan at the point of afforestation that identifies where SNAs are located and how they will be protected throughout the plantation forestry rotation. As part of that plan, require forestry operators to demonstrate prior to afforestation that areas where afforestation is proposed do not contain indigenous vegetation cover. If they do contain indigenous vegetation cover, require them to demonstrate that the indigenous vegetation is not a SNA.
- Review SNA setback provisions (such a review should include expert ecological advice) and increase setbacks where ecological advice indicates this is required to protect SNAs.
- Require and incentivise regional councils to progress identification of marine SNAs, and provide guidance to assist councils to derive regional rules relating to plantation forestry that address effects of sediment on marine SNAs.

Habitat, including for mobile fauna

- Incorporate integrated species conservation measures for all indigenous species that use plantation forests as habitat. Ensure this is reflected in regulations and harvest plan requirements (which to be meaningful must be verified and able to be changed by councils). Species conservation measures should not be limited to steps to avoid or mitigate impacts on individuals.
- Further investigation of indigenous fauna within plantation forestry should be encouraged.
- Consider whether support in the form of grants for forestry owners and managers to help retain habitat that benefits biodiversity (other than existing SNAs which must be protected by law) should be provided.

Freshwater biodiversity

- Recognise that freshwater biodiversity is not limited to fish species, and ensure other aquatic species are also recognised and protected in the NESPF, including by providing protection to ephemeral water bodies.
- In relation to indigenous freshwater fish, continually improve the Fish Spawning Indicator by ongoing investment in verification, testing, and use of regional data. Enable an alternative regulatory mechanism to be used in areas where the NZFFD is known not to be an effective predictor of presence or absence.

National Policy Statement for Indigenous Biodiversity

- After the NPS for Indigenous Biodiversity has taken effect, undertake a review for the specific purpose of aligning the NESPF with the NPS for Indigenous Biodiversity.

Kea


Wairau River

6 Fresh and coastal water

THE CURRENT NESPF: WHAT DOES IT SAY?

All activities covered by the NESPF are subject to at least one permitted activity standard aimed at controlling effects on fresh or coastal water. These come within five broad categories:

- Setbacks
- Mixing or minimisation of sediment
- Depositing material into or in proximity to water
- Management plans
- Water body-specific activities

Controls based on erosion susceptibility and classification under the ESC are also directly relevant to controlling impacts on fresh and coastal water, as are controls relating to freshwater fish passage. These are discussed under the 'Erosion' and 'Indigenous Biodiversity' sections.

Setbacks

A setback is the most common water-related permitted activity standard in the NESPF. A setback is defined in the NESPF as "*the distance measured horizontally from a feature or boundary that creates a buffer within which certain activities cannot take place*".[89]

There is variation between activities regarding setback distance and the water bodies to which a setback is applied. To be undertaken as a permitted activity (provided the other permitted standards are met) afforestation, the first activity addressed in the NESPF, must not occur:[90]

- Within 5m of a perennial river[91] less than 3m wide, or a wetland larger than 0.25ha
- Within 10m of a perennial river greater than 10m wide, a lake larger than 0.25ha, an outstanding freshwater body, a water body subject to a conservation order, or a SNA
- Within 30m of the coastal marine area

Operation of harvesting machinery,[92] mechanical land preparation[93], and replanting[94] are subject to the same setbacks. An exception applies to harvesting machinery, with operation able to occur within the setback distances if "*disturbance to the water body from the machinery is minimised*" and the machinery is operated at a water body crossing where slash removal is necessary; where essential for directional felling in a chosen direction; or to extract trees from within the setback. Replanting is also subject to an additional setback standard requiring resource consent for replanting closer than the existing stumpline adjacent to a perennial river, wetland, lake, SNA, or the coastal marine area.

Different setbacks apply to earthworks which, to be permitted, must not occur within 10m of all the above listed water bodies, except for SNAs which are not addressed.[95] The same 30m setback from the coastal marine area applies. The earthworks setbacks are subject to exceptions for river crossings, slash traps, specified volumes of spoil, and maintenance of existing earthworks.[96]

A slightly different set of setbacks again applies to forestry quarrying, with a 20m setback applying to perennial rivers of any size, a wetland larger than 0.25ha, or a lake larger than 0.25ha, and a 30m setback to the coastal marine area.[97] No other water bodies are mentioned (eg outstanding water bodies).

In all but one instance, if an activity is proposed to be undertaken within the setback a restricted discretionary activity resource consent must be applied for. The exception is harvesting where inability to comply results in a controlled activity resource consent requirement unless being undertaken in Class 8e land or an area not classified under the ESC. In those two instances, restricted discretionary resource consent is required.

Mixing or minimisation of sediment

There are two broad categories of permitted activity standards focused specifically on sediment (excluding ESC-related controls). The first is the use of a general

standard, the wording of which mimics s 70(1) of the RMA,[98] requiring sediment to be managed to ensure that after reasonable mixing it does not give rise to "*a conspicuous change in colour or visual clarity*", "*the rendering of freshwater unsuitable for consumption by farm animals*" or "*any significant adverse effects on aquatic life*". Earthworks, harvesting, mechanical land preparation, and the use of slash traps are all subject to such a permitted activity standard.[99]

Except for harvesting, inability to comply with the standard results in a restricted discretionary resource consent requirement. For harvesting, inability to comply results in a controlled activity resource consent requirement (unless being undertaken in Class 8e land or an area not classified under the ESC). In those two instances, restricted discretionary resource consent is required.

Falling within the second category are permitted activity standards which refer to minimising sediment entering water. In respect of earthworks, harvesting, and mechanical land preparation, stabilisation of the area where the activity is being undertaken must be done to "*minimise*" sediment entering water and resulting in at least one of a number of listed impacts. Those impacts differ slightly between activities. All include the impact of damage to the receiving environment, and have a variation focusing on damage, damming, or diversion of the waterway. Harvesting also includes degradation of habitat or the riparian zone.[100] Inability to comply results in the same resource consent requirements as under category one set out in the paragraph above.

Depositing material

Restrictions on placement of material in a water body, or within specifically identified proximate areas, is another method by which the NESPF addresses the risk of adverse effects on fresh and coastal water. Common between slash, spoil for earthworks, excavated quarry burden, and disturbed vegetation from harvesting is a permitted activity standard that material must not be deposited into a water body or coastal water.[101]

All are also subject to additional and more specific deposition restrictions.

Slash from pruning and thinning or harvesting cannot be deposited on land that would be covered by water during a 5% annual exceedance probability event as a permitted activity. However, if this (and the restriction on deposition in a water body) is not complied with, removal is only required if it would not be unsafe and if required to avoid blocking and damming, erosion, significant adverse effects on aquatic life, or damage to downstream environment or property.[102]

Deposition of spoil is also not permitted if it is proposed to be over slash or woody vegetation, or "*onto land in circumstances that may result in the spoil or sediment entering water*".[103] Excavated burden from quarrying is subject to a similar restriction, with an extension to prevent deposition within a setback as a permitted activity.[104]

Disturbed vegetation from harvesting is subject to additional permitted controls which require deposition to avoid diversion or damming of water and degradation of aquatic habitat or the riparian zone. In addition, as a starting point, harvesting must be undertaken in a manner which sees trees felled away from water bodies and the riparian zone unless unsafe. In steeper areas, the ability to fell away from water bodies is limited. If unsafe, trees must be "*felled directly across the water body for full length extraction before de-limbing or heading*". Full suspension harvesting is required across rivers of 3m or more in width.[105]

Inability to comply with permitted activity slash standards for pruning and thinning to waste, and harvesting in green-, yellow-, or orange-zoned land, results in a controlled activity resource consent requirement. Otherwise, restricted discretionary resource consent is required.

Earthworks that do not comply with spoil deposition standards are a restricted discretionary activity. Forestry quarrying in green-, yellow-, or orange-zoned land[106] that does not comply with the excavated burden deposition standards is a controlled activity. In red-zoned land, earthflow terrain in orange-zoned land, or an area undefined in the ESC, restricted discretionary activity status applies.

Management plans

Management plans required for earthworks, harvesting, and forestry quarrying all have water-focused components.[107]

The earthworks and harvest management plans must identify all water bodies, setbacks, the coastal marine area, registered drinking water supplies, existing and proposed river crossings, and slash storage areas. For sites with perennial rivers, they must identify downstream rivers, lakes, estuaries, or the sea if those areas are at risk of slash or sediment deposition if mobilised.

Specifically related to the earthworks management plan, a description of works to be undertaken and the management practices that will be used to avoid, remedy, or mitigate risks (including erosion and sediment control measures) is required. The harvest plan must include a description of harvesting methods, timing, duration, intensity, and management practices that will be used to avoid, remedy, or mitigate risks on features listed above. Both plans must also include response measures if heavy rainfall occurs.

The forestry quarrying management plan is simply required to identify on a map wetlands and lakes larger than 0.25 ha, perennial rivers, water tables, the coastal marine area, and setbacks.

Water body-specific activities

River crossings and slash traps are subject to their own suite of specific permitted activity standards.

Subpart 4 covers five different types of river crossings: single culvert, battery culvert, drift deck, ford, and single span bridge. There are seven permitted activity standards applying to all crossing types. Each is then also subject to a number of specific standards.

Common controls relevant to impacts on water are extensive and mean that for a river crossing to be permitted it must (in summary):

- Not alter the natural alignment or gradient of the river[108]
- Provide for fish passage[109]
- Not cause or induce erosion of the bed or bank, or create sedimentation, and must be maintained to avoid erosion[110]
- Not be located within a wetland greater than 0.25ha, a wetland less than 0.25ha if it covers 20m or more, an outstanding freshwater body, a water body subject to a water conservation order, or a SNA[111]
- Discharge no contaminants other than sediment.[112]
- Be designed taking all practicable steps to avoid deposition of organic matter or sediment, to minimise disturbance, and avoid concrete entering water[113]
- Be constructed so that elevated sediment levels do not occur for longer than 8 hours, with machinery out of the water body unless necessary, and so that materials and equipment that are in the water are removed within five days of completion[114]
- Be subject to flow estimates using the incorporated method[115]

Permitted standards specific to each crossing type are set out in Regulation 46 and relate generally to location, size, and design.

Inability to comply with the common permitted activity standards (except for the flow estimate requirement) leads to a restricted discretionary activity resource consent requirement. Inability to comply with the crossing type-specific standards means the crossing becomes a controlled activity. Types of river crossings not covered by the NESPF are a discretionary activity.

Specific controls on slash traps are contained in Subpart 9. A slash trap is defined as "*a structure set in a river, on the bed of a river, or on land to trap slash mobilised by water*". Standards relevant to impacts on water relate to flow, quality, and natural character. In summary, in order to be a permitted activity slash traps must:

- Allow water to flow freely, avoid damming, and be lower than 2m[116]
- In areas where the upstream catchment is 20ha or larger, must not be located within the bankfull channel width[117]
- Be inspected within five working days of a "*significant rainfall event in the upstream catchment that is likely to mobilise debris*"[118]
- Be cleared of debris following a 5% annual exceedance probability flood event[119]
- Be maintained to avoid erosion and to ensure effectiveness[120]
- Not alter the natural alignment or gradient of the river, or cause or induce erosion[121]
- Discharge no contaminants other than sediment[122]
- Be designed to take all practicable steps to avoid deposition of organic matter or sediment, to minimise disturbance, and avoid concrete entering water[123]
- Be constructed so that elevated sediment levels do not occur for longer than 8 hours, with machinery out of the water body unless necessary, and so that materials and equipment that are in the water are removed with five days of completion[124]
- Not result in specified outcomes after reasonable mixing, as discussed above under 'Mixing or Minimisation of Sediment'[125]

Inability to comply with permitted activity standards results in a restricted discretionary activity resource consent requirement.

Catch-all discharge, disturbance and diversion provision

Regulation 97 effectively comprises a 'catch-all' permitted activity relating to discharges, disturbances, and diversions. It confirms that discharges of sediment, disturbance of the bed or bed vegetation of a river or lake, and diversion of water associated with plantation forestry activities are permitted activities, subject to the standards set out under the relevant subpart in the NESPF. It then introduces an additional, overarching standard to sit alongside the activity-specific standards relevant to those impacts relating to protection of freshwater fishing spawning areas. It also introduces an exception to the NESPF's disturbance provisions by defining disturbance of the bed or bed vegetation to exclude:

> *(6) ...*
>
> *(a) vehicles using a ford to cross the wetted river bed at a rate of up to 20 axle movements per day:*
>
> *(b) hauling logs over the bed of a river less than 3 m wide where butt suspension is achieved in the segment of the river marked in the Fish Spawning Indicator, in the relevant spawning period shown in the fish spawning indicator, unless any species listed in Group B in the Fish Spawning Indicator is present:*
>
> *(c) clearing a slash trap.*

Regulation 97 also addresses wetland disturbance and classifies it as a permitted activity subject only to limited freshwater fishing spawning standards, provided the wetland is greater than 100m^2 and less than 0.25ha, or greater than 100m^2 and the activity is harvesting.

Activities that cannot comply with Regulation 97 become a discretionary activity.

Stringency

A number of the areas in respect of which plans have the flexibility to be more stringent than the NESPF are relevant to water. Directly relevant is provision for increased stringency to:

- Give effect to "*an objective developed to give effect to the National Policy Statement for Freshwater Management*"
- Give effect to Policy 22 of the NZCPS:

  Policy 22 Sedimentation

  (1) Assess and monitor sedimentation levels and impacts on the coastal environment.

  (2) Require that subdivision, use, or development will not result in a significant increase in sedimentation in the coastal marine area, or other coastal water.

  (3) Control the impacts of vegetation removal on sedimentation including the impacts of harvesting plantation forestry.

  (4) Reduce sediment loadings in runoff and in stormwater systems through controls on land use activities.

  Even though Policy 22 relates to coastal water, it is also relevant to freshwater management because it could be relied on to impose more stringent controls further up the catchment.
- Recognise and provide for the protection of freshwater and marine SNAs
- Manage relevant unique and sensitive environments such as "*activities within 1km upstream of an abstraction point of a drinking water supply for more than 25 people where the water take is from a water body*"

Additional protection for fresh or coastal water is indirectly available via the ability for plans to be more stringent to give effect to Policies 11, 13 and 15 of the NZCPS, and to recognise and provide for the protection of ONLs. Protection of coastal biodiversity as required by Policy 11 of the NZCPS may demand controls focused on water quality outcomes to, for example, avoid adverse effects on a threatened species, marine reserves, or on the habitat of species at the limit of their natural range. Similarly, protection of natural character or landscape may demand controls relating to water quality or water body formation if presence of water bodies or a specific water body is a value contributing to the natural character of an area or classification as an ONL.

Does it work?

What can be said for the NESPF is that it contains numerous provisions relating to fresh and coastal water. The question, therefore, is less about whether gaps need to be filled and more about the adequacy of what is there.

This report does not intend to address all water-related provisions, but rather focuses on a subset of key, high level issues. For example, technical parameters relating to crossing construction and design are not addressed, nor are controls relating to minimum stormwater diameters on different slopes or to aquifers. The report is intended to be the starting point for a more detailed analysis.

Setbacks

To start on a positive note, the inclusion of setbacks in the NESPF is itself a win, as setbacks are often a contentious issue when making or changing regional or district plans. Unfortunately, *how* they have been included raises concern.

First, the adoption of setbacks is pointless if the setback distances are inadequate to protect riparian and instream ecosystem health. Research on riparian setback distances indicates that a minimum setback width of 10m is needed to achieve improvements in instream habitat and provide sustainable riparian areas.[126]

The NESPF's setbacks for afforestation, harvesting machinery, mechanical land preparation, and replanting from a perennial river less than 3m wide (or a wetland larger than 0.25ha) do not meet the scientifically established 10m minimum. Instead, only a 5m setback is adopted.

A complication which needs to be factored into setback width is the extent of ground disturbance that occurs during harvesting. Removal can result in significant disturbance extending well into the setback area, meaning that, for example, only 5m of a 10m setback will remain intact. This degradation needs to be accounted for in any setback width, as do the water absorption impacts of trees, in particular *Pinus radiata*, in close proximity to wetlands and smaller water bodies. If trees are planted too close to these features they will effectively be 'sucked dry.'

The adoption of inadequate or minimum setbacks at the point of replanting misses an opportunity to reduce or remove risks of adverse effects on fresh and coastal water. Permitted activity setbacks at replanting should be set at a conservative distance that aligns with the distance necessary to achieve protection of the most sensitive water bodies.

The lack of scientific justification for setbacks less than 10m, the apparent failure to factor in degradation and loss of the setback buffer during harvesting, and the well-recorded adverse impacts on water quality, natural character, and aquatic ecosystems of forestry form a potent trio that call into question the lawfulness of the NESPF's permitted setback standards under s 43A(3) of the RMA.

Putting setback width to one side, the limits on water bodies subject to setback standards are also concerning. For example, setbacks are only required for wetlands greater than 0.25ha – which is a 50m by 50m wetland. New Zealand's wetlands are compositionally unique and are home to many endemic flora species. They are generally accepted to have reduced nationally by 90%; they are on the precipice of total loss. Wetlands smaller than 0.25ha have very high ecological values, both in an intrinsic sense and in terms of ecosystem services. No ecological justification for restricting protection to wetlands greater than 0.25ha appears to be provided in the background documents. The lawfulness of this approach is questionable, with s 6(a) and (c) of the RMA requiring the preservation of the natural character of all

wetlands, and the protection of significant indigenous vegetation and habitat to be recognised and provided for as a matter of national importance. Similarly, the NPSFM requires protection of the significant values of wetlands generally, not only those of a certain size. Issues around the practicality of identification and delineation of wetlands are acknowledged. However, wetland identification and protection have been identified by the government as core components of its Essential Freshwater work programme, which will hopefully assist.

Rivers less than 3m wide are equally as valuable. Smaller streams in the headwaters are the main conduits to lower reaches. Water quality impacts there will significantly increase cumulative impacts down the catchment. Loss of riparian vegetation in upper reaches will likely result in increased water temperatures at the point of clearance and down the catchment due to loss of shading. Smaller rivers, both those with continuous and intermittent flow, and surrounding riparian vegetation, also provide critical ecological habitat. For example, macroinvertebrates and indigenous freshwater fish, like the shortjaw kōkopu, take refuge in streams that are intermittent or as small as 0.3m wide in the upper reaches of a catchment, and riparian vegetation alongside headwater streams provides important spawning habitat during autumnal freshes.

The short point is that size of a water body is not determinative of its value, so should not be used as the determinant for the application or width of a setback. What should be determinative is the sensitivity of the water body, and its slope, soil, and rainfall.

The permitted setback standards also suffer from a lack of consistency. Setbacks for some activities capture a much broader range of water bodies than others. Similarly, the matters of discretion applying to activities are different. No clear reason for these differences is apparent.

Mixing or minimisation of sediment

The underlying issues with the NESPF's permitted standards relating to mixing or minimisation of sediment relate to uncertainty and lack of measurability.

The permitted standards relating to mixing uplift the words of s 70(1)(c)–(g) of the RMA (or a subset of those). However, subsections (c)–(g) are not put forward by s 70 of the RMA as standards that should be applied to a permitted activity in a plan. Rather, on the face of s 70, they constitute the test that a regional council must apply before it classifies a discharge to water or land which may enter water as a permitted activity. The regional council must satisfy itself that the standards that do apply to an activity proposed to be permitted will mean none of the effects in s 70(1)(c)–(g) are likely to arise. This interpretation of s 70 of the RMA is consistent with the requirements that a permitted activity standard should be specific (so that an applicant can know whether it will comply), should not include a "*value judgement*", and should be set at the point that the consent authority can be confident that it will fulfil its obligations under the RMA[127] (in respect of water, being primarily ss 30(1)(c) and 70 of the Act, and the NPSFM).

Failure to include precise and measurable permitted activity standards results in difficulties with compliance and enforcement. For example, how does an operator know if a colour change qualifies as "*conspicuous*"? What is there to ensure that an operator and regulator are applying the same definition of "*conspicuous*"? How does a forester know whether or not its operation is having significant adverse effects on aquatic life without constant

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monitoring? In the NESPF's defence, this is an approach that has been adopted by regional plans. However, that is not a reason for a national regulation to itself adopt an inadequate approach.

Precise measures have been developed to assess compliance with the requirements of s 70 of the RMA. For example, a "*conspicuous*" change has been defined as a percentage change in horizontal visibility of a black disc between upstream and downstream measurement (the 'disc test'). The acceptable percentage change may decrease in water bodies with sediment-sensitive species to enable a regional council to be satisfied a permitted activity is not likely to have significant adverse effects on aquatic life. There are also specific measures for deposited sediment. These types of precise measures are likely to be easier to comply with.

Permitted activity standards relying on minimisation of effects suffer from similar problems. The word "*minimise*" is open to broad interpretation: whether it has been achieved is a value judgement, suggesting that it is not an appropriate permitted activity standard. A requirement simply to "*minimise*" impacts also risks non-compliance with the requirements of ss 30 and 70 of the RMA, as it does not install a clear, baseline level of acceptable effects. Instead, an activity can be considered compliant even if it has significant impacts (eg results in a significant amount of sediment entering a water body) provided the forester has done everything it can, within the confines of how it wants to run its operation, to "*reduce [sediment] to the smallest possible amount or degree*".[128]

On a plain reading of the permitted standard, minimisation of sediment entering water is only required if it will result in one of the specifically listed outcomes. For example, all soil disturbed by earthworks must be stabilised or contained to "*minimise*" sediment entering water and resulting in either diversion or damming of any water body, or damage to downstream infrastructure, property, or the receiving environment.[129] If sediment is not going to result in one of those outcomes, it appears it does not need to be contained. In contrast, disturbed soil generated from harvesting must be contained to "*minimise*" sediment entering water and resulting in the outcomes above *and* degradation of aquatic habitat, the riparian zone, and fresh or coastal water environments. There is no obvious justification for this difference. The deleterious effects of sediment are the same irrespective of the activity that has generated it.

Depositing material

Setbacks, uncertain and subjective wording, and an inability for councils to ensure locally nuanced controls are in place again rear their heads as high level issues with the NESPF's management of deposition of material.

Outside of avoiding deposition into a water body, the key permitted standard is avoiding deposition on land that would be covered by a 5% annual exceedance probability event. This report does not look at the adequacy of that percentage figure. What it does explore is whether this standard is sufficient on its own. It is probably not, especially for orange-zoned land. What the additional parameters should be is not clear and requires investigation. In some instances, for example on green- or yellow-zoned land, general storage setbacks from water bodies as an additional standard may be sufficient. However, in other areas, such as orange-zoned land, the management difficulties associated with gradient and soil may demand a case-by-case approach from the outset, which points towards a resource consent requirement.

Moving to deposition of spoil and excavated burden, both are subject to an additional permitted activity standard preventing placement "*onto land in circumstances that may result in [spoil/excavated burden] or sediment entering water*". Implementation would inevitably require a value judgement, which is not appropriate for a permitted activity standard (see the 'Structure and Language' section). Arguably, the adoption of such a standard indicates that site-specific controls are required for councils to be certain that effects are accounted for and appropriately managed.

Harvesting is also subject to a permitted standard that full suspension removal of logs is required over water bodies greater than 3m wide. This, in a similar vein to the setback provisions, ignores the importance of smaller streams. Practical limitations mean that full suspension over all water bodies is unrealistic. However, a case-by-case approach would allow for identification of highly sensitive locations, or key tributaries, and require full suspension over those sites. At present, this would theoretically be available in red-zoned land as a controlled activity condition. However, land around Aotearoa zoned as green, yellow or orange will all have water bodies smaller than 3m where a more careful approach may be justified. Management of harvested logs across or through wetlands is subject to additional control under the catch-all discharge and disturbance regulation, Regulation 97. Under Regulation 97(2) disturbance of a wetland is permitted only if the wetland is greater than 100m^2 and the associated activity is harvesting. Again, as discussed in relation to setbacks, this ignores the significant value of smaller wetlands, is inconsistent with their protection as a matter of national importance, and fails to give effect to the requirement in the NPSFM that the significant values of *all* wetlands, not wetlands of a certain size, are protected.

Freshwater management is extremely complex, as is the operation and management of a plantation forest. On top of this, the adverse freshwater impacts of plantation forestry are known and can be significant. This is not a situation that lends itself easily to a nationally applicable permitted activity management approach, especially when it comes to harvesting. It restricts the ability of councils to work with operators to develop appropriate harvesting and operational methods and put restrictions in place if necessary. Currently the situations where council involvement in harvesting will be triggered in respect of green-, yellow-, and orange-zoned land are limited. In green-zoned land, this might be acceptable but in some yellow-zoned land and for orange-zoned land there is still significant risk of water impacts due to the gradient and

soil associated with those areas. In addition, in red-zoned land that is not Class 8e harvesting is only a controlled activity. Although control is reserved over many matters (although an obvious gap is fauna habitat) a council's ability to install conditions is curtailed by the risk of being considered to have frustrated the consent.

Management plans

Management plans can be useful tools. However, their utility turns on the quality of the content and proper implementation and monitoring. Achievement of quality management plans under the NESPF faces two hurdles when it comes to managing effects on water.

First, the content requirements in Schedules 3 and 4 are incomplete. In some respects, important content is missing altogether, as not all forestry activities with effects on water are required to be included in a management plan. This means there is no complete picture of the impacts of an overall operation on water.

Second, there is no verification, feedback, or peer-review step of management plans by councils because their preparation is a permitted activity standard. Councils are unable to reject a plan or require changes to it where they consider it uses inappropriate methods. Review is simply a 'tick box' exercise to make sure the listed content is provided. This 'high trust' model of regulation is untested (see the 'Structure and Language' section).

Catch-all discharge, disturbance, diversion provision

Issues with this provision as it relates to wetlands have been addressed above.

A further issue is how disturbance is defined for the purposes of the regulation – which is to exclude vehicles using a ford to cross a wetted river bed at a rate of up to 20-axle movements per day. There are different views on the adequacy of this provision. On one hand, directing vehicle crossings to established fords is a good thing (provided the ford is well constructed) as this limits the extent of area impacted and the amount of sediment discharged. This is, of course, provided that the number of fords is limited, and their construction is directed away from sensitive areas. On the other hand, there appears to be no ecological or water quality justification for the 20-axle movement figure. In addition, the way in which the exception is framed – an exclusion to the meaning of disturbance – effectively creates a 'factual fiction'. It says that 20-axle crossings is not disturbance when it is. The courts have not looked favourably on factual fiction provisions relating to freshwater.[130]

Water-specific activities

Insofar as the permitted standards relating to river crossings and slash traps include setbacks, a "*reasonable mixing*" provision, a requirement to "*minimise*" effects, or water body or wetland minimum size, issues have been discussed above.

The two key issues in respect of river crossings are a failure to specify a maximum number of crossings, and a failure to require avoidance of crossings at ecologically sensitive locations.

The biggest issue with slash traps is not the adequacy or inadequacy of the permitted activity standards, but rather the NESPF's focus on them being the answer to controlling material mobilised during rainfall events. In many areas, in particular those with steeper gradients and soft soils, a slash trap is nothing more than an ambulance at the bottom of the cliff. They are a necessary component of slash management, but the focus on them is directing attention away from an issue at the heart of the forestry debate: that in some parts of Aotearoa, plantation forestry is located in environments that simply cannot cope with the pressures of harvesting. No control around placement of slash or number of slash traps is going to be sufficient to prevent significant amounts of debris being mobilised when it starts to rain heavily, especially in a clear-felled area. The simple response to this issue, which is unlikely to be palatable to operators, is not to clear-fell.

Stringency

There are multiple avenues available to councils to exercise increased stringency in relation to fresh and coastal water, which is a good thing. However, two issues stand out.

First, greater stringency is available in order to give effect to "*an objective developed to give effect to the National Policy Statement Freshwater Management*". For a council to include more stringent rules in reliance on this provision, it must have at least notified a plan change for the purpose of giving effect to the NPSFM, or have undertaken a full review of its plan and concluded its objectives[131] give effect to the NPSFM. Unfortunately, the freshwater planning process is not a fast one, and it is likely that a number of councils have not done either. In areas where that is the case, councils will be unable to rely on this provision to include more stringent rules. To make matters worse, it appears that some councils are carrying out the exercise of amending their plan to align with the NESPF, including the deletion of existing provisions (which does not require a full RMA Schedule 1 process), in advance of being ready to change their plan to implement the NPSFM. A simple solution to this issue is for greater stringency to be available in order to give effect to the NPSFM itself, as well as to an objective developed to give effect to the NPSFM.

Secondly, the potential evidential difficulties with successfully putting in place more stringent provisions have been discussed under previous sections. This issue is exacerbated in the fresh and coastal water context, because diffuse pollutants are a critical source of environmental degradation. Councils may face pushback on the basis of insufficient ability to attribute to forestry activities specific, and quantifiable, responsibility for a contaminant. This is most likely to occur in mixed-use catchments. However, even in the Marlborough Sounds where there has been extensive research undertaken that confirms forestry as a significant contributor to sediment

in the coastal marine area and freshwater tributaries, this issue is arising, with proceedings currently under way questioning the justification for the proposed Marlborough Environment Plan's more stringent rules.

RECOMMENDATIONS

Recommendations to address the issues raised above are:

- Determine whether the permitted activity approach (both in respect of individual activities and overall) gives effect to the NPSFM, in particular: staying within limits; integrated catchment management; protection of ecosystem health, wetlands, and outstanding water bodies.
- Change the activity status of harvesting in orange- and red-zoned land to provide for regulatory oversight.[132] Review the activity status of harvesting in green- and yellow-zoned land, taking into account the issues identified by this report.
- Recognise that generous setbacks need to apply from the point of afforestation and replanting, because it is difficult to impose greater setbacks at a later stage.
- Review the NESPF's setback distances and reset at the appropriate distance to protect freshwater quality and the riparian zone, also accounting for the destruction to the setback as a result of undertaking the relevant activity.
- Review the coastal setback distances to ensure adequacy, and amend to increase if required.
- Review the areas to which the NESPF's setbacks apply, and amend to capture missing areas, (eg all wetlands) and ensure consistency in the water bodies to which setbacks apply across all activities.
- Review mixing and minimisation standards to determine whether a specific, measurable standard can be substituted. If it can, make appropriate amendments. If not, investigate and include the most appropriate alternative activity status.
- Investigate what additional placement and storage provisions are required to apply to deposited material. In doing so, consider whether different provisions should apply to different zones. If it is not possible to develop clear, measurable standards, investigate and include the most appropriate alternative activity status.
- Investigate additional provisions relating to suspension requirements over sensitive areas or water bodies, including wetlands. If it is not possible to develop clear, measurable standards, investigate and include the most appropriate alternative activity status.
- Investigate and report on the ecological and legal justification for adopting an exception to 'disturbance' for 20-axle movements at a ford per day. Make any necessary changes to respond to findings.
- Amend Regulation 6 to allow for more stringent rules in plans to:
  - Give effect to the NPSFM itself, as well as to objectives developed to give effect to the NPSFM
  - Expressly refer to the ability to include rules to control diffuse pollutants, to which plantation forestry contributes, when introducing more stringent rules to give effect to the NPSFM or Policy 22 of the NZCPS
- Include alignment of the NESPF with updated or newly introduced national freshwater policy (eg an updated NPSFM or a new, freshwater-focused NES) in the government's review of the NESPF. If any updated or newly introduced national freshwater policy is released after the government's NESPF review is completed, undertake a freshwater alignment review of the NESPF (for efficiency this could be undertaken in tandem with a NPS for Indigenous Biodiversity alignment review).

Para Wetland

Ōpotiki District

7 Erosion

THE CURRENT NESPF: WHAT DOES IT SAY?

The ESC is a risk-screening tool, developed by MPI for the NESPF. The tool combines climatic data with the New Zealand Land Resource Inventory and the land use capability (LUC) rating. The ESC determines the risk of erosion on land across Aotearoa based on its environmental characteristics. These characteristics include rock type, topography (steepness of the slope), and dominant erosion process (such as wind or water).

The ESC classifies land into four categories of erosion susceptibility according to the level of risk: low (green), moderate (yellow), high (orange), and very high (red). The ESC is used to classify Aotearoa into zones that align with these levels of risk, each of which have different restrictions under the NESPF. These zones are:

- Green- and yellow-zoned land:
  - Less likely to erode
  - Plantation forestry activities are permitted.
- Orange-zoned land:
  - More likely to erode
  - Plantation forestry activities are permitted, with some greater stringency for orange-zoned land with a slope of 25 degrees or more.[133] The NESPF's most relevant requirement is that a forestry earthworks management plan must accompany the harvest plan.[134]
- Red-zoned land:
  - Most likely to erode
  - Most plantation forestry activities cannot be carried out on red-zoned land without resource consent.
  - As per orange-zoned land, a forestry earthworks management plan must accompany the harvest plan.
  - There are exemptions to controls on red-zoned land for plantation forestry which is harvested under continuous cover forestry (where a minimum of 75% canopy cover is maintained) or small coupe harvesting (where no more than 2ha is clear-felled in any 3 month period).

DOES IT WORK?

There are two major issues in this section.

First, regarding erosion-prone land, is the NESPF facilitating the right tree, in the right place, for the right purpose?

Secondly, are the consent requirements for red-zoned land sufficient, or should these requirements be extended to orange-zoned land or even yellow-zoned land?

These issues are addressed in turn.

There is significant literature to support the benefits of woody vegetation cover for reducing localised surface erosion and mass-movement processes.[135] One research project found that afforestation of whole catchments can reduce loads of sediment into water bodies by as much as 90%.[136] On the face of that statistic it would be reasonable to conclude that plantation forestry should be encouraged on red-zoned land, which is arguably not the effect of the NESPF's requirement for resource consent for replanting and harvesting in those areas.

The problem is that it's not that simple, because the erosion-control benefits of plantation forests are short lived, lasting only as long as the trees are in the ground. On extraction that benefit is gone, and the bare face that remains can itself result in significant amounts of sediment ending up in sensitive receiving environments. This issue is particularly acute in respect of forestry operations which undertake extraction by clear-felling, the typical method in Aotearoa. This opens the 'window of vulnerability' – the period of time before the roots of new trees replace the rotting roots from the previous rotation. During this time, land is vulnerable to landslides, which may in turn mobilise slash, debris and sediment to be deposited into fresh or coastal water. The predominance of *Pinus radiata* in clear-felling systems is associated with a larger window of

vulnerability due to its rapidly rotting roots. Species such as beech, blackwood, cedar, cypress, eucalyptus, kauri, poplar, redwood, and totara have much slower root decay rates, thereby providing soil stability and land resilience for longer after harvesting (if they are harvested at all).[137]

Against that background, the right tree, in the right place in red-zoned land, is clearly a tree that stays put or one that is extracted while others remain to provide continued soil stability (ie continuous cover forestry).

To be consistent with that outcome, the NESPF and the wider forestry system need to disincentivise clear-fell forestry in red-zoned areas, and incentivise permanent or continuous cover forestry in red-zoned areas. Insofar as the NESPF's requirement for resource consent for replanting and harvesting in red-zoned land is a disincentive for clear-fell forestry, it is consistent with that outcome. However, although a restricted discretionary resource consent requirement may be a disincentive, it does not send a clear message that clear-fell harvesting in these areas is generally not acceptable. Permitted status for "*long-term ecological restoration planting of forest species*" or "*willows and poplars space planted for soil conversation purposes*"[138,139] and the NESPF's more lenient approach to continuous cover forestry are also consistent with the outcome sought. However, a question remains as to whether continuous cover forestry would be adopted in practice, notwithstanding a more lenient activity status. This is because in Aotearoa, unlike in Europe, the economic viability of continuous cover forestry systems is not clear. Economic viability depends on a host of factors which fall beyond the scope of the NESPF including forest revenue streams, subsidies, knowledge extension, and landowner aspirations. These factors may be beyond the scope of the NESPF, but they are critical issues that need to be addressed if we are to transition to more sustainable forestry methods. When it comes to establishing permanent forests, ensuring the One Billion Trees Programme's criteria are calibrated to favour red-zoned areas is critical.

If these two things don't happen, there is a real risk that red-zoned land will remain bare, or continue to rotate through a cycle of cover and stability to sediment loss, both of which are environmentally suboptimal.

The second major issue is whether the NESPF is too permissive in its treatment of orange-zoned land. Orange-zoned land is classed as 'high' erosion risk because it includes a number of LUC units that are highly vulnerable to erosion. Given that extreme weather events are increasingly likely because of climate change, the risk of erosion is also increasing. By permitting afforestation, harvesting, and replanting of plantation forest on orange-zoned land, especially when the intention is to clear-fell, there is a question as to whether the NESPF is consistent with s 43A(3)(b) of the RMA, which does not allow a NES to state that an activity is permitted if it has "*significant adverse effects on the environment*". It is likely that a resource consent requirement in order to assess the acceptability of both location and harvesting method is more appropriate, with more lenient provision made for continuous cover and small coupe harvesting as is currently the case under the NESPF for red-zoned land.

However, the same conundrum arises with this issue as with the first. The best outcome for orange-zoned land is for it to be forested. But the question is: in what sort of forest? In some orange-zoned areas plantation forestry that adopts current, typical methods will be acceptable and in others it will not. A resource consent requirement on orange-zoned land may discourage plantation forestry in those areas, which isn't necessarily a bad thing if the wider environment is sensitive to the period of intensive sediment loss that will likely follow harvesting. However, there needs to be something to fill the gap, so the land does not remain bare. Again, continuous cover forestry or permanent forest is that something. Unless there is an adequate enabling environment for establishing continuous cover or permanent forestry in place, there is a risk that orange-zoned land will remain bare by default.

In short, the NESPF cannot be seen in isolation from the wider context that it operates in, and relevant agencies need to put in place appropriate enabling mechanisms to facilitate outcomes that deliver maximum public value.

A subsidiary issue relates to the fidelity and granularity of the ESC: "*The ESC is recognised as having limitations related to: the underlying data it was derived from; the scale of mapping; and probable misclassification of some land.*"[140] This is inevitable for broad-brush zoning. It may result in restricting activities on sites where the risk of environmental damage is low or permitting activities on sites where the risk of environmental damage is high. Reliance on the ESC is therefore arguably at odds with the site-specific considerations that might result in the optimal balance between environmental and financial sustainability by enabling integrated land use management that is attuned to the capacities of the landscape.

RECOMMENDATIONS

Recommendations to address the issues raised above are:

- Change the activity status for clear-fell harvesting in all red-zoned areas to non-complying. Provide for continuous cover forestry either as a permitted or controlled activity depending on the control considered necessary to address effects other than erosion.
- Change the activity status for clear-fell harvesting in all orange-zoned areas to restricted discretionary at a minimum. Provide for continuous cover forestry as a permitted or controlled activity depending on the control considered necessary to address effects other than erosion.
- Initiate a programme for the purpose of developing policy and other necessary mechanisms (eg upskilling and education) to facilitate a transition to more sustainable forestry methods, like continuous cover forestry.
- Review the One Billion Tree Programme criteria to ensure they operate to favour permanent, indigenous forest on red-zoned land.

Pelorus Sound

8 Wilding conifers

THE CURRENT NESPF: WHAT DOES IT SAY?

The NESPF includes provisions to address wilding conifer risk at the point of afforestation, when replanting with different species, and through provisions requiring removal of wilding conifers in specified situations.

The NESPF relies on establishing wilding conifer risk by using a risk calculator: the Wilding Conifer Calculator (WCC). Afforestation of a conifer species may not be carried out as a permitted activity in an area with a WCC score of 12 or more. A score of 12 or more means that afforestation requires consent as a restricted discretionary activity.[141]

Conditions on afforestation also require that all wilding conifers must be removed at least every 5 years after afforestation where established in wetlands or SNAs on the same property on which the afforestation activity occurs, and on any other adjacent properties under the same ownership or management as that of the property on which the afforestation activity occurs.[142]

Upon replanting, a resource consent is required if replanting with a different conifer species; in an area with a WCC score of 12 or more; and where the previous plantation had a lower risk calculator score.

Wilding conifers that have established in wetlands and SNAs must be eradicated before replanting begins if the wilding conifer has resulted from the previous harvest, or at least every 5 years after replanting if the wilding conifer has resulted from the replanting.[143]

Where resource consent is required for afforestation or replanting due to wilding conifer standards not being met, the council's discretion is limited to the level of wilding conifer risk; the mitigation proposed to restrict wilding conifer spread, including the species to be planted; effects on the values of SNAs or ONLs (where relevant); and information and monitoring requirements.[144]

A council could adopt more stringent plan provisions in relation to wilding conifers where this is related to protection of SNAs or ONLs.[145]

DOES IT WORK?

The key issues are that:

- The WCC is a 'high trust' tool which relies on the adequacy of the assessment.
- Controls may not be sufficiently stringent to minimise wilding conifer risk.
- The NESPF externalises much of the cost of wilding conifer control.

High trust tool reliant on adequacy of assessment

A WCC score is generated by a "*suitably competent person*" on behalf of the forestry company. This includes a person with silviculture experience.[146] There is no express requirement for the assessment to be carried out on site. Compliance with the NESPF rules is achieved by submitting a calculator score of less than 12. Councils have no discretion as to whether they accept an assessment, even if they disagree with it. There appears to be some concern about the quality of the assessments received so far.

While a calculator approach might be appropriate where the assessment is quantitative and objective, there are various subjective, qualitative aspects to the WCC that can change assessment scores significantly (eg where within a forestry block the "*siting*" assessment is carried out or the extent to which land is identified as "*downwind*").

Wilding conifer risk management is therefore an aspect of the NESPF that represents a 'high trust' model with little scope for independent regulatory oversight.

Controls may not be sufficiently stringent

The WCC takes into account species growth, species palatability (susceptibility to browsing by livestock), siting (topographical position relative to prevailing wind direction), downwind land use, and downwind vegetation cover before generating a binary permitted or consented outcome. The requirement for resource consent is set at the point at which there is 'high risk' of wilding conifer spread (ie a score of 12 or more).

The WCC should more accurately be viewed as representing a risk spectrum. A score of 12 or more represents 'high risk', a score of 10 or 11 indicates a relatively high risk; yet any score less than 12 means afforestation can occur as a permitted activity. Activities with a relatively high risk of causing significant economic and environmental effects on surrounding land would not normally be classified as permitted under the RMA.

A score of 0 in relation to the downwind land use (intensive grazing on developed pasture) or downwind vegetation cover (plantation forest or intensively grazed pasture) criterion means that the total score becomes 0 regardless of the score for other criteria. This potentially converts a moderate to high risk afforestation activity (eg Douglas fir afforestation in Marlborough) into a deemed low risk permitted activity. This means that the risk assessment is greatly influenced by those two criteria, even though the downwind land may be in different ownership, and the land use or vegetation cover could well change over the life of the initial and subsequent plantation forest rotations. This suggests that the WCC does not accurately reflect the risk of wilding conifer spread.

With respect to replanting, the NESPF is less stringent again. Consent is only required where there is a change of species; a WCC score of more than 12; *and* the previous crop did not have a higher risk score. The last clause applies even where the previous crop required resource consent due to wilding conifer risk. This means a high risk species like Douglas fir planted in the wrong area could be replanted there as a permitted activity (even if the previous crop had required resource consent). If the previous crop had resulted in wilding conifer spread, allowing the same activity to continue does not avoid, remedy, or mitigate adverse effects. This approach provides for the continuation and exacerbation over time of an activity with known adverse environmental effects that extend outside the property boundary, which simply makes no sense. Replanting high risk species should not be an expectation.

The guidance specifies that even with a total score of 0 a small risk of unwanted spread cannot be fully excluded. However, those are not requirements under the NESPF. The Forest Owners Association has said that forest owners undertake a range of measures to control wilding conifer risk, including planting buffer trees with a lower seed spread risk, such as *Pinus attenuata* or hybrid *radiata*, around the edge of plantations.[147] These measures are not requirements of the NESPF (although they could potentially be required for 'high risk' afforestation under a resource consent).

NESPF controls are not adequate to deal with wilding conifers that have established on properties other than that of the forest owner. For afforestation, the permitted activity requirement to control established wilding conifers is limited to SNAs, wetlands, and to the forest owner's land. The impacts of wilding conifers on biodiversity justify a stringent approach to wilding conifer removal in SNAs and wetlands, but it is not clear why removal of all wilding conifers is not required given the risk they pose to other environmental and economic values. The restriction of this provision to the forester's own land is understandable given the difficulty in requiring people to undertake activities on other people's land as part of a permitted activity framework. However, this could be addressed by requiring written approval from neighbouring landowners or consent conditions, which would allow for a discussion with neighbours on agreed conditions addressing their land.

Upon replanting, a similar restriction to SNAs and wetlands applies, but the provision does not appear to be restricted to the forester's land. It is not clear whether this is intentional.

Overall, the NESPF's provisions are inadequate to manage the significant environmental, cultural, and economic risks posed by wilding conifers.

Externalisation of cost

In a recent report based on surveys of landowners affected by wilding conifers, according to the participants the wilding conifers had come mainly from other properties, with 26% blamed on nearby commercial forestry. Eight per cent said wilding conifers were from their own forest and 4% said wildings were due to historic plantings by the government. There was a shift in attitudes about who should bear the cost of dealing with wilding conifers: in 2015 more respondents considered controlling wilding conifers should fall to the owner of the property from which the seeds came. By 2017 more people thought the government should take over. This potentially reflects the growing magnitude of the problem.

The New Zealand Wilding Conifer Management Strategy 2015–2030 and regional programmes like the Marlborough Sounds Restoration Trust are considered to be achieving good outcomes, but they require a huge amount of volunteer effort and public funding alongside forestry industry contributions.

While some spread of wilding conifers results from legacy state forestry service or shelterbelt issues, the costs associated with spread from plantation forestry should be borne by forestry companies.

RECOMMENDATIONS

Recommendations to address the issues raised above are:

- Introduce a zoning or spatial planning approach that enables councils in moderate to high wilding conifer risk areas to require consent for afforestation or replanting in order to retain the discretion to assess wilding conifer risk and either decline consent or impose appropriate conditions. There is plenty of information about where the vulnerable areas are, and a consent process should apply in these areas.
- Reassess the WCC to ensure that it does not place undue reliance on neighbouring land cover and land use in assessing wilding conifer risk.
- Make changes to the replanting regulations so that they do not perpetuate previous high wilding conifer risk scenarios.
- Introduce permitted activity conditions requiring foresters to demonstrate that they have approached all landowners within the receiving environment of their plantation forest and that they have offered to undertake wilding conifer removal on those properties. If this offer has been accepted, the site should be incorporated into a wilding conifer management plan specifying appropriate objectives and actions to ensure wilding conifer removal will be undertaken.

Queen Charlotte Sound

9 Landscape and natural character

THE CURRENT NESPF: WHAT DOES IT SAY?

Landscape

Explicit provision for landscape in the NESPF is focused on two landscape categories: ONLs and visual amenity landscapes. Provision is further limited to only those ONLs and visual amenity landscapes that:[148]

- Are identified in a regional policy statement, regional plan, or district plan as outstanding or as having visual amenity values, however described
- Are identified in the policy statement or plan by their location, including by mapping, a schedule, or a description

When it comes to management and consideration of potential effects on landscape, the NESPF draws a clear distinction between establishment of plantation forestry and the undertaking of activities as part of the operation of a plantation forest.

Afforestation is subject to a permitted activity standard that it must not occur within an ONL. Inability to comply with that condition results in a restricted discretionary resource consent requirement. Discretion is restricted to "*the effects on the values of ... the outstanding natural feature or landscape*".[149]

No other activity covered by the NESPF and undertaken as part of operating a plantation forest is subject to a permitted activity standard specifically relating to potential impacts on ONLs.

Councils are able to include more stringent rules to address impacts on ONLs under Regulation 6. This regulation provides for a rule in a plan to be more stringent than the NESPF if it "*recognises and provides for the protection of outstanding natural features and landscapes from inappropriate use and development*", or if it gives effect to Policy 15 of the NZCPS (which requires the avoidance of adverse effects on ONLs in the coastal environment and the avoidance of significant adverse effects on all other coastal landscapes).

A measure of vicarious protection is arguably provided via permitted activity standards relating to water bodies (see the 'Fresh and Coastal Water' section), as water bodies or the presence of water are often values contributing to classification as an ONL.

Afforestation is also not permitted within a visual amenity landscape (as defined by Regulation 3). Inability to comply results in a controlled activity resource consent requirement *if* the relevant plan identifies plantation forestry activities as restricted in visual amenity landscapes. Control is restricted to effects on the visual amenity values of the landscape.[150] There is no ability for plans to be more stringent than the NESPF.

There is some consideration of effects on amenity in a more general sense via permitted activity standards requiring afforestation and forestry quarrying to be set back specified distances from a dwelling(s).[151]

Natural character

Areas of identified natural character value (eg areas of outstanding natural character) are not referred to by the NESPF.

Ability to address effects on the natural character of the coastal environment is available under Regulation 6 and includes the ability for plans to include rules that are more stringent than the NESPF to give effect to Policy 13 of the NZCPS. It is also addressed to a limited extent via controls on activities occurring within 30m of the coastal marine area.

The ability to address effects on natural character of water bodies and wetlands is covered to some extent by permitted activity standards relating to those areas, although natural character is generally not itself specifically the focus of those provisions (see the 'Fresh and Coastal Water' section). Where resource consent is required, impacts on natural character are only relevant if referred to in the matters over which control or discretion has been reserved.

DOES IT WORK?

There are four high level issues with the NESPF's approach to landscape and natural character.

First, the definitions of ONL and visual amenity landscape mean that these landscapes must be specifically identified in a policy statement or plan in order to fall within the NESPF's ambit. This means that unless a council has gone through an identification exercise and incorporated this into its policy statement or plan, there is no ability for it to control afforestation or adopt more stringent rules for landscape protection purposes. There is no ability to rely on identification via criteria which allow for a case-by-case assessment, as there is for SNAs.[152]

The extent to which this is an issue in practice depends on the extent to which these landscapes have been identified in policy statements or plans, and the quality of that identification process. On a cursory review many district plans had identified ONLs via mapping or description,[153] but there are important exceptions, such as Tasman (which includes Golden Bay) and Wellington, meaning there are many ONLs not protected. Conversely, although many district plans have discussed the importance of amenity to different zones or locations, they have not specifically identified visual amenity landscapes.[154]

There is additional scope for control in the coastal environment due to the ability for increased stringency in order to give effect to Policy 15 of the NZCPS. However, an attempt to introduce more stringent provisions to address coastal landscape effects in a more general sense (without a focus on formally identified areas) may be met with opposition given that the protection of identified areas is the approach of the NESPF's provisions specific to ONLs and visual amenity landscapes. It is also likely to be more difficult to prove that increased stringency is required as the size and generality of the area subject to control increases from, for example, a specific ONL to an entire coastline.

Secondly, controlled activity status for afforestation proposed in a visual amenity landscape does not give councils any real ability to control effects on those landscapes. This is because, as a controlled activity, resource consent must be granted.[155] Although councils have the ability to impose conditions in respect of matters over which control is reserved, those conditions cannot be so onerous so as to frustrate (effectively negate) the consent. Because there is no ability for councils to adopt more stringent provisions to control impacts on visual amenity landscapes, afforestation in these areas cannot be avoided and councils are restricted to 'tinkering around the edges' in an effort to try and ameliorate effects.

Thirdly, there is no ability to control the effects of plantation forestry adjacent to visual amenity landscapes. This issue extends past afforestation to control and management of operational activities. Controlling the effects of plantation forestry adjacent to an ONL is theoretically available via the increased stringency provisions.

The lack of value placed on visual amenity landscapes is a significant gap. These landscapes are generally identified due to their significance to local communities, forming an important part of their background and heritage. They are the landscapes that New Zealanders "*commonly inhabit, work in, and travel through*".[156] As a result, their protection is important. Plantation forestry comes with significant visual impacts, but also other impacts on amenity such as reduced access, noise, and traffic.

Fourthly, the NESPF does not directly control the effects of plantation forestry on the natural character of the coastal environment. Although there is flexibility for councils to adopt more stringent provisions for this purpose, it places the onus back on councils to develop and pursue appropriate controls, and justify when greater stringency is warranted. This, as discussed, is likely to have its challenges. There is no clear reason why natural character has been treated differently to landscape given the trend in identification of outstanding and high natural character areas, and the equally strong direction in the RMA and NZCPS regarding their preservation.

RECOMMENDATIONS

Recommendations to address the issues raised above are:

- Alongside the matters already included in Regulation 6, provide councils with the flexibility to apply greater stringency to:
  - Protect landscapes and natural character when specific landscape or natural character areas have not been identified in regional policy statements and plans
  - Protect visual amenity landscapes
- Include amendment of the definition of ONLs to capture situations where they have not been identified in a plan but rather are identified by case-by-case application of criteria (as per the approach to SNAs) as an issue to be considered in the NESPF review.
- Amend the activity status for afforestation proposed to occur in a visual amenity landscape from controlled to an activity status which provides councils with the ability to decline consent.
- Develop and incorporate provisions, or amend existing provisions, to control effects on landscape and natural character from adjacent plantation forestry.
- Insert analogous provisions for natural character areas as included for ONLs and visual amenity landscapes (as recommended to be amended).
- Undertake a review of other amenity effects associated with plantation forestry. For effects intended to fall outside scope of the NESPF, consider whether that should be expressly stated in the NESPF. For effects intended to fall within scope of the NESPF, consider adoption of additional controls as necessary to manage those effects. Amend the NESPF as required.

Picton

10 Structure and language

THE CURRENT NESPF: WHAT DOES IT SAY?

Some matters are outside the scope of the NESPF. Expressly excluded are "*vegetation clearance that is carried out before afforestation*" and "*any activities or general provisions and conditions not specified in regulation 5(1)*".[157] Councils may also continue to control activities and effects not covered by the NESPF (see the 'The Current NESPF: A General Outline' section).

Many of the activities controlled by the NESPF are permitted, subject to compliance with standards. The NESPF thus places a great deal of reliance on these standards (in terms of their effectiveness, clarity, and enforceability), and on forestry operators' compliance with them, including compliance with requirements to submit management plans for certain activities.

MPI has developed guidance to assist with the implementation of the NESPF.

DOES IT WORK?

There is likely to be uncertainty while the NESPF is being implemented as to whether it controls particular effects or not. Examples of effects that are not controlled by the NESPF are transport effects, effects on water yield, and effects on cultural values; but this is only apparent from the lack of provisions to address these matters in the NESPF and from reading the background documents. Recourse to background documents such as evaluation reports and submission summaries will be required in order to determine whether a matter is within the scope of the NESPF or not. This is not particularly satisfactory in the context of regulations.

In an attempt to provide for most aspects of plantation forestry as permitted activities, the NESPF strains the ability of the permitted activity framework to adequately deal with the matters it intends to control.

Jurisprudence directs that qualifying standards for permitted activities must be clearly specified and capable of objective attainment.[158] Some of the permitted activity standards within the NESPF do not appear to meet the legal standard of certainty required. For example, sediment from forestry activities has significant cumulative impacts on receiving freshwater and marine environments. In relation to this potential effect, the relevant NESPF provision for earthworks says:

> *26 Permitted activity conditions: sediment*
>
> *Sediment originating from earthworks must be managed to ensure that after reasonable mixing it does not give rise to any of the following effects on receiving waters:*
>
> *(a) any conspicuous change in colour or visual clarity:*
>
> *(b) the rendering of fresh water unsuitable for consumption by farm animals:*
>
> *(c) any significant adverse effect on aquatic life.*

"*Reasonable mixing*" is not defined. What constitutes a "*significant adverse effect on aquatic life*" entails a degree of judgement that makes the standard incapable of objective interpretation. Issues with this standard and others that are similar are further addressed in the 'Fresh and Coastal Water' section.

Other provisions have limited enforceability, as regulators cannot practicably identify non-compliance. For example, fords across rivers are a permitted activity, subject to standards including that:

> *(b) use of the ford must not cause a conspicuous change in colour or visual clarity beyond a 100 m mixing zone downstream of the ford for more than 30 consecutive minutes after use of the ford...*

This standard acknowledges the adverse impacts of turbidity on aquatic ecosystems that can occur when fords are used for regular river crossings. However, the permitted activity framework for fords does not provide for the risk of river crossings to be assessed and

outcome-focused conditions to be imposed. In place of such an assessment, this practically unenforceable standard has been used. It is unlikely to be effective in controlling the turbidity effects it is aimed at controlling.

The NESPF aims to be consistent with ss 6(a) and (c) of the RMA by specifying that most forestry activities may not occur as a permitted activity or must be set back from ONLs and SNAs. However, many districts and regions have not identified ONLs or SNAs.[159] The NESPF deals with this in relation to SNAs by defining those terms to include areas that meet criteria in a regional policy statement or plan (areas do not need to be mapped as SNA to be considered as such), but the issue remains for ONLs. While this is an improvement on the notified NESPF, which was limited to mapped SNAs, it still provides for a framework where forestry activities are permitted unless the forestry operator identifies that an area meets regional policy statement or plan criteria as an SNA. An example of where this does not appear to have worked effectively is afforestation within South Marlborough shrubland that is identified as meeting SNA criteria but is not mapped as such within the plan.

Several plantation forestry activities are permitted subject to the forestry operator submitting a management plan to the relevant local authority.[160] Because permitted activity rules cannot reserve discretion to the council to approve or decline plans,[161] compliance with the regulations is achieved simply by submitting the plan. The plan requirements are topic-focused rather than outcome-focused. For example, the forestry earthworks management plan must:

> *(d) describe clearly the management practices that will be used to avoid, remedy, or mitigate risks due to forestry earthworks that have been identified on the map, including the proposed erosion and sediment control measures to be used and the situations in which they will be used, in sufficient detail to enable site audit of the management practices to be carried out:*
>
> *(e) include the following for earthworks management:*
>
> *(i) water run-off control measures:*
>
> *(ii) sediment control measures during construction and during harvest:*
>
> *(iii) the method used to manage excess fill for large-scale cut and fill operations, and if end haul, the proposed disposal location:*
>
> *(iv) methods used to stabilise batters, side cast, and cut and fill:*
>
> *(v) post-harvest remedial work (timing and methods).*

Provided those matters are addressed in the plan, it must be accepted. There is no verification, feedback, or peer-review step. Councils are unable to reject a plan or require changes to it where they consider the plan uses inappropriate methods or is inadequate for some other reason. The same issue arises in respect of the WCC (see the 'Wilding Conifers' section). Compliance monitoring is limited to whether the plan's provisions are implemented, rather than whether mitigation activities are appropriate, or environmental outcomes acceptable.

There is a risk that plan content is 'cut and pasted' from other sites and operations rather than being site-specific.

The unverified management plan approach assumes that forestry operators will submit management plans that are high quality, and which adequately address the environmental risks that they are intended to manage. That assumption is untested, and this 'high trust' model of regulation is unlikely to be warranted across the board.

Hunua

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INTERVIEWS

In writing this report the authors spoke with experts, council representatives, industry representatives, consultants, and mana whenua. The input of everyone spoken with was invaluable and very much appreciated. Interviewees are not quoted nor referenced by name.

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ENDNOTES

1 Reg 2, NESPF

2 For example, the 2017/2016 forestry compliance review undertaken by Marlborough District Council found 50% non-compliance and 20% serious non-compliance, making a total of 70% non-compliance. See Marlborough District Council, 2018.

3 MPI, 2017b, 12

4 New Zealand Forest Owners Association, 2017

5 New Zealand Forest Owners Association, 2017

6 New Zealand Forest Owners Association, 2017

7 Dyck W J, 1997, 6–9

8 Pawson S M et al, 2010

9 New Zealand Freshwater Sciences Society, Submission on the NESPF.

10 It also does not set out the relationship between NPSs and NESs.

11 ss 43, 44A RMA

12 s 43(1)(a)–(c) RMA

13 s 43(2) RMA

14 s 43A RMA

15 s 43A(3) RMA

16 s 44A(2) RMA. The same applies to bylaws: s 43E RMA. Designations are treated differently. A designation prevails over a NES until either it lapses or one (or more) of its conditions to which the NES is relevant is altered. A NES also prevails over an existing designation if, when the NES is made, there is no outline plan for the designation: s 43D.

17 s 43A(4) RMA

18 That is, if it is classified as controlled, restricted discretionary, discretionary, or non-complying.

19 That is, a regional or district plan could not simply install a controlled, restricted discretionary, discretionary, or non-complying consent requirement. It could include a permitted standard specifying, for example, that the activity must not occur in a specific area, with failure to comply resulting in a consent requirement.

20 s 5 RMA

21 *Environmental Defence Society Inc v New Zealand King Salmon Company Ltd* [2014] NZSC 38 at [85]

22 Being the part setting out the RMA's purpose and principles.

23 MPI, 2016, 3

24 Reg 5

25 Reg 3 definition: "*(a) means planting and growing plantation forestry trees on land where there is no plantation forestry and where plantation forestry harvesting has not occurred within the last 5 years; but (b) does not include vegetation clearance from the land before planting.*"

26 Reg 3 definition: "*means pruning plantation forest trees and thinning to waste involving the selective felling of plantation forest trees within a stand where the felled trees remain on site.*"

27 Reg 3 definition: "*(a) means disturbance of the surface of the land by the movement, deposition, or removal of earth (or any other matter constituting the land, such as soil, clay, sand, or rock) in relation to plantation forestry; and (b) includes the construction of forestry roads, forestry tracks, landings and river crossing approaches, cut and fill operations, maintenance and upgrade of existing earthworks, and forestry road widening and realignment; but (c) does not include soil disturbance by machinery passes, forestry quarrying, or mechanical land preparation.*"

28 Reg 3 definition: "*(a) means a structure that is required for the operation of a plantation forest and provides for vehicles or machinery to cross over a water body; and (b) includes an apron and other structures and materials necessary to complete a river crossing; but (c) does not include a stormwater culvert or a culvert under a forestry road or forestry track.*"

29 Reg 3 definition: "*(a) means the extraction of rock, sand, or gravel for the formation of forestry roads and construction of other plantation forestry infrastructure, including landings, river crossing approaches, abutments, and forestry tracks,—(i) within a plantation forest; or (ii) required for the operation of a plantation forest on adjacent land owned or managed by the owner of the plantation forest; and (b) includes the extraction of alluvial gravels outside the bed of a river, extraction of minerals from borrow pits, and the processing and stockpiling of material at the forest quarry site; but (c) does not include earthworks, mechanical land preparation, or gravel extraction from the bed of a river, lake, or other water body.*"

30 Reg 3 definition: "*(a) means felling trees, extracting trees, thinning tree stems and extraction for sale or use (production thinning), processing trees into logs, or loading logs onto trucks for delivery to processing plants; but (b) does not include— (i) milling activities or processing of timber; or (ii) clearance of vegetation that is not plantation forest trees.*"

31 Reg 3 definition: "*(a) means using machinery to prepare land for replanting trees, including root-raking, discing, ripping, roller crushing, clearing slash, and mounding the soil into raised areas; but (b) does not include— (i) the creation of alternating drains and planting mounds using a V-shaped blade attached to the front of a bulldozer; or (ii) earthworks or forestry quarrying.*"

32 Reg 3 definition: "*means the planting and growing of plantation forestry trees on land less than 5 years after plantation forestry harvesting has occurred.*"

33 Reg 6

34 MPI, 2017b, 8

35 Reg 3

36 Regs 14, 54

37 Regs 17, 61

38 MPI, 2017b, 88

39 MPI, 2017b, 88; 2017a, 4.10.1

40 See Section AA, NPSFM

41 See Appendix 1, NPSFM

42 See Appendix 1, NPSFM

43 See Policy 15(c)(viii), NZCPS

44 The two other main types of abatement are reducing domestic emissions and international purchasing of emission reductions.

45 Office of the Minister for Climate Change, 2018

46 Regs 8–17, 62–71, 76–81

47 Ministry for the Environment, 2010, vii

48 Of course, as discussed elsewhere in this report, the resource consent process can protect environmental values that are ignored by a narrow alignment analysis.

49 Reg 3

50 See Forestry Reference Group, 2018

51 Ministry for the Environment, 2010, vii

52 Te Uru Rākau–Forestry New Zealand, 2019

53 Lindenmayer D B et al, 2012

54 Pinkard L, 2010

55 Reg 5(3)

56 Reg 3

57 Reg 3

58 Reg 3

59 Regs 12, 14, 16

60 Regs 30, 55

61 Reg 43

62 Reg 78

63 Schedule 4

64 These are required for earthworks involving more than 500m² of soil disturbance in any 3 month period.

65 Schedule 3, Clause 3(3)

66 Reg 27(2)

67 Reg 55

68 Reg 59

69 North Island brown kiwi, Eastern falcon, Bush falcon, North Island weka, and any indigenous bird species classified as Nationally Critical, Nationally Endangered, or Nationally Vulnerable.

70 Reg 102

71 Reg 3

72 Reg 40

73 Reg 91

74 Reg 6

75 *Director-General of Conservation v Invercargill City Council* [2018] NZEnvC 175 at [36]

76 Reg 93

77 Specific examples include long-tailed bats roosting at Waiotapu in Kaingaroa Forest, and a population of Hochstetter's frogs inhabiting an area within plantation forest in Rodney District, Northland. Other species known to use plantation forest include various skink and gecko species and many invertebrates including *Powelliphanta* snails and peripatus.

78 At Iwitahi (Kaingaroa Forest) 36 species of native orchids grow within an area of plantation forestry.

79 Scion, 2015

80 The example of the Eyrewell beetle (only 10 individuals ever found, the 5 most recent findings from a Canterbury plantation forest) was described recently; see Hancock, F, 2018a

81 FSC, 2013, Indicator 6.24

82 Indicator 6.2.12

83 Indicator 6.2.13

84 Indicators 6.2.14 and 6.2.15

85 Criterion 10.5

86 Peterson P and E Hayman, 2008

87 Ministry for the Environment and Statistics New Zealand, 2015

88 Gillespie P, 2007

89 Reg 3

90 Reg 14(3)

91 Reg 3 definition: "*means a river that is a continually or intermittently flowing body of freshwater, if the intermittent flows provide habitats for the continuation of the aquatic ecosystem.*"

92 Reg 68

93 Reg 74

94 Reg 78

95 Significant natural areas are subject to a permitted activity control relating to deposition, which is addressed below.

96 Reg 29

97 Reg 54

98 s 70(1) RMA: "*Before a regional council includes in a regional plan a rule that allows as a permitted activity—*

(a) a discharge of a contaminant or water into water; or

(b) a discharge of a contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water,—

the regional council shall be satisfied that none of the following effects are likely to arise in the receiving waters, after reasonable mixing, as a result of the discharge of the contaminant (either by itself or in combination with the same, similar, or other contaminants):

(c) the production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials:

(d) any conspicuous change in the colour or visual clarity:

(e) any emission of objectionable odour:

(f) the rendering of fresh water unsuitable for consumption by farm animals:

(g) any significant adverse effects on aquatic life."

99 Regs 26, 65, 74, 90

100 Regs 31, 32, 67, 74

101 Regs 20, 30, 55, 68

102 Regs 20, 69

103 Reg 30(2)

104 Reg 55(1)

105 Reg 68

106 Except in earthflow terrain: Reg 60(3)

107 Regs 27, 59, 66, Schedule 3

108 Reg 39(a)

109 Reg 40

110 Regs 41, 42

111 Reg 43

112 Reg 44(a)

113 Reg 44(b), (c)

114 Reg 44(d)–(f)

115 Reg 45

116 Reg 84

117 Reg 85

118 Reg 86(1)

119 Reg 86(1)

120 Reg 86(1)

121 Reg 87

122 Reg 89(a)

123 Reg 89(b), (c)

124 Reg 89(d)–(f)

125 Reg 90

126 Davies-Colley R J et al, 2000; Reeves P et al, 2006; Parkyn S M et al, 2003; Parkyn S, 2004; Daigneault A J et al, 2017

127 See the 'Structure and Language' section.

128 Wyeth J, 2018, 9.10

129 Reg 31

130 *Hawkes Bay and Eastern Fish and Game Councils v Hawkes Bay Regional Council* [2014] NZHC 3191

131 'Objectives' in this context means both policy objectives and numerical objectives developed under Part C NPSFM and the National Objectives Framework. This conclusion is reached due to the changes from the draft NESPF, which referred only to a "*freshwater objective*," to the gazetted version which refers to objectives generally.

132 Noting that specific activity statuses are recommended under the 'Erosion' section.

133 For example, Regs 35(2a), 73(2c, 2d), 75(1b)

134 Reg 66(3)

135 For review, see Satchell D, 2018

136 Hill R and I Blair, 2005

137 See Satchell D, 2018

138 Reg 3

139 Noting that depending on the location and species used this may not necessarily be consistent with achieving wider indigenous biodiversity outcomes.

140 Phillips C et al, 2018

141 Regs 11, 16

142 Reg 11(5)

143 Reg 79

144 Regs 17, 81

145 Reg 6(2)

146 Reg 11

147 Newsroom, *New Zealand's Super Sized Weed Problem,* www.newsroom.co.nz/2018/11/14/320273/nzs-super-sized-weed-problem.

148 Reg 3.

149 Reg 12, 17(1)(c)

150 Reg 13, 15(4)

151 Regs 14, 53, 54

152 Noting that this approach has its own issues, as discussed in the 'Structure and Language' and 'Indigenous Biodiversity' sections.

153 The Kaipara District Plan, Auckland Unitary Plan, Thames-Coromandel District Plan (proposed), Waipa District Plan, Waitaki District Plan, Marlborough Environment Plan (proposed), Gore District Plan, Mackenzie District Plan, and Wellington City District Plan had not, and it does not appear that the Regional Policy Statement or Natural Resources Plan (proposed) do either.

154 An example of a plan that does is the Marlborough Environment Plan (proposed).

155 s 87A(2) RMA

156 Brown S, 2003

157 Reg 5(1) sets out the activities the NESPF applies to

158 *Maclean v Thames-Coromandel District Council* A046/03 at [19]–[21]

159 For example, Marlborough, Tasman, Nelson, Thames-Coromandel have not identified SNAs.

160 Reg 27 forestry earthworks management plan, Reg 58 quarry erosion and sediment management plan, Reg 66 harvest plan.

161 *Bryant Holdings Ltd v Marlborough District Council* [2008] NZRMA 485 (HC)

JOINT SUBMISSION ON DISCUSSION DOCUMENT "NATIONAL DIRECTION FOR PLANTATION AND EXOTIC CARBON AFFORESTATION"

on behalf of

THE ENVIRONMENTAL DEFENCE SOCIETY and PURE ADVANTAGE

Submitter Details

Full Name	Environmental Defence Society Incorporated
Address	PO Box 91736, Victoria Street West, Auckland 1142
Phone	09 302 2972
Contact	Shay Schlaepfer
Email	shay@eds.org.nz
Date	11 November 2022

Full Name	Pure Advantage
Address	PO Box 99421, Newmarket, Auckland 1149
Phone	09 600 6408
Contact	Simon Millar
Email	simon@pureadvantage.org
Date	11 November 2022

1 Introduction

1.1 This is a joint submission on behalf of the Environmental Defence Society (EDS) and Pure Advantage on the Ministry for Primary Industries' (MPI) "National Direction for plantation and exotic carbon afforestation" – MPI Discussion Document 2022/10 (Discussion Document).

1.2 Pure Advantage is a registered charity led by business leaders and supported by a collective of researchers and writers who investigate, communicate and promote opportunities for Aotearoa New Zealand to fulfil its potential for green growth.

1.3 EDS is a not-for-profit, non-government national environmental organisation. It was established in 1971 with the objective of bringing together the disciplines of law, science, and planning to promote better environmental outcomes in resource management.

1.4 EDS and Pure Advantage (together, 'we') welcome the opportunity to present this joint submission in relation to the Discussion Document.

1.5 We have had an intimate engagement in related land use challenges, ranging from EDS's involvement in the evolution of freshwater and indigenous biodiversity national policy and regulations, through to Pure Advantage's co-hosting of O Tātou Ngahere, a recent conference on indigenous forestry and biodiversity.

1.6 EDS's involvement in reviewing the efficacy of Aotearoa New Zealand's regulatory settings for forestry to avoid adverse (and enable positive) environmental effects is extensive. Most relevantly, in 2019 EDS published a comprehensive review of the National Environmental Standards for Plantation Forestry (NESPF) (EDS NESPF Review)[1] to determine whether its settings adequately address the environmental risks associated with plantation forestry activities and ensure the right tree is planted in the right place for the right purpose.

1.7 That review identified a series of shortcomings in the NESPF which have not been addressed by Te Uru Rākau's Year One Review thereof, nor (consequently) in this Discussion Document. The findings of the EDS NESPF Review underpin many of the matters raised in this submission.

1.8 We accept that the plantation forestry sector is an important part of our economy and will remain so. We also accept the role forestry plays in offsetting carbon emissions in the near term under the Emissions Trading Scheme (ETS).

1.9 But we have serious reservations about the role of so-called 'permanent' exotic forests as a key feature of our climate mitigation and resilience strategy. Exotic carbon forests are a relatively recent construct driven by short-term climate change policy settings and the economics of the ETS. This means that in practice, the exotic carbon forests being planted are predominantly *Pinus radiata* monocrops, which are relatively inexpensive and fast-growing, promising a quicker and higher rate of return on investment than alternative species can realise.

1.10 We do not accept the rationale for refusing to ban these forests from registering in the ETS's permanent forest category and consider that Ministers have made an egregious error in recently deciding - contrary to their original position - to allow such forests to do so from January 2023. In extending the ETS's permanent forest category to exotics, Ministers are exacerbating serious policy failings in this area.

1.11 The way that incentives are driving 'permanent' *Pinus radiata* forests to take advantage of an increasing carbon price (while it lasts) is an appalling breakdown in environmental policy. Tens of thousands of hectares of land will be planted in pines, well in excess of the Climate

[1] Wright, M., Gepp, S., and Hall, D., A Review of the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017 - Are the settings right to incentivise "the right tree in the right place", and is a high trust regulatory model the right fit for a high risk industry? Environmental Defence Society Inc and Royal New Zealand Forest & Bird Protection Society of New Zealand, April 2019.

Change Commission's net-zero modelling recommendations. The resulting oversupply of ETS units and suppressing effect on carbon prices will stymy the rate of gross emissions reductions in Aotearoa New Zealand, with attendant reputational and market risks.

1.12 Meanwhile, the opportunity to restore much of our lost indigenous forest cover with its multiple benefits will be lost. This is all down to Government agencies and Ministers not acting resolutely and quickly enough, and being captured by vested interests. It is notable that the current review of relevant provisions in the ETS is being led by an advisory group consisting largely of those same interests.

1.13 The perverse ecological outcomes that the ETS settings are driving, and will further cement, provide the context for this submission. Financial incentives must be urgently redirected to realise a sustainable, biodiverse, climate-resilient forest future for Aotearoa New Zealand. This necessitates amendments to the ETS settings to:

i. Recognise the carbon sequestration rates of different native species relative to age and location;
ii. Extend the carbon sequestration look-up tables beyond 50 years to recognise the true total carbon stocks of native forests, which accumulate for hundreds of years; and
iii. Establish a premium class of NZUs generated by indigenous forests.[2]

1.14 In addition, and recognising that the ETS is limited in scope to incentivising carbon sequestration, a complementary biodiversity credit scheme is needed. Proposals[3] and pilots[4] for this already exist.

1.15 At the very least, we are seeking tighter controls over 'permanent' exotic forests to minimise adverse environmental effects associated with these shorter-lived forests.

1.16 We also have serious concerns about the way *plantation* forestry's environmental effects are managed currently and consider that the NESPF in its current form is *ultra vires* the Resource Management Act 1991 (RMA) for reasons further outlined in this submission.

1.17 In brief, the NESPF is:

(a) Failing to effectively address adverse environmental outcomes associated with plantation forestry activities, let alone "*maintain[ing]* or *improv[ing]* the environmental outcomes associated with plantation forestry activities" in accordance with an NESPF objective;
(b) Unjustifiably and unlawfully permissive for such high risk activities, particularly with regard to afforestation on highly erodible land and clear fell harvesting;

[2] As proposed in The Aotearoa Circle's Native Forests: Resetting the balance Report, https://www.theaotearoacircle.nz/reports-resources/biodiversity.
[3] Including The Aotearoa Circle's Native Forests: Resetting the balance Report, https://www.theaotearoacircle.nz/reports-resources/biodiversity, at p 24.
[4] See for example https://www.agriculture.gov.au/agriculture-land/farm-food-drought/natural-resources/landcare/sustaining-future-australian-farming/carbon-biodiversity-pilot.

(c) Failing to adequately recognise and encourage the wider and intergenerational climate resilience, biodiversity, social, cultural, and economic opportunities associated with indigenous forests; and

(d) Insufficiently aligned with national objectives and direction in relation to freshwater, coastal and indigenous biodiversity protection and long-term carbon sequestration.

1.18 These shortcomings necessarily inform our response to the proposal to extend the NESPF to permanent exotic forestry.

1.19 We will set out the regulatory tightening required to properly manage the adverse environmental effects associated with plantation forestry activities, and bring plantation forestry operations into line with other land use obligations. This is essential if regulatory controls under the NESPF are to be extended to include 'permanent' exotic forests.

2 Structure of submission

2.1 Our submission is structured as follows:

(a) National context, where we outline the:
  i. Need for better regulatory controls for all forest types in light of increasing afforestation rates;
  ii. Need to ensure broader policy alignment; and
  iii. Relevant legal principles;

(b) Scope of consultation, which must be expanded to address the adequacy of the NESPF's settings vis-à-vis *plantation* forestry in order to properly consider the appropriateness of their application to 'permanent' exotic forests;

(c) Problems with the NESPF's settings, where we set out how they are:
  i. Unlawfully permissive;
  ii. Insensitive to the diversity and suitability of tree species; and
  iii. High trust with limited regulatory oversight;

(d) Part A, where we outline why we support:
  i. Bringing 'permanent' exotic forests into the NESPF, subject to addressing its many shortcomings for plantation forests;
  ii Mandating certified forest management plans for all forest types, consistent with the requirements for freshwater farm management plans under the RMA;

(e) Part B, where we support national direction to manage social, cultural and economic effects subject to the avoidance of adverse biophysical effects;

(f) Part C, where we support the need for wildfire risk management planning as an element of a broader forest management plan; and

(g) Part D, where we address:

i. Year One Review issues covered by the Discussion Document, namely the need for a more precautionary approach to wilding tree risk assessment thresholds and the ability for Councils to interrogate scores, and correcting the scale of risk assessment that underpins the Erosion Susceptibility Classification tool (beyond *ad hoc* remapping);

ii. Year One Review issues not covered by the Discussion Document (or indeed the Year One Review), including how it is that clear fell harvesting could be permitted under the NESPF in light of its significant adverse environmental effects, and the inadequacy of protections for indigenous biodiversity; and

iii. Other issues with the NESPF in relation to the protection of significant natural areas, landscape and natural character; inconsistent and ecologically questionable setbacks; and vague and unenforceable sediment and indigenous vegetation clearance controls.

3 National context

Increasing rates of afforestation mean we need to get the settings right, for <u>all</u> forest types

3.1 The Discussion Document is a response to what it describes as "the recent surge of interest in carbon forestry", which is not currently subject to national direction. MPI details a number of reasons why the NESPF's shortcomings need to be promptly addressed, noting "[t]he issue has become more urgent because the scale and type of interest in exotic afforestation has changed rapidly since the NZU price rose significantly in 2021."[5]

3.2 These reasons include that:

(a) Of Aotearoa New Zealand's 1.74 million hectares (approx.) of plantation forests, 90% comprise *Pinus radiata*;

(b) Aotearoa New Zealand can expect to see continued growth in the establishment of exotic forestry, largely attributable to increasing NZU prices, but also an emerging bioeconomy:

i. Total afforestation in 2022 is intended to be 68,000 hectares, of which only 5,000 hectares is indigenous species;[6]

ii. Close to 1 million hectares could be planted between 2022 – 2050, of which around 70% would be exotic plantation forestry, 20% permanent exotic forest, and 10% indigenous forest;

iii. Additionally, people with exotic and indigenous forest that meet the requirements of the permanent post-1989 forest category will be able to register in the NZ ETS from 1 January 2023. Taking this into account,

[5] Discussion Document, at 14.

[6] Discussion Document, at 8, citing the Afforestation and Deforestation Intentions Survey, 2021.

"[m]odelled scenarios suggest that *exotic afforestation could total around 2.8 million hectares over 2022-2050, with the majority managed as exotic carbon forests*."[7]

(c) The "Government is taking action to help the forestry and wood processing sector increase its potential – to offset emissions, replace high-emissions products with biomaterials and biofuels, enhance the natural environment by supporting biodiversity, improve water quality and stabilise erosion-prone land, and contribute to social and cultural wellbeing."[8]

(d) "[W]e are … starting to see shorter rotation exotic plantation forests to provide feedstock for the growing bioeconomy."[9]

3.3 Māori interests in forestry are growing, with the percentage of plantation forestry on Māori land expected to increase from around 30% to 40% as Treaty settlements are concluded.

3.4 In short, Aotearoa New Zealand needs to plan for a significant increase in exotic afforestation rates. Ensuring this growth is carefully managed, for *both* plantation and permanent forests, is urgent and critical.

Ensuring broader policy alignment is critical

3.5 Forests affect soil health and stability, freshwater ecology and wellbeing, water yields and quality, flood and fire management, climate resilience, carbon sequestration, air quality and biodiversity. They also provide (or detract from) visual amenity, recreational and cultural opportunities, spiritual connection, ETS revenue streams, timber, biofuels, and associated livelihoods.

3.6 As a result, the location, scale, types, and management of forestry activities directly impact whether Aotearoa New Zealand:

(a) Meets national emissions reductions targets, both in the short-term and in perpetuity, and how it does so (the Climate Change Response Act and Emissions Reductions Plan (ERP) relate);

(b) Reverses biodiversity decline and leaves a legacy rich with indigenous flora and fauna (Te Mana O Te Taiao and the draft National Policy Statement for Indigenous Biodiversity (NPS IB) relate);

(c) Protects highly productive and erodible soils and minimises the risk of landslides in the face of increasingly frequent and severe storm events (National Policy Statement

[7] Discussion Document, at 8, based on the 2021 Afforestation Economic Modelling report completed by the University of Canterbury's School of Forestry.
[8] Discussion Document, at 12.
[9] Discussion Document, at 13.

for Highly Productive Land (NPS HPL) and New Zealand's Climate Change Risk Assessment relate); and

(d) Avoids significant adverse effects on receiving freshwater and coastal environments (National Policy Statement Freshwater Management (NPS FM), National Environmental Standards for Freshwater (NES F), and New Zealand Coastal Policy Statement (NZCPS) relate).

3.7 Achieving such broad policy and regulatory alignment is challenging in the absence of an overarching national land use strategy.

3.8 A degree of forestry-specific guidance is set out in the Government's first ERP, which establishes a 'vision for forestry' that acknowledges the vital role forests will play as Aotearoa New Zealand transitions to a low-emissions economy:[10]

> "By 2050, Aotearoa New Zealand has a sustainable and **diverse** forest estate that provides a renewable resource to support our transition to a low-emissions economy. Forestry will contribute to global efforts to address climate change and emissions reductions **beyond 2050**, while building sustainable communities, **resilient landscapes, and a legacy for future generations to thrive**."

3.9 In support of this vision, the ERP variously articulates support for the right type, mix, scale and location of afforestation to achieve afforestation rates consistent with the bioeconomy aspirations set out in the draft Forestry and Wood Processing Industry Transformation Plan, whilst also seeking to balance the need for carbon removals in tandem with driving gross emissions reductions. It recognises the significance of, and expresses a desire to encourage more, permanent native forests as long-term carbon sinks;[11] the need to maintain and increase native biodiversity;[12] and that there is an opportunity to grow and manage the forestry sector in ways that secure positive outcomes for climate change, biodiversity and water quality alongside economic aspirations.

3.10 Translating these interrelated aspirations and the ERP's vision for forestry into practical outcomes appears limited to the extent that these goals are either:

(a) Influenced by the ETS settings (i.e., as a function of carbon pricing); or
(b) Regulated directly or indirectly by the NESPF.

3.11 For reasons we explore later in this submission, the NESPF as currently drafted does not function as an effective cross-cutting regulatory tool in this regard. Its ability to do so is further limited by the absence of a biodiversity credit scheme capable of counteracting the ETS's economic bias towards *Pinus radiata* monocrops.

[10] Aotearoa New Zealand's First Emissions Reduction Plan, Chapter 14.
[11] ERP, at 272 – 273, 276.
[12] ERP, at 274.

Legal context

3.12 In considering the Discussion Document's proposals, we have had particular regard to the following legal principles and provisions:

(a) Promoting the sustainable management of natural resources, which means:[13]

"managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment."

(b) Managing the use, development, and protection of natural resources in ways that recognise and provide for:[14]

(a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate use;

(b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development; and

(c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;

and with particular regard to:[15]

(a) Kaitiakitanga;

(b) The ethic of stewardship;

(c) The maintenance and enhancement of amenity values;

(d) Intrinsic values of ecosystems;

(e) Maintenance and enhancement of the quality of the environment; and

(f) The effects of climate change.

(c) Section 43A(3) of the RMA, which provides that:

"**If an activity has significant adverse effects on the environment, a national environmental standard must not**, under subsections (1)(b) and (4),—

(a) allow the activity, unless it states that a resource consent is required for the activity; or

(b) state that the activity is a permitted activity."

[13] RMA, s 5.
[14] RMA, s 6.
[15] RMA, s 7.

(d) Applying a precautionary approach where there is uncertainty about the risk of adverse effects on the environment.

4 Scope: This consultation *must* address the current settings for plantation forestry activities

4.1 The changes proposed to the NESPF in the Discussion Document address matters not currently managed by the NESPF, namely managing the environmental effects associated with permanent exotic forests and controlling the location of afforestation to manage social, cultural and economic effects. The proposed changes do not seek to amend the existing regulatory settings for plantation forestry in the NESPF.

4.2 In the interests of achieving nationally consistent environmental outcomes for all forestry, regulatory coherence and administrative efficiency, and avoiding unnecessary duplication, we agree that the NESPF should manage all exotic forestry, plantation and permanent. We intentionally exclude the reference to "carbon", which implies that only ETS-registered permanent exotic forests would be subject to regulatory oversight. All permanent exotic forests must be managed to avoid adverse environmental effects, including those originally planted for harvest but which, due to logistical complexities (distance to market) and economic factors (log prices, harvesting costs, etc), will not be harvested and thereby become permanent, but not (ETS-registered) "carbon" forest.

4.3 However, support for this option - that the NESPF should manage all exotic forestry - necessarily relies on the efficacy of the existing controls to achieve their purpose: to manage the adverse environmental effects of forestry activities. The current NESPF settings are failing to achieve this objective.

4.4 Aside from a limited set of shortcomings identified in the Year One Review of the NESPF (not all of which are, in fact, addressed in the Discussion Document), the Discussion Document fails to examine some fundamental issues with the current regulations. To ensure that the environmental effects of permanent exotic forests are successfully managed, issues with the current settings for *plantation* forestry must be addressed. This necessitates a full review of the NESPF with particular focus on the following shortcomings:

(a) Removing the permissive activity status regime for forestry activities;
(b) Improving the NESPF's risk assessment tools, particularly the Erosion Susceptibility Classification (ESC);
(c) Changing the regulatory settings which permit widespread clear fell harvesting in respect of which the avoidance, or indeed minimisation, of adverse environmental effects is impossible;
(d) Increasing accountability through mandatory forestry management plans on the basis that a high trust model is inappropriate for forestry, which has the potential for significant adverse effects; and
(e) Changing the NESPF's agnosticism in relation to species diversity and stand composition (other than concern for wilding conifer spread).

4.5 In simple terms, current regulatory settings in the NESPF are failing to address significant adverse environmental effects associated with *where* trees are planted, *what* trees are planted (and to what end), and *how* forests are managed and harvested.

5 Problems with the NESPF

Activity status: presumption of permitted activity status for plantation forestry activities is irreconcilable with risk of significant adverse effects and is unlawful

5.1 The NESPF were developed largely to address the effects of clear fell harvesting following a period of net deforestation in Aotearoa New Zealand. To encourage afforestation, the NESPF established a highly permissive regulatory regime pursuant to which most forestry activities enjoy permitted activity status, subject to compliance with conditions.

5.2 Matters in respect of which Councils may apply greater stringency are restricted to:[16]

(a) Achieving an objective of the NPS FM;
(b) Giving effect to Policies 11, 13, 15 and 22 of the NZCPS;
(c) Protecting outstanding natural features and landscapes and significant natural areas (SNAs); and
(d) Managing activities in certain unique and sensitive environments.

5.3 Such a permissive approach has put the forestry sector's regulatory regime at odds with more stringent primary sector regulatory regimes. More worryingly, it fails to recognise that forestry activities are inherently high risk in light of their potential for environmental harm.

5.4 The need to change this permissive starting point is particularly important given the NESPF's tacit endorsement of clear fell harvesting, which gives rise to significant adverse environmental effects that are largely externalised downstream.

5.5 The EDS NESPF Review concluded that:[17]

> "the NESPF's presumption that plantation forestry activities should be a permitted activity needs to be revisited. A complex, intensive activity that not only has immediate impacts but contributes to diffuse pollutants does not easily lend itself to the certainty and specificity required for a permitted activity standard of national application. This is particularly so when that activity occurs across a national landscape that is extremely diverse and which, in many areas, is reaching environmental limits."

Additionally, the EDS NESPF Review noted that permitted standards are either inadequate to achieve the necessary level of environmental protection in all situations, or are uncertain and subject to value judgement, making them difficult to implement or enforce.[18] In sum, a

[16] NESPF, Regulation 6.
[17] ESD NESPF Review, at 2.
[18] Ibid.

presumption that forestry activities should be "permitted" is unworkable, inappropriate, and ineffective at securing environmental protection.

5.6 Crucially, the RMA does not allow an NESPF to permit an activity that may result in significant adverse effects.[19] Yet the NESPF's permissive approach, in combination with its reliance on the ESC as a risk assessment tool, is permitting forestry activities that are resulting in significant adverse environmental effects. This is particularly evident with regard to clear fell harvesting on highly erodible land, with significant adverse environmental effects resulting on receiving marine environments. In this regard, the NESPF is in breach of the RMA.

5.7 As recommended in the EDS NESPF Review, the balance between permitted activities and those requiring a resource consent "will need to shift if the issues associated with the current approach are to be addressed."[20] A better approach to activity status might be as follows:[21]

(a) If all potential effects are known, then restricted discretionary status may be appropriate;
(b) If all potential effects are not known, discretionary status should apply; and
(c) In areas where plantation (or permanent exotic) forestry is not desirable, non-complying or prohibited status should be used.

The ESC is not fit for purpose

5.8 The ESC attributes an erosion risk to land according to four zones – green (low risk), yellow (moderate risk), orange (high risk) or red (very high risk).

5.9 The NESPF uses the ESC-ascribed risk profile to determine whether a resource consent is required to undertake certain plantation forestry activities. The NESPF imposes fewer controls on activities conducted on lower risk (green and yellow zoned) land and more controls on activities conducted on higher risk (orange[22] and red zoned) land.

5.10 The ESC is therefore critical to the level of regulation applied to forestry activities under the NESPF, and consequently the appropriate management of associated environmental effects.

5.11 However, as the ESC applies an erosion risk assessment scale of 1:50,000 and relies on out-dated data in some areas, it is unable to determine site-specific erosion risk accurately and therefore assign appropriate regulatory controls.

5.12 Although the NESPF requires that earthworks management and harvest plans include maps at "a scale not less than 1:10,000",[23] the provision of these plans is only required in

[19] RMA, s 43A(3).
[20] EDS NESPF Review, at 2.
[21] EDS NESPF Review, at 2.
[22] The controls in respect of orange zoned land are barely distinct from green and yellow.
[23] NESPF, Schedule 3(2).

accordance with permitted activity conditions or as a matter of control/discretion for controlled or restricted discretionary activities. Thus, the finer scale assessment is not the information basis for determining what regulatory controls should apply in the first place.

5.13 This creates problems for foresters and Councils because it provides a misleading picture of risk and does not appropriately assign resource consent to activities. For example, at a 1:50,000 scale an area may be mapped as yellow zone, when areas within it, if mapped at a granular resolution, would be zoned red and subject to greater control.

5.14 Issues associated with using the ESC in the NESPF have been raised since it was first proposed and are acknowledged by MPI via its Forestry Service Te Uru Rākau.

5.15 The ESC was first developed by Bloomberg et al in a 2011 report.[24] That version of the ESC was the basis for consultation on the proposed NESPF. A number of submitters contended that the model was not precise enough nor completely accurate with regard to the characterisation of risk. Accordingly, MPI commissioned Landcare Research to refine the original ESC. It did so in three reports published in 2015, 2016 and 2017[25] which variously amended and updated the ESC. The current version of the ESC is dated March 2018.

5.16 A 2020 research article published in the New Zealand Journal of Forestry Science stated that "the coarse spatial resolution of the ESC may be ill-suited to managing forestry activities at the scale of forestry operations"[26] and:[27]

> "… in our study **the ESC failed to reliably discriminate areas of high landslide occurrence from areas of low landslide occurrence**. This probably relates to the resolution of the ESC and the New Zealand Land Resource Inventory (NZLRI) (Newsome et al. 2008) on which it is based, as **the scale (1:50000) of these data layers may be too coarse to adequately represent local scale (1:10000) variation** in land cover, climate, or topography. Deficiencies in the ESC could also be due to the **quality of the data contained in the NZLRI, which in some areas is 40 years out of date** (Bloomberg et al, 2011). The potential shortcomings of the ESC are well recognised (Basher et al. 2015a; Bloomberg et al. 2011; Marden et al. 2015) and it was intended as a regional rather than local land use management tool (Bloomberg et al. 2011). Nevertheless, the failure of the ESC to discriminate areas of high landslide occurrence from areas of low landslide occurrence in our study area, which covers almost

[24] Bloomberg M, Davies T, Visser R, Morgenroth J (2011) *Erosion Susceptibility Classification and analysis of erosion risks for plantation forestry*. Report prepared by the University of Canterbury for the Ministry for the Environment, Wellington.

[25] These are:

1. Bloomberg M, Davies T, Visser R, Morgenroth J (2011) *Erosion Susceptibility Classification and analysis of erosion risks for plantation forestry*. Report prepared by the University of Canterbury for the Ministry for the Environment, Wellington.

2. Basher L, Lynn I, Page M (2015) *Update of the Erosion Susceptibility Classification (ESC) for the proposed National Environmental Standard for Plantation Forestry – revision of the ESC*. MPI Technical Paper No. 2015/13. Prepared by Landcare Research for the Ministry for Primary Industries, Wellington (Landcare Research Contract Report LC2196).

3. Basher L, Barringer J, Lynn I (2016) *Update of the Erosion Susceptibility Classification (ESC) for the proposed NES for Plantation Forestry: Subdividing the High and Very High ESC classes – Final report*. MPI Technical Paper No. 2016/12. Prepared by Landcare Research for the Ministry for Primary Industries, Wellington (Landcare Research Contract Report LC2472).

4. Basher L, Barringer J (2017) *Erosion Susceptibility Classification for the NES for Plantation Forestry*. Prepared by Landcare Research for the Ministry for Primary Industries, Wellington (Landcare Research Contract Report LC2744).

[26] J Griffiths, C Lukens, R May, 2020, *Increased forest cover and limits on clear felling could substantially reduce landslide occurrence in Tasman, New Zealand*, New Zealand Journal of Forestry Science, 50:13, p 2.

[27] Ibid, p 9.

20,000 ha, raises questions about the reliability of the ESC as a regional land management tool in Tasman, New Zealand, and may warrant investigation elsewhere."

5.17 Te Uru Rākau states that "[i]t is recognised that the application of this data, to the specific requirements of the NES-PF, may bring about local issues that require adjustment to the ESC to improve its accuracy".[28] That the ESC applies an assessment scale that is not sufficiently granular and therefore accurate for the purpose of site-specific assessments was also identified in the Year One Review of the NESPF by Te Uru Rākau, released in April 2021. The Year One Review also acknowledged that some regions have questioned the accuracy of the ESC. But ultimately, it is up to forest owners or Councils to request a reassessment or readjustment of applicable ESC zoning[29] "if there are concerns about its accuracy."[30]

5.18 Technologies exist which provide new forms of data to understand erosion (i.e., LiDAR and physiographic mapping) but currently there is no national, or even regional level data to supersede the ESC. Te Uru Rākau acknowledges that when this information becomes available it will need to consider whether, and how, more wholesale changes to the ESC can be made.

5.19 Given the scale of afforestation anticipated over the coming years, the need for locationally-sensitive risk assessment tools is urgent and essential for the avoidance of significant adverse environmental effects. It is therefore disappointing to see that the Discussion Document proposes only to "[a]mend the regulations to clarify that a Council may waive resource consent, or require it if satisfied that remapping by a suitably qualified person indicates at a 1:10,000 scale the land in question fits within a different erosion susceptibility zone to that recorded in the ESC."[31] Such amendment will only address the shortcomings of the ESC's assessment scale in cases where remapping is requested, either by Council or a forest operator. Failing to address the reliability of the ESC as the default risk assessment tool itself is further reason why the permissive regime of the NESPF is inappropriate.

Regulatory controls associated with ESC zones need to better correlate with risk profile

5.20 In addition to recalibrating the scale at which an ESC assessment is undertaken, the distinctions made between, and thresholds and controls applied to, the various ESC zones should better reflect relative risk. Perverse outcomes are occurring whereby afforestation and replanting in green, yellow and orange zoned land is permitted, despite many orange and some yellow zoned land areas being at high risk of erosion.

5.21 Harvesting in red zoned land is permitted provided the area is less than 2ha in a calendar year. However, should trees that are planted specifically for removal be put in these areas? Whilst there may be some short-term stabilisation benefit, the erosion and sediment

[28] Process for Updating the Erosion Susceptibility Classification for the National Environmental Standards for Plantation Forestry, 2019, Te Uru Rākau.
[29] https://www.mpi.govt.nz/dmsdocument/28542-Process-to-update-the-NES-PF-ESC-on-a-case-by-case-basis.
[30] The NES-PF's Risk Assessment Tools, Te Uru Rākau, p 3; https://www.mpi.govt.nz/dmsdocument/28485-The-NES-PFs-Risk-assessment-tools-guidance.
[31] Discussion Document, at 65: D10a.

discharge that follow harvesting (particularly clear felling) could be significant, even from smaller areas.[32] Permanent forests should be targeted towards areas where the risk of adverse environmental effects from tree removal is high, and the NESPF should provide a robust and clear regulatory framework consistent with that approach.[33]

5.22 Regard should also be had to the reality that the:[34]

> "erosion-control benefits of plantation forests are short-lived, lasting only as long as the trees are in the ground. On extraction, the benefit is gone and the bare face that remains can itself result in significant amounts of sediment ending up in sensitive receiving environments. This issue is particularly acute in respect of clear fell extraction as this opens a window of vulnerability between when new trees replace the rotting roots from the previous rotation."

During this window, which can last between 3 and 8 years from the time of harvest,[35] the site is vulnerable to landslides, mobilisation of slash, debris, and sediment. Pines are associated with a longer window due to rapidly rotting roots. Other species with slower root decay rates provide more soil stability and land resilience after harvesting.

5.23 The complex interplay of variables associated with forestry activities calls for a more sophisticated, nuanced and strategic approach to decision-making about where plantation forests are located, what trees are planted, and how they are harvested. Identification of significant environmental values and risks needs to take place *before* planting, not at the point of harvesting or on an *ad hoc* basis when a certain operational activity needs to occur.[36] As drafted, "[t]he NESPF simply does not provide for that level of care and precision."[37]

5.24 Clearly there is a need to ensure that plantation forest activities are considered from a lifecycle perspective, from the point of afforestation, through to harvest and replanting. Such an assessment would ensure forest operations and management are appropriately calibrated according to a more holistic risk profile.

The right tree: NESPF is agnostic as to species (other than exotics generally)

5.25 Apart from a wilding conifer tree risk assessment, the NESPF is agnostic as to species selection. The continuing proliferation of *Pinus radiata* afforestation suggests stronger direction and more nuanced regulatory controls should be provided around what trees should be planted where in order to achieve the right tree in the right place for the right purpose.

[32] EDS NESPF Review, at 2.
[33] EDS NESPF Review, at 2.
[34] EDS NESPF Review, at 25.
[35] EDS NESPF Review, at 17.
[36] EDS NESPF Review, at 2.
[37] EDS NESPF Review, at 2.

5.26 Species choice has implications for a wide range of environmental effects and forest outcomes. These include longevity, stand stability, biodiversity, impacts on water yield, carbon sequestration rates and volume, soil stability (including in relation to root decay during the post-harvest window of vulnerability), risk of windthrow, water purification, and resilience to pest, disease, fire and drought, as well as broader landscape, social, cultural and economic effects.

How should we determine what species to plant? The need for broader policy alignment pursuant to a national land use strategy

5.27 Forestry is to play a central role in delivering Aotearoa New Zealand's short-term domestic emissions abatement, so the extent to which the NESPF enables certain forestry activities is relevant to the delivery of our climate change mitigation strategy. But the way the NESPF regulates plantation forestry activities (and possibly, by extension, permanent exotic forestry) is also relevant to developing long-term climate resilience and adaptation.

5.28 From a *mitigation* perspective, the starting proposition is the more forest the better. On this measure:

(a) The NESPF is climate-aligned only to extent that it promotes afforestation and discourages deforestation (by facilitating the replanting of sites or by limiting harvesting); and

(b) Tree species and forest management systems are only of subsidiary interest, insofar as they can optimise sequestration rates and increase total carbon stocks (these are important to adaptation and sustainability).[38]

5.29 As previously noted in the EDS NESPF Review:[39]

> "A narrow focus on mitigation is concerned with species and systems ONLY insofar as these optimise carbon sequestration rates. In Aotearoa, **this tends to recommend pines**, which [are] fast growing in a range of circumstances, highly adaptable, and well understood by forestry operators. These qualities make this species attractive for plantation forestry, but also for carbon farming, because rapid growth corresponds to rapid carbon sequestration and, consequently, rapid accrual of carbon credits."

The increasing carbon price has further cemented *Pinus radiata's* preferential status.

5.30 However, a narrow policy and management focus on single environmental problems without considering the broader ecological context can give rise to 'bio-perversities'. The better view, and one that supports policy coherence, is to place the NESPF in its wider regulatory context which includes the ETS and other environmental regulation, and which indirectly influences land use choices in ways that may or may not align with climate change mitigation

[38] EDS NESPF Review, at 9.
[39] EDS NESPF Review, at 10.

objectives.[40] This requires looking more broadly at the role of forestry in terms of mitigation, adaptation and wider sustainability (biodiversity) and resilience outcomes (like the Sustainable Development Goals (SDGs) and Part 2 of the RMA).

5.31 The EDS NESPF Review noted, for example, that Goal 15 of the SDGs calls on nations to manage forests sustainably, combat desertification, halt and reverse land degradation, and halt biodiversity loss. Regard to this goal is more consistent with the RMA's purpose of promoting "the sustainable management of natural and physical resources" and the NESPF's objective of "maintaining or improving the environmental outcomes associated with plantation forestry activities".

5.32 Applying a climate adaptation lens, pine monocultures are not the optimal choice:[41]

> "Generally, **diversity is key to ecosystem resilience**, both in terms of age and species diversity. Accordingly, even-aged, monoculture forests are generally regarded as more vulnerable to the impacts of extreme weather events such as drought, fire, and windthrow, as well as pests and diseases. These risks multiply as global mean temperatures increase because of the increased incidence of extreme weather events."

5.33 Given the increasing risks of massive forest loss as a result of climate change, the NESPF settings should be recalibrated towards building the resilience of future forests in line with best practice for climate adaptation – the inclusion of firebreaks, rules on slash and residue management to reduce fire risk, tighter regulation of clonal forestry, promoting age and species diversification, and climate-resilient management practices for thinning, fertilising, weeding, and pest control.[42]

5.34 Land resilience[43] is also compromised with pines as roots decay rapidly on harvesting, so the soil-holding capacity of remaining roots is quickly lost. This means clear felled sites are vulnerable to erosion and sedimentation during this 'window of vulnerability', when new trees are yet to establish themselves.

5.35 Pines are not aligned with the objective of restoring indigenous biodiversity. Wilding conifer spread is detrimental to the regeneration of indigenous flora and can affect the integrity of SNAs, outstanding natural landscapes (ONLs), visual amenity landscapes (VALs), natural character areas, sites of cultural significance, or the opportunity to preserve non-forest land uses such as high-country farming.

5.36 We have also raised concern in relation to potential legacy issues associated with 'permanent' pines: it is unclear what landowners will do when these forests mature and

[40] EDS NESPF Review, at 10.
[41] EDS NESPF Review, at 10-11.
[42] EDS NESPF Review, at 11.
[43] Choice of forest management system also impacts land resilience – clear felling exposes land to climatic impacts after harvesting. Continuous cover forestry has no window of vulnerability because a forest canopy cover is maintained continuously.

cease to generate carbon revenue, what happens when forest land changes ownership, or whether large pine sinks will have social licence among future generations.[44]

5.37 A national land use strategy (subject to which a national forestry strategy could be developed) would help to secure more synergistic policy approaches and outcomes, providing a holistic view across the various regulatory interventions and ensuring that they are mutually reinforcing, as well as clearly addressing interactions between instruments like the NESPF, ETS, Zero Carbon Act, NZCPS, NPSFM, NESF, NPSIB, ERP, and NPSHPL, and various market factors, and the emergence of sectoral inequities for the land sector.[45]

How we are managing our forests: No requirement for plantation forest management plans creates an accountability gap

5.38 Forest operations in Aotearoa New Zealand enjoy a very high trust management regime. The NESPF only requires the submission of earthworks and harvest management plans. There is no requirement for these to be independently verified, peer-reviewed or qualitatively assessed in any way. As we have noted previously:[46]

> "Using management plans that cannot be certified or rejected relies heavily on foresters designing adequate management plans and complying with vague permitted standards. This is **a very high trust model, which may not be warranted given the seriousness of potential environmental impacts, variability in practice around the country, and poor compliance outcomes in some areas**."

5.39 Furthermore, those management plans are limited in scope to specific time and effects related activities. Such a narrow approach to forest management gives rise to a significant accountability gap in relation to how forest operators are identifying and assessing risks, and selecting appropriate management actions in relation thereto.

5.40 For permanent exotic forests, requiring a more holistic, forest lifecycle approach to forest management and regular compliance auditing and enforcement will be essential to ensuring owners do not just 'plant and walk away'. In this regard, we strongly disagree with the suggestion in the Discussion Document that it is too challenging to implement a management plan for a forest that extends over decades.[47] We detail a practicable forest management planning regime that could apply to all forest operations (plantation and 'permanent') in paragraphs 6.16 – 6.22 below.

[44] EDS NESPF Review, at 11.
[45] This will enable the development of ubiquitous, cross-cutting controls where appropriate, such as setbacks that apply equitably to competing land uses (eg pastoral agriculture cf plantation forestry, where setback requirements can penalise small holdings where they disproportionately reduce productive land vis-à-vis larger holdings and other land-users). EDS NESPF Review refers.
[46] EDS NESPF Review, at 2.
[47] Discussion Document, at 26.

How we are harvesting our forests: Tacit acceptance of clear fell harvesting irreconcilable with avoidance of adverse effects

5.41 The Discussion Document acknowledges that:[48]

> "The design of the NES-PF has a focus on managing the effects of clear fell harvest, which is the dominant harvest model in Aotearoa New Zealand, because **other harvest models (eg low-intensity harvesting) usually have lesser environmental effects**".

5.42 The Discussion Document further notes that the provisions in the NESPF are intended to achieve its policy objective of maintaining or improving the environmental outcomes associated with plantation forestry activities nationally through "[e]stablishing rules that permit plantation forestry activities where it is efficient and appropriate to do so, and where the activities will not have significant adverse effects on the natural environment", and "[r]equiring resource consent for activities where the environmental risk is higher and more site-specific oversight is needed".[49]

5.43 In most instances, clear fell harvesting gives rise to significant adverse environmental impacts. Biodiversity loss, climate change, and water quality pressures mean these impacts are increasingly damaging.

5.44 Yet under the NESPF, harvesting activities start from a baseline presumption of permitted activity status. Having regard to s 43A(3) of the RMA, this approach is unlawful.

5.45 Given the widespread use of lower impact harvesting models overseas that result in less harmful environmental effects, it is unclear why such ecologically superior alternatives are perceived as 'niche' in Aotearoa New Zealand. They should be the norm.

5.46 In support of this, the NESPF should apply a reverse burden on forest operators, whereby clear fell harvesting cannot be carried out unless it can be established that clear felling will not result in significant adverse environmental effects.

5.47 In the absence of a more stringent approach to harvesting methods, the costs of clear fell harvesting will continue to be externalised and ecological damage permitted. This is particularly the case for difficult, fragile and/or steep terrain where low impact harvesting systems should be mandatory, or the land retired and restored through native regeneration. Clear fell harvesting on red zone land should be non-complying, and permanent indigenous forest on such land incentivised.[50]

5.48 Clear policy direction and regulatory measures are essential to facilitate a transition to lower impact harvesting methods, like continuous cover (which has a range of benefits in relation

[48] Discussion Document, at 16.
[49] Discussion Document, at 16.
[50] EDS NESPF Review, at 26.

to erosion control, biodiversity and water quality) or small coupe alternatives.[51] This is how plantation forestry is undertaken now in many countries, where the downstream social, economic and ecological costs associated with more damaging harvest methods are internalised. It is past time for Aotearoa New Zealand to catch up.

5.49 We are aware that low impact harvesting systems are almost always more costly and less efficient than clear cutting. But this is *only* because the regulatory settings in Aotearoa New Zealand do not oblige forest operators to internalise the costs of the significant adverse environmental effects associated with clear fell harvesting - the soil loss; sedimentation of freshwater, wetlands, estuaries and the marine environment; or damage to habitats, property and infrastructure. If forest operators were required to *remedy* these effects, clear fell harvesting would rarely be commercially viable, or only so in places where significant adverse environmental effects could be legitimately avoided.

5.50 Financial support may be required alongside the necessary regulatory tightening around harvesting practices. This may also encourage a positive shift from pine monocrops and other low value timber species to maintain profitability.

6 Part A: Bringing 'permanent' exotics into the NESPF

6.1 As a preliminary point, we do not support the overreliance on (and consequent facilitation of) exotic afforestation as an emissions abatement tool.

6.2 Whilst it is accepted that some additional afforestation will be necessary to meet Aotearoa New Zealand's emissions reduction targets:

(a) We disagree that this should be primarily achieved through exotic afforestation, which will not provide a multigenerational carbon sink with any of the attendant benefits that a reorientation towards indigenous forests would achieve;

(b) There is a significant risk that increased exotic afforestation rates could lead to an oversupply of NZUs with a dampening effect on the cost of offsetting. This could slow the rate at which carbon-intensive industries transition to low-emission operational footprints. The Climate Change Commission's net-zero pathway modelling estimated that Aotearoa New Zealand could meet its net-zero goals by planting around 25,000 hectares of exotics per annum (in addition to complementary actions). Current and projected exotic afforestation rates appear to be around double that; and

(c) The assumption of equivalence between one tonne of carbon emitted and one tonne of carbon sequestered vis-à-vis forestry does not adequately account for forest risks, such as stock loss from disease, pest incursions or fire. These risks may be higher for exotic single species forests, particularly if they are long standing.

[51] EDS NESPF Review, at 2.

6.3 Of the options proposed to effectively manage 'permanent' exotic forests, **we prefer Option 2** – amending the NESPF to include these forests. Our support for Option 2 is, however, **subject to addressing the shortcomings of the NESPF**, many of which are identified in this submission. These need to be comprehensively and urgently addressed alongside any amendments proposed in relation to permanent exotic forestry specifically.

6.4 The Discussion Document notes that:[52]

> "Although the NESPF was designed to focus on anticipating and managing a forest at harvest, this means **exotic carbon forests in the NESPF would be required to comply with all afforestation provisions, which have been designed with harvest in mind.** However, **these provide protections where harvest is part of an exotic carbon forest lifecycle and where related activities are carried out** (e.g. pruning and thinning, development of river crossings, and harvest activities)."

6.5 We support the proposal that permanent exotic forestry should be required to comply with all afforestation controls that apply to plantation forests. As a matter of good forest management practice, permanent exotic forests will require pruning and thinning, and some degree of harvesting and extraction. It is correct to anticipate and provide for this through regulatory controls at the point of afforestation.

6.6 Ensuring that permanent exotic afforestation activities are subject to the same regulatory controls as plantation forests:

(a) Is consistent with the relative impermanence of ETS-registered 'permanent' *Pinus radiata* forests, in respect of which only 30% canopy cover must be maintained, and which cannot otherwise be clear felled for "at least 50 years" to qualify as such;[53] and

(b) Ensures that appropriate protections are in place in the event of a subsequent change in intended land use or circumstance.

6.7 Option 2 also proposes to introduce a new matter of discretion to enable Councils to consider wind effects on forest stability for all forests greater than 2 ha on red zone land. It is not clear why wind effects on forest stability would be the only new matter of discretion to which Councils would be able to have regard in respect of permanent exotic forestry. And in light of our concerns regarding the robustness of the ESC as a land zoning tool, we do not think consideration of wind effects on forest stability should be limited to red zone land.

A note on 'permanence'

6.8 *Pinus radiata* continues to be the species of choice due to the rate of return on investment under the ETS. This informs our interpretation of the reference to 'permanent' exotic forests, making it something of an oxymoron. That is because, as we understand it, unlike

[52] Discussion Document, at 25.
[53] https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/about-forestry-in-the-emissions-trading-scheme/permanent-forests-in-the-ets/.

most indigenous tree species (and indeed many alternative exotic species), *Pinus radiata* has a comparatively limited natural lifespan.[54] This is acknowledged in the Discussion Document,[55] and is borne out in the need for a regulatory approach that anticipates issues like end-of-life management – i.e., what is to happen to vast swathes of pines when they reach the end of their natural lifespan and pose increasing stand stability, fire, and pest risks. Indigenous forests, by comparison, do not need to be designed with such longevity risks in mind.

6.9 Transitional forests are also referred to, where the primary exotic forest is only 'permanent' for as long as it takes to establish a viable indigenous forest. Transitional forests are an emerging concept with further research required to inform their efficacy and necessary management interventions.

6.10 In combination, these factors make references to 'permanence' and to managing environmental effects "to ensure a carbon forest is sustainable in perpetuity"[56] misleading. It also suggests that the benefits associated with 'permanent' exotic forests, such as carbon sequestration, providing biodiversity habitats, and erosion-control could be overstated (or certainly more temporary), particularly where harvesting occurs.

Forest Management Plans should be mandatory, for <u>all</u> forests

6.11 The Discussion Document acknowledges that "The regulations do not include requirements for managing a forest, so cannot currently require certain activities in relation to the longevity or composition of the forest e.g., cutting lightwells in the forest to enable regeneration, or requiring assessment of an existing native seed source."[57] In this regard, **we support proposed Option 3**, which involves amending the NESPF to require forest management plans for permanent exotic forests.

6.12 However, we submit that **a comprehensive forest management plan should be mandatory for <u>all</u> forests**: plantation, permanent exotic, and transitional.

6.13 However, the efficacy of management plans depends on the scope and quality of content; the translation of clearly identified risks to specific, measurable, proportionate, and effective responses; and proper implementation and monitoring. Compliance with the current regulations is achieved simply by preparing and submitting the plan (e.g., for earthworks or harvesting). As noted in the EDS NESPF Review:[58]

> "The unverified management plan approach assumes that forestry operators will submit management plans that are high quality, and which adequately address the environmental risks that they are intended to manage. That assumption is untested, and this 'high trust' model of regulation is unlikely to be warranted across the board."

[54] Around 80 to 90 years: https://www.nationalarboretum.act.gov.au/living-collections/forests-and-trees/forest-76.
[55] Discussion Document, at 27.
[56] Discussion Document, at 20.
[57] Discussion Document, at 26.
[58] EDS NESPF Review, at 32.

6.14 To address this accountability gap, forest management plans must be subject to independent, expert review to ensure that forest management risks and opportunities are comprehensively identified and translated into credible management objectives and actions, with measurable outcomes. The implementation of forest management plans should be regularly monitored, periodically reviewed and updated, and enforcement action taken in the event of non-compliance.

6.15 The Discussion Document identifies that there may be administrative costs for Councils associated with reviewing, monitoring and enforcing forest management plans.[59] Such administrative costs are outweighed by the ecological, social and economic costs of poor forest planning and mismanagement, which are currently falling to Councils, ratepayers, local communities, and ecosystems to pay. In any event, as for freshwater farm management plans, a number of these functions could be outsourced to independent certifiers and auditors as described below.

6.16 Management plans are required for Forestry Stewardship Council certification.[60] Further precedent for a workable, qualitatively robust management planning regime is set out in Part 9A of the RMA with respect to freshwater farm plans. This regime provides a clear line of sight between regulation and management practice. Introducing a comparable regime for forest operators would also address sector equity concerns.

Plans should be certified

6.17 Part 9A of the RMA requires that farms must have **certified** freshwater farm plans if they meet certain land use thresholds.[61] The duties of farm operators who require a certified freshwater farm plan include:[62]

(a) Preparing a plan in accordance with Part 9A and applicable regulations;
(b) Submitting the plan to a certifier for certification;
(c) Ensuring the farm operates in compliance with the plan;
(d) Arranging for the farm to be audited for compliance with the certified plan; and
(e) Keeping the plan fit-for-purpose by amending it (and having it recertified) to reflect changes in the farm or to achieve compliance with Part 9A and applicable regulations.

Section 217G sets out the certification process, which involves:

(a) The farm operator submitting a plan to a certifier within a prescribed time frame; and

[59] Discussion Document, at 27.
[60] Principle 7 refers.
[61] RMA, s 217D.
[62] RMA, s 217E.

(b) The certifier certifying the plan if satisfied the plan complies with the contents requirements set out in section 217F (see below), and notifying the relevant regional council of the fact of certification and the date thereof.

Contents of plans should be set out

6.18 Section 217F of the RMA prescribes the contents of a freshwater farm plan. They must:

(a) Identify any adverse effects of activities carried out on the farm on freshwater and freshwater ecosystems;
(b) Specify requirements that are appropriate for the purpose of avoiding, remedying, or mitigating the adverse effects of those activities on freshwater and freshwater ecosystems, and are clear and measurable;
(c) Demonstrate how any outcomes prescribed in regulations are to be achieved; and
(d) Comply with any other requirements in regulations.

6.19 For forests, such plans should (among other things) clearly identify:

(a) How compliance with the NPS FM and other matters of stringency will be achieved;
(b) Risks that may give rise to adverse environmental effects, including but not limited to anticipated harvesting (including sediment controls, slash management, etc), windthrow, fire, drought, pests and disease, natural decay and senescence, stand stability, and biodiversity protection. For administrative efficiency, we recommend that wildfire risk management planning (discussed further in relation to Part C below) is incorporated as a module of a mandatory forest management plan;
(c) Clear and measurable actions appropriate for the purpose of avoiding, remedying, or mitigating those adverse effects; and
(d) Forest outcomes and how those will be achieved over the life of the forest. Transitional forests will need to identify what interventions will be undertaken with clear progress (and compositional) milestones that map out how the forest will achieve its transition from exotic to indigenous species.

Auditing for compliance

6.20 Like farms,[63] we submit that forests should be subject to auditing for compliance with their certified forest management plans. Any compliance failures and supporting reasoning would be identified in the auditor's findings, together with a reasonable timeframe within which to remedy non-compliance. Audit reports would be provided to the relevant regional councils.

[63] RMA, s 217H.

Role of regional councils

6.21 The functions of regional councils in relation to freshwater farm plans is to:

(a) Appoint certifiers and auditors;[64]
(b) Receive notification that freshwater farm plans have been certified and receive audit reports;[65] and
(c) Enforce the observance of the Part 9A requirements and applicable regulations and monitor compliance by farm operators in respect of these.[66]

6.22 The same functions could apply vis-à-vis forest management plans, assuming the same certification and auditing processes and requirements were adopted.

Forest management plans should be underpinned by a performance bond

6.23 Currently, the adverse environmental effects associated with forestry activities are externalised, with downstream communities and receiving ecosystems wearing the financial and biophysical costs. This is entirely unacceptable. Forest management plans should be underpinned by a performance management bond designed to better incentivise effective risk management measures and internalise the costs where such measures result in adverse effects. A performance bond would also disincentivise forest abandonment when a forest is at the end of its natural lifespan, has exhausted its ETS-revenue capacity, there is a drop in the carbon price, and/or it is uneconomic to harvest.

6.24 There will be other ways of obtaining a performance guarantee (such as holding back a proportion of NZUs for ETS-registered forests, or arranging a form of compulsory insurance). But the key point is that given the long-lived nature of so-called permanent carbon forests, there needs to be a formal and secure arrangement put in place.

7 Part B: How to manage social, economic, cultural effects

7.1 The Discussion Document considers two approaches to manage the social, cultural and economic effects of plantation and permanent exotic forests:

(a) Option 1 involves amending the NESPF to make explicit that Councils have the ability to make rules to manage these effects pursuant to district and regional plans (application), and enable Councils to make more stringent or lenient rules relating to afforestation (stringency); or

(b) Option 2 entails providing national direction in respect of these effects through the development of a consenting framework, which could apply nationally or by district,

[64] RMA, s 217K.
[65] RMA, s 217I.
[66] RMA, s 217I.

be time-limited, and address a number of variables such as land type, forest type, and scale of afforestation.

7.2 On balance, we favour **Option 2 – national direction**. In assessing the relative merits of these approaches, we note the following:

(a) Consideration of social, cultural and economic effects is likely to attract a range of competing interests and perspectives. These should be reconciled subject to the avoidance of adverse biophysical effects. There is precedent for this hierarchy of considerations. For example, clause 2.1 of the NPS FM (which reflects and gives effect to *Te Mana o Te Wai*) provides that:

> "The objective of this National Policy Statement is to ensure that natural and physical resources are managed in a way that **prioritises**:
> (a) first, the health and well-being of water bodies and freshwater ecosystems
> (b) second, the health needs of people (such as drinking water)
> (c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future."

(b) Consideration of social, cultural and economic effects must support the right tree in the right place for the right purpose. This necessitates a holistic and intergenerational approach to forestry effects and outcomes and broader policy alignment with other national direction, including in relation to freshwater management, coastal protection, indigenous biodiversity, and climate change mitigation, resilience and adaptation.

For example, narrow, short-term economic considerations could favour further *Pinus radiata* afforestation, whether for harvest or carbon sequestration. However, where, what and how forestry activities are undertaken - particularly for (multigenerational) permanence - requires a more strategic, longer-term assessment lens that properly internalises the costs of such forests on indigenous biodiversity, freshwater and coastal ecosystems, mahinga kai, future climate resilience and any other legacy measures, and is thereby more consistent with kaitiangatanga.

(c) The competing interests that will characterise consideration of the social, cultural and economic effects associated with permanent exotic forests would be very challenging for local authorities to navigate. It could be difficult for Councils to engage effectively on such potentially broad effects, let alone articulate permitted activity standards relating to social, cultural and economic effects with the specificity and measurability required of a permitted activity standard.[67] Councils may be hesitant to include controls that could expose them to litigation risk.

(d) The absence of national direction may lead to inconsistent approaches whereby those effects are actively considered by some Councils but not at all by others (since

[67] EDS NESPF Review, at 8 refers.

the NESPF would simply clarify that social, cultural and economic effects are a matter of full discretion). This would limit the ability of the NESPF to achieve its objective of ensuring certainty and consistency for forest owners. It could also dilute alignment with wider policy strategies (biodiversity, ERP, freshwater, etc).

(e) The suggestion in Option 1 that the NESPF could enable Councils to make more lenient rules than the NESPF afforestation controls having regard to social, cultural and economic effects could risk cutting across NESPF rules in relation to (biophysical) environmental effects and thereby undermine the very risks the regulations were established to address.

(f) The absence of national direction could exacerbate such risks if inconsistency across regional approaches led to a displacement effect, with afforestation occurring more intensively (and disproportionately) in regions without rules that appropriately distinguish the risks associated with different forest types, the scale at which they are being established, and the cumulative effects thereof (or as a result of more lenient rules, as proposed by the Discussion Document).

(g) In relation to Option 2, for reasons already set out above, we disagree with Table 3's "Possible approaches to design a consent requirement" presumption that some land types or scales of afforestation might not require a consent. All afforestation proposals should require consent above a certain threshold.

(h) We are not entirely clear how the possible approaches to designing a consent requirement set out in Table 3 would interact with the existing settings. For example, Table 3 discusses the possibility of designing consent requirements according to land types, which might be determined by reference to the ESC, "or other tools (e.g., HPL or the Land Use Capability (LUC) classification)." It is unclear how introducing a different method of land type assessment for the consideration of social, cultural and economic effects would interact with the current application of the ESC to determine the consent status for afforestation and associated activities.

We suggest that possible approaches in this regard are properly explored under the proposed National Planning Framework and Regional Spatial Plans. We further recommend that tree species and suitability for low impact harvesting would be relevant variables to consider.

8 Part C: Improving wildfire risk management in all forests

8.1 MPI is proposing to introduce a standardised national approach that will require the preparation of a wildfire risk management plan (WRMP) and attestation to its completeness for all forests larger than one hectare covered by the NESPF as part of the NESPF notification

or consent process. The aim of this proposal is "to reduce the environmental effects that a wildfire in a forest might pose."[68]

8.2 It is further proposed that the comprehensiveness of an WRMP would vary according to the size of the forest. The Discussion Document explains that "[t]he intent of requiring a plan is to ensure wildfire is considered in both planning and managing the forest over its life cycle, proportional to the size of the risks."[69] To this end, the Discussion Document notes that risk reduction for plantation forestry requires assessing the following variables: the species being planted, the weather, topography, values at risk within and neighbouring the forest, suppression and containment options, access to water for firefighting, and mitigation measures which can be built into the development and management of the forest.[70]

8.3 We agree that wildfire risk management planning should be an essential feature of every forestry operation. However, (and noting our arguments above that afforestation should not enjoy permitted activity status), we do not agree that the mere preparation of an WRMP, and providing attestation thereof to Council, would allow the necessary qualitative assessment to which such plans should be subject, and therefore support the overarching goal of ensuring the right tree in the right place for the right purpose.

8.4 Although WRMPs would be a requirement of the NESPF, MPI is:

> "not proposing that Councils are responsible for the plan, as FENZ has the statutory responsibility for fire management, and few Councils have the knowledge or systems to use the plans meaningfully. However, where a WRMP is a requirement of a permitted activity, the Council would be able to request a copy of the plan to verify that conditions have been met … [and w]here afforestation requires a resource consent, the Council would be able to request a copy of the plan as a matter of discretion if there is demonstrated benefit to them holding it."[71]

In short, it is proposed that Councils' role in monitoring the WRMP (irrespective of afforestation's activity status) would be limited to ensuring that a plan has been developed.

8.5 The WRMP proposal thus gives rise to a gap in meaningful oversight in terms of reviewing the adequacy of forest planning for fire risk reduction, and in subsequent responsibility for compliance monitoring and enforcement. We suggest that:

(a) Wildfire risk management planning is a module required in a mandatory forest management plan; and
(b) As set out at section 6 above, those forest management plans would be subject to certification, compliance auditing and enforcement.

[68] Discussion Document, at 36.
[69] Discussion Document, at 40.
[70] Discussion Document, at 37.
[71] Discussion Document, at 40.

8.6 The Discussion Document acknowledges that climate change will increase the number of very high or extreme fire weather danger days per annum. This translates to increasing risks of forest loss. In light of this, the NESPF's afforestation and replanting controls should build in resilience consistent with best practice for climate adaptation.[72] As noted above at paragraph 6.19(b), the inclusion of firebreaks, rules on slash and residue management to reduce fire risk, proximate water availability and yield pressures, tighter regulation of clonal forestry, diversification of species and age groups, controls around scale, and active climate-resilient management practices for thinning, fertilising, weeding and pest control[73] will be key determinants of risk and should therefore be subject to qualitative scrutiny, not just once the trees are in the ground, but *before* that even occurs. The NESPF does not provide the necessary degree or quality of oversight in this regard.

9 Part D: Addressing Year One Review (and other) issues

Year One Review issues covered by the Discussion Document

Wilding Tree Risk Calculator (WTRC)

9.1 The WTRC currently operates as a high trust tool that relies on the adequacy of the assessment with little scope for regulatory oversight.[74] A WTRC score must be generated by a "suitably competent person" on behalf of the forestry company. There is no express requirement for it to be carried out on site, and Councils have no discretion whether or not to accept a WTRC assessment. To date, the NESPF has not required forest operators to show how their wilding tree risk calculation has been undertaken other than to provide the resulting score. We understand that the quality of WTRC assessments received so far has been questionable.

9.2 To improve the quality and transparency around such calculations, we support the proposal for template worksheets and the requirement to provide these worksheets with supporting information (and resulting score) to Councils 6-8 months prior to afforestation. Depending on the design of the standard format template (which should discourage scope for subjective assessment), we agree that this should ensure a degree of consistency, transparency, and quality in respect of how wilding tree risk calculations are derived and presented.

9.3 However, Council's role is, as before, essentially limited to receipt of such workings. The Year One Review noted that Councils needed more time and ability under the regulations to query scores[75] and address any discrepancies before forest operators commit resources.[76] For meaningful oversight of wilding conifer risk, Councils should be empowered to qualitatively review, reject, or seek third party verification of wilding tree risk calculations.

[72] EDS NESPF Review, at 11.
[73] EDS NESPF Review, at 11.
[74] EDS NESPF Review, at 27.
[75] Year One Review, at 14.
[76] Discussion Document, at 46.

9.4 Importantly, the Discussion Document does not interrogate the merits or arbitrary effect of the WTRC thresholds. A resource consent is only required for afforestation if a wilding conifer calculation scores an area at 12 or above. However, a score of 10 or 11 is still deemed 'relatively high risk'.[77]

9.5 The Year One Review observed that the NESPF does not specify that a score lower than 12 equates to low risk. It noted that:[78]

> "One forest sector expert considered scores over 9 of concern because they rely on assessed conditions remaining static over a long period."

9.6 Although the Discussion Document proposes both to remove downstream land use as wilding tree risk criteria due to future uncertainty, and to require a wilding tree risk assessment at replanting to ensure changes in risk over time are managed, it does not address the appropriateness of the risk threshold. In this regard, the Year One Review noted that given spread may extend many kilometres from the source site and that foresters cannot manage spread beyond their own property, a more precautionary threshold should be considered.[79] It also recommended that the conservation value of downwind cover type should be considered.[80]

9.7 Wilding conifer control is costing millions of dollars annually. Without such control, the cost of wilding pine spread "could reach $4.6 billion over 50 years."[81] And because forest owners are only deemed responsible for eradication measures within their property, the cost of wilding control is not borne by those responsible for the problem. Clearly the settings are failing, and the externalisation of these costs is totally unacceptable. We agree that, at minimum, a more precautionary threshold should be set, and consideration of the conservation value of downwind cover type incorporated within the assessment.

9.8 As we have previously observed, "[a]ctivities with a relatively high risk of causing significant economic and environmental effects on surrounding land would not normally be classified as permitted under the RMA."[82] Instead, a zoning or spatial planning approach that enabled Councils to require consent for afforestation and replanting in moderate to high risk wilding conifer areas would reserve discretion to better assess risk and decline consent or impose conditions (such as a requirement to plant buffer trees with lower seed spread risk).

ESC

9.9 The Terms of Reference for the Year One Review included considering whether changes were required to the ESC. The inadequacy of the ESC as a risk assessment tool and our recommendations are set out in paragraphs 5.8 – 5.19 above. As we note there, the ESC is

[77] EDS NESPF Review, at 2.
[78] Year One Review, at 13.
[79] Year One Review, at 14.
[80] Year One Review, at 14.
[81] https://www.beehive.govt.nz/release/wilding-conifer-control-efforts-smash-targets
[82] EDS NESPF Review, at 28.

not fit-for-purpose. Changes to its underlying risk assessment scale are urgent and should not be confined to *ad hoc* remapping at the request of forest operators or Councils.

Year One Review issues not covered by the Discussion Document

9.10 The Terms of Reference for the Year One Review also included considering:

(a) "Whether the settings in the NESPF relating to harvesting and slash management are appropriate for controlling the environmental effects on plantation forestry on erosion-prone land, including whether the controls for ESC orange and red zone land are too narrow"; and
(b) Biodiversity protections in the NESPF, including protections for indigenous flora and mobile fauna such as birds and fish.

Neither of these issues is adequately addressed.

NESPF settings for harvesting should impose a reverse burden for clear felling

9.11 In most cases, clear fell harvesting will result in significant adverse biophysical effects. It is contrary to s 43A(3) of the RMA to ascribe permitted activity status to clear fell harvesting where this is the case. To correct this, the NESPF settings should impose a reverse burden for clear fell harvesting. Our discussion and recommendations in paragraphs 5.41 – 5.49 above refer.

The NESPF's biodiversity protections are insufficient

9.12 The NESPF recognises that plantation forestry activities can adversely affect indigenous flora and fauna by giving particular consideration to SNAs, indigenous vegetation clearance (excluding pre-afforestation), certain bird species when nesting, and freshwater fish species when spawning.[83] The scope and substance of these limited protections are inadequate, particularly in light of the increasing role of plantation forests in providing ecological buffers and connectivity between indigenous forest remnants, habitat for indigenous endangered fauna, and canopy cover for the growth of indigenous understorey flora. Indeed, in Kinleith Forest, the proportion of indigenous plants in the understorey of a 29-year-old stand was found to be 82%.[84]

9.13 With the extensive loss of natural, indigenous habitat for so many species, plantation forests are becoming increasingly important in some regions for helping to conserve indigenous fauna on a landscape scale. As a result, "[f]ailing to both assess the effects of forestry activities on indigenous fauna and ensure the protection of species that live in plantation forest could have significant impacts, even including species extinction."[85]

[83] EDS NESPF Review, at 12.
[84] EDS NESPF Review, at 3, 12, citing Dyck W J, 1997, Biodiversity in New Zealand plantation forestry – an industry perspective, NZ Forestry 42(3): 6–8.
[85] EDS NESPF Review, at 13.

9.14 It is therefore a significant omission that, in relation to fauna habitat, the NESPF deals only with certain bird species nesting sites. No provision is made for other fauna species for whom plantation forests provide habitat, such as bats, reptiles, frogs and invertebrates.[86]

9.15 And as far as the NESPF relates to bird nesting sites, the efficacy of its protections is questionable. Where nesting sites for certain species are known to be present, steps must be taken to locate these; staff trained to identify them, and unspecified steps taken to avoid or mitigate impacts on these birds and nests. Such a degree of regulatory generality makes these controls unlikely to be enforceable except in very clear cases and ultimately inadequate to address what may be significant adverse effects on threatened species.[87]

9.16 Realising the positive outcomes of forests for all native flora and fauna depends on a much more comprehensive and integrated approach that extends well beyond bird nesting sites. The diverse habitat requirements, dispersal abilities, and threat status of indigenous fauna and impact of harvesting on these requires a multifaceted approach within plantation forests to help conserve indigenous biodiversity on a landscape scale.[88] Peterson and Hayman[89] have suggested that effective measures should include retaining areas of forest which develop high structural complexity,[90] maintenance of mixed-age exotic stands, and individual threatened species programmes.

9.17 Requirements under the Forestry Stewardship Council's certification scheme are more consistent with such an approach. These require signatories to:[91]

(a) Identify, map, and protect indigenous habitat that supports rare, threatened, or endangered species and those important to their life cycle;
(b) Detail in management plans and work prescriptions for areas due for harvesting or silviculture the steps to be taken to protect rare, threatened, or endangered species in production areas. This includes training employees and contractors to recognise these species and in contingency planning to enable the protection of located species; and
(c) Retain or restore at least 5% of the management unit to natural forest cover[92] and a minimum of 10% of the ecological district or region must be protected or restored to indigenous vegetation (although this can be achieved through "equivalent ecological effort" elsewhere).

9.18 The draft NPSIB recognises that plantation forestry blocks increasingly provide significant habitat for indigenous fauna and vegetation, which would ordinarily qualify as an SNA (thereby triggering requirements for a resource consent and associated SNA controls in

[86] EDS NESPF Review, at 13.
[87] EDS NESPF Review, at 13.
[88] EDS NESPF Review, at 14.
[89] Peterson P and E Hayman, 2018, Conserving indigenous fauna within production landscapes, Contract Report LC3216, Manaaki Whenua–Landcare Research, Lincoln, cited in the EDS NESPF Review, at 14.
[90] Retention forestry has emerged as an effective, practical approach to achieve biodiversity gains internationally. EDS NESPF Review refers at 14.
[91] EDS NESPF Review refers at 14.
[92] FSC Certification, Criterion 10.5.

respect of future forestry activities).[93] The approach proposed under the NPSIB is "to provide for production activities to continue, while protecting the rarest species." The Ministry for the Environment's exposure draft summary of the NPSIB for the forestry sector accordingly provides that:[94]

> "Where Threatened or At Risk species occur within the productive parts of a plantation forest, this creates an SNA but without the full set of SNA restrictions. Instead, the NPSIB requires the species to be managed to maintain their long-term populations over the course of consecutive rotations. This replaces the 'avoid' requirements and the effects management hierarchy which normally apply to SNAs (3.10(2))."

9.19 In light of our current biodiversity crisis, regulatory controls must extend beyond both a managing-for-maintenance for Threatened or At-Risk species, or an 'avoid or mitigate' adverse effects approach, if genuine biodiversity gains are to be achieved.[95] Integrated species conservation measures for all indigenous species that use plantation forests as habitat are necessary.[96] Such measures should be expressly provided for in certified forest management plans, and subject to compliance auditing and enforcement.

9.20 A biodiversity grant scheme could be explored to recognise that retention forest decreases the productive area to some extent, and therefore compensates forest owners for the associated financial loss and incentivises the setting aside of such areas.[97]

9.21 A more powerful tool would be to establish a credible biodiversity credit scheme that operates alongside and as a counterbalance to the bio-perversities occurring as a result of the ETS. Foresters would be able to access revenue streams for carbon sequestration under the ETS and for measurable biodiversity gains under a biodiversity credits scheme. The latter would support the achievement of freshwater objectives, help arrest the decline of Aotearoa New Zealand's indigenous flora and fauna, and create long-term, biodiverse and climate-resilient carbon sinks in line with the Government's aspirations under the ERP.

9.22 Harvest methods and management also need to be addressed. The nature of plantation forestry means that many biodiversity gains are temporary and are lost during harvesting when the plantation canopy cover, understorey, and associated fauna habitats are lost.[98] As the Year One Review noted, a cyclical forest regime conflicts with providing continuous habitat for species.[99]

9.23 The effects can vary, however, depending on the method and speed of felling, refugia that remain, and the surrounding land uses.[100] Where clear fell harvesting methods are used, as

[93] EDS NESPF Review, at 13.
[94] Ministry for the Environment's National Policy Statement for Indigenous Biodiversity - Exposure Draft Summary for the Forestry Sector, at 2.
[95] EDS NESPF Review, at 15.
[96] EDS NESPF Review, at 15.
[97] EDS NESPF Review, at 15.
[98] EDS NESPF Review, at 12.
[99] Year One Review, at 31.
[100] Year One Review, at 29.

is typical in Aotearoa New Zealand, habitats are destroyed and flora and fauna can be harmed or killed.[101] Some are taonga.

9.24 The protection of areas of indigenous vegetation and habitats of indigenous fauna is a matter of national importance under section 6 of the RMA. Yet it is abundantly clear that clear fell harvesting often results in significant adverse environmental effects, including for biodiversity, and is therefore contrary to sections 6 and 43A(3) of the RMA. As a harvesting method, clear fell harvesting should be the exception (pursuant to a reverse burden) under the NESPF. The presumption, thus, would be that alternative, less ecologically destructive harvesting methods, should be deployed.

9.25 Freshwater biodiversity protections under the NESPF should also be revisited. Shortcomings include:

(a) The focus of regulatory protection is on streams as freshwater fish spawning habitat. This fails to recognise the broader ecosystem value of freshwater habitat, or habitat at other stages of a freshwater fish's life. The NESPF should recognise that freshwater biodiversity is not limited to fish species and other aquatic species should be recognised and protected, including protection of ephemeral water bodies;

(b) The exclusion of ephemeral streams (which only flow part of the year after rainfall) from the NESPF's definition of perennial river. Ephemeral streams are highly important for vertebrate life. As a result, the NESPF fails to provide protection for entire ecosystems;[102]

(c) River crossings other than fords may be installed as a permitted activity regardless of the water body's significance as habitat;[103]

(d) New fords are not permitted in a river listed in a regional plan or water conservation order as a habitat for *threatened* indigenous freshwater fish or as a freshwater fish spawning area, but this does not provide any protection for those at risk but not threatened, except when they are spawning;[104] and

(e) Reliance on the New Zealand Freshwater Fish database and Freshwater Fish Spawning Indicator to predict the presence of absence of fish is questionable due to significant data gaps.[105]

[101] EDS NESPF Review, at 12.
[102] EDS NESPF Review, at 15.
[103] Ibid.
[104] Ibid.
[105] Ibid.

Other issues that need to be addressed under an amended NES

SNAs

9.26 Afforestation does not enjoy permitted activity status within SNAs. However, the protection of SNAs relies on their identification pursuant to a regional policy statement or plan. The extent to which Councils have identified and mapped SNAs is variable, and therefore their protection.

9.27 A better position would be to place an onus on forest operators to demonstrate *prior* to afforestation that the proposed areas do not contain indigenous vegetation cover, and that if they:

(a) Do, it does not qualify as an SNA; or
(b) Do not, their forestry management plan identifies where SNAs are located and how they will be protected throughout the forestry rotation.[106]

9.28 Currently, only harvest plans must identify the location of SNAs to be protected, and how harvest operations will ensure that:

(a) There is no significant affect to SNA values; and
(b) The ecosystem will recover to a state where it is predominately of the composition previously found at that location within 36 months.

There is no requirement for independent expert ecological advice in relation to assessing the adequacy of any proposed measures in this regard.[107]

9.29 As noted above at paragraph 9.27, the point of SNA protection should not be at harvest. SNA protection must be incorporated into forest design and planning to understand how the overall forestry operation will likely affect SNAs.[108] Again, a more holistic, lifecycle approach to forestry management planning prior to afforestation will better ensure the avoidance of adverse environmental effects.

9.30 Other concerns we have noted in relation to the SNAs include that:

(a) The anticipated expansion of forestry land could give rise to the conversion of grassland and shrubland that may qualify as an SNA simply because they have not been identified as such by Council, and there are either no or inadequate controls for the clearance of indigenous vegetation prior to afforestation (which fall outside the NESPF). In such cases, "there is a real risk that there may be no interaction with Council prior to afforestation occurring."[109] The Year One Review noted that the

[106] EDS NESPF Review, at 13.
[107] EDS NESPF Review, at 14.
[108] EDS NESPF Review, at 14.
[109] EDS NESPF Review, at 14.

NESPF rules should include vegetation clearance pre-afforestation so that afforestation does not occur on land that has, or may develop, high indigenous biodiversity values.[110]

(b) The ecological rationale for setbacks from SNAs for many plantation forestry activities is questionable, with many insufficient (e.g., 10m when trees may be as tall as 50m), or indeed not required at all (e.g., earthworks). [111]

(c) Although the NESPF allows Councils to apply more stringent rules to protect SNAs and other areas meeting Policy 11 of the NZCPS in the coastal marine area, in practice only a few Councils have identified marine SNAs. This means that ecologically significant coastal sites may not receive adequate protection from sedimentation impacts through regional rules. Support is necessary to require and incentivise regional councils to progress the identification of marine SNAs and provide guidance to help them derive regional rules relating to plantation forestry that address the effects of sediment on marine SNAs.[112]

Landscape and natural character

9.31 The NESPF protects landscapes and natural character only in relation to ONLs and VALs that have been identified in Council plans or policies by description or location.[113] Areas of natural character are not referred to in the NESPF.[114]

9.32 Greater stringency is permitted to protect identified ONLs, but not for VALs, in respect of which controlled activity status applies to afforestation. In this regard,[115]

> "although Councils have the ability to impose conditions in respect of matters over which control is reserved, these conditions cannot be so onerous so as to frustrate the consent. Because there is no ability for Councils to adopt more stringent provisions to control impacts on visual amenity landscapes, afforestation in these areas cannot be avoided and Councils are restricted to 'tinkering around the edges' in an effort to try and ameliorate effects."

Instead, the activity status for afforestation in VALs should be changed so that afforestation can be declined.[116]

9.33 There is no ability to control the effects of plantation forestry adjacent to VALs or areas of natural character.

[110] Year One Review, at 33.
[111] "The Scion assessment of the environmental costs and benefits of the NESPF did not include any evidence that a 10m setback would be adequate to protect SNAs." (Scion 2015), cited in EDS NESPF Review, at 14.
[112] EDS NESPF Review, at 15.
[113] EDS NESPF Review, at 29.
[114] EDS NESPF Review, at 29.
[115] EDS NESPF Review, at 30.
[116] EDS NESPF Review, at 30.

9.34 The EDS NESPF Review concluded that:[117]

> "The lack of value placed on visual amenity landscapes is a significant gap. These landscapes are generally identified due to their significance to local communities, forming an important part of their background and heritage. …. [T]heir protection is important. Plantation forestry comes with significant visual impacts, but also other impacts on amenity such as [noise, traffic, and reduced access]."

9.35 The EDS NESPF Review also found that the NESPF does not directly control the effects of plantation forestry on the natural character of the coastal environment.[118] Councils could adopt more stringent provisions for this purpose, but this places the onus back on Councils to develop and pursue appropriate controls and justify when greater stringency is warranted. Why natural character has been treated differently to landscape is not clear.

9.36 In summary, Councils should have flexibility to apply greater stringency to protect ONLs and VALs, including areas that qualify as such but have not yet been identified in plans.

Setbacks

9.37 The NESPF's setback standards are inconsistent (both across the range of water bodies and as between forestry activities), inadequate and ecologically questionable. By way of summary, and subject to various listed exceptions:

(a) Afforestation and the operation of harvesting machinery must not be undertaken within:
   i. 5m of a perennial river less than 3m wide or a wetland larger than .025ha;
   ii. 10m of a river greater than 3m, lake larger than 0.25ha, an outstanding freshwater body, a water body subject to a conservation order, or an SNA; or
   iii. 30m of a coastal marine area

(b) Earthworks must not be undertaken within:
   i. 10m of a perennial river, wetlands or lakes larger than 0.25ha, an outstanding freshwater body or water body subject to a conservation order; or
   ii. 30m of a coastal marine area

   SNAs are not addressed.

(c) Forestry quarrying must not be undertaken within:
   i. 20m perennial river of any size, wetland or lake larger than 0.25ha; or
   ii. 30m of a coastal marine area.

   No other water bodies are mentioned (e.g., outstanding freshwater bodies).

[117] EDS NESPF Review, at 30.
[118] EDS NESPF Review, at 30.

9.38 Thus, setback standards:

(a) Only apply to a portion of water bodies, either because of size restrictions (e.g., wetlands) or due to exclusion altogether (ephemeral streams).

i. With wetlands on the precipice of total loss in Aotearoa New Zealand, the setbacks completely fail to recognise that many of the country's remaining wetlands are compositionally unique and home to many endemic flora species, irrespective of their size, and that even small wetlands have very high ecological values, intrinsically and ecologically;[119]

ii. Similarly, rivers less than 3m wide are equally as valuable as those greater than 3m.[120] Smaller streams in the headwaters are the main conduits to lower reaches, meaning water quality impacts there will significantly increase cumulative impacts further down the catchment.[121] Loss of riparian vegetation in upper reaches will likely result in increased water temperatures at the point of tree clearance and down the catchment due to loss of shading.[122] Smaller rivers, both those with continuous and intermittent flow, and surrounding riparian vegetation provide critical ecological habitat.[123]

To this end, "size of the water body is not determinative of its value, so should not be used as the determinant for the application or width of setback. What should be determinative is the sensitivity of the water body and its slope, as well as the surrounding soil profile, and likely increasing frequency of significant rainfall events]."[124]

(b) Are inadequate to protect riparian and instream ecosystem health. A minimum setback width of 10m is needed to achieve improvements in instream habitat and provide sustainable riparian areas;[125]

(c) Are either set at a distance for which no ecological (or scientific) justification has been evidenced (5m) or at a distance (10m) which, in light of the damage that occurs during harvesting, will effectively be halved. Generous setbacks need to apply at the point of afforestation and replanting because it is difficult to impose greater setbacks later;[126]

(d) Do not factor in degradation and loss of the setback buffer during harvesting; and

[119] EDS NESPF Review, at 20.
[120] EDS NESPF Review, at 21.
[121] Ibid.
[122] Ibid.
[123] Ibid.
[124] Ibid.
[125] EDS NESPF Review, at 20.
[126] EDS NESPF Review, at 24.

(e) Do not properly account for the water absorption impacts of trees in close proximity to wetlands and smaller water bodies. The NESPF setbacks should adopt a conservative distance consistent with achieving protection of the most sensitive water bodies on replanting.[127]

9.39 These deficiencies are resulting in forestry activities having adverse impacts on water quality, natural character and aquatic ecosystems, thereby calling into question the lawfulness of permitted setback standards under s 43A(3) of the RMA.[128]

Sediment controls

9.40 Sediment controls under the NESPF are vague and unenforceable. They require the management of sediment originating from applicable forestry activities to ensure that "after reasonable mixing" it does not give rise to "any conspicuous change in colour or visual clarity", the rendering of fresh water unsuitable for consumption by farm animals, or any significant adverse effect on aquatic life in the receiving waters. We acknowledge that the phrase "reasonable mixing" derives from RMA's provisions regarding discharges. Nevertheless, it is unclear how to determine the point at which "reasonable mixing" may have occurred, nor indeed what would constitute "any conspicuous change in colour or visual clarity". It is unclear how compliance with this standard can be measured, adequately monitored, or enforced.

9.41 It is also unclear why a different set of effects are listed in relation to "disturbed soil" from harvesting, which "must be stabilised or contained to *minimise* sediment entering into any water and resulting in (a) the diversion or damming of any water body; or (b) degradation of the aquatic habitat, riparian zone, freshwater body, or coastal environment; or (c) damage to downstream infrastructure and properties.[129] In addition, the term "minimise" is inherently subjective and there are no clear baseline attributes, nor measurable quantitative or qualitative level of 'acceptable' effects, against which to assess compliance.[130] Clear standards are essential, providing how and where to measure an acceptable percentage change in visibility, and within what time periods.

9.42 Such regulatory uncertainty, together with a permitted activity standards approach to regulatory control, risk cutting across the objectives of the NPS FM, including staying within limits, integrated catchment management, and the protection of ecosystem health, wetlands, and outstanding water bodies.[131] Although regulation 6(1)(a) provides that rules or plans *may* be more stringent than the NESPF for the purpose of giving effect to the NPS FM, this is obviously not mandatory. The absence of such stringency (and a nationally consistent approach in this regard), in concert with the uncertain application and enforceability of sediment controls under the NESPF, jeopardise the health and well-being of

[127] EDS NESPF Review, at 20.
[128] EDS NESPF Review, at 20.
[129] NESPF, Regulation 67(2).
[130] EDS NESPF Review, at 21.
[131] EDS NESPF Review, at 24.

water bodies and freshwater ecosystems. It is therefore essential that the NESPF's sediment controls fully and expressly align with the objectives and requirements of the NPS FM.

10 Vegetation clearance

10.1 The NESPF currently defines "vegetation clearance" as:[132]

(a) the disturbance, cutting, burning, clearing, damaging, destruction, or removal of vegetation that is not a plantation forest tree; but
(b) does not include any activity undertaken in relation to a plantation forest tree.

We agree with the Discussion Document that the exclusion described in paragraph (b) could be interpreted "as enabling any vegetation clearance as long as it is associated with any activity involving plantation trees, which could potentially cover most activities in a plantation forest"[133] and should be removed.

10.2 As noted in paragraphs 9.27 and 9.30(a) above and the Year One Review, the NESPF does not, but should, regulate pre-afforestation vegetation clearance.

10.3 The NESPF permits clearance of non-indigenous vegetation associated with plantation forestry activities if all permitted activity conditions are met for the associated plantation forestry activity.[134] Clearance of indigenous vegetation associated with plantation forestry activities is also permitted provided:

(a) clearance does not occur within an SNA except to clear a forestry track that has been used within the last 5 years;[135] and
(b) the indigenous vegetation:[136]
    i. has grown up under (or may have overtopped) plantation forestry; or
    ii. is within an area of a failed plantation forest that failed in the last rotation period (afforestation to replanting) of the plantation forestry; or
    iii. is within an area of plantation forest that has been harvested within the previous 5 years.

10.4 In addition to the above, clearance of indigenous vegetation located within or adjacent to a plantation forest is also allowed if it is under the same ownership and does not exceed 1 hectare or 1.5% of the total are of indigenous vegetation (whichever is greater).[137]

10.5 Incidental damage to indigenous vegetation is also a permitted activity and may occur in an area that is within or adjacent to any plantation forest, including a riparian zone.

[132] NESPF, Regulation 3.
[133] Discussion Document, at 64, D9c.
[134] NESPF, Regulation 95(1).
[135] NESPF, Regulations 93(1), 93(2)(d).
[136] NESPF, Regulation 93(2).
[137] NESPF, Regulation 93(3).

10.6 Regulation 93(5) defines "incidental damage" as

(a) damage where the ecosystem will recover to a state where, within 36 months of the damage occurring, it will be predominantly of the composition previously found at that location; or

(b) damage to indigenous vegetation canopy trees that are greater than 15 m in height, where the damage does not exceed—

(i) 30% of the crown of any indigenous vegetation canopy trees and no more than 30% of those trees per 100 m of the indigenous vegetation perimeter length; or

(ii) 10 m in continuous length per 100 m of a riparian zone length (with the applicable riparian zone width); or

(c) if it occurs in an SNA, damage that—

(i) does not significantly affect the values of that significant natural area; and

(ii) allows the ecosystem to recover as specified in paragraph (a).

10.7 There are a number of highly subjective elements to this definition, including how to determine with a reasonable degree of certainty (and in advance):

(a) whether an ecosystem will be able to recover

i. within 36 months of the damage occurring;

ii. to a state where it will be "*predominantly* of the composition previously found at that location";[138] or

(b) whether the damage will "not significantly affect the values" of the SNA.

10.8 The Discussion Document acknowledges that "there is a degree of subjectivity in regulation 93(5)(a) and (c)",[139] but submits that "this is almost unavoidable in practical terms."[140] MPI seeks information in relation to "how foresters are complying with this regulation and any issues foresters or councils are having in applying it as a permitted activity."[141] A more telling lens through which to assess the efficacy of the "incidental damage" definition would be to consider its enforceability. In its current form, "[i]t is likely to be impossible to enforce except in the most egregious cases of damage."[142] Accepting regulatory uncertainty in this respect is entirely at odds with the aim of avoiding significant adverse environmental effects.

[138] The EDS NESPF Review noted, at p 13, that "indigenous "*predominance"* can be particularly difficult to demonstrate in an enforcement context following vegetation clearance. In *Director-General of Conservation v Invercargill City Council* the Environment Court declined to incorporate the term "predominantly" into a definition of indigenous vegetation because of its uncertainty. The definition in the NESPF was specifically noted."

[139] Discussion Document, at 64, D9d.

[140] Ibid.

[141] Ibid. As an example of practical compliance with the indigenous vegetation clearance regulation, we have been advised anecdotally that spray drift from forestry herbicide use (which does not appear to be subject to any regulatory setbacks under the NESPF) is destroying non-SNA native riparian vegetation.

[142] EDS NESPF Review, at 13.

11 Concluding remarks

11.1 Realising the full range of intergenerational benefits associated with forests is complex, with multiple policies and interests at play. Careful, long-term strategic thinking is necessary to chart a clear path towards a sustainable, biodiverse, climate-resilient forest future for Aotearoa New Zealand.

11.2 The first critical steps on this journey are to make the NESPF fit-for-purpose, and to counteract the ETS's economic bias towards *Pinus radiata*. We would welcome further involvement in each of these tasks.

Proposal for a Continuous Cover Forestry (CCF) Fund

Author: David Hall, Climate Policy Director, Toha.

Adapted from: David Hall & Sam Lindsay (2020). *Scaling Climate Finance: Forest Finance*. Mōhio Research: Auckland.[1]

Summary

1. The Continuous Cover Forestry (CCF) Fund is a proposed impact equity instrument which acquires forestry assets for management under CCF principles, so that harvesting is limited to selective felling or small coupe harvests. Consequently, the CCF Fund is designed to precipitate a shift toward more sustainable forestry management, mobilise capital markets for an impact-oriented investment asset, and create an 'exit route' for forestry companies that cannot continue to clear-fell harvest due to greater regulatory stringency or loss of social licence.
2. CCF is a promising land-use option as part of a nature-based recovery for Te Tai Rāwhiti. CCF will *not* be appropriate for *all* sites, but, where CCF is technically and economically feasible, it offers the opportunity to continue forestry production while significantly reducing negative impacts on local environments and communities.

Context

3. Continuous cover forestry (CCF) refers to forest management systems, such as selective harvesting or small coupe felling, that maintain a continuous canopy cover throughout the practice of timber extraction.
4. Promotion of CCF systems is identified as Action 7.2 in the Forestry and Wood Processing Industry Transformation Plan (ITP). Work is currently underway to address critical knowledge gaps and establish forestry trials.
5. CCF is relatively rare in New Zealand. Most plantation forestry is managed by clear-fell systems. However, there are examples of CCF in New Zealand which can be learnt from (see **Appendix**). Also CCF systems are more common in other parts of the world, including Europe through the Pro Silva movement.
6. Because CCF systems retain an ongoing presence of canopy cover, root structure and forest habitat, some of the environmental harms of clear-fell harvest systems can be avoided or minimised. CCF can result in reduced incidence of sedimentation and erosion, reduced habitat disruption for native flora and fauna, and reduced mobilisation of forestry debris. CCF may also produce greater ecological resilience due to its uneven-aged forest structure and frequent use of diverse tree species, which reduces the risk of significant forest loss from fire, disease or windthrow.
7. These attributes make CCF a potential substitute for conventional clear-fell forestry at *some* sites in Te Tai Rāwhiti. It must be stressed that the appropriateness of CCF can

[1] This report was an output of the Climate Innovation Lab, a co-design process supported by ANZ, involving representatives from the investment, forestry and research sectors.

only be determined on a site-by-site basis, because at some sites the transition from clear-fell to CCF may be impractical, so the environmentally optimal land use might be unharvested native forest. However, where CCF is viable, these systems may reduce the environmental impacts of plantation forestry while preserving ongoing opportunities for timber harvesting.

8. CCF faces multiple barriers to implementation at scale. These include:
    - an unwillingness among forestry-sector incumbents to accept a reduced rate of return by transitioning forest assets from clear-fell to CCF;
    - a lack of technical expertise in selective harvesting;
    - limited access to specialised harvesting equipment;
    - cultural and institutional inertia (or path-dependencies) which lock-in clear-fell systems, such as optimisation of wood processing for standardised *Pinus radiata* logs; and
    - actual or perceived risks of an unfamiliar silvicultural system by land- and forest-owners.
9. However, once a forest is being successfully harvested under a CCF regime, it is an attractive asset from an investor perspective.[2] Its advantages include:
    - CCF delivers a stable cash yield, like 'clipping the coupon' on a bond, with less exposure to timber price fluctuations than clear-fell forestry.
    - CCF produces larger, more valuable trees and a higher proportion of saw logs, which achieve a higher price per m3.
    - CCF grows and maintains the capital value of the forest in perpetuity.
    - CCF can generate higher carbon yields under stock change accounting in the Permanent Forest Category than plantation forestry otherwise can under averaging accounting.
    - Transformation to CCF brings forward cash flows because of heavier thinning in early years.
    - CCF minimises the costs of replanting by relying on natural regeneration to establish replacement trees.
    - Ongoing management and harvesting creates more stable job opportunities.
    - Additional costs from management and harvesting are not prohibitive once the environmental and social benefits of CCF are taken into account, especially if ecosystem services like biodiversity improvement and avoided erosion are monetised.

Proposal

10. A Continuous Cover Forestry (CCF) Fund is designed to leverage the positive investment attributes of CCF in order to overcome the transition barriers. It uses sustainable finance to induce a transition in forestry management approaches in the East Coast.
11. The CCF Fund's theory of change is to focus on shareholders as a critical lever for change in East Coast forestry. By creating an investment opportunity that strikes a better

[2] McMahon, P. and Sarshar, D. and Purser, P. (2016). *Investing in Continuous Cover Forestry*. Report prepared by SLM Partners.

balance between social, environmental and financial returns, the CCF Fund crowds in impact-oriented shareholders whose risk and return expectations are well-aligned with CCF. Consequently, it also crowds out shareholders who are singularly focused on financial returns and indifferent to the social and environmental harms of clear-fell forestry on highly erodible land.

12. The CCF Fund uses blended finance – i.e. a combination of structured public and private finance – to create a tiered funding pool that purchases forestry assets with the intention of transitioning into CCF systems. Government capitalises the junior tranche, which provides investors the confidence to capitalise senior tranches.
13. The primary focus of the CCF Fund's investment strategy is harvested forest land which is due for restocking, and recently planted sites (e.g. planted within last ten years). In both cases, the transition to CCF is relatively straightforward and a positive return on investment can be achieved through good forest management.
    - A secondary focus for the CCF Fund is mature even-aged stands which were intended for clear-fell harvest, but cannot be harvested due to environmental, social and regulatory factors. Conversion of mature stands to CCF is technically challenging and therefore likely to incur higher costs and risks. Consequently, such assets will likely need to be publicly funded as a harm avoidance strategy, rather than solely on the basis of expected financial returns. Nevertheless, a vertically integrated CCF Fund is likely to accumulate the skills and equipment needed for such transitions, so the provision of public goods should be included in its strategy.
14. Existing economic analysis of CCF demonstration sites in New Zealand give reasonable confidence of positive returns on investment from CCF assets under existing settings (see **Appendix** below). All else being equal, financial returns are likely to be lower than clear-fell systems, but this is partly because the latter do not pay the full costs of production. Many of the environmental and social costs from clear-fell harvesting are externalised, which include the costs of erosion and sedimentation associated with earthworks and harvesting, the production of forestry debris and its impacts when mobilised by flood events, and the total loss of habitat for native flora and fauna when harvesting occurs. If clear-fell forests were compelled to pay for those costs, or if CCF forests were remunerated for their relative benefits, then the economics would shift in favour of CCF.
15. If Cyclone Gabrielle results in new regulations or penalties, or greater stringency and enforcement of existing regulations and penalties, then these externalities will be (at least partially) internalised. Consequently, many clear-fell forest assets are likely to become uneconomic and/or unharvestable, effectively becoming stranded assets. If forestry investments are forfeited and abandoned, this creates future challenges and risks for land management, because these abandoned forests are likely to be maladaptive and hazardous. In this context, the CCF Fund offers an 'exit route' for such forests, which might be sold at a discount to the CCF Fund for transition into an appropriate management system. This could help to defuse industry resistance to

stronger regulation of clear-fell forestry on erodible land, because forestry companies at least have an option to minimise losses.[3]

16. Government support for the CCF Fund is likely to be essential. The CCF Fund is designed to alleviate total liabilities to government by crowding in private finance, deploying public finance as equity rather than grants, and using productive forestry systems to address multiple policy goals. However, because the current forestry sector is dominated by clear-fell systems, a transition to alternative systems will require a pro-active market-shaping approach by government. This support need not be indefinite, because CCF systems can be profitable and self-sustaining over the long run, but support is needed to achieve breakthrough for innovative forestry systems.
17. The proposed CCF Fund uses blended and structured finance to crowd in impact-oriented investment. Government investment is used to capitalise the CCF Fund's junior tranche, which absorbs a higher level of risk in order to facilitate a transition in forestry management that supports multiple policy objectives including climate adaptation, biodiversity, water quality, and long-lasting carbon storage. The senior tranche is capitalised by private capital markets, specifically impact-oriented institutional investors who are actively searching for opportunities to combine positive financial returns with a strong alignment to net-zero, climate-resilient, nature positive outcomes. With this equity-based structure, private capital markets can do the heavy lifting of capitalisation, while government can achieve multiple policy objectives by taking an equity stake that (unlike grant funding) creates revenue opportunities over the long run.
18. Another critical enabler of CCF systems is a biodiversity payment which enables a shift from *Pinus radiata* to high-value native timber species, thereby increasing the financial returns from timber as well as the co-benefits for biodiversity. This payment could be operationalised by various instruments, such as biodiversity credits, payments-for-ecosystem-services or ecological fiscal transfers. The rationale is as follows:
    - Although CCF of *Pinus radiata* is economically feasible (see **Appendix**), the economics are improved if continuous-cover forests transition into high-quality, high-value timber species, including native timber species.
    - Native timber species have slower growth rates in the early years, which reduces the scale of potential revenue from carbon markets such as the Emissions Trading Scheme, and also delays the opportunities for harvesting.
    - Consequently, native forests face a liquidity challenge in the early phases, with limited opportunities for cashflow to pay dividends, service debt, or fund forest management. Although growth rates might be increased through improved forest management and genetics, the slow initial growth rates of native tree species is a biophysical constraint with implications for economic viability.
    - A well-designed biodiversity payment, however, would create liquid cashflow when it is needed most. The early phase of forest establishment, when growth

[3] Sally Gepp, Madeleine Wright & David Hall (2019). *A Review of the Resource Management (National Environmental Standards for Plantation Forestry Regulations 2017*. Report prepared for Environmental Defence Society (EDS) and Forest & Bird. Retrieved from: http://www.eds.org.nz/assets/pdf/Review%20of%20NES -PF%20FINAL.pdf

rates of native trees are slowest, is also the phase when the biodiversity improvements are greatest, when native tree species succeed over exotic grasses, shrubs and trees. A well-designed biodiversity payment could reward the rate of change in species composition toward indigenous species dominance, which means that the biodiversity payment declines while the carbon revenue increases. This also means that the funder's liabilities are time-limited, rather than extended into perpetuity.

- In this way, a biodiversity payment can address financial barriers for CCF by creating liquid cashflow to pay dividends, service debt or fund forest management in the early years, before carbon revenues and harvesting opportunities are realisable.

19. In sum, a CCF Fund would make a valuable contribution to a nature-based recovery in Te Tai Rāwhiti, while also building the skills and capabilities to catalyse a nationwide shift to alternative forestry systems. Through a cornerstone investment, the government could mobilise private capital markets to support revenue-generating forestry assets that create regional economic opportunities, while also serving multiple policy objectives in climate adaptation, biodiversity enhancement, protection of freshwater and marine ecosystems, and long-lived carbon storage.

Appendix

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Forest & Bird

TE REO O TE TAIAO | *Giving Nature a Voice*

Submission of the Royal Forest & Bird Protection Society of New Zealand Inc. to the Ministerial Inquiry into Land Use of East Coast region following Cyclone Gabrielle February 2023

6 April 2023

Contact

Name	**Dean Baigent-Mercer**
Title	**Conservation Manager**
Email	9(2)(a)
Phone	

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Nature-based solutions key to climate resilience and land use recovery on the East Coast

Summary

Following the destructive forces of Cyclone Gabrielle in February 2023, Forest & Bird outlines solutions within the Inquiry area and beyond, in the context of both the global climate and biodiversity crises, including:

- nature-based solutions for the East Coast region to build natural resilience in a changing climate
- necessary plantation forestry controls and improvements

Introduction

1. The Royal Forest & Bird Protection Society of New Zealand has been New Zealand's independent voice for nature since 1923. Over generations, Forest & Bird has helped make New Zealand a better place to live by standing with communities to protect forests, lakes, and rivers from destruction, campaigning to create marine reserves and eco-sanctuaries, and working to save threatened species.
2. Forest & Bird's constitutional purpose is:

   > *To take all reasonable steps within the power of the Society for the preservation and protection of the indigenous flora and fauna and the natural features of New Zealand.*

3. Following his successful 1922 campaign to protect and restore Kāpiti Island, Captain Ernest "Val" Sanderson, of Paekākāriki, was urged by his friend Sir Thomas Mackenzie to set up a society of like-minded people to work together to do the same for the "birds and bush" all over the mainland. Sanderson went on to establish the Native Bird Protection Society of New Zealand in Wellington on 28 March 1923 – the first modern day conservation group in Aotearoa.
4. In the 20 years after World War I, the Society's rising profile saw a rapid growth into the regions with many Forest and Bird "sections" established all over the country, with the first being in Christchurch (1946), with Auckland and Gisborne following in 1947. These sections advocated for nature in their backyards, supporting national campaigns while also advocating locally on conservation issues. In the mid-1950s, the society changed its constitution so the sections could become branches. Around this time, many local members wanted to carry out practical conservation work – planting, weeding, and predator control.

The Gisborne Forest & Bird group at Morere 1959

5. Forest & Bird is proud to have helped five generations of dedicated nature lovers – volunteers, donors, and staff – be the voice of nature for the past 100 years...and counting.
6. We are a registered charity, with our funding coming primarily from members and supporters; we receive government grants only for specific practical projects. Our nearly 50 volunteer branches throughout New Zealand work on the ground to restore nature through activities such as running pest control programmes, native plant nurseries, field trips, and public talks.
7. The Society has advocated for better soil and water management in Te Tairāwhiti and the rest of New Zealand since the 1930s. Back then, Sanderson and soil scientist Dr Lance McCaskill connected the dots between native forest logging, erosion, and flooding and asked New Zealanders to become “soil savers”.
8. Our branches in Te Tairāwhiti, Gisborne, Central Hawke’s Bay, Napier and Hastings-Havelock North are strong advocates and our local voices for nature. They are looking after our ecological taonga such as Lindsay Bush, Blowhard Bush, Little Bush and Waitangi Reserve by planting native trees, pest control and liaising with local authorities and Iwi.
9. Cyclone Gabrielle has severely affected those areas, with years of conservation mahi conducted by our members and volunteers diminished overnight. Some sites still cannot be accessed safely by our volunteers.
10. Impacts on the local infrastructure, such as state highways as critical lifelines, particularly for remote communities in Tairāwhiti, have significantly disrupted everyday life for thousands of Kiwis long-term.
11. While roads can be rebuilt, many local communities have lost their entire livelihoods as a result of Cyclone Gabrielle. As we look to recover from these disasters and reduce the

impact of future extreme weather events, nature has a key role in helping us to adapt. By protecting nature, we can protect ourselves and our communities.

12. Across the world people are looking to nature-based solutions to solve the challenges that climate change poses to us, our communities, and our businesses. Aotearoa New Zealand has considerable opportunity to deploy nature-based solutions as adaptation to a changing climate in the aftermath of Cyclone Gabrielle.
13. Nature-based solutions are defined as "actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity"[1].

Background: relearning old lessons from Cyclone Bola

14. The impacts of Cyclone Gabrielle exposed many vulnerable – and failed – aspects of land management.
15. In 1988, the then Parliamentary Commissioner for the Environment conducted an inquiry in flood mitigation measures in light of Cyclone Bola's aftermath. The report from the inquiry revealed problems and proposed solutions that are still relevant 25 years later.
16. That inquiry accurately warned of the consequences of significant rainfall causing flooding, including the loss of soil, pasture, stock and farming assets, the loss of crops, damage to public property and services and the risk of social disruption for the people who live on flood plains. It also noted the exacerbation of impacts from deforestation of hillsides and destruction/drainage of wetlands.
17. Key findings from the inquiry about measures that worked to reduce sedimentation and erosion and that led to recommendations of more afforestation and soil conservation work included:
    a. Farms with soil conservation work experienced less damage.
    b. Soil erosion was minimised in hill country catchments that had large scale afforestation or native forest.

[1] https://wwf.panda.org/wwf_news/?5226891/nature-based-solutions-UNEA

18. Unfortunately, the risks associated with large-scale plantation afforestation in the region were not recognised and so the response appears to have largely been one of planting exotic pines rather than encouraging regeneration of native vegetation on erodible hill country.
19. Cyclone Gabrielle significantly affected areas impacted by Cyclone Bola and so it would be useful for the Inquiry to consider what lessons were learnt in 1988, and what actions were subsequently implemented, what actions were not, and the reasons for those choices and the consequences we experience now.

Key issues: planning, pests, pines, pasture, and property

20. The key challenges that need to be resolved to reduce the future impact of events like Cyclone Gabrielle are:
    a. **Planning:** the resource management planning system has not encouraged the restoration of native forests on erodible hill country or moved vulnerable infrastructure and capital investments away from flood plains. It has failed to protect downstream properties from siltation from erodible land in pasture or slash from inadequately managed forestry. The panel needs to consider the planning rules that have been applied and the ability of councils to enforce those rules.
    b. **Pests:** Introduced browsing pest numbers in upper catchments throughout the North Island East Coast are high and largely managed for recreational hunting purposes rather than for biodiversity protection or soil and water conservation. Some iwi are taking the lead in controlling browsing pests in Te Raukūmara, but public conservation land and Te Urewera management is not up to scratch with native forests actively collapsing**.**
    c. **Pines:** Exotic forest management is not adequate and the Commission needs to consider what rule changes are needed and whether local government has the capacity to adequately monitor and enforce consents, and what enforcement would look like.
    d. **Pasture:** New Zealand has known since at least the late 1800s the risks of converting native forest to pasture in this region due to the notorious erodibility of the landscape. This was again recognised after Cyclone Bola. A solution is needed for the problem of unsustainable hill country pasture farming on erodible land.
    e. **Property**: The advice of the 1988 Parliamentary Commissioner for the Environment's investigation into Cyclone Bola raised situations where councils were placing

property values ahead of responsible hazard mitigation. The panel needs to consider how to address short term property rights issues in the context of longer-term risks. This also needs to consider the impact of managed retreat on iwi and hapū who may have limited options.

Pests in native forest upper catchments

21. The southern sides of the Raukūmara Range and Te Urewera form the headwaters of the inquiry area. The headwaters of the Cyclone Gabrielle devastation in the Hawkes Bay region include the Kaweka and Kaimanawa Ranges.
22. The headwaters of these significant catchments all have one thing in common: they've had very high numbers of introduced possums, deer, goats, pigs, and possums for many decades.
23. Since their introduction, these animals have been eating their way through native forests, shrubland, and tussock lands. The combined impact of these animals consuming seedlings, leaf litter, leaves, buds, bark, and branches and killing trees has significantly reduced the natural ability of native habitats to lock in carbon, to hold the whenua together, and to absorb and slow the movement of water.
24. The effects of introduced browsers compound over time and contribute to major impacts, such as:
    a. Native forest collapse due to damage inflicted from introduced herbivores, which in turn release huge volumes of carbon dioxide as trees die and rot.
    b. Consumption of future generations of forest through animals eating seedlings and young trees, preventing future native forests' ability to absorb maximum carbon and hold the whenua together.
    c. Ruminant animals production of methane, a significant greenhouse gas.
    d. Impacts multiply when more than one invasive browser is present.

Introduced browsers and their impacts on native forests

25. This means that one of the greatest strategic climate risks in the inquiry area, and indeed across the country, is the heavy loading of feral deer, goats, pigs, and possums.
26. Wallaby arrival is another real concern for the area. Introduced in the late 1800s as game animals, they have emerged as very mobile pest species. It is estimated that, on average, populations can spread up to 2km per year in each direction. Environmental modelling

shows that by 2065, if unmanaged, wallabies currently concentrated in the Lakes District will spread as far as Tairāwhiti.

27. Throughout Aotearoa, native ecosystems (native forests, shrubland, and tussock land) holds around 1450 million tonnes of carbon, 74% of which is stored in native forests. Our largest forest type is presently bleeding 3.4 million tonnes of CO2 every year because ongoing animal pest impacts are creating the carbon loss as those habitats become more and more degraded and collapse.
28. Forest & Bird estimates that the equivalent of nearly 15% of New Zealand's 2018 net greenhouse gas emissions per year — 8.4 million tonnes of CO2 — could be locked into native ecosystem carbon sinks if we controlled feral browsing animals to the lowest possible levels.[2]
29. Many impacts of goats and deer species on native habitats have been known for over 100 years:

    "*Culling of red deer began in the 1930s with the aim of reducing competition with domestic livestock, preventing soil erosion, and protecting native flora*"[3].
30. Normally after a fire or a slip, seeds of native plants such as toetoe and tutu naturally arrive to start stabilising the land. From there, other types of longer-lived native plants start growing and lock their roots together to stabilise the earth.
31. But even on severely steep slopes and cliffs within the inquiry area there are goat and deer tracks to these first stabilising plants, so they get eaten. The natural processes that stabilise land get undermined and erosion accelerates.
32. Even the leaf litter has been eaten in upper catchment native forests. When heavy rain or a cyclone hits, there is less surface area to absorb rainfall and less vegetation that would slow the movement of water through the landscape.
33. This is best explained by Graeme Atkins of the Raukūmara Pae Maunga Project:

    "During heavy rain, 30 percent of the rainfall is intercepted by the canopy, a further 30 percent is dissipated down the trunks. What eventually hits the forest floor -- mosses used to cover everything… I can remember walking and sinking up to your knees in moss, and that acted as a giant sponge."[4]

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[2] https://www.forestandbird.org.nz/sites/default/files/2021-06/Protecting%20our%20natural%20ecosystems%27%20carbon%20sinks%20-%20Forest%20%26%20Bird%20report.pdf

[3] https://newzealandecology.org/nzje/3515.pdf

[4] https://newzealandecology.org/nzje/3515.pdf

34. Recent soil conservation concerns – preceding Cyclone Gabrielle – have been highlighted across the broad Kaweka catchment because of intergenerational deer impacts:

> *"Herds of 30-40 deer can be found around Rissington, and groups of farmers have been forced to get together to shoot deer destroying their crops. ...All that is needed is a cyclone hitting the ranges and waves of gravel will once again come down the rivers because the vegetative cover has been destroyed... The effects of deer in the [Kaweka] ranges are long term and insidious. It took many years to get deer numbers under control and forest regeneration to happen. It will take many years to return the forests to their former state".*[5]

35. In 2021, Forest & Bird highlighted the impacts that deer, goats and pigs were having in the inquiry area, producing maps showing their locations and number of species present: https://www.forestandbird.org.nz/resources/maps-reveal-nations-forests-under-attack-wild-deer-pigs-and-goats

36. At the time Pāmu's environment manager for its forestry operations, Gordon Williams, said the number of pests it sees across its farm portfolio within the inquiry area was increasing.

> *"We have established forestry and erosion control and riparian plantings on our East Coast and northern Hawke's Bay farms and began pest control to give the plantings the best chance of survival, but the numbers of pests, particularly goats and deer, are making this very challenging. Even our farm staff were unaware of the scale of the problem, and we are likely underestimating the pests within the wider landscape. It is an ever-growing threat to our work establishing plantings for forestry, but also for erosion and nitrogen leaching control".*

37. The issue of feral deer and their land-destabilizing impacts are within scope of the inquiry and a key outcome needs to be solutions to feral browsing pest animal numbers.

38. Since the deer culling of the 1970s and 80s, new technology has emerged to target deer and goats from helicopters: thermal imagery. This allows for the animals to be seen through vegetation and shot allowing a higher number of animals shot in a shorter time.

39. In the Government Budget 2022 there was $30 million allocated over three years to start tackling the explosion of deer and goats nationally. The aftermath of Cyclone Gabrielle calls for a ring-fenced and targeted budget beyond this to knock down deer, goats and pigs in the

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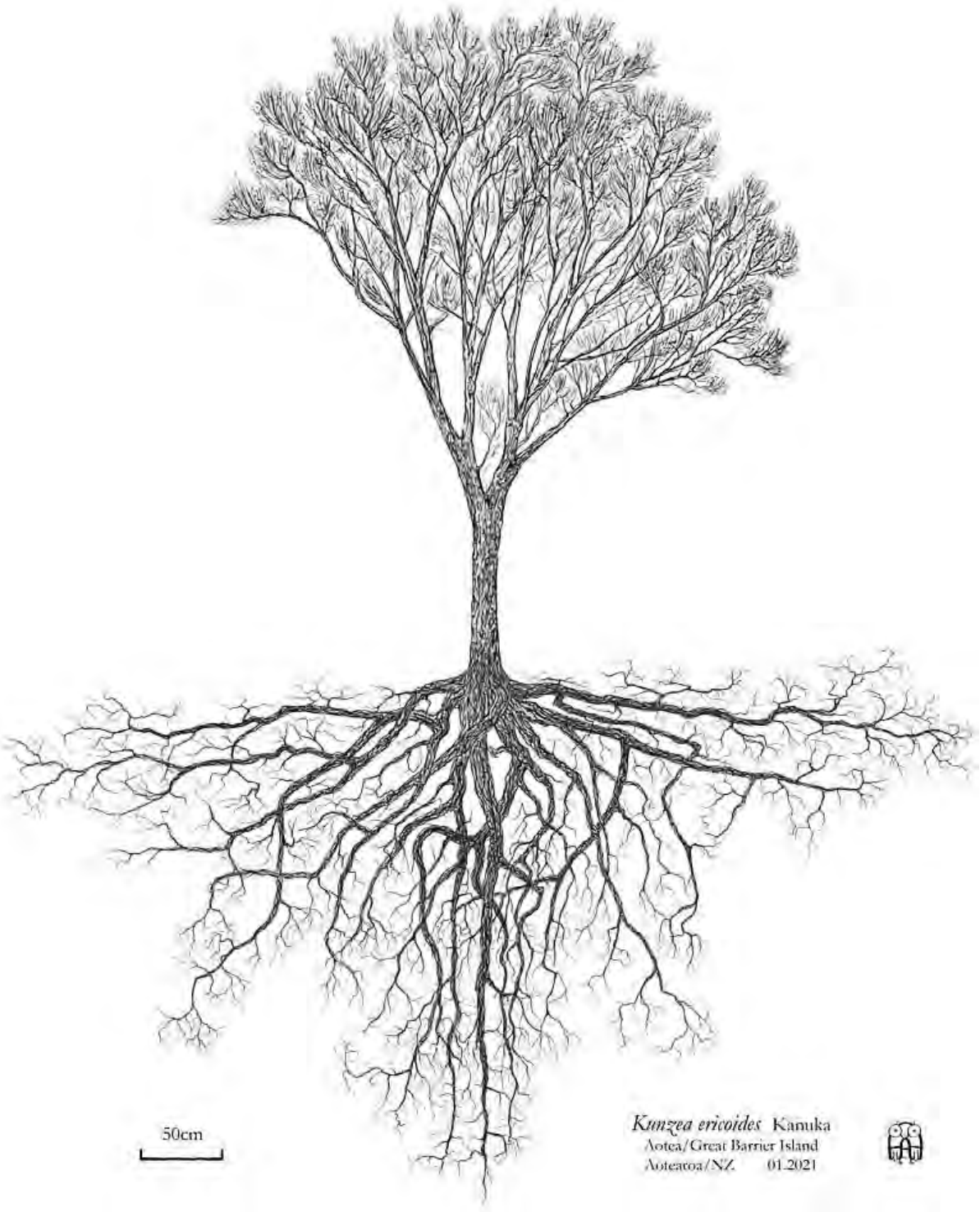
[5] https://www.facebook.com/watch?v=1263103450817631
https://www.nzherald.co.nz/hawkes-bay-today/news/talking-point-it-will-take-courage-to-control-feral-deer/OFNOW3W7GFX5URYJD5A43IHEQE/

inquiry area and Forest & Bird would suggest broader culling nationally in upper catchments.

Re-establishing native forests

40. Native forests have been recognised by the Climate Change Commission as nationally significant carbon sinks that are vital to climate protection efforts. The Commission has called for a massive forest restoration programme alongside a ramped-up browsing pest control programme to protect all existing native forests.
41. Forest & Bird acknowledges many Ngāti Porou whanau, including trustees and beneficiaries of Māori land trust blocks, and other landowners have preferences to return their whenua to native forests.
42. There are a number of different methods of re-establishing native forests within the inquiry area, such as retiring farmland and allowing natural regeneration, using exotics like poplars (which don't spread) for land stability with natives to come through later, scattering 'seed bombs', or actively re-planting native trees, forestry style.
43. Nearly all of these methods are difficult within the inquiry area due to drought, the sheer scale of land needing remediation, and the lack of local seed sources due to how far native forest has been cleared back to.
44. Unfortunately, all native forest restoration methods will end up providing free lunches to possums, deer, goats and pigs and be unsuccessful without large-scale, co-ordinated and ongoing work to keep these animals' numbers as low as possible.
45. Kānuka (*Kunzea ericoides*) is the most common native tree on much of the East Coast foothills. It is one of the best native tree species for holding land together as their roots form networks like huge spiderwebs that interlock. Although the leaves of kānuka are small, the leaf fall is high and constant, and this helps build soil. Kānuka also provide light shade for trees growing up among them.



Root system of kānuka[6]

46. These are all really useful attributes as a foundation for returning areas to native forest. But what is a benefit for native species is also a benefit to aggressive introduced weed species.

[6] By FrederikZumpe - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=99550592

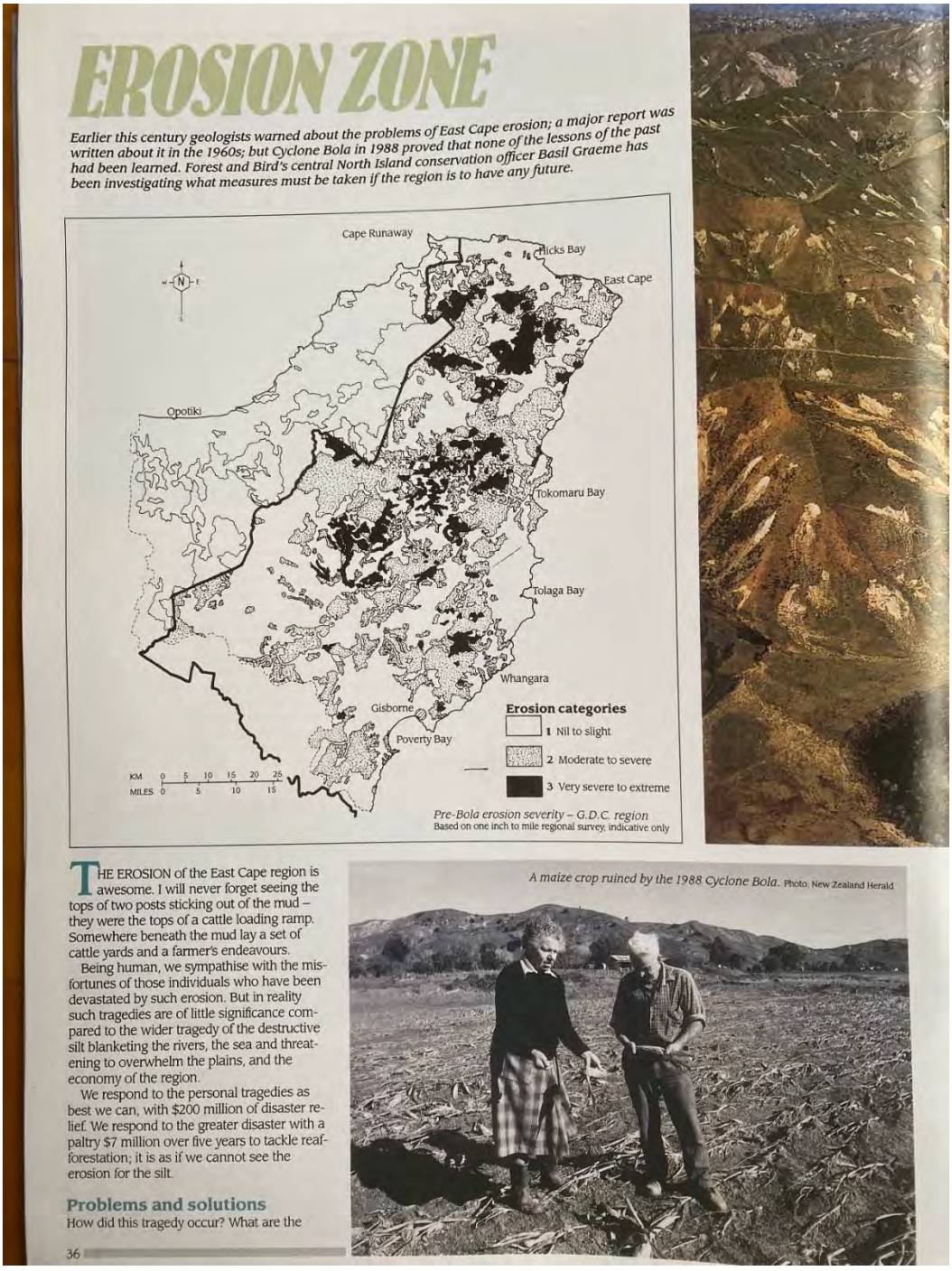
47. Tree privet (a native of China and Korea) are one of the trees that will undermine native forest restoration efforts in the inquiry area. A single tree privet has thousands of black berries full of seed that are spread by birds. The seeds can germinate under trees, in grass, and in high and low light levels – like beneath kānuka trees.[7]

48. Tree privet grows thickly and with a dark high canopy (this stops many types of native plants growing beneath because it's too dark). Therefore, restoration of native forests will be undermined unless both the pest animals and worst environmental weeds are removed at once. There will be invasive weeds other than tree privet (some are vines) that need to be removed as soon as possible, to alleviate the same risk. Otherwise birds and wind will spread seeds allowing aggressive environmental weeds to take over regenerating native habitats.

Poor management of pastoral lands

49. Following Cyclone Bola in 1988 the Parliamentary for the Environment made recommendations regarding pastoral farming within the Inquiry Area. The report stated:
    - "This inquiry has concluded that it is time to change policies and practices to the goal of sustainable land use for all the New Zealand land area. Policies and practices for today should recognise that sustainability of land use applies to both the hill country and flood plains."
    - "Gisborne Regional Council should encourage conservation forestry, or managed reversion on 77,500 hectares of Category 3b, 3c, and 4 land instead of pastoral agriculture."
    - "Under pastoral farming regimes, erosion rates are in general, much greater than soil formation rates on this country… pastoral farming cannot be considered a sustainable land use on much of this hill country… afforestation of the land probably represents the only realistic, economically viable, erosion control option."
    - "In the interests of future generations, central government cannot allow the nation's soil resource to be degraded or the nation's floodplain land to be unwisely used... The true [benefits] of soil conservation include… mitigation of downstream impacts… on water quality, flooding [and] retention of the soil resource for future generations… [These] have real value to society…"

[7] https://www.nzpcn.org.nz/flora/species/ligustrum-lucidum/



EROSION ZONE

Earlier this century geologists warned about the problems of East Cape erosion; a major report was written about it in the 1960s; but Cyclone Bola in 1988 proved that none of the lessons of the past had been learned. Forest and Bird's central North Island conservation officer Basil Graeme has been investigating what measures must be taken if the region is to have any future.

Pre-Bola erosion severity – G.D.C. region
Based on one inch to mile regional survey, indicative only

THE EROSION of the East Cape region is awesome. I will never forget seeing the tops of two posts sticking out of the mud – they were the tops of a cattle loading ramp. Somewhere beneath the mud lay a set of cattle yards and a farmer's endeavours.

Being human, we sympathise with the misfortunes of those individuals who have been devastated by such erosion. But in reality such tragedies are of little significance compared to the wider tragedy of the destructive silt blanketing the rivers, the sea and threatening to overwhelm the plains, and the economy of the region.

We respond to the personal tragedies as best we can, with $200 million of disaster relief. We respond to the greater disaster with a paltry $7 million over five years to tackle reafforestation; it is as if we cannot see the erosion for the silt.

Problems and solutions

How did this tragedy occur? What are the

A maize crop ruined by the 1988 Cyclone Bola. Photo: New Zealand Herald

Article in the Forest & Bird magazine following Cyclone Bola with map displaying erosion categories from slight (1) to extreme (3).

50. A key adaptation measure – both because of the rapidly changing climate and because a lot of Tairawhiti land should never have been cleared because of soil type and steepness – is retiring farmland to become permanent native forest carbon sinks.
51. Over time landowners can earn carbon credits as income which acts as an incentive to keep feral browsing animals as low as possible to lock in as much as possible carbon each year.

There needs to be catchment-wide co-ordination because of the mobility of pest animals and native habitat carbon farming is a good way to encourage that co-operation.

52. See Forest & Bird's briefing paper *Four Forests for Climate* which outlines the four categories we would like the Inquiry to advocate for that will enable land use changes to stabilise land and allow future income options for the Cyclone affected areas: https://www.forestandbird.org.nz/sites/default/files/2022-09/Four%20Forests%20for%20Climate%20-%20August%202022.pdf

Restoring lost wetlands

53. With agricultural and urban development, Aotearoa New Zealand has seen a significant loss in its wetlands. However, they are a critical tool to mitigate climate change as wetlands provide more benefits to humans by area than any other habitat type. They lock in carbon, support our native species, and retain soil moisture – effectively dampening the impacts of extreme rainfall by soaking up water, slowing down the speed of floodwaters, and minimising the resulting damage.

54. The Gisborne area has seen one of the highest proportions of wetland loss in New Zealand.[8]

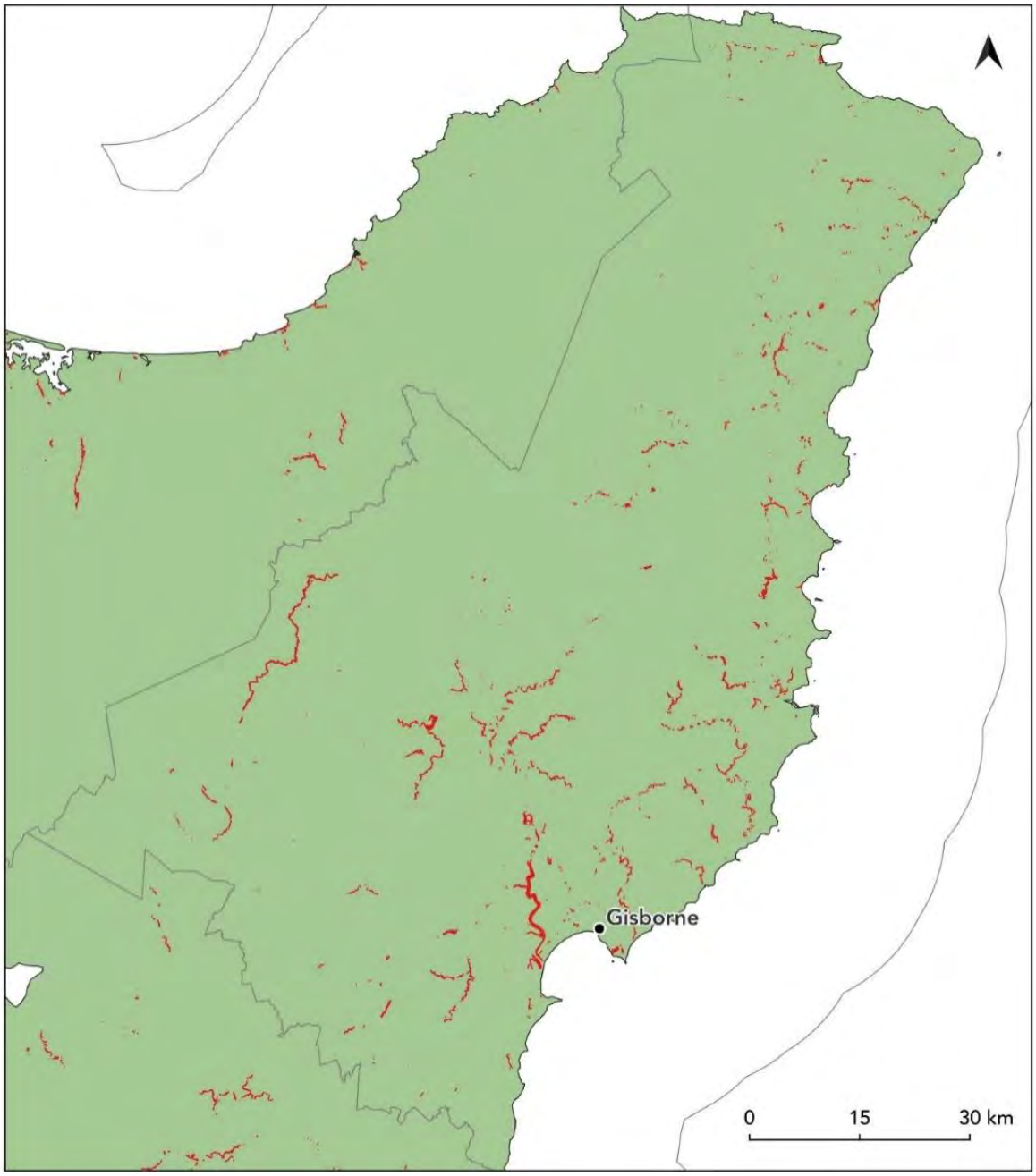
55. The Parliamentary Commissioner for the Environment's report after Cyclone Bola stated, "The draining of wetlands has intensified flooding problems in many areas, as wetlands can buffer floodflows."

Predicted historic wetland extent (left) and current wetland extent (right) in the Gisborne region. Imagery sourced from the Ministry for the Environment and licensed for reuse under the CC 3.0 license.

[8] https://www.stats.govt.nz/indicators/wetland-extent

56. If future disasters are to be avoided, wetland restoration needs to be a priority, so that at least 20% of original wetland extent (as a start) is re-established.
57. Government needs to support councils to develop a funded regional restoration plan to restore wetlands as part of flood management and carbon sinks. Areas that are retreated from should be considered for restoration into wetland (e.g. high risk floodplains).
58. Forest & Bird has done analysis that shows thousands of hectares of lost wetland remains in public ownership.[9] Restoration of these areas is possible as they were turned into grassland and could readily be restored (or allowed to revert) into wetland. There are local reserves such as Grey's Bush to source seed and local native plant restoration nurseries (eg the Women's Native Tree Project Trust) in Gisborne with the expertise to contribute to the success.
59. Restoration of these areas could form the first steps of a larger restoration programme, as they do not face the same barriers to land ownership or resourcing that restoration of wetlands on private land might.
60. Forest & Bird recommend the inquiry report:
    - Advocate for at least 20% of the original (pre-human) wetland extent in the Gisborne region to be restored to act as a buffer and assist in reducing peak storm flows.
    - Advocate for further investigation of the potential to rapidly restore areas of historic wetland that remain in public ownership (as provisionally mapped by Forest & Bird)
    - Advocate for strong rules and policies to be inserted into the Gisborne regional plan to protect and restore wetlands for the purpose of flood protection (as well as biodiversity values and carbon storage) - i.e., rules that are stronger than the National Environmental Standards for Freshwater minimum requirements and which embed a restoration target in the plan.
    - Advocate for funding to enable this wetland restoration, including on private land.
    - Advocate for the inclusion of wetlands in the Emissions Trading Scheme to rapidly incentivise wetland restoration as an alternative to pine forestry, which is otherwise incentivised for carbon credits and which has proven ineffective for soil conservation.

[9] Summary of analysis at: https://www.forestandbird.org.nz/resources/lost-wetland-public-land-could-be-restored-help-protect-against-climate-change; Full dataset at: https://koordinates.com/layer/113000-areas-of-historic-wetland-that-are-now-grass-but-still-in-public-ownership-sept-2022/



Map of the East Coast displaying publicly owned wetlands turned grassland (red). Full dataset available at https://koordinates.com/layer/113000-areas-of-historic-wetland-that-are-now-grass-but-still-in-public-ownership-sept-2022/

Making room for rivers

61. The Parliamentary Commissioner's 1988 inquiry found significant issues with land use planning and flood protection, warning that the public put too much trust in river protection works and that capital investment and infrastructure should be located away from flood-

prone areas. Helen Hughes also noted that these schemes require constant maintenance (which comes at considerable cost). She noted:

- *"River control schemes, which have been the principal means of flood mitigation over the last 40 years, require continuous assessment and maintenance to secure their integrity; … Public perception of river control schemes has been that the schemes offer an absolute standard of flood protection and unwise intensive development behind stopbanks has often been encouraged",* effectively resulting in people taking on excessive risk, and;
- There was a need for land use planning to encourage capital investment and infrastructure away from flood plains, and;
- A lack of agreed standards and guidelines for river control work that took into account the nature and variability of New Zealand rivers.

62. The string of devastating floods across Aotearoa over the past five years alone has illustrated that many existing flood mitigation schemes need holistic upgrading and rethinking to cope with heavier and more frequent rainstorms – simply building larger stopbanks does not and will not work.
63. Cyclone Gabrielle illustrated that flood protection infrastructure did not provide an absolute level of protection. Stop banks in Gisborne, Wairoa, Napier, and Hastings were overwhelmed. Forestry slash become 'dammed' up against bridges and exacerbated this problem – creating areas of pooling upstream of bridges where water then found another course 'around' the dam by going over a stopbank (often into a community that was located alongside the bridge – e.g., Omahu, Waiohiki, Taradale).
64. This is a problem Forest & Bird has seen nationally where rivers have forced their way over and through stop banks and reclaimed their previous beds and natural patterns, destroying or damaging everything that was unwisely placed in their path.
65. The scientific consensus is that 'engineering' our way to resilience against the impacts of climate change through the expansion or strengthening of flood protection infrastructure isn't going to work. This was affirmed by river experts in a recent (2022) New Zealand journal article, who stated that:

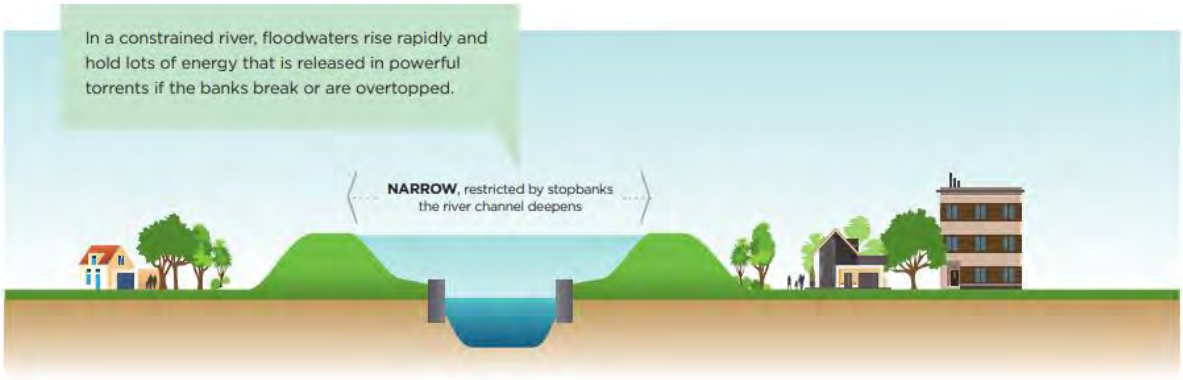
- "working against nature does not work",
- "[we] may inadvertently be manufacturing future disasters", and
- "moving out of harm's way saves lives".[10]

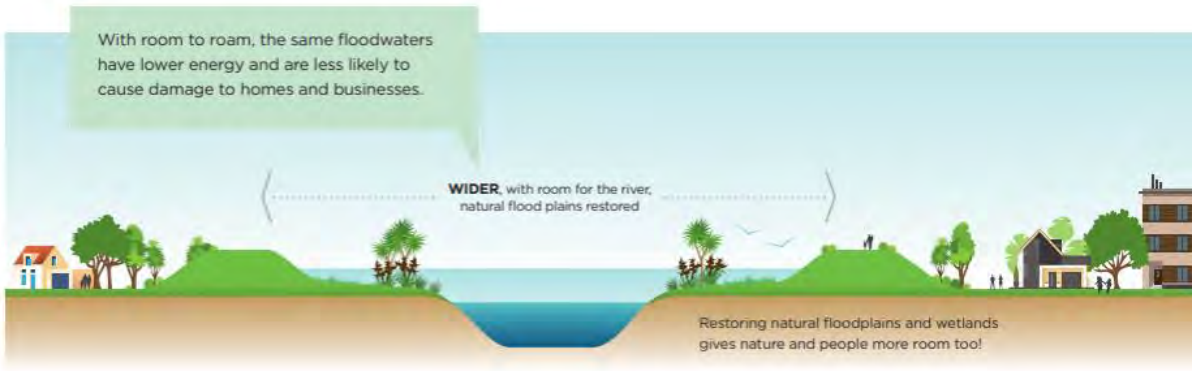
[10] Reanimating the Strangled Rivers of Aotearoa New Zealand, https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wat2.1624

66. This is a view that is supported by river geomorphologists and academic experts across Aotearoa[2] and internationally (bold emphasis added):[11]
    - International studies show that **allowing a river to self-adjust is cheaper and more effective than active interventions that force a river into a particular place**.
    - **Working with the processes that create and rework a river channel and its floodplain will reduce the impacts of future disasters**.
    - **An honest discussion now could save us the direct and indirect costs of future clean-up and repair.**
67. Reanimating rivers seeks to respect the rights of healthy, living rivers that erode and flood in the right place and at the right rate.
68. In today's language we would describe the findings from the Cyclone Bola report as identifying a need to "make room for rivers" through a process of managed retreat of people and infrastructure from high-risk floodplains. This would significantly reduce the risk of damage to infrastructure and communities during storm events.
69. Essentially, the entire natural 'stormwater' system – forests, wetlands, and rivers – has had its capacity severely reduced. We must increase the ability of that natural system to cope with extreme weather. That means we must address all parts of the problem – native forests, wetlands, and river corridors. We cannot only focus on forestry slash.
70. Making room for rivers also makes much more river habitat available for the health of the river and creates a much wider active gravel riverbed for things like (natural) aquifer recharge. A study underway in Marlborough, Canterbury, and Hawke's Bay has established a connection between braided river width and groundwater levels – whereby narrowing of the rivers has contributed to lower groundwater levels (because of reduced natural aquifer recharge).[12,13] Making room for rivers provides space for rivers to flood safely, increases community resilience to flooding; and also ensures continued aquifer recharge, increasing our groundwater supply and resilience to drought.
71. Making Room for Rivers allows space for rivers to function as rivers and is much more consistent with the National Policy Statement for Freshwater's direction to manage rivers

[11] https://theconversation.com/why-we-should-release-new-zealands-strangled-rivers-to-lessen-the-impact-of-future-floods-153077
[12] https://www.lincolnagritech.co.nz/news/research-to-uncover-crucial-knowledge-on-braided-rivers/
[13] Narrowed Wairau River influencing aquifer recharge levels (Stuff.co.nz, 27 June 2022), https://www.stuff.co.nz/national/politics/local-democracy-reporting/128998428/narrowed-wairau-river-influencing-aquifer-recharge-levels

(or perhaps more appropriately, to live with rivers) in a way that provides for Te Mana o te Wai, and for the health of freshwater to be put first, before any others uses or activities.





72. *Wider river corridors (as demonstrated in the bottom diagram) provide space for rivers to flood safely, where floodwaters don't get as deep and stopbanks don't have as much pressure put on them (and therefore the likelihood of failure is decreased). Wider corridors also provide space for riparian planting, wetlands, and recreational areas, as well as improving rivers connection to and recharge of groundwater (increasing drought resilience).* **Tukua Ngā Awa Kia Rere / Making Room for Rivers – Forest & Bird.**[14]

73. Forest & Bird suggest this inquiry:
    a. Advocate for the development of a plan to make room for rivers across the regions affected by Cyclone Gabrielle in the first instance, including strategic managed retreat from high-risk floodplains to stop further development and allow conversion

[14] https://www.forestandbird.org.nz/sites/default/files/2022-11/F%26B_Room-For-Rivers_Report_online_0.pdf

to wetland, riparian vegetation, and recreational areas. This could be a pilot for the development of a national plan of a similar nature.

b. Recommend this plan be supplemented with advice for councils on how they can better manage flood protection schemes to make room for rivers and live alongside rivers with minimal intervention (e.g., in the form practical guidance on zoning for regional/district plans and for managing in-river works). This echoes calls from the 1988 PCE report calling for practical guidance on river management.
c. Advocate for the establishment of river corridors/floodways in the regional plan through a plan review (possibly alongside/integrated with the NPSFM 2020 freshwater planning process), where further development should not be allowed and managed retreat should be considered.
d. Advocate for the education of the public on the limitations of stopbanks and the evidence surrounding modern river management (that moving out of harm's way is a preferable approach to stopbanks in many cases), including through community forums.
e. Advocate for the investment of funding to support councils in the affected area (and, longer term, nationwide) to widen river corridors, on the condition that those councils do not simply re-build like-for-like flood protection infrastructure and can illustrate how they will (or how they have considered they could/couldn't) widen river corridors to make room for rivers in the first instance.
f. Identify publicly-owned land alongside rivers or on active floodplains (e.g., LINZ land, council land) that could be used to widen river corridors and advocate for the prevention of any further development (building, fences, irrigation, etc.) in those areas. If possible, establish these areas as river esplanade/river corridor reserves where activities are limited and develop a long-term plan for their restoration and reconnection with the river (e.g., through widening a river corridor to allow these areas to flood again, restoration to wetland, etc.).

Pine forestry management

74. In 1990, Forest & Bird's then North Island East Coast field officer Basil Graeme wrote about the aftermath of Cyclone Bola and recommended that the erodible hill country should be planted and not felled. Had this been done it is likely that the impact of Cyclone Gabrielle would have been reduced.

75. It's likely economics played a role in that landowners could see no other way of generating an income. Fortunately, we now have the option of carbon sinks and carbon farming. However, monoculture "permanent" pine carbon farming is a risk – and a liability – on the East Coast that undermines genuine permanent carbon sinks.
76. Forest & Bird urges the Inquiry not to support 'permanent' pine carbon sink as a recovery option.
77. Pine tree monoculture is not a long-term solution to front the looming climate crisis. *Pinus radiata* was introduced into Aotearoa to fast-track the timber industry. The shallow-rooted and fast-growing trees deprive creeks of their water, are highly flammable, and are a rather short-lived species of exotic trees. Pitch pine canker and other diseases could easily rip through cloned pines and kill them, destabilising the land once more on a large scale.

The National Environment Standards for Plantation Forestry is too permissive

78. The National Environment Standards for Plantation Forestry ('NES-PF') applies to plantation forestry across Aotearoa. It was enacted in 2018, in response to concerns by foresters that regulation differed across councils. However, the NES-PF represents a highly permissive regulatory regime for plantation forestry, and does not tackle the issue of whether plantation forestry will always be appropriate in all locations.
79. We do not have the data on how much forestry in the Inquiry area was consented (or permitted by plan rules) before the NES-PF was enacted, and how much has been enabled by the permissive approach in the NES-PF. However, what can be said is that the NES-PF facilitates plantation forestry without sufficient regard for whether that is appropriate in a particular location, and without taking into account site specific risks. In our view, because the NES-PF facilitates more forestry with little oversight, the NES-PF will only exacerbate the problems already associated with forestry in the Inquiry area. The NES-PF must be changed if we are to reduce the likelihood of similar problems in future.
80. In 2019 Forest & Bird and Environmental Defence Society (EDS) wrote a report on the NES-PF: *'A Review of the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017. Are the settings right to incentivise "the right tree in the right place", and is a high trust regulatory model the right fit for a high risk industry?'*.[15]

[15] https://eds.org.nz/resources/documents/reports/a-review-of-the-resource-management-national-environmental-standards-for-plantation-forestry-regulations-2017/

81. Some of the key findings of that report are highly relevant to the problems faced in the Inquiry area. They are repeated here:
82. Firstly, the NES-PF's approach to afforestation and replanting is too permissive and needs to be re-examined. Greater stringency needs to be applied.[16]
83. Decisions about where plantation forests are located and what trees are planted (and replanted) should be subject to careful and strategic thought. Planning to identify significant environmental values or risks should be occurring before planting, not at the point of harvesting or on an ad hoc basis when a certain operational activity needs to occur. This goes for new plantation forests and new rotations at existing sites.
84. The current NES-PF simply does not provide for that level of care and precision.
85. For example, afforestation and replanting in green-, yellow- and orange-zoned land is permitted, despite many orange-zoned and some yellow-zoned land areas being at high risk of erosion. In red-zoned land both are permitted provided the area is less than 2ha in a calendar year. The question needs to be asked: Should trees that are planted specifically for removal be put in these areas? They might provide some stabilisation benefits but those are short-term and the erosion and sediment discharge that will follow on harvesting will be significant, even from smaller areas.
86. Similarly, the NES-PF's setback provisions are inadequate. These are either set at a distance for which there is no ecological justification (5m), or at a distance (10m) which, in light of damage that occurs during harvesting, will effectively be halved. This means they, too, are ecologically questionable. The provisions also only apply to a portion of water bodies, either because of size restrictions (eg wetlands) or due to exclusion altogether (eg ephemeral streams). Setback requirements at the point of afforestation and replanting are critical because once a tree is in the ground it will likely be removed, meaning impacts are inevitable.[17]
87. Secondly, the NES-PF's presumption that plantation forestry activities should be a permitted activity needs to be revisited.[18]
88. A complex, intensive activity that not only has immediate impacts such as erosion, but also contributes to diffuse pollutants does not easily lend itself to the certainty and specificity required for a permitted activity standard of national application. This is particularly so when that activity occurs across a national landscape that is extremely diverse and which, in many areas, is reaching environmental limits.

[16] Report, pg 1.
[17] Ibid.
[18] Report, pg 2.

89. The result of taking a permitted activity approach is the use of permitted standards which are either inadequate to achieve the necessary level of environmental protection (including the effects of erosion and sediment) in all situations, or are uncertain and subject to a value judgement. They are therefore difficult to implement or enforce.
90. The NES-PF relies heavily on forester-supplied management plans to deal with potential adverse effects. However, using management plans that cannot be certified or rejected relies heavily on foresters designing adequate management plans and complying with vague permitted standards. This is a very 'high trust' model, which may not be warranted given the seriousness of potential environmental impacts, variability in practice around the country, and poor compliance outcomes in some areas.
91. Finding the answer is not easy. National direction has its advantages, but it only works if national standards are set at a point which will ensure protection of all environments. Council oversight via resource consent has its advantages in allowing site-specific assessment of risks and development of site-specific management responses. The answer likely lies somewhere between these two approaches, with increased nuance in how plantation forestry activities (particularly harvesting) are controlled in different areas and near different, sensitive environments. We think that the current presumption in the NES-PF that most forestry activities should be permitted needs to change, so that the site-specific risks can be actually assessed as part of a consenting process.
92. Thirdly, in most instances, the adverse environmental impacts of clear-fell harvesting are significant. Policy needs to be developed to facilitate a transition to more sustainable methods such as continuous cover forestry and other silviculture techniques.
93. In respect of many of the issues discussed in the report, the issue isn't harvesting per se. It is how we are harvesting. Alternative methods, like continuous cover forestry, have a whole range of benefits (eg in relation to erosion, biodiversity and water quality). This is how plantation forestry is now undertaken in many other countries. Research needs to be carried out to examine how those methods can be applied here, and what is required to make a transition in harvesting method commercially viable for New Zealand foresters. This research needs to include implementation of alternative methods and the creation of demonstration sites to allow for rigorous analysis of outcomes. The NES-PF should be changed to support the transition to more sustainable harvest methods, for example by assigning continuous cover forestry a more lenient activity status than clear-fell harvesting.
94. We also note that Forest & Bird has joined proceedings initiated by Environmental Defence Society with respect to the approach in the NES-PF. Forest & Bird supports EDS' application

for declarations stating that the permissive approach in the NES-PF breaches the RMA, because it permits harvesting and related earthworks in the orange zones of the Marlborough Sounds. EDS says this is contrary to the requirement in the RMA that activities that have significant adverse effects cannot be classified as permitted.

95. As noted above, the NES-PF classifies certain activities based on their zone: green, yellow, orange or red. A lenient management approach is provided for in green, yellow and orange zones. The zones are determined by application of the 'erosion susceptibility calculator', which we say is flawed because it is too high level, and does not address the site-specific risks of effects.
96. While these proceedings are focused on the NES-PF's operation in Marlborough, the issues are likely to be similar in the Inquiry area.

Recommendations: nature-based solutions in Cyclone Gabrielle recovery

97. Forest & Bird recommends that the inquiry:
    1. Align Inquiry outcomes with Te Mana o te Taiao/NZ Biodiversity Strategy and incorporate native biodiversity and climate protection goals into recommendations.
    2. Re-visit the 1988 Parliamentary Commissioner for the Environment's report and assess what recommendations were not or were carried out and their consequences for Cyclone Gabrielle.
    3. Recognise heavy loading of native habitats by introduced feral deer, goats, pigs, and possums as one of the greatest strategic climate risks in the eastern North Island.
    4. Advocate for a significant reduction of the number of feral goats, possums, deer, and pigs in the region overall, recognising that restoring the health of native habitat carbon sinks are key actions to lock in carbon, stabilise land, prevent erosion and siltation, and slow down water movement.
    5. Advocate for a ring-fenced budget within a Cyclone Gabrielle budget package for urgent helicopter culling of deer and goats, prioritizing the upper catchment protection of native forests.
    6. Support new technologies for introduced browser animal control.
    7. Advocate for policy changes that would allow landowners to earn carbon credits as financial incentives to keep deer, goats, pigs, and possums in low numbers.
    8. Encourage co-operation between iwi, hapū, Māori land trustees, Pāmu, and private landowners throughout catchments. This should include sustained and coordinated

control of introduced feral browsers on public and private land to prevent spread, re-invasion, and pest densities returning after knock-down.

9. Advocate for the adoption of four types of carbon sink categories within the ETS to allow for improved land management by Government decision makers, land managers/owners, kaitiaki, native biodiversity, and the climate. These categories are: 1) Permanent native habitat carbon sinks, 2) Forests in transition, 3) Planted continuous cover production forests, and 4) Exotic planted timber production forestry (under specific regionally enforced controls).
10. Support large-scale afforestation in light with the above carbon sink categories, in particular, through retiring marginal and steep farm and pine forestry land to become native forest carbon sinks.
11. Advocate for catchment wide soil conservation plans and co-operation between landowners supporting each other, including carbon credit options for permanent native carbon sinks.
12. Advocate native habitat carbon sink restoration through the Carbon Neutral Government Programme (CNGP) on publicly owned lands.
13. Prioritise control of aggressive environmental weed species alongside pest animal control to stop undermining permanent native forest and wetland carbon sinks.
14. Support the Emissions Trading Scheme phase out of planting pine 'permanent' carbon sinks within the region by 31 December 2023 and oppose 'permanent' pine carbon sinks as a recovery option.
15. Support the national Emissions Reduction Plan and National Adaptation Plan, using the East Coast region as a lead example of the managed retreat land use changes required to (1) reduce agricultural climate pollution emissions and soil loss/erosion by retiring farmland into permanent native forest carbon sinks, (2) restore the ability of wetlands to absorb water in landscapes, reducing flood impacts, and to act as carbon sinks, and (3) making room for rivers to flood safely and increasing their health by widening river corridors and retreating from high-risk floodplains.
16. Recommend the native reforestation of pasture and recently harvested areas and transitioning existing plantations on red and orange landscapes to permanent and diverse native forests.
17. Recommend an immediate cessation of all spraying and clearfell harvesting of trees (native and exotic) in red (*very high risk*) and orange (*high risk*) zones as defined by NES-Plantation Forestry Erosion Susceptibility Classification.

18. Recommend a moratorium on new and replanted pine plantations on red and orange zones erosion-prone land in the region until the risks and alternatives are better understood.
19. Advocate for a review of the NES-PF, to remove the presumption that afforestation, harvesting, and other plantation forestry activities will have permitted activities status. A resource consent requirement (rather than making most activities permitted) would allow for a more appropriate analysis of risks and benefits in site specific locations. The NES-PF review should also facilitate more sustainable harvest methods, such as continuous cover forestry.
20. Promote the restoration and protection of wetlands through improved legal protection, better hydrological management, active restoration, and paludiculture (the use of wetlands for production).
21. Advocate for at least 20% of the original (pre-human) wetland extent in the Gisborne region to be restored to act as a buffer and assist in reducing peak storm flows.
22. Advocate for further investigation of the potential to rapidly restore areas of historic wetland that remain in public ownership (as provisionally mapped by Forest & Bird).
23. Advocate for strong rules and policies to be inserted into the Gisborne regional plan to protect and restore wetlands for the purpose of flood protection (as well as biodiversity values and carbon storage) - i.e., rules that are stronger than the National Environmental Standards for Freshwater minimum requirements and which embed a restoration target in the plan.
24. Advocate for funding to enable this wetland restoration, including on private land.
25. Advocate for the inclusion of wetlands in the Emissions Trading Scheme to rapidly incentivise wetland restoration as an alternative to pine forestry, which is otherwise incentivised for carbon credits and which has proven ineffective for soil conservation.
26. Advocate for the development of a plan to make room for rivers across the regions affected by Cyclone Gabrielle in the first instance, including strategic managed retreat from high-risk floodplains to stop further development and allow conversion to wetland, riparian vegetation, and recreational areas. This could be a pilot for the development of a national plan of a similar nature.
27. Recommend this plan be supplemented with advice for councils on how they can better manage flood protection schemes to make room for rivers and live alongside rivers with minimal intervention (e.g., in the form practical guidance on zoning for regional/district

plans and for managing in-river works). This echos calls from the 1988 PCE report calling for practical guidance on river management.

28. Advocate for the establishment of river corridors/floodways in the regional plan through a plan review (possibly alongside/integrated with the NPSFM 2020 freshwater planning process), where further development should not be allowed and managed retreat should be considered.
29. Advocate for the education of the public on the limitations of stopbanks and the evidence surrounding modern river management (that moving out of harm's way is a preferable approach to stopbanks in many cases), including through community forums.
30. Advocate for the investment of funding to support councils in the affected area (and, longer term, nationwide) to widen river corridors, on the condition that those councils do not simply re-build like-for-like flood protection infrastructure and can illustrate how they will (or how they have considered they could/couldn't) widen river corridors to make room for rivers in the first instance.
31. Identify publicly-owned land alongside rivers or on active floodplains (e.g., LINZ land, council land) that could be used to widen river corridors and advocate for the prevention of any further development (building, fences, irrigation, etc.) in those areas. If possible, establish these areas as river esplanade/river corridor reserves where activities are limited and develop a long-term plan for their restoration and reconnection with the river (e.g., through widening a river corridor to allow these areas to flood again, restoration to wetland, etc.).

Submission on the Ministerial Inquiry into Land Use causing woody debris and sediment-related damage in Tairāwhiti and Wairoa.

Submission by Fraser Rob

Our climate warming commitments can be achieved hand in hand with minimising flooding, with benefits to biodiversity, water quality, economy and society. A huge investment is required to resolve each one of these issues, however it is of more benefit to focus investment in areas that solve multiple issues at once.

We do not seem capable of significantly reducing emissions while industry burn coal and gas, and any government introducing a fuel tax will not be elected. While we struggle to reduce emissions, the alternative is to soak up (sequester) our carbon to balance the equation. In Paris New Zealand agreed to reduce climate warming emissions to 50% below 2005 levels by 2030, and to achieve net zero by 2050.

By year 2030 New Zealand is destined to buy $16 billion of carbon credits from overseas at the mercy of another government and foreign companies. It is a better idea to invest within New Zealand, and to use our least productive farmland to produce a surplus of carbon credits to sell overseas. Exporting carbon credits maybe a better proposition than exporting logs and meat from our most marginal land. Strategies like tree planting can solve multiple issues while achieving the Paris agreement.

To personalise this responsibility, if you drive a petrol car you need 60 pine trees to get on the right side of net zero carbon.

Three main contributors to flood damage are pastoral farming, the natural forest (including DOC), and exotic forestry. These are land areas where we could make improvements to minimise flooding while saving carbon.

Nearly half the flood waters originate on farmland while steeper areas accelerate the problems with peak flows and more sedimentation. Pastoral production cannot be maintained where soil is being lost so these eroding landscapes (and riparian margins) need a change of land use to carbon farming. Cyclone Gabriel is the latest call for this change.

The best candidates for carbon farming are landowners that want that change. Incentives are required to make carbon farming desirable to the occupants and the surrounding community.

Flood damage can be minimised voluntarily by offering landowners subdivision rights in exchange for converting land to carbon farming. Presently (with some councils) landowners apply to covenant bush, shrubland, wetlands, waterways, significant natural or historic features, esplanade reserves and public access in exchange for consent to subdivide. A Council rule change could create a new type of subdivision right earnt by converting land to trees. These would be legally covenanted carbon forests designed to minimise flood damage, improve biodiversity, protect infrastructure, benefit the local community, and used to balance New Zealand's long term carbon equation.

A subdivision is more valuable closer to cities therefor carbon farming will be encouraged throughout all farms and lifestyle blocks (except on the most productive land). Many farms have an unproductive pocket, a corner, or a stream where the owner might consider planting trees. More pockets of native trees on our lowland farms will look great. The plantings will bring biodiversity closer to town along corridors and steppingstones from mountains to city to sea. Carbon farming will not be confined to over running the cheapest backcountry land.

The covenanting and subdivision process requires the landowner and a Council Land Manager to negotiate a site-specific carbon forest plan. Once signed off the agreement is attached to the land title in perpetuity and the covenanted land is surveyed and may require fencing. The landowner then has the right to subdivide and sell the covenanted land if they desire and any buyer would operate under the terms of the covenant. The subdivision will require access and a house site. The house site could be located anywhere on the parent property or transferred to another property within the community. Regardless of where the house site lands it remains attached on the title of the covenanted carbon forest.

The plan also sets out the progress required to gain additional subdivision rights. Successful plantings reaching canopy closure and good pest control would be incentivised by earning another subdivision right. The subdivision right could be transferred to any property in the district that wouldn't otherwise have the right. Alternatively, the landowner could subdivide the remainder of their farm, or sell the right without land. Multiple titles create options including the right to build another dwelling while some may see advantages for succession to their children or legacy plantings for their grandchildren. Extra titles could restore the value of a cyclone devastated property and be as good as money sitting in the bank. This might be the disaster relief a farmer (and bank manager) requires, and everyone wins including the downstream public living in a safer catchment with cleaner streams.

A social change could be achieved in rural NZ where people get more opportunities to buy and live in the country and bolster rural communities. The covenant would attract people interested in manging a native and/or exotic carbon forest project while they may not be interested in pastoral farming. They like the house site, the country school, restoration employment, affordable land, and some may be the drivers of catchment care groups uniting the community. They enjoy good Regional Council funding and the prospect of gaining subdivision rights when flood control and carbon credit goals are reached. City people could migrate to the country or have a weekend retreat. Catchment care group participation would be encouraged, and ideally volunteer groups would adopt an area and receive good support from the Regional Council as is common today. Public access would be encouraged but not compulsory.

Overseas investors could buy covenanted land, build dwellings, employ managers and staff, and gain a pathway to citizenship. Flood control could advance on a grand scale with overseas money. On balance foreign ownership could be better than more debt.

A new cohort of rural employment will be created in both the native and exotic forests; managers, Regional Council Land Managers, contractors, field monitoring, forest planning,

planting, ongoing pest control (animal and plant), pruning, roading, maintenance, managing volunteer groups, ground hunting, helicopter hunting, deer trapping, fencing. A new agency is required (similar to the QEII National Trust) to oversee the covenanted land ensuring it is fit for purpose and balancing national carbon credits.

Good funding is critical. Flood prevention will cost a fortune and that investment should be directed into funding flood minimisation through carbon farming. Natives require more funding than pines to put costs on an equal footing. Natives are more expensive, more work and slower to gain carbon credits. However, a balance of native plantings is necessary and needs to be incentivised. Secure ongoing funding is required for management and pest control in both native and exotic carbon forests to ensure they remain in good health in perpetuity.

As an example the Hawkes Bay Regional Council has 252,000 hectares of erosion prone land that dumps over 3,000,000 tonnes of sediment into waterways every year, while they say planting closed canopy forest reduces erosion 16x more than pasture. Presently farmers would plant native if it wasn't so expensive, and many prefer erosion control polars so they can keep the grazing. An offer of 100% funding to establish carbon farms of native, poplar or pine would gain maximum buy in and add another tool to the Regional Councils Erosion Control Scheme where they could promote more carbon farming that includes a larger balance of natives.

Rate payers and taxpayers need to be confident the funding investment is secure. A covenant or encumbrance over the carbon forest will be attached to the land title in perpetuity ensuring the forest is fit for purpose. The intentions of the covenant document will be negotiable but will designate the primary purpose of the land to be for flood minimisation and carbon sequestration, while water quality, retaining soil, community wellbeing, scenic values, and biodiversity will also be stated aims. Conditions placed on the parent property might include pest control, access, stock proofing, while all water sources, stream margins and wetlands are included in the covenant. The success of the covenant needs to be assured by a monitoring agency similar to the QEII National Trust model.

New Zealand has one million hectares of pastoral land considered highly prone to erosion. These areas are suited to native carbon forests as native will halt erosion more effectively than pine. Native trees do not attain any size until the forest has developed and the slopes are secure. Riparian margins are also suited to enhancing biodiversity using natives. Some riparian margins maybe fit for purpose at 10m width and should get carbon credits, while on eroding mud-stone country some may extend to the ridge line. Normally the covenant would use the less productive land and avoid using better land however some landowners could decide to plant out most of the farm.

Pinus radiata and poplars should not be anywhere near streams and eroding country where the trees (and carbon) can be lost to slips and cause downstream damage. Trees do not completely stop erosion, and some trees will eventually slip into streams. Carbon farming large exotics on vulnerable land will lead to log jams with trees of ever-increasing size. We

can’t let Gabriel’s log jams become an unheeded warning of a bigger problem to come. So, plant natives instead.

The East Coast Forestry Project planted 32,000 hectares of pasture into forestry as a reaction to Cyclone Bola. In 2018 forestry dumped a million tons of slash on the East Coast and in 2023 foresters have not solved the problem. Much of the area is marginally profitable to harvest and trees are slipping away before they can be harvested. These high-risk forests should be incentivised to progressively poison their trees, and let the native come through and become permanent carbon forests.

About 60% of radiata forests throughout New Zealand that are eligible for carbon credits are not registered so significant areas of radiata could be encouraged into the carbon forest registration and take some pressure of the need to plant out pastoral land. A main reason for eligible forests not being registered is uncertainty. Uncertainty is also a main reason why farmers are not joining the scheme. Few people have a good understand.

The place for production forestry and carbon farming radiata is on the safer land away from the slips and streams. Carbon farmed radiata (and native) should be managed and pruned as sustainable logging may be a good option some time in the future. Carbon farming could kick start a long rotation radiata and native timber industry. Logging would be controlled under the terms of the covenant remembering the primary purpose of the land is for water quality and balancing New Zealand’s carbon equation.

Pine can be planted at 600 stems per hectare to get maximum early carbon, and production thinned to an eventual stocking of 200 stems per hectare. An alternative is to plant 200 stems per hectare allowing more space for native biodiversity. Radiata does not eventually die out allowing native to succeed it. This is a fallacy or wishful thinking claimed by some companies and commentators. All the statistics show pine self thins to 200 stems per hectare and then remains stable. A stand of 100-year-old pine can be visited near Rotorua along with the historic measurements.

If we cannot reduce emissions and carbon forestry was to be the only way forward, then we need one million hectares of Pinus radiata eligible to meet our carbon sequestration requirements asap. Pinus radiata is the cheapest, easiest and quickest way to plant a forest to sequester carbon.

In addition to pine forest one million hectares of native is required on the most erosion prone pastureland where pine and logging is not suitable. The native will take 100 years to catch up to the sequestering ability of the pine while sometime in the future the pine can be harvested as the native areas mature and become the main carbon sink.

Two million hectares of new forestry on pasture is a huge ask of rural communities. It must be remembered that pastoral farming gave New Zealanders the highest standard of living in the world and today our economy is still dependant on grass. There are other options including reducing emissions which should mean less area is required for pine.

Forestry slash is a monumental problem while self-reliance in fuel would improve our fuel security and immunity to OPEC manipulating fuel prices. With fuel prices set to rise again in

2023 biofuels and alternative energies will become more competitive and worth reassessment. Presently forestry slash is a loss of carbon however if it became the resource used to make biofuel the log jam problem is solved, and we gain carbon credits. The cost of slash in our rivers and on the beaches, and the social cost of excessive fuel prices needs to be considered when evaluating a biofuel production industry.

“If the river drops its time to evacuate,” was the words of a Ruatoria woman during Cyclone Gabriel. She understood a log jam meant run. The social cost of forestry on marginal land is too high. Further, before Cyclone Gabriel 16 logging crews left the East Coast due to pine logging not being profitable, so they were out of work. Forestry does not give job security.

According to Scion there is enough waste or residual wood from forests to replace all the fossil fuels burned in domestic and industrial boilers. The recent Huntly trial demonstrated a 90% reduction in carbon footprint using imported charcoal-like torrefied wood fuel pellets. The obstacle for Huntly to convert from coal to pellets is the need for a supply chain to deliver the fuel. Investment is required to process and distribute fuel made from slash.

An easy source of pine waste would be available if logs had their slabs removed before export. This would be a huge handy resource and shipping logs overseas would be cheaper.

Based on Ministry of Business, Innovation and Employment data from 2020, New Zealand could use up to 1.7 million tons of wood pellets a year and replace a similar volume of coal. This will produce less than 10% of coal emissions.

The torrefied wood pellets used at Huntly have alternative uses. This charcoal produced by pyrolysis saves the carbon which can be used with fertiliser to be stored in agricultural soils. The pellets can be used in cattle standoff pads and barns using the charcoals’ ability to soak and hold nutrient. The bedding can then be spread as biochar fertiliser.

Another interesting development is feeding the charcoal directly to the cattle mixed in feed. The charcoal passes through the cow and is deposited as biochar in the dung. Dung beetles are used to spread the biochar and bury it deep in the ground. This will improve the soils aeration, water holding, root depth and nutrient holding. Biochar has a liming effect and breaks down heavy clays.

Similarly, the charcoal can be made into biochar by saturating with nutrient to be spread on the land. Biochar will continue to sequester in perpetuity and a farmer could import this carbon to become carbon negative. Every ton of biochar added to the ground is capable of capturing and holding another three tons of carbon. Biochar fertiliser lost during rainfall will continue to sequester and not cause pollution. A biochar agricultural fertiliser industry could reduce the need for some imported fertiliser.

Pyrolysis furnaces could be used to process most waste including household refuse, sewerage and building materials. Waste would be reduced in quantity while the carbon is saved as charoal. Household pyrolysis ovens are becoming available so people can convert their waste to carbon at home.

Bush covers much of New Zealand's steepest lands and is the biggest contributor to flood waters. Our natural forest is slowly losing its water holding capacity and carbon as browsing animals deplete the understorey preventing natural regeneration and accelerating erosion. Eventually our bush will become a shrubbery on slips and our trees lost as a carbon emission! LUCUS measurements will reveal this forest decline and loss of carbon while other monitoring like the Kaweka Mountain Beech Survey will reveal the pest control required to get a pulse of new vegetation. The first line of defence against flooding, loss of biodiversity, and loss of carbon is to look after the bush we already have. With the New Zealand bush in such poor health any improvement will gain carbon credit and reduce the floods.

Perhaps the biggest way New Zealand can gain carbon credits is to eradicate browse in the native forest. Has anyone done the research?

Unfortunately, farmers who have protected their stands of bush are not eligible for carbon credits in spite of being measured by LUCUS and being part of the national equation. Some recognition is required. To get carbon credits a land-owner has to plant new areas ignoring the first line of defence which is to protect the bush we already have.

Change causes unintended consequences and retiring land to native revegetation is no exception. Removing grazing and browse will cause the inevitable explosion of weeds. We tend to plant out areas and walk away and native planting projects go backwards. Without good management retired areas will revert to plant and animal pest corridors (as is happening now along our streams, roads, rail and unmanaged reserves). Ongoing maintenance is an essential part of the plan while monitoring and early intervention is essential to keep out the pests. Presently NZ is failing here, and we need to improve.

A scattering of totora, manuka and kanuka may prove valuable on erosion prone farms as they self-sow prolifically on disturbed ground. On difficult country where browse is a problem a cover of unpalatable manuka and kanuka would be considered a successful beginning. In ten years a kanuka forest will have dense canopy closure, good weed suppression, and an open understorey that is easy to manage. A thick litter layer and soil formation will soak up rainfall and reduce peak flooding. Insects will attract birds that bring in seeds and guano. Birds will also bring in soil micro-organisms that will multiply to 10 or 20 tons per hectare. Smaller trees like kanuka may be more appropriate beside infrastructure, fence lines, cropping paddocks and eroding stream banks.

Throughout NZ forest succession to a more diverse tall forest is severely inhibited by pests. Deer can double in numbers every three years necessitating a new attitude and determination to achieve browse free. The phrases, 'Good hunting' and 'hunting block' are synonyms for 'bush in decline' while the decline is too slow for most people to notice. A new cohort of native biodiversity needs a chance to take hold to maintain our natural forests deep rooted biodiversity, water holding capacity and ability to sequester carbon.

Deer, goats, pigs, rabbits, wallabies and possums need ongoing control or eradication. Predator Free NZ needs to be upgraded to Pest Free NZ (plant and animal). A healthy forest will actively sequester carbon and soak up the first 100mm of each rainfall. Is pest control our easiest way to minimise flooding and balance our carbon equation?

To conclude. The multiple issues of water quality, flooding, erosion, forestry slash and biodiversity can be remedied while gaining carbon credits. One million hectares of our most eroding farm and forestry land requires conversion to native forest to minimise flooding and gain long term carbon credits. If alternatives are not advanced New Zealand will require another one million of farmland converted to Pinus radiata forest as the quickest short-term fix. Eventually, say in 50 to 100 years, the native will catch up and become the main carbon sink and the pine can be harvested. And some native logging may become acceptable.

To incentivise landowners to convert to carbon farming a site specific plan would create certainty and describe the progress required to earn subdivision rights. Each carbon farm would be covenanted in perpetuity with a designation of carbon farming, water quality and flood protection. The local rural communities would benefit from funded revegetation employment and available land for people to migrate to the country. Most farms and lifestyle blocks have an area where they could be encouraged to plant natives creating biodiversity steppingstones from mountains to city to sea.

Alternatives are available that will reduce the amount of farmland needed for pine carbon forests. There is enough waste (including slash) from logging operations to replace coal and a supply chain is required throughout New Zealand. Biofuels produced from forestry would create fuel security. Pyrolysis furnaces could convert most waste into a safe inert form while retaining the carbon. For example, forestry wood chip and dairy effluent could be converted to biochar to be spread on farmland reducing the need for fertiliser.

Erosion prone farms are being devastated by reoccurring rain events and subdivision rights and funding into carbon farming could offer a way forward.

A2877077

Te Kaunihera o Te Tairāwhiti
GISBORNE
DISTRICT COUNCIL

6 April 2023

Ministerial Inquiry into Land Use
Ministry for the Environment
Wellington

Attention: Ministerial Inquiry into Land Use Panel

By Email:

Gisborne District Council's submission into land uses associated with the mobilisation of **woody debris (including forestry slash) and sediment in Tairāwhiti/Gisborne District**

1. We thank the Inquiry Panel for the opportunity to provide a uniquely Tairāwhiti perspective on the woody debris and sediment issue. The main points of this submission were also presented by Gisborne District Council (Council) staff in person to the Inquiry Panel, on 4 April 2023, in Tairāwhiti.
2. We acknowledge Government's commitment for taking up the challenge of addressing this sensitive matter in the short time span provided.
3. For further clarification please contact Joanna.Noble@gdc.govt.nz
4. We give consent to Gisborne District Council's submission being published where applicable.

Nāku noa nā,

Remove signatures, OIA: s9(2)(a)

Nedine Thatcher-Swann
Chief Executive Officer

Joanna Noble
Chief of Strategy and Science

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APPENDICIES

Ministerial inquiry into Tairāwhiti/Gisborne land-use

1. PURPOSE AND SCOPE OF THE INQUIRY

- The scope of inquiry (as set out in the Terms of Reference) is specific to land uses associated with the mobilisation of woody debris (including forestry slash) and sediment in the Tairāwhiti/Gisborne and Wairoa Districts, and to make recommendations about the further work needed to address land use impacts of storms.
- This written submission focuses on Tairāwhiti, and the impacts created by clear-fell plantation forestry. We acknowledge that sediment discharge is also generated by other land-uses, including farming. However, the government has already introduced a suite of freshwater regulation to address farming practices that is significantly less enabling that that in place for plantation forestry. This regulation, coupled with the economic drivers for conversion of highly erodible land to forestry, means that this submission focuses on plantation forestry.

2. EXECUTIVE SUMMARY

2.1. PRIMARY SUBMISSION POINTS

2.2. Council acknowledges that urgent action is needed to ensure better outcomes for the environment and our community. We look forward to this inquiry informing change to national policies and regulations so that the national settings actively support and enable an appropriate approach to managing land use in Tairāwhiti/Gisborne.

2.3. It is easy to look back and ask why wasn't more done 25 years ago when the pine plantations were planted in the Tairāwhiti/Gisborne region to prevent the issues we are now experiencing. Today no one in the driver's seat had any involvement in the past legacy issues and are desperate to see a step change in the legislative environment to support our region. Noting that "context is everything" hindsight is a wonderful thing, but foresight is even better.

2.4. Harvest volumes have significantly increased over the last 10 years. This is coupled with a move to harvest steeper more vulnerable land and more frequent ex tropical storms and cyclones. The introduction of the NES-Plantation Forestry (NES-PF) in 2018 cut across regional powers imposing a one size fits most set of rules for the country, that set a permissive regulatory framework for clearfell plantation forestry. Attempts to impose more stringent controls have received vigorous push-back from the forestry sector.

2.5. Council agrees that a new approach to sustainable land use, inclusive of all land uses, is needed for Tairāwhiti and a lot of work is already underway as part of the Tairāwhiti Resource Management Plan review. However, the plan review process takes time, especially if not well-supported by national level policy, and there is likely to be economic and associated social impacts from introducing a more restrictive regulatory regime. Government intervention and investment to create change remains an important part of addressing the issues we face and ensuring an equitable transition.

2.6. We are also reviewing and adjusting our consenting processes, have established a forestry taskforce to address the issue of woody debris that has the potential to be mobilised within catchments, and continuing our compliance, monitoring and enforcement programme.

2.7. SUMMARY OF RECOMMENDATIONS

SOLUTIONS UNDER THE CURRENT SYSTEM	
To complement controls via the NES PF, a slash management plan (within Forest Environment Plans) should be required as part of the permitted activity in Green/ Yellow/Orange (most), and for a resource consent application for harvesting on Orange/Red Zone land. They could consider a wide range of options to address plantation forestry management:	Long term binding Forestry Environment Plans (that include slash management plans) Setbacks: inclusion of realistic case by case Biodiversity setbacks: 5 and 10 m have proven inadequate. Require direct actions within setback areas such as *high stumping* is required to harvested trees to a height of 1.0 metre

	within one tree length of the permanent 'biodiversity set-back'. Increased stringency is required for harvesting and replanting
Require a further Risk Zone for Extreme Risk, a "Purple" zone where *plantation* forestry should not take place. Some of the areas are shown in figure 6. We believe many sites should now be re-planted or aerial sown (drone) with un-palatable native species such as manuka, kanuka, tutu, rohutu which will allow recovery without negative browsing impact from ungulates	Erosion Susceptibility Classification (ESC) use at a realistic scale with further attributes considered. These in turn underpinned by rules that are more stringent than the NES-PF in the Councils emerging Land use plan (replacing the TRMP) examples at Appendix 3. Hold settings at strategic points.
Safe storage or removal (as a valuable raw material) of wood debris from landings, especially in steep slopes. Harvesting methods that minimise breakages and place potential slash in safe sites. Partial catchment (coup) harvesting[1]	Location and timing of installation of slash catchers Consideration of the potential for slash to be generated from the harvested slope (less likely on easier slopes and further from waterways). Introduction of live slash retention plantings at harvest to protect the site at the subsequent rotation harvesting. Retention of riparian vegetation.
RMA Prosecution changes Greater cost recovery Higher fines Remove option for offenders to elect a jury trial. Inclusion of civil sanctions as a tool to respond to offences when traditional prosecution is not the best tool	Enable Council to recover more from prosecutions. This would help offset high legal costs and allow remediation of impacts. Polluter or the ratepayer pays Increase maximum fines available for criminal prosecutions. Any fines imposed should be reflective of the environmental, infrastructure and social impact of the offending. No jury trial would reduce delays and costs associated with prosecutions
Changes to the **Tairāwhiti Resource Management Plan** (ideally supported by national direction)	
New overlay (riskiest land)	The *purple zone* (referred to above)

[1] Alternatives to clearfelling for harvesting of radiata pine plantations on erosion-susceptible land Mark Bloomberg, Eric Cairns, Denny Du, Harriet Palmer and Chris Perry NZ Journal of Forestry, November 2019, Vol. 64, No. 3 http://www.nzjf.org.nz/free_issues/NZJF64_3_2019/5D9ABDDD-40ED-494f-BE1F-BE5BE4AF5A64.pdf

Reduce volume of woody debris – logging residues removed; slash at landings removed	Tighter controls on harvest; drive land use change
More substantial setbacks	To provide a natural buffer between harvest areas and waterways
Area based restrictions on harvest in catchments/sub catchments	Reduce the amount of land that is vulnerable until a vegetation has re-established
Carbon and Conservation Forests	Content to expand aspects from the NESPF to all Forests
Manufacturing Clusters to stimulate demand for Biomass	Provisions to enable development of manufacturing clusters. As the new RMA system that will provide RSS is not in place for a number of years.
POST RMA IMPROVEMENTS UNDER THE NBA, RSS and NPF	
RSS Manufacturing Clusters to stimulate demand for Biomass	Details in section below.
Limitations of the NES-PF to provide content into plans will be provided for by the NPF.	Greater ability to incorporate into plans, see below.
Incorporation of the Forestry Owners Association *Voluntary* Code of Practice into the system.	Details in section below.
New approaches to land-use could be explored through the development of the Regional Spatial Strategy (RSS) which will be required by the new Spatial Planning Bill currently being considered by Select Committee. However, this is not an immediate solution.	Central government buy-in and investment will be critical to achieving transformational change.
Creation and implementation of biodiversity credits	A system is needed to incentivise transition to a more sustainable land use on the most vulnerable land that also provide multiple positive outcomes
ROADING	
Review of Waka **Kotahi's Emergency Work** Policy	Policy is capped at an organisation's normal FAR plus 20% to a maximum of 95%.

Collaborate with other councils impacted by weather events like Wairoa and Tasman likely similar issues.	Bespoke application for 100% is already predetermined.
TECHNOLOGY	
Greater use of technology such as drones and tagging.	Could be set out in RMA or the Forests Act. Details in section below.

3. **TAIRĀWHITI**/GISBORNE REGIONAL CONTEXT

3.1. Gisborne District Council (Council) was created in 1989 as the first of six unitary authorities with both regional council and territorial authority functions and responsibilities. Our status comes from the district's relative isolation and its strong communities of interest. We combine the functions, duties and powers of a territorial authority (service delivery bodies) with those of a regional council (regulatory authorities).

3.2. Tairāwhiti covers a land area of 8,265 square kilometres. While we are home to only 1% of the national population, our land area comprises 3% of New Zealand's national land area. Tairāwhiti is 8% of the North Island but has 25% of the severe to extreme soil erosion.

3.3. Māori comprise more than half the population of our region. Government has and continues to make decisions that place Māori (whanau, hapū, iwi) at a considerable economic disadvantage and is evidenced by the Tairāwhiti featuring regularly as one of the most socially and economically deprived regions in the country.

3.4. Here in Te Tairāwhiti iwi, hapū, and whanau have lost most of their best lands that have the most productive soils. There is 228,000 ha of whenua Māori in Tairāwhiti, and it is predominantly LUC 7 to 8, and situated more than 80 km from the Gisborne Port.

3.5. Māori have invested heavily in forestry. Capital investment in forestry on Māori farms/lands in Tairāwhiti increased by about 46% as at 2018 (MfE & Stats NZ, 2018). A significant proportion of this land is located on the East Coast. Without support to make other forest types financially viable, permanent exotic forests in remote areas where harvest is not economically or environmentally feasible are a means to provide income from whenua Māori.

3.6. In Tairāwhiti, whenua Māori has significantly more indigenous cover than General Title land. However, Māori were not granted Carbon Credits for their pre-1990 indigenous forests.

3.7. In 2020, Council adopted the Tairāwhiti 2050 Regional Spatial Plan, which sets out a collective vision for the region for the next 30 years. The following aspirations are relevant to this kaupapa:

- Land uses across the region are optimised to suit their physical and cultural setting and have adapted to changing climate patterns.
- No "at risk" catchments in the region.

- There is a korowai of more permanent vegetation on highly erodible and most vulnerable steep land.
- The mana of the whenua and mauri of the waterways is restored in Te Tairāwhiti.
- We can swim in our waterways and our beaches and waterways are free of forestry slash.

3.8. Population growth in Tairāwhiti over the past three years has increased at a higher rate than expected. The region's population is now over 50,000 and continues to grow. This growth is putting pressure on services, housing, infrastructure, and the natural environment. We also have a younger population than most other regions, and the over 65 age group is growing. These factors influence the ability of our community to pay more rates and our ability to match the level of investment other councils can make in capital projects and operational programmes.

3.9. In the year ended March 2022, forestry was one of the biggest contributors to Tairāwhiti region's GDP, alongside agriculture; health & social services; and hiring, rental and real estate services[2].

Table 1: Most significant contributions to regional GDP by industry sector (data is for the year to end March 2022)

Industry	Gross Domestic Product ($million)	Percentage of total regional GDP
Agriculture	222	9%
Health care and social assistance	220	9%
Forestry, fishing, and mining	219	8.9%
Rental, hiring, and real estate services	207	8.4%
Owner-occupied property operation	185	7.5%

[2] Figures extracted from Stats NZ Regional GDP Regional gross domestic product: Year ended March 2022 | Stats NZ

4. THE REGION AND FORESTRY

4.1. Severe erosion issues have been longstanding in Tairāwhiti with soil conservation programmes operating since at least the 1950s.

4.2. As a means of reducing both the on- and off-site impacts of erosion, particularly within and downstream of areas of 35,000 ha of severely eroding pastoral hill country was progressively retired and planted (1962–1985) in exotic forest species as "protection forests"[3].

4.3. The first major forestry plantings were undertaken in the Mangatu Forest in the 1960s, and significant afforestation has happened in a range of areas across Tairāwhiti since that time. About 17% of Tairāwhiti's landmass has now been converted to forestry.

4.4. In 1988 Cyclone Bola caused further significant soil erosion and landslide related damage within existing areas of planted exotic forest and across extensive areas of remaining pastoral hill country. More detailed information on Cyclone Bola and the subsequent Inquiry is provided in the further information links at the end of this document.

4.5. Following Cyclone Bola, the East Coast Forestry Project (ECFP[4]) was set up in 1992. This project subsidised large-scale planting of Pinus radiata across the district, often on the most seriously eroding land. The focus moved to blanket Pine Radiata establishment with little consideration of establishing long term species, such as willows, into gullies.

4.6. On-farm soil conservation works, which had traditionally introduced trees into gullies and eroding slopes, were not continued at this time. Some were planted under subsidy with the intention of both recovery and establishing a commercial forestry industry including some land cleared from regenerating indigenous scrub at the time of Cyclone Bola. Land planted by the New Zealand Forest Service as "protection forestry" with the main objective to combat very serious accelerated soil erosion with production of timber as a secondary aim.

4.7. Following several reviews,[5] the project was extended from commercial afforestation to also include reversion grants (assisted natural regeneration of forest) starting in 2000 and require a non-use covenant with a 30-year term to be registered. A requirement for all grantees to register 50-year covenants on their land titles was introduced in 2007.

4.8. *Pinus radiata* remains the preferred tree species for plantation forestry operators and for carbon forestry due to its rate of sequestration, through increasing economic potential, the earliest of the "protection forests" were later reclassified as "protection-production forests", raising concerns at the time over the probability that their harvesting would reactivate erosion.

4.9. Many of the forests planted post-Bola are now being harvested. Harvesting accelerated around 2010, and since that time the region has also been subject to greater and more frequent severe weather events – which have combined with forestry harvest to result in unacceptable environmental and community effects. Coupled with this, in 2018 the introduction of the NES-Plantation Forestry removed regional controls over forestry harvest. Until 2018, all forestry in Gisborne required a resource consent. From May 2018 (when the NES-Plantation Forestry was introduced) only forestry on the most severely eroding land (Erosion Susceptibility Classification Very High/ Red) required consent for harvest.

4.10. The plantation resource is about 155,359 hectares (ha), consisting primarily of Pinus radiata (150, 806 ha) and Douglas-fir (2,090 ha of Douglas-fir) much of it on steep and severely eroding land. The forestry estate in the region has the potential to generate a substantial increase in the amount of wood available over the next three to four years, coming mostly from the small-scale[6] owner resource. This volume reduces substantially as the large plantings from the 1992 to 1995 period are harvested[7].

4.11. Initial harvesting was on highly erosion prone, but generally easier sloping areas. Harvesting moved from easy sloping but eroding land to steep slopes with shallow and skeletal low fertility soils. As the first rotation harvests on steep lands have proceeded, the issue of sediment and woody debris deposition into waterways, onto floodplains and beaches and ultimately the coastal environment have become of increasing concern.

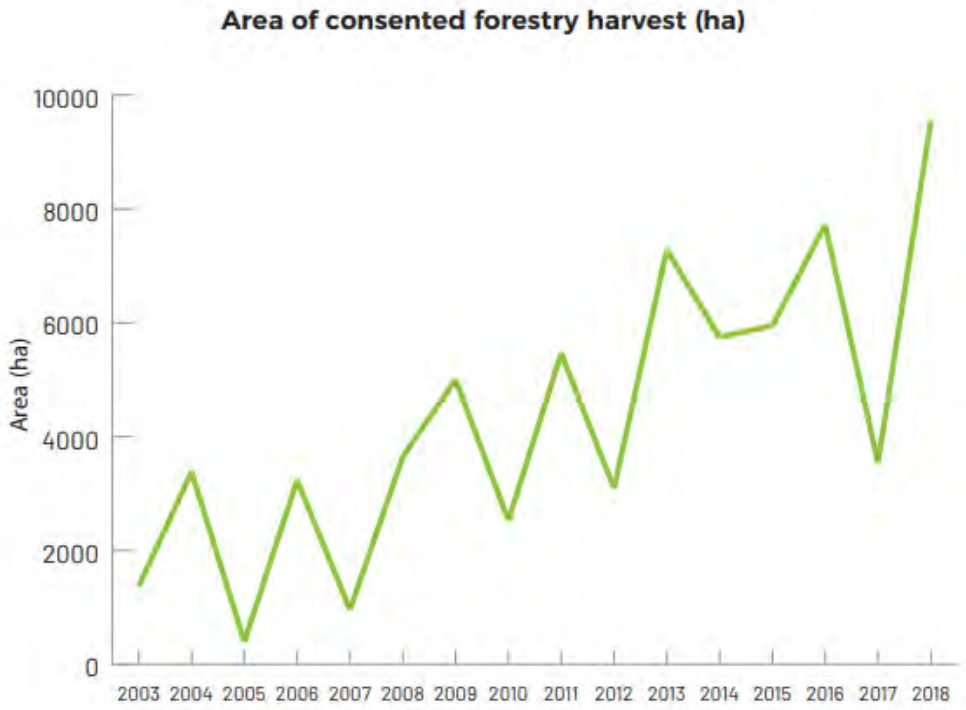

Figure 1 Forestry harvest by year. Forestry harvest planning tends to be on a two-year cycle, with a busy year followed by a less busy year. This trend can be generally observed since 2003, with a step change increase in harvest areas from 2009.

[3] Poole, A.L. (1960). Protection forests in New Zealand and a Poverty Bay example. New *Zealand Geographer*, *16*(2), 115-130. https://doi.org/10.1111/j.1745-7939.1960.tb00309.x

[4] Programme is closed but funds approved up until 2018 are still available to landowners. Alternative treatments can be progressed, but the funding is capped to the approved sum.

[5] MPI 2005 review of the ECFP https://mpi.govt.nz/dmsdocument/3999-east-coast-forestry-project-review

[6] Small-scale owners have less than 3 000 ha of forest in the region

[7] Ministry for Primary Industries Wood Availability Forecast - East Coast (mpi.govt.nz)

5. APPROACHES TO HARVESTING IN TAIRĀWHITI

5.1. Commercial exotic planation forestry is clear felled, removing all trees from large areas at any one time. This applies both on the easy sloping and steep terrain. Timber removal methods vary, generally according to terrain.

5.2. Ground-based machinery (such as tractors or skidders) are used on easier slopes, whereas cable-hauler or skylines are used for steep terrain. Removal by helicopter is possible but rarely used due to cost[8]. Drone technology is being used and emerging as an option for harvest and thinning but is not being used in Tairāwhiti.

5.3. Ground based harvesting can substantially degrade and scar the land over which the trees are towed, leaving it vulnerable and exposed to erosion. Weight distribution of ground-based machinery based improved significantly resulting in reduced disturbance over time. Tracking of ground-based access tracks needs to have cutoffs to prevent water concentration installed at the completion of harvesting. Woodlots require remedial earthworks and water controls to be left in a functional condition on completion of harvesting activities as machinery is removed from the site on completion of harvesting.

Figure 2 Areas prone to gully formation from tractor logging

5.4. The heavy machinery and logs hauled over the surface also contribute to soil compaction, contributing to water-logging if satisfactory drainage is not provided and maintained.

5.5. Cable logging can also leave deep, erosion-prone scarring on outcrops of steep land and near to landings on concave upper slopes, Logging roads need to be well constructed with robust a water-table, culverts and water controls installed. Mechanical harvesting has significantly reduced breakages resulting in increased retrieval of logs to landings as well as improved placement of logs as they are felled. This provides improved returns and environmental effects.

[8] Taranaki Regional Council. (n.d.). *Harvesting a radiata pine woodlot*. Retrieved May 27, 2008 from http://www.trc.govt.nz/environment/land/pdfs/44_harvestinga_radiata_woodlot.pdf

Figure 3 Gully erosion

Figure 4 Soil compaction from skidder logging

Figure 5 Steep land left denuded and vulnerable from cable logging

5.6. Issue 1: Exacerbation of Risk of Landslip and Debris Flow from Forestry Activities on Vulnerable Land

5.7. Some of the land with the greatest erosion risk has been planted in plantation forestry.

5.8. There are no effective mitigation options where the riskiest land is subject to clearfell plantation forestry. The land slide risk which is prevalent under pastoral farmland is also substantial for at least eight years (30%) of the plantation forestry cycle and in some locations, when forestry thinning or significant disturbance to the canopy is undertaken, extending to 50% or more of the plantation forestry cycle.

5.9. When landslip occurs in forestry situations, this exacerbates to debris flow as slash, woody debris, windthrow and riparian vegetation are all entrained in a destructive flow that can have substantial environmental, social and economic impacts on downstream areas.

5.10. Issue 2: The High Volume and Concentration of Forestry Waste Creates a High Risk of Mobilisation **of Forestry Slash across Tairāwhiti**

5.11. New Zealand forests generally have a high proportion of forestry waste compared with other countries in the OECD (Visser et al 2017), with an average 15% left on the slopes and by landings after harvest. This makes safe disposal of forestry slash more difficult and when it is mobilised, there are very substantial volumes involved.

5.12. This is exacerbated because most Tairāwhiti land where forestry is established is in the steeper areas. The overwhelming majority of forestry in Tairāwhiti is harvested using cable hauling operations. The size of landings (where wood is haul to, processed and trucked out) are also very large by international standards.[9] Large landings mean large concentrations of wood waste and wood from landings has been implicated in many landslide and debris flow events, particularly those which occurred during the 2018 storms[10].

5.13. In order to reduce the risk of landing failing, forestry companies are now commonly pulling some unstable material up onto the landing at the end of harvest. However, in a very large storm event, these areas can still fail – with the heavy weight of wood contributing to debris flow.

5.14. Large landings also lead to more extensive earthworks – such as larger roads (as more trucks will need to visit the landing to collect the wood). The more extensive the earthworks in steeper lands, the more likely to trigger erosion and landslides, so these are all connected matters.

5.15. Forestry slash production is known to be substantially exacerbated by some other cable hauling practices – the most significant of which is hauling logs over gullies and streams. Research by Scion[11] indicates that hauling across streams, generates 2 – 4 times the amount of woody debris than hauling the wood away from streams. This is because when hauled across streams the riparian areas are usually substantially damaged by the logs, and in some cases the logs are dragged through the waterbody destroying the integrity of the banks of the waterway. While an attempt to address this issue was made in the TRMP, with a restricted discretionary activity rule in place for hauling through riparian areas, in practice these consents are routinely granted, and the existence of the rule has not resulted in significant changes in forestry practice.

5.16. Most harvest in Tairāwhiti operates under Permitted or Controlled Activity in the Red ESC areas, so there is no direct incentive or requirement for forestry companies or contractors to reduce the volumes of slash and woody debris left in a forest during forestry harvest.

5.17. Issue 3: Management of Offsite Impacts of Forestry Slash including from Legacy Harvest Operations

5.18. With the frequency of mobilisation of forestry slash, and large volumes now deposited in streams and in the coastal environment there is a substantial legacy issue to be dealt with. No firm estimates of volume of existing slash exist, but in some locations (such as Mangatokerau Catchment, Waimatā Catchment) the estimates of residual material are in the hundreds of thousands of tonnes. When it is considered that in recent years 2.8 million tonnes/year has been exported from Gisborne Port, where 15% on average is residual waste left on slopes – alongside further material left at landings, it could be expected that in the order of 500,000 tonnes per year of material is being left in harvested forests.

5.19. Over the last eight years of harvest (from which most of the woody debris has come) this could mean in the order of 4 million tonnes of woody debris was deposited in forests. While each year thousands – or sometimes tens of thousands of tonnes of woody debris is mobilised and deposited in streams, on private land and on beaches, there is a very substantial volume of material that still remains yet to be mobilised, or is trapped in birds nests (huge wood dams in steep gullies), and gradually moving downstream in each storm.

6. WOODY DEBRIS AND SEDIMENT IMPACTS

6.1. Historically, mobilisation of woody debris and forestry slash was a periodic occurrence in Tairāwhiti (such as 1994 Wharerata storm event). However, since 2010 there have been landslips and woody debris mobilisations in some locations in the district at least annually (see Appendix 1).

6.2. The adverse environmental and social effects of clearfell forestry harvesting are increasingly prominent in the district. Additional information and photographs events are presented in Appendix 1 and 2.

6.3. We believe that the increase in woody debris incidents is for several reasons:

- The steeper more slip prone land is being harvested
- Harvest practices adopted are not suitable for the terrain (despite the assurances and statements to the contrary made by forestry companies in their consent documentation)

[9] Visser, R., Spinelli, R. and Brown, K. (2018) Best practices for reducing harvest residues and mitigating mobilisation of harvest residues in steepland plantation forests. Canterbury School of Forestry, Envirolink Report 1879-GSD152 for Gisborne District Council

[10] Cave, M., Davies, N. and Langford, J. (2017) Cyclone Cook Slash Investigation. Report for Gisborne District Council, October 2017. Cave, M. (2019) Forestry Harvest Residues on slopes in Makiri Forest Upper Waipaoa Catchment Storm of 11th-12th June 2018. Report for Gisborne District Council. Cave, M. (2020) Tikapa Beach Woody Material July 2020 storm. Report for Gisborne District Council. 22 September 2020. Cave, M. (2021) Post Storm Surge May 2021 Clean-up of North Tolaga Beach. Report for Gisborne District Council June 2021. Cave, M. (2022a) Downstream impacts of sediment and woody debris inundation in the Mangaheia sub-catchment Uawa Catchment during the Queens Birthday Storm 2018. Report for Gisborne District Council. September 2022 Cave, M. (2022b) Estimates of log volumes on Tolaga, Kaiaua and Anaura Beaches. Report for Gisborne District Council. September 2022

[11] SCION https://www.scionresearch.com/about-us/about-scion/corporate-publications/scion-connections/past-issues-list/issue-9/New-technologies-for-improved-forest-safety

- The extended period of vulnerability post-harvest, of up to eight years
- Climatic conditions - heavy localised rain events have been occurring more frequently. NIWA climate change projections[12] for the region are that more extreme events (including droughts) will be more likely.
- In some instances, there may be non-compliance with consent conditions and/or the national regulations. Due to the nature of the national regulations, often non-compliance can only be proven when a 'failure' occurs

6.4. Previous and current national policy settings and the way that the forestry industry is structured (relying heavily on contractors and subcontractors to carry out the harvest, working to slim margins, with limited security of work) also contributes to land use choices and forestry practices.

6.5. Council is investigating the origins and causes of the woody debris and sediment found in the recent events. Appendix 4 gives an overview of the recent prosecutions from a large-scale event/s in 2018. We are still seeing these types of impacts despite taking a punitive approach with companies who continue to not comply with requirements or who use poor practices.

[12] NIWA Gisborne https://niwa.co.nz/sites/niwa.co.nz/files/WEB%20Gisborne%20Climate%20book2019.pdf

6.6. Impacts on freshwater and coastal ecosystems

6.7. Forestry practices have well-documented impacts on freshwater ecosystems globally. These adverse effects are substantial in freshwater environments (e.g. as outlined in Death and Roil, 2017) and the coastal environment (e.g. as outlined in Johnston et al 2022). Sedimentation can result from the creation of roads to access forests, direct deposition of materials into the waterway, and incidental deposition of materials into the water via slow movement and gullying, resulting in reduced soil stability and increased soil exposure after harvest and prior to canopy closure on second rotation plantings[13].

6.8. There are positive benefits of afforestation for water quality and environmental health are present while the forest is standing. However, the combination of the high volume of earthworks required to install forestry infrastructure, and the discharges of sediment and debris that occur during earthworks and harvest, combine to degrade the quality of freshwater and coastal waters. Many river systems in Tairāwhiti fall below the National Bottom Lines for sediment (visual clarity and deposited sediment) but the tributary streams are less impacted and remain the refuge for native fish species[14].

6.9. When forestry infrastructure is installed, and clearfell harvest occurs, the level of sediment in these streams rises very significantly. It also increases significantly in the receiving rivers, estuaries and the coast – with step changes in sediment levels seen once significant clearfell occurs.

6.10. The accumulation of material, aggradation, causes physical changes to the terrestrial, riparian, and freshwater habitat. Sedimentation in water systems such as rivers can lead to hypoxic conditions where the oxygen concentration is too low to support the diversity of organisms that would naturally inhabit the area.

6.11. The primary impact resulting from the physical movement of P.radiata is demonstrated by the photographs at Appendix 2– deposition of logs and debris on riverbanks and beaches. This affects the plant, animal, and fungal compositions of these systems as the physical habitat is drastically altered. Many riparian plants had been damaged or displaced at the sites, by both debris and silt deposition. The breakdown of this material will also have impacts on freshwater, coastal, and riparian systems by entering a significant amount of organic matter, and therefore nutrients, to environments where this is not a naturally occurring nutrient source, nor a naturally occurring quantity of such matter. These impacts are felt most strongly by mana whenua communities, who often rely on natural freshwater for bathing and drinking and who source kai from freshwaters and the sea. These communities are increasingly concerned and vocal about the impact of sedimentation on their awa and moana. While sediment is also generated from pastoral farmland, it tends to be delivered on a more continual low level basis – rather than in the very substantial pulses with associated smothering effects from forestry harvest. Where sediment is combined with woody debris, scouring out the beds of rivers and smothering shellfish beds, the impacts on Māori communities is very significant.

6.12. Te Aitanga a Hauiti at Tolaga Bay, Ngāti Porou hapū at Tokomaru Bay, Tikapa, and around Tikitiki, Rongowhakaata hapū at Waikanae, Te Wherowhero and Te Arai, and Ngāi Tāmanuhiri hapū at Maraetaha and Te Wherowhero have been the most adversely affected to date.

6.13. Impacts on infrastructure and property

6.14. Where public infrastructure such as bridges, culverts and roads are affected by woody debris – or destroyed, central government (through Waka Kotahi) or the Council (for local infrastructure) pay the repair and clean-up costs – often extending into the 10s of millions. For example, the clean-up and repair costs for the 2018 winter storms was estimated at over $10 million, most of this due to damaged infrastructure and roading from woody debris.

6.15. Our roading and water supply infrastructure comprises some of the region's most critical infrastructure along with the highway, power and communication services provided by other entities. This network infrastructure resides within a natural environment that is extremely vulnerable to severe weather events.

6.16. Following the Queen's Birthday storms in 2018, Council recognised that the plantation forest planted to protect the water supply pipeline for Gisborne City would be a risk when harvested and accordingly established the Waingake Transformation project to transition the forest to permanent indigenous forest. It was recognised that this would not afford full protection until the new forest became established. This has proved to be the case with the pipeline suffering a significant number of failures due to the migration of large woody debris from steep slopes which failed during Cyclone Gabrielle.

[13] Wallis G, McMahon S. 1994. The impacts of forest management on erosion and sedimentation: a New Zealand review. Logging Industry Research Organisation report. 19(2) and Quinn JM, Boothroyd IKG, Smith BJ. 2004. Riparian buffers mitigate effects of pine plantation logging on New Zealand streams 2. Invertebrate communities. Forest Ecology and Management. 191: 129- 146.

Figure 6 impacts on infrastructure

Figure 7

6.17. The pipeline from the Bush Intake to the city has now been largely repaired and that this has happened in such a short period of time is entirely the result of the rapid response that the Council could make as the owner of the critical infrastructure. This highlights the value of local ownership of critical infrastructure assets where decisions could be made rapidly by local decision-makers who understood the infrastructure and what the best solutions would be. It is unlikely that this pipeline would have been repaired by now if that decision had to be made by a committee elsewhere without that local knowledge.

6.18. It is a similar situation with the local roading network. The councils roading team is used to the storms we have every year which degrade parts of the network but what has been a factor particularly since 2017 is the impact of large woody debris on bridges. The bridges can generally cope with floodwaters although clean ups and some abutment repairs will be required. Large woody debris is a separate issue and of the 8 bridges destroyed, partially destroyed or severely damaged (11) or adversely affected (41), all but one of those was the result of woody debris becoming wedged up against the bridges.

6.19. Woody debris continues to accumulate on beaches, either through storm events or incrementally over time as vegetation makes its way into our rivers, marine environment and eventually onto the beach.

6.20. Large amounts of woody debris on the beach is a Health and Safety issue and environmental issue, impacting on the general amenity of the area. While the issue of woody debris is best addressed at source, once the woody debris has reached the coastline and marine environment, it is extremely difficult to identify the original landowner, and has become Council's responsibility by default.

6.21. Due to community concerns, Council and the forestry industry have undertaken beach clean-ups, but this has been reactive, and the damage has already occurred to the receiving environment/s.

6.22. Woody debris remaining in river catchments poses a risk to bridges and may exacerbate flooding in some catchments.

6.23. Landowners affected by deposition of woody debris are generally left with paying the costs of clean up and remediation. This includes replacement of flood gates and fences, and removal of debris from paddocks.

7. IMPACTS AND EXPERIENCES DURING CYCLONES HALE AND GABRIELLE

7.1. Over two days Cyclone Gabrielle brought 547mm to Raparapaririki (Waiapu) the highest rainfall in the district, and 500mm to Mangapoike by the water supply dam in Waingake. Cyclone Gabrielle resulted in a State of Emergency being declared that lasted a month. At the peak of the event, the Waipaoa River water level reached 12.8m; the Waiapu River reached 8m, which is the highest level recorded since 1975; and the Te Arai River 4.9m, the highest recorded since 1983. The Hikuwai River reached around 14m, for context the Cyclone Bola level was 14.3m.

7.2. Damage was exacerbated by large volumes of woody debris (including forestry slash) and sediment in many places including Tolaga Bay and the Waiapu catchment. An example of the source of woody debris below with terms explained in Definitions at the end of document.

Waikanae Beach	Number	%
Long resident pine logs	157	49%
Pine RB	35	11%
Fresh cut Pine	8	3%
Pine obvious cuts	7	2%
Fresh cut to waste	15	5%
WPA	45	14%
Indigenous	41	13%
Fence Posts etc	11	3%
Totals	319	100%

Table 1 Example of source of woody debris

7.3. Impacts on livestock

7.4. Stock losses from flooding resulted in significant loss for some landowners. Significant areas of grazing land (pasture and crops) were covered with sediment and some land captured by riverbank erosion. Fences and floodgates were lost or disrupted resulting in difficulties in retaining and controlling livestock.

7.5. Transporting stock to alternative grazing or the freezing works has been severely disrupted due to road closures in parts of the district. This has led to exploring alternative such as droving across properties to get access to transport. This is difficult due to terrain and many people no longer have droving horses as they rely on motorised vehicles. It also has other risks such as river crossings etc. where flow can be high due to ongoing rain events. There are some properties that will have issues with feed as we head into winter if they cannot offload stock.

7.6. Impacts on infrastructure

7.7. At the peak, some 60 local roads were closed, and several have reduced levels of services; there are ongoing road closures at short notice to clear fallen trees. Today 30 roads closed, 20 bridges closed, and 9 roads closed to heavy vehicles. Hikuwai Bridge and Mangahauini Gorge repairs will take several months to complete.

7.8. Many bridges were destroyed (black in table below) and the Council is working with local industry for solutions to replace and building back stronger. Eleven are still standing but with major structural issues (red); forty-one are still standing but with structural issues (orange). Green are minor repairs such as approach railings. Disruption was increased as many of these bridges also carry vital infrastructure.

Table 2 Regions Bridges impact

Current summary

No. of Bridges	Black	Green	Orange	Red	Not Inspected	Total
Hikurangi		66	5	3		74
Turanga		35		1		36
Uawa	4	58	16	3	4	85
Waipaoa	7	194	20	4	2	227
Total	**11**	**353**	**41**	**11**	**6**	**422**

7.9. The increased frequency and intensity of events nation-wide is putting a high demand on the national emergency works fund. Council seeks a review of Waka Kotahi's Emergency Work Policy, which is capped at an organisation's normal FAR (Financial Assistance Rate) plus 20% to a maximum of 95%.

7.10. Impacts on Land

7.11. Soil erosion is evident on all land uses with the extent and severity dependent on the intensity of rainfall events and the land use. Inundation of sediment on valuable alluvial flats is extensive. Reactivation of existing erosion scars is evident throughout Tairāwhiti

7.12. Gully plantings have performed very well on farmland and in the limited gully plantings within forest blocks. Gully erosion has been significant in areas where no conservation planting has occurred.

7.13. Severe slip damage has occurred on steeper land with thin and skeletal topsoils in areas where very intensive rainfall has occurred.

7.14. Slump and slope movement on easier slopes is less evident but this form of erosion is often activated by prolonged wet weather. This may be experienced if a wet winter follows the wet summer and autumn to date.

7.15. Many of our existing disposal sites for sediment and woody debris have reached capacity, and disposal is a growing challenge.

7.16. Impacts on Forests

7.17. Mature forestry on easier slopes has performed well, the movement of whole slopes has occurred on steep slopes, where significant soil erosion was the reason for initial establishment. In places, slope collapse can be attributed to high river flows resulting in riverbank erosion particularly on outside bends of streams and rivers.

7.18. Some alternative exotic species appear to have performed well, these areas are small in extent and assessment of their success will need to include the extent of historic and existing erosion and the impact of the cyclones on this land. This includes eucalyptus, acacia and redwood planting along with assessing of performance of a range of indigenous species on eroding land.

7.19. The effect on indigenous forest has seen some slope movement, a protection management area of primary bush has slumped, and some riparian collapse alongside waterways has occurred in the steeper forests. Regenerating scrub has held slopes well although there has been gullying on erosion prone slopes, which would have been worse under pasture. Such forests have not been a contributor of large woody debris.

7.20. Impacts on Rivers

7.21. Large volumes of sediment and woody material has entered waterways throughout Tairāwhiti. This has resulted in a significant loss in capacity within the beds of Tairāwhiti waterways' which increases the risk of flooding from ensuing rainfall events.

7.22. Riverbank and streambank erosion have occurred throughout with new episodes of erosion evident as bed levels rise and adjoining slope toes are exposed to high flows during intensive rainfall events. Trees that were previously some distance above the bed level are now collapsing into the waterway and being carried downstream.

7.23. Aggradation and riverbank erosion have resulted in disruption to bridges and assets alongside riverbanks.

8. STATUTORY FRAMEWORK AND POLICY CONTEXT

8.1. This section briefly outlines current policy framework; and the use of current legislation, policies and rules that influence the way we use land, what works well, what is unhelpful; and market drivers and conditions, regulations, rules and the way in which requirements are enforced.

8.2. LEGISLATION

8.3. The Resource Management Act 1991 (RMA)

Land and water management in Aotearoa New Zealand is largely managed within the framework of the RMA.

Section 5 sets out the purpose of the Act, which is to promote the sustainable management of natural and physical resources[14]. This includes *safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and avoiding, remedying or mitigating any adverse effects of activities on the environment.*

This is clearly not functioning for forestry in Tairāwhiti as set out in the act.

8.4. Soil Conservation and Rivers Control Act 1941 (SCRCA)

The purpose of the SCRCA is to promote soil conservation, prevent and mitigate soil erosion, prevent damage by floods, and use land to achieve these purposes. Council owns and manages flood protection and drainage assets across Tairāwhiti. Catchment boards were able to be established under the Act and were responsible for the activities in their catchment district.

Under the SCRCA, catchment boards had several functions, including:[15]

- Minimising and preventing damage by floods and erosion

[14] Section 5 RMA https://www.legislation.govt.nz/act/public/1991/0069/latest/DLM231905.html
[15] Section 126, SCRCA.

- Constructing, reconstructing, altering, repairing, and maintaining all works necessary for: controlling or regulating the flow of water towards, into, in, and from watercourses; preventing or lessening any likelihood of the overflow or breaking of the banks of any watercourse and any damaging arising from those overflows or breaks; preventing or lessening erosion or the likelihood of erosion.

These catchment board functions are inherently to environmental outcomes for land and fresh water. This is a very old Act, and large sections have been repealed. Due to age it fails to address some more modern situations and commercial arrangements.

8.5. Climate Change Response Act 2002 (CCRA)

The CCRA establishes the legal framework to enable Aotearoa New Zealand to meet its international obligations under the United Nations Framework on Climate Change, the Kyoto Protocol and the Paris Agreement.[16]

The CCRA requires the Government to set emissions budgets and emissions reduction plans to achieve domestic targets. The NZ ETS is the Government's primary policy tool for reducing greenhouse gas emissions. The NZ ETS establishes a price on greenhouse gas emissions in the form of an 'emission unit' – also known as a 'New Zealand Unit (NZU)'. All sectors of the country's economy must measure and report their emissions and, if required to, purchase NZUs that they can surrender to the Government to cover their emissions.

Relevance to this topic: The NZ ETS incentivises afforestation by allowing eligible foresters to earn NZUs from the Government as their trees grow and absorb carbon dioxide, which they can then trade on the market. The NZ ETS drives increased Carbon Forestry (in a category *permanent forest*) planting, which are not covered under the National Environmental Standards for Plantation Forestry (NES-PF).

8.6. Biosecurity Act 1993

The purpose of the Biosecurity Act[17] is to enable "*exclusion, eradication, and effective management of pests and unwanted organisms*".

Biosecurity functions are split between the Ministry for Primary Industries (MPI), other governmental departments and regional councils. Regional councils are responsible for undertaking monitoring and surveillance of established pests and to prepare and implement regional pest management strategies.

Relevance to this topic, wilding conifer control is carried out under the Biosecurity Act and individual regions set strategies to control pests. Other pests also have impacts on indigenous biodiversity and species, soil erosion, water bodies and freshwater ecosystems.

There is a real need for more comprehensive animal and plant pest control to assist in establishing functional riparian areas within forests, indigenous bush and within farmland. Due to current pest levels the funding we have available can't cover all the needs and we are reliant on private landowners to finance pest control.

[16] In 2019, the Climate Change Response (Zero Carbon) Amendment Act committed New Zealand to reducing greenhouse gas emissions by 2050 in line with global commitments under the Paris Agreement.
[17] Bio Security Act 1993 https://www.legislation.govt.nz/act/public/1993/0095/latest/DLM314623.html

8.7. Local Government Act 2002 (LGA)

Section 10 of the LGA sets out the purpose of local government. This includes promotion of the social, economic, environmental, and cultural well-being of communities in the present and for the future.

Under the LGA, Council may prepare bylaws for managing, regulating against, or protecting from, damage, misuse, or loss, or for preventing the use of, the land, structures, or infrastructure associated with water supply, land drainage and water races.[18] These have limited impact alone without enabling legislation to specify penalties. There are few bylaw prosecutions for a number of reasons including substantial evidence to be successful, which in itself takes financial and staff resources.

Relevance to this topic, bylaws are sometimes suggested as a solution, in this circumstance they are not suitable as they have even lower cost recovery amounts through prosecutions.

8.8. Other Legislation

In addition to the key pieces of legislation outlined above, there is a suite of legislation relevant to the management of land and freshwater. These statutes include:

- Reserves Act 1977
- Civil Defence Emergency Management Act 2002
- Local Government Act 1974
- Hazardous Substances and New Organisms Act 1996
- Fire and Emergency New Zealand Act 2017
- Health Act 1956
- Building Act 2004
- Conservation Act 1987 (currently under review)
- Water Services Act 2021.

Relevance to the topic all of these may have an impact on the solutions or may assist, for example the review of the Conservation Act may assist with land that effectively needs to be retired from production. Perhaps *protection forests* into reserves.

8.9. National Direction under the RMA

8.10. National Policy Statement for Freshwater Management 2020 (NPSFM)

The NPS-FM is highly relevant to this topic as many of the impacts of forestry activities (both positive and negative) are felt in the freshwater environment.

The NPS-FM establishes the fundamental concept of Te Mana o Te Wai as the basis for freshwater quality and quantity management in Aotearoa New Zealand.

Te Mana of te Wai encompasses six principles, along with the hierarchy of obligations to ensure that natural and physical resources are managed in a way that prioritises:

- first, the health and well-being of water bodies and freshwater ecosystems
- second, the health needs of people (such as drinking water)

[18] Section 146(1)(b), LGA.

- third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

Relevance to this topic: It is difficult to understand how the NES-Plantation Forestry can be assessed as giving effect to Te Mana o Te Wai in Tairāwhiti.

8.11. New Zealand Coastal Policy Statement

The NZCPS provides national direction on sustainable management of the coastal environment. The preamble in the NZCPS notes that activities inland can have a major impact on coastal water quality, and that there is poor and declining water quality in many areas as a consequence of point and diffuse sources of contamination. It is therefore important to consider the interconnections between land and freshwater and the coastal environment.

Relevance to this topic: The NES – PF places very limited restrictions on the water quality of discharges from forestry infrastructure and harvest. However, both the NPS-FM and NZCPS are clear that it is not acceptable to either degrade waterbodies that are not degraded or do nothing in a situation where degradation exists. It is unlikely – and may be impossible to meet the NPS-FM and NZCPS requirements around sediment in particular, without placing further regulation over forestry activities to protect freshwater and the coast.

8.12. National Environmental Standard for Plantation Forestry (NES-PF)

The NES-PF provides nationally consistent regulations to manage the environmental effects of plantation forestry, covering eight core plantation forestry activities and allowing these to be carried out predominantly as permitted activities subject to permitted activities conditions on Low, Moderate and High Risk Zone but subject to controlled activity resource consents for harvesting and replanting on Red Zone and restricted discretionary activities for afforestation on Red Zone to manage potential effects on the environment. The NES-PF provides a highly permissive regulatory regime.

The NES–PF has different levels of regulation depending on the Erosion Susceptibility Classification (ESC). This is shown in Table 2 for harvest.

Table 2 Plantation forest harvest – activity status

Erosion susceptibility	% land in **Tairāwhiti**	Activity status for harvest	Can consent be declined?	
Green (Low Risk),	3%	Permitted	No	
Yellow (moderate erosion susceptibility),	30%	Permitted	No	
Orange (high erosion susceptibility),	12%	Permitted	No	
Red (very high erosion susceptibility).	55%	Controlled	No	
Red – Land Use Class 8e	Small subset of the red zone	Restricted Discretionary	Yes	But no policy guidance on when a consent

				should be declined.

8.13. **Iwi/Hapū Management Plans and Other Mechanisms**

8.14. **Iwi/Hapū Management Plans**

In addition to the legislative framework and national guidance documents above, hapū and iwi management plans are also a relevant consideration to the management of land and freshwater. Hapū and Iwi Management Plans identify resource management issues important to tangata whenua and iwi and resource management strategies for sustainable development of natural and physical resources.

8.15. **Ngā Ariki Kaiputahi Hapū/Iwi Management Plan 2012**

The Nga Ariki Kaiputahi Hapū/Iwi Management Plan provides general principles for kaitiaki/management of natural resources. The IMP covers all tribal lands, waters and resources of Ngā Ariki Kaiputahi.

Relevant to this topic, the IMP includes direction to:

- Engage and consult with Ngā Ariki Kaiputahi and include them in decision-making processes.
- Regularly monitor cumulative effects and disturbances, removal or indirect removal of habitat and impacts on wildlife.
- Uphold and document sustainable best management practices in disturbed areas.
- Reduce access so that ground cover is disturbed as little as possible.
- Avoid the harvesting and pruning of natural shade cover.
- Avoid and limit the introduction of non-native species.
- Encourage natural re-vegetation by indigenous flora and fauna and avoid the removal of vegetation, topsoil and seed source unless it is for Te Ao Māori and Te Ao Wairua purposes.
- Reduce surface disturbance and soil erosion thereby reducing reclamation needs and promoting natural regeneration.
- Plant native trees on slopes to counteract erosion and in unproductive areas of land.
- Avoid pollution of rivers and streams and the disposal and release of contaminated waters within their tribal boundaries.

8.16. Te Aitanga a **Māhaki** Iwi Environmental Inventory (2006)

Te Aitanga a Māhaki Iwi Environmental Inventory provides a framework that allows Te Aitanga a Māhaki iwi along with local/central governments to evaluate/enhance local rivers/waterways whilst educating and empowering its people.

The Environmental Inventory contributes to the overall vision of the iwi to 'restore the mauri of the Waipaoa'.

Key objectives relevant to this topic include to:

- Map wāhi tapu and other significant traditional areas.

- Identify the important rivers, streams, wetlands, lakes, rivers (water resources) in the rohe.
- Identify flora and fauna and their cultural, recreational, commercial importance.
- Identify significant regional water issues for iwi.

The Environmental Inventory includes a range of actions, including but not limited to:

- Developing catchment-based strategies to protect land and encourage well-suited land uses, re-establish an inter-connected forest network, sustain minimum water quantity and quality standards, restore wetlands and riparian plantings, and select tributaries for restoration of habitat of fisheries and other resources.
- Developing a catchment monitoring programme.
- Developing and disseminating educational materials and guidelines on the value of catchment base planning.
- Surveying and selecting sites for wetland and river habitat restoration, developing sites and planting harakeke beds, and monitoring habitat recovery.
- Developing catchment-based strategies for the recovery of tuna.

8.17. Statutory Acknowledgements

Ngā Whakaaetanga ā Ture mō Te Tairāwhiti contains the statutory acknowledgements from Te Tiriti o Waitangi settlement legislation within the Tairāwhiti region.[19] A statutory acknowledgement is a mechanism within a settlement that provides a formal acknowledgement by the Crown that recognises the specific cultural, spiritual, historical and traditional association of Iwi, with a site of significance or resource identified as a statutory area.

Table 3 Statutory Acknowledgements

[19] https://www.gdc.govt.nz/__data/assets/pdf_file/0025/41839/Nga-Whakaaetanga-a-Ture-mo-te-Tairāwhiti-Statutory-Acknowledgements-of-the-Gisborne-District-updated-June-2022-A2566712.pdf

Iwi	Statutory Acknowledgements
Ngāti Porou	• Waiapu River and its tributaries upstream of the CMA • Uawa River and its tributaries upstream of the CMA • Tūranganui River and its tributaries (to the extent that this area is within the area of interest), upstream of the coastal marine area • Waimatā River (as a tributary of the Tūranganui River) to the extent that this area is within the area of interest), upstream of the CMA
Ngai Tāmanuhiri	• Ngai Tāmanuhiri CMA • Part Waipaoa River (including Karaua Stream)
Rongowhakaata	• Tūranganui River within area of interest • Taruheru River within area of interest • Waipaoa River within area of interest • Waimatā River (including Karaua Stream) within area of interest • Hangaroa River within area of interest • Te Arai River within area of interest • Waikanae Creek within area of interest • Rongowhakaata CMA within area of interest
Iwi and hapū of Te Rohe o Te Wairoa	There are also several statutory areas for iwi and hapū of Te Rohe o Te Wairoa that fall within the Tairāwhiti region's boundaries, including: • Nuhaka River and its tributaries • Wairoa River and its tributaries • Hangaroa River and its tributaries • Mangapoike River and its tributaries • Ruakituri River and its tributaries

8.18. Codes of Practice

Several guidelines and codes of practice[20] have been produced for the *plantation* forestry industry. They sit outside of the RMA and other legislation and do not have any statutory weight; however, prosecutions and judgements reference them and failures to comply. As they feature a level of detail and specification there may be routes to incorporate into to legislation such as the Forests Act. This adoption has been done in the past with health and safety codes, particularly if voluntary codes are not being followed.

[20] The New Zealand Environmental Code of Practice for Plantation Forestry https://www.nzfoa.org.nz/resources/file-libraries-resources/codes-of-practice/44-environmental-code-of-practice/file

9. WHAT IS COUNCIL DOING TO ADDRESS WOODY DEBRIS AND SEDIMENTATION ISSUES

9.1. Changing the regional rules: Council has commenced a review of the Tairāwhiti Resource Management Plan – it is a combined regional policy statement, regional plan, coastal plan, and district plan. The plan review provides an opportunity for Council and its community to consider longer term land use changes to manage the effects of climate change and plantation forestry in the region and achieve other environmental outcomes. The plan review process takes time however and any Government intervention to create change would still be an important part of addressing the issues we face and will provide national level policy support to what could be a contentious and litigious process.

9.2. Changes being considered are:

- Restricting/preventing certain land uses (such as plantation forestry) on high-risk land.
- Restricting how much of an area or catchment can be harvested within a set time period.
- Introduction of significant riparian areas supported by intensive pest control are essential.
- Introduction of bonds or financial contributions for higher-risk land use activities.
- Requiring removal of more woody debris from slopes and landing sites. The Visser report recommends 6% residual material left at harvest areas and 4% on high-risk areas.
- Restricting landing sizes.
- Setting maximum sediment and woody debris discharge contaminant limits.

9.3. Applying for an enforcement order[21] to require removal of residual slash and woody debris any other remediation required. Work is under way to establish a taskforce to undertake the necessary work, with a Special Operations Lead appointed in February 2023. This is not a quick or cheap process with the burden of proof on the Council and undertaking requires a high level of evidence to start with.

9.4. Review of Resource Consents. It is unlikely that a review of the consent conditions of all forestry consents would be possible under the RMA. It would also be a costly and lengthy exercise given each review is treated as a normal resource consent application. Staff have identified four initial consents which could be considered for review and have prepared an action plan. Further reviews may follow.

9.5. Staff are reviewing and making changes to the suite of consent conditions commonly used and also considering whether some consent applications should be publicly notified given the current knowledge regarding potential effects.

[21] S.314-321 RMA https://www.legislation.govt.nz/act/public/1991/0069/latest/DLM238529.html

9.6. Ongoing compliance, monitoring and enforcement work

9.7. Council notes and accepts that following its prosecutions of 5 parties in relation to 6 forests after the Queens' Birthday storms of June 2018, Judge Dwyer was critical of Councils' compliance record for two of those forests, namely Waituna and Paroa Forests. The Judge did not criticise the Council for its compliance record in the remaining forests including the largest forests involved in the prosecution.

9.8. Council's own detailed investigation into the impacts of Cyclone Cook in 2017[22] resulted in several recommendations. These included:

1 That in the short term, Council adopt or adapt one of environmental guidelines used by other Councils and work with other councils to understand the tools and practices that have been employed to take into account issues not fully addressed in the National Environmental Standard (NES) for planation forestry. The NES provides guidance for good practice but further work is required to ensure that this good practice is implemented on the ground.

2 That comprehensive Assessments of Environmental Effects are required for all forestry harvest consents, taking into account the existing environmental values and the measures to be adopted to mitigate those effects (See schedule 3 of the NES for plantation forestry).

3 That where practicable, existing harvest consents are reviewed to ensure that the procedures within those consents are fit for the purpose of mitigating against the environmental impacts of the harvest operation and that this is measured against NES environmental guidelines (See schedule 3 of the NES for plantation forestry).

4 That consents where existing or proposed landings are within flood plains are reviewed to ensure that existing landings are protected from flood impacts and alternative sites are identified for proposed landing sites (See schedule 3 of the NES for plantation forestry).

5 That the effectiveness of current monitoring is reviewed and that cost-recovered compliance monitoring is undertaken on a business as usual basis (See schedule 3 of the NES for plantation forestry).

9.9. Council engaged with both the public and directly with the forestry industry following the completion of the Cook report. It is fair to say, as noted by the reports principal author during oral submissions, that the reception the forestry industry to the report was robust to the extreme. The author, who is an experienced Environment Court Expert witness, has commented that the dialogue was more robust than he had experienced in any court or Royal Commission proceeding.

9.10. The Cook report was followed by a review of council's consents, compliance and environmental science teams in 2018 and a subsequent restructure to better align Council structure into regulatory and non-regulatory functions. Regrettably, the Queen's Birthday storms of 2018 occurred before this new structure could be put in place. Fortunately, Council was able to call on expertise from Bay of Plenty as well as the technical expertise it had in place because of the Cyclone Cook investigation to ensure that post-event compliance inspections took place and that forests with significant non-compliance were identified and investigated.

[22] Cave, M. P., Davies, N., Langford, J., (October 2017) Cyclone Cook Slash Investigation. V3.5. 106p.+appendices.

SOLUTIONS UNDER THE CURRENT SYSTEM	
To complement controls via the NES PF, a slash management plan (within Forest Environment Plans) should be required as part of the permitted activity in Green/ Yellow/Orange (most), and for a resource consent application for harvesting on Orange/Red Zone land. They could consider a wide range of options to address plantation forestry management:	Long term binding Forestry Environment Plans (that include slash management plans) Setbacks: inclusion of realistic case by case Biodiversity setbacks: 5 and 10 m have proven inadequate. Require direct actions within setback areas such as *high stumping* is required to harvested trees to a height of 1.0 metre within one tree length of the permanent 'biodiversity set-back'. Increased stringency is required for harvesting and replanting
Require a further Risk Zone for Extreme Risk, a "Purple" zone where *plantation* forestry should not take place. Some of the areas are shown in figure 6. We believe many sites should now be re-planted or aerial sown (drone) with un-palatable native species such as manuka, kanuka, tutu, rohutu which will allow recovery without negative browsing impact from ungulates	Erosion Susceptibility Classification (ESC) use at a realistic scale with further attributes considered. These in turn underpinned by rules that are more stringent than the NES-PF in the Councils emerging Land use plan (replacing the TRMP) examples at Appendix 3. Hold settings at strategic points.
Safe storage or removal (as a valuable raw material) of wood debris from landings, especially in steep slopes. Harvesting methods that minimise breakages and place potential slash in safe sites. Partial catchment (coup) harvesting[23]	Location and timing of installation of slash catchers Consideration of the potential for slash to be generated from the harvested slope (less likely on easier slopes and further from waterways). Introduction of live slash retention plantings at harvest to protect the site at the subsequent rotation harvesting. Retention of riparian vegetation.
RMA Prosecution changes Greater cost recovery Higher fines Remove option for offenders to elect a jury trial.	Enable Council to recover more from prosecutions. This would help offset high legal costs and allow remediation of impacts. Polluter or the ratepayer pays Increase maximum fines available for criminal prosecutions. Any fines imposed

[23] Alternatives to clearfelling for harvesting of radiata pine plantations on erosion-susceptible land Mark Bloomberg, Eric Cairns, Denny Du, Harriet Palmer and Chris Perry NZ Journal of Forestry, November 2019, Vol. 64, No. 3 http://www.nzjf.org.nz/free_issues/NZJF64_3_2019/5D9ABDDD-40ED-494f-BE1F-BE5BE4AF5A64.pdf

Inclusion of civil sanctions as a tool to respond to offences when traditional prosecution is not the best tool	should be reflective of the environmental, infrastructure and social impact of the offending. No jury trial would reduce delays and costs associated with prosecutions
Changes to the **Tairāwhiti Resource Management Plan (**ideally supported by national direction)	
New overlay (riskiest land) Reduce volume of woody debris – logging residues removed; slash at landings removed More substantial setbacks Area based restrictions on harvest in catchments/sub catchments Carbon and Conservation Forests Manufacturing Clusters to stimulate demand for Biomass	The *purple zone* (referred to above) Tighter controls on harvest; drive land use change To provide a natural buffer between harvest areas and waterways Reduce the amount of land that is vulnerable until a vegetation has re-established Content to expand aspects from the NESPF to all Forests Provisions to enable development of manufacturing clusters. As the new RMA system that will provide RSS is not in place for a number of years.
POST RMA IMPROVEMENTS UNDER THE NBA, RSS and NPF	
RSS Manufacturing Clusters to stimulate demand for Biomass	Details in section below.
Limitations of the NES-PF to provide content into plans will be provided for by the NPF.	Greater ability to incorporate into plans, see below.
Incorporation of the Forestry Owners Association *Voluntary* Code of Practice into the system.	Details in section below.
New approaches to land-use could be explored through the development of the Regional Spatial Strategy (RSS) which will be required by the new Spatial Planning Bill currently being considered by Select	Central government buy-in and investment will be critical to achieving transformational change.

Committee. However, this is not an immediate solution.	
Creation and implementation of biodiversity credits	A system is needed to incentivise transition to a more sustainable land use on the most vulnerable land that also provide multiple positive outcomes
ROADING	
Review of **Waka Kotahi's Emergency Work** Policy Collaborate with other councils impacted by weather events like Wairoa and Tasman likely similar issues.	Policy is capped at an organisation's normal FAR plus 20% to a maximum of 95%. Bespoke application for 100% is already predetermined.
TECHNOLOGY	
Greater use of technology such as drones and tagging.	Could be set out in RMA or the Forests Act. Details in section below.

10. FURTHER DETAILS ON SOLUTIONS OUTLINED

10.1. Forestry Environment Plan addresses some of the current gaps in the NES-PF, while it addresses how to deal with latter stages of the plantation forestry lifecycle (earthworks, harvesting) there is an opportunity to better consider these long term effects at planting. An added bonus could be clarification for the intention of forests, that is plantation, carbon or exotic to native carbon to conversation forest and so on. This is difficult for the NES-PF to cover as it was designed for plantation forests.

10.2. The NES-PF definition of slash includes all harvest residues irrespective of size and is not consistent with widely accepted definitions. Those widely accepted definitions are more specific and refer to scrap timber, branches and offcuts left behind in a felling area or as coarse and fine woody debris generated during logging operations.

10.3. There are benefits to leaving some slash on slopes to protect soils from infiltration and sediment loss but there are no environmental benefits in leaving harvest residues, be it cut logs, or felled to waste logs, slovens, or recovered root balls on slopes.

10.4. The NES-PF should differentiate between slash and harvest residues to reduce the risk of it being perceived that it is acceptable practice to leave harvest residues on vulnerable slopes. The NES-PF should have strong controls over the management of such harvest residues.

10.5. If the NES-PF is amended improvements to long term outcomes would be provided by incentivising soil conservation and long-life span species. In addition, promoting ongoing retirement of plantation forestry in eroding areas (remove the incentive to clear land for fast growing plantation species) ideally transiting to native species these would all act as a carbon sink.

10.6. Carbon Forestry: Beyond the generation of woody debris from natural forests and Plantation Forests, Carbon Forestry (forests for carbon sequestration purposes) are likely to generate some debris that should be managed. Although there is likely to be less material generated than during the harvest of a plantation forest there is potential from limited harvest, thinning or in active models that transition to natives over time. Of concern is the establishment of trees on highly sensitive (very steep or in close proximity to waterways) which is currently less regulated. It is a somewhat of a myth that Carbon is unregulated many aspects such as the Biosecurity Act, Fire and Emergency New Zealand Act still apply.

10.7. In recent years there has been calls for more regulation of Carbon Forestry and the suggestion of inclusion into an updated/ expanded NES-PF or introducing an alternative National Direction. The NESP PF was created specifically around planation forestry and the management of its effects it would be very difficult (and time consuming) to do this. A more immediate solution would be to link the financial returns to Forestry Management Plans or a code of conduct similar to the Forest Accords[24]. Aspects of Forestry Management could be specified such as pest and debris management and the NZ ETS already specifies compliance with other requirements such as the RMA.

10.8. Within MPI Future of Forests it sets a vision for the future for Plantation Forestry and wood processing to expand the green economy[25] including sustainable management of Carbon Forestry. Building on this and the outline of other MPI programmes this should include

- Gully and Waterway Protection and Maintenance

- Long Term and Sustainable Vegetation Cover
- Embrace Technology Changes and Innovation

10.9. As part of the more long term sustainable practises drone technology is emerging for a variety of forestry purposes. They have improved the monitoring of Forests; and could assist with seed application to erosion prone sites; wilding pine control; release spraying without aerial desiccation tasks such as pest management, harvest planning, and more recently thinning and even harvesting. Part of the Embracing Technology could be greater use of the 'tagging' of logs with greater identification**26**.

10.10. New Zealand companies have begun to utilise technology that is commonplace in Scandinavia. The potential for thinning and harvest via drone provides many wider benefits The reduction of the need for roads that are normally required during thinning, can in itself require the felling of more trees, create deep tracks in the ground and damage other vegetation and roots.

10.11. Since 2018 MPI has been considering market development initiatives for biomass (from woody debris) in February 2023[27] a proactive release details of programmes to stimulate demand for the biomass, methods to retrieve slash and what it might be used for.

10.12. A difficulty of the RMA its national direction regime, is that it involves the separate development of national environmental standards and national policy, rather than the development of an integrated national policy framework. This is itself complicates solutions and the speed of material into land use plans. Many of the issues the NES-PF is trying to achieve would be better suited to a National Policy Statement. This is eventually proposed to be addressed through the Natural and Built Environments Act, which will require the development of a National Planning Framework (NPF). The Government has an option for very prompt action in the form of Regulations under section 72 of the Forests Act[28] which allows many aspects including prescribing the terms, conditions, and securities upon which money may be advanced to persons, local authorities, and companies for the establishment, maintenance, and protection of forests. There are also wide ranging powers under s.330 of the RMA.

10.13. Under the replacement RMA system, the new RSS for the region could include Forestry related Manufacturing Clusters located near existing forestry support infrastructure like processing facilities. The idea has been suggested by MPI that they would Identify internationally competitive technologies, develop products and systems to better utilise wood by-products and enable a bio-economy**[29]**. The report details how a problematic by-products such as Forestry Slash can be transformed into a useful raw material for products such as wood based liquid biofuel**[30]**. There is also a growing market for buildings insulation and soundproofing along with construction materials from recycling wood material.

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[26] Log tagging information https://fgr.nz/documents/download/4097

[27] MPI briefing *Programmes and initiatives to manage forestry slash* https://www.mpi.govt.nz/dmsdocument/55978-Programmes-and-initiatives-to-manage-forestry-slash-AM23-0087-Cabinet-paper

[28] S.72 Forests Act 1949 https://www.legislation.govt.nz/act/public/1949/0019/latest/DLM257413.html#DLM257413

[29] Ibid

[30] Te Uru Rākau NZ Wood Fibre Futures Project Stage Two Final Main Report 2021 https://www.mpi.govt.nz/dmsdocument/51007-NZ-Wood-Fibre-Futures-Project-Stage-Two-Final-Main-Report

10.14. As RSS have not been finalised details of Manufacturing clusters and criteria of the retiring of plantation forestry land that could be prepared via a National Policy Statement to be carried into the National Policy Framework of the new RMA system.

10.15. Bioeconomy not burning. Nationally there has been a move to convert coal fired heating to wood biomass (mainly pellets or chips), while some of this material could be processed for this sort of use it is not without its problems. Internationally, European Union and Government subsidies are being withdrawn for a number of reasons such as the health implications of particulates produced and that it can drive demand for fresh timber (not slash) to be processed. The demand eventually becoming a driver of deforestation[31]. The Council has resisted short term solutions such as burning, In some instances, burning may still be required for either logistical reasons or because of the scale of the problem is urgent from an environmental or health and safety risk point of view, however alternative solutions are required in the long term.

10.16. The issues of burning such volumes of wood waste has significant implications in its release CO2 as well as particulates. Mulching or chipping provides an opportunity to add to soil carbon thus sequestering CO2. It is not possible to undertake the work without the use of heavy machinery which will emit CO2, however, longer term options will include use of wood wastes as a feedstock offsetting emissions. Allowing pine wood wastes to decompose in "birds' nests" in forests or end-of-life willow and poplar is not carbon neutral and has an equivalent CO2 profile to burning.

10.17. Regarding land that that has been identified as needing to be retired into long term vegetation cover, considerations should be:

- Species: planting, seeding. reversion or a combination
- Transition from existing shorter-term species to long term vegetation cover.
- Introduction of Land Overlay 3B: Retirement Land, Needs to be considered in a similar manner to LO3A
- Slopes and geology
- Catchment Size
- Vegetation options such as native forest
- Mapped at 1:10,000, use of mapping (several options and complimentary options): scales important to identify land for retirement.
- Off site considerations: infrastructure and receiving environments

10.18. What should not be changed is the region's ability to feed into developing solutions to addressing a problems by establishing a Tairāwhiti Land Use Task Force (or Commission) with input from:

- Tangata Whenua
- Local Government
- Government Departments such as MPI/MFE/LINZ Support
- NGOs
- All Land Uses
- Community Input
- Research Entities

11. GENERAL FEEDBACK

The Council is disappointed that after some initial reluctance on the part of the Government to hold this Inquiry at all, it is not a binding Inquiry under the Inquiries Act 2013. We sincerely hope the outcomes and solutions are given due consideration that results in action as our community needs there to be intervention.

12. DEFINITIONS. Not all have been used in this submission but they are terms that will assist the Inquiry[32].

Biomass. Any woody material in a forest. Refers to both merchantable material and material left following a conventional logging operation. In the broad sense, all of the organic Managing Harvest Residues on Steep Terrain Page 6 material on a given area; in the narrow sense, burnable vegetation to be used for fuel in a combustion system.	
Carbon Forestry Carbon forestry (sometimes called carbon farming) is the planting of trees to offset carbon emissions. In New Zealand, eligible foresters can enter their trees into the scheme and earn carbon credits that can then be sold to emitters in the NZ ETS. This is because forests can earn New Zealand emission Units (NZUs) as trees grow and absorb carbon dioxide. The activity of Carbon Forestry as a land use is often confused with the category within the NZ ETS titled 'Permanent Forest', while it is a long term activity it is not permanent.	
Cut-over: The forest area that has been clear-cut is referred to as a cut-over. This area excludes the landings and roading infrastructure	
Debris flows: "geological phenomena in which water-laden masses of soil and fragmented rock rush down mountainsides, funnel into stream channels, entrain objects in their paths, and form thick, muddy deposits on valley floors." Note that 'debris flows' by definition includes 'entrained objects' which for forest harvested areas will include 'harvesting residues'. Landing: also called a skid, or a deck, is an area that is cleared in the forest where the stems and or logs are extracted to for processing, storage and subsequent loading onto trucks for transportation to market.	
Debris Slide: "a mass of predominantly unconsolidated and incoherent soil and rock fragments that has slid or rolled rapidly down a steep slope when comparatively dry to form an irregular hummocky deposit."	
Dross Very small, disseminated pine or other wood debris which may include bark, waratah waste and a mix of fine woody "mash". This material will not be all pine and will likely include willow, poplar or other introduced species or indigenous wood material	
Fence posts and battens and rubbish *As LWD migrates downstream during a flood it will often "take out" any fences standing it its way. Similarly, some waste transfer stations are presently in flood zones and consequently, a wide mix of rubbish can be incorporated to the woody debris in the receiving zone*	

[31] EU Parliament groups rally behind plans to end biomass subsidies https://www.euractiv.com/section/biomass/news/eu-parliament-groups-rally-behind-plans-to-end-biomass-subsidies/

[32] Some of the definitions credit to, Visser, R., Spinelli, R. and Brown, K. (2018) Best practices for reducing harvest residues and mitigating mobilisation of harvest residues in steepland plantation forests. Canterbury School of Forestry, Envirolink Report 1879-GSD152 for Gisborne District Council

Harvesting Residues: should be the preferred term in the forest industry for material left onsite post-harvest. The definition for residue is "a small amount of something that remains after the main part has gone or been taken or used". As such it can refer to all material left on site after harvesting has been completed, but also recognise that it might still have value. The benefit of this term is that it includes merchantable stems and or logs left onsite, but excludes naturally downed woody material. Non-merchantable timber: This term refers to stem material left on site that does not meet the specification of any of the forest products being produced in the forest. For most operations this means it is smaller than a pulp log, with a small end diameter of 10cm (but can range from 8 to 15 cm depending on region), and a minimum length of 2.5m (but this can range from 2 to 3.5 m depending on region).
A high stump, also called artificial snag, is created by cutting the stem of a tree at a height of 2–4 metres and leaving the stump standing where it is. The stumps are left to provide deadwood for species dependent on it.
Large Woody Debris (LWD) / Coarse Woody Debris (CWD): Is also a well-established term and by common definition refers to logs, sticks, branches, and other wood that is larger than 10cm in diameter. It is frequently used when discussing the need for LWD in creating adequate waterway habitat, or for identifying a risk when an over-abundance poses a dam risk. Small (or Fine) Woody Debris (SWD): is a less used term, but simply refers to 'woody debris' that is smaller than 10cm in diameter, but larger than 1cm. Material less than 1cm is referred to as 'litterfall'.
Long Resident Logs (LRL) Pine that has been harvested but not recently. They may still have sharp cut ends, but a weathering rind will be present, or the ends will be uniformly weathered. In other instances, the cut ends will have been rounded off and can form cone shapes Waratah marks may still be present. The trunk may look relatively fresh or may be grey.
Slash: (also called 'Brush') is defined as coarse and fine woody debris generated during logging operations, but it also includes material generated by wind, snow or other natural forest disturbances. In Europe slash usually just refers to the branches that are delimbed from the felled trees. For example, 'slash' is used in extraction corridors to reduce soil disturbance and compaction. Off-cuts: a specific type of slash whereby a segment of a stem that has a defect (i.e. large knots), and these will typically be larger than 10cm in length. NZ operations generate a large volume of off-cuts (1) radiata pine trees have many defects that are not preferred in our log grades (2).
Sloven: a specific type of material whereby a log (or stem) is trimmed to create a flush end. These thin segments will typically around 10cm in length. NZ operations tend to generate a large number of slovens as most stems will be cut flush at the butt end, and again either side of the stem break. Sometime also incorrectly called a 'biscuit' because of its shape, but that term technically refers to a small flat piece of wood used to join two larger pieces of wood together.
Woody Debris: This term is widely used to refer to material left behind after a harvesting operation. However, it is not necessarily a preferred term as the definition of debris is "scattered pieces of rubbish or remains" and as such has an immediate negative connotation. The woody material being left behind is neither rubbish nor evenly scattered. Especially post-harvest on steep terrain the material is typically concentrated either at the landing (/processing area) or swept into depressions along the slope.

13. ADDITIONAL LINKS AND EVIDENCE

These links contain some expert evidence that may be useful for sustainable land use mahi and ministerial inquiry.

- Environment & Planning Committee 9 March 2023 Agenda (marlborough.govt.nz)
- EDS Legal proceedings – NES-PF Item 11 - 09032023 - EDS Legal Proceedins - NES-PF - Attachments 1-11 (marlborough.govt.nz)
- Cyclone Bola Inquiry https://pce.parliament.nz/media/lr2n4g4x/inquiry-into-flood-mitigation-measures-following-cyclone-bola-december-1988-small.pdf

Appendices

Appendix 1 ***Events with significant forestry impacts in Tairāwhiti 2012*** *- 2023*

Date	Event	Impacts
20 March 2012	Wharerata – Whareongaonga Forest	Destroyed part of the railway line State Highway 2 Culverts damaged Forestry slash impacts on Maraetaha River  
Easter 2014	Wharerata – Whareongaonga Forest	Forestry slash impacts Maraetaha River Blockage of Maraetaha River bridge 
	Waimata Catchment – Mangarara and Whakaroa Forests	Forestry slash impacts Waimatā River, Waikanae Beach Impacts on farmland in Waimatā River headwaters Significant sedimentation event Turanganui Estuary

		
23 May 2015	Wharerata - South	Forestry slash at all SH2 bridges Maraetaha River Orongo Beach covered in slash Impacts on Maraetaha River, Kopuawhara Stream, Nuhaka River Kopuawhara and Nuhaka Flood Control Scheme blocked by slash and flooding occurred Coastal impacts widespread as slash moved north depositing at Kaiti Beach, Wainui and Makorori and presenting a danger to coastal shipping for several months  
September 2015	Waimatā Catchment – Wakaroa Forest	Waimatā River impacts, Mangataikehu Stream affected. Downstream farmland fences destroyed, riparian sediment loaded and large amounts of slash deposits. Waikanae Beach covered in slash Significant slash around Gladstone Road Bridge Gisborne City Significant sedimentation event Turanganui Estuary

		 
12th April 2017	Cyclone Cook (credit Cave, Davies and Langford 2017)	 
3-4 June 2018	Queen's Birthday Storm	Mangatokerau overwhelmed by slash, evacuations, houses and buildings destroyed by slash. Wigan Bridge jammed. Tolaga Bay beach and farmland covered in slash and sediment Massive sedimentation of Tolaga Bay and woody debris across the bay bottom

		  
11-12 June 2018	Second June Storm	Waimatā River extensive slash damage Waimatā Valley Road culvert blocked, damage to road Mangataikehu Stream affected. Downstream farmland fences destroyed, farmland covered in slash and sediment loaded and large amounts of slash deposits. Waihora River extensive slash damage Mangapoike River extensive slash damage Waikanae Beach slash Significant slash around Gladstone Road Bridge Gisborne City Significant sedimentation event Turanganui Estuary Waiapu Mouth/Tikapa Beach affected by slash
June and July 2020	Winter storms	Tolaga Bay, Tokomaru Bay and Waipiro Bay Beaches covered by slash

		Waiapu Mouth/Tikapa Beach affected by slash 
20 May 2021	Large Storm	Uawa – Tolaga Bay remobilisation of material and substantial deposition across Tolaga Bay Beach and Uawa River Mouth
March 2022	Cyclone Hale	Waimatā River extensive slash damage Mangataikehu Stream affected. Downstream farmland fences destroyed, farmland covered in slash and sediment loaded and large amounts of slash deposits. Waikanae Beach slash Significant slash around Gladstone Road Bridge Gisborne City Significant sedimentation event Turanganui Estuary Waiapu Mouth/Tikapa Beach affected by slash 
January 2023	Cyclone Hale	Mangatokerau overwhelmed by slash, evacuations, buildings destroyed by slash. Waimatā River extensive slash damage Mangataikehu Stream affected. Downstream farmland fences destroyed, farmland covered in slash and sediment loaded and large amounts of slash deposits. Waikanae Beach slash. Crayfish and pāua found after Cyclone Hale, at Tikapa credit NZ Herald. 

		 Significant slash around Gladstone Road Bridge Gisborne City Significant sedimentation event Turanganui Estuary Waiapu Ngutuawa significantly affected Tikapa Beach
February 2023	Cyclone Gabrielle	Region-wide significant devastation. A step change in land damage from the previous events – older trees (12+ years) have also failed on steep slopes. Numerous rivers including the Mangatokerau, Mangaheia and Hikuwai at Tolaga Bay overwhelmed by logs and evacuations.  Tolaga Bay Massive slash metres high on Tolaga Bay beach and on beaches further north (drone survey done, extent of damage not yet known as these areas have not been able to be surveyed as they are cut off).  Tributary of Waimata River

		Waimatā River extensive slash damage, damage to Waimatā Valley Road and Riverside Roads and widespread damage to farms in the catchment – loss of fences, flood gates, farm buildings. Massive sediment losses from forests into upper catchment farms. Failure of older trees on steeplands. Massive deposits of slash across Poverty Bay beaches Significant slash around Gladstone Road Bridge Gisborne City Te Arai River extensive slash damage. Loss of Gisborne water suppy – while land failure has been the main cause, forestry slash has hindered repair efforts.  Hikuwai Bridge No1 Multiple bridges destroyed by slash including the Hikuwai and Wigan Bridges cutting off the East Coast from Gisborne.
February – March 2023	Continued heavy rain events	Impacts of Cyclone Gabrielle exacerbated. Difficulty in clean up compounded by the huge volumes of forestry wastes and also whole tree failures.

Appendix 2 Wood debris from 2023 events

Tolaga Bay Wharf logs in the coastal environment have accelerated need for the wharf to be replaced/renewed.	 
Woody Debris jammed against Wigan Bridge on the Mangaheia River, Upper Tauwhareparae *Road.*	

Waimatā River, around the 10km mark of Waimatā Valley Road. A large build-up of primarily pine debris is on the true left of the river.	
Waimatā River, east of the 10km mark of the Waimatā Valley Road. Pine debris has been caught in kānuka and another *Pinus radiata* plantation on the true left bank of the river.	
Watson's Bridge, Linburn Road over the Waimatā River. A mix of pine, one macrocarpa and silver poplar has collected beneath the bridge.	

Waimiro Station, Waimatā Valley. A paddock on the true left of the river has been completely covered in a thick layer of silt with identifiable parts of pine scattered throughout.	
Waimiro Station, Waimatā Valley, more pine forest waste has built up on the true left riverbank.	
Waimatā Valley 18km culvert. Mainly on true left bank of main river channel, piles are on both banks are c.3 metres in height.	

Example of trees that fell in the storm or flooding typically remain in place due to their root structures.	

Appendix 3 Council approaches to managing plantation forestry impacts

Council	Provision where more stringent than NES-PF	Further regulation planned?
Northland Regional Council	Where forestry could impact on Pouto Lakes from harvest and afforestation where it could impact on water levels in lakes	-
Bay of Plenty Regional Council		Yes – actively investigating options re sediment loss as part of NSPFM implementation
Waikato Regional Council	Where forestry could impact on geothermal resources	-
Marlborough District Council	Afforestation in sites that are identified as flow sensitive, within 10m of a Significant Wetland, within the Limestone Coastline Outstanding Natural Landscape and Wairau Dry Hills Amenity Landscape or in proximity to a water supply abstraction point. Harvesting within 8m of a Significant Wetland, or in proximity to a water supply abstraction point. Operation of wheeled or tracked machinery within 8m of a Significant Wetland. Harvesting must not cause any conspicuous change of colour or natural clarity of the water in a Significant Wetland or the coastal marine area. Comprehensive provisions for woodlot planting and harvesting	-
Tasman	Forestry activities within St Arnaud and Takaka Hill Landscape Priority Areas. 50m setback from the coastal environment for forestry activity including afforestation and replanting. Restrictions on afforestation and replanting within the Groundwater Recharge Protection Area and Surface Water Yield Protection Area. Earthworks require resource consent within 200m of the coastal marine area where they are >1000m2/year or visible from any publicly accessible viewing point or where they will change the height of ridges or cliffs identified in the planning maps. Soil disturbance and removal of vegetation within the Separation Point Granite soils	Yes – currently reviewing adequacy of protections following significant storms and impacts on the coastal marine area
Canterbury Regional Council	Discharge limits for sediment	
Otago		Yes- in relation to sediment

Regional Council		discharges, agrichemical use, disturbance of beds and rivers, flow regimes and soil quality

Appendix 4 : *Summary of consent related prosecutions from the events of 2018*

Forest	Defendant	Fine imposed	Reparation imposed	Comments	Date of guilty plea / sentencing
Te Marunga	Aratu Forests Ltd	$229,500	$125,000	- 83 collapsed skid sites - Damage outside forest - Tolaga Bay catchment	13 June 2019 / 17 February 2020
Wakaroa	Aratu Forests Ltd	$150,000	$0	- 8 collapsed skid sites - Damage outside forest	13 June 2019 / 17 February 2020
Waituna	Juken NZ Ltd	$152,000	$0	- 11 collapsed skid sites - No damage outside of forest	22 August 2019 / 22 November 2019
Makiri	DNS Forest Products 2009 Ltd	$124,700	$6,500	- 3 collapsed skid sites - No damage outside forest	7 February 2020 / 15 July 2020
Paroa	PF Olsen Ltd	$198,000	$0	- 7 collapsed skid sites and one road collapse - Damage outside forest - Tolaga Bay catchment	17 July 2020 / 14 September 2020
Uawa	Ernslaw One Ltd & Timbergrow Ltd	$225,000	$130,000	- 10 collapsed skids sites, multiple road collapses - Damage outside forest	28 January 2022 / 9 December 2022

				- Tolaga Bay catchment - Disputed facts hearing (4 days)	

Summary of Gisborne District Council's non-forestry prosecutions

Defendant(s)	Year of alleged offending	Year case concluded	Description of alleged offending	Outcome
Luke Nigel Hansen	2015	2017	Discharges of felled trees into streams at a lifestyle block near Gisborne.	Convicted after judge-alone trial and fined $15,000.
Cedenco Foods NZ Limited	2018	2019	Discharge of industrial waste to drains. Failure to comply with an abatement notice.	Convicted after pleading guilty and fined $86,250.
John Richard Bracken	2018	2019	Discharge of sediment from unconsented earthworks and works carried out in the bed of a river at a farm at Matawai. Failure to comply with an abatement notice.	Convicted of six offences after judge-alone trial. Fined $20,000.
John Richard Bracken	2018 - 2019	2020	Discharge of sediment from unconsented earthworks at a farm at Matawai.	Convicted after judge-alone trial and sentenced to 150 hours community work.
Kuru Contracting Limited, Ricky Thomas Kuru and Te-Rangi Matanuku Parata	2019	2020	Modifying a wetland without consent and damming or diverting water in the Kopuaroa Stream.	Kuru Contracting Limited and Ricky Thomas Kuru were convicted after pleading guilty and fined $49,000 (divided between them). Te-Rangi Parata was convicted after pleading guilty and fined $19,500.

Tairawhiti Pharmaceuticals Limited	2019 - 2020	2021	Unconsented modification of a regionally significant wetland and unlawful water take from the wetland.	Convicted after pleading guilty and fined $28,000.
A F Thompson Contracting Limited, Scarly Heights Limited, Jonathan Norman Bain, and Patrick John Kershaw	2020	2021	Unconsented earthworks and discharge of sediment at a lifestyle block at Okitu. Failure to comply with an abatement notice.	AF Thompson Contracting Limited was convicted and fined $37,500 Scarly Heights Limited was convicted and fined $33,600. Jonathan Bain was convicted and fined $36,000. Patrick Kershaw was convicted and fined $16,800.
Yannis Kokkosis and Gypsy Investments Limited	2020 - 2021	(ongoing)	Disturbance / removal of contaminated soil from a residential development site without resource consent.	(ongoing)
Dylan Michael James O'Connell	2020 - 2021	(ongoing)	Contravening an enforcement order by failing to remove car wrecks and associated items from road reserve at Patutahi.	(ongoing)

Submission on the Ministerial Inquiry into Land Use causing woody debris and sediment-related damage in Tairāwhiti and Wairoa.

Submission by Graeme Williams.

Submission by Graeme Williams further to my meeting one on one with Hekia on 28.3.23

1. I am a 4th generation East Coast farmer and our extended family have been the recipients of many environmental farming awards over the years. Our family continues to have a very strong mutual respect and appreciation with the East Coast community, and in particular the Maori families where our forebears worked together, played together, fought in wars together and continue to live in harmony together. I have lived on the Coast all of my life and forestry has created far more problems than it has addressed particularly in terms of the overall wellbeing of every member of the community and the entire country in the East Coast region.
2. Regarding the current inquiry only 2 things can have happened; Either the Government did not put the necessary rules in place or the rules (if any) were not adhered to or enforced.
3. What has occurred to a large extent was preventable. We can't stop the rain, but we can stop the slash. It comes at a cost that should be borne by the industry NOT THE NZ TAXPAYER.
4. I know of no other industry that can essentially take the cream of the crop, biff their rubbish over the back fence and not only bugger the neighbours business, but then expect the neighbour and every other NZ tax payer to pay to fix it.
5. Soil erosion will always occur. I recently saw an enormous slip in Martins Bay, Fiordland, in bush thousands of years old. Our family planted 58,000 poplars and willows on Mangaroa Stn , 239 Waiau Rd, Tokomaru Bay . Did it get hit in Gabrielle ?….. yes. Did soil erode into the creeks ? …. Yes. Will it continue as an economic food producer as good as any in the world ? ….. yes. Did it bugger 3 of the 6 bridges within a 5 km distance of the homestead over the Hikuwai river ?.....No. Did forestry trees and slash bugger these 3 bridges and cause havoc to innocent parties homes and businesses downstream ?..... yes they did ? Can I prove it ? …….. yes I can.
6. Everyone knows the problem. What is the solution for the NZ and the East Coast in particular ? :
    - Set the rules and vigorously enforce them.
    - Make the forest industry accountable.(Impossible whilst the Government is in bed with them, so they need to swap beds)
    - Stop one more acre of food producing land going into trees, and change legislation making a level playing field so farmers,(ESPECIALLY WEALTHY PHILANTHROPIC FOREIGN OWNERS LIKE 9(2)(a)), can buy the likes of Huiarua and Matanui, keep 12 families employed producing world class carbon efficient food, keep the school open, and therefore provide a hub for a community that supports the remaining East Coast farming enterprises that are doing a fantastic job despite the hurdles they are faced with.
    - As Para Horomia kept saying; He Tangata, He Tangata, He Tangata. 9(2)(a) employs 16 fulltime staff and enhances every aspect of the people and the land. Having been a neighbour of production forestry under 3 separate ownerships, of over 10,000 acres each, on the Mangaroa boundary for over

40 years, I can with authority tell you that the foreign owners of these former Stations couldn't give a toss about the East Coast people or their land. They are literally raping both, with the Government continuing to look at the elephant in the room, and choosing not to see it.

7. I love NZ and its people, and especially the East Coast. I put extensive submissions in with our 9000 odd petition to save Huiarua and Matanui. Everything I said would happen, has happened, and it really bloody annoys me as it is preventable and there are solutions.
8. I will re submit my submissions and trust your inquiry gives me the courtesy of at least reading them. Maybe they are slightly out of context, but the underlying problems and solutions are totally symbiotic with this current inquiry. There will be 5 emails including this one with my submissions (mainly photographs) Sorry, I don't have the computer skills to collate them.
9. I will finish by stating that the East Coast and it's people is one of the best examples in the world of living in unity with both it's inhabitants and it's environment. Forestry and the Government support of forestry, has seriously undermined all aspects of what in my opinion WAS world class. Yes there are issues, but like farming those that do it well, putting people and the environment before profit, for everyone's benefit, should be followed for the benefit of not only NZ, but the world. Foresters in other countries have a proven track record on all of the issues we are currently dealing with. Climate is a huge issue, but ultimately we will starve to death before we all drown from a rising sea, or disappear from a hole in the ozone layer. Charity begins at home, and common sense and practicality must prelude ideology. The Government have created this issue (Not just this Government either) and they have the power to stop the Titanic sinking completely. Stopping looking through Stevie Wonders eyes would be a bloody good start for everyone and especially those of us living on the East Coast.
10. I trust those calling the shots in the Beehive take heed of what I suspect a vast majority of those mostly affected by forestry slash destruction are conveying to your inquiry, in order to stop what I consider to be further social and economic suicide, resulting from ill fated policy, albeit possibly initiated with the best intention at the time.

To Whom it may concern,

1. I am writing this submission in opposition to the sale of Huiarua and Matanui to overseas forestry interests.
2. I am Graeme Williams and I have lived and farmed all of my life at Mangaroa Stn Tokomaru Bay. Mangaroa is a 2000 acre steep hill country Stn situated 22 km north of Tolaga Bay in the Hikuwai River catchment.
3. After cyclone Bola in March 1988, 3 of our 5 neighbours all over 10,000 acres each, were planted into production forest. They were owned or managed by PF Olsen, Ernslaw or Hikurangi (now Aratu). On Mangaroa my Father and I planted over 58,000 poplar and willow trees for erosion control and the Stn is still a very profitable enterprise that has picked up 4 environmental awards over the years.
4. I am not anti-pines or anti- carbon . I only have one degree and that is in common sense and first- hand knowledge of the issues. 2 of our neighbouring forestry enterprises used the road through our farm for their access and I have had a first-

hand knowledge of a myriad of the issues they face covering a broad spectrum through the relationships I have developed over the past 30 or so years with the forestry staff at all levels.

5. Despite these forests being well over an hour closer to the Gisborne port than Huiarua I was often told by the forest managers that at particular times they were running at a daily loss due to log prices verses the extraction costs. They continued working so when the price lifted the crews were already on site. A vast majority of the crews travelled every day from Gisborne, 90 kms away. The combined 12 or so families from these Stations left the community and district as the stations were planted. Over this period in both the Tauwhareparae area and the Ihungia area for the very same reason those 2 schools have closed. Huiarua has the last remaining school.
6. I am the first to admit that some of the properties currently in trees (Not all of them) should be in trees but the remaining properties are the jewels in the crown of pastoral farming in both NZ and the world. I will endeavour to get to you the Bayleys promotional video of the Stations. If you intend to sign these properties over to foreigners to grow trees you need to be totally aware of the calibre of land you are sending to the gallows. If only for your own interest please please look at the video.
7. I have a very good understanding of the erosion issues and environmental implications of land use in the general East Coast area. Blanket planting of pines on these soils in this area have created far more problems than the financial returns from the sale of the logs can ever display. Slash is a major issue and beaches are the least affected despite being the most visible. It is the roads and bridges and general infrastructure which is incredibly expensive to reinstate after each weather event that bear the brunt of the slash issues. I include the attached PDFs of articles taken from the local papers. I am no David Attenborough but I have enough knowledge to reliably state that the slash referred to is predominantly pine and in certain catchments entirely pine. I will send other photos of such evidence after this email. This is slash I have inspected first- hand myself in riverbeds, up against bridges on farmland and on the beaches up and down the whole Coast.(I am in some of the photos to prove this)
8. Every property that goes into forestry irrespective of the contour adds to this pile as a result of the soils and rainfall. Every property that goes into trees makes it so much more difficult for those remaining as pastoral farms as the financial burden becomes more for less people. It is the very recipe to turn the light out;
    - The pastoral farms go, the families go
    - the families go the school closes
    - The School goes the families on the other farms go
    - The infrastructure servicing the remaining farms becomes more expensive per capita ie power reticulation and roading etc and they disappear or become an additional expense on those that remain.
    - Other people leave and the entire community is destroyed.
    - This happened in the area after cyclone Bola when the worst of the land was put into trees. 90% of the remaining land is now iconic because it is the best land in terms of contour, fertility, tenure ship and is being well farmed by some of the best farmers in the country getting some of the best returns in

the country. This land is the jewels in the crown. Huiarua and Matanui are 2 of the diamonds in that crown.

9. Current neighbouring Jewels in the crown in the immediate vicinity of Huiarua and Matanui stations all being exceptionally well farmed

- All of these Stations have pockets of pines, natives, poplars and willows and conservation areas. They epitomise exceptional land tenure ship in terms of environmental sustainability, animal welfare, financial soundness and community cohesion and contribution. These are the very farms that sell New Zealand to the world and they are all iconic. Huiarua and Matanui are physically in the hub of all these Stations and a wheel without a hub does not turn around in a cohesive and functional manner.

10. If the OIO fly to Gisborne I will happily drive you around these Stations and show you first hand their combined value on all fronts. I suggest it is 100 times more crucial to take me up on this offer if you intend to sign it over but it is as equally important to view them if they remain in pastoral farming as one gets a chalk and cheese comparison between a view from a saddle and that from an office chair in Wellington. I likewise extend this invitation to the politicians who I gather ultimately make the final call. Some things are just wrong and if these 2 Stations go into pines it will go down in history as one of them. There are highly desirable and beneficial alternatives and common sense must prevail.
11. If the farms are retained;
    - The staff stay in the existing homes and less pressure is put on an already under pressure urban housing crisis (We are talking 10-12 good homes on these 2 Stations alone)
    - The School stays so the community has a hugely important hub given that their nearest 2 sister schools have already gone.
    - Exceptionally good land that if closer to town could successfully house a dairy farm, cropping farm or golf course remains in pastoral farming producing some of the most carbon efficient food in the world and valued export dollars.
    - The community and its infrastructure remains viable through the sheer volume of people working and living on site supporting all rural services such as mailmen, shearing gangs, ,fencers, rural services, power supplies etc.
12. The recent adverse weather has highlighted 2 things if nothing else. Firstly the vulnerability places like the East Coast are at with the soil type and blanket planting of trees and secondly how important communities are to maintaining the overall welfare of the region. It is imperative that regions like the East Coast retain was is left of the remaining diversity for the long term benefit of the entire country.

13. 9(2)(a) epitomises everything and more I have raised in point 9 above. Again before you contemplate signing the dotted line please spend five minutes and google 9(2)(a) and any of the other named Stations. Unlike land in the central plateau if this land goes into pines it will be lost forever. They are iconic Stations in an iconic region of the country. That alone is no reason to retain them, but combined with my brief comments above it would be absolutely unforgiveable to not retain them.
14. I the past year I have been a strong advocate for the retention of these properties on Jamie Mackays farming show daily on the ZB network called "The Country ". In the past 6 months alone I have heard;
    - Damien O'Connor
    - Stuart Nash
    - James Shaw
    - David Parker
    - Kieran McInaulty
    - Don Carson (NZ Forestry Assn)
    - Roger Dickie (Prominent NZ forester)
    - The Prime Minister herself and many others qualified to make a reasoned opinion that land of this calibre should not go into trees of any description and that it should remain in pastoral farming.
    - All Black legend and Gisborne farmer Ian Kirkpatrick will be on the " Best of the Country With Jamie Mackay tomorrow morning at 6am on the ZB network. Listen to him live or on podcast. He speaks for the people on this one and as a straight shooter will tell it as it is on behalf of those of us lucky enough to live here.
15. I trust that the 6850 signatures we currently have, gained locally in support of saving these iconic Stations that are an integral portion of the glue that is holding an already fragile community together are taken into consideration when considering their ultimate fate.
16. Whilst I have no personal or financial involvement I have approached the Bayleys agents involved and offered a feasible alternative to them which they are happy to consider as an option B.
    I think it is totally unreasonable to oppose something without sound reason and offering an alternative. It is in that capacity that I have become involved to the extent I have. With the backing of academics the calibre of Dame Ann Salmond and many others who are supporters based on academic research I am confident our opposition to the sale of these properties in soundly founded despite the fact my degree in common sense having little value to anyone other than myself.
17. Please take the time to view the photos and read the Gisborne Herald articles I have attached and others to follow this email, and google Puketoro Stn and the other named Stations, view the Bayleys sales video. A picture tells a 1000 Words and these ones show "1000 Woods " which do nothing positive for the community, the environment or the economy.
    Thank you for hearing me out. I trust common sense over prevails over this application before you.

I am technically challenged I am sorry. I do not have the skills to attach all of the photos to this email. I will send them separately plus the link to the 6pm TV3 news item of 11th January 2022 which is a must watch for everyone in the OIO office. Please don't hesitate to contact me if you need clarification on any of the issues I have raised.
Many Thanks

https://www.newshub.co.nz/home/new-zealand/2022/01/5000-hectare-historic-station-on-east-coast-could-soon-be-foreign-owned-carbon-farm.amp.html

Many Thanks
Graeme Williams
9(2)(a)

6 April 2023

Panel for the Ministry Inquiry into Land Use

via email to: landuse.inquiry@mfe.govt.nz

Submission on the Ministerial Inquiry into Land Use in the Wairoa and Gisborne districts

1. We appreciate the opportunity to make a submission on this important Inquiry.
2. Our feedback is intended to assist the Panel's work. Our feedback builds on decades of extensive programmes of work by HBRC and predecessors. Some of our recent work relevant to the Inquiry have been documented in published reports. Rather than repeat that material, our feedback provides weblinks to those online publications or copies are attached to this submission.
3. To further assist the Panel, we have assembled an interactive online mapping tool. Our intention is that this mapping tool enables Panel members to view and interrogate a number of spatial datasets held by HBRC. We believe this tool will be far more valuable to the Panel than static maps appended to our written feedback. We are happy to provide a basic demonstration to assist Panel members and your advisors understand the tool's features and functionality. Details of user permissions will be provided to the Panel separately following the Easter Break after preliminary user testing.

Part A - Introduction

4. Ex-Cyclone Gabrielle inflicted significant destruction and damage across large areas of the North Island on the 12th, 13th and 14th of February 2023. It resulted in the declaration of a National State of Emergency and the mobilisation of large-scale resources to help communities respond to the impacts of the emergency event. The impacts of the event were particularly hard-hitting in Hawke's Bay and Tairawhiti regions. The true extent of the impacts are still being identified some six weeks on. Tragically, lives were lost. Homes, marae, businesses, orchards, vineyards, farms and forestry assets were damaged or destroyed. Impacts on the economy and people's wellbeing and prosperity are still being assessed but are significant. Major damage was done to infrastructure, with power supply and telecommunications cut-off for varying periods of time, electricity and rail infrastructure destroyed, and roads and bridges destroyed or damaged, isolating a number of communities and disrupting essential economic and lifeline transport routes. A range of other community infrastructure was also disrupted or impacted, with attendant impacts on community life.
5. Like much of the North Island's East Coast, the Hawke's Bay region has a prevalence of soft sedimentary geology underlying its hill country, particularly so in the Wairoa district. The combined historical land clearance has driven high rates of erosion resulting in detrimental levels of sediment in many of our waterways and near-shore environment. Both land use type and soil type determine how sediment moves off the land, into waterways and out to the coast. Many key environmental issues in Hawke's Bay are a consequence of land use that contributes to erosion and discharge of nutrients to waterways.
6. While sediment loss and erosion are a natural feature of the landscape, the rate of sediment loss has increased because of changes in land use. Sediment load lost from the Wairoa catchments averages

just over 3 million tonnes per year, estimated to be approximately 240% more than before human arrival.

7. In February 2022, HBRC presented a report to the Minister for the Environment which responded to a number of questions posed by the Minister asking how HBRC manages sediment losses in Hawke's Bay. Some of the general content of that report features in this submission. Refer Attachment B for a full copy of that February 2022 report.

8. In 2017, we submitted to MFE and MPI that there [was approximately] 130,000 hectares under pines within the Hawke's Bay region. The annual harvested area in the region will double in the next few years. The additional harvested area is largely in erodible hill country.

9. In 2022, HBRC published its State of the Environment Report spanning the 2018-2021 period. Sections of the SOE report are published by catchment area while others are in terms of the region as a whole. In terms of Wairoa District, the catchment 'chapters' in the SOE report are the Wairoa/Northern catchment and Mohaka catchment. Figure 1 and Figure 2 below are extracts from that report to assist as helpful context-setting for our submission.

Figure 1 - Land cover in the Wairoa/Northern catchments, 2018-2021 SOE Report

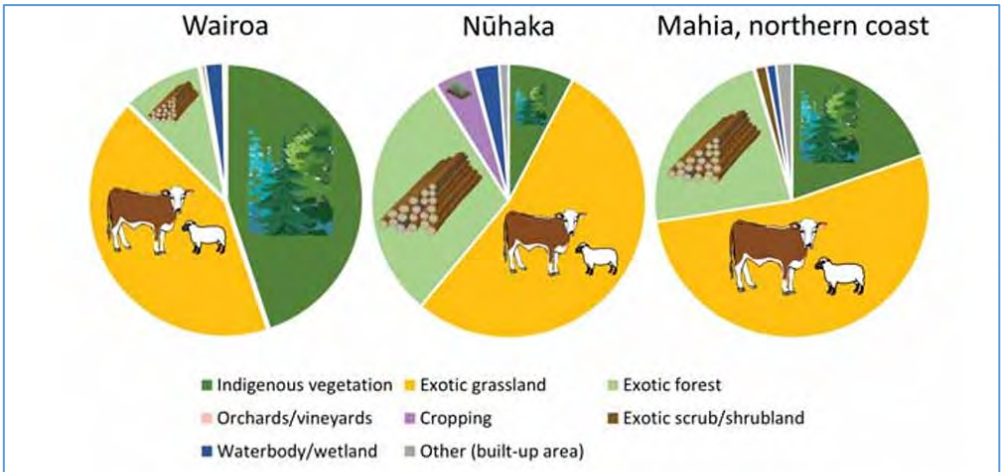


Figure 15-1. Land cover in the Wairoa/Northern catchment. The 'other' category includes built-up areas (settlements, urban parkland, and transport infrastructure) and bare surfaces such as bare soil, gravel, and rock.

Figure 2 - Land cover change in the Wairoa/Northern catchments between 2001 and 2018, 2018-2021 SOE Report6

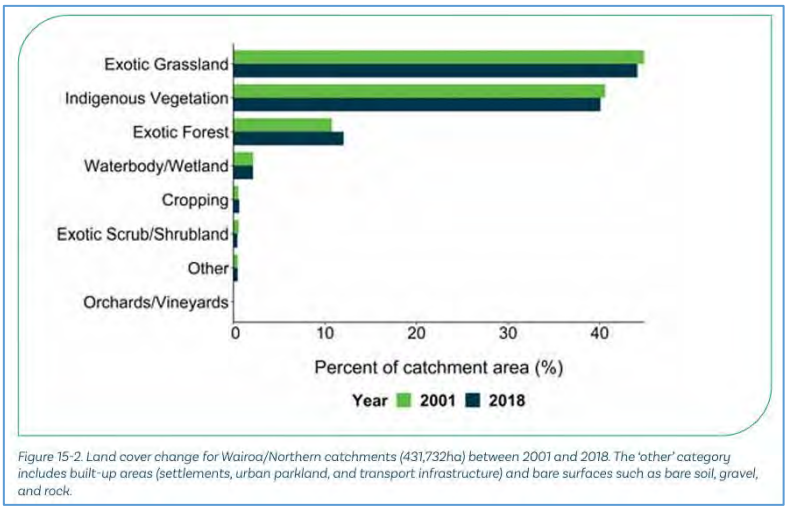


Figure 15-2. Land cover change for Wairoa/Northern catchments (431,732ha) between 2001 and 2018. The 'other' category includes built-up areas (settlements, urban parkland, and transport infrastructure) and bare surfaces such as bare soil, gravel, and rock.

10. The state of our region's fresh waterbodies and coastal waters is noticeably impacted by sediment. HBRC has an extensive programme of works to reduce the impacts of sediment on our aquatic environments (see Attachment B).

Climate science

11. There are no clear trends in the long-term rainfall record for Wairoa catchments. However data does indicate that lower-than-average rainfall from 2018-2021 contributed to lower flows in many of the Wairoa/Northern Hawke's Bay river systems.

12. In Part B of this submission, the key characteristics of climatic conditions immediately preceding and during Cyclone Gabrielle are outlined.

13. Our submission focusses on the following in terms of the Wairoa district:

Part B - Key contributors to woody debris and sediment and observed effects of Cyclone Gabrielle

Part C - Current land management practices for forestry and extent of regulatory oversight

Part D – Recommendations.

Part B - Key contributors to woody debris and sediment and observed effects of Cyclone Gabrielle

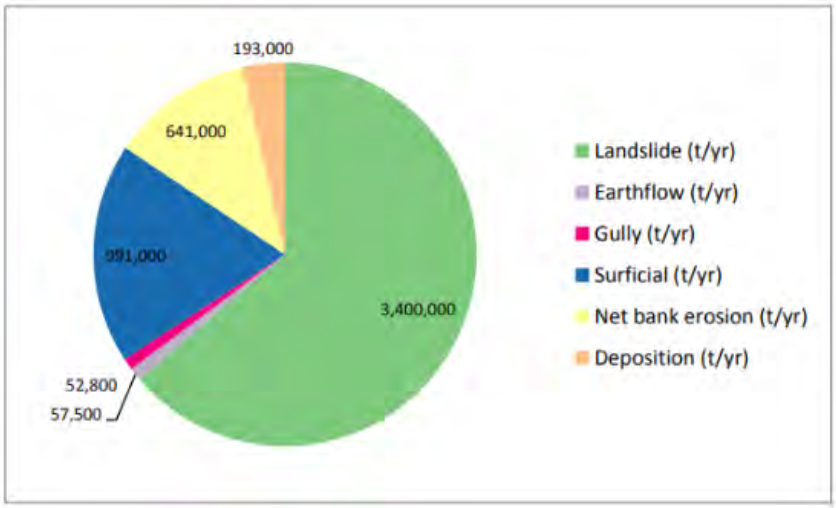
14. The movement of sediment across the region's landscape is a natural process. Modification of the landscape by humans, in many places, can accelerate that movement. While natural processes contribute to woody debris and sediment runoff, it is clear that human's use of land has, and continues, to exacerbate the impacts of woody debris and sediment runoff.

15. Fundamentally, it is land instability that is the key contributor to woody debris and sediment loss from hill country.

16. SedNetNZ modelling in the Northern Hawke's Bay catchments[1] (approximating to the Wairoa district) shows the key sources of sediment (refer Figure 3 for breakdown of sources). Total suspended sediment load for the Northern Hawke's Bay region is 4,950,000t per annum. Instability of the banks of rivers and streams is a large contributor to sediment loads in waterways in the Wairoa district. But landslides are clearly the primary contributor of sediment to waterways.

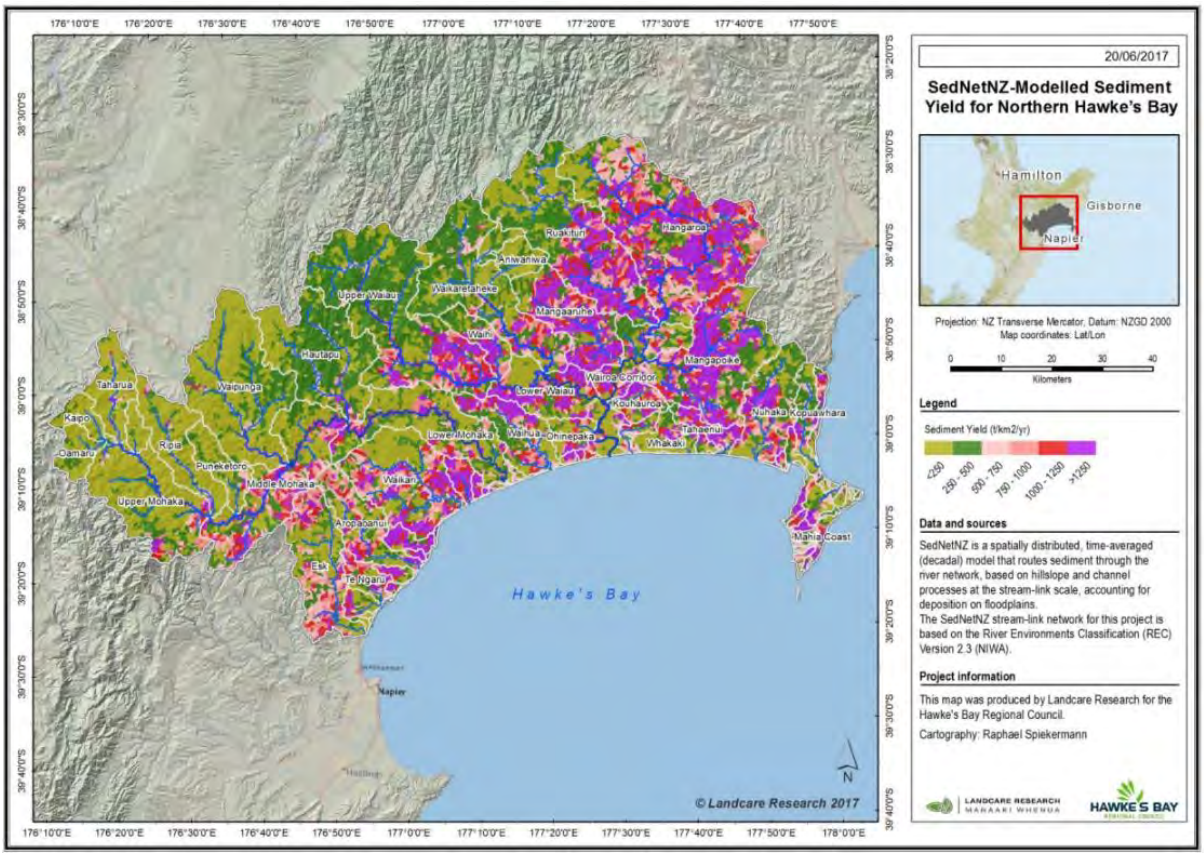
[1] SedNetNZ modelling of sediment sources and loads in the Northern Hawke's Bay region, June 2017, HBRC Report Number RM18-17 – 5001. Accessed at: https://hbrc.sharepoint.com/sites/Publications/HBRC%20Publications/Forms/AllItems.aspx?id=%2Fsites%2FPublications%2FHBRC%20Publications%2F5001%5FSedNetNZ%5FModelling%5FSediment%5FSources%5FNorthern%5FHB%5F010617%2Epdf&parent=%2Fsites%2FPublications%2FHBRC%20Publications&p=true&ga=1

Figure 3 - Sediment load (tonnes per annum) by erosion process in Northern Hawke's Bay using SedNetNZ modelling



17. The SedNetNZ modelling report (at Figure 11, reproduced as Figure 4 below) provides an overview for identifying hot-spots of particularly high rates of erosion and therefore sediment yields for each REC-2 watershed.

Figure 4 - SedNetNZ modelled sediment yield for Northern Hawke's Bay catchments



18. In Part C of this submission, we outline a number of programmes that HBRC leads or is involved with that are intended to address significant sediment losses into waterways.

Climatic and ground conditions preceding Cyclone Gabrielle and during the Cyclone

19. Leading up to the arrival of Cyclone Gabrielle in Hawke's Bay, the area had experienced more than double its average January rainfall and had received above average rainfall in consecutive months since August 2022. Soil moisture levels were well above normal for the time of year and appeared saturated at the Cricklewood Climate site prior to the event. Soils in the area that weren't at field capacity at the start of the storm quickly reached it during the event (refer Attachment C for February 2023 Regional Soil Moisture Report).

20. The highest rainfall in the Wairoa area, (which includes the Wairoa, Nuhaka and Mahia catchments) was by its eastern border, where over 500 mm was recorded at Pukeorapa Station and Fairview. Totals were also relatively high in the west of the area, at Aniwaniwa by Lake Waikaremoana, which received 317 mm. At all three sites, more than half of the total fell within 12 hours. This represents about double the average February rainfall. The rainfall rate at Pukeorapa peaked at 38 mm/h. Sites located in the central southern part of the catchment had 100 mm or less and were relatively sheltered from the rain compared to most of the region.

21. Rainfall at the eastern sites set new records for intervals from 3 hours to 2.5 days, including a doubling of Fairview's previous highest 24-hour total and a 45% increase on Pukeorapa's total for the same period. However, the records for these sites only extend back to the late 1990s. Sites in the north and west hit new high totals across the 6 to 24-hour intervals, though mainly small increases on the previous record totals.

22. The estimated return period of Fairview's rainfall exceeded 100 years across intervals from 3 hours to 48 hours, as did Pukeorapa's rainfall for the 1 and 2-day totals. The 6 to 18-hour totals at Aniwaniwa had return periods over 30 years but a nearby site, Nga Tuhoe, topped 80 years for its 18-hour total and Bushy Knoll, a little further north, also neared 80 years. Four sites in the area existed in the days of Cyclone Bola. Three of those sites, namely Bushy Knoll, Nga Tuhoe and Hangaroa River at Doneraille Park, experienced higher rainfall from Cyclone Gabrielle for time intervals up to 1-day. Cyclone Bola did however deliver more rain over two days. Cyclone Bola delivered higher 1 and 2-day rainfall to the Kopuawhara rainfall site, just north of the Mahia Peninsula, but Cyclone Gabrielle delivered higher intensity rainfall over short timeframes, i.e. intervals from 3 to 18 hours.

23. Winds were mainly from an east-southeast direction during the 13th and 14th February 2023. Wind gusts peaked at 120 km/h at the Pukeorapa Climate Station and 148 km/h at MetService's Mahia Radar site.

Post-cyclone woody debris survey

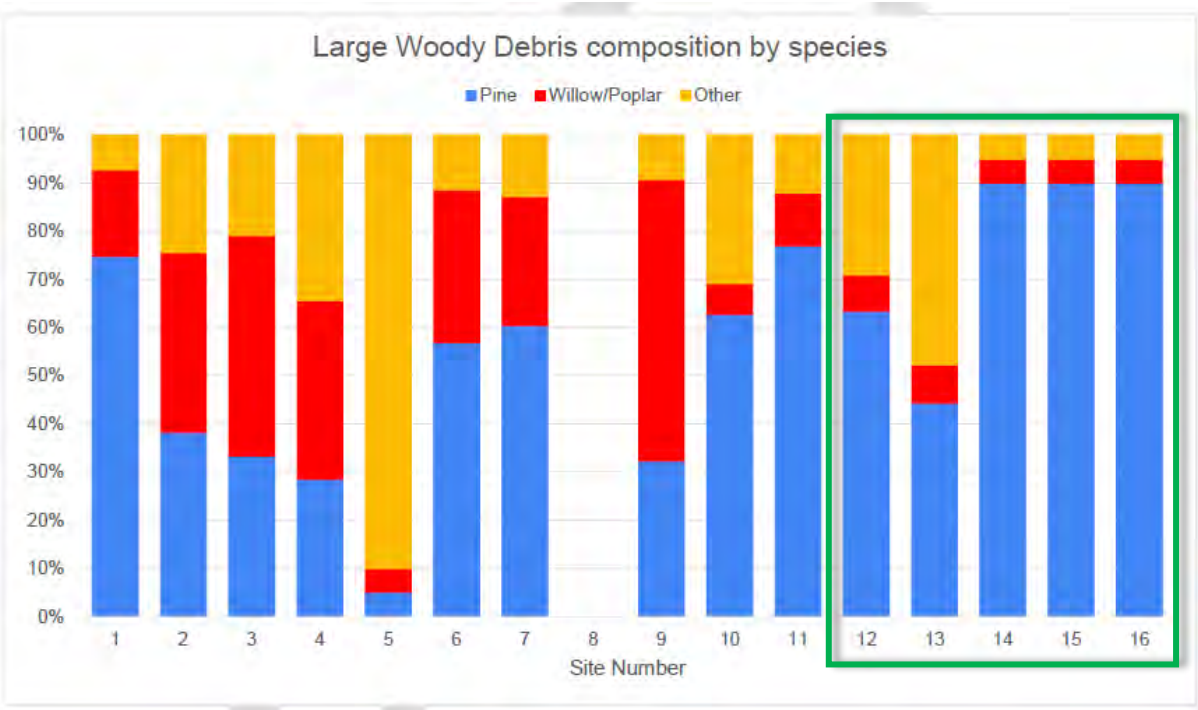
24. We are aware that in a number of contexts, the terms 'slash' and 'woody debris' have been used by commentators casually and interchangeably. We prefer to use the term 'woody debris' to describe all types and forms of solid vegetative matter debris along waterways and coastlines. Whereas 'forestry slash' is a particular sub-type unique to production forestry. We think our interpretation better aligns with the Panel's terms of reference where it refers to *"mobilisation of **woody debris (including forestry slash)** and sediment."*

25. In the first few days of the post-cyclone response, HBRC commissioned a survey of woody debris. This was a rapid survey completed within tight timeframes prior to volumes of woody debris being

moved and chipped. Seventeen sites were visited (eleven river sites and six beach sites in total, four of those in the Wairoa district[2]). Refer Attachment D for draft version of full survey report.

26. Figure 5 summarises the large woody debris composition at surveyed sites. Surveyed sites in Wairoa district appear in green square.

Figure 5 - Post-Cyclone Gabrielle survey of large woody debris composition by species at surveyed sites



27. We understand the Hawke's Bay Forestry Group has commissioned a similar woody debris survey but it applied a slightly different methodology. We also understand that the Group intends to present their survey findings to the Panel as part of its submission to the Inquiry.

Post-cyclone aerial and ground observations

28. A number of reconnaissance helicopter flights over the region were done in the days and weeks immediately following Cyclone Gabrielle by several senior staff from HBRC (including Iain Maxwell, Group Manager Integrated Catchment Management at HBRC). Several of those flights have traversed the Wairoa district. In a number of locations, tours by land have augmented those aerial observations. Those key senior staff have observed a number of features, incidents and consequently surmised several key contributors to mobilisation of woody debris and sediment in the Wairoa district. In short, our advice to the Panel at this time is that key contributing factors and effects observed in the Wairoa district include:

    1. those factors are **not** universally the same as those observed further north in Tairawhiti/Gisborne

[2] Five sites surveyed in the Wairoa district were the Mohaka River mouth, Mahia beach, Wairoa River mouth, Waikari River mouth and Mangapoike River at Tiniroto Road bridge.

2. beds and banks of many streams have been eroded. Sediment has been deposited on the upper banks of rivers and streams and downstream receiving environments
3. travelling northwards along the coastline, the incidence of large logs, trees and other woody debris on beaches increases. Surveys identify that not all are pinus radiata species.
4. pine plantings of approximately less than four years old suffered similar hillside failures as pastured land
5. older plantings (5+ years) were not completely immune from damages either
6. forestry 'infrastructure' generally remains intact. There were no failures observed of landing/skid sites
7. mid-slope failures were common. These mid-slope failures certainly mobilised large volumes of sediment on rural land. On production forestry sites, mid-slope failures were also observed although extent was variable by planting age, aspect and land characteristics
8. most operators post-harvest leave slash and other woody remnants laying on slopes. Those remnants become mobilised with slope failures.
9. in some locations, entire standing trees (i.e. tip to toe) have been levelled and mobilised downhill, and in some cases, then downstream.
10. pre-cyclone soil moisture levels, coupled with exceptionally rainfall intensities and very strong winds have, in combination, contributed to mobilisation of significant volumes of sediment and woody debris. We are unable to determine what woody debris was windthrow and what was mobilised by other mechanisms
11. non-pine tree species have also been mobilised, for example, willows and poplars growing in riparian margins. Some of those may have been wildings and others part of deliberate riparian edge enhancement projects by landowners, community groups and others
12. small-sized culverts may have contributed to flooding and exacerbated 'debris dams'
13. structures in beds of rivers and streams (such as culverts and bridge piles and abutments) have intercepted larger-sized woody debris in waterways; debris dams have built-up behind these structures, further impeding floodwaters.

<u>Analysis of post-cyclone intelligence</u>

29. For the purposes of the Panel's Inquiry into land use associated with mobilisation of woody debris in the Wairoa district, we have endeavoured to provide the Panel with our most recent understanding and compilation of information available relevant to the Panel's terms of reference.

30. HBRC continues to compile intelligence from a wide range of sources on the events and impacts of Cyclone Gabrielle. That intelligence continues to grow day by day. The data and information gathered will inform various reviews that HBRC will undertake into its operations and future activities. The data and information may also inform reviews that other groups and agencies might decide to commit to.

31. There are third-parties also undertaking analysis of post-cyclone data. For example, Ministry for the Environment has commissioned Manaaki Whenua Land Care Research to undertake a preliminary analysis of steep bare land exposure as a result of Cyclone Gabrielle. We respectfully suggest that

the Panel request that work from Ministry for the Environment as at time of writing this submission, HBRC does not permission to share that material.

Part C - Current land management practices for forestry and extent of regulatory oversight

32. The Hawke's Bay Regional Council and the Hawke's Bay Catchment Board prior, have a long history of working with landowners to address soil loss. The 1941 Soil Conservation and Rivers Control Act came about following a major weather event in 1938 that caused massive erosion and sedimentation of waterways in Hawke's Bay, and action to address soil conservation in our region has been underway since.

33. HBRC believe that the work we have done and are continuing to do with our communities is making a difference but acknowledge there is still a long way to go to improve current practices in production forestry and agriculture. The scale of the challenge is significant and HBRC has a coordinated strategy of engagement, education, encouragement, and enforcement with all sectors, to bring about step change in outcomes. This is not unique to only the Wairoa district.

34. The Hawke's Bay Regional Council's strategy to address these issues has been to build the information base to inform the best interventions. Using SedNetNZ landscape modelling[3] and Land Use Capability (LUC) mapping, both of which have benefitted from the region being the first in the country to be comprehensively S-Mapped and most recently fully LiDAR surveyed (with co-funding from LINZ), HBRC has identified high risk landscapes for erosion and sediment loss to model the potential sediment loss to waterways, therefore ensuring that we target the most effective and appropriate interventions.

Science and sediment monitoring

35. In addition to regular State of the Environment monitoring sites, HBRC oversees a network of automated sediment sampling stations (ISCOs) on a selection of rivers and streams across the region. Once activated, the ISCOs take a series of time-stamped water samples over the course of a high flow event. These can be correlated with flow gauging to quantify the volume of sediment transported during a flood event. The ISCOs have been strategically located in catchments with known sediment issues and priorities for soil-conservation works. This will allow us to detect and monitor the long-term results of land use change, planting programmes and other interventions over time.

36. ISCO data known to have been recorded during Cyclone Gabrielle is currently being analysed but due to limited access, ISCO sites in Wairoa district have not yet been checked for data capture and operational state.

Catchment management

37. The HBRC Catchment Management Team is tasked with providing advice and helping facilitate non-regulatory sustainable land management, including soil conservation and erosion mitigation on privately owned land. The team has grown from eight land management advisors in 2005 to 14

[3] SedNetNZ is based on the original Australian SedNet model, modified to account for erosion processes that occur in the New Zealand environment. SedNetNZ is a spatially distributed, time-averaged (decadal) model that routes sediment through the river network, based on a relatively simple physical representation of hillslope and channel processes at the stream link scale and deposition on floodplains and in the channel.

Catchment advisors plus administration support in 2021. This is an $18 million ratepayer funded investment over the last 14 years.

38. As well as providing an advisory extension service, HBRC continues to support landowners financially to undertake soil conservation works. Grants are available to assist with such activities as space planted poplar and willow planting, riparian management, and retirement and/or reversion of severely eroding land.

39. Prior to 2018, erosion control works on farmland were funded through the Regional Landcare Scheme (RLS), with an annual budget of $800,000 which was allocated as a 50% grant toward eligible works. The RLS has been replaced by the Erosion Control Scheme (ECS) to which HBRC has committed $30m over 10 years, the majority of which will be administered through a grant scheme to support on-ground erosion/sediment control works. The ECS is a region-wide programme, but does have particular focus in the Wairoa district given the highly erodible land in that area.

40. Riparian management is usually the most effective way to stabilise stream banks, reduce *E. coli*, and improve ecosystem health. Riparian planting provides shade, lowers river temperatures, limits periphyton and macrophyte growth, regulates dissolved oxygen, filters sediment run-off, and provides adult insect habitat. Targeted erosion control and excluding stock from riverbanks also reduces bank erosion and prevents sediment from entering waterways, as well as reducing direct faecal contamination.

41. The Resource Management (Stock Exclusion) Regulations 2020 require farmers to keep cattle, deer, and pigs out of waterways in low-slope areas by July 2025. The proportion of stream length covered by these regulations will vary among catchments depending on their topographies. HBRC does not currently have any additional rules requiring stock exclusion fencing of rivers and streams in the Wairoa district.

<u>'Land for Life' scheme</u>

42. HBRC and global environmental organisation The Nature Conservancy, have been working in partnership to establish an impact investment programme for the pastoral farming sector.

43. The programme now known as 'Land for Life' (previously 'Right Tree Right Place'), involves HBRC working with the farming community to plant trees on marginal land that can earn a return and enhance regenerative farming practices. If taken up at scale, this programme will significantly reduce sediment load into the waterways and improve freshwater health.[4]

<u>Soil conservation reserves and forest parks</u>

44. HBRC manages 1,805ha of erosion-prone land in the Tangoio / Tūtira area primarily for the purposes of soil conservation. Those areas are not within the Wairoa District.

<u>Forestry activities</u>

45. Over 90% of forestry activity in the Hawke's Bay region is undertaken by six main companies, all of whom are members of the Hawke's Bay Forestry Group (HBFG). Through the HBFG these companies have made it clear to HBRC that they want and expect to see council staff on the ground. Through regular contact with the HBFG and individual forest managers, a positive relationship has been

[4] For further information about the 'Land for Life' or 'Right Tree Right Place' scheme, see https://www.hbrc.govt.nz/environment/farmers-hub/right-tree-right-place/

developed between industry and council officers. This relationship had led to a number of collective initiatives, including:

- establishment of an environmental sub-committee within the HBFG to address forestry compliance issues in relation to the NES-PF across the region as they arise
- continuation of the Pakuratahi paired catchment land use joint study[5] into a second rotation that assesses sediment load and water quality over the forest's life cycle.

Flood control schemes

46. HBRC provides 23 flood control and drainage schemes in Hawke's Bay to reduce the risk of flood and erosion damage. There are two major flood control schemes on the Heretaunga Plains and in the Upper Tukituki River. HBRC has established and maintains twelve smaller individual flood protection and/or drainage schemes in the region. These are funded primarily through targeted rates by landowners directly or indirectly benefitting from the scheme. In the Wairoa district, the smaller schemes are:

Kopuawhara Stream Flood Control Scheme - this scheme covers the Kopuawhara Stream in Wairoa District from the railway bridge to 4.7km downstream and includes 4.5km of stopbanks. The gravity system scheme was established in 2000 to alleviate the effects of flooding and bank erosion on adjacent land and to reduce the closure of adjacent access roads. Following large storms, funding may be insufficient to meet the cost of major repair work, and a special meeting and agreement may be required with the community to levy additional funds.

Ohuia-Whakaki Drainage Scheme - this scheme drains 1,100ha of intensively farmed and cropped coastal plains east of Wairoa township. The scheme was established in 1966 and uses a combination of detention and gravity drains plus controlled pump discharges, to enable landowners to improve production. Flooding outside of the channels is still likely in places.

Opoho Drainage Scheme - this scheme drains approximately 200ha of low lying, productive land to the east of the Opoho Stream near Nuhaka. The scheme is based primarily on gravity drainage; however when the stream is in flood, the floodgate on the outlet of the drain closes, activating the pump station to take flood waters from the drain into the stream. The scheme and assets were established in the 1970's but have been added to and altered to meet changing demands and land uses.

Paeroa Drainage Scheme - this scheme uses a gravity system to more rapidly drain surface water from productive land near the Awatere Stream north of Wairoa town. The scheme was constructed 1953-1958. It includes the last 6.9km of the Awatere Stream and 12.18km of its drainage channels, and is intended to contain water in its channels in a 2 - 5 year rainfall event. The scheme reduces damage to properties and improves production from the land.

47. The broader Wairoa Rivers and Streams Scheme is established to look after river catchment maintenance to reduce risk of flooding and help manage flooding in the Wairoa District. The work includes flood forecasting and early warning, removal of unwanted vegetation from channels and banks, and the purchase of land adjacent to waterways where public ownership would be an

[5] The original Pakuratahi Land Use Study Report (published June 2006) can be viewed online here: https://hbrc.sharepoint.com/:b:/s/Publications/EYoHqPVPJF1BsC-gaefg6sYBZI1tdUuD_uT9OvnkkWOiwg

advantage. Funding levels for this scheme are considerably less than what is paid by those landowners benefitting from the much larger Heretaunga Plains and Upper Tukituki River Schemes.

48. HBRC has adopted an Environmental Code of Practice which provides clear standards of practice for river control and drainage works by, or on behalf of, HBRC. The Code of Practice also documents the environmental enhancement or conservation protection; identifies areas for public access and recreation; and identifies future enhancement or protection requirements. The current version was adopted in 2017 which is the Code's fourth edition.

Compliance monitoring and enforcement

49. Until the recent amendment to the Resource Management Act under the Resource Legislation Amendment Act, councils have not had the ability to charge for monitoring permitted activities. As such, Hawke's Bay councils typically have not routinely monitored permitted activities under the current regional and district plans. There are exceptions such as when a council is made aware of an activity that is not complying with the appropriate permitted activity rules. This then can become an enforcement issue where costs/fines can be imposed, but this not a substitute for recovery of costs for monitoring performance of activities (e.g. forestry operations) against the relevant rules in regional and district plans. The absence of monitoring permitted activities (generally) is primarily a consequence of a lack of financial and subsequently human resource.

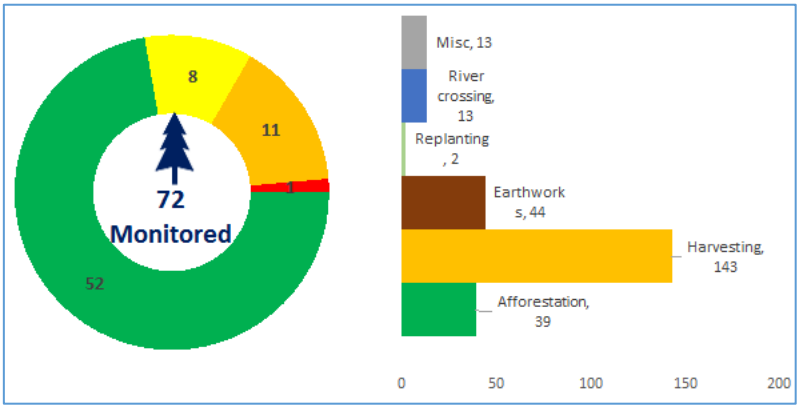
50. Notwithstanding this, over the past five years HBRC has made significant investments into scaling up our compliance monitoring and enforcement activities in relation to plantation forestry. HBRC currently employs 2.5 full time equivalent positions dedicated to forestry compliance activities. One FTE position is 50:50 funded by Hastings District Council. The 2.5 FTE figure does not count HBRC's consenting staff who process consent applications for plantation forestry-related activities.

51. During the 2021-22 period, HBRC received 148 notifications[6] for forestry activities such as earthworks, harvesting, afforestation and river crossings. Activities were dominated by harvesting and associated earthworks (see Figure 6). All notifications were assessed for the potential environmental risk against several the NES-PF national tools and other parameters and awarded a monitoring priority which determined the frequency of required site visits. Priorities are awarded from (1) for very high-risk consents to (5) for low-risk permitted activities. The number of site visits undertaken is also determined by the permitted activities that are chargeable under the regulations, namely earthworks, river crossings, quarrying and harvesting only. Site visits were undertaken for all high-risk sites and many medium-risk sites.

52. The compliance grading for the 2012-2022 period presented in Figure 6 shows that 72% (52) of all monitored consents and permitted activities achieved full compliance, 11% (8) were graded low-risk non-compliant, 15% (11) were graded moderately non-compliant and <1% (1) held by FMNZ was graded significantly non-compliant for a sediment discharge resulting in abatement and infringement notices.

[6] A notification can be for more than one activity such as Earthworks and Harvesting.

Figure 6 - Overall grading of monitored forestry consents and permitted activities (left) and breakdown of forestry activities (right) during 2021-22 period



53. It is worth noting that nearly all non-compliance relates to earthworks and sediment issues and very little non-compliance relates to poor 'slash' management. The non-compliance relates predominantly to either inadequate installation or maintenance of erosion and sediment control measures. Moderately non-compliant levels have been elevated by a few under-performing earthwork contractors not adhering to best practice (who were previously under enforcement action).

54. Education of the smaller forestry companies is on-going to achieve consistent standards of work. The appointment of specialist environmental managers within the larger companies is benefiting Council to help relay expected environmental outcomes.

55. Regional policy statements and regional plans under the RMA

56. We understand officials from the Ministry for the Environment (and other Ministries) are supporting the Panel with its Inquiry work. We understand MFE officials are compiling advice on the 'history' of relevant key policy and planning instruments as referenced in section 12.3.5 of the Panel's Terms of Reference.

57. Key regional planning documents prepared under the Resource Management Act 1991 (RMA) are listed in Table 1. Digital copies of the superseded documents can be provided to the Panel upon request. The two current documents can be viewed online (see links below). Panel members may already be well aware that under the RMA, mandatory regional planning documents are the regional policy statement and the regional coastal plan. Any other type of regional plan (by issue or combination of matters) is something that each regional council or unitary authority has self-determining discretion over.

Table 1 - Hawke's Bay regional planning documents prepared under the RMA (excluding plan changes and variations)

Current documents	
Hawke's Bay Regional Resource Management Plan (RRMP) incorporating the Regional Policy Statement [weblink]	Operative date: 28 Aug 2006 Public notification date: April 2000
Hawke's Bay Regional Coastal Environment Plan (RCEP) [weblink]	Operative date: 8 Nov 2014 Public notification date: 30 Aug 2006
Superseded documents	
Regional Policy Statement	Operative date: 7 Oct 1995

	Public notification: May 1993
Regional Coastal Plan	Operative date: 28 June 1999 Public notification date: Oct 1994
Regional Air Plan	Operative date: 26 Jan 1998 Public notification date: 17 Dec 1997
Regional River Bed Gravel Extraction Plan	Operative date: 8 Aug 1994
Regional Waste and Hazardous Substances Management Plan	Operative date: 10 April 1995
Proposed Regional Hill Country Erosion Control Plan	Publicly notified: Sept 1993 (NB: not progressed to operative. Instead, superseded and incorporated into RRMP)

National Environmental Standard for Plantation Forestry (NES-PF)

58. The NES-PF provides a set of national standards that address plantation forestry matters specifically. It is a form of national regulation made under Subpart 1 of Part 5 of the RMA and came into effect on 1 May 2018. The submission by LGNZ provides a good summary of relevant provisions of the NES-PF so we do not repeat that here.

59. Based on senior HBRC staff members' practical experiences, including in the field observations, there are a number of improvements that could be done to enhance effectiveness of the NES-PF. These include the following:

    1. A number of the key tools referenced in the NES-PF are too coarse for site-specific controls and mitigations. The 'ESC' is one prime example of this. HBRC considers that regional scale land use capability lacks sufficient detail as a tool to underpin national regulations permitting broad-scale forestry across the landscape. Certain bedrock types at certain slopes are just not suited to short rotation forestry or non-coppicing tree species. This variability is not readily picked up by the 1:50,000 scale ESC tool.
    2. Five metre setbacks near waterways are insufficient if harvested trees are likely to crush the 'buffer'
    3. The flooding parameters currently specified in the NES-PF are totally insufficient. For example, Regulation 20 for slash permitted activity conditions requires *"Slash from pruning and thinning to waste must not be deposited into a water body, onto the land that would be covered by water during a 5% AEP event, or into coastal water."* The permitted 5% AEP condition needs to be raised in many clauses throughout the NES-PF.
    4. Pinus radiata is a relatively low-value timber species with end-uses that are typically temporary and/or require chemical treatment to be used for trade purposes. Low-value products limit financial reward and incentives to "take more care" or "spend more time" on performing best practice forest management or utilising more woody biomass.
    5. 'Slash' currently does not include windfall, prunings or stems broken during harvest. Limiting 'slash' to only cut material fails to ensure significant volumes of other woody biomass from forestry operations are appropriately regulated.
    6. The degree of permissiveness throughout the NES-PF is concerning and is setting up future problems. For example, permissive afforestation that in several decades time will pose

challenges and largely uncontrolled threats to land instability and woody debris movement during and after harvest.

7. Greater controls (e.g. though consenting pathways) are needed not only for Class 8 land, but also other highly erodible land types. The consent authority for forestry activities on erodible land should remain within the roles and responsibilities of regional councils and unitary authorities and not be split partly with territorial authorities and partly regional councils.
8. Plantation forestry operations are already meant to have quite comprehensive earthworks and harvest management plans in place. By and large we find these plans to be too generic to be auditable, perhaps due to the scale and nature of forestry and the way companies plan their work. Forestry operators don't always know too far in advance exactly what they will do in detail in each setting, but refined ESC and LUC information would serve to better inform decisions to tailor their practices.
9. A 'forest management plan' regime (possible akin to the Freshwater Farm Plan Regulations under the RMA) would prompt plantation forester AND carbon foresters to carefully think about the whole life-cycle of their activities, the timing, the places and the management interventions required to "take more care" and "spend more time" on performing good or best practice forest management. We note LGNZ's submission recommends 'forest management planning' and we support that recommendation.

60. We understand LGNZ's submission to the Panel is likely to identify a range of other similar and related matters. LGNZ and HBRC continue to call for the NES-PF to be amended to apply to not only plantation or production forests, but also carbon forests.

Part D - Recommendations

A. Amend NES-PF and associated instruments as necessary to address concerns in paragraph 59 above.

B. Government policies be adapted or introduced that provide far greater incentives and support for the 'right tree in the right place.' This would necessitate significant Crown funding sustained over decades – not just a short injection for limited period time.

ATTACHMENTS

A – Additional helpful web links

B – HBRC Regional Sediment Management Report, February 2022

C – HBRC's regional soil moisture report for February 2023

D –Post-Cyclone Gabrielle large woody debris survey report (Draft) commissioned by HBRC, March 2023

Thank you for the opportunity to make this submission.

Ngā mihi nui,

Pieri Munro MNZM
Interim Chief Executive
Phone: (06) 835 9200
Email: pieri.munro@hbrc.govt.nz

Address for service:
Hawke's Bay Regional Council
Private Bag 6006
Napier 4142

Contact person (in first instance):
Gavin Ide
Principal Advisor Strategic Planning
e: gavin@hbrc.govt.nz
p: 06 835 9200
m: 0275 888 901

ATTACHMENT A – Further additional weblinks

HBRC's submission on MPI and MFE national direction for plantation and exotic carbon afforestation (November 2022)

HB councils' joint submission on proposal to amend NES-PF enabling councils to charge to monitor permitted activities (June 2017)

HBRC's submission on proposed National Environmental Standard for Plantation Forestry (June 2015)

HBRC's State of the Environment Report 2018-2021

HBRC's Environmental Code of Practice for River Control and Waterway Works (February 2017), 4th ed.

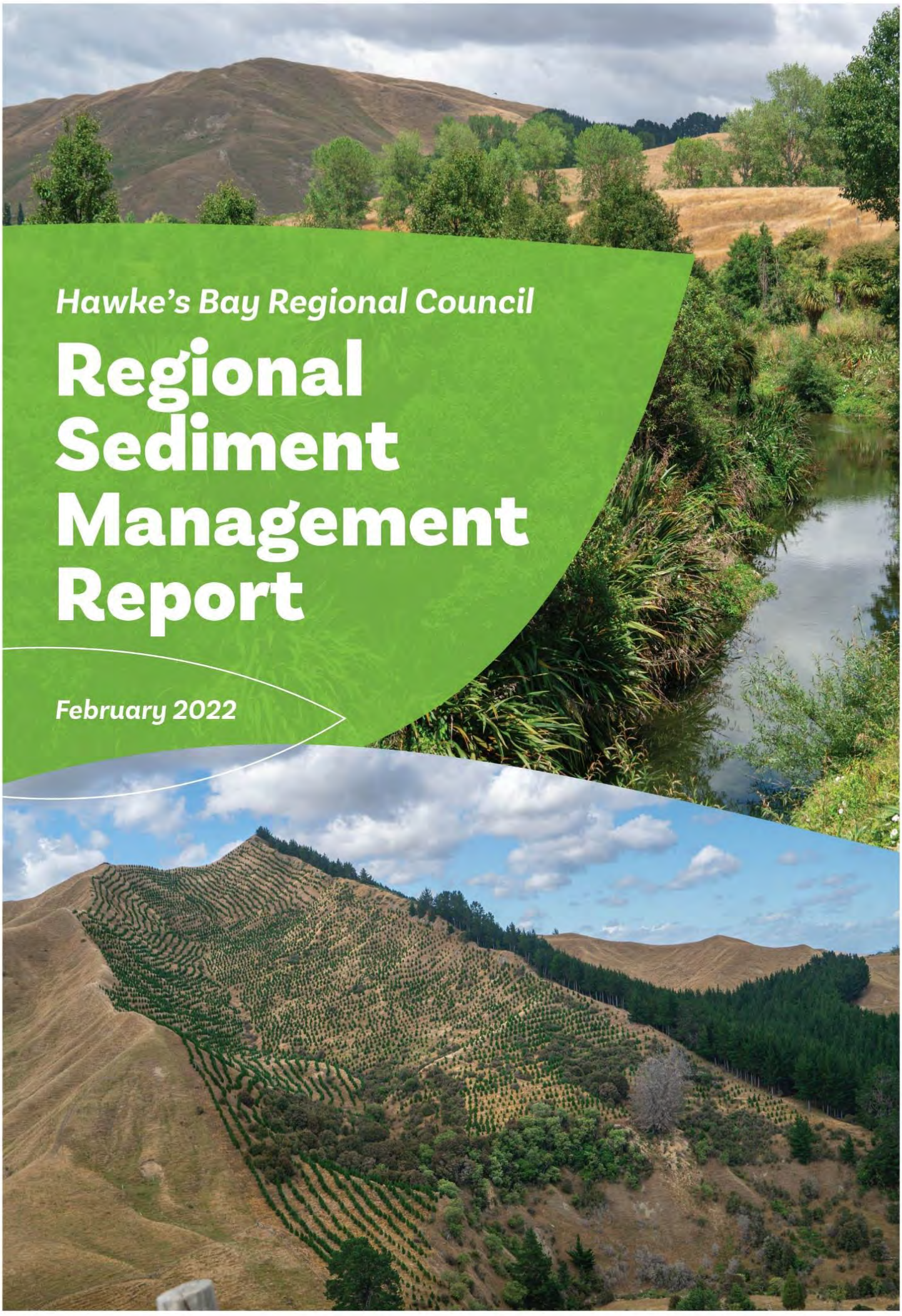
SedNetNZ modelling of sediment sources and loads in the Northern Hawke's Bay Region (June 2017)

Soil Quality of Exotic and Indigenous Forests in Hawke's Bay 2015/2016 (August 2016)

Hawke's Bay Waterway Guidelines – Erosion and Sediment Control, HBRC (April 2009)

The Pakuratahi Land Use Study Report (June 2006) HBRC, Pan Pac, Carter Holt and Juken Nissho

Our Land and Water National Science Challenge – Whitiwhiti Ora Land Use Opportunities



Hawke's Bay Regional Council

Regional Sediment Management Report

February 2022

Background

Like much of the North Island's East Coast, the Hawke's Bay region has a prevalence of soft sedimentary geology underlying its hill country (Figure 1). The combined historical land clearance has driven high rates of erosion resulting in detrimental levels of sediment in many of our waterways and near-shore environment.

In New Zealand, estuaries are being recognised as the most at-risk coastal environments, as they are the depositional endpoint for the cumulative contaminants (e.g. nutrients, sediments) from the surrounding catchment.

Many key environmental issues in Hawke's Bay are a consequence of land use that contributes to erosion and discharge of nutrients to waterways.

SedNet modelling has identified approximately 252,000 hectares of Hawke's Bay pastoral hill country as generating sediment losses of more than 1,000 T/Km^2/Yr, (Figure 2). This has been the primary driver behind programme development and resourcing that aims to accelerate erosion and sediment interventions across the region.

Figure 1 – photo showing scale of highly erodible land in Hawke's Bay

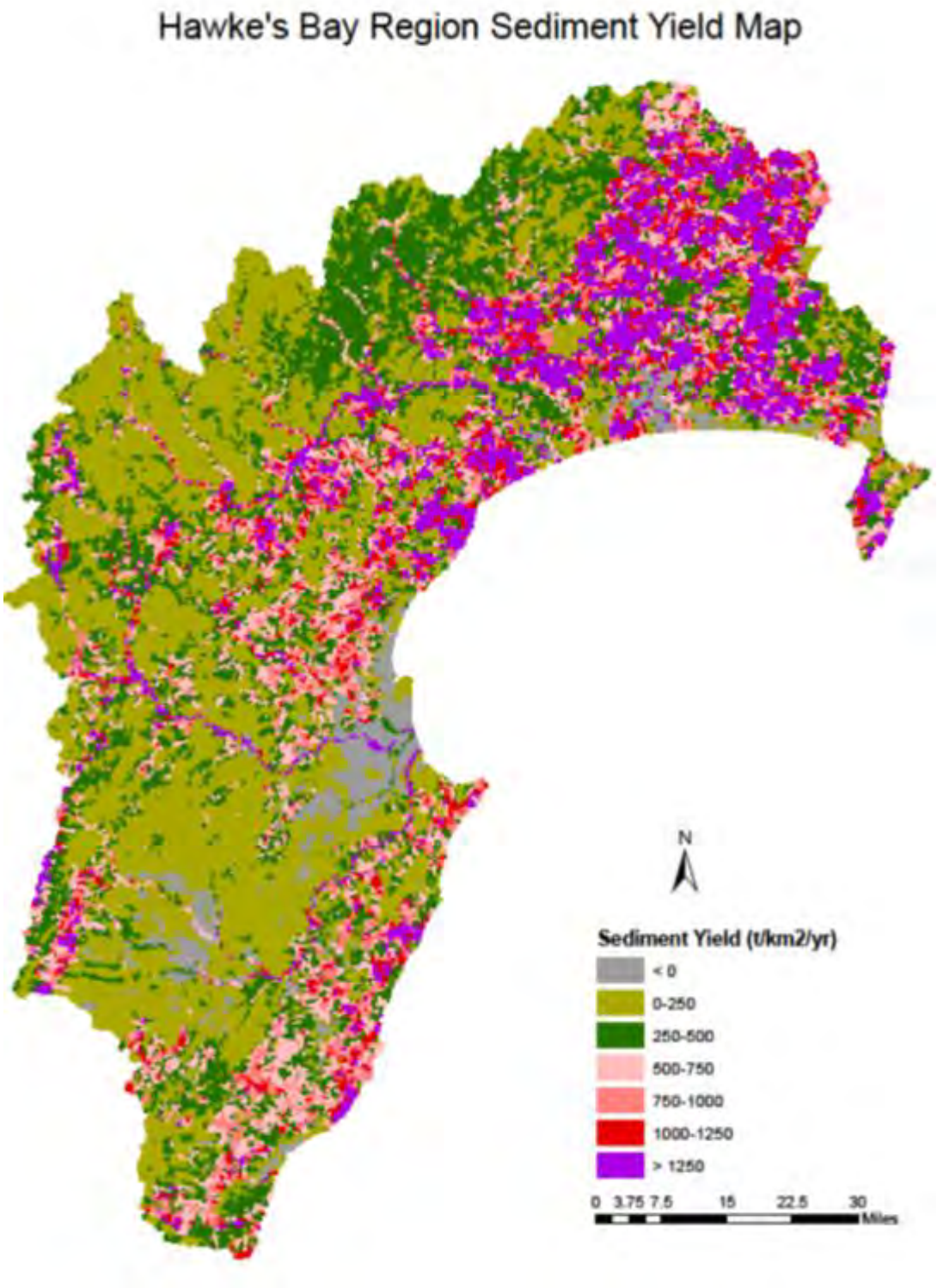


Figure 2 – Map showing sediment yield in Hawke's Bay Region

This is a significant, historic legacy issue for the country and a challenge that all Regional Council's are currently facing. The Hawke's Bay Regional Council (HBRC) and the Hawke's Bay Catchment Board prior, have a long history of working with landowners to address soil loss. The 1941 Soil Conservation and Rivers Control Act came about following a major weather event in 1938 that caused massive erosion and sedimentation of waterways in Hawke's Bay, and action to address soil conservation in our region has been underway since.

HBRC believe that the work we have done and are continuing to with our communities is making a difference but acknowledge there is still a long way to go to improve current practices in production forestry and agriculture. The scale of the challenge is significant and HBRC has a coordinated strategy of engagement, education, encouragement, and enforcement with all sectors, to bring about step change in outcomes.

The Hawke's Bay Regional Council's strategy to address these issues has been to build the information base to inform the best interventions. Using Sednet Landscape modelling and Land Use Capability (LUC) mapping, both of which have benefitted from the region being the first in the country to be comprehensively S-Mapped and most recently fully LiDAR surveyed (with co-funding from LINZ), HBRC has identified high risk landscapes for erosion and sediment loss to model the potential sediment loss to waterways, therefore ensuring that we target the most effective and appropriate interventions

In response to the specific requests for further information:

1. **The steps your council has taken to address overall sediment loads arising in particular from plantation forestry and its effect on waterways, estuaries and the coastal marine area;**

While HBRC will be undertaking significant engagement, collaboration and consultation with stakeholders and the wider community, as we prepare a new regional freshwater management plan in line with the NPS-FM2020, outlined below is a snapshot of some of the work already being undertaken by the council to reduce the impact of sedimentation on vulnerable catchments.

Science and sediment monitoring

In addition to regular State of the Environment monitoring sites, HBRC oversees a network of automated sediment sampling stations (ISCO's) on a selection of rivers and streams across the region. Once activated, the ISCO's take a series of time-stamped water samples over the course of a high flow event. These can be correlated with flow gauging to quantify the volume of sediment transported during a flood event.

The ISCO's have been strategically located in catchments with known sediment issues and priorities for soil-conservation works. This will allow us to detect and monitor the long-term results of land use change, planting programmes and other interventions over time.

Figure 3 ISCO Automated sediment sampling unit

As well as a comprehensive monitoring programme across the region, HBRC are involved in three different areas of work specifically looking at understanding sediment movement from the land to the coastal environment:

1. HBRC are sponsoring a PhD student at the University of Waikato to look at the source, transport and fate of sediments into the Bay. This includes remote sensing work that focuses on distribution and frequency of sediment movement out of the rivers using satellite imagery, and this will then be coupled with a hydodynamic model that will look at sediment deposition, re-working and movement. The aim of this work is to provide information about where the sediment from the different rivers go so that identified issues can be coupled with appropriate management interventions.
2. HBRC are undertaking collaborative work with NIWA and MPI to produce seafloor maps for areas of our coastal environment. This gives us information on what the seafloor structure looks like (reef vs cobble/shingle vs sand).
3. HBRC are undertaking a collaborative project[1] with the Sustainable Seas National Science Challenge and the Hawke's Bay Marine Coast Group (a group comprised of recreational and commercial fishers, Pan Pac, Port of Napier, MPI, DOC, iwi and hapū), that looks at the combined effects of fishing and sedimentation on the benthic environment of Hawke's Bay to gain an understanding of what needs to be done to improve benthic health.

[1] https://www.sustainableseaschallenge.co.nz/our-research/hawkes-bay-regional-study/

Catchment Management

The HBRC Catchment Management Team is tasked with providing advice and helping facilitate non-regulatory sustainable land management, including soil conservation and erosion mitigation on privately owned land. The team has grown from eight land management advisors in 2005 to 14 Catchment advisors plus administration support in 2021. This is an $18 million ratepayer funded investment over the last 14 years.

As well as providing an advisory extension service, HBRC continues to support landowners financially to undertake soil conservation works. Grants are available to assist with such activities as space planted poplar and willow planting, riparian management, and retirement and/or reversion of severely eroding land.

Prior to 2018, erosion control works on farmland were funded through the Regional Landcare Scheme (RLS), with an annual budget of $800,000 which was allocated as a 50% grant toward eligible works. The RLS has been replaced by the Erosion Control Scheme (ECS) to which HBRC has committed $30m over 10 years, the majority of which will be administered through a grant scheme to support on-ground erosion/sediment control works. At the property level, individual projects are underpinned by an 'Erosion Control Plan' which is prepared by a catchment advisor to guide landowners through a multi-year programme of works.

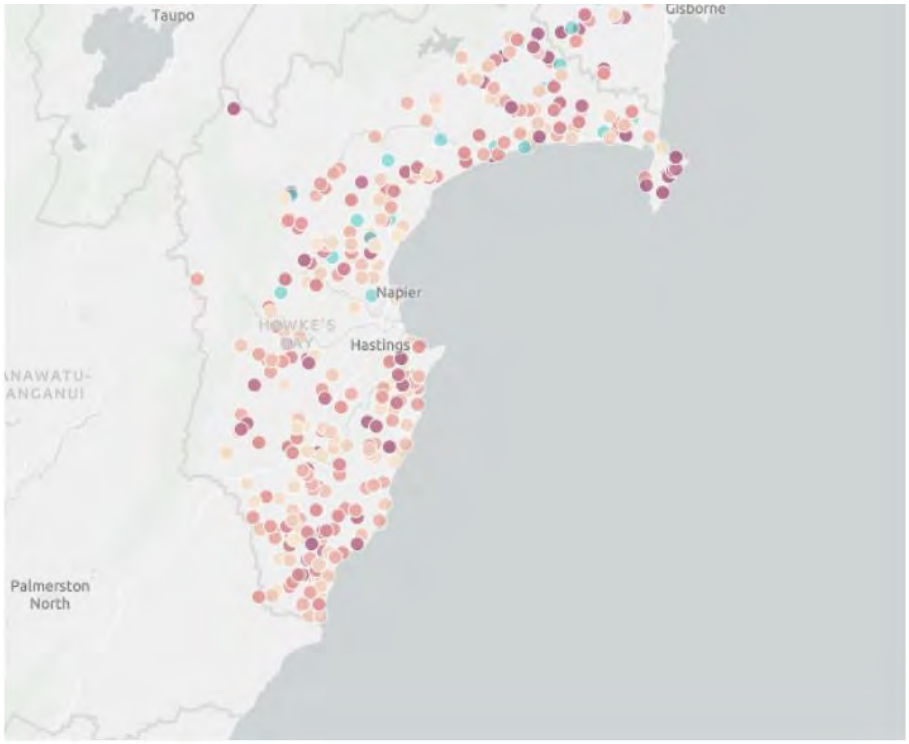


Figure 4 Map of Hawke's Bay showing the location of Erosion Control Scheme projects since 2018

The Catchment team has continued to seek further funding opportunities to achieve erosion/ sediment control outcomes. Over the 2020 and 2021 financial years, the ECS was used to match a $1.2 million contribution from the MfE Freshwater Improvement Fund. This was used to fund eligible riparian fencing projects that will reduce erosion and sediment loss, along with providing benefits to freshwater and riparian habitat.

The ECS has also been successfully used to obtain a further $5,035,000 over four years from MPI's Hill Country Erosion (HCE) Fund. This is being used to fund additional staff and facilitate training as well as on-ground works and monitoring.

Since 2018, $5.7 million of ECS funding has generated $9.1 million of erosion control works, treating approximately 2,038 ha of Hawke's Bay Hill Country and 128 km of riparian management. There is a further $24.3 million available over the remaining seven years of the scheme.

The planting of poplar and willow poles remains the most cost effective and practical means of reducing erosion on pastoral landscapes. The HBRC Poplar and Willow nursery produces between 20,000 and 30,000 3-meter poles annually (the optimal size for planting in a grazed environment), along with smaller numbers of shorter/smaller grades. Poles are sold at a subsidised rate to landowners undertaking erosion control planting.

A nursery development plan is currently underway to expand production, and HBRC is considering further options to optimise and expand nursery production to meet growing demand.

HBRC also supports the work of the New Zealand Poplar and Willow Research Trust, establishing propagation material that is fit for purpose and best suited to our region's challenging climate and environmental conditions.

Figure 5 Example of recent poplar and willow pole planting on the Hawea Stream, Tukituki Catchment

The Catchment team uses SedNet Landscape modelling and Land Use Capability (LUC) mapping to identify high risk landscapes for erosion and sediment loss. SedNet uses geospatial data (geology, soils, terrain and landcover) to model the potential sediment loss to waterways, therefore ensuring that we target the most effective and appropriate interventions.

Right Tree Right Place scheme

Hawke's Bay Regional Council and global environmental organisation The Nature Conservancy, are working in partnership to establish an impact investment programme for the pastoral farming sector.

The programme, currently called Right Tree Right Place, involves council working with the farming community to plant trees on marginal land that can earn a return and enhance regenerative farming practices.

If taken up at scale, this programme will significantly reduce sediment load into the waterways and improve freshwater health.

HBRC will work with the landowner to set up a financial agreement that will fund the project and may enter into a finance agreement with the landowner.

HBRC will initially run a pilot on up to five farms and assess the potential to scale up the project across the region by bringing in other funding. Council is currently working with two pilot farms to develop detailed farm and forestry plans, with the aim of planting seedlings this year.

HBRC will be surveying around 400 landowners across Hawke's Bay in February to see what their appetite is for the Right Tree Right Place programme and build a list of farms who are interested in being involved.

Soil Conservation reserves and forest parks

HBRC manages 1,805ha of erosion-prone land in the Tangoio / Tūtira area primarily for the purposes of soil conservation. The land use mix of the properties is shown in Figure 6 below.

	Owner	Purpose	Total area (ha)	Commercial Forest (ha)	Planted or reverting native (ha)	Pastoral (ha)
Tangoio Soil Conservation Reserve	NZ Crown	Soil conservation, highway protection, recreation, biodiversity, high cultural value	550	330	220	0
Tūtira Regional Park	HBRC	Soil conservation, lake protection, recreation, biodiversity, high cultural value	469	114	271	157
Waihapua Forest	HBRC	Soil conservation, recreation (planned), biodiversity	319	212	88	19

Figure 6 – Land use mix of HBRC managed properties

Especially with the public access through the Tangoio Soil Conservation Reserve and Tūtira Regional Park, management of the properties provides a valuable opportunity for HBRC to use, trial and demonstrate land use initiatives to reduce sediment generation and loss. Initiatives currently underway are:

- The country's first mānuka plantation (95ha), established in order to trial the feasibility of planted as opposed to naturally existing mānuka as an economic landuse alternative to commercial forestry or farming on erosion-prone lands and to act as a nurse crop for eventually reversion to native forest. HBRC is cooperating with Comvita to better understand the variables affecting honey production in the plantation. The plantation was used in a study by Landcare Research to investigate the potential of mānuka plantations for erosion control.

- Reversion of approximately 70ha of pine forest to native over the coming 6 years via low-cost methods (i.e. natural regeneration on southern faces near existing seed sources and mānuka nurse crops in more exposed northerly sites, both assisted by herbicide mixes trialled with industry to control plant pests with minimal impact on natives).

- Trialling methods to establish as much protective vegetation cover as possible following forest harvest and retain as much of this as possible in the replanting stage, without overly compromising establishment or growth of the new tree crop.

- 49 different timber species are represented between the three properties, 38 of these in the form of commercial plantings. They serve as valuable demonstration sites for landowners making decisions on what trees to plant on their own properties and for research organisations involved in the development of the various species, both during scheduled field days and casual visits. Scion and the New Zealand Dryland Forest Initiative have trial sites on the properties. HBRC work with local sawmillers to better understand properties and potential markets for the alternative timber species.

A visit to the research site by former Minister of Forestry Shane Jones and current Minister Stuart Nash is pictured below.

HBRC has established and administered a 'Catchments Fund' as required by Sections 20-25 of the Maungaharuru Tangitū Hapū Claims Settlement Act (2014). Funds not required for the management of the Tangoio Soil Conservation Reserve (the Reserve being entirely funded via revenue from the commercial forestry on it) are transferred to the Catchments Fund and used in soil conservation projects in the surrounding catchments decided in partnership with and led by tāngata whenua represented by the Maungaharuru Tangitū Trust. To date, a Catchments Fund contribution of $230,000 has helped leverage some $6 million in funding for the Tūtira Mai Ngā Iwi, Te Waiū o Tūtira, and Kia eke Te Ngārue, Kia eke Arapawanui Projects.

Operating as a forest owner and manager in addition to the more obvious Local Government role as a forestry regulator and land-use advisor, allows HBRC to work with industry at a different level. It means HBRC has skin in the commercial forestry game and is intimately involved in all aspects of the forest cycle. Particularly around the high-risk periods of harvest and post-harvest- in working with industry to plan forest establishment, earthworks and harvest to minimise sediment loss on HBRC's land. Much is shared both ways and the end result is a greater sharing of knowledge and more robust relationships, both of which lead to improved practice and ultimately less sediment loss.

Other work being supported by catchment management teams

By increasing the number of staff and work programmes, HBRC has been able to increase landowner and community engagement. Some examples of how this has been achieved are listed below;

- Since July 2018, HBRC has completed 431 Erosion Control plans, spanning 311,762 hectares of land. This has resulted in 600,000 natives being planted for erosion control and 63,473 poplar and willow poles and other exotics.
- HBRC has subsidised targeted catchment works to reduce sediment into Ahuriri Estuary – 16.8km of fencing and 53,000 native plants and 1,500 poles over three years.
- HBRC has partnered with Fonterra and NIWA to investigate constructed wetlands as a tool for sediment and nutrient reduction in the Tukituki catchment
- HBRC has established two MFE FIF projects in partnerships with tangata whenua focusing on two critical areas deemed outstanding water bodies in Lake Tutira ($3.3M) and Whakaki Lake ($3.1M). While there is a broad set of objectives behind these projects, a key focus is addressing both current sediment inputs and legacy sediment loads
- As highlighted below, HBRC is working alongside the Aramoana Environmental & Education Charitable Trust to reduce land erosion above the Te Angiangi Marine.
- HBRC are providing technical support for the Maraetotara Tree Trust, which is undertaking the restoration and protection of approximately 34km of river margin. The vision is to create a corridor for native birds, a living laboratory for schools, and clean water to support economic, recreational, cultural, and ecological values.
- HBRC are supporting community groups submit funding applications (e.g. **Porangahu Catchment Group** MfE's Freshwater Improvement Fund (FIF)) and provide technical advice to the project.
- HBRC has two staff in Catchment policy implementation who are focused on supporting the building of catchment community groups. There are currently 35 groups at some stage of development, from having expressed an interest in forming a group, through to well developed. Of these 18 meet regularly, and 7 have a formalised structure and legal agreement. Several of these groups have been successful in drawing in outside funding for works on the ground, including erosion control works. Examples include Whangawehi and Porangahau coastal.

Case study – Aramoana restoration project

Adjacent to Aromoana beach in Central Hawke's Bay is the Te Angiangi marine reserve, which is home to a myriad of different species, including kingfishers, oyster catchers, pied stilts, godwits, white-fronted terns, Caspian terns and little blue penguins. At low tide, a mudstone platform is exposed, revealing beds of pink coraline seaweeds and patches of native sea grass. Like much of the east coast, the hill country surrounding the beach is literally falling into the sea as a result of erosion and this is having a detrimental impact on the marine reserve and the ecosystems it sustains.

Hawke's Bay Regional Council has purchased 44 hectares of steep hill country, with a vision of protecting the marine reserve from land erosion. In partnership with the Aromoana Environmental and Education Charitable Trust (AEECT), a planting and regeneration project has been established on the land. The aim of the project is to protect the marine reserve from sedimentation, stabilise the land by planting trees, allowing regeneration and creating a habitat of rich biodiversity for the whole community to enjoy.

HBRC and the AEECT have partnered with Omakere School to plant 4,400 native trees and plants, which were funded by the MPI One Billion Trees programme. The aim is to plant another 5,000 trees and shrubs in the coming year.

Intensive Winter Grazing

Hawke's Bay Regional Council have taken a proactive approach to informing and engaging with farmers/landowners to improve winter grazing practices. Building understanding of current state (Satellite image analysis of crop extent/change), awareness within the trusted advisor network (engaging with seed merchants providing cropping advice to farmers) and the delivery of awareness and practice change events (partnering with industry to develop resources and deliver farmer workshops to help farmers develop their Winter Grazing Module using the MPI/MfE module).

In addition to awareness and engagement, enforcement has been used to help farmers develop appropriate winter grazing modules.

Workshops were delivered across Hawke's Bay in partnership with industry and Catchment Groups. This resulted in a significant increase in awareness of correct grazing practices. Farmers positively engaged with HBRC to develop their understanding of good practice, and for implementation support in developing a winter grazing module.

Hawke's Bay Regional Council have been proactive in identifying practices that negatively impact on the health of waterways/streams because of grazing winter crops and have developed and delivered information and good management practice resources to help farmers/landowners deal with it.

Hawke's Bay Future Farming

The Hawke's Bay Future Farming Charitable Trust was founded to shine a light on our region's existing and emerging farming expertise, and create a local hub of knowledge, research education, and the opportunity for profitable and resilient farming to ensure the health of the region's soil and water communities, and farmers into the future. Some of the current activity includes:

- MPI LandWISE project – compare commercial conventional versus alternative/ regenerative farming systems to Hawke's Bay horticulture, viticulture and cropping sectors, with a special focus on soil carbon, irrigation and water retention, and energy efficiency.
- Mangaone Catchment Group Project – catchment wide comparison of conventional pastoral farming practices against trialled alternative approaches (e.g Regen) aiming to improve water and soil environmental health outcomes, overall farm resilience (including water and energy use) and economic sustainability.
- Inventory database – build an inventory of HB awarded best practitioners and other HB exemplars creating an online library of case studies to facilitate understanding of and communicate best practices throughout the region.
- Soil Carbon – measuring the ability of farm practices to increase soil carbon, by measuring across three properties at various stages of organic/regenerative development.
- Environment/Economic Assessment (E2E) – Complete a holistic, economic an environmental assessment of the overall farming system for ten dairy and sheep and beef farms across Hawke's

Bay. Measure all inputs/outputs, modelling how various interventions might improve performance and measuring outcomes from changed or alternative practices.

Regenerative Agricultural Practices

There is growing reference to the role of regenerative agriculture as a critical tool for farmers and landowners in the future of farming. However, New Zealand specific research and evidential information is scarce, with most information based on case studies from sources outside New Zealand. Hawke's Bay farming systems and land use models offer significant opportunities through applying regenerative agricultural practices, with minimal investment or system changes. However, a critical element missing is trusted research information, and demonstrable examples for farmers to trust making changes to existing practices.

It is now widely recognised by farmers/landowners that the definition of regenerative agriculture remains fluid, and the lack of a crystal-clear definition or validity of suggested practices is a barrier to practice change. Research at the fundamental science level is committed to dismantling some of the myths around regenerative agriculture, but now is the time to focus on applied scientific studies that are demonstrable and transferable to a community seeking options beyond the status quo.

Regenerative agricultural practices can create a stronger link between productive potential of land and the susceptibility of water bodies. There is an opportunity in Hawke's Bay to invest in research which works backwards from potential erosion or sediment loss locations and the impact of applying regenerative agricultural practices and systems to design optimal land modelling. Current practice is to start with existing practices (known to have negative environmental impact) and then try and fit them to an optimal environmental outcome. E.g. farm planning and applying input measures to drive change takes too long to achieve the desired outcome.

Regenerative farming systems can halt sediment loss and further land degradation from through erosion through implementing multi-species pasture systems that increase sward density, increase moisture holding capacity of soils and reduce the risk of erosion and sediment loss.

Forestry activities

Over 90% of forestry activity in Hawke's Bay is undertaken by six main companies, all of whom are members of the Hawke's Bay Forestry Group (HBFG). Through the HBFG these companies have made it clear to Council that they want and expect to see Council staff on the ground. Through regular contact with the HBFG and individual forest managers, a positive relationship has been developed between industry and Council.

Within the HBFG, an environmental sub-committee (made up of key industry and compliance representatives) was established in response to the NES-PF. The focus this year for the sub-committee are the regulations that specifically relate to control of **sediment** and how to improve the environmental outcomes from the activities that can cause sediment losses. Importantly, the appointments of specialist environmental managers within the larger companies will be able to assist in this work with the HBFG.

The Council developed an information brochure for landowners of smaller woodlots that draws their attention to their responsibilities and encourages them to select high quality forestry contractors who integrate environmental best practice into their operations.

Since introduction of the NES-PF in 2017, HBRC have added additional capacity to respond to the extra responsibilities which the NES-PF placed upon regional councils.

An eleven-year joint study (Jan 1995 – Dec 2005) between HBRC and industry was undertaken that compared sediment yield from the Pakuratahi catchment of Tangoio, Hawke's Bay (3.45 km2) in mature forest, that was subsequently harvested and replanted, with that monitored over the same period in the adjacent Tamingimingi catchment (7.95 km2) left in pasture.

This study concluded that during the harvesting period, the amount of sediment was 2–3 times that generated from comparable pasture catchments. However, the data showed the pasture catchment yielded more suspended sediment (3-4 times) than the catchment in mature plantation forests over the eleven-year study cycle. Until the exposed soil is stabilised, sediment yields can exceed those from comparable catchments in pasture. The key findings were the importance of appropriate management practices such as rapid replanting and oversowing, which can greatly reduce sediment losses.

Below is a time sequence of photos from a Hawke's Bay forest harvested in 2020. The harvest is within a steeply incised gully with trees that had been planted with no setbacks from the stream (Figure 7). Councils assess harvest plans favourably that have no or minimal interaction with waterbodies: earthworks management that has low risk of sediment discharge to water and harvest systems that fell and extract trees away from water bodies. This cannot always be achieved so rather than operating as a permitted activity a resource consent may be sought. The consenting process aims to minimise the impacts of working near and at times across streams.

However, the difficulty of harvesting trees in close proximity to the stream is demonstrated with slash and some sediment being inevitably deposited in the stream (Figure 8). In this case, the consent conditions, under the NES-PF, required the removal of slash from the stream and stabilisation of the cutover (Figure

9). The period from harvest to re-stabilisation of the cutover and stream riparian margins was six months as required by NES-PF Regulations (Figure 10).

The second rotation is now due for harvest again in the original study area of Pakuratahi and most importantly, Council and industry (co-ordinated by the Hawke's Bay Forest Group) are committed to continue with a new study to measure overall sediment loads that will result from a second rotation harvest. It is anticipated that with existing infrastructure in place (roads, landings), improvements in harvest technology, planning and methodology, sediment yields will be reduced during the harvest period.

Afforestation and replanting setbacks from waterbodies are required under the NES-PF 2017. The Pakuratahi catchment area to be further studied was not subject to these setback requirements at replant in 2000. However, the harvest area shown in the photos has been replanted in 2021 with the appropriate setbacks. It is expected that the increase in riparian areas required by the NES-PF will enhance biodiversity and reduce sediment losses to rivers and streams.

Due to the inability of regional councils to charge for monitoring of both permitted activity afforestation and replanting (as per Regulation 106, NES-PF 2017), councils must rely on requested post-planting maps. The ground proofing of the required setbacks will not be confirmed. There is concern that the environmental gains of trees being planted with required riparian setbacks may not be consistently achieved.

Figure 7 February 2020 – pre-harvest

Figure 8 August 2020 – harvest, pre-stream remediation

Figure 9 November 2020 – regrowth post aerial oversowing

Figure 10 December 2020 – Spring regrowth

In 2009 HBRC developed a set of waterway design guides[2], featuring an 'Erosion and Sediment Control' guide with the three main objectives:

1. To provide users, ranging from those directly associated with various Land Disturbing Activities to interest groups, with a series of comprehensive guidelines for erosion and sediment control for land disturbing activities by:
    - outlining the principles of erosion and sediment control and the sediment transfer process; and
    - providing a range of erosion and sediment control practices that can be implemented on various Land Disturbing Activities.

2. To detail the rules in the Hawke's Bay Regional Council's Regional Resource Management Plan which defines the permitted activity and restricted discretionary status of Rules 7 and 8 relating to Vegetation Clearance and Soil Disturbance Activities.

3. To minimise adverse environmental effects of Vegetation Clearance and Soil Disturbance Activities through appropriate use and design of erosion and sediment control techniques.

These Guidelines overview the erosion and sediment controls that can be used when undertaking various Vegetation Clearance and Soil Disturbing Activities and are known as Technical Guidelines AM08/13

[2] https://www.hbrc.govt.nz/assets/Document-Library/Waterway-Design-guidelines/Erosion-and-Sediment-Control-20090406.pdf

related to Guidelines for Waterways and titled Erosion and Sediment control Guidelines for the Hawke's Bay Region.

These Guidelines are referred to in consent conditions and referenced by compliance officers when completing compliance monitoring.

2. The compliance monitoring and enforcement activities undertaken in the last two years, particularly in relation to the types of example(s) shown in the video[3];

Forestry

The forestry notifications and subsequent monitoring in the last two years is illustrated in the following charts.

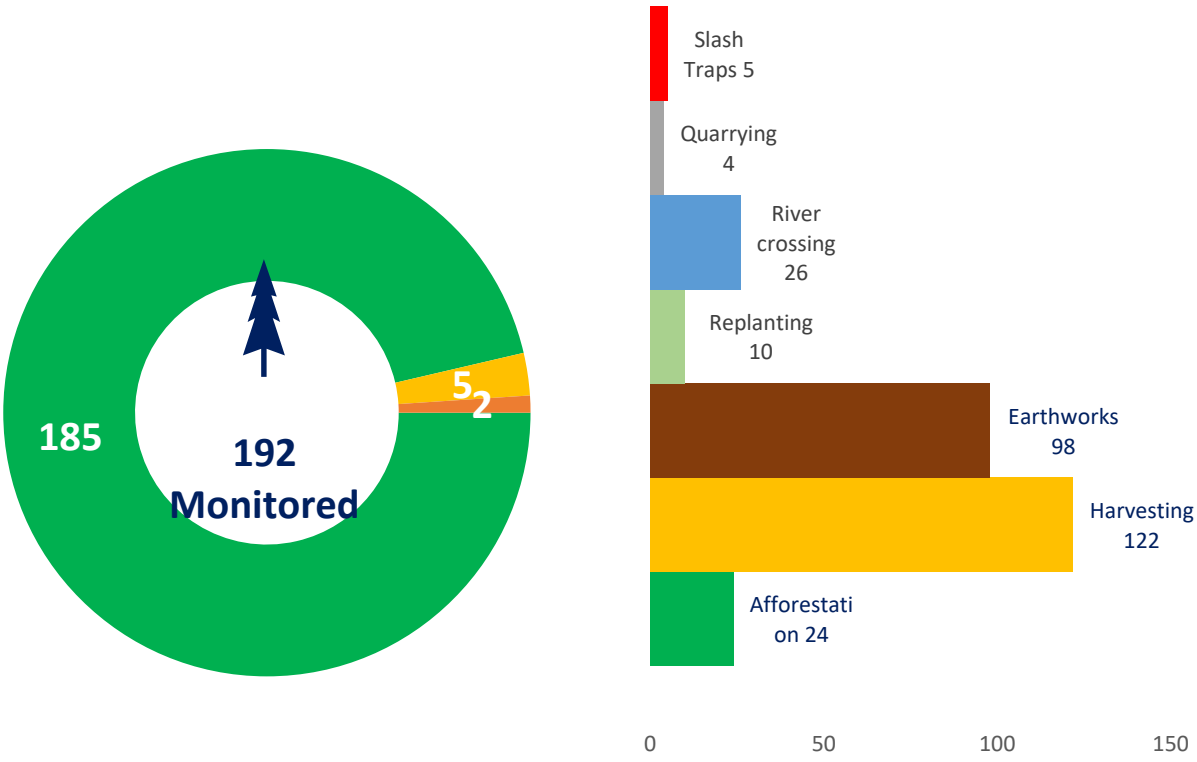


Figure 11. Overall grading of monitored forestry consents and permitted activities (left) and breakdown of forestry activities (right) during 2019/20.

During the 2019/20 period, Council received 192 notifications for 281 forestry activities such as earthworks, harvesting, afforestation and river crossings. Activities were dominated by harvesting and associated

[3] Appendix 1. Still photo from video unconfirmed as being from a Hawke's Bay plantation forestry block

earthworks. The compliance grading presented in figure 11 shows that 96% (185) of all monitored resource consents and permitted activities achieved full compliance. Of all permitted activities and consents, 3% (5) were graded low-risk non-compliant, 1% (2) were graded moderately non-compliant and no consents were graded significantly non-compliant in the 2019/20 period.

The 'low risk' non-compliance relates predominantly to earthworks not constructed to best practice at the time of the visit. The moderate non-compliances were both for harvesting activities with none or inadequate erosion and sediment control measures in place.

No enforcement action has been undertaken during the period for forestry activities as the non-compliance was addressed and actions taken to remedy the issues where these were required.

20/21

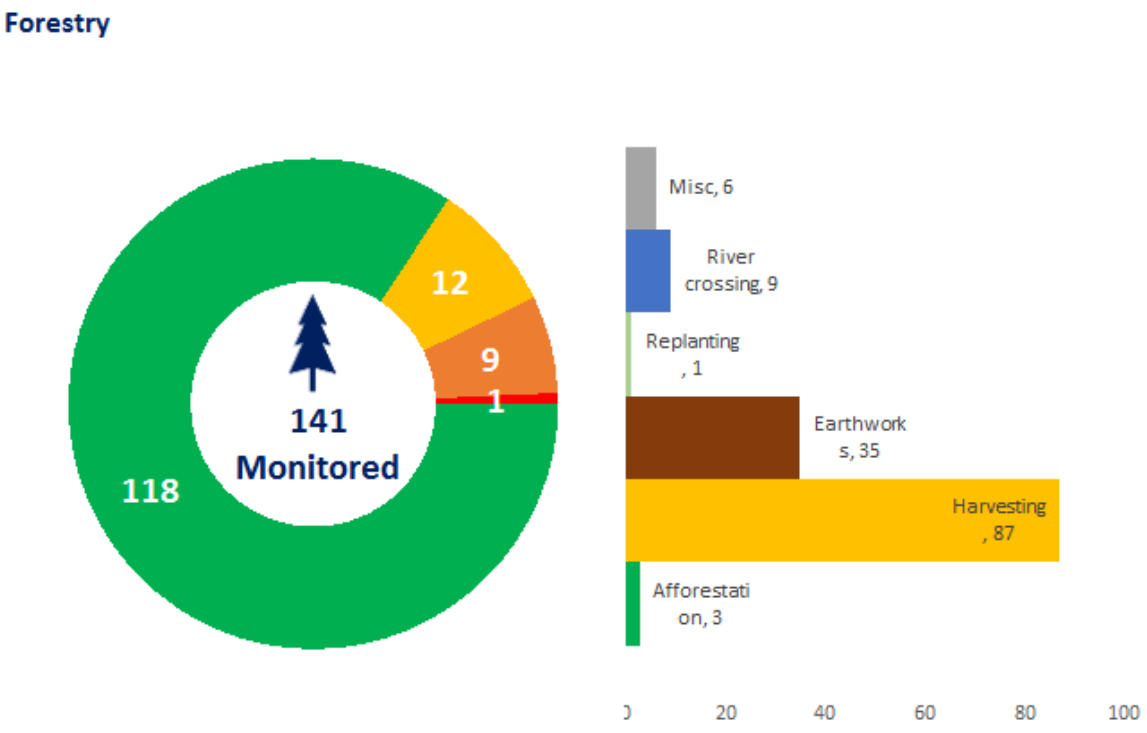


Figure 12. Overall grading of monitored forestry consents and permitted activities (left) and breakdown of forestry activities (right) during 2020-21.

During the 2020-21 period, Council received notifications for 141 forestry activities such as earthworks, harvesting, afforestation and river crossings. Again, activities were dominated by harvesting and associated earthworks (Figure 12).

The compliance grading presented in Figure 12 shows that 84% of all monitored resource consents and permitted activities achieved full compliance, 9% (12) were graded low-risk non-compliant, 6% (9) were graded moderately non-compliant and <1% (1) was graded significantly non-compliant in the 2020-21 period for a sediment discharge resulting in abatement and infringement notices.

It is worth noting that nearly all non-compliance relates to earthworks and sediment issues and very little non-compliance relates to poor slash management. The non-compliance relates predominantly to either inadequate installation or maintenance of erosion and sediment control measures.

Other Compliance Monitoring and Enforcement

Where there are known earthworks sites the compliance team has focused on ensuring adequate sediment controls are in place where required and that these are maintained throughout the activity whether these are a consented or permitted activity. The targeted entities include property developers, rural property owners, TLA's government departments and companies. With any non- compliance that is identified the Council has been consistent in it's approach using abatement notices, infringement fines and in serious breaches prosecution to get the message across. The abatement notice requires either the activity to cease or to take specific actions. The following are various examples of the type of earthwork sites or sediment discharges the Council has taken some form of enforcement action.

Figures 13 and 14 are of a logging truck trailer lifting area where the logging trucks have their empty trailers lifted onto the rear of the trucks. As they exited this designated area, they drag sediment all over the road which then washes into the adjacent stormwater drains.

In late December 2021 the company was issued with a $750 infringement and served with two abatement notices to cease the discharge and to take action. The company is undertaking redevelopment of the site to ensure this does not re occur.

Figure 13

Figure 14

Figure 15 and 16 are taken from a new subdivision under construction at Pourerere Beach. In February 2021 Council officers visited the site and found breaches of the Regional Coastal Environment Plan. Two abatement notices were served one to cease unauthorised earthworks on the property. The other was to secure the site of the earthworks already undertaken and for any future earthworks that maybe undertaken by installing and maintaining appropriate sediment and erosion controls. A $750 infringement notice was also issued for discharges of sediment within 20 metres of a stream.

In Sept 2021 after a significant rain event a follow up site visit was conducted. There were clear sediment discharges into the stream, sediment build up in places and numerous failures of the installed sediment controls. The site was revisited two days later with no maintenance of the sediment controls of which some were found to be inadequate. A $750 infringement was issued for a breach of an abatement notice.

This site will continue to be monitored at regular intervals for compliance of the Regional Coastal Environment Plan.

Figure 15

Figure 16

Figures 17 – 19 below, are of a property the Council visited in July 2021 after a complainant raised concerns about earthworks that were been undertaken on a neighbouring property. The stream running through his property was discoloured due to sediment after recent rain. From the visit the Council officer noted there were no sediment controls in place for the entire development, an ineffective wind break was in place with pig tails across several small waterbodies and sediment discharges into a dam which eventually feeds into the Tukituki River.

The Council issued a $750 infringement for the discharge of contaminants to land which may enter water and three abatements notices. One was to cease any further unauthorised earthworks on the property, one to cease any further unauthorised discharge and the third to install sediment and erosion controls designed by an appropriately experienced and qualified professional. These were required to be maintained and serviced in accordance with the Councils Waterway Guidelines for Erosion and Sediment Control.

There were are number of follow up visits to the property to check compliance with the abatement notices.

Figure 17

Figure 18

Figure 19

Figures 20 and 21 is a consented activity for Waka Kotahi to widen a bridge on SH 2, Nuhaka. A compliance site visit established that there were several non-compliances relating to sediment management that were required in the resource consent. The non-compliance was highlighted to the consent holder and remedial work was completed. A subsequent site visit identified that the remedial works was still non-compliant with the contractor placing some of the fill on the river side of the silt fence.

The Council issued Waka Kotahi a $750 infringement for the discharge of contaminants to land which may enter water and one abatement notice to cease any further unauthorised discharge.

Figure 20

Figure 21

Figures 22 -25 are large earthworks north of Napier and the property was first visited by Council in February 2021. The owner had previously been visited by Hastings District Council and told he needed to install sediment controls. After a rain event there was sediment laden water running of the excavation site into a lagoon.

The lagoon is an identified wetland and is known as the Whirinaki Bluff Lagoon. It is a recommended area for protection by DOC as it is one of the very few coastal wetlands and the home of the threatened species such as the Australasian bittern, spotless crake and dabchick.

On this occasion two abatement notices were served one to cease the unauthorised discharge of contaminants. The other was to install and maintain appropriate sediment and erosion controls. A $750 infringement notice was also issued for discharges of sediment which may enter water.

In June 2021 the Council visited the property again after some rain to find sediment discharge into the lagoon. The installed sediment controls had failed in places and were not appropriate for the job. There were clear indications that the controls that were in place were not adequately maintained. Another $750 infringement notice was issued with further enforcement action under consideration.

Figure 22

Figure 23

Figure 24

Figure 25

3. Your compliance monitoring and enforcement strategies, particularly as they relate to sedimentation (including your budget and resourcing for this work);

The Compliance section use the Four E's model: Engage, Educate, Enable and Enforce to achieve compliance. The model is used as a 'spectrum' (rather than solely as a linear progression). This is considered the most effective way of achieving the highest levels of compliance with regulation. This also means that although we have set up the right mechanisms to achieve an enforcement outcome, Council is not obligated to do so and can continue to seek alternative solutions.

The principles underpinning our Enforcement are:

- Fair, reasonable and proportional
- Informed, Consistent and transparent
- Collaborative, targeted and effective.

HBRC is committed to conducting investigations that are professional and gather all the relevant information. This is then assessed and an informed, evidence-based enforcement decision made. The enforcement policy provides support for industries to develop best practice and encourages engagement to encourage compliance or better within their peers and own industry.

Compliance Monitoring Strategies related to Forestry

As part of managing the large volume of forestry permitted activities and resource consents compliance notifications are submitted through an online portal. This has ensured an efficient transfer of information into Council's data management system (IRIS) as well as providing a consistent and transparent process for applicants.

All notifications are assessed for the potential environmental risk with several NES-PF national tools and other parameters and awarded a monitoring priority which determines the frequency of required site visits.

Priorities are awarded from (1) for very high-risk consents to (5) for 'low-risk' permitted activities (PA's) see Appendix 2. The number of site visits undertaken is also determined by the PA's that are chargeable under the regulations, namely earthworks, river crossings, quarrying and harvesting only (see Appendix 3). Site visits were undertaken for all high-risk sites and most medium-risk sites with PA visits restricted to those only chargeable under the Regulations

Site visit timetables have been established with all the main forestry companies and these are reviewed yearly to reflect any change to the risk profile (management performance) of individual forests.

Site visits are also targeted to follow significant rain events (which can generate significant **sediment** loss). The requirement for an audit report from forest managers is a standard forestry resource consent condition on any event that accumulates rainfall greater than 50mm in a 24-hour period. The report details any infrastructure damage from the event and the expected remediation. Council conduct site visits to ensure this work is compliant and timely. Because rain events will always occur it is a key strategy of Council to undertake regular monitoring to ensure sediment and erosion control measures are maintained.

Enforcement Strategies

Where enforcement through infringements and abatement notices has been undertaken, Council have observed both prompt action by the offending forestry company in remediating the non-compliance and changes to the management protocols.

As an example, an abatement notice was served in 2021 for a discharge of sediment to a stream due to a lack of maintenance of sediment control structures and un-stabilised earthworks. The actions of the forestry company were to undertake an immediate rehabilitation project involving re-working the area and

extensive grass hydro-seeding (Figures 26 and 27). A review by the company of the non-compliance resulted in improved timing of earthworks stabilisation and maintenance scheduling across all their managed forests.

Figure 26

Figure 27

Resourcing

Hawke's Bay Regional Council has 1.5 FTEs solely dedicated to forestry compliance. Past collaboration with other regional councils highlighted that HBRC is fortunate to be adequately resourced. To date, this has enabled HBRC to implement the monitoring programme set out in the described compliance strategy. Of particular note is that one of those FTEs is a shared role with Hastings District Council as HDC also have monitoring responsibilities under the NES-PF and their own infrastructure (e.g. roading and structures across waterways) can be assessed for risk against forestry activity.

Real time satellite imagery is an important tool (Figure 27), enabling timely site visits to previously identified areas of high risk. The images below show the progression of harvest over several months up to present time, in this example showing activity has advanced to higher risk consented areas.

Figure 27 Satellite imagery for tracking harvest activity

The use of unmanned aerial vehicles (UAVs), or drones has also been adopted. This has led to more complete capture of imagery for both compliance and enforcement action.

HBRC has completed a LiDAR (light detection and ranging) survey of the region and this data provides far greater mapping detail. It is expected that over the coming months the use of LiDAR will improve decision making when assessing risk within harvest plans.

4. How those strategies will achieve the management of sedimentation in line with requirements contained in your relevant plans or applicable national direction;

In the mid-2000s, HBRC was a pioneer for combining its second-generation Regional Policy Statement and regional plan. In relation to Question #4, key points to note about HBRC's relevant plans under the RMA are:

a) The Regional Resource Management Plan (RRMP)[4] includes the Regional Policy Statement. The Regional Coastal Environment Plan (RCEP)[5] is a regional plan applicable to the region's coastal environment – not just the coastal marine area, so it spans the jurisdictional boundary of mean high water springs mark.

b) Both RRMP and RCEP include policies and methods relating to land disturbance and erosion, amongst many other things. A range of non-regulatory methods (many are described elsewhere in this report) are used in support of regulatory methods such as regional rules and national regulations.

c) The RRMP and RCEP do not include rules applying specifically to 'plantation forestry', such as those now in the NES-PF. Rules in the RRMP for land disturbance and vegetation removal are reasonably generic and complement various land use and earthworks rules featured in district plans prepared and administered by territorial authorities.

d) The RRMP had no rules for requiring exclusion of stock from waterways until Plan Change 6 for the Tukituki catchment became operative in October 2015.

e) Over the past decade, HBRC has adapted three iterations of its work programme to implement each of the three earlier versions of the 2011, 2014 and 2017 National Policy Statements for Freshwater Management. A key feature of those progressive implementation programmes was a series of prioritised catchment-based plan changes.[6]

f) Most recently, HBRC has substantially overhauled its resource management work programme to feature a review of its both the RRMP, the RCEP, and implement the full suite of national direction, particularly the new 2020 NPS-FM. This substantial plan review programme (the 'Kotahi Plan') will be underpinned by our extensive science, matauranga Maori, plan effectiveness reporting and complement a wide range of non-regulatory initiatives underway.

g) Our work programme and Long -Term Plan resourcing is designed so the Kotahi Plan will be publicly notified by December 2024 as required by the RMA and NPS-FM 2020 directives.

h) Kotahi Plan will address sedimentation as a significant problem in many of our region's catchments. However, sedimentation is not an isolated issue, so it is likely policy responses will be multi-pronged, integrated and aim for multiple positive outcomes (e.g. increased tree planting on high erosion-prone slopes will reduce sedimentation, improve water quality, reduce hill country erosion, sequester carbon and provide enhanced habitats for biodiversity).

i) In preparing the Kotahi Plan, there will be an opportunity for HBRC and communities to consider if the degree of regulation under the NES-PF is suitable, or if more stringent controls should be

[4] HB Regional Resource Management Plan is viewable online at https://www.hbrc.govt.nz/our-documents/rrmp/
[5] HB Regional Coastal Environment Plan is viewable online at https://www.hbrc.govt.nz/our-documents/rcep/
[6] First three prioritised catchments were Tukituki River catchment (Plan change 6); Tutaekuri, Ahuriri, Ngaruroro & Karamu (aka TANK Plan Change 9); and the Mohaka River catchment.

included in the Kotahi Plan for some plantation forestry activities that result in sedimentation and other contaminants in our waterways.

j) In relation to land and freshwater management, the RPS[7] mandates a range of monitoring activities. These include state of the environment monitoring (and reporting); resource consent condition monitoring; specific research and investigations; and compliance monitoring.

The compliance monitoring strategies are effective in identifying non-compliance with resource consents issued by HBRC and the NES-PF site visits are made as infrastructure is installed and as harvest progresses.

Prior to the NES-PF compliance monitoring had little to do with the forestry industry. Resourcing was small and monitoring was complaints or incident based. Few complaints were made, and few incidents were reported.

Through working with industry, a clear interpretation of the NES-PF has been communicated to the six major forestry companies covering 90% of the HB region in plantation forestry. Monitoring visits are scheduled to see key activities and to see how well infrastructure has held up to weather events.

Council involvement in land use sediment loss studies and working to advance adoption of practices that reduce sediment loss from infrastructure and harvest activities are producing positive gains in reducing sediment loss.

Sediment loss from Agricultural land

Since 2015, when the Tukituki Catchment plan became operative, Council has been working with land owners to manage freshwater quality issues through farm planning, education and promoting good management practice, as well as resource consenting in sub-catchments where water quality has been degraded to below an acceptable level.

Currently all properties over 4 hectares (apart from some low intensity properties), located within the Tukituki Catchment, require a Phosphorous management plan as part of their Farm environment management plan (FEMP).

The Tukituki FEMPs must also consider;

- Livestock management: To manage wetlands and water bodies so that stock are excluded from water in accordance with Rule TT1, to avoid damage to the bed and margins of a water body, and to avoid the direct input of nutrients, sediment, and microbial pathogens

[7] See RRMP Chapter 4.

- Soils management: To maintain or improve the physical and biological condition of soils in order to minimise the movement of sediment, phosphorus and other contaminants to waterbodies.

Tukituki FEMPs must also provide a description of the good management practices together with actions required to achieve the objective and targets set out in the catchment plan.

The Tūtaekurī, Ahuriri, Ngaruroro and Karamū (TANK) Catchments plan was notified in May 2020. This plan builds on the work that was initiated by the Tukituki Plan, with provisions to;

- Protect the quality of source water for community supply
- Target erosion control to reduce adverse effects of sediment on aquatic ecosystems
- Improve management of stormwater to reduce adverse effects of urban run-off into rivers, and the Ahuriri and Waitangi estuaries
- Target nutrient and other contaminant losses from land through Farm Environment Plans - where water quality doesn't meet objectives
- Improve and protect riparian land management and wetlands with specific milestones for the activities
- Improve water quality in the Karamū catchment by increasing shade for water bodies using riparian planting
- Manage risk activities, such as stock access to water and cultivation near waterways through new rules
- Manage land use change so that water quality is not further degraded.

The Plan encourages collective action at a catchment level to resolve local water quality issues. The more degraded the water quality, the higher the priority for action. The preparation of Farm Environment Plans will be on a priority basis according to existing water quality. Priority areas are based on the current water quality state compared to the desired water quality for nitrogen concentrations and yields, sediment loss and dissolved oxygen.

The National environmental standards for freshwater (NES-F) became operative in 2020, the council has been actively engaged with landowners and primary industry partners to ensure that landowners are aware of the new regulations, have been provided with opportunities to learn and understand how these regulations may impact their on-farm activities, through the previously mentioned workshops, videos and guidance material.

In response to the requirements of the National Policy statement for freshwater management (NPS-FM 2020), the council intends to combine and update our existing Regional Policy Statement, the Regional Resource Management Plan and the Regional Coastal Environment Plan into one plan known as Kotahi, giving effect to the new policies, planning and technical standards from Central Government.

5. Which catchments you have identified in your region that are most at risk from damage from sedimentation;

Hawke's Bay Regional Council have been working to understand the source areas of sediment and how land cover has impacted natural sediment loss rates. Based on data obtained through SedNetNZ modelling specific to the Hawke's Bay, we have identified estimated long-term erosion processes that are related to risk of increased erosion rates to support management interventions (Figure 28).

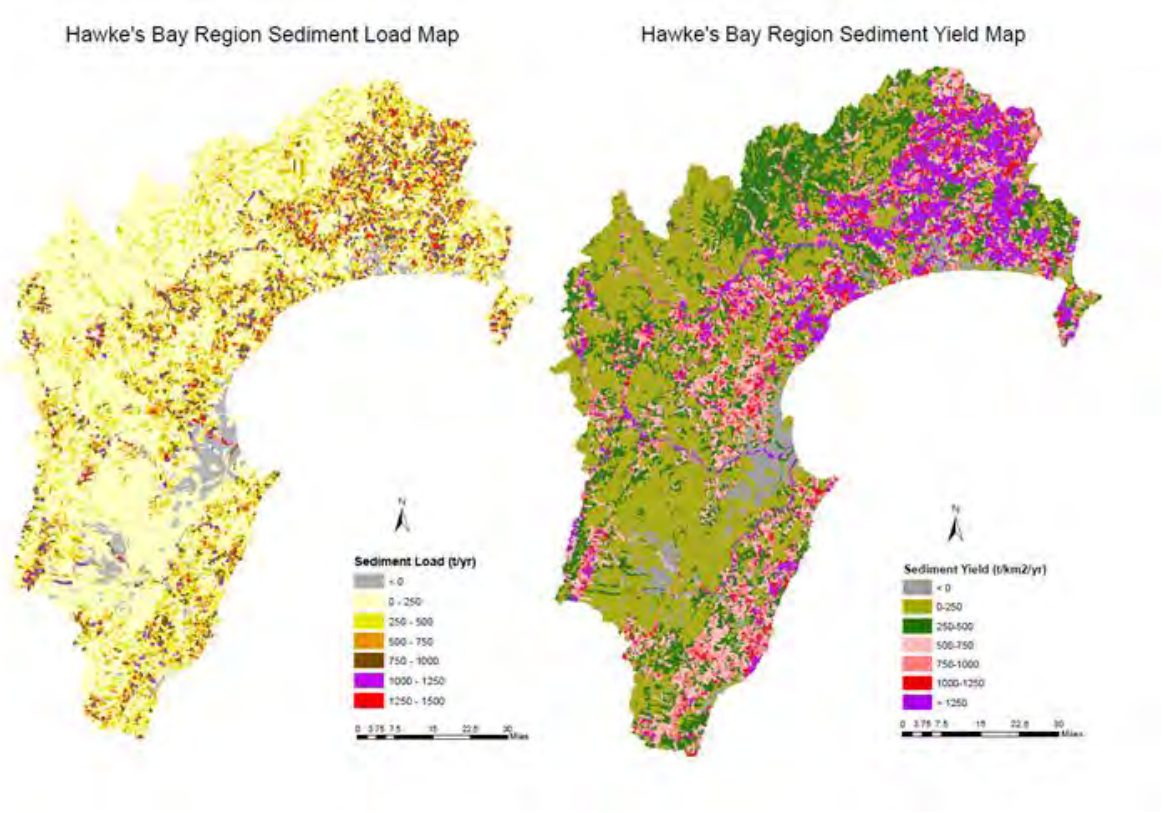


Figure 28: Sediment load and yield maps predicted from SedNetNZ 2020.

All catchments and subcatchments have the potential to generate sediment, however combining land use suitability with erosion risk and targeted interventions can help reduce the potential for excess sediment generation at a catchment scale. Significant sediment loss can arise from inappropriate land use activities and can be irrespective of catchment characteristics in these cases, however the severity of loss is impacted by site specific aspects such as sediment type, slope, climate etc.

The risk of *damage* from sedimentation does not necessarily come from total amount of sediment lost from a particular catchment, but more the magnitude of any increase over and above the natural background rate of loss, the type of sediment generated, and the types of receiving environments. All waterways are potentially sensitive to the effects of sedimentation, however fast flowing rivers may entrain sediments in the water, for them to deposit in areas where water movement is slower. This can be low-lying streams and rivers, lakes, estuaries and the coastal marine area. Adverse impacts arise from both suspended as well as deposited sediment, which can affect receiving environments differently.

Hawke's Bay Regional Council continues to monitor, investigate, and provide information on the receiving environments that are showing sediment stress in terms of elevated levels of sediment deposition, visual clarity and suspended sediment.

State of the Environment monitoring has highlighted areas such as estuaries (e.g., Ahuriri, Waitangi), and coastal areas adjacent to some river mouths as likely to have sediment related issues.

Further information on our catchments can be found at the following link;

https://www.hbrc.govt.nz/assets/Document-Library/Reports/SOE-5-Year-report/5461-Our-Hawkes-Bay-Environment-2013-2018-Key-issues-report.pdf

Appendices:

Appendix 1 - Photo reported in the video to be from a forest in the Hawke's Bay Region

Appendix 2 - Priority descriptors are as follows:

Priority 1: SIGNIFICANT environmental risk.

High risk red ESC harvest. Pre-start site visit (SV) probable then several throughout the year. Associated with very poor compliance history, large scale activity, at-risk waterbodies, poor management plan completeness.

Priority 2: HIGH environmental risk.

Other red ESC harvest and orange ESC earthworks. A minimum of one SV per year.

Associated with moderate non-compliance history, medium scale activity, waterbodies present, average management plan completeness.

Priority 3: MODERATE environmental risk.

Higher risk permitted activities and medium risk consented infrastructure. A minimum of one SV per year.

Associated with relatively good compliance history, small to medium scale activity, moderate ESC zone, some lower risk waterbodies, adequate management plan completeness.

Priority 4: MEDIUM environmental risk.

Medium risk permitted activities. A SV may be undertaken.

Associated with good compliance history, small to medium scale activity, low to moderate ESC zone, low risk waterbodies, adequate management plan completeness.

Priority 5: LOW environmental risk.

Associated with good compliance history, small to medium scale activity, low to moderate ESC zone, no waterbodies, adequate management plan completeness.

Low risk permitted activities. A SV will generally not be undertaken.

Appendix 3 - Risk assessment of PA notifications is undertaken using the following template:

3. Significant non-compliance within the last year or **Unknown** to council.			
4. Moderate non-compliance within the last year.			
5. Full or low risk compliance within the last year.			
	5. Not significant or minor effects on the environment possible.	**4. Moderate** effects on the environment possible.	**3. Significant** effects on the environment possible.

Compliance History75 (y-axis)

No non-compliance within the last year		5
Low risk non-compliance within the last year		4-5
Moderate non-compliance within the last year		4
Significant non-compliance within the last year		3-4
Unknown to council		3
Average		

Potential effects on the Environment (x-axis)

Overlays (Fish Spawning, native vegetation, SNA's, arch. sites)	Less than minor.		5
	Low to moderate		4
	High Risk		3
Harvest area	Less than 10 ha		5
	10-100 ha		4
	More than 100 ha		3
Waterbodies (within or bordering harvest boundary)	N/A		5
	Low to medium risk		4
	High risk streams, wetlands (e.g. straight to water)		3
Management Plans (adequate completeness to Schedule 3)	Adequate detail		5
	Incomplete.		4
	Very poor detail		3
ESC zone	Green		5
	Yellow		5-4
	Orange		3
	Red		n/a
	Average		

Soil Moisture Report February 2023

Hawke's Bay Regional Council monitors soil moisture content at several climate stations within the region (see Figure 1). The soils monitored are those found at the climate stations and may be different from surrounding agricultural soils. However, this data is of use across the Bay as it provides a generic indication of regional trends.

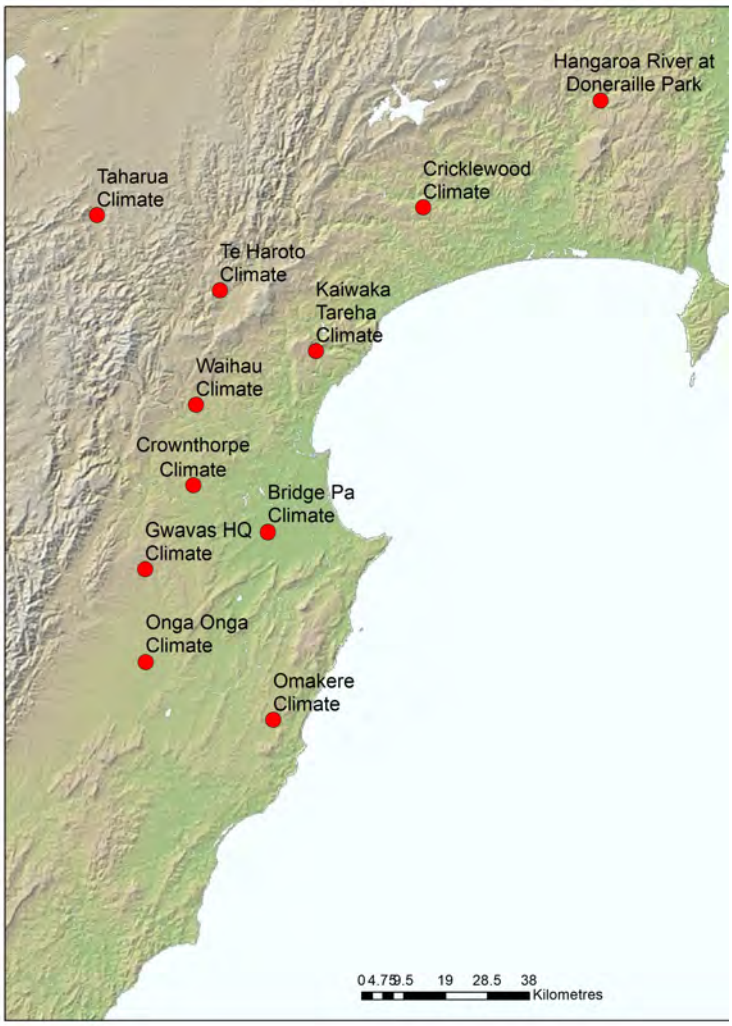


Figure 1: Location of climate stations with soil moisture sensors in Hawke's Bay

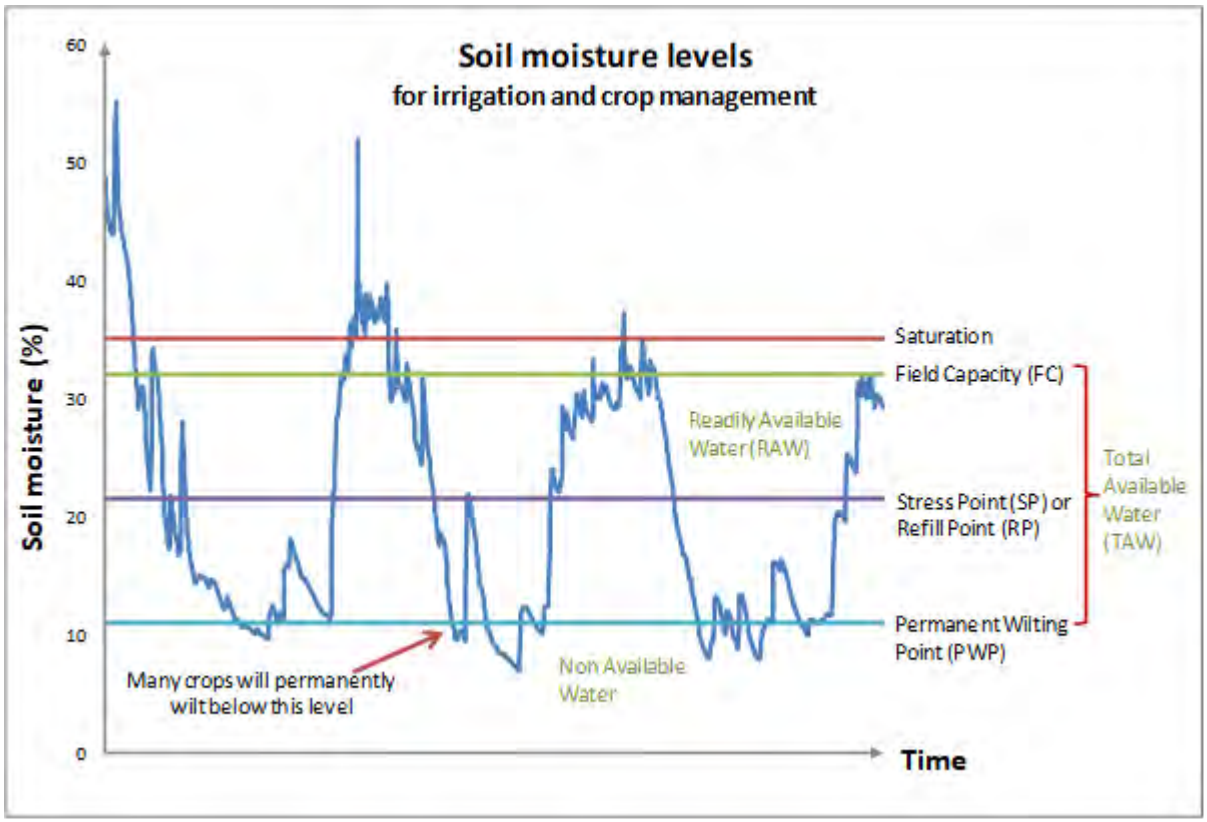
Soil moisture measurement:
Soil moisture data is collected by HBRC using Aquaflex soil moisture sensors at several climate stations in Hawke's Bay. The sensor is a long flexible tape (3m length) which is buried in the root zone on an angle from approximately 0mm down to 300mm soil depth. Units are % soil moisture content.

How do we use soil moisture data?
Soil moisture information is particularly useful for assessing irrigation needs for a variety of crops. It is also used for analysis of long-term climate trends, measuring how often plant growth is restricted by soil moisture, and providing an indication for early intervention and drought management decisions. Soil moisture conditions can influence river flows, so when the soil moisture deficit is high, the soils absorb more water and this reduces the risk of flooding.

Soil moisture is also useful for identifying when not to irrigate effluent, to avoid surface runoff into streams and excessive leaching losses below the root zone.

Using soil moisture levels for irrigation and crop health purposes

In order to better understand soil water availability to plants, common terms are presented graphically in the following figure:



(Please note that these levels are indicative only. The soil water storage ability will vary between sites due to the influence of the sites soil type, aspect and crop type.)

Field capacity (FC):

Field capacity is the water content of the soil after excess water has drained away (approximately two to three days after heavy rain). For irrigation purposes, the field capacity should not be exceeded so that wastage of water, energy and nutrients is avoided.

Stress point (SP):

The point where the roots cannot extract water at the rate required, so the plant will be under stress. Stress point is also known as the refill point, and is approximately half way between Field Capacity and Permanent Wilting Point.

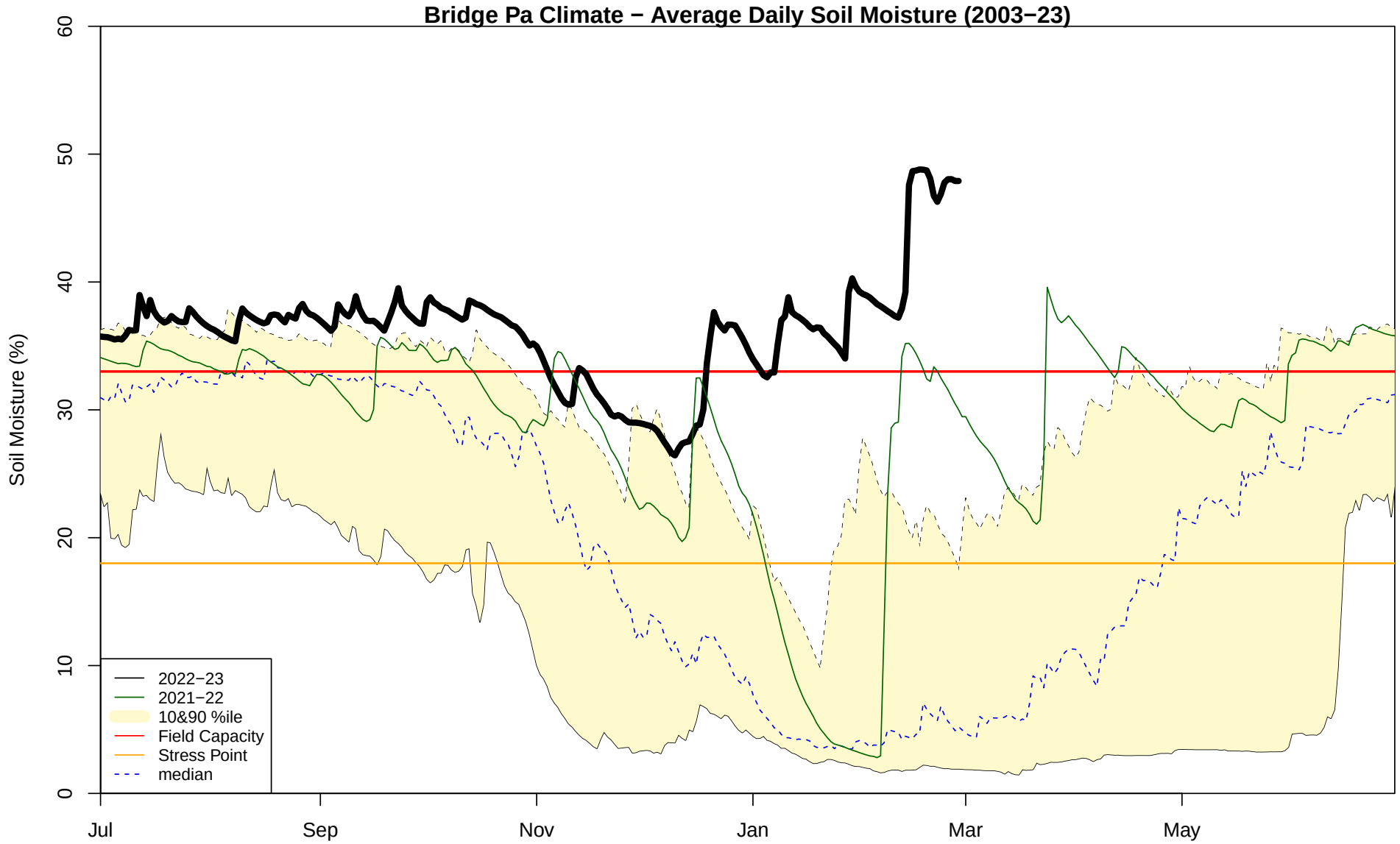
Successful irrigation means applying sufficient water to avoid a reduction in plant yield due to water stress, while not producing a saturated soil or wasting water through an excessive application. The aim of most irrigation is to keep soil water levels between field capacity and stress point.

It is possible to calculate the number of days before stress point is reached and therefore irrigation rotations. Information on Understanding Soil Moisture, Scheduling Irrigation and Irrigation Efficiency Evaluations are located in our Environment Topics publications at https://www.hbrc.govt.nz/.

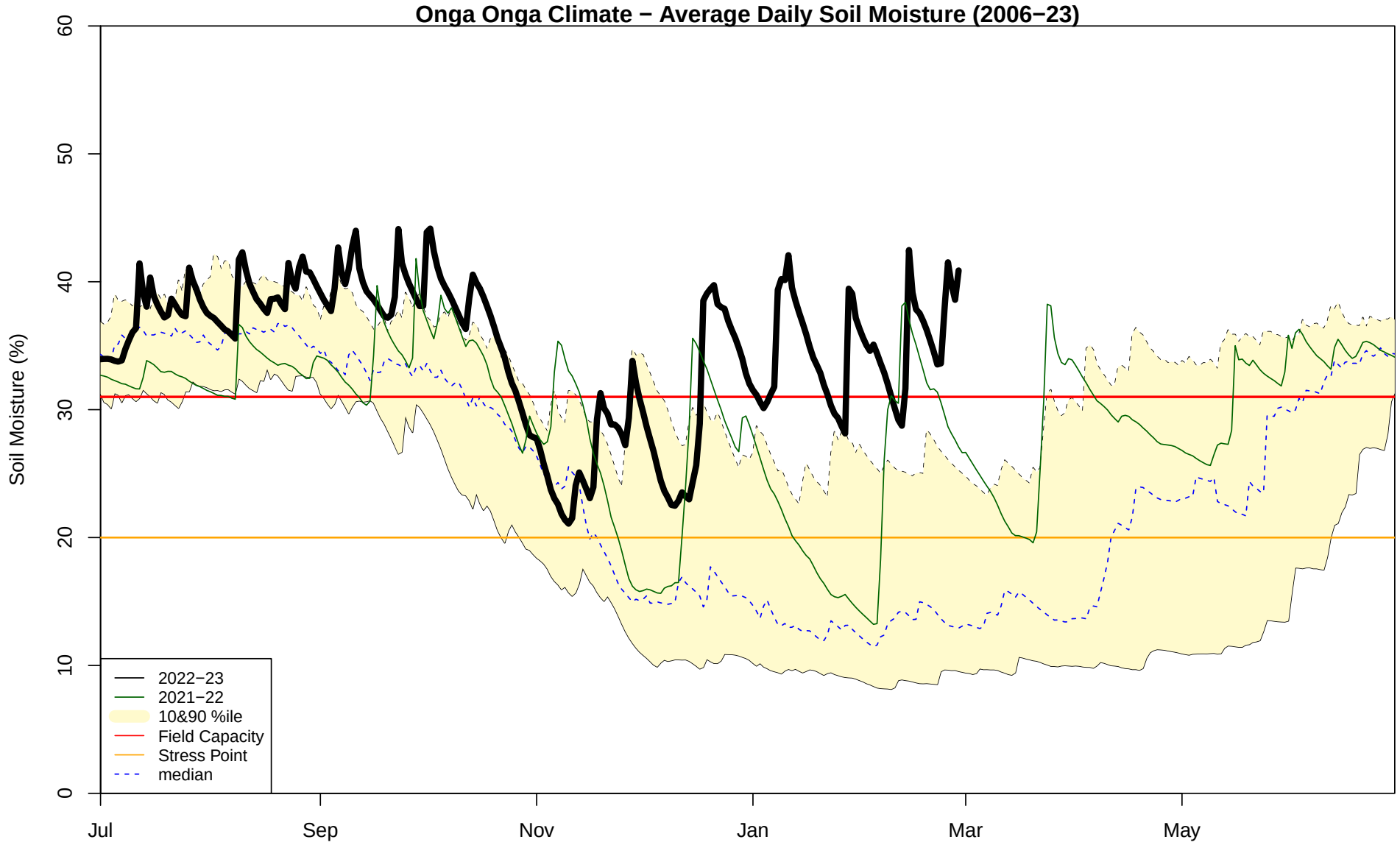
Live soil moisture data from these sites are available on our website at https://www.hbrc.govt.nz/environment/climate/climate-monitoring/.

Please note that the live graphs on our website are generated from raw data collected by Hawkes Bay Regional Councils automatic telemetry system, therefore is not quality audited. The data presented here is intended for general information purposes only. For further information please contact us at climate@hbrc.govt.nz.

Comparison of soil moisture levels over the last 10 or more years in Hawke's Bay



(Disclaimer: Field capacities at each site vary according to soil type and conditions. All field capacities are estimates only, and are based on patterns in historical data from each site.)



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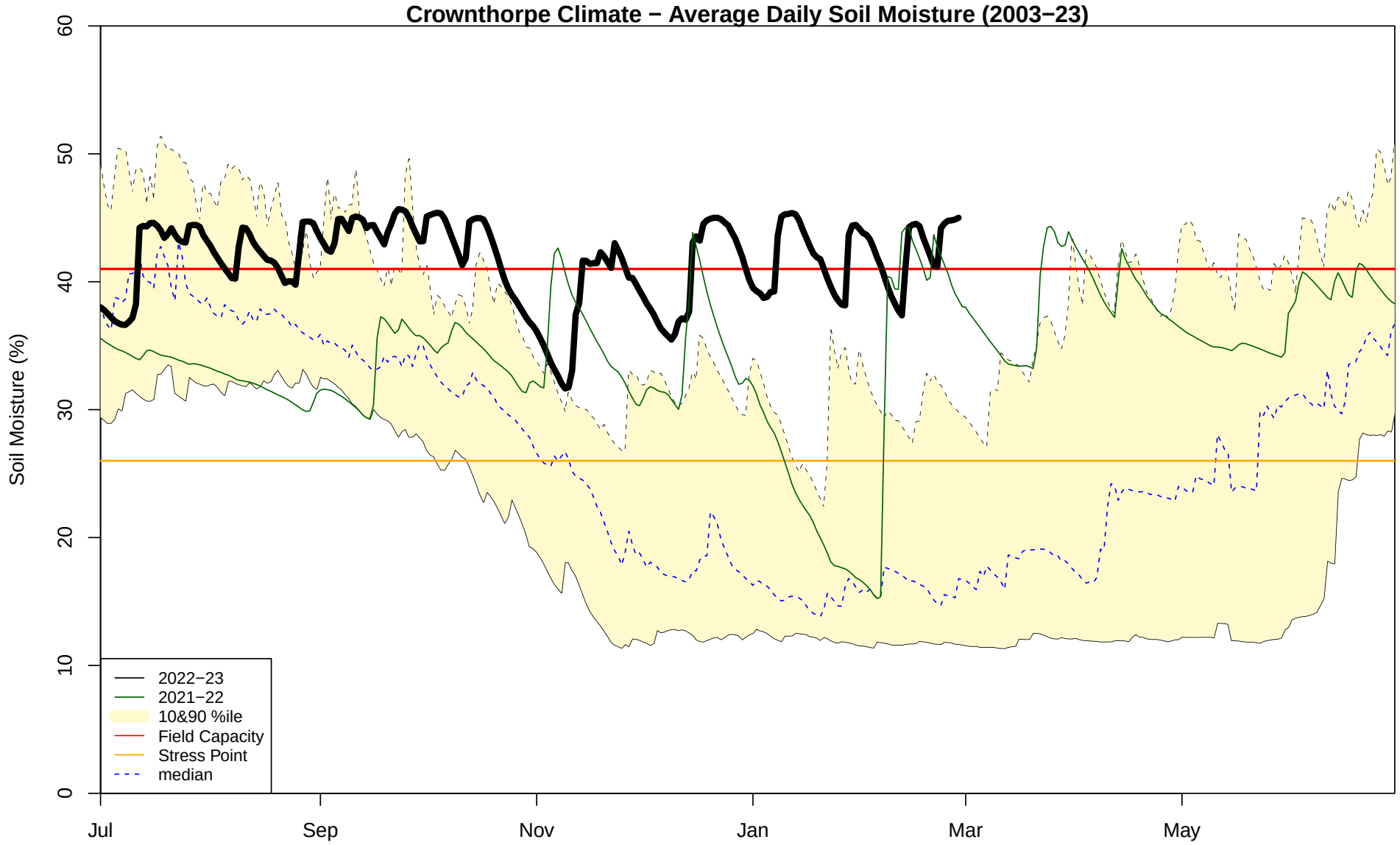

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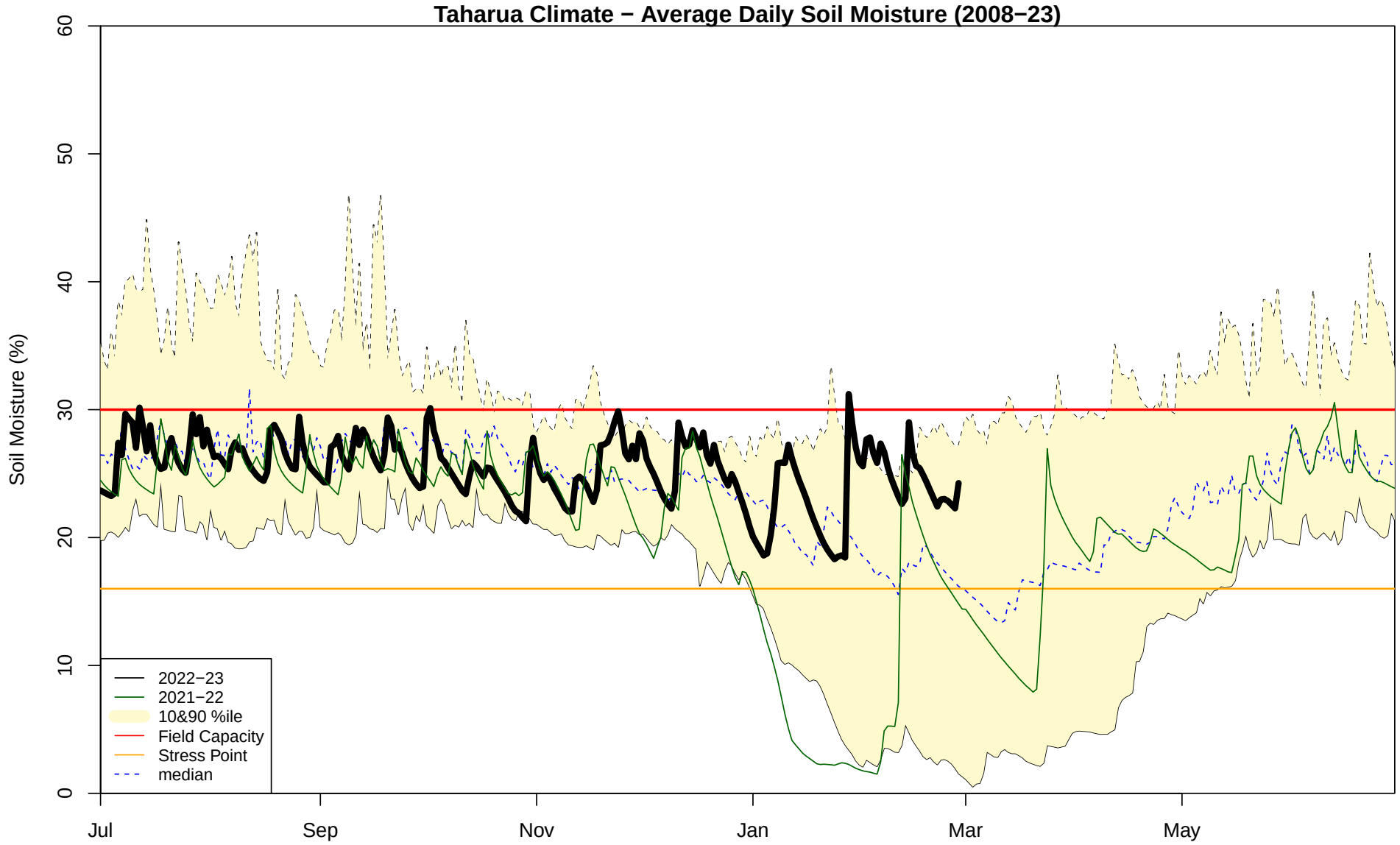

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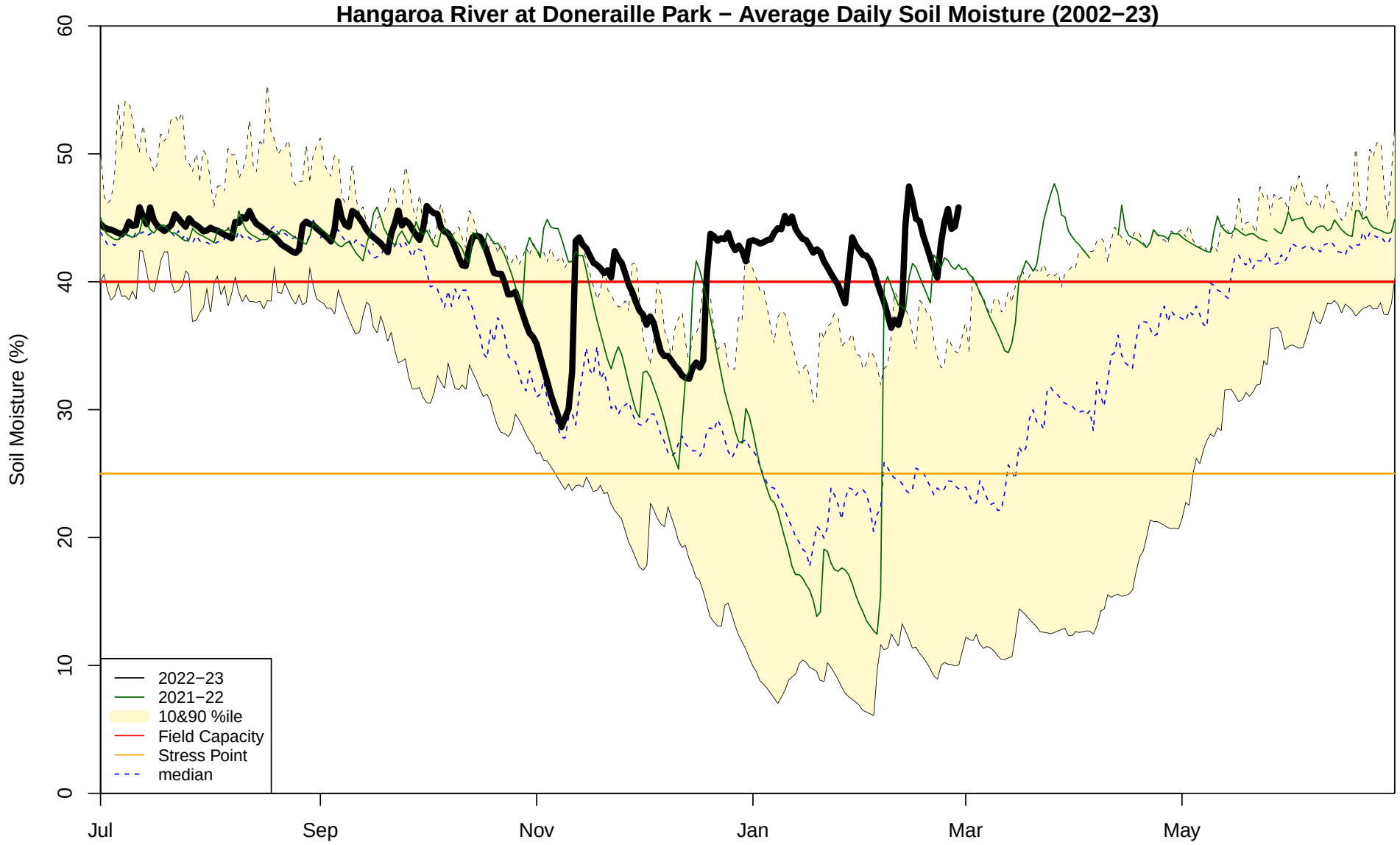

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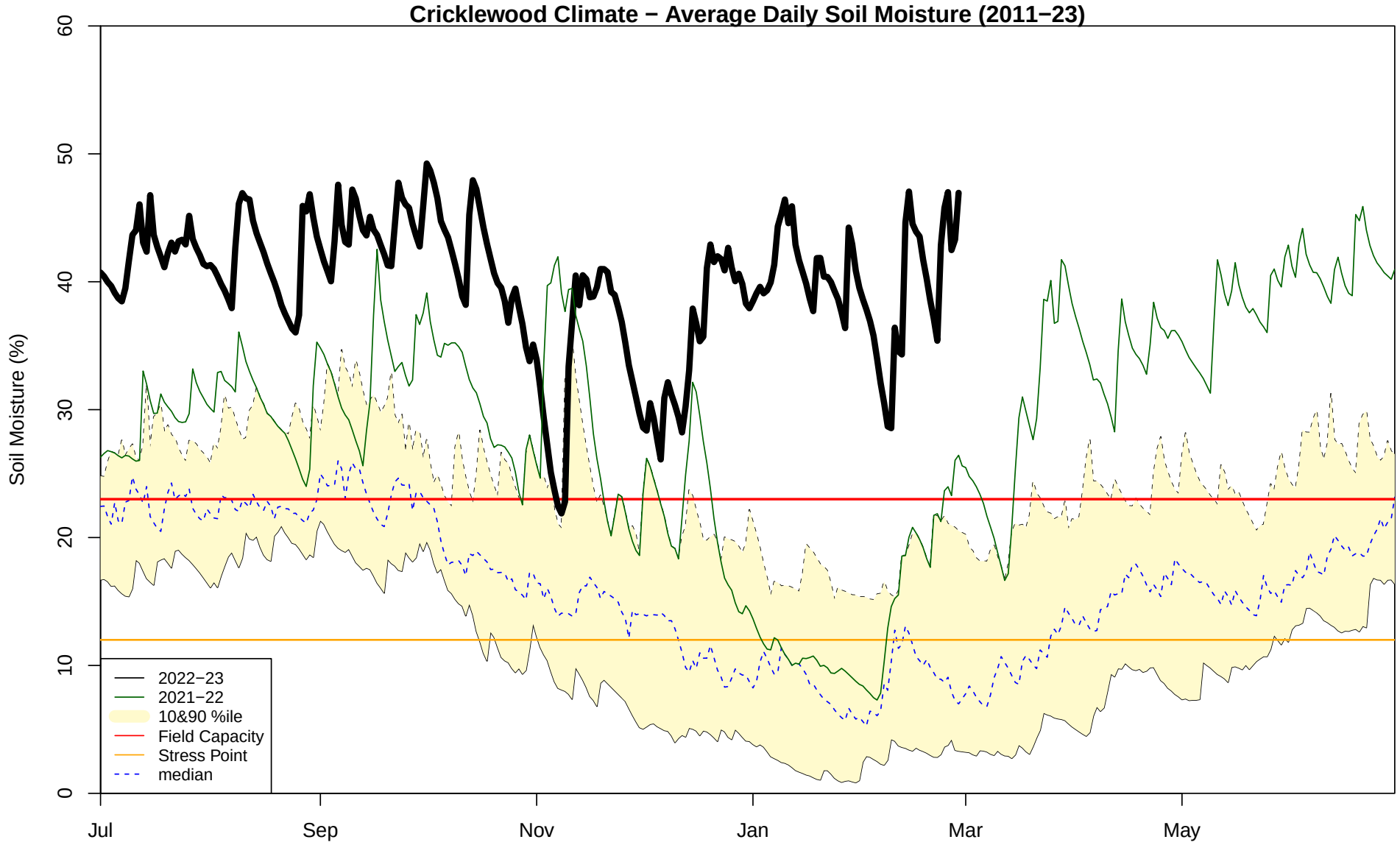

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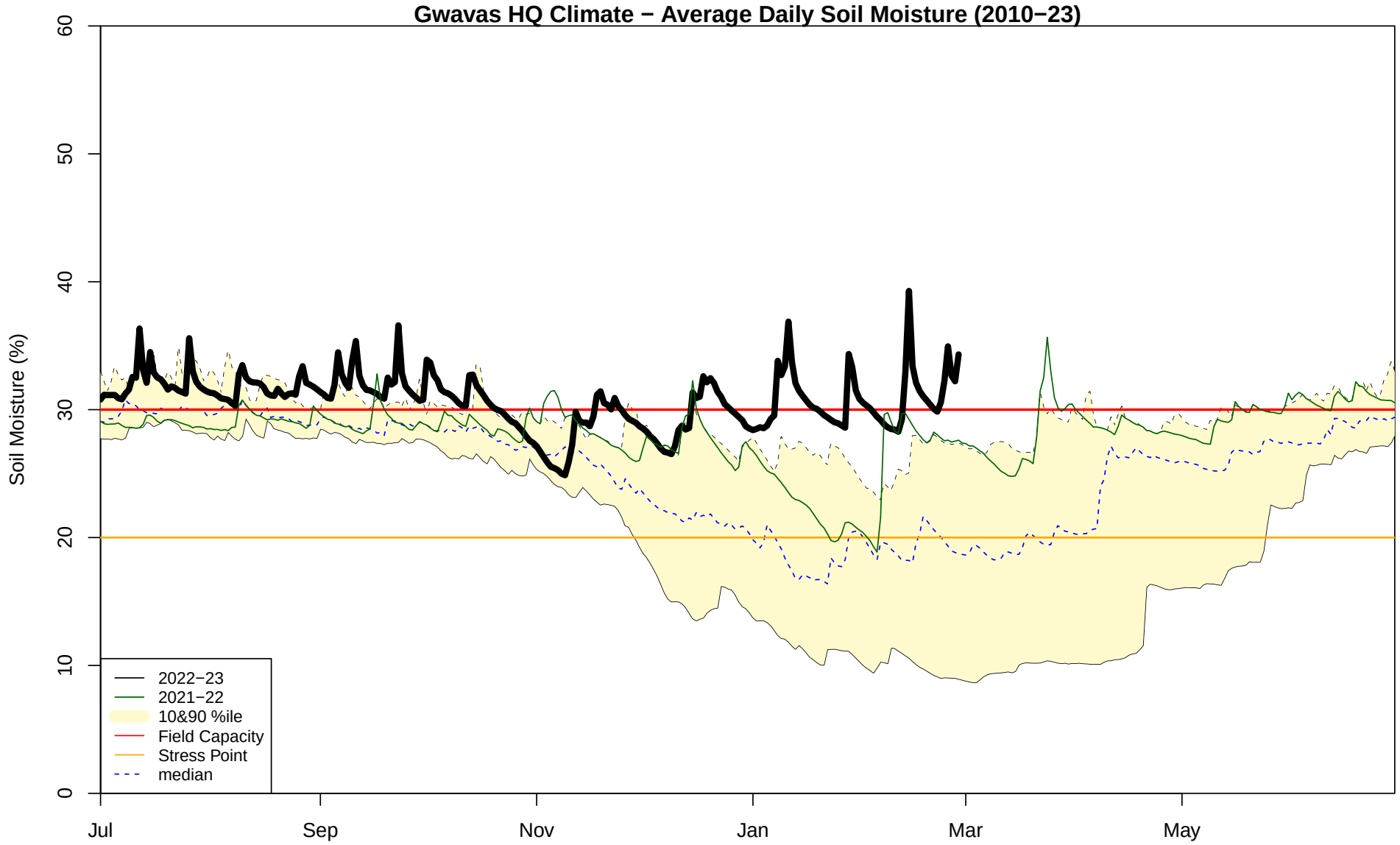

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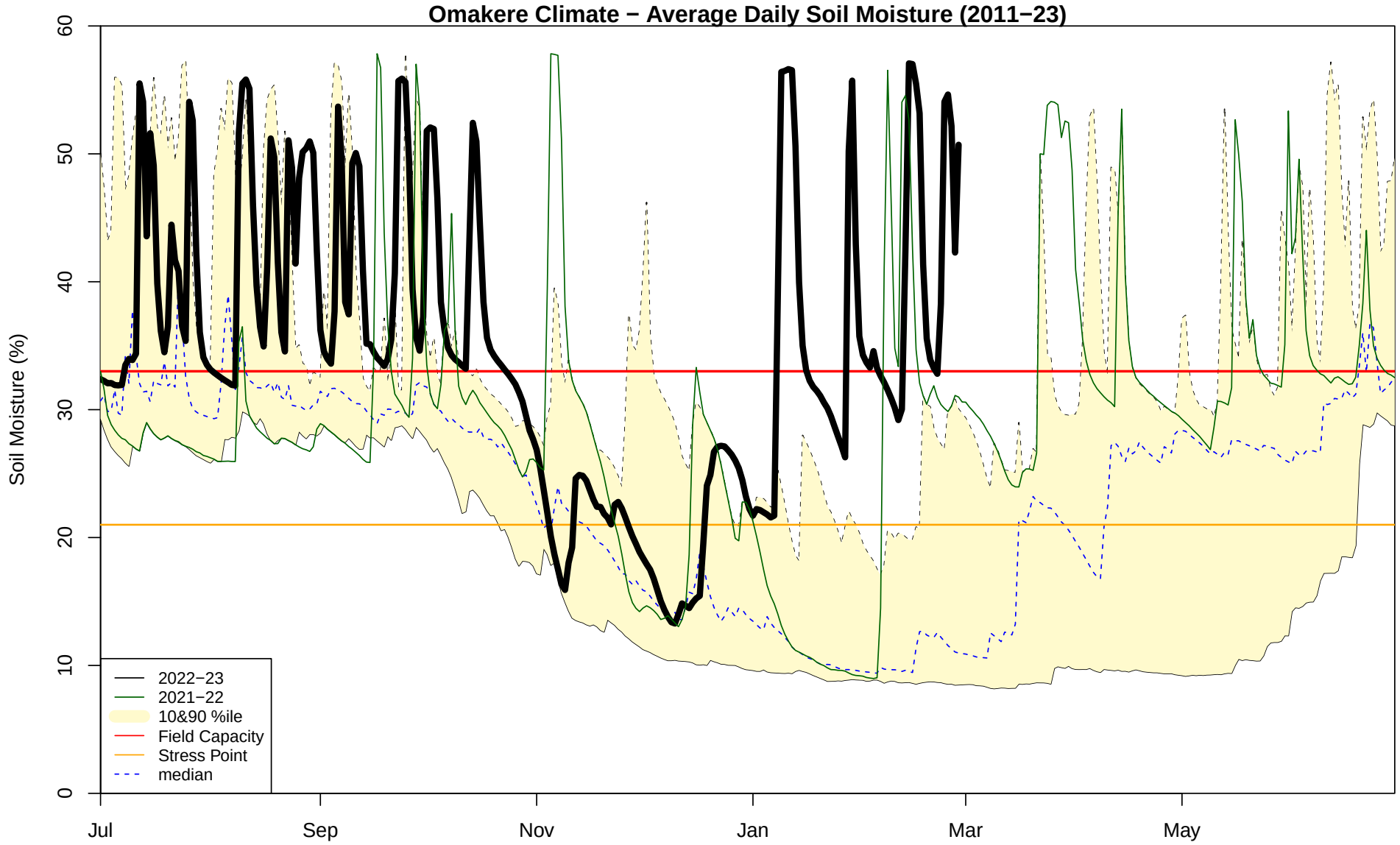

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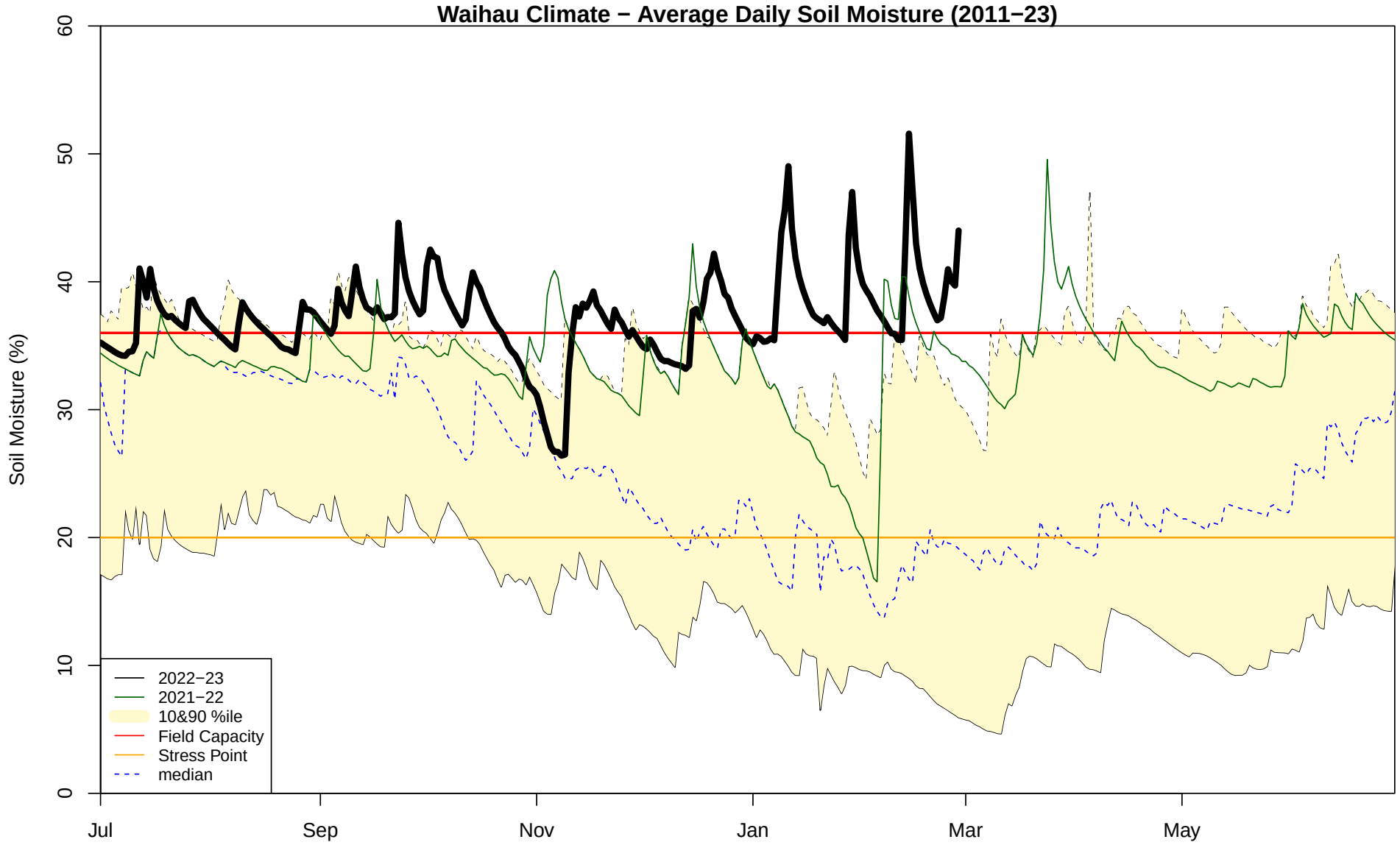

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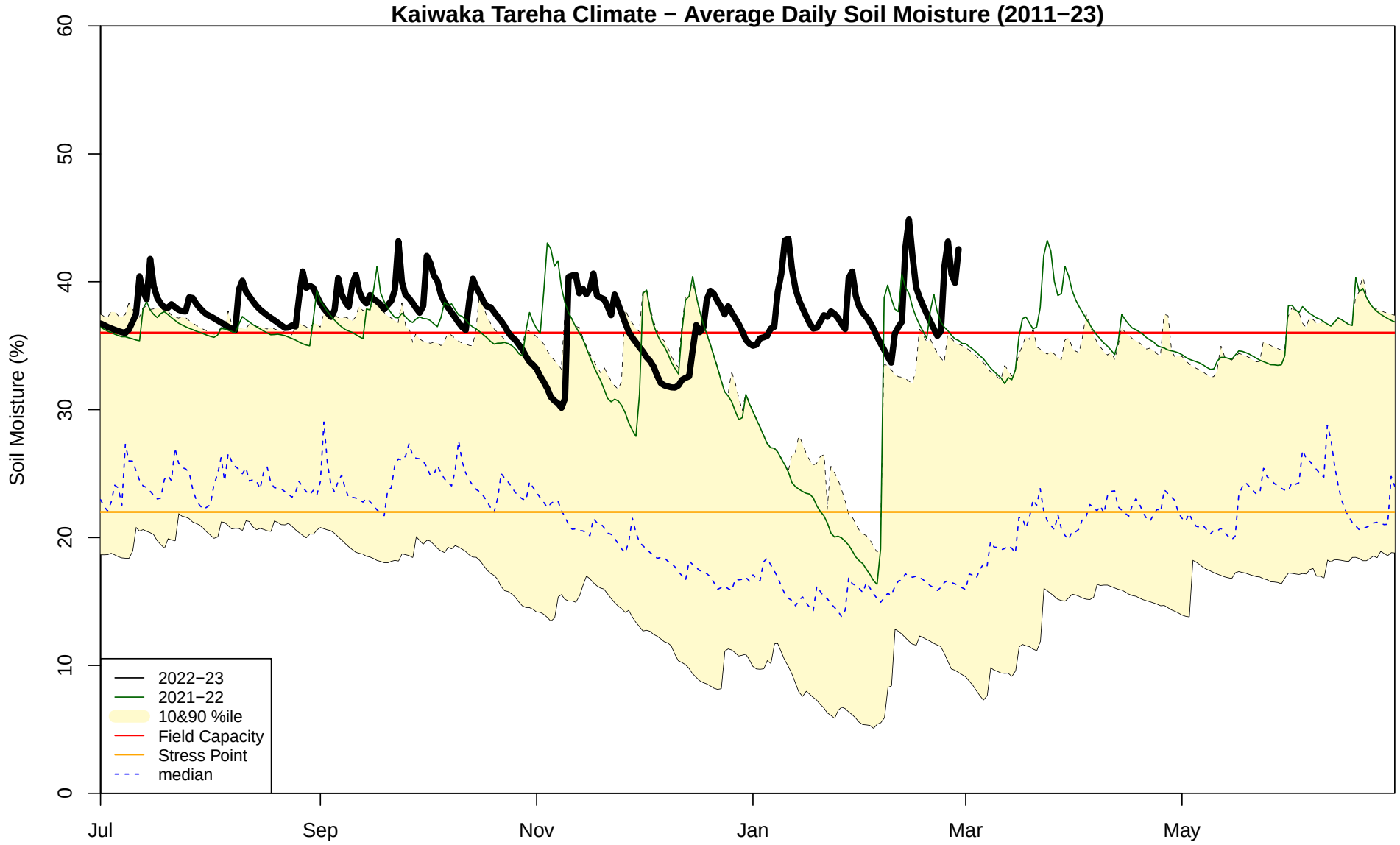

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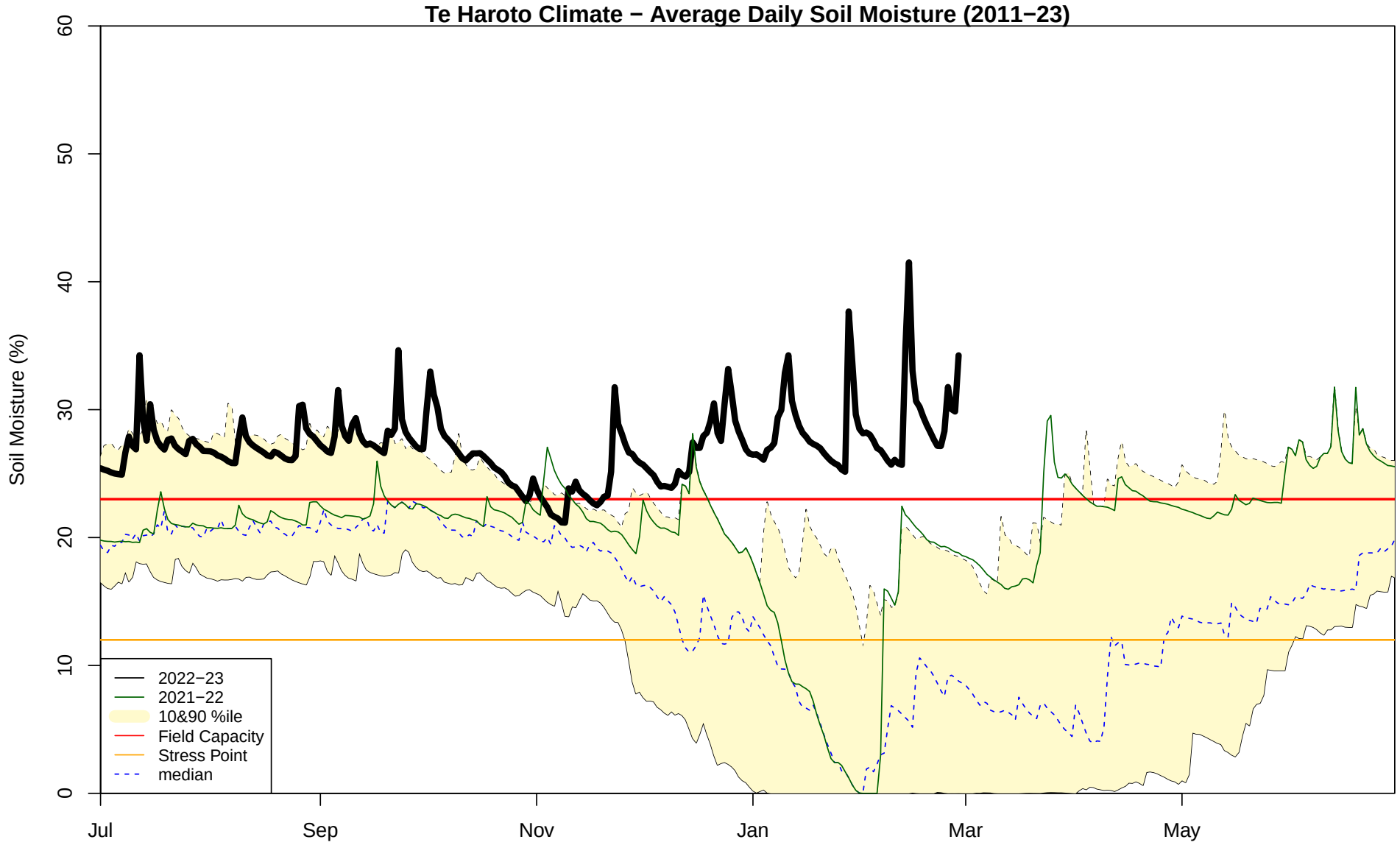

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DRAFT

ecoLogical Solutions
Environmental Consultants

March 2023

Cyclone Gabrielle
Woody Debris Species Composition Assessment

Submitted to:
Hawke's Bay Regional Council

water fauna flora land

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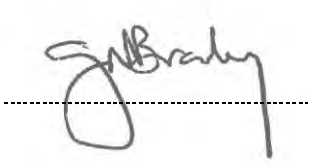
Quality Assurance

This report has been prepared and reviewed by the following:

Prepared by: Mark Roper
Freshwater Ecologist

Reviewed by: Dr Gary Bramley
Director / Ecologist



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ecoLogical solutions

tauranga office
115 the strand,
tauranga 3141.
po box 13507
p: 07 5771700

auckland office
building 2/195 main highway,
ellerslie, Auckland, 1051
p: 021 578726

northland office
first floor, 30 leigh street, kāeo
p:021 403386

hawkes bay office
p: 027 3360966

www.ecoLogicalsolutions.co.nz

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1.0 Introduction

Plantation forestry is a significant land use in the Tairāwhiti Gisborne and Hawke's Bay regions, with each region having more than 000,000ha under radiata pine. The industry provides a number of soil conservation, water quality, employment, and economic benefits. There are, however, an increasing number of environmental, social and economic issues associated with this land use type. A key issue, and the one at focus in this report, is that of harvest and post-harvest large woody debris (LWD) mobilisation events after high intensity rainstorms and their impacts on our environment, communities, and infrastructure.

Post Cyclone Gabrielle, there is no longer any question that these types of LWD events represent a significant environmental and social issue for the communities within the East Coast and Hawke's Bay regions as well as an infrastructural and fiscal risk to physical assets (e.g., bridges) and their owners. LWD mobilisation events are of concern to the community because of the environmental and visual impacts and the increasingly common occurrence of property damage and the potential for loss of life. There are also significant post-event clean-up costs for asset owners and managers associated with mobilisation events.

Cyclone Gabrielle ravaged the Hawke's Bay between the 12th-14th of February 2023, just one month after Cyclone Hale had also affected the region. Hawke's Bay Regional Council (HBRC) rainfall figures revealed Cyclone Gabrielle to be one of the most significant to impact the region on record. The region's rain stations tell the story:

- In some places, including the Tukituki Valley, rainfall was even more intense than that experienced during Cyclone Bola in 1988.
- The Glengarry site recorded 546mm of rainfall, the most of all the region's sites, with almost 400mm falling in 12 hours at a maximum intensity of 56mm per hour.
- Totals along the southern coast reached 450mm during the storm – about a quarter of the usual annual rainfall there - with rainfall intensity peaking at nearly 40mm per hour.
- Being similarly exposed, the eastern area of Wairoa was the other part of the region, alongside Glengarry, to get more than 500mm of rain.
- Gabrielle delivered about 320mm of rain to the Newstead site, in the western hills of the Ahuriri catchment near Puketapu, which is about one-third of the usual annual rainfall there – most of it falling within 24 hours.

Along with the rain came the wind. Gusts of up to 90kph were recorded, with exposed stations near the coast – such as Cape Kidnappers – seeing even higher wind gusts of up to 131kmh.

The result of this catastrophic weather bomb was that many waterways reached peak flood record levels, including the Mangaorapa, Porangahau and Taurekaitai streams and the Wairoa, Waipawa and Tukituki rivers. A major infrastructural risk was associated with LWD accumulating at road and rail bridges throughout the region. A total of XX bridges suffered some degree of damage during Cyclone Gabrielle within the Hawke's Bay region alone.

HBRC engaged Ecological Solutions Limited to assess LWD at a number of locations across the Hawke's Bay region, including at a number of damaged infrastructure assets. The aim of the assessment was primarily to determine the species composition, and if possible, gain insight as to the likely origins of LWD mobilised during Cyclone Gabrielle to help inform future land use planning objectives and outcomes.

2.0 Methodology

2.1.1 Assessment Sites

All assessment site coordinates were provided by Hawkes Bay Regional Council (HBRC). It is understood that site selection was based upon intelligence received from several sources including local residents and personnel engaged in the immediate emergency response. Sites therefore represented either known or likely sites of LWD accumulation at structures (e.g., road bridges) or on beaches.

Assessments were undertaken at 11 river sites and 6 beach sites by an ecologist from Ecological Solutions Ltd accompanied by a representative from HBRC between 28 February and 3 March 2023 (Figure 1).

2.2 Assessment categories

Large Woody Debris (LWD)[1] is defined as woody material more than 25cm in circumference (or 15cm diameter) irrespective of species and is a term used internationally to describe logs from various sources mobilised within a catchment (Cave, 2023). The Large Woody Debris Assessment Guide V.2.1 (Cave, 2023) was finalised and published during the assessment phase of this exercise. The broad methodologies described therein are the ones used to collect the data presented here.

The LWD assessment category descriptions presented in Cave (2023) are reproduced below. The full guide to the LWD assessment categories developed by Cave (2023), which including visual references for each category type, can be found in Appendix B.

The 11 categories for LWD assessment presented in Cave (2023) were not replicated exactly during this assessment. In particular five of Cave's categories relating to pine debris were grouped into one category called 'Cut Pine'. We have also created a new category for woody debris we called pine piece (not cut / not windthrow). We created this category because there does not appear to be an equivalent category in Cave (2023). For the purposes of this assessment the category *pine piece (not cut / not windthrow)* was defined as pine 'pieces' that do not have cut marks on either end, waratah marks, or rootballs attached.

A comparison of how those LWD assessment categories relate to the LWD assessment categories used here is provided in Table 1 and the categories are defined below.

Fresh cut pine (FCP)

A pine log larger than 25cm in diameter that is cut at the ends and typically shows the gouge marks characteristic of debarking (Waratah marks) and will occasionally show generic or company specific stencilling on the butt ends. There will be no or minimal weathering evident on the cut ends. Bark will be absent.

Long Resident Logs (LRL)

Pine that has not been recently harvested. They may still have sharp ends but a weathering rind will be present or the ends will be uniformly weathered. In other instances, the cut ends will have been rounded off and can form cone shapes. Waratah marks may still be present. The trunk may look relatively fresh or may be grey.

[1] NB: the current assessment measured woody debris more than 15cm in diameter *and* more than 50cm in length.

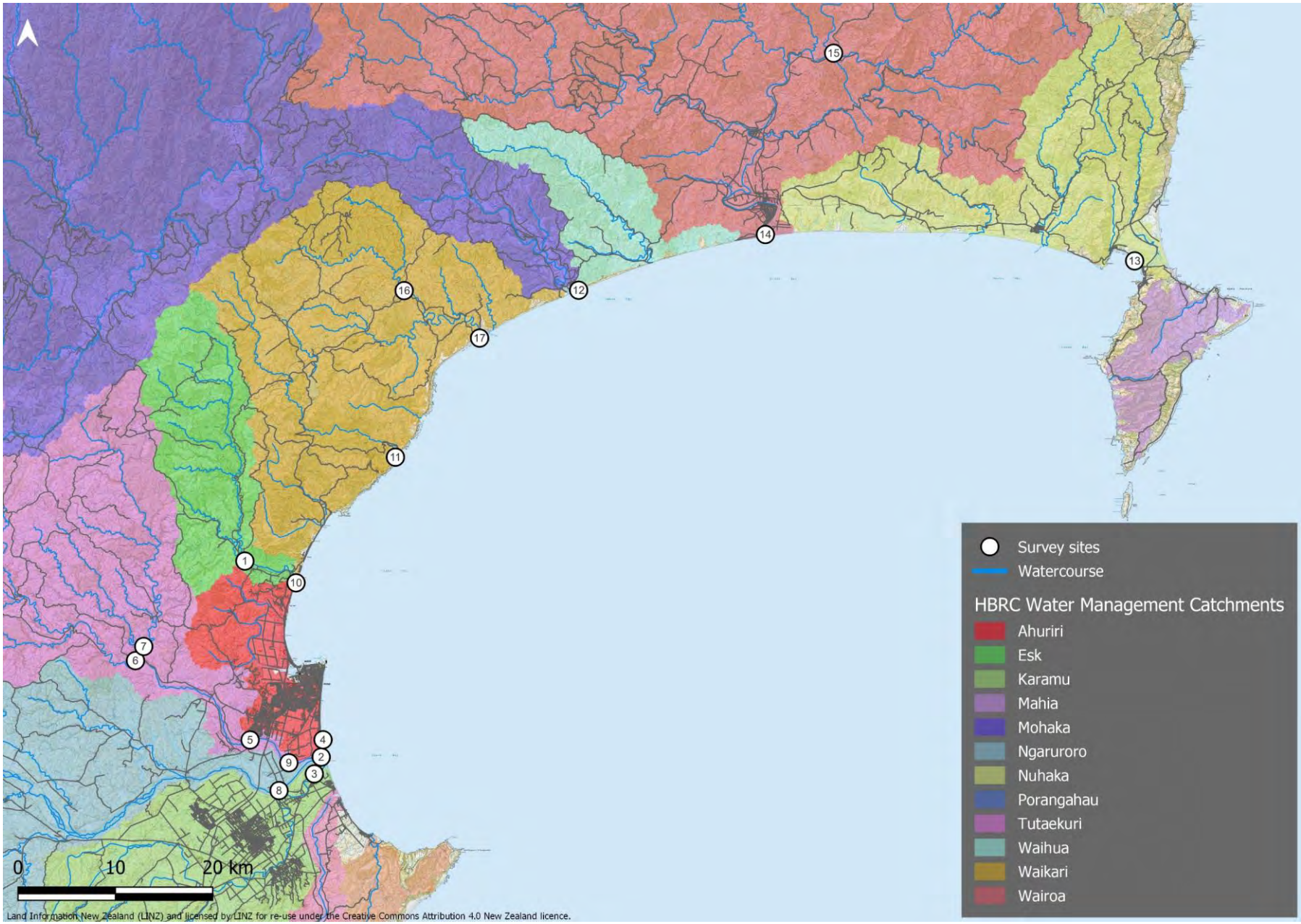


Figure 1: Large Woody Debris (LWD) assessment site locations.

Slovens

A short pine log cut into rounds.

Short cut Pine Rootballs

The root mass of a pine tree cut within approximately 1m of the rootball. Rootballs from harvested areas are sometimes used to buttress the base of sidecast material and is thus best regarded as a harvest residue.

Table 1: Comparison of current assessment categories with Cave (2023).

ESL (2023) category	Cave (2023) category
	Fresh cut pine
	Slovens
Cut Pine	Short cut pine rootballs
	Long cut pine rootballs
	Cut to waste pine
Long resident pine	Long resident logs
Fresh cut pine	Post-event modified logs
Pine Piece (not cut / not windthrow)	
Windthrow pine	Rootball pine with full or partial trunks
Willow/poplar	Willow, Poplar and Acacia
Windthrow willow/poplar	Willow, Poplar and Acacia
Other	Indigenous
	Slash
Excluded from assessment	Dross
	Fence posts and battens and rubbish

Long cut Pine rootballs

The root mass of a pine tree with a cut several metres from the rootball.

Cut to Waste Pine (CTW)

Medium to large but out-of-spec cut logs that may or may not have been debarked. Will sometimes have painted markers on the trunk. Difficult to definitely identify, but where pine logs exceeding 25cm in circumference have been cut, they have been classed as cut to waste for convenience of counting.

Post event modified logs

This may include material on a beach which is the burnt remnant of prior clean-up operations and/or long resident logs where the community has cut and removed rounds for firewood.

Rootball Pine with full or partial trunks

Often referred to as windthrow but the provenance of such material is not confined to the action of wind-induced downbursts and can be derived from riparian erosion, landsliding, or dislodgement during the harvesting of adjacent trees. May have partial or significant loss of bark.

Willow, Poplar and Acacia (WPA)

Willows (*Salix* spp.), Poplar (*Populus* spp.) and Acacia (*Acacia* spp.) are the most common erosion and riparian margin control species used within the region. They can generally be readily distinguished from pine by their different bark textures and markings, although willow, poplar and acacia bark can be quite variable in texture. Poplar can have a slim relatively straight truck and normally finer bark. Debarked poplar will often have a dimpled texture and a spiral crack system. Willow generally has an irregular trunk and if it's a whole tree will show a long root system.

Indigenous

Many different species of indigenous vegetation can be incorporated within the woody debris and these can include softwoods, semi-hardwoods, and mānuka/kānuka (*Leptospermum scoparium* agg., *Kunzea* spp.). These are generally readily distinguished from either pine or the willow/poplar/acacia suite.

Fence Posts and Battens and rubbish

As LWD migrates downstream during a flood it will often remove any fences or other material in its path. Similarly, some waste transfer stations are presently in flood zones and consequently, a wide mix of rubbish can be incorporated to the woody debris in the receiving zone.

2.3 Assessment Types

In an ideal world every piece of LWD would be counted, but the very large volumes involved means that this is impractical in most instances. Instead, subsets of the woody debris field are counted. Provided that sufficient replicate assessments are undertaken, the data can be considered representative. At most sites, especially those at the coast, the debris field extended for kilometres along the shoreline.

Cave (2023) proposes three primary methodologies for on-the-ground rapid assessments:

- 10 metre square plots
- Transects
- Wood pile counts

Both the 10m square plot and wood pile count methodologies were utilised during this assessment, along with a visual estimation of percentage volume. Each of these methodologies is described in more detail below.

2.3.1 10m square plots

Three equally spaced plots (approximately 50m apart) where a 10m square area was dominated by LWD were established. Every piece of LWD over 15cm in diameter and 50cm in length within each plot was counted and then were dazzle-painted to ensure that they were only counted once. Plots were photographed from each corner with a GPS enabled (phone) camera for later exporting to a Geographic Information System (GIS).

A visual estimate of the percentage area of the plot covered by slash or dross was not

made. However, in almost every plot, the average area covered by woody debris exceeded 95% (9.5m^2).

For LWD that extended beyond the plot area, Cave (2023) proposes that any log where 25% or less of the log sits outside the plot is counted while logs which are only 25% within the plot area are excluded. This rule was modified slightly for the current assessment in order to accommodate the large number of full-length stems (i.e., whole trees) observed, often with rootballs still attached, and typically measuring 30-40m in length. Such logs would almost always be excluded from assessment by Cave's 25% limits unless they lay through the plot. The current assessment instead excluded full stems / logs over 20m in length only if they did not have more than 2.5m of their length within the plot. This modification may therefore lead to an over representation of this type of LWD when compared to plots assessed using Cave's 25% rule.

2.3.2 Wood pile counts

Wood piles may occur naturally when LWD gets lodged against standing trees on the flood plain or be the result of urgent works undertaken to clear log jams against bridges that could otherwise fail. Cave (2023) proposes two options for counting wood piles:

A digger can be used to pull apart the piles and place them in separate sub-piles based on species class for counting. Unfortunately, due to the nature of emergency works being undertaken by the machinery at some sites in this study (e.g., rebuilding stopbanks or removing debris from bridges), attempts to organise assessments using the '*wood pile – deconstruction*' method were unsuccessful.

As the use of a digger was not possible, hand counting in-situ was necessary. Because it was often not possible to count all logs in a pile since they may be obscured, or it was too hazardous to get close enough to count, the upstream face of piles was assessed. This essentially replicated a 10m square plot but in the vertical rather than horizontal plane (noting that pile assessment dimensions were not standardised). For safety reasons clambering over (or under) wood piles was avoided. Wood piles were assessed with the aim of counting three piles and a minimum of 100 pieces of LWD at each site.

2.3.3 Visual estimation of percentage volume

A visual estimation of the percentage volume of pine in terms of total LWD volume was made. This additional data point was collected to offset the potential risk that a few large pieces of LWD may be overrepresented in volume but underrepresented in piece counts within the same plot or pile.

For example, a large windthrow willow/poplar may comprise 90% of wood volume within a pile with 49 small pieces of pine that comprise just 10% of wood volume. By volume then, willow/poplar is clearly the predominant LWD type, but the *wood pile – hand count* or *10m square plot* methodologies described above would present data suggesting that willow/poplar contributed just 2% of LWD while pine contributed 98%.

3.0 Woody Debris Assessments

3.1 Site 1: Esk River at Waipunga Road Bridge

This site was visited on 28 February 2023. There had been some emergency work done with machinery to both clear the debris accumulation from the bridge and reconstruct the bridge approach. While assessment could have been conducted on any of the piles created by machinery, it was decided to assess natural (i.e., undisturbed) debris accumulations. This was achieved in three locations where debris had accumulated on the upstream side of riverside trees where the '*wood piles – hand counting*' methodology was used to assess woody debris species composition. In total, 111 pieces of LWD were categorised.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed were 75%, 18% and 7% respectively (Figure 42).

By volume, pine was visually estimated to comprise 75% of the woody debris present within the piles assessed, with willow/poplar and other species comprising the remainder.

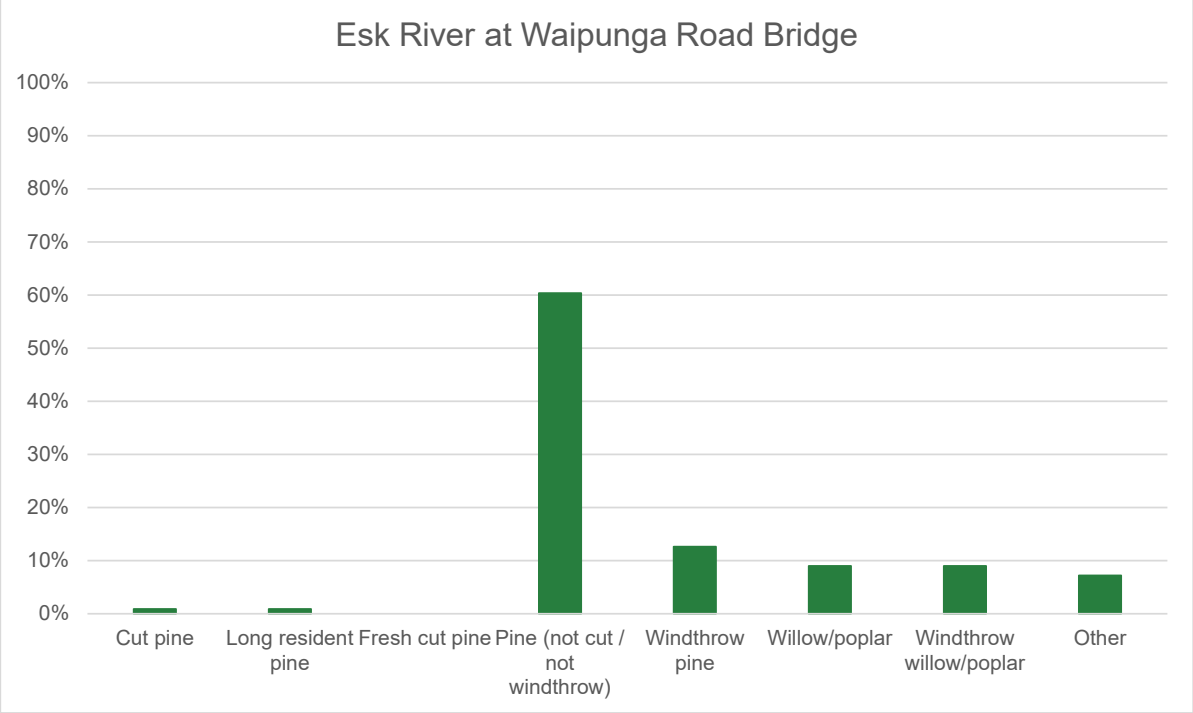


Figure 2: Within species breakdown of woody debris by piece type at Site 1.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 1% (Figure 2: Within species breakdown of woody debris by piece type at Site 1.Figure 2). The proportion of long resident pine debris was similarly low (1%). Interestingly the proportion of both windthrow pine (13%) and windthrow willow/poplar (9%) were similar.

The overwhelming majority of woody debris was however pine 'pieces' (60%) which constituted pieces of woody debris not evidencing cut (or other) marks indicating that they had been harvested.

Figure 3: View upstream from the true right bank at Site 1.

Figure 4: Typical woody debris accumulation assessed at Site 1.

3.2 Site 2: Tutaekuri / Ngaruroro River at State Highway 51 Bridge

This site was visited on 1 March 2023. Three different piles of LWD accumulation were assessed. In total, 123 pieces of LWD were categorised. The data was averaged across these replicates and is presented and discussed below.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed were 38%, 37% and 24% respectively (Figure 42).

By volume, pine was estimated visually to comprise 18% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder.

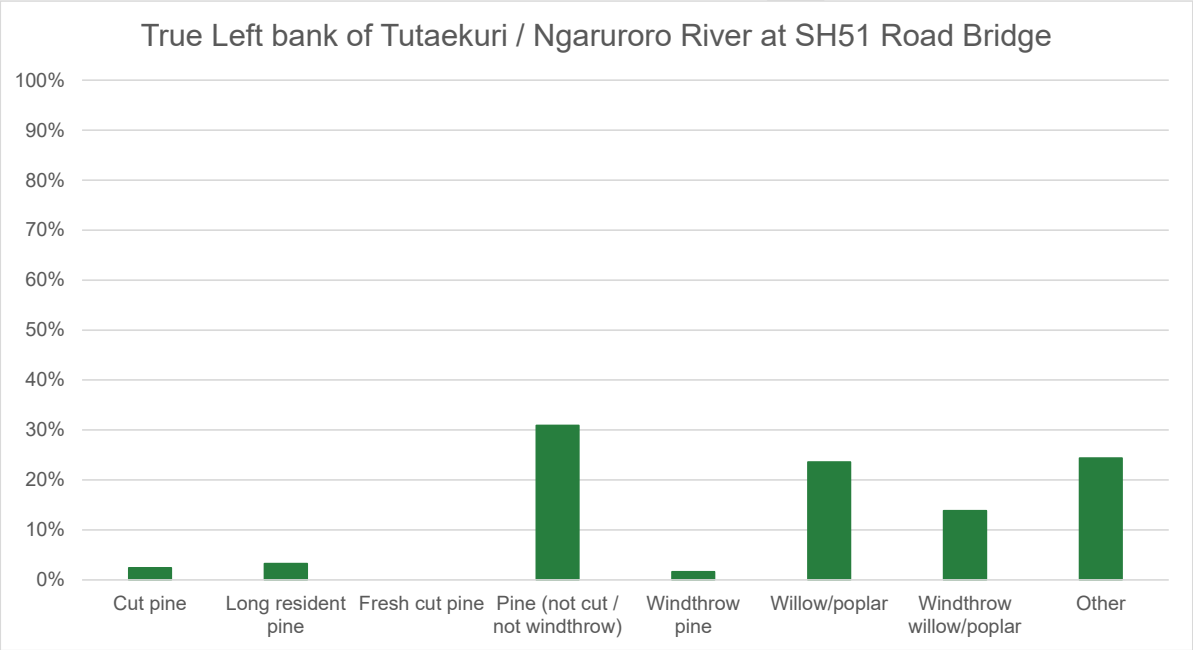


Figure 5: Within species breakdown of woody debris by piece type at Site 2.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 2% (Figure 5). The proportion of long resident pine debris was similarly low (3%). Interestingly the proportion of both windthrow pine (2%) and windthrow willow/poplar (14%) were quite different, perhaps reflecting the scale of river protection plantings within the catchment[2].

The majority of woody debris was however pine 'pieces' (31%) which constitute pieces of woody debris not evidencing cut (or other) marks indicating that they had been harvested.

[2] The Tutaekuri / Ngaruroro River has XXX km of willow and poplar river protection plantings.

Figure 6: View downstream from the true left bank at Site 2.

Figure 7: Typical woody debris accumulation assessed at Site 2.

3.3 Site 3: Tutaekuri / Ngaruroro River at Railway Bridge

This site was visited on 1 March 2023. Three different piles of LWD accumulation were assessed. In total, 120 pieces of LWD were categorised. The data was averaged across these replicates and is presented and discussed below.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed was 38%, 46% and 21% respectively (Figure 42). These percentages were similar to Site 2 immediately downstream at the State Highway 51 road bridge with the percentage of pine and other species decreasing slightly (5% and 3% respectively) and the percentage of willow/poplar increasing slightly (9%).

By volume, pine was visually estimated to comprise 24% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder.

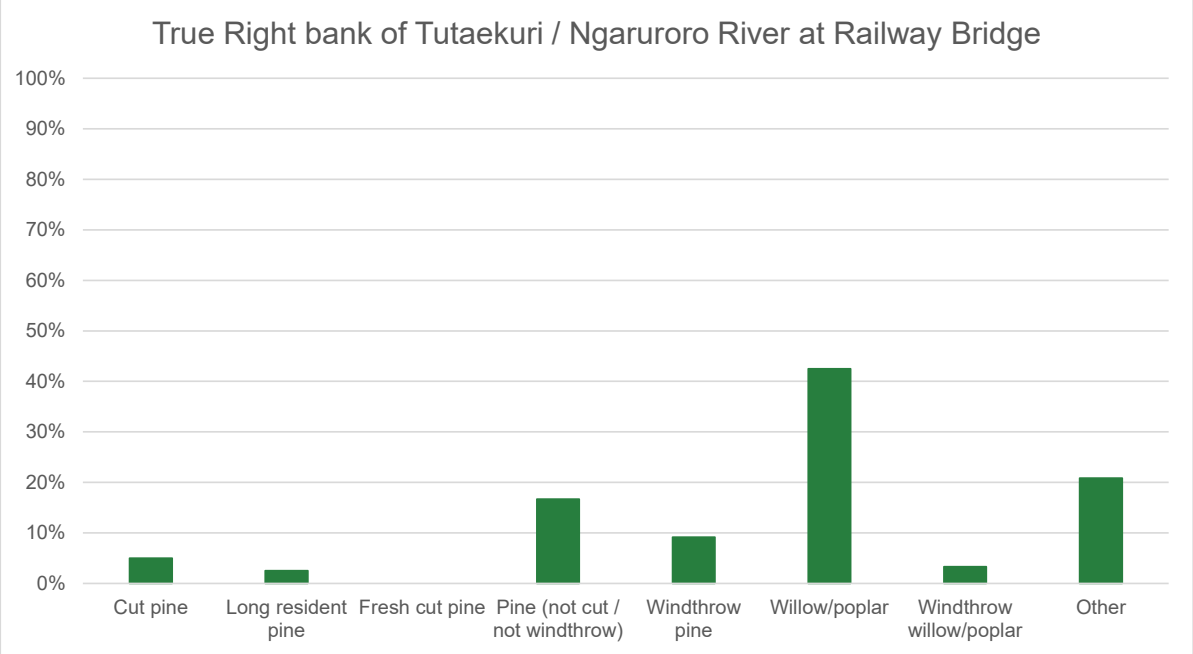


Figure 8: Within species breakdown of woody debris by piece type at Site 3.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 5% (Figure 8). The proportion of long resident pine debris was even lower (3%).

The proportion of windthrow pine (9%) and windthrow willow/poplar (3%) were again different, there was apparently less variation than at Site 2 immediately downstream where less windthrow pine (2%) and more windthrow willow/poplar (14%) was evident. However, total windthrow accounted for similar proportions of LWD at Site 3 (12%) and Site 2 (16%).

The majority of woody debris assessed was willow/poplar (43% - not including the 3% categorised as windthrow), with the next highest categories being other species (21%) and pine 'pieces' (17%).

Figure 9: View downstream from the true right bank at Site 3.

Figure 10: Typical woody debris accumulation assessed at Site 3.

3.4 Site 4: Tutaekuri / Ngaruroro River mouth

This site was visited on 1 March 2023. Three different piles (10m x 10m plots) of LWD accumulation were assessed. In total, 235 pieces of LWD were categorised. The data was averaged across these replicates and is presented and discussed below.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed were 29%, 37% and 34% respectively (Figure 42). These percentages were similar to Site 2 and Site 3 immediately upstream with the percentage of pine decreasing only slightly (4-9%), the percentage of willow/poplar remaining constant or increasing slightly (0-9%), and the percentage of other species increasing slightly (10-13%). The increase in the percentage of other species in the coastal environment could reflect the increase in (usually small) unidentifiable woody debris present (e.g., due to time in water / abrasion removing distinctive features necessary for a positive species identification).

By volume, pine was estimated visually to comprise 18% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder.

The species composition average for Sites 2-4 which each reflect the Tutaekuri / Ngaruroro River are pine (M = 33%, SD = 5%), willow/poplar (M = 40%, SD = 5%) and other species (M = 27%, SD = 7%).

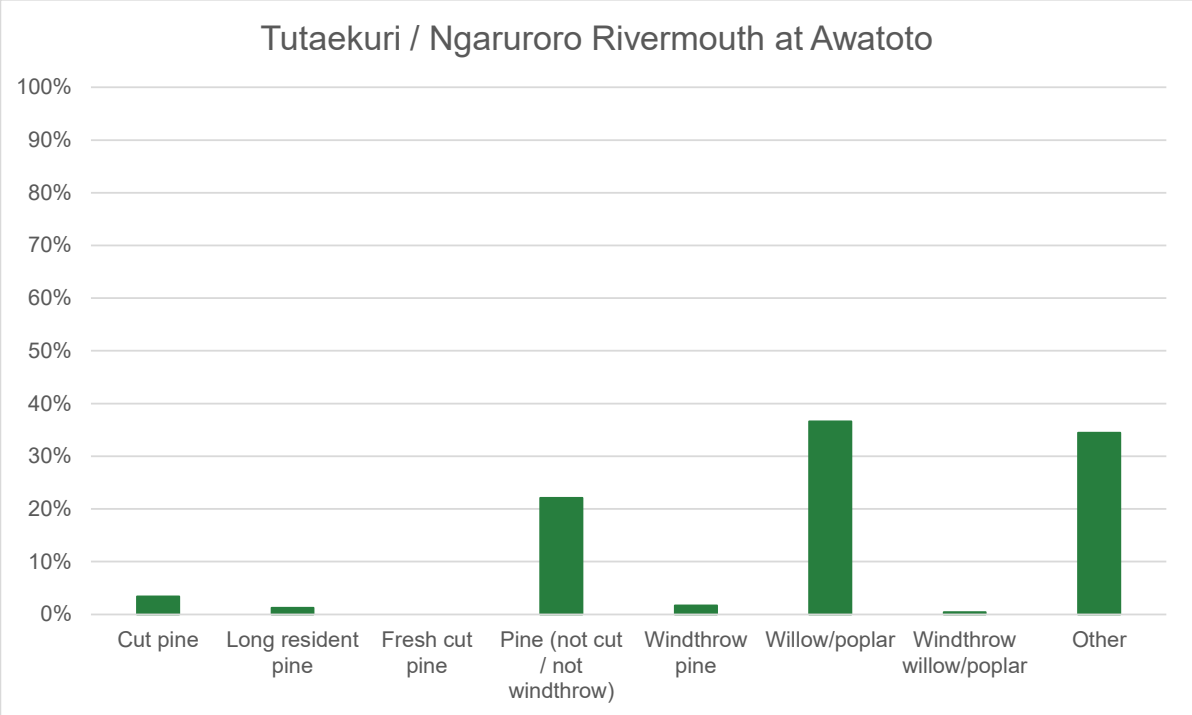


Figure 11: Within species breakdown of woody debris by piece type at Site 4.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 3% (Figure 11). The proportion of long resident pine debris was similarly low (1%). The low proportions of both windthrow pine (2%) and windthrow willow/poplar (<1%) may reflect the fact that much of this material was held up at the road and rail bridges (Site 2 and Site 3) where windthrow proportions were higher at 16% and 12% respectively.

The majority of woody debris assessed was willow/poplar (37% - not including the <1% categorised as windthrow), with the next highest categories being other species (34%) followed by pine 'pieces' (22%).

Figure 12: View south over the river mouth at Site 4 showing plot with dazzled wood.

Figure 13: Typical woody debris accumulation assessed at Site 4.

3.5 Site 5: Tutaekuri River at Redclyffe Bridge

This site was visited on 1 March 2023. Due to accessibility issues, this site was not able to be safely assessed using any of the methods outlined by Cave (2023). It had been intended to utilise the '*wood pile – deconstruction*' methodology to count LWD accumulations at this location. Due to the urgent nature of the work being undertaken to clear debris from the bridge and rebuild the stopbank, woody debris was not available to assess at the designated disposal site (Figure 14). It was therefore decided to undertake a basic visual assessment only. NB: the visual assessment was undertaken from the same location as the photo in Figure 14 where the upstream face of the debris accumulation was best viewed. It may be possible (and if so is recommended) to undertake a more formal assessment of the LWD disposal pile at a later date.

A visual estimation of the percentage volume of pine, willow/poplar and other species in the woody debris accumulation at the bridge was 5%, 90% and 5% respectively (Figure 42).

Comparing this assessment with the results from Site 2 and Site 3 (but excluding Site 4 on the grounds of it being a beach site) it is evident that the proportion of pine is below the average of those sites (M = 36, SD = 3%), as is the proportion of other species (M = 23%, SD = 3%), while willow/poplar was assessed as being significantly higher (M = 42%, SD = 6%). These differences may be a true reflection of the LWD composition at this site, or (perhaps more likely) an artefact of the visual assessment methodology used (which is somewhat of a mix of a '*wood pile - hand count*' and '*percentage volume*' estimate.

Figure 14: View from the true left bank over the destroyed Redclyffe Bridge at Site 5.

3.6 Site 6: Mangaone River at Dartmoor Road Bridge

This site was visited on 2 March 2023. Three different piles of LWD accumulation were assessed. In total, 88 pieces of LWD were categorised. The data was averaged across these replicates and is presented and discussed below.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed were 57%, 32% and 11% respectively (Figure 42).

By volume, pine was estimated visually to comprise 55% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder.

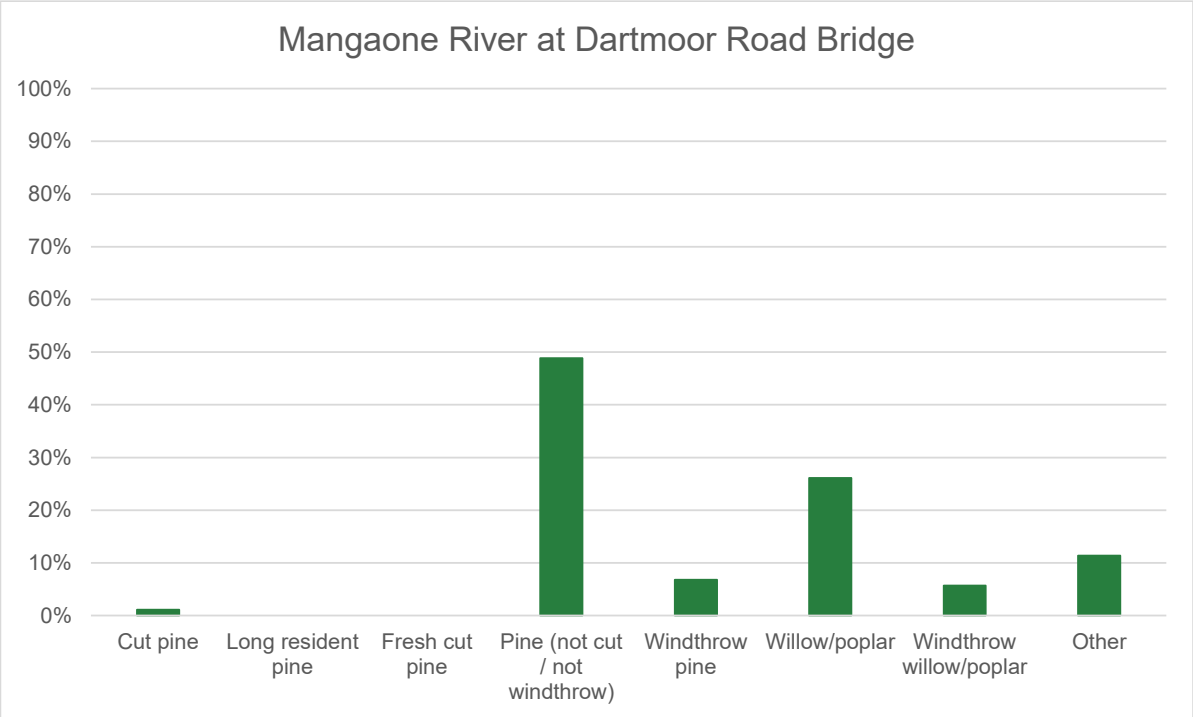


Figure 15: Within species breakdown of woody debris by piece type at Site 6.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 1% (Figure 15). The proportion of long resident pine debris was similarly low (0%). Interestingly the proportion of both windthrow pine (7%) and windthrow willow/poplar (6%) were similar and approximated the average of all sites assessed (M = 6% for windthrow pine, and M = 3% for windthrow willow/poplar).

The overwhelming majority of woody debris was however pine 'pieces' (49%) which constitute pieces of woody debris not evidencing cut (or other) marks indicating that they had been harvested. Willow/poplar was the next most frequently observed LWD contributing approximately half the number of pieces as pine 'pieces' (26%).

Figure 16: View downstream along the true right bank and over Site 6.

Figure 17: Typical woody debris accumulation assessed at Site 6.

3.7 Site 7: Tutaekuri River upstream of confluence with Mangaone Stream

This site was visited on 2 March 2023. Three different piles of LWD accumulation were assessed. In total, 149 pieces of LWD were categorised. The data was averaged across these replicates and is presented and discussed below.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed were 60%, 27% and 13% respectively (Figure 42).

By volume, pine was estimated visually to comprise 53% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder.

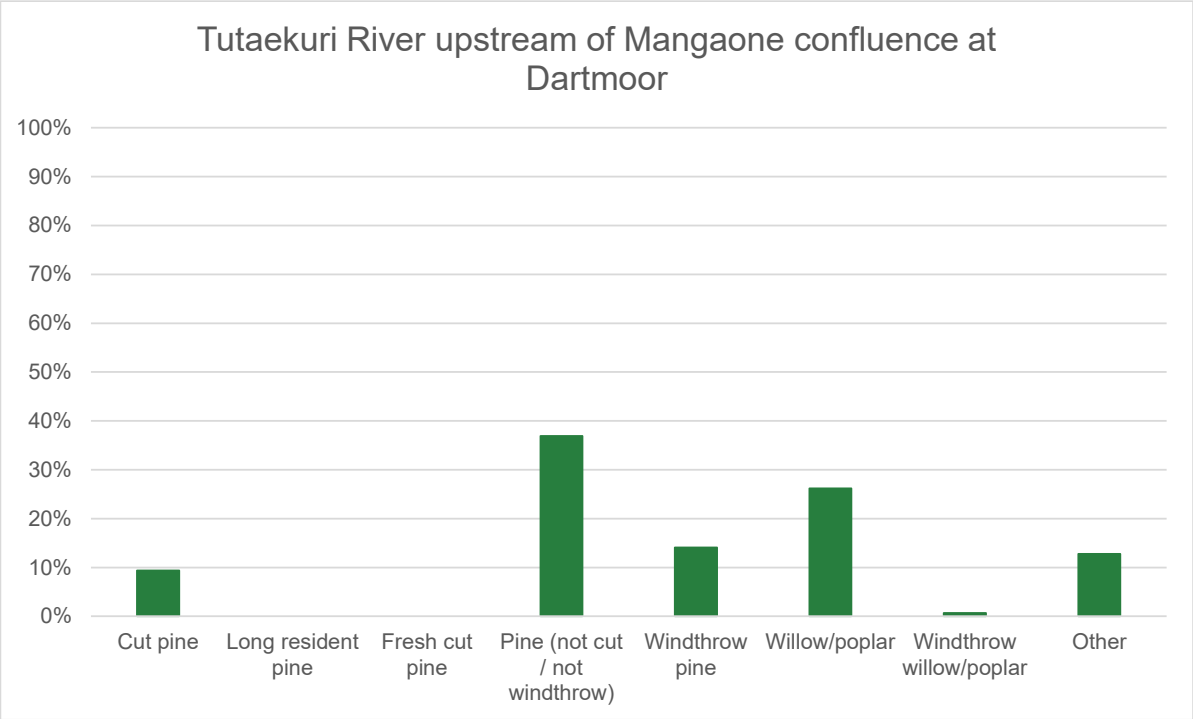


Figure 18: Within species breakdown of woody debris by piece type at Site 7.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 9% - the highest proportion recorded at any site assessed (Figure 18). This represents 8% more cut pine pieces than was observed at Site 6 (very close nearby but in a different river system) where only 1% of LWD was categorised as cut pine. The proportion of long resident pine was low (0%), suggesting that the cut pine LWD present had entered the river system recently (potentially and perhaps most likely during cyclone Gabrielle).

Interestingly the proportion of both windthrow pine (14%) and windthrow willow/poplar (1%) were quite different from not only each other, but also the values recorded at Site 6 (very nearby but in a different river system) where values were 7% and 6% for windthrow pine and windthrow willow/poplar respectively.

The majority of woody debris was however pine 'pieces' (37%) which constitute pieces of woody debris not evidencing cut (or other) marks indicating that they had been harvested. This value also represents the average value for pine 'pieces' across all sites assessed by either the *wood pile – hand count* or *square plot* method (N = 11, M = 37%, SD = 14%). Willow/poplar was the next most frequently observed LWD contributing 26% of LWD pieces.

Figure 19: View downstream along the true left (stop)bank and over Site 7.

Figure 20: Typical woody debris accumulation assessed at Site 7.

3.8 Site 8: Ngaruroro River at Chesterhope Bridge

This site was visited on 2 March 2023. Since the bridge was almost completely free of debris no assessment was undertaken. This fact is however both a useful and interesting data point as the Tutaekuri and Ngaruroro River have their confluence near Site 2, Site 3 and Site 4 where a significant amount of LWD accumulated, resulting in damage to two bridges. This perhaps provides an opportunity to investigate upstream land use differences.

Figure 21: View downstream from the true left bank and over Site 8.

Figure 22: A windthrown willow was one of the few pieces of LWD seen at Site 8.

3.9 Site 9: Tutaekuri River at Brookfields Bridge

This site was visited on 2 March 2023. Only one pile of LWD accumulation was present. As such, the entire pile was assessed. In total, 65 pieces of LWD were categorised.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed was 32%, 58% and 9% respectively (Figure 42).

By volume, pine was estimated visually to comprise 20% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder.

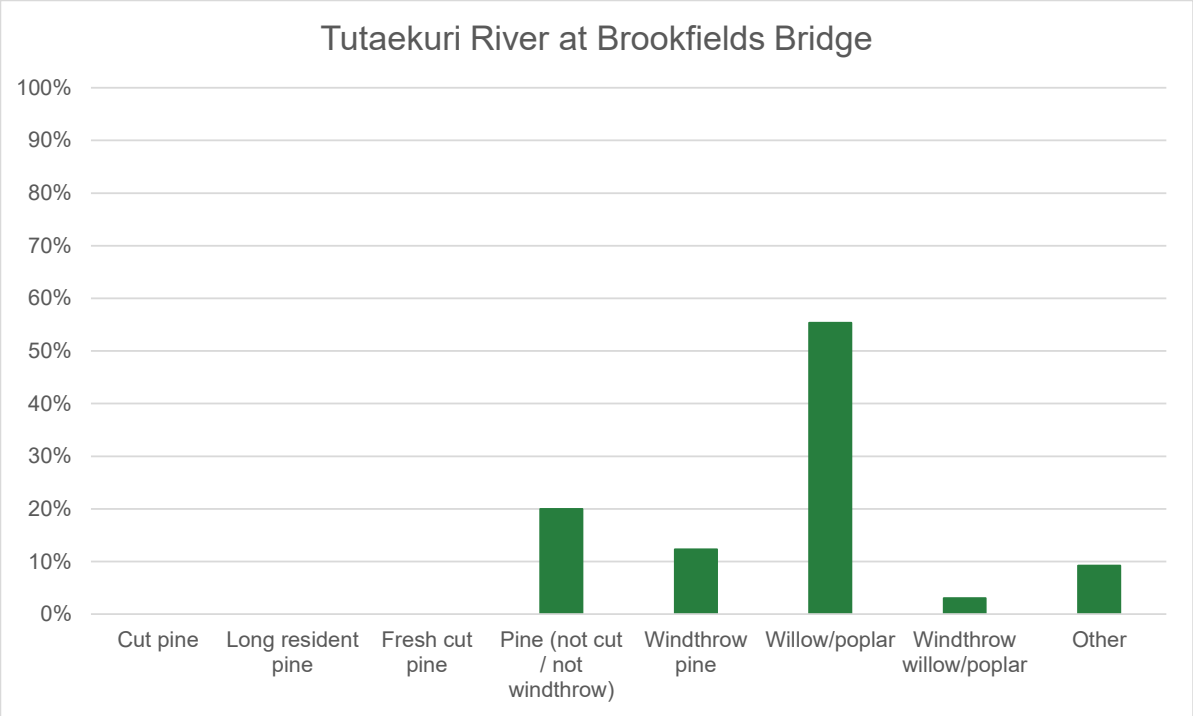


Figure 23: Within species breakdown of woody debris by piece type at Site 9.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 0% (Figure 23). The proportion of long resident pine debris was similarly low (0%). The proportion of windthrow pine (12%) was higher than the average of all sites assessed calculated in Section 3.18 (N = 11, M = 6%, SD = 5%) while windthrow willow/poplar (3%) was average (N = 11, M = 3%, SD = 5%).

The overwhelming majority of woody debris was willow/poplar (55%) with pine 'pieces' being the next most frequently observed LWD but contributing approximately one third the number of pieces (20%) as willow/poplar.

Figure 24: View upstream from the true right bank and over Site 9.

Figure 25: A single woody debris accumulation was available to assess at Site 9.

3.10 Site 10: Esk River mouth

This site was visited on 2 March 2023. Three different piles of LWD accumulation were assessed. In total, 357 pieces of LWD were categorised. The data was averaged across these replicates and is presented and discussed below.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed was 63%, 6% and 31% respectively (Figure 42). These proportions were 12% lower for both pine and willow/poplar but 24% higher for LWD categorised as other species (Figure 42). As for Site 4 at Awatoto Beach, the increase in the percentage of other species in the coastal environment could reflect the increase in (usually small) unidentifiable woody debris present (e.g., due to time in water / abrasion removing distinctive features necessary for a positive species identification).

By volume, pine was estimated visually to comprise 87% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder. This is in keeping with the estimated contribution of pine by volume to the LWD accumulations assessed at Site 1 upstream (75%).

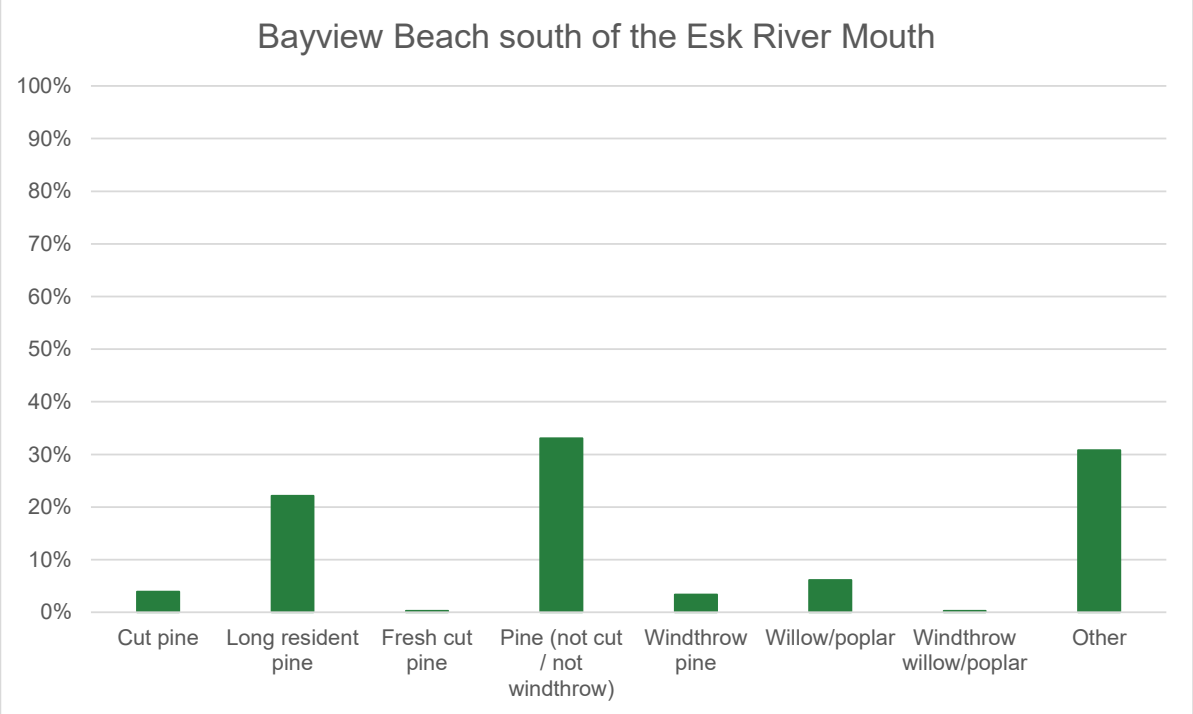


Figure 26: Within species breakdown of woody debris by piece type at Site 10.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 4% (Figure 26). The proportion of long resident pine debris was the highest of any site assessed at 22% (N = 11, M = 7%, SD = 9%). Interestingly the proportion of both windthrow pine (3%) and windthrow willow/poplar (0%) were both relatively low at this location.

The majority of woody debris was pine 'pieces' (33%), but in this instance not too dissimilar from either other species (31%) or long resident pine (22%). The presence of a large proportion of long resident pine may suggest that LWD within the Esk River catchment is not solely the result of Cyclone Gabrielle. However, long resident pine did not feature as prominently at Site 1 upstream where just 1% of LWD was assigned to this category.

Figure 27: View north along the coast towards the Esk River mouth (Site 10 to south).

Figure 28: Typical woody debris accumulation assessed at Site 10 (view south).

3.11 Site 11: Aropaoanui River mouth

This site was visited on 3 March 2023 via helicopter. In the interests of time just two plots of LWD accumulation were assessed. In total, 347 pieces of LWD were categorised. The data was averaged across these replicates and is presented and discussed below.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed was 77%, 11% and 12% respectively (Figure 42).

By volume, pine was estimated visually to comprise 93% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder.

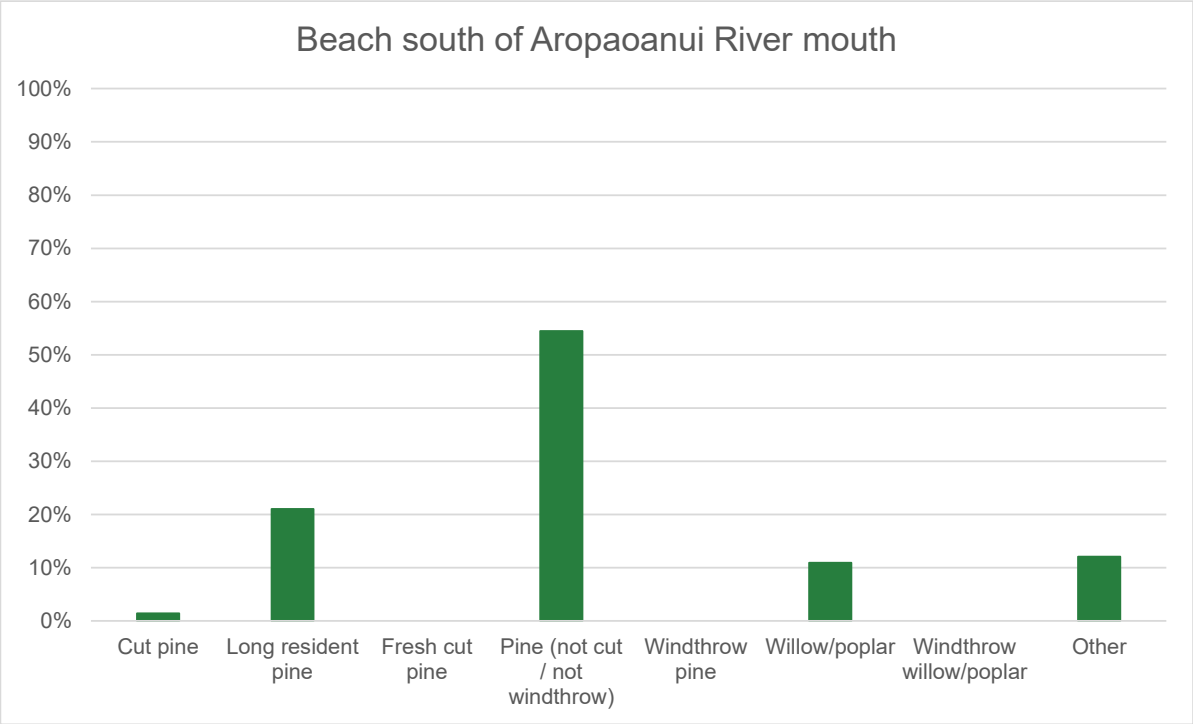


Figure 29: Within species breakdown of woody debris by piece type at Site 11.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 1% (Figure 29). The proportion of long resident pine debris was the second highest of any site (21%). The proportion of long resident pine LWD was lower than Site 10 to the south (22%) but higher than Site 12 to the north (15%). Interestingly the proportion of both windthrow pine (0%) and windthrow willow/poplar (0%) were the lowest of any site assessed. These proportions were similar only to Site 13 at Mahia Beach to the north where no windthrow material was recorded either.

The overwhelming majority of woody debris was however pine 'pieces' (33%) and long resident pine (21%). Many pieces categorised as long resident pine would have been categorised as pine 'pieces' if they had been of more recent origin (i.e., they too did not have any evidence of cut / processing marks associated with harvesting activity). Willow/poplar and other species were the next most frequently observed LWD categories contributing approximately only one third the number of LWD pieces counted as pine 'pieces' (11% and 12% respectively) and just half as much as long resident pine pieces counted.

Figure 30: View north over the Aropaoanui River mouth and Site 11.

Figure 31: Typical woody debris accumulation assessed at Site 11.

3.12 Site 12: Mohaka River mouth

This site was visited on 3 March 2023 by helicopter. Three different plots of LWD accumulation were assessed. In total, 172 pieces of LWD were categorised. The data was averaged across these replicates and is presented and discussed below.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed were 63%, 8% and 29% respectively (Figure 42).

By volume, pine was estimated visually to comprise 78% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder.

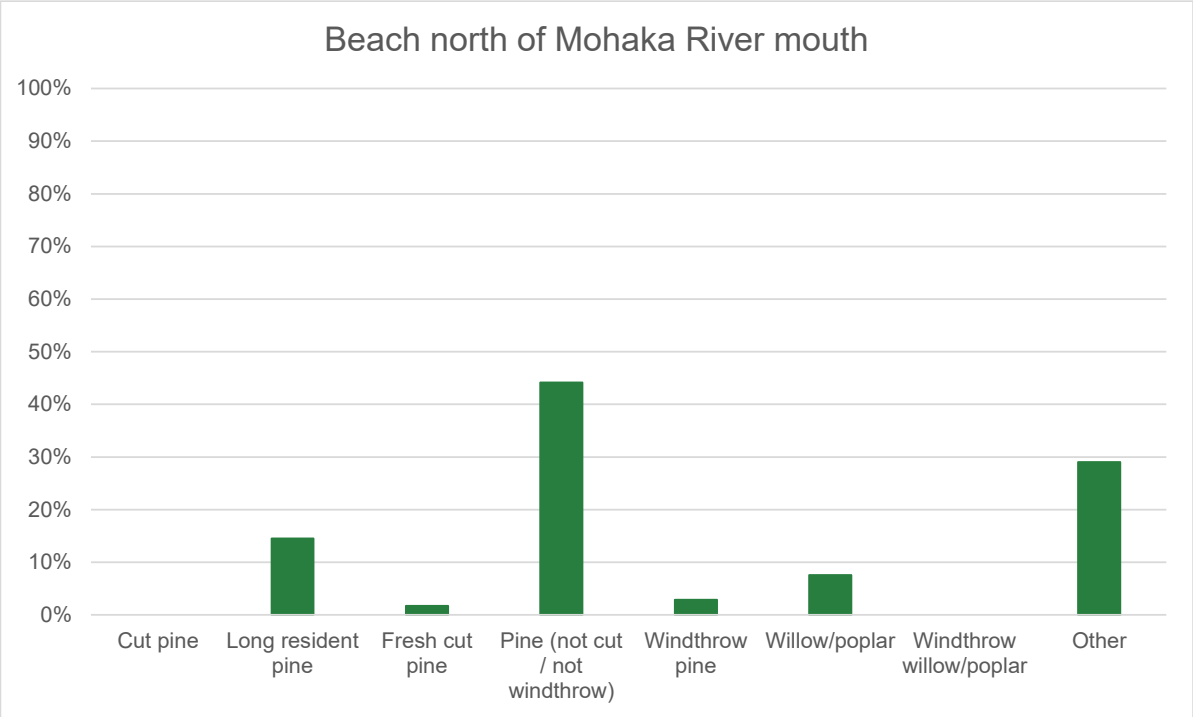


Figure 32: Within species breakdown of woody debris by piece type at Site 12.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 0% (Figure 32). The proportion of long resident pine debris was the third highest of any site (15%). The proportion of long resident pine LWD was lower than Sites 10 and 11 to the south (22% and 21% respectively). The proportions of both windthrow pine (3%) and windthrow willow/poplar (0%) were low. The low proportion of windthrow willow/poplar was evidenced by all five beach assessment sites (where in fact no windthrow willow/poplar was recorded). That is not to say this LWD did not exist at beach sites, as pieces fitting that assessment category were observed outside assessment plots.

The overwhelming majority of woody debris was however pine 'pieces' (44%) which constitute pieces of woody debris not evidencing cut (or other) marks indicating that they had been harvested. Other species was the next most frequently observed LWD (26%) followed by long resident pine (15%).

Figure 33: View north over the Mohaka River mouth and Site 12 on the northern bank.

Figure 34: Typical woody debris accumulation assessed at Site 12.

3.13 Site 13: Mahia Beach

This site was visited on 3 March 2023 via helicopter. Three different plots of LWD accumulation were assessed. In total, 436 pieces of LWD were categorised. The data was averaged across these replicates and is presented and discussed below.

The proportion of pine, willow/poplar and other species in the woody debris accumulations assessed was 44%, 8% and 48% respectively (Figure 42).

By volume, pine was estimated visually to comprise 43% of the woody debris present within the accumulations assessed, with willow/poplar and other species comprising the remainder.

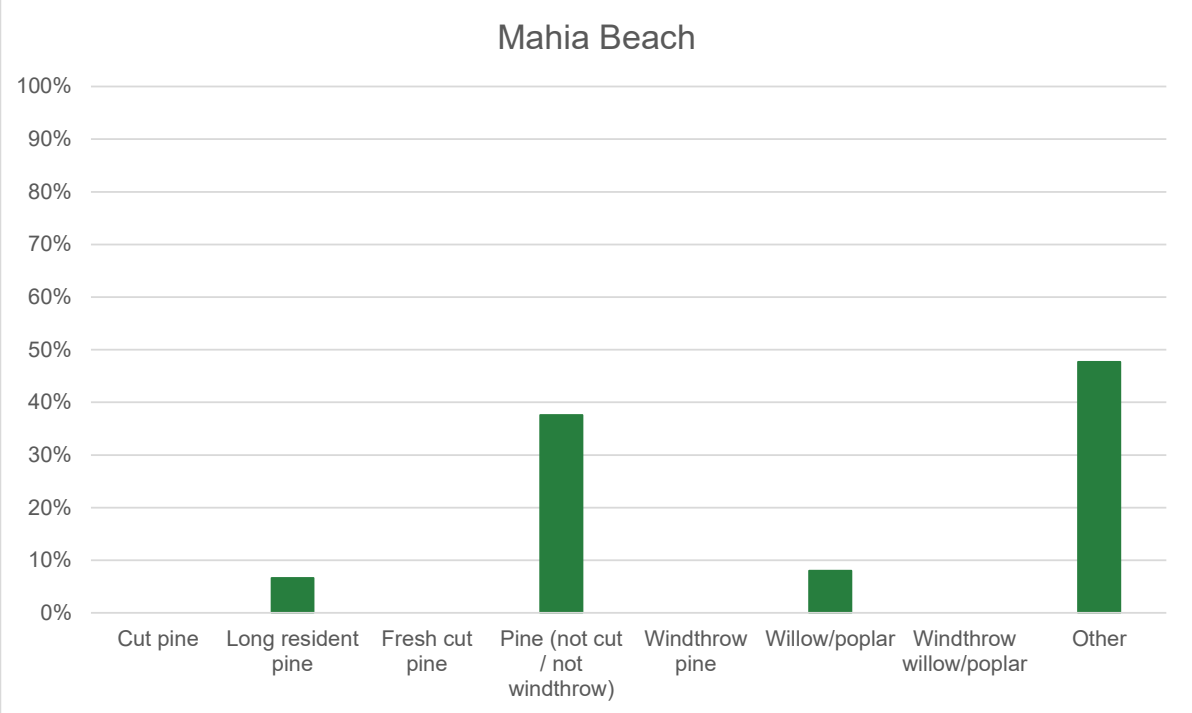


Figure 35: Within species breakdown of woody debris by piece type at Site 13.

The proportion of cut pine (whose source would be historic or current forestry harvesting operations) was 0% (Figure 35). The proportion of long resident pine LWD was (7%). The proportion of both windthrow pine was low (0%) and like all other beach sites windthrow willow/poplar was not present with survey plots (0%).

The majority of woody debris was split fairly evenly between other species (48%) and pine 'pieces' (38%) which constitute pieces of woody debris not evidencing cut (or other) marks indicating that they had been harvested. Willow/poplar contributed only 8% of LWD assessed. The high percentage of other species in the coastal environment at this site in part reflects the increase in (usually small) unidentifiable woody debris present (e.g., due to time in water / abrasion removing distinctive features necessary for a positive species identification) that most people would recognise as '*driftwood*'.

Figure 36: View north over Mahia Beach and Site 13.

Figure 37: Typical woody debris accumulation assessed at Site 13.

3.14 Site 14: Wairoa River mouth

This site was visited on 3 March 2023 by helicopter. Much of the coastline evidenced the recent arrival of significant amounts of woody debris likely originating from the Wairoa River. A particularly dense and expansive accumulation of LWD was apparent on the southern (true right) bank of the Wairoa River close to the river mouth. It appeared that perhaps this debris had been corralled by the tide as it moved downstream and was forced ashore where it remains.

Unfortunately, no suitable and safe landing location was available, so this site was not able to be assessed using quantitative methods. The site was therefore assessed using the qualitative *visual estimation of percentage volume* methodology. It is recommended that this site is revisited and assessed quantitatively once access is safely obtainable.

The proportion of pine, willow/poplar and other species in the woody debris accumulation at the bridge was visually assessed as comprising 90%, 5% and 5% respectively (Figure 42).

Figure 38: View south over the true right bank of the Wairoa River and Site 14.

3.15 Site 15: Mangapoike River at Tiniroto Road Bridge

This site was visited on 3 March 2023 by helicopter. Unfortunately, no suitable and safe LWD accumulations were identified that were able to be assessed using quantitative methods. The site was therefore assessed using the qualitative *visual estimation of percentage volume* methodology.

The proportion of pine, willow/poplar and other species in the woody debris accumulation at the bridge was visually assessed as comprising 90%, 5% and 5% respectively (Figure 42).

Based on qualitative observations only, the predominant LWD category represented here by count and volume was pine 'pieces' (estimated >80%). While some evidence of LWD that would be classified as cut pine was observed, this did not comprise a significant proportion by count or volume (estimated <10%).

It is recommended however that this site is revisited and assessed quantitatively once access is safely obtainable. This may be best achieved using the *wood pile – deconstruction* methodology, assuming that the woody debris is able to be safely removed and stockpiled elsewhere. In addition, given the volume and type of material present, further investigation as to potential material sources within the Mangapoike River catchment is recommended.

Figure 39: View over the Mangapoike and Wairoa River confluence and Site 15.

3.16 Site 16: Waikare River at State Highway 2 Bridge

This site was visited on 3 March 2023 by helicopter. Unfortunately, no suitable and safe landing location was available, so this site was not able to be assessed using quantitative methods. The site was therefore assessed using the qualitative *visual estimation of percentage volume* methodology. It is recommended that this site is revisited and assessed quantitatively once access is safely obtainable.

The proportion of pine, willow/poplar and other species in the woody debris accumulation at the bridge was visually assessed as comprising 90%, 5% and 5% respectively (Figure 42).

It is recommended that this site is revisited and assessed quantitatively once access is safely obtainable. This may be best achieved using the *wood pile – deconstruction* methodology, assuming that the woody debris is able to be safely removed and stockpiled elsewhere. In addition, given the volume and type of material present (both there and at Site 17 downstream at the coast), further investigation as to potential material sources within the Waikare River catchment is recommended.

Figure 40: View of the destroyed SH2 road bridge on the Waikare River and Site 16.

3.17 Site 17: Waikare River mouth

This site was visited on 3 March 2023 by helicopter. It has not however been included in the data presented in this report. Unfortunately, while a suitable and safe landing location was available and used, fine organic debris present at this site obscured the areas of accessible LWD to such a degree that the site was not able to be assessed using quantitative or qualitative methods (Figure 41).

In areas where LWD was visible (i.e., unobscured by fine debris) there was some evidence that material had been sorted by tidal action. This meant that there were accumulations (particularly to the south of the bay) where neatly packed pine LWD were lining the shore. Sampling such an area was considered to represent an inappropriate introduction of potential bias to the assessment process. This, in combination with the lack of a safe and suitable landing area for the helicopter, meant that Site 17 was not assessed (quantitatively or qualitatively).

It is recommended that this site is revisited and assessed quantitatively if tidal action removes the fine debris accumulation revealing LWD suitable for assessment, or an alternative safe landing location is found.

A local land manager was present on site and reported anecdotally that a storm during 2012 resulted in a significant amount of LWD being discharged to the coast from the Waikare River. In their own estimation, this material would have been categorised in the current assessment as cut pine. The suspected LWD sorting action performed by the tides at this location were confirmed, with the additional information obtained also suggesting that material continues to be remobilised from the beach during heavy seas. This remobilised material tends to migrate north within Hawke Bay. It could be expected therefore that Site 13 (at Mahia Beach) may receive LWD via this coastal transportation mechanism.

Figure 41: A deep layer of fine debris covered LWD accumulations at Site 17 (left) while to the south LWD of pine species origin appeared dominant (right).

3.18 Summary of LWD by species

A total of 17 sites were visited either by vehicle or helicopter between 28 February and 3 March 2023 to determine the species composition of any LWD present. Data was collected at 15 of these sites.

Of the sites visited, only 11 were safely accessible and/or suitable for undertaking quantitative assessment using either the *wood piles – hand count* or *square plot* methodologies outlined in Section 2.0. A total of 2,203 pieces of LWD were counted at these 11 sites (M = 200, SD = 126, min = 65, max = 436).

Four of the six sites that were not safely accessible and/or suitable for undertaking a quantitative assessment were assessed using the qualitative *visual estimation of percentage volume* methodology. Figure 42 presents an overview of the LWD species composition data collected at each of the 16 sites visited.

Two sites (Site 8 and Site 17) were not suitable for the undertaking a quantitative or qualitative assessment and as such have been excluded from the calculation of the summary statistics. Site 8 (where no LWD accumulated) is however included in graphical depictions of data collected.

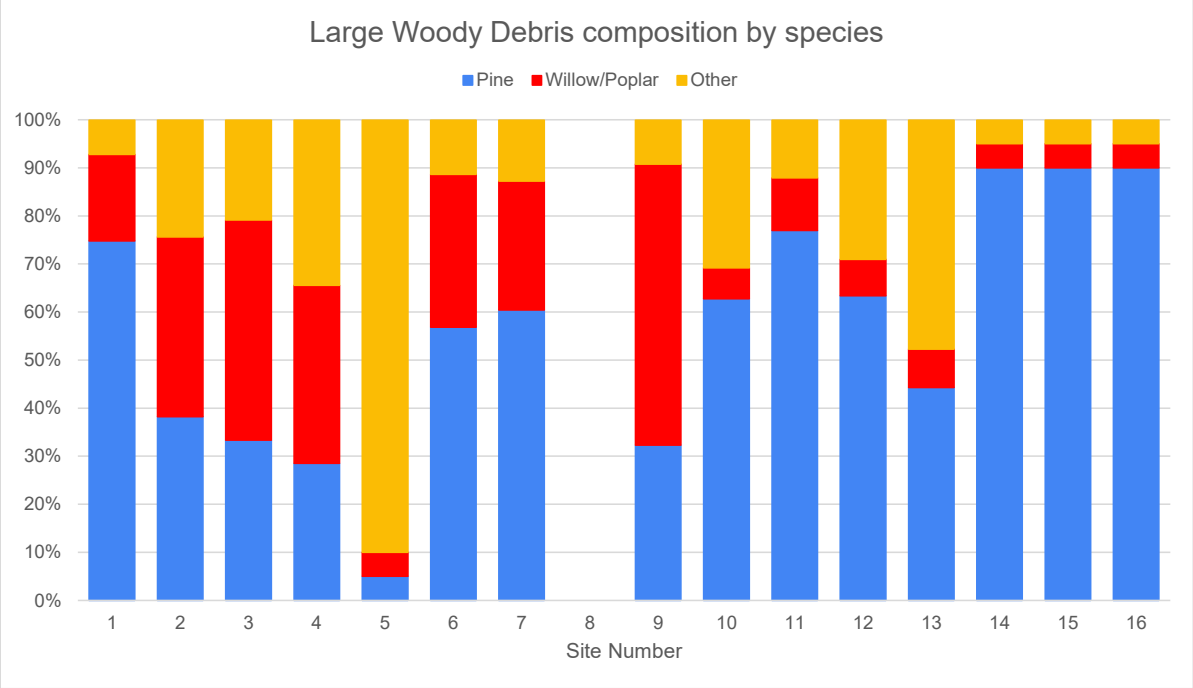


Figure 42: Large woody debris composition by species at all sites.

The proportions of LWD categorised as pine, willow/poplar or other species present at all sites ranged widely (between 5%, 0%, 0% and 90%, 58%, 90% respectively).

On average, the proportion of pine (N = 15, M = 56%, SD = 26%) present in LWD accumulations was approximately 35% higher than the proportion of either willow/poplar (N = 15, M = 21%, SD = 18%) or other species (N = 15, M = 23%, SD = 23%). On average the proportions of LWD categorised as either willow/poplar or other species each comprised approximately 20% of LWD accumulations.

3.19 Summary of LWD by assessment category

At 11 of the 17 sites visited each piece of LWD counted was assigned to one of eight categories as set out in Table 1. The aim of categorisation was to collect data that might give clues as to the ultimate origins of LWD.

The average proportions of LWD assigned to each of the eight categories at the 11 sites for which qualitative data was collected were as follows (presented in the order they appear in Figure 43 from bottom to top): pine piece (M = 37%, SD = 14%), cut pine (M = 3%, SD = 3%), windthrow pine (M = 6%, SD = 5%), long resident pine (M = 7%, SD = 9%), fresh cut pine (M = 0%, SD = 1%), willow/poplar (M = 23%, SD = 16%), windthrow willow/poplar (M = 3%, SD = 5%), and other species (M = 22%, SD = 13%).

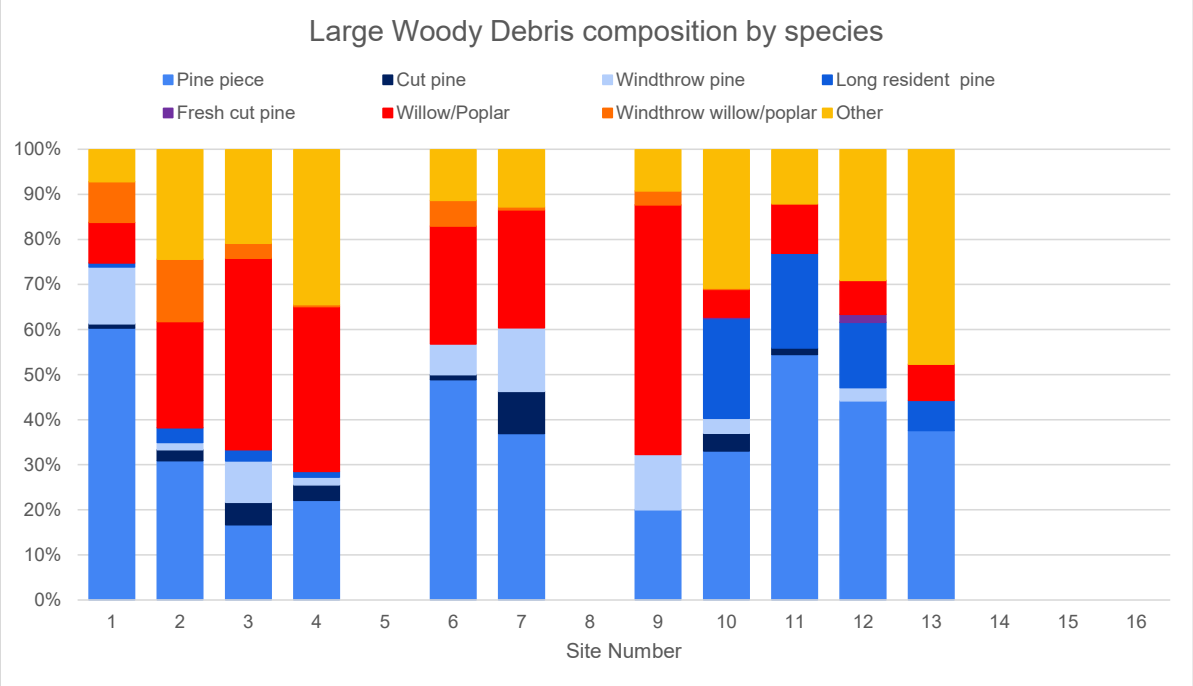


Figure 43: Large woody debris composition by category at all sites.

By far the most common category of pine species LWD recorded on average was *pine piece* (N = 11, M = 37%, SD = 14%, min = 17%, max = 60%). This LWD assessment category is defined as pieces of LWD not evidencing cut (or other) marks indicating that they have been harvested (either recently or historically). All other categories into which pine species LWD were placed averaged less than 10% across all 11 sites. Of particular note was the low contribution that *cut pine* made on average (N = 11, M = 3%, SD = 3%, min = 0%, max = 9%). It should be noted here that absence of cut (or other marks) is not absolute confirmation that LWD in this category has not originated from harvesting activity. Breakage is a common occurrence during tree felling, for example.

On average the proportion of *pine pieces* present in LWD accumulations (N = 11, M = 37%, SD = 14%, min = 17%, max = 60%) was approximately 15% higher than the proportion of either *willow/poplar* (N = 11, M = 23%, SD = 16%, min = 6%, max 55%) or *other* species (N = 11, M = 22%, SD = 13%, min = 7%, max – 48%).

On average the proportions of LWD categorised as either *willow/poplar* or *other* species each comprised approximately 22% of LWD accumulations.

3.20 Summary of LWD by estimated percentage volume

At 15 of the 17 sites visited a qualitative visual estimation of the percentage volume of pine in terms of total LWD volume was made.

The average proportions of pine species LWD by volume across all sites assessed was 56% (N = 15, SD = 32%, min = 5%, max = 90%) (Figure 44).

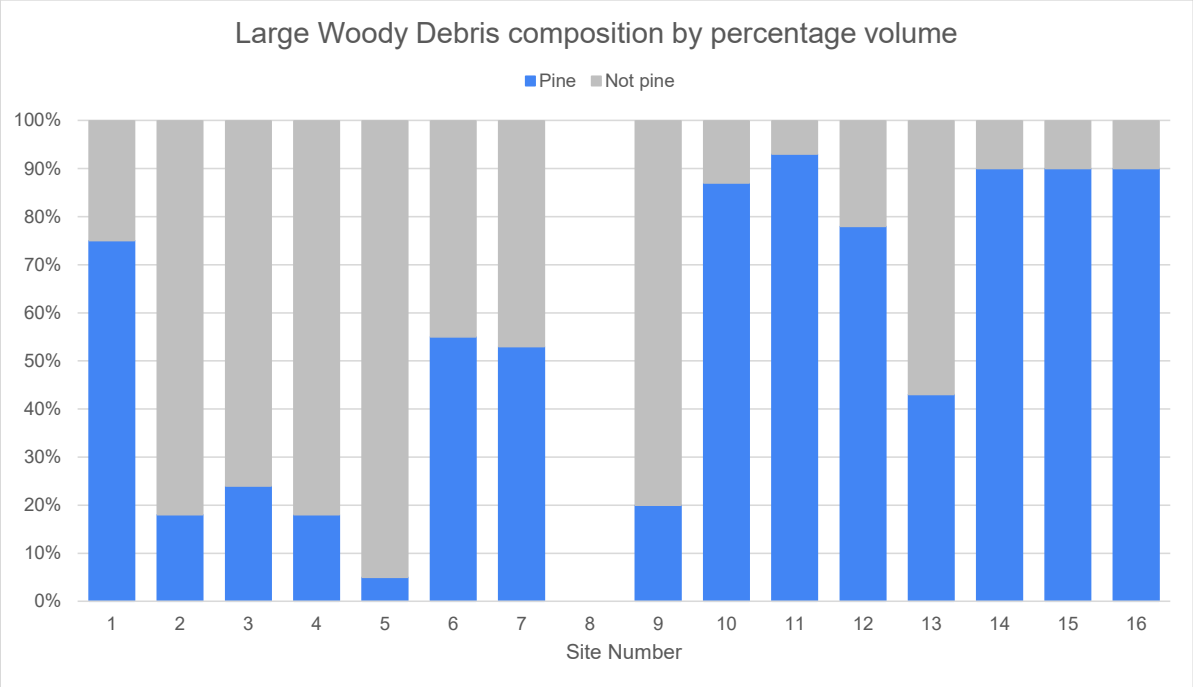


Figure 44: Large woody debris composition by percentage volume at all sites.

The figure returned via the qualitative visual assessment is similar to the quantitative LWD count data for pine species collected and presented in Figure 42 (N = 15, M = 56%, SD = 26%, min = 5%, max = 90%), suggesting that a qualitative visual estimation of percentage volume may have value as an additional LWD assessment methodology. This may be particularly valuable when time is limited (e.g., assessing multiple or remote sites via helicopter) or setting boots on the ground at assessment sites is not safe or achievable.

4.0 Conclusion

On average across the 15 sites for which data was collected the proportion of LWD of pine origin was 56% (N = 15, SD = 26%). The proportion of LWD of both willow/poplar or other species was on average 21% (N = 15, M = 21%, SD = 18% and N = 15, M = 23%, SD = 23% respectively). It is apparent from the data collected that pine was a significant contributor to LWD accumulations at the sites assessed with 75% or more of LWD at 5 sites (31%) originating from a pine source, 50% or more of LWD at 9 sites (56%) originating from a pine source, and 25% or more of LWD at 14 sites (88%) originating from a pine source. This finding is supported by the LWD percentage volume estimates which suggest that LWD accumulations at the sites assessed with 75% or more of LWD at 7 sites (44%) originating from a pine source, 50% or more of LWD at 9 sites (56%) originating from a pine source, and 25% or more of LWD at 10 sites (63%) originating from a pine source.

LWD of pine origin was allocated to one of five categories (Table 1) with the expectation that doing so could provide insight into the debris source of origin (e.g., a particular plantation forestry related activity). The average proportions of LWD assigned to each of these five categories at the 11 sites for which quantitative data was collected were as follows: pine piece (M = 37%, SD = 14%), long resident pine (M = 7%, SD = 9%), windthrow pine (M = 6%, SD = 5%), cut pine (M = 3%, SD = 3%), and fresh cut pine / post event modified logs (M = 0%, SD = 1%).

On average, the most common LWD recorded was *pine piece* (N = 11, M = 37%, SD = 14%, min = 17%, max = 60%). This category is defined as pieces of LWD not evidencing cut (or other) marks indicating that they have been harvested (either recently or historically). It is not unreasonable therefore to assume that this type of debris may have originated from trees damaged by cyclonic winds with pieces thereof subsequently entering waterways. The mechanism of delivery is potentially the same as that proposed for LWD categorised as windthrow pine discussed below.

The other four categories into which pine species LWD were placed averaged 16% in aggregate across the 11 sites assessed quantitatively. The relatively high contribution (in comparison to cut pine for example) of LWD in the windthrow pine assessment category was perhaps somewhat unexpected. Averaging 6% of LWD assessed across all sites, the presence of windthrow pine (which constitutes a tree or part thereof with the rootball attached) seems to indicate that perhaps both streambank and hillside erosion processes were a key LWD delivery mechanism during Cyclone Gabrielle.

Of particular note in terms of the scope of this assessment is the low contribution that *cut pine* made to LWD accumulations on average (N = 11, M = 3%, SD = 3%, min = 0%, max = 9%). Importantly according to the categorisation used, the LWD assessment category 'cut pine' took precedence over all others. That is to say that any piece of LWD of pine species origin evidencing cut or processing marks was categorised as cut pine. This was done to ensure LWD of this type (i.e., wood previously being harvested / processed in some way) was not underrepresented or diluted through inclusion in other categories.

5.0 Recommendations

5.1 Additional data collection

This assessment was undertaken within seven of the 12 HBRC water management catchments (Figure 1). This provided good representative coverage for areas known or thought to be subject to LWD accumulations. However, undertaking LWD assessments at sites within the Nuhaka, Waihua and Tangoio catchments (the latter falling within the Waikare water management catchment) would provide a more complete picture of LWD within the entire Hawkes Bay region. Sites to be targeted for additional LWD assessment should include both coastal and riverine sites, the latter focussing on locations at which infrastructure (e.g., bridges) are present. In this way, any differences in LWD accumulating at structures compared with LWD accumulating at the coast will be captured. As well as additional sites to be assessed, a number of sites visited during this assessment should be revisited with the aim of undertaking quantitative LWD assessments.

The degree to which LWD remains distributed within river catchments over time? remains unknown. Regular traverses of some rivers are recommended to begin assessing the residual risk posed by LWD that remains in Hawkes Bay river systems at or below flood height level. It is possible that other agencies have already collected data that would address both of the points raised above. If so, a collaborative approach to data analysis and interpretation should be explored.

Further, it is recommended that a routine LWD monitoring / assessment protocol be established at a number of LWD assessment sites, and that these are visited after significant rainfall events likely to have mobilised LWD.

5.2 LWD origin and future risks

One of the key outcomes of this LWD assessment was to utilise, if possible, the categorisation methodology to inform HBRC as to potential sources of LWD origin. Identifying the amount of land (ha) within each water management catchment (or better yet each river catchment) with the potential to contribute LWD could be used as a starting point for assessing risk to downstream infrastructure. A second measure that could be considered is the length of river (m) adjacent to each land use type with the potential to contribute LWD. This metric may be particularly useful when addressing the LWD contribution of willow and poplar tree species.

5.3 National Environmental Standards for Plantation Forestry compliance

Two elements of the NES-PF appear relevant in light of the results of this assessment.

Firstly, the protection of wetlands, which are an effective flood mitigation measure, is provided for through the application of machinery and planting setbacks. In addition, there is a requirement to remove any naturally / self-seeded pine trees that encroach into wetland areas.

Secondly, the protection of streambanks is provided for through the application of machinery setbacks, requirements for full suspension of trees being extracted across waterways, and planting setbacks. Considering the contribution to LWD accumulations made by windthrow pine, streambank erosion and/or hillslope erosion may be key LWD delivery mechanisms. An assessment of the scale to which planting setbacks (in particular) may contribute the current and future risk posed by LWD mobilisation events is recommended.

In addition, despite cut pine not contributing significantly to the LWD accumulations assessed, a review of information pertaining to slash trap location, design, maintenance and performance is also recommended to give further insight as to the risks posed by LWD of pine species origin in the HB region.

5.4 Summary of Recommendations

1. Assessment of LWD accumulations identified at additional locations.
2. Establishment of a routine LWD monitoring / assessment protocol after storm events.
3. Identification of potential LWD contributing land uses within river catchments.
4. Assessment of forestry industry compliance with several NES-PF regulations.

6.0 References

Cave, M., (2023). *Large Woody Debris Assessment Guide. V.2.1.* Gisborne District Council.

APPENDIX A

Large Woody Debris Data Collected

Site #	Summary statistics - quantitative and qualitative assessments				Summary statistics - qualitative assessment	
	Pine	Willow/Poplar	Other	Pieces counted	Pine	Not pine
1	75%	18%	7%	111	75	25
2	38%	37%	24%	123	18	82
3	33%	46%	21%	120	24	76
4	29%	37%	34%	235	18	82
5	5%	5%	90%		5	95
6	57%	32%	11%	88	55	45
7	60%	27%	13%	149	53	47
8						
9	32%	58%	9%	65	20	80
10	63%	6%	31%	357	87	13
11	77%	11%	12%	347	93	7
12	63%	8%	29%	172	78	22
13	44%	8%	48%	436	43	57
14	90%	5%	5%		90	10
15	90%	5%	5%		90	10
16	90%	5%	5%		90	10
17						
Mean	56%	21%	23%	200	56	44
SD	26%	18%	23%	126	32	32
Min	5%	5%	5%	65	5	7
Max	90%	58%	90%	436	93	95
N	15	15	15	2,203	15	15

Site #	Quantitative LWD Assessment							
	Cut pine	Long resident pine	Fresh cut pine	Pine piece	Windthrow pine	Willow/poplar	Windthrow willow/poplar	Other (No ID)
1	1%	1%	0%	60%	13%	9%	9%	7%
2	2%	3%	0%	31%	2%	24%	14%	24%
3	5%	3%	0%	17%	9%	43%	3%	21%
4	3%	1%	0%	22%	2%	37%	0%	34%
5								
6	1%	0%	0%	49%	7%	26%	6%	11%
7	9%	0%	0%	37%	14%	26%	1%	13%
8								
9	0%	0%	0%	20%	12%	55%	3%	9%
10	4%	22%	0%	33%	3%	6%	0%	31%
11	1%	21%	0%	54%	0%	11%	0%	12%
12	0%	15%	2%	44%	3%	8%	0%	29%
13	0%	7%	0%	38%	0%	8%	0%	48%
14								
15								
16								
17								
Mean	3%	7%	0%	37%	6%	23%	3%	22%
SD	3%	9%	1%	14%	5%	16%	5%	13%
Min	0%	0%	0%	17%	0%	6%	0%	7%
Max	9%	22%	2%	60%	14%	55%	14%	48%
N	11	11	11	11	11	11	11	11

APPENDIX B

Large Woody Debris Assessment Guide

Issues with the New Zealand Emissions Trading Scheme (ETS)

Dr. Christina Hood

27 March 2023

Prepared for Mana Taiao Tairāwhiti, as input to the Ministerial inquiry into Tairāwhiti/Gisborne and Wairoa land-use.

While the Emissions Trading Scheme (ETS) has a number of aspects that should be improved, this note focuses only on those that directly impact forestry and land use.

Background: What is the ETS? How does it work?

The ETS is a market which prices greenhouse gas emissions. The higher the cost of emitting, the more incentive there is to make reductions. The ETS covers most of Aotearoa New Zealand's greenhouse gase emissions apart from agricultural methane and nitrous oxide.

Each year, covered companies are required to surrender one New Zealand Unit (NZU) for every tonne of carbon dioxide (or equivalent) emitted. Over time, the government can reduce emissions by reducing the number of NZUs made available. NZUs can be traded, which creates a market price and allows emissions reductions to be made where they are most cost effective.

Covered companies can obtain NZUs from several sources:

- Through regular government auctions
- Via free allocation from the government to "energy intensive trade exposed" companies
- From a large "stockpile" of unused NZUs that companies hold and have banked from previous years
- By purchasing forestry NZUs which correspond to removal of carbon dioxide (CO_2) from the atmosphere.

The ETS is currently structured to control "net" emissions[1]: reductions in gross emissions are treated as fully equivalent to removals of CO_2 from the atmosphere through forestry. That is, if it is cheaper to do so, emitting companies have the option to purchase and surrender forestry NZUs rather than reduce their own emissions. The cost to convert marginal farming land to forestry is lower than the cost of many emission reduction options in the energy, transport, and industry sectors: as a result, the current ETS structure encourages substantial land-use change and has less impact on reducing gross emissions.

Forests established between 1990[2] and 2022 that are registered in the ETS earn or must surrender NZUs corresponding to their carbon "stock change", that is, the amount of carbon stored in the forest. As forests grow the carbon stock increases, earning NZUs, but if carbon stock is reduced

[1] "net" emissions = gross emissions - CO_2 removed through forestry

[2] Forests established before 1990 are not eligible to earn NZUs, but do face liabilities for deforestation. Pre-1990 forest owners were given a one-off allocation of NZUs when forestry entered the system as compensation for this. The distinction between pre- and post-1990 forests dates back to the accounting rules of the Kyoto Protocol which applied when the ETS was introduced. This accounting (with some modifications) is still used in the ETS and for New Zealand's domestic and international climate targets.

through harvest or conversion of land away from forestry ("deforestation") then NZUs must be paid back accordingly.

From 2023 new ETS forestry rules apply:

- New production forests will earn NZUs only until they reach their long-run average carbon stock (averaged across planting and harvesting cycles). As a result, NZUs will only be earned during the growth phase of a first rotation of forestry. As long as trees are replanted there are no harvest liabilities and there are no NZUs earned on subsequent rotations. NZUs would still have to be paid back if land is converted away from forestry. This new regime, known as "averaging", was intended to simplify participation for foresters.

- Forests registered in the new "permanent forestry" category (both new forests, and existing forests that are moved into the permanent category) can continue to earn NZUs on a stock-change basis. These forests must not be clear-felled for at least 50 years. The government consulted in late 2022 on whether to exclude exotic forests from the permanent category. It decided to redesign the permanent category, but not to exclude exotic forests in the meantime. In their decision, Ministers envisaged that a redesigned permanent category could put in place stronger measures around ongoing forest management, including requirements to transition to long-term indigenous carbon sinks.

Issue #1: CO2 removals from forestry should not be traded off against gross emissions reductions: Both are important.

The International Energy Agency's net-zero energy scenario shows that for 1.5C consistency, emissions from energy, transport and industry need to reach near zero globally by 2050, with the small amount of residual emissions captured and permanently stored. There is no offsetting of emissions with forestry. Developed countries' emissions from these sectors reach near zero well before 2050. At the same time, global pathways show that halting deforestation and supporting re-forestation are also critical for holding global temperature increase well below 2C (and ideally 1.5C). These international pathways show that both deep emission reductions and support for increased forestry removals are part of the climate change response.

New Zealand's current long-term targets in the Climate Change Response Act (and as a result, our ETS settings) are based on a net-zero target for 2050[3] that trades off emission reductions and CO_2 removals from forestry. Because buying forestry units is cheaper for companies than many emission reduction options, land conversion rather than emission reductions is currently the principal outcome.

In 2024, He Pou a Rangi (the Climate Change Commission) will provide its next advice on emissions budgets (adding a budget for 2036-40, and reviewing the existing budgets that have been set out to 2035). As part of this, it will assess and recommend whether the current 2050 target should be changed. The 2050 targets were set by political negotiation during the passage of the legislation, and in my view are not aligned with international expert views on 1.5C consistency, but this issue will not be debated until 2024.

However even with the current framework based on net emissions, He Pou a Rangi recommended a stronger focus on gross emissions reductions in the <manner> that the budgets are achieved. In

[3] The net-zero target applies to gases other than biogenic methane (which has a separate target).

its 2021 advice, it found that continuing with current ETS design that only considers "net" emissions would lead to our 2050 net-zero target being met mostly through forestry removals, with very little reduction in gross emissions. Its modelling found that a steeply rising ETS price is expected to be needed to drive gross emission reductions, while even at a significantly lower price there is sufficient incentive for enough new forestry to meet the emissions budgets.

He Pou a Rangi advised that such a heavy reliance on forestry removals is not a durable net-zero strategy, because:

- to maintain net-zero after 2050 would require ever-increasing areas of land to be converted to forestry (remembering that forests only earn NZUs during the first rotation);
- it would leave Aotearoa out of step with the rest of the world which is making technology transition in these sectors; and
- it would leave future generations with the task of reducing gross emissions at the same time as they will need to be adapting to escalating climate change impacts.[4]

He Pou a Rangi also raised concerns about how "permanent" plantation pine forests are once mature, or whether they would be exposed to pests or windfall. Considering all these factors, they recommended *" Amending the NZ ETS to strengthen the incentive for gross emissions reductions and to manage the amount of exotic forest planting the NZ ETS drives, in line with the Commission's advice on the proportion of emissions reductions and removals necessary for meeting emissions budgets"*.

The government agreed with this recommendation and has announced that there will be a consultation in Q2 of 2023 on ETS reform. This consultation provides an opportunity to realign the balance between emission reductions and land-use change driven by the ETS.

ISSUE #2: Under current ETS settings, there is a looming oversupply of forestry units.

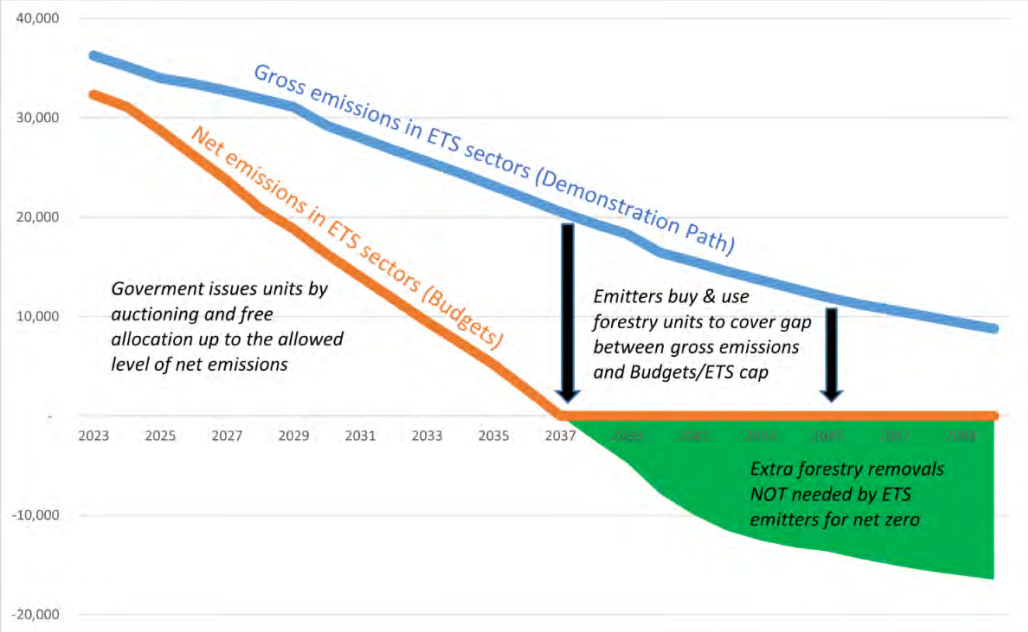
Under the current ETS design and current practice for making ETS settings, Figure 1 below shows the projections made by He Pou a Rangi for gross and net emissions in sectors covered by the ETS. The orange line shows the net emissions in ETS sectors consistent with meeting the legislated emissions budgets out to 2035. The government issues NZUs that allow emissions in ETS sectors up to that orange level. Companies can buy and use forestry credits to cover emissions beyond that level.

The projection for ETS sector net emissions goes to net-zero in around 2037. After 2037 if the ETS maintains a net-zero obligation on covered companies, then there will be a large surplus of forestry units that will not need to be bought by ETS emitters (the green area in Figure 1). That is, ETS emitters can buy forestry NZUs to cover all of their emissions, and still there will be a large quantity of forestry NZUs left over. There is currently no plan to deal with this surplus. Units could potentially be sold to other buyers such as

- the government, to meet New Zealand's domestic and international targets
- farmers, if future governments were to bring in a requirement for agricultural emissions to be offset, or
- overseas buyers, if the government allows export of units.

[44] Ināia tonu nei, pg 90. https://www.climatecommission.govt.nz/our-work/advice-to-government-topic/inaia-tonu-nei-a-low-emissions-future-for-aotearoa/

Figure 1 – Projected gross and net emissions in the ETS (He Pou a Rangi scenarios)



This means that even if the current "net" target is retained, the role of forestry in the ETS needs a major re-think.

Note that the government modelling still projects significant long-term oversupply of forestry NZUs even if exotic forestry were excluded from the "permanent forest" category. For example, Ministry for Primary Industries scenarios (which informed decisions on the permanent category) show that in 2050 there could be 30Mt of forestry removals vs 15Mt of emissions, even if exotic forests were excluded.[5] In their modelling, including of exotic forests leads to a much higher surplus of forestry units that are not needed by ETS emitters.

ISSUE #3: The current ETS is much better aligned for fast-growing plantation pine forests than for slower-growing indigenous reforestation.

He Pou a Rangi recommended greater investment in new and regenerating native forests to deliver a long-term carbon sink, improve biodiversity, soil and water health, and realise recreational and cultural benefits. However native forests with long-lived tree species are slower growing, have high establishment and maintenance costs, and lack a downstream wood industry. These make the economic case for native reforestation challenging.

The government's Emissions Reduction Plan proposed several responses:

- a review of the yield tables (carbon look up tables) that provide default values for carbon stored in different forest types, and extend these to greater than 50 years.
- Reducing the cost of native afforestation by working with the nursery sector

[5] More discussion at https://www.linkedin.com/pulse/forestry-ets-some-thoughts-ahead-fridays-consultation-christina-hood/

- Investigating longer-term options, including supporting Māori-led approaches to native forest establishment[6]

These are worthwhile actions, but in themselves will not make the ETS a strong driver of native forest planting. The ETS is a system based around emissions and removals each year, which naturally favours rapidly-growing species. Other types of policy solutions to complement the ETS price signal are needed.

POSSIBLE ETS CHANGES

The government's review of ETS settings provides an opportunity to update the scheme to drive much deeper emission reductions in energy, transport and industry. The key challenge is how to realign the way forestry is supported so that it is done "as well as" not "instead of" making a transition away from fossil fuel emissions.

Because of the looming oversupply of forestry units in the ETS, solutions which propose to award native forests extra NZUs won't work. That type of proposal is also at odds with the fundamentals of the ETS, where each unit must represent one tonne of emissions emitted to or removed from the atmosphere.

In my view the best way forward at a high level is[7]:

- forests that receive NZUs should still be managed using the current architecture of the ETS (which is world-leading) to e.g. register forests, do measurement and reporting, set legal obligations, issue units, manage deforestation obligations, provide infrastructure for registries etc.
- However, there should be a change made to who <buys> forestry units. ETS participants should have cap for gross emissions, and no longer purchase/use forestry units. Forestry removals should instead be paid for by the government (which would receive enough increased auction revenue under a gross ETS cap to cover this cost) and/or by other purchasers. Most of the projected forestry removals to 2035 are needed to meet New Zealand's domestic emissions budgets, and any extra can reduce the need for offshore purchases toward New Zealand's current and next NDC. As such, the government could easily commit to being a backstop buyer for all forestry units issued until at least 2035.

This change would address the looming supply/demand imbalance in the ETS, and also means that a different price can be struck for forestry units than the ETS market price. Forest CO_2 removal would still be financially rewarded, but at its own appropriate level (reflecting its non-permanent storage of carbon) rather than the ETS price needed to drive energy system transformation.

Separation of forestry unit generation/management from purchase would also:

- make it easier to add additional payments that reflect other values beyond only short-term CO_2 removal: biodiverse native forests could for example receive added biodiversity credits or payment for erosion control.

- allow for better ongoing land-use flexibility, as land-use decisions would not be tied to the high and rising ETS price seen by emitters. The need for flexibility includes the potential future need for some forestry to be replaced with bioenergy or food crops.

[6] Emissions Reduction Plan Action 14.2.3

[7] A longer discussion can be found at https://www.linkedin.com/pulse/nz-ets-re-design-gross-emission-reductions-better-land-christina-hood/

- enable lower (social) discount rates to be used in assessment of policies to support long-term native reforestation. The short to medium term commercial returns from carbon forestry (reflected in commercial discount rates) do not capture the societal and environmental benefits of large-scale indigenous reforestation.

- open the door to long-term funding options, that "bring forward" the benefit of long-term sequestration to cover up-front costs. The government, or other buyers with very long-term interests (super funds etc.) could enter into long-term (e.g. 100 year) agreements for carbon rights, coupled with financial support for forest establishment and management.

In addition, it is critical that the government follow through with its intended redesign of the permanent forestry category: there should be strong and binding measures around long-term forest management, and an emphasis on indigenous carbon sinks for any newly planted forests. For Tairāwhiti a key question will be what the best transition path is for existing pine plantations. Should these be harvested at all? If not, how will ongoing forest management and transition to indigenous forest be funded? The permanent category in the ETS could potentially help transition existing forests that it is not appropriate to harvest, as well as to support new indigenous planting.

Finally, it is important to note that the ETS only provides a financial incentive relating to carbon, other policies are needed for appropriate land-use regulation. Land-use planning and resource management tools will be a critical part of improving forestry outcomes, but are additional to the ETS.

Land Use in Tairāwhiti & Financing Biodiversity – Briefing Paper for Mana Taiao Tairāwhiti

Dr David Hall, March 2023

Context

1. In the aftermath of Cyclone Gabrielle, there is an opportunity for land-use change to positively contribute to a variety of community and government objectives, including climate adaptation, biodiversity improvement, catchment resilience, and long-term carbon storage.

2. Ultimately, there can be no predetermined spatial solution, because land-use decisions should reflect the risks and opportunities of specific sites, as well as the aspirations of landowners, land managers, tangata whenua and the wider community. However, to support the above objectives, land use change in the East Coast should exhibit several trends in the near future:

    - A shift from pastoral agriculture on highly erodible soils to vegetation and forest, especially in upper catchments.

    - A shift from clear-fell harvesting of plantation forests to less intensive forest management systems, such as continuous cover forestry, or unharvested biodiverse forest for carbon farming.

    - A shift from the use of exotic even-aged monocultures for carbon farming to the use of biodiverse, uneven-aged forests – with a strong preference for native species dominance over time.

    - A greater integration of wetlands, floodplains, riparian margins and estuarine ecosystems throughout catchments to manage flood risk and flood-related impacts.

3. Current policy settings are not well-suited to delivering these outcomes. In particular, the monetisation of carbon sequestration through the Emissions Trading Scheme creates strong incentives which is inconsistent with these objectives:

    - Averaging accounting creates an incentive to convert pastoral land to exotic plantation forestry for clear-fell harvest.

    - Stock change accounting in the Permanent Forest Category creates an incentive to convert pastoral land into unharvested exotic forests for carbon farming.

    - A combination of high carbon prices and increased regulatory stringency on clear-fell harvesting is likely to incentivise the transition of even-aged exotic

forests into the Permanent Forest Category for carbon farming, even though these forests are likely to lack resilience to climate-related events.

4. To facilitate change toward improved land use in the East Coast, coordinated reform is needed across multiple policy instruments, especially the Emissions Trading Scheme (ETS) and National Environmental Standards for Plantation Forestry (NES PF). However, an effective policy mix also needs new economic or policy instruments to enable and incentivise nature-positive activities that the present economy is currently failing to deliver.

Proposal: Options for a Biodiversity Payment

5. A biodiversity payment has the single greatest potential to improve land use outcomes in the East Coast and elsewhere. This is because a biodiversity payment, by creating liquid cashflow for biodiversity improvement, facilitates the creation of markets that can match demand for regenerative activities with supply.

6. A biodiversity payment supports nature-positive land uses by reducing or neutralising the opportunity cost between more and less intensive land uses, and especially the opportunity cost between native forest and faster growing exotic forest. Consequently, a biodiversity payment creates an incentive for landowners not otherwise motivated to restore biodiversity, but also enables landowners who are motivated to restore biodiversity to do more of what they already want to do.

7. The aftermath of Cyclone Gabrielle creates an opportunity to pilot a biodiversity payment through disaster recovery funding. This would deliver on two critical objectives: (1) enhancing regional resilience to future climate-related disasters and (2) creating regional economic opportunities to address the long-run economic effects of Cyclone Gabrielle. Lessons learned from the application of a regional biodiversity payment could be applied elsewhere in Aotearoa New Zealand to drive better land-use outcomes.

8. A biodiversity payment could be delivered by a number of different instruments, which range from voluntary to compliance-based.

Biodiversity credits

9. A biodiversity credit is a tradeable unit which represents a standardised improvement to biodiversity. Through the issuance of biodiversity credits, there is an opportunity to create biodiversity markets that serve to complement and counterbalance existing markets for carbon credits.

10. Currently, two major constraints for biodiversity credits are (1) a lack of appropriate methodologies for the issuance of biodiversity credits in Aotearoa and (2) uncertainty around the scale of voluntary demand for biodiversity credits:

- Internationally and domestically, there is already progress underway to develop appropriate methodologies for biodiversity credits. A critical platform is the Biodiversity Credit Alliance, led by the UNDP and UNEP, which counts at least three New Zealand-based organisations among its members. Also, Australia has now introduced the Nature Repair Market Bill into parliament to establish a legislative framework for a biodiversity market. Methodological constraints are on the way to being overcome.

- Achieving scale in voluntary demand is likely the greater challenge, because of the significant market education involved. This is beginning to occur, especially through the adoption of reporting and disclosure frameworks for climate and nature-related risks, which are designed to motivate companies to invest in biodiversity and ecosystem-based adaptation to reduce the risks identified. Similarly, impact frameworks like Science Based Targets for Nature encourage companies to address biodiversity impacts throughout their value chain. Nevertheless, voluntary demand is only likely to increase gradually, with an initial focus on where biodiversity impacts are material to the company.

11. To overcome uncertainties around voluntary demand, governments might implement compliance markets for biodiversity, analogous to what the Emissions Trading Scheme enables for greenhouse gas emissions. One way to achieve this is biodiversity offsetting requirements, which are currently being developed for the Natural and Built Environment Act. However, internationally, there is an emerging consensus that biodiversity credits should not be used for offsetting, but rather as proof that the credit holder has contributed positively to biodiversity goals or objectives. In this vein, an alternative structure for a compliance market would instead require participants to meet annual quotas in biodiversity improvement. As such, participants would be required to surrender a certain volume of biodiversity credits each year to achieve a pre-agreed quota, with credits being purchased directly from suppliers or via secondary markets.

Direct payments for biodiversity

12. Direct payments are simply a financial transfer in exchange for the production of biodiversity value. Ideally these are designed as results-based or outcomes-based payments, which reduce the risks to funders that intended impacts are not achieved. While the issuance of a credit is not necessary to support direct payments, a methodology for monitoring, reporting and verification of various indicators will still be critical for establishing a high-integrity outcomes-based funding system.

13. A direct payment for biodiversity and landscape resilience is one way that disaster recovery funding could be deployed by government to stimulate the regional economy, while also contributing to policy objectives for climate adaptation and biodiversity. The Jobs for Nature programme is a recent example that could be improved upon. In the post-disaster context of the East Coast, the payment could be earmarked for the

creation and management of nature-based solutions, such as native forests on erosion prone slopes, or wetlands in flood prone catchments. By shifting to paying for outcomes, moreover, a payment scheme might reduce its overall administrative costs.

14. Direct payments are vulnerable to fiscal unsustainability and changes in government priorities. However, as a time-limited use of recovery funding, a direct payment scheme might serve to demonstrate the impacts that biodiversity payments has on land use outcomes.

15. Over the longer term, a direct payment scheme in the East Coast could serve as a pilot for revenue-neutral schemes that use a levy to fund the protection, restoration and creation of native biodiverse ecosystems. In accordance with the polluter-pays principle, the levy might be imposed on activities that threaten or degrade biodiversity. This corresponds with the Tax Working Group recommendations to explore a natural capital enhancement tax, complemented by biodiversity tax credits, over the next 10–30 years. The intent is to expand the tax base and to improve market functioning by ensuring that people and companies better understand and account for the impact of their actions on natural ecosystems.

16. A natural capital enhancement tax could be implemented by a national land-use intensity (LUI) indicator, which involves a measure of human activity concentrated per unit area and time. This might be measured as inputs (e.g. amount of fertiliser), outputs (e.g. yields), emissions (e.g. nitrogen, phosphorus, E. coli, air emissions), efficiencies, frequencies (e.g. cultivation), or densities (e.g. housing density). Basically, this would involve a transfer of capital from areas with the most intensive land uses (i.e. urban areas, followed by intensive agriculture and forestry) to land areas with less intensive or more regenerative land uses. In turn, this might improve the acceptability of the levy by increasing the social solidarity between urban and rural communities.

Resilience bonds

17. Bonds are certificates of debt issued by a government or corporation that promise payment of the borrowed amount, plus interest, by a specified future date. Green, social and sustainability (GSS) bonds have emerged in recent years as a family of bonds which require that bond proceeds are strictly used for projects with positive environmental and social outcomes across various sectors, including energy, transport, built environment, waste, water, land use, agriculture, adaptation and resilience. Resilience bonds are simply a species of GSS bond that focus on the latter themes of adaptation and resilience.

18. Bonds create the capacity to spread the costs of investment across multiple generations. This is appropriate when future generations are beneficiaries of that investment, such as long-lasting infrastructure which contributes to future wellbeing and economic productivity. The same economic logic applies to the natural infrastructure of nature-

based solutions, such as native forests or wetlands in strategic sites. In the context of global heating, these land-use changes can reduce risks and vulnerabilities, and therefore result in avoided losses and damages. It also reduces the forward liabilities to government which would otherwise carry the costs of repairing or replacing infrastructure, as well as assisting communities in the event of disasters. From the perspective of the Crown's balance sheet, nature-based solutions will often be a highly cost-effective way to manage those forward liabilities. Also, in the context of high inflation, debt is potentially more politically acceptable than new levies or taxes that create revenue in the present.

19. The purpose of a use-of-proceeds bond, such as a resilience bond, is to ensure that bond proceeds are directed toward pre-specified outcomes and activities. Biodiversity payments, supported by impact verification, is one way to ensure that bond proceeds are being used to achieve social and environmental objectives. For instance, bond proceeds could be used to fund a region-wide pest and predator control programme, which facilitates natural and assisted regeneration in upper catchments that most need forest canopy cover.

20. The potential for impact can be further enhanced by designing a sustainability-linked bond, which reduces interest rates if pre-agreed sustainability performance targets, or KPIs, are achieved. For instance, Uruguay has issued a sovereign sustainability-linked bond which tracks KPIs on emissions reductions and also the maintenance of native forest area. If both KPIs are exceeded, then interest rate is reduced, thereby reducing the costs of servicing the debt.

A Submission to the Inquiry into Forestry Related Impacts of Cyclone Gabrielle

Don Miller (Formerly Scientist Water and Soil Divn, MWD/DSIR and Geotechnical Consultant.) March 2023

In this I will call on my four decades of field experience in this topic in this region. Time constraints limit me to two interrelated subjects – Mapping Scale and The Mechanics of Large Slope Failures. Failures of this type have plagued SH35 since at least 1973, when I first investigated problems of slope instability in the Kopuaroa Hill section of the highway.

The scale at which an area is mapped can greatly influence the class into which an area is assigned. During the initial 1973 mapping of the East Coast Region it was noted that an area mapped as a certain unit at 1:63,000 scale (one mile to the inch used at that time) contained almost none of that unit when remapped at 1:10,000 (farm scale mapping). This scale related problem can lead to anomalies in assigning areas of land appropriately for the erosion problem being treated.

The Mangahauini Gorge has been badly affected by large landslides, despite the eroding parts of the slopes being forested. A study of historic and recent aerial imagery, plus my experience in this area both before and after Cyclone Bola, has revealed the likely cause of these movements. It seems that the policy used in selecting LUC Units to be planted may have failed to have the correct areas treated.

Very large movements, as seen in the slopes either side of the Mangahauini Gorge, are usually deep seated and have a rotational component in the upper slope that can produce relative flat land. Even under 1:10,000 mapping this area will be classed outside of the group designated for stability planting.

Aerial Imagery

The ready availability online of historical aerial photographs provides a tool that can allow most people involved in land management of all kinds to see how things have changed over time. Yet during my many years in MWD I found that only a few engineers could make the best use of aerial photographs.

I have used the 1945 NZ Aerial Mapping photographs in this study, as well as the post Gabrielle 3 metre resolution satellite imagery from LINZ and Google Earth. The 1945 series of photographs have remarkable definition.

Fig 1

Close examination of this 1945 photo of the Mangahauini Gorge shows a series of large land slide features on both sides of the river. The areas outlined are the steeper main scarp and relatively level head of two of these failures.

The following stylized diagram quite closely resembles the movement outlined in blue on the eastern side of the gorge.

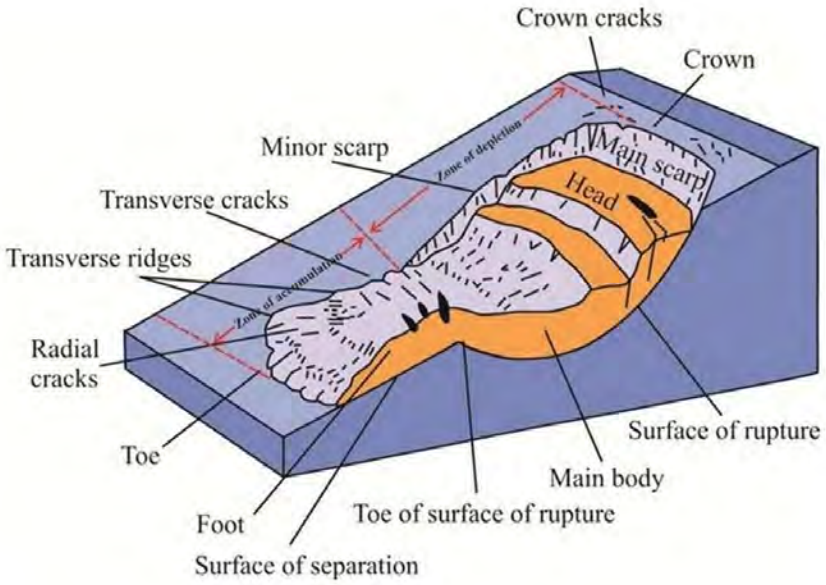


Fig 2

As I have been unable to obtain ground-based photographs of the western slope failures since Cyclone Gabrielle, I will use this **eastern** failure, on the opposite slope, as a proxy. The photo below, taken after Cyclone Bola, shows the relatively gentle contours of the head of the failure and the steep scarp behind clad in native vegetation. (See circled area in fig 1)

Fig 3 (1989 photo)

The head, in this case, is largely self draining, with little evidence of ponding of water. Infiltration in that area may, however, have contributed to the failure of the lower slope which blocked SH35 for some time after Bola. In the intervening 3 decades some observations have been forgotten!
The main body of the **eastern** slope failure is seen here with typical disturbed ground contours. Of significance is the pine forest on the lower slopes on the **western** side of the gorge seen here. This area will be referred to next.

Fig 4 (1989 photo)

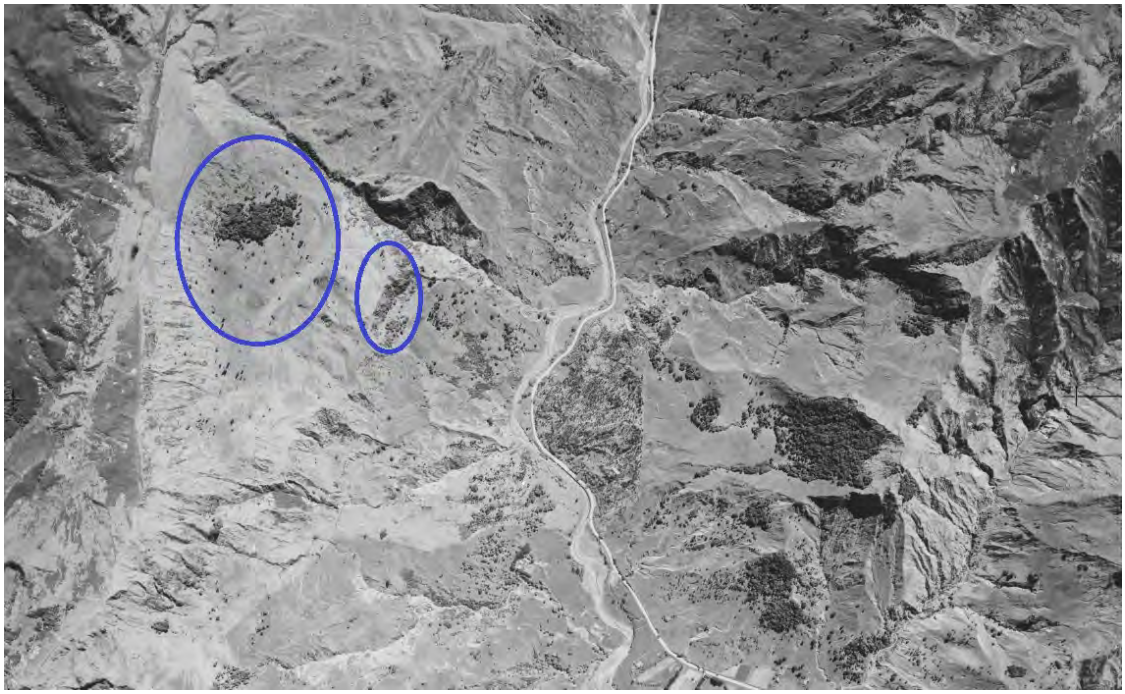


Fig 5

In fig 5 above I have again outlined areas of importance in this discussion, while in fig 6 below I have identified these features in greater detail.

Fig 6

Ridgeline in blue. Main back-tilted head and ponding area and secondary back-tilted head in red.

The significance of the main back-tilted head as a potential ponding area and infiltration zone will become apparent in the imagery taken immediately after Cyclone Gabrielle. The smaller back-tilted head has unknown ponding capacity but is highly likely to also increase infiltration of rain water into deeper levels of the movement.

Increased Porewater Pressure is a major destabilizing force in almost all slope failures and in cases like these in the Mangahauini Gorge that are only triggered by very high rainfalls of long duration it has clearly been the dominant cause. In lesser rainfall events the rate at which internal permeability allows porewater pressure to dissipate is greater than infiltration rates in the major infiltration zones. Consequently porewater pressure does not rise to dangerous levels.

Where there is an infiltration zone that has inadequate surface drainage, water can pond during high rainfall, greatly increasing flow to deeply levels where the historic failure plane exists. A difficulty in identifying these infiltration zones is that they don't hold ponded water for long and when inspected after the event may appear to be dry and of little importance. I could quote other examples, but the slopes above SH35 on the Kopuaroa Hill contain clear examples.

The post Gabrielle satellite photo seen below (fig 7) shows very clearly the significant volume of water pooled in the main ponding area of the slope failure in the Mangahauini Gorge that we are discussing.

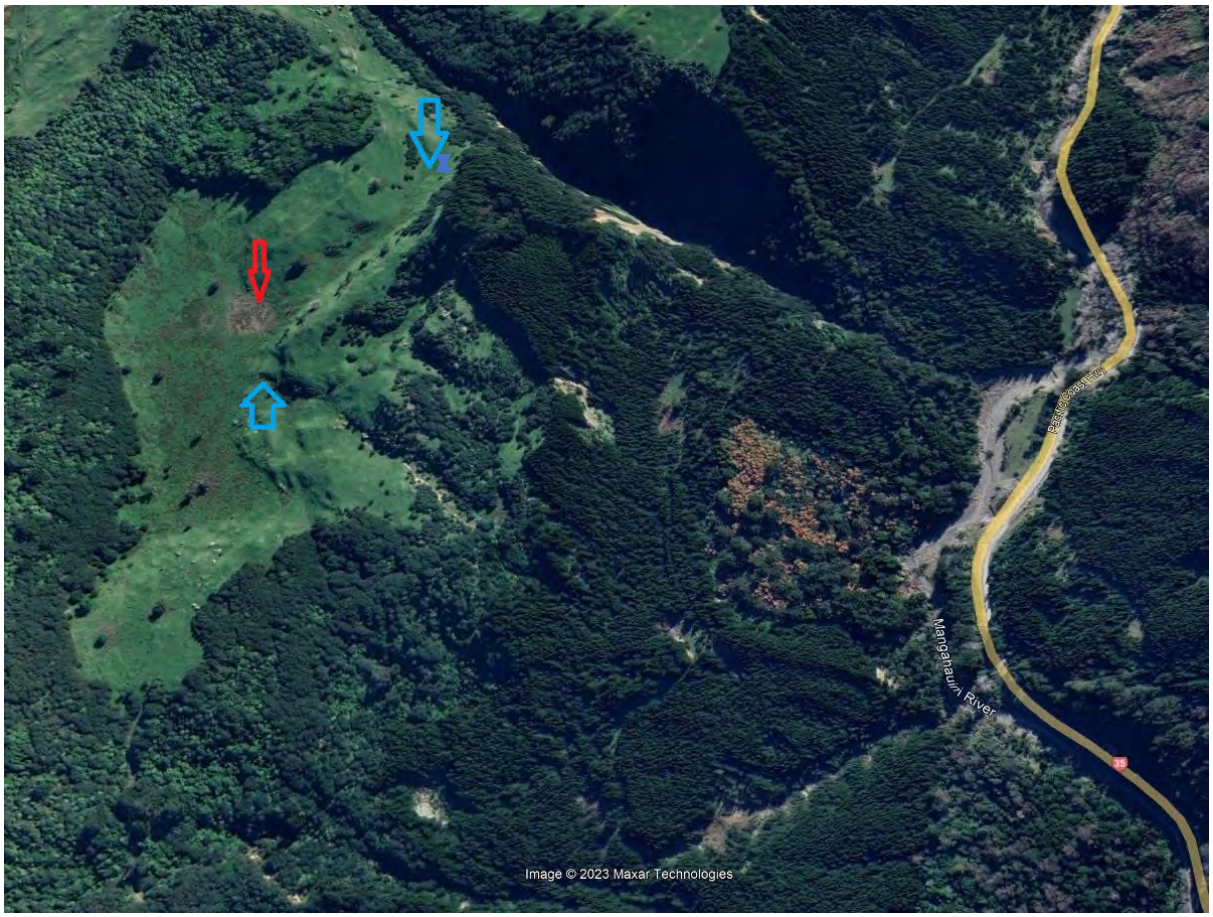
Fig 7

Back-tilted head with ponded water in red. Reactivation of gullies within the main body of the historic slope failure in white.

The volume of water seen pooled here, plus the volume already infiltrated, as well as infiltration over the entire area of the historic failure, has been enough to trigger further movement.

Current Google earth imagery (fig 8) shows signs of vegetation that may have been affected by standing water over a smaller area, which implies that it is a regular occurrence, but with worse impacts due to the extended period of frequent intense rainfall over the last year. Rough heights obtained from this imagery indicate that about a metre depth of water could pool during intense rain events, although an on-site survey is required for accurate results. A large proportion of that back-tilted head appears to have vegetation typical of very damp areas.

Fig 8



Vegetation affected by standing water in red. Likely existing surface outlets in blue.

Salient points

1. A whole-of-slope geotechnical assessment should be applied to all slopes adjacent to a major highway such as SH35. This need not be an expensive detailed study, but merely an assessment of likely risks resulting from increased infiltration due to previously unrecognised infiltration zones.

2. Treatments could consist of the opening of surface drainage channels to ensure that water no longer ponds in these zones and the possible lining of such zones with an impermeable clay where they are of particularly permeable material.

3. The established drainage technique of horizontal boring could have application in some situations, but only if effort has been made to reduce infiltration up-slope of the drainage boreholes first.

4. Where the LUC classification of an area indicates that only certain designated units should be treated (with, for example, afforestation) the remainder of the slope should always be assessed to determine if it also needs to be treated in some way to improve the success of the revegetation work. The back-tilted slopes in the examples studied above have apparently fallen outside of the criteria for conservation planting.

Notes.

The author worked as a scientist with MWD between 1967 and 1987 with MWD investigating aspects of slope stability on the East Coast including ground water flow in unstable slopes. This was followed by further years with DSIR due to restructuring. From 1992 he was a Geotech and LUC mapping consultant while also teaching Earth Science at Tairawhiti Polytech and consulting internationally on revegetation projects.

He was employed by the GDC for three years reviewing geotechnical reports before leaving to teach environmental science in Vietnam.







Taiao Mātāmua

Mana Taiao Tairāwhiti submission to the Ministerial Inquiry on Land Use in Tairāwhiti, Tūranganui-a-Kiwa and Te Wairoa

Taiao Mātāmua

Wānangahia te atua o te rangi
O te rā, o te marama, o te whetū, o te kapua, o te hau
Tātaihia ko te kawa o te rangi,
Ko te nui o te rangi, ko te hua o te rangi
Ko te paki o te rangi, ko te pū o te rangi
Ko te mana o te rangi ka tau hā,
Whakatau ko te rangi e tū iho nei

Ka tau hā, whakatau
Ko te whenua e takoto ake nei
Takitakina ko te kawa o Papa
Ko te horanga ā-nuku, he atua!
He tipu te atua, he rākau te atua,
He ngārara te atua, he manu te atua
He oneone te atua e tangi ai te mapu
I te korowai ka takapau he kawa ora!

He orangarangi, he oranganuku
He aroha nā, he kōmanawa
Rurukuhia ki te wai whakaika,
Ko te kawa Tangaroa, he atua!
He mātāpuna, he pukenga wai,
He terenga ika, he paringa tai,
Homai te waiora ki a au
Ki taiao nuku, ki taiao rangi
Ka whakairihia te kawa
Homai te kauhou atua ki uta e

Tēnei te ara, ko te ara ki hea
Ko te ara ki uta, ko te ara ki tai
Ko te ara ki tua o taumata whakaaro
Kia puta ki te whai ao, ki te ao mārama
Mārama te whakaaro
Mārama te whakatika
Mārama te whakakao
Mārama te hau,
He mauri ka whiti, he kawa ora!

Submission

1. **Te Mamae:** The Pain
2. **Te Tono:** Our Priority Recommendations
3. **Te Rongoā:** Evidence Base for Recommendations & Solutions
4. **He Moemoeā:** A Vision for Optimal Land Use in Tairāwhiti

Thematic Summaries of Evidence

A. Whakapapa & Whenua

B. Human occupation and activity

C. Impacts of storms

D. Economic drivers of current land use practices and economic constraints on better alternatives

E. Afforestation (exotic vs indigenous / production vs permanent)

F. Regulatory issues

G. Current local and central government work programmes

H. Recommendations to improve land use, employment and regulatory settings

I. Impacts of the political economy, land tenure system and capital on power dynamics and land use decision-making processes in the region

J. The role of Whakapapa, Tikanga, Mātauranga and Kaitiekitanga in relation to the protection and utilisation of whenua

K. International best practice, agreements and norms compared to New Zealand's land use system

Issues Papers

1. ETS & Tairāwhiti Forests
2. NES-PF Process & Problems
3. Incentives for Diverse Indigenous Afforestation
4. Climate Change & Tairāwhiti Forests
5. Technical Case Study: Mangahauini Slip

Visual Evidence & Testimonies

MTT has also produced an interactive map of testimonies and evidence from residents available at: **www.manataiao.org**

1.

An immediate end to clear-felling on erosion-prone land.

Firstly, we recommend an immediate cessation of all spraying and clear-fell harvesting of trees (exotic and indigenous) in Red (“very high-risk”) and Orange (“high-risk”) zones as defined by NES-PF Erosion Susceptibility Classification.

2.

An immediate native reforesting of recently harvested areas and erosion-prone land currently in pasture.

Secondly, we recommend reforestation of pasture and recently harvested areas, and transitioning existing plantations on Red and Orange zoned landscapes to permanent diverse native forests.

3.

Not one more pine tree planted on erosion-prone land.

Thirdly, we recommend a moratorium/rāhui on new and replanted pine plantations on Orange and Red zoned erosion-prone land in the region until the risks and alternatives are better understood..

Additional Recommendations

A. ETS Changes

B. Invest in Community Resilience & Capacity-Building for Transition Planning

C. Increase efforts to accurately map terrain to a finer scale and classify acceptable land uses accordingly

D. Forest Environment Plans

E. Progress Constitutional Transformation

Potential Action Plan (1-5 years +)

◆ Catchment Communities, Marae, Hapū & Iwi
◆ Local Government
◆ Central Government
◆ Business & Industry

Area	Long-Term (5 Years)	Short-Term (2 Years)	Immediate (1 Year)
Land Use	• Mosaic of Truly-Sustainable Land Uses ◆◆◆◆	• Catchment Level & Regional Planning ◆◆◆ • Land Governance Succession ◆	• Catchment Level Learning & Assessments ◆◆◆ • Land Governance Training ◆
Habitation	• Seasonal Access? ◆◆ • Managed Retreat / Migration? ◆◆◆	• Resilience Planning & Action ◆◆◆◆ • Relocation ◆◆◆◆	• Risk Assessments & Emergency Planning ◆◆◆◆
Tikanga	• Constitutional Transformation ◆◆ • Legislation & Tikanga Changes ◆◆	• Policy & Rule Reviews ◆◆ • Wānanga Tīkanga ◆	• Enforcement Orders ◆ • Class Action ◆◆ • Treaty Claims ◆
Planning	• National Just Transition Legislation ◆	• Action for Energy, Food, Transport, Housing & Communications Resilience ◆◆◆◆	• Local, Regional & National Just Transition Planning ◆◆◆◆
Economic	• Degrowth / Reimagining Capitalism / Circular Economy ◆◆◆ • Land Tenure Legislation Review ◆◆	• Redeploy/Retrain affected farm and forestry workers ◆◆◆ • New IP & Ownership Models ◆◆◆ • Truly Sustainable Industry & Business Development ◆◆◆◆	• Identify & Support Vulnerable Workers ◆◆◆ • R&D Investment & Reprioritisation ◆◆◆ • Showcase Better Businesses ◆◆

Brief to Mana Taiao Tairāwhiti to support with Tairāwhiti Land Use Inquiry

Shaun Awatere, Manaaki Whenua Landcare Research, Hamilton 3240, New Zealand, awateres@landcareresearch.co.nz
Nathanael Melia, Climate Prescience Limited, Rotorua 3010, New Zealand, nathanael@climateprescience.com
Greg Bodeker, Bodeker Scientific, Central Otago, 9320, New Zealand, greg@bodekerscientific.com
Suzanne Lambie, Manaaki Whenua Landcare Research, Hamilton 3240, New Zealand, lambies@landcareresearch.co.nz

1. We submit that: due to the unique landscape of Te Tairāwhiti, adhering to Clause 69 of the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017 (NES-PF) is not possible for many Te Tairāwhiti's pine plantation forest blocks.

Key Recommendations

2. We recommend immediate cessation of all clear-fell harvesting of pine plantations in "very high-risk" (red) and "high-risk" (orange) as defined by NES-PF Erosion Susceptibility Classification (ESC)[1].
3. We recommend the reforestation of recently harvested areas and transitioning existing "very high-risk" (red) and "high-risk" (orange) plantations to old-growth native forests[2].
4. We recommend investigating the potential for on-site slash removals, such as chipping and biomass processing, and bio-energy with carbon capture and storage (BECCS).

Supporting information

Cyclones and human-induced climate change

5. Topical Cyclones that form in the tropics but then migrate out of the Tropics towards Aotearoa New Zealand, always become extratropical cyclones. Cyclone Gabrielle was an extratropical cyclone. Extratropical cyclones have always impacted Aotearoa New Zealand. While there is little robust evidence as to whether the **frequency** of extratropical cyclones making landfall in Aotearoa New Zealand is increasing or decreasing, there is evidence that the **intensity** of such events may increase due to climate change (Figure 1).
6. A priority study by the global organisation World Weather Attribution found a "relationship between historical weather station data (1979-2023) and global mean

[1] See Figure 1.
[2] Available here: https://mpi_nes.cloud.eaglegis.co.nz/NESPF/

temperature to extrapolate back to colder climates, we found that the 2-day maximum rainfall over Te Matau-a-Māui/Te Tairāwhiti region is now about 30% more intense than it might have been had human greenhouse gas emissions not warmed the climate by 1.2°C. This also means a rainfall event of this magnitude is now about four times more likely to happen than it was when the world was 1.2°C cooler than it is today." (Harrington et al 2023). They suggest that events like this are rare but will be made increasingly likely with future warming that the world will experience in the coming decades.

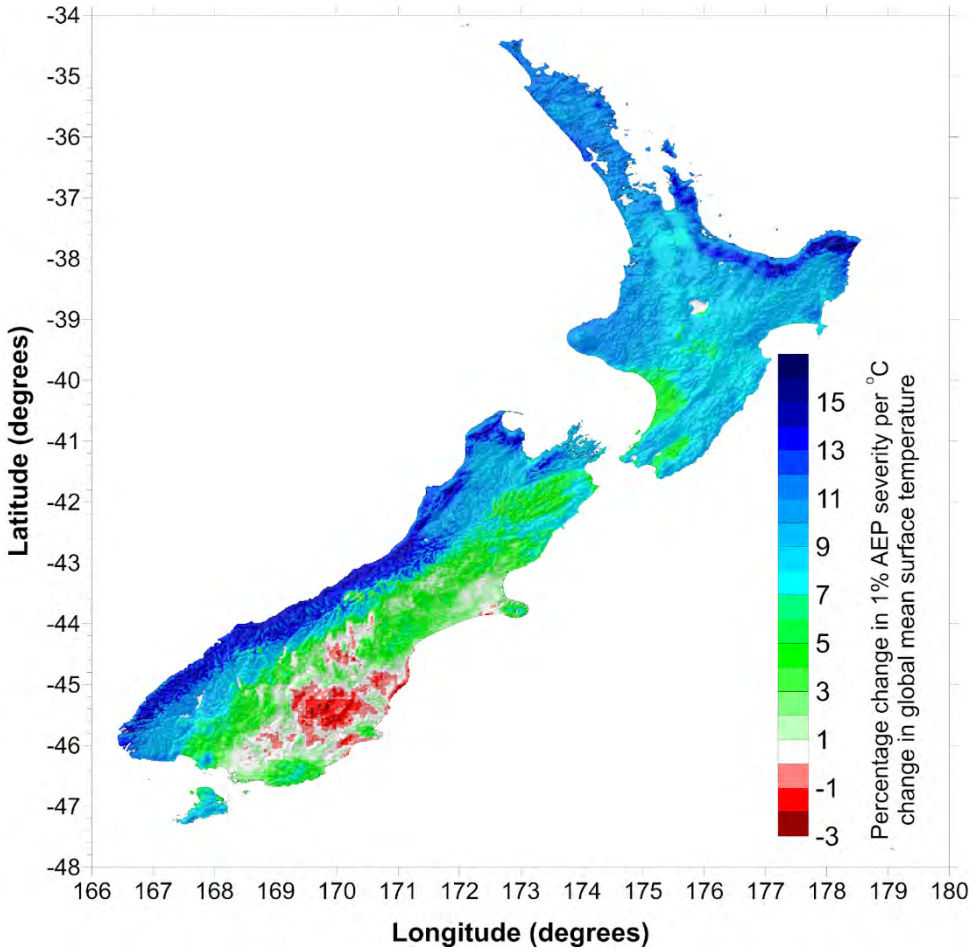


Figure 1. Measured daily rainfall where we have inferred how the intensity of 1-in-100 year rainfall events (1% annual exceedance probability; AEP) is likely to change with increasing global temperatures

7. Storm events cause:
   7.1. **Mobilisation of slash** and debris flows (Debris_flows_info_sheet.pdf (scionresearch.com)), Melia et al. 2019.
   7.2. Windthrow (trees blown over) (Basher et al. 2012) and stem snap (Climate-change-Info-Sheet_wind.pdf (scionresearch.com))
   7.3. River flooding and coastal storm surge.

Erosion Susceptibility

8. Te Tairāwhiti contains the largest concentration of “very high risk” or ‘red-zone’ land outside of the high alpine areas of the South Island (Figure 2).

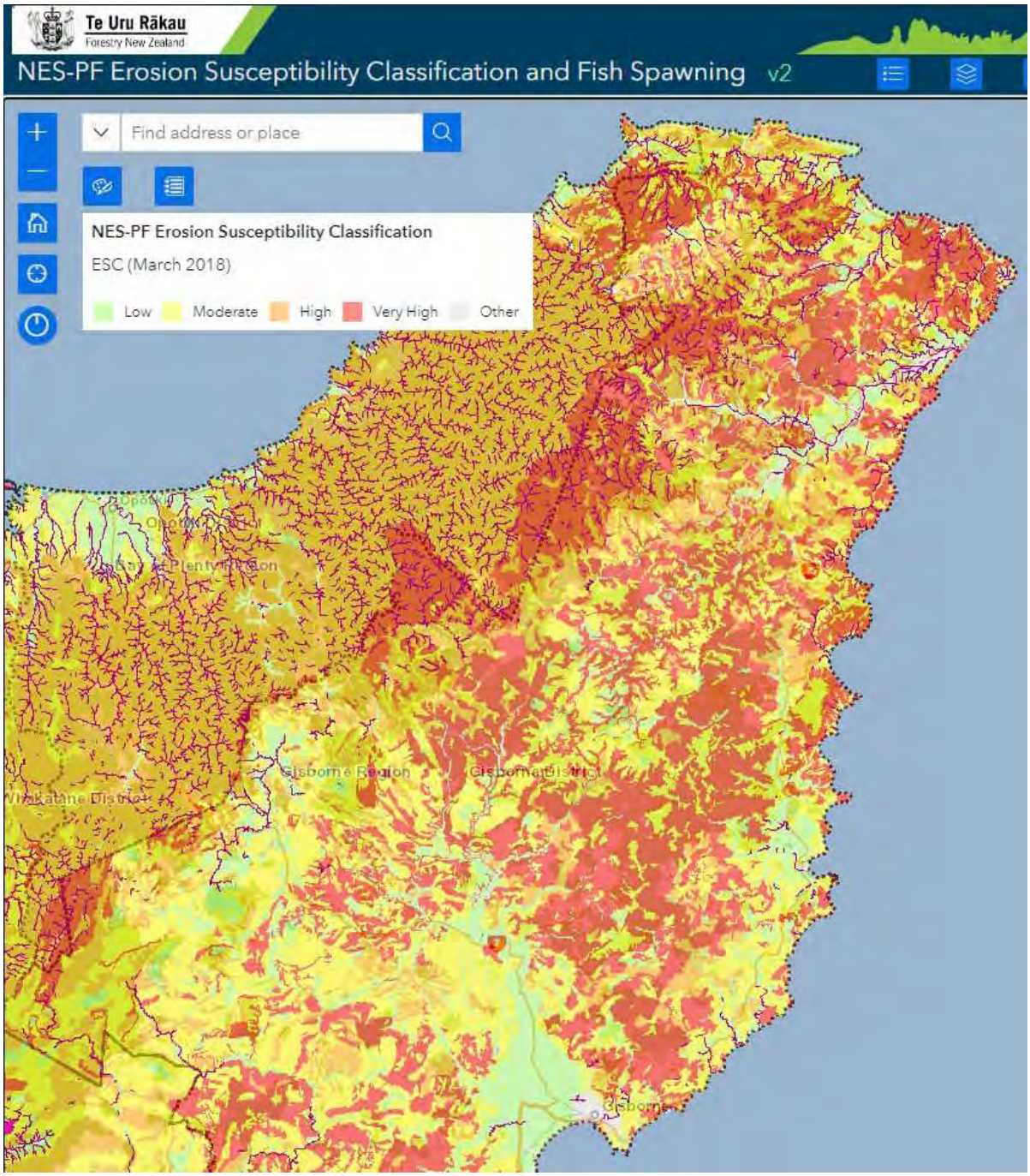


Figure 2. MPI National Environmental Standards for Plantation Forestry Erosion Susceptibility Classification for Tairāwhiti “very high risk” or ‘red-zone’ areas from https://mpi_nes.cloud.eaglegis.co.nz/NESPF/ .

9. As evident in the Hawke's Bay silt events, pine trees do a good job of mitigating erosion compared to pasture, although pine plantations are not as robust as old-growth native forests in defending East Coast landscapes.

    9.1. However, there is a window of vulnerability for land cleared of pine plantations and recently planted with juvenile pines **under eight years old** (Phillips et al. 2012, Marden 1991, Marden and Rowan 1993).

    9.2. The land is vulnerable between 2-8 years once pine plantations have been clear-felled up until pine plantations have been re-established. During this window of vulnerability, the landscape is susceptible to erosion during storm events.

10. Pinus radiata is the dominant plantation species in the area; it is harvested via clear-felling approximately 28 years post-planting. The last planting cycle was in the early 1990s. Multiple flooding, slash, and forest debris events have occurred in Tairāwhiti in the last five years following clear-fell harvesting of the 1990s planting cycle.

Forestry 'Slash'

11. Slash is left on-site post-harvest to return nutrients to next rotation on stable central north island plantations e.g. Kaingaroa Forest. This approach works better than fertiliser (Smaill et al. 2008).

12. Slash can be mobilised in storm events from steepland forests (Garrett et al. 2015).

13. Slash used to be burnt (Visser 2016), but: Burning inhibits native forest regeneration and councils regulated against burning.

14. Slash management is regulated under National Environmental Standards for Plantation Forestry (NES-PF) – pruning and thinning permitted activity is a permitted activity.

Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017 (NES-PF)

15. The New Zealand Legislation relevant to slash and debris management with reference for flooding is contained within the Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017. Clause 69 of this legislation reads as follows:

69 Permitted activity conditions: slash and debris management

(1) Slash from harvesting must be placed onto stable ground.

(2) Slash from harvesting that is on the edge of landing sites must be managed to avoid the collapse of slash piles.

(3) Slash from harvesting must not be deposited into a water body or onto the land that would be covered by water during a 5% AEP event.

(4) If subclause (3) is not complied with, slash from harvesting must be removed from a water body and the land that would be covered by water during a 5% AEP flood event, unless to do so would be unsafe, to avoid—

(a) blocking or damming of a water body:

(b) eroding river banks:

(c) significant adverse effects on aquatic life:

(d) damaging downstream infrastructure, property, or receiving environments, including the coastal environment.

Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017

16. Annual exceedance probability (AEP):

a. AEP means the annual exceedance probability, which is the chance of a flood of a given size (or larger) occurring in any one year, usually expressed as a percentage.

b. A 5% AEP is equivalent to a 1 in 20-year event.

c. Due to increased precipitation from climate change AEP is a non-stationary number and should to be given baseline e.g. an AEP (for 1990 – 2010).

References:

Harrington, LJ; Dean, SM; Awatere, S; Rosier, S; Queen, L; Gibson, PB; Barnes, C; Zachariah, M; Philip, S; Kew, S; Koren, G; Pinto, I; Grieco, M; Vahlberg, M; Snigh, R; Heinrich, D; Thalheimer, L; Li, S; Stone, D; Yang, W; Vecchi, GA; Frame, DJ; Otto, FEL (2023). The role of climate change in extreme rainfall associated with Cyclone Gabrielle over Aotearoa New Zealand's East Coast. World Weather Attribution Initiative Scientific Report. DOI: https://doi.org/10.25561/102624

Melia N, Sutherland-Stacey L, Fedaeff N, Nicol J, Noll B 2019. The 2018 Queen's Birthday Tolaga Bay Flood: A Meteorological Analysis. Growing Confidence in Forestry's Future.

Smaill SJ, Clinton PW, Greenfield LG 2008. Post-harvest organic matter removal effects on FH layer and mineral soil characteristics in four New Zealand Pinus radiata plantations. Forest Ecology and Management 256(4): 558−563.

Garrett L, Smaill S, Clinton P 2015. Nutrient supply one rotation to the next. NZ Journal of Forestry 60(2): 16−20.

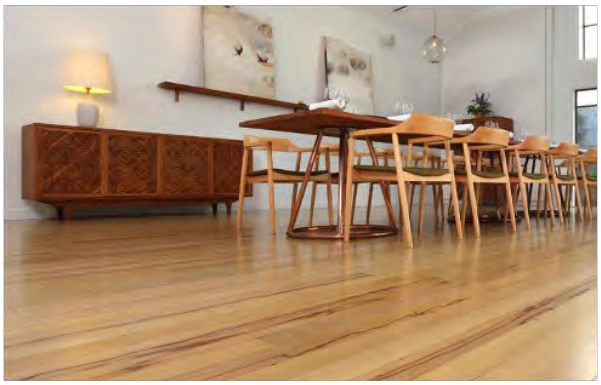
Visser R 2016. Timber harvesting in New Zealand: a guide for small scale forest landowners. Retrieved 8 November 2017, from http://www.nzffa.org.nz/farm-forestry-model/theessentials/roads-and-harvesting/timber-harvesting-in-new-zealand/

Phillips C, Marden M, Basher L 2012. Plantation forest harvesting and landscape response: what we know and what we need. New Zealand Journal of Forestry 56(4): 4−12.

Basher L, Elliott S, Hughes A, Tait A, Page M, Rosser B, McIvor I, Douglas G, Jones H 2012. Impacts of climate change on erosion and erosion control methods: a critical review. MPI Technical Paper No: 2012/45. 216 p.

Marden M, Phillips C, Rowan D 1991. Declining soil loss with increasing age of plantation forests in the Uawa catchment, East Coast Region, North Island, New Zealand. In: Proceedings of the International Conference on Sustainable Land Management, Napier, New Zealand. Pp. 358−361.

Marden M, Rowan D 1993. Protective value of vegetation on tertiary terrain before and during Cyclone Bola, East Coast, North Island, New Zealand. New Zealand Journal of Forestry Science 23: 255−263.




Taiao Mātāmua

Mana Taiao Tairāwhiti submission to the Ministerial Inquiry on Land Use in Tairāwhiti, Tūranganui-a-Kiwa and Te Wairoa

APRIL 2023

Taiao Mātāmua

Wānangahia te atua o te rangi
O te rā, o te marama, o te whetū, o te kapua, o te hau
Tātaihia ko te kawa o te rangi,
Ko te nui o te rangi, ko te hua o te rangi
Ko te paki o te rangi, ko te pū o te rangi
Ko te mana o te rangi ka tau hā,
Whakatau ko te rangi e tū iho nei

Ka tau hā, whakatau
Ko te whenua e takoto ake nei
Takitakina ko te kawa o Papa
Ko te horanga ā-nuku, he atua!
He tipu te atua, he rākau te atua,
He ngārara te atua, he manu te atua
He oneone te atua e tangi ai te mapu
I te korowai ka takapau he kawa ora!

He orangarangi, he oranganuku
He aroha nā, he kōmanawa
Rurukuhia ki te wai whakaika,
Ko te kawa Tangaroa, he atua!
He mātāpuna, he pukenga wai,
He terenga ika, he paringa tai,
Homai te waiora ki a au
Ki taiao nuku, ki taiao rangi
Ka whakairihia te kawa
Homai te kauhou atua ki uta e

Tēnei te ara, ko te ara ki hea
Ko te ara ki uta, ko te ara ki tai
Ko te ara ki tua o taumata whakaaro
Kia puta ki te whai ao, ki te ao mārama
Mārama te whakaaro
Mārama te whakatika
Mārama te whakakao
Mārama te hau,
He mauri ka whiti, he kawa ora!

Clear-fell harvesting affects biodiversity and re-introduces erosion risk similar to grassland for a number of years. Forestry slash, woody debris and sediment can end up being deposited in large quantities in receiving environments – whether they be streams, wetlands or the coast... Local communities have also recently voiced concerns over woody debris ending up in streams, rivers and beaches.

- **Freeman, T**. (2015), p2. *National Environmental Standard for Plantation Forestry Submission.* Report to the Environmental Planning and Regulations Committee. Gisborne District Council

The times ahead are going to need us to focus on adaptation, and maladaptation is a significant risk if you have convinced yourselves that your carbon emissions today have been permanently offset in the biosphere by forests that are increasingly exposed to climate risk, through disease, fire and storm – and the most risky of all, must surely be: the same age, mono-species clones we call *Pinus radiata*.

- **Carr, R.** (Chair, NZ Climate Change Commission) speaking at Ō Tātou Ngāhere Conference, November 2022. https://youtu.be/IFKAnw39GCg

In Aotearoa the cost of erosion is significant, and historically, in some instances, has outweighed prevention expenditure on a 3:1 ratio.

- **Marden, M.** (2003). Gully erosion, the cancer of Waiapu catchment: 901 reasons to act now. Tairawhiti Conservation Quorum, Issue 32

Introduction

This submission to the Ministerial Inquiry into Land Use in Tairāwhiti and Te Wairoa is made by Mana Taiao Tairāwhiti (MTT), an informal network of Tairāwhiti residents and others concerned about land use and the impacts of woody debris.

The karakia at the start of this document is our vision of the world. It is like a policy statement that privileges taiao whakapapa as mātāmua, and acknowledges that people have a place in the world, largely in relation to Te Taiao, other living systems, and life forms. We use the phrase 'Taiao Mātāmua' to underpin engagement with environmental matters as a reminder of an ancient order of the world that doesn't place humans at the top or centre.

The submission is based on a systematic review of more than 130 peer reviewed studies and other reference material, along with the testimony and evidence provided by residents affected by land use and weather events in Tairāwhiti. MTT was instrumental in calling for an inquiry into these issues. While the Inquiry that has materialised is not the comprehensive process MTT hoped for, MTT has decided to focus on doing as much as it possibly can in the short time available. It has relied on thousands of hours of volunteer time to pull different threads together. Many of these volunteers are still dealing with the impacts of recent events themselves – emotionally and physically. MTT recognises the process and timeframes were decided by the responsible Ministers, not the Panel. MTT has given everything it can in the time available.

This is an Inquiry about land use in this region and the rules set by central and local government that influence how landowners and businesses make decisions about what does or doesn't happen on the land—and how these affect local communities, waterways, and the ocean. While the increasing impact of climate change on the environment and our place in it is front of mind post-Gabrielle and an essential factor to consider, the focus of this submission is about what humans do on the land in this region.

Some of the adverse effects experienced in recent times would not have occurred – or would be less/much less (depending where you are) if the unsustainable land uses this inquiry is looking into were not in existence; and this is not climate change's fault – this is the fault of the forestry and farming industries and the regulation of them; whether or not climate change were occurring, these issues would still exist. It is compounded by the effects of increasing changes in the climate, but climate change is not the creator of the issues.

We hope Tairāwhiti is committed to proving that a truly sustainable model for land use and economic wellbeing in Aotearoa can be achieved while helping the country to meet our climate change targets, biodiversity aspirations, economic goals, and hopes for a fair and just society.

Our vision is for a thriving, prosperous region in which land uses – including horticulture, sheep and beef farming, production forestry (including nature-based forestry), and permanent indigenous forests – are well matched with suitable land types across the region.

We aim for a sustainable regional economy, based on a 'mosaic' approach to land use that optimises a healthy, flourishing environment, rewarding active land management, providing safe, well-paid, long-term jobs, and the production of high-value goods and services.

Thank you for considering this submission and we hope it is useful for a range of stakeholders.

Submission Structure

This submission is structured as follows:

1. **Te Mamae: The Pain** p8

   Understanding the issues from the places and people affected - a personal story of environmental and social harm repeated in different ways in communities around the region.

2. **Te Tono: Our Priority Recommendations:** p9
   a. An immediate cessation of all spraying and clear-fell harvesting of trees (exotic and indigenous) in Red ("very high-risk") and Orange ("high-risk") zones as defined by NES-PF Erosion Susceptibility Classification.
   b. The reforestation of pasture and recently harvested areas and transitioning existing plantations on Red and Orange landscapes to permanent diverse native forests.
   c. A moratorium/rāhui on new and replanted pine plantations on Red and Orange zoned erosion-prone land in the region until the risks and alternatives are better understood.

3. **Te Rongoā: Evidence Base for Recommendations & Solutions** p13
   - A history of the land and land use in Tairāwhiti
   - Why permanent diverse native forest is the only sustainable option for erosion-prone land
   - What we do with the existing pine plantations, and the myth of transitional plantations
   - The regulatory issues at play, and what needs to be done
   - How we incentivise the transition to permanent diverse native forests
   - Why we need catchment-led transition plans informing a regional Just Transition Plan
   - What else could be done and the policies we need to do it (additional recommendations)

4. He Moemoeā: A Vision for Optimal Land Use in Tairāwhiti p27

References p28

Separate Documents –

Attached to this submission are two separate documents and an online audio-visual resource:

Thematic Summaries of Evidence: Land Use in Tairāwhiti Literature Review & Commissioned Papers

- A set of executive summaries from our analysis of more than 150 relevant publications:
    A. Whakapapa & Whenua
    B. Human occupation/activity
    C. Impacts of storms on land in Tairāwhiti
    D. Economic drivers of current land use practices and economic constraints on better alternatives
    E. Afforestation (exotic vs indigenous / production vs permanent)
    F. Regulatory issues
    G. Current local and central government work programmes
    H. Recommendations to improve land use, employment and regulatory settings
    I. Impacts of the political economy, land tenure system and capital on power dynamics and land use decision-making processes in the region
    J. The role of Whakapapa, Tikanga, Mātauranga and Kaitiekitanga in relation to the protection and utilisation of whenua
    K. International best practice, agreements and norms compared to New Zealand's land use system

(A database with a systematic review of these papers is available at: **www.manataiao.org)**

Issues Papers: Five reports on specific issues written for Mana Taiao Tairāwhiti by subject matter experts.

MTT has also produced an interactive **map of testimonies and evidence** from residents available at: **www.manataiao.org**

Cover photo credits:

Cornell Tukiri; Redwoods Treewalk®; Manaaki Whenua Landcare Research; Tane's Tree Trust; Ministry for Primary Industries.

1. Te Mamae: The Pain

> *The wood debris on the beach impacts how and when we can use or access the beach. My partner's place of employment has been heavily impacted by wood debris and silt a number of times since 2018.*
>
> *The two most recent cyclones have caused considerable damage to infrastructure. Health services available at Te Puia Hospital are now no longer available due to the destruction of parts of State Highway 35 from Uawa north to Te Puia.*
>
> *Erosion along the Uawa riverbank from the river mouth past Uawa Parade is now impacting on the recently developed Uawa cycleway. The picnic area at the end of Uawa parade is eroding into the awa. The bank has slipped close to the corner of Uawa Parade and Banks St, near to three residential properties.*
>
> *The impact is an emotional one. My whanau have worked this land for generations. My tipuna fought for these lands over generations. We are people of the whenua and the moana. Whatungaro te tangata, Toitu te whenua, when my tipuna left the land remained. However not in its current condition. The slash has scarred our lands as well as our people both physically and emotionally.*
>
> *(from Mana Taiao Tairāwhiti online submission form of testimonies from residents)*

The Inquiry Panel will have heard similar stories and reflections around the region and through other submissions. Similar experiences, frustrations, sadness, and anger are shared in homes and workplaces across Tairāwhiti. Lives are being lost, property destroyed, hundreds of millions of dollars of public and private funding wasted, and kaitieki responsibilities curtailed. Our relationship with Te Taiao, each other, and ourselves is being irreparably damaged.

We think it is important to articulate whakapapa connections to Te Taiao as in the karakia at the beginning of this submission, and to acknowledge the very real losses (physical, financial, cultural, spiritual, social, health) suffered by Māori and Non-Māori, young and old, across Tairāwhiti and Te Wairoa as a result of land use decisions that are causing significant damage to both Te Taiao and humans. We have compiled an interactive map to share further reflections on the situation and invite the Panel to view them at: www.manataiao.org

These stories have informed the guiding principles we have used to develop this submission:

1. *Taiao Mātāmua* – humans are subordinate to the wider environment; we rely on it for our existence and damage it at our own peril.
2. *Ka ora te Whenua, ka ora te Tangata* – when the land is healthy, the people are healthy.
3. *Tama tu, tama ora. Tama noho, tama mate* – everybody has the right to safe, enjoyable, and meaningful activity that contributes to collective wellbeing.
4. *Kaare taku maunga i te maunga nekeneke he maunga tu tonu a maunga Hikurangi* – like the mountains around us, we aren't going anywhere.

2. Te Tono: Our Priority Recommendations

Mana Taiao Tairāwhiti helped to initiate this Inquiry and has been committed to collating, reviewing, and drawing conclusions from the vast array of evidence on the issues the Inquiry is tasked with investigating.

From the scientific literature, public policy reports and records, and from first-hand experience as residents of communities who depend on farming and plantation forestry, and who are increasingly impacted by these activities on highly erosion-prone land, we ask the Panel to support the following priority recommendations:

1. An immediate end to clear-felling on erosion-prone land.

Firstly, we recommend an immediate cessation of all spraying and clear-fell harvesting of trees (exotic and indigenous) in Red ("very high-risk") and Orange ("high-risk") zones as defined by NES-PF Erosion Susceptibility Classification.

Parties involved: regulatory bodies, local government, forestry companies, local landowners.

Current evidence from NES-PF mapping activities show that Te Tairāwhiti contains the largest concentration of "very high risk" or 'red-zone' land outside of the high alpine areas of the South Island (Bodecker et al., 2023). Plantation forestry intended for harvest creates a 'window of vulnerability' that lasts for 2-8 years after clear-fell harvesting activities (Bodecker et al., 2023; *Ministry for Primary Industries NES-PF Submissions: NGOs and Community Groups N-Z.*, n.d.; Watson et al., 1999). The 28-year [or less] harvesting cycle that applies to the local dominant plantation species of Pinus radiata has seen us living though such a window of vulnerability - multiple flooding, slash, and forest debris events have occurred in Tairāwhiti in the last five years following clear-fell harvesting of the 1990s planting cycle (Bodecker et al., 2023). **A complete moratorium on clear-felling activities in erosion-prone areas will make a significant contribution to preventing the current cycles of storm-induced loss from continuing.**

2. An immediate reforesting of recently harvested areas and erosion-prone land currently in pasture

Secondly, we recommend reforestation of pasture and recently harvested areas, and transitioning existing plantations on Red and Orange zoned landscapes to permanent diverse native forests.

Parties involved: regulatory bodies, local government, forestry companies, farm owners, landowners.

Deforestation since the 19th century has degraded hills, river systems, and the marine environment, resulting in irreversible landscape changes and soil quality loss (Page et al., 2000). Reforestation can reduce hillslope sediment loss and can be targeted to address specific erosion types such as landslides or gullying. Although pine trees better mitigate erosion

compared to pasture, pine plantations are not as robust as permanent diverse native forests in protecting East Coast landscapes (Bodecker et al., 2023); and during Cyclone Gabrielle, 10–12-year-old pine plantations on erodible slopes suffered extensive collapse.

Recent research has shown that in Gisborne, converting the most erosion-prone sections of land currently used for production forestry (315–556 ha) to natural regeneration could potentially reduce erosion by 1–2.5 $t \cdot yr^{-1}$ of sediment (Lambie, 2021).

A recent briefing from David Hall (2023, p. 1) states that decisions around land use and management should be site-specific, based on risk, opportunities, and the expectations of those involved in or affected by land use. However, broad recommendations for land use change in Tairāwhiti include:

- Highly erodible soils becoming used for indigenous vegetation and forest rather than pasture, and particularly in sensitive environments such as gullies, steeplands and upper catchments.
- Exchanging clear-felling for less intensive forestry management approaches---for example, continuous cover forestry if harvesting is to continue, or biodiverse unharvested indigenous forest.
- Shifting away from using exotic, even-aged monocultures to biodiverse, uneven-aged forests, favouring indigenous forest for 'carbon farming'. Native forests have co-evolved with local landscapes for perhaps 80 million years, and are inherently far more biodiverse than exotic plantations (from underground communities of microbes, roots, and mycelial fungal networks to the plants above ground and forest creatures) – a vital prerequisite for adaptation in a time of climate change and biodiversity collapse.
- To help manage flood risk and related impacts, we must better integrate wetlands, floodplains, riparian margins, and estuarine ecosystems throughout catchments.

3. Not one more pine tree planted on erosion-prone land.

Thirdly, we recommend a moratorium/rāhui on new and replanted pine plantations on Orange and Red zoned erosion-prone land in the region until the risks and alternatives are better understood.

Parties involved: regulatory bodies, local government, forestry companies, landowners.

Nearly one quarter of the region is now covered in *Pinus radiata*, a short-lived, shallow-rooting, highly flammable monoculture plantation species, with a rapid acceleration in these plantings in recent years. Meanwhile the science (e.g. Marden & Seymour, 2022) is clear that pines – whether intended for timber, carbon, or soil conservation – are the wrong trees to plant in highly erodible landscapes at a time of climate change and ecosystem collapse. Now is the right time to take a break and re-evaluate the strategy for afforestation in the region.

National Environmental Standards – Plantation Forestry Reform

The above three recommendations will be best enabled if the NES-PF is overhauled to provide local authorities with the ability to prohibit plantations on all erosion-prone land.

The NES-PF are regulations made under the RMA (1991) and apply nationally. In its quest to be all things to all people in all of Aotearoa, it has failed Tairāwhiti dismally. It has proven itself unsatisfactory to deliver expectations for environmental outcomes for all stakeholders, and in particular those of many iwi, hapū, local authorities and environmental organisations. It has tried harder to appease industry than to look after our tangata, our whenua, our awa and our moana.

Under the RMA, the NES-PF sits at the top of the planning hierarchy for forestry regulation, yet its regulations are objectively and obviously inadequate to prevent or even reduce the degree of harm and suffering being wrought on Tairāwhiti. The NES-PF permits harvesting on low, moderate, and high erosion risk areas; meaning that no resource consent is required. In enabling significant adverse effects to occur the NES-PF fails the purpose of the RMA and fails the communities of Tairāwhiti.

To date, Government-initiated reviews of the NES-PF have been tightly constrained in scope, effectively closing the Government's eyes and ears to the environmental and cultural harm brought about by regulatory weaknesses of the NES-PF. The NES-PF needs urgent review in respect of how it manages forestry. The effects of harvesting need to be front and centre of a review, and that review needs to start now.

Local Government Rules

The Gisborne District Council (and Hawkes Bay Regional Council) have a significant role to play in both the immediate and long-term regulatory response to the adverse effects of land use – including forestry practices – in Tairāwhiti. The ultimate, holistic solution may take some years to design, but that is not a reason to do nothing in the meantime. There is much the Council can do to alleviate the recurring impacts of forestry slash and sediment on the communities of Tairāwhiti. The Council should, as a matter of urgency:

1. Bearing in mind that with each event the flood-carrying capacity of our waterways reduces, the impacts of severe weather events are getting worse each time, even though the severity of the weather event itself may be less. Undertake a focused review of the land use rules that present the greatest risk, rather than risking the rules relating to erosion and harvesting impacts getting caught up with the much larger process of all land use rules review.
2. Review all extant resource consents for forestry harvesting and identify weaknesses in the consent conditions, which have or will allow for the generation of adverse effects that were not foreseen or addressed when the consents were issued.

3. Instigate enforcement action under the RMA to prevent recurrence of the adverse effects that have devasted Tairāwhiti communities over and over again. This should include orders as to what can occur in the future as well as orders requiring existing risk to be reduced – for example, removing slash from all areas where that poses a risk in future weather events. This would include all erosion-prone areas and also those areas where slash now sits as a result of past events, and from which a future event will "pick it up" and transport it further.
4. Prosecute those responsible for slash and sediment-generating activities where they are in breach of existing NES-PF rules and/or TRMP rules and/or resource consent conditions.

3. Te Rongoā: Evidence Base for Recommendations & Solutions

A History of the Land and its Uses in Tairāwhiti

Te Tairāwhiti is world-renowned for its severe erosion, flooding and sedimentation (Spiekermann & Marden, 2018). It has a unique erosion profile with 22% of the land susceptible to severe erosion, compared to a national average of 2%, and 79% being between moderately and very highly susceptible to erosion (Basher et al., 2015).

From the Last Glacial Maximum up to the 1800s, the Waipāoa catchment alone is thought to have deposited 12.1 cubic kilometres of sediment in the ocean (Marden, Mazengarb, et al., 2008). Since the 1880s land use by humans in the catchment has accelerated the natural levels of erosion to something like five times the rate in the 20,000 years prior (Marden, Mazengarb, et al., 2008).

Forestry in Aotearoa New Zealand has gone through six main phases that can be summarised as: Pre-human, Māori deforestation, European deforestation, Conservation pine, Extraction pine, and, most recently, Carbon pine.

Prior to humans arriving about 800 years ago, around 80 percent of the country was covered in forest (Guild & Dudfield, 2009).

Upon their arrival in Tairāwhiti, the ancestors of Māori had to adapt to forest ecosystems very different from those in their tropical homelands. In coastal areas, where native forests were cleared for gardens and settlements on the foothills and river flats, forest stands were left for building timber, birds, bush foods, and fibres (Coombes et al., 2000). Forest resources were seasonally harvested in the hinterland, where “the steep hills and river flats were bush covered right down to the beds of the rivers, which were hard and full of huge boulders” according to a European bushfeller (Howard, 1976, p. 4 as cited in Coombes et al., 2000, p. 11). About one third of Aotearoa was cleared of native forest prior to Europeans arriving, most by humans burning it (Guild & Dudfield, 2009).

After European settlement in Tairāwhiti, when the land was surveyed into blocks and titles awarded by the Native Land Court in the 1880s, land clearance accelerated dramatically. Native trees were felled for houses, bridges, fences, jetties, farm and office buildings, and mills were set up to process the timber. This phase of forestry relied on native forests, but no attempt was made to manage them sustainably (Coombes et al., 2000).

Across Tairāwhiti, huge areas of bush were felled and burned for pasture for sheep farming. The erosion from this large-scale land clearance across the region was catastrophic. It was not until the 1950s, however, that afforestation schemes were proposed as a way forward. Although the restoration and sustainable harvesting of native forests were suggested by L.M Ellis, the first Director of Forests in New Zealand (1920-1928; Roche, 2015) this was not taken seriously. The afforestation schemes involved mass plantings of *Pinus radiata* and targeted planting of willow and poplar on erosion-prone hillsides and gullies, so a timely opportunity to explore sustainable approaches to native forestry was squandered.

POST-BOLA LAND USE

At the same time, pastoral farming on steep hillsides was still causing severe erosion, with the formation of gullies and sedimentation in rivers, most spectacularly during Cyclone Bola in 1988. During the 1980s, the pine plantations established for soil conservation through erosion control were sold by the state to private interests, and wholesale harvesting began. Again, this led to severe flooding events, now aggravated by forestry logs and waste in the floodwaters, culminating in the devastation caused by Cyclone Gabrielle in 2023.

In the latest phase, carbon farming with pine trees, funded by the Emissions Trading Scheme, is expanding in Tairāwhiti, with highly erodible landscapes being sprayed with defoliant (Smale, 2023) and then mass planted with relatively short-lived, shallow rooting, highly flammable monocultures of pine trees (BDO Gisborne Limited, 2021).

Given the risks of fire, disease and increasing storm damage, this is not a credible form of long-term carbon sequestration in a time of climate change. For local communities, pest and weed ridden plantations of ageing and dying pine trees across vast parts of most catchments are the most likely legacy of this latest central government policy, conceived at a distance from the region but impacting local landscapes throughout Tairāwhiti and beyond.

CROWN LOBBYING OF LANDOWNERS

We support the numerous testimonies before the Inquiry Panel that have spoken to the aggressive lobbying of Tairāwhiti landowners since the 1980s by the NZ Forestry Service, Crown Forestry Rental Trust, Ministry for Primary Industries, and the East Coast Forestry Project (ECFP).

Crown led campaigns promoted conversion of land to pine with promises of economic prosperity, passive income for landowners, sustained employment, and erosion prevention. Landowners recall visual resources depicting future Ngāti Porou townships as bustling hubs of prosperous activity from the pine industry. For communities who had been cast into material deprivation by successive Crown economic policies and were also deeply concerned about the ecological harm delivered by extensive conversion to pasture, these Crown-led campaigns were extremely seductive and appeared to present an effective cure to their woes.

This campaign included the use of Crown scientists who provided short-sighted, potentially misleading scientific rationales for afforestation, which further convinced landowners that it would solve the problems of erosion. The promotion of pine as erosion control treatment continued well into recent years.

The ECFP is still noted in the Ministry of Primary Industries website (MPI, 2023) as being aimed to “address the severe erosion problems in the Gisborne district”, whilst also being responsible for facilitating the planting of pine upon highly erodible land.

The privileging of pine as a solution over natives is still observable today within the ETS system, and pine as a climate “solution” is still emphatically promoted by Crown scientists today.

Why Permanent Diverse Native Forest is the only Sustainable Option for Erosion-Prone Land

Since the 19th century, deforestation in Te Tairāwhiti has impacted hills, river systems, and the marine environment, resulting in irreversible landscape changes and soil quality loss. A century of pastoral farming has resulted in a highly degraded environment. Exotic plantations, mostly *Pinus radiata*, began in the 1960's and by 2018 occupied more than 188,000 hectares of the region (BDO Gisborne Limited, 2021).

Reforestation can reduce hillslope sediment loss, though stored sediment will continue to move downstream, impacting freshwater and marine ecosystems. Targeted reforestation is advised to address specific erosion types (Page et al., 2000). Recent research suggests that selectively reforesting 8% of the most unstable landscape units in the Waipaoa catchment, could reduce landslide-derived sediment by approximately 40% (Reid & Page, 2003).

In terms of erosion-prone land still in pasture, reforestation of 12% of landslide-susceptible land or 30% of randomly selected land could reduce landslide-derived sediment in the Waipāoa by 50%. Similar success could be achieved within three decades across Tairāwhiti by targeting gully-mass movement complexes in high sediment-yielding river systems including the Waiapū Catchment, the Waimatā, and the Waipaoa, for instance (Marden et al., 2014).

Reforestation also affects gullying and water yield in the long term (Marden et al., 2014). It is important to note that different forest types have significantly different abilities to capture and disperse rainfall, mitigate erosion and reduce sediment. Indigenous forests, for example, with their tiered canopies and complex root architecture reduce sediment much more effectively than a harvested pine plantation. An indigenous forest also has many additional ecosystem benefits and services (i.e. increasing biodiversity) which monocultural pine plantations do not share (Pierce, 2022).

The role of forestry in reducing erosion in steep lands, such as the East Coast, is also critical. Closed canopy forests offer the best protection against gully formation and stabilisation, contributing to flood resilience.

Research has shown that diverse species mix plantation forests can sequester more carbon and experience faster growth compared to monocultures (Pierce, 2022). In other countries, however, diverse conifer plantations have suffered major windthrow, die back and extreme fire events due to climate change.

Mature indigenous forests play a crucial role in reducing erosion and sediment in lowland river systems, unlike short-lived exotic species, and provide habitats for a wide range of indigenous plant and animal species. Mature, biodiverse, native forests are essential for reducing future flood risk and preserving or enhancing ecosystems.

What We Do with the Existing Pine Plantations, and the Myth of Transitional Plantations

The most recent official estimates put the area of pine in Tairāwhiti at around 190,000 hectares. Unofficial estimates have recorded at least another 30,000 ha of farm sales to pine plantation companies since 2021. As a result, there are a lot of trees on large areas of land, and a lot of land with no trees since they were recently clear-felled.

The pine plantation industry is desperate to make profits from carbon credits and preferably also timber. For nearly a decade, the industry has continued to claim that they can and will do

clear-fell harvesting better. Nearly all the scientific studies, and recent experience in all the main catchments, however, suggest clear-felling on highly erosion-prone land is a dangerous idea.

If the rules change and there is a moratorium or a permanent ban on clear-felling in the Orange and Red zones, as proposed by Bodecker et al. (2023), we accept there will be immediate economic impacts. As proposed by Hall (2023), the Government should consider providing support to affected forestry, transport, and port workers, and alternative employment in native afforestation schemes, including trials with closed canopy indigenous forests. The business models and profit projections for plantation operations in the region would need to be rapidly rewritten. Continuous canopy plantations and much more restricted harvesting regimes may still be economically viable; after all, the companies have been making over half a million dollars in profit per worker in recent years (in 2021 the company profit per worker was down to $330,000) (Macfie, 2023).

Either way, we acknowledge there will be a financial impact until new industries are established, but this needs to be weighed up against the cumulative impact to the region of frequent extreme weather events coupled with clear-fell harvesting and unacceptable forestry practices(as documented in recent successful prosecutions).

In Cyclone Gabrielle, the costs to horticulture, agriculture, health, education, and almost every other industry and activity in the region, and the costs of roads and bridges damaged or destroyed by forestry slash are immense; and these costs are not just financial, but human, environmental, cultural, and social. The cost of enduring these adverse effects over and over again are even more significant if local people no longer have access to kaenga, wāhi tapu, moana, awa, whenua – and the whenua is literally being lost forever, one storm at a time, while rivers and the moana, and associated kai and tikanga, are being irreversibly damaged.

If companies decide to abandon any form of harvesting, an increasingly common option is to leave the trees standing, cut all production costs, and claim the NZUs being stockpiled in the plantation. The NZ carbon market has lost 30% of its value this year, so carbon farming may not seem quite as attractive as previously anticipated, but the Government will likely make changes to ensure the price of carbon rises, even as it tries not to add additional pressures to the ‘cost of living’.

As Dr Christina Hood explains in the paper we attach to this submission, a fundamental issue with ETS is its focus on net emissions, disincentivising emissions reduction and promoting land-use change to forestry (inherently favouring fast-growing pine). Forestry carbon storage should not be traded off against gross emissions.

While emissions reductions and forest carbon capture are both essential for controlling increases in global temperature, according to the Food and Agriculture Organisation of the United Nations, the global industrial forestry supply chain emits about twice as much carbon as it sequesters. Given that the New Zealand industrial forestry supply largely sends raw logs to China for processing into very short-lived products, it is likely to be on the high side of that calculation.

As He Pou a Rangi (Climate Change Commission) advised, maintaining net-zero emissions after 2050 under the current ETS would require ongoing forestry conversions. Other countries focus

on actual emissions reduction and technology transitions, so we risk being left behind 'trading' emissions for forestry; and future generations will have to cope with a combination of climate adaptation, emissions reduction, and a country covered in pine plantations.

A second problem is that we face an oversupply of NZU in around 15 years (Hood, 2023). The Māori forestry companies claiming they'd lose $7 billion if pine was excluded from the Permanent Forest category need to better understand this risky market. Even if the NZU price increases again, the current trend of farmland conversions is likely to leave many companies and shareholders with stranded assets as oversupply kicks in. International critiques of 'offsetting' through industrial monocultures are also gathering pace, increasing the probability that this kind of carbon sequestration will no longer be allowed to count against Nationally Determined Contributions in international climate change agreements. In that case, carbon markets based on this kind of 'offsetting' (New Zealand's ETS, for instance) would collapse.

In recent reports, international bodies have strongly recommended nature-based strategies for responding to biodiversity losses and climate change. In 2019, for instance, in its report *Biodiversity and climate change: interlinkages and policy* options, the Royal Society (UK) advises against establishing large monoculture tree plantations as long-term carbon sinks. Likewise, the Report from the *Joint Workshop COP Panels on Biodiversity and Climate Change* (2021) recommends discouraging ecosystem-based approaches to climate mitigation that have negative outcomes for biodiversity, such as tree planting in inappropriate ecosystems, and monocultures. As a result, monocultural carbon farming will likely no longer be recognised in international frameworks and may be worthless.

Suggestions that exotic plantations may be established and then transitioned to native forests are not persuasive, given the very high costs and practical challenges involved, especially in erodible steeplands. In many catchments, after one or two rotations of pine trees, the soils are thin or back to bedrock, at which point reforestation becomes difficult or impossible. Trials for transitioning pine trees to natives should be restricted to existing plantations, and not used to continue existing poor practices.

Plantation owners need rules to remove existing pine trees in ways that don't put whole mountains and catchments at risk during the 'vulnerability window' during and after harvest for 7-9 years. We also need a strategy that is both ecologically and economically sound for a process to quickly reforest the land in diverse species that may include some exotics but would mostly be native trees.

The regulatory issues at play, and what needs to be done

There are a range of regulatory issues relating to land use in Tairāwhiti and Wairoa, across interconnected concerns regarding climate change, land use rules for plantation forestry, and the rights and interests of tangata whenua. Many of these concerns are outlined in Wai 2607, which claims the New Zealand government's response to climate change breaches Treaty of Waitangi obligations. The claim outlines a range of failures and how these impact tangata whenua, natural ecosystems, health, and the economy. Regulatory issues manifest at central,

local, and industry governance levels. Failures include both the Emissions Trading Scheme (ETS); which has been ineffective at reducing greenhouse gas emissions, including in the forestry sector; and the National Environmental Standards for Plantation Forestry (NES-PF), which have been ineffective in managing plantation forestry on highly erodible soils.

Addressing these challenges requires an integrated, multifaceted approach that respects the rights and knowledge of tangata whenua, promotes sustainable land and water management practices, and fundamentally acknowledges the local context and environment. Collaboration between government agencies, councils, businesses, and communities is essential in creating a regulatory framework that balances economic, environmental, and social needs while adapting to the challenges posed by climate change. To date, formal regulatory approaches have underdelivered with respect to this context across all levels of governance, and are disconnected from nuanced, local contexts. Regulatory mechanisms have been largely one-size-fits-all in their design, with significant shortcomings, to the detriment of communities and the environment.

In 2015, the Future Tairāwhiti Committee of the GDC began exploring options to address the escalating slash issue. They proposed solutions including retiring steep land from clear-fell forestry and introducing a levy or rate on forestry companies to contribute to clean-up costs. The constraints of the NES-PF were raised again in this forum, with emphasis on the region's unique geographical context, susceptibility to erosion and the damaging effects of wood debris from timber harvesting, and the need for further regulatory action from central government (Gisborne District Council, 2015). Further to this, the MPI-led review of the first year of the NES-PF identified concerns with wildling pines, slash, and biodiversity. Several changes to regulations were recommended, including to clarify and strengthen the controls and improve management of slash (Te Uru Rākau, 2021).

> "Tangata whenua have identified the discharge of forestry slash from forestry activities as a significant resource management issue. Forestry slash discharge can have actual and potential adverse effects on the mauri of ancestral water and other taonga (e.g. fish spawning and feeding grounds, mahinga maataitai, taonga raranga, and tauranga ika and waahi tapu)." (Gisborne District Council, 2015, p. 15)

> "Of particular concern is the lack data on the environmental benefits, although we expect those gains to be marginal. There is also no information on how an NES will improve firm and government performance over and above the reduction in administrative and compliance costs." (Nixon & Peterson, 2015, p. 49)

Development of the NES-PF appears to have favoured regulatory streamlining for forestry companies over the environment. Evidence from a 2015 cost-benefit assessment of the proposed NES-PF (Nixon & Peterson, 2015) shows forestry stakeholders sought consistency and efficiencies in terms of resource management regulation. They viewed rules as differing widely between local authorities with inconsistencies creating the possibility of increased costs and uncertainty for forestry companies attempting to comply with varying rules. The assessment caveats the lack of data, and insufficient research, on environmental values and benefits. Assumptions are derived from interviews with the forestry industry, councils, and government departments. Problems associated with variable environmental practices are

considered to be of marginal significance, citing improved professionalism of forestry sector (Nixon & Peterson, 2015). The effects of climate change on Aotearoa's national and regional weather patterns, and consequent risks of fire, flooding, and disease in forests have not been sufficiently considered throughout the development of the NES-PF, and future climate predictions need to inform risk thresholds when making decisions about permitting or prohibiting forestry activities (Tait-Jamieson, 2023). Almost no consideration has been given to the risks associated with biodiversity losses and ecosystem collapse, arising from policies that strongly encourage the expansion of monocultures of relatively short-lived, shallow rooting, and highly flammable exotic conifers across Tairāwhiti and other regions of Aotearoa New Zealand.

How We Incentivise the Transition to Permanent Diverse Native Forests

Land-use change after Cyclone Gabrielle is an opportunity for positive environmental developments that meet both community and government objectives. Current policy, especially the ETS, strongly incentivises pasture conversion to exotic forestry for clear-felling or permanent plantations, but biodiverse, uneven-aged, indigenous forests offer better protection against erosion, waterways and marine degradation, and long-term carbon sequestration.

In the current ETS look-up tables, landowners in Tairāwhiti are allocated up to ten times more NZUs by Year 6 for planting pine trees than for planting or regenerating native forests. Given the overall emissions profile across the industrial forestry supply chain, with roughly twice the amount of carbon emitted as is sequestered, this is very difficult to justify. Permanent indigenous forests offer the only credible and sustainable model for long term carbon sequestration. Because of these major flaws in current policy settings, co-ordinated reform of the ETS, NES-PF, and other policies, including new instruments, is needed.

In the paper attached to this submission (Hall, 2023), David Hall proposes a biodiversity payment from disaster recovery funding to reduce or neutralise the opportunity cost difference between native and exotic forestry, incentivising restoration of biodiversity. This would improve future resilience, support new economic opportunities, and serve as a pilot for use in other regions.

It should be emphasised that a biodiversity payment should go alongside major reform of the ETS and NES-PF, and not replace it. There is a danger that it might be used as a 'get out of jail' card for both forestry companies and the government, leaving the current dysfunctional suite of forestry policy instruments largely intact.

Models include **biodiversity credits** with a compliance market (like the ETS but showing proof of positive contribution rather than offsetting harm); **direct payment**, mostly likely results-based, e.g. for planting native forest on erosion-prone slopes or wetlands in flood-prone catchments—this could be covered by disaster recovery funding now, but later work as a longer-term scheme funded by levies on activities threatening biodiversity (like development contributions currently do for physical infrastructure); and **resilience bonds** that spread investment cost over future generations, with proceeds being directed towards specific activities and interest rates linked to sustainability targets.

Encouraging **greater investment in research and development for goods and services derived from indigenous plant species** is another way to increase demand for native forests that can be utilised for these enterprises. An example of this is Hikurangi Bioactives LP (https://hikurangibioactives.co.nz), working with a group of 14 Māori land blocks in the Waiapū Valley and developing therapeutic products for international markets based on proven safety and efficacy. The first product to go through a successful Phase II clinical trial utilises sustainably harvested kānuka oil and is currently being tested on patients in Florida. If there is a positive response from patients and doctors, there will be a significant kānuka oil manufacturing operation in Ruatorea and possibly elsewhere.

Strategies for incentivising the establishment and protection of diverse permanent native forests are desperately needed. Since the 1920s, little has been done to encourage the replacement and sustainable management of native forests in New Zealand.

In Aotearoa the cost of erosion is significant, and historically, in some instances, has outweighed prevention expenditure on a 3:1 ratio (Marden, 2003). In Tairāwhiti, it is a substantial legacy issue, largely attributable to the region's unique, steep topography, and deforestation. Erosion and sediment issues have plagued Tairawhiti's major catchments since 1880-1920, particularly the Waiapū Catchment which has seen significant and continued gully erosion (Marden, 2003). A review of gully erosion remediation attempts from 1997-2017 found that erosion control targets have not been met, despite some success. The review suggested solutions including staged replanting, harvestable crop setbacks, and transitioning to indigenous vegetation for actively eroding gullies (Marden & Seymour, 2022). Further investment and regulatory enforcement are needed to ensure landowner compliance in this area. Another contributing factor here is the mis-classification of land and erosion susceptibility due to mapping at too coarse a spatial scale (Miller, 2023).

Another example of maladaptation is the One Billion Trees programme. As of February 2023, less than 10% of the trees planted since the One Billion Trees initiative began (now closed for new funding) had supported indigenous afforestation while millions of taxpayer dollars have flowed to companies owning exotic tree plantations and tens of thousands of hectares have been planted in pine (MPI, 2023).

What this Inquiry needs to do is tell the Government that any more pine – whether production or 'permanent' – on erosion-prone land is unnecessary, unhelpful, unwanted, and unethical. Restoration of native forests is the only truly sustainable option for highly-erosion-prone land, and is achievable - but only if the Government creates the necessary policy.

Why We Need Catchment-led Transition Plans Informing a Regional Just Transition Plan

If significant rule changes mean less traditional farming and forestry activity, there will be significant unemployment, and workers and their families need to see a clear, quick path to new employment. Rural Tairāwhiti has comparatively few alternatives to drystock farming and plantation forestry. One of the most pressing needs for the region, individual communities and households is to identify new industry and employment opportunities.

The petition organised by Mana Taiao Tairāwhiti that led to the establishment of this Inquiry also requested:

> That Gisborne District Council, Trust Tairāwhiti, and other regional leadership organisations, residents, ratepayers and Central Government work on a 20-year regional Just Transition plan to ensure all land use in the region is truly sustainable - from economic, social, cultural and environmental perspectives.
>
> That the Government establish a ministerial group including the Ministers for the Environment, Climate Change, Business & Employment, Social Development, Forestry, Agriculture, Civil Defence, Research, Science & Innovation, and Māori Development to support the development, implementation and monitoring of a regional Just Transition plan for Tairāwhiti.

The Inquiry should seek a government commitment to include Tairāwhiti as a region supported though MBIE's Just Transition Partnership, similar to the support provided to Taranaki and Southland. What we don't need, however, is a top-down plan led by a handful of individuals. Land blocks, and then catchments, are the most appropriate level for initial planning to take place. They can then feed into a regional plan supported by local government, national agencies, and other stakeholders as appropriate. Catchment groups can look at the particular opportunities and challenges in their context and with support from local and external experts, including discussions with neighbouring catchment groups, identify new business and employment options alongside jobs in native afforestation (nurseries, pest control, planning and managing projects, etc.).

Transition in the context of major industry changes in an already low-income region with a fragile physical environment and unprecedented infrastructure and property damage, and in a changing climate, is not something communities, hapū, iwi or local authorities can achieve on their own. They require outside resources. And local economic and social transformation must be part of a bigger national policy-making and implementation process. Hence the need for what Nobel Prize winner Elinor Ostrom calls 'polycentric governance' and top-down, bottom-up collaboration. The strength of collaborative processes lies in the creative approach that multiple stakeholders can bring to problem solving. When stakeholders at all levels are involved in identifying the key issues and devising the best pathway to just transition, coordination is improved, and everyone is committed to the plan.

The massive exercise underway to help communities and districts recover from Cyclone Gabrielle and 'Build Back Better' (BBB) has revealed major problems with overlap and coordination among government agencies, councils, service providers and NGOs. It has also exposed the difficulties these organisations have experienced in communicating with communities, iwi, hapū and marae, understanding their needs and priorities, and including them in the recovery and adaptation process. These are even more essential when planning for transformative, long-term just transition for employment and industry.

What Else Could be Done and The Policies We Need to Do It

Our research for this submission has found a long list of excellent science-based studies with highly relevant conclusions and specific recommendations for land management in the region that have not been implemented.[1]

A. ETS Changes

Carbon farming through native tree planting on Indigenous land has gained attention, particularly with Manuka/Kanuka medicinal products and honey. However, there are inherent difficulties in transitioning from current land uses to permanent carbon farming. There are insufficient returns through the ETS scheme to incentivise planting natives, however the short life of exotics means that, with time, the forests will start providing a negative return, rendering the land essentially useless to future generations. This can be negated by publicly funding the transition of exotic forest planted to gain credits, into permanent native forest i.e. privatise the profit, socialise the losses. There is also considerable scientific scepticism that such transitions will be practical and affordable, particularly in highly erodible steeplands.

The real discussion is in the value of the transition, which has unquantified environmental, economic and health and wellbeing benefit to our vulnerable communities, and how this could be met via public schemes like the East Coast Forestry Project that was set up post Bola. It has been suggested that altering the ETS can promote more manuka or indigenous forestry options, including relaxing geospatial requirements to allow smaller landowners to participate, gaining a better understanding of actual carbon sequestration rates by different kinds of native forests in different regions, recognising the negative emissions profile of industrial forestry supply chains, and potentially offering financial incentives for non-carbon co-benefits such as biodiversity. In its current form, the New Zealand ETS is a very high-risk policy instrument, for local communities and landscapes, for investors, and for the nation.

For the agriculture sector, the importance of continuous support, guidance, and tangible incentives for farmers to implement emissions pricing based on farm use is emphasized. Tailoring policies for Māori landowners is essential, as is tracking outcomes as the scheme unfolds. A review of factors driving farmers to implement land use changes before emissions pricing suggested that farmers respond well to effective communication and guidance.

B. Invest in Community Resilience & Capacity-Building for Transition Planning

Building community resilience in the face of climate change is imperative, as exemplified by the "Climate Change and Community Resilience in the Waiapu Catchment" report. The study

[1] For example, in a 2018 MPI report (Spiekermann & Marden, 2018) into the best options for land use in Te Tairāwhiti, the authors recommend high-resolution assessments, which can be adjusted for management purposes, and detailed erosion risk assessments for all exotic forests, accounting for harvesting effects. Annual risk maps should be created based on harvest sites and times, and the information should be used to evaluate future forestry, including post-harvest land use, to mitigate storm damage in marginal areas.

emphasises the significant impacts of climate change on the Waiapu catchment community's natural systems and social and economic well-being.

To build resilience, community-led initiatives such as sustainable farming practices and climate adaptation, mitigation and response risk assessments and plans are necessary.

Recommendations include:

- Investing in in holistic, community-based catchment-level organisation and planning for restoration projects in every catchment across the region.
- Establishing 'Model Forests' to develop a strategic understanding of land use, coalitions, and new decision-making methods.
- Investing in nature-based forestry research, training and trials, entrepreneurship programs, and innovative forest-based value chains to provide alternative, high quality employment and support transition towards a circular bioeconomy.

Public policies, regulations, and education campaigns are needed to support this transition.

The state government of Victoria recently banned native timber harvesting and established a $200m forestry transition package to support communities, businesses, and workers reliant on that industry. Something similar will be required for Tairāwhiti and Te Wairoa – $100m could go to support workers and business owners to retrain and/or redeploy resources into new sectors and $100m could go into R&D and establishing new businesses and industries based around the region with a far higher proportion of native trees and forest on the land.

C. Increase efforts to accurately map terrain to a finer scale than currently available, and classify acceptable land uses accordingly

Risk assessments should be carried out for all exotic forests, existing and planned. Since harvesting affects risk, there should be annual risk maps created, based on intended harvest sites and times. The information should also be used to evaluate future forestry, including post-harvest land use and infrastructure decisions.

Hazards created by the combination of forestry practices and heavy rainfall events can be reduced through informed forestry management practices, such as Terrain Susceptibility mapping (Amishev 2014; Speikerman & Marden, 2018). A proactive, preventative approach is needed to minimize forestry-related hazards, requiring a shift in regulatory processes and investment in high-resolution mapping for better forest management decisions. Specifically recommended actions from Don Miller (2023) include:

1. Applying a whole-of-slope geotechnical assessment to all slopes adjacent to a major highway (e.g. SH35).
2. Treatments such as opening surface drainage channels to prevent water ponding and infiltrating slopes, triggering deep-seated movements, and possibly lining such zones with an impermeable clay where necessary.
3. If problems remain after efforts to curtail infiltration up-slope, horizontal boring for drainage could be useful in some situations.

4. Where the LUC classification of an area indicates limited units within a slope should be treated for erosion susceptibility (e.g. by afforestation) the remainder of the slope should always be assessed to determine if it also needs to be treated in some way.

(Miller, 2023, p. 7)

D. Forest Environment Plans

Given the extreme environmental, social, and economic harm caused in Tairāwhiti by poorly located and managed pine plantations, Plantation Forest Environment Plans in parallel with Farm Environment Plans should be required for all plantations, whether indigenous or exotic. These should cover the establishment, management and harvesting of the plantation to ensure that environmental, social, and economic harm to the wider community and local landscapes, waterways, and the ocean is minimised.

E. Progress Constitutional Transformation

There are legitimate calls for an overhaul of the constitutional foundations of Aotearoa New Zealand that continue to be seen as a fundamental problem in situations like the challenges of land tenure, land use and climate adaptation (Potter, 2023).

In 2010 a Working Group was established at a meeting of the Iwi Chairs' Forum with Terms of Reference: "*To develop and implement a model for an inclusive Constitution for Aotearoa based on tikanga and kawa, He Whakaputanga o te Rangatiratanga o Niu Tireni of 1835, Te Tiriti o Waitangi of 1840, and other indigenous human rights instruments which enjoy a wide degree of international recognition"* (Matike Mai Aotearoa, 2016, p. 7).

The Terms of Reference did not ask the Working Group to consider such questions as "How might the Treaty fit within the current Westminster constitutional system" but rather required it to seek advice on a different type of constitutionalism that is based upon He Whakaputanga and Te Tiriti. For that reason this Report uses the term "constitutional transformation" rather than "constitutional change".

As a result of 252 hui between 2012 and 2015, in 2016 the Working Group produced a report, *Matike Mai,* that starts with recognising He Whakaputanga (the parent document) which asserted the absolute authority of the hapū of this country in 1835. It was a message to the world and their trading partners that this country was, and is, a Māori country. Te Tiriti (the child document) affirmed the parent authority and allowed England to establish a governor over their people, within a Māori country. The rest is the history which the Crown hasn't quite got around to teaching throughout our schools.

Matike Mai is a commitment to human values such as the value of place and belonging, of community, of tikanga, and of balance. It speaks of building structures for finding ways through conflict, rather through trying to beat your adversary.

Some of the main findings from the report recommend:

- that Iwi, Hapū, and lead Māori organisations initiate dialogue with other communities in their rohe about the need for and possibilities of constitutional transformation.
- that Iwi, Hapū, and lead Māori organisations initiate formal dialogue with the Crown and local authorities about the need for and possibilities of constitutional transformation.
- that Iwi, Hapū, and lead Māori organisations initiate dialogue with the Crown to organise a Tiriti Convention to further discussions about the need for and possibilities of constitutional transformation.

These recommendations seem pertinent to the current situation where the fundamental arrangements for decision-making on land use and property rights currently sit with Parliament and the government of the day. Arrangements that provided Māori with more control over the governance and management of their tribal estate could be expected to have significant impacts on current and future activities. Hapū being empowered to have decision-making powers on resource consents in their rohenga also requires training and resources to enable proper participation in these processes.

Other Opportunities Across Time Horizons and Areas for Action

The following chart provides high-level suggestions for activity types different stakeholders could commit to, according to the time horizons by which the Inquiry Panel proposed to order their recommendations to ministers (1, 2, and 5+ years).

◆ Catchment Communities, Marae, Hapū & Iwi
◆ Local Government
◆ Central Government
◆ Business & Industry

Area	Long-Term (5 Years+)	Short-Term (2 Years)	Immediate (1 Year)
Land Use	• Mosaic of Truly-Sustainable Land Uses ◆◆◆◆	• Catchment Level & Regional Planning ◆◆◆ • No more pine planting on erosion-prone land. ◆◆◆ • Land Governance Succession ◆	• Catchment Level Learning & Assessments ◆◆◆ • Ceasing to leave slash on erosion prone land and cleaning up existing slash that presents risk ◆◆◆ • Land Governance Training ◆
Habitation	• Seasonal Access? ◆◆	• Resilience Planning & Action ◆◆◆◆	• Risk Assessments & Emergency Planning ◆◆◆◆

	• Managed Retreat / Migration? 	• Relocation 	
Tikanga	• Constitutional Transformation  • Legislation & Tikanga Changes 	• Policy & Rule Reviews  • Wānanga Tīkanga 	• Enforcement Orders  • Legal Action  • Treaty Claims 
Planning	• National Just Transition Legislation 	• Action for Energy, Food, Transport, Housing & Communications Resilience  • Hapū resourced and trained to contribute to decision-making on resource consents in their rohe. 	• Local, Regional & National Just Transition Planning 
Economic	• Degrowth Commitments / Circular, Low Emissions Economy  • Land Tenure Legislation Review 	• Redeploy/Retrain affected farm and forestry workers  • New IP & Ownership Models  • Truly Sustainable Industry & Business Development 	• Identify & Support Workers and Businesses At Risk and Displaced by Transitioning Land Use  • R&D Investment & Reprioritisation  • Showcase Better Businesses 

4. He Moemoeā: A Vision for Optimal Land Use in Tairāwhiti

2024: The people of Tairāwhiti have understood the scale, risk and options for protecting waterways, land, property and human life from the threat of woody debris and sediment entering waterways, and taken action to minimise the impacts of this threat.

The people of Tairāwhiti have committed themselves to developing plans for their homes, places of work and places of recreation and remembrance, that will provide the best chance of protecting the things we value.

The people of Tairāwhiti have begun serious deliberations about the kinds of industry and activities that are possible and preferable in a region highly susceptible to both erosion and flooding.

2025: Tairāwhiti has one or more Just Transition Plans developed by groups of residents[2] that provide a clear path to eliminating clear-fell forestry and pasture on red and orange erosion-prone land and creating new jobs in permanent forest management and indigenous forest regeneration.

Tairāwhiti landowners, residents, businesses and regulatory authorities have agreed on a set of rules/tikanga for activities on different types of land in each catchment.

Tairāwhiti has produced sector development road maps for a dozen emerging industries in the region that don't rely on grazing or clear-felling on red and orange zone land.

2030: Tairāwhiti has stopped clear-felling on red and orange zoned land, and is implementing a plan for the rapid transition of pasture and pine on red and orange zone land to diverse native forest.

2040: Tairāwhiti has significantly diversified its economy while reducing gross emissions and reducing inequalities in the region

2050: Tairāwhiti is a model region for transitioning from unsustainable land use to truly sustainable land use

2100: Diverse native forest is protecting red and orange zone land.

[2] based on shared whakapapa, geographic proximity, work/education/faith/sports community and/or other mutual interests

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Thematic Summaries of Evidence for Mana Taiao Tairāwhiti Submission

to the Ministerial Inquiry into Land Use in Te Tairāwhiti, Tūranganui-a-Kiwa and Te Wairoa

MANA TAIAO TAIRĀWHITI

APRIL 2023

Introduction

This document has ten sections based on seven themes associated with the Terms of Reference for the Ministerial Inquiry into Land Use in Te Tairāwhiti, Tūranganui-a-Kiwa and Te Wairoa and three additional themes that Mana Taiao Tairāwhiti identified as important factors associated with the scope of the Inquiry.

The review of evidence included more than 150 peer reviewed studies, policy papers and other reference material, along with the testimony and evidence provided by residents affected by land use and weather events in Tairāwhiti. The review has been undertaken by the Mana Taiao Tairāwhiti steering group and 110 volunteer researchers working over the month of March 2023.

The document starts with whakapapa showing the links between humans and Te Taiao as the mātāmua, or senior in the relationship. This is followed by a section (B) prepared by Dr Wayne Ngata on the history of human occupation in Te Tairāwhiti.

The Second theme (C) focuses on the inherently erosion-prone landscape occupants have found ourselves living with and the impacts of storms on the landscape, before and since human occupation, and how our activities on the land have dramatically accelerated erosion.

The Third section (D) looks at the financial incentives driving land use change (from pasture to pine plantations, from production plantations to carbon farming) and touches on influences like the ETS, access to capital and potential incentives for better land use options.

The Fourth theme (E) is afforestation and its importance on erosion-prone land, the big problems evident with clear-felling and 'permanent' pine plantations on erosion-prone land, the fact that we don't know if pines plantations can transition to native forest in ideal conditions (let alone the extreme environs of Tairāwhiti) and alternative options for pine management on less erosion-prone land.

Regulatory issues in Theme Five (F) are clearly at the heart of much of these challenges – local government feels hamstrung by the NES-PF and every party seems to agree both the NES-PF and ETS are not doing what they were intended to. MTT has commissioned papers on both the NES-PF and proposed ETS changes as they relate to pine plantations in Tairāwhiti, and we strongly encourage the Inquiry team to read these two short reports.

Theme Six (G) is an overview of some of the government initiatives intended to help with the issues, but MTT figures officials will be able to offer more up to date evidence on the effectiveness of these programmes.

Theme Seven (H) derives from the Terms of Reference, and here is all about key recommendations.

Theme Eight (I) tries to cover the macro issues at play on the situation the region finds itself in and proposes some approaches to rethinking land tenure and financing and Theme 9 (J) looks at challenges and opportunities around Kaitiekitanga and the role of mātauranga Māori in this context.

The final Theme Ten (K) provides some compelling examples of how behind other parts of the world Aotearoa New Zealand is, and really challenges the claims of good local land use practice—especially by forestry companies operating our region that have somehow retained certification with FSC, but perhaps not for much longer. Nature Based Solutions and biodiverse forests are becoming the expectation internationally, and Aotearoa New Zealand needs to catch up quickly.

Beyond the list of references are the five papers prepared by independent experts for the MTT submission.

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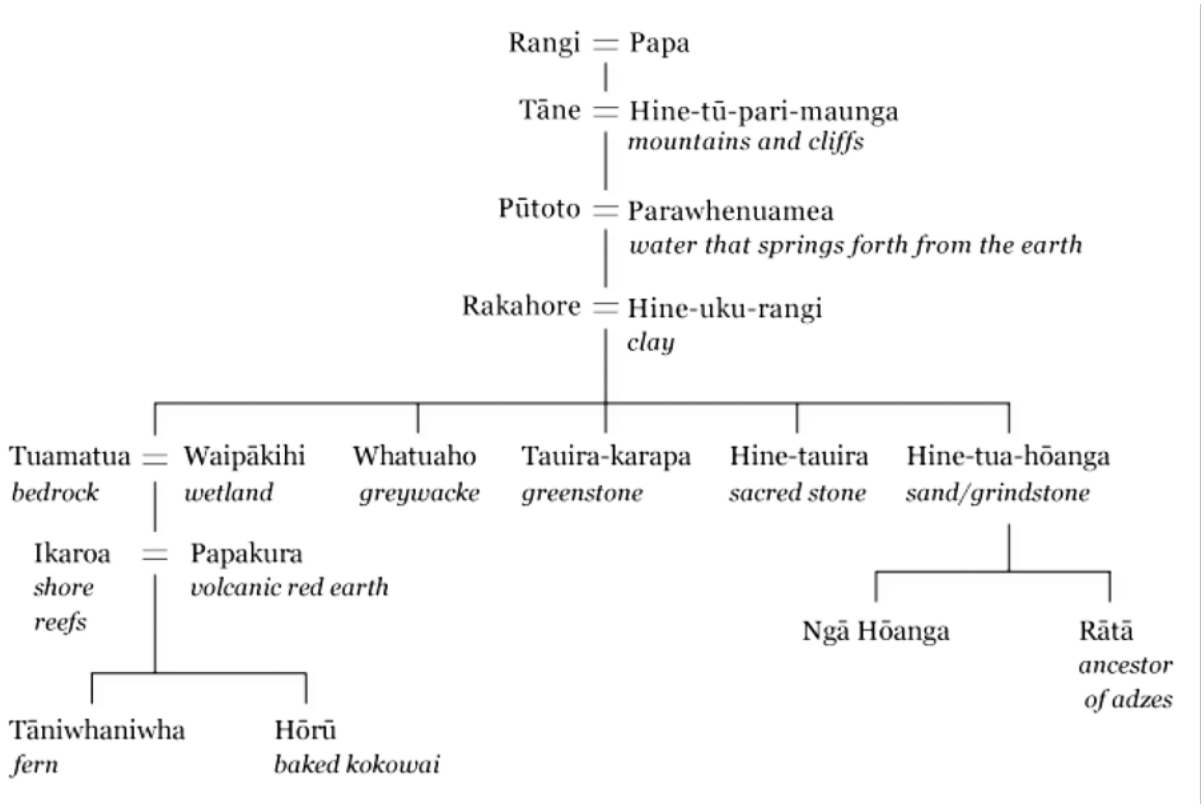
TE KORE WHAKAPAPA[1]

Te Kore
(the void, energy, nothingness, potential)
|
Te Kore-tē-whiwhia
(the void in which nothing is possessed)
|
Te Kore-tē-rawea
(the void in which nothing is felt)
|
Te Kore-i-ai
(the void with nothing in union)
|
Te Kore-tē-wiwia
(the space without boundaries)
|
Te Pō-nui
(the great night)
|
Te Po-roa
(the long night)
|
Te Pō-uriuri
(the deep night)
|
Te Pō-kerekere
(the intense night)
|
Te Pō-tiwhatiwha
(the dark night)
|
Te Pō-tē-kitea
(the night in which nothing is seen)
|
Te Pō-tangotango
(the intensely dark night)
|
Te Pō-whāwhā
(the night feeling)
|
Te Po-namunamu-ki-taiao
(the night of seeking the passage of the world)
|
Te Pō-tahuri-atu
(the night of restless turning)
|
Te Pōtahuri-mai-ki-taiao
(the night of turning towards the revealed world)
|
Te Whai-ao
(the glimmer of dawn)
|
Te Ao-Mārama
(the bright light of the day)

Depending on who the presenter of the information “I te timatanga” (before man) this may change however the common reference is still from Te Kore, Te Pō into Te Ao-Mārama.



Rangi and Papa begin the whakapapa of human descendants as every persons whakapapa is individual to themselves this may vary. Here the descendants of Tane and Hine-tū-pari-maunga shows the connection between stone water and soil.[2]

Sky *Earth*
Ranginui = Papatuanuku
|
Tāne = Mumuwhango
|
tōtara (Podocarpus totara)

Tāne = Pūwhakahara
|
akerautangi (Dodonaea viscosa)

Tāne = Atatangirea
|
maire *(Nestegis cunninghamii)*

Tāne = Kūraki
|
kahikatea *(Dacrycarpus dacrydioides, white pine)*

Tāne = Ōtunairanga
|
nikau *(Rhopalostylis sapida, New Zealand palm)*

Tāne = Ngāore
|
toetoe *(Cortaderia toetoe, grass, sedge)*

Tāne = Pākoti
|
harakeke *(Phormium tenax, flax)*

Tane = Kui-ū-uku
|
mataī *(Prumnopitys taxifolia)*

Tāne = Tū waerore|
_____|_____
| |
rīmu tanekaha
(Dacrydium cupressinum) *(Phyllocladus trichomanoides)*

Tāne = Huri-mai-i-te-ata
|
mānuka
(Leptospermum scoparium)

This whakapapa between Tane and Mumuwhango[3] are the tree elements. Whakapapa is not limited to the human element. Whakapapa is our interconnectedness with our world before, our world now and our world in the future.

TENEI AU

TENEI AU

KO TE HOKAI NEI

O AKU TAPUWAE

KO TE HOKAI NUKU

KO TE HOKAI RANGI

KO TE HOKAI A O TIPUNA

A TANE NUI A RANGI

I PIKITIA AI KI NGA RANGI TUHAHA

KI TE TIHI O MANONO

I ROKOHINA ATU RA

KO IO MATUA KORE ANAKE

I RIRO IHO AI

NGA KETE O TE WANANGA

KO TE KETE TUAURI

KO TE KETE TUATEA

KO TE KETE ARONUI

KA TIRITIRIA

KA POUPOUA

KIA PAPATUANUKU

KA PUTA TE IRA TANGATA

KI TE WHAI AO

KI TE AO MARAMA

This karakia which incorporates our spiritual journey of searching for enightenment is a timely reminder of reinstating the mauri of whakapapa.

Whakapapa is a framework that links all animate and inanimate, known and unknown phenomena in the terrestrial and spiritual worlds. Whakapapa therefore binds all things. It maps relationships so that history, knowledge, tikanga (custom), philosophies and spiritualities are organised, preserved and transmitted from one generation to the next. [1] Whakapapa is at the core of traditional mātauranga Māori (Māori knowledge) and the core connection between Māori people and the environment we exist within – past, present and future.

The timeless chant proclaims Tāne-mahuta's journey in search of higher knowledge and enlightenment. There are several interpretations of what each basket represents, however the late scholar and revered pakeke Māori Marsden has suggested that the basket of light is present knowledge, the basket of darkness is things unknown and the basket of pursuit is the knowledge that we presently pursue.

The efforts to bring together this submission has collected what is known, highlights some things we still do not know and identifies knowledge we now need to pursue to create a better future with our communities.

[1] Basil Keane, 'Traditional Māori religion – ngā karakia a te Māori - Ngā atua – the gods', Te Ara - the Encyclopedia of New Zealand, http://www.TeAra.govt.nz/en/speech/30768/te-kore-whakapapa (accessed 2 April 2023)

[2] Phil Moore and Bruce McFadgen, 'Kōhatu – Māori use of stone - Stone tools', Te Ara - the Encyclopedia of New Zealand, http://www.TeAra.govt.nz/en/document/8877/whakapapa-of-rocks-and-stones (accessed 2 April 2023)

[3] Te Ahukaramū Charles Royal, 'Te Ao Mārama - He ao hono', Te Ara - the Encyclopedia of New Zealand, http://www.TeAra.govt.nz/mi/whakapapa/7949/te-whakapapa-o-nga-rakau (accessed 2 April 2023)

[4] Rāwiri Taonui, 'Whakapapa – genealogy - What is whakapapa?', Te Ara - the Encyclopedia of New Zealand, http://www.TeAra.govt.nz/en/whakapapa-genealogy/page-1 (accessed 1 April 2023)

B. Human occupation of Tairāwhiti

Te Tairāwhiti refers generally to the eastern seaboard of the North Island of New Zealand, and more specifically, the region from Te Paritū south of Gisborne to Pōtaka in the north. Like other regions throughout the country, the stories of its settlement are a reflection of the diaspora of human civilisations since time immemorial with a mix of ancient origins, migrations from Hawaiki of Te Moananui a Kiwa, conflict and resolution, subsequent inter-regional migrations, and more recent non-Māori migrations. The need to locate, establish, and protect territory on land and sea is not exclusive to the human race, and certainly not to Māori.

The Ruatepupuke story is one of the numerous stories that belong to hapū and iwi of the Tairāwhiti and is designed to articulate an origin story of a coastal and marine people. Māori tradition was maintained through a range of oral devices including: pure, karakia, various forms of whakapapa, pūrakau and pakiwaitara, a wide range of waiata or mōteatea, and pepeha and whakataukī, to name a few. Māori literature is replete with the full gamut of human existence; life, love, war, joy, sadness, death and more. The Māui, Tinirau, Whiro, Uenuku, Ruakapanga and Toi traditions weave the fabric of Te Moananui a Kiwa legacies into the waka migrations south to a new land called Aotearoa.

Whatever the route, mode, or cargo, and whoever was on board, it is widely accepted that Māori arrived in Aotearoa-New Zealand over a period of time between 900-1350 AD, and some even returned to those Hawaiki homelands of Te Moananui a Kiwa. Ngata refers to several landing places of waka in the Tairāwhiti as ‘pūtahi’ (Ngata, 1972, Lecture 2, p. 8) because these became staging points of exploration, settlement, expansion and refuge over time for the initial immigrants and subsequent generations. Numerous waka made landfall on the Tairāwhiti: Nukutaimemeha of Māui on Hikurangi, Nukutere of Te Whironui at Waiapū and Māhia, Horouta of Paoa at Waiapū and Tūranganui, Takitimu of Tamatea at Nukutaurua, Tereānini of Rongomaituaho at Whāngārā, Tūtepewarangi of Paikea at Ahuahu (then he eventually made his way to Whāngārā), Mataatua of Uenuku at Parinuiterā, and Te Ikaroa a Rauru of Māia at Tūranganui.

It is important to note here that our historical viewpoint of migration to and within Aotearoa has been heavily influenced by 19th and early 20th century ethnographers and anthropologists. This is not to devalue the contributions of the likes of White, Locke, Percy-Smith, Best, and the like, but rather to pause and consider how people coming to a new land responded to a different environment and its resources, and others who they encountered, and how our own story tellers articulated these responses.

Different waves of migration and settlement of the Tairāwhiti region have provided a picture of Māui origins, Toi settlement with Ruawaipū and Uepōhatu, southern contributions with Ngāti Ruanuku who according to some arrived with Tahupōtiki on his return to Whāngārā (Ngata, 1972, Lecture 3, p. 6); mixed groups including descendants of Tamateatoia and Tamateataharoa banding together to form a powerful coalition called Te Wahineiti; later Horouta, Nukutere and Takitimu contributions; and Ngāti Ira from the south. The relatively well defined tribal boundaries we advocate today were far more fluid and transient than we appreciate in the time of our ancestors. The migratory pattern of living depended on access to seasonal food, on land and sea, wild or cultivated; and the relationships with kin groups in similar situations.

Four generations after Paikea, we have the birth of Porourangi and his brother, Tahupōtiki, at Whāngārā. Whāngārā is referred to as ‘te pārekereke o te kōrero’, and ‘te pūtahitanga o te tangata’, an important homebase and refuge for Paikea’s descendants; a place from which they could expand further afield to establish new settlements and return to in times of conflict. The expansion of Porourangi and Tahu’s descendants north and south of Whāngārā have heavily influenced the current make-up of hapū an iwi groups on the eastern seaboard of the North Island, from Ngāti Porou in the north, Te Aitanga a Hauiti in Uawa south, Te Aitanga a Māhaki, Rongowhakaata, Ngāi Tāmanuhiri and Ngāti Ruapani in Tūranganui, and Rongomaiwahine, Ngāti Rākaipāka, Ngāti Pāhauwera and Ngāti Kahungunu further south.

Monty Soutar, 'East Coast region - Māori settlement', Te Ara - the Encyclopedia of New Zealand, http://www.TeAra.govt.nz/en/map/33350/waka-landings-places-of-significance-and-tribes (accessed 4 April 2023)

C. Impacts of storms on land in Tairāwhiti

The impact of storms is multifaceted and dependent on several interrelated factors including storm characteristics (usually wind and rain intensity), land use, infrastructure, underlying geology, and topography. Some of these factors, like a lack of infrastructure or poor practices associated with forestry slash, can exacerbate the impact of storms. Extreme rainfall in Te Tairāwhiti is predicted to become increasingly intense under current climate change projections, particularly towards the end of the century (Woolley et al., 2020). It is therefore essential that policies, planning, and land use activities and practices (including forestry) account for and actively manage the increasing risk from storms.

Historical context

Te Tairāwhiti is world-renowned for its severe erosion, flooding and sedimentation (Spiekermann & Marden, 2018). It has a unique erosion profile with 22% of the land very highly susceptible to severe erosion, compared to a national average of 2%, and 79% being at least moderately susceptible to erosion (Basher, Lynn, et al., 2015). Extensive deforestation between 1880-1920 was the beginning of an intensive and dramatic transformation of the landscape. A century of pastoral farming has resulted in a highly degraded environment and reforestation was seen as a way to remedy this. Exotic forestry began in the 1960s and by 2018 occupied more than 188,000 ha of the region (BDO Gisborne Limited, 2021). Te Tairāwhiti has physical characteristics that lead to high erosion and sedimentation rates, including steep to strongly rolling hills underlain by weak and highly deformed rocks; periodic intense rainstorms (a rate of one every 2.5 years between 1900-1988), and massive.

Erosion and sediment

Since the 19th century, deforestation in Te Tairāwhiti has affected hills, river systems, and the marine environment, resulting in irreversible landscape changes and soil quality loss. Reforestation can reduce hillslope sediment loss, though previously eroded stored sediment will continue to move downstream. Targeted reforestation is advised to address specific erosion types (Page et al., 2000). A study found that selectively reforesting 8% of the most unstable landscape units in the Waipaoa catchment could reduce landslide-derived sediment by approximately 40% (Reid & Page, 2003). Erosion is accelerated by storm events. One clear example is the increase in gully erosion in disturbed and undisturbed forests following Cyclone Bola, which left the Mangaoporo catchment area with 21 active gully systems, when previously it only had four. As rainfall events continued, the gullies began to show recovery signs, highlighting the influence of factors such as lithology and topography in determining the nature and location of gully systems (Parkner et al., 2007).

The clear links between sediment loading in rivers and land use practices of pasture, exposed soil, and deforestation/reforestation, support the conversion of pasture to forestry to reduce sediment loads. Comparing exotic forestry and pasture, reforestation of 12% of landslide-susceptible land or 30% of randomly selected land could reduce landslide-derived sediment in the Waipaoa by 50%. Research suggests similar success could be achieved within three decades in the East Coast region by targeting gully-mass movement complexes in high sediment-yielding river systems like the Waiapu Catchment (Marden et al., 2014). Reforestation also affects gullying and water yield in the long term[4]. It is important to note that different forest types have significantly different abilities to reduce sediment erosion. For example, an indigenous and unharvested forest will reduce erosion a lot more than a harvested pine forest. An indigenous forest will have many additional ecosystem benefits

and services (i.e. increasing biodiversity) absent from monocultural pine plantations (Salmond, 2022).

The role of closed canopy forests in reducing erosion and promoting slope stabilisation is crucial, especially in the highly erodible steep lands common in Tairāwhiti region (Marden, 2004). Closed canopy native forests played a significant role in reducing erosion during Cyclone Bola (Marden, 2011). Kānuka planting is more effective at slope stabilisation and mass movement prevention than pines for the first nine years, after which their performance is similar. High-density planting and established, closed canopy forests provide the greatest stabilisation. Long-term thinking is essential in addressing erosion and promoting slope stabilisation (Marden & Seymour, 2022).

An analysis of sediment production in the Waipaoa, Waiapu and Uawa catchments before and after exotic reforestation showed that despite reforestation, sediment increased due to ineffective and untimely planting (Marden et al., 2008). The studies highlighted that reforestation would be most successful in Cretaceous gullies, headwaters, and active gullies in pastoral land. It will take approximately 24 years to see sediment yield reduction, and until then, environmental co-benefits like reduced flood risk and improved water clarity will not occur. Timing of harvesting can result in worse erosion from pine forestry as evidenced by the June 2018 slash damage at Tolaga Bay. In an MPI report into the best options for land use in Te Tairāwhiti, authors recommend high spatial resolution assessments, which can be adjusted for management purposes, and detailed erosion risk assessments for all exotic forests, accounting for harvesting effects. Annual risk maps should be created based on harvest sites and times, and the information should be used to evaluate future forestry, including post-harvest land use, to mitigate storm damage in marginal areas (Spiekermann & Marden, 2018).

Flooding and slash

Flooding issues in Te Tairāwhiti have been exacerbated by heavy rainfall, steep terrain, inadequate infrastructure, and poor coordination among government agencies. An inquiry into severe flooding in the region from Cyclone Bola in 1988 recommended constructing new flood protection infrastructure, improving existing infrastructure, enhancing coordination, and adopting a proactive approach that includes early warning systems and emergency response plans (Office of Parliamentary Commissioner for the Environment - Te Kaitiaki Taiao, 1988). A long-term strategy for flood management must prioritise investment in effective flood mitigation measures, protection of communities and infrastructure, and improved communication and collaboration between government agencies and local communities.

Storms, such as the 2018 Queen's Birthday storm and Cyclone Cook in 2017, mobilise significant sediment and woody debris within sub-catchments. This causes landslides and changes channel morphology, ultimately exacerbating flooding and damaging crops, fences, and infrastructure. It is well-established that most of the woody debris comes from pine rather than indigenous forests. For example, after the June-July 2020 storm (Cave, 2021), 46% of woody debris on Tikapa beach was pine and 36% was Indigenous species. Pine made up only 38% of land cover so contributed disproportionally to the debris; and after the January 2023 storm, a survey of woody debris (Fox, 2023) found that pine comprised up to 81% of the debris on beaches , representing between two and ten times the proportion of native wood deposits. 'Slash events' negatively affect ratepayers, beach amenities, biodiversity, and water quality and have been blamed for the death of a child at a Gisborne beach (Nightingale, 2023).

The impacts of forestry and slash in Tairawhiti must be addressed to protect social, economic, and coastal infrastructure. Although similar events occurred prior to forestry, worsening storms and mismanagement during harvesting have significantly increased the impact of these problems. Suggestions for mitigating these issues include addressing slash before it causes damage and exploring alternatives for unstable areas.

Changes are urgently needed to the way that slash and riparian buffers are managed (C. Phillips et al., 2016). Riparian buffers can reduce the effects of forestry and floods on receiving aquatic ecosystems (Boothroyd et al., 2004). For example, having a riparian zone (i.e. not planting pine all the way to the stream edge) reduced bank erosion but maturity and vegetation composition can influence the characteristics of streams in forested areas (Boothroyd et al., 2004). Other studies have found that riparian zones reduce the effects of logging by reducing algae biomass and water temperatures (Quinn et al., 2004). Another study concluded that native fish communities were enhanced by the presence of riparian buffers in logged catchment (Rowe et al., 2002).

Impacts of selected previous storms in Te Tairāwhiti

Extra-tropical Cyclone Cook (April 2017) was a small storm following Cyclone Debbie, causing flooding and instability. Pine-dominated woody debris, mostly from stored slash piles, was found at multiple locations and was the primary source of immobilized slash. Slash material traveled downstream during floods, potentially reaching the coast in a single storm or moving episodically. In the wake of Cyclone Cook, researchers recommended improved forestry policy and practices (i.e. utilising terrain susceptibility mapping; Marden et al., 2015) to address these issues and limit the impacts of future cyclones (Cave et al., 2017). Feedback from these earlier report writers suggests few, if any, recommendations have been implemented since their reports were submitted.

The 2018 Queens Birthday storm mobilized significant sediment and woody debris within the Mangaheia sub-catchment of the Uawa catchment. Landslides deposited sediment across roads, properties, buildings, and 224+ hectares of land. A lasting sediment plume was observed at the coast. Woody debris comprised 84% pine (mostly weathered logs), 12% willow and poplar, and 4% indigenous wood, similar to debris from Cyclone Cook in 2017. The debris caused log jams, altering channel morphology and exacerbating flooding around dams, damaging crops, and fences. Logs from the Uawa forest likely reached Tolaga Bay (Cave, 2022).

Importantly, despite a long history of devastating storms and the fact that they will only become more frequent in the future, very little has been done to address the risks of forestry practices and their associated impacts in Te Tairāwhiti. For example, a ministerial inquiry in the wake of Cyclone Bola (Office of Parliamentary Commissioner for the Environment - Te Kaitiaki Taiao, 1988) highlighted the need for more sustainable land use, soil conservation, and reforestation. Similar devastation from Cyclone Gabrielle shows fundamental issues remain unaddressed. The inquiry argued that an integrated approach to flood mitigation is necessary, with a focus on identifying risk generators and bearers. It also suggested that land use decisions should prioritise soil conservation and sustainability. However, the inquiry notably omitted the potential role of Māori in leading solutions to soil erosion and best land use practices.

Impacts of storms on ecosystems

The impacts of storms can have far-reaching environmental consequences, with erosion, sediment loads, and soil conservation being major concerns. In the Waipaoa River, Cyclone Bola in 1988 caused significant land sliding and sediment loads. Research shows that 48% of sediment in the river resulted from shallow landslides upstream, and 64% at the river's

mouth. However, long-term data reveals that landslides from major rain events contribute only 10-19% of sediment loads, with the majority stemming from gully erosion, sheetwash, and stream bank erosion during smaller rainfall events (Page et al., 1999).

It is important to consider the impacts of increased sediment related to forestry practices into receiving waterbodies. Excess sediment is a pollutant in aquatic ecosystems because there are multiple implications of increasing sediment loads to the health and functioning of our freshwater and marine environments. In the marine environment, for example, sediment smothers shellfish, reduces light which reduces seaweed growth which has knock-on effects up the food web, makes it hard for birds and visual predators to hunt and reduce oxygenation, and can lead to toxic algal blooms (Green et al., 2021). Though our native freshwater species have differing responses to increasing sediment, sediment can adversely affect river ecosystems in multiple ways. For example, sediment can change water chemistry, cause temperature decreases and increase turbidity. It can fill the interstitial spaces in the riverbed, where macroinvertebrate communities live, reducing their abundances and altering community structures (Ryan, 1991). In addition to sediment associated with forestry effecting aquatic ecology, the impact of larger woody debris (i.e. slash) is also likely to significantly affect ecosystems during floods.

Hei whakakapi

The impact of storms is large in Te Tairāwhiti. Despite the potential of reforestation, challenges remain. Ineffective and untimely planting, for instance, has led to an increase in sediment production in certain catchments. The forestry industry has been slow to adopt detailed erosion susceptibility mapping and must collaborate with regulatory authorities to develop precise, usable maps for better risk management.

Flood mitigation measures need improvement, such as constructing new flood protection infrastructure, enhancing existing infrastructure, and adopting early warning systems and emergency response plans. An integrated approach to flood mitigation, which includes identifying risk generators and prioritising soil conservation and sustainable land use, is essential. The role of Māori in leading solutions to soil erosion should not be overlooked.

Ultimately, a shift in regulatory processes and long-term thinking is necessary to promote slope stabilisation, reduce erosion, and minimise the hazards posed by storms, forestry practices, and climate change. Addressing forestry-related slash is crucial to prevent damage to social, economic, and coastal infrastructure. Through a combination of approaches, Te Tairāwhiti may be better equipped to face the impacts of future storms.

D. Economic drivers of current land use practices and economic constraints on alternatives

Land use and land use change are affected by a combination of biophysical, economic, technological, demographic, institutional, and cultural/social factors. Current land use practices in New Zealand are not working for managing highly erodible hill country, which is particularly vulnerable to increasing risk from storm events (climate change). Pastoral farming, monoculture plantations and clear-fell harvesting are not optimal activities on vulnerable, erosion prone land. One possible way forward is the adoption of alternative vegetation strategies such as reverting/converting erosion-prone land to diverse indigenous forest and making some of it sustainably 'productive' rather than fully protected in reserves and conservation estate.

Land use change has been a significant feature of the New Zealand landscape since European settlement, largely driven by economic factors. Over the last 30 years, the most significant land use change has been a switch out of sheep and beef farming, with an increase in dairying and forestry (Journeaux et al., 2017).

Economic drivers (Journeaux et al., 2017) include:

- Relative profitability of the land use
- Access to capital
- Infrastructure
- Markets, commodity prices
- Access to information
- Access to skilled labour
- Land tenure

Government policy and regional and territorial government policy, primarily driven by the Resource Management Act, have also been identified as external drivers to land use change.

Relative profitability (costs and returns)

Private land use decisions depend critically on land quality but also anticipated economic returns for alternative uses. In some cases, land use has also been significantly affected by public policies such as the removal of farming subsidies in 1985.

A good example of land use change due to profit pressure are dairy conversions in Canterbury and Southland where relatively flat land was available for use. An assessment of return on equity showed a threefold advantage over arable land in Canterbury, and a twelvefold advantage over sheep farming in Southland (Thorrold, 2010). Similarly, Wairakei Estate between Taupo and Rotorua began a large-scale conversion from forestry to dairying starting in 2004 (Fischer, 2021; *Wairakei Estate Webpage*, n.d.).

Landowners and managers often use models to provide a structured way to think about land-use change and its impact on key economic and environmental values. Hendy et al. (2018) discuss the pros and cons of the two models available at national level, NZ-FARM and LURNZ, , alongside other models. Forestry-specific models include Forestry Investment Finder (Scion; Yao et al., 2019) and Forecaster (*Forecaster - Integral*, 2020), which is available in online and consultant versions.

Farm and forestry models often do not integrate well, and exclude ecosystem services (e.g., erosion control, carbon sequestering) data and values. For example, modelling the effect of

planting native shrubs has been found to reduce farm income but the modelling did not reflect the value of ecosystem services provided by the native shrubs (Wangui et al., 2021).

In contrast, a case study of a Manawatū-Whanganui hill country and steep-land farm predominantly running sheep and beef showed changing to multi-function uses that increased ecosystem services provision (soil conservation, nutrient preservation, and GHG sequestration) could increase farm profit/ha and NPV significantly compared to the base farm (Tran et al., 2023). This positive impact was due to a conversion from pasture to other land uses, including indigenous forest, mānuka, space-planted poplars, and exotic forest.

Access to capital

Landowning entities' financial capabilities are a significant determinant of whether any decision to afforest is considered or realised. Assisting landowners to secure funding could considerably improve outcomes.

Land use change is expensive, and access to capital for both investment and development is vital. At an aggregate level, New Zealand is not short of capital, but at an individual level it varies widely, particularly for Māori landowners, as Māori land cannot be used as security.

The restrictions placed upon Māori land under the Te Ture Whenua Māori Act 1993 make accessing conventional financing from banks challenging. Under this Act, Māori land cannot be alienated, sold, transferred to general title, or forfeited as collateral without a decree from the Māori Land Court. This can mean that financial institutions are hesitant to lend to Māori freehold land with multiple owners as the land cannot be used as collateral against default (Pohatu et al., 2020).

Crown funding mechanisms such as Erosion Control Funding Programme (ECFP) and One Billion Trees (1BT) are/have been available. However, they are not without problems. At its inception, the ECFP required upfront payments from landowners, which was a barrier for unprofitable land blocks and those with low or no functioning governance and management. Changes in funding approaches addressed this including more upfront funding, though application, reporting and management costs mean blocks with limited capability and capacity still struggled to access the fund before it ended in 2018 (Velarde et al., 2019).

Interviewing Māori landowners and managers in the Waiapu catchment, Pohatu et al. (2020) reported that only a small proportion of the sample land blocks had successfully applied or were eligible for funding programmes such as ECFP and 1BT. A further problem was that the funding was often not enough to adequately afforest land in many cases, with some estimates of cost ranging from $24,000 to $66,000 per hectare while the funding available was less than $2,000 per hectare.

Access to information

Forestry in New Zealand has been characterised as having systemic problems in knowledge development, dissemination, and resource mobilisation. Knowledge and financial infrastructure is inadequately resourced and currently unable to fully support the diverse aspirations of New Zealand's land owners. There is a clear need for more translation of technical knowledge into accessible formats and improved infrastructure for information storage, management, and access (Muda, 2022). There has also been a bias in forestry research and development in favour of exotic species to the exclusion of indigenous species, for both soil conservation and timber production.

More data and improved land use modelling capability and accuracy

Hendy et al (2018) found land use modelling capability could be strengthened by improved data collection, and sharing of the data more effectively and with different sectors working together collaboratively to develop transparent processes for applying common datasets, scenarios and assumptions, including more integrated modelling across environmental issues.

Access to financial advice is vital

Most of the decision-makers in a sample of Māori land owning entities in the Waiapu catchment had little detail of costs or returns in regard to establishing native forest or the returns from carbon income they could reasonably expect (Pohatu et al., 2020).

Improved carbon look-up tables (NZ ETS)

In the NZ ETS, the carbon sequestration of different tree species can be calculated using look up tables if the area planted is less than 100 ha (Climate Change (Forestry) Regulations, 2022). These data are adequate for radiata pine as a plethora of information exists on this species. However, for other species, the provided values are based on limited samples and very general.

Māori land owning entities in the Waiapu catchment are in disagreement with the NZ ETS sequestration methodology and rates being skewed towards exotic species. They felt the synergistic ways native forests sequester carbon were not fully accounted for. One person pointed out that the "models that are being presented to us are saying is that [land should] be permanently retired in pine. Because it sinks carbon and landowners can get money from that…"(Pohatu et al., 2020, p. 27). Tree science has demonstrated that mature indigenous forests sequester many times the levels of carbon stored by monocrop plantations (Kimberley et al., 2021) and a review of the official look up tables for a range of native species in a range of landscapes is well overdue (Scion, 2023).

A study of regenerating mānuka on a south Taranaki farm demonstrates the limitations of the look up tables; mean carbon storage of the mānuka was around 80% higher than the table value (Wilson, 2022). This does not necessarily mean that the carbon sequestering of regenerating mānuka and other shrub species is being underestimated countrywide, as the values differ with growth rates, which will vary according to geography. However, it does demonstrate the need to refine the look up tables. It must also be acknowledged that this will require substantial funding as it is a major body of work.

Land tenure

Tenure is the conditions under which land is held or occupied; who owns the land or has the right to make decisions about land use (for example, private land owners, lease-holders, or the Crown). According to Timar (2022), Māori freehold land tends to be underdeveloped even after controlling for land quality and location and less likely to make an active land use transition. Māori freehold land tenure is associated with a decreased probability of grazed pastoral land uses and an increased probability of forested, ungrazed grassland, and cropland uses. This trend has created opportunities for mānuka and kānuka honey and oil products to be sourced from Māori land that has begun regenerating with native species after being left fallow for 40-50 years.

Influencing land use change via financial incentives and regulations

Government, whether national, regional, or local, can directly influence land use and land use change via incentives or regulatory control.

Incentives may include cash subsidies or tax concessions for planting areas for erosion control purposes and/or carbon sequestration such as the ECFP, which led to an increase in afforestation activity beyond baseline levels (Timar, 2022).

With respect to environmental policies, results suggest the incentives of the Emissions Trading Scheme did not significantly affect land-use decisions during the sample period of 2008-2016, most likely due to low carbon prices (Timar, 2022). More recent research suggests that landowners are now being influenced by the potential revenue from the ETS (West et al., 2020). The challenge now is that these incentives are having unintended consequences as afforestation and harvesting of pine on erosion-prone land brings longer-term ecological and physical risks within catchments and marine coastal environments (Taylor, 2022).

Changing land use

There is no 'one size fits all' approach to land use change. While profit and cost are major factors, they operate within "a context of human, structural, historical, contextual, biological, cultural and geographical factors that all determine whether farmers, growers and landowners can, or will, make changes. Understanding the context, limits and/or constraints such as time, capacity and capability that landowners work within, and actively and proactively working with them to develop and implement options that enable them to manage their land sustainably, are therefore keys to effective and sustainable change (Hungerford, 2022).

Work with farmers, foresters and local communities suggests a bottom-up approach is needed, engaging landowners and managers, supporting them, providing the resources needed and evidence, evidence especially from case studies.

New Zealand needs improved data collection around different land uses and better modelling that values ecosystem services such as erosion control and carbon sequestration accurately. Long term financial support is also essential for the implementation of sustainable land use diversification. A part of this will be continuing to expand and fund research (government is still the major funder of industrial research in New Zealand).

Stricter regulatory controls are also likely to be part of the solution. Land use change will need collaboration between government, CRIs, industry bodies, and especially local communities as Aotearoa New Zealand shifts from a human-centred approach to a nature-centred one to sustain and nurture our whenua.

E. Afforestation (exotic vs indigenous / production vs permanent)

Introduction: the crucial role of afforestation

Afforestation, whether exotic or indigenous, production or permanent, plays a crucial role in addressing various environmental challenges, including erosion, climate change, and habitat preservation. The Tairāwhiti region, with its highly erodible steep lands, provides clear examples for understanding the importance of strategic afforestation efforts. The government's Erosion Control Funding Programme, acknowledging widespread concerns about erosion associated with pine plantations, has aimed to re-afforest erosion-prone land in the Gisborne District. Mānuka scrub and indigenous forestry have both been considered as alternatives to plantation forestry for harvest.

Closed canopy forests, such as indigenous kānuka, are highly effective compared to pine at reducing erosion and stabilizing slopes, especially during the first nine years (Watson et al., 1999). In contrast,

> "…the increasing concern is with pine plantations with the harvesting step of the rotation and the *changing localised climatic conditions accentuating erosion risk* with that five years after harvest. Indigenous reversion offers the best long term protection as no clear-fell harvesting will occur." (*Environmental Planning & Regulations Committee*, 2015, p. 4, section 8.1 - italics added)

Modelling results indicate that targeted reforestation could reduce sediment erosion by approximately 50%, limiting aggradation in downstream areas, protecting infrastructure, and reducing flooding. Studies in the Coromandel Peninsula (Quinn et al., 2004; Rowe et al., 2002) have shown the importance of riparian zones for preserving stream health and native fish abundance, emphasizing the need for holistic catchment restoration approaches.

Community-led initiatives in sustainable farming practices and climate action plans are essential for building resilience in areas like the Waiapu catchment (Warmenhoven et al., 2014). The establishment of a 'Model Forest' is recommended for developing strategic land use, coalitions, and new decision-making approaches. However, limited resources and conflicting interests pose challenges to such collaborative efforts. Evaluating the costs and benefits of tree establishment for carbon sequestration remains a complex task, requiring further research and development of methodologies.

Afforestation: a complex dynamic of data, strategy, practice and economic considerations

Afforestation, specifically exotic versus indigenous and production versus permanent, has significant implications for land management and environmental preservation. The balance between the two approaches and their effectiveness can determine the success of combating challenges such as erosion, flooding, and sedimentation. Soil loss from landslides contributes to gully erosion as well as increased sedimentation in streams and rivers, and is a significant issue that needs to be addressed. In contrast, native afforestation offers a myriad of benefits, including carbon revenue, erosion control, and biodiversity improvement, making it an attractive option for land use, but currently has lower financial returns to landowners and forestry investors.

Informed forestry management practices, including Terrain Susceptibility mapping (Marden et al., 2015), can mitigate hazards arising from heavy rainfall events. However, such information is sometimes absent from management strategies, despite their value in

minimising forestry-related hazards. Equally, independent environmental monitoring during harvest can minimize environmental damage and provide unbiased information for future planning.

There is a real need for better data, collaboration, and strategic policies to improve land use decisions and address the interconnected challenges of erosion, climate change, and biodiversity (Hendy et al., 2018). Targeted reforestation, especially in erosion-prone areas, can significantly reduce sediment and gully erosion (Marden & Seymour, 2022). However, progress is limited, in part due to a reluctance to prioritise future-proofing broader ecological health over short-term economic gains.

The role of forestry in reducing erosion in steep lands, such as Tairāwhiti, is also critical. Closed canopy indigenous forests offer the best protection against gully formation and stabilisation, contributing to flood resilience.

> "The future for forestry in New Zealand's steeplands is promising, but unresolved issues remain. Principally among these is first resolving where the most critical areas are in terms of the potential for post-harvest, storm-induced landsliding and debris flows, and then second, how to manage these. ... [M]ore people with geomorphology skills either within or servicing the forest industry [are needed]." (C. Phillips et al., 2018, p. 121).

Research has shown that diverse species mix plantation forests can sequester more carbon and experience faster growth compared to monocultures (Pierce, 2022). Because mature forests play a crucial role in reducing erosion and sediment in lowland river systems, they are essential for reducing future flood risk and preserving or enhancing the entire ecosystem. Moreover, expenditure associated with the targeted reforestation of erosion-prone hill country needs to be considered alongside the significant reduction in off-site damage with consequential savings in the cost of repair to structural utilities and clean-up costs associated with future flood events (Marden, 2004).

A report commissioned by MPI almost a decade ago stated:

> "If clearfelling of large areas is to continue as a silvicultural regime of choice then harvesting methods will have to be changed in the areas most susceptible to landslides and debris flows leaving the forest boundary." (Amishev et al., 2014, p. 71)

Continuous cover forestry has successfully addressed the problems with clear-cut harvesting that Cyclone Gabrielle has made apparent, but perhaps the climate change projections at the time of planting meant that the potential negative impacts were unknown and/or minimised. It is also clear that economic considerations play a significant role in regulations and decision-making:

> "In recent years, forestry has moved to steeper and more difficult terrain with associated higher roading and landing construction costs because of competition from other land uses on flat land. Some regions in the country are more difficult than others and the East Coast/Hawkes Bay (ECHB) region tends to have the highest harvesting costs in the country ($33.20/tonne)… Any additional requirement and effort that may lead to reduced landslide or debris flow risk may likely increase the cost of the delivered logs making forest plantations unsustainable in such areas. In the same instance, *harvesting operations in these forests generates huge cashflow into the local economies and to walk away from these forests would have massive implications on local unemployment and the local economy*." (Amishev et al., 2014, pp. 28–29, italics added)

There are alternatives to the dominant forestry practices of clear-fell harvesting. Non-Wood Forest Products (NWFP) can provide benefits to local communities, such as food, cosmetics, therapeutics, energy, and ecosystem services, but integrating NWFP utilisation with modern pine plantations requires access rights, shared governance, suitable sites and sustainable management practices supported by state and local communities (Sheppard et al., 2020). Equally, the conversion of excess forest biomass into outputs like biochar and electricity can have multiple benefits, such as reducing wildfire risk and improving soil quality, so finding economical methods and developing markets for these by-products is the goal of a number of initiatives underway or proposed at various sites and scale.

> "Stakeholder participation within political, governance and research groups can provide social empowerment delivering the motivation for changes at a grassroots level and pressure for legislative bodies for a transition from the status quo." (Sheppard et al., 2020, p. 32)

The impacts of major weather events over the last five years, culminating in Cyclone Hale and Cyclone Gabrielle this year, have already galvanised a grassroots pressure for change. Efforts to improve compliance with slash management and erosion control have highlighted the challenges around regulatory oversight, rule setting, voluntary changes in industry practices and the need for more research, training and education. However, profit margins and returns on investment along with historic and contemporary government subsidies and the lack of significant penalties, can hinder land-use change decisions.

Understanding global industry standards and maintaining certification for sustainable practices and products is essential for staying competitive in the wood sector (refer to final section in this document for more on international standards and certifications).

High-resolution mapping and geomorphic assessments of forestry regions are now critical for predicting downstream negative impacts, particularly after major storms. However, due to the high cost, only sites with higher Erosion Susceptibility Classes have typically undergone such detailed assessments. It is crucial that consistent and appropriate standards for forestry operations are both agreed and monitored, as current rules and practices vary across councils and may not meet international standards.

Erosion control in the hill country of Tairāwhiti can be achieved through mature revegetation of trees, as evidenced in a call to action for land management that centres on reforestation (Marden & Seymour, 2022).

Studies (Blaschke et al., 2008; Giuntoli et al., 2022; Tran et al., 2023) show that changing land use to multifunctional purposes and increasing ecosystem service provision significantly increased profit/ha and NPV compared to the base farm. This was due to conversion from pasture to land uses involving woody vegetation. Hill country farmers increasingly prefer scenarios with mānuka regeneration and landscape conservation, both improving multifunctionality, ecosystem services, and reducing environmental issues.

Changing approach, changing practice, changing outcomes

Climate change, human activities, and deforestation have resulted in the loss of ecosystem services and biodiversity, underscoring the need to shift from a human-centred approach to a nature-centred one. Decision-makers, particularly those in forest management, need to learn from local histories.

Implementing reforestation strategies usually involve collecting locally-sourced seeds and cuttings, establishing and expanding local nurseries of appropriate native species, as well as employing rural residents with employment conditions that provide a standard of living

comparable with what they could enjoy in bigger centres. The guiding concept for sustainable forest preservation should be the interconnectedness of people with the biophysical environment.

Between 1880 and 1920, deforestation in Tairawhiti's major catchments led to erosion and sediment issues (Marden & Seymour, 2022). Despite various strategies being employed since 1960, erosion control targets have not been met. Stabilising treatment using exotic species, such as radiata pine and Douglas fir, has achieved a 62% reduction in the number of gullies but only a 5% reduction in overall gully erosion area.

> "[Since 1960] gully initiation and development have outstripped mandated erosion control targets set by the East Coast Forestry Project (ECFP), for land designated as LO3A, and for the 'Restoration of the Waiapu Catchment' by 2020-22…
>
> For gullies identified in the NES-PF as high erosion risk (orange zone) or where the erosion risk is very high (red zone), we recommend:
>
> (i) a revision of remediation strategies for the larger and more actively eroding of gullies destined for future afforestation; and
>
> (ii) for gullies within exotic production forests, the replanting of species (exotic or indigenous) better suited to providing long-term stabilisation, post-harvest."
>
> (Marden & Seymour, 2022, p. 1)

Other studies (e.g. Watson et al., 1999; Marden et al., 2018) show that native tree roots, including kānuka, last longer than pine after harvest and provide crucial reinforcement during storms compared to pine. Phillips & Watson (1994) found that pine roots lose half their strength in 15 months after harvest, while two native species (beech and rata) reach the same level of decay at 33 and 49 months respectively.

The government's ambitious plan to plant one billion trees by 2028, with the largest afforestation areas expected in Tairāwhiti, and the Sustainable Food and Fibre Futures (SFFF) subsidies fund underline the political recognition of the importance of integrating trees into the landscape and diversifying land uses. However, there is an ongoing tension between commercial imperatives and conservation, biodiversity and community imperatives—and research gaps remain, particularly in understanding the relationship between trees, erosion, and slash.

"Furthermore, in light of the Government's 'Billion Trees' project, it is recommended that a detailed assessment of erosion susceptibility of areas identified as potential sites for future planting be undertaken to assess the long-term sustainability of each of the proposed planting/land use options." (Spiekermann & Marden, 2018, p. 3)

The Gisborne District Council's literature review on erosion and sedimentation recommends reforestation of gullies and managing the entire river basin. Similarly, a study in the Waipaoa catchment emphasised the success of reforestation in reducing erosion and sediment loading in watercourses. Both underscore the assessment that "prevention is significantly more effective and cheaper than cure" (Marden & Seymour, 2022, p. 19).

Forestry management needs to consider the long-term plan for forests, covering planning, harvesting, re-establishment, and canopy closure to manage post-harvest risks. As noted elsewhere in this document, post-harvest options include strategic withdrawals or species

changes (Marden & Seymour, 2022), and research areas must include alternative land use, low-impact harvesting, residue minimisation and recovery, fine-scale risk assessments, closing vulnerability windows, nutrient supply maintenance, and economic models for steep land management.

Conclusion

Addressing afforestation through a combination of exotic and indigenous species, production and permanent approaches, and targeted reforestation, can help mitigate environmental challenges, preserve ecosystems, and benefit local communities. This necessitates a shift in priorities, public and private investment, and collaboration between stakeholders.

Afforestation and reforestation policies need to strike a better balance between exotic and indigenous species, focusing on both production and permanent solutions depending on the host landscape, catchment dynamics and climate predictions. While exotic species have demonstrated some success in erosion control and carbon sequestration, indigenous species offer more long-term benefits such as improved biodiversity and reduced environmental impact. Supporting land use diversification, fostering collaboration, incentivising investment while restoring ecological wellbeing and aligning policies with sustainable practices are essential for a successful and balanced afforestation approach.

The focus should be on ensuring ecological integrity is restored as the main priority, with short- and medium-term economic benefits a secondary consideration. This approach depends on mitigating erosion, preserving biodiversity, and promoting land use that will remain viable as best as possible in a rapidly changing environment, as extreme weather becomes more frequent and intense. Collaborative efforts involving governments, researchers, indigenous communities, and land managers will be key to achieving these goals and fostering a nature-centred approach to forest preservation.

F. Regulatory issues

Introduction

> "Forestry has, since 2013, been a net emitter and is forecast to remain that way until 2025" (*Wai 2607, #1.1.1*, 2016, p. 19)
>
> "It's necessary to consider that the NES-PF may be consistent with the RMA, yet due to deficiencies in the RMA, is not adequately managing our use of the environment." (Tait-Jamieson, 2023, p. 11)
>
> "The times ahead are going to need us to focus on adaptation, and maladaptation is a significant risk if you have convinced yourselves that your carbon emissions today have been permanently offset in the biosphere by forests that are increasingly exposed to climate risk, through disease, fire and storm – and the most risky of all, must surely be: the same age, mono-species clones we call Pinus radiata." (Carr, 2022).

There are a range of regulatory issues relating to land use in Tairāwhiti and Wairoa, across interconnected concerns regarding climate change, land use rules for plantation forestry, and the rights and interests of tangata whenua. Many of these concerns are outlined in Wai 2607, which claims the New Zealand government's response to climate change breaches Treaty of Waitangi obligations. The claim outlines a range of failures and how these impact tangata whenua, natural ecosystems, health, and the economy. Regulatory issues manifest at central, local, and industry governance levels. Failures include both the Emissions Trading Scheme (ETS); which has been ineffective at reducing greenhouse gas emissions, including in the forestry sector; and the National Environmental Standards for Plantation Forestry (NES-PF), which have been ineffective in managing use of the environment.

Addressing these challenges requires an integrated, multifaceted approach that respects the rights and knowledge of tangata whenua, promotes sustainable land and water management practices, and fundamentally takes into account the local context and environment. Collaboration between government agencies, councils, businesses, and communities is essential in creating a regulatory framework that balances economic, environmental, and social needs while adapting to the challenges posed by climate change. To date, formal regulatory approaches have underdelivered with respect to this context across all levels of governance, and are disconnected from nuanced, local contexts. Regulatory mechanisms have been largely one-size-fits-all in their design, with significant shortcomings, to the detriment of communities and the environment.

Central Government

Emissions Trading Scheme (ETS)

Launched in 2008, the objective of the ETS is regulating, and ultimately reducing, greenhouse gas emissions. The scheme's present structure is problematic and ineffective in that it runs counter to its overarching objective. Companies obtain ETS units (NZU) through various means, including government allocation and purchase from forestry, and must surrender NZU in proportion to their emissions. With this structure, net emissions are all that is counted—so companies will buy forestry units instead of reducing their actual emissions if that is cost effective. As conversion of marginal pasture to forestry remains cheaper than reducing industry emissions, the ETS promotes land use change and only reduces net

emissions (i.e. total emissions minus estimated captured carbon due to forestry, rather than total, or gross, emissions) (Hood, 2023)

Therefore, a key issue with the ETS is its focus on net emissions, which disincentivises emissions reduction and promotes land use change to forestry, specifically, fast-growing plantation pine. Forestry carbon storage should not be traded off against gross emissions if the goal is genuine emissions reductions. Emissions reductions and forest carbon capture are both essential for controlling increases in global temperature. He Pou a Rangi (Climate Change Commission) has advised that: maintaining net-zero emissions after 2050 under the current ETS would require ongoing forestry conversions; other countries focus on emissions reduction/technology transitions - Aotearoa risks being left behind 'trading' emissions for forestry; and future generations will have to cope with both climate adaptation and emissions reduction. Additional problems are the country's impending oversupply of NZU (ETS credits) in approximately 15 years (Hood, 2023) and the numerous challenges associated with blanket pine plantations across much of our highly erosion-susceptible land areas.

National Environmental Standards for Plantation Forestry (NES-PF)

The NES-PF are regulations made under the RMA (1991), yet the RMA (1991) is unsatisfactory to deliver expectations for environmental outcomes for all stakeholders, and in particular those of many iwi, hapū, local authorities and environmental organisations. This considered, the NES-PF is not adequately managing use of the environment as it permits forestry activities under conditions which risk significant environmental effects (Tait-Jamieson, 2023). The NES-PF's capacity to manage erosion is a major concern. The Erosion Susceptibility Classification (ESC) model has limitations in terms of its core assumptions, and data, which experts have shown contribute to inaccurate erosion risk classification zones at the land-block (Tait-Jamieson, 2023). Further to this, the NES-PF's ESC and Annual Exceedance Probability (AEP) thresholds do not adequately account for the consequences of landslide events when calculating risk (Tait-Jamieson, 2023).

In Tairāwhiti, the NES-PF is a longstanding and contentious issue. The Gisborne District Council (GDC) raised concerns with the NES-PF as early as 2010 when it was first proposed, and actively highlighted the shortcomings of the one-size-fits-all approach of successive proposals. In 2015, the GDC's Chief Science Specialist provided a report to the Council which emphasised the shortcomings of the NES-PF for plantation forestry compared to previous resource consents. The report noted that limits on regional stringency were likely to lower environmental standards for plantation forestry activities. Forestry companies that follow the NES-PF do not need consent for most activities, which reduces consultation, context-specific tailoring, and the ability to charge for monitoring their activity was limited. This is particularly problematic in Tarāwhiti which has some of the most erodible land in the country (Freeman, 2015).

> "Clear-fell harvesting affects biodiversity and re-introduces erosion risk similar to grassland for a number of years. Forestry slash, woody debris and sediment can end up being deposited in large quantities in receiving environments – whether they be streams, wetlands or the coast ... Local communities have also recently voiced concerns over woody debris ending up in streams, rivers and beaches." (Freeman, 2015, p. 2)

In 2015, the Future Tairāwhiti Committee of the GDC began exploring options to address the escalating slash issue. They proposed solutions including retiring steep land from clear-fell forestry and introducing a levy or rate on forestry companies to contribute to clean-up costs. The constraints of the NES-PF were raised again in this forum, with emphasis on the region's

unique geographical context, susceptibility to erosion and the damaging effects of wood debris from timber harvesting, and the need for further regulatory action from central government (Gisborne District Council, 2015a). Further to this, the MPI-led review of the first year of the NES-PF identified concerns with wildling pines, slash and biodiversity. Several changes to regulations were recommended, including to clarify and strengthen the controls and improve management of slash (Te Uru Rākau, 2021).

> "Tangata whenua have identified the discharge of forestry slash from forestry activities as a significant resource management issue. Forestry slash discharge can have actual and potential adverse effects on the mauri of ancestral water and other taonga (e.g. fish spawning and feeding grounds, mahinga maataitai, taonga raranga, and tauranga ika and waahi tapu)" (Gisborne District Council, 2015a, p. 15).

> "Of particular concern is the lack data on the environmental benefits, although we expect those gains to be marginal. There is also no information on how an NES will improve firm and government performance over and above the reduction in administrative and compliance costs." (Nixon & Peterson, 2015, p. 49)

Development of the NES-PF appears to have favoured regulatory streamlining over the environment. Evidence from a 2015 cost-benefit assessment of the proposed NES-PF shows forestry stakeholders sought consistency and efficiencies in terms of resource management regulation. They viewed rules as differing widely between local authorities with inconsistencies creating the possibility of increased costs and uncertainty for forestry companies attempting to comply with varying rules (Nixon & Peterson, 2015). The assessment caveats the lack of data, and insufficient research, on environmental values and benefits (Nixon & Peterson, 2015). Assumptions are derived from interviews with the forestry industry, councils and government departments. Problems associated with variable environmental practices are considered to be of marginal significance, citing improved professionalism of forestry sector (Nixon & Peterson, 2015). The effects of climate change on Aotearoa's national and regional weather patterns have not been sufficiently considered throughout the development of the NES-PF, and future weather predictions need to inform risk thresholds when making decisions about permitting or prohibiting forestry activities (Tait-Jamieson, 2023).

> "Central government and industry approaches to forestry appear to underestimate the impact the post-harvest period has within the forestry cycle on increasing erosion risk." (Tait-Jamieson, 2023, p. 4).

In Aotearoa the cost of erosion is significant, and historically, in some instances, has outweighed prevention expenditure on a 3:1 ratio (Marden, 2003). In Tairāwhiti, it is a substantial legacy issue, largely attributed to the region's unique, steep topography, and deforestation. Erosion and sediment issues have plagued Tairawhiti's major catchments since 1880-1920, particularly the Waiapu Catchment which has seen significant and continued gully erosion (Marden, 2003). A review of gully erosion remediation attempts from 1997-2017 found that erosion control targets have not been met despite some success. The review suggested solutions including; staged replanting, harvestable crop setbacks, and transitioning to indigenous vegetation for actively eroding gullies (Marden & Seymour, 2022). Further investment and regulatory enforcement are needed to ensure landowner compliance in this area. Another contributing factor here is the mis-classification of land and erosion susceptibility due to coarse-scale mapping (Miller, 2023).

Issues have emerged at the intersection of central and local government with regard to the regulatory tools which are intended to manage and mitigate erosion. At present, these tools are rendered ineffective due to non-compliance and non-enforcement.

Local Government

From 2009, the GDC's Combined Regional and District Plan required all landowners with eroding land identified as Land Overlay 3A (LO3A) (comprising approximately 50,000 ha of the 'worst of the worst' eroding land use capability classes) to have an effective tree cover or be fenced for reversion by 2021 (Marden & Seymour, 2022). Marden and Seymour (2022) find that lack of compliance and enforcement have resulted in these erosion targets being unfulfilled, with gully initiation and development continuing. Many gullies have occurred in land retained in pastoral use. Their report recommends significant long-term investment in the prioritisation and completion of these unfulfilled targets in addressing ongoing on- and off-site impacts of gully erosion.

Regional-level regulatory mechanisms appear to be ineffective, and issues have arisen due to a lack of efficiency and consolidation of resource management components. The Tairāwhiti Resource Management Plan (TRMP) is outdated, and insufficient in meeting RMA requirements. The TMRP guides decision-making on land use effects on freshwater, coastal marine areas, soil conservation, and avoiding natural hazards. Climate change risks exacerbating these natural hazards. A report conducted in September 2019 recommended a staged review of the TRMP, encouraging the GDC's Sustainable Tarāwhiti Committee to endorse a full review, using a streamlined, engagement-based process. The review offers the opportunity to integrate land use, catchment plans, transport planning, and to protect regionally significant infrastructure (Kohere, 2020).

Concerns exist with respect to the consenting process with respect to GDC's ineffective financial management (Easton, 2015), and inability to proactively set consent conditions with respect to environmental impact (Hancock, 2018). In Tairāwhiti, forestry related resource consents approved by GDC frequently involve clear-felling, with a 10-year expiry. A typical application includes clear-fell harvest of 441 hectares of *Pinus radiata*, 17,600 meters of new road construction, 42 landings, 18 hauler pads, and replanting. Of over 230 consents granted since 2013, only three consents mention debris catchers or slash-catching devices (Gisborne District Council, 2023a). Streams undergo vegetation removal, cable hauling, and earthworks. Areas identified as red zone, protected management areas, or riparian management areas lack sufficient extra protection measures and communities around the region have subsequently experienced large scale impacts to private property and public infrastructure over recent years.

The Gisborne District Council (and Hawkes Bay Regional Council) have a significant role to play in both the immediate and long-term regulatory response to the adverse effects of land use – including forestry practices – in Tairāwhiti. The ultimate, holistic solution may take some years to design, but that is not a reason to do nothing in the meantime. There is much the Council can do to alleviate the recurring impacts of forestry slash and sediment on the communities of Tairāwhiti. The Council should, as a matter of urgency:

1. Bearing in mind that with each event the flood-carrying capacity of our waterways reduces, the impacts of severe weather events are getting worse each time, even though the severity of the weather event itself may be less. Undertake a focused review of the land use rules that present the greatest risk, rather than risking the rules relating to erosion and harvesting impacts getting caught up with the much larger process of all land use rules review.
2. Review all extant resource consents for forestry harvesting and identify weaknesses in the consent conditions, which have or will allow for the generation of adverse effects that were not foreseen or addressed when the consents were issued.

3. Instigate enforcement action under the RMA to prevent recurrence of the adverse effects that have devasted Tairāwhiti communities over and over again. This should include orders as to what can occur in the future as well as orders requiring existing risk to be reduced – for example, removing slash from all areas where that poses a risk in future weather events. This would include all erosion-prone areas and also those areas where slash now sits as a result of past events, and from which a future event will "pick it up" and transport it further.
4. Prosecute those responsible for slash and sediment-generating activities where they are in breach of existing NES-PF rules and/or TRMP rules and/or resource consent conditions.

Industry Governance

Issues have arisen with respect to the industry itself, and the capacity for forestry industry and companies alike to regulate themselves. The exposure of exploitative and environmentally damaging practices of multinational forestry companies in Tairāwhiti, such as Ernslaw One (Minto et al., 2005), has served to cultivate awareness and scrutiny in this area. An extensive review of international industry governance interventions revealed significant knowledge gaps regarding the environmental impacts of Community Forest Management (CFM) and Forest Certification (FC) interventions. FCs are a form of non-state, market-driven governance developed in the early 1990s, and CFM is a form of decentralised governance, defined as the use, management and conservation of forests by communities. While evidence generally indicates positive impacts on the ground, findings on flora and ecosystems remain inconclusive (Di Girolami et al., 2023). High-resolution mapping and geomorphic assessments are seen as being crucial for predicting environmental impacts, however at a regulatory level, due to high costs, only sites with higher Erosion Susceptibility Classes (ESC) are required to undergo such assessments (Bloomberg, 2015).

There are also questions about the legal responsibilities of company boards, directors and managers. A recent legal opinion issued by law firm Chapman Tripp concludes, "New Zealand company directors' duties to exercise reasonable care require them to ensure that their businesses are identifying foreseeable and potentially material nature-related risks that could affect their companies, and equally to take nature-related risks with material impact into account in their decision-making." (Swan & Lampitt, 2023, p. 1). The advice suggests "prudent directors in sectors highly dependent on nature and the environment for their business model should be starting on the path to ensure the business is in a position to:

- Identify direct and indirect dependencies on natural capital, ecosystem services and biodiversity that are at risk or vulnerable
- Assess exposure to nature-related risks and the financial materiality of such risk
- "Manage nature- related risks that may have a financially material impact." (Swan & Lampitt, 2023, p. 1)

A range of legal remedies may be sought from companies found liable for damages. Mana Taiao Tairāwhiti understands litigation is currently being explored in the wake of recent weather events and subsequent public and private property damage from woody debris and sediment derived from forestry blocks.

Efforts to increase industry awareness to the environmental impacts of forestry are nothing new in Tairāwhiti. A 1994 report into the value of environmental monitoring recommended increasing awareness of environmental damage consequences, industry-funded monitoring

programs, prompt action on impact reports, and designing monitoring requirements around management objectives (Marden, 1994). More recent analysis has suggested the forestry industry should collaborate with regulatory authorities to create a standard for detailed erosion susceptibility mapping, particularly in the areas prone to slash damage (Marden et al., 2015).

A question remains about the level of erosion susceptibility a regulatory threshold should be set at for prohibiting both clear-fell harvesting and pasture cover only on erosion-prone hillsides.

The precautionary principle is an approach to risk management, where, if it is possible that a given policy or action might cause harm to the public or the environment and if there is still no scientific agreement on the issue, the policy or action in question should not be carried out (Cheever & Campbell-Mohn, 2004). Another tenet of environmental law is the 'polluter pays' principle.

An objective assessment of the current situation would suggest that current threshold for clear-fell harvesting is far from where it should be and that if there is a cost to change, at present that needs to rest with an industry that has polluted large tracks of land, waterways and the marine coastal environment. The only decision consistent with the precautionary principle in this situation would be to recommend a cessation of clear-fell harvesting practices until a regime can be designed that eliminates the risk of forestry site woody debris and sediment entering waterways in the region.

Likewise, erosion-prone land in pasture continues to erode and the evidence from 60 years of erosion treatment finds that more land needs to be retired, with diverse, permanent tree species. The only decision consistent with the precautionary principle in this situation would be to recommend an urgent change in erosion treatment strategies and resourcing to greatly reduce the risk of new sediment gullies forming on pastoral farming blocks and sediment subsequently entering waterways in the region.

Conclusion

In summary, key regulatory issues exist at national, local, industry, and land block governance levels. Of particular concern are deficiencies with the ETS and NES-PF that are contributing to disastrous environmental, economic, cultural, and social outcomes. Addressing regulatory issues in the forestry and farming sectors requires an integrated and multifaceted approach that considers environmental, social, cultural, and economic aspects. Key areas of focus include fundamental emissions reduction mechanisms, filling knowledge gaps on the environmental impacts of forestry and farm management interventions, strengthening resource consent and environmental management conditions, and planning for an efficient land transition to permanent diverse indigenous forest, including establishment of new jobs and markets Engaging tangata whenua in resource management and more sustainable enterprise development, and improving monitoring and mapping practices is essential. By addressing these challenges, the forestry and farming sectors can contribute to truly sustainable development and mitigate the negative effects of historic environmental degradation and future climate change.

G. Current local and central government work programmes

Introduction

The Tairāwhiti region faces complex environmental management challenges that have been part of central and local government initiatives for a number of years. These initiatives have consistently identified the need to address erosion-prone land remediation schemes in Tairāwhiti. Central government policies impact on local communities and have been criticised for not adequately fulfilling Treaty of Waitangi obligations.

Local and central government work programmes in Tairāwhiti must address the interconnected challenges of land use, climate change, and forestry management through comprehensive planning, community engagement, and sustainable practices.

Central Government Policy & Legislation

Funding programmes through the Ministry for Primary Industries acknowledge “the Gisborne district has severe erosion problems, with 26% of the land being susceptible to severe erosion, compared with only 8% of the rest of New Zealand.” (MPI, 2023)

Deforestation in Tairawhiti's major catchments between 1880 and 1920 led to erosion and sediment issues. Since 1960, various strategies have been employed to restore East Coast gullies. Cyclone Bola in 1988 prompted new policies subsidising forestry. Government initiatives such as the Erosion Control Funding Programme (formerly East Coast Forestry Project) aimed at addressing erosion in the region show that despite some success, “regionwide, the area occupied by gullies as at 2017 (5347 ha) was only 5% less than the 5600 ha of eroding gully present before remediation treatments began 60-years ago” (Marden & Seymour, 2022, p. 14). Marden and Seymour (2022) also make a range of recommendations including the use of mānuka and kānuka, setbacks for slash, not replanting some areas as plantation forests and calling for funding and enforcement to meet unfulfilled targets.

Comparing carbon sequestration rates of mānuka and pine within the Emissions Trading Scheme (ETS) has led to recommendations for promoting more indigenous forestry options. This could include relaxing geospatial requirements and potentially offering financial incentives for non-carbon co-benefits such as biodiversity (Wilson, 2022).

The Ministry for Primary Industries (MPI) 2021-2025 Strategic Intentions document notes that they are undertaking a “multi-year programme to improve the forestry ETS [sic]” (MPI, 2021, p. 65) and will also continue to review the impact of the National Environmental Standards for Plantation Forestry (NES-PF).

Many of these government initiatives are challenged by Waitangi Tribunal Claim Wai 2670 (20 February 2023) which claims that the New Zealand’s Government’s response to the threat of global climate change represents a breach of the Crown’s Treaty of Waitangi obligations towards Māori and Māori have and will continue to suffer prejudice as a result. This claim addresses a range of international and central government initiatives and notes that “the actual and potential impact of climate change on Māori is serious and widespread.” (Potter, 2023, p. 5)

Harmsworth and Tipa (2006) and Harmsworth and Awatere (2012) provide a range of cultural monitoring and assessment tools that show how cultural values, monitoring and assessments by iwi, hapu and whanau can contribute to supporting government initiatives to achieve environmental outcomes.

Regional implications

Local government programmes are led by the Gisborne District Council, Te Kaunihera o Te Tairāwhiti. For example the Tairāwhiti Resource Management Plan (TRMP) is being updated currently which provides the Tairāwhiti community an opportunity to address current challenges (Gisborne District Council, n.d.).

In 2015 a report on Restoring the Waiapu Catchment Project and Erosion Control Funding Programme was presented to the Gisborne District Council (Easton, 2015). Discussion about this report noted the issues with erosion after pine harvesting (Gisborne District Council, 2015b, p. 4). There was no mention of the issues associated with slash.

However, in 2016 Landcare Research completed a report for Gisborne District Council (GDC) which examines the impact of forestry and slash on the environment and provides some data collection protocols for analysis. This information would help GDC, the public, and the forestry companies to understand the nature of hazards in the region and the likely landscape responses to storms of different magnitudes (C. Phillips et al., 2016). It is unclear if these recommendations were ever implemented by Gisborne District Council although a case study in the 2020 Gisborne District Council State of the Environment report analyses the forestry debris from Cyclone Cook in 2017 and identifies that approximately 2/3 of the debris was pine and 1/3 willow (Gisborne District Council, 2020). A table listing weather events recorded as causing harvest residue mobilisation in Tairawhiti between 1994 and 2018 identifies eight events that have had substantial impact (Gisborne District Council, 2020, p. 20).

The Tairāwhiti 2021-2031 Long Term Plan, Te Kaunihera o Te Tairāwhiti Gisborne District Council, was adopted by Council on 30 June 2021. This plan sets out the GDC's commitment to delivering the activities, services and infrastructure for the region. This will be reviewed in 2024 and communities will be consulted on the council's future direction. This will provide an opportunity for communities to emphasise their expectations regarding environmental priorities.

Summary

In summary, the Tairāwhiti region is facing significant environmental challenges, from erosion control to the impacts of forestry and slash. A range of reports have identified these issues over several years and provided a range of solutions. Addressing them requires a comprehensive approach that incorporates updated management plans, government initiatives, engagement with iwi, hapū and landowners, cultural assessment tools, and innovative solutions for sustainable land use.

Central government initiatives impact on regional communities and so it is essential to work collaboratively and understand local needs and solutions to overcome these challenges and create a more sustainable future for Tairāwhiti.

H. Recommendations to improve land use outcomes and employment with changes needed to regulatory settings

Extreme weather events such as Cyclones Gita (in 2018), Hale (January 2023), and Gabrielle (February 2023) may have a range of far-reaching consequences unrelated to the forestry and farming industries. However, the devastating impact that these events continue to have on our region as a direct result of the mobilisation of woody debris and sediment is undeniable; and illustrates that current land use regulations and the existing work programmes that are attempting to mitigate these effects have not yet gone far enough to protect our communities and the environment.

To address these issues, it is crucial to implement improved policy and practices across the region. A robust body of independent research and government- and local council-initiated reports are already in existence, which together make a range of well-researched recommendations on how to approach some of these issues (Marden et al., 2015; Payn et al., 2015; Basher, Harrison, et al., 2015; C. Phillips et al., 2016; Spiekermann & Marden, 2018; BDO Gisborne Limited, 2021). We have also commissioned a series of current urgent briefings from local experts who have kindly synthesised their knowledge and recommendations for positive change (Bodecker et al., 2023; Hall, 2023; Hood, 2023; Miller, 2023; Tait-Jamieson, 2023).

URGENT RECOMMENDATIONS

1. **A moratorium/rahui on creation of further pine plantations on erosion-prone land until the risks and alternatives are better understood.**

Parties involved: regulatory bodies, local government, forestry companies.

It is clear that the majority of woody debris that causes such devastation across our region is forestry-related pine (Cave et al., 2017; Spiekermann & Marden, 2018) A 2016 report on current forestry practices, focusing on harvesting, residues, and mitigation of debris flow or downstream slash impact (C. Phillips et al., 2016) found that slash in the Gisborne region is nearly double the average. Post-harvest landsliding is the main mechanism through which such debris movement arises (Spiekermann & Marden, 2018)and these events are frequently associated with infrastructure construction on steep slopes and landings (C. Phillips et al., 2016). **It is essential that we do not continue to exacerbate these existing problems and that any planning or creation of new pine plantations be halted until there are clear guidelines and agreements in place between commercial entities, regulatory authorities and local communities on how to proceed.**

2. **An immediate end to clear-felling on erosion-prone land.**

Specifically, we recommend immediate cessation of all clear-fell harvesting of pine plantations in “very high-risk” (red) and “high-risk” (orange) as defined by NES-PF Erosion Susceptibility Classification (ESC) (see Bodecker et al., 2023 for maps).

Parties involved: regulatory bodies, local government, forestry companies, landowners.

Current evidence from NES-PF mapping activities show that Te Tairāwhiti contains the largest concentration of “very high risk” or ‘red-zone’ land outside of the high alpine areas of the South Island (Bodecker et al., 2023). Plantation forestry intended for harvest creates a ‘window of vulnerability’ that lasts for 2-8 years after clear-fell harvesting activities (Watson

et al., 1999; *Ministry for Primary Industries NES-PF Submissions: NGOs and Community Groups N-Z.*, n.d.; Bodecker et al., 2023). The 28-year harvesting cycle that applies to the local dominant plantation species of *Pinus radiata* has seen communities living though such a window of vulnerability - multiple flooding, slash, and forest debris events have occurred in Tairāwhiti in the last five years following clear-fell harvesting of the 1990s planting cycle (Bodecker et al., 2023). **A complete moratorium on clear-felling activities in erosion-prone areas will make a significant contribution to preventing the current cycles of storm-induced loss from continuing and increasing in scale and impact.**

3. An immediate reforesting of recently harvested areas and erosion-prone land currently in pasture

A particular emphasis should be given to reassessing the scope and strategy (species, planting density, scale) of the Gisborne District Council's Overlay 3A Policy along with the reforestation of recently harvested areas and transitioning existing "very high-risk" (red) and "high-risk" (orange) plantations to permanent diverse native forests.

Parties involved: regulatory bodies, local government, forestry companies, landowners.

Deforestation since the 19th century has impacted hills, river systems, and the marine environment, resulting in irreversible landscape changes and soil quality loss (Page et al., 2000). Reforestation can reduce hillslope sediment loss and can be targeted to address specific erosion types. For example, studies on Waipaoa, Waiapu, and Uawa catchments have shown that reforestation would be most successful in Cretaceous gullies, headwaters, and active gullies in pastoral land (Marden et al., 2008; Marden, 2011; Warmenhoven et al., 2014). Although pine trees do a good job of mitigating erosion compared to pasture, pine plantations are not as robust as permanent diverse native forests in defending East Coast landscapes (Bodecker et al., 2023). For example, recent research has shown that in Tairāwhiti, converting the most erosion-prone sections of land currently used for production forestry (315–556 ha) to natural regeneration could reduce erosion by 1–2.5 $t \cdot yr^{-1}$ of sediment (Lambie et al., 2021).

A recent briefing from David Hall (2023) states that "ultimately, there can be no predetermined spatial solution, because land-use decisions should reflect the risks and opportunities of specific sites, as well as the aspirations of landowners, land managers, tangata whenua and the wider community. However, to support the above objectives, land use change in Tairāwhiti should exhibit several trends in the near future:

1. "A shift from pastoral agriculture on highly erodible soils to vegetation and forest, especially in upper catchments.
2. A shift from clear-fell harvesting of plantation forests to less intensive forest management systems, such as continuous cover forestry, or unharvested biodiverse forest for carbon farming.
3. A shift from the use of exotic even-aged monocultures for carbon farming to the use of biodiverse, uneven-aged forests – with a strong preference for native species dominance over time.
4. A greater integration of wetlands, floodplains, riparian margins and estuarine ecosystems throughout catchments to manage flood risk and flood-related impacts."

(Hall, 2023, p. 1)

A related issue in this discussion will be Māori landowner claims that any change in rules disadvantages them and is a potential breach of Te Tiriti or other agreements" including the UN Declaration on the Rights of Indigenous Peoples. Of course the financial value of land, forests and other assets is largely a result of legislation and policy set by central

government. Changes to the settings around land use are within the scope of government responsibilities, which as outlined in this and many other papers haven't been well executed and are now the subject of recent Treaty claims as a result.

ADDITIONAL RECOMMENDATIONS

ETS recommendations

Carbon farming through native tree planting on Indigenous land has gained attention, particularly with mānuka/kānuka medicinal products and honey. However, there are inherent difficulties in transitioning from current land uses to permanent carbon farming. There are currently insufficient returns through the Emissions Trading Scheme (ETS) scheme to incentivise large scale planting and regeneration of natives. The short life of *P. radiata* means that, with time, the forests will start providing a negative return, rendering the land essentially useless to future generations. This can be negated by publicly and potentially privately funding the transition of exotic plantations to gain credits, into permanent native forest. The real discussion is in the value of the transition, which has unquantified environmental, economic and health and wellbeing benefit to our vulnerable communities, and how this could be met via public schemes like the East Coast Forestry Project that was set up post Bola.

It has been suggested that altering the Emissions ETS can promote more indigenous forestry options, including coordinating smaller landowners to increase their participation, gaining a better understanding of actual carbon sequestration rates for various native species and mixed forests, and potentially offering financial incentives for non-carbon co-benefits such as biodiversity via a market-based approach or additional development contributions collected by local authorities or central government (Bendikson, 2023; Hall, 2023; Hood, 2023).

For the agriculture sector, the importance of continuous support, guidance, and tangible incentives for farmers to implement emissions pricing based on farm use is emphasised. Tailoring policies for Māori landowners is essential, as is tracking outcomes as the scheme unfolds. A review of factors driving farmers to implement land use changes before emissions pricing suggested that farmers respond well to effective communication and guidance.

Recommendations regarding community resilience

Building community resilience in the face of climate change is imperative, as exemplified by the "Climate Change and Community Resilience in the Waiapu Catchment" report (Warmenhoven et al., 2014). The study emphasises the significant impacts of climate change on the Waiapu catchment community's natural systems and social and economic well-being. To build resilience, community-led initiatives such as sustainable farming practices and climate action plans are necessary.

Recommendations include engaging the broader community in holistic catchment restoration approaches, and establishing a 'Model Forest' to develop a strategic overview of land use, coalitions, and new decision-making methods. Investment in forest infrastructure, entrepreneurship programs, and innovative forest-based value chains are recommended to support transition towards a circular bioeconomy. Public policies, regulations, and education campaigns are needed to support this transition.

However, limited resources and conflicting interests pose challenges and few, if any, of the recommended outcomes from this and other rigorous locally-led, evidence-based studies in the region over the past thirty years have been implemented. This is one of the most disappointing findings of the review of research and policy reports – so much is known but so little positive action has happened to minimise negative impacts and maximise benefits to the natural environment and our communities that rely on it.

The state government of Victoria recently banned native timber harvesting and established a $200m forestry transition package to support communities, businesses, and workers reliant on that industry. Something similar will be required for Tairāwhiti and Te Wairoa – $100m could go to support workers and business owners to retrain and/or redeploy resources into new sectors and $100m could go into R&D and establishing new businesses and industries based around the region with a far higher proportion of native trees and forest on the land.

Regulate for better assessment of land use risks

If plantation forestry is to continue, Increase efforts to accurately map terrain to a finer scale than currently available, and classify acceptable land uses accordingly. Appropriate tools already available, and in use internationally, but have not been adopted here.

Risk assessments should be carried out for all exotic forests, existing and planned. Since harvesting affects risk, there should be annual risk maps created, based on intended harvest sites and times (Spiekermann & Marden, 2018). The information should also be used to evaluate future forestry, including post-harvest land use and infrastructure decisions.

Hazards created by the combination of forestry practices and heavy rainfall events can be reduced through informed forestry management practices, such as Terrain Susceptibility mapping (Amishev et al., 2014; Spiekermann & Marden, 2018). A proactive, preventative approach is needed to minimize forestry-related hazards, requiring a shift in regulatory processes and investment in high-resolution mapping for better forest management decisions. Specifically recommended actions from Don Miller (2023) include:

1. Applying a whole-of-slope geotechnical assessment to all slopes adjacent to a major highway (e.g. SH35).
2. Treatments such as opening surface drainage channels to prevent water ponding and infiltrating slopes, triggering deep-seated movements, and possibly lining such zones with an impermeable clay where necessary.
3. If problems remain after efforts to curtail infiltration up-slope, horizontal boring for drainage could be useful in some situations.
4. Where the LUC classification of an area indicates limited units within a slope should be treated for erosion susceptibility (e.g. by afforestation) the remainder of the slope should always be assessed to determine if it also needs to be treated in some way.

(Miller, 2023, p. 7)

Slash management

Investigate the potential for on-site slash removals, such as chipping and biomass processing, and bio-energy with carbon capture and storage (BECCS).

Bodecker et al. (2023) put forward that “forestry slash massively amplified the impacts of cyclone Gabrielle, creating dams that exacerbated flooding, increased the stress on bridges, and resulted in significant additional damage to infrastructure.” (Bodecker et al. 2023, p. 5). Reducing generation of slash through forestry methods as demonstrated internationally

appears to have proved challenging here, partly due to the cost (e.g. Amishev et al., 2014), but it is imperative that practises around slash must be modified if forestry is to continue.

“Bio-energy with carbon capture and storage (BECCS) is a technology where biomass, e.g. forestry slash, is burned in a power plant to generate electricity. The emissions from the flues of such power plants are rich in carbon dioxide (CO_2) from the burning of the slash. The CO_2 from the flue can be captured (e.g. liquified) and pumped either into underground reservoirs such as geological faults, or into the deep ocean - in both cases keeping that carbon well out of the atmosphere. While some work has been done by MfE to evaluate BECCS technologies for use in Aotearoa New Zealand, given the role of forestry slash in exacerbating the impacts of cyclone Gabrielle, it might be opportune to look again at BECCS as a use of forestry slash that also directly addresses the climate crisis by providing electricity generation while simultaneously decreasing CO_2 concentrations in the atmosphere.” (Bodecker et al., 2023, p. 5).

A small BECCS pilot plant using otherwise uneconomic pine logs is currently under development near Ruatoria at the local timber mill that will debark the logs for fence posts and use the bark waste for electricity generation to be fed into the main grid (Neilson, 2019).

I. Impacts of the political economy, land tenure system and capital on power dynamics and land use decision-making processes in the Tairawhiti region

Background

'Political economy' is a term used to describe the policies set by governments and power relations that affect the economy. Policy decisions regarding land tenure, taxation, regulation, and subsidies all have major impacts on land use in the region.

'Capital flows' refer to the movement of money for the purpose of investment, trade, or business operations. Capital flows have influenced ownership, development, and resource extraction within Tairāwhiti.

Political Economy

The Tairawhiti region is generally considered to be the area covered by unitary authority Gisborne District Council, but sometimes also includes the area covered by Wairoa District Council. The economy of the region is based on primary industries such as forestry, sheep and beef farming, fisheries, horticulture, apiculture, and viticulture, along with some innovative manufacturing, tourism, and retail. There is also some investment in electricity distribution, roading and port infrastructure and telecommunications, as well as cultural and heritage restoration. The economic development strategy for the region includes initiatives to diversify the economy and promote innovation, entrepreneurship and skills development, which have attracted some talent into the region in the past decade including organisations focused on medical research and biotechnology, automated translation services and other digital services and products. The region also has strong ties to Māori culture and identity, which is reflected in many sectors, including education, healthcare, performing arts and governance.

The forestry industry contributes significantly to the regional economy. The region is home to some of the largest forests in New Zealand, covering an area of around 250,000 hectares. Of a workforce of about 27,000, there are 970 employed in forestry and logging, i.e. 3.6% of workers in the region (Ashton, 2023). In addition, forestry-related businesses, such as sawmills, panel mills, veneer processors, and transport companies provide many forestry-related jobs in the region. There are differing views on the multiplier factors that should be used to estimate the employment contributions of the sector (Ashton, 2023).

Forestry has a major impact on roading infrastructure and generates about 90% of port activities. A balanced assessment of the industry's contribution to the regional economy would include a calculation of the costs of maintaining a fragile roading network in highly erodible landscapes for heavy vehicles used in forestry operations, versus the rating and taxation contributions made by forestry companies; and the contributions made by ratepayers to port infrastructure versus benefits to the local economy. Other calculations of this kind might include the costs of deaths and injuries associated with forestry operations compared with the tax paid by the forestry companies. Reliable calculations of this kind have not been found.

Land Tenure System

The current land tenure system in the Tairawhiti region is governed by New Zealand property laws including agencies like the Māori Land Court that determines title and occupation rights for whenua Māori. Land can be held in freehold title, multiple ownerships or interests,

and customary title. Each of these systems serve different purposes and provide different opportunities and barriers for land ownership, access, utilisation and management in the region.

The current land tenure system benefits large landowners more than small landowners. Large landowners are better able to secure leases from the government and use them to generate economic returns. Meanwhile, small landowners may not have the resources or access to the same type of leases. They may struggle to gain access to the same economic gains large landowners receive.

Capital Flows

In relation to capital flows, the current land tenure system of the region tends to benefit private individual or corporate landowners on General Title land more than collectives entities for Māori landblocks with multiple shareholders. This is because private landowners are able to access capital funded by debt, while collective entities typically do not have access to loans unless they have significant existing revenue to provide security for lenders, as the land cannot be used as security against a loan.

This has implications for power dynamics and land use decision making, as General Title landowners tend to have more resources available to them when it comes to negotiating with local authorities and other stakeholders. Furthermore, private landowners may also be able to exert a greater degree of influence over local decision-making processes due to their increased access to financial resources and well-established industry bodies associated with their particular sector(s).

In an attempt to access capital and secure some long-term revenue opportunities, many Māori landblocks in the region have entered into joint ventures with forestry companies to lease their land for up to 99 years for three cycles of pine plantations. This often means control over what happens on the whenua is taken away from landowners and their descendants for at least a century. The state of the land when it is finally returned to landowners (soil and vegetation cover, for instance) after three cycles of pine plantations is a material factor, when harvesting often involves heavy losses of topsoil, and land may be stripped back to bedrock after harvest in some locations.

Costs and Benefits of Forestry Industry

Some claim the forestry industry may make more than $90 million annually from the region. Of this, an estimated $50 million dollars may remain locally, with the other half going to non-local forestry shareholders, transport companies and other external forestry goods and services sectors. As noted earlier, significant costs for ratepayers and taxpayers are associated with this income, and reliable cost-benefit analyses are lacking.

The benefits of the financial contribution by the forestry industry in the Tairawhiti region are divided among employee households, resident and non-resident landowners, a few local forestry company shareholders and local transport and infrastructure companies in a variety of ways. Shareholders in forestry companies have recently been making between $330,000 (2022) and over $500,000 (2018) profit for every worker they employ (Macfie, 2023).

Again, reliable estimates of the distribution of financial costs and benefits from forestry between the forestry companies, their employees and the regional community are lacking.

These should include the costs of maintaining roading and port infrastructure for forestry operations; the costs associated with deaths and injuries in forestry plantations; and the direct and indirect costs associated with damage to private and public property caused by

forestry waste in successive storms, including crops, vineyards, orchards, animals, houses, farm buildings, schools, water supplies, communications networks, bridges and roads.

Other costs include the damage to topsoil, rivers and beaches and risks to public health and safety from forestry waste. The direct and indirect costs associated with damage caused by forestry waste during recent storm events are difficult to quantify, but are likely to far exceed the industry's positive economic contributions to the region over recent years.

Alternative options and benefits for Forestry Industry and the region

Current forestry industry practices also do not account for the unique ecological value of Aotearoa landscapes. Numerous alternative approaches to forestry management are available, and continue to prove successful elsewhere both in protecting forest ecology and in reducing downstream erosional impacts. These include focusing on planting and harvesting of native species, continuous cover forestry or leaving larger areas of protected forest while reducing clear-felling and the areas harvested, using selective harvesting or thinning operations instead (Amishev et al., 2014; Gresh & Courter, 2021).

The financial costs to the forestry industry in adopting alternative land use practices vary depending on the size and scope of the businesses; forest holdings' location, size and age; and the scope and details of new regulations. The costs will include higher labour costs and pest control costs associated with planting native species and costs associated with reducing areas of forest harvested.

Some specific factors that should be taken into consideration include the cost of implementing sustainable forestry practices, projected revenues from the sale of timber, potential regulatory incentives, savings from reduced land management costs, and potential environmental impacts. Additional factors such as the tree species harvested, the local environmental conditions, and the overall sustainability of the industry must be considered in order to make an accurate assessment of costs and benefits from proposed changes.

In the medium-term if the forestry industry in the Tairawhiti region chooses, or is forced to adopt, better ecological practices, the financial implications may mean less forestry work in the region – reducing the GDP and employment of the sector locally. Contributions to support the transition may include incentives and subsidies to local businesses and landowners for new industries and enterprises, as well as grants and funding for research and development initiatives that further promote good forestry practices and/or new employment opportunities in new sectors based in the region.

In the long-term the financial contribution of the forestry industry in the region could continue to be meaningful, but only if the industry adopts better ecological practices including the end to clear-felling on erosion-prone land. Furthermore, ecologically sustainable practices could also protect the area's unique biodiversity and create a healthier environment for the local community.

Likewise, the farming sector and regulators must urgently reconsider the contribution of pasture on erosion-prone land in relation to soil conservation and loss. Similar to forestry, there is a need to scale back the area committed to pasture considering 88 percent of the region is erosion-prone. Like forestry, new industries will need to be established to replace farming job losses as land is transitioned to permanent diverse native forest again.

J. The role of Tikanga, Mātauranga and Kaitiakitanga in relation to the protection and utilisation of whenua and wai

Tikanga is a system of responsibility and accountability (Menzies & Paul, 2023) that provides guidance for how we behave through an arrangement of values, codes and conventions (King et al., 2010). This helps ensure that our mauri (life essence) remains secure and we are well. Tikanga are the result of knowledge and practice formed and adapted over generations, that give rise to responsibilities of conservation and guardianship. These are relevant to the use of land and water, and the protection of their respective mauri as well, and the impacts of human behaviour and climate change on them. This includes sedimentation and woody debris moving from the steep, erodible lands of Te Tairāwhiti into its waterways.

> "Māori ethics… recognise that cultural order comes from the natural environment and hence people have a responsibility to care for these systems. Lack of respect, honour and protection of this natural order compromises the well-being of these systems on which people depend." (Te Huirangi Waikerepuru in King et al., 2010, p. 107)

It is important to understand that cultural order as presented in whakapapa (genealogy) privileges representations of the natural environment as tuākana (older siblings) to humankind as taina (younger sibling). This means that people have obligations to other parts of the whakapapa, and that these are enacted through tikanga and the application thereof. This approach fundamentally challenges the western doctrine of singular human power and domain over all things, and the subsequent behaviour, policy, process, and actions that this doctrine espouses, implements, and supports.

This plays out in terms of the use of and effects on whenua (land) and wai (water) in particular. The impacts beneficial or otherwise, of land and water uses on Te Tairāwhiti environment have changed over time, but records of the impact of erosion have identified the conversion of forested land cover to pastoral farming as a key factor. Extensive forest clearance between 1890 and 1930 together with repeated high-intensity storm and flood events as well as a catchment with unstable rock types were identified in studies as impacting negatively on land, water and people and the respective cultural values. This had led to the loss of significant resources and habitats and a decline in the mauri of land and water, and arguably people as well.

Pastoral farming gave way to plantation forestry, recommended and supported by government, in an attempt to address widespread hill erosion as a result of intense rainfall from Cyclone Bola. Storm events are forecast to become more frequent and extreme due to human-induced climate change. New strategies are sought to ensure long-term sustainability across agriculture, forestry, water resources, natural ecosystems, settlements and infrastructure, and coastal ecology and health and well-being. Sedimentation and forestry woody debris impact natural resources, and in turn affect people and their role as kaitiaki of tuākana species.

Land use changes are now being further impacted by climate change, which is likely to exacerbate many of the socio-economic disparities already facing Māori society (King et al., 2010). While Māori are experienced in dealing with climate variability, new strategies are needed to address different sectors. Proposed options such as conventional adaptation through managed retreat and relocation (Ministry for the Environment, 2008) may not be perceived as options by Māori and may put extra pressure on inter-iwi relationships.

> "Another barrier may include the high spiritual value placed on coastal land and resources which can restrict, and may even rule out conventional adaption options..." (King et al., 2010, p. 108)

A further aspect of climate change impact on Māori is the limited representation of Māori around the decision-making table, and strategies and actions to reduce vulnerability have also been suggested (King et al., 2010).

The impact of sediment mobilisation on rivers such as the Waiapu River has been the subject of studies with iwi, seeking long-term sustainable solutions through integrating mātauranga and science. The causes of severe land degradation and high sediment loading must be addressed before a community partnership for restoration can be undertaken.

> "Heavy deforestation led to years of erosion, and the Waiapu River has the highest level of sediment loading of any river in the country. The flow on effect for the community is huge with many people leaving the area to seek opportunities." (Barnard et al., 2016)

The indication that impacts will worsen makes this a complex intergenerational challenge. Options to address impacts of sedimentation include adaptation, environmental monitoring with iwi, and reviewing values and decision-making to protect and better manage rivers:

> "The river is our taonga and our life essence. Land erosion reflects how we are becoming as a people. We are losing our mana… Without this land we are nothing." (Harmsworth & Warmenhoven, 2002, p. 7)

A 2012 case study of the Waiapu River catchment and impacts on the community found that Ngāti Porou sought Mana Motuhake, self-determination over the river and catchment, and a strategy to accurately represent their aspirations and values. Fresh water management incorporating mātauranga (Harmsworth et al., 2013) fosters collaboration and engagement between iwi and governments, crucial to recognising the relevance of mātauranga in decision-making. The researchers identified mātauranga as a unique, ecosystems-based knowledge system specific to local issues, historic knowledge, and spatial and temporal contexts. Area-specific policies are able to address social, cultural, economic, and ecological values together. The Resource Management Act supports the exercise of kaitiakitanga in managing and protecting resources, which in turn is relevant to climate change adaptation.

> "A chorus of Māori voices...indicated that adaptation should focus on kaitiakitanga (environmental stewardship) - with families, and communities being involved in habitat protection and enhancement." (King et al., 2010, p. 107).

Turning to the issue of the mobilisation of woody debris, including forestry slash, a 2016 report for Gisborne District Council (C. Phillips et al., 2016) emphasised the need to address slash, by preventing mismanagement during harvest, before it caused damage to the social, economic and coastal infrastructure. Identification of alternative management options for unstable areas, and mitigation of issues were proposed. A contemporary paper on forests (Pierce, 2022) discusses the challenge of sustaining forests and emphasises the need to move from a human-centred approach to a more nature-centred one. Forestry maintenance and restoration needs priority, and decisions need to be made on harvesting and carbon sequestration, and for inclusion of Indigenous people in forest management. The author argues:

> "Local concern and care for the forest is displaced by the new commercial forests run by large corporations, whose concerns are for profits and development in distant cities and faraway countries." (Pierce, 2022, p. 28)

Monitoring of harvesting and removal of woody debris is a focus for better management and impact prevention. A paper on environmental monitoring (Harmsworth & Awatere, 2012) details an assessment method of cultural monitoring which enables iwi/hapū values and perspectives to be articulated spatially. Monitoring environmental-cultural changes through time can then provide validity and contribute to national environmental outcomes.

> "Once established, mātauranga Māori-based monitoring is used to express Māori values, monitor change (spatially and temporally), respond to issues, inform planning and policy, plan actions, and underpin the long-term management of freshwater." (Harmsworth & Awatere, 2012, p. 2)

While more thorough monitoring of plantation forest and adoption of strategies such as best management practice are important, a workshop with Gisborne District Council also considered the need to develop criteria for identifying areas that might not be replanted for plantations harvesting due to unacceptably high risk following harvest, based on factors such as poor tree growth, difficulty of harvest, and higher risk for generating debris flows (Phillips et al., 2016). As the study notes, debris flows happen because it rains, the slopes are steep, and the landscape (soils/regolith) is susceptible to mass failure. The study discussed introduction of a risk matrix for analysis, including consideration of downstream effects from any one of multiple source sites. Alternatives for land use on unstable areas, which may be sizeable within Tairāwhiti, were considered but closer investigation is needed, as site mapping has been at a coarse scale which may not identify all such areas.

The government's emissions trading scheme (ETS) provides an incentive for plantation forestry (Hood, 2023). A recent review (Hungerford, 2022) focusing on farmer values provides recommendations for support for farmers when considering emissions pricing considered what drives farmers to consider land use changes. It notes that it is important to consider the complexities involved where it applies to Māori landowners and to tailor the polices, deadlines, and timeframes to accommodate their decision-making as well as implementation processes.

In summary, research shows that values, the exercise of kaitiaki as custodians and conservators of whenua, wai, mātauranga, and tikanga are interlinked and relevant to the discussions of responsibilities, accountabilities, and use of the whenua; sedimentation affecting rivers; and forestry woody debris affecting waterways, fresh water and coastal water, ecologies, and coastlines.

Climate change will exacerbate impacts of sedimentation from run off and mud flows in steep and unstable landscapes such as Tairāwhiti. While plantation forestry provides economic benefits, including from the ETS, much greater action than 'best practice' harvesting and 'risk monitoring' is needed to move towards a healthier, more sustainable environment. This action must focus on a return to permanent indigenous forest, and as a bare minimum, should include a more proactive approach to anticipating and planning around risks of future land-use. An example could be the making of finer-scale local assessments, hapū-determined tikanga framing land use rules, and decisions that are re-evaluated based on changes to land use and external factors (e.g. Spiekermann and Marden's annual risk maps), which is more in keeping with responsibilities to the whenua than national level reliance on the prescriptive NES-PF type regulations and coarse-scale mapping of the ESC.

Prioritising permanent diverse indigenous forest afforestation (Marden & Seymour, 2022) should be done within catchment communities utilising both local and external expertise, being led by the community with a focus on ecological, social and economic wellbeing.

K. International best practice: plantation and nature-based forestry

Background

Forestry in Aotearoa New Zealand has gone through a series of phases. Prior to humans arriving about 800 years ago, around 80 percent of the whenua was covered in forest (Guild & Dudfield, 2009).

Upon their arrival in Tairāwhiti, the ancestors of Māori had to adapt to forest ecosystems very different from those in their tropical homelands. In coastal areas, where native forests were cleared for gardens and settlements on the foothills and river flats, forest stands were left for building timber, birds, bush foods and fibres (Coombes et al., 2000). Forest resources were seasonally harvested in the hinterland, where according to an early European bushfeller:

> "The steep hills and river flats were bush covered right down to the beds of the rivers, which were hard and full of huge boulders. The water was clear and sweet, and it ran fast. Children swam in the clear pools, and there were eels, native trout and freshwater mussels. The native bush was beautiful. There was tawa, with plenty of totara, white pine and matai. There was beech forest at the higher levels. There were pongas and ferns of all sorts, and the undergrowth was thick and green." (Howard, 1976, p. 4 as cited in Coombes et al., 2000, p. 11)

About one quarter of Aotearoa was cleared of native forest prior to Europeans arriving, most of it by humans burning it (Guild & Dudfield, 2009).

After European settlement in Tairāwhiti, when the land was surveyed into blocks and titles awarded by the Native Land Court in the 1880s, land clearance accelerated dramatically. Native trees were felled for houses, bridges, fences, jetties, farm and office buildings, and mills were set up to process the timber. This phase of forestry relied on native forests, but no attempt was made to manage them sustainably (Coombes et al., 2000).

Across Tairāwhiti, huge areas of bush were felled and burned for pasture for sheep farming. The plumes of smoke were so thick that people on ships out at sea thought that inland, there had been a volcanic eruption:

> "This was a first-class fire; some four square miles of felled bush were cleared off in about three hours. A ship coming down the coast reported, where it next put in, that there had been another volcanic eruption inland. And the sea was twenty-five miles from the run!" (Kenway, 1928, p. 47).

The erosion from this large-scale land clearance across the region was catastrophic. It was not until the 1950s, however, that afforestation schemes were proposed as a way forward. Although the restoration and sustainable harvesting of native forests were suggested by L.M Ellis, the first Director of Forests in New Zealand (1920-1928; Roche, 2015) this was not taken seriously. The afforestation schemes involved mass plantings of *Pinus radiata* and targeted planting of willow and poplar on erosion-prone hillsides and gullies, so a timely opportunity to explore sustainable approaches to native forestry was squandered.

At the same time, pastoral farming on steep hillsides was still causing severe erosion, leading to the formation of gullies and sedimentation in rivers, most spectacularly during Cyclone Bola in 1988. During the 1980s the pine plantations established for soil conservation through erosion control were sold by the state to private interests, and

wholesale harvesting began. This also contributed to severe flooding events, now aggravated by forestry logs and waste in the floodwaters, culminating in the devastation caused by Cyclone Gabrielle in 2023.

In the latest phase, carbon farming with pine trees, funded by the Emissions Trading Scheme, is expanding in Tairāwhiti, with highly erodible landscapes being sprayed and then mass planted with relatively short-lived, shallow rooting, highly flammable monocultures of pine trees (BDO Gisborne Limited, 2021).

Given the risks of fire, disease and increasing storm damage, this is not a credible form of long-term carbon sequestration at a time of climate change. For local communities, pest and weed ridden plantations of aging and dying pine trees are the most likely legacy of this latest ill-conceived central government policy that impacts local landscapes across Tairāwhiti.

1. Forestry Stewardship Council (NZ) standards for plantation forestry:

International best practice for plantation forestry is represented by the Forestry Stewardship Council standard (NZ). The FSC is based in Bonn (Germany), and its certification is supposed to ensure that:

> "forest operations are structured and managed so as to be sufficiently profitable, without generating financial profit at the expense of the forest resource, the ecosystem, or affected communities…. This system allows certificate holders to market their products and services as the result of environmentally appropriate, socially beneficial, and economically viable forest management." (*The FSC Forest Stewardship Standard for New Zealand*, 2023, p. 5)

For regions like Tairāwhiti, the FSC(NZ) standard states that:

> "hilly and mountainous landscapes can make forestry challenging as erosion poses a real threat to NZ forest management, both in harvesting and planting. Special considerations, included in this standard, must be taken to minimize and mitigate the risk of landslides that could lead to the harm of forest workers, waterways, communities, flora, and fauna." (*The FSC Forest Stewardship Standard for New Zealand*, 2023, p. 12).

Given the devastation caused by landslides and forestry waste in the wake of Cyclone Gabrielle, this requirement is clearly being breached.

The standard also states:

> "the Organisation shall comply with the legal obligations in applicable national and local laws and regulations and administrative requirements (*The FSC Forest Stewardship Standard for New Zealand*, 2023, p. 16)."

Despite this, a number of the major forestry companies in Tairāwhiti have been successfully prosecuted for breaches of local laws, regulations and administrative requirements by the Gisborne District Council, and remain FSC certified.

The FSC(NZ) also states that:

> "The Organisation shall identify, prevent, and resolve disputes over issues of statutory or customary law, which can be settled out of court in a timely manner, through engagement with affected stakeholders". (*The FSC Forest Stewardship Standard for New Zealand*, 2023, p. 17).

This has not happened in many cases.

In addition, the FSC(NZ) standard states that

> "Operations [shall] cease in areas while disputes exist: 1. Of substantial magnitude; or 2. Of substantial duration; or 3. Involving a significant number of interests." (*The FSC Forest Stewardship Standard for New Zealand*, 2023, p. 18).

In the wake of Cyclone Gabrielle, harvesting continues, despite the sheer magnitude, scale and long-lasting impacts of the damage caused by forestry waste in Tairāwhiti, from farming to horticulture to businesses reliant on transport and water supplies, individuals, families and entire communities.

The FSC(NZ) standard also states that

> "the Organisation, through engagement with local communities, shall take action to identify, avoid and mitigate significant negative social, environmental, and economic impacts of its management activities on affected communities. The action taken shall be proportionate to the scale, intensity, and risk of those activities and negative impacts." (*The FSC Forest Stewardship Standard for New Zealand*, 2023, p. 29)

Such identification and avoidance has not occurred, and mitigation is cursory at best.

Further comment could be made on other standards, but these will suffice. According to a number of court judgements (Gisborne District Council, 2023b) it is obvious that many forestry companies operating in Tairāwhiti do not observe international best practice for plantation forestry. Given the gravity and multiplicity of these breaches, the FSC certification of such companies should be withdrawn.

2. International best practice for nature-based forestry

Over the past 140 years, extractive forms of forestry have proved ecologically, economically and socially disastrous for Tairāwhiti. It is time for new approaches to be trialled and adopted.

In recent reports, international bodies have strongly recommended nature-based strategies for responding to biodiversity losses and climate change. In 2021, for instance, in its report *Biodiversity and climate change: interlinkages and policy* options, the Royal Society (UK) advises against establishing large monoculture tree plantations as long-term carbon sinks:

> "**Policy measures to discourage**: Planting trees, either for bioenergy or as long-term carbon sinks, should focus on restoring and expanding native woodlands and avoid creating large monoculture plantations that do not support high levels of biodiversity. Simple targets such as 'numbers of trees planted' ignore biodiversity considerations, such as long-term survival of trees or stewardship, and can be misleading, potentially contributing to policy failure and misuse of carbon offsets." (The Royal Society, 2021, p. 7)

Likewise, the Report from the Joint workshop COP Panels on Biodiversity and Climate Change (Pörtner et al., 2021) recommends **discouraging** ecosystem-based approaches to climate mitigation that have negative outcomes for biodiversity, such as tree planting in inappropriate ecosystems, and monocultures, for the following reasons:

- Large-scale tree planting can be harmful to biodiversity and food production due to competition for land.

- Afforestation may reduce existing ecosystem carbon storage, cause further biodiversity loss and displace local people or curtail their access to land and its use. Single species plantations can increase pests and disease.
- Plantations of exotic species often have negative impacts on biodiversity, on adaptive capacity and on many nature's contributions to people not related to timber production or carbon sequestration, especially if the planted species becomes invasive.
- Further, their climate benefits may be offset by local warming, especially in boreal and temperate regions, which is induced by different exchanges of water and energy compared to the land cover which it replaces.

Rather, the report recommends "the protection of existing carbon-rich native ecosystems, restoration of degraded ecosystems and improved management in agriculture and forestry." (Pörtner et al., 2021, p111).

In 2022, the IPCC (AR6) report described the practice of "planting large scale non-native monocultures, which would lead to loss of biodiversity and poor climate change resilience" as among the '**Worst Practices and Negative Adaptation Trade-offs'** for temperate forests (IPCC, 2022, p. 308).

By contrast, to "maintain or restore natural species and structural diversity, leading to more diverse and resilient systems" was placed among the '**Best Practices and Adaptation Benefits'** (IPCC, 2022, p. 308), with very high potential for mitigation of climate change effects—importantly, the potential for restoration is currently still high.

International best practice in forestry now requires the restoration, expansion and nature-based harvesting of natural forests, rather than monocultural plantations.

Nature-based silviculture has long been practiced by indigenous peoples, and in places such as the Black Forest in Germany, Slovenia, and Switzerland.

Many other countries are transitioning from clear fell plantation forestry towards nature-based approaches, for instance Germany and the Nordic countries, where over the past 20 years multi-age, multi-species forests of indigenous trees closely adapted to local landscapes are being managed by selective harvesting, based on long rotations, natural regeneration and the sustainable harvesting of a range of forest products, not just timber (e.g. Amishev et al., 2014).

This is coupled with the restoration and expansion of permanent indigenous forests to sequester carbon, maintain biodiversity, enrich soils, enhance the quality of waterways and stabilise erodible land.

This is the only credible form of long-term carbon sequestration by forests. According to the Food and Agriculture Organisation of the UN (Miner, 2010), the industrial forestry supply chain emits about twice as much carbon as it sequesters, and carbon credits based on relatively short-lived monocultures in industrial plantations harvested every 25 to 30 years are not valid. The forestry supply chain in New Zealand, which largely sends raw logs to China and India for processing into very short-lived products, is likely to be on the high side of that equation.

The New Zealand Emissions Trading Scheme, which relies almost exclusively on industrial plantations for carbon sequestration, and in Tairāwhiti awards up to ten times more carbon credits for pine plantations than for restoring native forests, does not follow international best practice (Climate Change (Forestry) Regulations, 2022).

New Zealand's approach to carbon sequestration using exotic monoculture plantations is a form of 'greenwashing' that is incentivising many perverse outcomes, including those seen in Cyclone Gabrielle. In effect it is an excuse for the forest industry to continue its "Business As Usual" approach. It also excluded the possibility of using slash derived biochar for carbon sequestration.

Nature-based forestry has a number of things in common wherever it is practiced:

- A recognition by all the involved parties that a nature-based approach to forestry requires close attention to biodiversity, nutrient cycling, water regulation, carbon storage and soil health.
- It aims to promote biodiversity by developing and maintaining forest structure and composition, protecting critical habitats, and encouraging the growth of diverse tree species and understory vegetation.
- By mimicking natural disturbances such as fire and insect disturbance through controlled burns or selective harvesting, forest managers promote forest resilience and maintain ecological integrity.
- It recognises that indigenous knowledge of forests as a basis of survival evolves over hundreds or thousands of years. This knowledge is assessed, affirmed and rechecked as environments modify (Apgar et al., 2009).
- Nature-based forestry seeks to integrate social and cultural values in forest management into decision-making processes. This includes the use of non-wood forest products for food, energy, medicine, arts, crafts, and ecosystem services by local communities.
- al Access rights for local communities, shared governance, and state-supported sustainable forest management help to ensure that forest management practices are socially and economically sustainable (Sheppard et al., 2020);
- Nature-based forestry emphasizes the importance of adaptive management to evaluate the effectiveness of forest management practices under changing conditions, adjusting them as needed to meet ecological and social objectives.

Internationally there is a shift from a human-centred to nature-centred approaches for sustaining forests. These emphasize the interconnectedness of all Earth's organisms and the biophysical environment, with people as part of forest ecosystems and dependent upon them for their survival (Larsen & Nielsen, 2007).

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NES-Plantation Forestry: Development and workability analysis to support Mana Taiao Tairāwhiti submission to the Ministerial Inquiry into Land Use

Purpose

The Hon Stuart Nash (Minister of Forestry) and the Hon David Parker (Minister for the Environment) announced on 23 February 2023 the Ministerial Inquiry into Land Use (MILU) causing woody debris, including forestry slash, and sediment-related damage in Te Tairāwhiti, Tūranganui-a-Kiwa and Te Wairoa regions.

This report was commissioned by Te Weu Charitable Trust to provide an analysis of the development of, and a summary of stakeholder submissions, on the National Environmental Standards for- Plantation Forestry since its inception to the present day to support a submission by Mana Taiao Tairāwhiti on the Ministerial Inquiry into Land Use in Te Tairāwhiti, Tūranganui-a-Kiwa and Te Wairoa regions.

The report provides a brief background to the NES-PF and presents a system view of forestry management. Summaries of some of the commentary deemed most relevant to the MILU from officials, local government representatives, and industry, are provided. Commentary is categorised by key questions that relate to the various components within this system view. Further analysis on commentary themes is provided by the author along with further context on the development of the NES-PF, and expert commentary on aspects of NES-PF design and implementation. This analysis includes:

- The impact of Ministry for Primary Industries vs Ministry for the Environment-led NES-PF development
- The impact of resource management reform on future NES-PF revision
- Commentary on the 2015 consultation process with iwi
- Assessing erosion risk in the context of climate change.

Submission themes that were considered out of scope were:

- Impacts on native fish, birds, bats, and bees
- Wilding conifer spread
- Genetically modified plantation species

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Executive Summary

Stakeholder positions on the National Environmental Standards for Plantation Forestry (NES-PF) throughout its development were reviewed. Stakeholders included iwi/hapū, local authorities, environmental NGOs, forestry operators, and subject matter experts. The advice of central government agencies was also consulted. The timeframe under which this review was completed meant the number of positions reviewed was limited. The positions and advice reviewed point to seven main themes:

- The Resource Management Act 1991 is unsatisfactory to deliver expectations for environmental outcomes for all stakeholders, and particularly those of wi/hapū and environmental NGOs.
- The NES-PF permits forestry activities under conditions which, when they are breached, cause significant environmental effects.
- The Erosion Susceptibility Classification (ESC) model has limitations in terms of its core assumptions, and the data on which it depends, which render its resulting erosion risk classification zones inaccurate at the land-block scale.
- The NES-PF's ESC and Annual Exceedance Probability (AEP) thresholds do not adequately account for the consequences of landslide events when calculating risk.
- Industry standards lack sufficient guidance on managing debris flows. Multiple forestry operators in Tairāwhiti have been found breaching permitted activity rules and the terms of their consents.
- Monitoring and enforcement by the GDC has been lacklustre citing a lack of available resourcing, however monitoring and enforcement has increased since 2018.
- GDC is currently considering bringing forward a review of forestry rules in the regional and district plan, but no formal review is proposed to include consenting practices.

Further analysis of the themes imparted the following conclusions:

- Central government and industry approaches to forestry appear to underestimate the impact the post-harvest period has within the forestry cycle on increasing erosion risk.
- Claims that NES-PF development and gazettal is 'ultra-vires' are likely unfounded. The Ministry for Primary Industries leading the development of the NES-PF as opposed to the Ministry for the Environment is unlikely to have significantly influenced the final NES-PF wording.
- The proposed resource management reform may significantly improve forestry issues in Tairāwhiti, and the degree of engagement by central government with iwi/hapū, by addressing legacy issues with New Zealand's resource management system.
- The effects of climate change on New Zealand's national and regional weather patterns has not been sufficiently considered throughout the development of the NES-PF. Future weather predictions need to inform risk thresholds when making decisions about permitting or prohibiting forestry activities.

Background

Resource Management in Aotearoa New Zealand

The Resource Management Act 1991 (RMA) is the primary piece of legislation governing management and use of natural resources in New Zealand. National Environmental Standards are secondary legislation and an RMA instrument by which central government can prescribe technical standards, methods, or other requirements for environmental matters at the regional and district level. National Environmental Standards must be consistent with the purpose and principles of the RMA (see figure 2). Regional planning rules must not conflict with National Environmental Standards.

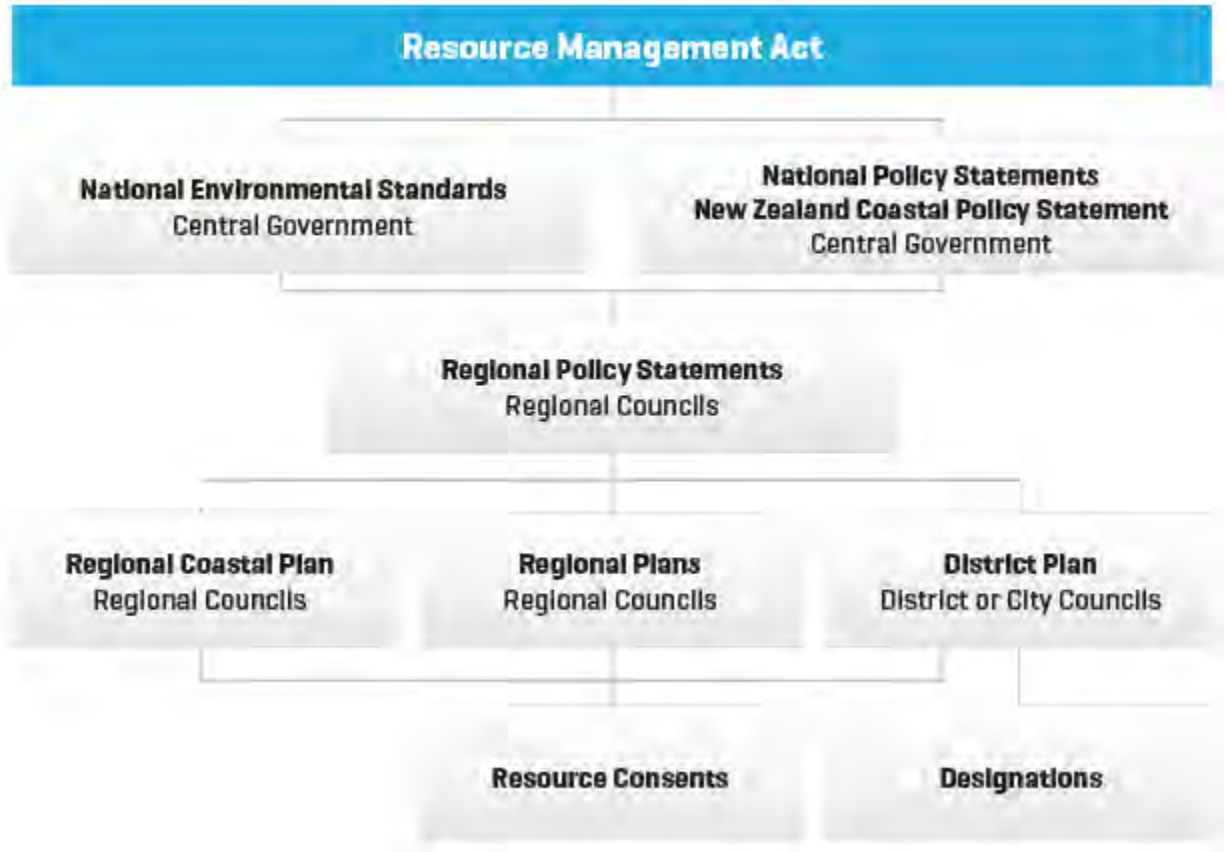


Figure 1. Hierarchy of resource management planning instruments in New Zealand[1].

[1] Medium Density Housing, 2023

5 Purpose

(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

(2) In this Act, **sustainable management** means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.

Figure 2. The overarching purpose of the RMA 1991 with which all planning instruments must be consistent.

National Environmental Standards - Plantation Forestry

The National Environmental Standards for Plantation Forestry (NES-PF) objectives set by Cabinet were to:

- maintain or improve the environmental outcomes associated with plantation forestry activities
- increase the efficiency and certainty of managing plantation forestry activities.

The NES-PF sets standards for eight core plantation forestry activities, allowing these to be carried out as permitted activities, subject to conditions to manage potential effects on the environment.[2]

The NES-PF classifies permitted, controlled, and restricted discretionary activities to apply to different land classes. Most relevant to the MILU are rules for slash (figure 3), harvesting (figure 4), and slash and debris management when harvesting (figure 5).

20 Permitted activity conditions: slash

(1) Slash from pruning and thinning to waste must not be deposited into a water body, onto the land that would be covered by water during a 5% AEP event, or into coastal water.

(2) If subclause (1) is not complied with, slash from pruning and thinning to waste must be removed from a water body, the land that would be covered by water during a 5% AEP event, and coastal water, unless to do so would be unsafe, to avoid—

(a) blocking or damming of a water body:

(b) eroding river banks:

(c) significant adverse effects on aquatic life:

(d) damaging downstream infrastructure, property, or receiving environments, including the coastal environment.

Figure 3. Minimum prescribed conditions for slash activities under Part 2 subpart 2: Pruning and thinning to waste.

[2] Ministry for Primary Industries, 2022a

63 Permitted activity

Territorial authority

(1) Harvesting is a permitted activity if regulation 64(1) and (2) is complied with.

Regional council

(2) Harvesting is a permitted activity if regulations 64 to 69 are complied with and the harvesting is in any—

(a) green, yellow, or orange zone; or

(b) red zone that is not of Land Use Capability Class 8e, where it involves no more than 2 ha of harvesting in any 3-month period.

(3) Harvesting where a minimum of 75% canopy cover is maintained at all times for any given hectare of plantation forest land (low-intensity harvesting) is a permitted activity in all erosion susceptibility classification zones if regulations 64 to 69 are complied with.

Figure 4. Minimum prescribed conditions for harvesting activities under Part 2 subpart 6: Harvesting

69 Permitted activity conditions: slash and debris management

(1) Slash from harvesting must be placed onto stable ground.

(2) Slash from harvesting that is on the edge of landing sites must be managed to avoid the collapse of slash piles.

(3) Slash from harvesting must not be deposited into a water body or onto the land that would be covered by water during a 5% AEP event.

(4) If subclause (3) is not complied with, slash from harvesting must be removed from a water body and the land that would be covered by water during a 5% AEP flood event, unless to do so would be unsafe, to avoid—

(a) blocking or damming of a water body:

(b) eroding river banks:

(c) significant adverse effects on aquatic life:

(d) damaging downstream infrastructure, property, or receiving environments, including the coastal environment.

Figure 5. Minimum prescribed conditions for slash and debris management activities under Part 2 subpart 6: Harvesting

Annual Exceedance Probability

Deposition of slash is restricted in instances according to Annual Exceedance Probability (AEP).
AEP is the probability of a certain size of flood flow occurring in a single year. A 5 per cent AEP flood flow has a 5 per cent, or 5-in-100 chance of occurring in any one year, and a 50 per cent chance of occurring in any 10 year period.

Erosion Susceptibility Classification

Harvesting is a permitted activity depending on certain conditions being met, and depending on which zone (green, yellow, orange, or red) it is planned to occur in. Zones are determined via the Erosion Susceptibility Classification (ESC) data layer hosted on the MPI website.

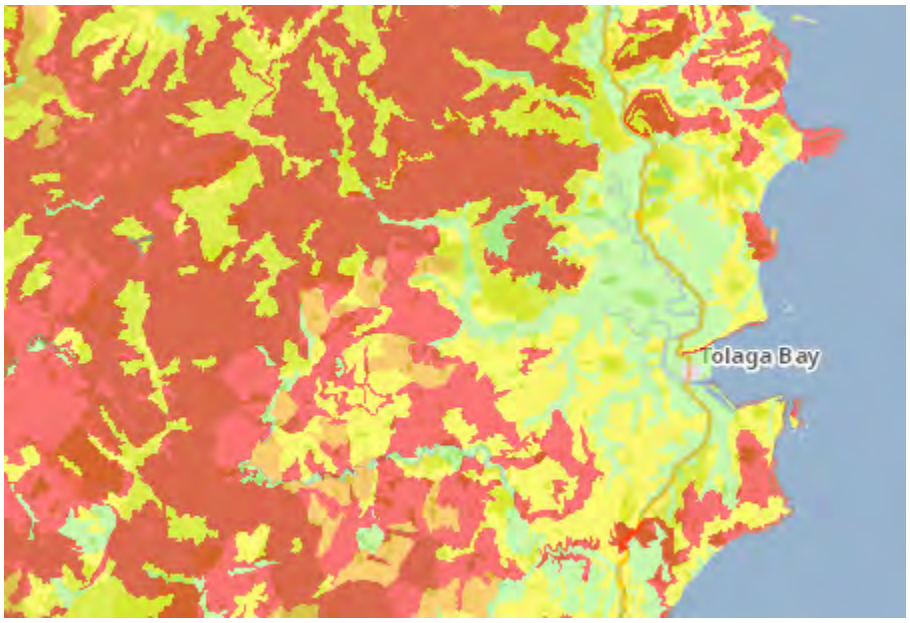


Figure 6. Snapshot of erosion susceptibility land classes west of Tolaga Bay, Tairāwhiti. Orange (high risk) or red (very high risk) — land more likely to erode. Most forestry activities can't be carried out on red-zoned land without resource consent. Some activities, such as earthworks also require consent on orange-zoned land with steeper slopes. (accessed : https://mpi_nes.cloud.eaglegis.co.nz/NESPF/)

The classification categorises erosion risk based on the NZLRI Land Use Classification (LUC) database. The ESC interprets risk according to three factors inherent within LUC.

- steepness of slope
- dominant erosion processes like wind or water
- rock type

Slope data relies on a digital elevation model that records steepness at a scale of 1:50,000. The Land Use Classification 3rd Edition Handbook describes this scale as suitable for regional or district studies which is equivalent to a 10ha 'smallest area' of interest, sufficient to capture major soil and landform types.[3]

Development of the NES-PF

2009 – Minister for the Environment, Hon. Nick Smith, approves a scoping project into national environmental standards for plantation forestry.

2009 to 2013 – The Ministry for the Environment (MfE) works with the commercial forestry sector, councils and other stakeholders to define the issues and draft preliminary conditions. Consultation is held in 2010 and 2011. Feedback shows further development of the proposal is needed.

[3] Lynn, et al., 2009 (pg 11)

2013 – Cabinet directs Ministry for Primary Industries (MPI) to address inconsistent forestry planning.

2015 – Consultation opens on the NES-PF. 18,732 submissions are received from stakeholder groups and individual members of the public.

2017 – Draft regulations are prepared and a draft circulated to a panel of technical experts to assess their clarity and workability. The panel includes representatives from councils, the plantation forestry sector and key environmental non-governmental organisations.

2017 (May to June) – Further consultation is held on a proposal to include a provision allowing councils to charge fees for monitoring permitted activities in the National Environment Standards for Plantation Forestry (NES-PF). This follows an amendment to the RMA which allows councils to charge a fee for monitoring permitted activities under a National Environmental Standard.

2017 (June to August) – Draft regulations are revised after consultation[4]. Final regulations under the NES-PF are approved by Cabinet and published in the New Zealand Gazette.

2022 (November) - MfE, MPI, and Te Uru Rākau consulted on four topics relating to afforestation and management of plantation and exotic carbon forests. Submissions are currently being processed.

[4] Page 8 of Ministry for Primary Industries, 2017a summarises the additional analysis made to inform the final NES-PF draft.

Commentary on select aspects of the NES-PF

Submissions on the 2015 NES-PF consultation varied substantially by position, specificity, and areas of priority. The NES-PF Report on Submissions and Recommendations technical paper provides a summary of submissions and recommendations by sector, identifies the general themes, and provides an analysis of submissions and recommendations with reference to NES-PF content and development. Given time constraints on the development of this report, the commentary provided here is limited to those deemed most relevant to the scope.

The NES-PF does not operate in isolation from the broader resource management system and its key players, therefore a system view of the NES-PF is provided in figure 7. The key questions that relate to each system component are presented in figure 8. Key commentary by stakeholders is organised under these question headings.

A systems view of forestry management

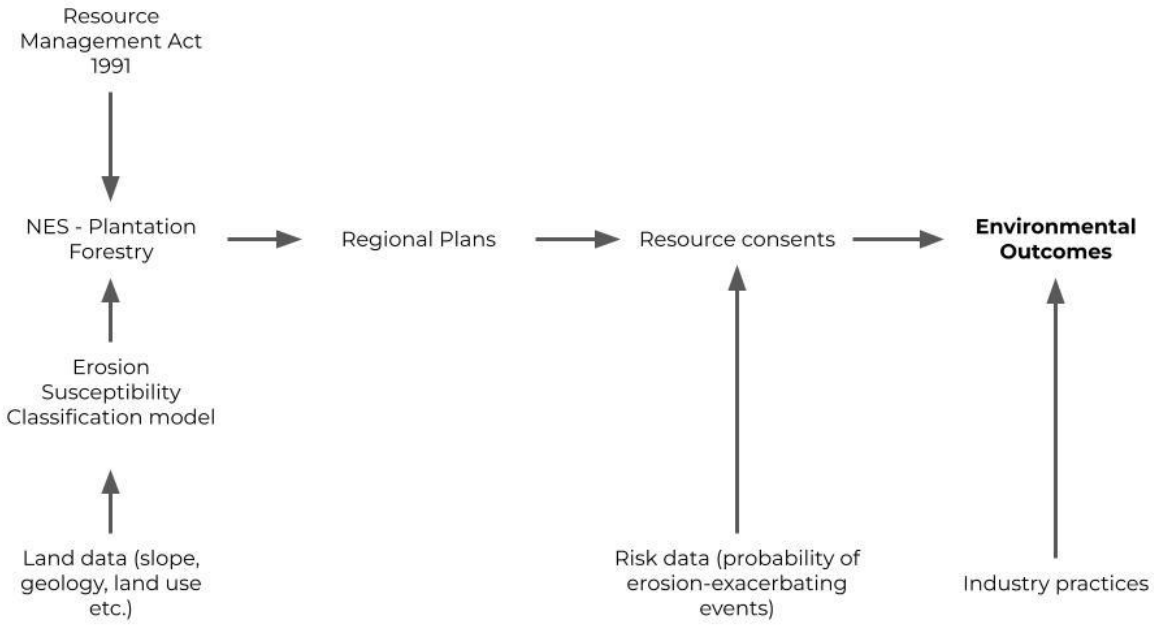


Figure 7. A simplified systems view of the components that contribute to environmental outcomes in the forestry sector.

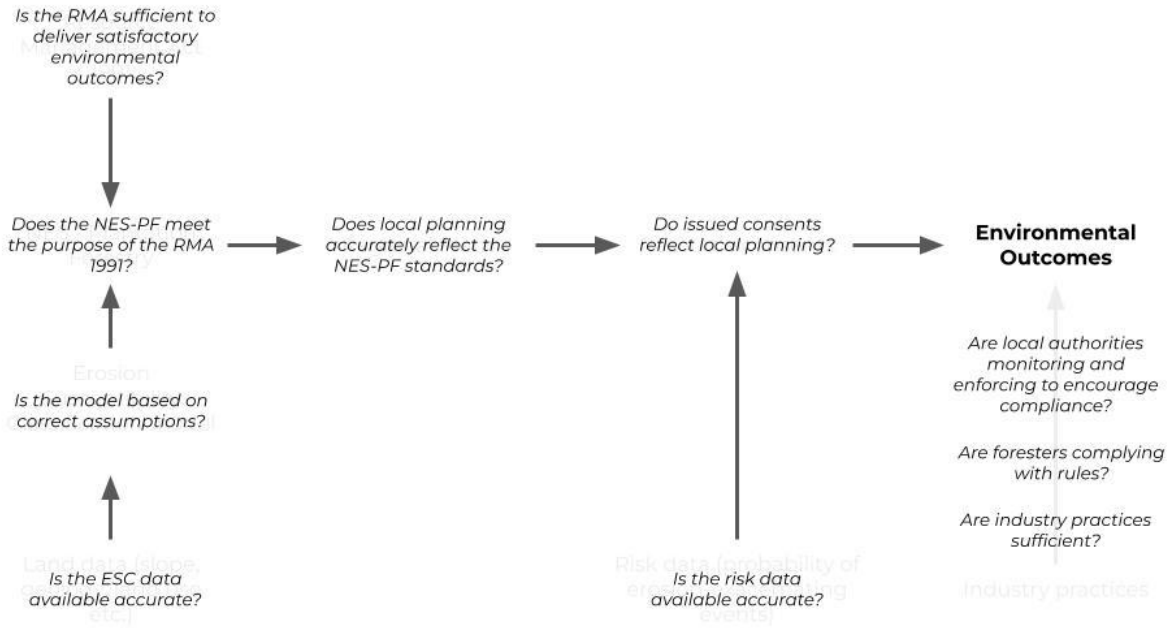


Figure 8. Key questions overlaying the system components that contribute to environmental outcomes in the forestry sector.

Is the RMA sufficient to deliver satisfactory environmental outcomes?

It's necessary to consider that the NES-PF may be consistent with the RMA, yet due to deficiencies in the RMA is not adequately managing our use of the environment. The resource management reforms underway since 2021 indicate government acknowledgement that the RMA is failing. The Resource Management Review Panel, chaired by Tony Randerson, was appointed by the Minister for the Environment to undertake a comprehensive review of the resource management system in New Zealand. Among other recommendations, the resulting 'Randerson Report' recommends that resource management reform:

- establish a stronger system of environmental limits that incorporates a safety buffer to manage risks and uncertainty;
- codify the precautionary principle, favouring protection where there is uncertainty about information but significant risk of irreversible harm; and
- make plan-making more efficient and responsive to change, so that it better accommodates the uncertainty associated with climate change adaptation[5].

These recommendations respond to the following observations made (particular to this kaupapa):

1. New Zealand's natural environment is under significant pressure: the way we use land and water has proved to be unsustainable for the natural environment. The quality of our freshwater,

[5] Randerson et al., 2020 (pg 29)

coastal and marine environments is in serious decline, and biodiversity is under significant threat.

2. An urgent need to reduce carbon emissions and adapt to climate change: the impacts of climate change are already affecting where people live and how we use our environment. Our land and resource use patterns need to change to mitigate and adapt to the effects of climate change and we need a resource management system that supports New Zealand's commitments to reduce greenhouse gas emissions.
3. The need to ensure that Māori have an effective role in the system, consistent with the principles of Te Tiriti o Waitangi: when it was enacted, the RMA was a significant step forward for Māori, offering opportunities for shared management of the environment. However, it has failed to live up to its promise, leaving Māori out of critical decision-making.
4. The need to improve system efficiency and effectiveness: significant criticisms of the RMA have been its increasing complexity, cost and delay caused by its processes, uncertainty, and lack of responsiveness to changing circumstances and demands.

The NES-PF may be inherently failing to deliver environmental outcomes because as a National Environmental Standard it is secondary legislation to legislation that is also failing.

Does the NES-PF meet the purpose and principles of the RMA 1991?

Cost-benefit analyses

In 2017 the Minister for the Environment presented a cabinet paper to the Cabinet Economic Growth and Infrastructure Committee. The cabinet paper stated that the policy objectives of the NES-PF are the most appropriate to achieve the purpose of the RMA and that there would be significant environmental benefits[6]. This statement mischaracterized the conclusions drawn in the section 32 report produced by NZIER which states only that the NES was found to be the most effective and certain option to deliver net environmental benefits. The report specifically stated under its 'effectiveness assessment' that NES-PF provisions will "maintain or improve environmental outcomes"[7] ie., there is uncertainty whether there will be environmental benefits beyond the status quo, and it is unsure to what degree they could be expressed. NZIER's 2016 analysis stated the difficulties inherent in costing environmental benefits in analysis, specifically that "in some cases, there is not enough information to understand what the magnitude of costs and benefits is, particularly on environmental issues."[8] Submitters to the 2015 consultation also picked up on this. The Forest and Bird Mercury Bay branch remarked that, "the environmental costs have been woefully under-studied and considered within the cost benefit analysis.[9]"

[6] Minister for the Environment, 2017a
[7] Ministry for Primary Industries, 2017b (pg 91)
[8] NZIER, 2016
[9] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups A-L (pg 109)

Environmental impacts

A considerable number of submissions to the 2015 consultation from environmental non-government organisations (NGOs) and some iwi expressed concern that the NES-PF was too permissive and would result in environmental damage:

- Submissions by Hikurangi Takiwa Trust and Te Papatipu O Uepohatu Charitable Trust (entities representing mana whenua in the Waiapu Valley near Ruatōrea) opposed the NES-PF on the grounds that it would relax regulation further and ultimately be devastating for the district – both in terms of the life of waterways and soil conservation.[10]
- ECO NZ argued that more consideration needed to be given for how the NES-PF meets the purpose and principles of the RMA. [11]
- The Fish & Game Council considered NES-PF 2015 draft rules, "do not ensure that adverse effects of plantation forestry activities including cumulative effects are avoided, remedied, or mitigated…"[12]
- The Forest and Bird Dunedin branch said it was too permissive, and remarked that the NES-PF was an activity-based approach to rule-setting, rather than effects-based as is the RMA generally.[13] The Marlborough Sounds Integrated Management Trust agrees.[14] MfE has since acknowledged under resource management reform analysis that sector-specific national direction such as the NES-PF, "may have been better addressed with consistent limits for sediment and earthworks regardless of the activity"[15].
- The Forest & Bird central branch considered that the designation of permitted activities removing certain forestry activities from the consenting process forgoed the benefits of enabling site-specific mitigation measures that can't be provided for in permitted activity standards. Further, permitted activities requiring management plans may be ineffective if councils have no power to require changes to them when they're deemed unsatisfactory.[16]
- The Forest and Bird Mercury Bay branch said "If forestry companies want the benefits of a standardised approach and to take away the opportunity for public input they must be able to show that it will actually achieve better outcomes for the environment."[17]
- Forest and Bird, and other environmental NGO submitters took issue with clear-felling, which the NES-PF allows as a permitted activity on all ESC zones albeit only 2,500 m^2/hectare.
- Multiple environmental organisations proposed specific rule changes they felt would enable the NES-PF to meet their expectations for environmental outcomes e.g., greater riparian setbacks and prohibited clearfelling.

[10] Hikurangi Takiwā Trust, 2015
[11] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups A-L (pg 22)
[12] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups A-L (pg 61)
[13] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups A-L (pg 74)
[14] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups M (pg 1)
[15] Ministry for the Environment, 2022 (p 193)
[16] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups N-Z (pg 48)
[17] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups A-L (pg 97)

- Arguments were made by a number of submitters for better recognition of the impacts of forestry activities on sensitive receiving environments such as freshwater bodies, estuaries, and the coastal marine area, and the species that inhabit them.
- Environmental NGO and iwi submitters generally supported consenting authorities to retain the ability to make more stringent rules than the NES-PF prescribed.

Building on their 2015 submission, the Environmental Defence Society (EDS) has lodged legal proceedings in the Environment Court seeking a declaration that the NES-PF breaches the RMA by permitting harvesting in orange (high-risk erodible) zones because this permission is inconsistent with the RMA's statutory purpose.[18]

A specific area of focus was the designation of forestry activities on orange class (high risk erodible) land as permitted activities. Hikurangi Takiwa Trust's 2015 submission, argued that Section 43 A (3) (b) of the RMA does not allow an NES to state that an activity is a permitted activity if it has significant adverse effects on the environment, and that afforestation and harvesting on 'high-risk erodible' land is such an activity. This argument was raised by other submitters including the (EDS and was raised again by GDC in 2022: "Due to the effects of clear-fell harvest, [deforestation] should be avoided on erosion prone land." Their general message was that the NES-PF was not fit for purpose in regions like Tairāwhiti.[19]. Mark Bloomberg - a senior academic within the School of Forestry at the University of Canterbury, and who has provided expert commentary on the aspects of the NES-PF throughout its development, contends that controlled activity status, "should be the default minimum for earthworks and clearfell harvesting on orange ESC land, as these activities may not meet the threshold for permitted activity status on land highly susceptible to erosion".[20]

Forestry operators

Forestry operators have expressed that regardless, they would prefer rules that restrict afforestation or replanting to equally restrict harvesting to avoid the possibility of investment in forestry where harvesting becomes prohibited. The Forest Owners Association (FOA) contend that criticisms of the NES-PF are precipitous given the NES-PF is only five years old. They consider the NES-PF could take a full plantation cycle (30 years) for full benefits to be realised.[21]

Under the RMA, decision-makers must balance competing priorities for resource use. These priorities are listed under sections 6-7 of the act identifying national and other matters of importance that must be recognised and provided for, or given particular regard to, respectively. Whether these matters have been balanced appropriately is a constant source of debate. What is clear from environmental NGO and

[18] Environmental Defence Society Incorporated, 2023
[19] Gisborne District Council, 2023b (attachment 2)
[20] Bloomberg, 2022
[21] Forest Owners Association, 2022

iwi/hapū submissions is that the NES-PF does not reflect their expectations for environmental outcomes from forestry.

Is the ESC model based on correct assumptions?

2015 consultation submitters raised concerns that the NES-PF would permit forestry activities on highly erosion prone land (the 'Orange Zone'), and increase the potential for significant adverse effects to arise from higher risk forestry activities (harvesting, earthworks, and mechanical land preparation) on this land."[22] Other key concerns with the ESC summarised in this report were:

- The ESC should incorporate the probability and impact of high intensity rainfall events and climate change;
- The ESC is focused on erosion susceptibility and does not address the 'downstream' risks of sediment, slash and debris delivery to receiving environments; and
- The reliance on the New Zealand Land Resource Inventory (NZLRI) to derive the ESC ratings does not adequately represent erosion susceptibility.[23]

Mark Bloomberg argues that the NES-PF and guidance documents do not adequately address problems with the scale and accuracy of mapping for the ESC and the need for landslide hazard mapping by qualified geoscience professionals.[24]

A 2023 memorandum by EDS to the Environment Court argues that ESC's methodology is flawed because it does not address site-specific effects of sediment erosion[25]. This argument may find less traction in the Environment Court given the NES-PF still requires harvesting activities to have a harvest plan in place for all ESC zones, and an additional erosion management plan in place for orange and red zones that respond to site-specific characteristics in order for harvesting to be considered a permitted activity. It should be noted however that Cabinet received advice in 2017 that these particular activities should be monitored by council, recognising that large scale or long-term environmental impacts could occur if the harvest and erosion management plans were not complied with.[26]

Is the ESC data available accurate?

The 2015 consultation summary or submissions and recommendations acknowledged submitters' views that the 1:50,000 scale of the ESC could significantly affect its accuracy to identify erosion risk features. For example, Fish & Game Council[27] and the Environment Institute of Australia and New Zealand Inc[28].

[22] Ministry for Primary Industries, 2017a
[23] Ministry for Primary Industries, 2017a
[24] Bloomberg, 2022
[25] Environmental Defence Society Incorporated, 2023
[26] Minister for the Environment, 2017a (para 35)
[27] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups N-Z (pg 10)
[28] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups N-Z (pg 15)

Robson 2013, Basher et al. 2015 note that the ESC has limitations related to the scale of mapping and misclassification of some land. Basher et al. 2015 consider this is best resolved through mapping at a more detailed scale. They provide an example:

> *Part of the difficulty with classifying some LUC units was their broad definition. For example, legend 00 LUC unit 7e9 includes areas of highly erodible Separation Point Granite, but it also includes areas of weathered schist and greywacke. The ESC for this LUC unit applies to the unit as a whole, even though some parts of it are more susceptible to erosion than others.*[29]

The EDS in its 2023 Environment Court proceedings has declared that the NES-PF breaches the RMA specifically because it relies on an ESC that in turn relies on elevation data at an unreliable scale (1:50,000). GDC in its 2022 submission on the NES-PF suggested "the LUC and red zone [classification system] is too coarse a measure to be helpful in Tairāwhiti. The LUC system is used to identify risk zones and is mapped at a 1:50,000[30].

Is the risk data available accurate?

The Wellington Recreational Marine Fishers Association was the only submitter in 2015 to recommend readjusting AEP to take into account climate change predictions in order to avoid or mitigate the effects of slash and debris movement. They argued that climate change has increased the depth and speed of depressions moving across the lower North Island dumping more water than perhaps the AEP model is able to predict.[31]

Are industry practices sufficient?

Forest Owners Association president Grant Dodson contends that tree planting remains the answer for stabilising erodible soils. Dodson also acknowledged the forestry industry needs to improve practices and have done so since the 2018 Tolaga Bay storm, however there is further improvement the industry can make to stay ahead of climate change and reduce slash discharge.[32] A report prepared for the Gisborne District Council of industry practices suggests that industry standards fall short, reporting that, "New Zealand has a number of documents that support best harvesting practices, but few collate, detail or set standards for minimising debris flow risk."[33]

A 2017 review by 4Sight Consulting on behalf of MPI to confirm the robustness of the 2017 NES-PF Exposure Draft restated Boffa Miskell's earlier evaluation[34] that the NES-PF "ensures (…) no significant residual effects arise from activities that are permitted". 4Sight Consulting concluded that Boffa Miskell's

[29] Basher, Lynn, and Page, 2015 (pg 11)
[30] Gisborne District Council, 2023b (attachment 2)
[31] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups N-Z (pg 113)
[32] Farmers Weekly, 2023
[33] Visser, Spinelli, & Brown, 2018
[34] Flynn, 2017

evaluation endured despite the exposure draft changes, but noted that "a significant assumption of that evaluation was consistent compliance with all of the rules, controls and conditions."[35] NZIER's 2016 economic analysis also pointed to the success of the NES-PF depending on the compliance of forestry operators.[36]

Are foresters complying with rules?

In 2018, GDC successfully prosecuted five forestry companies for poor forestry harvesting & management. Fines ranged from $124,700 to $379,500. In the wake of Cyclone Gabrielle GDC is extending its investigations.[37] The prosecutions are irrefutable evidence that regardless of whether the rules are fit for purpose, forestry companies have not regulated their practices sufficiently to comply with NES-PF rules.

In a 2021 review of the NES-PF, Te Uru Rākau concluded that, "further implementation support for councils and the forestry sector was required to lift performance and compliance", and better national data to, "allow the development and implementation of a nationally consistent compliance, monitoring, and enforcement framework."[38] Te Uru Rākau's conclusion provides further evidence that assigning permitted activity rules for forestry activities would inevitably fail if the positive environmental outcomes anticipated were dependent on implementation support that was not provided for. In their 2022 submission, GDC stressed their inability to recover costs associated with compliance and monitoring activities[39].

Are local authorities monitoring and enforcing to encourage compliance?

Te Uru Rākau's 2021 identification of a need for a nationally consistent compliance, monitoring, and enforcement framework suggests that some councils are not monitoring and enforcing activities sufficiently to encourage compliance by forestry operators. Indeed they note that, "where expectations of compliance activity are low and/or pressure to harvest is high, poor practice has been observed."[40]

The 2017 RMA amendment enabled local authorities to charge for monitoring of permitted activities. 12 out of 16 councils surveyed in 2018 stated they had a permitted activity monitoring programme in place

[35] 4Sight Consulting Limited, 2018
[36] NZIER, 2016
[37] NZ Herald, 2023
[38] Te Uru Rākau, 2020
[39] Gisborne District Council, 2023b (attachment 2)
[40] Te Uru Rākau, 2020 (pg 24)

for forestry. GDC at this time did not but stated that one was under development.[41] GDC's Chief Executive in 2022 said monitoring of forestry consent conditions had increased.[42]

The absence of full NES-PF compliance means that the question remains open whether the NES-PF could deliver positive environmental outcomes if implementation were appropriately resourced. Councils may have limited capacity and may have committed inadequate resources to properly monitor these sites.

Does local planning accurately reflect the NES-PF standards?

Te Uru Rākau's one-year review of NES-PF implementation reported that all regional and unitary councils had undertaken, or were in the process of undertaking, alignment of the major parts of their plans that deal with forestry. They noted that most district councils in a sample had not undertaken alignment, but that this would have less direct impact on resource users given forestry activities largely trigger regional versus district planning activities.[43] At least two reports in 2016 and 2017 highlighted the need for GDC to take a more proactive approach to forestry consent monitoring and compliance.[44] [45]

The MILU terms of reference notes that GDC has commenced a review of planning instruments to provide GDC and its community an opportunity to, "consider longer term land use changes to manage the effects of climate change and plantation forestry in the region, and achieve other environmental outcomes."[46]**Do issued consents reflect local planning?**
No formal review has been undertaken by GDC to determine whether the issuance of consents for forestry activities are consistent with planning rules. Generally however, the resource management reform policy development process has identified that plans and consenting don't adequately control for cumulative effects.[47] In the context of forestry, and in the absence of more stringent rules than the NES-PF being set in planning, multiple consents for erosion-inducing forestry activities could be granted in the same catchment and compound erosion risk and potential impacts.

[41] Brown, 2018 (p52)
[42] Gisborne District Council, 2022
[43] Te Uru Rākau, 2020 (pg 43)
[44] Phillips, Basher, & Marden, 2016
[45] Gisborne District Council, 2017
[46] Terms of Reference for the Ministerial Inquiry into Land Use. Retrieved from https://environment.govt.nz/assets/Terms-of-Reference-for-Ministerial-inquiry-v2.pdf
[47] Ministry for the Environment, 2022

Summary of 2017 changes in response to commentary

The ESC was revised in 2015 by Manaaki Whenua on behalf of MPI with the intention of identifying LUC units in the High and Very High ESC classes that were misclassified or conservatively classified, and update the ESC accordingly. The ESC was subsequently changed for approximately 16% of LUC units, and mostly involved in lowering the ESC classification (eg., from red to orange, or orange to yellow) predominantly within te Wai Pounamu[48]. While the ESC was revised, it was made more permissible, rather than more stringent.

In February 2017, an exposure draft of the NES-PF was tested with a group of technical experts made up of regional councils and a Stakeholder Working Group which largely consisted of forestry industry representatives.[49]

Additional public consultation was held in May-June 2017 on an additional NES-PF provision to explicitly state that councils can charge for permitted activities. This was received with mixed support by submitters[50] but was ultimately included in the final NES-PF.[51]

The 2017 Cabinet paper *Revised Policy Proposal for the National Environmental Standard for Plantation Forestry* summarises the revision made to the final NES-PF. Of relevance to the commentary reference in this report, flexibility was incorporated for councils to manage nationally important resource management issues and unique and sensitive receiving environments, and to create more stringent rules in planning than the NES-PF provides if deemed appropriate.[52]

In November 2022, MfE, MPI, and Te Uru Rākau – New Zealand Forest Service consulted on changes to the NES-PF.[53] The proposal features changes to slash provisions however these are largely changes in wording to improve clarification.

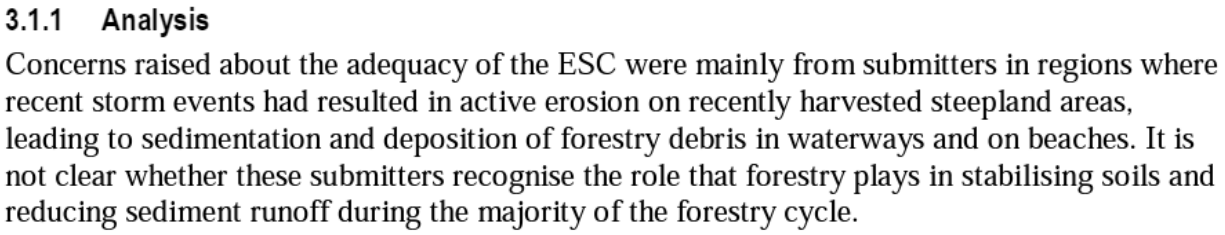
[48] Basher, Lynn, and Page, 2015
[49] Stakeholder Working Group members: Gisborne District Council, Upper Hutt City Council, Bay of Plenty Regional Council, Tasman District Council, Forest and Bird, Raukawa Trust, Farm Forestry Association, PF Olsen, Ernslaw One, Hancock Forest Management, Timberlands.
[50] Minister for the Environment, 2017a
[51] Minister for the Environment, 2017b
[52] Minister for the Environment, 2017b
[53] Ministry for Primary Industries, 2022b

Analysis

The Window of Vulnerability

In addition to public criticisms, it is the author's opinion that there is a key flawed assumption behind the NES-PF - that afforestation of plantation forestry intended for harvest is a solution to manage erosion on highly erodible land. The benefits of managing erosion from afforestation are lost and potentially exacerbated at the point of harvest, recognising that the erosion-reducing ability of plantation forestry is likely lost for significant periods of time in which annual exceedance events are likely to occur. Particular attention should be focussed on the environmental effects and duration of effects on the mass removal of canopy.

Experts place this "window of vulnerability" generally between six and seven and a half years after clearfell harvesting[54] [55]. While not referred to explicitly in 2015 submissions, Fish in Game in their submission alluded to it in their recommendation to shift the thresholds for activity status accordingly to the length of rotation for the species being considered ie., restricted discretionary for the replanting of species with a rotation cycle of less than 25 years[56]. Restricting the size of clearcut felling areas is a pragmatic way of mitigating some of the risk of erosion and slash movement. An official report indicates this window of vulnerability is perhaps not well understood by officials (see figure X)



3.1.1 Analysis

Concerns raised about the adequacy of the ESC were mainly from submitters in regions where recent storm events had resulted in active erosion on recently harvested steepland areas, leading to sedimentation and deposition of forestry debris in waterways and on beaches. It is not clear whether these submitters recognise the role that forestry plays in stabilising soils and reducing sediment runoff during the majority of the forestry cycle.

Figure X. MPI Officials commentary appears to minimise the contribution the "window of vulnerability" (typically 6 years) makes to erosion susceptibility during the forestry cycle (typically 30 years).

MPI-led versus MfE-led policy development

The author considers the leadership of the NES-PF by MPI versus MfE unlikely to have significantly impacted the direction of development of the NES-PF. Cabinet Ministers are collectively responsible for making final policy decisions, and the Minister for the Environment will have been briefed on the cabinet paper regarding the NES-PF by MfE officials particularly as it relates to the Minister for the Environment's Environment portfolio responsibilities. Cabinet authorised the Minister for the Environment and the

[54] Phillips, Marden, & Basher, 2018
[55] Watson, Phillips, & Marden, 1999
[56] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups N-Z (pg 11)

Associate Minister for Primary Industries to approve the final details of planning and control terms and conditions in the final NES-PF[57].
A far more significant determiner of NES-PF outcomes would be the Cabinet-agreed objectives for NES-PF development/review and/or the ruling Government's political priorities.
It should be noted however that the Dunedin branch of Forest & Bird in their 2015 submission stated that the NES-PF should be promulgated, administered and monitored by MfE. They opposed MPI being the government agency promoting, administering and monitoring the NES and considered this to be ultra vires (done without the appropriate authority) as it is the Minister with the responsibility for the RMA who has this power that cannot be delegated. [58]

Some commentators, including the EDS, claimed that the NES-PF was "ultra vires" - null and void because it was not produced by the proper authority - the Minister for the Environment. The Minister for the Environment is endowed by law with the function of recommending the making of national environmental standards to Cabinet under Part 4, section 24(b) of the RMA. While MPI may have led the development of the NES-PF, it was the Minister for the Environment who presented the recommendation to Cabinet. The RMA does not clearly state whether the development of an environmental standard can be led by another Minister's department.[59]

In the context of reform

The resource management reform policy programme announced in 2021 recognises that New Zealand's resource management system has not adequately protected the natural environment. Ecosystems have been degraded by poorly managed cumulative effects, biodiversity lost, and the response to climate change challenges has been slow.[60]

Many environmental and iwi submitters felt that the NES-PF should have been able to provide that environmental benefits would improve, rather than be maintained, perhaps acknowledging that existing environmental outcomes were considered unsatisfactory. The Natural and Built Environment Act exposure draft proposes to shift environmental outcomes from the RMA's "maintain or improve" to "protect, restore, or improve" e.g. figure X.

[57] Minister for the Environment, 2017a (para 27)
[58] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups A-L (page 76)
[59] The interpretation given here is solely the authors and does not constitute legal advice. Specific advice should be sought from qualified professionals before taking any action based on this information.
[60] Minister for the Environment, 2020

8 Environmental outcomes

To assist in achieving the purpose of the Act, the national planning framework and all plans must promote the following environmental outcomes:

(a) the quality of air, freshwater, coastal waters, estuaries, and soils is protected, restored, or improved:

Figure 9. Excerpt from Natural & Built Environment Act exposure draft demonstrating a strengthening of expectations for environmental outcomes away from the RMA's "maintain or improve".

National oversight of compliance, monitoring, and enforcement practices has been identified as a critical need to support the transition to the proposed new resource management system. New funding tools have also been identified as necessary to support the effective implementation of a more ambitious environmental management system.[61]

Comments on consultation process with iwi/hapū

Treaty analysis in the development of the original NES-PF appears to be completely absent. No mention of Treaty analysis or impacts were presented in the advice that went to Cabinet in 2017. Perhaps as a result of a lack of analysis, the level of engagement with iwi throughout NES-PF development was considered largely unsatisfactory by many iwi/hapū submitters,[62] and iwi/hapū environmental concerns were grouped under general commentary in the summary of submissions and recommendations.[63]

The resource management reform recognises that, "the more effective involvement of Māori in the RSS and NBA plans process will support the protection and resilience of taonga, wāhi tapu, marae and other important places from the effects of climate change and natural hazards".[64] The dedicated chapter defining Māori interests in forestry within the 2022 NES-PF consultation discussion document[65] suggests that officials are improving their understanding of Treaty rights and interests that intersect with NES-PF matters (see chapter 2, page 19). Future engagement with iwi/hapū/Māori on forestry management rules and regulations may continue to disappoint, but should hopefully improve over time.

[61] Ministry for the Environment, 2021b
[62] Ministry for Primary Industries. NES-PF Submissions: Iwi organisations A-M & Ministry for Primary Industries. NES-PF Submissions: Iwi organisations N-Z
[63] Ministry for Primary Industries, 2017a (pg 7)
[64] Ministry for the Environment, 2022 (pg 61)
[65] Ministry for Primary Industries, 2022b

Assessing erosion risk in the context of climate change.

Geomorphologists agree that where a weather event is severe enough, or part of a sustained weather pattern, no form of land cover will prevent slope failure.[66] It is therefore essential for proper risk management to be informed by accurate weather prediction.. Saunders and Glassey's 2007 *Guidelines for assessing planning, policy and consent requirements for landslide-prone land* identifies three components for assessing erosion risk:

1. Erosion susceptibility
2. Probability of erosion-triggering events
3. Consequences should erosion occur[67]

The NES-PF identifies erosion susceptibility via ESC, and the probability of erosion-triggering events via AEP. Experts suggest AEP thresholds (typically 5% for permitted activities) are insufficient and inaccurate. Mark Bloomberg asserts that the ESC will "never be a completely reliable predictor of risk", and that the ESC "should be backed up by a robust risk management process" to account for the consequences should erosion occur[68].

De Lange & Hibb (2000) argue that two assumptions underlying AEP - that annual exceedance events are randomly distributed, and do not change characteristics over time, are invalid. Climate change models predict an increasing frequency of high-intensity rainfall events for some parts of New Zealand[69]. This has been acknowledged by MPI in their one-year review of the NES-PF that intense storm events drive slash mobilisation, and more intense events are expected due to climate change[70]. Forest & Bird's 2015 submission stated their concern that, "no regard has been had to the effects of climate change in designing the calculators and setting the associated rules (within the NES-PF)".[71]

De Lange & Gibb (2000) argue that while this doesn't mean the application of AEP is always inappropriate, it could well be inappropriate when it is applied to developments with design lifetimes longer than a few decades. If AEP data is found to mischaracterise the risk and probability of annual exceedance events occurring due to climate change, then it may also be considered that the NES-PF is flawed in its reliance on AEP to assess erosion risk.

Perhaps the last piece of the puzzle beyond accurate rainfall data is, as Manaaki Whenua and Phillips et al. (2013) have suggested, improved quantitative and spatial data on landslide and debris flow occurrence to assist in better defining thresholds for triggering landslides and debris flows.[72] Laurence, Reisinger, Mullan & Jackson (2013) consider that a more nuanced, risk-based approach to flood

[66] Te Uru Rākau, 2020
[67] Saunders & Glassey, 2007
[68] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups N-Z (pg 51)
[69] NIWA, retrieved 23/03/23
[70] Te Uru Rākau, 2020
[71] Ministry for Primary Industries. NES-PF Submissions: NGOs and community groups N-Z (pg 42)
[72] Phillips, Basher, & Marden, 2013

frequency changes is needed to reflect climate change uncertainties.[73] Finer mapping down to 1:1,000 is available for most forestry areas in Tairāwhiti and can be provided on unmapped areas. This finer scale mapping would be much more accurate for determining where and where not to plant responsibly at the land-block scale..[74]

[73] Laurence, Reisinger, Mullan, & Jackson, 2013
[74] Gisborne District Council, 2023b (attachment 2)

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6 April 2023

Ministerial Inquiry into Land Use
Ministry for the Environment
PO Box 2526
Wellington
6140

Tena koutou,

Subject: Rau Tipu Rau Ora Submission.

Please find attached the submission from Rau Tipu Rau Ora (Tairawhiti regional leadership group). Our submission is complementary to the submissions provided by Rau Tipu Rau Ora members.

We appreciate the efforts that the Independent Inquiry Panel has made to conduct a robust, inclusive and future focused inquiry, notwithstanding the additional challenges of operating in regions that has been ravaged by severe weather events, culminating in Cyclones Hale and Gabrielle and engaging with whanau, hapu, iwi and communities that have been focused on survival, response, relief and now recovery.

We look forward to receiving a copy of your report and are optimistic about the considered, holistic and strategic direction it will provide, to assist us future proof the Coast, Turanga (urban and rural) and Wairoa, in respect to sustainable land use and management options, cognisant of the unique cultural and ecological, geological context of Tairawhiti.

Noho ora mai,

Amohaere Houkamau
Director
Rau Tipu Rau Ora- Tuara.

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Submission to the Ministerial Inquiry into Land Use

From Rau Tipu Rau Ora

by Amohaere Houkamau

6 April 2023

Background:

1. Rau Tipu Rau Ora

The Rau Tipu Rau Ora (RTRO) governance group was established in June 2020 to develop, lead, champion and oversee the preparation and implementation of the Tairawhiti COVID 19 Pandemic Response and Recovery Plan (Published June 2020.

Rau Tipu Rau Ora encourages and supports integrated planning, joined up actions and investment, that achieves collective impact across four priority focus areas; Economic, Environment, Whanau and Community and Workforce development.

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Rau Tipu Rau Ora seeks to leverage the skills, expertise, networks and leadership of its members and relationship with central government, to achieve optimum benefits for Tairawhiti whanau, communities, businesses, and workforce.

We note that we are in uncertain times, and still recovering from the aftermath of the Covid-19 pandemic and six severe weather events in the past 18 months, most notably Cyclone Gabrielle. Against this background, our current focus traverses four areas.[1]

SUPPORTING OUR WHĀNAU AND COMMUNITY	***GETTING OUR ECONOMY MOVING***
Our people must have confidence in their health, social and emergency services to cope with a repeat of the pandemic and the severe weather events that we are becoming only too familiar with, while maintaining core services and support for those in need. Our ongoing responses will build on services, partnerships and approaches that worked well during Alert Level 4; address key gaps in our services and support for those most affected by COVID-19, Cyclones Hale and Gabrielle and their impact; and increase local decision-making across health, emergency services and the social sector in support of Tairawhiti households, whanau and communities.	Stimulate our regional economy by delivering large scale capital works projects, injecting significant Government funding into our community. Targeting investment and support for our Tairawhiti businesses through enhanced procurement processes will enable the creation of further employment and training opportunities for local people. Opportunities for growth through the Recovery Plan will include a focus on meeting housing and infrastructure needs.
OUR ENVIRONMENT	***OUR WORKFORCE***
As part of our broader interests in managing and protecting our natural environment we unlock immediate opportunities for 'green' employment and training. This will include initiatives to sustain our local waterways and riparian lands, and endangered ecosystems. As well as those initiatives, we practice good kaitiakitanga (guardianship): which means improving biodiversity, fresh water and clean rivers, sustainable land use and management, and climate change adaptation and mitigation.	To improve our economic recovery and ensure our households and whanau have greater resilience against future disasters, emergencies, and shocks, we boost the opportunities for local training, qualifications, and jobs. We partner with industry and employers, iwi, tertiary education providers and Government, to include a strong focus on re-deployment. For large scale investments we focus on developing regional procurement guidelines to support workforce development with an emphasis on our local labour workforce and local industry and sector requirements. This is particularly important for locally funded public organisations.

These four focus areas underpin our approach to issues that concern our region, including any proposed recommendations that may emanate from the independent inquiry report.

2. Tairawhiti

The Tairawhiti region is around 8,265 square kilometres. Within this is about 228,000 hectares of whenua a whanau, a hapu, a iwi — 28% of the total land area in the region. Some of the key industries in the region include horticulture, agriculture, fishing, and forestry.

The region has experienced population growth over the past three years. Our population is now over 51,000 and continues to grow, putting added pressure on the natural and built environment, housing, and social services.

[1] As contained in the RTRO Covid-19 Pandemic Response and Recovery Plan 2020.

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Māori represent over half of Tairawhiti's population — 53% compared to 16.5% for New Zealand.[2] We also have a younger population than most other regions, and the over 65 age group is growing.

3. Our Regional Economy

Forestry, agriculture, fishing, and horticulture are some of the key industries in the region and major contributors to Tairawhiti's economy. Our GDP for the year ending March 2021 stood at $2.3 billion,[3] with forestry, agriculture, and fishing accounting for a significant proportion of the GDP.

The proportion of land use category (LUC) 7 and 8 in Te Tairawhiti, makes this region a target for afforestation. A sizeable chunk (about 17%) of Tairawhiti's landmass has been converted to forestry.[4] The region currently has a plantation resource of 155 359 hectares (ha), consisting primarily of radiata pine (150, 806 ha) and Douglas-fir (2, 090 ha of Douglas-fir).[5] However, distance to the Gisborne Port means the economics of exotic rotational forests are always "marginal" as a result of the high transport costs. For example, much of the forest north of Tokomaru Bay is infrequently economically viable for harvest – usually when log prices spike or if logs are grown through to later harvest at age 40 or more.

Tairawhiti is one of the largest forestry employers in the North Island with 10% of the workforce.[6] Therefore, changes to the forestry settings in the region will impact on a large proportion of the region's workforce with multiple socio-economic impacts. Hence our request to Hon Megan Wood to approve Tairawhiti as the next, JUST TRANSITION, priority area. Please note as Attachment 3, the letter to Hon Megan Woods.

The region is also exposed and vulnerable to climate risks and multiple natural hazards. Recent severe weather events, regional climate change projections by the New Zealand Institute of Water and Atmospheric Research (NIWA) show that climate change will adversely impact our natural and built environments. Manaaki Whenua Landcare Research states that climate change will adversely impact four key areas of Māori wellbeing. The areas include He Kura Taiao (living treasures), Whakatipu Rawa (Māori enterprise), He Oranga Tangata (healthy people), Ahurea Māori, and Tikanga Māori (Māori culture and practices).[7] Recognising the large Maori population and the extent of the tribal estates of the four Tairawhiti iwi, Ngati Porou, Te Aitanga a Mahaki, Rongowhakaata and Ngai Tamanuhiri, Tairawhiti will be disproportionately challenged by these impacts and will also be in a position to design and lead models and approaches that build on these pou, building blocks.

We support the Government general policy intent in responding effectively to climate change, building regional resilience, and supporting our people along the transition to a low-carbon future. This includes robust policy settings, investment, strongly positioned iwi

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[2] Iwi represented in Rau Tipu Rau Ora Membership are Ngati Porou, Ngai Tamanuhiri, Rongowhakaata and Te Aitanga-a-Mahaki. There are also approx. 100 hapu located throughout Tairawhiti.
[3] See New Zealand's Forestry Statistics by MPI here and particularly the Wood Availability Forecast – East Coast 2021.
[4] See the State of Our Environment Report 2020 here.
[5] See New Zealand's Forestry Statistics by MPI here and particularly the Wood Availability Forecast – East Coast 2021.

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and regional leadership, central and local government support and whanau, hapu, iwi, community participation.

7. Our Position on the Key Issues for Our Region

We are a Tairawhiti regional leadership body focused on all-encompassing regional development, but we do not claim to represent a unanimous voice of all the groups and interested parties in the region on this matter. As noted above, there are differences in views on sustainable land use and management in our region to reach a unified position on the matter and Rau Tipu Rau Ora does not purport to speak for all parties across our region. Our position reflects the overarching aspirations of the interested parties in the region regarding minimum benchmarks that Government must incorporate into planning and policy processes regarding, He kura Taiao (the regions living treasures), Whakatipu Rawa (for the people of the region, particularly those who maybe adversely impacted by any recommended changes), He Oranga tangata (the wellbeing and prosperity of Tairawhiti whanau, hapu, iwi and communities) and Ahurea a iwi and tikanga a iwi (the protection of the intrinsic as well as physical connections, relationships that the mana whenua of Tairawhiti have with the Taiao inclusive of whenua, wai, moana).

8. The science and potential disruptions

Science is clear about anthropogenic climate change, mitigation, and adaptation measures. We also understand the need to manage the use of exotic specifies for carbon offsets due to the social and environmental risks involved in such an approach.
Government should avoid any policy settings that foster the adoption of a monoculture of exotic species in the afforestation regime in the country.
Government needs to create policy settings and investment incentives to enable all viable sustainable land use and management practices to be considered, researched and explored. We believe there is a RIGHT TREE FOR THE RIGHT PLACE, EQUALLY THERE ARE PLACES WHERE TREES ARE NOT THE RIGHT OR BEST LAND USE OPTION.

9. Efficient land use through a mosaic approach

Based on the science and potential impacts already canvassed in previous consultations, the Government should enable a mosaic approach to land use management to achieve efficiencies and optimum benefits from various forestry species and other land uses.
In Tairawhiti, soil erosion is a major issue. Our region has more than 1,000km^2 of highly erodible lands, and has the highest proportion of its area classified as highly erodible land at risk of erosion.[8] Fast-growing exotic species are necessary to address this problem in specific sites. A mosaic approach to afforestation supports the planting of the right exotic trees to address this problem where they are needed.
The figures below provide a good illustration of a mosaic approach where different forest types exist in the region, and how they help to address the problem of erosion.

[8] See https://www.stats.govt.nz/indicators/highly-erodible-land.

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Mixed treatment of forest types (1)

Poplar and willow in gullies (planted several years prior to the plantation seedlings) and plantation seedlings, in this case Pinus radiata, is a highly successful erosion treatment utilising fast growing exotic species.

Mixed treatment of forest types (2)

This depicts an indigenous riparian component with Pinus radiata on the upper more stable slopes. The riparian area is stable with permanent cover and will protect the land upslope from soil erosion when this plantation area is harvested.

Therefore, we do not support a complete exclusion of either native or exotic species. Government needs to maintain some flexibility and allow the planting of the right tree in the right place. This can help us optimise multiple benefits from various trees. If Government adopts this approach, we can seek efficiencies through a hybrid regime that allows for growing various exotic and native species in accordance with sustainable land use and management practices.at suitable locations across Tairawhiti.

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10. Sustainability thinking with a long-term lens

Government must consider land use and management policy settings through a long-term sustainability lens. If Government chooses to exclude natives from the ETS, that will not be a long-term sustainable option because exotic species may yield quick short-term benefits (especially carbon sequestration benefits) but have constraints for the long-term horizon. Native species have longer-term environmental, biodiversity and emissions reduction benefits.

Government should take a holistic approach that considers equity concerns and socio-economic impact of any policy decision on land use management.

11. Flexibility for best future options

Government should allow flexible land use and management regimes that support feasible changes in the short, medium and long term to meet the aspirations of whanau, hapu, iwi, landowners and communities that depend on various land uses.

12. Intergenerational equity and welfare concerns

In Tairawhiti and several other regions, whanau, hapu and iwi, rely on revenue from different land uses and may not have readily accessible alternative sources of income and jobs. Any changes to land use and management settings that do not consider this circumstance will impact the wellbeing of current and future generations of whanau, hapu, and iwi.

As noted above, the forestry sector is a major employer of labour in our region and accounts for a significant proportion of our GDP. Climate policy objectives in afforestation policy settings must not be made at the expense of jobs, the cultural, wellbeing, and economic aspirations of our people.

The government must work closely with iwi and hapu, Māori landowners, forestry and agriculture business owners in Tairawhiti to better understand the wider economic implications of any sustainable land use and management decisions. This will be a good way to obtain social license from treaty partners and implement policy measures that promote the socio-economic and cultural aspirations of present and future generations of the mana whenua in Tairawhiti.

13. **Equity considerations for Whenua Māori**

In less than 8 generations since the signing of Te Tiriti, Māori have lost 95% of the land that makes up Aotearoa. Land confiscation since the arrival of European settlers has resulted in Māori being left ownership of marginal land that others did not want. This loss of productive land has negatively impacted on many generations' socio-economic status for iwi, hapu, and whanau. The Treaty Settlement process has not been able to restore significant parcels of land to whanau, hapu and/or iwi ownership and reverse the disparity in socio-economic status. The marginal land in whanau, hapu and iwi ownership is often classed as LUC 7 or 8. Māori comprise more than half the population of our region, and Government has and continues to make decisions that place Māori (whanau, hapu, iwi) at a considerable economic disadvantage and is evidenced by the Tairawhiti featuring regularly as one of the most socially and economically deprived regions in the country.

Here in Te Tairawhiti iwi, hapu, and whanau have lost, through confiscatory and discriminatory policies and practices, most of their best lands that have the most productive soils. There is 228,000 ha of whenua Māori in Tairawhiti, and it is predominantly

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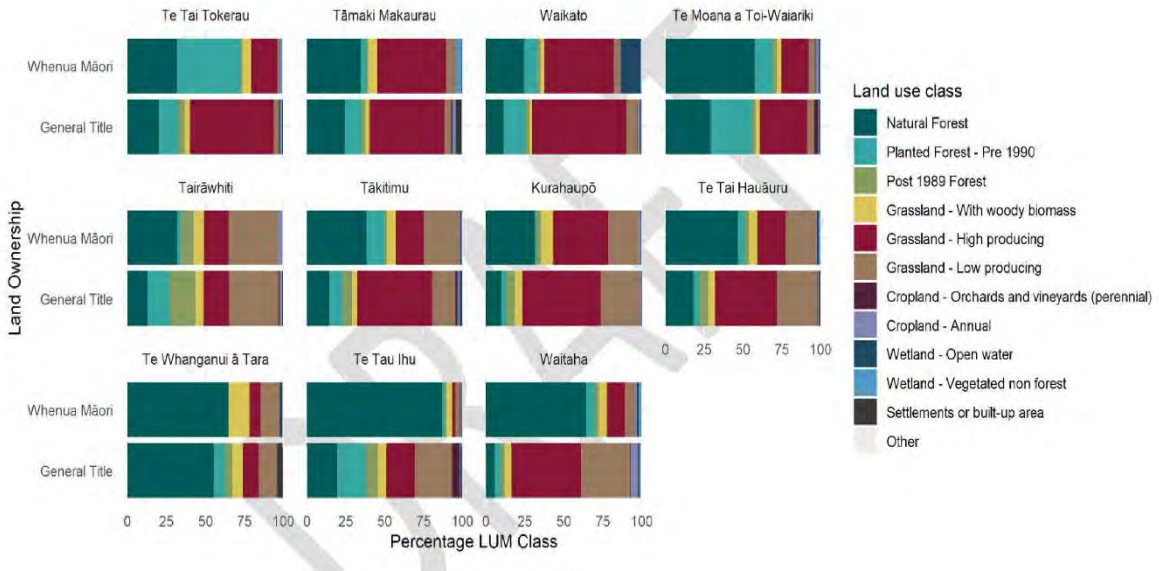
LUC 7 to 8, and situated more than 80 km from the Gisborne Port.
Tairawhiti iwi have invested heavily in forestry. Capital investment in forestry on whanau, hapu, iwi farms/lands in Tairawhiti increased by about 46% as at 2018 (MfE & Stats NZ, 2018). A significant proportion of this land is located on the East Coast. The removal of exotics from the permanent forestry category in the ETS will significantly impact forestry investment on whenua a iwi, a hapu, a whanau will create ripple impacts for current and future generations of iwi members. Without support to make other forest types financially viable, permanent exotic forests in remote areas where harvest is not economically or environmentally feasible are a means to provide income from whenua Māori.

Native forests are now recognised as being highly desirable for carbon sequestration. Today in Tairawhiti, whenua a whanau, a hapu a iwi has significantly more indigenous cover than General Title land. However, whanau, hapu and iwi were not granted Carbon Credits for their pre-1990 indigenous forests. Carbon credits were granted to those with pre-1990 planted exotic forests. The largest share of these credits went to the owners of General Title land rather than whenua Māori. This is because General Title land had more pre-1990 exotic forests than Whenua a whanau, a hapu, a iwi,

Figure 7. Fractional land cover by Rohe



Maori landowners have been subjected to a raft of barriers and criteria that has inhibited and restricted their ability to economically develop their land compared with non-Maori landowners who have general titles. Barriers created by mono-cultural legislative and fiscal policies and complex ownership structures and processes. Changes to national policy or regulatory settings have the potential to cause further barriers to the development and prospective revenues of whenua Māori

For Māori, land use decision-making is complex. This complexity is imposed by Te Ture Whenua Māori Act 1993. This Act is not well understood and imposes significant barriers to Māori trying to use their land for economic benefit. As well as imposing considerable bureaucracy, achieving the levels of support to be able to raise capital is more often than not a slow drawn-out process that often results in sub-optimal access to capital to enable business plans to be prepared and executed.

Government should create specific exemptions for whanau, hapu, iwi landowners and

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provide support to enable other land use and management practices to be financially viable on their whenua. Government needs to work closely with whanau, hapu, and iwi, to design other sustainable land use and management options and approaches to avoid inequities to the mana whenua of Tairawhiti.

With the right support, landowners and other interested groups/parties can decide on suitable uses for their whenua to derive multiple economic, environmental, biodiversity, and emission reduction benefits.

14. Partnership opportunity

Tairawhiti has a unique set of circumstances that make the area an ideal source for future sustainable land use and management case studies. For example, a high proportion of our population are Māori, our district has a significant proportion of whenua Māori, the exposure and vulnerability of our lands to erosion, and increasing levels of severe flooding and other adverse natural hazards. Some of these circumstances are exacerbated by climate change and under investment in regional infrastructure. There is an opportunity for the Government to partner with Tairawhiti to undertake whenua a whanau, a hapu, a iwi case studies across the region. These case studies could also highlight the potential impact(s) on our region's Treaty of Waitangi settlements and commitments already made by the Crown.

There are several climate-related pieces of work being progressed currently by the Government that will impact heavily on our region. Government assistance will be crucial in terms of regional partnership, funding, and technical support.

15. Te Tiriti o Waitangi Obligations

It is widely understood that any proposed changes to current policy settings will have significant impact on Tairawhiti whanau, hapu and iwi, who have interests in forests as rangatira, kaitiaki, land and forest owners, (both freehold and Treaty settlement), workers, and business owners.

In other areas of resource management, Government is prioritising building treaty-based partnership with Maori. For example, by 2023, there will be a requirement to 'give effect' to Te Tiriti when undertaking functions or duties under the Natural and Built Environments Act. Any proposed changes and recommendations emanating from this Independent Inquiry on sustainable land use and management needs to be consistent with this approach and uphold all current Te Tiriti o Waitangi obligations that the Crown has with Tairawhiti iwi.

Summary

Rau Tipu Rau Ora, actively supported the call for an independent review, focused on sustainable land use and management in Tairawhiti. We convened a meeting on 1 February at the request of Hon Kiritapu Allan, to enable Ministers, (Hons; Allan, Whaitiri, Nash and O'Connor to meet with representatives of iwi, the local council, landowners, forestry, agriculture, horticulture sectors and a member of the 'mana taiao' group, to discuss a way forward for Tairawhiti to address climate change, land use and infrastructure challenges and opportunities. The hui unanimously supported the call for an independent review, with a focus on sustainable land use and management.

RauTipu RauOra
Collaborating for Regional Impact

1st Floor, The Works Building,
41 The Esplanade, Inner Harbour,
Gisborne 4010

www.rtrotairawhiti.nz

We applaud the open and robust processes and systems you established to consult with whanau, hapu, iwi, landowners, industry sector representatives and other stakeholders, mindful of constrained timeframes, broken infrastructure that made it difficult to physically visit and engage with whanau in isolated communities on the East Coast, in Te Karaka and Wairoa.

Rau Tipu Rau Ora anticipates that any major changes to the forestry sector in the region will have significant social, economic, and environmental impacts. Regional leadership strongly believes that one opportunity for addressing these impacts would be for the Tairawhiti region to become the next Just Transition pilot region. The implementation of a regional, fit for purpose Just Transition plan will enable Tairawhiti to lead our own way as we transition our region into a low carbon future. We see this as one fundamental way we can adapt to and manage this transitionary period so that the outcomes are fair, inclusive and equitable across our region.

Current systems of land-use and engagement within Aotearoa follow a traditionally Western system of landscape domination and utilization, series of mono-culture systems that emphasizes economic production above cultural connection and identity, ecological integrity, and spiritual and physical wellbeing. We hope that the findings of your review provide some policy setting guidance for correcting the current imbalance, reinforced by programs and investments that are locally lead and supported centrally.

Toitu te whenua
Toitu te manawa o te Taiao
Toitu nga whanau, hapu, iwi,
Toitu te Tairawhiti

RauTipu RauOra

Rau Tipu Rau Ora Overview

March 2023

GISBORNE DISTRICT COUNCIL Te Kaunihera o Te Tairāwhiti

Te Whatu Ora Health New Zealand Tairāwhiti

TĀMANUHIRI

Trust Tairāwhiti Regional Wellbeing He Tohu Ora

Te Runanganui O Ngati Porou

Eastland Group

RONGOWHAKAATA

Our story so far

Rau Tipu Rau Ora is a collective of regional leadership groups committed to collaborating for positive impact in Tairawhiti.

The Rau Tipu Rau Ora Governance Group that heads this collective, initially established to champion and oversee the region's response and recovery from the COVID-pandemic.

Rau Tipu Rau Ora seeks to leverage the skills, expertise, networks and leadership of its membership and its relationship with central government, to achieve optimum benefits for our environment, whanau, communities, businesses and workforce.

Rau Tipu Rau Ora - Plan

- Our plan encapsulates our aims for our local economic recovery, supporting all our people, from our pēpi to our kaumātua, while making sure that we take the time to care for all those who are vulnerable to the health and social impacts of COVID-19.
- The plan brings together an initial set of priorities and actions that we will track, and report regular progress on, over the next three to four years.
- The Plan is a living document, and will be reshaped over time by the views, aims and new priorities of Tairāwhiti people, communities, hapu and iwi, businesses and partner agencies.
- The role of Rau Tipu Rau Ora extends beyond COVID, with an emphasis on building prosperity and wellbeing, and growing **regional capability and resilience** to deal with and **respond to future crises and opportunities**.

Our principles

Rau Tipu Rau Ora operates in an integrated manner, facilitating, encouraging and enabling best for region outcomes

Decision-making is based on consensus, and an ethos of best for Tairawhiti

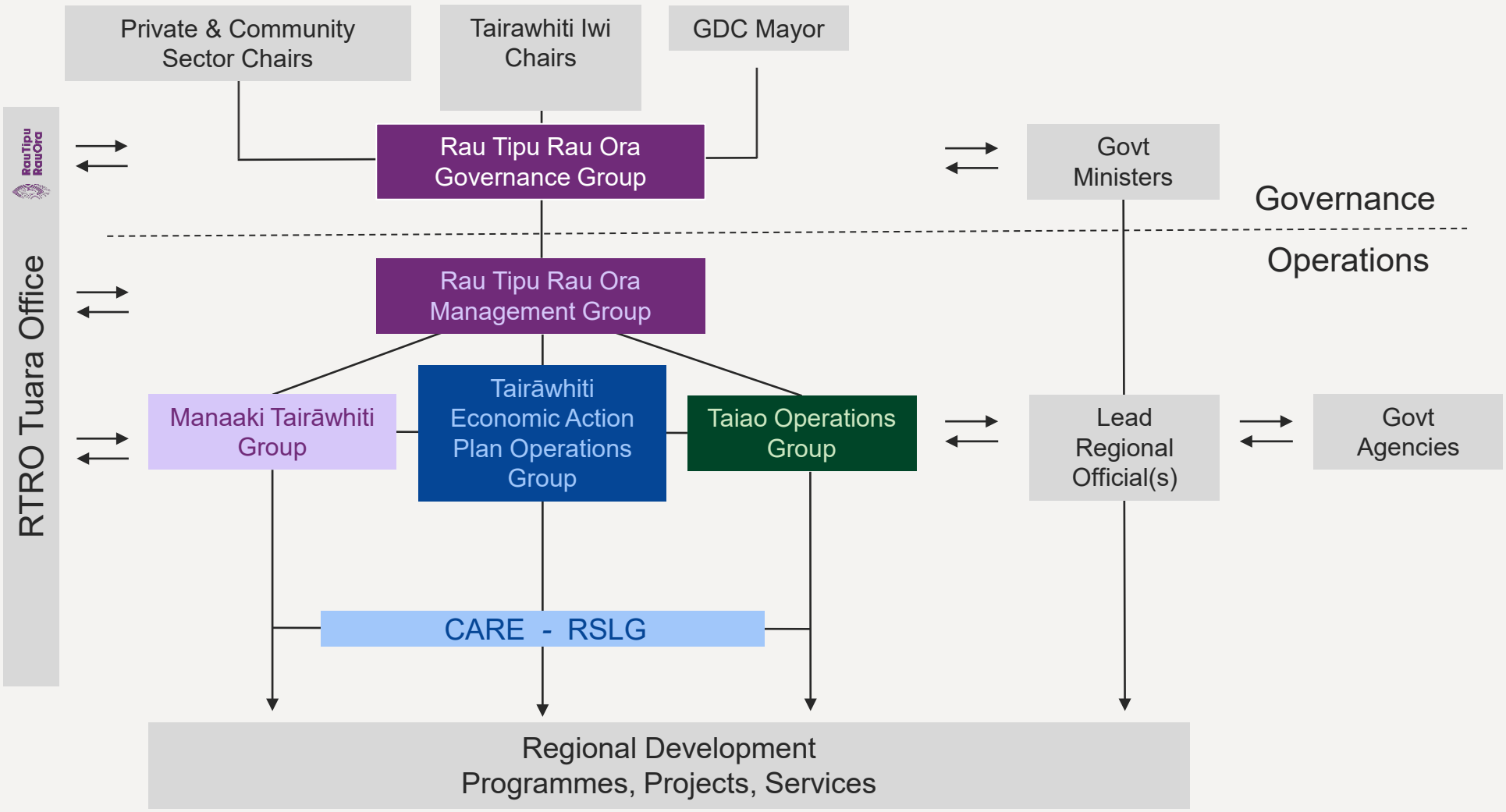
Information is shared (where not commercially sensitive) in an open and transparent manner

Working cooperatively.

Communicating the plan externally with one voice through the Co-chairs, or designated representative, when required.

Conflicts of interests to any existing or new projects are noted and managed accordingly.

Rau Tipu Rau Ora Framework



RTRO Governance & Operations

RauTipu RauOra

Governance

- Co-chair: Rehette Stoltz - Gisborne District Council (GDC)
- Co-chair: Selwyn Parata - Te Rūnanganui o Ngāti Porou (TRONPnui)
- Pene Brown – Te Aitanga a Mahaki Trust (TAAMT)
- Pauline Hill – Tamanuhiri Tutu Poroporo Trust (TTPT)
- John Clark – Trust Tairawhiti (TT)
- Matanuku Mahuika - Eastland Group Ltd (EGL)
- Hilton Collier -Te Pukenga- Tairawhiti (Tertiary Sector)
- Vacancy – Te Whatu Ora or IMPB (Health Sector)

Management

- Chair: George Reedy (TRONPnui)
- Nedine Thatcher-Swann (GDC)
- Gavin Murphy (TT)
- Ronald Nepe (Te Runanganui o Turanganui a Kiwa (TROTAK)
- Doug Jones (TTPT)
- Karen Bartlett – Regional Commissioner/ PSL - Ministry of Social Development (MSD)
- Teina Moetara - Rongowhakaata Iwi Trust (RIT)
- Ariana Roberts - Te Whatu Ora (TWO)
- Kemara Keelan - Te Puni Kōkiri (TPK)
- Tracey Tangihaere - Te Pukenga- Tairawhiti (EIT)
- Matt Todd - Eastland Group Ltd (EGL)

Our RTRO Collective

The RTRO collective includes four operational leadership groups driving transformation in the following areas:

1. Economic prosperity – Tairawhiti Economic Action Plan Operations Group (TEAP)
2. Social Sector Enhancement – Manaaki Tairawhiti
3. Environmental Regeneration – Te Roopu Taiao
4. Workforce Development – CARE RSLG (Regional Skills Leadership Group)

Steering Groups are established as required to work on agreed priorities including

1. Housing – Tairawhiti Regional Housing Strategy Steering Committee
   - Tairawhiti Housing Operational Groups

Our operational 'engine rooms' are aligned with the Rau Tipu Rau Ora vision for Tairawhiti, leading and supporting initiatives and work programmes in their respective spheres.

Operations Groups

Tairāwhiti Economic Action Plan (TEAP) Steering Group

- Ngāti Porou (TRONP)
- Co-Chair: Gavin Murphy - Trust Tairāwhiti
- Matt Todd - Eastland Group Ltd
- Philip Hope - Eastland Wood Council for the Forestry Sector
- Tracey Tangihaere Te Pukenga Tairawhiti (Tertiary Sector)
- Toby Williams - Federated Farmers
- Belinda Mackay & Damian Skinner - Gisborne Chamber of Commerce
- Jo Noble - Gisborne District Council
- Jeremy Raymond - Gisborne Holdings Limited
- Richard Burke - Leaderbrand
- Shannon Williams - Ministry of Business, Innovation and Employment (MBIE)
- Karen Bartlett - Ministry of Social Development (MSD)
- Teina Moetara - Rongowhakaata Iwi Trust
- Doug Jones - Tamanuhiri Tutu Poroporo Trust
- Kemara Keelan - Te Puni Kōkiri (TPK)
- Ronald Nepe - Te Runanga o Turanganui a Kiwa (TROTAK)
- Richard Searle - Trust Tairāwhiti

Manaaki Tairāwhiti

- Chair: Ronald Nepe – TROTAK
- Rehette Stoltz – Gisborne District Council
- Rewiti Ropiha – Turanga Health
- Lynsey Bartlett – Te Whatu Ora Tairawhiti
- Sam Aberahama - Police
- Leanne Forward – Corrections
- Daniel Murfitt - Ministry of Education
- Naomi Whitewood – Kainga Ora
- Julie Tangaere - Oranga Tamariki
- Gavin Murphy – Trust Tairāwhiti
- Kararaina Calcott Cribb – Maori Housing Unit / MHUD
- Karen Bartlett – Regional Commissioner / MSD

Te Roopu Taiao

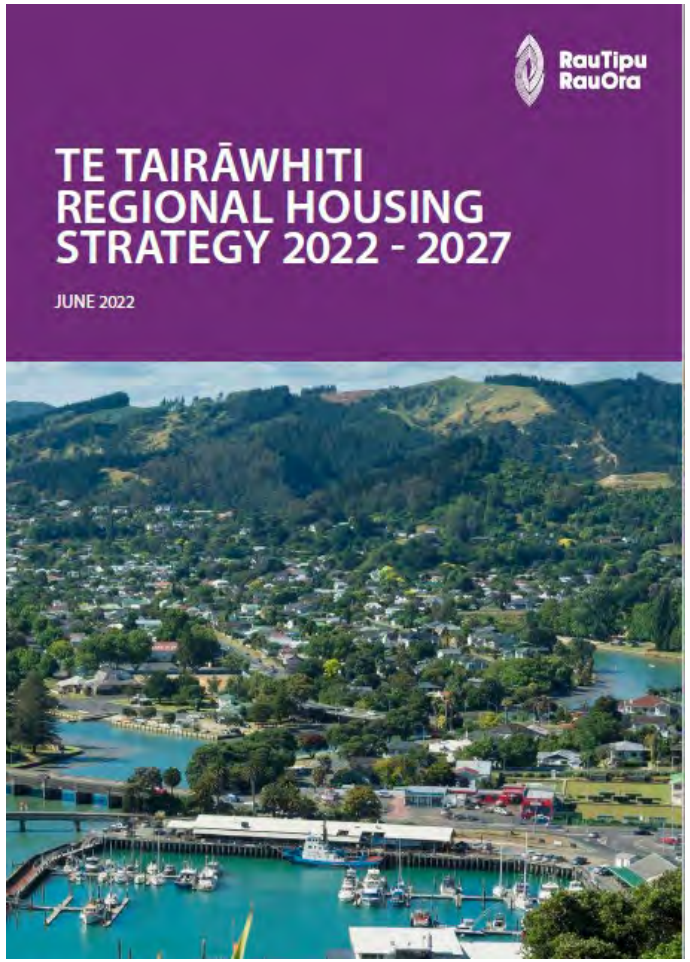
- Co-chair: Rena Kohere - Tairāwhiti Environmental Centre
- Co-chair: Doug Jones - Tāmanuhiri Tūtū Poroporo Trust
- Mahora Edwards & Sheree Smith - Department of Conservation (DOC)
- Michèle Frey - Gisborne District Council
- Mike Jones & Sarah Pohatu - Ministry for the Environment (MFE)
- Lyall Anania - Ministry of Business, Innovation and Employment (MBIE)
- William Wetere - Ministry of Primary Industries (MPI)
- Karen Bartlett - Ministry of Social Development (MSD)
- Annalena Atzwanger - Regional Commissioners Office
- Soraya Pohatu & Teina Moetara - Rongowhakaata Iwi Trust
- Meikura Williams - Te Aitanga a Mahaki
- Ronald Nepe - Te Runanga o Turanganui a Kiwa (TROTAK)
- Ngarangi Walker - Te Rūnanganui o Ngāti Porou (TRONP)
- Renee Raroa - Toha

Tairāwhiti CARE Regional Skills Leadership Group (RSLG)

- Co-chair: Alex Hawea - Iwi Representative
- Co-chair: Gavin Murphy - Trust Tairāwhiti
- Phill Claffey - Character Building
- Nigel Pollock - Downer Group NZ
- Daniel Williams - Eastland Wood Council
- Colleen Ryan - First Union
- James Baty - Gisborne District Council
- Karen Bartlett - Ministry of Social Development (MSD)
- Anna Holdsworth - Pultron Composites
- Teina Moetara - Rongowhakaata Iwi Trust
- Brae Kennedy - Matapuna Training Centre
- Doug Jones - Tāmanuhiri Tūtū Poroporo Trust
- Ronald Nepe - Te Runanga o Turanganui a Kiwa (TROTAK)
- Sonia McAllister - Thompson's Horticulture
- Richard Searle & Matt Cairns - Trust Tairāwhiti

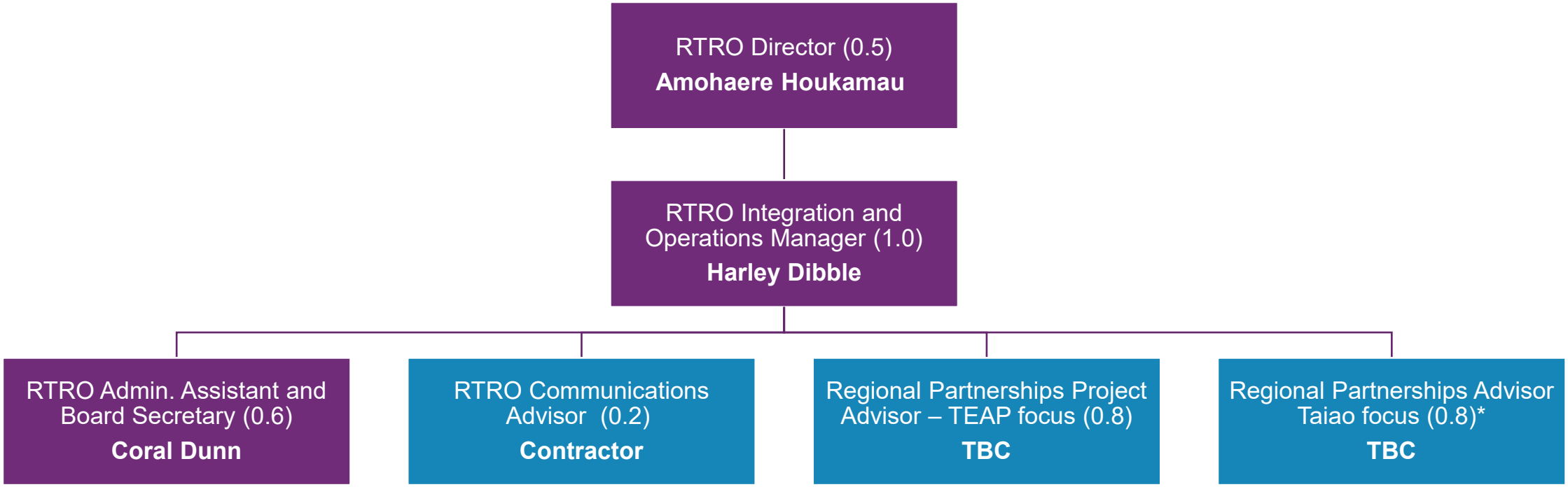
Housing Steering Committee (TRHSC)

- Chair: George Reedy - Te Rūnanganui o Ngāti Porou (TRONP)
- Nedine Thatcher-Swann & Jo Noble - Gisborne District Council
- Annette Wehi - Iwi Representative
- Naomi Whitewood - Kainga Ora
- Judy Campbell - Manaaki Tairāwhiti
- Dan Shenton - Ministry of Housing and Urban Development (HUD)
- Karen Bartlett - Ministry of Social Development (MSD)
- Teina Moetara - Rongowhakaata Iwi Trust
- Doug Jones - Tamanuhiri Tutu Poroporo Trust
- Shalom Haenga - Te Puni Kōkiri (TPK)
- Athena Emmerson-Kapa - Te Runanga o Turanganui a Kiwa (TROTAK)
- Gavin Murphy & Richard Searle - Trust Tairāwhiti



Rau Tipu Rau Ora leverages the skills, expertise, networks and leadership of its members and its relationship with central government, Iwi, the private and public sector.

Rau Tipu Rau Ora Tuara Office



Key:
= filled position
= vacancy

** = appointment pending
* = part funded by DOC until June 2023

Rau Tipu Rau Ora Priorities

1. Local **Workforce Development** aligned to forecast economic opportunities growth.

2. Increasing the supply of **Affordable Housing** for whanau in region.

3. Improved service and support to address **family harm** and (drug and alcohol) **addiction**.

4. **Te Mauri o Te Taiao**: restoring the vitality of our natural environment.

5. Improving our regional **economic infrastructure and technology with an emphasis on Climate Change – adaptation and mitigation and Just Transition**

RTRO Achievements

1. Rau Tipu Rau Ora Response and Recovery Plan - June 2020 Acknowledged as a blueprint for the country, particularly the partnership approach taken for recovery
2. Establishment of Te Roopu Taiao collective September 2021
3. Coordinated RTRO position statement on proposed changes to Emissions Trading Scheme, May 2022
4. Completed Tairawhiti Regional Housing Strategy 2022-2025
5. Agreed Shared priorities and work programme with the Public Services Lead/ Commissioner
6. Supported Jobs for Nature Regional Symposium December 2022
7. Addiction and Family Harm Situational Analysis completed Feb 2023
8. Coordinated RTRO / cross agency response to community petition for public inquiry into land-use and slash. Jan-Feb 2023
9. Negotiated service agreements with;
    a. MSD – Est and operate RTRO Tuara 2020- 2021
    b. DOC – Te Roopu Taiao 2021-2022
    c. HUD – Place Based Housing Coordination Feb 2023

Pivoting the Rau Tipu Rau Ora Group

What role should RTRO play in the Cyclone Hale & Gabrielle Recovery at;

- Governance Group level
- Management Group level
- Operating arms 'engine rooms'

Is the current structure fit for purpose in respect to the requirements of a Regional Cyclone Recovery entity?

- Strengths
- Weaknesses
- Opportunities
- Threats

Is the current membership fit for purpose and if not, what needs to change, what needs to improve?

What is the role of RTRO in terms of climate change mitigation and adaptation, regional resilience and future emergency responses and recovery?


Lifting the wellbeing and prosperity of whanau, businesses and communities in Tairāwhiti through collaborative action.

Tāne's Tree Trust
NATIVE FORESTS FOR OUR FUTURE
Hereherea te Wao-nui-a-Tāne

PO Box 12094, Hamilton 3248
office@tanestrees.org.nz
www.tanestrees.org.nz

Submission for

Ministerial Inquiry into Land Use in Te Tairāwhiti, Tūranganui-a-Kiwa and Te Wairoa

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Alternative forestry regimes for climate resilience

Native afforestation and continuous cover forestry systems

Submitted to

The Ministerial Inquiry Panel:
Hon Hekia Parata, Bill Bayfield, and Matthew McCloy
Email: landuse.inquiry@mfe.govt.nz

April 2023

Executive Summary

Alternative forestry regimes for climate resilience - Native afforestation and continuous cover forestry systems

Tane's Tree Trust is a nation-wide organisation with a vision to support landowners in successfully establishing and sustainably managing native forest, for all the benefits they provide. We have 701 members, including members within Tairawhiti and Wairoa regions. We are committed to scientific research as a base for best practice guidelines. Our resources are freely available to all. We have field trials throughout NZ, including project work in Tairawhiti and Hawke's Bay.

The Tairawhiti and Wairoa have a long, well documented history of severe hill country erosion and flooding. This is an area with highly erodible soils and steep topography. Gisborne District has 26% of its land susceptible to severe erosion, compared with 8% of land in New Zealand. However, the erosion has been made much worse by changes in land use, driven in good part by government policy.

The increased frequency and severity of major storm events due to climate change have exacerbated the problems. The enormous amount of sediment washed from the highly erodible soils on hill country farms, and forestry slash and sediment from recently clear-felled forestry sites appear to have caused most of the damage downstream.

However, underlying these issues is the extensive loss of native forest historically, and the current lack of exotic forests managed primarily for catchment protection - both factors driven by past government policy. There is a history of imbalance in land-use decision-making between those who benefit from short-term economic gains and those suffering the long-term impacts from the historical loss of permanent forest cover and the ecosystem services they provided.

The native forest cover that was historically destroyed in the steep hinterlands, **would likely have contributed billions of dollars in ecosystem services,** particularly in keeping vulnerable hillsides relatively stable, and reducing impacts to downstream communities, infrastructures, local economies, food production, and natural ecosystems. It would also have reduced the loss and trauma experienced by thousands of people impacted by extreme weather events such as the Esk Valley floods (historic and recent), and Cyclones Bola, Hale, and Gabrielle.

Past Governments funded forestry plantings, primarily for land stabilisation and catchment protection, such as the East Coast Forestry Project initiated in 1992 following Cyclone Bola. However, while the East Coast was still in post-Bola recovery mode, **the Forestry Corporation was sold off and catchment protection became subservient to timber production and market forces**.

In 1993, a Parliamentary Commission for the Environment report on progress towards sustainable land management in the Gisborne region, following Bola, stated that **though the cost of land use change is high, the cost of disaster relief is enormous** - *"Immediately after the Bola storm, Government disaster relief totalled $111 million. Money spent on disaster prevention is money well spent."*

Clear-fell regimes of radiata-pine leave a vulnerable period of approximately 6 years, during which time there is a risk of erosion in high-intensity rain events. So, attempts at amelioration of some of the erosion (by planting commercial forests) have themselves caused problems, particularly with the mobilization of forestry slash and the damage that this has caused to infrastructure, communities, other businesses, and the environment.

Harvesting of forest plantations should be staggered in a mosaic pattern to avoid large land areas being denuded of forest cover and becoming vulnerable to erosion in extreme weather events. This has been done in other regions, but Gisborne District Council failed to do this when the post-Bola forest plantations reached rotation age, but had the capability to do this via consenting processes.

There is a wealth of published research quantifying the role of forests – exotic plantations and permanent native forest and shrubland – in reducing erosion on steepland erodible soils, much of which is based on data from Tairawhiti.

Multi-age, multi-species, permanent native forests are more likely to be resilient to the impacts of climate change.

New Zealand urgently needs alternative forestry regimes for climate resilience, managed primarily for ecosystem services and the public good. However, landowners need revenue for forest cover on their land (whether exotic or native). Apart from carbon, there are few opportunities for those establishing permanent native forest cover to realise any ecosystem service benefits that this would provide, as **most benefits accrue to the wider community** – locally, regionally, and nationally, but **particularly those downstream**.

Central and local governments must work together to right past wrongs and, in liaison with stakeholders (particularly tangata whenua), **urgently develop models to incentivise sustainable land use**, for the benefit of all.

Tane's Tree Trust would like to see solutions that will improve climate resilience and protect communities, livelihoods, and natural ecosystems. We are committed to supporting landowners, community and iwi groups in restoring and protecting native forest in this region and elsewhere.

Forests need to not only be environmentally sustainable, they also need to be socially and culturally beneficial to contribute to sustainable development.

Tane's Tree Trust would like to see tangata whenua have a major leadership role in healing the whenua. There are already ecological restoration and conservation programmes in the regions that have been very successful in not only environmental gains, but also in positive outcomes for local people. There are already engaged and trained workforces through programmes such as Jobs for Nature, which only have a limited period of funding. We would like to see the funding extended for these groups, particularly in light of the recent destruction and the need for restoring natural ecosystems, which will improve climate resilience.

The problem is – **How do we value the extremely important non-market forest ecosystem services** within our current economic systems and frameworks, which fail to value natural capital in land-use decision-making, and in doing so, short change future generations?

The models urgently need to be developed to incentivise native afforestation and reward landowners for the provision of environmental and cultural services, for the benefit of all.

Tane's Tree Trust's recommended solutions include:

- A more comprehensive review of land use, with a timeframe long enough to fully analyse the damage on the ground, identify the contributing causes, undertake adequate stakeholder consultation, and analyse the data and identify workable long-term solutions to mitigate erosion risks and downstream impacts from future extreme weather events in this region.
- First consider wider landscape land-use options and potential mosaic of land use – native and exotic forestry species, ongoing pasture, etc., to match sites.

- We see a significant role and opportunity to integrate native forestry into the landscape, as part of a mosaic-like landscape pattern of vegetation types and multi-purpose land management. This is likely to take a diverse range of forms and include different weightings and balances of management objectives, depending on the characteristics of each site and stakeholder priorities.
- Multi-purpose, inter-generational, and locally integrated, land-use and land management plans are needed, which are site-specific and also recognise the many ecosystem services that native forests provide.
- There is 'no one size fits all', as there is a wide range of sites, stakeholder requirements, and management concepts involved, including planting native species, natural regeneration, assisted natural regeneration, sustainable indigenous forestry, CCF, carbon farming, transitional forestry, and exotic/native mixes.
- Specific solutions for native forest establishment, from a TTT perspective, are provided in APPENDIX 2. In short, this includes reducing the cost of planting, working with nature (i.e., assisted natural regeneration), pest browser and bird predator control, seed islands and enrichment planting, use of existing cover of brush weeds as a nurse, selective weed control, ongoing monitoring and an adaptive management approach.

Finally, TTT recommends the following land use scenarios:
- most vulnerable hill country transitioned into permanent native forestry;
- continuous cover forestry (CCF) considered as an option on some sites;
- exotic forest transitioned to native forest on these vulnerable sites, based on science and demonstrated best practice (currently being researched and developed by TTT and partners);
- ongoing exotic forest production where appropriate, with appropriate safeguards, e.g., generous riparian buffers, strict controls on clear-felling, management of slash, etc.;
- alternative exotic forestry, e.g., redwoods on lower slopes, valley floors, and river flats (which is covered in other submission, e.g., NZ Farm Forestry Association);
- ongoing pastoral grazing on slopes with a low risk of erosion;
- appropriate catchment protection upstream of horticultural land and communities; and
- strategic placement of green firebreaks of low flammability native species.

Successful, cost-effective, large-scale establishment of native forest will depend on working with nature, i.e., **assisted natural regeneration, plus complementary planting where needed**, e.g., seed islands. Integration with supportive economic drivers is essential, i.e., investment, markets, industries, and incentives.

There is an urgent need for financial incentives to bridge the gap between native trees becoming established and increasing their growth rate sufficient to earn enough carbon credits to reward landowners. Ongoing monitoring and an adaptive management approach are recommended as all forests need active ongoing management.

We must start now but recognise that there are knowledge gaps and a need for an adaptive management approach - to help inform and refine site-specific forest/land management plans, and cater for stakeholder requirements. Ongoing applied research programmes are needed to help counter the knowledge gaps and development of appropriate management practices.

There will be **job opportunities**, including highly-skilled forest managers and workers. There is a need for training and continuing professional development programmes in alternative forestry regimes, **but funding is needed to make this happen**. There is support for this within the plantation forestry industry.

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Details of Submitter – Tāne's Tree Trust

- **Tāne's Tree Trust (TTT) was established in 2000**, with the vision to support landowners in successfully establishing and sustainably managing native forest, for all the benefits they provide – https://www.tanestrees.org.nz/
- Our resources are freely available to all – https://www.tanestrees.org.nz/resources/
- We currently have 701 TTT members, including members in Tairawhiti and Hawkes Bay.
- **We have ongoing project work in Tairawhiti and Hawkes Bay** with collaborative partners.
- We are amongst those best informed and most experienced at native forestry in NZ.
- **We are a nation-wide organisation** with 13 trustees who have expertise in forest science, forestry management, ecological restoration, ecology, genetics, tree physiology, economics, policy, carbon sequestration, farm forestry, landscape architecture, kaitiakitanga, rongoa, Wai 262, conservation, natural resource management, sustainable land use and water quality.
- We are researching a range of options to **cost-effectively establish native forest at landscape scale**, including assisted natural regeneration and use of seed islands.
- **We are committed to scientific research** as a base for best practice guidelines.
- **Our Annual Report details our comprehensive research & development programme** – https://www.tanestrees.org.nz/site/assets/files/1037/ttt_annual_report_2022.pdf
- **We are highly qualified and experienced** – eight trustees have postgrad qualifications, including three doctorates. Between us, we have 43 years of experience in government organisations, 55 years in university academia, 68 years in CRI research positions, 70+ years in technical roles and private consulting, and 100+ years in professional forestry management.
- **We manage NZ's largest national database** on planted natives with over 60 different native tree and shrub species measured throughout NZ from over 100 stands, age 5 to over 100 years old.
- **We have field trials throughout NZ** that underpin our databases and development of resources.
- **We recently developed an online Native Forest Toolkit** https://toolkit.tanestrees.org.nz/ - which is a suite of calculators designed for those planting and managing native trees to meet multiple objectives from environmental restoration to sustainable production. It draws on scientifically robust data from **TTT's Indigenous Plantation Database** to provide farmers, iwi, environmental NGOs, foresters, community groups and individuals with realistic expectations for their plantings.
- **The Toolkit** includes a Planting & Budgeting Calculator, a Growth and Yield Calculator, an Economics Calculator (which includes non-timber values), and a Carbon Calculator.
- **The Carbon Calculator:** https://www.tanestrees.org.nz/resource-centre/carbon-calculator/?highlight=carbon+calculator is for planted native forest. TTT data shows that the Look-up tables significantly underestimate C sequestration in planted, managed native forest – https://pureadvantage.org/carbon-sequestration-by-native-forest-setting-the-record-straight/
- **We are currently developing a fact sheets series**, to assist those establishing and managing native forest to meet multiple objectives. These will soon be uploaded to our website.
- **We hold workshops throughout NZ,** including in Tairawhiti and Hawkes Bay.
- **We co-hosted (with Pure Advantage) a conference at Te Papa**, Wellington, in October 2022 – *O Tatou Ngāhere – Regenerating our landscape with native forest.* Over 1,000 people attended, breaking records for a forestry conference in New Zealand
- **We have expertise in and are proponents of continuous cover forestry:** https://www.tanestrees.org.nz/site/assets/files/1069/continous_cover_forestry_-_web.pdf
- We are advocates for **continuous cover forestry (CCF) regimes** as opposed to clear-fell regimes.
- **We convene the Northland Tōtara Working Group** and facilitate research into the sustainable management of this naturally regenerating native forest resource.
- Some of our trustees have worked across forestry with indigenous species and exotic plantation species. Several trustees have hands-on experience in sustainable indigenous forestry management via CCF regimes, under part 3A of the Forests Act.

We are happy to provide further information and are best contacted via office@tanestrees.org.nz

The Issues & Causal Factors

Frequent and high-intensity storms, exacerbated by a lingering La Nina cycle and climate change, and vulnerabilities in existing land uses, culminated in the highly damaging floods during Cyclones Hale and Gabrielle in February 2023. High levels of erosion, silt deposition, and forestry slash and other woody debris caused extensive damage to downstream infrastructures and communities in the Tairawhiti and Wairoa regions.

The underlying factors contributing to the recent devastation include:

- the highly erodible soil types;
- steep topography;
- historical deforestation;
- 'blanket' land uses that are ill-suited to the fragile environment;
- failure to manage forestry harvesting patterns to mitigate the well-recognised, 6-year period of vulnerability between harvest, and sufficient canopy closure of the new crop; and
- more frequent and extreme weather events due to climate change.

The region has geology and soils that are naturally highly erodible, but this natural erosion is made worse through the historical clearance of native forest[1].

In hindsight, we can now see the value of the native forest cover that was destroyed to create extensive pastoral land. **It would likely have contributed billions of dollars in ecosystem services,** particularly in keeping vulnerable hillsides relatively stable, and reducing impacts to downstream communities, infrastructures, local economies, food production, and natural ecosystems (from mountains to the sea). It would also have reduced the loss and trauma experienced by thousands of people impacted by extreme weather events such as the Esk Valley floods (historic and recent), and Cyclones Bola, Hale, and Gabrielle.

Unfortunately, many forest ecosystem services are not fully appreciated until the forests are damaged or destroyed.

Rural production land uses in New Zealand are heavily influenced by global primary produce markets and investment. These tend to encourage and support broad-scale, mono-functional land management activities (e.g., extensive areas of pastoral farming and production plantation forestry), that are not necessarily functionally well when integrated into their local landscape settings and contexts – ecologically, culturally, or socially.

Moreover, **extensive single-purpose land use is often at odds with the complex nature and diversity of the landscape**, even within each property's boundaries. Subtle variations in soil types, topography, aspect, and natural and cultural features, systems, and values, all bring unique combinations of issues, restraints, risks, and opportunities. Therefore, appropriate land management needs to be responsive to these variations right down to a micro-site level. This approach generally results in a rich, diverse, 'mosaic-like' landscape pattern, as opposed to 'blanket-like' single-purpose land uses. We contend that the latter, whether as part of a pastoral or forestry system, is also a shortcoming that has contributed to the recent problems experienced in the region and beyond.

The devastation in Tairawhiti and Wairoa was predictable. There is a wealth of research on land use and erosion in this region and elsewhere, as discussed below. Poor land-use decisions, often driven by ill-conceived policy and poor application of regulations, are contributing factors.

[1] https://soils.landcareresearch.co.nz/topics/soil-quality/state-of-nz-soils/

A Messy Land-Use History - Government Must Right Past Wrongs

Underlying the issues faced in Tairawhiti and Wairoa (and elsewhere) is the extensive loss of native forest historically, and more recently, the lack of exotic forest managed primarily for the public good - both **driven by past government policy**.

Therefore, does Government not have an obligation to subsidise land use change that will improve climate resilience, and protect natural ecosystems, downstream communities, and livelihoods?

In the late 1800s and throughout the 1900s, government policy supported an agriculturalist economy. **Clearing of virgin forest was encouraged to create pastoral farmland; this included erodible hill country**.

Concerns were raised about erosion and flooding from the early 1900s. In April 1938, prolonged heavy rain over 3 days caused severe flooding in Hawke's Bay and Gisborne[2]. Most roads suffered damage from slips or flooding. Esk Valley was the hardest hit, with most homes and farmland flooded and buried in silt.

Large-scale afforestation efforts to protect erosion-prone land and catchments in the region started with the planting by the NZ Forest Service, of Mangatu Forest from 1949 to 1969, which was hailed as a success in erosion control[3].

A pivotal report on the management of erosion-prone lands, the 'Taylor Report'[4], was released in 1970, after a Government initiated investigation into repeated severe erosion, flooding and sedimentation events in the Tairawhiti region, which was impacting a "large section of the rural community". A key recommendation was that 140,000 ha of pastoral hill country was deemed unsuitable for farming and should be afforested for soil conservation and catchment protection, and the benefits would "accrue to all sections of the community and to the nation".

However, counter to this, **in the 1970s and early 1980s, government subsidies resulted in agricultural development being pushed into marginal, erosion-prone land** where it would otherwise be uneconomical[5].

All too quickly, it became apparent that erosion and sedimentation were a widespread problem on this marginal land, resulting in **further planting of exotic forests from 1980 onwards**[6]. Various Government schemes provided incentives for afforestation of vulnerable, highly erodible land (Land-Use Classes 6 to 8).

The NZ Forest Service was disbanded and the forests were placed into commercial crown-owned entities.

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[2] https://hwe.niwa.co.nz/event/April_1938_Gisborne_and_Hawkes_Bay_Flooding

[3] Olsen (1970). Mangatu: A production forest with major protection value. NZ Journal of Forestry 15(2) 169-183. http://nzjf.org.nz/free_issues/NZJF15_2_1970/AF80D9D6-DA72-4CD7-BF25-CC07D390FA45.pdf

[4] Taylor NH comp. 1970. Wise land use & community development, report of Technical Committee of Inquiry into the problems of the Poverty Bay–East Cape District of New Zealand. Wellington, Water and Soil Division, Ministry of Works for the National Water and Soil Conservation Organisation.

[5] MPI (2017). New Zealand Agriculture. A policy perspective. https://www.mpi.govt.nz/dmsdocument/27282-New-Zealand-Agriculture

[6] Marden et al. (1991). Declining soil loss with increasing age of plantation forests in the Uawa Catchment, East Coast Region, North Island, New Zealand. Pp. 358–361 in: Henriques P, editor. *Proceedings of the International Conference on Sustainable Land Management*, Napier, New Zealand.

Extensive and severe erosion and flooding caused by Cyclone Bola was a further warning that many existing land uses were not sustainable[7]. Aerial imagery showed that pasture and young plantations (under 5 years old) suffered eight times more erosion than mature native forest and established pine plantations[8]. Regenerating scrub and young pine forest aged 6- to 8-years-old provided an intermediate level of protection[9].

The government subsequently funded further forestry plantings, primarily for land stabilisation and catchment protection, such as the East Coast Forestry Project initiated in 1992. This was later expanded to allow for a mix of commercial exotic forest plantings and natural forest regeneration[10].

However, attempts at amelioration of some of the erosion by planting commercial forests, have themselves caused problems, particularly with the mobilization of forestry slash and the damage that this has caused to infrastructure, other businesses and the environment.

In 1993, a Parliamentary Commission for the Environment (PCE) report on progress towards sustainable land management in the Gisborne region, following Bola, gave a mixed review[11]. Concern was raised about the risks associated with clear-fell harvesting on highly erosion-prone land.

The PCE stated that though the cost of land-use change is high, the cost of disaster relief is enormous.

> *"Immediately after the Bola storm, Government disaster relief totalled $111 million. Money spent on disaster prevention is money well spent."*

While the East Coast was still in post-Bola recovery mode, **the Forestry Corporation was sold off and catchment protection became subservient to timber production and market forces**. The east coast forestry plantations are currently owned by multiple forestry companies, and many are in remote, difficult-to-access areas, and therefore, economically marginal for forestry production. When these plantations reached rotation age, they were clear-felled when log prices were high to maximise financial returns.

Harvesting of these stands should have been staggered in a mosaic pattern to avoid large land areas being denuded of forest cover and, therefore, becoming vulnerable to extreme weather events – as has been done in other regions. **Gisborne District Council** (district and regional authority for Tairawhiti) **could have ensured this through consenting processes, but failed to do so.**

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[7] PCE (1993). Water and soil resource management on the East Coast: A review of progress towards sustainable land management in the Gisborne region following the Bola storm in 1988. https://pce.parliament.nz/publications/archive/1997-2006/water-and-soil-resource-management-on-the-east-coast-a-review-of-progress-towards-sustainable-land-management-in-the-gisborne-region-following-the-bola-storm-in-1988/

[8] Phillips et al (1989). Planning for forestry after Cyclone Bola - a comment. *NZ Journal of Forestry 34*(3) 16-17. http://nzjf.org.nz/free_issues/NZJF34_3_1989/C016AE54-9E84-4544-B2B1-CC8BBE67C7A3.pdf

[9] Marden and Rowan (1993). Protective value of vegetation on tertiary terrain before and during Cyclone Bola, East Coast, North Island, New Zealand. *New Zealand Journal of Forestry Science 23*(3): 255-263. https://www.scionresearch.com/__data/assets/pdf_file/0017/17702/NZJFS2331993MARDON255_263.pdf

[10] MPI (2014). East Coast Forestry Project. Proposed Changes to the Operation of the Scheme. Options for improving the East Coast Forestry Project. https://www.mpi.govt.nz/dmsdocument/3519/direct

[11] PCE (1993). Water and soil resource management on the East Coast: A review of progress towards sustainable land management in the Gisborne region following the Bola storm in 1988. https://pce.parliament.nz/publications/archive/1997-2006/water-and-soil-resource-management-on-the-east-coast-a-review-of-progress-towards-sustainable-land-management-in-the-gisborne-region-following-the-bola-storm-in-1988/

In summary, **the underlying issues contributing to the extent of cyclone damage** in the Tairawhiti and Wairoa region **are poor land-use decisions and the strong dichotomies in land management** in New Zealand between conservation and production, and indigenous and exotic ecosystems[12].

This is particularly evident in forestry, and **it limits the realisation of the wider value of forests (native and exotic) in our rural working landscapes and urban areas**, and their importance for land stabilisation, biodiversity, climate adaptation, water quality, and human well-being.

There is a strong dichotomy between clear-fell systems on one side, and retirement to native forest on the other – with nothing much in between, other than a very small minority of brave practitioners of continuous cover forestry (CCF) systems. This polarised dichotomy has largely been driven by short-sighted, black-and-white policy initiatives from previous New Zealand governments. It has stymied diversification, and therefore climate resilience, in forestry land use in New Zealand.

[12] Parliamentary Commissioner for the Environment (PCE) (2002). Weaving Resilience into our Working Lands: recommendations for the future roles of native plants. Parliamentary Commissioner for the Environment, Wellington. ISBN 1–877274–05–4. https://www.pce.parliament.nz/media/pdfs/weaving_pdf.pdf

Impact on Mana Whenua & Possible Opportunities

Tane's Tree Trust is concerned about the impact of the extreme weather events on tangata whenua, and the potential increase in inequities in communities within the region. We are also aware of the determination of the Tairawhiti and Wairoa communities to restore their landscape and their way of life.

In many parts of New Zealand, including the Tairawhiti and Wairoa Districts, **Maori historically have had to adjust to the loss of large areas of native forest, culturally significant flora and fauna, traditional food sources, and traditional ways of life**, which has negatively impacted on cultural values and well-being[13]. Environmental damage causes loss of cultural values such as access to natural resources, including traditional food gathering, fibre for traditional weaving and wood for carving, and Rongoa Maori medicinal plant resources and practices.

Looking at the aerial imagery of the devastated areas, it is disturbing to see not only the high number of large landslips, particularly on pastoral hill country, but also the massively gouged out riparian areas, the sediment-clogged waterways and the brown plumes of sediment fanning out into coastal waters. This will have **huge long-term effects on mahinga kai and kaimoana**. Possibly even local extinction of key species.

There will also be long-term impacts on local businesses and employment.

TTT would like to see tangata whenua have a major leadership role in healing the whenua. There are already ecological restoration and conservation programmes in the regions that have been highly successful in not only environmental gains, but also giving positive outcomes for local people.

An example is the extensive restoration project funded by Job's for Nature and led by Whanau-a-Apanui and Ngati Porou for the whole of the Raukumara Range. We know that Graeme Atkins is concerned that the people who they have trained need work once the Jobs for Nature programmes are finished – he is anxious that the work continues as they are seeing good results and they don't want to lose an engaged and trained workforce.

In all the nightmare of devastation, there may be opportunities for ecological restoration work, and people gaining skills and employment, as well as stronger connections to the land. **There may also be opportunities for iwi groups to become involved in regenerative forestry** projects such as working with nature to help with forest regeneration. This could include establishing seed sources of key native forest species that are locally extinct or scarce, controlling browsers, reducing the impact of bird and seed predation by stoats, rats and possums, and possibly developing industries involving alternative forestry regimes – permanent forests, either unharvested or continuous cover forestry (CCF) regimes with native or exotic species.

Potentially, Tane's Tree Trust could help with many of these aspects.

Not only does forestry management need to be environmentally sustainable - it also needs to be socially and culturally beneficial to contribute to sustainable development[2].

'Ka ora te whenua, ka ora te tāngata – When the land is well we are well'.

[13] Aimers, J., Bergin, D., Horgan, G. (2021). Review of non-timber values in sustainably-managed native forest in New Zealand. Tāne's Tree Trust bulletin, Hamilton, New Zealand. 119 pages. https://www.tanestrees.org.nz/site/assets/files/1099/non_timber_values_in_native_forests_-_web.pdf

Land Use, Soil Stability, and Catchment Protection

Stabilisation of slopes and the subsequent catchment protection provided by forests is a key ecosystem service in New Zealand because many regions are vulnerable to erosion due to their geology and relatively high frequency of extreme weather events[2]. Tairawhiti and Wairoa are well recognised for their history of severe erosion, which has been made worse through the historical clearance of native forest[14].

Hill country erosion was estimated to cost New Zealand $100-150 million per year in 2014 (NZ $124-186 million in 2022-dollar values)[15] due to lost production, damage to infrastructure and sedimentation. **Gisborne District has 26% of its land susceptible to severe erosion,** compared with 8% of land in New Zealand[16].

Enormous amounts of topsoil have been lost due to erosion where there has been clearance of native forest and conversion to agriculture in unstable hill country[17,18]. This has led to loss of topsoil, negatively impacting agricultural productivity, and causing damage to infrastructure and sedimentation of streams, rivers and harbours, which has affected water quality and caused loss of biodiversity in freshwater and estuarine ecosystems[3,19].

Also, **denuded hillsides shed more water during intense rainfall events, leading to greater flood events downstream,** damaging communities, infrastructure and freshwater, estuarine and marine ecosystems[20,21].

A report prepared for the Hawke's Bay Regional Council quantified **ecosystem services lost** from grazed pasture following a heavy rainstorm in 2011 that caused landslides and soil erosion from hill slopes along a 250 km coastal zone in Hawke's Bay[22]. The cost-benefit analysis showed that planting trees was not profitable unless the trees were harvested for timber, and low discount rates (less than 5%) were used. However, **when considering the value of the extra provision of ecosystem services**

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[14] https://soils.landcareresearch.co.nz/topics/soil-quality/state-of-nz-soils/

[15] MPI (2015). *Sustainable management of New Zealand's forests.* New Zealand's third country report on the Montreal process criteria and indicators: https://www.teururakau.govt.nz/te-uru-rakau-forestry-new-zealand/about-te-uru-rakau/our-work-and-partnerships/montreal-process/

[16] MPI (2014). East Coast Forestry Project. Proposed Changes to the Operation of the Scheme. Options for improving the East Coast Forestry Project. https://www.mpi.govt.nz/dmsdocument/3519/direct

[17] Ausseil, A.G.E., Dymond, J.R., Kirschbaum, M.U.F., et al. (2013). Assessment of multiple ecosystem services in New Zealand at the catchment scale. *Environmental Modelling and Software,* 43: 37 – 48. http://dx.doi.org/10.1016/j.envsoft.2013.01.006

[18] Basher, L.R. (2013). Erosion processes and their control in New Zealand. Pp 363 - 374 *in* Dymond, R. (ed.) *Ecosystem services in New Zealand: Conditions and trends.* Manaaki Whenua Press, Lincoln, NZ. http://www.mwpress.co.nz/__data/assets/pdf_file/0004/77053/2_7_Basher.pdf

[19] Gluckman, P. (2017). *New Zealand's fresh waters: Values, state, trends and human impacts.* Office of the PM's Chief Science Advisor. http://www.pmcsa.org.nz/wp-content/uploads/PMCSA-Freshwater-Report.pdf

[20] Duncan, M.J., & Woods, R.A., (2013). Water regulation. Pp 460 - 473 *in* Dymond, J.R. (editor) *Ecosystem Services in New Zealand: Conditions and Trends.* Manaaki Whenua Press, Lincoln, NZ. http://www.mwpress.co.nz/__data/assets/pdf_file/0020/77060/2_14_Duncan.pdf

[21] Awatere, S., Marden, M., Warmenhoven, T., Pohatu, P., Daigneault, A., Monge, J., Dowling, L., & Harrison, D. (2018). *Climate resilient Māori land*. Contract Report: LC3133 Manaaki Whenua – Landcare Research. https://deepsouthchallenge.co.nz/wp-content/uploads/2021/02/Climate-Resilient-Maori-Land-Technical-Report-Final-Pipiri-2018.pdf

[22] Dominati, E., & MacKay, A. (2013). *An ecosystem services approach to the cost of soil erosion and value of soil conservation RE500/2013/086*. Prepared for the Hawke's Bay Regional Council by AgResearch Limited; Palmerston North. https://envirolink.govt.nz/assets/Envirolink/1259-HBRC175-An-ecosystem-services-approach-to-the-cost-of-soil-erosion-and-value-of-soil-conservation.pdf

(largely avoided erosion) the Net Present Value of the investment in planting trees was strongly positive, regardless of the discount rate.

It is estimated that NZ$300 million a year (in 2022-dollar values) could be saved through avoided erosion if another 2.9 million hectares of forests were to be planted[23].

Unfortunately, in Tairawhiti, historical attempts at reducing erosion (by planting commercial forests) have themselves caused problems, particularly with the mobilisation of forestry slash and the damage that this has caused to infrastructure, other businesses and the environment. Observations on the impact from the recent extreme weather events in the region indicate that sediment lost from hill country farms, and forestry slash and sediment from forestry sites that were clear-felled in recent years, appear to have caused the most of the damage downstream.

A wealth of research has identified that **clear-fell regimes of radiata-pine have a vulnerable period of approximately 6 years** between the decaying of root systems of the logged crop and the new crop becoming established, **during which time there is a risk of erosion in high-intensity rain events**[24,25]

This is a concern, because almost one-quarter of New Zealand's plantation forest estate is on erosion-prone land, i.e., high to very high erosion susceptibility classification[26,27].

Social license to operate (community acceptance) has become a significant issue regarding clear-fell regimes and exotic plantation forestry[28].

Riparian buffers can help limit the negative impact of harvesting operations[29,30]. However, massively gouged out riparian areas are evident in aerial imagery in a few catchments, after Cyclones Hale and Gabrielle, where riparian plantings have disappeared and would likely have contributed to the woody debris that caused issues downstream. Nevertheless, riparian buffers probably helped limit the negative impact of harvesting and mobilisation of slash and silt in many other catchments.

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[23] Yao, R.T; Harrison, D.R. & Harnett, M. (2017). The broader benefits provided by New Zealand's planted forests. *New Zealand Journal of Forestry* 61(4) 7–15. http://www.nzjf.org.nz/free_issues/NZJF61_4_2017/140A070B-042D-4f0f-9DED-CD8915E14A17.pdf

[24] Bergin, D.O., Kimberley, M.O., & Marden, M. (1995). Protective value of regenerating tea tree stands on erosion-prone hill country, East Coast, North Island, New Zealand. New Zealand Journal of Forestry Science, 25 (1), 3-19. https://www.scionresearch.com/__data/assets/pdf_file/0004/59638/NZJFS2511995BERGIN3-19.pdf

[25] Bloomberg, M., Cairns, E., Du, D., Palmer, H., & Perry, C. (2019). Alternatives to clear felling for harvesting of radiata pine plantations on erosion-susceptible land. NZ Journal of Forestry 64(3), 33–39. http://www.nzjf.org.nz/free_issues/NZJF64_3_2019/5D9ABDDD-40ED-494f-BE1F-BE5BE4AF5A64.pdf

[26] Bloomberg, M., Cairns, E., Du, D., Palmer, H., & Perry, C. (2019). Alternatives to clear felling for harvesting of radiata pine plantations on erosion-susceptible land. NZ Journal of Forestry 64(3), 33–39. http://www.nzjf.org.nz/free_issues/NZJF64_3_2019/5D9ABDDD-40ED-494f-BE1F-BE5BE4AF5A64.pdf

[27] Te Uru Rākau (2019). *Erosion Susceptibility Classification by class & area of plantation forestry (excluding Department of Conservation Land)*: https://www.agriculture.govt.nz/dmsdocument/29804/direct

[28] Bayne, K.; Edwards, P. & Payn, T. (2019). Media coverage of recent New Zealand storm events. New Zealand Journal of Forestry, 64(1), 17–25. https://www.nzjf.org.nz/free_issues/NZJF64_1_2019/50AC3E90-9D43-48c9-A469-E41E00B26F7E.pdf

[29] MPI (2015). *Sustainable management of New Zealand's forests.* New Zealand's third country report on the Montreal process criteria and indicators: https://www.teururakau.govt.nz/te-uru-rakau-forestry-new-zealand/about-te-uru-rakau/our-work-and-partnerships/montreal-process/

[30] Gluckman, P. (2017). *New Zealand's fresh waters: Values, state, trends and human impacts.* Office of the PM's Chief Science Advisor. http://www.pmcsa.org.nz/wp-content/uploads/PMCSA-Freshwater-Report.pdf

Permanent unharvested forests, or forests managed under continuous cover regimes[31], **provide significantly better maintenance of soil cover and catchment protection**, compared with plantation forests managed under clear-fell regimes[32].

A study of land slipping was undertaken on the highly erodible, steep hill country on the East Coast, in the aftermath of Cyclone Bola[33]. **It compared pasture to areas reverting to native shrubland** of different ages. Landslide damage showed a rapid and highly significant reduction against increasing age of reverting manuka/kanuka shrubland. Compared to pasture, there was a 65% reduction in shallow slipping of hillsides in reverting shrubland by age 10 years; and **a 90% reduction by age 20 years**. Other studies indicate that radiata-pine forest provides similar protection from landslide damage as reverting native shrubland, within 10 years of establishment on steep hill country. However, there is a vulnerable period of approximately 6 years post-harvest, as described above.

A review of erosion processes and control in New Zealand concluded that a **closed-canopy of tall woody vegetation typically reduces landslides in large storms by an estimated 70 – 90%**[34].

Patterson and Cole (2013)[35] cite Cyclone Bola as a good example of an erosion event occurring on land once protected by native forest. For just that one event, the economic cost of losing this ecosystem service of erosion control (due to deforestation) was estimated at NZ$225 million (in 2022-dollar values). Early indications are that the economic cost due to damage caused by Cyclones Hale and Gabrielle is much greater than that documented for Cyclone Bola.

Griffiths et al. (2020)[36] developed a spatial model for landslides that occurred during a period of heavy rain from ex-tropical Cyclone Gita. They used the model to demonstrate that landslide occurrence in the Tasman District, could be substantially reduced by limiting the clear-fell harvest of plantation forests and increasing the extent of permanent forest cover on landslide-prone slopes.

Yao and Velarde (2014)[37] used NZeem® to estimate avoided erosion values in exotic production forest and native forest in Ōhiwa catchment, eastern Bay of Plenty. They calculated the aggregated economic value of avoided erosion and sedimentation, and flood mitigation, by using economic data

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[31] Barton, I.L. (2008). Continuous cover forestry: A handbook for the management of New Zealand forests. Tāne's Tree Trust, Pukekohe. 104 p. https://www.tanestrees.org.nz/site/assets/files/1069/continous_cover_forestry_web.pdf

[32] Aimers, J., Bergin, D., Horgan, G. (2021). Review of non-timber values in sustainably-managed native forest in New Zealand. Tāne's Tree Trust bulletin, Hamilton, New Zealand. 119 pages. https://www.tanestrees.org.nz/site/assets/files/1099/non_timber_values_in_native_forests_-_web.pdf

[33] Bergin, D.O., Kimberley, M.O., & Marden, M. (1995). Protective value of regenerating tea tree stands on erosion-prone hill country, East Coast, North Island, New Zealand. *New Zealand Journal of Forestry Science, 25* (1), 3-19. https://www.scionresearch.com/__data/assets/pdf_file/0004/59638/NZJFS2511995BERGIN3-19.pdf

[34] Basher, L.R. (2013). Erosion processes and their control in New Zealand. Pp 363 - 374 *in* Dymond, R. (ed.) *Ecosystem services in New Zealand: Conditions and trends.* Manaaki Whenua Press, Lincoln, NZ. http://www.mwpress.co.nz/__data/assets/pdf_file/0004/77053/2_7_Basher.pdf

[35] Patterson, M.G., & Cole, A.O. (2013). Total economic value of New Zealand's land-based ecosystems and their services. Pp. 496 - 510 *in* Dymond, R (ed.) *Ecosystem services in New Zealand: Conditions and trends.* Manaaki Whenua Press, Lincoln, New Zealand. https://www.landcareresearch.co.nz/publications/ecosystem-services-in-new-zealand/

[36] Griffiths, J.W.; Lukens, C.E. & May, R. (2020). Increased forest cover and limits on clear-felling could substantially reduce landslide occurrence in Tasman, New Zealand. *New Zealand Journal of Forestry Science 50*(13) 1-13. https://doi.org/10.33494/nzjfs502020x94x

[37] Yao, R.T. & Velarde, S.J. (2014). *Ecosystem Services in the Ōhiwa Catchment*. A commissioned report submitted to the Bay of Plenty Regional Council, New Zealand. ISBN: 978-0-478-11033-3: https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP203660/Yao-and-Verlarde-2014-ecosystem-services-in-the-ohiwa-catchment.pdf

based on avoided expenditure costs, derived from discussions with local government staff. The value of avoided erosion provided by the native forest was about 37% higher than for the exotic forest. This was largely because the exotic production forest included the negative impacts of clear-felling systems.

The most effective measures for maintaining soil cover (and protecting catchments) are to retain existing forest and shrub cover, or encourage reforestation of erosion-prone areas and riparian zones[38,39]. There is a wealth of data showing that the area of soil eroded by storms is consistently less (in the range of 50% to 90% less) where native forest is retained, or marginal land is allowed to revert to native vegetation, or forest is planted – as compared with pastureland[40,41].

The evidence from the collective research shows that **where there are highly erodible hill country soils, a better land use is permanent native forest grown primarily (or solely) for environmental services,** rather than exotic timber plantations grown on a clear-fell regime.

However, even if permanent native forest was restored on all the erodible soils, it would not provide a complete solution. There would still be some woody debris washed down in extreme weather events, as is evident in south Westland where there are no clear-fell plantations, just native forest in the hinterlands. **But the risk and extent of this would be considerably lower.**

One important consideration is the composition of the woody debris mobilised by Cyclones Hale and Gabrielle. It is likely that not all of it is forestry slash. Based on available imagery, it appears that some of the woody debris are whole trees, possibly from riparian plantings, as it appears from aerial imagery that that some riparian areas have been massively gouged out. TTT recommends an analysis to correlate the dominant land use in the catchment with the degree of siltation and slash downstream. For example, did unlogged exotic forest in the later part of their rotation, or native forest contribute any slash debris? Did the largest amounts of sediment come from pasture dominant catchments, etc?

In summary, the Tairawhiti and Wairoa have highly erodible soils, and the erosion has been made much worse by changes in land use – the past destruction of the original forest cover and its replacement with grass. Added to this, there is the increasing frequency and severity of major storm events due to climate change. Also, attempts at amelioration of some of the erosion (by planting commercial forests) have themselves caused problems, particularly with the mobilization of forestry slash. Clear-fell regimes of radiata-pine leave a vulnerable period of approximately 6 years, during which time there is a risk of erosion and mobilization of slash in high-intensity rain events.

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[38] MPI (2015). *Sustainable management of New Zealand's forests.* New Zealand's third country report on the Montreal process criteria and indicators: https://www.teururakau.govt.nz/te-uru-rakau-forestry-new-zealand/about-te-uru-rakau/our-work-and-partnerships/montreal-process/

[39] Gluckman, P. (2017). *New Zealand's fresh waters: Values, state, trends and human impacts.* Office of the PM's Chief Science Advisor. http://www.pmcsa.org.nz/wp-content/uploads/PMCSA-Freshwater-Report.pdf

[40] Blaschke, P., Hicks, D., & Meister, A. (2008). *Quantification of the flood and erosion reduction benefits, and costs, of climate change mitigation measures in New Zealand*. Blaschke and Rutherford Environmental Consultants for the Ministry for the Environment. Wellington. https://environment.govt.nz/publications/quantification-of-the-flood-and-erosion-reduction-benefits-and-costs-of-climate-change-mitigation-measures-in-new-zealand/

[41] Ausseil, A.G.E., Dymond, J.R., Kirschbaum, M.U.F., et al. (2013). Assessment of multiple ecosystem services in New Zealand at the catchment scale. *Environmental Modelling and Software,* 43: 37 – 48. http://dx.doi.org/10.1016/j.envsoft.2013.01.006

SOLUTIONS – Land Use Analysis, Risk Mitigation, and Alternative Forestry Regimes for Climate Resilience

Analysis of Land Use Issues & Immediate Risk Mitigation Measures

This Ministerial Inquiry has had a very short timeframe for submissions, probably not long enough for submitters to fully analyse the damage on the ground, identify the contributing causes, and analyse the data and identify long-term solutions. As a follow-up to this Inquiry, TTT recommends a more comprehensive review of land use, with a timeframe long enough for adequate stakeholder consultation, to identify solutions to help mitigate the impacts of future extreme weather events in this region. There is also a wealth of research papers and reports that provide significant insight and, in some cases, include prudent recommendations.

However, it is clear that **reducing the source of eroding sediment and mobilisation of slash from both farming and forestry catchments urgently needs addressing**.

Unfortunately, there are no easy or quick fixes, **although there are a few immediate risk mitigation measures** that can be undertaken, as explained below. Vegetation management and land-use changes would provide key solutions in responding to the challenges that have developed, as explained below. However, it will take decades to be fully effective. Unfortunately, some areas of deeply cut erosion are likely to be beyond stabilising by vegetation cover.

Also, are there piles of slash of forestry sites that could still be mobilised in future extreme weather events? In other words, even if all clear-felling was stopped now, would more forestry slash come down the rivers if another extreme weather event hits the East Coast within the next few years? This needs to be checked and remedied, if possible.

Aerial imagery is available for at least some of the affected areas, and we are aware that other organisations, such as Scion, have undertaken analyses of various aerial/satellite imagery. These analyses would likely help identify which vegetation types are most effective in reducing erosion, and what stage in the plantation forestry cycle is most vulnerable to erosion and debris loss. For instance, what is the difference between catchments that have mostly radiata-pine forest (logged versus unlogged, and age of plantation cover), and catchments dominated by pasture, and those catchments with a high proportion of native forest or shrubland cover?

The information gleaned from aerial imagery analysis would likely corroborate the wealth of research on land use and soil stability, and catchment protection, as described in the previous section.

<u>Immediate risk mitigation measures include:</u>

- **Identifying (via aerial imagery) and removing remaining forestry slash**, where possible, as it could be mobilised by the next extreme weather event, if that were to happen before the slash became fully decomposed.
- **Professional geological and engineering input on erosion susceptible land,** within this region (and possibly other vulnerable catchments) to identify priorities for immediate risk mitigation.
- **Initiating land-use change** in areas identified as having a high risk of erosion and flooding.
- **Creating more resilient infrastructure** (stop banks, roads, culverts, bridges, etc.,) in vulnerable catchments.
- **Placement of debris traps**[42], which could include strategic plantings of trees.

[42] Visser and Harvey (2020). Design of Debris Slash Traps: Considerations for NZ Plantation Forestry Operating. School of Forestry, University of Canterbury, Christchurch, NZ. Report prepared for Gisborne Regional Council.

Trees, forests, and land use/management changes are inextricably related and, in this case, will have a central role in trying to remedy the situation. There is significant interest in the potential scope and roles for indigenous forests as a long-term solution. However, the situation is complicated in many ways, including by the exotic trees and forests that have already been established, the needs and rights of landowners, and the difficulties in reforesting much of the steep terrain that would benefit from permanent forest cover.

Alternative Forestry Regimes for Climate Resilience – Part of the Solution

Strategically-established native forest can provide climate resilience via soil stabilisation and catchment protection; green firebreaks reduce the risk of wildfire spread; trees provide shade, shelter, and trap moisture, ameliorating local climate in urban areas and farmland; and green infrastructure and coastal buffers protect urban and rural landscapes by moderating extreme weather events, including flood events and storm surges[43,44].

In continuous cover forestry (CCF) or 'near to nature' forestry regimes, selected trees are harvested without compromising the integrity of the forest and the myriad of ecosystem services it provides[45]. Permanent forest cover is maintained, along with high-forest ecosystem services, and there is a future revenue stream for landowners in addition to carbon.

Multi-age, multi-species forests are more likely to be resilient to the impacts of climate change[46].

The problem is – **How do we value these extremely important non-market forest ecosystem services within our current economic systems and frameworks,** which fail to value natural capital in land-use decision-making, and in doing so, short changes future generations?

Landowners need revenue for forest cover on their land (whether exotic or native), and presently, apart from carbon, there are few opportunities for them to realise any ecosystem service benefits that permanent forest cover would provide. This is despite **most benefits of establishing permanent forest accruing to the wider community** – locally, regionally, and nationally, but **particularly those downstream.**

The **models urgently need to be developed to incentivise native afforestation** and reward landowners for provision of environmental and cultural services, for the benefit of all.

We see a significant role and opportunity to integrate native forestry into the landscape, as part of a more sophisticated approach to land-use design and planning – one that results in a **mosaic-like landscape pattern of vegetation types and multi-purpose land management.** This is likely to take a diverse range of forms and include different weightings and balances of management objectives.

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https://www.gdc.govt.nz/__data/assets/pdf_file/0010/11305/forestry-slash-traps-uc-visser-harvey-2020-final.pdf

[43] Aimers, J., Bergin, D., Horgan, G. (2021). Review of non-timber values in sustainably-managed native forest in New Zealand. Tāne's Tree Trust bulletin, Hamilton, New Zealand. 119 pages. https://www.tanestrees.org.nz/site/assets/files/1099/non_timber_values_in_native_forests_-_web.pdf

[44] Aimers, J. (2021). Future-proofing our Ngahere. O Tātou Ngahere (Our Forest) - https://pureadvantage.org/future-proofing-our-ngahere/

[45] Barton, I.L. (2008). Continuous cover forestry: A handbook for the management of New Zealand forests. Tāne's Tree Trust, Pukekohe. 104 p. https://www.tanestrees.org.nz/site/assets/files/1069/continous_cover_forestry_web.pdf

[46] Aimers, J. (2021). Future-proofing our Ngahere. O Tātou Ngahere (Our Forest) - https://pureadvantage.org/future-proofing-our-ngahere/

In some areas, soil conservation values will be the priority; in other areas, natural, ecological, archaeological, or cultural features and values may require special management; or sustainable timber production may be an appropriate land use. Different mixes and balances of various management objectives could vary across short distances and within a landscape.

Realising locally appropriate and multi-functional forestry will require more than just a range of forest management concepts (such as CCF) – involving exotic and native species, mixed species, and transitions), and skilled practitioners. It will also require long-term investors, the development of supportive industries/markets, conducive policy and regulatory frameworks, and probably financial incentives such as some form of payment for ecosystem services.

New Zealand urgently needs alternative forestry regimes for climate resilience and other important environmental services, cultural values and socioeconomic benefits.

Examples of successful CCF in NZ include:

- The Totara Industry Project in Northland – https://www.totaraindustry.co.nz/ https://www.tanestrees.org.nz/about-us/northland-totara-working-group-ntwg/
- Forever Beech in Westland – https://www.healthbasedbuilding.com/foreverbeech
- Woodside Forest in Canterbury – John Wardle's operation with radiata-pine and black beech, near Oxford - https://www.tanestrees.org.nz/site/assets/files/1067/newsletter_39.pdf https://pureadvantage.org/quantifying-multi-purpose-indigenous-forest-management-in-nz/

New Zealand currently imports about NZ$100 million of specialty timbers each year[47], some of which are from non-sustainable sources, e.g., kwila. NZ could produce more of its own specialty timbers, including timber from native species; e.g., sustainably-grown totara could be a substitute for imported western red cedar in many applications.

The **Totara Industry Project**[48] demonstrated the practical feasibility and potential business case for sustainable forest management, with naturally regenerating totara on marginal Northland hill country (as per Part 3A of the Forests Act). Totara is also a culturally important resource for Maori.

A viable native timber industry is required to encourage sustainable native forestry. Government investment can help expedite this, providing funding for developing industry, markets and infrastructure to support production of high-value timber from CCF regimes. This is reflected in the Government's Forestry and Wood Processing Industry Transformation Plan (ITP)[49] which identified accelerating the uptake of CCF, in its various forms, as a priority under action 7.2.

In remote, difficult-to-access areas, it is unlikely that any form of timber harvest would be economically viable due to logistics and lack of infrastructure. Carbon sequestration is likely to be the only market-based ecosystem service. Regardless, **the myriad of non-market ecosystem services provided by permanent forests in these areas must be seen as valuable and worthy of investment**[50]**.** Note that ongoing management would be needed, particularly pest control.

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[47] MPI (2021a). Wood product markets. Data on forestry imports, exports, and indicative log prices: https://www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/forestry/wood-product-markets/

[48] Totara Industry Project – see https://www.totaraindustry.co.nz/

[49] https://www.mpi.govt.nz/forestry/forest-industry-and-workforce/forestry-and-wood-processing-industry-transformation-plan/

[50] Aimers, J., Bergin, D., Horgan, G. (2021). Review of non-timber values in sustainably-managed native forest in New Zealand. Tāne's Tree Trust bulletin, Hamilton, New Zealand. 119 pages. https://www.tanestrees.org.nz/site/assets/files/1099/non_timber_values_in_native_forests_-_web.pdf

TTT supports a wider landscape review of land-use options, to provide a mosaic of land uses to match appropriate sites, including:

- most vulnerable hill country transitioned into permanent native forestry;
- continuous cover forestry (CCF) could be an option on some sites;
- exotic forest with hope of transition on these vulnerable sites, based on science and demonstrated best practice (currently being researched and developed);
- ongoing exotic forest production where appropriate, with appropriate safeguards – e.g., generous riparian buffers, strict controls on clear-felling, management of slash, etc.;
- alternative exotic forestry, e.g., redwoods on lower slopes, valley floors, and river flats;
- ongoing pastoral grazing on slopes with a low risk of erosion;
- appropriate catchment protection upstream of horticultural land and communities;
- strategic placement of green firebreaks of low flammability native and exotic species.

Pathways to Alternative Forestry Regimes & Climate Resilience

How can the historical government policy and land-use decisions, which contributed to the damage, be counteracted? **Government must incentivise or subsidise forestry land use changes that result in the 'greater good'**, i.e., provide long-term environmental, societal and economic sustainability.

This needs to include managed retreat from clear-fell forestry systems in vulnerable catchments, to be replaced by alternative forestry regimes for climate resilience. This could either involve establishing permanent native forest after clear-felling, although this carries a period of vulnerability until forest cover is established[51,52], or radiata pine could be transitioned to permanent native forest while maintaining canopy cover. The latter is difficult due to knowledge gaps, as described below.

Current road-blocks to alternative forestry regimes include:

- perceptions that these forestry regimes are uneconomic;
- high costs of native planting stock, lack of infrastructure and expertise;
- the complexity and diversity of our native forests, and knowledge gaps around indigenous forest restoration and management - due to decades of divestment;
- limited financial incentives for native afforestation, transitioning exotics to natives, and sustainable native forest management;
- very limited published research on transitioning exotic plantations to native forest, resulting in knowledge gaps and lack of established management practices[53]; and
- the limited number of people with skills in native afforestation, transitional forestry, and continuous cover forestry systems.

However, it is important not to 'throw the baby out with the bathwater'. **Alternative forestry regimes** – permanent forests, either unharvested or CCF regimes with native or exotic species, need to be geared as being **complementary to traditional clear-fell systems.**

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[51] Bergin, D.O., Kimberley, M.O., & Marden, M. (1995). Protective value of regenerating tea tree stands on erosion-prone hill country, East Coast, North Island, New Zealand. New Zealand Journal of Forestry Science, 25 (1), 3-19. https://www.scionresearch.com/__data/assets/pdf_file/0004/59638/NZJFS2511995BERGIN3-19.pdf

[52] Bloomberg, M., Cairns, E., Du, D., Palmer, H., & Perry, C. (2019). Alternatives to clear felling for harvesting of radiata pine plantations on erosion-susceptible land. NZ Journal of Forestry 64(3), 33–39. http://www.nzjf.org.nz/free_issues/NZJF64_3_2019/5D9ABDDD-40ED-494f-BE1F-BE5BE4AF5A64.pdf

[53] Forbes, A., & Norton, D. (2021). Transitioning Exotic Plantations to Native Forest: A Report on the State of Knowledge. Contract report prepared by Forbes Ecology Limited for MPI. https://www.mpi.govt.nz/dmsdocument/47521-Transitioning-Exotic-Plantations-to-Native-Forest-A-Report-on-the-State-of-Knowledge-2021-22-

Clear-fell radiata-pine regimes are problematic only on a subset of the current forestry estate, and they are economically the 'bread & butter' of the forestry industry, employing a large percentage of NZers, particularly in rural areas. **Forestry is a significant employer in the Tairāwhiti region**[54].

Anecdotal reports suggest close to 1,000 forestry employees in 2021. Approximately 80% of forestry workers identify as Māori[55]. In 2020, forestry and logging were the biggest contributors to GDP in the Tairāwhiti region, earning $180.7 million[56]. This represents 8.2% of total GDP for the region.

There is an opportunity to work with the forestry industry to upskill a subset of the current workforce, on native forest restoration and management, and CCF systems (with native and exotic species). This could also help the forestry industry restore its social licence to practice.

Getting the agricultural industry on board is also imperative.

Manaaki Whenua Landcare Research's Survey of Rural Decision Makers[57], which is conducted every 2 years, shows that (i) there is a strong interest in planting trees, particularly native species (2019 survey), and (ii) the large majority of rural landowners believe that climate change is already affecting the frequency and intensity of weather-related events (2021 survey).

Tane's Tree Trust and Pure Advantage hosted a conference at Te Papa, Wgtn, in October 2022 - **O Tatou Ngāhere** - ***Regenerating our landscape with native forest***. Over 1000 people attended, breaking records for a forestry conference in NZ. Attendees included farm catchment group leaders, Maori landowners, scientists, academics, government officials, conservationists and ecologists, foresters, and 33 schools - reflecting enthusiasm across a wide cross-section for native afforestation to address the pressing existential crises we are facing.

Many speakers highlighted the need to urgently recalibrate our policy settings to incentivise the protection of existing native forests, and the establishment of new indigenous forests.

It was clear from the conference and many other engagements, that we have the commitment of landowners, iwi, and community groups, but **funding is a critical issue.** Te Kapunga Dewes spoke for many, not just Iwi, when he stated - *"We want natives but we need finance".*

Those of us who are regularly engaging with farmers are consistently hearing the same message across the motu - there is a strong appetite across the entire sector to establish native forest, **but farmers are crying out for incentives** to help them do so. This is warranted given that most of the benefits of native afforestation accrue off site.

At the end of the OTN Conference, **we ran a poll to rank the top 'where to next' themes** that came up at the conference. **The top theme by a strong margin was** *"Encourage urgent action by Govt to establish a Biodiversity credit - 'standard'".*

Landowners need to be able to access enough support to establish natives and also to maintain existing native forest. Financially viable models are needed to incentivise indigenous afforestation. Incentive schemes need to be fair and equitable, and not overly complex. We are not sure whether

[54] https://www.mbie.govt.nz/dmsdocument/18735-tairawhiti-update-february-2022
[55] https://www.mbie.govt.nz/dmsdocument/18735-tairawhiti-update-february-2022
[56] https://www.mbie.govt.nz/dmsdocument/18735-tairawhiti-update-february-2022
[57] https://www.landcareresearch.co.nz/discover-our-research/environment/sustainable-society-and-policy/survey-of-rural-decision-makers/

this could be achieved via new policy, or through amending the existing ETS provisions, or a combination of both.

Recently published research, based on Tane's Tree Trust's national database of planted native forest, demonstrates that **planted and managed indigenous forest is better at sequestering carbon than commonly considered**[58]. Some exotic species, particularly radiata pine, initially sequester carbon at a faster rate than indigenous species. However, after 20 to 30 years in managed planted stands, several native species are capable of sequestering carbon at a similar rate and can continue to do so for many decades.

Tane's Tree Trust's carbon calculator[59], based on our database of planted native forest, predicts that though a stand of native trees planted at 1,250 trees per hectare has an average CO_2 removal rate of only 6 tonnes over the first 30 years, this increases to 20 tonnes between ages 30 and 60 years, and further increases to 27 tonnes between ages 60 and 90.

Regardless, published research undertaken by Tane's Tree Trust on non-timber values in sustainably managed native forests[60], **recommends that government and corporate grants are linked to the broader range of ecosystem services, rather than a single ecosystem service** such as carbon sequestration. However, biodiversity was identified as pivotal, i.e., actions to increase biodiversity values are likely to concurrently improve most (possibly all) other non-timber values.

Cost-Effective Establishment of Native Forest at Landscape-Scale

Currently, there are barriers to rapidly upscaling native forest cover due high costs of planting stock, lack of infrastructure and expertise, the complexity and diversity of our native forests, and knowledge gaps around indigenous forest restoration and management - due to decades of divestment. This is in contrast with the massive investment in research & development and infrastructure around exotic species, particularly one species – radiata-pine.

Addressing these issues is a major focus of Tane's Tree Trust's R&D work programme, as described in our recent Annual Reports[61,62] and summarised in APPENDIX 1. Cost-effective methods for landscape-scale establishment of native forest are summarised in APPENDIX 2.

Please note that **any native afforestation project must include a long-term animal pest control programme to be successful**. There are native species that are relatively browse resistant, including manuka, kanuka, and totara, but a diverse and complex (therefore, resilient) native forest is not likely to occur until there is fencing out of domestic stock and control of pest browsers and predators.

[58] https://pureadvantage.org/carbon-sequestration-by-native-forest-setting-the-record-straight/
[59] https://www.tanestrees.org.nz/resources/carbon-calculator/?highlight=carbon+calculator
[60] Aimers, J., Bergin, D., Horgan, G. (2021). Review of non-timber values in sustainably managed native forest in New Zealand. Tāne's Tree Trust bulletin, Hamilton, New Zealand. 119 pages. https://www.tanestrees.org.nz/site/assets/files/1099/non_timber_values_in_native_forests_-_web.pdf
[61] Tane's Tree Trust Annual Report 2021 - https://www.tanestrees.org.nz/site/assets/files/1037/ttt_annual_report_2021.pdf
[62] Tane's Tree Trust Annual Report 2022 - https://www.tanestrees.org.nz/site/assets/files/1037/ttt_annual_report_2022.pdf

Regarding native afforestation in erodible steeplands in Tairawhiti, there is already a body of research on this[63,64] based on a major survey of manuka/kanuka regeneration on Tairawhiti steep hill country following Cyclone Bola in 1988. The lead researcher in this work, Dr David Bergin, currently leads Tane's Tree Trust's R&D work programme.

A major research finding was a rapid and highly significant reduction in slip damage with increasing age of the manuka/kanuka shrubland. At 95% confidence intervals, there was a 65% reduction in shallow land-slipping at shrubland aged 10 years, increasing to 90% at age 20 years.

Addressing Knowledge Gaps in Transitional Forestry

Tane's Tree Trust is pleased to have recently started a 5-year project on **Transitioning Exotic Forest to Native**, supported by the MPI Sustainable Food and Fibre Futures (SFFF) fund and forestry partners.

One of the drivers of this research is the opportunity to transition directly from exotic to native forest, avoiding clear-felling on erodible land, such as in Tairāwhiti. The commercial plantation forestry industry is looking for advice on how to retire radiata-pine stands safely and cost-effectively on remote, erodible steeplands, which are not economical to harvest and/or pose environmental risks and where the best option is a managed transition back to native forest. Another positive driver is that many Maori landowners are currently actively seeking technical advice in transitioning radiata-pine forest back to native forest.

Managing transitions from exotic forest to native is complex, subject to many variables, and very site and context dependent. There is also a conflict between maximising income from carbon sequestration and effecting a transition to native forest. The research project will establish forestry trials to collect data in existing exotic stands of various ages, on a range of sites throughout New Zealand - to determine factors and interventions that are likely to allow a transition to native forest. It will look for drivers of natural regeneration such as levels of canopy cover (light ingress), seed source proximity, climatic variables and site factors - to inform what types and levels of management are required, and identify situations where a transition is unlikely to be successful/unsuccessful, and subsequently provide guidelines and recommendations.

It will be a challenge managing and maintaining transitions to predominantly native forest through weed-infested vegetation. Active management will be essential for all forests in New Zealand.

Summary and Recommendations

Tane's Tree Trust recommends land-use and land management plans that are multi-purpose, intergenerational, locally integrated and site-responsive – which also recognise the multivalent potential that native forests bring. There is 'no one size fits all', as there is a wide range of sites, stakeholder requirements, and management concepts involved, including native afforestation primarily through planting, natural regeneration, assisted natural regeneration, sustainable indigenous forestry, CCF, carbon farming, transitional forestry, and exotic/native mixes.

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[63] Bergin, D.O., Kimberley, M.O., & Marden, M. (1993). How soon does regenerating scrub control erosion? NZ Journal of Forestry 38(2) 38 – 42. http://nzjf.org.nz/free_issues/NZJF38_2_1993/4C4924D7-90CF-40FC-A310-B0481D74E71C.pdf

[64] Bergin, D.O., Kimberley, M.O., & Marden, M. (1995). Protective value of regenerating tea tree stands on erosion-prone hill country, East Coast, North Island, New Zealand. NZ Journal of Forestry Science, 25 (1), 3-19. https://www.scionresearch.com/__data/assets/pdf_file/0004/59638/NZJFS2511995BERGIN3-19.pdf

We believe that to be successful, cost-effective, large-scale establishment of native forest will depend on working with nature, i.e., **assisted natural regeneration, plus complementary planting where needed** (e.g., seed islands). This is described in more detail in APPENDIX 2.

Integration with supportive economic drivers is essential, i.e., investment, markets, industries, and incentives. There is an urgent need for financial incentives to bridge the gap between native trees becoming established and increasing their growth rate sufficient to earn enough carbon credits to reward landowners.

Ongoing monitoring and an adaptive management approach are recommended as all forests need active ongoing management.

We must start now but recognise that there are knowledge gaps and an adaptive management approach is needed - to help inform and refine site-specific forest/land management plans, and cater for stakeholder requirements. Ongoing applied research programmes are needed to help counter the knowledge gaps and development of appropriate management practices.

There will be job opportunities, including highly-skilled forest managers and workers. **Early career training and continuing professional development programmes are needed.** The latter will help upskill those in the traditional forestry industry who wish to transfer their skills and become involved in alternative forestry regimes with a focus on climate resilience. There is considerable interest in this, particularly via the NZ Institute of Forestry, but funding is needed to make it happen.

Tane's Tree Trust would like to see tangata whenua have a major leadership role in healing the whenua. There are already iwi-led ecological restoration and conservation programmes in the region that have been very successful in not only environmental gains, but also in positive outcomes for local people. There are already engaged and trained workforces through programmes such as Jobs for Nature, which only have a limited period of funding. We would like to see the funding extended for these groups, particularly in light of the recent destruction and the need for natural ecosystems providing climate resilience.

APPENDIX 1 - Tane's Tree Trust's Research & Development programme

TTT undertakes applied research to deliver practical science-based technical information. Projects are based around forest establishment (planting and assisted natural regeneration) through to supporting long-term sustainable management of permanent native forest.

A summary is provided below. More information is available in the TTT Annual Report[65].

Normalising Native Forestry (core research programme)

This is funded by The Tindall Foundation, with support leveraged from other funders. It includes six workstreams:

1. Working with nature to establish native forests at scale through planting and encouraging natural regeneration.
2. Promoting continuous-cover native forestry for sustainable harvesting.
3. Making the most of TTT's growth and reference databases.
4. Incentivising landowners by developing an economic case for native forestry and supporting incentive schemes.
5. Evaluating novel, transitional ecosystems – transitioning of exotic species to native forest.
6. Collaboratively building capability by working with others involved in, for example, pest animal, bird predator and selective weed control.

Other ongoing and recently completed work

- Native Forest Toolkit – calculators developed for: (i) planting and budgeting; (ii) productivity; (iii) carbon sequestration; and (iv) economics (returns and benefits). Largely funded by the Sustainable Farming Fund (SFF) and based on the Trust's Indigenous Plantation Database. These web-based tools are free to access via our website - https://toolkit.tanestrees.org.nz/
- Adaptive Management of Coastal Forestry Buffers, with the Coastal Restoration Trust. Preliminary guidelines are available for this recently completed SFF-funded project.
- Fact sheets on forest establishment (planting and assisted natural regeneration) funded by Te Uru Rākau. These will soon be freely available on our website.
- Re-measurement of farm-tōtara trials established by the Northland Tōtara Working Group.
- A practical guide to the management of tōtara on private land, co-funded by Te Uru Rākau.
- Videos and workshops on best practice restoration and management of native forests – a collaborative project, co-funded by the Department of Conservation.
- Demonstrating the establishment of seed islands to bring back natives and encourage natural regeneration in collaboration with Trees That Count; Waikereru Ecosanctuary, Tairāwhiti; Pāmu Farms; and other partners.
- Monitoring system for early survival and growth of plantings, in collaboration with Trees That Count, Tasman Environment Trust, Auckland Council and Pāmu Farms.
- Transitioning exotic forest to natives – a recently initiated 5-year project, largely funded by the Sustainable Food and Fibre Futures Fund (SFFF).
- Valuing ecosystem services – a recently initiated multi-agency collaboration with Pāmu Farms, largely funded by SFFF.
- Ongoing work on submissions and consultation with the Government, advocating for all aspects of native forestry, and incentives for landowners.

[65] Tane's Tree Trust Annual Report 2022 - https://www.tanestrees.org.nz/site/assets/files/1037/ttt_annual_report_2022.pdf

APPENDIX 2 – Cost-effective methods for landscape-scale establishment of native forest

We propose assisted natural regeneration augmented by targeted planting:

- **We advise a shift in focus from reliance on mostly planted forests to assisted natural regeneration –** where planting is part of the mix, along with management to limit factors that inhibit natural regeneration of natives, i.e., control of the most aggressive weeds, elimination of pests including predators of bird populations essential for seed spread.
- We support direct planting, but recommend that it is deployed strategically (to complement leverage natural processes), starts on a modest scale, and expands as quickly as capacity permits.
- Concurrent with this is the need to monitor the success or otherwise of planting programmes so that management changes can be made early on to improve performance with subsequent plantings.
- Fixed annual targets should be used with caution, although we understand there is a need to reach carbon sequestration targets.
- Management of natural regeneration coupled with targeted planting must be well planned, adapted to the site, supervised, and the outcome monitored and the management input sustained.
- Start with a survey to identify potential sites for natural regeneration.
- Identify any existing native forest within bird range that will encourage the spread of seeds of key native tree species.
- Our birds have a good track record, having established forests in Aotearoa for millions of years. Strategic planting of berry-producing shrub species provides an incentive for birds to visit sites. Implement control of bird and seed predators such as rodents, mustelids and possums – to protect and boost natural regenerative processes.
- There will likely be a need for enrichment planting of species no longer locally present. In addition to native forest species that are bird dispersed, this will include species with wind-dispersed seed.
- Let the birds and the wind be our natural drones in spreading seed across vast landscapes of marginal pastoral steep hill country that are a priority for native afforestation. Where there are no native forests within bird range, we can prepare a seed source for them by employing a strategy that has been developed and is being evaluated by TTT, i.e., establishing a network of seed islands comprising a diverse range of bird- and wind-dispersed seeding species.
- TTT has produced fact sheets on assisted natural regeneration and the seed island approach. These will soon be published on our website.
- Assisted natural regeneration could be done at a large scale as resources permit, and there should be no need for delay in getting this underway.
- Monitoring systems are vital as practitioners can act promptly to protect their ngahere, and also learn what does, and doesn't work, and adapt accordingly. This is particularly important in an era of climate change.
- This need not be delayed. Some of the human and financial resources available for direct planting should be diverted towards establishing a framework that supports natural regeneration – including sustainable management of the large area of existing natural regeneration, some of which is being routinely sprayed, cut back or burnt to keep marginal farmland in pasture.

Much of this is described in more detail in an article by Dr David Bergin – *The ten golden rules for establishing native forest at scale*, published as part of the O Tatou Ngāhere campaign https://pureadvantage.org/ten-golden-rules-for-large-scale-establishment-of-native-forest/.

Pros and cons of assisted natural regeneration

Advantages

- Scale - significant areas already exist (hundreds of thousands of hectares), that are in the process of regeneration to forest cover, and much more could be encouraged to regenerate.
- Low cost. Nature and time, assisted by the wind and birds, do the greatest share of the work.
- Less pressure. There are no fixed annual targets to be met.
- Flexibility. It is suited to a range of sites, large and small; and a range of different scenarios can be employed. There is scope here for site-specific and creative solutions.
- Plants that germinate naturally have been, by definition, ecosourced, and are therefore adapted to the site.
- Planting can be leveraged for maximum cost/benefit.
- Lower risk of dramatic failure.

Disadvantages

- Forest establishment will take longer. On the other hand, as it is low cost, it can start sooner and at a larger scale (and is already happening over large areas).
- We cannot assume that available open space will be colonised by native species alone. Over time we have introduced too many impediments for that to occur.
- We have introduced a range of weeds, some of which will be better adapted to the changing conditions of a warming climate – these can preclude natural regeneration on some sites, if there is no intervention. And then there are the introduced pests that must be controlled.
- Our remaining forests have been degraded and fragmented, and natural pathways for colonisation have been intercepted by cities, farms, and roads.
- Natural regeneration will need our assistance - weed and pest control is vital.
- All forests require ongoing and active management. There is presently insufficient financial incentive or income potential to encourage and support native forest management on private land – especially regarding regenerating native forest cover.

In summary – working with Nature for landscape-scale establishment

Successful large-scale establishment of native forest will depend on working with nature and integration with supportive economic drivers (i.e., investment, markets, industries, and incentives).

Encouraging natural regeneration should be done in tandem with pest animal control to prevent damage to the naturally established seedlings, working with Predator Free NZ, neighbouring landowners, iwi and local communities to boost bird populations and seed production for diverse forest ecosystems, selective weed control to remove or reduce the most aggressive and persistent exotic species, and undertaking strategic supplementary planting to bring back once abundant species now locally extinct or scarce.

Our recommendations:

- Enable naturally regenerated native cover that predates 1990, but that still has significant potential to sequester more carbon, to be eligible for financial returns from carbon through the ETS.
- For afforestation by planting alone, start with modest targets and build infrastructure, capability and confidence, and ‘iron out problems’, i.e., start with a smaller yearly target, upscaling gradually as capacity and competence improve.

- Look at the easiest options first - ‘nature-based solutions’ - assisted regeneration, building on the natural regeneration that is already happening in many hill country sites.
- Establishing seed islands amongst shrub pioneers, to help the natural succession to high-forest – let the birds do the work of spreading the seed.
- Ensure that nursery plant quality standards and infrastructure are in place to deliver quality, fit-for-purpose planting stock.
- Monitoring systems are vital and need to be a requirement of any funding for afforestation.
- Planters – are there sufficient well-trained planting gangs who know how to plant native species (as opposed to radiata-pine, which is quite different to plant)?

Submitter's Information

- **Name**: Tangikaroro Native Nursery
- **Email**: tangikaroro.native.nursery@gmail.com
- **Region**: Gisborne
- **I am submitting as individual or on behalf of an organisation**: Organisation
- **I have used my own words and examples in this submission**: Yes
- **I consent to this submission being published on the MfE website**: Yes
- **Association:** farmer/grower

Section 1: Impacts and Experiences

MfE Question: 1. Tell us about your experience during Cyclones Hale and Gabrielle? What effects have you experienced?

Farmers and rural communities have been significantly affected by slash, sediment, and flooding from the recent cyclones. A large percentage of farmers within the Eastern North Island are still grappling with the consequences of widespread devastation including, but not limited to:

- Infrastructure loss including fences, buildings, roads, and water systems
- Clearing debris and silt
- Coming to terms with stock and pasture losses
- Managing ongoing stock health
- Significant loss of income

At this current time, it is hard for farmers to engage in this inquiry. Most farmers are focused on the day-to-day needs of their farms, families, and communities and submitting on this inquiry isn't a top priority for many. Therefore, this inquiry consultation should lead onto further engagement which would provide adequate opportunity to be involved and share their thoughts.

Section 2: Causes

MfE Question 2: What is it about the way we use land, and how land use has changed over time that led to the effects being so severe?

Question 3: Are there specific practices or ways in which we use the land that have caused more harm than others? Which of these practices are most important? Why?

Question 4: Is there anything else we should know about that has contributed to the damage from severe weather?

As farmers we understand that our land use practices have an impact on the environment, and we work hard to manage and remedy those impacts. It is evident that there are land use practices in the Te Tairāwhiti, Tūranganui-a-Kiwa and Te Wairoa regions that have exacerbated the impacts of Cyclone Hail and Gabrielle. We therefore support this inquiry into land use.

Through generations of pastoral farming in these regions we have learnt that the naturally softer soils and unique geology of the East Coast need careful management. Based on the instincts and understanding of the day previous Government funding and policy has not recognised this to the same extent and allowed for widespread commercial plantation forestry, with limited consideration of the effects of clear-fell harvest, which has now placed foresters in a challenging position.

The cumulation of multiple large storm events within a relatively short timeframe has had a greater impact due to the harvest and replanting timeframes. Clear felling and replanting forests within a catchment all at the same time means there is a significant risk window for sediment and debris loss as new plantings take time to root.

However, there are responsibilities on landowners to manage the downstream impacts of their activities. The inquiry needs to focus on adequate engagement with different land users to best understand how to best manage the land from a social, economic, and environmental perspective.

As a farmer I seek that forestry is properly integrated into our landscapes with the right tree, in the right place.

There is a great opportunity within this inquiry to learn from the past to create a more sustainable and prosperous future. The inquiry must lead to concrete actions led by community engagement so that this scale of devastation is not allowed to happen again and impact future generations.

Section 3: Policy framework, including legislation, market settings and regulations

Question 5: How do the current laws, policies and rules influence the way we use our land? What works well? What is unhelpful? Think about the current legislation, market drivers and conditions, regulations, rules, and the way in which requirements are enforced.

Question 6: Anything else you would like to say about the current policy framework?

Current laws, policies, and rules for example the New Zealand Emission Trading Scheme (NZ ETS), carbon markets, National Environment Standards for Plantation Forestry (NES-PF), foreign investment, and increased regulation within farming are currently encouraging and/or enticing sheep and beef farmers to either sell or convert to plantation forestry of exotic species such as Pinus radiata.

With the recent land conversions to forestry and replanting that is currently happening, if we do not give adequate consideration of the placement and management of forestry, we risk similar devastation and results in the future.

As current carbon forestry sees significantly higher returns than other land uses, land managers are encouraged to plant new trees and either walk away from them, leave existing forests standing, or clear-fell forests with limited consideration of the flow on effects from the sediment or slash.

The current legislative framework is clearly not enough to manage the effects of market drivers or manage the effects associated with a severe weather event. The Government needs to set clear standards for forestry practices and the councils must take responsibility to ensure best management and compliance. To appropriately set these standards and regulations, this inquiry must involve adequate engagement with local communities and solutions must be set at the local/regional level.

Section 4: Solutions

Question 7: What is your vision for the future of land use in the region?

Question 8: What do we need to do to achieve this vision?

Please think about:

- Immediately? (in the next 12 months)
- In the short term? (next 1–2 years)
- In the medium term? (3–5 years)
- In the long term? (10+ years)
- Far into the future? (30–100 years)

Question 9: Is there anything that shouldn't be changed, for example, things that if changed would make it worse?

Question 10: In your view, which groups need to be involved in developing solutions and what is the best way for these groups to be involved?

The vision for what our land should be used for needs to be determined by, and for, local communities. This should be supported and resourced by central government but needs to be driven locally by those most affected and those who understand the land and issues the most. We need a vision that supports a diverse and resilient landscape that has a variety of production options that can provide for the local community.

We must effectively and efficiently determine the desired outcomes for landscapes, communities, and wider environments given the short and long-term impacts of land use and climate change. At a national level we need a review of:

- The NES-PF including its conditions, implementation, and compliance
- The New Zealand Emissions Trading Scheme (NZ ETS)
- The Resource Management Act 1991 (RMA) to ensure that land use change and practices are aligned with community expectations.
- Foreign Investment

Despite this being an urgent issue for the Eastern North Island this should be seen as a journey to create change nationwide to create a more resilient future for all New Zealander's.

To achieve a successful vision and future within the region, appropriate support must be given to landowners to transition their land use type and practices to ones that are going to be the most resilient to the impacts of climate change and provide the best value add for communities. We must consider how people are and will be active in the landscapes and what level of risk is deemed appropriate.

Section 5:

Add any general feedback, comments, or ideas on the consultation:

Te Rūnanga o NGĀI TAHU

6 April 2023

Ministerial Inquiry into Land Use
c/o Ministry for the Environment
PŌ Box 10362
Wellington 6143

By email: ministeriallanduseinquiry@mfe.govt.nz

Tēnā koe

Ministerial Inquiry into Land Use

Te Rūnanga o Ngāi Tahu (**Te Rūnanga**) and Ngāi Tahu Forestry wishes to contribute to the work being undertaken by the Ministerial Inquiry into Land Use (the **Inquiry**) on the impacts of land use in the recent cyclone.

Background

Te Rūnanga is statutorily recognised as the representative tribal body for Ngāi Tahu Whānui.

As stated in the Crown Apology to Ngāi Tahu (attached as **Appendix One**), the Ngāi Tahu Claims Settlement marked a turning point, and the beginning for a new age of cooperation.

The Ngāi Tahu takiwā (region) covers the largest geographic area of any tribal authority in New Zealand (a map of the Ngāi Tahu takiwā is attached as **Appendix Two**). Ngāi Tahu currently have more than 78,000 individuals registered with the iwi, most of who reside in Aotearoa.

Te Rūnanga, through Ngāi Tahu Forestry, owns approximately 3,396 hectares of Emissions Trading Scheme (**ETS**) registered post-1989 forest land on the West Coast of the South Island planted between 1991 and 2022. In addition, Ngāi Tahu Forestry owns approximately 2,000 hectares of post 1989 production forest and approximately 26,000 hectares of pre 1990 production forest across the takiwā.

Notwithstanding its statutory status as the representative voice of Ngāi Tahu whānui for all purposes, Te Rūnanga accepts and respects the right of individuals and Papatipu Rūnanga to make their own responses in relation to this matter.

1. Treatment of ex-Forestry Service Forest

While Ngāi Tahu does not have any forestry assets within the region being covered by the

Inquiry, we wish to bring your attention to the history of many of the forests in this region and the implications that this now has for many forest owners, including iwi, in the area.

Many of the historic forests in the Te Tairawhiti, Tūranganui-ā-Kiwa and Te Wairoa regions originally planted by the Government through the Forestry Service. This forestry estate was subsequently sold off to interested parties and/or given to iwi and hapū as part of te Tiriti settlements.

The ETS has placed a substantial liability on the owners of these forests (planted pre-1990). If the owners of these forests do not replant their land in plantation forestry, they will have to surrender sufficient carbon credits to offset the carbon sequestration that would have otherwise occurred in the forest. This liability is expected to be in excess of $42,000 per hectare at current carbon prices.

Unfortunately, landowners still face a significant liability even if they were to convert their land in indigenous forest. Indigenous forests grow, and sequester carbon, at a much lower rate than exotic plantation forestry. After 50 years, an indigenous forest will have sequestered less than half the amount that an exotic plantation forest can sequester in 25 years. As a result, the owner will still be facing a liability of more than $23,000 per hectare.

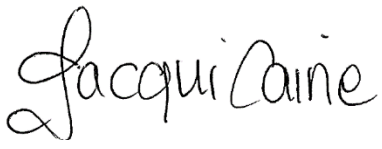
It is therefore vital that you fully consider the impact of any recommendations you make on the owners of pre-1990 forests. To not do so, risks adding to the problems that the forest owners in this area are facing. They should not be left with a stranded asset and a significant liability.

Te Runanga believes iwi with te Tiriti settlement assets of land and/or forestry should not be negatively impacted by any changes to the ETS.

2. Ngāi Tahu Expectations

Given the limited geographic scope of the Inquiry and the short timeframe for consultation, we have not prepared a more fulsome response to the issues being considered. If the Inquiry intends to recommend policy changes that extend into the Ngāi Tahu Takiwā, we expect to have more fulsome engagement. Similarly, we would expect that the Crown would engage with us, as their te Tiriti partner, if they are considering any policy changes that extend into our Takiwā.

Nāku noa, nā



Jacqui Caine
Group Head, Strategy & Environment

APPENDIX ONE: TEXT OF CROWN APOLOGY

The following is text of the Crown apology contained in the Ngāi Tahu Claims Settlement Act 1998.

Part One – Apology by the Crown to Ngāi Tahu

Section 5: Text in Māori

Kei te mōhio te Karauna i te tino roa o ngā tūpuna o Ngāi Tahu e totohe ana kia utu mai rātou e te Karauna—tata atu ki 150 ngā tau i puta ai tēnei pēpeha a Ngāi Tahu arā: "He mahi kai tākata, he mahi kai hoaka". Nā te whai mahara o ngā tūpuna o Ngāi Tahu ki ngā āhuatanga o ngā kawenga a te Karauna i kawea ai e Matiaha Tiramōrehu tana petihana ki a Kuini Wikitoria i te tau 1857. I tuhia e Tiramōrehu tana petihana arā:

> 'Koia nei te whakahau a tōu aroha i whiua e koe ki runga i ēnei kāwana... tērā kia whakakotahitia te ture, kia whakakotahitia ngā whakahau, kia ōrite ngā āhuatanga mō te kiri mā kia rite ki tō te kiri waitutu, me te whakatakoto i te aroha o tōu ngākau pai ki runga i te iwi Māori kia noho ngākau pai tonu ai rātou me te mau mahara tonu ki te mana o tōu ingoa.'

Nā konei te Karauna i whakaae ai tērā, te taumaha o ngā mahi a ngā tūpuna o Ngāi Tahu, nā rēira i tū whakaiti atu ai i nāianei i mua i ā rātou mokopuna.

E whakaae ana te Karauna ki tōna tino hēanga, tērā i takakino tāruaruatia e ia ngā kaupapa o te Tiriti o Waitangi i roto i āna hokonga mai i ngā whenua o Ngāi Tahu. Tēnā, ka whakaae anō te Karauna tērā i roto i ngā āhuatanga i takoto ki roto i ngā pukapuka ā-herenga whakaatu i aua hokonga mai, kāore te Karauna i whai whakaaro ki tāna hoa nā rāua rā i haina te Tiriti, kāore hoki ia I whai whakaaro ki te wehe ake i ētahi whenua hei whai oranga tinana, whai oranga ngākau rānei mō Ngāi Tahu.

E whakaae ana te Karauna tērā, i roto i tāna takakino i te wāhanga tuarua o te Tiriti, kāore ia i whai whakaaro ki te manaaki, ki te tiaki rānei i ngā mauanga whenua a Ngāi Tahu me ngā tino taonga i hiahia a Ngāi Tahu ki te pupuri.

E mōhio ana te Karauna tērā, kāore ia i whai whakaaro ki a Ngāi Tahu i runga I te ngākau pono o roto i ngā tikanga i pūtake mai i te mana o te Karauna. Nā tāua whakaaro kore a te Karauna i puaki mai ai tēnei pēpeha a Ngāi Tahu: "Te Hapa o Niu Tīreni". E mōhio ana te Karauna i tāna hē ki te kaipono i ngā āhuatanga whai oranga mō Ngāi Tahu i noho pōhara noa ai te iwi ia whakatupuranga heke iho. Te whakatauākī i pūtake mai i aua āhuatanga: "Te mate o te iwi".

E whakaae ana te Karauna tērā, mai rāno te piri pono o Ngāi Tahu ki te Karauna me te kawa pono a te iwi i ā rātou kawenga i raro i te Tiriti o Waitangi, pērā anō tō rātou piri atu ki raro i te Hoko Whitu a Tū i ngā wā o ngā pakanga nunui o te ao. E tino mihi ana te Karauna ki a Ngāi Tahu mō tōna ngākau pono mō te koha hoki a te iwi o Ngāi Tahu ki te katoa o Aotearoa.

E whakapuaki atu ana te Karauna ki te iwi whānui o Ngāi Tahu i te hōhonu o te āwhitu a te Karauna mō ngā mamaetanga, mō ngā whakawhiringa i pūtake mai nō roto i ngā takakino a te

Karauna i takaongetia ai a Ngāi Tahu Whānui. Ewhakaae ana te Karauna tērā, aua mamaetanga me ngā whakawhiringa hoki I hua mai nō roto i ngā takakino a te Karauna, arā, kāore te Karauna i whai i ngā tohutohu a ngā pukapuka ā-herenga i tōna hokonga mai i ngā whenua o Ngāi Tahu, kāore hoki te Karauna i wehe ake kia rawaka he whenua mō te iwi, hei whakahaere mā rātou i ngā āhuatanga e whai oranga ai rātou, kāore hoki te Karauna i hanga i tētahi tikanga e maru motuhake ai te mana o Ngāi Tahu ki runga i ā rātou pounamu me ērā atu tāonga i hiahia te iwi ki te pupuri. Kore rawa te Karauna i aro ake ki ngā aurere a Ngāi Tahu.

E whakapāha ana te Karauna ki a Ngāi Tahu mō tōna hēanga, tērā, kāore ia I whai whakaaro mō te rangatiratanga o Ngāi Tahu, ki te mana rānei o Ngāi Tahu ki runga i ōna whenua ā-rohe o Te Wai Pounamu, nā rēira, i runga i ngā whakaritenga me ngā herenga a Te Tiriti o Waitangi, ka whakaae te Karauna ko Ngāi Tahu Whānui anō te tāngata whenua hei pupuri i te rangatiratanga o roto I ōna takiwā.

E ai mō ngā iwi katoa o Aotearoa e hiahia ana te Karauna ki te whakamārie I ngā hara kua whākina ake nei—otirā, ērā e taea i nāianei - i te mea kua āta tau ngā kōrero tūturu ki roto i te pukapuka ā-herenga whakaritenga i hainatia i te 21 o ngā rā o Whitu hei tīmatanga whai oranga i roto i te ao hōu o te mahinga tahi a te Karauna rāua ko Ngāi Tahu.

Section 6: Text in English

The text of the apology in English is as follows:

> The Crown recognises the protracted labours of the Ngāi Tahu ancestors in pursuit of their claims for redress and compensation against the Crown for nearly 150 years, as alluded to in the Ngāi Tahu proverb ‘He mahi kai takata, he mahi kai hoaka’ (‘It is work that consumes people, as greenstone consumes sandstone’). The Ngāi Tahu understanding of the Crown's responsibilities conveyed to Queen Victoria by Matiaha Tiramorehu in a petition in 1857, guided the Ngāi Tahu ancestors. Tiramorehu wrote:
>
> > “‘This was the command thy love laid upon these Governors … that the law be made one, that the commandments be made one, that the nation be made one, that the white skin be made just equal with the dark skin, and to lay down the love of thy graciousness to the Māori that they dwell happily … and remember the power of thy name.”
>
> The Crown hereby acknowledges the work of the Ngāi Tahu ancestors and makes this apology to them and to their descendants.
>
> The Crown acknowledges that it acted unconscionably and in repeated breach of the principles of the Treaty of Waitangi in its dealings with Ngāi Tahu in the purchases of Ngāi Tahu land. The Crown further acknowledges that in relation to the deeds of purchase it has failed in most material respects to honour its obligations to Ngāi Tahu as its Treaty partner, while it also failed to set aside adequate lands for Ngāi Tahu's use, and to provide adequate economic and social resources for Ngāi Tahu.

The Crown acknowledges that, in breach of Article Two of the Treaty, it failed to preserve and protect Ngāi Tahu's use and ownership of such of their land and valued possessions as they wished to retain.

The Crown recognises that it has failed to act towards Ngāi Tahu reasonably and with the utmost good faith in a manner consistent with the honour of the Crown. That failure is referred to in the Ngāi Tahu saying ‘Te Hapa o Niu Tireni!’ (‘The unfulfilled promise of New Zealand’). The Crown further recognises that its failure always to act in good faith deprived Ngāi Tahu of the opportunity to develop and kept the tribe for several generations in a state of poverty, a state referred to in the proverb ‘Te mate o te iwi’ (‘The malaise of the tribe’).

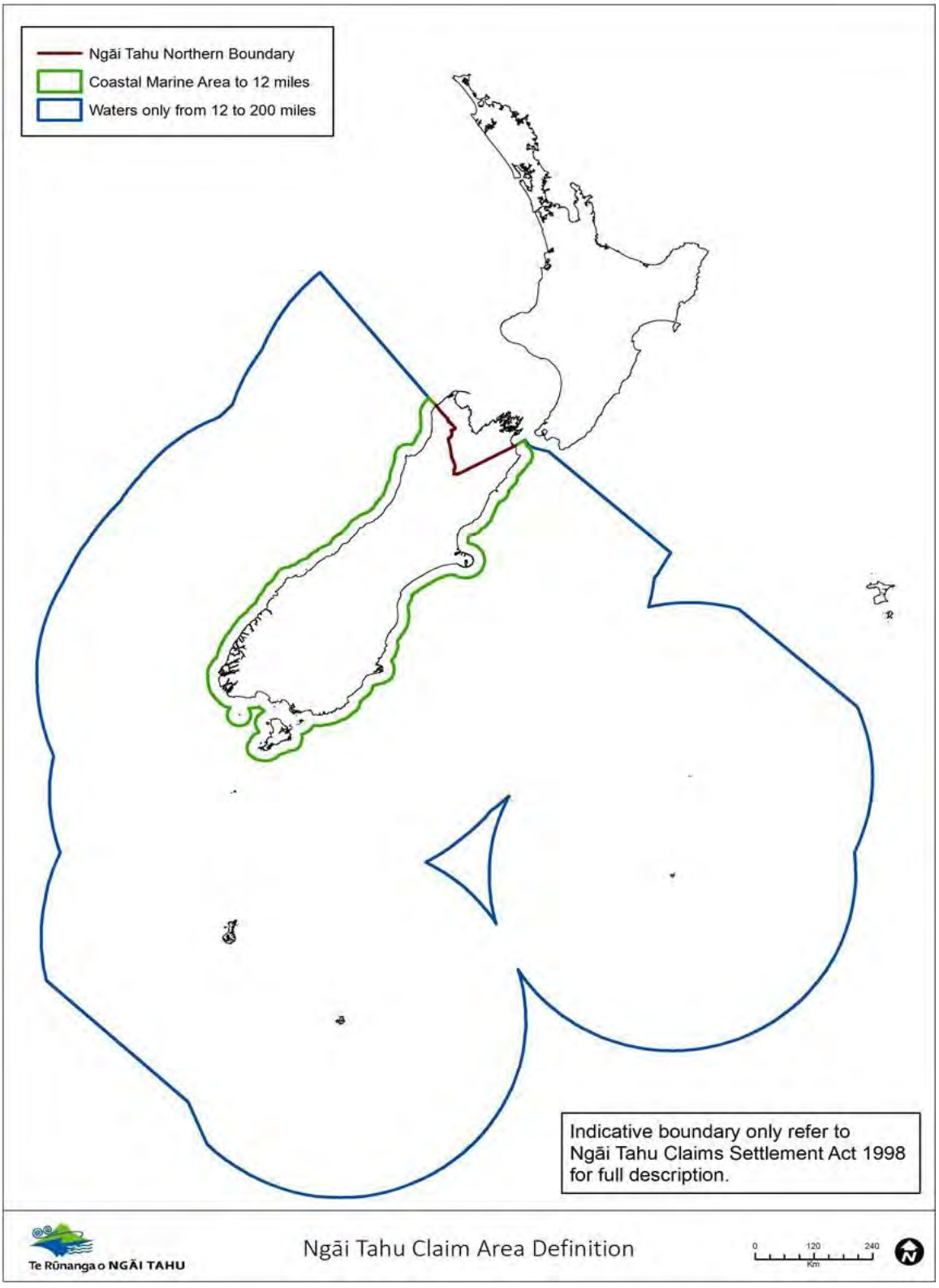
The Crown recognises that Ngāi Tahu has been consistently loyal to the Crown, and that the tribe has honoured its obligations and responsibilities under the Treaty of Waitangi and duties as citizens of the nation, especially, but not exclusively, in their active service in all of the major conflicts up to the present time to which New Zealand has sent troops. The Crown pays tribute to Ngāi Tahu's loyalty and to the contribution made by the tribe to the nation.

The Crown expresses its profound regret and apologises unreservedly to all members of Ngāi Tahu Whānui for the suffering and hardship caused to Ngāi Tahu, and for the harmful effects which resulted to the welfare, economy and development of Ngāi Tahu as a tribe. The Crown acknowledges that such suffering, hardship and harmful effects resulted from its failures to honour its obligations to Ngāi Tahu under the deeds of purchase whereby it acquired Ngāi Tahu lands, to set aside adequate lands for the tribe's use, to allow reasonable access to traditional sources of food, to protect Ngāi Tahu's rights to pounamu and such other valued possessions as the tribe wished to retain, or to remedy effectually Ngāi Tahu's grievances.

The Crown apologises to Ngāi Tahu for its past failures to acknowledge Ngāi Tahu rangatiratanga and mana over the South Island lands within its boundaries, and, in fulfilment of its Treaty obligations, the Crown recognises Ngāi Tahu as the tangata whenua of, and as holding rangatiratanga within, the Takiwā of Ngāi Tahu Whānui.

Accordingly, the Crown seeks on behalf of all New Zealanders to atone for these acknowledged injustices, so far as that is now possible, and, with the historical grievances finally settled as to matters set out in the Deed of Settlement signed on 21 November 1997, to begin the process of healing and to enter a new age of co-operation with Ngāi Tahu.

APPENDIX TWO: NGĀI TAHU TAKIWĀ



Submission on the Ministerial Inquiry into Land Use causing woody debris and sediment-related damage in Tairāwhiti and Wairoa.

Submission by Vivienne Hall.

Hi there

Below is a submission to the government to show how the forestry industry has affected us. I would like those that can to please seriously consider putting more resources into looking into this ever growing industry as 2 months doesn't feel like it would do it justice.

We are in our mid 30s we are young hard working and keen on farming. We have 2 children. We live in Gisborne. We are heavily involved in our local community; school boards, rugby referee, kindergarten committee, dog trial committee etc. We lease my parents farm whilst managing another farm.

On the farm we lease everytime we have a flood slash comes down and goes through flood gates wiping them out depositing silt and slash on the land. This happens at least yearly. We are then at the mercy of the forestry companies to please try and come clean up or help us get access so we can start fencing and moving stock through. Our farm can't take place properly until the fences are in place and tracks.

Since Cyclone Gabrielle we have told the companies that we need help but they are in full swing logging trucks are flying down the road. It bothers us that they are fully operation while we are still flat out repairing fences and don't have access to part of the farm. We are in a rock and a hard place though because we cannot afford to complete this work ourselves. We try to keep them on our side and don't want to talk bad about them.

Normally pragmatic we are seriously thinking about not moving ahead with succession. This is a horrific thought because my parents who have worked themselves tirelessly to pay off the farm as their "nest egg" now have a farm that is seriously devalued.

The farm is only half an hour from town but past it is 1000s of hectares of forestry, so the farm will most likely be purchased by forestry or carbon farming.

The way forestry has been heavily subsidized over the years has been incredibly prevenlant in our region. Please case study the Tairawhiti when looking into this issue. We have been at the perfect example of the effects of the policy in action I.e. Bola = subsidies to plant = fast forward 30yrs and into second plantations and another Cyclone.

If you would every like to come see us we would love to have you, and show our Waimata River Catchment Group - which is amazing.

Thank you for reading this submission.

Kind regards

Vivienne.