



Plantation Forestry on Separation Point Granite lands

Summary of Feedback from Community and Forestry Industry Workshops

Legend

SPG

ESC2018

Low

Moderate

High

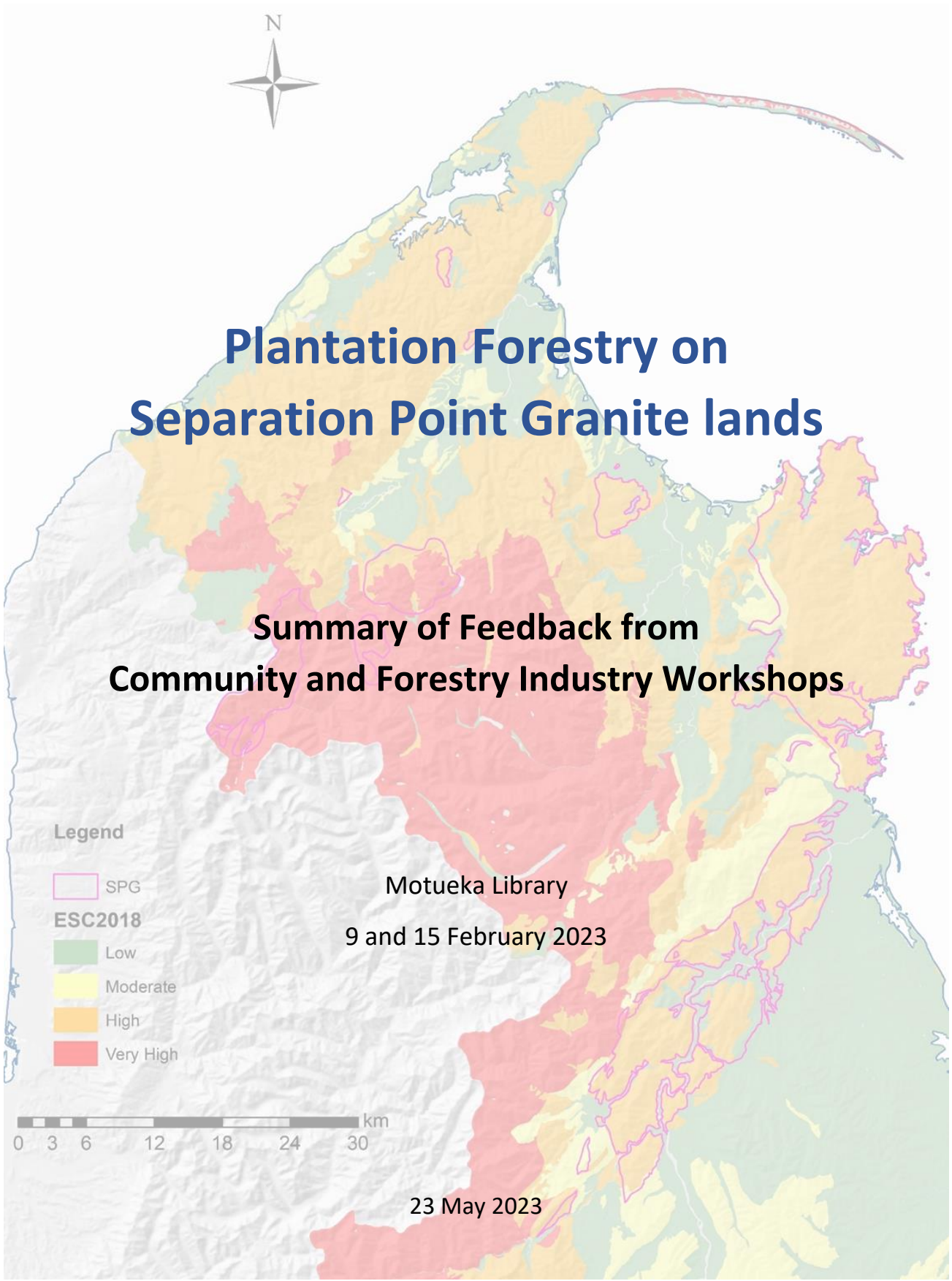
Very High

Motueka Library

9 and 15 February 2023

0 3 6 12 18 24 30 km

23 May 2023





Tasman District Council
c/o 189 Queen Street Private Bag 4,
Richmond, 7050 Phone: 03 543 8400
Email: environmentplan@tasman.govt.nz

Executive summary

Te Tai o Aorere/Tasman District has a lot of plantation forestry, and a large proportion of that forestry is on the unique Separation Point Granite (SPG) geology. SPG is known for having characteristics that make it difficult to work with. The environmental effects are managed through a combination of the National Environmental Standards for Plantation Forestry (NES-PF) and rules in the Tasman Resource Management Plan (TRMP). Areas of SPG geology are identified within the TRMP as Land Disturbance Area 2 (LDA2).

A review of the current TRMP regulatory framework, including environmental monitoring, indicates the wider community is not always getting the environmental outcomes they want. As part of this review, Tasman District Council staff held two workshops to gather perspectives from the forestry industry and community stakeholders on:

- their perceptions of the issues facing plantation forestry on SPG geology in Te Tai o Aorere/Tasman post Cyclone Gita; and
- what more stringent rules in a plan (as provided for under the NES-PF Regulation 6(3)(a)) might look like.

This report brings together a summary of participants' feedback from both workshops, along with a brief overview of the legal and policy context and the science presentations that provided background information to help focus the group discussions. The workshops form part of Council's engagement with industry and community to assist the development of updated plan rules for plantation forestry as provided for under the NES-PF. Ngā iwi o Te Tau Ihu will be engaged through a separate process, respecting their standing as manawhenua and upholding Council's obligations as Te Tiriti o Waitangi partners.

Dr Les Basher (EroSed Services) presented at both workshops, providing scientific context on:

- erosion in the New Zealand landscape and the Tasman district,
- characteristics of SPG geology,
- how trees influence slope stability, and
- the risks around post-harvest activities.

He also explored improvements to the management of risk in the context of the NES-PF, and potential tools to address the risks he identified.

An experienced facilitator ran the two workshop sessions using a participatory approach to ensure individual voices were heard. There was no attempt to reach a consensus position on issues or topics discussed. The workshop participants explored topics such as whether erosion due to plantation forestry activities is manageable. They also canvassed opportunities for improving management of risks including transitioning from *Pinus radiata* plantation forestry on SPG lands to indigenous, or other exotic species.

Themes emerging from the two workshops include:

- Support for a review of the TRMP policy framework for plantation forestry activities on SPG geologies to improve outcomes for the environment. A range of feedback included finding a balance between rules/consenting requirements and community support for increased permitted activity compliance monitoring.
- Support for a risk management framework to:
 - identify areas that could be retired from plantation forestry or are appropriate for replanting/afforestation; and

– identify vulnerable areas where management is required to minimise the risk of sediment, slash and debris mobilisation during storm events.

- The increasing effects of climate change and weather-related events and how this relates to SPG geology. Feedback highlighted the importance of where forestry activities are located, and that Council needs to address the risk to buildings that located in vulnerable downstream locations/on debris fans.
- Alternative management options were suggested such as small coupe harvesting, continuous cover forestry or use of alternative species.
- Acknowledgement that there are challenges/barriers to enable retirement of land from plantation forestry. Feedback included central Government regulatory and funding disincentives (such as emissions trading scheme liability), and that economic support is needed to transition to other land uses/covers as ongoing land management will be required.

This summary of feedback from the workshops will contribute to the development of an Issues and Options report on plantation forestry on SPG lands. That report will review the potential for developing revised rules that can be included in the new plan that will replace the TRMP. This is taking place during a period of change as the Resource Management Act 1991 undergoes reform. Also of note are the recommendations from 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' (*Outrage To Optimism* report, May 2023), and any consequential changes the Government may make to the NES-PF.

Contents

Executive summary	ii
Acronyms	1
1. Introduction	2
2. Purpose and format of the workshops	2
3. Background: Separation Point Granite	3
3.1. Legal and policy context	3
3.2. Science presentation	3
4. Industry workshop, 9 February 2023	5
4.1. ‘Top of mind’ matters	5
4.2. Discussion on the science presentation and workshop topic	5
4.2.1. Positive responses	6
4.2.2. Concerns raised	6
4.3. Options for minimising forestry impacts	6
4.4. Options to improve forestry management on SPG land	9
4.4.1. Government impediments	9
4.4.2. Risk management framework	10
4.4.3. Retiring land from plantation forestry	12
5. Community workshop, 15 February 2023	14
5.1. ‘Top of mind’ matters	14
5.2. Discussion on the science presentation and workshop topic	14
5.2.1. Positive responses	14
5.2.2. Concerns raised	15
5.3. Insights, comments, and questions	16
5.4. Ideas for transitioning from <i>Pinus radiata</i> on SPG land	18
5.5. Key messages for TDC	20
6. Close of workshops and next steps	22
7. Common themes from the workshops	22
8. Appendices	23
8.1. Appendix 1: Workshop participants	23
8.2. Appendix 2: Legal and policy presentation slides	25
8.3. Appendix 3: Science presentation slides	26

Acronyms

ESC	Erosion Susceptibility Classification
ETS	Emissions Trading Scheme
LCDB5	Land Classification Database (version 5)
LDA2	Land Disturbance Area 2 (in the Tasman Resource Management Plan)
NES-PF	Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017
NPS-IB	(Proposed) National Policy Statement – Indigenous Biodiversity (awaiting Gazettal)
SNA	Significant Natural Area
SPG	Separation Point Granite
TDC	Tasman District Council (or, Council)

1. Introduction

Tasman District Council staff held two targeted stakeholder workshops with the forestry industry (9 February 2023) and community stakeholders (15 February 2023) to gather their perspectives on plantation forestry land use on Separation Point Granite geology. The workshops shared knowledge from a soil and erosion expert, and explored the opportunity to consider whether further controls over and above those in the National Environmental Standards for Plantation Forestry (NES-PF) and the Tasman Resource Management Plan (TRMP) are needed for plantation forestry activities to improve outcomes for the environment. A review of the current regulatory framework, including environmental monitoring, indicates that the wider community is not always getting the environmental outcomes they want.¹

This report presents the participants' feedback gathered at the two workshops. A separate workstream will seek Te Tau Ihu iwi input on this issue and, together with the workshop information gathered, will be used to inform the forestry/land disturbance portfolios as part of the wider TRMP review work programme.

2. Purpose and format of the workshops

The purpose of the workshops was to consider opportunities for improving management of plantation forestry on Separation Point Granite lands in Te Tai o Aorere/Tasman. Representatives from the local forestry industry participated in one workshop, and local community members participated in another (see Appendix 1 for list of participants). At both workshops, participants were invited at the outset to share their 'top of mind' matters for discussion. Participants were encouraged to ask questions of clarification during the presentations.

Council staff opened the workshops by outlining the challenges and uncertainty associated with the changing legal and policy context – notably, the current reform of the Resource Management Act 1991. This was followed by a science presentation from Dr Les Basher (EroSed Services) that included information on:

- erosion in the New Zealand landscape and Tasman district
- characteristics of SPG
- forestry risks
- risk management under the NES-PF, and improving management of risk
- what "greater stringency" on SPG might look like.

A facilitated discussion followed wherein participants were asked to reflect on the science presentation and provide feedback on what resonated with them and what raised concerns. Further insights and questions raised were also recorded, along with any recommendations to the Council for improving current planning policies. There was no attempt to reach a consensus position between workshop participants.

This summary of feedback reflects the input of participants as captured in their own words – either written by them or scribed by the facilitator. A draft set of notes for each workshop was emailed to all participants seeking clarification/further explanation on some of the feedback provided, and responses were incorporated where these were provided.

¹ See: Webby, P. 2020. *Tasman Resource Management Plan Efficiency and Effectiveness Evaluation, Chapter 12: Land Disturbance*. TDC Report, 41pp. Accessible on the Tasman District Council website.

3. Background: Separation Point Granite

3.1. Legal and policy context

Council staff provided a brief outline of the existing legal and policy context related to plantation forestry management in Te Tai o Aorere/Tasman, and imminent changes to the resource management legislation in New Zealand (see presentation slides in Appendix 2).

Forestry is regulated in Tasman through a combination of rules in the TRMP and rules in the NES-PF. The NES-PF introduced a national set of standards for specified activities associated with plantation forestry. The NES-PF prevails over district or regional plan rules except where the NES-PF specifically allows more stringent plan rules (under Regulation 6). Of relevance to Te Tai o Aorere/Tasman, Regulation 6(3)(a) states that a rule in a plan may be more stringent than the NES-PF if the rule manages "...activities in any green, yellow, or orange zone containing separation point granite soils areas that are identified in a regional policy statement, regional plan, or district plan". Currently the TRMP includes earthworks rules for the area with SPG geology (known as Land Disturbance Area 2) that are more stringent than the NES-PF regulations. So, the TRMP rules effectively override the NES-PF in these locations. As part of the review of the TRMP, there is the opportunity to consider whether the rules for plantation forestry where it is being grown on SPG geology need to be revised.

In September 2019, Council resolved to undertake a full review of its resource management plans with the intention of replacing the current Tasman Resource Policy Statement and TRMP with a new combined plan – the Tasman Environment Plan. However, central Government announced in February 2021 its intention to repeal the Resource Management Act 1991 and replace it with three new pieces of legislation: the Natural and Built Environment Act, Spatial Planning Act and Climate Adaptation Act. Furthermore, a proposed National Planning Framework is intended to provide integrated direction on matters of national significance, bringing together all the national regulatory instruments under a single framework. At a regional level, Tasman District Council and Nelson City Council will be required to produce a combined resource management plan. The work programme to transition to the new legislation and develop a combined plan, once it comes into force, is yet to be determined.

The community workshop on 15 February was during the same period that Cyclone Gabrielle caused devastating impacts to the regions of Tairāwhiti/Gisborne and Hawke's Bay (12-16 February). Following the aftermath of the cyclone, a Ministerial Inquiry was held into 'land uses associated with the mobilisation of woody debris (including forestry slash) and sediment in Tairāwhiti/Gisborne District and Wairoa District' (See: *Outrage To Optimism* report, May 2023, 44pp).

3.2. Science presentation

Soil and erosion expert Dr Les Basher (EroSed Services) gave a presentation on **"Managing forestry on Separation Point Granite"** (see slides in Appendix 3).

Dr Basher's presentation provided the context for erosion in New Zealand as a whole and Te Tai o Aorere/Tasman specifically, and the purpose of his presentation was to prompt workshop participants to consider to what extent erosion resulting from forestry activities is manageable and how improvements to erosion management might be addressed. Dr Basher explained that Separation Point granites are deeply weathered, which has dramatically altered the physical and chemical properties of the granite and soils formed from it. There were attempts historically to farm the SPG land in the Tasman district, but due to the poor and infertile soils farming was difficult. Subsequently, large areas of steep, erosion-prone land were converted to forestry. Dr Basher

cautions that if we do not very carefully manage the weathered granites under forestry, then erosion by landslides and associated debris flows can be severe.

Key points raised in the presentation:

- We cannot stop erosion, but to a certain extent we can manage it.
- Sediment loads are significantly higher on pasture/grassland than forests (including both plantation forestry and native/regenerating forests).
- The large amounts of sediment delivered during high rainfall storm events mostly come from landslides and debris flows – and risk management needs to focus on those. Sheet and rill erosion produces less sediment in large events but is important in smaller events.
- Forestry has a risky post-harvest period (of approximately eight years) until forest canopy cover and root structure is re-established with a new crop. We can do better at recognising this risk and developing strategies to minimise it.
- There are a range of options for greater stringency on SPG land, including targeted restrictions on reforestation/afforestation for plantation forests as well as voluntary retirement and/or transitioning to natives or other species.

For Dr Basher, the key question is: “How do we best manage for the benefits of forestry while minimising the risk during and post-harvest?” He acknowledged that there will be a range of perspectives and aspirations for managing SPG land.

4. Industry workshop, 9 February 2023

This section sets out the feedback from the forestry participants as captured in their own words – either written by them or scribed by the facilitator.

4.1. ‘Top of mind’ matters

What is the most important thing you hope is discussed today?

The following responses were provided by participants:

- Climate change – the community understanding its effects.
- How do we change business-as-usual on steep, erosion-prone SPGs to retain the social license of forestry as we are faced with climate change and more cyclones? e.g., Ex-Tropical Cyclone Gita: Shaggery! Mārahau!
- Community perception of harvesting practice within Nelson/Tasman against the rest of New Zealand.
- Ensuring plantation forests are an accepted land use on granite soils.
- Getting the balance right: industry continues; protects the environment; community accepts and understands.
- Achieving a balance between regulation and community resilience (downstream).
- Clearer, relevant local policy and regulation.
- National Forest Industry setting changes and direction: change is needed.
- Practical and realistic goals for managing forests in SPG, including education.
- How do we better capture the experience/knowledge of practitioners?
- Granite Management Plan recognition: local best practice?
- Watercourse management, pre- and post-harvesting.
- Sediment control: how to minimise sediment run off. What are the options?
- What are the best ways to reduce sediment losses post-harvest?
- Better practices for slash management.
- How to retire areas that shouldn’t be in production forestry.
- Managed retirement of land that is not suitable for production.
- Reassess future harvest areas based on whether (or not) it’s suitable for replanting.

4.2. Discussion on the science presentation and workshop topic

Participants discussed opportunities for improving management of plantation forestry on SPG land in Te Tai o Aorere/Tasman, focussing on issues associated with erosion and sediment generation (e.g., landslides, debris flows and debris floods).

4.2.1. Positive responses

Following the science presentation, participants were asked what resonated positively with them:

- Provides scientific information for the community.
- Good technical analysis – TDC to use this – need more science rather than ‘perception’.
- The presentation put the issue of sediment levels into perspective:
 - where and what generated from;
 - change through time.
- The forestry companies doing mapping work and mapping landslide risk.
- Nice to see personal observations reflected in the data.

4.2.2. Concerns raised

Participants were also asked what areas of concern arose from the science presentation:

- Slash – definition of slash vs woody debris:
 - The term ‘slash’ is often referred to as being wholly responsible for problems – is this right? Slash is a result of harvesting. The public perception is that all woody debris is slash. Where does all the debris come from? What types of wood/species is included?
- The word ‘prohibited’ – rather than prohibited, forestry broadens to a land use restriction and refine the wording to “retirement from forestry”.
- “Small” coupe harvesting and continuous cover forestry:
 - struggle with this for *Pinus radiata* because of the practicality, but for other species (e.g., redwoods) yes, it’s possible;
 - in order to diversify species, we need to have this conversation;
 - the catchment area is important;
 - the size of the coupe is important;
 - need to explain and understand what this means and all the practical considerations and limitations – all the positives and negatives;
 - drop the qualifier “small” – it’s not about size, but more about topography.
- What does Council do, or will do, about buildings in risky downslope locations?
- What we can and what we can’t manage.

4.3. Options for minimising forestry impacts

Focussing on plantation forestry on SPG land, participants were asked:

If the goal is “To minimise the risk and impact of erosion, sediment and debris flows and debris floods”, then:

Where would you focus your effort? What do you think the ‘best’ option for improvement is?

Note that no collective criteria for what is ‘best’ was discussed. The exercise was to gather insights from participants about what they would focus on to change or do differently in forestry management to address the issues associated with erosion, sediment, and debris flows/floods.

Best options for improvement and for focussing efforts:

- 1) Decide which land is suitable, or not, for plantation forestry
 - Which land should be replanted?
 - How to transition to new land use/forestry type/permanent native forest, etc.? How to manage areas into retirement:
 - e.g., rotational;
 - noting that the Government is providing impediments and disincentives to this and needs to help.
 - Implications, e.g., Significant Natural Areas (SNAs).
 - Considerations:
 - location/soils;
 - native vs exotic species;
 - now and looking forward;
 - whole catchment scale;
 - how? e.g., poison?
- 2) Practicalities of addressing watercourse management and sediment loss/debris flow pre- and post-harvest
 - When harvesting, how do you minimise the risk of slash and debris flow mobilisation in weather/storm events?
 - We are good at engineering for small or planned events/standards but have an increasing number of cyclone and storm events – can't always manage for these.
- 3) Review the rules in the TRMP for SPG
 - Review and state how they can be improved.
- 4) Review where regulations and legacy issues are hampering improved management
 - Forestry is doing good stuff – needs compensating.
 - Government is providing a disincentive to change what we do today because for forestry planted pre-1990, have to replant for ETS benefits.
 - The Government decided to plant much of SPG for erosion control purposes in the 1970s, so the Government needs to be involved in the transition to something new if it is not going to be *Pinus radiata*. If it was easy, forestry would have done it already.
 - Regulation and legacy issues may lead to a “walk away” = “retired” approach:
 - risk is high – considerations around safety/cost/environmental/economics, e.g., market down.
- 5) Replace the ESC with a risk management framework
 - Motivated by social license and environmental impact.
 - Considerations:
 - tools/methods;
 - level of detail;
 - cost.

- Determining where harvesting is not economic or safe.
- For parts that are good to harvest, how to do risk management?
- Use risk management framework to decide where planting occurs.
- Not to regulate.

6) Alternative management options

- For example, small coupe/continuous cover, etc.
- Different crops.
- Considerations:
 - shareholders;
 - economics/cost;
 - when, where, how – what is suitable?
 - criteria – aims/what managing for?

7) Education

Education for public perception and understanding:

- Being judged on past practices prior to the NES-PF.
- What is ‘tipping’ public opinion? Can you influence this?
- Key messages, re:
 - legal definitions of slash and erosion;
 - economics – forestry reality;
 - water volumes and storms.

8) Industry

- Focus on adaptive management and continuous improvement.

9) Economics

- For all options, what needs to be considered from an economic perspective?
- Regulation is making plantation forestry uneconomic and therefore non-viable.

Arising from this discussion, the following five themes were offered for more in-depth discussion in smaller break-out groups:

- 1) **Education:** How do we improve public understanding and inform perceptions of plantation forestry?
- 2) **Harvesting:** When we harvest, how do we minimise the risk of slash/debris mobilisation in ‘storm’ events?
- 3) **Government impediments:** Identify the government impediments to ‘good practice’ and describe when/where/how government policy and regulation are causing poor outcomes.
- 4) **Risk management framework:** What is the aim? What is included? What support and tools are needed? How to implement it?
- 5) **Retiring land from plantation forestry:** What land should not be replanted or afforested in plantation forestry? Alternative options/consequences – how to decide and transition?

Further to that, participants decided to focus on three of these options; these being the last three listed above. The practicalities of minimising the risks of sediment and debris became part of the discussion on a risk management framework.

4.4. Options to improve forestry management on SPG land

Note that whilst this workshop focussed on improving management to reduce the generation and risk of sediment, erosion and debris from plantation forestry on SPG land in Te Tai o Aorere/Tasman, the ideas for improved land use and forestry management canvas matters that are nationally relevant and applicable.

The notes below were scribed in the break-out groups.

4.4.1. Government impediments

This break-out group discussed government impediments to improve forestry practices and recommendations for the TRMP:

- Inability to change from *Pinus radiata* to another forest type or to retire. Legislation doesn't encourage diversification.
- ETS carbon liability for changing from *Pinus radiata* to the likes of native species. There is a problem if you need to extend land to achieve harvest. A change in legislation could enable recognition of retirement for protection so that you're not liable.
- NPS-IB is going to make forest management more difficult. Any indigenous area that is habitat will become a SNA, therefore locking up land. This causes a loss of guarantee and ability to harvest as of right. Decreases investment confidence.
- Ministry for Primary Industries *One Billion Trees* monetary assistance wasn't enough to encourage a diversity of species.
- Councils push to create SNAs – creates future management issues.
- NES-PF and various interpretations and implementation of Schedule 6. For example, Marlborough District Council got around the NES-PF by defining large coastal areas – made it difficult.

Recommendations for the TRMP:

- If a forest management company adheres to the Granite Management Plan, then resource consent isn't required. Currently resource consent is required on SPG, but it just replicates the NES-PF.
- Land Disturbance Area 2 (LDA2) rules in the TRMP should be amended to include compliance with the Granite Management Plan as a permitted activity.²

² In the Tasman Resource Management Plan, Land Disturbance Area 2 encompasses all Separation Point Granite lands. Land Disturbance Area 1 applies to all other remaining lands within the Tasman District.

4.4.2. Risk management framework

This break-out group discussed a risk management framework and ways of minimising the risk of slash and debris mobilisation in storm events, with a focus on SPG land.

The group used a definition of slash as “processing material”, recognising that fine slash reduces the sediment leaving the site/hillslope and reduces the effects of rainfall such as channelling.

Good ways to manage slash were considered:

- Slash stockpiled and not over the side / edge of skid.
- Carted to stable sites daily:
 - consider how much time (e.g., two hours a day) is spent each day loading slash out;
 - \$120/hr + operator + cost of truck for cost of removing slash;
 - cost per tonne removed.
- Positives and negatives to costs:
 - if pushed over the bank, reduced recovery.
- In Cyclone Gita, slash didn't leave skids – it was the stuff in channels that left the site/was mobilised. There's a concentration of stuff (woody debris/slash) in the gully now. Falling machines can directionally fell trees to avoid slash in gullies.

Considering slash management upfront in the planning phase:

- Planning for the slash that will be generated so the manager knows how much, how to manage it and where it can go. This needs a whole plan.
- Skids – layout, siting, better storage.
- Ensuring the forestry crew is trained in how to manage slash is important.

Managing slash through harvesting methods:

- Two stages:
 - how material is managed over the site;
 - dephasing the material away from the skid is more cost effective.
- Make slash management easier right at the front end – once slash is over the side, it is expensive to recover. Then when rains, creates stream and flow path.
- Crews to stop harvesting after four hours of rainfall.
- Pulling over ground because don't want to damage biodiversity, but pulling through indigenous growth sometimes needs to happen.
- Perceived damage (e.g., hauler ropes coming down on native areas during the harvesting process) may not be as big as it looks. Ground methods cause more channel erosion.
- Reusing a past harvesting site can cause issues with slash that are not ideal.
- Consider the risk of fire generation in deep piles of slash.
- Health and safety costs – value of people less than costs.
- Health and safety: It's far more dangerous to pull stems along the ground as you need men on the ground, and you cannot use mechanical grapples. It also creates more soil disturbance.
- Fixed felling heads: shorter rotations lower the weight of the tree.

- If slash stays where it falls, it is mobilised by gully head erosion.
- How do we manage slash in deeply incised gullies?
 - more sizable riparian margins;
 - some methods are too risky;
 - pull what you can – it's not economic to remove everything;
 - steep, incised gullies are hard to clear slash from;
 - everything you do helps;
 - practices today are different to those used 20 years ago when foresters did not worry about how much debris was put in gullies during harvest. Harvesting methods have changed significantly over this time.

Post-harvest clean-up:

- Long term site stabilisation.
- Regular maintenance of water controls.
- Long established practice of using more corduroy on sites causes less damage to the soil surface.

Sediment management on SPG:

- High risk terrain and history.
- Flash floods lead to successive downstream flows.
- Use sediment retention engineered wetlands.
- Engineered environmental solutions – all have potential to become a dam and then burst.
- A bit of water plus a little slash plus a little dam – then it builds.
- Sediment period of exposed earth.
- Bunds stop what we do.
- Slash traps:
 - build slash traps; doesn't take a lot to trap/catch slash;
 - consider the topography – slash needs to be trapped at the bottom of the gully.

Risk management:

- Use an “adaptive management” approach; blanket rules are not helpful:
 - no “avoid” – it's not possible or practical on site;
 - want to avoid excess prescriptiveness in rules – rules take away innovation;
 - a lot of good practice is happening and is possible.

Risk management framework:

- ESC mapping is an improvement:
 - ESC – good practice in Golden Downs: two rotations.
- Need a planning tool and an operational tool, such as SxHxC.³

³ 'SxHxC' refers to slide 31 in Dr Les Basher's science presentation, i.e. “Improving management of risk”, where Risk = Susceptibility x Hazard x Consequences.

- Consider risk, consequences and mitigations – a spectrum from ‘walk away’ to replant in a different species. Concern over leaving *Pinus radiata* unharvested.

Recommendations that the forestry industry:

- Does continuous improvement: do what we can where we can.
- Understands social license.
- Accepts that there are some areas that will not be economic to harvest: markets dictate.
- Amount of ? to cut, re. establishing infrastructure – expensive: re-engineering is as costly as old.

4.4.3. Retiring land from plantation forestry

The third break-out group considered the option of retiring land from plantation forestry, recognising in some places production forestry is still failing communities even though foresters are following the NES-PF. The group asked: ***What land should not be replanted or afforested in plantation forestry?*** They also discussed what barriers there are to retiring land from forestry production and what support is needed to transition to other land uses/covers.

Initial discussion points included:

- Remnants are over-mature – not harvested. Leaving remnants does not always eliminate the risk.
- Trial study – what is the best way to retire land?
 - replanting in native is high cost and slow regeneration;
 - Douglas fir tends to fail in SPG;
 - Ligar Bay – redwoods a viable option? (interlocked roots).

Barriers to retirement from plantation forestry:

- Pre-1990 rules, re. carbon credits – Government barrier.
- Cost:
 - loss of revenue/opportunity cost;
 - no compensation.
- Risk of acting or not acting – a liability: both have consequences.
- Landowner interest and aspirations (multiple owners).
- Risk of additional regulation, e.g., SNA label.
- Risk of slope failure still present and plantation forestry still blamed.
- Long time frames.
- Future changes in land managers.
- Future changes in legislation.

What support is needed to change, i.e. to transition to retirement?

- Change the ETS – it doesn’t incentivise “right tree in right place”.
- Develop good council policy and rules that recognise risk to the community, e.g., houses on fans.

- Support from councils and supportive policy, not increased regulation:
 - For example, a recent resource consent (not a TDC consent) – spent hours writing the resource management application; it cost \$60k; and it made no material change on the ground because the conditions of consent are a replication of the NES-PF. That \$60k could be better spent on a retirement plan or a replanting plan or slash management.
- Enable landowners to make change: make the philosophy to incentivise and enable change rather than regulate.
- Government compensation: assist in the places where Government required that forestry be planted.
- Hill Country Erosion Fund partnerships.
- Produce science and/or other studies on the best options and tools.
- Provide risk management support tools.
- Allow damage to enable the change, therefore not damaged in the next rotation. For example, if there is an area that is difficult to harvest and an indigenous forest is damaged, allow that damage to happen on the proviso that the land is retired from plantation forestry after harvest and can revert to native vegetation.
- Wilding control in “retired” areas.
- Education on timeframes and realistic expectations.
- Willingness to change.

5. Community workshop, 15 February 2023

This section sets out the feedback from the community participants as captured in their own words – either written by them or scribed by the facilitator.

5.1. ‘Top of mind’ matters

What is the most important thing you hope is discussed today?

The following responses were provided by the participants:

- Understand what a well-managed Separation Point Granite catchment looks like.
- Reframe land management policy to mitigate/minimise/repair social and environmental damage arising from forestry on SPG.
- Government/council policies and actions/rules to control (or stop) and manage plantation forestry on SPG.
- Improved policy for forestry management.
- What are the appropriate rules for any plantation forestry on SPG land?
- Change harvesting method, X clear-fell.
- More effective controls on forestry.
- Enforcement of improved regulation compliance.
- Environmental impacts: monitoring + enforcement.
- Protection, timely remediation, accountability.
- The challenge of land use change.
- How do we unlock change in a 30-year crop cycle?
- Change/options to achieve positive environmental outcomes.
- Alternative forest management strategies.
- Stop planting pine trees on SPG – instead, plant natives.
- Real action: ban some areas from pine plantation? Need resilience.
- Practical solutions.

5.2. Discussion on the science presentation and workshop topic

Participants discussed opportunities for improving management of plantation forestry on SPG land in Te Tai o Aorere/Tasman, focussing on issues associated with erosion and sediment generation (e.g., landslides, debris flows and debris floods).

5.2.1. Positive responses

Participants were asked what from the science presentation resonated positively with them, and replied as follows:

- Presentations were informative and reinforced views I held already.
- Refreshing to see Council taking notice of community concerns.

- Danger points clearly identified as harvest time (30-year cycle) and matching with areas that economically and environmentally can't sustain forestry.
- Reinforced the feeling that pines should not be planted on SPG and, if they are, they should not be clear-felled.
- Importance of the location of commercial forestry plantation increases with increasing impact of climate change events. Need to focus on where it is appropriate to plant.
- Found the relationship between slips and rainfall intensity/hour very interesting.
- That industry realise that slips are coming from places other than earthworks is a significant change.
- ESC (in NES-PF) resolution and other failings make it a poor tool for managing forestry and the scale of plantation forests. Like the proposal for a risk management framework, which is more refined.
- Use of LCDB5 vs James, Roger and Claire's work⁴, which has more detail:
 - can understand use of LCDB5 nationally – would like to see version 'LCDB6' with increased detail.

5.2.2. Concerns raised

Participants were also asked what areas of concern arose from the science presentation, and replied as follows:

- That Tasman sediment loading is only slightly higher than pre-human levels is very interesting. Some questions around the accuracy of this:
 - Hicks's model doesn't align with sediment core. *Dr Basher's response – differing studies with different metrics.*
 - Scale and data – expect increased rates of sediment post Māori and European settlement.
- The definition of what is considered established/mature native:
 - Disagree with including regenerative native as established – need to separate out.
 - Regenerating vs established (e.g., 100+ years old) native – there is a big difference, e.g., in established native, there will be moss soaking up water.
 - Much of the Abel Tasman National Park vegetation is young/seral⁵ vegetation (40-50 years) in coastal areas, reverting from farming. The rest of the park/inland is more established – hundreds of years old.
 - LCDB5 – doesn't differentiate between native forest that is tall canopy and that which is scrub, e.g., mānuka and kānuka.
- Comparisons between tall/mature forest and farmland is unhelpful:

⁴ LCDB5 refers to Manaaki Whenua Landcare Research Ltd.'s Land Cover Database version 5. James *et al.* work refers to: 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. doi.org/10.33494/nzjfs502020x94x

⁵ A seral community is an intermediate stage found in ecological succession in an ecosystem advancing towards its climax community.

- It is deforested land: vegetation clearance and clear-felling are all forms of disturbance that result in no trees.
- Compare tall native vs deforested lands – a continuum from tall natives to deforested.
- Forestry infrastructure and associated slips:
 - What is the definition of a slip coming from infrastructure? How do you determine this and where the slip starts?
 - It appears (from local observation) that slips happen directly below cut-offs.
- For risk management applied to existing plantation forestry, where was this and how was it/is it to be harvested?
- Want to see data/information on landslips occurring between harvest on the same area to see whether improved practices are making differences (vs slope/rain, etc.).
- No information presented on alternative methods to clear-felling – want to discuss this.

5.3. Insights, comments, and questions

1) Legacy issue and questioning existing use rights:

- Frustration that we're still discussing the same issues decades on. There is a legacy issue of plantation forestry on SPG. The Government supported planting of pines, e.g., planted at school for Arbor Day. SPG should never be planted in pine trees.
- Working on this issue 30 years ago and now the Otūwhero forest is being harvested again, and being planted again now, which creates another 30-year cycle:
 - Question around 'existing use rights' for harvest based on intent to harvest at time of planting.
 - Part of the condition of consent to harvest can be a requirement to replant:
 - question: is this specific to *Pinus radiata* or can other species be used?
 - relationship between the lessee and landowner regarding replanting.

2) Transitioning from *Pinus radiata* to other species:

- Economic reality of transitioning people out of *Pinus radiata* and plantation forestry to replanting in other species (e.g., Iwi ownership through Treaty settlement).

Questions related to how to transition:

- Leave *Pinus radiata* and don't harvest?
- Harvest, then transition to a different species or permanent forest? What species is best?
- Work and management required to transition from plantation forestry to native, but once native is established no effort:
 - Need to have pest management as pigs, deer and goats will destroy the understory of regenerating or planted natives. Understory is needed for soil stability.
- Could have high-value species (including exotics: hardwood and/or softwood) mixed with native – transition over a long period, e.g., 80 years.
- Economic considerations – how to make money off native?

Other topics mentioned and questions raised in the workshop, primarily during the presentations:

- Steep hill country with certain geology – need to decide suitable land uses.
- Human activity in flood plains – where we live and build?
- River management – what can we manage?
- Impact of riparian planting, wetlands, etc.:
 - Depends whether it's on flat or steep land;
 - Good in small events, not in big events.
- Taking a long timeframe: big storm events have been happening throughout history.
- Where to focus the rules:
 - A focus on forestry infrastructure may not manage the bulk of landslides, e.g., Mārahau.
 - May be better to focus on clear-felling.
- Forested land has less sediment and fewer landslides than non-forested land.
- Need management of any species of trees – consider the options for transitioning through regeneration/post-harvest.
- Understand landslides better. In storm events, where are landslides occurring in relation to different vegetation cover:
 - Mature native vs regenerating native/scrub vs mature pine?
- Sediment load in large storm events:
 - To what extent is it acceptable?
 - To what extent can we manage it?
- What is the role of tree cover and how does it differ for:
 - species;
 - regenerative;
 - mature forest;
 - permanent forest?
- Assessing risk:
 - Risk = SxHxC (i.e. susceptibility, hazard, consequences) – what is considered in each?
 - To what extent is a risk acceptable, or not; manageable, or not?
 - Risk and assessing the 'window of vulnerability'. Consider past storm events, and what is predicted for storm events in the future, i.e. more rain volume and higher frequency.
- Regulation doesn't necessarily solve the issue – can work collaboratively to get better outcomes.

5.4. Ideas for transitioning from *Pinus radiata* on SPG land

In the context of plantation forestry on Separation Point Granite soils, participants were asked:

***If the goal is:
 “To minimise the risk and impact of erosion, sediment and debris flows and debris floods
 for the environment (freshwater and coastal marine area) and
 for people, property and infrastructure –
 What ideas do you have for transitioning from
 Pinus radiata plantation forestry to a desired future?”***

Note that no collective criteria for a ‘desired’ future or what would need to be considered was established; it was for individuals to determine this. The focus of this question came from the ongoing discussion around wanting environmental and socially sustainable outcomes, along with a consistent theme that *Pinus radiata* plantation forestry was not suitable on SPG soils. The exercise was to gather insights from participants about how they might get to a desired future and what that future might look like. Individual feedback has been arranged under common themes.

1) Differentiation of risk/hazard

- Work out what land should/should not be in productive use:
 - High risk = retire to managed native, non-productive species.
 - Medium risk = mixed exotic with or without natives – productive.
- None to involve large clearcuts on orange land (i.e. deemed high risk in the Erosion Susceptibility Classification).⁶
- No externalised costs of forestry (e.g., costs from sediment).

2) Understanding risk

- Understand what the environment and the community can sustainably tolerate in terms of runoff and impacts.
- Need an understanding of risk at a site-specific level.
- High risk areas = permanent forest cover. No opinion on whether that is exotic or native – just needs to have less environmental effects.

3) Over time, strategically withdraw from the most susceptible and risky parts of the landscape

- Either allow it to revert or enhance it with native planting (non-productive use).
- Decisions on where to do this to be informed by high spatial resolution information and other objective criteria.

⁶ The NES-PF required a tool that took into account the risks of erosion, sedimentation and environmental harm associated with plantation forestry activities in each of the classification zones. The Erosion Susceptibility Classification (ESC) is a database and tool that maps classes of risk and was produced for the NES-PF by combining erosion severity potential identified in the New Zealand Land Resource Inventory (NZLRI) and the Land Use Capability (LUC) database, along with climatic data. The ESC tool supports councils and foresters in decisions on the level of risk associated with the NES, and it divides the New Zealand landscape into four erosion categories that are colour coded according to risk: green (Low) and yellow (Moderate) is land less likely to erode; orange (High risk) or red (Very High risk) is land more likely to erode.

- 4) Land managed in a way that reduces the magnitude and impact of damage
 - Good data, i.e. erosion data layers.
 - Continuous cover forestry – this would mean retirement of some forests.
 - Monitoring and enforcement.
 - *Pinus radiata* is fire vulnerable – consider more fire resilient species. (Note: so is mānuka and kānuka, but many others a lot less so).
- 5) Improved policy for forestry management practices
 - Such as plantations that were planted before 2018 without setbacks from waterways.
 - Improved ways of harvesting these, such as leaving the pines within setback areas and planting natives within these.
 - Relook at the setback requirements, which from my understanding are not currently required to be planted in natives.
- 6) To minimise erosion on SPG after harvesting
 - Plant in indigenous mānuka, kānuka, (gorse?), and “tall natives” e.g., beech, tōtara, rimu.
 - Develop as “managed retreat”, ETS or based on Government funding and risk management levels, including freshwater management policy.
- 7) If already planted, harvest it responsibly, then replant in native with assisted funding
 - Could be joint funding between forestry and government.
 - Use the money made from plantation forests, when harvested, to establish native forest on SPG soils to partly fund planting of native species and ongoing care of them, including pest management.
- 8) Slope/risk assessment leading to retirement of high-risk slopes
 - Transition from a clear-fell cutting 30-year cycle.
 - Staggered planting regime with mixed species.
 - Plant a range of natives on risky slopes, including black and hard beech. Beech grows phenomenally fast and deer don’t eat it.
 - Undertake pest control, especially deer, pigs, goats.
- 9) Transition out of *Pinus radiata* on SPG
 - Transition to mixed land use: plantation forestry retirement to natives.
 - Government subsidies for forestry companies to retire forests for permanent old growth native regeneration, and other exotic mixed species planting (for carbon credits) with pest control and alternative methods of harvesting –
 - not clear-fell;
 - single tree selection;
 - closed canopy – small coupes.
- 10) Other points raised:
 - *Pinus radiata* and Douglas fir are invasive weeds, so should not be used.

- To increase biodiversity, need more than a monoculture.
- More work needs to be done on land use suitability and alternative species for production forestry.
- Managed transition to mixture of native and exotic.
- Stagger harvest of current pines while planting lasting species on slip prone areas, adding higher value trees as you go.
- Get support for processing infrastructure for milling and sales, and costs to transition to mixed exotic hardwood, and coppicing, with native forest, for carbon income and high value wood.
- Retire steep higher slopes and riparian strips, and plant with natives.
- Compliance with existing rules – funded by forestry companies. Also, there should be a levy for wilding pines.
- Research on alternative harvesting methods.
- Foster alternative uses of slash.
- No more clear-felling.
- Support for sediment ponds and actions that retain sediment on land.
- Mitigate debris flow down the streams to remove logs before they block bridges and do most damage.

5.5. Key messages for TDC

1) Concern that TDC is not taking timely action

- TDC to give reasons why the Council appears to be slow in putting stringency rules for plantation forestry on SPG soils. What are roadblocks to getting planning actions?
- This is an important issue that community has wanted to be addressed for decades. Don't let planning uncertainty delay doing something.
- If there is consensus between foresters and the community, then this issue could go through a plan change relatively quickly.
- People affected by Cyclone Gita have been talking to TDC a lot and nothing is happening.

2) Central and local government reluctant to fund more research and tools

- Concerned that local government have issues with funding and retaining staff.
- Central and local government are highly resistant to funding the tools and research needed to do the work.
- Central government – research and funding tools:
 - Some work (e.g., Farm Environment Plans produced by approved consultants) is being done for pastoral catchments, but this is not NZ wide. This work is needed to support landowners.

3) Rule review needed for forestry on SPG

- What are the rules and are they working?
- Current rules might be adequate/appropriate.

4) Better resource monitoring and compliance

- Monitoring and enforcement are as important as having good rules.
- What is happening on SPG? Is it fully compliant with current rules?
- Is the Council adequately resourced to do monitoring and compliance?
 - What resource is TDC putting into monitoring and compliance of forestry on SPG?
 - Need to feed through to the Council funding round/Annual Planning.
 - Forestry industry to cover the cost of monitoring and compliance – they do for NES-PF.
- Monitoring of permitted activities needed:
 - TDC only responds to complaints.
- It seems obvious that there are visible impacts in waterways (e.g., colour and clarity) after rain events.

Ideas for TDC to follow-up:

- Ensure that the ideas discussed in this workshop are shared with iwi as primary landowners of forestry.
- Can we also share this information/presentation with the Motueka Forestry Working Group? And/or have a similar workshop for the Motueka Catchment Group?
- Interested in having a meeting with members of the forestry industry and local community in the same room.
- Council could undertake a targeted plan change, ahead of the wider TRMP review process, to address the SPG/forestry issues discussed at the workshop.
- Take the opportunity to send a combined paper (i.e. this summary of feedback report) from the forestry industry and community workshops to the Ministry for Primary Industries.

6. Close of workshops and next steps

At the close of the workshop, participants were invited to share any final thoughts on the workshop. Feedback at both meetings was positive. Both workshops concluded with Council staff outlining what would happen next.

Following the workshops, the intention is to prepare an Issues and Options paper for plantation forestry for SPG lands. While there are uncertainties with the timing of the plantation forestry policy work programme (largely due to the resource management system reform), staff emphasised that there will be opportunities for the wider community to provide input in the future as the work progresses.

7. Common themes from the workshops

Following the workshops, Council staff analysed feedback from the two workshops and identified the following themes common to both. For example:

- Support for a review of the TRMP policy framework for plantation forestry activities on SPG geologies to improve outcomes for the environment. A range of feedback included finding a balance between rules/consenting requirements and community support for increased permitted activity compliance monitoring.
- Support for a risk management framework to:
 - identify areas that could be retired from plantation forestry or are appropriate for replanting/afforestation; and
 - identify vulnerable areas where management is required to minimise the risk of sediment, slash and debris mobilisation during storm events.
- The increasing effects of climate change and weather-related events and how this relates to SPG geology. Feedback highlighted the importance of where forestry activities are located, and that Council needs to address the risk to buildings that located in vulnerable downstream locations/on debris fans.
- Alternative management options were suggested such as small coupe harvesting, continuous cover forestry or use of alternative species.
- Acknowledgement that there are challenges/barriers to enable retirement of land from plantation forestry. Feedback included central Government regulatory and funding disincentives (such as emissions trading scheme liability), and that economic support is needed to transition to other land uses/covers as ongoing land management will be required.

8. Appendices

8.1. Appendix 1: Workshop participants

Industry representatives from the following organisations participated in the workshop held at Motueka Library on **9 February 2023**:

Name	Role and organisation
Brendan Horrell	Regional Development Manager, IFS Growth Ltd.
Craig McMiken	Director, Tasman Forest Management
Gary Brown	Harvest Planner and Engineer, OneFortyOne Ltd.
Hamish Berkett	Harvest infrastructure, Tasman Pine Forests
Heather Arnold	Environment Manager, PF Olsen
Jo Field	Environment Manager, OneFortyOne Ltd.
John Jamieson	Operations Manager, Moutere Logging Ltd.
John Webster	Harvesting Manager, Tasman Forestry Management
Marianne Brooks	Resource consent consultant, Berkett Contracting
Mike Fahey	Forestry Division Manager, Taylors Contracting Co Ltd.
Pete Taia	Nurseryman, Westbank Natives
Rhys Barrier	Manager, Nelson/Marlborough Fish & Game Council
Siobhan Allen	Forest Estate Manager, M&R Forestland Management
Steve Chandler	CEO, Tasman Pine Forest
William Waldron	Director, C&W Logging Ltd.

* Note that whilst the workshop was intended for the forestry industry, there were two community organisation representatives who attended this workshop instead of the community workshop held on 15 February 2023 – likely because of a miscommunication around workshop dates. The facilitator checked that both the community representatives and the forestry industry participants were happy for all present to remain in the workshop. It was agreed that everyone was comfortable with that.

All community participants resided in the local area (e.g., Motueka Valley, Mārahau, Brooklyn, Shaggery, Waiwhero, Graham Valley, Orinoco). Community stakeholders from the following organisations participated in the workshop held at Motueka Library on **15 February 2023**:

Name	Role and affiliation
Annette Litherland	NZ Landcare Trust
Brad Chandler	Te Tau Ihu Forestry Management Advisor
David Ogilvie	Motueka Catchment Collective
Erena Wraight	Resident Peach Island
Fiona Nelson	Motueka Valley Association
Gary Rae	Resident of Mārahau and member of Mārahau Ratepayer Assn.
Helen Forsey	Ranger, Department of Conservation
Helen Lindsay	Otūwhero Trust and Project Janszoon
James Griffiths	Motueka Catchment Collective
Matt Clapshaw	Mārahau Ratepayers Association
Roger Gaskell	Otūwhero Trust
Roger May	Forest consultant
Sebastian Den Doncker	Resident, Motueka Valley
Sky Davies	Manager, Tasman Environmental Trust

Tasman District Council staff who attended one or both workshops:

Name	Role	9 Feb	15 Feb
Andrew Smith	Communication specialist contracted to TDC (audio visual recording)	x	x
Barry Johnson	Environmental Policy Manager	x	
Diana Worthy	Team Leader – Natural Resources Policy		x
Glenn Stevens	Senior Resource Scientist – Natural Hazards		x
Pauline Webby	Policy Planner (workshop organiser)	x	x
Sam Ashley	Law student – TDC summer intern (assisting facilitator)	x	x
Warren Galbraith	Compliance and Monitoring (forestry)	x	

Non-TDC scientists and the independent facilitator:

Name	Role	9 Feb	15 Feb
Dr Chris Phillips	Senior Researcher (soils & landscapes) – Manaaki Whenua Landcare Research Ltd.		x
Dr Les Basher	EroSed Services, Nelson (science presenter)	x	x
Rochelle Selby-Neal	Independent facilitator, RSNC	x	x

8.2. Appendix 2: Legal and policy presentation slides

Presentation by TDC staff: Pauline Webby, Barry Johnson, Diana Worthy.

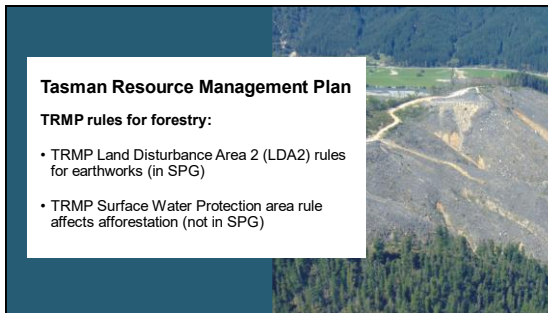
Slide 1 (of 6)



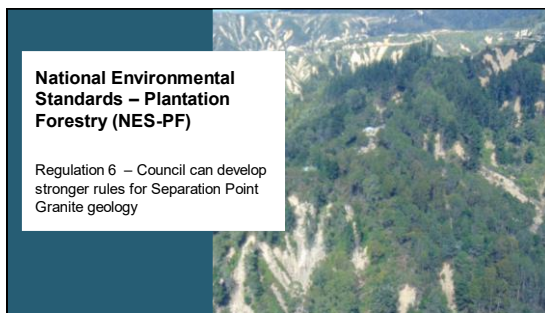
Slide 2



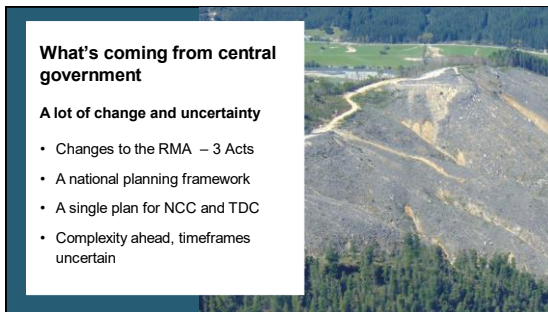
Slide 3



Slide 4



Slide 5



Slide 6



8.3. Appendix 3: Science presentation slides

Presentation by Dr Les Basher, EroSed Services.

Slide 1 (of 41)

Managing forestry on Separation Point Granite

1. **Context**
 - Erosion in the New Zealand landscape
 - Erosion in Tasman district
2. **Characteristics of Separation Point Granite (SPG)**
3. **Forestry risks**
 - How do trees influence slope stability?
 - What happens when the trees are harvested?
4. **Risk management**
 - National Environmental Standards for Plantation Forestry (NESPF)
 - Improving management of risk
5. **What might "greater stringency" on SPG look like?**

Slide 2

Key messages

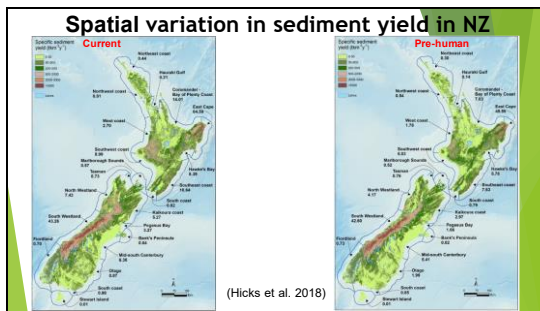
1. Erosion is a natural feature of the NZ landscape
2. We can manage erosion to a certain extent
3. Forestry has a risky post-harvest period
4. We can do better at recognising this risk and developing strategies to minimise it

Slide 3

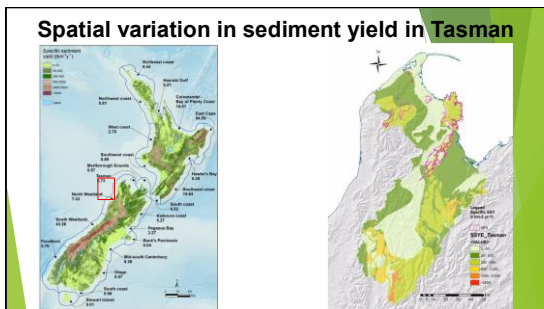
Erosion in the NZ landscape

- NZ produces ~1.7% of the sediment load to the world's oceans from <0.2% of the land area
- This is primarily a result of:
 - geology/tectonics
 - steep slopes
 - high rainfall
- Land cover/management tends to be a secondary influence
- Erosion and sediment yield is highly variable spatially

Slide 4



Slide 5



Slide 6

Characteristics of granite

- granite is a coarse-grained igneous rock
- granite properties
 - sand sized grains
 - hard
 - strong
 - stable

(e.g. Fiordland)

Slide 7

Characteristics of SPG

- In the Tasman District, the granite is typically deeply weathered.
- Weathering reflects a long history of land stability.
- As a result, it:
 - loses a lot of its strength
 - produces coarse, sandy sediment
 - is prone to landslides and debris flows, gully, rill and surface erosion.
- Requires careful water management, erosion and sediment control.

Slide 8



Slide 9



Slide 10



Slide 11



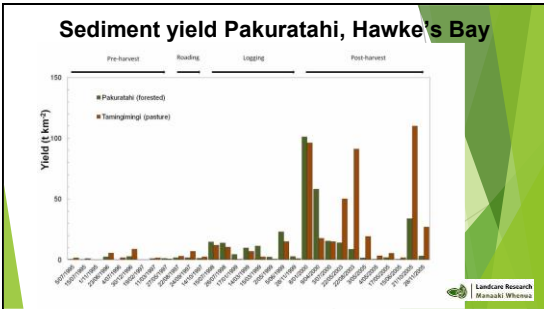
Slide 12

Forestry risks

For ~25 of the 30 years of a rotation, plantation forestry produces very low sediment yields.

For several years, during and post-harvest, yields are elevated significantly.

Slide 13

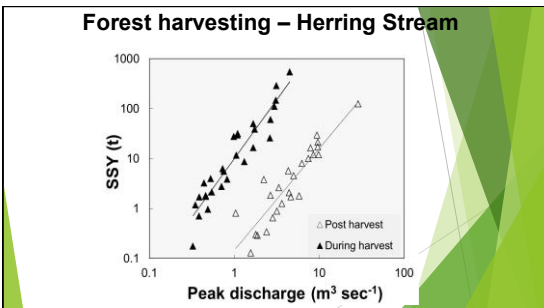


Slide 14

Key results from the Pakuratahi study

- Over the full rotation, it was estimated that the pasture catchment produced 2-3 times more sediment than the forested catchment.
- Loads from both catchments were generally much higher in the post-harvest phase because of greater storminess, illustrating the dominance of rainfall in controlling sediment generation and the impact of harvesting.

Slide 15



Slide 16

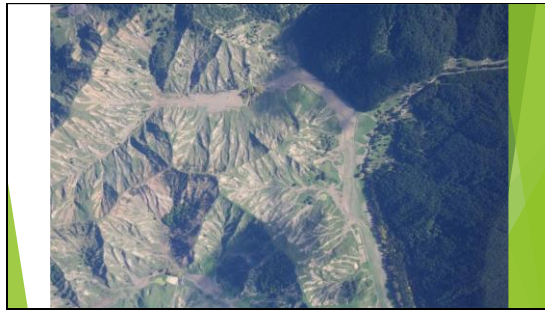
Mature forest effects

- In large storms, mature forests typically have 70 –90% less landsliding than grassland.
- Small forested catchments yield 50 –90% less sediment than pasture catchments.
- Earthflow movement rates under grassland 10x higher than forest.
- Planting of forests has been widely used to control landslide and gully erosion (e.g., ECFP).

Slide 17



Slide 18

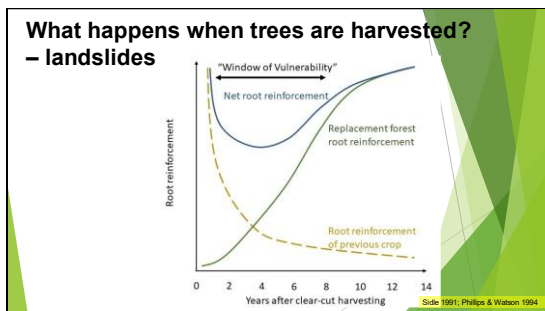


Slide 19

What causes the slope stability effects of mature trees?

- A closed tree canopy intercepts and evaporates rainfall and soil moisture.
- Roots mechanically reinforce slopes.

Slide 20



Slide 21

What happens when the trees are harvested – other effects

- When forests are harvested, soil disturbance increases:
 - construction of roads and landings
 - surface soil disturbance through harvesting and mechanical land preparation.
- Slash is produced and can be mobilised by landslides/debris flows.
- Runoff increases:
 - bank erosion can increase.

Slide 22

Slash/debris flows

- A little bit of residual slash is good for:
 - organic matter return
 - nutrient cycling
 - surface soil protection
- But too much slash can create large off-site problems in big storms which produce landslides and debris flows.

Slide 23

Landslide sources

The severe off-site effects are mostly due to landsliding and debris flows.

Landsliding has two sources

- the clear-cuts
- infrastructure (roads, landings)

Risk management needs to focus on landslides/debris flows.

Slide 24



Slide 25

What controls the response to rainfall events

Rainfall

- > total amount
- > intensity-duration-return period
- > area of storm
- > antecedent moisture

Erodibility of the underlying rock/soil

Topography

- > slope steepness
- > aspect

Vegetation

- > time since harvest
- > area harvested
- > tree density
- > species

Presser B, Massey C, Lukovic B, Debois S, Hill M 2020. Development of a rainfall-induced landslide forecast tool for New Zealand. In: Casaghi N ed. Understanding and reducing landslide disaster risk.

Landcare Research
Rangaki Whenua

Slide 26

Forestry risk management

So the real question is:

How do we best manage for the benefits of forestry while minimising the risk during and postharvest?

The NES-PF attempts to do this by:

- > an **Erosion Susceptibility Classification (ESC)** of the land that underpins the rule set for controlling forestry activities;
- > allowing for greater stringency in the rules on SPG.

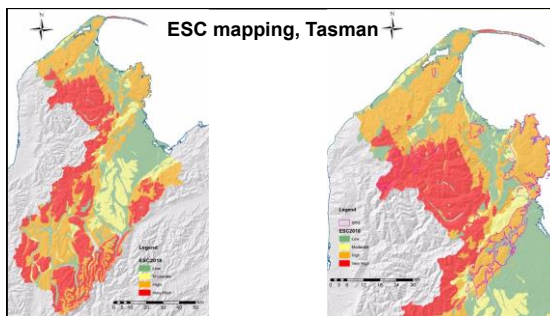
Slide 27

What's wrong with the NES-PF?

The ESC has a number of limitations including:

- its conceptual basis
 - > based on a poorly defined concept of "potential erosion"
 - > does not have a risk management basis
susceptibility → hazard → risk
- scale/resolution
 - > derived from NZLRI
 - > underlying mapping is 1:50,000 scale at best

Slide 28



Slide 29

ESC vs susceptibility & hazard mapping

In my view, the ESC cannot be usefully modified and improved.

It needs to be replaced with a risk management framework that can help us determine where greater stringency is required, and what that means.

Slide 30

Improved risk management

The major risks arise when large storms occur during the post-harvest "window of vulnerability".

Impacts result from:

- > sediment generation (especially from landslides)
- > slash mobilisation
- > debris flows

Slide 31

Improving management of risk

$$Risk = S \times H \times C$$

(Susceptibility x Hazard x Consequences)

These factors need to be evaluated independently and then integrated.

Slide 32

Recent work evaluating susceptibility

Methods are available for evaluating landslide and debris flows susceptibility.

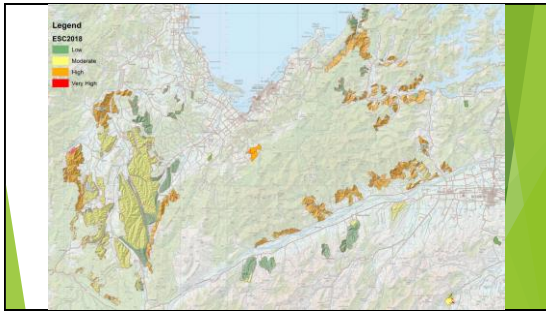
Landslide susceptibility was modelled and mapped

$$LS = f(\text{slope, geology, aspect})$$

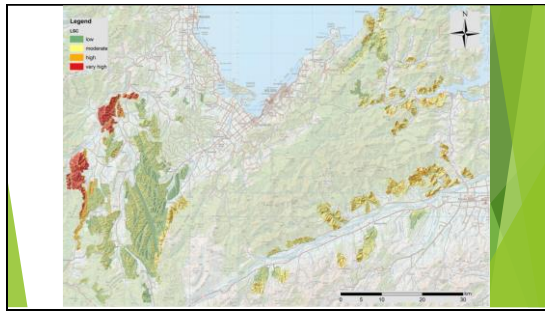
Connectivity also modelled and mapped.

Debris flow susceptibility modelled and mapped for catchments and associated fans.

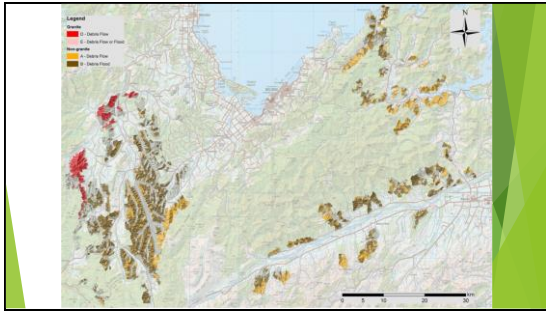
Slide 33



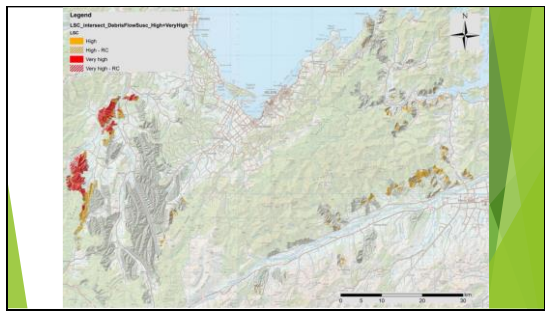
Slide 34



Slide 35



Slide 36



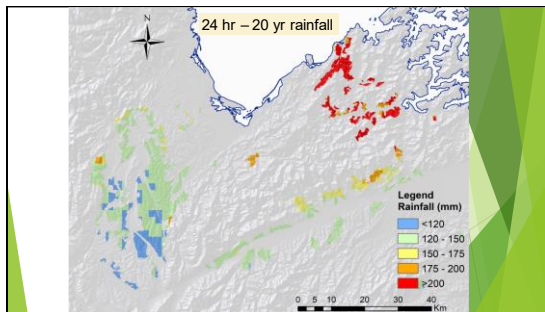
Slide 37

Rainfall hazard

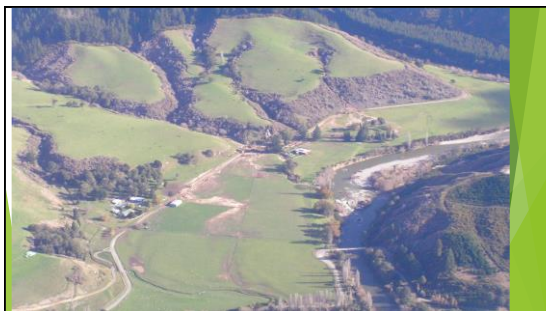
Data is available from NIWA to estimate spatial variation in rainfall depth-duration-frequency, and the effect of climate change on these statistics.

Duration (hrs)	Return period (years)					
	2	5	10	20	50	100
1	13 – 30	17 – 39	21 – 145	25 – 52	30 – 62	35 – 69
12	47 – 109	61 – 141	72 – 165	83 – 190	99 – 225	111 – 253
24	62 – 146	80 – 189	93 – 222	107 – 255	126 – 302	142 – 339
48	78 – 185	103 – 239	120 – 279	136 – 322	160 – 380	177 – 427

Slide 38



Slide 39



Slide 40

- Options for greater stringency on SPG**
- -BAU
 - Targeted restrictions on reforestation/afforestation for plantation forest (including voluntary retirement)
 - Small coupe harvesting
 - Continuous cover forestry
 - Longer rotation species
 - Blanket prohibition of forestry
- We need to develop a consistent, defensible approach that can help with making decisions about where "greater stringency" on SPG is needed.

- Key messages**
- We can't "stop" erosion.
 - But we can manage erosion, to a certain extent.
 - Forestry has a risky post-harvest period.
 - We can do better at recognising this risk and developing strategies to minimise it.