



## Harvesting Landing-based Injuries: Analysis of IRIS data

### Summary

This report summarises injury reports supplied to the New Zealand forest industry Incident Recording Information System (IRIS) database from January 2014 to December 2018. There were a total of 185 landing-related injury incidents recorded. They comprised 42 lost time injuries, 39 medical treatment injuries and 104 minor injuries. The most common cause of injury was being hit by a log that rolled or moved unexpectedly. The most common body parts injured were the legs from the knees to the feet. All categories of incident showed a reduction over the period 2014-2018, however these trends showed a lot of year-on-year variation. More needs to be done to reduce landing-based incidents.

Richard Parker, Brionny Hooper, Christine Dodunski, Scion and Keith Raymond, FGR

### Introduction

The “Harvesting in the Modern Age” Primary Growth Partnership aims to introduce automation into harvesting and logistics operations in New Zealand. One of the drivers for this programme is to make harvesting and log transport operations safer.

The purpose of this report is to focus on landing-based injury incidents and to identify trends in these incidents over the last five years. Analyses will provide a baseline of injury types, situations and causes from which any improvements in safety due to interventions such as new technology (or other innovations) on the log landing developed in the new FGR programme can be measured.

The New Zealand forest industry’s Incident Recording Information System (IRIS) database includes records for both injury events (lost time, medical treatment and minor injury) and non-injury events (contact, and near hit incidents). This report focuses on lost time and medical treatment injuries because reporting is more reliable as there is less discretion possible in the reporting of such incidents.

### Methods

There are three injury types recorded in the IRIS database.

**Lost Time Injury** - An incident that results in injury to an employee to the extent that they do not return to work at the start of the next regularly

scheduled work day or any other subsequently scheduled shift.

**Medical Treatment Injury** - Any incident requiring medical treatment for the injured party by a medical practitioner (including prescribed medication) other than onsite First Aid Treatment. Employee returns to work at the start of the next regularly scheduled work day or any other subsequently scheduled shift.

**Minor Injury** - also referred to as First Aid Cases or Treatment Not Required. For example contact with an energy source has occurred resulting in minor injury and treatment is applied on-site (first aid) or not sought.



Figure 1: Log-maker working on the landing  
(Ref: FGR)



# HARVESTING TECHNICAL NOTE

HTN12-02  
2019

**Table 1: Variables used in the analysis of lost time, medical treatment and minor injuries**

Variable	Examples <sup>1</sup>
Task	Log processing/Skid work, Fleeting/sorting/stacking
Lost hours	9 hours considered 1 working day
Body part	Foot, Ankle, Head, Eye, Face, Shoulder, Knee, Hip/upper leg/thigh, Hand/wrist
Profile	Left, Right, Back, Front
Injury type	Fracture, Crush, Bruising, Chipped tooth, Puncture, Sprain/strain, Sting/bite
Injury cause	Rolling log, Chainsaw, Chemicals, Uneven surface underfoot, Vehicle
Injury severity	Lost time, Medical treatment, Minor, Near hit, Property damage, Contact-no injury
Incident cause	Body stressing, Hit by object, Loss of control, Slip/trip/fall, Entanglement

<sup>1</sup> Not an exhaustive list of examples used in the database

IRIS data were selected for the period January 2014 to December 2018. The criteria for selection (Table 1) were:

- ACTIVITY = Harvesting
- OPERATION = All operations
- TASK = Log processing, skid work, fleeting, sorting, stacking, quality control

## Results

There were a total of 1,438 landing-related incident reports to the IRIS database in the period January 2014 to December 2018. Most reports were for near-hit events and property damage (Table 2). The number of injury incidents (LTI, MTI and minor) has declined over time and is likely to be due to the increase in mechanisation on landings (Figure 2).

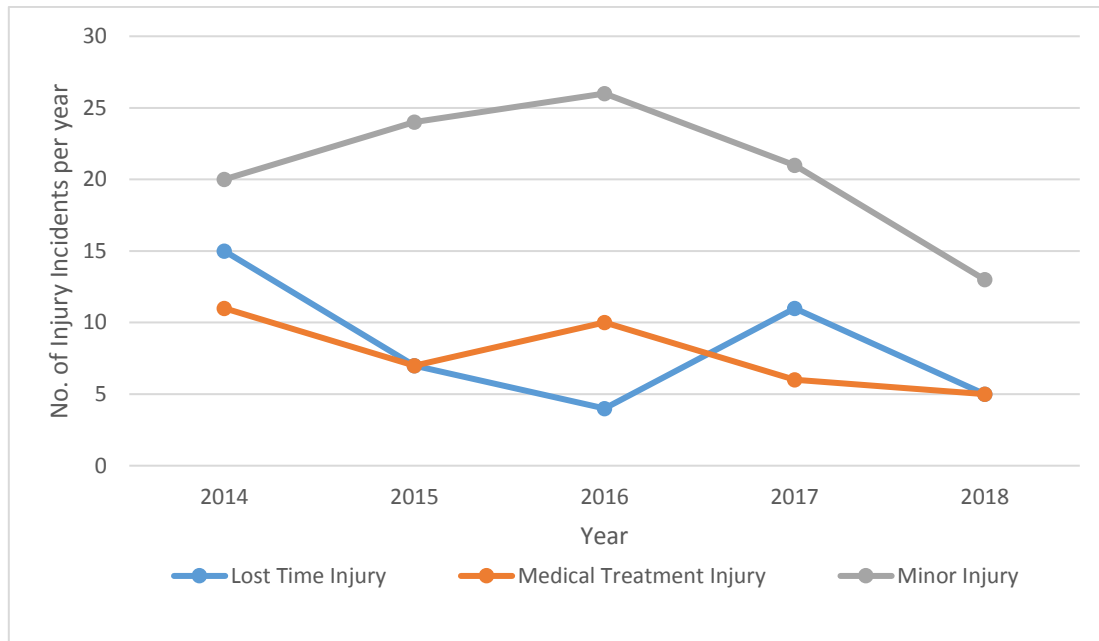
Log processing and general skid work tasks contributed to the greatest number of events reported to the IRIS database of the last five years (Table 3). The number of fleeting, sorting and stacking events increased to 2017 and then declined rapidly in 2018. Log processing and skid work events showed a trend of generally declining (except for 2017), and were at their lowest number in 2018.

**Table 2: Landing work related event types reported to the IRIS database**

Event type	2014	2015	2016	2017	2018	Total
Lost Time Injury (LTI)	15	7	4	11	5	42
Medical Treatment Injury (MTI)	11	7	10	6	5	39
Minor Injury	20	24	26	21	13	104
Contact - No Injury	61	31	37	43	12	184
Near Hit	175	184	150	154	45	708
Property Damage	66	77	76	105	37	361
<b>Total</b>	<b>348</b>	<b>330</b>	<b>303</b>	<b>340</b>	<b>117</b>	<b>1,438</b>

**Table 3: Landing work events by task**

Task	2014	2015	2016	2017	2018	Total
Fleeting / Sorting / Stacking	70	70	95	115	42	392
Log Processing / Skid work	275	247	196	211	72	1,001
Quality Control	3	13	12	14	3	45
<b>Total</b>	<b>348</b>	<b>330</b>	<b>303</b>	<b>340</b>	<b>117</b>	<b>1,438</b>



**Figure 2: Trends in landing-related injury incidents**

## Lost time injuries

There were a total of 42 lost time injuries (LTIs) occurring on the landing over the last five years, resulting in a total of 2,687 hours lost at an average of 64 hours lost per incident (Table 4).

### *Injury event*

The most frequent lost time injury event was being hit by an object (38% of landing LTIs). In 11 of the 16 injury incidents the object was a rolling log. These ‘hit by object’ injuries tended to be severe with an average of 101 hours lost time (11 work days). Eight of the 11 rolling log injuries occurred to the victims’ legs below the knee and/or to the feet. A further two injuries were to the knees and only one injury was to the upper leg.

The second most frequent lost time injury related to slipping or tripping or falling over (29% of landing LTIs) resulting in an average of 37 hours off work. In contrast to “hit by object” events “slip/trip/fall” events resulted in injuries to the upper body with three to the chest and four to hands, wrists and arms. Of note was a “Loss of Control” event where a skid worker was cutting a

log which rolled, pinched his saw bar and he fell trying to pull the saw out. The cut log then rolled over his foot resulting in 342 hours lost time.

The other “loss of control” event was a hand laceration when a skid worker shielded his face with his hand when his saw kicked back.

**Table 4: Landing work lost time injuries (LTIs) by injury inflicting event**

Event “Incident cause”	Number of injuries	Total number of hours lost	Average number of hours lost
Hit by Object	16	1,612	101
Slip/Trip/Fall	12	439	37
Body Stressing	5	162	32
Eye	3	50	17
Loss of Control	2	360	180
Burn	1	27	27
Entanglement	1	9	9
Hit object with body	1	9	9
Poor Communication	1	19	19
<b>Total</b>	<b>42</b>	<b>2,687</b>	<b>64</b>



# HARVESTING TECHNICAL NOTE

HTN12-02  
2019

## Body part injured

The lower legs from the knee down to the feet were the most frequently injured body parts in landing work (Table 5). Injuries to the lower leg and ankles were the most severe and frequently resulted in bruising or fractures from impact with rolling logs on the landing.

**Table 5: Landing work lost time injuries by part of body injured**

Body part	No. of injuries	Total no. of hours lost	Average no. of hours lost
Eye	3	50	17
Hand/Wrist <sup>2</sup>	8	273	34
Upper/Lower Arm	2	27	14
Upper body <sup>1</sup>	5	268	54
Abdomen/Pelvis	1	27	27
Hip/Upper Leg/Thigh	2	180	90
Knee	4	229	57
Lower Leg	6	894	149
Ankle	5	513	103
Foot	6	226	38
<b>Total</b>	<b>42</b>	<b>2,687</b>	<b>64</b>

<sup>1</sup>chest, back, shoulder

<sup>2</sup> hand, wrist, finger/thumb



**Figure 3: Landing workers cutting logs to length (Ref: FGR)**

## Injury type

Bruising and sprains and strains accounted for the greatest number of lost time injuries followed by lacerations and fractures (Table 6). The most severe injuries were fractures, mostly to the lower legs, resulting in the greatest lost time (158 hours or 18 days per incident).

**Table 6: Landing work lost time injuries by type**

Injury type	Number of injuries	Total no. of hours lost	Average no. of hours lost
Fracture	6	948	158
Bruising	9	806	90
Sprain/Strain	9	300	33
Cut/Lacerated	6	192	32
Crush	3	165	55
Amputation	1	104	104
Puncture	2	59	30
Foreign Body	3	50	17
Burn	2	36	18
Infection	1	27	27
<b>Total</b>	<b>42</b>	<b>2687</b>	<b>64</b>



**Figure 4: Landing workers measuring and cutting logs (Ref: FGR)**



# HARVESTING TECHNICAL NOTE

HTN12-02  
2019

## Medical treatment injuries

Medical treatment injuries are serious in that they require treatment by a medical practitioner (doctor, physiotherapist, chiropractor etc.) and not just first aid on site. In this type of injury the worker returns to work at the start of the next scheduled work day, so there is no lost time.

### Injury event

Slip, trip and fall injuries were the most frequent injury event (Figure 5). Landings often have uneven ground and logging debris present such as slovens, bark and limbs underfoot which provide tripping hazards.

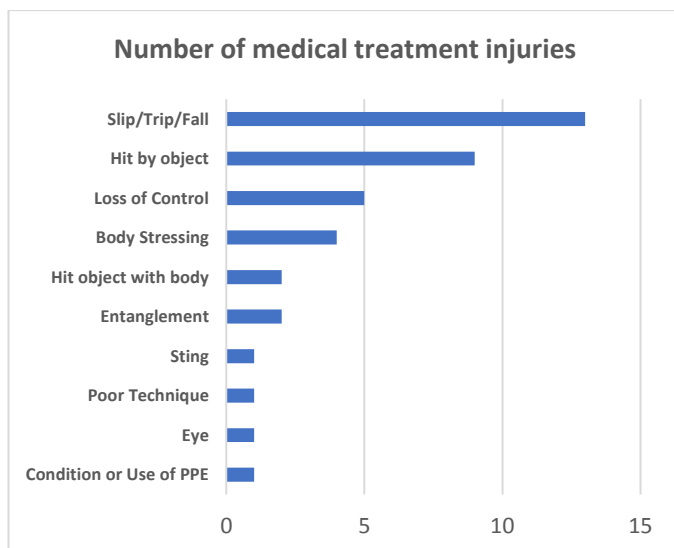


Figure 5: Number of landing related work medical treatment injuries by injury event

### Injury type

Lacerations were the most frequent medical treatment injury during landing work (Figure 6). Lacerations occurred most commonly from the chainsaw, followed by lacerations during maintenance and being cut on the loggers' tape. Sprains and strains were the second most frequent medical treatment injury.

## Number of medical treatment injuries

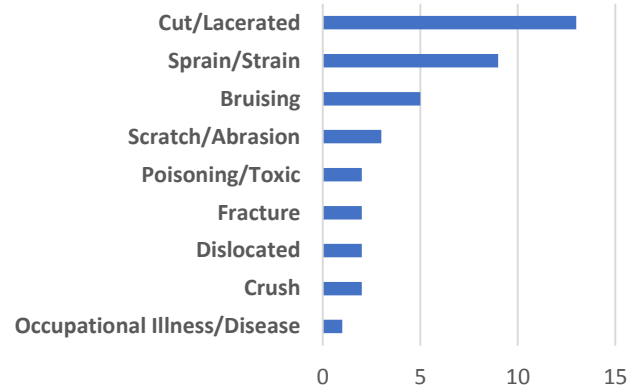


Figure 6: Number of landing related medical treatment injuries by type

## Discussion and Conclusions

This analysis has highlighted the considerable differences in the type and frequency of injuries occurring to landing workers. The number of injuries reported has reduced over the analysis period 2014 to 2018 likely due to the greater use of mechanisation on the landing.

Landing workers suffered most injuries to the lower legs and feet, often from impact from logs. Overall there has been a reduction in the frequency of lost time and medical treatment injuries to landing workers.

This data will be used as a baseline of injury types, situations and causes so that changes due to technologies (and other innovations) developed in the Primary Growth Partnership "Harvesting in the Modern Age" research programme can be identified.