FOREST OWNERS ASSOCIATION

FOREST GROWERS RESEARCH

Workshop Report

Harvest Residue Management on Erosion Prone Land

supported by forestgrowers commodity levy

CONTACT:
Russell Dale
NZ Forest Owners Association
russell.dale@fgr.nz
+64 7 921 1883

FOREWORD

The forest growing industry convened a workshop on August 2nd 2018 in Auckland, as one of the measures taken in response to the damage caused to other landowners and the public by forest harvesting debris following intense rainfall on recently harvested land in both Nelson and Gisborne Districts.

The objectives of the day were to:

- consider what we are trying to manage and the changing environment we are operating in
- assess a wide range of potential options that could mitigate the impact of harvesting on steep land with unstable soils
- arrive at some conclusions around the best options for industry uptake
- consider what further work, information and other follow up is needed.

While there are numerous other parties who need to be part of this discussion, the intention was for the industry to focus on its own business operations, and responsibilities, prior to engaging with other stakeholders. Specialists in steep land hydrology, climate modelling, risk management and insurance contributed to the workshop to provide additional information and advice to industry participants.

The workshop identified a wide range of potential initiatives to deal with the challenge of harvesting forests on erosion prone land. This report captures those ideas. Many can only be implemented by individual forest owners and managers in the course of planning and implementing harvesting and replanting operations. This report provides some initial guidance to forest owners.

Other ideas presented require further work and investigation, and collaborative action is needed to progress these initiatives.

It is now the responsibility of the Forest Owners Association and Forest Growers Research to ensure the outcomes of the workshop are acted upon. The summary matrix at the end of the report provides an outline action plan of the priorities for further work, responsibilities and timeframes.

Russell Dale
Forest Owners Association
March 2019

SUMMARY

The challenge

- Climate change models for New Zealand predict that extreme weather events such as very heavy rainfall will become more frequent, and more intense. Recent weather patterns suggest that these predictions are already coming to fruition.
- Lack of economic markets for harvest residues (also called harvest debris or 'slash') result in non-merchantable wood material being left on forest sites following harvest. However, this cannot be an excuse for this debris being left in such a way that it is mobilised during heavy rain and moves off-site, only to be left for someone else to clean up.
- Intense storm events will continue to occur, but the management of harvesting operations and harvest residues will influence the risk of residue mobilisation and subsequent off-site damage when storms do occur.
- Catastrophic slope failure and flood plain inundation will occur when high intensity rainfall happens. At a certain rainfall intensity, even relatively low angle slopes (e.g. 15-20 degrees) will fail and cause earth flows and landslides. The type of vegetation cover influences frequency of slope failure, with steep slopes with pasture cover failing more frequently than those with forest cover.

The focus

- Proactive communication between key stakeholders will be important in helping find solutions. Minimising damage from extreme rainfall is the collective responsibility of forest owners, local authorities and downstream landowners who can all take measures to mitigate risks of flooding, sedimentation and debris flows when extreme weather events occur.
- Education on the predicted increase in storm frequency and intensity is also needed. This should be targeted particularly at owners of significant assets on flood plains located below erosion prone hills.
- There is a lack of good data on landslip events that can be used to predict the probability of slope failures. The relatively coarse definition of orange and red zoned land means it is difficult to identify and target mitigation measures on the areas of highest risk.
- Finding ways to keep woody debris out of waterways is the highest priority. Changes are needed in the way that some forest operations are planned, and post-harvest erosion risk is managed.
- Stem breakage during felling and material from dead standing and wind-thrown trees remaining on the cutover is a major source of material that is mobilised during extreme rainfall.

The focus continued

- The National Environmental Standards for Plantation Forestry (NES-PF) are well-tailored and designed to address plantation forestry on red and orange zoned land. There may be adjustments that arise as part of the planned review in approximately 12 months, but over time the NES-PF will help solve the problems. The resolution of the current erosion risk rating is coarse and can be refined.

- Insurance protection has a role in spreading risk where storms are relatively infrequent, unpredictable, cause significant impact on the individual party or parties and where a large number of people and entities would potentially benefit from the cover.

- The East Coast has the additional overlay of the Erosion Control Funding Programme rules and other planting scheme requirements that were put in place some time ago, when measures were introduced to encourage landowners to replace pastoral farming and to stabilise badly eroding hill country by planting trees. These schemes may need to be reassessed in light of the above.

- Forestry management options can be segregated into:

    1. **recommended industry best practice**
    2. **additional near-term management actions**
    3. **medium-term investigation of other options.**

THE RESPONSE

1. RECOMMENDED INDUSTRY BEST PRACTICE

With the support of MPI, industry best practice slash management guidelines have been reviewed recently as part of work on the National Environmental Standards-Plantation Forestry (NES-PF).

The NES-PF consists of 106 separate regulations and four schedules. In October 2018 NZFOA released 28 separate Forest Practice Guides describing industry best practice. These were released in October 2018. The guides provide forest owners and managers with operational information in a number of areas of forest operations:

- Earthworks and construction (including planning and design)
- Erosion and sediment control measures
- Construction of river/stream crossings
- Construction of tracks
- Vegetation measures to manage erosion
- Slash management

The Forest Practice Guides which specifically cover operations to mitigate erosion and manage harvest slash are as follows:

Vegetation measures to manage erosion (Forest Practice Guide No. 5)

- Grassing
- Hydroseeding
- Mulch
- Slash

Harvest slash management (Forest Practice Guide No. 6)

- Managing processing slash on landings
- Managing cutover slash on high-risk slopes
- Managing slash in and around rivers
- Slash traps

The Forest Practice Guides will help industry and councils by providing standard practice guidance to include in management plans as part of requirements under the NES-PF. The guides will be especially useful for smaller companies with less specialist in-house expertise because the information is standardised to enable the forest industry to meet the NES-PF rules and conditions.

2. ADDITIONAL NEAR-TERM MANAGEMENT ACTIONS

The following recommendations for additional action that the forest industry could take were made by the workshop participants.

Community/stakeholder engagement

- Improve communications with landowners and communities down-stream of forests being harvested to discuss planned operations, slash management, and risks and mitigation measures both on and off-site. Incorporate downstream landowner and community engagement as an integral part of harvest plans. Harvest plans should include slash reduction strategies, readiness for high risk areas, response plans following storms and recovery plans to assist businesses and neighbours following storms. The fact that these are included in harvest plans should be communicated to neighbours and other stakeholders.
- Commission a short-term study to:
  - document how the threat of downstream damage from harvest debris is affecting the industry's licence to operate
  - understand community views on remediation options
  - identify policy interventions that might alleviate public concerns.

Harvest planning

- Utilise remote sensing technology (LiDAR) to better identify high risk areas during harvest and road planning and remove more harvest slash from these areas.
- Utilise international expertise to assist with identifying options to manage steep and unstable slopes.
- Purchase land or negotiate lease agreements with neighbouring landowners at the base of catchments to capture any debris that does move off site during intense rainfall.

Harvesting

- Review current felling practices and identify options for reducing tree breakage, including options for directional felling to slow rate of fall and reduce resulting breakage.
- Identify and action training options to enhance the overall skill of operators using grapple systems with the aim of reducing the volume of residues left on slopes.
- Evaluate whether increased stump heights along the edges of important water courses will intercept slash.

Slash removal

- Pull back slash that is accessible and where it is practical with available technology to a safe distance from waterways.
- Pull back log waste onto skids where risk of downhill movement into waterways is identified.
- Burn cutover slash and landing waste where permitted and safe to reduce risk of mobilisation.
- Evaluate alternative means of slash removal from sensitive areas such as helicopter grapples.

2. ADDITIONAL NEAR-TERM MANAGEMENT ACTIONS continued

Slash control

- Retain buffer zones of mature trees adjacent to neighbouring properties where practical to prevent debris movement with aim of removing once remaining area is re-established and stabilised.
- Plant riparian margins in non-commercial or long rotation species.
- Establish woody debris traps in upper catchment areas to hold debris that is mobilised.

Slash disposal

- Prepare guidelines on the options for disposing of slash deposited downstream.
- Undertake a literature review of the risk of burning harvesting debris and slash soaked in salt water.

Post-harvest

- Minimise fallow period, maximise growth rate through weed control and seedling quality and type and consider higher stockings when replanting to speed up root occupancy on site following harvesting.

3. MEDIUM-TERM OPTIONS

The following recommendations for additional action that the forest industry could take were made by the workshop participants.

Risk assessment

- Develop models and tools that enable prediction of conditions likely to lead to debris flows and sedimentation. These will be based on assessment of geomorphology, hydrology, slash type and likely quantity, taking account of harvesting system and crop characteristics so as to reliably assess risks and target risk mitigation measures.

Minimise slash

- Undertake studies to assess slash remaining after harvesting including standing dead trees and wind throw across a range of sites to improve understanding of the quantity and source of slash.
- Investigate alternative mechanical felling technologies for steep terrain that give greater control over tree felling direction and rate of breakage. To include an evaluation of felling head design and harvesting machine configurations.
- Investigate slash and skid residue diminution and spreading on cutover or landing.

Develop markets and improve economics of residue utilisation

- Investigate lower cost ways of loading and transporting forest residues.
- Support investigations into in-forest manufacture of charcoal, biochar and activated carbon utilising skid waste.
- Investigate uses of logging waste for bioenergy and biochemicals with potential for small-scale distributed processing.
- Investigate the business model for a wood-chip processing plant at Gisborne in light of the need to find ways to reduce the volume of residues left on-site.
- Revisit East Coast transport infrastructure options via an economic modelling study, including rail of pulp logs and wood chip to the pulp mill in Napier.
- Consolidate and reassess prior studies of technologies and products for using the non-timber components of the harvested tree in the context of current and projected prices, costs, ETS policy amendments and the pricing of other externalities.

3. MEDIUM-TERM OPTIONS continued

Review proportion of area harvested

- Identify examples of catchment level harvest planning with clearfell constraints and attempt to assess effectiveness of these self-imposed constraints on downstream effects.
- Commission research focusing on options to reduce the vulnerability to post harvest storm events by incorporating clearfell constraints at a catchment scale. Modelling would be tested with expert contractors utilising the latest roading and harvesting costs and log prices; and incorporating land erosion and other attributes of the forest.
- Dependent on the above demonstrating benefits in mitigating risk, promote forest owners working together with regional councils to achieve catchment-level harvest planning to secure longer-term catchment wide harvesting consents.

Afforestation and alternative species to radiata pine

- Consider modifying the Erosion Control Funding Programme to facilitate a managed transition to longer-lived species or permanent forest on the higher risk areas identified.
- Build on existing work to investigate alternative commercial species that retain root strength, coppice and are suitable for steep eroding land. Develop models to help investors evaluate commercial viability of alternative species to encourage investment in longer rotation or permanent forest cover management systems.
- Use the Scion Forest Investment Finder to estimate the returns for prospective afforestation land opportunities, taking into account land suitability, forest productivity, silviculture regime and species, supply chain to processing plant or port, and ecosystem services.

Storm clean-up fund

- Investigate the feasibility of an EQC type fund or forestry fidelity fund that can be used to quickly respond to downstream debris clean up following severe storm events.

Increase training

- Design and implement a forestry training and education programme for local authority planning and regulatory staff who may have limited forestry knowledge.
- Design professional development courses on modern forestry practices and systems for agriculture consultants, farm advisors, rural bankers and property valuers (such as through a partnership with NZIPIM).

3. MEDIUM-TERM OPTIONS continued

Improve information and tools

- Support research to collate storm and erosion events and use the data to better predict the incidence of erosion events. This could be used when planning establishment and harvesting to build a more resilient landscape. This data, combined with a finer resolution NES-PF (Erosion Susceptability Classification – ESC) zoning based on new remote sensing and latest contour data, will enable erosion prone areas to be identified with more accuracy and be used to guide harvesting and slash management activity.
- Consolidate and package information on steep land management to a portal that can be accessed easily via multiple websites e.g. Te Uru Rākau, Forest Growers Research, Farm Forestry Association, NZ Institute of Primary Industry Management and Beef + Lamb NZ.
- Develop a decision-support tool that prescribes best practice management on steep land based on location, soil type, NES-PF erosion risk zoning and forest type.
- Review codes of practice to ensure risk mitigation measures are correctly addressed.
- Update engineering guidelines for debris structures based on current research on debris check dams, mid-slope and landing site interventions to prevent the movement of harvesting residues into waterways in the post-harvest 0-7year window.
- Develop a tool to help forest owners and investors quantify likely impacts of climate change hazards (wind throw, fire, and intense rainfall) on their forests in 25-50 years and review the probabilities.
- Develop spatial planning tools for planting at various scales – block, land owner, catchment – with the capacity to take into account natural hazards, road access and harvesting costs – in the context of the NES-PF. Test findings from this tool with district councils or local territorial authorities for their sanction.

Coordinated action with other partners

- Undertake social impact research to determine what level of engagement is required with communities and what level of resilience to severe storms is acceptable to the community.
- Work with central and regional government to develop regional strategies that create economies of scale for alternative commercial species.
- Investigate the potential for catchment planning noting that the difficulty of doing this increases as the number of landowners increases.

OPTIONS NOT FAVOURED BY WORKSHOP PARTICIPANTS

- **Mid-slope roading** – due to the instability of mid-slopes and the risk of accelerating mid-slope failures.
- **Downhill pulling** – unless there is sufficient flat land at the base of the hill to work from and ensure sediment and debris does not enter waterways.
- **Reducing radiata pine clearfell coup size** – reduces area of vulnerability but will open up of edges to wind throw and slipping on unstable soils.

PROPOSED PRIORITIES FOR ACTION

	Action	Responsibility	Timing	Status
1.	Investigate commercial processing options, including bio-energy options, for harvesting residue and slash	FMAG/MPI/ Scion	Q1 2019	Draft report completed for completed for FMAG. Tairawhiti/Eastland Community Trust commissioned investigation on biomass residue supply to east Coast Communities
2.	Survey communities in areas affected by storm events to document society concerns and understand community views	Scion	Q4 2018	Media Analysis of Storm Events completed for FOA Environment Committee
3.	Investigate reducing felling stem breakage, improved techniques for removal of slash from high risk areas and benefits of catchment level harvest planning	FGR/FGLT	Q4 2019	Underway
4.	Improve identification of areas at risk of erosion that can be used to review NES-PF risk zonings and enable land use and management refinement	Landcare Research	Q1 2019	Funding proposal to MBIE prepared Endeavour Fund prepared and submitted
5.	Update guidelines for construction of slash retention structures	FOA	Q2 2019	Not started
6.	Investigate harvesting and log processing capture log residue system changes to reduce landing size and and recoverable slash for chip or bio-fuel	FGR/PGP	Q1 2019	New PGP programme approved and commenced
7.	Investigate a storm damage fidelity fund and initiate discussions with insurance industry over storm damage insurance scheme	FOA	Q2 2019	Not started
8.	Investigate forest management and system design options for post-harvest re-establishment	FGR/Scion	Q2 2019	Not started

IMMEDIATE FOLLOW-UP ACTIONS

1.	Distribute workshop report to workshop participants and key stakeholders
2.	Convene a meeting of key stakeholders (Regional Councils, forest and land owners, Federated Farmers, MPI, Te Uru Rakau, FMAG, FSC and key NGO's to discuss report and seek feedback on priorities for action
3.	Provide finalised report to membership and government
4.	Develop research programme for endorsement by FOA Research and Environment Committees and funding agencies

WORKSHOP REGISTRANTS

First Name	Last Name	Company
Grant	Dodson	City Forests Limited
Mark	Andrew-Neal	CLIMsystems Ltd
Peter	Urich	CLIMsystems Ltd
Tricia	Fordyce	Consultant
Warwick	Foran	Crown Forestry
Iain	McInnes	Ernslaw One Limited
Dan	Gaddum	FOMS
Marcus	Musson	FOMS
Bert	Hughes	Forest Enterprises Growth Limited
Keith	Raymond	Forest Growers Research Ltd
Russell	Dale	Forest Owners Association
David	Rhodes	Forest Owners Association
Glen	Murphy	GE Murphy & Associates
Tony	Dwane	Hancock Forest Management (NZ) Limited
Geoff	Gover	Hancock Forest Management (NZ) Limited
James	Palmer	Hawkes Bay Regional Council
Ian	Brown	Hikurangi Forest Farms Limited
Andy	Costello	Hikurangi Forest Farms Limited
Kelvin	Meredith	IFS Growth Ltd
Dylan	Foster	Juken New Zealand Limited
Les	Basher	Manaaki Whenua - Landcare Research
Chris	Phillips	Manaaki Whenua - Landcare Research
Nick	Radock-Henry	Manaaki Whenua - Landcare Research
Hugh	Smith	Manaaki Whenua - Landcare Research
Ian	Moore	Moore & Associates
Oliver	Hendrickson	MPI
Heather	Arnold	Nelson Forests Limited
Daniel	Williams	Ngati Porou Forests Ltd
Petra	Pearce	NIWA
Neil	Cullen	NZ Farm Forestry Association
Angus	Gordon	NZ Farm Forestry Association
Patrick	Milne	NZ Farm Forestry Association
Dean	Satchell	NZ Farm Forestry Association
Murray	Parrish	Ojifs
Tim	Sandall	Pan Pac Forest Products Limited
Peter	Clark	PF Olsen Limited
Tony	Morris	PF Olsen Limited
Dean	Neilson	PF Olsen Limited
Zac	Robinson	Port Blakely Limited NZ
Phil	Taylor	Port Blakely Limited NZ
Steve	Chandler	Rayonier | Matariki Forests
Brendan	Slui	Rayonier | Matariki Forests
Jason	Syme	Rayonier | Matariki Forests
Roger	Dickie	Roger Dickie NZ Limited
Brenda	Baillie	Scion
Peter	Clinton	Scion
Julian	Elder	Scion
Peter	Hall	Scion
Dave	Palmer	Scion
Henare	Walker	Summit Forests New Zealand Ltd
Simon	Rapley	The New Zealand Redwood Company
Tim	Payn	Toi Ohomai Institute of Technology and Scion
James	McEwan	Wenita Forest Products Limited
Brian	Stanley	WPMA