

# ANALYSIS OF FATAL LOGGING ACCIDENTS — 1968 to 1987

N.Z. Logging Industry,  
Research Assn. Inc.  
P.O. Box 147,  
Rotorua

John Gaskin

## ABSTRACT

*Analysis of Department of Labour fatal accidents in logging records for the period 1968 to 1987 showed that there has been a significant reduction in the average number per year for the last 10 years when compared with the first 10 year period. The rate of fatal accidents was found to be 0.7 per million m<sup>3</sup> for exotic production logging and 2 per million m<sup>3</sup> for indigenous logging operations.*

*A fatality rate of 2.3/1000 workers per year was calculated for production logging operations. This compares with a rate of 0.07/1000 workers per year for the New Zealand Workforce.*

*The fatal injury rate in production logging is too high. Felling accidents accounted for over 60 percent of fatalities and the main causes were: working in front of hang up trees, being hit by sailers, working too close and driving trees. Through research, loggers knowledge of potential risks needs to be assessed and strategies for improving their knowledge and understanding need to be developed and implemented.*



Figure 1 - Faller : the most "at risk" worker in a logging operation - are these people aware of the risks? If not, how can better awareness be instilled?

## INTRODUCTION

During the past six months there has been considerable publicity over the apparent increase in the number of fatal logging accidents in New Zealand during recent years. (For example, articles in South Waikato News, Rotorua Daily Post, Taupo Times, and The Dominion, May 1988, and The National Business Review, June 1988.) Various theories have been advanced, linking the rise in fatalities to poor regard for basic safe practices, production pressures on loggers, the

move to full contract operations, reduction in training effort, etc.

Only two scientific papers have addressed the topic. Cryer (1987a) in a paper to The New Zealand Medical Journal, reviewed work-related fatal injuries for a ten year period, 1975-84. Within this publication the author grouped all forestry workers together. Cryer noted that over the ten year period 68 workers had been killed. In a second paper on this work, Cryer (1987b) noted that of the 68 workers killed, 50 were

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classified as bushmen. Forty-one of the bushmen had been killed during tree felling or trimming of felled trees.

LIRA has recently accessed The Department of Labour's (DOL) fatal accident register which gives details on such accidents for the past 20 years. Information collected by this register includes:

- Date of Accident
- Worker's name
- Employer
- Locality
- Age
- Brief description of accident

The data provides details of 219 fatal accidents and covers a range of operations from tree felling to trucks unloading at a mill. All of the operations in which fatalities have been recorded are covered under the Bush Workers Act (1945).

This report will analyse only those accidents that occurred in exotic production logging as this is the group that has been singled out for attention by the DOL through the media.

Accidents in firewood operations and land clearing will be excluded as they do not involve bona fide logging workers and it is difficult to determine the numbers employed in these categories. Transport fatalities too require separate analysis and the numbers employed are not known.

The following aspects will be discussed:

- A summary of all fatal accidents in the last 20 years.
- Age distribution of victims in exotic logging.
- Job at the time of accident.
- Causes of fatal accidents.

As background information, Cryer (1987) noted that the estimated average work-related fatal injury rate for New Zealand was 0.07/1000 workers/year.

## RESULTS

The total number of fatal accidents in the DOL register have been classified according to the occupation or general activity engaged in at the time of the accident, as illustrated in Table 1.

The "exotic production logging" classification includes all exotic logging other than farmers and firewood production. Ten of the 104 accidents occurred during farm shelter belt logging and small logging operations supplying a portable sawmill. "Transport" covers those accidents that occurred both outside the forest gate, for example people being fatally injured during logging truck unloading at the mill, and on forest roads, for example truck roll overs. Land clearing fatalities include accidents that happened during burn offs, tractor roll overs, felling accidents etc. The "Miscellaneous" category are those fatalities that should never have been assigned to

**Table 1: Classification of Fatal Accidents**

Classification	Number	Percent
Exotic production logging	104	47
Native production logging	33	15
Land clearing	27	12
Farmers	15	7
Miscellaneous	12	6
Transport (in forest)	4	2
Transport (at mill)	10	5
Firewood	7	3
Unknown	7	3
<u>Total</u>	<u>219</u>	<u>100 %</u>



**Table 2: Employment and Volume Harvested per Year  
(At Five Yearly Intervals)**

Period	Number Employed*	Volume Harvested m <sup>3</sup> (thousands)		
		Indigenous	Exotic	Total
1968/69	2,884	1,033.6	6,781.9	7,815.5
1972/73	2,866	889.1	7,353.8	8,242.9
1977/78	3,108	692.0	8,574.0	9,266.0
1982/83	2,773	608.0	9,019.0	9,627.0
1984/85	2,554			
* Excludes transportation				

logging, for example, driving a truck with hoist up metalling a road, and being thrown from a grader.

#### **Fatal Injury Rate (Exotic and Indigenous)**

Based on an average figure for the twenty years of data from the DOL, the fatal injury rate was 3.7/1000 workers per year. This figure is, however, misleading as it includes numerous accidents that are not related to logging production operations. When those fatalities are removed from the total, the rate was found to be 2.3/1000 workers per year, still considerably greater than the average for all industries and therefore of major concern to those in the logging industry. (To calculate this rate it has been assumed that on average over the twenty years 2900 people have been employed in logging each year over the twenty year time period - based on Year Book statistics.)

A comparative figure from the Oregon area in the United States for the 1985 and 1986 years is approximately 2.0/1000 (Garland pers.comm.). The figure for Australian hardwood logging is similar to the New Zealand 2.3/1000, but the Australian softwood logging figures are much lower (Bannister, 1988).

Table 2 details the number of workers employed in logging and the annual volume harvested of both indigenous and exotic logging. (Source: Official Year Books, 1969/70 to 1986/87, Department of Statistics)

The annual indigenous cut has been steadily decreasing, while there has been an increase in the annual exotic cut. Unfortunately, employment figures can not be separated by indigenous versus exotic, but it is reasonable to assume the number of people involved in native logging has reduced while the number involved in exotic logging has probably increased.

From the information in Table 2 there is, on average, 0.7 fatal accidents for every million m<sup>3</sup> harvested in exotic operations. By contrast there are two fatal accident for every million m<sup>3</sup> harvested in native operations. This suggests that there are three times more fatal accidents by volume in native logging operations. This is partly due to the lower man day productivity in indigenous logging compared with exotic. In 1974 the respective productivities were 1.3 and 2 m<sup>3</sup> per manhour (estimated from Fraser et al, 1976).

#### **Exotic Logging**

Analysis of the number of exotic logging fatal accidents per ten year period shows a reduction in the second decade. During the first ten years of the data, 1968/69 to 1977/78, a total of 63 loggers were killed in exotic operations giving an average per year of 6.3. In the second ten year period, 1978/79 to 1987/88, 41 loggers were killed resulting in a lower mean of 4.1 per year.

While acknowledging that correlation does not necessarily imply causation, the point at which the data was

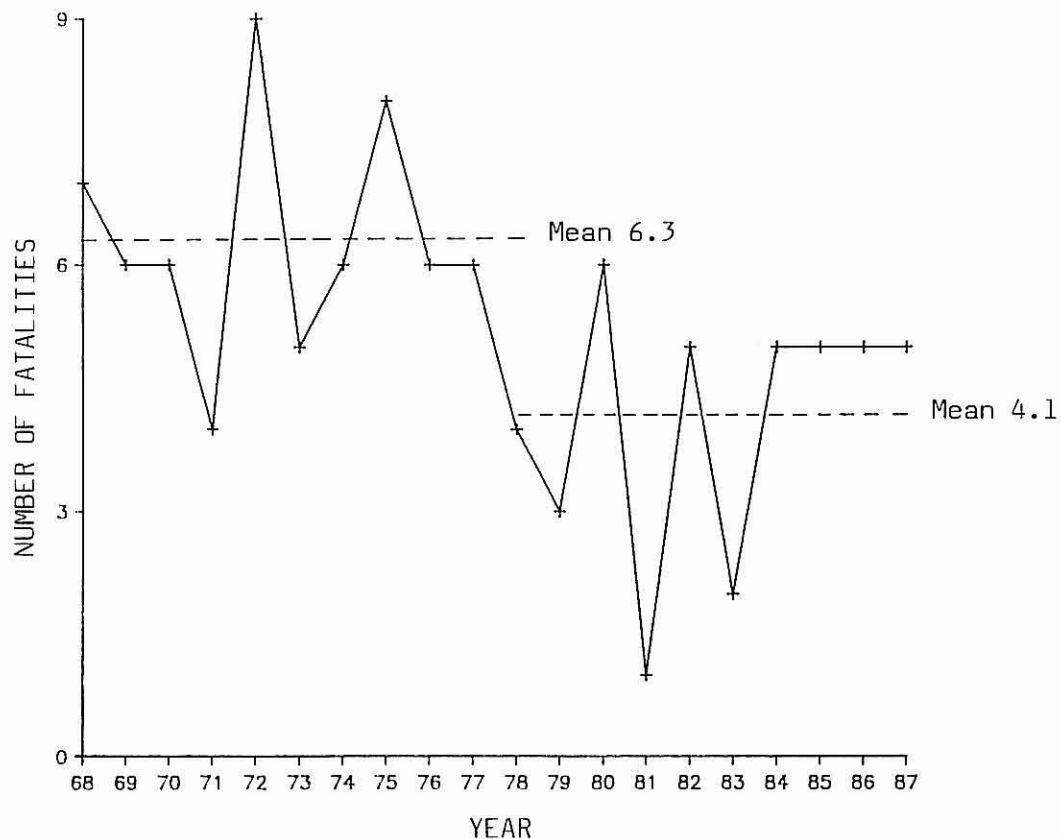


Figure 2 - Exotic Logging Fatalities per Year

separated into ten year periods coincides with the adoption of formal training in the major industry organisations, and the formation of the

Logging and Forest Industry Training Board. Furthermore the Bush Inspectorate was increased by 50% since 1979. (Prior to the latest Departmental review.)

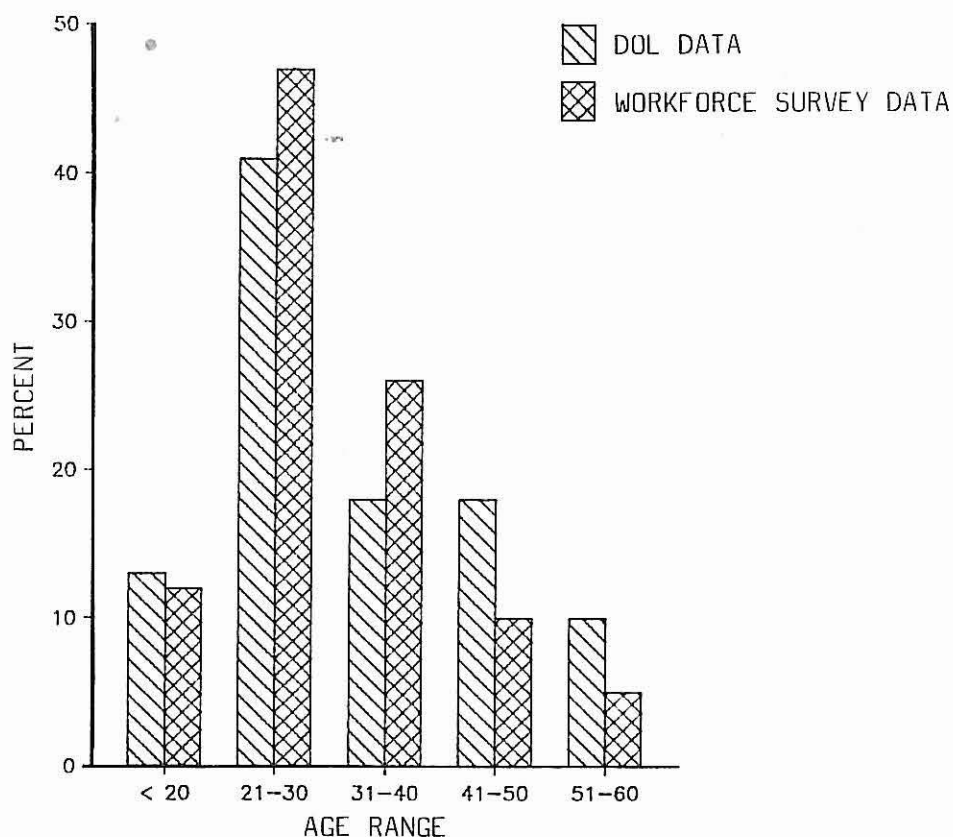


Figure 3 - Age Distribution of Fatalities  
(A Comparison with Logging Workforce Survey Data)

**Table 3: Job at Time of Accident**

Job	Number	Percent	Percent of Workforce Employed in this Job (Logging Workforce Survey)
Felling	58	55	) 37.2 *
Trimming	8	7	
Moving Plant	11	11	N/A
Breaking Out	10	10	2.6
Extraction	8	7	19.5
Skids	6	6	13.1
Loading	4	4	10.5
<u>Total</u>	<u>105</u>	<u>100 %</u>	<u>82.9 % **</u>

Note : \* In the Workforce Survey felling and trimming were combined

\*\* Does not add due to combinations. For example, skid worker and loader operator or faller and skid worker, being omitted.

### Age Of Victims

The age distribution of fatalities is compared with the age distribution of the workforce collected by the Logging Workforce Survey, (Gaskin et al, 1988) in Figure 1. The average age of workers in the above survey was found to be 30 years (384 loggers), whereas the average age of the exotic logging fatalities is 32 years (96 loggers). Older workers, over 40 years in age, have a proportionately higher incidence of fatal injuries than their 20 to 40 year old counterparts.

### Job At Time Of Accident And Cause

Felling stands out as the major area of concern for fatal accidents (Table 3). Over half of all reports (55%) indicated that the victim was felling trees or was caught while trying to drive trees. In fact the eight trimming accidents occurred as a result of the trimmer being struck by trees which had been scarfed and left, so could be assigned to felling accidents also.

The "Moving plant" accidents were incidents where machinery rolled while driving from site to site, for example a

loader driver being killed after rolling a machine while moving between skids. Also included in this category are situations where maintenance was being carried out and someone was involved in a fatal accident.

Table 4 details the felling accidents by cause as far as could be determined. "Hang up" is where the faller went in front of a scarfed and backcut tree which subsequently fell on him. "Sailer" is a branch or part of tree broken off or dislodged that struck the operator. "Drive" is where the tree being driven came back while the faller was preparing the drive tree, during the drive, or after the drive. "Second party" are those accidents where another faller felled a tree which hit the worker, i.e. working too close. "Contact" describes an accident where the falling tree made contact with a standing tree, causing part of it to break off and hit the faller. "Direction" is where the tree fell in the wrong direction, and "Position" is where the faller, for whatever reason, stood in the wrong place during felling.

**Table 4: Cause of Felling Fatalities (1968 to 1987)**

Cause	Struck by Tree	Struck by Part of Tree
Hang Up	14	2
Sailer		10
Drive	6	
Second Party	6	
Contact	4	1
Direction	3	
Position	3	
<u>Total</u>	<u>36</u>	<u>13</u>

Note : The cause of nine accidents was indeterminable

It is apparent from the information in Table 4 that the most common cause of felling fatalities is where the faller works in front of a hung up tree. Being hit by a sailer, driving, working too close together, and felling into standing timber are also worth closer attention.

A study by Ostberg (1980) was designed to assess whether fallers already had a sound knowledge of which working methods were dangerous or safe. Ten situations were presented to 393 fallers working in motor manual production systems (the experiment group also included forest worker school students, safety officers, teachers, supervisors, and safety engineers) and they were asked to rank them in order of danger.

The situation ranked as most dangerous was "Freeing a lodged tree by felling the supporting tree" i.e. working in front of a hang up. This situation was followed by "Felling in proximity of a second party (closer than two tree lengths)" and "Freeing a lodged tree by felling across it" i.e. driving. The order of risk ranking is consistent with the actual situation illustrated in Table 4

the exception being that "hit by a sailer" was not included as part of Ostberg's study.

It would be interesting to attempt to repeat a modified version of this type of study amongst New Zealand fallers and supervisors to check if the most dangerous situations are recognised by those in the industry. Findings from such a study may well indicate that high risk situations, such as working in front of a hung up tree and being hit by a sailer, are in fact not considered to be as serious a situation as statistics indicate.

## CONCLUSIONS

An analysis of 219 fatal accidents recorded by the Department of Labour under the Bushworkers' Act between 1968 and 1987 shows that 47% of these occurred in exotic production logging operations, 15% in indigenous logging and 7% in transport operators. Many fatal accidents being attributed to the exotic logging industry are in fact more accurately land clearing, sawmill, and "hobby logger" fatalities. The rate of

fatal accidents was found to be 0.7 per million m3 for exotic production logging and 2 per million m3 for indigenous logging operations.

However, the rate of fatal accidents in logging is still far too high at 2.3 per 1000 workers per year, compared with the average New Zealand work place fatality rate of 0.07/1000 workers per year. It is similar to the rate in Oregon and the Australian hardwood logging industry but much higher than in Australian softwood logging.

The number of fatal accidents in exotic production logging has reduced significantly from 6.3 per year in the ten years to 1977, to 4.1 per year in the ten years since. This trend is considered to be a reflection of the introduction of formal training to much of the exotic logging industry from the late 1970s. Within the last ten year period there has been an upward trend with five fatalities in each of the last four years.

A comparison of the age distribution of fatalities with that found through the logging workforce survey indicated that although the average age of victims was not significantly greater than the workforce average, workers over 40 have a disproportionately higher incidence of fatalities than their 20 to 40 year old counterparts.

Felling accounted for over 60 percent of fatal accidents and the main causes were working in front of hung up trees, sailers, working too close to another person, and driving, trees.

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**N.Z. Logging Industry,  
Research Assn. Inc.  
P.O. Box 147,  
Rotorua**

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For further information, contact:

N.Z. LOGGING INDUSTRY RESEARCH ASSOC. INC.  
P.O. Box 147,  
ROTORUA, NEW ZEALAND.

Telephone: (073) 87-168