



Harvesting Breaking Out 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, specifically related to cable logging breaking out. There were a total of 132 breaking out related injury incidents recorded. They comprised 29 lost time injuries, 33 medical treatment injuries and 70 minor injuries. The most frequent cause of injury was being struck by an object. Most commonly the object was a stem in the drag or strops. The body part most frequently injured was the head and face including the teeth.

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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 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).

The purpose of this report is to identify trends in breaking out injury events over the last five years. Breaking out is the task of manually attaching cables to logs or tree stems for extraction to the landing. Analyses will provide a baseline of injury types, situations and causes from which any improvements in safety due to interventions such as grapples or other innovations developed in the new FGR programme can be measured. This report focuses on lost time and medical treatment injuries because there is less discretion available 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. The 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 or not sought.



Figure 1: Breaking out on steep terrain

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



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For breaking out events:

- ACTIVITY = Harvesting
- OPERATION = All operations
- TASK = Breaking out, out haul and walk in, retreat and in haul, stopping

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

Variable	Examples ¹
Task	Breaking out – out haul and walk in, retreat and in haul, stopping 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

¹ Not an exhaustive list of examples used in the database

Results

There were a total of 414 breaking out-related incident reports to the IRIS database in the period January 2014 to December 2018 (Table 2). Most reports were for near-hit, minor injury, and contact – no injury events. The number of lost time injuries has fluctuated over time and generally trended down since the high in 2014. This could be due to the greater use of grapples for breaking out.

The tasks of attaching strops to stems (hooking on) and the retreat and inhaul phase of cable logging operations have resulted in the greatest number of events reported to IRIS over the last five years (Table 3). However, the number of these events has decreased substantially from 60 and 69 events respectively in 2014 to nine and ten events respectively in 2018. This is likely to be due to the greater use of grapples for cable logging extraction.

Table 2: Breaking out related event types reported to the IRIS database

Event type	2014	2015	2016	2017	2018	Total
Lost Time Injury	11	3	6	3	6	29
Medical Treatment Injury	12	6	6	6	3	33
Minor Injury	14	10	21	18	7	70
Contact - No Injury	28	18	6	11	1	64
Near Hit	84	60	41	14	11	210
Property Damage	4	3	1	0	0	8
Total	153	100	81	52	28	414

Table 3: Breaking out events by breaking out task

Task	2014	2015	2016	2017	2018	Total
Breaking Out – Hooking on	60	40	34	19	9	162
Breaking Out - Retreat and In Haul	69	33	25	20	10	157
Breaking Out - Out Haul and Walk In	24	27	22	13	9	95
Total	153	100	81	52	28	414



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Lost time injuries

There were a total of 29 breaking out lost time injuries (LTIs) resulting in a total of 3,478 hours lost at an average of 120 hours lost per incident (Table 4).

Injury event

The most frequent breaking out lost time injury event was being hit by an object (62%) with 18 injuries resulting in a total of 2,724 hours lost. The object inflicting injury was most commonly a stem in the drag (7 injuries) or strops or rigging (6 injuries). Hit by object injuries tended to be severe with an average of 151 hours lost time (17 work days). The head was the most frequently injured part of the body (7 injuries). The second most frequent lost time injury event was slipping or tripping and falling over (17%) resulting in an average of 128 hours off work per incident (14 days).

Table 4: Breaking out lost time injuries by injury inflicting event

Event "Incident cause"	Number of injuries	Total number of hours lost	Average number of hours lost
Hit by object	18	2,724	151
Slip/Trip/Fall	5	638	128
Body Stressing	3	35	12
Other	1	9	9
Poor Communication	1	63	63
Sting	1	9	9
Total	29	3,478	120

Body part injured

The head was the body part most frequently injured in breaking out lost time events (Table 5). This is not surprising given the posture and body position of the breaker-out while hooking on (Figure 2 and 3).

There were four concussions recorded; three were breaker outs hit in the head by a moving stem and one where the breaker out was hit in

the head by the strop he was carrying. A further three head injuries were to the face; struck by swinging rigging, hit by a dislodged stick and hit a moving stem. The most serious injuries (time off work) were to the hip, upper leg region resulting in an average of 419 hours lost time. There were two injuries of this type, both fractures from being hit by a stem in the drag.



Figure 2: Attaching wire strop (R. Visser, 2019)

Table 5: Breaking out lost time injuries by part of body injured

Body part	Number of injuries	Total number of hours lost	Average number of hours lost
Head	10	1071	107
Eye	1	9	9
Finger/Thumb	3	396	132
Upper/Lower Arm	3	570	190
Upper body	5	187	37
Hip/Upper Leg/Thigh	2	837	419
Knee	1	9	9
Lower Leg	2	170	85
Ankle	2	229	115
Total	29	3478	120



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Figure 3: Attaching a chain stop (R. Visser, 2019)

Injury type

Fractures accounted for the greatest total amount of lost time followed by concussions (Table 6). The most severe injury was an amputation where a breaker out tripped and fell, one hand landed on the moving rope and was pulled into the block cutting off his fingers.

Table 6: Breaking out lost time injuries by type of injury

Injury type	Number of injuries	Total number of hours lost	Average number of hours lost
Fracture	6	1591	265
Concussion	4	957	239
Sprain/Strain	7	384	55
Amputation	1	328	328
Dislocated	1	81	81
Bruising	4	59	15
Cut/Lacerated	3	51	17
Sting/bite	2	18	9
Dehydration	1	9	9
Total	29	3478	120

Medical treatment injuries

Medical treatment injuries are serious in that they required treatment by a medical practitioner (doctor, physiotherapist, chiropractor etc.) and

not just first aid on site. The worker can return to work at the start of next scheduled work day.

Slip, trip and fall injuries are the most frequent injury event (Figure 4). The steep terrain, logging debris underfoot and slippery surfaces due to rain and cambium on logs when the bark has been knocked off make for a demanding work environment.

Swinging rigging, siwashed ropes (rope bent around a stump or other obstruction) and moving stems were the most frequently recorded events which resulted in “hit by object” injuries.

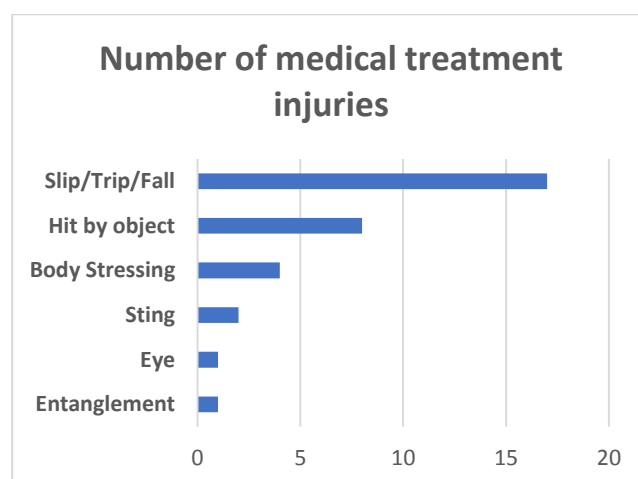


Figure 4: Number of breaking out medical treatment injuries by injury event

Sprains, strains and bruising tend to be associated with the most common event of slipping, tripping and falling (Figure 5). The four chipped tooth injuries were the result of being hit in the mouth by the strops while hooking up a drag.



Number of medical treatment injuries

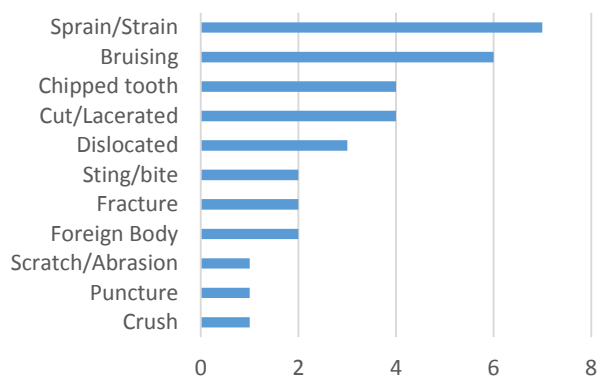


Figure 5: Number of breaking out medical treatment injuries by type of injury

Discussion and Conclusions

This analysis has highlighted the considerable differences in the types and frequency of injuries occurring to breaker outs. The number of injuries reported has reduced over the analysis period 2014 to 2018 likely due to the greater use of grapples for breaking out.

Breaker outs were most commonly hit by the drag or strops about the head and face. Overall there has been a reduction in the frequency of lost time and medical treatment injuries to breaker outs.

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