

## Lost Time Injuries in Forest Silviculture - 1997

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### Summary

- 164 injuries and incidents were reported for 1997 (166 for 1996).
- 67 lost time injuries (LTI) resulted in 294 lost work days (84 injuries, 434 lost work days in 1996), with an average of 4.4 days lost per injury.
- There was a peak of injuries in February. Most were pruning injuries. There were two injury peaks during the working day - the first between 10 am and 11 am and the second between 1 pm and 2 pm. Most (73%) injuries occurred in the first three days of the week.
- Thirty percent of the workers experiencing an LTI had worked in silviculture for less than a year.
- The hand was the most commonly injured body part, due to lacerations and sprains.
- Sprain/strain injuries were most common (37%), followed by lacerations (30%). Pruning accounted for 44% of sprain/strain injuries, and 50% of lacerations.
- There were 29 lost time injuries in pruning (43%), resulting in a total of 134 lost work days. Six injuries (21%) resulted from slipping on vegetation while walking between trees. Nine injuries (31%) resulted from a fall or slip from the ladder or pruning step. The causes of these falls were: the ladder twisting (four injuries), slipping

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while climbing off the ladder or pruning step (two injuries), the safety chain breaking (one injury), and the ladder being hit by a falling branch, causing it to twist (two injuries).

- Injuries caused from slips/trips occurred in all operations. Many of these injuries may have been reduced or prevented by wearing spiked boots.
- Nearly half (45%) of the near miss injuries reported occurred during travel to and from work.
- The number of near miss incidents reported continues to improve. This is a consequence of industry pressure to report near misses due to their value in injury prevention. Reporting of near miss incidents highlights those areas where there is a high potential for injury, and allows steps to be taken to reduce the chance of an injury occurring.
- In many cases, information regarding training and Forest Industry Record of Skills (FIRS) module attainment, was missing from the reports. This information is important to determine whether the injured person had been trained for the job. For the scheme to provide most benefit to the forest industry, it is vital that as much information as possible about the injury or incident is reported.

This report summarises the information supplied to the Forest Silviculture Accident Reporting Scheme (ARS) for 1997. This is the eighth year of data collection.

Exposure hours collected from New Zealand Forest Owners' Association members are related to LTI statistics to provide a monthly LTI frequency for 1997 (Table 1).

## Acknowledgements

Liro Limited acknowledges the co-operation of the workers, contractors and companies that supplied the data used for these analyses.

## Definitions

**Forest Silviculture** Includes the following operations: nursery work, establishment, releasing, thinning to waste, pruning and forest maintenance

**Lost Time** The injury causes the injured person to miss any full day's scheduled work

**Minor** First aid or medical treatment required, but lost time as defined above does not apply

**Near Miss** First aid or medical treatment not required but the incident could have caused injury or property damage

Table 1 - Lost time injury frequency statistics - 1997

Month	Hours Worked	Lost time Injuries	LTI per Million man hours	Total Days Lost
Jan	279479	2	7.2	12
Feb	313257	12	38.3	57
Mar	287742	7	24.3	18.5
Apr	254147	8	31.5	40
May	304512	6	19.7	56.5
Jun	317916	4	12.6	10
Jul	344269	6	17.4	24.5
Aug	317717	2	6.3	6.5
Sep	309882	6	19.4	12
Oct	288929	3	10.4	13
Nov	253368	8	31.6	25.5
Dec	205694	3	14.6	18
<b>Average</b>	<b>289742</b>	<b>5.6</b>	<b>19.4</b>	<b>24.5</b>

# Injuries

One hundred and sixty-four injuries and incidents were reported in silviculture for 1997 (Table 2). This is consistent with the number recorded for 1996, and reflects the consistency in levels of reporting to the scheme. There has been an increase in the number of near miss injuries reported to the scheme. This is due to an increase in levels of reporting rather than an increase in the number of near misses occurring.

Table 2 - Injuries and incidents recorded by the ARS

Report Type	1995	1996	1997
Fatal	0	0	0
Lost Time	84	84	67
Minor	52	53	53
Near Miss	14	29	41
<b>Total Reports</b>	<b>150</b>	<b>166</b>	<b>164</b>

## Analysis of Lost of Time Injuries

### Lost time per injury

The average number of days lost per injury was 4.4, slightly lower than both the 1995 (5.6 days) and 1996 (5.2 days) figures. The number of days lost per injury ranged from half a day to 30 days, with median of three days, following a similar trend to that of 1996 (Byers and Parker, 1997) and 1995 (Parker, 1997).

The total number of work days lost in 1997 was 294 (Figure 1). This is significantly less than both the 1996 (434) and 1995 (474) figures (Byers and Parker, 1997; Parker, 1997). While there was a reduction in the number of lost work days, these figures are often estimated and must therefore be treated with caution.

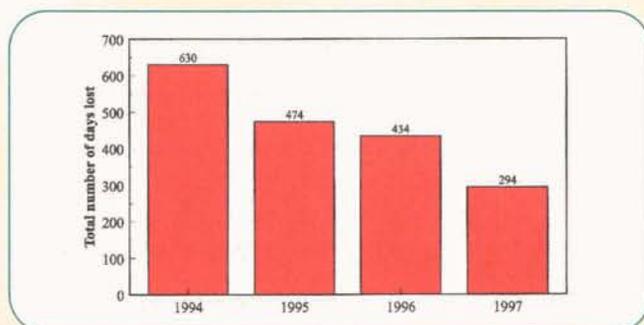


Figure 1 - Total number of days lost

Most injuries (80%) resulted in the loss of one to five days work as in previous years. The overall severity of injuries sustained by silviculture workers appears to follow a similar trend to previous years (Figure 2), with an increasing number of lower severity injuries contrasting with a reduction in the number of higher severity injuries.

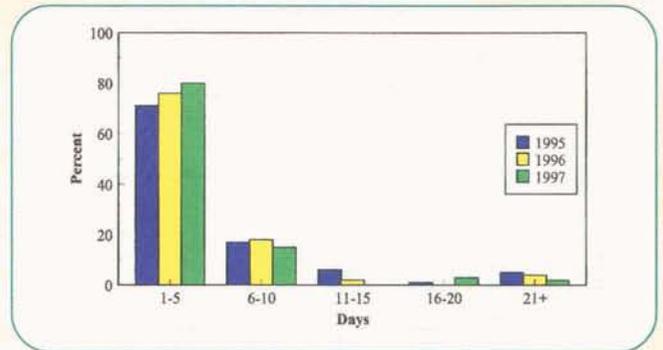


Figure 2 - Days lost per injury

## Time of Injury Occurrence

### Month of year

The injuries for 1997 show a peak in the month of February (Figure 3). This is similar to the pattern in 1996. Most of the injuries were pruning injuries. February is the first full month of work after the Christmas break, and the main work carried out is pruning. February is traditionally a high injury month in the forest industry due to a reduction in body conditioning and higher daily temperatures (Figure 3).

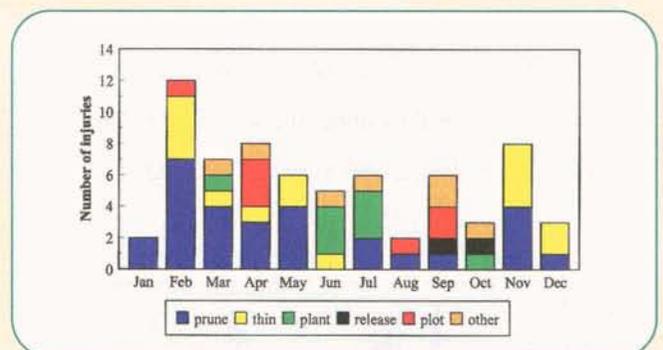


Figure 3 - Injuries by month and operation - 1997

In 1997, 58% of injuries occurred in the first six months of the year (31% in the first quarter). This is similar to the pattern of 1996 (50% occurred in the first six months), but differs from the 1995 result (74% occurred in the first seven months of the year).

## Day of week

Most of the injuries (73%) occurred within the first three days of the week, consistent with that found for 1996. There appears to be an increasing trend for injuries to occur on a Tuesday (Figure 4). There was no pattern to the type of injury occurring (i.e. sprain, laceration) or operation undertaken at the time of the injury (i.e. planting, pruning).

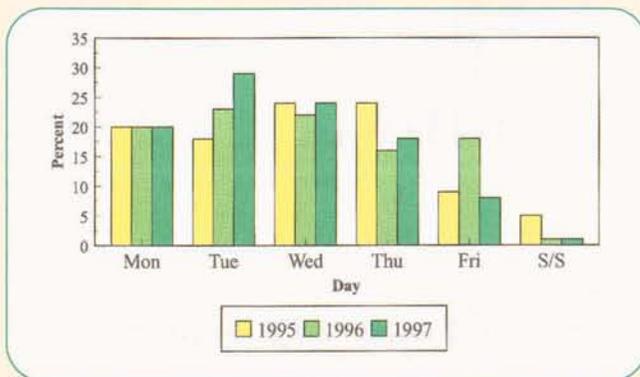


Figure 4 - Injury by day of week

## Hour of day

There were two peaks in the time of injury occurrence - the first between 10 am and 11 am and the second between 1 pm and 2 pm (Figure 5). These injury peaks may be due to increased levels of fatigue in workers prior to stopping for a meal break. Eating a good breakfast has been shown to increase physical performance, improve co-ordination, concentration and awareness in the first few hours of work (Kirk, Gilbert and Darry, 1996). Replacing fluid losses throughout the day has also been shown to reduce levels of fatigue (Paterson and Kirk, 1997).

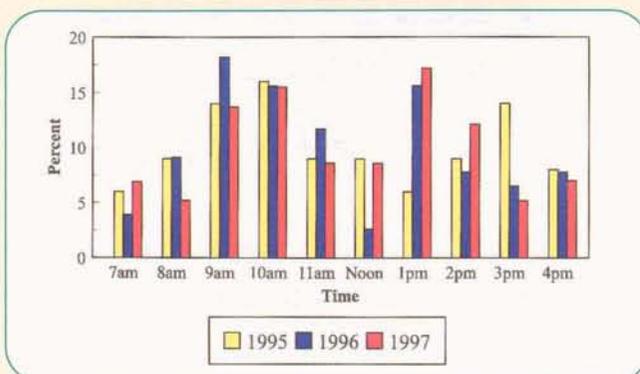


Figure 5 - Injury by time of day

## Experience

Thirty percent of the injured workers had worked in silviculture for less than a year. Of this group, 27% (15 workers) had worked less than six months. Five of these 15 injuries were the result of slipping and tripping while walking through blocks. The use of spiked boots has previously been shown to reduce the incidence of slips, trips and falls, especially while walking on undergrowth (Kirk and Parker, 1993). The use of this footwear may be especially beneficial to new entrants to the forest who are not conditioned to walking over rough terrain. Five of the 15 injuries recorded with less than six months' experience involved falls from ladders. This highlights the importance of correct training so new workers are aware of the correct ladder placement and pruning techniques, and raises the question for improved ladder design.

## Injury - Part of body

The hand was the most common body part injured (12 injuries - 18%), followed by ten lower leg (15%) and nine lower torso injuries (14%) (Figure 6). The hand was also the most commonly injured body part in 1996 (16 injuries - 25%).

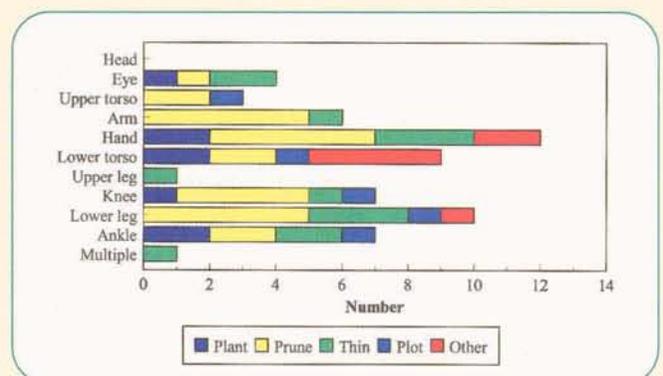


Figure 6 - Body part injured by operation - 1997

Eight of the hand injuries were due to lacerations caused by contact with the equipment being used in the various operations. Three injuries were sprains and one involved a dislocated finger after falling over in dense undergrowth.

Three of the lower leg injuries involved pulled calf muscles, and five of the lower torso injuries were a strained lower back. Adopting correct techniques when lifting, as well as warm up

exercises, have been shown in other industries to help reduce the incidence of soft tissue injuries such as sprains and strains (Kirk, Gilbert and Simpson, 1996).

Table 3 - Lost time injuries by operation - 1997

Operation	No. of Injuries	Average Days Lost	Total Days Lost
Planting	8	2.8	22
Pruning	29	4.6	134
Thinning	15	5.6	84
Plotting	7	3.2	23
Other	8	3.5	28

### Planting

There were eight lost time injuries in planting leading to a total of 22 lost work days. The most serious injury was a back strain which occurred when lifting and carrying heavy planting boxes (seven days lost). Falling over on unstable ground resulted in three sprained ankles (one, one and a half, and five days lost)

Falling also resulted in a dislocated finger (one day lost), and a puncture to the leg when the person landed on a stick (three days lost). Jarring to the wrist when planting caused three days to be lost, and pushing through gorse while planting led to the worker losing a day when a stick entered his eye.

### Pruning

There were 29 lost time injuries in pruning, resulting in a total of 134 lost work days. Pruning accounted for 43% of all lost time injuries, consistent with the 1996 figure (48%). Sprain/strain injuries were most common (38%), followed by lacerations (34%) (Figure 7). Six injuries (21%) resulted from slipping on vegetation while walking between trees. Nine injuries (31%) resulted from a fall or slip from the ladder or pruning step. Causes of falls were: the ladder twisting (four injuries), slipping while climbing off the ladder or pruning step (two injuries), the safety chain breaking (one injury), and the ladder being hit by a falling branch, causing it to twist (two injuries). In all but two of the ladder falls, workers had less than six months' experience. This highlights the need for

correct training in ladder placement and pruning techniques to reduce the incidence of falls from ladders, and an awareness of the hazard of walking over rough terrain.

### Thinning

Fifteen lost time injuries occurred during thinning operations, resulting in a total of 84 lost work days. The most serious injury occurred when the worker fractured his arm and cut his head after falling down a bluff (30 days lost). The most common type of injury was lacerations (six), three of which resulted from contact with the chainsaw. Only one was the result of a kickback. Two injuries were scratches to the eye from vegetation; these would have been easily prevented through the use of eye protection. Slipping and falling over resulted in three sprain/strain injuries. It is important to take extra care when walking across uneven ground to reduce the likelihood of slipping and falling.

### Plotting

Seven injuries occurred while plotting, resulting in 23 lost work days. Four of these injuries were the result of slipping and falling while walking through blocks. Two others were caused while using a slasher to cut an access path through blackberry.

### Spraying

There were no lost time injuries reported for spraying for 1997.

## Type of Injury

Sprain/strain injuries were most common (37%), followed by lacerations (30%) (Figure 7). Pruning had the highest number of both sprain/strain injuries (44%), and lacerations (50%). Thinning had the second highest frequency of laceration injuries (30%). Several of these injuries were occurring across all operations, and may have been avoided or reduced through the use of spiked boots and warm-up stretches. Wearing spiked boots has been shown to reduce slip accidents in both breaker-outs (Kirk and Parker, 1993) and fallers (Kirk and Parker, 1992). Warm-up stretches have been shown in other industries to reduce the incidence of soft tissue injuries (Kirk, Gilbert and Simpson, 1996).

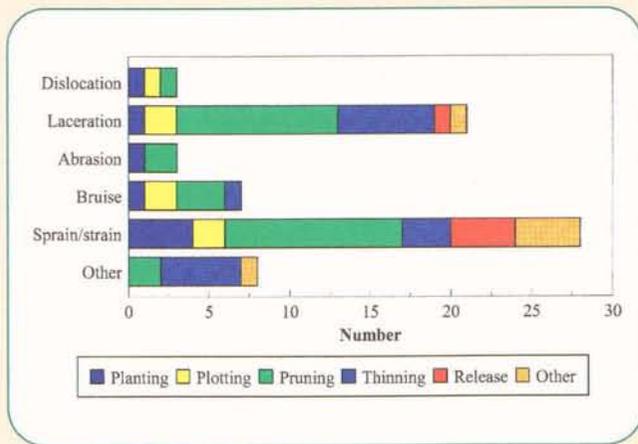


Figure 7 - Type of injury by operation

## Analysis of Near Miss Incidents

There was a higher incidence of reporting of near miss incidents for 1997 (41) than for previous years (29 in 1996, 14 in 1995). This is a consequence of industry pressure to report near misses, due to their value in injury prevention. Reporting of near miss incidents highlights those areas where there is a high potential for injury, and allows steps to be taken to reduce the chance of an injury occurring. Forty-five percent of the near misses reported occurred during travel, and frequently involved another vehicle. Forest roads are often narrow with blind corners, and can be made more hazardous by dust, ice, or greasy surfaces. It is essential to drive defensively on forest roads to reduce the likelihood of an accident occurring

Table 4 - 'Near miss incidents - 1997

Operation	Number of Incidents
Travel	19
Planting	4
Pruning	4
Thinning	4
Nursery	2
Other	6

The following are verbatim comments from the ARS report:

### Pruning:

- Trying out new pruning saw, handle of saw broke off, and saw fell towards operator.
- Pruned branch dropped between ladder rungs causing ladder to twist and drop.
- Cutting large branch from behind, weight of branch pushed saw on to left leg, cut through top layer of chainsaw pants (chainsaw pruning).
- Person was at top of 3 metre ladder attaching step. Put his weight on the step and the chain snapped.

In all but one occasion (unrecorded), workers were experienced pruners.

### Planting:

- Vehicle passed a road closed sign during an aerial spray operation, into a dangerous operational area.
- Pod lid detached during flight, just missing tail rotor.
- Person was riding 4 wheel motorbike to convey seedlings to planters.  
Front wheels of bike struck a rut and bike reared backwards. Unable to control the bike, person jumped off and bike rolled to hollow at bottom of hill.
- Windthrow stump "let go" at top of work site hill and tumbled to the bottom near where crew were planting.

### Thinning:

- Chainsaw hit old fencing wire and kicked back while thinning regenerating pine.
- Person moving from scarf to backcut moved left leg forward into saw, just damaging top layer of leggings.
- Tree fell over on back after being thinned.
- Saw jammed in backcut, tree tipped over and butt caused saw to flick up into chin and throat area.

Protective legwear helped prevent two laceration injuries from occurring.

## Discussion and Conclusions

There were 164 injuries and incidents reported to the Silviculture ARS for 1997; of these 67 (41%) were lost-time injuries. The average number of days lost per injury was 4.4, slightly lower than both the 1995 (5.6 days) and 1996 (5.2 days) figures. The total number of work days lost in 1997 was 294. Most injuries (80%) resulted in the loss of one to five days work as in previous years. Most of the injuries (73%) occurred within the first three days of the week, consistent with that found for 1996.

The injuries for 1997 peaked in February. Most of the injuries were pruning injuries.

There were two distinct injury peaks during the working day - the first between 10 am and 11 am and the second between 1pm and 2 pm. These injury peaks may be due to increased levels of fatigue in workers prior to stopping for a meal break. In any physically-demanding job, it is essential that workers maintain adequate nutritional and fluid levels throughout the working day.

Thirty percent of workers experiencing an LTI had worked in silviculture for less than a year. Of this group, 27% (15 workers) had worked less than six months. This may highlight the need for structured induction training for new entrants to the industry

There was a high number of slips occurring throughout all operations, which had led to the occurrence of various injuries. The use of spiked boots is recommended where terrain is rough and hindrance is present, to maintain footing and reduce slip and fall-related injuries.

The minimal experience associated with the pruning injuries involving a fall from a ladder, highlights the need for adequate training in correct technique. This can be extended to include training on the correct method of sharpening equipment, another common cause of injuries. There is also the question for improved ladder design.

There has been an improvement in the number of near miss incidents being reported to the scheme. This is encouraging, as

this information highlights those areas where there is a high potential for injury, and allows steps to be taken to reduce the chance of an injury occurring.

In many cases, information regarding training and Forest Industry Record of Skills (FIRS) module attainment, was missing from the reports. This information is important to determine whether the injured person had been trained for the job. For the scheme to provide most benefit to the forest industry, it is vital that as much information as possible about the injury or incident is reported.

Continued support of the scheme by the forest industry improves the accuracy of the ARS and allows accurate trend information to be made available to the forest industry. The continued success of the scheme is wholly dependent upon the support of the New Zealand forest industry.

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