HARVESTING TECHNICAL NOTE

HTN06-03
2013

Survey of Cable Yarders Used in New Zealand

Summary

Cable yarders are used in steep terrain timber harvesting worldwide due to their versatility and lower environmental impact than ground-based equipment. A survey to ascertain the number, type and distribution of yarders currently operating in New Zealand was completed in 2012. The methodology used for completing the survey was to approach all major forest management companies in each region for input. Logging contractors were then followed up for further information as required. The survey recorded a total of 305 yarders either working or still in working order. The Central North Island region had the largest number of yarders with 76, followed by East Coast and Nelson/Marlborough with 49 and 48 respectively. In terms of yarder type, 67% of yarders recorded were towers, 30% were swing yarders and 3% were excavator-based haulers. Various models of Madill and Thunderbird brands made up the majority of machines, 37% and 33% of the yarder population respectively. Local manufacturer Brightwater was third most popular with 11% of the total. With the closure of most North American yarder manufacturers, the reduced availability of used machines and the expected increase in cable harvesting volume, New Zealand will likely see an increase in new yarders entering the yarder population over the next few years.

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INTRODUCTION

Cable yarders (commonly known as 'haulers' in New Zealand) are the mainstay of steep terrain timber harvesting operations worldwide. Their versatility over a range of terrain types, lower environmental impact than ground-based equipment and good production capability have ensured their sustained success (Liley, 1983). The FFR Benchmarking system indicates that approximately 50% of the harvesting contractors working in New Zealand's plantation forest estate are using cable yarders (Visser, 2012). In the past New Zealand has relied heavily on North American developments in yarder technology (particularly from the Pacific Northwest, or PNW) to meet its cable logging needs.

The significant decline in total harvest in the PNW during the 1990s resulted in the rationalisation, consolidation and finally the closing of many yarder manufacturers. Madill Ltd., of Nanaimo, British Columbia, was the last of the major yarder manufacturers to close (in 2008). This decline also resulted in many used PNW yarders becoming available for purchase at relatively low cost. A yarder survey in 2002 indicated that there were 214 yarders active at that time (Finnegan and Faircloth, 2002). Of those, 130 (60%) were either Madill or Thunderbird models.

Despite the predominance of Pacific Northwest yarder brands in New Zealand there has been a small local yarder manufacturing industry (represented in the past by Dispatch and Wilson), and this continues today with Brightwater and Harvestline brands. The Brightwater range of yarders manufactured in New Zealand (including the earlier Bellis hauler models) competes today with the Pacific Northwest yarder brands in terms of size and type. To date, 70 Brightwater yarders have been produced, the majority being constructed during the early and mid-1990s.

As the total harvest in New Zealand increases as a result of new forest planting in the 1980s and 1990s, much of it on steep terrain, the cable harvesting volume is expected to increase. The increasing cable yarder demand led in June 2011 to Brightwater Engineering Ltd of Nelson securing the exclusive manufacturing rights (in the Asia-Pacific region) to the popular Madill range of yarders. Two Madill 124 machines were manufactured and sold in 2012.

The purpose of this survey is to both quantify and characterise the current NZ yarder population. It provides the opportunity to check on changes and developments over the last decade, and will provide a baseline reference for future analyses.

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SURVEY METHODOLOGY

There is no formal registry of yarders in New Zealand. Yarder ownership is predominantly by small private independent contractors, although a small number of forestry companies have purchased yarders to facilitate the development of new crews in some regions. Also, there is no registry for private independent forestry contractors. However, the majority of harvesting operations are associated with larger forestry companies managing plantation estates, or larger consulting foresters working with woodlots.

Developing the survey included putting the 2002 yarder survey (Finnegan and Faircloth 2002) into a Microsoft Excel spreadsheet including make, model, owner and region information. The survey was set up so that participants could:

(1) confirm the existence of the yarder in their area;
(2) note the movement of the yarder out of their area;
(3) note the decommissioning of the yarder; and
(4) add additional yarders to the spreadsheet known to be operating in the area but not already listed in the spreadsheet.

The survey requested the make and model of the yarder, the type (tower, swing or excavator-base); the region in which it was working (as defined by the Ministry for Primary Industries, MPI); and their access to carriages (motorised or mechanical, slack-pulling or grapple). The name of the contractor owner and the company for whom they were working was also noted (but only for the purposes of facilitating the accuracy and expediency of the survey).

The following process was followed to further develop the survey data:

1. The spreadsheet was sent to two or three company people in each region known to have extensive knowledge of operating yarders. The data were returned and collated. This accounted for the majority of the input to the survey.

2. The updated spreadsheet was then circulated to all known companies, and they were invited to circulate to smaller companies, forestry consultants and/or contractors in their region if required. The responses were collated and the spreadsheet updated.

3. Possible discrepancies and or clarifications, as well as individual leads of possible yarders were followed up by phone call.

4. The 'draft' survey spreadsheet, together with a preliminary summary of the data, was circulated to all participants with a final opportunity to note corrections.

Not all yarders have been recorded in this survey, although it is estimated to cover around 90% of harvesting in New Zealand. Approximately 15 yarders were noted as being not active ('parked up' or 'for sale') and these have been included in the survey results. During the course of the survey three newly imported machines were included, and a number of entries changed based on yarder sales or the relocation of crews to different regions. It is recognised therefore that the yarder population is dynamic and as such this survey is just a 'snapshot' as of 2012.

RESULTS

The total number of yarders recorded in the survey was 305, compared to 214 recorded in the 2002 survey and only 82 yarders in 1985 (Liley, 1985).

Table 1 shows the regional distribution of the yarder population, using the forestry regions as defined by the Ministry for Primary Industries (MPI).

Table 1: Distribution by region.

Region (MPI)	No.	%
Northland	39	12.8
Auckland	11	3.6
Central North Island	76	24.9
East Coast	49	16.1
Hawkes Bay	27	8.9
Southern North Island	33	10.8
Nelson/Marlborough	48	15.7
Canterbury	5	1.6
West Coast	5	1.6
Otago/Southland	12	3.9
Total	***305***	***100***

The central North Island had 25% of the total yarder workforce, followed by East Coast and Nelson/Marlborough at 16% each. Compared to

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2002, the biggest increase has been on the East Coast, increasing from 8% (17 yarders) to 16% (49 yarders). The biggest decline has been in Otago/Southland, currently operating only 12 yarders.

The types of yarder were classified as tower, swing yarder and excavator based yarder (Table 2).

Table 2: Summary by type

Yarder Type	No.	%
Tower	204	67
Swing Yarder	92	30
Excavator-based	9	3
Total	***305***	***100***

Of the total, 67% were tower yarders and 30% were swing yarders. The remaining 3% were identified as excavator-based yarders. In 2002, only 23% were swing yarders (Finnegan and Faircloth 2002), so there has been a significant increase in this type of yarder over the last 10 years.

The breakdown by manufacturer's brand is presented in Table 3.

Table 3: Summary by manufacturer

Yarder Make	No.	%
Madill	115	37.7
Thunderbird	100	32.8
Brightwater	34	11.1
Berger	15	4.9
Washington	8	2.6
Pacific	7	2.3
Harvestline	6	2.0
Wilson	4	1.3
Dispatch	3	1.0
Other	*13*	*4.3*
Total	***305***	***100***

The Madill range of haulers was the most common make in New Zealand, representing 38% of haulers surveyed. This is an increase from 30% of haulers surveyed in 1991 (Lyon and Raymond, 1993).

The second most popular make was the Thunderbird brand manufactured by Ross Corporation, with 33% compared to the 2002 survey when Thunderbird had the leading share with 31% (Finnegan and Faircloth 2002).

Brightwater yarders were third most popular, with 11% of the total. A notable change is the dominance of the largest three (Madill, Thunderbird and Brightwater) which now make up almost 82% of the total (249 of 305 machines), whereas in 2002 these made up 70% of total yarders (151 of 214 machines). Also noteworthy is the marked decline in the older New Zealand brands such as Wilson and Dispatch which made up 17% and 11% of haulers surveyed in 1991 (Lyon and Raymond, 1993). Other older makes and models such as Skagit and Ecologger have also declined.

There were 68 different 'models' of yarders recorded in the survey. Table 4 shows the top ten most common yarder models. The Thunderbird TMY 70 tower yarder is the most common model yarder in New Zealand with 31 machines (10% of total).

Table 4: Ten most popular yarder models

Yarder Model	No.	%
TMY 70	31	10.2
Madill 071	26	8.5
Madill 123	18	5.9
Madill 124	17	5.6
Madill 171	17	5.6
BE70LT	13	4.3
Madill 009	13	4.3
BE 85	10	3.3
TSY 255	10	3.3
Madill 122	9	3.0

By far the majority of yarders currently operating in NZ are imported PNW machines. Most are refurbished upon arrival. Improvements are available for the older machines, for example a retrofitted electronic control system with a digital signal processor, joystick control and a visual display (Evanson and Henderson 2009).

In terms of productivity, incremental improvements are continually being made with existing equipment. Step changes in overall system productivity include the extensive use of mobile tailholds, an increase in mechanised felling and bunching, and mechanised processing on the landing to decrease operational delays.

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In the survey, carriage information was recorded for only 213 yarders. Of this total 129 (61%) did not have access to a carriage of any sort. A survey of rigging configuration (Harrill and Visser, 2011) showed that cable yarding operations in New Zealand rely heavily on running skyline, highlead, North Bend and gravity return (shotgun) configurations.

Yarders for New Zealand need to be designed primarily for clearfelling operations, where lines can be rapidly shifted using mobile tailholds. This makes lateral yarding capability much less critical and hence less reliant on slack-pulling carriages.

Of the 84 yarders that used a carriage in the survey, 17 were simple mechanical grapple carriages (20%), mainly associated with swing yarder machines. Of the motorised carriages, Acme brand carriage was the most common with 17 units identified in the survey. New carriages, such as motorised grapple carriages that can be used on tower yarders, are also being developed.

A number of factors would suggest that a larger number of new machines will be required to service the needs of the plantation forest industry in the near future. These include the age of our current yarders and the expected large increase in harvest volume, as well as the increasing average slope of current and future harvest areas in the plantation forest estate.

The earlier survey in 2002 recorded a total of 214 yarders. Accounting for around 40 yarders decommissioned since that survey, the population has grown by approximately 130 yarders in the last 10 years. The majority of additions have been used machines purchased from the Pacific Northwest and either put into service directly or reconditioned here in New Zealand. With the closure of most North American yarder manufacturers, the reduced availability of used machines on the market and the expected increase in cable harvesting volume, it is unlikely that this trend can continue for much longer. Therefore New Zealand will likely see an increase in new yarders entering the yarder population over the next few years.

CONCLUSION

The completion of the 2012 yarder survey by most of the major forestry companies has resulted in a database of yarders currently used or in working condition in New Zealand.

The yarder survey shows the New Zealand yarder population totals 305 yarders, a significant increase since the last survey was undertaken in 2002.

This survey has provided a baseline to record the future growth in national yarder numbers as the proportion of steep terrain harvesting increases.

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