

# Hill Country Erosion Fund Boost Year Final Report

Prepared by the Northland Regional Council

With contributions from Heather Taylor, Duncan Kervell, David McDermott, Beth Masser, and Justin Murfitt

Report prepared 26 June 2019 for the Ministry for Primary Industries

E koekoe te tūī, e ketekete te kākā, e kūkū te kūkupa.

*By appreciating all our voices, our different songs, we make good music for the future.* 

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# Acknowledgements

The Northland Regional Council (NRC) Hill Country Erosion Fund (HCEF) Boost Year, aka the A Team (A for afforestation), would like to thank the Ministry for Primary Industries (MPI)/Te Uru Rākau for supporting the Hill Country Erosion Fund (HCEF) Boost Year project. Their support was above and beyond the normal role as funder; they engaged closely in and collaborated on initiatives such as the regional afforestation hui held at Jet Park in Auckland, and other NRC-hosted events. Their guidance and comprehensive support has been the impetus we needed to complete this project.

Our thanks also go to the numerous consultants and contractors who "gave their everything" to support the HCEF Boost Year project. When we asked the hard questions, you answered. Without you, we could not have achieved such a good outcome for the Northland Region. Forgive us if we have inadvertently left anyone off the list of contributors — the following organisations provided rich and deep material for us to work with:

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- AgFirst (Bob Cathcart)
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- Te Puni Kōkiri
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- Tawapou Coastal Nurseries (Guy Bowden)
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- Jeff Martin

Last but not least, we acknowledge the faith of our mentor, Duncan Kervell. With his belief in our abilities, and his expert guidance, we have achieved a result for Northland we hope will e enduring.



# **Disclaimer Statement**

This report is designed to raise awareness and inform decision-making, to help minimise the negative impacts of and maximise the opportunities of afforestation in our region. The data have been compiled using the best available information and expert consultants, and should give a good indication of regional priorities. However, afforestation is a complex process which involves some approximation of the opportunities and barriers associated with putting trees in the ground.

In addition, many views are expressed in this report. Some of them may be contradictory to a degree. These views arise from many sources operating at many different levels in the complex social and cultural web that is Northland. As such, the views expressed in this report do not necessarily reflect the views held by NRC, any of its staff, or any other NRC representative.

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# Abbreviations

AFFCO Auckland Farmers Freezing Company ASPP alternative species to Pinus radiata CSSI compound specific stable isotope CBEC **Community Business and Environment Centre** CLT cross-laminated timber DIY do it vourself DOC Department of Conservation ETS **Emissions Trading Scheme** FEP Farm Environment Plan FIF Freshwater Improvement Fund FFA Farm Forestry Association FNDC Far North District Council FOMS **Forest Owner Marketing Services** GIS geographic information system HCEF Hill Country Erosion Fund HEL highly erodible land IRR internal rate of return LIDAR light detection and ranging LMA land management advisor LMG Land Management Group LUC land use classification MBIE Ministry of Business, Innovation and Employment MfE Ministry for the Environment MPI **Ministry for Primary Industries** NES-PF National Environmental Standards for Plantation Forestry NGOs non-governmental organisations NES-FW National Environmental Standards for Freshwater NPS-FM National Policy Statement for Freshwater Management National Policy Statement for Indigenous Biodiversity NPS-IB NRC Northland Regional Council NWC Northland Wood Council NZARM New Zealand Association of Resource Management NZFS New Zealand Forest Service



- NZIF New Zealand Institute of Forestry
- NZPPI New Zealand Plant Producers Incorporated
- NZU New Zealand Unit
- RMA Resource Management Act 1991
- ROI return on investment
- SHaRP Sustainable Hill Country and Regional Priority
- GWRC Greater Wellington Regional Council



# **Executive Summary**

# Background

Northland Regional Council's (NRC's) Hill Country Erosion Fund (HCEF) Boost Year project ran from October 2018 to June 2019. The project was jointly funded by NRC and the Ministry for Primary Industries (MPI). Its purpose was to provide a rapid stocktake of the opportunities and constraints for afforestation and forest management across the Northland region.

The HCEF Boost Year final report is designed to be an in-depth but accessible resource for all parties involved with land management and forest establishment in Northland — from regulators through to landowners. It is also designed to inform NRC's future operations — including the newly funded Sustainable Hill Country & Regional Priorities (SHaRP) project (2019 – 2023) and the proposed Northland Afforestation & Reforestation Strategy — and to contribute to partnership projects involving afforestation in the region.

# **Our Achievements**

In the past 7 months, discussions, facilitated forums, in-house and commissioned research has included:

- identifying priority catchments through a local, regional and national lens
- establishing regional priorities for erosion control
- updating soil conservation research
- building engagement with iwi and hapū
- identifying indigenous biodiversity priorities
- organising a stocktake of historic and current afforestation activities
- developing a prototype nursery accreditation scheme and testing the idea on industry representatives
- clarifying the regulatory framework governing plantation forestry, including the ETS
- developing a one-stop-shop database of Northland nurseries, seed collectors, forestry advisors, wood buyers and harvesters for landowners
- investigating the pros and cons of the native plantation forest registration process, and the social license needed to grow native trees for harvest
- developing innovative digital tools for land management and forest establishment
- learning lessons from other HCEF regions via expert and national afforestation hui hosted by the NRC
- collating and refining afforestation good practice for Northland, with consideration of looming climate change pressures



- scoping potential markets for alternative timbers and uses for trees, including forest understory species
- planning future stakeholder engagement and communications about land management
- coordinating the planting of 2,500 poplar and willow poles, and 20,000 native trees

# **Internal Collaboration**

The HCEF Boost team worked closely with other NRC departments to ensure existing knowledge and research were considered and well aligned. The internal technical advisory group included Land Management, Biodiversity, Biosecurity, Māori Engagement, Monitoring and Consents, Strategy, Communications and GIS departments. The high level of collaboration achieved to date has opened new channels of communication and encouraged cross-discipline teamwork within NRC.

# **External Partnerships**

Our external partners were consulted at hui and different forums; they provided a diverse range of inputs throughout the Boost Year. These parties' future collaboration is crucial in creating a broad and effective Regional Afforestation Strategy (pending application approval). Key project partners are:

- Department of Conservation (DOC)
- Northland Wood Council (NWC)
- Te Puni Kōkiri (TPK)
- MPI & Te Uru Rākau
- Reconnecting Northland
- Tai Tokerau Māori Forestry, Inc.
- Tane's Tree Trust (TTT)
- Trees that Count
- the Far North District Council (FNDC)
- the New Zealand Farm Forestry Association (NZFFA)
- QEII National Trust
- the Ngā Whenua Rāhui (a DOC funding programme)
- other regional & local authorities
- local and national industry representatives



# **Expert Advice**

Numerous contracts were initiated through the Boost Year, which saw NRC engage with local industry experts across a wide range of forest and land management topics. These consultants produced a highly informed, deep analysis of issues and opportunities. Their reports can be found in the final report appendices, and a list of contracts can be viewed in the "Report Structure" section of this document.

Refining and mapping of regional afforestation priorities/opportunities and constraints was undertaken at a catchment scale by our team, with input from land management experts. Doubtless Bay catchment was used as a test case to spatially identify and record these factors. This pilot exercise may in time inform strategic land-use planning and forest design across the region, and will continue to be developed under NRC's proposed land management programmes and partnership projects (Ministry for the Environment [MfE] Freshwater Improvement Fund [FIF] and HCEF SHaRP project).

## **Engagement with Mana Whenua**

The HCEF Boost Year research identified a solid level of engagement by Māori landowners with NRC Land Management Advisors (LMAs), especially via advisory services and farm environment plans (FEPs cover 22,000ha [18%] of Māori-owned land). The project also highlighted NRC's lack of a formally structured approach to Māori engagement for land management staff. We recognised a need for a whenua Māori-focussed training for our Land Management Advisors, which will be designed as a pilot from late 2019.

There are a large number of iwi involved with commercial forestry in Northland; they are well represented in industry up to the governance level and are generally supported by the private sector. Smaller whānau and hapū groups with freehold land represent significant allies for achieving regional sustainable land use goals, particularly indigenous afforestation. These groups are at varying "levels of readiness" to engage with NRC on afforestation and other land-use issues, partly due to complex, shared-ownership models (and related financial & administrative structures) prevalent on whenua Māori in Northland. These factors reinforce the importance of fostering NRC and partners' working relationship with Te Puni Kōkiri, and of our shared responsibility in helping Māori landowners fulfil their vision for their land. NRC's role as a culturally aware, reliable and trusted technical advisor on sustainable land use is integral to building lasting relationships with tangata whenua.

# **Building Industry & Landowner Support**

Overall, the commercial forestry sector is fully aware of, and engaged with, the afforestation opportunity. The Northland Wood Council (NWC) is keen to continue to work alongside NRC and partners to build regional successes and alliances — including collaboration on skills, capacity and capability building, and forest management extension services. Discussions around best practice forest management and sustainable design are ongoing. The forestry sector is very important to Northland's economy and has been managing high-quality forests for decades, though planting rates have ebbed and flowed over the years. Currently, there is an



upsurge in activity, with a number of parties engaging in opportunities such as One Billion Trees — from iwi trusts to individual landowners. As with all good land management, assessing approaches to plantation afforestation on a case-by-case (farm-by-farm) basis, whilst understanding wider catchment impacts, will deliver the best results.

During the Boost Year project, 17 nurseries provided data for a targeted survey, which showed that around 10 million trees are currently produced per annum in Northland. Critical issues for Northland's 31 plant nurseries are thought to be similar to those across New Zealand. For example, the approach of pre-ordering plants for afforestation projects will help build business confidence to enable upscaling to meet demand. Ecosourcing of indigenous trees is viewed as an appropriate and effective measure that can help to facilitate afforestation good practice, especially in light of regional biodiversity goals. Agency support of local nurseries – and closer working relationships between agencies and nursery sector representatives – is key to successfully increasing the quantity and quality of forest establishment in Northland.

More collaboration is needed with the agriculture sector to promote afforestation, soil conservation, and sustainable land use in a shifting regulatory environment. This ongoing work will ensure that current information, skills, incentives (and hence motivation), and supply of materials will not become barriers to afforestation for rural professionals or landowners. A cross-agency "land-use toolbox" can be designed as a future one-stop-shop for landowners, providing easy access to funding options, accurate and up-to-date forest establishment costings, and clarity of agency roles/extension services available. Knowledge captured by NRC's Boost Year project, especially the "Afforestation Good Practice Repository" (to be made available online), represents a major contribution to this toolbox.

Landowners have voiced a number of barriers to afforestation on their land, such as taxation, Emissions Trading Scheme (ETS) complexities, and the shifting sands of the regulatory environment. They are operating in a rapidly changing landscape, with further pressure being applied to the agricultural sector through signalled changes to the National Policy Statement– Freshwater Management (NPS–FM) and the potential announcement of National Environmental Standards–Freshwater (NES-FW). Perceived instability has a direct impact on the uptake of afforestation, and will likely manifest in adjustments to NRC's SHaRP and Long Term Plan delivery over time. Trees represent a multi-generational investment in our land and communities, but such investment relies on a stable, long-term vision, as well as wise leadership from policy makers.

The effects of climate change on our landscapes and forests are also worthy of much greater assessment and action. Focussed research into this topic, specifically for Northland, should form part of a Regional Afforestation & Reforestation Strategy.

New Zealand Farm Forestry Association (NZFFA) member Michael Gravatt formally interviewed 13 farm foresters, and NRC held many informal discussions with members. Our team also attended the NZFFA National Conference in Rotorua. The NZFFA has provided a wealth of practical knowledge to the Boost Year project. Aligning this knowledge with NRC programmes will help build capability and capacity, thus assisting successful forest establishment on farms across Northland. This collaboration also ensures that decades-old afforestation wisdom can be passed down to future generations.



Finally, the HCEF Boost Year team coordinated the planting of approximately 20,000 native trees and 2,500 poplar and willow poles through 11 projects. These plantings contribute to the national goal of "planting the right tree, in the right place, for the right purpose" – and add to the millions of trees planted annually by councils, hapū, schools, community groups, foresters and many others.

Afforestation presents a significant opportunity to provide multiple benefits for Northland's biodiversity, water quality, soil conservation, economy and climate change response. Providing an accessible range of high-quality guidance to landowners in priority areas will be fundamental to maximising these benefits. The HCEF Boost project has provided invaluable insights into Northland's capacity to take advantage of afforestation initiatives. It has also identified a number of issues to be addressed if the opportunity is to be realised to its full potential.



# Progress Summary

## **Project Reporting**

For monthly project updates and the Interim Project Report (Milestone 5 – April 2019), see the "Dashboard", reference #A1136746.

## Project Summary, June 2019

NRC contracted over \$150,000 on consultants. Their backgrounds and expertise are wideranging. Their work includes:

- regional nursery stocktake
- investigation of a possible nursery accreditation scheme
- good practice native forest plantation
- forestry advisor and "do it yourself" (DIY) forestry stocktake
- forest establishment guidance (native and exotic)
- research on perverse outcomes of past afforestation in Northland
- building capacity to engage with tangata whenua
- the marketability of alternative exotic timbers
- good practice small woodlot management
- Emissions Trading Scheme (ETS) for small woodlots
- developing good practice guidelines to help DIY foresters adhere to regulations
- alternative uses for trees and understory mosaic forestry
- stakeholder interviews.

A summary of their work can be found in Table 1, in the "Report Structure" section.

We have also organised or convened several gatherings to build internal capability and to facilitate learnings from other Hill Country Erosion Fund (HCEF) regions. These meetings and group planning sessions focused on starting conversations about "the right tree in the right place for the right purpose". Afforestation gatherings for the 2018–2019 Boost Year include:

- our "Afforestation Expert Hui", 24 April 2019, attended by key Northland representatives from commercial forestry, MPI/Te Uru Rākau, DairyNZ, the Farm Forestry Association (FFA), and other influential stakeholders
- a mapping exercise modelling Doubtless Bay, 9 May 2019, to determine constraints and opportunities for afforestation on a catchment scale, attended by the Department of Conservation (DOC), the Far North District Council (FNDC) and internal experts



- the "National Afforestation Hui", 21–22 May 2019, which was attended by 14 of 16 unitary authorities/regional councils, Crown Research Institutes (CRIs) such as Scion, and the Central Government (Ministry for the Environment [MfE], the Ministry for Primary Industries [MPI]/Te Uru Rākau
- the June "Hill to Harbour" lecture series, which was attended by land management team members, external partners, chief stakeholders, and some of the wider Northland Regional Council (NRC) Environmental Services Group



# Context

## **Report Structure**

The Northland Regional Council (NRC) Hill Country Erosion Fund (HCEF) Boost team took a 7month journey. The contract with MPI was originally intended to fill 12 months of our time. We began on 12 November 2018.

This report will be structured according to the milestones agreed before our team convened to begin our HCEF Boost research contract, which was a journey for the team employed to deliver it. Milestone 5 is contained in the report appendices in a discreet folder titled "Dashboard Report". It is titled "Dashboard – Milestone 5 Hill Country Erosion Fund Boost Year".

Where possible, the content of this report is referenced to already published documents, or reports furnished by consultants we engaged to help us deliver the milestones.

Within a short time, we realised that the milestones overlapped to a great degree, and that milestone deliverables could be interpreted in a number of ways. This report describes each piece of work only once, even though the work may have bridged several milestones. Where possible, the overlap will be noted, but cross-referencing is not intended to be comprehensive.

Supporting documents are:

- Engagement strategy (A1136008)
- Iwi engagement strategy (A1157890)
- Stakeholder list by industry sector (A11304336)
- Live progress report dashboard (A1136746)
- Hill to Harbour lecture series (A1195705)
- National afforestation hui (A1195185).

All appendices to this report are collated in folders, and are not attached to the end of this report. They are organised by milestone. Subfolders in the milestone folders support subheadings in this report.

A summary of external consultation follows on the next page (Table 1).



| Торіс                              | Primary milestone    | Supplier                          | Document type                      | Document ID |
|------------------------------------|----------------------|-----------------------------------|------------------------------------|-------------|
| Farm forestry interviews           | M-03-1               | Michael Gravatt                   | Interview transcript               | A1191187    |
| Kiwi (ratites) in pine plantations | M-03-4               | Leslie Baigent                    | Report                             | A11783243   |
| Stocktake forestry advisors and    | M-03-4               | Margules Groome                   | Contract                           | A1171722    |
| DIY forestry                       |                      |                                   |                                    |             |
|                                    |                      |                                   | Report                             | A1191180    |
|                                    |                      |                                   | Forestry consultant database       | A1188018    |
| Native forest registration         | M-03-4               | Tāne's Tree Trust, Paul Quinlan   | Contract                           | A1173523    |
| Nursery and seed collector         | M-03-1 for database  | Tāne's Tree Trust, Dr. Jacqui     | Contract                           | A1173515    |
| database and accreditation pilot   | and M-03-4 for       | Aimers                            |                                    |             |
|                                    | accreditation scheme |                                   |                                    |             |
|                                    |                      |                                   | Anonymous survey                   | A1186838    |
|                                    |                      |                                   | Report summary (brief)             | A1201949    |
|                                    |                      |                                   | Full report                        | A1201947    |
|                                    |                      |                                   | Nursery-seed collector database    | A1186846    |
| Soil conservation stocktake        | M-02-1               | AgFirst, Bob Cathcart             | Contract                           | A1178664    |
| The Ngāti Hine story and           | M-02-3               | AgFirst, Bob Cathcart             | Contract                           | A1173636    |
| Engaging with Māori                |                      |                                   |                                    |             |
|                                    |                      |                                   | Report*                            | A1179800    |
| Lessons learned from past          | M-03-1               | AgFirst, Bob Cathcart             | Contract                           | A1173637    |
| afforestation Northland            |                      |                                   |                                    |             |
| Expert hui facilitation            | M-01-2               | Alternative Endings, Annette Lees | Contract                           | A1170233    |
|                                    |                      |                                   | Outcomes analysis                  | A1183792    |
| Alternative uses for trees and     | M-03-4               | Scion, Dr. Laura Holt             | Contract                           | A1186852    |
| understory plantings               |                      |                                   |                                    |             |
|                                    |                      |                                   | Report                             | A1199222    |
| Alternative exotic timbers, good   | M-03-4               | Dean Satchell                     | Contract                           | A1178348    |
| practice                           |                      |                                   |                                    |             |
|                                    |                      |                                   | Report                             | A1187536    |
|                                    |                      |                                   | Exotic species supplier's database | A1187539    |

#### Table 1. Summary of external work completed for the NRC HCEF Boost Year



| Торіс   | Primary milestone | Supplier   | Document type  | Document ID |
|---|-------------------|--|--|-------------|
| Alternative exotic timbers,<br>market viability study | M-03-4            | Forme, Paul McCreedy   | Contract   | A1178342    |
| Stocktake wood buyers and harvesters                  |                   | Forme, Paul McCreedy   | Contract   | A1179739    |
|   |                   |  | Report, step plan for forest<br>owners considering harvesting,<br>and map of Northland and<br>Auckland log processor and forest<br>locations | A1199360    |
| Stocktake small woodlots and ETS for woodlots         | M-03-1            | Forme, Paul McCreedy   | Contract   | A1173514    |
|   |                   |  | Report and embedded ETS fact sheet for landowners  | A1199667    |
| Good practice library                                 |                   | Jacqueline Brown (Rahui Gardens)<br>and Matthew Bauer (Clear Edit) | Online afforestation library   | A1191847    |
|   |                   | Rahui Gardens  | Restoration summary  | A1178786    |
|   |                   | Rahui Gardens  | Trees for Zones database   | A1178787    |
| Good practice regulations                             | M-03-4            | Brett Gilmore and Justin Murfitt                                   | Contract for Brett Gilmore**   | A1175897    |
|   |                   |  | Survey questions for forestry companies  | A1175925    |
|   |                   |  | Report and flow chart***   | A1186692    |
|   |                   |  | Small forestry company responses to survey   | A1183481    |
|   |                   |  | Northland Wood Council responses   | A1183480    |
| Coastal buffers                                       | M-03-4            | Tāne's Tree Trust  | Project update   | A1176000    |
| Climate change and afforestation, Northland           | M-03-4            | Scion  | Report   | A1165346    |
| Afforestation and historic sites                      | M-03-4            | Heritage NZ  | Report   | A1176531    |



| Торіс                          | Primary milestone | Supplier                         | Document type              | Document ID |
|--------------------------------|-------------------|----------------------------------|----------------------------|-------------|
| Contractors barriers and       | M-03-1            | Northland Vegetation Control     | Report                     |             |
| enablers                       |                   |                                  |                            |             |
| June lecture series: Upscaling | M-03-1            | Various suppliers                | Lecture recap              | A1201755    |
| internal capacity              |                   |                                  |                            |             |
| National HCEF workshop         | M-03-3            | Various councils, collaborators, | Summary of lessons learned | A1178830    |
|                                |                   | partners and government          |                            |             |
|                                |                   | agencies                         |                            |             |
| Edit final report              |                   | Matthew Bauer (Clear Edit)       | Final report to MPI        | A1202123    |
| Mapping workshop               | M-03-2            | In conjunction with FNDC, DOC    | Internal report            | ТВС         |

*Note*. All document files are held in NRC's document repository, Objective. The file path to locate HCEF Boost work is: Land and rivers > Land and Biodiversity > Projects > Plans and Strategies > Land and Biodiversity > Hill Country Erosion Fund > HCEF Boost Team.

\* Appendices 1–10 not listed.

\*\* Justin Murfitt is a strategic planner within NRC. He collaborated with Brett Gilmore.

\*\*\* Survey methodology not included.



## **Northland Contexts**

*"No future can be planned without being informed by the past. If we lose sight of our ancestors, we cannot respect our children."* — Ernest Morton, Chairman, Taitokerau Māori Forests (TMF) Inc.

### Beginnings

Northland a part of Te Tai Tokerau, which is covered by both Auckland and Northland unitary authorities. Te Tai Tokerau is the northernmost Māori electorate, and covers an area between Cape Rēinga in the Far North to a boundary cutting through West Auckland. Its southernmost delimitation is the Auckland Harbour Bridge. The electorate contains all of the Ngāpuhi, Te Aupōuri, Ngāti Kurī, Te Rarawa and Ngāti Kahu rohe, and part of Ngāti Whātua's rohe. Political boundaries aside, the words have come to mean "Northland" to the people who live here, as distinct from Auckland.

Te Tai Tokerau is framed by its heritage and is considered the "cradle of the nation". It was favoured by early Polynesian settlers when they landed 900–1,000 years ago because of its near-tropical climate. It was the first place the people called Māori today met Western voyagers. Significant pā still dominate the landscape, and it was here that early settlers developed intensive agricultural methods later transferred to other regions.

In the 1800s, a whaling industry developed in the Bay of Islands. Missionaries also arrived. The introduction of Christianity, European crops, and Western diseases (including thenincurable and lethal venereal diseases) created a volatile mix. Ngāpuhi was the only iwi with firearms, which led to the decimation of the other iwi.

Although the Treaty of Waitangi was signed in 1840, a vocal cross-section of Northland Māori still do not accept it as genuine. The battles with Ngāpuhi – subsequent to the signing of the Treaty once some indigenous leaders came to the realisation they had been duped, and following Hōne Heke's cutting down the British flag – were eventually won by the British, although narrowly. An uneasy quiet descended as Northland residents became busy extracting kauri gum and timber, farming, and ship-building (DOC, n.d.).

However, the effects of colonisation remain fresh today. Grievances remain because the history has been long, and Northland is one of the few regions where major Treaty settlements have not been concluded for some iwi. The economic and social effects of colonisation run deep in Northland, because the region was repeatedly settled and resettled. The longer history presents rich opportunities, too: Northland's Māori asset base was estimated at \$2.4 billion in 2012 and will continue to grow as Treaty settlements are finalised (Martin Jenkins, 2015). As such, it is important to remember our origins when we conduct any negotiations in the afforestation space.



### **Ghosts of Forestry Past**

### Demise of Kauri

By 1910, nearly 1,000,000 ha of kauri forests had been ransacked for timber and farming. A large swathe of the landscape had been burnt to make way for Western-style agriculture. Both timber extraction and pastoral farming of sheep and beef created an economic legacy that fully defines the region today.

Now the logging of kauri is finished, but pastoral farming cannot recreate the value in these trees. "Think Big" government policies came well before Robert Muldoon, and they led to a vicious circle of over-production and consequent over-heated competition, lowering the value of kauri and leading to over-extraction in the 1800s. Land was valued then without considering the value of kauri; for example, what is now Puketi Forest was sold in 1859 for \$840 because a year earlier, a Royal Commission had decided this price was fair. In those times, a hectare was worth \$0.15–\$0.30. By 1881, 40 sawmills in Te Tai Tokerau were producing 260,000 m<sup>3</sup> of sawn kauri per year, mills were flagrantly over-capitalised, and the resultant gross overproduction crashed timber prices. Lasting profits could not be made (Thode, 1983). More wood was burnt to waste than was used, as land settlement policies forced new farmers to burn valuable timber to fulfil their contractual obligations to the government.

The nation's biggest loss of forest ever recorded was in Northland. Puhipuhi kauri forest caught fire in 1887, which resulted in 11,900 acres of burnt kauri being withdrawn from the reservation in 1913. Converted to 2008 NZ dollar values, the loss equated to \$570 million. Fire as an agricultural clearance tool exacerbated erosion, which was made worse by cattle and sheep (Guild & Dudfield, 2010). The problem continues today.

In the second half of the 1800s, demand for timber was so high, other wood types were being imported into Northland at great expense. Exploitation was exacerbated by political instability: 27 governments in 37 years. Advice was given to various regimes to halt the removal of kauri by respected geologists and foresters – Ferdinand von Hochstetter and Campbell Walker – and by Commissioners of Crown Land, but they were all ignored. Conservation efforts were started in 1868 in Parliament by MP Thomas Potts, but a failed, weak Crown timber licensing system made these conservation efforts ineffective. By 1874 the first New Zealand Forests Act was passed. Eventually, in 1921 after the collapse of the kauri timber trade, the State Forest Service was formed via the Forests Act 1921 (Guild & Dudfield, 2010).

By then, it was too late for Northland. The government policy of fostering farming to substitute for timber did not work here, because most Northland soils are poor. Our kauri forests produced valuable foreign exchange that helped the development of other parts of the country but left us with gleyed nutrient-deficient soils, unsuitable in the main for agriculture, and a poor infrastructure, the direct result of the boom and bust kauri trade. Any soils under kauri for thousands of years are depleted (Bob Cathcart, AgFirst, personal communication, 8 January 2019).



The boom-and-bust mentality was culturally embedded in the colonisers. The British of the 1800s had poor or no forest policies at home and applied a "no State forest" policy in New Zealand when they arrived. But the extant of the kauri was so great that the German model of sustained, controlled and selective logging could have been possible.

### New Zealand Forest Service Legacy

Today, DOC reserves in Northland include parts of Omahuta, Waipoua, Warawara and parts of Puketi. The only reason they are public conservation land now is that they could not be sold for timber in 1919, even though the sale was held open for 2 years, because by 1919, the kauri still left standing were inferior. No bids meant they could be cleared for farming as provision State forest. Research conducted on kauri in the 1920s came to a halt by 1933 because of troubles with the research leader, Arnold Hansson, who probably suffered from Asperger syndrome. Despite these failures, it took a fight just after WWII to turn Warawara into a sanctuary, and the debate raged for several years, until 1951. What we take for granted today was by no means certain in the recent past.

Throughout the first half of the 1900s, settlers had been gradually giving up in Northland as they discovered that the soils were too podzolised to farm, and areas reverting to fern and scrub were snapped up by the New Zealand Forest Service (NZFS) and the Lands Department for exotic afforestation – mainly *Pinus radiata* but also many failed experiments with other species – and in some instances, sustained effort to convert to agriculture. *P. radiata* plantings were nearly abandoned, however, because soils were so poor, until after WWII, when fertiliser use became the norm. Other pines were trialled, including *P. elliotti, P. taeda, P. palustris* and *P. pinaster* (Thode, 1983).

Still, kauri were felled and sold until 1973 (Thode, 1983). In Puketi, selective logging occurred until kōkako were found in the forest in 1979. In 1983, the NZFS Kauri Management Unit was still of the opinion, based on resource data collected, that an annual sustained yield from kauri forests in Northland in the long term was somewhere in the region of 12,500 m<sup>3</sup> per annum (Thode, 1983).

Failure of *P. radiata* and the other species despite fertiliser use (perhaps exacerbated by less than adequate application) then caused an interesting policy decision by the NZFS. They decided not to acquire land in Northland for forestry, despite land prices being low and plenty available where settlers had given up on farming. The policy remained through the 1960s, which is why Northland has experienced fewer rotations of pine forest than in other parts of the country. This lack of early investment was probably wise, but it exacerbated the region's economic woes. The gem that is now Glenbervie Forest won out over policy and was planted in 1947. Today, it features the best pine timber grown in the country.

In the early 1960s, Aupōuri Forest was established when foresters realised the value of pines in holding shifting sand dunes. For the first time in Northland, political pressure was applied on government by means of television and the then *Auckland Weekly News*. The issues that were used to convince policy makers included serious sand erosion threatening farms, high unemployment, and low economic returns for businesses. Today, there is DOC-



managed public conservation land covering Kaimaumau, and a Juken pulpmill operates between Kaitāia and Awanui, but in the 1960s, plans were very different.

A pulpmill was to be built on the Karikari Peninsula, with a port at Matai Bay. The Rangaunu Harbour was to be dammed and dredged out, with the tailings going to fill the Kaimaumau Swamp. The harbour was then to fill with fresh water. Timber would have gone by rail from Aupouri, across the sandstone ridges in the swamp, over the dam and thence to the mill. (Thode, 1983, p. 216)

Muldoon's version of "Think Big" also resulted in a feasibility study for Whangaroa Harbour to become Northland's main port (Marriot & Lee, 1976). But both ideas were abandoned, and forestry exports became dependent on the Aupōuri Juken triboard mill in the Far North, and the Marsden Port in Whāngārei, as we know the situation today.

The dramatic crash and burn of the NZFS in 1983, at the time of Thode's (1983) writing, put paid to a future many envisaged as stable. Although individuals claim "it had to happen" due to bloated budgets and waste, the legacy of the demise of the NZFS is still a deeply emotional topic for foresters who lived through it in Northland. Indeed, land being "eyed up" by the NZFS included vast tracts in Mangonui, Hokianga, Whangaroa, Bay of Islands, Whāngārei, Hobson and Ōtamatea (203,000 ha total). All these areas had operating sawmills (Thode, 1983).

It seems that although agriculture is how Northland has progressed, the cost of this trajectory is largely unacknowledged. Poor soils and difficult conditions have not produced the rich pasture dreamed of at the time of original settlement. In fact, large areas are still reverted to weed-filled scrub (Thode, 1983), which may or may not become the conservationist's dream of "regenerating bush" because kikuyu – an African grass with an appetite for life beyond most native species – and other dominant weeds like Japanese honeysuckle (*Lonicera japonica*) do not allow native bush to establish in an as yet unquantified number of Northland scenarios.

### Northland Forestry Today

### **Opportunities**

In 2017, commercial forestry in Northland employed 2,500 people (Williams, 2017). In 2019, the commercial sector still provides jobs, mana and skills to many people from all walks of life, and employers are worried that the influx of One Billion Trees will mean the region will not be able to supply enough labour to fulfil demand for tree planting and tending (Kevin Ihaka, CEO Forest Protection Services, personal communication, 18 November, 2018).

Commercial forestry also provides business opportunities for a variety or contracting companies, despite the fact that pruning *P. radiata* in this region is largely a thing of the past. Contractors provide direct services such as planting, thinning, removal of regenerated wilding pines with inferior genetics and inappropriate spacing, log harvest and other



services. Other contracts focus on roading, silt traps, structures such as sheds and bridges, weed control, possum and pig control, and the management of heritage sites.

As of early May 2019, the Forest Growers Levy was approved by forest owners' referendum with an 89% majority. This means that funding for the Forest Growers Levy Trust Work Programme is secured for the next 6 years. It means that Northland's commercial and woodlot operators can plan with confidence to continue improvements in forest mechanisation, tree breeding, health and safety, and biosecurity, enhancing profitability. The Forest Growers Levy Trust administers research grants supporting improvements in core forestry operations (N. Cullen, personal communication, 13 May 2019). The levy is not controlled by commercial forestry, but is influenced by both small woodlot and larger commercial entities equally. The vote on what the levy is spent on is annual, and both area and ownership count. The vote cannot be swayed by a few large forest owners, or by a large number of small growers who have very few trees overall. The result of the vote has to be a majority of the votes cast in favour, and those votes have to represent a majority of the volume of forests owned by those voters.

In particular, since 2017, Northland has been a leading region for export of pine logs to international markets, partly because Northland produces the best quality timber in the nation. Northland timber is known for its strength and density, and valued as a top-quality structural product (Reay, 2019).

Whāngārei is "the last port to market" (Peter Davis-Colley, FFA Northland President, personal communication, December 2018), meaning from here, ships carrying logs have no other New Zealand ports to stop in at before heading across the water to foreign countries. Although the port is too small to command industries as yet, or to dictate market movements, ships that are not full are forced to stop at Whāngārei to fill up if they want to make their journey profitable.

Farmers have been mooted as the future of afforestation in Northland, mostly anecdotally, based on the reasoning that high land prices prevent commercial foresters from buying new tracts of land to put into pines (Kevin Ihaka, CEO Forest Protection Services, personal communication, 25 November 2018). No solid evidence has been presented that small woodlots are the future direction afforestation will take, but Mr. Ihaka's statement has been repeated ad infinitum by various parties – including some farmers. Whether this is the truth or not, if small woodlot owners are to become the future of afforestation, they will need assistance in ways that are meaningful to them.

### Constraints

#### GENERAL

In 2015, Northland's economy accounted for only 2.6% of New Zealand's GDP despite being home to 3.6% of the population. Real GDP in the region increased by 1.6% per year on average between 2005 and 2015, compared to the national average of 2.2%. Real GDP per person was around 26% below the national average, and unemployment was above the national average (Martin Jenkins, 2015). This trend continues today. This means that the large and youthful Māori population, approximately 30% percent of the region's population



(relative to 14% percent for New Zealand), is on low or no wages. Poor economic performance, exacerbated by poor transport links between Auckland and Northland, is also made worse because the region's working-age people are being employed elsewhere in New Zealand, and the region attracts very few working-age people from other regions (Martin Jenkins, 2015).

#### COMMERCIAL FORESTRY

Commercial forestry, although a mainstay of the region's economy providing employment to many (Martin Jenkins, 2015), remains controversial in some local circles and communities (Alexander, 2002; Baker, 2014; Williams, 2017), despite its focus on replanting and sustainable rotations of exotic pines, rather than the Northland history of unsustainable, one-off extraction of slow-growing native timbers. Controversy continues despite a long history of community relations efforts, and a mostly profitable history of pine plantation work, and despite investment in years of research into tree genetics, safe operation, harvest techniques, planting methods and so on (Richards, 2019). In stark contrast to the doubters, many businesses, community groups, individuals and non-profit organisations are fully supportive of the opportunities commercial plantations have brought to Northland (New Zealand Institute of Economic Research, 2017; Northland Age, 2018), including life skills and a landscape more defined by tree cover.

#### Point 1. Farmer vs. Forester

Controversy between farmers and foresters is a part of this (Alexander, 2002; Baker, 2014; Williams, 2017), in stark contrast to the ambition of One Billion Trees and the HCEF to see farmers planting trees. Many farmers are keen on farming trees for profit, stock health (fodder, shade), soil conservation, honey profits, and carbon sequestration (DairyNZ, 2019; Jeff Martin, personal communication, 11 June, 2019). But niggles remain. For example, Greg Alexander, a Mangakāhia farmer, says flooding since pines were planted upriver has damaged his farm a lot more than before trees were planted. He has gone to the press with his story (Williams, 2017). He sees NRC environmental regulations as weak, and wants to dump a truckload of slash at our door. Other Mangakāhia residents interviewed by Williams (2017) are of the same opinion. Carter Holt employed Greg's father, Bruce, to do an assessment of damage to waterways in Mangakāhia. The stream snags, eroded streambanks, and silt build-ups pictured in Alexander (2002) were still common in Omahuta in 2011, when commercial foresters were reported to NRC for failing to follow consent conditions (anonymous personal communication, February 2011).

Ngunguru has also been affected by failed silt traps, riparian management, and lack of monitoring (Baker, 2014). One problem with remediation cited by Baker (2014) is the flawed ETS, which makes foresters pay back carbon credits when they remove riparian margins from production. But the other issue not fully appreciated by most parties in the debate is that forestry on so-called "good land" might be better than farming in some instances. For example, where more unstable, steep hill country is planted in pines (as in the Mangakāhia) but lower alluvial fans are kept in paddocks for grazing, it is very likely that during or just after harvest, any storm event will deposit slash and sediment on the alluvial fan in proportions unacceptable to the farmer.



#### Point 2. Foreign Investment Levels

Another aspect even professional foresters do not all accept is the level of foreign investment. Forests planted by Carter Holt and Shell in the 1980s are owned by American investors Hancock, or Chinese entrepreneurs Greenheart, which owns Northland Forest Managers (Williams, 2017). This level of ownership and removal of cold, hard cash from New Zealand is a matter for debate even at the Northland Wood Council (NWC) (Bob Shirley, personal communication, 26 April 2019). A case in point, the former Moerewa Station, an Auckland Farmers Freezing Company (AFFCO)-owned, failed sheep and beef operation established on heavily podzolised soils especially susceptible to sheet and gully erosion, was recently sold in March 2019 to off-shore investors who plan to convert the whole property to a pine forest (Bob Cathcart, 2019 personal communication, 12 February, 2019).

#### Point 3. Clumped Age Distribution

A further issue is that the age class distribution of *P. radiata* is clumped, and at a time when log prices are the highest they have ever been in New Zealand, the forest industry is facing a critical shortage of logs due to the huge downturn in planting the industry saw in the early 1990s. Forest buyers in Northland in particular (where most logs are exported, unlike in other regions) have targeted smaller independent forests of mid-rotation age to secure their future survival as harvesters and wood marketers as their supply of larger woodlots dries up. One small Whāngārei-local harvester has noted that "larger operators are all over small woodlots like a rash" (anonymous personal communication). There is anecdotal evidence that some owners of small woodlots were and are still selling at a price below the true current value of their forest to industry opportunists, or "cowboys" (New Zealand Herald, 2017).



# Milestone 1: Regional Priorities

Scoping of priority catchments and regional priorities with regional experts and mana whenua.

# **Deliverable Due Date**

30 June 2019

## **Milestone 1.1: Priority Catchments**

Undertake an analysis to classify priority catchments to assist in identifying target land and the downstream vulnerability to sediment impacts.

## **Evidence of Completion**

• Report of priority catchments, geospatial maps, and/or geographic information system (GIS) layers.

### Purpose

Our purpose with this exercise was to go beyond listing catchments with erosion issues in priority order. We wanted to choose from our list of priority catchments one that we could work with to define how afforestation might look on the ground, taking into account both regulatory and non-regulatory "good practice" constraints and opportunities for afforestation.

Existing knowledge on priority catchments provides an interface for additional knowledge layers – for example, traditional blends of knowledge gained by comparing landcover, land use, and land use capability (LUC). Work on mitigating erosion across numerous areas, including the Kaipara in the last MPI funding round (2015–2019), a priority catchment, is already providing lessons for work in other catchments.

### Mapping Workshop

### Process

### PRIORITY CATCHMENTS

Comprehensive mapping work has identified the catchments suffering the worst erosion in Northland. Northland has a highly varied geological landscape, with a majority of catchments containing highly erodible Land (HEL). The catchments differ in priority for targeted soil conservation activities based on:

• amount of HEL without woody vegetation,



- geo-structural settings that influence the susceptibility to mass wastage,
- the severity and source of erosion based on land use,
- land use and activities,
- the connectivity of sediment sources to waterways,
- and the sensitivity of the receiving environments.

HEL is historically defined by land mapped with a land use classification of 6e, 7e, and 8e. A more recent SedNetNZ model by Manaaki Whenua has allowed for improved spatial granularity and quantification of soil loss. This has further assisted to identify areas of significant erosion potential and quantify the yield of soil loss annualised in 0.25 ha areas (pixels) into tonnes/km<sup>2</sup>/year of sediment loss. SedNetNZ has allowed NRC to complete catchment sediment modelling of all catchments to determine the most yielding of all catchments and further define the areas and farms that need to be included for some sort of land treatment. These have been built into a long-term soil conservation plan and help determine the resources required by NRC to manage the issue via advisory and treatment works.

Through the *Whangarei Harbour Sediment and E. coli Study: Catchment Economic Modelling* study (MPI, 2015), the *Kaipara Harbour Sediment Mitigation Study* (Lohrer, 2017), and compound specific stable isotope (CSSI) sediment source tracking in a number of catchments (see figure on next page), NRC is using cutting-edge science to understand the source of the eroded soil, define the catchment susceptibility to erosion, understand and model the mitigation effectiveness under different treatment scenarios, and understand the economic implications of such sediment treatment scenarios.

NRC has taken this approach a step further in recent years by setting rules in four priority catchments for compulsory erosion control planning on mapped areas of the priority catchments of:

- Whangarei Harbour Catchment,
- Mangere Catchment,
- Waitangi Catchment, and
- Doubtless Bay Catchment.

The erosion susceptibility thresholds of these mapped areas for farm environment plan (FEP) rules were defined by a collective community process based on the sediment reduction indices and economic implications for implementation of the rules.





Proportional sediment contributions (%) by land use for tributaries and main reaches at confluences of the Waitangi River Catchment, Northland (2014). The results show a progressive shift from soil erosion sources in the upper catchment to river-bank erosion in the lower catchment. Major land use sources of sediment are soils eroded from pastoral agriculture. These estimates are based on CSSI analysis of recent sediment deposits sampled from the river bed and/or banks. [Source: Northland Regional Council funded study of contemporary sediment sources in the Waitangi River catchment]



#### DOUBTLESS BAY MAPPING EXERCISE

On 9 May 2019, the HCEF Boost team held a cross-agency mapping workshop to identify afforestation design principles – that is, constraints and opportunities for afforestation at a catchment scale. The aim was to quantify these regulatory inputs and make a "wish list" of good practice inputs as far as possible, and where practical, to map them. This exercise was based on a regional prioritisation exercise conducted earlier in the year, which was a cross-sector exercise identifying regional aspirations (see the "Milestone 1.2" section for details).

We used the Doubtless Bay Catchment as our base map because we had identified this catchment as a suitable pilot. We chose Doubtless Bay because it has an extremely proactive, energetic and relationships-focused catchment group with enough drive to take on afforestation with a sustainable level of input from NRC.

Participants included in-house strategy, hydrology and biosecurity experts, DOC, and the Far North District Council (FNDC). The workshop used a GIS platform to identify:

- areas where afforestation (exotic and/or native) would be constrained by either regulatory mechanisms (such as the National Environmental Standards for Plantation Forestry [NES-PF]/district or regional plan rules), or other known environmental or cultural concerns
- areas considered a priority/opportunity to enhance environmental outcomes (such as biodiversity and water quality).

### Outcomes

#### CONSTRAINTS AND OPPORTUNITIES

Constraints on and priorities/opportunities for afforestation differed depending on the type of afforestation (e.g. permanent native revegetation or commercial plantation forestry). Where practical, such differences were identified. Tables summarising constraints and opportunities, and rationales for their inclusion in the exercise, can be found in tabular format in the Milestone 1.1 appendices.

#### MAPPED CONSTRAINTS AND OPPORTUNITIES

Initial maps showing regulatory and non-regulatory constraints were prepared by our GIS member, Joshua Sharp-Heyward. The three maps contained in the Milestone 1.1 and 3.2 appendices show constraints for:

- plantation forestry
- permanent exotic forests
- permanent native forests.

Where practical, priorities for afforestation will be mapped in a GIS format. The melded constraints–opportunities maps produced will provide indicative information needed to:



- identify areas where afforestation (of various types) may not be supported (due to regulatory constraints), or should be designed with caution (due to environmental or other constraint)
- identify areas to target efforts, to introduce particular regimes, or to afforest to optimise specific water quality, water quantity, biodiversity and other benefits
- identify the number of landowners, locations, hectares, and types of land use in priority areas that may benefit from afforestation
- quantify the potential demand on seedlings/resources if uptake in priority areas is high
- act as a catchment-tailored guide to landowners seeking to undertake afforestation
- assist NRC and MPI to assess the merits and appropriateness of particular afforestation requests for funding and One Billion Trees direct funding applications.
- help provide transparency on technical advice NRC would provide MPI when they are assessing One Billion Trees applications.



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Note. All three maps can be accessed via OneDrive appendices (Milestone 1.1) as interactive PDFs, where layers can be turned on and off.



## **Ongoing Consultation**

### **Forest Design Work**

Further work is underway determining what "forest design" looks like in the New Zealand (specifically Northland) context – particularly considering the role and mandate of the participants (e.g. does any party have a mandate of establishing New Zealand's ideal forest, and what would NRC's role be in this respect).

### **Ongoing Catchment Assessment**

Under the NES-PF one-year review, Te Uru Rākau requested NRC to start preparing examples of catchment assessment that indicate the fit of the NES-PF erosion susceptibility classifications with the Northland landscape, following the procurement of the physiographic sediment process attribute layer. This newly provided sediment source-andsink erosion susceptibility classification is helping NRC to prioritise areas and test against existing traditional LUC and sediment models.

This work is ongoing, and NRC will be happy to work with MPI on an ongoing basis to further develop this thinking, and to test the on-the-ground effectiveness of new datasets.

A full report of preliminary work done by Clint Rissman of Land and Water Science can be found in the Milestone 3.1 appendix.

### Recommendations

- Involve the NWC in the exercise in a sensitive manner that acknowledges NRC's dual role as the regulatory body for the NES-PF, in contrast to its role as afforestation facilitator (and sometimes funder).
- Apply physiographics datasets to test and determine real erosion risks. Initial analysis by NRC suggest a few queries regarding the spatial extent of the MPI Erosion Sustainability Classification (ESC) red-zoned areas versus orange-zone land; this may mean that in some cases (geological-setting based), NES-PF red-zone areas are less susceptible to erosion than orange-zone lands.
- Use wider feedback from partners and staff, and determine how to use the constraints and opportunities learnings from the Doubtless Bay pilot. This will include whether the exercise is scaled up across the region or just used as a reference.
- Broaden the discussion about catchment prioritisation to include other key stakeholders.
- At the highest risk/opportunity locations, run a proactive approach to working with individual landowners to boost afforestation.
- Ensure access to funding sources is simplified and aligned to help enable this.



- Create efficiency by supporting initiatives led by others, by providing technical expertise, and by working in a nimble, enabling way.
- Consider facilitating erosion initiatives across the region (not necessarily led by the NRC) by creating a portfolio of networked projects that work together at various levels in a nimble way.

Northland REGIONAL COUNCIL Te Kaunihera ā rohe o Te Taitokerau
### **Milestone 1.2: Regional Priorities**

Undertake a 2-day in-house workshop on afforestation with linked industries, agencies, and stakeholders (in Northland) to explain the prioritisation of catchments and receiving environments. Experts include NRC staff, district council staff, forestry companies, mana whenua, consultants, contractors (pest control, weed control, kiwi handlers), MPI/Te Uru Rākau and DOC. The workshop will be facilitated by an external, professional facilitator.

### **Evidence of Completion**

• Workshop agendas, attendance list (A1155639), minutes, and outcome priorities (A1183792).

### Purpose

### **Context of Workshop**

NRC has been contracted by MPI, through the HCEF, to understand the constraints and opportunities for afforestation in Northland. This strategy will help Northland to make the best use of the One Billion Trees fund to achieve the best outcomes for the region, through better understanding of barriers to and opportunities for afforestation, building capability and capacity, and determining priority locations.

### Purpose for the Workshop

To bring together a cross section of Northland representatives to present our findings to date, test our thinking, challenge our assumptions, and to understand the partnerships required going forward in an attempt to realise the opportunities of working together under the banner of One Billion Trees.

### Process

We facilitated an "Afforestation Expert Hui" on 24 April 2019, with design and facilitation support from Annette Lees of Alternative Endings. It was attended by representatives from a cross section of stakeholders – forestry, agriculture, native forestry, the Community Business and Environment Centre (CBEC), iwi, and scientists – and linked with the NWC. We compiled and pre-circulated a summary of a range of sector strategies and NRC's Afforestation Project Plan and Dashboard as context. Each agency/sector presented their afforestation related context. We workshopped three questions and gathered the following summary.



### Outcomes

### Question 1: What things will be critical for afforestation success in Northland?

- We need a regional strategy for Northland, defined by a clear, sharp and co-owned vision.
- Outcomes will have to be spread across the "four wellbeings": environmental, cultural, social, economic.
- Infrastructure planning will have to encompass spatial and the structural elements.
- Afforestation success will be on an intergenerational timeframe (100+ years).
- The "afforestation project" will have to be written, planned, communicated and executed collectively across agencies.
- It will have to inform from a high level to sub-catchments to farms.
- The best tools for afforestation were considered to be information, knowledge, resources, and training delivered to the right people at the right time.
- Land, plants and workforce availability were seen as the top three limitations.
- The future of work for afforestation should be addressed, career-focused and year-round.
- Everyone involved would have to understand scale (blanket "forestry" or niche afforestation/balanced land use).
- The plant supply chain would have to be solved.

# Question 2. How do we make it easy and compelling for landowners to establish forestry at priority places?

- Socialise the priority places with relevant parties (including catchment and Landcare groups, landowners, iwi and communities).
- Offer a package solution a one-stop-shop simplified: make it easy to find, easy to do, tailored, and use simple language.
- Build business confidence by defining priorities, translated for landowners, by:
  - offering financial support during establishment, especially native revegetation (burden and risk)
  - working out return on investment (ROI)
  - giving clear information about ETS and log prices.
- Speak to people's values, which may mean different packages for different people (e.g. ageing farmers, tangata whenua).
- The biggest barrier is how to provide a sense of empowerment for landowners.
- Policy in Northland is slack/has been slack in the past (e.g. you can flatten bush even if it's a Significant Natural Area), so nationally compelling change is needed that is



easy to work with, harmonises still disparate pieces of legislation, and allows enough room for individuals to innovate.

# Question 3: What is the best way to align our organisations' strategies so we can make the most of our opportunities?

- Create alignment between parties.
- "What's in it for me?" People need to understand how the afforestation project can work. A specialist is needed to translate it into simple language.
- Ideally a national policy would be developed for forestry, but we recognise there is not enough time to do this. Hence, we recommend a regional strategy with community implementation plans.
- Define the "what we want to achieve" first, then work on "how to achieve it".
- Identify the vision, and the deal breakers/no-go areas/limits from the fund for each agency.
- A pilot should be rolled out as a catchment approach, with consultation.
- Each party needs to identify their priorities negotiables, non-negotiables.
- Learn from Kaipara work: identify principles and extrapolate learnings.

In planning the exercise, we realised that NRC already know enough of the technical stuff, are competent in farm environment planning, and have enough information to determine "right tree, right place" at a farm scale. The challenge is in scaling up. Through our participation in the Integrated Kaipara Harbour programme, we are learning about the empowered marae-led catchment approach to One Billion Trees. We need to use this knowledge that we already have.

Hence, we focused the workshop at a strategic principle level about regional priorities, rather than at a GIS-detailed mapping level. The workshop allowed a cross-section of views to be shared and discussed, helping create synergy. It was complementary with a regional strategy PGF application led by multiple parties, and we believe the face-to-face time helped contribute towards sectors and parties working in the same direction.

As a result of the workshop, we ran a pilot exercise to test how One Billion Trees would be implemented in a priority catchment (based on Doubtless Bay), in order to iron out the wrinkles before scaling up across the region. Details of this pilot are included under Milestone 1.1, "Doubtless Bay Mapping Exercise".

The other issues identified have been woven into the subsequent planning and implementation.



### Recommendations

- Take the pilot learnings and apply them to the region to allow NRC to build learnings into future programmes.
- Follow up the regional strategy, with the multiple agencies that have aligned priorities. Do it as a live operational plan that's refined with, new learning on the way.
- Create a toolbox.
- Consider running a "portfolio" of initiatives, which is a collection of ideas, and projects that are underway (not necessarily led by NRC).
- Operate by enabling, empowering, and meeting face to face on stakeholders' "turf" – find out what's needed by "being there", helping solve problems, and filling gaps when asked.
- Broker deals, partnerships, share good practice, and provide leadership.
- Focus on how to create scale.
- Set clear objectives for each initiative.
- Work out milestones. Determine how many trees will get planted each year and how much time it will take. Use drive and focus to deliver this.
- Have a monthly strategy meeting What are you doing, and how does it deliver the objective?



# Milestone 2: Stocktake of the Work and the Environment

Stocktake and compilation of Northland soil conservation and identifying regional biophysical priorities.

### **Deliverable Due Date**

30 June 2019

### **Milestone 2.1: Soil Conservation Activities**

Stocktake of soil conservation activities and associated guidelines including major land-use options such as reversion, space planting and riparian retirement.

### **Evidence of Completion**

• Detailed report on existing soil conservation activities and associated guidance documents.

### Purpose

Our purpose was to find out what work was being undertaken in Northland within the soil conservation arena, and to determine how not only NRC approached such work, but also other regionally active organisations. Our purpose was also to create a database of up-to-date information and resources about how to prevent and manage erosion.

### Process

We commissioned Bob Cathcart of AgFirst to help us round up soil conservation updates from around the region. The following summaries are from Bob Cathcart's work.

### Soil Conservation in Northland

### **Soils and Sediments**

The OECD definition of soil conservation includes protecting the soil from erosion, but also from other types of deterioration – loss of soil fertility and productivity, structure or organic matter, or an accumulation of salts – any of which can make the soil more susceptible to erosion.



The major contaminant of Northland streams (NRC, 2015), rivers harbours, estuaries and inshore waters is sediment, which is washed off the land with phosphorus bound to the sediment particles, and with faecal matter. The objective for NRC is to retain soil and keep contaminants on land.

There is a need to plant trees, grasses or shrubs to protect soil from the impact of rain, flowing water, and wind where there is not currently suitable cover. Trees may also be planted to hold the soil together and in place on hillsides to improve stability or to control gully or streambank erosion. Plants are valuable as sediment traps, slowing the flow of water and providing a bigger surface area on which fine sediment can settle. Riparian vegetation (including grasses, sedges, flax and low-growing shrubs) traps sediment. Wetlands, both natural and man-made, are very effective sediment and nutrient traps.

But there is a natural rate of erosion, even in pristine native bush. And as riparian vegetation matures, there is a risk that trees will shade the low-growing sediment-trapping plants, resulting in bare ground. Riparian plantings need to be managed to avoid shading and to maintain a dense cover at ground level. During Northland's high intensity rainstorms, runoff is channelised in paddocks and flows right through riparian vegetation into streams.

If we have too much sediment in floodwaters, sediment trapped in riparian vegetation will form stopbanks, silt up channels and increase subsequent flooding. Emphasis should be on preventing soil particle detachment or, if particles, nutrients and faecal matter are detached, trapping them in the paddock, forest or bush where they will be of value.

In Northland, NRC has over 900 Farm Environment Plans (FEPs) in place with farmers, covering over 200,000 ha. These plans are the start of a conversation with each landowner about the steps they can take to address soil conservation particular to their property. Most include recommendations regarding riparian fencing, afforestation, structural planting with poplar and/or willows, and riparian planting. NRC requires that landowners have a FEP before they are given grants such as those available through NRC's Environment Fund. Likewise, MPI proposes to confirm with NRC the validity/priority of applications for One Billion Trees funding. These processes give us greater opportunity to work with farmers to come up with tailored erosion control measures.

#### Getting the Work Done

The following excerpts are from the AgFirst (Bob Cathcart) report on past afforestation initiatives and their impact on Northland.

There are various organisations and individuals who, often for altruistic reasons, wish to participate in land management programmes. This community involvement and sharing of responsibility should be encouraged, but should not be relied on as the main source of labour to implement programmes. They may be schools (e.g., NRC EnviroSchools), community groups, river-care and harbour-care groups, etc., who can assist landowners with weed clearing, planting and releasing days. While



the good intentions of such groups [are] to be applauded, such programmes carry risks for the landowner, including health and safety, and quality of workmanship.

A problem facing landowners and the primary industries across Northland is the lack of qualified and experienced contract labour. The economic shocks of the mid 1980s forced farmers to review their ways of conducting businesses. Systems are more efficient and each labour unit on a farm looks after a lot more stock than they did previously. Contractors are now used for fencing, topdressing, shearing, weed control and all the tasks previously performed by staff or family members. The cost of equipment, health and safety requirements and quality assurance have all encouraged this move.

The work involved in changing land use from grass to trees, for example, includes fencing, land preparation, tree planting, topdressing, releasing, thinning and pruning, and are all tasks over and above the farmer's daily stock management regime. Similarly, planting willows and poplars to control erosion requires planting and tree protection, re-ramming in late spring, pruning, blanking, thinning, lopping of trees not required for timber, and eventually, harvest and replanting. These extra tasks requiring specialist equipment and skills.

This concern over attracting personnel into primary industry work has been raised in different forums – forestry, horticulture, pastoral farming, and directly with NorthTec, and through Federated Farmers. Unfortunately, each sector is tackling the problem alone. Employment in the primary sector has been discouraged in the education system. Each sector also faces a problem in that much of the work they are offering is seasonal, within their industry, but is it seasonal across all?

We note that Northland Inc, the Ministry of Business, Innovation and Employment (MBIE), Te Puni Kōkiri, and industry leaders such as the NWC are more directly involved in addressing training needs, labour supply shortages and bottlenecks, and rules governing immigrant labour, which are probably beyond NRC's remit.

### Soil Conservation Guidelines

A full suite of representative guidance documents exists in Northland. These are published by various sources, and are listed below. All are open access (no fee required) and freely available online. Examples of these publications can be found in the Milestone 2.1 appendices.



### Recommendations

- Decide which NRC soil conservation publications are the most relevant today, and update them with the help of the Communications team. DairyNZ and other regional councils have up-to-date material that could be adapted to suit Northland conditions.
- Make sure resources are all online, accessible to the public.
- Consider reopening conversations about structural interventions for erosion control. Consider constructing controlled overflow sections on riverbanks where floodwater is deliberately spilled onto the floodplain to deposit sediment (where water ponds for several days) – for example, the Kaihu River. A flood management plan was mooted for this river by NRC in 2011, and is still on the NRC website, but it requires further vetting and adequate funding. See <u>https://www.nrc.govt.nz/resource-librarysummary/research-and-reports/flood-risk-reduction/kaihu-flood-control-schemeinvestigation-scheme-concept/</u>
- Place greater emphasis on avoiding soil particle detachment on site, such as:
  - avoiding pugging, compaction (by animals and by machinery), rehabilitating pugged or compacted areas – soil husbandry on pastoral farms
  - grazing management to increase pasture covers (length and density) and extend the time between grazings – pasture management
  - arable farming, market gardening and horticultural management of soil disturbance, cultivation, water management, etc. – i.e. water management
  - grazing management and management of cultivated land to improve soil structure and organic matter levels and infiltration of water – i.e. soil husbandry on cultivated land
  - roadside and industrial land revegetation and management (including construction and management of sediment traps) – i.e. stormwater management
  - management of land cover and sediment trapping from natural areas disturbed by recreational use, such as vehicles.
- Ensure all professional planting/maintenance contractor listings are maintained in a contractor database similar to our new database detailing nurseries (provided by Tāne's Tree Trust). Include organisations recommended by soil conservation and agricultural specialists, such as Worsfold Design, Kaiwaka (recommended by Bob Cathcart).



### **Milestone 2.2: Research and Guidelines**

Identification of regional situation based on recent research, soil conservation, and water quality issues ensuring alignment with the One Billion Trees Programme. Recent research may include Kaipara sediment study, sediment physiographic attribute layer, and state of the environment reports.

### **Evidence of Completion**

- Provision of updated 30-year NRC soil conservation strategy
- Documentation of additional Kaipara prioritisation

### Purpose

The objective in this work was to understand and consolidate research and projects undertaken thus far to enable the best possible outcomes for the HCEF in Northland.

### Updated 30-year NRC Soil Conservation Plan

The following key messages have been copied from the *Updated 30-year NRC Soil Conservation Plan*.

### **Executive Summary**

This report provides aspirations and resource requirements for NRC's Long-Term Soil Conservation Programme (2018 to 2048). Highly erodible land (HEL) has been mapped across the region and is included within the draft Regional Plan. In order to produce Farm Environment Plans (FEPs) that cover all HEL within the region, analysis has been undertaken to estimate what resources will be required (environment fund, staff and poplar poles) and what are realistic timeframes to achieve our goals with soil conservation.

The proposed approach is to establish three soil conservation catchments that cover the Northland region: Kaipara, Eastern Bays and Far North. The catchments are similar in size, with Kaipara and Far North each representing 38% of Northland, and although Eastern Bays is slightly smaller (24% of Northland), it contains more farms. The Kaipara catchment is currently receiving funding (2016–2019) from the Hill Country Erosion Fund (HCEF). By establishing soil conservation catchments, work can be aligned with potential future applications to the HCEF.



*It is estimated that there are approximately 4,990 farms that contain HEL and require a FEP. This number is split relatively evenly between the three catchments, with 1,696, 1,754 and 1,540 FEPs required for Kaipara, Eastern Bays and Far North, respectively.* 

*To complete nearly 5,000 FEPs will require considerable resources allocated over a significant timeframe. It is estimated to cost on average \$5,000 per FEP, which will mean a cost of nearly \$25 million to complete the required FEPs across the region.* 

Based on the current rate of 120 FEPs being completed per year, it will take approximately 42 years at a cost of \$594,000 per year to complete the FEPs required. By adding four more full-time staff, the number of years required to complete the FEPs is reduced down to 30. land management advisors (LMAs) completing 12 new FEPs per year could be considered conservative; however, an average of 12 per year over the 30 years allows for the likely decrease in new FEPs completed as years go on due to the increase in follow-up work required for previous years' FEPs.

Additional costs to the current land management expenditure for the first 10 years (2018–2028) of the Long-Term Soil Conservation Programme are presented in detail in the full report (Milestone 2.2 appendices). It is estimated that approximately \$5.8 million will be required over the first 10 years. These additional costs are largely related to the costs of four additional LMAs and an increase to the Environment Fund of \$1.3 million over the 10 years.

Poplar and willow trees are the primary tool for soil conservation on erosion-prone land, although there are other options, including converting pasture to plantation forestry (exotic and native) and retiring land from grazing and allowing it to regenerate. Since 2012, a total of 24,329 poplar and willow poles at an average of 6,082 per year have been provided to landowners. With the future development of the NRC Flyger Road nursery (maturing in the early 2020s), there will be 12,000 poplar and willow poles available to be planted on a yearly basis.

*Planting poles over 30 years at the maximum production of 12,000 per year would equate to planting 3.3% of the total HEL throughout Northland. Currently it is estimated just 1% of HEL is being planted with poles through FEPs.* 

There are several opportunities available that could help with resourcing, funding and efficiencies. MPI has a contestable fund available to regions



with hill country erosion issues. Currently, the Kaipara Hill Country Erosion project receives \$666,000 over 4 years (2016–2019). Following the completion of the Kaipara catchment project, there is potential to either continue the Kaipara work or undertake a new project, probably within the Far North soil conservation catchment. Other opportunities exist through the MPI Afforestation Grant Scheme, which provides grants to landowners of \$1,300 per hectare of new forest. Potentially, industry and farm consultants could also be used to produce FEPs, although this would need to be investigated further.

Alternatively, there are potential risks with investing significant time and resources on one specific project, which also need to be considered.

#### **Future Objectives**

The objectives of the NRC Long Term Soil Conservation Programme are:

#### NEXT 3 YEARS

More than double the capacity of the Flyger Road nursery to have the potential to produce 12,000 poles annually by the early 2020s.

*Provide resourcing to manage and redirect a higher proportion of the Environment Fund from waterway fencing to soil conservation, and match new regional plan timescales.* 

Develop the Northland Soil Conservation Strategy and direct resourcing to deliver the strategy.

#### NEXT 10 YEARS

Have 50% of Northland's HEL under management of a FEP.

*Provide soil conservation management for 3% of the HEL included within FEPs.* 

#### NEXT 30 YEARS

Have 100% of Northland's HEL under management of a FEP.

*Provide soil conservation management for 4% of the HEL included within FEPs.* 

The full report can be found in the Milestone 2.2 appendices.



### Kaipara Prioritisation

#### **Key Messages**

The following key messages have been copied from the *Kaipara Harbour Sediment Mitigation Study: Summary*. This summary report and the full report can be found in the Milestone 2.2 appendices.

> The key purpose of the Kaipara Harbour Sediment Mitigation Study was to assess the economic costs and environmental benefits of a range of scenarios for reducing catchment sediment loss.

> Nine sediment-mitigation scenarios and two catchment-afforestation scenarios were compared to a present-day baseline scenario. Five of the sediment-mitigation scenarios were practice-based, such as fencing all streams for stock exclusion, and the other four were outcome-based – for instance, reducing the catchment sediment load at each of the freshwater nodes by a certain percentage.

#### SOURCES OF SEDIMENT

Sediment loss from the land to Kaipara Harbour and to rivers and streams in the surrounding catchment is almost an order of magnitude higher than in pre-human times. This has caused significant changes in the harbour and in river and stream ecosystems. Sediment loss presently is split about equally between land-based erosion and streambank erosion, so measures that address both sources are likely to be most effective.

*Pastoral land uses occupy about 70% of the catchment by area (sheep and beef 47% of the catchment and dairy 23% of the catchment), with the remainder primarily in native or plantation forest.* 

- About 13% of the catchment is identified as HEL, which produces about 77% of the land-based erosion.
- About half of the sediment loss comes from sheep and beef farms, and about one quarter comes from dairy farms.

#### MITIGATION

- Sheep and beef farms face the largest total and per-hectare costs for nearly all scenarios investigated.
- Targeting HEL results in significant reductions in sediment loss at relatively low cost.
- Mitigation can be targeted to the land in a cost-effective way to achieve specific outcomes.



#### FINDINGS

- Re-afforesting the catchment could reduce sediment loss substantially (68–88%), and provide catchment-wide improvements in stream and river ecosystem health, at a cost of between \$255 and \$331 million per year, which is mostly opportunity cost.
- A combination of stock exclusion rules (fencing but no riparian planting) and stabilising large tracts of HEL in pasture with poplars could reduce total catchment sediment loss by 41% at a cost of about \$13.0 million. This would yield beneficial outcomes for aquatic ecosystems (and potentially recreation due to improved water clarity) in rivers in certain sub-catchments, which could be prioritised for mitigation efforts.
- Annual-average sedimentation rates are particularly high in the three depositional basins in the southern sector of the harbour that were examined. Reducing sedimentation rates to less than or close to 2 mm per year above the "natural" rate in these basins should result in benefits to the benthic ecology and improved ecosystem functioning. However, only three scenarios are predicted to achieve this: both full-afforestation scenarios, and the outcome-based scenario that is designed to bring the sedimentation rate down to this threshold. This scenario would cost about \$9 million per year, equivalent to about a 2.3% decline in net revenue compared to currently.
- The annual-average sedimentation rate is predicted to be smaller in the northern sector of the harbour. Nevertheless, this sector will be experiencing some level of sediment stress and will benefit from management interventions to reduce catchment sediment runoff.
- Limiting catchment sediment loss is a necessary first step towards improving the harbour's ecological health, where there will likely be multiple benefits to ecological health and functioning.

#### UNCERTAINTIES AND CAVEATS

There are many uncertainties and assumptions associated with the study around, for example, sediment loads, mitigation efficiencies and costs, relationships between catchment sediment loads and instream and harbour sediment attributes, and ecological thresholds. Despite uncertainties, the results of the study demonstrate, at least, the relative effectiveness and costs of the mitigation scenarios examined. Interventions to reduce sediment loss may not generate positive ecological effects in the short term; the legacy of sediment may impinge on the ecology for decades after management interventions are initiated. Furthermore, sediment is not the only cause of environmental degradation of freshwater and estuarine ecosystems.

#### FURTHER WORK

*Targeting mitigation is a cost-effective way of achieving specific outcomes. While the study demonstrates that initiatives based on stock exclusion and* 



stabilising HEL can be effective in reducing sediment loss, further finegrained analysis is needed to target mitigations at the location and scale that will maximise benefits in a cost-effective manner.

A map of the Kaipara showing the large scale of the project can be seen on the page below.







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### Afforestation Funding Case Studies

Te Uru Rākau held a workshop with NRC on 23 January 2019 to present the One Billion Trees Programme to NRC staff and some key stakeholders. This presentation helped the NRC HCEF Boost team to clarify our scope and definitions (minutes: A1158972). In future, it will help NRC to improve afforestation extension services.

Following this workshop, a number of applications were lodged with MPI to test that the One Billion Trees Programme criteria were not functioning as perceived or actual barriers, but preferably enabled the objectives of our afforestation project. A full review of the case studies undertaken during the HCEF Boost Year can be found under "Milestone 3.1: Stocktake Afforestation in Northland", subsection "Outcome 5: Case Studies".

### Summary Report of Regional Priorities

A prioritisation of the surviving indigenous biodiversity in Northland has recently been undertaken. Results from this analysis rank all indigenous-dominated terrestrial sites (including mangroves) and all freshwater sites, based on their ability to contribute to the representation of a full range of regional terrestrial and freshwater ecosystems. The need to carry out such a regional analysis reflected the rise of other players alongside DOC, including regional councils, non-governmental organisations (NGOs), philanthropists, community groups and private individuals. The effectiveness of multiple players in working together very much depends on coordination and prioritisation.

NRC's biodiversity priorities are outlined in detail in the *Prioritisation of the Northland Region* document contained in the Milestone 2.2 appendices. This prioritisation process will be reflected in the next 4 years' HCEF project, SHaRP, which is discussed in the final section, "The Future", under the subheading "The SHaRP Project".

### Summary Land and Water Science Work

The following excerpts are taken directly from the report done by Clint Rissman of Land and Water Science. The full report can be found in the Milestone 2.2 appendices.

### Abstract

The work presented here utilises regional scale airborne gamma-ray spectroscopy (AGRS), topographic indices, and regional geology to identify the combined role of rock and sediment type, faulting, stratigraphy, and topographic controls over the susceptibility of the Northland landscape to mass wasting, erosion and subsequent sediment generation. The sediment process-attribute layer (S-PAL) classification is geologically and geochemically based and data-driven, applying image classification



algorithms to regional scale raster imagery of Digital Elevation and AGRS within GIS for the purposes of better understanding sediment supply to the region's waterways, estuaries, and harbours.

A conceptual understanding of the drivers of landscape instability were developed for the Northland Region by exploring the relationships between geological and topographic gradients with the spatial variation in AGRS signals. Google Earth imagery and in places, Northland's highresolution oblique imagery, was used to provide visual evidence for erosional features, such as slips, rock avalanches, mudslides, soil creep, and tunnel gullying.

AGRS guided exploration of the region revealed four generalised geostructural settings that govern gradients in mass wasting and sediment supply across Northland, namely:

#### Fault Controlled Mass-wasting in Rocks of Contrasting Strength

Fault controlled mass-wasting at the contact between outcrops of competent volcanic rock and weak sedimentary rocks of the Northland Allochthon form localised areas of high intensity mass wasting and sediment generation. Across these fault zones, anomalous AGRS signals coincide with exaggerated terrain ruggedness and correspond with evidence for mass wasting in Google Earth imagery and higher resolution oblique imagery. The sphere of influence of fault-controlled mass wasting, as evident in AGRS signals, topographic indices, and aerial photography, extends back approximately 8 km from the contact between the Tangihua Complex basalts and the weak Punakitere Sandstone (and mudstone). In addition to faulting at the contact between materials of contrasting strength, folding of weak sedimentary units drives localised instability and attendant increases in terrain ruggedness and AGRS signal anisotropy albeit of a lower intensity. The role of faulting and folding over enhanced susceptibility to mass wasting is well recognised internationally and is especially common where there is a large contrast in rock strength.

#### Stratigraphically Controlled Mass-wasting

Across the Northland region, stratigraphically controlled mass-wasting occurs where young flood basalts overlie weak sedimentary rocks, especially mudstones, of the older Northland Allochthon. Here fracture permeability in the overlying basalt focuses the infiltration of water, resulting in the dispersion and deflocculating of underlying clay units and the resultant destabilisation of the rock mass and sediment export. Down cutting of competent rock by the drainage network and subsequent knickpoint migration is also a key driver of instability, mass wasting and



ensuing sediment supply to Northland's streams and harbours and is most notable at the peripheral margins of the rhyolite mantled Kerikeri Volcanic plateau and the Waipoua Basalts.

#### **Ancient Basement Mass-wasting**

The ancient basement rocks of the Waipapa Group greywacke and argillite, and the less extensive Caples Group argillite and conglomerate are highly susceptible to mass wasting and erosion. Both units pre-date the Northland Allochthon and where terrain ruggedness scores are elevated, exhibit radiometric signals consistent with exposed bedrock and clear evidence of mass wasting and sediment (Land and Water Science Report 2018/35 2 Project Number: 18007) generation in Google Earth and Northland's high-resolution oblique imagery.

Compositional heterogeneities, inclusions of weakly or poorly competent basalts, are a possible source of the inherent susceptibility of these ancient basement rocks to high rates of mass wasting, erosion and sediment yields. Here internal contrast in rock strength, and structural controls over slope and dip interact producing significant instability. A high degree of inherent instability across these ancient sedimentary units, is not specific to areas of developed land but are also evident across areas of old growth native forest. Inappropriate development of currently forested land is likely to further exacerbate sediment yields from these already inherently unstable geological units.

#### Stable Landforms

Across the Northland region, stable landforms are characterised by low terrain ruggedness and radiometric signals consistent with advanced weathering and soil formation – there is little evidence for bedrock geochemical signatures. These areas include large areas, e.g., volcanic plateaus of the Kerikeri Volcanics and Waipoua Complex Basalts. Smaller areas of stable land are also associated with mantling by aeolian or marine deposited sediments of Neogene age.

Following the development of an AGRS guided conceptual model of landscape stability, an image classification algorithm was applied to regional scale rasters of potassium (K) concentration, equivalent uranium (eU) concentration, equivalent thorium (eTh) concentration, and a Terrain Ruggedness Index (TRI) to produce a data-driven classification of landscape characteristics within GIS. The 35-class classification was subjectively considered most suited to catchment scale and State of Environment surface water monitoring sites. This genetic classification includes c.



700,000 polygons with an on the ground resolution of 50 x 50 m or 0.25 ha. From the genetic classification, a landscape susceptibility classification to mass wasting was developed that connects sediment sources to river systems and the coastal marine environment (Figure A). The resulting geospatial package is the interactive component of this report, providing the reader with a spatial interface to explore the Northland Region.

As the classifications are based on actual data, they are less subject to issues of qualitative uncertainty. However, the approach taken here does require further investment in terms of better understanding the relationship between the landscape susceptibility classes that can be generated and the underlying drivers of variation. Questions surround the most appropriate number of classes and a requirement to further validate the causal relationships driving variability. In some instances, Google Earth Imagery was able to support the classification process but in other instances it was too coarse or greater knowledge of vegetative succession, in response to mass wasting, was required. Therefore, in its current form it is recommended that the classification developed here is used in conjunction with expert local knowledge and field experience. The authors note that testing the performance of the model to estimate spatial variation in instream measures of Volatile and Total Suspended Sediment across the region is considered a critical step to further assess the validity of the classification presented here.

### Recommendations

- Ensure long-term planning and prioritisation to meet 30-year soil conservation strategy and biodiversity priorities.
- Keep refining regional priorities as new information becomes available.
- Consolidate soil conservation learnings, digital solutions, other resources, and recommendations the HCEF Boost project has developed, and translate these into a meaningful, easy-to-use prioritisation and implementation plan, with a flowchart for the NRC Land Management programme to engage with landowners.
- Consider if and how the learning from the Kaipara Sediment Study can inform work in the wider region.
- Keep looking for better understanding of the main drivers of soil erosion temporally and spatially, and adapt our soil conservation programme accordingly.
- Compare and utilise different datasets, including LIDAR, LUC, oblique photography, radiometrics, physiographics, and terrain roughness information to facilitate a better understanding of the main drivers for catchment sediment sources.



# Milestone 2.3: Building Capacity to Engage Tangata Whenua

Build capacity to engage and support iwi/hapū involved with forestry initiatives.

*Note*: This milestone originally sat in the Milestone 3 group, which is about capacity and capability building. It was subsequently shifted to the Milestone 2 group when milestones were renegotiated with Jessica Tramoundanas-Can of MPI, Duncan Kervell and David McDermott.

### Evidence of Completion (Milestone 2.3 appendix)

- Draft Iwi Engagement Plan (provided to Te Puni Kōkiri for comment)
- Evidence of iwi engagement training
- Te Kawa Wai Ora Project and Research Plans (draft)
- The Ngāti Hine Story Bob Cathcart

### Purpose

Our purpose was to better understand the whenua Māori management scene in Taitokerau, and to grow our team's confidence in engaging with tangata whenua in their daily work. We also want to clarify who our active partners are, and share our learning process and outcomes with our partners and, where possible, the wider stakeholder group.

### Process

Our Land Management team identified several key parties in our work to build capacity in the iwi/hapū engagement space. They are:

- government agencies and NGOs working with Māori on land management issues
- iwi-governed organisations with land management functions and/or aspirations
- hapū-led collectives looking to make use of Māori freehold land
- whānau groups and individuals seeking support/advice on land management issues
- NRC staff with existing projects involving iwi/hapū engagement.

We agreed that in order to build capacity to engage with Māori, we must first understand the basic functions and connectivity of these stakeholders. Beyond this, we must understand NRC's internal capacity (or lack of) for engaging tangata whenua, and identify opportunities for improvement wherever possible.



### Outcomes

### Iwi Engagement Plan

Alongside our broader Afforestation Communications and Engagement Plan (Milestone 3.5 appendix), we have developed a specific Iwi Engagement Plan (Milestone 2.3 appendix). This tool was used to keep track of our evolving relationships with iwi, hapū, whānau and individuals in the whenua Māori space, and includes a stocktake of Māori entities identified as active in afforestation in Northland.

### **Engagement with Government Agencies and NGOs**

Our Land Management team sought to initiate (and in some cases continue) working relationships with the following people involved with whenua Māori (land) management at a government level:

- Melanie Sweet, Senior Advisor, Māori Strategy, Policy and Partnerships Directorate, MPI
- April Erueti, Māori Business Growth Taitokerau, Te Puni Kōkiri
- Jared Pitman, Senior Advisor, Te Taitokerau, Te Puni Kōkiri
- Lisette Rawson, Northland Forestry Grants and Partnerships, Te Uru Rākau
- Meryl Carter, Ngā Whenua Rāhui, DOC
- Auriole Ruka, Kaiwhakahaere Hononga Māori Māori Relationships Manager, NRC
- Eamon Nathan, Pou Manatū, Reconnecting Northland.

Overall, we found a genuine desire from these agency representatives to share knowledge, experiences and resources. There is a common vision of improving outcomes for Māori on the land, and a keenness to not repeat past mistakes. From strategic and operational standpoints, it makes sense to continue building these inter-agency relationships and deepen the knowledge of each other's organisations. This will help to avoid doubling-up on work streams, to identify any gaps in agency knowledge, to deliver effective and efficient programmes, and to offer a united front when tackling the complex challenges of Māori land management.

### Iwi-governed Organisations with Land Management Functions and Aspirations

In Taitokerau/Northland, several iwi have historical and ongoing interests in forestry. The iwi governance bodies often have clear organisational structures and a top-down approach to managing their land on behalf of a large and often complex group of tribal members. As part of our investigation into iwi/hapū engagement in the afforestation space, we contacted representatives from the following iwi and iwi-led organisations:

- Te Rarawa (iwi)
- Ngāti Kurī (iwi)
- Te Aupōuri (iwi)



- opportunities. Overall, there is a strong desire to utilise funding to strengthen their communities' aspirations - to stand on their own feet and to realise the potential of their whenua.

variations in the "readiness" of hapū and collectives to respond to afforestation

The complexity of the multiple-owner hapu collective models, and the uncertainty of as-yet unsettled Treaty of Waitangi claims across much of Northland, means that there are great



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- Ngāi Takoto (iwi)
- Te Roroa (iwi)
- Te Hiku o Te Ika (iwi)
- Tai Tokerau Māori Forests Inc. (iwi collective)
- Pārengarenga Incorporation (iwi collective) •
- Amokura Iwi Consortium Ltd (iwi collective) •
- Taitokerau Māori and Council Working Party (iwi/NRC partnership). •

Through our discussions with iwi representatives, we found that those iwi with forestry interests were already engaging directly with MPI/Te Uru Rākau around their large-scale land-use aspirations, and have limited need for the smaller-scale technical and funding advice that regional government authorities have to offer. Overall, their message was clear: NRC has a vital role to play in providing technical advice, funding guidance and ongoing support for Māori landowners at a hapū/whānau level – i.e. "at the farm gate".

NRC's role as a provider of region-specific data, local knowledge and on-ground experience for central government land-use policy settings was also highlighted. Iwi see NRC as a key voice in ensuring that Northland-specific whenua Māori issues are considered as central government rolls out national funding models.

#### Hapū and Hapū-led Collectives Looking to Make Use of Māori Freehold Land

It became apparent early in our project that the One Billion Trees Programme and wider Provincial Growth Fund are of great interest to hapu and hapu-led collectives. These groups represent multiple stakeholders with tribal affiliations and a shared mandate to develop respective Maori freehold land. The scale of these landholdings ranges from small lifestyle blocks and orchards to large farms covering sub-catchments. We engaged with the following hapū and hapū-led collectives:

- Ngāti Rāhiri and Ngāti Kawa (Ngāpuhi iwi)
- Te Uri o Hau (Ngāti Whātua iwi)
- Te Kotahitanga E Mahi Kaha Trust
- Kaitiaki Nursery •
- Mahere Whenua Matua o Te Rewarewa (Te Parawhau iwi). •

Rohe-focused kaitiakitanga was a recurring theme, especially in relation to restoring indigenous vegetation in riparian zones for waiora. Provincial Growth Fund availability (or lack of) for nursery establishment/expansion was another recurring theme among those contacted by our Land Management team.

### Whānau Groups and Individuals Seeking Land Management Support

Ultimately, NRC's ability to provide sound technical advice and funding guidance "at the farm gate" is our most powerful tool for engaging with all landowners, including tangata whenua. Understanding good farming practice, afforestation techniques, land-use options and landscape planning will provide the backbone for practical guidance on any whenua Māori development, and NRC is best positioned to deliver this on the ground. Already, 22,000 ha of Māori-owned freehold land is under an FEP. This figure represents 18% of the total Māori freehold land (135,000 ha).

There is, however, a need for NRC staff to develop a deeper understanding of te ao Māori (Māori worldview) in order to build trustful and lasting relationships with Māori landowners, and to support their desire for self-determination, though this will take time. Concepts such as kaitiakitanga (custodianship), whānaungatanga (kinship) and rangatiratanga (self-determination) are foundations of mātauranga Māori (knowledge). These values align well with NRC's vision of a healthy and diverse Northland – this alignment will be strengthened by extending our internal capacity to engage with Māori on the land.

### Ngāti Hine Contract

In order to understand historical and current afforestation from a tangata whenua perspective, we commissioned Bob Cathcart of AgFirst to research and report on the Ngāti Hine story – an iwi with a long-standing interest in forestry in Taitokerau. Bob has been involved in iwi forestry as a consultant for decades. His reflections on the experiences of Ngāti Hine iwi members provides a snapshot of the best – and worst – of forestry from a Māori viewpoint. Bob also imparts his advice on how to engage effectively and safely with Māori in their cultural space. The full report can be found in the Milestone 2.3 appendix. A brief summary of Bob's findings are as follows:

- Past negative experiences with forestry particularly from an economic standpoint have resulted in many northern Māori viewing exotic plantation forestry (especially *P. radiata*) with some suspicion.
- Historically, central government has been implicated in creating perverse outcomes. This was due to lack of stability of interest rates on government loans for forest establishment and maintenance.
- Plantation forestry has resulted in indirectly supporting kaitiakitanga principles in some areas, often due to wetlands and other sensitive areas remaining undeveloped under plantation forestry.
- Mānuka plantations have been established on land where *P. radiata* growth was historically unsuccessful due to low-fertility soils. This represents a more refined approach to forest design and builds economic resilience through diversification.



- The Ngāti Hine Forestry Trust is particularly interested in providing ongoing employment in forestry. It is involved in a forestry training programmes and is investigating biofuel supply/production from wood residuals remaining after logging.
- One very valuable step in the review of land uses within the Ngāti Hine Forestry Trust whenua was the Trust having documented a "Vision". Each proposal, any suggested changes in land use or operating procedures could be measured against this broad objective – if it didn't fit the long-term goals of the Trust and its shareholders, don't waste any more time with it.
- The Ngāti Hine Forestry Trust is re-establishing indigenous riparian vegetation on alluvial soils along riverbanks. This the natural habitat of kowhai, kahikatea, kanuka, totara, pūriri, houhere, and ribbonwood, along with flax and shrubs.
- Eco-tourism, taking in forestry, mānuka, native forest and cultural sites, is viewed as an exciting opportunity for the future of Ngāti Hine tangata whenua.

### Building Capacity of NRC Land Managers: Mana Ao Tūroa Noho Marae

One of the cornerstones to building capacity to engage with tangata whenua is to increase the awareness and understanding of te ao Māori within NRC's Land Management Department. Therefore, we have worked with our in-house partners to develop the following noho marae programme, to be undertaken in spring 2019.

#### Аім

To build capacity within the NRC Land Management team to effectively engage hapū/iwi with particular focus on the natural environment.

#### PURPOSE

Develop an in-house training programme to build staff awareness and understanding of the Māori world view and how that relates to the natural world. This programme has been specifically designed for Land Management staff at NRC. The programme sessions are intended to stimulate learning, discussion, debate and, ultimately, action. Therefore, the sessions will utilise a wide range of teaching styles most responsive to programme content, interest and energy levels, prior knowledge base, and the learning models of participants.

#### PARTNERS

Partners include NRC, Reconnecting Northland, Te Puni Kōkiri and DOC.

Working with these key partners to co-deliver/design a 2-day noho marae programme in 2019 focused on the following outcomes:

- Increase participants' understanding of a number of broad te ao Māori concepts.
- Provide a safe and challenging environment for participants to explore issues related to mana ao tūroa.
- Strengthen participants' ability to build meaningful relationships with mana whenua.
- Increase participants' understanding of kaitiakitanga and manaakitanga.



#### Key Learning Outcomes

The programme will touch on the following four main learning outcomes.

| Te Ao Māori      | The Māori worldview considers everything living and non-living to<br>be interconnected. Whakapapa describe these connections and tell<br>the story of how people, the landscape, plants and animals came<br>into being. People, plants and animals are all descendants of<br>Ranginui (the sky father) and Papatūānuku (the earth mother) and<br>their children. The concepts of mauri (life force), mana<br>(authority/power), tapu (sacred and restricted customs) and wairua<br>(spirit) are important to consider in relation to both people and<br>nature. The tangata whenua (people of the land) have a role as<br>kaitiaki (guardians) to preserve the mauri, wāhi tapu (sacred sites)<br>and natural taonga (treasures) in their area. |
|------------------|---|
| Mātauranga Māori | The knowledge, comprehension, or understanding of everything<br>visible and invisible existing in the universe. In the contemporary<br>world, the definition is usually extended to include present-day,<br>historical, local, and traditional knowledge; systems of knowledge<br>transfer and storage; and the goals, aspirations and issues from an<br>indigenous perspective.  |
| Kaitiakitanga    | Kaitiakitanga includes active stewardship or guardianship of the<br>land, with Māori traditionally having their own system of resource<br>management to sustain people and natural resources for the future.  |
| Mana Whenua      | Recognises the importance of tribal affiliation, identity, tribal resources, tribal environs, stories and sayings.  |

### **Internal Staffing Boost**

The organisation has committed to growing its Māori engagement capacity by hiring a second Māori Liaison officer, Auriole Ruka. Auriole has proven to be very supportive of our Boost Year project. She will manage and guide the efforts of existing staffer Rachel Ropiha, and continue to focus on building capacity for Māori engagement across the wider NRC whānau.

### Te Kawa Wai Ora – A Precedent for Change

While our HCEF Boost Year project has been underway, other NRC Land Management staff have been working on an exciting new approach to collaborating with iwi/hapū on land management issues and actions (including afforestation) in the Northern Wairoa River catchment. Te Kawa Wai Ora is a collaboration involving the following parties:

- Ngā Kaitiaki o Ngā Wai Māori
- Te Roroa
- Te Uri o Hau



- Integrated Kaipara Harbour Management Group
- Reconnecting Northland
- DOC and Fonterra Living Water Partnership
- NRC
- Manaaki Whenua (Landcare Research)
- Sustainable Business Network's Million Metres Streams Project.

The parties met in 2017 and together developed the Northern Wairoa Freshwater Improvement project. The project subsequently received funding from MfE's Freshwater Improvement Fund. The group identified the following activities to be conducted over the next five years:

- Work with mana whenua and landowners to incorporate mātauranga Māori (indigenous knowledge) alongside good farming and forestry principles and restoration practice.
- Complete at least 180 FEPs with landowners to identify, prioritise and adopt sustainable land management practices on their farms.
- Provide subsidies to landowners to assist with fencing, planting, stock water reticulation and wetland enhancement.
- Target our efforts on the HEL in the catchment.
- Set up new freshwater quality monitoring sites in the catchment.

Te Kawa Wai Ora could provide a valuable precedent for how NRC builds capacity to engage and work alongside iwi, hapū and whānau groups. The related Draft Research Plan and Draft Project Plan can be found in the Milestone 2.3 appendices.

### Recommendations

- Strengthen our partnerships with government agencies and NGOs involved with whenua Māori issues, particularly Te Puni Kōkiri and Reconnecting Northland. A cross-agency "toolkit" and communications/engagement package could clarify each agency's role in the land management space, and clearly communicate all available services and funding options for landowners.
- NRC must continue to build its internal capacity to deliver up-to-date technical advice, good practice guidance and funding assistance to landowners on the ground. Advice suggests that activation in forest establishment can occur most effectively at the whānau (or hapū) level. NRC should be capable of delivering these services to groups and individuals, regardless of the recipients' "state of readiness".
- Seek a deeper understanding of historical afforestation and land-use change in Northland. Identify opportunities and threats to sustainable land management based on lessons learned.



- Build internal capacity to meaningfully engage with tangata whenua in the land management space via immersive tikanga Māori training for all NRC Land Management staff.
- Support the ongoing Te Kawa Wai Ora project to build deep and lasting relationships with our many partners in the land management and mātauranga Māori space.
- Continue building on the 18% of Māori land in Northland already covered by NRC FEPs.
- Tailor our communications to reach Māori communities, including identifying and using channels that will connect us and using appropriate language and style.
  Collaboration with partners such as Te Puni Kōkiri and Reconnecting Northland could be valuable in this space.



# Milestone 3: Capability and Capacity Building

Capability and capacity building to deliver soil conservation and afforestation extension services.

### **Deliverable Due Date**

30 May 2019

### Milestone 3.1: Stocktake Afforestation in Northland

Stocktake and documentation of forest establishment activities in Northland, including identifying barriers and capability and capacity specific to the region. This will include examples of different methods/types of forest establishment, and selected case studies to test alignment with funding options (including One Billion Trees).

### **Evidence of Completion**

• Documentation of stocktake, including key stakeholders, existing or previous afforestation projects, gaps and a future work plan.

### Purpose

Our purpose was to build a picture of who's doing what to enable us to create a "jump off point" building on existing work and knowledge and to create strategic partnerships and/or clear accountabilities. We also want to identify the needs and aspirations of relevant sectors that could be addressed through existing or future soil conservation and afforestation extension services.

### Process

### **Identifying Participants**

At the start of this project, we identified sectors involved directly or indirectly in land management and/or afforestation and then undertook a stocktake of activities. In particular, we set out to:

- develop a stakeholder list
- liaise with industry and community organisations involved in forest establishment to set up relationships with key regional influencers



- identify barriers to capacity and capability, both internal and external, and consider ways of addressing these
- investigate past afforestation initiatives in the region to learn what made them successful or otherwise
- support case studies to test One Billion Trees funding criteria relative to implementing regional priorities.

### Outcomes

### Outcome 1: Stakeholder List

A full list of stakeholders has been identified and collated by sector (document A11304336 in Milestone 3.1 appendices).

#### GROUPS

Stakeholders already involved in afforestation were varied in their interests, motivations, financial and land holdings, and size of operation. Some stakeholders' affiliations were spread across several of the following groups:

- forestry and agricultural consultants
- internal NRC technical advisory group and contributors
- training organisations (e.g. Papa Taiao Earthcare, Competenz, the New Zealand Institute of Forestry)
- iwi, hapū and whānau groups interested in afforestation, and facilitators
- other government agencies, both financial and non-financial supporters
- nurseries and seed collectors
- afforestation groups (e.g. catchment groups, Living Waters, the FFA, the NWC, etc.)
- individual landowners
- EnviroSchools with nurseries and planting interests
- landowners with available land
- contractors providing afforestation services
- conservation groups with an interest in native tree planting for various ecological outcomes, including improved water quality and erosion control.

#### Forested Lands in Northland

We were unable to obtain shapefiles of current commercial forestry cover. Feedback from forestry consultants and FFA members was that identifying landowners with small woodlots across the region would not be possible with any accuracy in the time we had to complete this project. Landcover database, oblique photography and other datasets provide some indication. MPI has some photographic landcover records also, and all of these provide useful benchmark information for applications to One Billion Trees and the ETS. A light detection and ranging (LIDAR) survey is planned soon too. In addition, locations of small



woodlots and harvesting operators in the region have been sourced by Forme Forest Consultants.

Kevin Reardon and Paul McCreedy of Forme Consulting Group produced a seminal report on "Stocktake of small woodlots". Their executive summary follows.

Forme Consulting Group has been engaged by Northland Regional Council to undertake a small woodlot stocktake within the Northland region and examine the impact the Emissions Trading Scheme has on small woodlot owners.

The definition of a small woodlot size is subjective. For this report, we have defined a woodlot as exotic forests between 2ha and 100ha. Our catchment area for analysis is the Northland region encompassing the Far North district, Kaipara district and Whangarei district.

The history of exotic forest and woodlot forest development in Northland mirrors that at a National scale. The first wave of commercial exotic forest plantings occurred between 1925 and 1936 with an estimated 288,000 ha of Pinus radiata established across the country.

The 1960s saw the commencement of a second wave of plantings, predominantly Pinus radiata and saw the national plantation estate grow from approximately 352,000 ha in 1960 to over 1,000,000 ha by 1984. This second wave was characterised by a significant shift to private/public companies, mid-range and small investors and farmers taking advantage of the incentives and increasing plantings on private land.

A global wood price spike through the mid-1990s coupled with declining agriculture product prices and land values was largely responsible for a third wave of new forest plantings largely by corporate forest owners, smaller investors and a new category of forest owner in syndicated forest partnerships aimed at retail investors. While this period of afforestation was relatively short lived it was very significant as it was not directly incentivised by Government and it introduced the many small owners that we now have, to forest ownership.

Forme Consulting has recently quantified the total exotic forest resource in the Northland region mapping the forest estate down to 2.0 hectares in size. The mapping work shows there is currently 147,011 hectares of P. radiata exotic forest in study catchment as of 2019. Approximately 14% of this total (19,973ha), would meet our woodlot definition of being less than 100 hectares in size.



In general, the profile of a Northland farm forester today is one in their late 50s and 60s, with a passion for the use of trees to enrich their farming lives. Most have invested in trees for either economic and farm management reasons, or for aesthetic and environmental reasons.

Pinus radiata is the species of choice for both large and smaller forest growers in the region however minor species such as eucalyptus, cypress's, acacias, and redwoods are more common, albeit on a 'hobby' scale, for the smaller forest owner.

Northland is not unique and generally mirrors the trend of forest harvesting activity throughout the rest of the country. The maturing of forests planted during the third wave of plantings in the mid-1990s is now in full swing. A significant amount of this activity is concentrated on small investors and woodlot owners.

The advent of forestry in the Emissions Trading Scheme in 2011 has added another dynamic to woodlot forest management bringing with it both complexities and barriers to flexible land use as well as opportunities through carbon credit (NZ) generation and sales.

The ETS was meant to stimulate new forest plantings by allowing eligible foresters to earn carbon credits or New Zealand Emission Units (NZUs) as their trees grow and absorb carbon dioxide. The carbon market that developed would allow foresters to sell their NZUs, and in turn, hopefully plant more forests and absorb more carbon. This didn't happen as climate change policy instability, low carbon prices and disengaged foresters turned away from the Scheme after initially registering.

The Scheme has also been plagued with barriers to participation, especially for smaller forest growers, who didn't necessarily have the mixed age classes, and forest scale to justify increased administrative requirements and compliance costs. A lack of general understanding around carbon accounting methodology meant that opportunities for additional revenue through carbon sales never really materialised for the woodlot owner.

With increased policy certainty, a rising NZU price and significant structural changes to the Scheme, woodlot owners are finally seeing a 'light at the end of the tunnel' for the years of mostly unfruitful participation. A move towards 'averaging' carbon accounting will allow forest owners to sell their NZUs without the risk associated with having to repay NZUs at harvest, so long as the woodlot is replanted.



For landowners, when cashflow can be a considerable constraint in the decision to establish a woodlot or not, the opportunity that carbon accounting methodology will allow, should be considerable.

In Forme's work through the forest sector and across the New Zealand landscape we are beginning to see increased confidence in the sector not only stimulated by the Governments 1BT program, but also through the ETS changes and rising NZU price.

A fourth wave of new forest planting may not be far way and one in which woodlot owners in Northland and around New Zealand, should be in a great position to benefit from.

#### **Outcome 2: Key Partners**

Over time, we developed a portfolio of key partners. Some partnerships are mandated by formal agreement; others are informal connections:

- DOC, with whom we meet once a month
- internal technical advisory group
- the NWC, which provides expert commercial sector advice, and with whom we meet regularly
- Te Uru Rākau, which is in the process of building its team in Northland
- Reconnecting Northland, which has an interest in fostering conservation for profit opportunities across the region
- the FFA via Peter Davies-Colley (chairman)
- DairyNZ via Helen Moodie
- Beef + Lamb New Zealand
- Ian Jenkins, forestry consultant to NRC, a sounding board for contract development and technical questions
- the Northland Totara Working Group.

### **Outcome 3. Capability and Capacity: Barriers and Opportunities**

#### INTERNAL WORK 1: BUILDING TEAM KNOWLEDGE

To avoid working in isolation, we engaged with an internal NRC technical advisory group across disciplines. Our secondary objective was to encourage collaboration on a common topic (afforestation) to foster closer working relationships.

We met with our nominated technical advisory group in early December 2018. Subject matter experts advising us are:



- Bruce Howse Governance Lead
- Duncan Kervell Accountable Manager
- Justin Murfitt Strategic Policy
- Lisa Forester Biodiversity lead
- Laura Shaft Biodiversity (coastal/wetlands)
- Kane McElrea Biosecurity lead
- Jo Barr Biosecurity (weeds)
- Ali McHugh NES-PF
- Tamara Lee Engagement (communications)
- Auriole Ruka Māori engagement
- Stuart Saville Consents
- Ricky Eyre Coastal
- Lorna Douglas Land management
- Michael Mitchell Land management
- Wendy Holland DOC (supported by existing MOU)
- Peter Graham Biosecurity (kiwi)
- Hoa Pham Surface water/modelling
- Susie Osbaldiston Hydrology
- Josh Sharp-Heyward GIS.

### INTERNAL WORK 2: CONTINUING EDUCATION

#### Initial ETS Education

We also realised that ongoing education of our core team was key in achieving success in afforestation. We surveyed staff to find out what their questions were, and found it was carbon and the ETS. We ran a pilot lecture on the ETS in April, with Ian Jenkins (JenksMax, forest consultant). The talk was well received, and the team showed engagement.

#### The June Lecture Series

We then extended our pilot to a 2-day "Hill to Harbour" lecture series, 10–11 June 2019. The topics covered had a future focus, and the invitation was extended to our wider team, all speakers, our technical advisory group, and close external partners. The lectures were filmed (with speaker consent) to create a learning resource.

Topics were:

- Laws of the Land: Rules Relating to Soil Conservation and Afforestation Justin Murfitt
- Futures of Native Forestry Paul Quinlan
- Agroforestry: Trees for Landscape and Community Resilience Klaus Lotz
- Soil Conservation: Pathways to Improvement Bob Cathcart
- Land Use Evaluation Economics Based on Forestry Ian Jenkins



- The Future of Farming in Northland Jeff Martin
- Digital Tools for Land Management Clint Rissman

The following is a summary of the main points from each lecture.

*Laws of the Land* – We learned from Justin Murfitt that:

- Landowners cannot offset methane by planting trees, so farmers cannot use trees to offset methane emissions emitted by farm animals (particularly cows). This will make agriculture's entrance into the ETS more difficult.
- If the government is solely relying on tree planting to solve the CO<sub>2</sub> problem, climate change risks (including increased fire risk and biosecurity incursions) require tree species diversification.
- District councils in Northland have responsibilities for wetlands (cross-over with NRC) and terrestrial biodiversity, so they need to be included in afforestation planning and activities as key partners.
- Many opportunities for best outcomes in the afforestation space are beyond the mandate of councils (district and regional) if we are relying on regulations, because central government holds those powers. It is therefore easier to be proactive in the non-regulatory space.
- The effect of making landowners comply with things they can't afford, like mandatory FEPs, will drive them off the land.

*Native Timbers in Northland* – We learned from Paul Quinlan that tōtara is a huge opportunity, but the business case remains to be proven. MPI has partnered with the Northland Totara Working Group to tackle the marketing issue via the Totara Industry Pilot. The outcome is as yet unknown. This work is discussed more in detail in the section "Native Plantation Forests" (Milestone 3.4). The critical issue for the Totara Industry Pilot is the question of how to navigate the lag of approximately 100 years to shift into sustainable yield under a continuous cover regime, such as the forestry regimes used in Europe. The additional question arising from this is: Should there by a higher-value New Zealand Unit (NZU) for trees that provide greater environmental or biodiversity value, such as tōtara?

*Agroforestry 2.0* – Klaus Lotz introduced permaculture and agroforestry in all its varied guises, beyond the traditional Kiwi vision of cows or sheep under trees. We learned that:

- Agroforestry has been practised in many countries for hundreds of years, with successful large-scale models today in Brazil, Germany and other countries.
- The discipline has potential to sequester carbon in the soil at a far greater rate than trees do.
- How to shift these ideas from the fringe to the mainstream is the challenge, especially when food trees are excluded from One Billion Trees incentivisation.

*Our Soils, Our Futures* – Bob Cathcart summarised the Northland situation of over 200 soil types, a far higher complexity than in other regions. He stressed that this situation made it



imperative for farm consultants to know their subject matter very well, which he felt most currently did not. Bob felt that land use change had to happen, and that the right tree in the right place meant reaffirming some traditional but lost knowledge, such as managing fire risk in plantations adequately.

*The Economics of Forestry* – Ian's tutorial explained the economics of forestry from a net present value and internal rate of return perspective. The Land Management team was enthusiastic about converting the Excel spreadsheet calculator into an interactive tool that landowners could use alongside LMAs to get an indication of venture viability, with the caution that NRC should not be seen to be giving financial advice. Ian stressed that:

- Under 5 ha was probably not that viable (in agreement with Margules Groome's conclusion).
- Pruned logs on small woodlots are better, because you can sell a pruned log on the unpruned or pruned market, but not vice versa, thus increasing your odds of making a profit in a volatile market. This is at odds with commercial forestry, where hardly any trees are currently pruned. We think it is key to small woodlot management, because size makes small woodlots more vulnerable to market changes.
- A key issue was balancing having adequately informed staff (LMAs) but clarity at the point where they would recommend that the landowner seek professional expert advice.

*Future of Farming in Northland* – Jeff Martin, a leading Northland farmer who is deeply involved in Extension 350, Beef + Lamb New Zealand, and other initiatives, spoke about forestry as being profitable at \$22,000 net return per ha for 6 ha total, at a location 50 km from the market, which was the Juken triboard mill in Kaitāia, not the port! We heard that:

- Cell grazing can revolutionise farming in its own right, and lead to as much reduced runoff as fencing riparian areas.
- Riparian fences can be used as the backbone for whole-farm fencing systems.
- Drones as mapping agents are key to setting up cell grazing systems, but service providers (e.g. Agdesign) need to be managed closely, especially as they are not local to Northland.

*Digital Tools for Land Management* – We learned from Clint Rissman how new mapping tools, if they are integrated, may be more accurate in showing unstable, erosion-prone land.

- He was able to clearly demonstrate that the NES-PF red-zone classification was less likely to erode than other orange-zone areas.
- He stressed the importance of "event sampling", or testing water quality directly after a large storm event, to gain a true understanding of when sediment really moves across the landscape.
- He suggested using sediment trap constructions at critical nodes, or stream confluences that have been identified as producing far greater sediment loads than other portions of a catchment watercourse network.



#### EXTERNAL BARRIERS 1: FFA INTERVIEW SUMMARY

Young doctoral candidate and FFA member Michael Gravatt, whose family has long been involved in small woodlot afforestation in the region, interviewed 9 members of the Northland branch to gain a cross-section of viewpoints. A full interview transcript can be found in the Milestone 3.1 appendices. All interviewees were self-taught and learned forestry through experience.

#### Point 1. Advice is Essential

Common themes were to understand what you want to achieve by planting trees and to seek advice – including professional advice for commercial crops. FFA members emphasised the ongoing commitment of trees and the multiple benefits and satisfaction gained. They all valued the FFA first and foremost for advice. Opinions on professional forestry consultants were mixed, with some FFA members cautioning against "cowboys" who collected commissions for helicopter spraying after recommending it. Some members, however, endorsed Northland consultants as a general rule.

#### Point 2. ETS

A need for more information about the ETS was expressed by all, with one member stating that tree planting for the reason of carbon alone was a mistake. One interviewee said:

There is a guy down the road that leases his farm to the government and he gets \$197 per ha per year, the carbon credits and 25% of the profit, I wouldn't have put my whole farm into that sort of scheme.

One member expressed the idea that trees had multiple benefits and that these should be promoted as part of the carbon package, rather than promoting ETS alone. A few felt that until retiring land was economically viable (i.e. native trees were a profitable component of ETS), it was not in general a good scheme.

#### Point 3. Knowledge Lost

Members expressed concern that knowledge held amongst farm foresters, particularly about alternative species, will be lost as the population of FFA members ages. The FFA is looking at ways to preserve this knowledge. They also made the balanced observation that trees are a risky investment, that there was a lack of expertise in the One Billion Trees programme, that setting up a new forest service properly would take 15 years, and that therefore, the FFA was a good place to start.

#### Point 4. Taxation

A common barrier to planting trees mentioned by a few members was taxation and instability in taxation regimes. Instability of central government was considered a barrier, especially in light of the 10-year duration of the One Billion Trees direct landowner grants contract. Many felt that the criteria of One Billion Trees were too tight and the cash rewards too low – that is, the cost–benefit analysis of entering the scheme did not stack up. Some small woodlot foresters have the wherewithal to contract companies like PF Olsen, or The Tree People Ltd. (well-known Whāngārei local expert Peter Davies-Colley) to invest for them.


Literature backs up this viewpoint. When planting trees, no one can anticipate what the IRD will do in the future, which can then ruin the investment when the trees are harvested a minimum of 25 years later. A total of 14 changes were reported as fundamental game changers to the forestry landscape from 1983–1993 by J. P. Maclaren in his seminal work, still used by foresters today, the *Radiata Pine Growers' Manual* (1993).

# Point 5. Socio-economic Constants

Another common concern was the social factor: labour community. Members felt that a great deal of support was required to organise and develop a sustainable local workforce to meet the challenges of One Billion Trees. The prevalent, ongoing concerns of drug addiction and criminal records among forestry workers were mooted.

#### Point 6. Lack of Practical Information

Members expressed concern about a lack of information on practical topics. For example:

- response to a fire
- biosecurity threats and how to assess disease risks when choosing what to plant
- shade trees for agriculture ("*all you get is opinion*")
- site-specific advice about sites for different species
- good, clear information on legal requirements.

Overall, the themes are consistent with what we have found from interviews with technical advisors in the industry and well within the scope of the HCEF Boost project. We found that the FFA may be a promotional vehicle to help increase interest in trees, and with their promotion of young foresters, may become a tool for the next generation of foresters.

#### External Barriers 2: Landcorp/ Pāmu Interview Summary

In Northland, Pāmu blocks are a significant part of the landscape, from north to south. These include:

- Rangiputa (3,500 ha bull beef Angus, and sheep, Karikari Peninsula, Far North)
- Sweetwater Farms Complex (4 dairy farms, Kaitāia)
- Takakuri Farm (1,650 ha sheep and beef breeding, Kāeo–Whangaroa, Far North)
- Kāpiro Farm (2,000 ha cropping, angus breeding, sheep and dairy grazing, north of Kerikeri)
- Tākou Bay Dairy Unit (440 ha dairy unit, north of Kerikeri)
- Puketotara Farm (1,000 ha lamb finishing and local trade beef cattle, Kerikeri area)
- Mangatoa Farm (4,234 ha sheep and beef, west of Kaikohe)
- Tītoki Farm (800 ha breeding and finishing sheep and beef, northwest of Whāngārei)
- Ōmāmari Farm (2,000 ha sheep and beef, Kaipara, north of Dargaville).



Beth Masser interviewed Gordon Williams, Environmental Manager of Landcorp Northland, with input from Peter Bullen, Northland branch manager for PF Olsen. PF Olsen manages all Landcorp forestry operations across New Zealand. Gordon used to be a registered land valuer, with responsibility for valuing key Crown assets. The following key points emerged:

- In 1987, Landcorp managers envisaged Landcorp would only be around until 2020, because their lands can be used in Treaty settlements. Most of Landcorp Northland is under Treaty claim now.
- Their farming operations in Northland now involve more intensive farming, but with more areas retired and available for planting. They have most of their HEL in Northland planted already. New Zealand-wide, Landcorp has 10,000 ha forested (1,500 stands 1 ha and bigger) and earned 344,000 carbon credits in 2018 (\$8.6 million). Ninety-eight percent of that is pine. Landcorp plans to increase to 15,000 ha, including dryland eucalypts in the mix. The plantation forestry brings them close to carbon neutral.
- Although average Landcorp returns are \$335/ha across 127,000 ha of sheep, beef and deer operations nationally, Northland's farms returned a higher average figure in 2017–2018 of \$374/ha.
- Nationally, their annual environment budget sits at \$2.5 million. They have land and environment plans in place for all properties based on LUC, all prepared by a single contractor, which will be updated once the National Policy Statement for Freshwater Management (NPS-FM) comes out, potentially in July. Most plans sit at 50% implementation, with some at 75%. Landcorp has entered into 220 QEII National Trust covenants since the year 2000, the majority in the last 5 years.
- Waterways for riparian planting are being identified, with an annual \$2.5 million budget for erosion works, and with supplements from work with councils and QEII National Trust. Riparian planting is the Landcorp priority in Northland.

Their viewpoints on farm viability and land use change challenged the status quo.

# Point 1. Farming Is Uneconomic

Farming in New Zealand is not economic, with 2–3% capital return on good sheep and beef land, and only 4% on dairy land. Costs are going up, but farm returns are not, making margins tighter and farmers asset rich but cash poor. Landcorp has \$1.6 billion in assets, including land and livestock, nationwide. From this they make \$10 million/annum. Capital value is shown as a return on their annual balance sheet, artificially inflating returns. Gordon believes that a capital gains tax is needed in New Zealand to bring land back to a realistic value. Land expectation value for forestry is \$7,000–\$8,000/ha, compared with \$4,000/ha for farming.

# Point 2. One Billion Trees Has Challenges

According to Gordon Williams, many farmers do not understand the value proposition of trees, partly because the accounting balance sheets are not written in "farming language", and returns are not cash in hand annually. One Billion Trees funding is marginal for *P. radiata* now, but if carbon goes up to \$28/unit, it is not economic to go into the scheme. At



\$40/unit, people will stop cutting trees without replanting. Averaging will help this process. The carbon lookup tables severely underestimate growth of *P. radiata* in Northland, but actual measurements are too expensive for small woodlot owners; lookup tables were 28% below actual measurements done by Landcorp in Northland. In contrast, lookup tables overvalue natives and hardwoods. They considered that MPI is not set up to manage small woodlots, so the ETS needs to be simplified to let people self-manage. Landcorp has 2 full-time staff managing carbon, which is not possible for most farming operations.

# Point 3. The Regional Council Has Challenges

Gordon felt that "grandparenting" bad practices is the worst thing to do; it rewards bad managers and practices. Instead, councils should set limits based on LUC and require implementation. Funds allocated should be monitored and taken back if FEP objectives are not met. A leaching limit should be set on class 7 land, which would help drive land use change from agriculture into forestry, much like Bay of Plenty Regional Council has done.

# Point 4. Beware Overly Simple Solutions

In Northland, natural regeneration by shutting the farm gate may not work. In Gisborne, Landcorp was advised by regional council that it would work, but after 7 years, still nothing had happened. In Northland, we have kikuyu, which is so thick as to make natural regeneration unlikely. Eucalypts are better than pine for HEL because their roots coppice and stabilise soil, so you don't get the 6-year window of severe risk after trees are harvested that led to the damage from flood-borne debris in Tolaga Bay. But there's no market for these trees.

A full record of the Landcorp interview can be found in the Milestone 3.1 appendices.

# External Barriers 3: Contracting Dilemmas

# Price Cutting

Contractors interviewed for this project see price cutting as one of their main barriers. Most contracting and nursery operations are already lean, competitive and require a great deal of marketing effort, and the cost of cutting comes at the cost of quality. At the current point in time, anything other than a partnership or sole operator business structure requires a minimum return of at least \$65/h, especially with ACC levies being high for most forest-related enterprises, usually \$3.00 to over \$5.00/\$100 earned under the ACC Business Industry Classification of "forestry other". Limited liability companies do not see any benefits in saving money via business structure, except potentially reduced IRD tax bills, depending on many variables. Good Wood Aotearoa, a Whāngārei-based contracting company, has reported difficulty in achieving \$65/h returns in Northland and Auckland (Clea Gardiner, Good Wood Aotearoa [Northland eco-services contractor], personal communication, 12 March, 2019), and the company has given permission to release these data.

# Lack of Security

Other barriers in this region are lack of consistent work, which is especially difficult to deal with when employees and/or sub-contractors are involved. This dilemma is seasonal, with winter and summer being especially difficult times. Rain events stymie much work (Clea



Gardiner, Good Wood Aotearoa [Northland eco-services contractor], personal communication, 12 March, 2019). The cost of training employees is hard to recoup when they are forced to find other work, especially outside the region, but this is a reality for many smaller contracting businesses involved in afforestation.

It is very hard to maintain consistent income for employees in this industry, even when they are able to stay within Northland. Because of its long, skinny North–South shape, many forestry workers have to live away from home when they have young families, putting a strain on relationships and mental fitness (Northland Vegetation Control, personal communication, 29 May, 2019).

#### Drug Testing

The ability to maintain a skilled and reliable workforce is further hampered in commercial plantation situations, where drug testing is both pre-employment and random. Up to one-third of employees may fail a drug test at one time, especially where larger forest management companies like Hancock require testing for all synthetic cannabinoids (Kevin Ihaka, CEO Forest Protection Services, personal communication, 18 November, 2018).

#### Access Issues

The very real issue of access to erosion-prone land also poses problems for contractors. These areas are often steep, fairly challenging-to-dangerous for vehicles of any type, and are isolated, requiring a high level of health and safety vigilance. Four-wheel driving skills are often required, and a great deal of the younger population fit enough for planting and maintaining HEL do not have four-wheel driving skills. Steep terrain sometimes requires helicopters to drop plants (Northland Vegetation Control, personal communication, 29 May, 2019). Such places are hard to manage after planting where weeds, possums, hares, pūkeko, rabbits and other pests need to be controlled for tree survival.

#### Potential Solutions

Northland contractors we interviewed concur that the only way to deal with managing planted forests in Northland, where pest issues are a huge challenge, is to coordinate package deals whereby contractors offer planting and follow-up as a bundled deal. This suggestion was clearly to their benefit, but we believe it remains valid, because the idea would also benefit biodiversity and afforestation.

In addition, farmer feedback to contractors involved in tree planting suggests that they need hard figures to enter into budget forecasts before they can commit to future planting of trees. They want to know how much it will cost to plant a riparian strip 60 m long and 5 m wide, or a 5 ha steepland block. They suggest that planting one side of an ephemeral drain or stream is more practical, because this type of waterway always clogs up, and they need digger access to clean drains.

Farmers also have commented to contractors that tall trees near waterways are not always good options, because animals tend to congregate under tall trees for shade, and defecate there en masse, leading to more faecal loading entering the water during rain events and in situations where narrow planting strips cannot filter the volume.



# Outcome 4: Lessons from the Past

# WHY WE MUST LEARN FROM THE PAST

We needed to consider the triumvirate of the triple bottom line: the economic, environmental and social foundations. We wanted to know also what the people of Northland felt about forestry initiatives. We have heard anecdotal evidence that "a lot was promised Māori people of Northland, especially by the New Zealand Forest Service, and nothing was delivered" (anonymous personal communication).

This succinct summary came at roughly the same time as the news of Ngāti Hine's failed planting, where \$160,000 worth of high-end genetics were being mulched instead of planted in Northland because the land had not been readied for planting.

The seedlings were part of a \$32 million deal with the Ngati Hine Forestry Trust. About 1.2 million seedlings were bought, but only 200,000 could be planted because scrub had not been cleared. (Trevett, 2018, para. 6–9)

We engaged soil and forest conservationist Bob Cathcart to find out how we could learn from past failures. We chose Bob because he is also, as an AgFirst representative, a consultant for Ngāti Hine, and has worked for a wide array of land-based clients. Bob has also been involved for many years at a high level with NRC. He was therefore well positioned to provide us with quality advice about building capacity for Māori to participate in afforestation. With his deep and rich historical knowledge of the region, we also felt he could provide a summary of lessons learned from past afforestation successes and failures.

# SUMMARY OF LESSONS FROM PAST AFFORESTATION

Here is a summary of Bob's conclusions:

- There is obviously scope for a much closer working relationship between farming and forestry, with foresters providing the services and skills the farmers will need to control erosion and to manage, market and optimise the value of their greenhouse gas off-set. The farmers, in turn, help to fill gaps in the supply chain for wood processing industries. NRC and MPI need to ensure advisory services are available for farmers to change land uses and learn new business skills.
- An improved rail link from Ōtīria and Whāngārei to Auckland would open the opportunity for pine chip transport to pulp mills in the Central North Island industries that are desperately seeking new supplies. It would also open the same market to hardwood chip, for high quality paper, and enable alternative species to be grown in Northland. An interesting development in the Far North that might support such rail development is the establishment of a biochar plant to use some of the residual wood from the Aupōuri forests.
- Coordinate labour in the region so forestry workers other than loggers are employed year-round.
- Over-cutting or harvesting early to satisfy spot markets, while perhaps a windfall for the grower who has borrowed to manage the crop, is preventing a constant, reliable



wood supply and investment in adding further value in Northland. Negotiate forward supply contracts with farmer-growers so both parties know what they will be getting.

- With strategic planting and management, riparian areas and alluvial fans can be managed to trap greater volumes of sediment and debris, preventing debris washing downstream and damaging infrastructure. Stopbanking of lower valley ponding basins should be discouraged as these provide the last opportunity to trap sediment, particularly fine silts and clays, before they reach our harbours.
- Actively spill floodwaters into ponding areas to enable sediment to settle. Each of the rivers draining from this study area to the Kaipara Harbour has suitable areas within which to build such systems.
- Well-grazed pasture could form effective fire and disease-control breaks through the forest.
- To promote public relations and good forest design, screen pine plantations with native tree plantings alongside public roads, and perhaps major walking tracks (e.g. Great Walks).

A full summary can be found in the Milestone 3.1 appendices.

# **Outcome 5. Case Studies**

Forest establishment activities in Northland generally fall into the following categories:

- native planting on marginal hill country, riparian zones or coastal buffers
- exotic space-planting for soil conservation and erosion control (typically polar and willow varieties)
- productive native monoculture (e.g. mānuka)
- exotic plantation forestry (usually *P. radiata*).

Public grants for afforestation have typically come from government initiatives, recently taking form as the HCEF and the Afforestation Grant Scheme. The HCEF is focused on exotic species establishment on HEL, while the Afforestation Grant Scheme (now superseded by the One Billion Trees Fund) encourages both native and exotic tree planting, with funding levels dependent on species and land-use type.

Since its launch in 2018, the One Billion Trees Fund has drawn much attention from landowners in Northland, likely due to nationwide publicity of the Government's Provincial Growth Fund and related programmes, as well as the multiple funding options available through the One Billion Trees Programme. The steady annual uptake of polar and willow poles via NRC's HCEF has continued despite the public attention that One Billion Trees has received. Below we explore some typical forest establishment activities in Northland, what funding options are available, and lessons learned from testing these cases.

*Test Case 1. PLANTING RECENTLY FELLED EXOTIC PLANTATION BLOCK INTO PERMANENT INDIGENOUS FOREST* Client: Tawapou Conservation Trust



Location: Matapouri Rd, Whāngārei Proposed afforestation area: 9 hectares Funding options: One Billion Trees (Mixed Native funding stream)

#### Overview

The Tawapou Conservation Trust manages an ongoing native forest restoration project on a family farm near the Tutukaka Coast, 30 km from Whāngārei city. The One Billion Trees application concerns a proposed 9-hectare indigenous afforestation project on a recently clear-felled *P. radiata* block. It is the intention of the landowners to create a permanent native forest on the site as part of a larger, ongoing 100+ hectare native forest restoration project.

As part of the One Billion Trees application, an NRC LMA surveyed the site and deemed the land-use change proposed by the applicant to be an excellent choice, given the project sat within a high-value coastal ecosystem and formed part of a larger ecological restoration project. The site clearly demonstrated that afforestation of this type also reduced the risk of weed infestation – a huge problem on bare ground in Northland. We realised upon interview and upon viewing the extensive native plantings already underway that, on the ex-pine block, any proposed planting will be managed to the same high standard as other restoration areas on the property. Accordingly, a support letter was written by our Project Coordinator, and a stage one application to the One Billion Trees fund was initiated.

#### Outcome

We have heard informally that the application was rejected on the basis that the area had been forested within 5 years of the application date, suggesting little flexibility in this ruling. The client is working with an MPI representative to investigate possible next steps.

Lessons: NRC LMAs report that there are many similar scenarios occurring across the region. The restoration of native forest onto recently felled exotic plantation land is often desired for one of the following reasons:

- The landowner has had a negative experience with exotic plantation as a land-use option due to low economic returns. Historically, small-scale commercial woodlots were often planted on difficult-to-access, marginal pasture land, leading to high maintenance and extraction costs.
- The landowner has overseen one (or sometimes two) cycles of *P. radiata* planting and harvest on suitable land, and has reaped the economic benefits of this. As they retire from intensive farming, they desire to see marginal areas of their farm returned to native forest for the enjoyment of future generations.
- Changing personal or community values have influenced their views of exotic plantation as a land-use option and highlighted the benefits of establishing indigenous forest for native flora and fauna and their community.

#### Conclusion

In Northland, much of the interest in One Billion Trees (via NRC) has been for establishing indigenous forest on recently felled exotic plantation land. Due to the restrictions of One



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Billion Trees criteria (i.e. exclusion of any land that has been "forest" in the past five years), these applications are currently not eligible for funding. Whilst the avoidance of "forest clearance for One Billion Trees funding" is clearly important, genuine cases of native forest establishment on ex-pine land should be carefully considered. The positive impacts of this land-use change will be seen in increased biodiversity, soil conservation and freshwater health for our region. It will also help combat inherent weed issues on what is often unproductive, marginal land.

#### TEST CASE 2. REVEGETATION AND REGENERATION OF INDIGENOUS FOREST ON MARGINAL PASTORAL LAND Client: Huruiki Stud

Location: Peach Orchard Rd, Helena Bay Proposed afforestation area: 100+ hectares Funding options: One Billion Trees (Mixed Native and Native Regeneration funding streams + Provincial Growth Fund for potential nursery extension)

# Overview

Huruiki Stud is a family trust-owned drystock farm on the culturally and geologically significant basalt fields of Huruiki Maunga. The landowners are members of the local hapū and identify strongly as tangata whenua. Their vision for the farm includes producing high-value meats using organic farming techniques, and restoring large tracts of the indigenous forest that once blanketed the landscape. The planned approach to establishing the forest is a mixture of active planting of indigenous species and active management of natural regeneration processes, including stock exclusion and manual weed control. The whānau and farm have close ties to the local hapū-led native plant nursery Akerama Nursery, which has sought funding for extending its operation via the Provincial Growth Fund.

# Lessons

Although this project is still in its planning phase, with the landowners being assisted by NRC and community members, some issues have arisen that may compromise a successful outcome.

- The Provincial Growth Fund application for an expansion of Akerama Nursery operations has been declined. Most of the native plants for Huruiki Stud's large-scale revegetation project were to come from this nursery, though current capacity is too low. The applicant is working through options with an MPI representative.
- The true cost of establishing indigenous forest was underestimated by the landowner, leading to uncertainty around which techniques to employ (revegetation vs. regeneration) and thus which funding streams are best suited to their project.

# Conclusion

Local and central government must acknowledge the intrinsic link between successful largescale indigenous forest establishment and the capacity/capability of local plant nurseries and labour forces. Local businesses are often able to provide projects with low-cost, ecosourced native plants, as well as local labour and skills. This is particularly important to iwi/hapū groups and small rural communities. Finally, the One Billion Trees Mixed Native funding stream (\$4,000/ha), whilst generous compared to other funds, only covers a small



part of the true costs of establishing indigenous forest (\$20,000+/ha), and is thus proving a major hurdle to interested parties with limited budgets.

# TEST CASE 3. ESTABLISHING MIXED-USE INDIGENOUS FOREST ON WILDING PINE-INFESTED LAND

Client: Te Rewarewa Ngahere Rōpū Location: Whāngārei City Proposed afforestation area: Circa 40 hectares Funding options: One Billion Trees (Mixed Native and Mānuka/Kānuka funding streams), National Wilding Conifer Control Programme Fund.

# Overview

Te Rewarewa Ngahere is a hapū-led collective overseeing the development of 40+ hectares of freehold Māori land near Port Whāngārei. The group is in the early planning stages of the project and have goals of establishing a papakāinga (community housing) development among productive gardens and native forest ventures. The site was formerly an exotic plantation forest (*P. radiata*) but has laid fallow since clear-felling in 2001, accumulating a substantial weed-burden over subsequent years. The group has approached NRC for guidance on potential funding opportunities and recommended land-use options. Their vision includes labour and training opportunities for hapū members as the site is developed.

### Lessons

Te Rewarewa Ngahere Rōpū is typical of whānau/hapū-led land initiatives in that they are keen to know their options at all stages of the development, regardless of the collective readiness to uptake afforestation grants. Although they are still in an early planning phase, their engagement has been direct and they expect regional council to provide clear guidance on available options. The physical and financial challenges of establishing indigenous forest and gardens on maturing wilding-conifer land cannot be overstated.

# Conclusion

NRC is proving to be a key player in communicating afforestation funding options and engaging with all types of landowners, thus it is essential that information from Te Uru Rākau is concise and easily communicated. The varying degrees of "readiness" of applicants – especially on complex, multiple-owner blocks typical of hapū/whānau collectives – should not be a barrier to accurate and timely advice. The potential funding for controlling wilding pines (Wilding Conifer Control Programme Fund) may prove integral to the viability of the Te Rewarewa Ngahere Rōpū project. The group's keenness to develop social and environmental enterprises on their whenua is a consistent theme for many whānau/hapū landowners, and highlights the importance of the One Billion Trees Partnerships Grant as a potential vehicle for realising these goals.

# **Outcome 6. Extension Services**

#### EXISTING SERVICES IN NORTHLAND

#### Extension 1. Expanding the NRC Land Management Team

The Land Management team has been and continues to be expanded via NRC Long-Term Plan (2018–2028) rate-funded programmes and successful, direct central government funding. The NRC land management programmes and projects are being developed to meet



regional priorities for soil conservation and obligations to improve water quality under the NPS-FM. NRC staff are trained to ensure capacity and capability improve over time, relative to land management, soil conservation, afforestation and catchment management programmes. NRC has raised rates by 30% in the year 2018 to meet, in part, the needs for soil conservation, biodiversity, and biosecurity.

Incentive funds for afforestation have typically come from central government initiatives; funding for local authorities have included the MPI-funded HCEF, the MfE Freshwater Improvement Fund, and The MfE Community Environment Fund, and others. Landowners had prior access to the MPI Afforestation Grant Scheme (AGS), which was available till 2017.

The HCEF in Northland was focussed on soil conservation – tree species establishment on highly erodible land. For other regional authorities, treatments of exotic plantation and some native planting were encouraged, while the AGS (now superseded by the One Billion Trees Fund) encourage both native and exotic tree planting, with funding levels dependant on species regime and type, and with top-ups for difficult establishment.

The "ramp-up" of to meet water quality and harbour health objectives has seen a push to formally expand the Land Management team for the next few years.

### Extension 2. Forest Managers

Several forestry companies handle all aspects of plantation management for clients who own woodlots, from land preparation for planting through to the administration of carbon reporting. The larger management companies who have such client portfolios in Northland are:

- PF Olsen (well established)
- Northland Forest Managers (well established)
- Forest Owner Marketing Services (FOMS), which rebranded as Forest360 in April 2019 and is expanding into Northland with an office in Whāngārei (Forest360, 2019)

A list of forest managers, harvesters, consultants and other contracting services can be found in the Milestone 3.1 attachments to this report (in Excel format tabbed by industry group). This list was accessed from the NWC.

#### Extension 3. DIY Forestry in Northland

Margules Groome has provided a list of forestry consultants to NRC under contract titled "Forestry Advisors and Advice for Small Woodlot Holders, Northland". The list is accompanied by advice on how to work with them to avoid potential pitfalls, and suggests a range of rates they might charge in relation to professional advisory services.

This report was commissioned for the purpose of providing potential and current small woodlot holders in the Northland region with the key sources of information for relevant areas of small woodlot management. This includes where to seek advice to help with critical decisions that need to be made, and questions during the planting, management, and harvesting of small woodlots.



By providing small woodlot owners with these information sources, it should in turn help to reduce the perceived barriers to planting trees in Northland, increasing uptake of establishment of small woodlots, and helping to support any MPI afforestation project. Critical decisions are identified as:

- land identification, and key risks through misinformation or misunderstanding
- forest establishment and key risks
- silviculture
- carbon and the ETS
- harvesting.

Data sources for small woodlot harvesters are suggested, including the New Zealand Planted Forests Portal, the FFA, Te Uru Rākau, the MPI web literature on the NES-PF, OMF CommTrade for carbon trading, and other sources.

Most importantly, the Margules Groome report revealed that individuals, not companies, are registered to the New Zealand Institute of Forestry (NZIF), which functions much like the Registered Master Builders Association in assuring the quality of services provided by their members. This information suggests that any small woodlot owner would be wise to check that potential forestry consultants are registered to the NZIF before engaging them.

The survey of consultants by Margules Groome revealed some key take-home messages:

- The minimum forest size a consultant would deal with was 5 ha.
- Charges ranged from \$100-\$200/hour, with the standard IRD travel rate applied.
- Strategies for controlling costs suggested by Margules Groome included having a clear end goal before planting, having all base information at hand prior to meeting with a consultant, and sticking to traditional *P. radiata* management regimes.

# Extension 4. Extension 350 Programme

Extension 350 is a partnership funded by NRC, MPI, DairyNZ and Beef + Lamb and delivered throughout Northland to provide a farmer-to-farmer mentoring programme. An overview of Extension 350 can be found at: <u>https://www.northlandnz.com/northland-inc/regional-initiatives/extension-350/</u>. The programme operates on a modified version of the triple bottom line: farmer well-being, profitability, and environmental sustainability. Participants (target farms, mentor farms and associate farms) are often farmers who are looking for impetus and a confidence-building, support network around them to improve their farming practices.

Commercial farm consultants, supported by Beef + Lamb New Zealand and DairyNZ, manage "clusters" of mentors, farmers and associate supporting farmers from Helensville to Te Hāpua. Target farms get one-on-one support from the consultant and mentor to establish priorities and set goals, a personalised whole-farm assessment, business development



training, and an FEP and advice from NRC, and they are shown how to use farm management tools and systems.

This programme has great potential and is well-received by farmers (Jeff Martin, farm owner, personal communication, 11 June 2019).

# Extension 5. Soil testing

Most fertiliser companies in Northland offer free soil testing farm-wide, and tailor-make a fertiliser programme that is paddock-specific for all their clients. Note that farmers surveyed anecdotally have advised that they prefer receiving FEP advice from a trusted advisor, not a paid party, but other farmers have reported that paid advice is something they are more likely to listen to. This tension may also be a component in the soil testing scenario, which is a service offered by neutral parties in Northland as well, such as Hill Laboratories, Far North Envirolab Ltd, and Geocivil.

# Extension 6. Independent Small Woodlot Advice

The FFA is well placed to offer small woodlot advice to landowners who have variable or little experience in growing trees for environmental purposes, or for profit. The organisation includes subject matter experts with practical expertise, such as Dean Satchell (exotic other species) and Peter Davies-Colley (small woodlot harvesting in difficult-to-access situations). The FFA has been endorsed by Margules Groome.

# Extension 7. Small Woodlot ETS Advice

Forme was asked to produce a 1-page ETS fact sheet for woodlot owners. This draft fact sheet will be reviewed under the SHaRP project and modified to suit diverse Northland landowner audiences. It, and the full report, can be found in the Milestone 3.1 appendices.

# Extension 8. Harvesting and Wood Processors List

This contract was also provided by Forme. It was an invaluable service. Their executive summary (quoted below [with basic language mechanics clarified]) can be used to help landowners locate harvesting and wood processors who are close to their properties, who deal with specific species of trees, and who would best suit their business model and circumstances.

*Forme has been engaged by the Northland Regional Council to complete a snapshot stocktake of the wood sellers and wood purchasers within Northland.* 

*Forme has identified 18 harvesting and marketing agents (HMs) or forest owners (FOs) as wood sellers, and 23 log processors (LPs) of varying capacities.* 

The HMs and FOs within Northland operate across all 4 of the districts which make up the Northland wood supply region (Far North, Whangarei, Kaipara and Auckland). Seventeen of the companies deal exclusively with



*Radiata pine, 14 deal with other exotic or "alternative" (to Radiata) species. Three of the smaller companies work with native timber.* 

*Eight of the 18 HMs operate on a scale larger than 150,000 m<sup>3</sup> produced per annum. Four operate between 50,000 and 100,000 m<sup>3</sup>.* 

Twenty-three LPs were identified within the Northland region: 16 of these were small operators or portable sawmills dealing with less than 60,000 m<sup>3</sup> of log consumption per annum. Three of the remainder consume more than 150,000 m<sup>3</sup> per annum and would be considered "large" commercial sawmills in Northland.

Sixteen of the LPs deal with FOs directly, while 10 deal with FMs/harvest management companies. The reason for so many of the processors deal with the FO directly is due to the nature of the small native and portable sawmills that were surveyed. These operations generally mill timber for the owner themselves and may sell the wood directly to the original owner. In most of these circumstances, the forests are small, or are shelterbelts or amenity plantings. These operations often deal with very small volumes of native timber per annum. They must all be certified with MPI to mill native timber.

Fifteen of the processors produce appearance grade, and 11 produce structural grade, products. The appearance grade bracket generally covers the smaller outfits as the native timbers often don't meet the building code for structural timber. One medium-sized mill focuses on pruned logs and appearance lumber. Many of the sawmills will produce multiple different products, and therefore, there is crossover between product types, with eight mills producing industrial grade products. Four produce engineered wood products (EWPs) and six produce post and poles.

A key feature of the Radiata grown in Northland is its high density, which is caused by the longer growing season. High density implies greater strength and stiffness, a competitive advantage for structural framing producers. Many alternative species are also cut, albeit in smaller volumes.

Forme was engaged to investigate and comment on the impacting factors that influence the profitability of a forest for an FO. There is no hard-andfast rule to maximising a profit for an FO as the nature of forest harvesting is that it is very dynamic. A combination of competent harvest planning, crew availability and productivity, and good log pricing will help to maximise the profits to an FO. These variables need to be assessed on a case-by-case basis. This is the role of a harvest and marketing agent such





as the companies outlined in the attached database. However, ultimately, an FO will decide based on the advice they receive, or their own experience, and there is no perfect sales model that suits every situation.

FOs are encouraged to seek independent forestry and divestment advice from a suitably qualified adviser, preferably a registered forestry industry consultant (<u>www.nzif.org.nz</u>) that is not engaged in management or marketing activities, and therefore is not conflicted.

The map of Northland log processors Forme produced appears on the next page. It can be used when talking to farmers about planting trees for harvest, in conjunction with the database.





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The step plan for small woodlot harvesting produced by Forme is a 1-page A4 guide to harvesting for the uninitiated. It is written in plain English and is understandable to the novice. The step plan (extracted from the report) and the full report can be found in the Milestone 3.1 appendices.

# Extension 9. Nursery and Seed Collector Database

To help Northland's landowners with accessing and purchasing trees, we commissioned Tāne's Tree Trust to compile a database of Northland-local seed collectors and nurseries. This list is comprehensive, and will become a part of our "tree toolbox". It will serve as a useful tool if updated on a regular basis to help LMAs facilitate tree purchases from the best nursery most suited to a particular project. It is possible the database can be made live on the NRC website for direct access by landowners as well.

The nursery database has been supplemented with a specialist nursery listing for operations that produce exotic species other than pine. This work was produced by Dean Satchell.

# Extension 10. IRR-ETS Calculation Tool

Ian Jenkins, currently advisor for NRC forestry operations, has developed a useful Excel calculator to help small woodlot owners understand if they will make a profit, before they put trees in the ground. This tool is brilliant. It works on internal rate of return (IRR), and incorporates ETS returns (if any). However, it is not 100% user-friendly for any but advanced Excel users, and is not, in our view, currently marketable. We have included this draft version tool in the Milestone 3.1 appendices.

# Future Work Plan (Evidence of Completion)

Evidence of completion for Milestone 3.1 indicated provision of a "future work plan", which addresses gaps in current knowledge. Future afforestation activities and recommendations are addressed in the final section of this report, "The Future".

# Recommendations

# **Outcomes 1 and 2: Building Partnerships**

We believe our focus in the future should be to strengthen newly established relationships with key partners in afforestation by attending their meetings regularly and inviting them to relevant gatherings hosted by NRC, and by involving them in projects specific to their areas of expertise. This could involve setting up a regular calendar schedule of prompts to engage with partners.



# **Outcome 3: Building Internal and External Capacity**

We recommend continuing our education programme in the same format as the June 2019 lecture series, which was well received by both external and internal audiences. We also need to extend our programme to include field training/field days for the Land Management team, particularly in forestry and soil conservation topics. In addition, we intend to further develop a suite of easy-to-use, practical literature on afforestation that can be used by landowners and staff. All of this activity will be focused on topics that are not well understood, such as IRR calculators, carbon farming, and other technical aspects of afforestation.

Scoping the strategic case for NRC carbon farming was an idea mooted by Justin Murfitt. We believe a possible new revenue stream for the council could be found in growing a substantial forest for the purposes of selling carbon credits to local Northland emitters, and for offsetting NRC's own emissions, which are substantia because NRC owns the public transport (bus) network servicing Whāngārei. This venture, if it were viable, could increase internal capacity in this field substantially. The strategic case scoping document is available in the Milestone 3.1 appendices.

# **Outcome 4: Lessons from the Past**

We wish to consolidate our learnings on this topic. Bob Cathcart (AgFirst) has provided a plethora of materials that require digestion at a deep-thinking level. The lessons he has derived will become part of our good practice suite.

# **Outcome 5. Case Studies**

We wish to continue to work with MPI and stakeholders to further refine what the criteria are for successful afforestation. Case studies have indicated gaps, uncertainties, and some potential perverse outcomes.

# **Outcome 6. Extension Services**

We are interested in pursuing opportunities with key partners to provide field training to LMAs and landowners about forestry topics on an ongoing basis.

Our next step is to review extension service options, refine what service offerings are appropriate to the region, and work out who will deliver them and in what format.



# **Milestone 3.2: Digital Solutions**

Digital solutions to assist with planning and managing afforestation projects.

# **Evidence of Completion**

• Provide working examples of digital solutions. Digital solutions may include, but are not limited to, forest design templates, afforestation management plans, and mapping systems.

# Purpose

Our purpose in this work was to progress a series of digital solutions, with potential for improved FEPs and afforestation plans. Digital solutions include:

- development of a Web-based GIS viewer to assist landowners in One Billion Tree direct landowner grant applications
- draft of a GIS-based catchment analysis of constraints and opportunities for afforestation (see Milestone 1.1, "Regional Priorities")
- compilation of an online repository of good practice afforestation for easy access to information for landowners and industry (see Milestone 3.4, "Afforestation Good Practice for Northland")
- progress in developing and working with providers of datasets and software that improve understanding and resolution of resource information for farm and catchment management via oblique photography and physiographic datasets.

After initiating work on this milestone, we realised that "digital solutions" are inextricably intertwined with other milestones in this project, as well regional priorities and catchment prioritisation work.

# Afforestation Web-based GIS Viewer

# Process

The purpose of this work is to assist Landowners in the One Billion Tree direct grant application process, to provide aerial photography and contextual data on erosion risk, property boundaries, waterways, and other useful GIS data. This GIS viewer can be used on desktop, and in time, on a tablet into the field. The concept is that a landowner can create feature classes for afforestation aspirations to send to an NRC LMA or MPI. Different tree types can be specified, and drawing tools are freeform. The afforestation GIS viewer is currently under beta development with Janelle Palmer (GIS specialist) and Duncan Kervell.

A link to the GIS viewer can be found here:

https://nrcgis.maps.arcgis.com/apps/webappviewer/index.html?id=570ea1d06c054539b59 de13badd0b3db



It should be noted here that this work is in development. The link is for sharing internally, within MPI, until the final version is completed.

# Outcomes

The GIS viewer allows users to capture proposed fencelines and five types of proposed planting areas, and then export these to a shapefile or feature class. This component of the package is still in the development stage and will be formalised for front end release in late 2019.

The following workflow issue need to be resolved before user testing begins.

- Proposed planting and fencelines Are the attributes captured for these adequate?
- Print template Is the standard NRC print template suitable? Or do you want something else?
- Additional layers Do you require any other data layers to be added?
- Additional functionality Is there anything else that the app must do?

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A snapshot of the tool and how it would look is below:



# **Physiographics Work**

# Process

Clint Rissman, Land and Water Science founder, has been working closely with NRC to define the scale of the erosion problem in this region via the use of existing datasets. He has clearly shown that current thinking around the use of legacy datasets and mapping tools could potentially underestimate the susceptibility of some areas to erosion, and ultimately, fate of sediment in Northland. In particular, previously perceived "quiet" areas, such as Waitangi, have been highlighted as severely eroding, and this finding has been corroborated in the field.

This quantitative dataset is the result of combining data on land use, hydrology, water quality, and radiometrics. High-resolution mineral data gleaned from the radiometers has allowed Land and Water Science Ltd to generate new mapping layers showing high-risk areas for erosion, as well as nutrient loss in surface and/or ground water. Data included in the making of these layers are drainage and redox potentials.

# Outcomes

Clint Rissman has provided NRC training on "digital land management tools" focusing on integrated uses of physiographics that can be applied in the field. The integration of these data with existing information and prioritisation about what intervention would work best in each situation provides transformational change for NRC in targeting actions for outcomes.

NRC has started to cross-check this new dataset with existing legacy datasets (LUC, fundamental soils, and SedNetNZ) to determine the differences of approach and landscape susceptibility.

# **Oblique Imagery**

# Process

Andrew MacDonald, founder of Biospatial Ltd, has produced an innovative "photoblique" software package that utilises regional oblique photography datasets commissioned in Northland. The ability to reference a high resolution oblique photo of almost any part of the region, based on GIS referencing, and annotate over the photography, is an extremely powerful tool.

Oblique photography allows very effective visual communication at farm scale, and allows users to more accurately delimit vegetation types and areas. It is a very farmer-friendly communication tool for land use adaptation and change. NRC has helped develop and trial the software, and is building the application for forest design in multiple scenarios.



# Outcomes

The potential combination of physiographics and oblique imagery will be used in future HCEF projects as well as for wilding pine control, kauri dieback, consent monitoring, One Billion Trees forest establishment projects, biodiversity and wetland mapping, and for the development of improved FEPs.

# Forest Design and Afforestation Management Plans

# Process

# Forest Design

Use of digital solutions has application for promoting good forest management and design. Forest design principles are not widely operational in New Zealand. The closest we come is with the NES-PF regulations and the *Environmental Code of Practice for Planation Forestry*. In the US, Canada, and the UK, especially Scotland and Ireland, the concept of "forest design" is advanced due to previous pubic pressure and a very long history in managing trees in sensitive landscapes. Therefore, good practice and forest design are embedded in afforestation practices. Concepts included in forest design examples around the world are based on landscape design, and include:

- landscape values and impact of forest activities
- other uses of the landscape, such as recreation (e.g., hunting grounds, mountain biking parks, archery ranges, or campgrounds)
- elements of enhanced public access
- corridors for biodiversity, both functional and structural, to reduce habitat fragmentation
- well-designed access to facilitate the most profitable harvest, with harvesting parcels close to main roads
- riparian setbacks and filter species as added protection
- other multiple objective functions underpinning forest design.

# SUPPORT FOR FOREST DESIGN DELIVERY

Processes and procedures are key to the successful implementation of any improvements. We looked for expertise within the team to shed light on ways we might deliver forest design as a new context to landowners. Our aim was to minimise potential negative reactions to "something new", and to enhance positive outcomes where possible.

# Outcomes

A full review of forest design will occur in conjunction with our Doubtless Bay Catchment exercise. This discipline is in its infancy in New Zealand, although it is more developed in countries like the US, Scotland, Germany, and Japan. Further work in this area is required to explore what science and concepts are applicable in the New Zealand context.



Discussions have begun in Northland to investigate the thinking needed to achieve regional good forest design over and above the NES–PF. Also attached in Milestone 3.2 appendices is a PowerPoint on forest design presented by NRC at the National Afforestation hui.

The Land Management team have developed FEP management plan templates. These templates work hand in hand with other digital solutions. One template is specific to riparian planting, and a second one is specific to hill country afforestation. They are supported by a landowner engagement process flowchart. Depending on the scale of the proposed works, the size of the property, and the number of interested parties, these templates can be expanded or contracted to suit the situation and agreed parameters. These templates and the flowchart are available in the Milestone 3.2 appendices.

# Recommendations

- Continue to work closely with Land and Water Science (Clint Rissman) and others in the digital land mapping field, ensuring that we hold the best possible understanding of our landscape and its dynamic natural systems. Take this understanding to the practical field level and create a highly accurate sediment mapping tool, and use his findings to inform the NES-PF review.
- Continue to integrate recent new tools, such as oblique imagery and sediment physiographics, into decision making to optimise land management outcomes.
- Continue research and development of integrated catchment management and sustainable forest design. The Doubtless Bay case study should be refined with input from partners such as DOC, NWC, local authorities (FNDC) and in-house (NRC) experts. The resulting knowledge may influence planning, funding and communication/engagement priorities.
- The NRC Land Management team should further refine their FEP process including afforestation management templates to enable more efficient and effective afforestation planning for our region.
- Continue developing the "One Billion Trees: Submission Assistant". This tool could allow for on-farm digital mapping of afforestation and fencing plans by LMAs, as well as provide an accessible online planning tool for landowners wishing to apply for One Billion Trees funding.
- Check what ETS calculating tools are available and adopt the best tool to help inform decision making for more planting.



# Milestone 3.3: Learning from Other HCEF Regions

Work with other HCEF regions to leverage good practice and learnings. Potential for workshops and field trips.

# **Evidence of Completion**

• Summary of lessons learned and their applications for this project.

# Purpose

The purpose of our work within this milestone was to make sure we had an opportunity to create synergies within a national-level community of practice in Land Management and resource management We wanted to cross-pollinate ideas between regions to get the best outcomes not only for us, but nationwide for MPI. We also wanted, where possible, to avoid duplication in HCEF work where either workload could be shared between councils, or the outcomes from the work could be shared. In attending the Farm Forestry Conference, our hope was to glean as much knowledge as we could from an organisation that has been involved in small woodlot work for a very long time, while the more avid members were all in one place: Rotorua. We realised fairly early in our HCEF journey that the FFA in Northland could be on borrowed time, with many members retiring without a succession plan for either their assets or their knowledge. We did not want to lose their valuable knowledge.

# Process

# Prioritisation

Originally, it was intended by all parties that the HCEF Boost team – David McDermott, Heather Taylor and Beth Masser – would be working on the Boost project for 12 months. However, the time left once we were able to convene was telescoped into 7 months. This truncated timeframe meant we started our work with a 5-month deficit.

We felt that the best way to maximise our 7 months was to take a cross-sectoral slice approach. We had enough time between 12 November 2018, our start date, and 20 June 2019, our effective project end date, to take a series of snapshots of afforestation initiatives operating outside Northland. This approach was also dictated by our ability to locate willing, qualified and able partners in Milestone 3.3. Our aim was to pursue a well-rounded, as fully informed as possible series of learnings. After initial analysis of afforestation operatives nationwide, we identified three key afforestation components operating at a nationwide scale:

- other HCEF-funded regional councils
- the FFA
- commercial forest designers from other regions (see Milestone 3.2 "Digital Solutions" for details).



# National Afforestation Workshop

# Purpose

NRC hosted a National Afforestation Workshop to bring together regional council representatives relating to the HCEF and One Billion Trees programmes to share approaches, learn from others' innovation and good practice, and to determine how to meld HCEF and One Billion Trees into existing land management programmes.

# Process

A two-day workshop was held in Auckland. All but two regional councils (West Coast and Otago) were represented at the workshop. In addition, representatives of MPI, Te Uru Rākau, Landcare, Scion, Plant & Food Research and MfE attended. The attendees were well prepared and provided useful contextual overviews of their regions. Facilitation was shared, and notes were recorded by NRC. A sense of collegiality flowed through the two days; sharing, networking and seeking constructive outcomes. A post-workshop survey will be conducted to gauge effectiveness of the workshop, and to seek suggestions for improvements if a follow-up workshop is to be held.

# Agenda for 21–22 May

The agenda for 21–22 May was set with MPI as follows:

# "OUR HCEF: SUCCESSES, CHALLENGES AND INNOVATIONS": PRESENTATIONS FROM EACH REGIONAL COUNCIL

- Lessons learned
- Farm planning and land use classification (LUC)
- Reversion/retirement treatment
- Poplar/willow supply
- Working with long-term plans

# Session 1: Afforestation and Forestry (Discussion Facilitated by David Boone, GWRC)

- Forest design and practices ... Challenging the plantation forest design status quo
- Afforestation/One Billion Trees and NES-PF confluence
- GIS: Eligibility of land for One Billion Trees vs. ETS

# Session 2: Staff Capability and Capacity (New Zealand Association of Resource Management [NZARM]/Land Management Group [LMG])

- Building capability and capacity for regional land managers/teams
- One Billion Trees Partnership fund applications
- Training and mentoring regional sector



• NZARM initiatives

## SESSION 3: WORKING TOGETHER (MPI/TE URU RĀKAU)

- Funding incentives: aligning, overlapping and efficiency
- Info/data sharing between regional councils, MPI and Te Uru Rākau establishing effective and efficient communications

# Outcomes

Direct, face-to-face contact with other regional council representatives, Te Uru Rākau, Scion and others engaged in HCEF afforestation was deemed invaluable by attendees informally interviewed about their experiences. A formal evaluation, circulation of the final agenda, and sharing of key learnings will now commence, led by Beth Masser of the HCEF Boost team. The evaluations have yet to be returned, but the form is available in Milestone 3.3 appendices.

### CAPACITY AND CAPABILITY

A key point that emerged was the need for 80+ LMAs in various roles nationwide. The need arises because of new regulations in the pipeline, such as mandatory FEPs, the NPS-FM, and the National Policy Statement for Indigenous Biodiversity (NPS-IB). The need also arises because regional councils are often understaffed to deliver long-term plan outcomes. Finally, One Billion Trees and increased afforestation and erosion mitigation activity has substantially increased the need for engagement with corporates, non-profit organisations, and individual landowners interested in following the opportunities offered by these government initiatives.

There is a wide variation in maturity of team implementation and scale. Causative factors appear to range from scale and priority (Marlborough), or as a result of organisational change (Auckland unitary council). Long-term stability and investment have allowed some regions to have a very solid base (Wellington, Southland) and for a range of innovation (most regions, notably Bay of Plenty). Local strength of the Auckland Council was its science and freshwater science.

In some places LMAs are doing FEPs, and in others (e.g. Horizons) consultants are doing them.

A critical issue identified by all councils was that of capacity and capability, with 68–80 additional staff estimated to be required across New Zealand.

#### LMA SKILLSET

There was universal agreement that working one-on-one with landowners to establish and maintain long-term relationships builds trust and helps deliver outcomes. Greater Wellington Regional Council also compiled a list of hard and soft skills an LMA needs to be successful. This list can be found in the Milestone 3.3 "HCEF Auckland Workshop" folder.



### FARMER ENGAGEMENT WITH FEPS

In some regions, council staff have done the physical work (e.g., Hawkes Bay), and in some, the staff have written FEPs (most others); some the FEPs have been written by the landowners themselves, as in Nelson, where lifestyle block owners engaged in this process showed a high level of engagement. The question remains as to the best balance between effort and outcome, and long-term attitudinal change.

## TOOLS OF THE TRADE

A range of tools to assist farm planning and land management are being used across New Zealand. There is variability in what is being used. Also, to some degree, the integration of historic records into current tools is still underway. New tools (mapping infield, sediment modelling, remote sensing, different photography datasets, use of drones on farm) are also in development, with the potential for scale-up or roll-out across the country once they are proven.

Good communication should avoid duplicated effort; this highlights the risk of duplication by regional, specified programmes and commissioned datasets for assisting land management. It is likely New Zealand would be better off if all of these resources were available in all locations (e.g. LUC, GIS, LIDAR, sediment physiographics, oblique imagery) through centralised programmes.

### DOC'S ROLE

It may be worth doing some analysis/comparison on how DOC's national role supports delivery in the regions around New Zealand to see if there are transferable learnings to the MfE/regional council framework.

#### **REGIONAL INNOVATION ROUNDUP**

We identified one key point from each region, as follows:

- *Auckland*: Engaged in an "ecological corridors" project linking high biodiversity values (despite not having a current, dedicated land management team) which is primarily focused on riparian corridors and flood mitigation.
- *Waikato*: A 70% funding incentive for farming communities facing hill country erosion.
- *Bay of Plenty*: Focus on management of lakes and estuaries because they have only 30,000 ha in hill country pasture, with typical riparian fencing an issue due to high inundation and sediment movement.
- *Gisborne*: The real issue here is a large area of NES-PF red-zoned land under plantation forestry, which potentially should be retired to permanent native forest, but with the caveat that no type of tree can prevent or mitigate some of the erosion this region experiences.
- *Hawkes Bay*: Regional priorities include any location where 1,000 tonnes of sediment is being lost per km<sup>2</sup> annually. The prioritisation is informed by instream water quality monitoring tools, and involving innovative native space planting trials as an erosion tool.



- *Horizons*: Have a very well established land management programme to meet the magnitude of their soil erosion issues. This region is innovative, having recently conducted 14 forestry appraisals using external consultants to inform farmers seeking to establish new woodlots.
- *Taranaki*: Innovations include a novel "Tree Planting Portal", a decision-making interactive tool that helps novice foresters with issues relating to climate, costs, returns, and comparisons between different options. This region also has a strict audit of FEP outcomes that occurs before landowners receive a pay-out.
- *Wellington*: This region has tried using consultants to produce a detailed whole FEP, but felt that this initiative did not produce any better outcomes, so they have focused instead on community-led catchment planning in the Ruamāhanga, a HEL sub-region.
- *Marlborough*: This team is very small compared to the size of their region's erosion problem, and they have highlighted a very graphic mismatch between NES-PF orange-zone classification and direct-line erosion into sensitive receiving environments that should be red-zoned.
- Nelson City: Focused on mainly lifestyle farmers, this region has developed a streamlined, cut-down version of the FEP that would be suitable for Northland, where especially in Whāngārei we are experiencing a lifestyle block boom. Using this template would help us mitigate the lack of current regional plan water take restrictions, especially in areas where small flows are threatened by multiple lifestyle blocks that are allowed 10,000 litres per day for any purpose. In addition, in Nelson, lifestyle block owners "write their own FEP", and this region has therefore experienced a high uptake and ownership of FEPs.
- *Tasman*: This region works closely with both Nelson and Marlborough, and uses LIDAR to map forests by age class, which could also be applicable in Northland via Scion's guidance.
- *Canterbury*: Land management staff are focused on facilitating community groups to take the lead in erosion mitigation projects, which creates tension and opportunity in a region where landowners need "consent to farm", which forces engagement with council.
- *Southland*: This region has 19 farmer-driven catchment groups informed by physiographic mapping.

# **ONE BILLION TREES AND REGULATIONS**

In particular, Greater Wellington engaged deeply with this conference. Post conference, they immediately supplied a very telling analysis of "overlapping issues between One Billion Trees and forestry regulations". They highlighted opportunities and risks:

- lack of landowner awareness
- the over-generalisation found in the NES-PF, including a too-high threshold for redzone classification
- the carbon offset issue as a barrier to land-use change



- lack of research on alternatives such as direct seeding, forestry methods, and managing weed crops
- increased community support under One Billion Trees for afforestation (social licence)
- the importance of using planning and planning support
- the need to set up a contractor base
- the gap in One Billion Trees where poplars and willows are not included, and where the HCEF is being phased out
- lack of capacity across central and regional government agencies, with 80+ LMAs on councils' combined wish list alone
- a suggestion to collectively shift resources into "training the trainers" to allow scaling without over-reaching councils, MPI, and other involved agencies.

### CONFERENCE SUMMARY

- Incorporate resources and research available from Scion and Landcare Research (e.g. "Smarter Targeting of Erosion Control" research) into Northland's HCEF work.
- Engage in the 2019 NZARM Conference for professional development and sharing, developing training units.
- Resources/learnings/ideas to share: Set up a way to systematically share.
- Learn from Horizons, Gisborne, Taranaki, Wellington, Southland and Kaipara work on HEL erosion control, which has focussed on community-led catchment planning (visit these areas to view examples on site).
- Make a collective bid to MPI/Te Uru Rākau for a regional council staff training package.
- MPI is seeking feedback from all regions as part of their one-year NES-PF review.

# Farm Forestry Conference, Rotorua

# Purpose

A well-established source of knowledge bridging both forestry and farming sectors has been the private members organisation known as the Farm Forestry Association (FFA). Because their annual general conference was being held down-country in Rotorua in May, and the theme was One Billion Trees, we elected to attend the conference to learn more about how farm foresters viewed afforestation in general. Because we have been fielding many private landowner enquiries about One Billion Trees applications, we also wanted to find out what their advice would be to members around One Billion Trees. We also felt we should assess as a group how we perceived the organisation and its position in the future.

The agenda for the conference, 16–20 May 2019, was as follows.



# THURSDAY 16 MAY 2019: PRE-CONFERENCE

Team arrives in Rotorua and meets with Lania Holt of Scion, who is leading a contract with us to explore alternative uses for trees and understory planting.

# FRIDAY 17 MAY 2019: CONFERENCE DAY 1

The first day focuses on an analysis of current topics including a description of the smallscale investors in New Zealand, how to make small-scale forest investment more attractive, and how the interests of small-scale forest owners are represented.

# SATURDAY 18 MAY 2019: CONFERENCE DAY 2

The focus of Day 2 is on solutions and actions for the future, including sessions on getting more trees planted, future directions for the FFA, and solutions for structure and funding.

# SUNDAY 19 MAY 2019: FIELD TRIP: NEW ZEALAND FARM FORESTRY FOR FAMILIES – A FUTURE MODEL FOR LAND USE

This field trip takes delegates to Clearwood Roydon Downs farm forestry. The trip looks at land use, forest investment, carbon, species and harvesting.

# MONDAY 20 MAY 2019: POST-CONFERENCE TOURS

Our team elected to split across the two tours for maximum learning.

**Tour One**: Bay of Plenty Forestry Supply Chain will be visiting Port of Tauranga, a full-stems harvesting operation, full stems cartage and a full-stems merchandising yard.

**Tour Two**: Future Forests will take delegates to Red Stag Sawmill, Redwoods Forest, Scion, and to view stream-side planting at Hamurana.

# Outcomes

# YOUNG FARM FORESTERS

This conference was about succession, with young farm foresters and a membership drive the focus to maintaining viability of the organisation. Young farm foresters took the lead in suggesting:

- a less formal structure for meetings, field days and outings, made more binding by the inclusion of a social event such as a barbeque
- serious engagement in online social media platforms led by young farm foresters with an in-depth, intuitive understanding of Facebook, Twitter, Instagram and others
- an upgrade of the current FFA website to be more interactive, to showcase younger members, and to drive recruitment
- active, substantial support for younger members wishing to purchase land, such as real-time financial advice, joint venture options, lease options with older members, and other incentives to give younger members a head start in afforestation
- a redirected focus on marketing alternative timber species, with marketing gurus behind the project



• a new focus on alternative uses for trees, such as mixed land uses, trees for food (both human and animal), and the consideration of new species as climate change advances.

#### BATTLING PERCEPTIONS

Small forest growers can be the future chemical, fibre and energy suppliers, but FFA members reported battling perceptions, many rooted in reality, such as:

- Land prices are too high the New Zealand Forest Owners Association is looking to do better on current land instead.
- Research is needed that encourages planting new forests (from MBIE research funding).
- Farmers don't like to see productive land planted into natives/locked up.
- Most regional councils are not creating incentives around tree planting *"Flawed idea that they will"*.
- Investment funds are not put into forest as they have no liquidity their rules preclude this. Action: If these rules are addressed, it could enable more investment.
- An at-large expectation that commercial pine plantations will be planting new land in trees, when it is farmers, iwi and urban investors (small-scale forest owners) who will be doing the planting.

#### BANKERS' SOLUTIONS

Susan Kilsby of ANZ Bank suggested several strategies for afforestation in her presentation "How to make small-scale forest investment more attractive". She related forest investment to economic drivers first and foremost. She said:

- Challenges were multiple in the delay for return and the risk, and professional forecasting is needed.
- Study what enabled earlier rounds of planting e.g. government initiatives 1920s, 1970s, 1990s.
- Study what determines success, and what sets the market price e.g. supply and demand, quality of logs, access to market.
- Include carbon price in your calculations.
- Analyse harvest costs before you plant: distance to market, access roads, steepness.
- Know your initial cost: land, planting and forest management.
- Know that all the growth in recent years has been in export logs.
- Realise that all the growth has been in China in the past 10 years new market.
- Realise that farmers prefer to take a market risk than a punt on government policy.

Susan said the reasons why farmers don't plant trees are:

• uncertainty: lack of forestry knowledge, need to rely on experts



- long-term decision: locks land, market price at harvest, succession planning
- cashflow (current government funding helps)
- policy risk: carbon price
- single species risk, some don't like pine trees, environmental concerns regarding felling.

Economists expect to see more demand from the farming sector, but economists expect landowners will have to overcome the barriers listed above.

# THE BIG QUESTIONS

### Can consultants give us a better return?

Consultants were deemed to be less than helpful in some forestry scenarios. Having a decent extension service run by government was suggested as a more attractive solution.

### Where can we get money and land?

A number of financing institutions are said to be repositioning around forestry. Land can be purchased using carbon credits or forward selling of logs (futures). Lease and joint venture agreements were also mooted.

### How can we deal with tax?

The tax treatment of forestry was deemed punitive. FFA members recommended a full review by IRD.

# How do we cope with changes to regulations?

The FFA suggested leaving regulations alone for several electoral cycles. Instability was seen as a serious obstacle. Speaker Egon Guttke recommended a standardised approach to charging or not charging for monitoring to support a consistent approach.

A full version of the conference notes can be found in the Milestone 3.3 appendices.

# Recommendations

- Formalise the regular and ongoing sharing of data, techniques, tools and processes by regional and local authorities. Such collaboration is highly valuable for the effective, long-term implementation of soil conservation and afforestation strategies. An annual workshop (such as the National Afforestation Workshop recently hosted by NRC in Auckland) could be hosted on a rolling roster by regional authorities across New Zealand. We need more time and space to continue cross-pollinating ideas and learning from each other's successes and failures. This process may evolve to streamlining data sharing, the sharing of contract outputs, reduction in duplication of efforts, and closer collaboration between councils with willow and poplar nurseries.
- Build on the concept of the "trusted advisor" as a central tenet for successful engagement with landowners. Whether this capacity and capability is built in-house



or externally (contractors), central and regional authorities must recognise that trust is the pillar that supports positive uptake of regional goals by landowners.

- In light of the shift towards increased regulation of properties with HEL, consider how to ensure capacity and capability to provide quality technical advice and support to landowners, either from within regional councils, other agencies (e.g. Te Uru Rākau) or the private sector. This probably requires design and investment now to facilitate this transition.
- Local authorities and NGOs should seek to engage with students and young
  professionals interested in land management and forestry. Professional
  development and sustainable skill succession could be achieved through regular,
  council-facilitated forums where young people from local educational institutes mix
  with their peers from organisations such as the FFA, DairyNZ, Beef + Lamb New
  Zealand, and Reconnecting Northland.
- Utilise the technical knowledge held within the FFA to inform central, regional and local government afforestation and soil conservation programmes. The FFA is a wellestablished organisation with dwindling participant numbers and an aging membership. However, the depth and breadth of knowledge held within the FFA must be harnessed as we enter a phase of increased forest establishment. A welldesigned collaboration between government and the FFA could bolster the technical skills of land managers nationally, and perhaps reinvigorate the FFA by providing a modern and highly relevant platform where their knowledge can be valued and utilised.
- Help the FFA to make their knowledge and information more accessible to new audiences through modern means of communications (e.g. short YouTube clips).



# Milestone 3.4: Afforestation Good Practice for Northland

Development of good practice guidelines for afforestation in Northland, in line with the NES-PF.

# **Evidence of Completion**

• Delivery of guidance documents.

# Purpose

The purpose of our work in Milestone 3.4 was to develop a "good practice" toolkit that LMAs can use when talking to landowners about afforestation options, forest establishment techniques, and funding opportunities. The intention is that these guidelines will also be accessible for landowners online, either in the field or from the desktop.

Our work was also about prioritising aspects of good practice we felt lacked adequate coverage. Therefore, we focused our efforts on the following areas:

- afforestation (forest establishment) good practice in Northland specifically
- regulations affecting afforestation
- native plantation forestry (for harvest)
- coastal buffers
- how climate change may affect good practice.

Ultimately, objectives in this work were to assist landowners to plant the right tree, in the right place, for the right purpose. We were also keen to take into account any forest-related regulations. Of particular interest is the NES-PF, which relates to any commercial forest of greater than 1 hectare and is administered in Northland by NRC.

# Process

# **Defining Best as Good Practice**

During the initial months of the HCEF Boost project, we undertook a review of what best practice entailed. Best practice is "a procedure that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption" ("best practice", 2019).

However, the word "best" suggests that someone other than the landowner knows best and there is no more work required. In fact, if landowners are to take ownership of land use change, best in a multi-situation scenario may be better termed "good". Changing nomenclature from "best", which suggests little ownership by landowners, to "good", which suggests a partnership in which the work will continue and systems can always be improved. This which may encourage uptake of afforestation initiatives by landowners.



# Scoping According to Needs

We originally intended to produce new good practice documents ourselves, with the help of expert consultants. However, when we searched within our own organisation's document libraries, we discovered a great wealth of resources. We also discovered other organisations housed a large volume of quality, publicly available publications, both online and in print.

Faced with the large volume of high-quality good practice documentation, we decided to focus on filling any gaps in available material and then collating the whole into a "good practice repository" – which we aim to make available and searchable to anyone seeking forest establishment guidance. We engaged local expert consultants throughout the process in order to develop the best possible technical advice.

# Outcomes

# **Good Practice Library**

We have created a digital library of good practice documents. Some of the categories in our library that we see as important to afforestation are biosecurity, woodlot maintenance, wildfire prevention, planting technique, sourcing quality seedlings, and small woodlot record keeping, to name just a few. The full list can be viewed in the Milestone 3.4 appendices.

# TREE LISTS FOR ZONES

Our consultant Jacqueline Knight of Rahui Gardens also came up with a succinct guide called *Tree Lists for Zones*, which clearly stipulates what trees can be planted in which areas as colonisers of bare ground, as secondary colonisers, and as end canopy species. Jacqueline's lists are included in this report within the Milestone 3.4 appendices. The lists are meant to be used in conjunction with her Northland-specific advice ("tips") on how to approach and organise native tree planting and site maintenance, which are also included in the appendices.

# OTHER EXOTIC SPECIES

In Northland, there is a groundswell of interest in tree species other than pine. Some of this interest arises from Māori landholders, some from FFA networks, and some from independent industry and agroforesters who see New Zealand taking a huge risk in relying on a single species (*P. radiata*) for timber production.

We commissioned Dean Satchell (Go-Eco Sustainable Solutions) to work closely with Paul McCreedy of Forme Forest Industry Consultants to develop a package outlining options for cultivating alternative exotic species. Dean's expertise lies in solid experience in the field and at the mill. He produced a good practice guide for exotic species he and others have trialled extensively in Northland's many soil types and microclimates, and also detailed respective timber qualities. His guide (see Milestone 3.4 appendices) also proposes what costs a forester might expect to pay for silvicultural operations such as pruning.



Forme Consulting Group Ltd (Forme), working in close collaboration with Dean Satchell, provided a report on the feasibility of planting and marketing alternative commercial species to *P. radiata* (ASPP) in Northland, for several reasons, including: crop diversification,

The scope of the contract was:

risk mitigation, and improved erosion control.

- 1. Define the current other exotic timber resource in Northland.
- 2. Study processing and alternative market options and their potential viability in Northland.
- 3. Identify what resources it would take to develop alternative markets for ASPP.

*P. radiata* (commercial pine) is the prevailing crop in Northland. In commercial terms, it can be viewed as a monoculture. This presents some market and sustainability risks. Further, there is a pending downturn in *P. radiata* availability in Northland. Demand for wood linked to population growth implies potential domestic growth of 18.0% by 2050, providing New Zealand producers hold import competition at bay.

ASPP use in New Zealand (both imported and domestic) is ~3.2% of the total. The opportunity to increase supply in the New Zealand domestic market could be 95,000 – 100,000 m<sup>3</sup> by 2050, which is small – there is a need to invest to develop export opportunities with competitive manufacturing solutions.

Globally, there will be growth in demand, but making ASPP a consistent, sustainable money earner would require market development, and the small processing industry in Northland is not likely to be able to compete in export markets due to cost barriers. Establishment of ASPP has not been successful in Northland on any scale to date. Plantings often failed due to factors such as poor species selection, misplacement, or poor tending (silviculture).

Some eucalyptus and cypress species grow well in Northland, providing the cypress is kept free of canker. Cypresses are produced at low volumes, but achieve good prices domestically. The negatives of harvesting eucalypts, including volume losses, can be managed if harvesting operations are efficient. The keys to maximising returns from eucalypt and cypress are to plant the right species, grow them well, harvest efficiently, and ideally, process the logs, fresh in Northland.

There are inadequate volumes of ASPP growing in Northland to enable significant expansion of the existing ASPP processing industry, which is limited to sawmilling. Some small industry growth could be developed in sawmilling or biofuels; however, the existing ASPP crop is not well quantified. therefore, a "whole-of-tree" approach to establishing a focused processing industry with new processing modes is recommended.

If ASPP are to be contemplated in Northland at all, Forme recommends:

• establishment of dedicated plantation crops for veneer and cross-laminated timber (CLT) manufacture from 2055 – 2060 onwards is realistic.



- Peeling (veneer) from *Eucalyptus microcorys* (tallow wood) and *C. lusitanica* is an immediate option, depending on the species distribution and volume.
- The CLT market using *E. microcorys*, with some *C. lusitanica* (and others) is a growth opportunity. A CLT plant aiming to process 45 60,000 m<sup>3</sup> per annum would require dedicated sawmilling capacity. (Current *P. radiata* plant processors are not suited to ASPP, hence adapting P. radiata operations offers a limited opportunity).
- Prepare a thorough inventory of the existing ASPP resource in Northland to enable potential ASPP processors to plan processing options.
- Targeting the solid sawn lumber market, with large plantings of ASPP, is not recommended.
- Biochar from *Eucalyptus* or *Cupressus* plantations could improve forest returns.
- Biofuel from *Eucalyptus* or *Cupressus* presents an opportunity if operated consecutively with veneer and CLT, and possibly biochar.
- Increased scale of plantings of suitable ASPP would assist to improve market options and returns by stimulating processing investment in the right processing mode.
- Ownership of ASPP crops by a public or Crown entity would be ideal.
- *P. radiata* grows very well in Northland. It is a tried-and-true solution, providing crops are managed and tended well, and a significant *P. radiata* processing business exists in Northland, hence it should not be ignored.
- suggested minimum combined Eucalyptus and Cupressus crop for development in Northland is 30,200 ha.

The full report from Forme on ASPP market development can be found in the Milestone 3.4 appendices. Please note, Figure 12 in the report is embargoed by MPI until further notice. If appendices are distributed by MPI to other parties, this figure will have to be redacted (blacked out prior to document dissemination).

# **Ecosourcing and Nursery Accreditation**

NRC's political stance on ecosourcing is neutral. In saying this, we recognise ecosourcing as good practice. We do not promote it, but where landowners wish to ecosource, we will support their decision. Our good practice library therefore contains a library subset containing practical ecosourcing guides developed by Tāne's Tree Trust for the HCEF Boost project.

In the view of our supplier (Tāne's Tree Trust), these guidelines are practical and do-able on the ground, in contrast to the more stringent requirements DOC has decided upon. For example, Tāne's Tree Trust suggests gathering seed from 10 trees, but DOC suggests 100 trees, a decision that arose partially from industry-reported views that the DOC seed collection permitting process is cumbersome. For an on-the-ground seed collector, collecting from 100 trees in a local zone is very difficult, especially where species are fairly restricted, and where access is restricted. In saying this, DOC representative Wendy Holland states that the DOC recommendations are for internal use only. The HCEF Boost team does


not know what consultation occurred with nursery and seed collector industry representatives to produce DOC's recommendations.

A full subset of ecosourcing guidelines can be found in the appendices under the subfolder "Ecosourcing", which is part of Milestone 3.4.

Tāne's Tree Trust's recommendations are, as quoted from their provisional report:

- Prepare a Northland Code of Good Practice for seed collection and nursery production of native stock that includes pragmatic guidelines covering:
  - ecosourcing
  - seed collection protocols
  - standards for plant quality
  - biosecurity measures.
- Utilise existing resources in preparing the Northland Code of Good Practice, including:
  - DOC's guidelines on ecosourcing
  - Tāne's Tree Trust's guidelines for species selection, ecosourcing and seed collection
  - New Zealand Plant Producers Incorporated (NZPPI) and MPI protocols for biosecurity measures in nurseries
  - other resources indicated in this report.
- Either update the NRC publication *A Planter's Handbook for Northland Natives* to include these good practice ecosourcing, seed collection, plant quality and biosecurity measures, or create a new document.
- NRC should stay abreast of the Plant Production Biosecurity Scheme being developed by the NZPPI, and utilise these resources as they become available. The Plant Production Biosecurity Scheme is expected to be completed late 2019.
- Recognise that there is no "one size fits all" set of rules for ecosourcing, and a pragmatic approach is required to incentivise the adoption of ecosourcing principles in raising and planting natives for multiple purposes.
- Good practice ecosourcing should always be advocated for ecological restoration, but it should not be so rigidly enforced that it becomes a deterrent to planting native forest. Care in following good practice ecosourcing, and avoiding genetic pollution, is also warranted where:
  - plantings are close to areas with high conservation values
  - there are distinct genetic differences within species
  - taonga species are being planted on or near iwi land.
- NRC should advocate for well-planned planting programmes including:



- allowing time for appropriate seed collection to meet ecosourcing requirements of planters
- setting realistic timeframes for nurseries to produce plants
- a commitment by planters to forward-order plants.
- NRC should work with DOC to streamline the seed collecting permit system on public conservation land, to allow better access to ecosourced seed.
- NRC should consider any potential unintended ramifications on small to mediumsized commercial nurseries of any policy initiatives, funding decisions, or "on the ground" decisions.
- At this stage, it is not recommended that a mandatory accreditation scheme is adopted for native plant nurseries. Rather, an educational approach should be adopted based on building a supportive relationship between NRC, nurseries and stakeholders involved in forest establishment – aimed at increasing awareness of good practice seed collection, nursery propagation, and biosecurity protocols.
- An industry-wide working group, composed of nursery growers, forest establishers, NRC staff, and possibly stakeholders from other organisations, should develop plant specifications for natives used in revegetation programmes appropriate for Northland.
- In conjunction with providing guidelines and a Northland Code of Good Practice, NRC should run workshops, bringing in outside expertise where necessary, to inform stakeholders on the good practice ecosourcing, seed collection, plant quality and biosecurity measures.

The full transcript of Tāne's Tree Trust's recommendations can be found in the Milestone 3.4 appendices.

#### Biosecurity

Tāne's Tree Trust also produced a set of biosecurity guidelines and fact sheets they have vetted as valuable, practical tools that can be used by foresters, particularly in Northland, where biosecurity issues are more pronounced due to warm climate and longer settlement of humans. These documents complement our current repository of resource links. They can be found in the "Biosecurity" folder nested under Milestone 3.4 appendices.

#### Work on Regulations

We commissioned a member of our NRC technical advisory group, Justin Murfitt, to help us clarify and clearly communicate the regulatory landscape around forestry (particularly afforestation) in Northland. We also asked consultant Brett Gilmore to work alongside Justin to provide an external, commercial forestry perspective.

We found that regulations affecting afforestation are evolving at a rapid rate, which causes confusion and uncertainty for some landowners. Most forestry-related regulations are currently under review. Only the Forests Act 1949 and its successor, the Forests



The following rulesets governing afforestation are currently under review:

- The ETS
- The NES-PF 2018
- NRC's 10-year Regional Plan, which sets out new rules and policies for how people use fresh water, land, air and the coast in Northland. It trumps the NES-PF if its provisions are more stringent that those in the NES-PF, but in Northland, no regional plan rules are currently more stringent.
- In Northland, there are three district councils: Kaipara, Far North, and Whāngārei. They all have different rules set out in separate district plans, which are also currently being reviewed.

With these facts in mind, Justin and Brett have developed a comprehensive guide to regulations affecting afforestation, including the ETS and the NES-PF, titled *Regulations and Guidelines for Afforestation, Northland*. This document is in draft format subject to review by the wider monitoring team. It can be found in the Milestone 3.4 appendices, sub-folder "Regulations and Guidelines".

#### THE FUTURE NES-PF

In addition, Brett explored potential future changes that could affect existing and new forests in Northland, titled *Future Changes to Regulations and Guidelines, Northland* (a Milestone 3.4 appendix). In summary, the NES-PF 1-year review, which started mid-April of 2019, will deal with:

- how aligned, or misaligned, council regional plans are with the NES-PF
- the way in which charging to monitor forest activities is being implemented, and the impacts of charging
- trends in actual implementation of the NES-PF vs. theory
- whether changes to the erosion susceptibility classification, fish spawning indicator and wilding conifer risk calculator are needed
- whether foresters operating under existing resource consents or who have existing use rights under section 10 of the Resource Management Act 1991 (RMA) must abide by the NES-PF.

#### ARRIVAL OF THE NPS-IB

In December 2018, after an 18-month process, the Biodiversity Collaborative Group delivered their proposed National Policy Statement for Indigenous Biodiversity (NPS-IB) to the Government. This includes aspects specific to plantation forestry as well as broader recommendations relating to plantation forestry. Our consultant, Brett Gilmore, was a member of this group.



Also, in November 2018, DOC started a broader conversation on biodiversity through the New Zealand Biodiversity Strategy. New Zealand is a signatory of the International Convention of Biological Diversity. Under the convention New Zealand is required to produce a national strategy, plan or programme for the conservation and sustainable use of biological diversity. The current national strategy (New Zealand Biodiversity Strategy 2000) and Action Plan (New Zealand Biodiversity Action Plan 2016–2020) expire in 2020. Three reference groups have been established: Te Ao Māori, Science and Stakeholder. The forestry sector has representation on the stakeholder reference group.

The New Zealand Biodiversity Strategy and a future NPS-IB will need to be strongly linked as they both address the broader what, when, who, and how of biodiversity processes. These developments are highly likely to impact on forestry in Northland.

#### ARRIVAL OF THE NPS-FM

The evolving National Policy Statement for Freshwater Management (NPS-FM) will also likely affect forestry activities, especially forest engineering and harvesting of existing forest. Harvesting can significantly increase sediment, especially in hill country, even when good practice is followed. There have been several studies (such as the Pākuratahi Land Use Study [now inaccessible via the Eastland Wood Council online]) that show overall sediment generated over the life of a plantation is likely to be considerably less than neighbouring farmland, but sediment at harvest and for the following two years is likely to be higher than pasture. This creates a challenge of how to manage a relatively short-term change with long-term land use. For example, in catchments where drinking water is drawn, post-harvest sediment could raise sediment issues at treatment plants – especially those reliant on UV treatment.

Councils are required to implement the NPS-FM, under Policy E1, in their policies and plans as promptly as is reasonable in the circumstances, and so it is fully completed by no later than 31 December 2025. If councils consider this would be impractical or would result in lower quality planning, they may extend their implementation programme to 31 December 2030.

#### CHANGES TO THE ETS

The ETS has the potential to significantly increase the opportunity for more afforestation, but it needs to work within an evolving regulatory framework and other drivers for change to make a substantial impact. The ETS is a huge topic area. This section only covers a few aspects of it.

Although the forestry sector is in the ETS, fewer than 20% of commercial plantation forests are actively involved, and their participation generates significant administrative work and cost. Some who have joined are simply holding their carbon credits as a liquid hedge against the future liability of land-use change. For these forest owners the ETS is not an incentive, but an added cost and a source of regulatory uncertainty. Others are using their carbon credits to afforest and use the growth of these forests to help create the hedge. Others simply have a cashflow need or see it as a source of capital for other ventures.



Changes to the ETS are being made to make it easier to work with and to improve how the ETS incentivises forestry. The key changes that may increase afforestation are:

- discontinuing the Permanent Forest Sink Initiative and introducing a new permanent
  post-1989 forest activity into the ETS. This enables a change to the way owners of
  permanent forests can access NZUs for the carbon stored in their forests. These
  changes are intended to greatly reduce barriers to establishing permanent forests by
  making permanent forest a more attractive and viable option, simplifying
  administration, and having a pathway for rotation forests to transition into
  permanent forest if, for example, they prove unsuitable for harvesting
- improving rules around pre-1990 forest land offsetting for more flexible land use, which is particularly important for Māori landowners and farm foresters
- replacing the current price ceiling (the \$25 fixed price option) with a cost containment reserve through auctioning, and investigating a price floor.

Another useful change would be the introduction of forest averaging and the flexibility for registered post-1989 forest landowners to transition to forest averaging should they choose.

The following points should also be considered.

- The Government wants to bring agriculture into the ETS. On more marginal hillcountry, ETS changes could create widespread land-use change to plantation forestry or reversion to native forest.
- An increasing price of carbon is seen as a catalyst for more forest, though higher carbon prices will not necessarily encourage the purchase of farmland for new planting.
- The Forestry Reference Group Final Report (2018) provided advice on the Climate Change Forestry Package of proposed options under the ETS. This document provides an interesting insight into the deeper issues at play in the carbon market and affected industries.

#### NORTHLAND WOOD COUNCIL VIEWS

Brett Gilmore interviewed the NWC members for their views on regulations. The NWC is made up of representatives from Summit Forests, Northland Forest Mangers, PF Olsen, Rayonier Matariki Forests, the FFA, Māori Forestry Collective and Hancock Forest Management Ltd NZ. This group collectively manage 80% of the total Northland volume.

The NWC works to represent or lobby for and on behalf of its members in a range of areas where common objectives can be better achieved when working as a cohesive group. A full account of group industry perspectives can be found in the Milestone 3.4 appendices.

Key points from the NWC include the following.

• There is a need for continued and deeper collaboration between NRC as new regulations are introduced, and as the impacts from new biosecurity threats are felt. The NWC wants to have input into policies, objectives and rules at a regional and



district level as plans and regulations evolve to ensure reasonable outcomes that are practicable to monitor.

- There is an opportunity to develop tools to implement regulations. For example, the use of environmental offsets has the ability to move cost and potentially time from one part of an operation and concentrate efforts in other areas of the operation (e.g. reduce sediment control structures and revegetation around risk appropriate roads and landing while developing a manmade wetlands system at the bottom of the catchment).
- The NWC sees slash management as a focus on waterways and land amenity that will incur additional operational costs in steep land areas. They have asked for improvements to regulations that currently cause issues, such as the closure of bridges or the lack of maintenance on public roads.
- Most importantly, the NWC noted inconsistency of rules, rates and constructive dialogue between district councils within Northland as a barrier. More in-depth analysis of this key issue can be found in the Milestone 3.4 appendices.

The NWC saw continued cooperation through the RMA Steering Group as a way to test and resolve issues. More in-depth analyses of these key issues are located in the Milestone 3.4 appendix.

#### Small Operator Views

Brett also interviewed smaller companies that are not members of the NWC. Key recommendations they made to central and local government are listed below.

- The NWC would like to see an online portal for all NES-PF notifications, the same as used for the ETS. That way councils, government, and industry would have all info in one place to analyse data. You could include an upload of a shapefile for forest just like the ETS, which then gives all parties a lot of spatial forest information, which is also needed.
- Roading issues in Northland are a major challenge Kaipara and Far North more so the Whāngārei. There is little or no ability to get these councils to invest in upgrade of roads/structures in advance. Central government needs to return money directly to regions for roading gathered from road user charges and fuel taxes, and councils need to invest it directly into unsealed road upgrades.
- The NES-PF has made little difference to good practice, but has increased time input vs. volume of wood out, because small operators are doing applications all the time due to the small size of their woodlots.

The interview series produced a list of forestry companies involved in small woodlot management, including harvesting. These names were added to the Margules Groome spreadsheet of forestry advisors and managers. A full account of small company, non-NWC affiliated forestry companies can be found in the Milestone 3.4 appendices.



#### NATIVE PLANTATION FORESTS

The concept of cutting down native trees for harvest lost much of its social licence in past decades when butt logs were dropped and left to lie in the South Island's pristine native forests. Only recently, partly through the sustained efforts of respected foresters involved in Tāne's Tree Trust, has the growing and cutting of native plantation forests built a following and regained social currency. Tāne's Trees Trust has been working from its Northland base, headed by Paul Quinlan, on a Totara Industry Pilot project for several years.

The Totara Industry Pilot is an ongoing project that sees totara logs harvested from various sites in Northland and then tested for their timber characteristics, with a view to fulfilling building code requirements and using the timber for any/all suitable purposes. It is possible that a niche industry can be developed in Northland around totara timber, with high-value products being a favoured focus going forward. The Totara Steering Group, which includes Scion, MBIE and MPI, has committed to ascertaining the value of totara. This process is funded at a rate of \$1 million over two years.

Tōtara was chosen because it grows exceedingly well in Northland, and because it is viewed as a high-quality timber by experienced foresters and timber-reliant professionals. It also grows as a pioneer species on disturbed ground (including pasture), and reaches maturity in fewer years than most other native species. The full project proposal can be found in the Milestone 3.4 appendices.

In order to understand the tōtara opportunity more deeply, the HCEF Boost team undertook a field education seminar with Paul Quinlan, who is spearheading the Totara Industry Pilot. We interviewed him about how a landowner might go about creating a tōtara plantation for harvest. One barrier to this was the native forest registration process and the difficulties and costs associated with it. Therefore, we commissioned Paul to describe the options open to native foresters as they stand under current legislation. His work is titled *Registering Forests under the Forests Act in Northland* (see the Milestone 3.4 appendices).

The report summarises what is Northland's natural advantage – growing native forest, especially totara – and outlines the investigations underway by the Northland Totara Working Group around sustainable forest management.

Specific topics covered are:

- reasons and available options for registering an indigenous forest
- experiences Paul has had in registering an indigenous forest
- recommended process improvements, and NRC's role in these processes
- the relationship between Sustainable Forest Management Plans and QEII National Trust and Ngā Whenua Rāhui covenants.

The conclusion of the report is a succinct summary that speaks to the difficulties inherent in making something formerly taboo a standard business type. The potentially vital role of NRC in the native plantation forestry scene is clearly stated. A complete report can be found in the Milestone 3.4 appendices.



#### PINUS RADIATA PLANTATION FORESTS

Bob Cathcart's observations on *P. radiata* plantations, as derived from his journey alongside Ngāti Hine (Milestone 2.3 appendices), were particularly relevant to the social, environmental and economic derivatives of good practice. His observations of the role pines play in the Northland landscape tell a story that is inclusive, rather than exclusive. Following are some key points from Bob's report.

#### Pines on Podzolised Soils

Plantation forestry is an economically and environmentally sustainable land use on podzolised and highly erodible soils, effectively reducing the severity and incidence of soil erosion. Plantation forestry with *P. radiata* improves the structure and fertility of impoverished soils, improving it for future uses, whether that be a second rotation of pines or retirement to indigenous vegetation.

#### Controlled Burns as a Tool

Total control over burning has not only protected the pine forests, it has enabled the extensive wetlands, pockets of remnant indigenous forest and regenerating forests to recover, whereas previously, they were reducing in extent and health each time the land was burned.

#### Wetlands and Pines

While afforestation of the catchment has protected the wetlands from burning and the wetlands have buffered the streams against sediment and nutrient runoff, the level of the wetlands has risen, and, in places, road access and road foundations are being affected by the rising levels. Accepting the role these wetlands provide, and understanding their ability to recover from managed disturbance, Regional (Plan) and National Policy Statement rules must enable channel maintenance to not only protect adjoining property and public assets such as roads and rail, but also natural wetland ecosystems that are unable to cope with rapidly rising water levels.

#### Land Connections

It takes some time for landowners/managers to develop a full understanding of the intrinsic capability of their land and to implement land uses and management systems that best match those capabilities. In the case of trustees or directors representing shareholders, many of whom no longer have any physical connection to or understanding of their land or are even resident in the district, this process may take even longer. This matter is explored more deeply in the "Mangakāhia Report" (Milestone 3.1 appendices).

#### The Need for Better Planning

More care is required during the establishment of forests to better match afforestation to location and the type of land. On replanting, areas difficult or costlier to harvest, such as heads of gullies and immediately adjoining pockets of bush and isolated pockets of land well away from roads, should not be replanted in pine – that is, pines should be planted on land most cost-effective to manage. The more difficult sites should either be planted with native



trees or allowed to regenerate to native bush, either via a mānuka cover crop or by natural regeneration.

#### Pines on Shallow Limestone Soils

The continued afforestation of areas of shallower limestone soils (Motatau clay, a relatively fertile soil over solid limestone), or at least the continued afforestation with *P. radiata*, is questioned.

#### Landscape Values and Pines

Slower-growing native trees should be planted along some road frontages to screen the plantation forests beyond and to reduce the incidence of trees falling across roads or affecting power wires. This screening will reduce the image of endless swaths of pine forests, and it will reduce shading and enable roads to dry during winter, thereby reducing maintenance costs.

#### Other Plants for Medicinal Purposes

As well as planting and managing mānuka on what is naturally "mānuka country" – gumland and wetlands on which mānuka is naturally the dominant vegetation – we should consider planting, managing and harvesting indigenous plants for use in the pharmaceutical industry.

#### COASTAL BUFFERS

Tāne's Tree Trust has been working closely on coastal buffer good practice with a number of subject matter experts, including Laura Shaft of the NRC Biodiversity team. Their February 2019 Summary Report can be found in the Milestone 3.4 appendices.

As this work is ongoing and as yet incomplete, we approached Northland plantswoman Jacqui Knight of Rahui Gardens to provide good practice recommendations for coastal buffers. We also included Auckland Council's planting guide PDFs – Auckland is a neighbouring region, so their plant list is very close to ours. We have downloaded their guides as examples of how our final product on good practice coastal planting should look. Auckland's guides are not exclusive to trees, but they are robust, practical and well considered.

#### CLIMATE CHANGE AND GOOD PRACTICE

#### Background

Compared to 1995, temperatures are likely to be 0.7°C to 1.1°C warmer by 2040 and 0.7°C to 3.1°C warmer by 2090. By 2090, Northland is projected to have from 13 to 75 extra days per year where maximum temperatures exceed 25°C. The Far North already experiences very few frosts, and in the future frosts are likely to become extremely rare. Rainfall will vary locally within each region. The largest changes will be for particular seasons rather than annually. Seasonal projections show spring rainfall decreasing by 1–12% in Kaitāia and 3–17% in Whāngārei by 2090.

There is large natural variability in extreme rainfall frequency in Northland from year to year and decade to decade. According to the most recent projections, Northland is not expected to experience a significant change in the frequency of extreme rainy days as a result of



climate change. In fact, it is likely to experience a decrease in daily extreme rainfall by 2090 under the highest emissions scenario. Future changes in the frequency of storms are likely to be small compared to natural inter-annual variability. Some increase in storm intensity, local wind extremes and thunderstorms is likely to occur. The frequency of ex-tropical cyclones is projected to either decrease or remain unchanged over the 21st century; however, the ex-tropical cyclones will likely be stronger and cause more damage as a result of heavy rain and strong winds (MfE, 2019).

#### What Will Happen?

- *Coastal hazards* Coastal roads and infrastructure may face increased risk from coastal erosion and inundation, increased storminess and sea-level rise.
- Drought By 2090, the time spent in drought ranges from minimal change through to more than double, depending on the climate model and emissions scenario considered. More frequent droughts are likely to lead to water shortages, increased demand for irrigation and increased risk of wildfires. Droughts are likely to increase in both intensity and duration.
- *Disease* There may be an increase in the occurrence of summer water-borne and food-borne diseases such as salmonellosis. There could also be an increased risk from some vector-borne diseases such as dengue fever and the Ross River virus.
- *Biosecurity* Climate change could result in an increased incidence of invasive pests affecting both pasture and horticultural crops. Several existing pest species could become more serious pests with even a slight increase in temperature.
- Agriculture Production of some crops (such as kiwi fruit) is likely to become uneconomic in Northland by 2050 because of a lack of winter chilling. Warmer temperatures, a longer growing season, and frosts becoming rare could provide opportunities to grow new sub-tropical crops. Farmers might benefit from faster growth of pasture and better crop growing conditions. However, these benefits may be limited by negative effects of climate change, such as prolonged drought, increased flood risk and greater frequency and intensity of storms (MfE, 2019).

#### Affected Tree Species

According to a report by the Forest Research Institute (Whitehead, Leathwick, & Hobbs, 1993), the plantation areas most likely to be affected adversely by climate change are in Northland. *P. radiata* growth may be affected in the most extreme climate change projections, especially in sand country in the Far North. The effects of changes in rainfall on the forest resource are expected to be much less than the effects of temperature; however, the predicted dryer weather may not affect commercial pine forests (Whitehead et al., 1993).

It is hard to know exactly how tree species will react, or how pronounced climate change will be. Models and reality can be an exact match, but at times, do not correlate well. We do know that indigenous species like taraire (*Beilschmiedia tarairi*) do not suffer drought well, as evidenced by widespread die-off in summers where drought lasts over months rather than weeks during summer.



#### ALTERNATIVE SPECIES AND USES

Scion was commissioned to look outside the box on uses for trees and species that can be companion planted with trees, such as understorey crops. They were asked to review this topic in light of climate change. Although food crop trees or associated cropping plants are outside the gambit of One Billion Trees, mixed species forestry – i.e. a mosaic of plants whose roots grow to different depths and have different soil retention capacities – is recognised worldwide as an effective erosion control mechanism (Leopold, 1949; Ola, Dodd, & Quinton, 2015). This can best be achieved by mixing plants of different genera, habits and purpose.

Scion reported that the following tree species can assist in erosion control, and also provide non-timber benefits:

 banana; black walnut; cabbage tree; candlenut; chestnut; cypress; eucalyptus; fig; five finger; flax; gum arabic; honey locust; Japanese cedar; mānuka/kānuka; karaka; karamu; koromiko; kōwhai; lacebark; ngaio; northern rata; oak; olearia; pōhutukawa; poplar; pūriri; radiata pine; raupō; rewarewa; rimu; tōtara; tītoki; tree lucerne; walnut; willow.

Some of these species, along with others that can be used in conjunction with these species, deserve further investigation, including:

- nut crops such as macadamia and chestnut these are a scalable production from between 1 to 5 ha
- oil nut crops such as Chinese tallow and candlenut these would require a larger land parcel of around 200 ha, but small-scale production for local districts may improve localised farm fuel sufficiency
- fodder crops such as tree lucerne and paulownia
- medicinal tree plants such as houhere and kava
- gum arabic.

In addition, some species provide a range of non-timber benefits, and could be planted to service an integrated product portfolio:

- banana useful for food, fibre and bioethanol
- cabbage tree useful for fructose, bioethanol, and cordage
- Chinese tallow useful for biodiesel, fodder, and industrial use
- mānuka/kānuka useful for honey, oil, firewood.

Understory cropping may be less suited to Northland forests, due to the climate conditions. For established forests, stocking with wild turkey or pheasant may provide another income source while trees mature. Sloping land management in an integrated agroforestry farming system is a "natural" for Northland hill country. The full table showing non-timber potential



uses for trees in Northland is below, because it is an excellent representation of the depth of possibilities. The full report can be found in the Milestone 3.4 appendices.



| Species                |                                 | Potential applications |       |              |              |              | Eros         | ion co       | ntrol        | Chemical compounds of note      | Potential for<br>Northland       |
|------------------------|---------------------------------|------------------------|-------|--------------|--------------|--------------|--------------|--------------|--------------|---------------------------------|----------------------------------|
| Common<br>name         | Botanical name                  | Food                   | Fibre | Biofu        | Medi         | indus        | Soil         | Bioen        | Ripari       |                                 | More stars =<br>better potential |
| Akeake                 | Dodonaea viscosa                |                        |       |              | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | Sakuranetin; ent-15 labdane     | **                               |
| Alder                  | Alnus cordata                   |                        |       |              | $\checkmark$ | $\checkmark$ | $\checkmark$ |              | ✓            | Salicin; Betulin; Lupeol        | ***                              |
| Ash                    | <i>Fraxinus</i> spp.            |                        |       |              |              | ✓            |              |              |              |                                 | *                                |
| Banana                 | <i>Musa</i> spp.                | $\checkmark$           | ✓     | ✓            | ✓            |              | $\checkmark$ |              |              | Bioactive phytochemicals        | ****                             |
| Black walnut           | Juglans nigra                   | $\checkmark$           |       |              | ✓            | ✓            | $\checkmark$ |              |              | Omega-3 fatty acids             | ****                             |
| Blackwood              | Acacia melanoxylon              |                        |       |              |              |              | $\checkmark$ |              |              |                                 | *                                |
| Californian<br>redwood | Sequoia<br>sempervirens         |                        |       |              |              |              | ~            | ~            |              | Antifungal bioactives           | *                                |
| Candlenut<br>tree      | Aleurites<br>moluccanus         | ~                      |       | ~            |              |              | ~            |              |              | Saponin                         | ****                             |
| Catalpa                | Catalpa speciosa                |                        |       |              | $\checkmark$ | ✓            |              |              |              | Luteolin; apigenin              | **                               |
| Chestnut               | Castanea sativa                 | $\checkmark$           |       |              |              | ✓            |              |              |              |                                 | ****                             |
| Chilean guava          | Ugni molinae                    | $\checkmark$           |       |              |              |              |              |              |              |                                 | **                               |
| Chinese tallow         | Triadica sebifera               | $\checkmark$           | ✓     | $\checkmark$ | $\checkmark$ | ✓            |              |              |              | Tannins                         | ****                             |
| Citrus                 | <i>Citrus</i> spp.              | $\checkmark$           |       |              | $\checkmark$ | ✓            |              |              |              |                                 | ****                             |
| Coffee                 | Coffee arabica                  | $\checkmark$           |       |              |              |              |              |              |              |                                 | ****                             |
| Coral tree             | Erythrina crista-galli          |                        |       |              |              | ✓            |              | $\checkmark$ |              |                                 | *                                |
| Cypress                | Cupressus spp.                  |                        |       |              | $\checkmark$ | $\checkmark$ | $\checkmark$ |              |              | Isocupressic acid; alpha-pinene | **                               |
| Dawn<br>redwood        | Metasequoia<br>glyptostroboides |                        | ~     |              |              |              |              |              |              |                                 | *                                |
| Elm                    | <i>Ulmus</i> spp.               | $\checkmark$           |       | $\checkmark$ | $\checkmark$ |              |              |              |              | Mucilage                        | **                               |



| Eucalyptus        | <i>Eucalyptus</i> spp.     |              |              | $\checkmark$ | $\checkmark$ |              | $\checkmark$ |              |                       | Eucalyptol  | **   |
|-------------------|----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----------------------|---|------|
| Fig               | Ficus carica               | $\checkmark$ |              |              |              | $\checkmark$ |              |              | $\checkmark$          | Many phytochemicals                                 | **** |
| Five-finger       | Pseudopanyx<br>arboreus    |              | ~            |              |              | ~            | ~            | ~            | ~                     | Many phytochemicals                                 | **   |
| Flax              | Phormium tenax             | ~            | ~            |              | ~            | ~            | ~            | ~            | ~                     | Tannins; palmitic, oleic, linoleic, stearic<br>acid | ***  |
| Gingko            | Gingko biloba              |              |              |              | $\checkmark$ |              |              |              |                       |   | **   |
| Ginseng           | Panax ginseng              |              |              |              | $\checkmark$ |              |              |              |                       | Ginsenoside (saponins)                              | **** |
| Goldenseal        | Hydrastis<br>canadensis    |              |              |              | ~            |              |              |              |                       | Hydrastine and berberine                            | **** |
| Grevillea         | Grevillea robusta          |              |              |              |              |              |              |              |                       |   | *    |
| Gum arabic        | Acacia senegal             | $\checkmark$ |              |              |              | ✓            | ✓            |              |                       |   | ***  |
| Honey locust      | Gleditsia triacanthos      | $\checkmark$ |              | $\checkmark$ | $\checkmark$ | ✓            |              | $\checkmark$ |                       | More than 60 phytochemicals                         | **** |
| Houpara           | Pseudopanax<br>Iessonii    |              |              |              |              |              | ~            | ~            | ~                     |   | *    |
| Jacaranda         | Jacaranda<br>mimosaefolia  |              |              |              | ~            |              |              |              |                       | Carobin   | **   |
| Japanese<br>cedar | Cryptomeria<br>japonica    |              |              |              |              | ~            | ~            |              |                       |   | **   |
| Jatropha          | Jatropha curcas            |              |              | $\checkmark$ |              |              |              |              |                       |   | **   |
| Kānuka            | Kunzeia ericoidies         | $\checkmark$ | $\checkmark$ | ✓            | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | <ul> <li>✓</li> </ul> | Alpha-pinene  | **** |
| Karaka            | Corynocarpus<br>laevigatus |              |              |              | ~            | ~            | ~            |              |                       | Karakin   | **** |
| Karamu            | Coprosma robusta           | $\checkmark$ |              |              | $\checkmark$ | $\checkmark$ | $\checkmark$ |              | $\checkmark$          | Asperuloside  | **** |
| Kauri             | Agathis australis          |              |              |              |              | $\checkmark$ | ✓            | $\checkmark$ | $\checkmark$          | Alpha-pinene  | **   |



| Kawakawa         | Piper excelsum             | ~            |   |   | ~            |              |              |   |              | Alpha-pinene; palmitic acid;<br>diayangambin   | **** |
|------------------|----------------------------|--------------|---|---|--------------|--------------|--------------|---|--------------|--|------|
| Kava             | Piper methysticum          | ✓            |   |   | $\checkmark$ |              |              |   |              | Kavalactones   | **** |
| Koromiko         | Hebe stricta               |              |   |   | $\checkmark$ | $\checkmark$ | $\checkmark$ | ✓ | $\checkmark$ | Iso alkanes  | **   |
| Kōwhai           | Sophora chathamica         |              |   |   | ~            | ~            | ~            | ~ | ~            | Alpha-matrine; verbascose; glucose; sucrose  | ***  |
| Lacebark         | Houheria populinea         |              | ~ |   | ~            | ~            | ~            |   | ~            | Mucigens rhamnose, galactose, galacturonic acid and glucuronic acid                                  | **** |
| Liquid amber     | Liquidambar<br>styraciflua |              |   |   |              |              |              |   |              |  | *    |
| Macadamia<br>nut | Proteaceae spp.            | ~            |   |   |              |              |              |   |              |  | **** |
| Magnolia         | Magnolia<br>grandiflora    |              |   |   |              |              |              |   |              |  | *    |
| Mānuka           | Leptospermum<br>scoparium  | ~            | ~ | ~ | ~            | ~            | ~            | ~ | ~            | Leptosermone; triterpene acid;<br>mannitol; Unique Mānuka Factor (UMF)<br>sesquiterpene hydrocarbons | **** |
| Matipo           | Myrsine australis          |              |   |   | $\checkmark$ |              |              |   |              |  | **   |
| Mulberry         | Morus alba                 | $\checkmark$ |   |   |              | $\checkmark$ |              |   |              |  | ***  |
| Ngaio            | Myoporum laetum            |              |   |   | ✓            | $\checkmark$ | $\checkmark$ |   | ✓            | Mannitol; ngaione  | ***  |
| Nīkau            | Rhopalostylis sapida       | ✓            | ✓ |   | $\checkmark$ |              |              |   |              | Fatty acids  | **   |
| Northern rātā    | Metrosideros<br>robusta    | ~            |   |   | ~            |              | ~            | ~ | ~            | Terpenes; ellagic acid; sesquiterpenes   | **** |
| Oak              | Quercus spp.               |              |   |   |              | $\checkmark$ | $\checkmark$ |   |              |  | **   |
| Olearia          | <i>Olearia</i> spp.        |              |   |   | $\checkmark$ |              |              |   | $\checkmark$ | Oleanolic acid;  | **   |



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| Paulownia        | Paulownia<br>tomentosa   |              |              | ~            |              | ~            |              |              |              |   | **** |
|------------------|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---|------|
| Pittosporum      | Pittosporum spp.         |              |              |              |              |              | $\checkmark$ | $\checkmark$ | $\checkmark$ | Turpines  | **   |
| Plane tree       | <i>Platanus</i> spp.     |              |              |              | $\checkmark$ |              |              |              |              | Quercetin, kaempferol and caffeic acid                    | **   |
| Pōhutukawa       | Metrosideros<br>excelsa  | ~            |              |              | ~            |              | ~            |              |              | Ellagic acid; sesquiterpene                               | **** |
| Poplar           | Populus spp.             |              |              | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |   | **** |
| Poroporo         | Solanum aviculare        | ~            |              |              | ~            |              |              |              |              | Solasonine; sapogenins; fructose; fatty<br>acids + others | **** |
| Puka             | Griselinia littoralis    |              |              |              |              |              | $\checkmark$ | $\checkmark$ | $\checkmark$ |   | *    |
| Pūriri           | Vitex lucens             |              |              |              |              | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | Vitexin; saponaretin                                      | **   |
| Radiata pine     | Pinus radiata            |              |              | ✓            |              |              | $\checkmark$ |              |              |   | *    |
| Raupō            | Typha orientalis         | ✓            | ✓            | ✓            | $\checkmark$ | $\checkmark$ |              |              | $\checkmark$ |   | **** |
| Rewarewa         | Knightia excelsa         | $\checkmark$ |              |              | $\checkmark$ |              | $\checkmark$ | $\checkmark$ | $\checkmark$ | Beta-sitosterol   | ***  |
| Rimu             | Dacrydium<br>cupressinum | ~            |              |              | ~            | ~            | ~            | ~            | ~            | Tannin; beta-sisterol; totarol                            | **   |
| Robinia          | Robinia<br>pseudoacacia  |              |              |              |              | ~            | ~            |              |              |   | **** |
| Silk tree        | Albizia julibrissin      | ✓            |              |              | ✓            | $\checkmark$ | $\checkmark$ |              |              | Julibrosides; fatty acids; saponins                       | **** |
| Swamp<br>cypress | Taxodium distichum       |              |              |              | ~            |              |              |              | ~            | Alpha-pinene; thujopsene; cytotoxins                      | **   |
| Taraire          | Beilschmedia taraire     |              |              |              |              |              | $\checkmark$ |              | $\checkmark$ | Beta-sitosterol   | *    |
| Теа              | Camellia sinensis        | $\checkmark$ |              |              |              |              |              |              |              | Polyphenols; amino acids                                  | **   |
| Tī kōuka         | Cordyline australis      | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |              | $\checkmark$ | Fructose; linoleic acid; sapogenins                       | **** |



| Toetoe       | Cortaderia<br>splendens    | ~                     | ~            |   |              |              |              |              | ~ | Triterpene methyl ethers                             | ***  |
|--------------|----------------------------|-----------------------|--------------|---|--------------|--------------|--------------|--------------|---|--|------|
| Tōtara       | Podocarpus totara          |                       |              |   | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | ✓ | Totarol  | **** |
| Tītoki       | Alectryon excelsus         |                       |              |   | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ | ✓ | Tannins; glycerides; quebrachitol                    | ***  |
| Tree lucerne | Chamaecytisus<br>palmensis |                       |              | ~ |              | ~            |              | ~            |   |  | **** |
| Tulip tree   | Liriodendron<br>tulipifera | ~                     | ~            |   | ~            | ~            |              |              |   | Tulipiferine; aporphine alkaloids; sequi-<br>terpene | **** |
| Tupelo       | Nyssa sylvatica            | <ul> <li>✓</li> </ul> |              |   |              |              |              |              |   |  | **   |
| Walnut       | Juglans regia              | <ul> <li>✓</li> </ul> |              |   | $\checkmark$ | $\checkmark$ | $\checkmark$ |              |   | Omega-3  | **   |
| Willow       | Salix spp.                 |                       | $\checkmark$ | ✓ | ✓            | $\checkmark$ | $\checkmark$ |              |   | Salicin  | **** |



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## Recommendations

#### **Good Practice Library**

- Further collate the good practice library, and rationalise it based on feedback from other HCEF regions and end users, such as LMAs and landowners. Our intention is to publish the library online on the NRC website, and to make it fully interactive where we can. We also intend to update it regularly, because good practice is constantly evolving.
- Streamline regulations work according to LMA feedback so it is fully understandable to a novice LMA. We intend to publish this content online as well.
- Review the Tāne's Tree Trust report on indigenous forest registration in depth to ascertain how we might best support the Totara Industry Pilot project, the Northland Totara Working Group, and other native plantation forest initiatives that are sustainable.
- Adapt any published planting guides (such as NRC's *Trees for the Land*) to reflect current knowledge on tree species and how they will react to the predicted climate change that Northland may experience.
- Review and include the relevant Tāne's Tree Trust's native afforestation guides in our good practice repository. These can be found online at <u>https://www.tanestrees.org.nz/resource-centre/publications/</u>

#### **Alternative Uses for Trees**

- Establish the domestic market demand for potential displacement of petrochemicals from locally supplied plant-based ingredients for use in cosmetic, soap and other industrial applications. Also assess the suitability and capacity of using vegetable tallow at the Z Energy plant in Auckland.
- Undertake feasibility studies (including spatial modelling of climatic suitability of species over time, and techno-economic assessments for suitable zones) for the following species: Chinese tallow, kava, houhere, poroporo, black cohosh, candlenut, tree lucerne, gum arabic and cabbage tree (fructose).
- Assess the undercropping potential of black cohosh and poroporo in Northland, in a similar manner to assessments recently undertaken by Scion.
- Hold a series of workshops with Northland growers to assess their interest in agroforestry farm systems conversions, using diversified species planting for a range of non-timber benefits. This could also be used as a means to prioritise species feasibility studies, so that enough resource can be provided into a smaller range of larger-scale industrial options of interest. It could also be used to create grower "networks of interest" in certain species or end-product uses.
- Conduct a de-risking long-term model for regional development from afforestation in Northland that accounts for layers, including soils, climate, grower needs, techno-



economic viability and market demand, to determine the most suitable sites for industrial-scale production.

#### **Ecosourcing and Nursery Accreditation**

Review Tane's Tree Trust recommendations on ecosourcing and nursery accreditation carefully, in conjunction with stricter DOC guidelines (for internal DOC use only) and prepare a final, succinct one-page guide that can be used by LMAs and landowners alike. A full subset of Tane's Tree Trust recommendations on these topics can be found in the "Ecosourcing and Nursery Accreditation" section.



## **Milestone 3.5: Communications and Engagement**

Develop a communications and engagement plan to raise awareness and build uptake of soil conservation and afforestation services.

## **Evidence of Completion**

• Provision of a Stakeholder Engagement Strategy (A1197157).

### Purpose

Determine how to most effectively deliver the Stakeholder Engagement Strategy working with others – internally and externally. This plan informed the HCEF Boost Year approach to stakeholder engagement and initial communication and has been adapted to implement the SHaRP project from 2019–2023.

## **NRC Funding Streams**

#### Process

When we began the HCEF journey at NRC, our initial activity focused on understanding the wider team's work in relation to the HCEF. We approached this fact-finding mission from the perspective of the landowner. We felt that we should look at our findings through the eyes of an outsider, or external customer, and from this perspective we could begin teasing out our own HCEF communications and engagement strategy.

#### Outcomes

The value of our initial fact-finding mission became clear very quickly, because there are multiple funding streams available to help landowners in Northland plant trees. Many of these are available through NRC, and some are not (e.g. Trees That Count funding). We did not know how the funding streams worked, what they were called, or what would be considered "double dipping" if a landowner were to access more than one fund. We did not understand eligibility criteria, how the funds were administered, where the monies came from, or when the funds were open/closed.

Heather Taylor undertook an exercise to separate out and categorise internally available funding for afforestation, and found that most funding streams can be applied to HEL as incentives for land-use change. The funds and advice (external and internal) available as of May 2019 include:

- One Billion Trees options (direct landowner grants, partnerships, etc.)
- MPI/NRC Kaipara Hill Country Erosion Project (until June 2019)
- NRC nursery poplar and willow supply (direct delivery to farm gate)



- Northern Wairoa Project (MfE funded)
- Kauri Dieback Fund
- NRC Biofund
- NRC Community Pest Control Areas
- the NRC Environment Fund (known as the E Fund)
- Trees That Count (https://www.treesthatcount.co.nz/)
- Million Metres (<u>https://millionmetres.org.nz/</u>)

A draft fact sheet for LMA use can be found in the Milestone 3.5 appendices.

## Communication and Engagement Plan

#### Process

Stakeholder engagement planning was undertaken in consultation with NRC's Communications team to find existing knowledge and practices that could:

- be used as a "jump off point"
- make use of communication tools, tactics and channels
- meet NRC's corporate identity guidelines
- ensure consistency.

The methodology involved planning how to most effectively deliver the Stakeholder Engagement Strategy by:

- identifying parties
- understanding their context, drivers and motivations
- knowing how we could engage with them
- prioritising what we will do to achieve the project objectives
- implementing engagement and recording outcomes
- learning, refining and integrating with other workstreams.

#### Outcomes

The plan details the overarching approach to stakeholder engagement planning, broken down by audiences, with targeted actions and outcomes. Beth Masser drafted the Stakeholder Engagement Strategy. Main topics covered in this plan are:

- Approach summary
- Audiences and targeted actions
- Northland stakeholders by type



- Behaviour change exploring landowner attitudes and motivation
- Tree Demand Survey summary
- Key messages and holding pattern for future development of plan under the SHaRP project.

A draft plan for future SHaRP communications designed to facilitate and enhance uptake of extension services and soil conservation funds can be found in the Milestone 3.5 appendices.

#### IWI ENGAGEMENT

A separate Iwi Engagement Plan (also supporting Milestone 2.3) has been prepared and is being actioned as NRC continues to grow its Māori Engagement team. For the purposes of this report, it has been included in the Milestone 3.5 appendices. The Iwi Engagement Plan is focused on understanding and addressing the needs and interests of Māori – as a Treaty partner and key stakeholder. It includes a stocktake of Māori entities identified as active in afforestation in Northland.

#### BEHAVIOUR CHANGE

Beth Masser has explored landowner attitudes and motivation towards forest establishment in Northland, based on MPI's discussion document on designing extension programmes (MPI, 2015). This is a critical element to successful implementation of afforestation in Northland. Much of the priority HEL is in private ownership and there are considerable barriers that we need to understand and seek to address in order to achieve forest establishment. The thinking is based on community-based social marketing. This paper has been drafted, workshopped internally, and is now with the agriculture sector for feedback.

Aspects of this paper that consider what the motivating factors are for planting (e.g. One Billion Trees funding, ETS carbon credits) are addressed throughout this final report and are a moving feast as policy (ETS review) and legislation (Carbon Zero Bill) evolve.

#### TREE DEMAND SURVEY

The Tree Demand Survey was sent to NRC's 900 landowners with FEPs and shared via NRC's social media network. The survey was designed with the Communications team to gauge landowner interest in planting trees. This survey was undertaken with tablet and paper versions at the March 2019 Field Days in Dargaville. It was also introduced to existing NRC clients with FEPs who receive regular electronic issues of the NRC "land" newsletter *Hill to Harbour*. A total of 21 responses were logged. Of those who responded, over 90% were interested in planting. They represented a broad cross-section of farm types, sizes and motivations for planting. A full dataset of responses can be found in the Milestone 3.5 appendices (in Excel format).



## Rural Expert Hui

#### Process

As a pilot test of our thinking in the communications space, we co-organised what we called an "expert hui" with a very experienced facilitator, Annette Lees (Alternative Endings Ltd). She worked closely with Beth Masser to develop a set of challenging questions and group exercises to stimulate thinking about what future land use in Northland might look like. Planning notes and a full list of invitees can be viewed by accessing the Milestone 3.5 appendices.

Key presenters were:

- Duncan Kervell of NRC
- Barry Ogilvie of Te Uru Rākau
- Helen Moodie of DairyNZ
- James Parsons, former President of Beef + Lamb New Zealand
- Peter Bullen of PF Olsen
- Juliane Chetham (representative Tai Tokerau Māori Advisory Committee)
- Heath Worsold of Urban Design (a nursery)
- Imogen Field of NRC (reviewing engagement learnings from the Te Kawa Wai Ora Project).

#### Outcomes

Questions asked and answers given were:

1. What will be critical for afforestation success in Northland?

A clear and shared vision spanning the environmental, cultural, social and economic spheres, with close attention to planning, a 100-year-plus view, close collaboration in writing, the labour supply and training question answered, plant supply chain cemented in place, and infrastructure changes needed to support afforestation.

2. How can we make it easy and compelling for landowners to establish forests in priority catchments?

A toolbox package solution, agency alignment, easy access to help and funding, legislation requiring land-use change, and a programme moulded by landowners' values and marketed to them that way (which may require segmentation).

3. What is the best way to align organisational strategies to make the most of opportunities in Northland?

Simultaneous working from the top down and bottom up by agencies, and a pilot project to test the waters.

Conclusions were that NRC should develop a more structured conversation around regional afforestation strategy, particularly should the recent application for funding to do so be



approved by MPI. The concept of a sub-catchment pilot was reiterated. The full notes for this hui can be found in the Milestone 3.5 appendices.

## Recommendations

- Continue to implement the Engagement Strategy into the SHaRP project, including leveraging the most effective and efficient outcomes through strategic partnerships.
- Refine and build the Stakeholder Engagement Strategy, including aligned messaging with other agencies and simple, clear communication particularly targeted to landowners and iwi.
- Assign an NRC staff member to update the stakeholder database on a regular basis to retain its value and currency, and share it with the Land Management team. We suggest the updated version can be melded with consultant outputs, such as Tāne's Tree Trust's nursery database, Margules Groome's list of forestry advisors, and Forme's list of harvesters and buyers.
- Engage more deeply with the NRC Communications team to mine their experiences and skills in implementing what we have started with stakeholder engagement. We see the preceding MPI work on behaviour changes as essential to this work stream.
- Build on and implement the outcomes of the *Behaviour Change* paper.
- Grow and nurture relationships between people we have opened dialogues with as a core component of effective engagement. We would like to facilitate land use change by continuing to build on the enthusiasm many people feel – including commercial forestry representatives.
- Develop a rohe-specific, target-driven subset of our Stakeholder Engagement Strategy to implement our pilot catchment prioritisation exercise in Doubtless Bay.
- Continue to work alongside our NRC Māori Relationships Manager to build the longterm capacity and capability of our Land Management team to engage in respectful and constructive partnerships with iwi, hapū and whānau in the land management space.



# Milestone 4: Planting Trees

Land treatments and project completion report.

## **Deliverable Due Date**

30 June 2019

## **Milestone 4.1: Poplars and Willows**

Supply and deliver 2,500 poplar/willow poles to landowners within Northland (excluding Kaipara) for soil conservation purposes.

## **Evidence of Completion**

- Provision of poplar pole delivery records and details of soil conservation planting plans.
- The funded trees have been committed for planting on farms at priority locations as detailed in the NRC Excel document *Record of Planting, HCEF Boost Milestone 4* (A1200348).



## **Milestone 4.2: Native Tree Planting**

Supply and planting of at least 20,000 trees for riparian margins susceptible to streambank erosion within Northland (excluding Kaipara).

## **Evidence of Completion**

- Provision of riparian planting plans and agreed work descriptions with landowners.
- The funded trees have been committed for planting on farms at priority locations as detailed in NRC document A1200348.

## Recommendations

The following three areas of improvement have been developed by the Land Management team and are endorsed by the HCEF Boost team.

#### **Expansion of Flyger Road**

NRC intends to expand Flyger Road to supply growing demand for poplar and willow poles. The property is able to sustain increased production with added irrigation infrastructure. Currently, demand far outstrips supply, with first-come, first-serve orders closing within a calendar month.

#### Far North Nursery Expansion

Delivery to the Far North is costly and problematic, with actual distance and state of roads a barrier to meeting demand in that region. NRC's long-term plan is to develop a subsidiary operation in the Far North, either in partnership with an existing nursery, or as a stand-alone operation.

#### Streamlining of Systems

New staff Matthew Mabbitt has been working closely with existing staff to streamline nursery operations prior to expansion. He has tendered a contract to work on harvest operation design to cut costs and realise efficiencies. This work is ongoing. Matthew is also working on introducing an automated bill payments reminder system to reduce inefficiencies in recovering payments for poles from landowners. Delivery of poles is also an area marked for improvement. Finally, Matthew is currently engaged in developing systems and protocols to work more efficiently with planting, pruning and harvesting contractors. These commitments represent the groundwork for later expansion.



# The Future

## The SHaRP Project

An overview of the next phase – Sustainable Hill Country and Regional Priorities – is evident in the package budget:

# Sustainable Hill Country and Regional Priorities (SHaRP) Project: \$\$ Metrics (2019-2023)

- 1. Research on Coastal Buffers : \$55K
- 2. Research and Trials on Mature Poplar and Willow: \$95K
- 3. Stakeholder Engagement: \$100K
- Farm Plans (Combination of new and existing Land staff) 127,000 ha: \$1.7M
- 5. Fencing for retirement (hill country to aid natural regen): \$660K
- Forest Planting: \$464K (Top ups: FIF and LTP Regional Afforestation Grant)
- 7. Soil Conservation: Space Planting \$292K
- 8. Capacity Development (Contractors for pole planting) \$45K

These priorities are also supported by NRC governing documents, detailed in the following sections.

## The Northland Long-Term Plan

The proposed next four years of HCEF are also informed by the NRC Long Term Plan 2018–2028. Regional priorities are derived from wide consultation across Northland with key stakeholders, tangata whenua and individual ratepayers. This process is coming to an end as fiscal year 2018–2019 draws to a close.

## Working More Closely with Others

We have already established relationships with key players such as the NWC, Te Puni Kōkiri, DOC, Reconnecting Northland, influential internal staff who form our technical advisory group, established forestry contractors and consultants who are well-respected in the region, and others. However, we have identified other key influencers we could engage to leverage HCEF efforts, including Trees that Count, the expanding roster at local Whāngārei Te Uru Rākau offices, Federated Farmers, Beef + Lamb New Zealand, DairyNZ, and potential new LMAs who may be engaged under the SHaRP project.



In addition, we will continue to strengthen working bonds with key partners we already meet regularly with, because they are contributing invaluable support and information to our HCEF programme.

## **Hill Country Priorities**

Northland is the fifth most erodible region in the country. Without SHaRP funding and under current financial constraints, it would take 30 years to fully engage the 5,000 farms in Northland that are situated on HEL and require FEPs, which may become mandatory in the near future. The additional proposed SHaRP funding will allow the Land Management team to accelerate the process in line with our Long-Term Plan and future changes to regulations, including proposed mandatory FEP requirements.

#### **SHaRP Milestones**

The following are considered priorities for the SHaRP project. There are a total of 11 milestones spanning 2019–2023. They cover three broad categories:

- applied research and landowner engagement
- FEPs and land treatments
- FEPs and tree planting land treatments.

NRC has already increased rates by 10% to fund future erosion works in the region. In more detail, our goals under SHaRP may, depending on final agreement with MPI, be to:

- develop research trials for coastal erosion buffers, and mature poplar/willow research
- develop a promotional materials package to help us engage better with landowners and stakeholders
- consolidate what extension services we might offer and how (external or internal)
- engage with up to 500 new FEP clients on HEL in our priority catchments
- fence approximately 306 ha for reversion/retirement areas or new forest
- develop and offer a training package for forestry contractors and private sector farm / forestry consultants involved in pole planting and forest establishment for erosion prevention (training days, register of good practice, register of approved contractors)
- engage in forest planting of exotic, native, and mānuka/kānuka
- engage in expanding willow and poplar space planting to achieve additional erosion control
- hold two field days annually on erosion-prone farm, and provide handouts and infield workshopping opportunities to promote good practice and different treatment options.



As part of these endeavours, we may find opportunities to forge new relationships, or to cultivate new partnerships. We hope to:

- increase production at our Flyger Road poplar and willow nursery, and expand operations to Kaitāia if possible to better service the Far North demand for erosion control plantings
- work more closely with CBEC's nursery to use their open-book business model as a template for other main centres in Northland
- engage more closely with reputable contractors and consultants already involved in afforestation and related activities to build a strong network for our region
- hold or facilitate additional workshops and field days in conjunction with key partners such as the FFA
- work with our new Māori Liaison Officer to build a regional version of Te Pūkenga Atawhai immersion training to upskill existing LMAs in working with tangata whenua
- potentially include reticulation of stock water in our funding structure to encourage farmers who see stock access to water as a barrier to afforestation
- develop protocols for promoting land-use change or mitigation treatments in economic terms, including long-term financial appraisal for the treatments.

#### Additional Engagement with Tangata Whenua

Many tangata whenua groups at the iwi, hapū and whānau level show various levels of enthusiasm for afforestation of different types (pine, native and/or exotic other). In the current HCEF Boost Year, the team have engaged with key potential partners, but Māori groups in Northland are extensive, and some are Treaty settled, while others are not. Potential additional engagement, both new and continued, may arise with various groups identified as having strong interests in erosion mitigation and afforestation, including:

- Poutō Tōpū Ā Trust
- Ōmāpere Taraire E and Rangihamama X3A Ahu Whenua Trust
- Oromāhoe Trust
- Te Tai Tokerau Māori Forestry Collective
- Ngāi Tokito iwi
- Kaipara Moana Negotiations Reference Group
- The Northern Wairoa Project
- The Dune Lake Restoration Project
- The Hātea Project.

We anticipate the future under SHaRP with a sense of pride in what has been achieved thus far, and with a sense of purpose.



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