



Programme Manager: Keith Raymond



# HARVESTING PROGRAMME UPDATE

Issue Number: 33

Date: December 2018

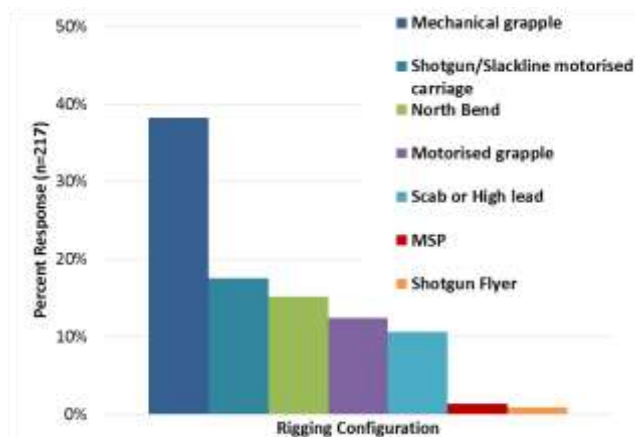
## Summary

This update features news about the Forest Growers Research harvesting programme and the new Primary Growth Partnership in automated forestry value chains. This new PGP programme proposes a new logistics solution and development of new automated machinery products. The business case was approved by MPI in May 2018 to proceed to contract negotiations. FGR is close to signing the contract with MPI and we look forward to getting the new PGP programme underway in the New Year.

## PROJECT PROGRESS Q1 2018/19

### 1.1 Harvesting Industry Survey

The cable yarder survey was completed in 2017/18. Harvesting Technical Note 10-04 "Survey of Yarders and Rigging Configurations" was published in October. The ground-based survey is on track to finish by Christmas, and a Technical Note will be completed.



### 1.2 Residue Management and Biomass Processing

Harvesting Technical Note 10-01 "Integrated Biomass Harvesting for New Zealand Operations" was published in September. A graduate student is working with Dr Hunter Harrill on this project, starting with a literature review and writing up the work plan to meet this year's objectives.

### 1.3 Improved Roding Systems

This project was completed in 2017/18. Technical Report H033 "Adoption of Emergent Technology in Forest Road Management in New Zealand" was published in July.

### 1.4 Utilisation of Cable Assist Systems

This project is continuing from 2017/18. Student Ben Reriti has completed his work with Pan Pac Forest Products Ltd and this has been written up as a full dissertation. Harvesting Technical Note 10-03 "Measuring the utilisation of winch-assist machines" was published in September. Two short reports on other New Zealand field studies have been written up as project notes by graduate student Cameron Leslie. Cameron is continuing his work with FPIInnovations in Canada, and will publish all his studies as a Technical Note when completed.



### 1.5 Benchmarking Project

This project is on-going. Harvesting Technical Note 10-02 "Benchmarking Harvesting Cost and Productivity: 2017 Update" was published in August. Data collection for harvest areas felled in 2018 has commenced. Work is focussed on training new forest company personnel in data collection and submission to increase data input this year.



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## 1.6 Automation of Cable Yarders

This is a final year student project investigating development with the new Falcon yarder of a laser sensor for the Falcon Claw grapple carriage (in conjunction with DC Equipment Ltd).

## 1.7 Harvester Simulator Training

This UC Forestry project involved final year student James Ma, who tested over 35 people on a harvester simulator with the focus of the study on operator characteristics of processor speed and quality. James has written up a draft of his dissertation. Future work will focus on the comparison with the real operator environment.

FGR also funded Toi Ohomai Institute of Technology for travel costs for James Broadley to visit Valtimo Forestry College in Finland in August. James reviewed their Mechanised Harvesting Operator Training System, with a view to establishing the system in New Zealand, and presented results of his trip to the TST in October. A Harvesting Technology Watch report summarising results and recommendations from James' trip is in preparation.

## 2.1 Quick Coupler project

Full workshop testing of the quick coupler was completed in Q1 by Total Hydraulic Solutions Ltd (Hydraulink), in Rotorua. Minor modifications were required to the coupler which were completed at Doherty Engineered Attachments Ltd in Mount Maunganui. The coupler was returned to Total Hydraulic Solutions for final fitment once a base machine can be sourced for this testing. This work has been scheduled for February 2019, and a base machine will be hired from Gaddum Construction Ltd in View Road Rotorua.

## 2.2 Remote Felling Wedge project

The aim of this project was to trial the remote-controlled battery-powered felling wedge developed by Georg Miggitsch, ex-Koller Yarders in Austria. FGR engaged Rob Prebble Consulting Ltd was engaged to undertake the trial work in Tarawera Forest in August, and later in Gisborne.

These initial trials were not successful. The felling wedge was very heavy, cumbersome to use, had limited lift, and stalled out on heavy leaning trees. Further modifications to the felling wedge are required, so it was freighted back to Georg Miggitsch. Georg will continue to develop a smaller, lighter model that has approx. 25 tonnes force and 5cm lifting height that is aimed at felling 80-90% of trees, so it can be successfully commercialised for both Europe and NZ. The project will now change direction to focus on remote control of a tree jack.

## Project Proposals for 2019 Forest Research Committee

The following project proposals for funding from Forest Growers Levy in 2019 were presented to the Forest Research Committee in November:

- A case study of harvesting the Pokairoa catchment in the Northern Boundary, Kaingaroa Forest – \$60,000. The elements of this harvest plan could be replicated in other catchments.
- Felling techniques to reduce woody debris on steep slopes – \$60,000. This project is aimed at exploring different felling heads to reduce felling breakage on steep slopes. Don Scott of Awdon Technologies Ltd is one of the partners in this project.
- Heli-extraction for improved recovery of harvesting residues – \$140,000. This proposal is aimed at improving extraction of harvesting residues on steep country. Ron Parker of HeliHawk Ltd, manufacturer of the self-release HeliHawk Grapple, is one of the partners in this project.

## ALPINE SHOVEL YARDER DEMO

In conjunction with Logpro Ltd and Total Hydraulic Solutions Ltd, FGR organised a field demonstration of the first Alpine Shovel Yarder in New Zealand in November.



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A new company, Alpine Logging Equipment Ltd has been formed and a Harvesting Technology Watch HTN-018 "The Alpine Shovel Yarder in New Zealand" is due to be published. An article has also been published in the December/January issue of NZ Logger.

FGR has an agreement in principle to collaborate with Alpine Logging Equipment Ltd to develop a prototype automated yarding system (using the Alpine Shovel Yarder and Alpine Grapple Carriage) as part of the new PGP programme.

We are excited about collaborating with Alpine and other technology developers to see the development of stem recognition camera software and communications to relay information back to the yarder to semi-automate some of the grapple functions. Forest Growers Research looks forward to working with Alpine Logging Equipment Ltd in this exciting new development.

## MoU signed with FPInnovations

In September, FGR and FPInnovations of Canada renewed a Memorandum of Understanding (MoU) that was first signed in 2012, to widen the scope of their information exchange in the area of steep slope harvesting, and to facilitate the international exchange of their combined research.

The MoU will allow FGR and FPInnovations to share expertise in cooperative research, development, and application activities for specific projects agreed by both groups. This will include sharing in the transfer of information and technology through cooperative demonstration projects and conferences; encouraging the exchange of research personnel, and preparing joint reports where possible.

An initial meeting was held in October to confirm a list of common research areas between the two organisations. These areas for information exchange include environmental sustainability of harvesting operations, including steep slope machine stability, steep slope road and landing construction, and soil disturbance in steep slope harvesting. Other joint topics of interest are the further development of line tension and cable integrity, remote control and teleoperation of forest machinery, and vision systems such as machine vision. A second meeting is scheduled for March 2019.

## NEW PGP PROGRAMME

### Update

The business case for the new PGP programme "Forestry Work in the Modern Age" was formally approved by the Ministry for Primary Industries (MPI) in May to proceed to contracting and FGR is currently negotiating the terms of the contract with MPI.

Work continues in meeting MPI's requirements regarding IP management for the new PGP programme. Letters of intent have been signed with 6 of the 7 manufacturing partners. Two manufacturing partners have chosen not to engage in the programme and work is continuing engaging alternative manufacturing partners.

The Business Case has been revised, due to the changes in financial contributions and limits to the level of MPI funding as a result of contract negotiations. Proposed changes to the draft



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contract with MPI have been proposed by FGR and are now being reviewed by MPI.

The new PGP programme is now scheduled to commence 1 January 2019, at the earliest, and the required FGLT funding for the 2019 calendar year is \$722,500, less than the earlier agreed funding of \$900,000.

## Programme Activities

Total programme funding is \$29.36 million over 7 calendar years out to 31 December 2025.

Investment is planned in the following objectives:

- Objective 1: New Automated Technology (\$20.73m). Designing and developing new automated machinery and equipment for the first three log sort yards.
- Objective 2: Human Factors of Automation (\$3.17m). Input to engineering design in Objective 1 to integrate the operator into automated machine design, with a focus on human-machine interaction.
- Objective 3: Commercialisation and Deployment (\$4.23m). Initial work will focus on establishing the commercial framework for each new product, and engaging with specifiers (forest owners) and users (contractors) to determine product specifications and market requirements.
- Programme Management and overheads (\$1.23m). This covers programme governance, monitoring project progress against milestones, financial management and reporting.

## Programme Outputs

The goal is that by 2025 all harvesting operations will be fully mechanised, and at least 10% of operations will be automated, using the following products developed in this programme:

- Semi-autonomous yarder grapple and control system

- Semi-automated log debarker-processor
- Large capacity log loading grapple
- Automatic log tagging and tag reading technology
- Automated log residue chipper
- Robotic log sorter
- Automated truck loading gantry
- Automated truck load securing system

Implementation of 8 new products and processes in five new log sort yards will generate cumulative economic benefits of \$103.6 million by 2025 from value chain efficiencies and sales of new machinery and equipment.

Investment by harvesting contractors in new automated machinery will be de-risked. New opportunities for NZ forestry machinery and equipment manufacturers will be created that will continue to catalyse innovations in harvesting and logistics.

## Programme Benefits

- Operational cost savings across the forestry value chain of \$9.71 per cubic metre of wood delivered (total \$80.8 million to 2025).
- Alleviating labour shortages of an estimated 700-800 additional workers in the industry through increased productivity (up 15%) and more automation
- Enhancing environmental sustainability through reduced landing size (sorting logs off-landing), less chemical fumigation (through increased debarking), increased HPMV use from log sort yards, and improved management of harvesting residues.
- Increasing skill levels in the industry, reducing labour turnover, and enhancing career opportunities in forestry.
- Sales of new equipment and machinery totalling \$56 million by 2025, generating margin for manufacturers of around \$22 million.

## Programme Development

- MPI approval of Business Case – May 2018
- MPI contracting with FGR – Jun-Dec 2018



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- Programme commencement – 1 Jan 2019 (early start).
- Technical Steering Group meeting – 12 February 2019

## RESEARCH OUTPUTS TO OCT 2018

The following research reports were published during the last Quarter:

### Technical Report

- Harvesting Technical Report H033. “Adoption of emergent technology for forest road management in New Zealand” – Kris Brown and Rien Visser.

### Harvesting Technical Notes

- Harvesting Technical Note HTN10-01. “Integrated biomass harvesting for New Zealand operations” – Raffaele Spinelli and Hunter Harrill.
- Harvesting Technical Note HTN10-02. “Benchmarking harvesting cost and productivity: 2017 update” – Rien Visser.
- Harvesting Technical Note HTN10-03. “Measuring the utilisation of winch-assist machines” – Hunter Harrill, Ben Reriti and Rien Visser.
- Harvesting Technical Note HTN10-04. “Survey of yarders and rigging configurations: 2018” – Hunter Harrill and Rien Visser.

### Harvesting Technology Watch

- Harvesting Technology Watch HTW-018 October 2018. “Alpine Shovel Yarder in New Zealand” – Keith Raymond and Spencer Hill.

These reports are now available on the FGR website: [www.fgr.nz](http://www.fgr.nz)

### Other reports

- Steepland Harvesting Programme – Post-Programme Report 2018, 31 July 2018. Forest Growers Research Ltd. Available for download from FGR and MPI websites.
- PGP steepland harvesting – a collaborative research and development programme – Keith Raymond. N.Z. Journal of Forestry, November 2018, Vol.63, No.3: 18-21. Overview of the programme outputs presented to the NZ Institute of Forestry conference in Nelson on 10 July 2018.
- Adoption of emergent technology for forest road management in New Zealand – Kris Brown and Rien Visser. N.Z. Journal of Forestry, November 2018, Vol.63, No.3: 23-29.