

## LOGGING RESIDUE AT HAULER LANDINGS - RESULTS FROM AN INDUSTRY SURVEY

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Figure 1 - Build-ups of logging residue at hauler landings

### ABSTRACT

A questionnaire survey of forest companies by region was conducted to evaluate issues associated with logging residue at hauler landings.

Replies covered 70% of the estimated annual harvest.

Based on these responses, the major findings of the survey were:

- Both the area and proportion of the total area, being harvested by hauler, are increasing.
- Of the 869 hauler landings used by respondent companies in 1996, 45% were considered to have a significant bird's nest after logging.
- In 1996, 24 birds' nests were reported as having collapsed. Of these, 12 resulted in secondary impacts such as soil and residue in streams.

- *The most common method of treating birds' nests was retrieval to the landing surface with an excavator.*
- *Seventeen of the 19 respondents stated that they had Best Management Practices for dealing with logging residue at landings.*

## INTRODUCTION

There are a number of issues associated with large piles of logging residue discarded at hauler landings (birds' nests). These include risk of collapse, potential fire hazard, nutrient loss from the site and the amount of merchantable wood left in them. There is also some interest in birds' nests as a potential source of biomass for energy.

Previous information on issues associated with birds' nests has been anecdotal, usually when something has gone obviously wrong. In order to determine the true nature and scale of these issues, a survey of forest companies was conducted.

The aims of the survey were to:

- identify the number and regional location of the birds' nests
- identify issues relating to birds' nests
- identify methods currently used for assessing birds' nests
- identify methods currently used for managing birds' nests.

Thirty questionnaires were sent to the regional offices of forest companies in New Zealand. The replies were summarised and the results are presented here.

The lower North Island was excluded from the analysis as only one reply was received, not allowing the region to be adequately represented.

## RESULTS

From the 30 questionnaires sent out, 19 replies were received (63% response).

### Harvest area

The respondents were asked to estimate total annual harvest areas in their region for 1996 to 1998.

The total annual harvest areas of all respondents were estimated as:

1996 - 21,091 ha  
1997 - 21,147 ha  
1998 - 21,667 ha

Based on the 1996 estimate, responses to this survey were estimated to cover 70% of the area harvested in New Zealand in 1996.

The respondents were then asked to estimate annual harvest area using haulers in their region for 1996 to 1998.

The annual area harvested using haulers of all respondents was estimated as:

1996 - 7208 ha (34.2% of total harvest)  
1997 - 7931 ha (37.5% of total harvest)  
1998 - 9013 ha (41.6% of total harvest)

The regional breakdown of estimated hauler logging areas is shown in Table 1.

*Table 1 - Regional breakdown of estimated hauler logging areas (ha) 1996 to 1998*

Region	Estimated hauler areas (ha)		
	1996	1997	1998
Northland	840	830	1110
Auckland			
Central NI	2592	2936	3166
East Coast			
Hawkes Bay	852	1113	1239
Nelson			
Marlborough	1859	1932	2238
Canterbury	210	240	260
Otago			
Southland	680	700	800

### Number of landings

The respondents were asked to estimate the number of hauler landings used annually for 1996 to 1998.

The total number of hauler landings used annually were:

1996 - 869 landings  
 1997 - 966 landings  
 1998 - 1027 landings

The regional breakdown of estimated numbers of landings is shown in Table 2.

*Table 2 - Estimated number of landings for each region*

Region	Estimated landings		
	1996	1997	1998
Northland Auckland	96	90	111
Central NI	350	386	403
East Coast Hawkes Bay	111	152	160
Nelson Marlborough	186	201	204
Canterbury	24	28	32
Otago Southland	68	69	70

Next, the respondents were asked to estimate the number of hauler landings used annually with "significant" birds' nests.

The total annual number of landings reported by respondents as having significant birds' nests were:

1996 - 396 (45.6 % of total landings)  
 1997 - 416 (43.1 % of total landings)  
 1998 - 450 (43.8 % of total landings)

The number of hauler landings that either had or were predicted to have significant accumulations of logging residue will increase annually.

### Number of collapses

Respondents were asked to report on the number of birds' nests that collapsed annually in the last three years.

The total number of birds' nests which collapsed were:

1994 - 26 birds' nests  
 1995 - 37 birds' nests  
 1996 - 24 birds' nests

The total number of birds' nests which collapsed in 1996 represented 6.1% of those deemed as significant and 2.8% of all birds' nests reported for that year.

The regional breakdown of bird's nest collapses is shown in Table 3.

Those respondents who reported a collapse or collapses during 1996, were then asked how many caused a secondary impact and to detail the nature of the impact.

Of the 24 birds' nests which collapsed in 1996, 12 were reported as having caused some significant problem. The most common types of problem reported were sediment in streams (10), land lost from production (7) and stream blockages (5).

*Table 3 - Regional breakdown of bird's nest collapses and the number of collapses in 1996 which caused secondary impacts*

Region	No. of collapses			No. causing impacts
	1994	1995	1996	
Northland Auckland	0	4	2	2
Central NI	5	11	4	4
East Coast Hawkes Bay	3	3	1	1
Nelson Marlborough	14	14	12	3
Canterbury	0	0	0	0
Otago Southland	2	2	3	2

Respondents were also asked to detail any problems other than collapse caused by birds' nests.

Other issues of concern included:

- blocked culverts
- poor public relations
- poor appearance
- creation of fire hazard
- increased risk of erosion
- potential risks to silviculture workers.

### Assessment of birds' nests

Respondents were asked three questions relating to the assessment of birds' nests.

Firstly, respondents were asked to detail the methods being used by the company to assess merchantable waste wood in birds' nests or landing surrounds.

Only five of the 19 respondents reported using any assessment of the birds' nests for merchantable material. These replies represented 10% of the total number of landings created in 1996.

The methods used involved a visual assessment of the heaps with measurement of visible merchantable pieces.

Next the respondents were asked to detail any methods used to assess the total biomass in birds' nests or landing surrounds.

There were no reports of regular assessment of the total volume of the heaps or the biomass contained in them. One reply reported that studies had been done by dismantling heaps and measuring the content.

Finally, respondents were asked to outline any methods used to measure the area occupied by birds' nests.

Three of the 19 respondents reported that the area covered by the birds' nests was

being measured; two used aerial photos and one measured and mapped them.

### Bird's nest treatment and management

Respondents were asked to list the methods currently used to treat birds' nests and outline why these methods were used.

The methods and the extent to which they were being used are summarised in Figure 2.

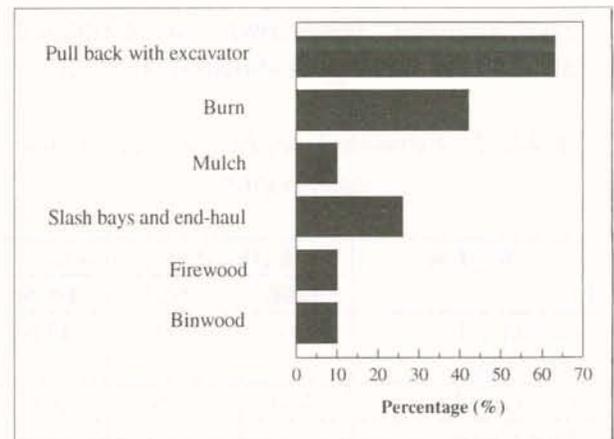


Figure 2 - Use of methods to treat birds' nests

Burning was preferred by some respondents as it was cheaper. However, it is not always possible due to weather conditions and location of landings near standing trees. Three respondents reported the use of slash bays on flat areas or end-hauling the slash to redundant skids as a solution in problem areas. Four replies stated the use of firewood or binwood removal as a means of reducing the size of, and weight in, the birds' nests. Two replies stated the use of mulchers to reduce the piles of branches and waste wood to chip size material that is left at the landing.

Respondents were then asked to comment on the effectiveness of the treatments which were used by the company.

Twelve replies (63%) rated the treatments they used as good, three rated them as okay and one as poor and expensive. Two were

doing no treatment at all. The treatments rated as poor and expensive (in one reply) were end-hauling, slash bays and mulching. Finally on the subject of treatments, respondents were asked to estimate the cost per landing of treatment over the previous 12 months.

Estimated treatment costs have been summarised:

Retrieve	\$1180 (\$500 - \$2500) per landing
Burn	\$ 600 (\$100 - \$1500) per landing
Mulching	\$2600 per landing
End haul	\$2000 per landing
Water control	\$ 400 per landing

Costs quoted (in one reply) to clean up collapsed birds' nests ranged from \$2,000 to \$50,000 per landing.

The indirect costs were not assessed but may be substantial as adverse reaction from the public and regional authorities could result in future restrictions being imposed.

### Regulatory conditions

Respondents were asked to outline any conditions imposed by regional or district councils relating to birds' nests.

Nine of the 19 respondents stated that there were restrictions placed on their hauler landing residues by regional authorities.

The types of restrictions were:

- slash must be placed where there is no risk of collapse (4)
- debris must be retrieved to landing surface (3)
- either of the two above with water control (1)
- "fix any problems" (1)

Retrieving residue to the landing surface was commonly limited to those landings

where there was a perceived risk of the bird's nest collapsing into a water way.

Finally, respondents were asked to outline the nature of Best Management Practices (BMPs) relating to birds' nests.

Seventeen of the 19 respondents reported inhouse BMPs for birds' nests (APPENDIX ONE). Of the two without, one respondent stated that the BMPs were being developed.

The collapse of birds' nests is commonly associated with heavy rainfall and accumulation of water at landings. However, only four respondents specifically mentioned water control at landings as a BMP.

Retrieving is the most common method for treating birds' nests which are regarded as at risk of collapsing.

Burning is also commonly used to treat birds' nests but is limited by risks associated with fire in close proximity to standing crops.

Designated slash placement (slash placed on areas where there is no risk of collapse) was reported by 47% (9) of the respondents.

## DISCUSSION

### Expansion in hauler logging

Expansion in hauler logging is likely in all regions surveyed. Correspondingly, the number of hauler landings will increase. The biggest increases are predicted to occur in the Central North Island, East Coast - Hawkes Bay and Nelson - Marlborough.

To meet the demands of the increasing hauler logging, the number of haulers in each region will probably increase. The number of additional haulers can be estimated based on 550 m<sup>3</sup> per ha and hauler crews extracting 60,000 m<sup>3</sup> per year (Table 4).

*Table 4 - Estimated numbers of additional hauler operations to meet increasing hauler logging demand (1996 to 1998)*

<b>Region</b>	<b>Estimated no. of new hauler operations</b>
Northland Auckland	2
Central NI	4 - 5
East Coast Hawkes Bay	3
Nelson Marlborough	3
Canterbury	0
Otago Southland	1

### **Bird's nest collapses**

There is some variation in the numbers of collapses per year over the period 1994 to 1996 (24-37), with the peak in 1995.

The secondary impacts caused by 12 bird's nest collapses in 1996 were associated with soil erosion, sediment in streams and in the worst cases debris dams in streams. The appearance of birds' nests and collapsed birds' nests were also a cause of concern with them being perceived as ugly and wasteful.

The region with the greatest number of bird's nest collapses was Nelson - Marlborough. Despite this, only 25% of those collapses in 1996 caused secondary impacts. This contrasts with the other regions where between 67% and 100% of collapses in 1996 caused secondary impacts. This suggests that the reporting from Nelson - Marlborough included minor collapses whereas the other regions were reporting only those that were large in both size and the scale of problem caused.

### **Assessment of birds' nests**

Of the respondents, only 26% (5) assessed the amount of merchantable wood in the birds' nests. None measure the biomass content.

Assessment can be targeted at quality management and value recovery. This appears to have been the focus of the assessments looking at merchantable waste. However these assessments do not give a total volume, only an estimate.

Knowing the total biomass content can be important to extracting potential value out of the residue. This is particularly important if the residue is to be used bioenergy.

The current lack of this type of assessment is understandable as markets for residue are limited and thus does not necessitate the intensive assessment of volume and nature. In addition, assessment of birds' nests is a difficult task.

However, hauler logging and therefore residue at landing volumes, are on the increase which may improve the viability of bioenergy systems.

Knowing the composition of the bird's nest can also help with assessing risk of collapse and the likely benefits of treatment and BMPs.

### **Management of birds' nests**

The majority of those surveyed had BMPs formulated by the companies as a guide for the management of birds' nests. There were usually a number of options available for each area, and what is used is site dependent.

Retrieving birds' nests from slopes surrounding landings was the most common method of treating birds' nests.

Burning was also common and was the preferred (cheapest) option in many cases, but it is not always possible or safe to burn due to the risk of carry over fires.

The use of specially created slash bays or designated dumping areas is used in some cases. This is in line with the restrictions applied by some regional authorities which

dictate that logging residues must be placed in areas where there is no risk of them collapsing into waterways.

Only four of the 17 who had BMPs specifically mentioned water control or drainage as part of the BMP. However, it was also common to find mention of collapses associated with heavy rain or poor drainage. Greater emphasis on water control at landings may help reduce the incidence of bird's nest collapses.

The direct costs of cleaning up collapsed birds' nests can be high (up to \$50,000 per collapse, approximately 12 per year). The indirect costs (adverse reaction from regional authorities and the public) are hard to determine but are likely to also be high. Sensible placement of the residues and appropriate post-harvest water control is worthwhile to avoid large one off clean up costs and adverse reaction from the public and the regional authorities.

The costs of treating birds' nests are substantial. From the above findings, it would appear that if at all possible it would be preferable not to create birds' nests in the first instance. One solution would be to use the material being discarded for some productive purpose and increase the resource efficiency of the forest. Where there are significant amounts of hauler logging with large numbers of birds' nests, it may be viable to consider utilisation of the residue currently being dumped into birds' nests for chip, mulch or energy wood.

However, there is very little being done in the way of detailed assessment of the size or content of birds' nests, either for merchantable material or for biomass.

## SUMMARY

- Both the area and proportion of the total area, being harvested by hauler, are increasing.
- Of the 869 hauler landings used by respondent companies in 1996, 45% were considered to have a significant bird's nest after logging.
- In 1996, 24 birds' nests were reported as having collapsed. Secondary impacts such as soil and residue in streams resulted in 12 of these cases.
- Retrieval of the logging residue to the landing surface with an excavator was the most common method of treating birds' nests.
- Of the respondents, 89% stated that they had Best Management Practices for dealing with logging residue at landings.

Future research will focus on determining the stem, branch and needle content of logging residue at landings and the impact of computer log optimisation tools on the stem waste content.

This will allow implications of slash management on site nutrients, bird's nest placement and stability and the potential for utilisation for bioenergy to be more readily assessed.

## ACKNOWLEDGMENTS

*LIRO acknowledges the assistance of all the respondents to the survey.*

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Appendix 1 - Best Management Practices used by companies

Region	Retrieve	Burn	Rehabilitate	Minimise Slash Production	Designated Slash Placement	Supervision & QC	Firewood Binwood Sales	Pre harvest Planning for slash	Water Control	None
<b>Northland Auckland</b>	*		*						*	
<b>Northland Auckland</b>	*	*			*					
<b>CNI</b>				*	*					
<b>CNI</b>		*			*	*				
<b>CNI</b>					*					
<b>CNI</b>				*	*		*			
<b>CNI</b>								*		
<b>CNI</b>				*			*			
<b>CNI</b>	*									
<b>East Coast Hwk Bay</b>	*				*	*				
<b>East Coast Hwk Bay</b>	*	*			*				*	
<b>East Coast Hwk Bay</b>	*	*			*				*	
<b>LNI</b>	*	*								
<b>Nelson</b>	*				*		*	*		
<b>Nelson</b>										*
<b>Canterbury</b>										*
<b>Canterbury</b>	*									
<b>Otago Southland</b>	*								*	
<b>Otago Southland</b>			*			*				
<b>Total</b>	10	5	2	3	9	3	3	2	4	2