

Newfoundland & Labrador Forestry Occupational Health and Safety Project

Statistical report on forestry and forestry-related WHSCC claims, 1990-2002*

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Mr. Pablo Navarro
Dr. Barbara Neis
Dr. Martha MacDonald
Dr. James Lawson

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Executive Summary

An analysis of claims from the Workplace Health, Safety and Compensation Commission was carried out for the logging, pulp and paper, and wood primary processing industries from 1990 to 2002 inclusive. The claims were for occupational injuries and fatalities sustained by workers involved in all occupations within those industries. Sub-groups divided the claims among “Logger”, “Processor” and “Supervisor”.

The Logger sub-group had the highest number of claims for any of the subgroups. The total number of claims for this group has been decreasing over the study period. The time of accidents within a logging season has been shown to be happening earlier in the season. Cluster analysis was used to classify the accidents into six groups: chainsaw injuries, injuries from being struck by wood, soft tissue injuries from overexertion, severe injuries due to falls and overexertion, less severe injuries due to worker reaction, and hearing loss injuries. This last accident profile was notable in that these accidents occurred earlier in the season compared to all others, and may indicate poor use of protective gear.

Processors had less claims than loggers and did not show any significant trends in terms of the number of claims per year or the timing of accidents within the year. Cluster analysis produced three accident profiles for this sub-group: hearing loss injuries, more severe accidents due to overexertion, and less severe injuries with a range of causes and characteristics.

The Supervisor sub-group was the smallest in terms of numbers of accidents. There were no significant trends in terms of annual number of claims or the timing of the claims within the year. A cluster analysis divided the accidents into two poorly defined groups based on severity.

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Part I. Overview

This report is based on an analysis of anonymized claims from the forestry and wood processing industries to the Newfoundland and Labrador Workplace Health, Safety and Compensation Commission (WHSCC). The data is based on claims submitted from 1990 to 2002 inclusive. WHSCC extracted the data from the WHSCC administrative claims database and the WHSCC employers database. The extracted data was anonymized by encrypting or removing personal information, e.g. the claimant's name and WHSCC provided the two sets of data in a raw, unprocessed format. Further measures have been taken to protect the privacy of claimants; any results with less than five claims are masked, i.e. written as "<5", to prevent the possibility of residual identification of an individual. Throughout this report, the privacy of employers is also protected in the same manner: identifying information was encrypted or removed by WHSCC prior to the transfer of data; and research results with less than five employers are presented with the "<5" mask in order to avoid identifying the employers.

Our data cleaning and preparation methods are detailed in the Forestry Data Log Sheet (Appendix A). We did not experience any difficulties linking the claims data to the employer data. Suspected data entry errors and ambiguous data have been queried to WHSCC. We have received partial responses to our queries. The unresolved queries are not expected to have a significant effect on the outcomes of our analyses. Ethics clearance for this project was received from the Interdisciplinary Committee on Ethics in Human Research at Memorial University.

Our main concern with regard to data quality relates to changes to the coding system over the study period. In particular, there was a major shift in the coding protocol that occurred in 1997. This problem has been addressed through a "re-categorization" process (see Appendix B). In short, the process grouped individual values for four separate variables (Nature of Injury, Source of Injury, Type of Accident and Part of Body). The new groups re-categorized the values into same-level or higher level categories that were consistent throughout the whole study period. In reviewing the results of our statistics, we recommend that you employ the re-categorization tables in order to better interpret the results.

The full dataset of claims has been divided into sub-groups based on the claimant's occupational classification. Our reasoning was that there was greater external validity in combining like professions across different industries than there was in analyzing industry sub-groups with a diversity of occupations or in analyzing all of the data together. The three sub-groups are: "Loggers", "Processor" and "Supervisor". The Logger cohort consists of workers who are involved in the direct harvesting of trees (including cutting, de-branching and loading). The Processor cohort is made up of workers who work directly with wood and wood products. The Supervisor sub-group consists of claims from workers in supervisory, administrative or quality-control positions. These groups were defined with the help of Dr. Peter Sinclair, as well as Dr. Jamie Lawson and Mr. Joshua Pike (see Appendix C).

This report provides a statistical summary of the data for each of the sub-groups. The summary gives an orientation to the data, descriptive statistics of the data and identifies, where possible, gross trends and statistically significant findings. The summary is exploratory in nature, and with the exception of the re-categorization process, no previous information has been used to guide the analysis in the manner of hypothesis testing. In particular, the results from cluster analysis are derived purely from the data. The hypothesis tests that are included in the summary indicate the significance of the observed trends.

Part II. The Logger sub-group

Claimants in the Logger sub-group are predominantly male (99.2%). They have a mean birth year of 1956 and a median birth year of 1957 (Figure 1). The age distribution is skewed towards younger claimants.

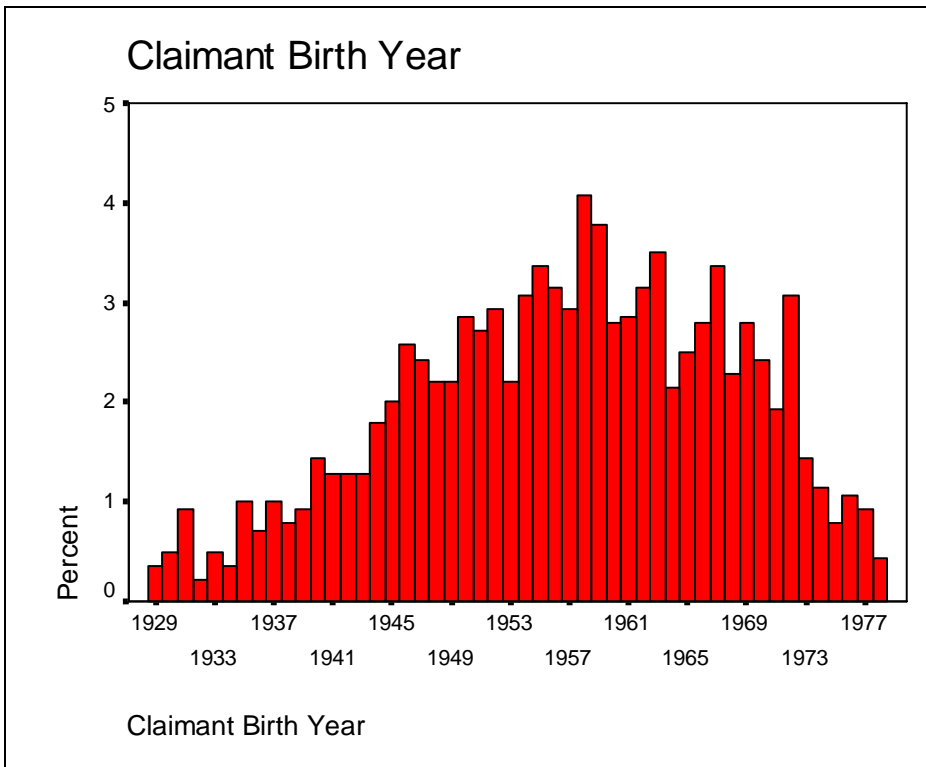


Figure 1: Distribution of Claimant by Birth Year



Figure 2: Distribution of Accidents by Year

There were 1412 claims for compensation in the Logger sub-group from 1990 to 2002. The number of accidents per year follows an overall downward trend from 1990 to 2002 (Figure 2). At this point, we cannot tell how much of the decrease in the number of accidents is due to a reduction in the size of the workforce, a reduction in the level of exposure (hours worked) or a change in safety practice. The decrease in total number of claims over the study window is significant ($p < 0.01$), but this result assumes no change in the number of workers in the Logger sub-group during the study period.

The relative significance of the decrease in number of accidents would be better understood through the rates of accidents during the study period, i.e. the number of accidents per year per worker or the number of accidents per year per 1000 work hours. Since a rate would divide the total number of accidents in a given year by the size of the work force or the amount of work exposure, it would take into account changes in workforce and working patterns and allow for a meaningful test of significance in those changes.

Year	WHSCC Claims	IMDB Forestry Survey		Canadian Census	
	"Logger" Accidents	Workforce estimate	Rate	Workforce estimate	Rate
1990	153	899	17.02%		
1991	132	834	15.83%	2840	4.65%
1992	109	785	13.89%		
1993	112	803	13.95%		
1994	145	885	16.38%		
1995	128	792	16.16%		
1996	112	823	13.61%	2430	4.61%
1997	116	1013	11.45%		
1998	88	798	11.03%		
1999	129	770	16.75%		

Table 1: Estimates of Logger Rates of Accidents

Unfortunately, we do not have any indicators of the size of the workforce according to the WHSCC coding system, and therefore cannot calculate the annual rates of accidents.

An estimate of the rates may be generated using other measures of workforce size; using figures from other sources, our best guess as to the rates of accidents among workers classified in the Logger sub-group are shown in Table 1 on the previous page.

Using the IMDB Forestry Survey data, there is no significant correlation between the year and the rate of accidents, i.e. there is no significant trend in either direction. The Canadian Census data does not have enough entries to carry out a statistical analysis. What is clear, however, is that the coding systems for occupation vary substantially and there appears to be little agreement on occupational classification definitions.

Within the course of a year, accidents are more likely to occur during the summer and fall; July, August and September are the months with the largest number of accidents (months 7, 8 and 9 respectively; Figure 3 next page). The box-plot (Figure 4 next page) shows the median day for accidents which is indicated by the dark bold black line (half the accidents occur before this day, and half occur after), with Day 1 being January 1st of that year. The upper and lower bounds of the box represent the first upper and lower quartiles respectively. The T-bars represent the second upper and lower quartiles. Outliers are indicated with circles. The median accident date appears to follow a weak trend of decreasing over the study period.

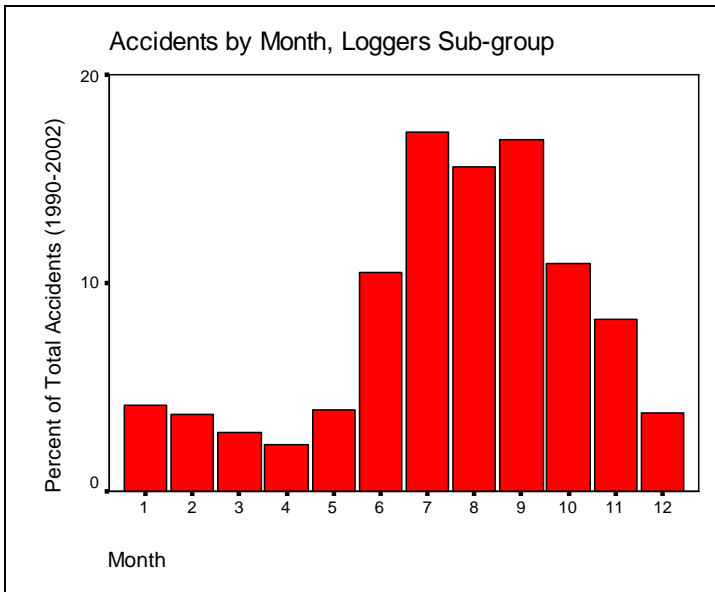


Figure 3: Distribution of Accidents by Month

The data indicate a trend over the course of the study period for accidents to occur earlier in the season (Figure 4; note that January 1= Day 1, February 1=Day 32, etc). An analysis of variance shows that there is a significant effect of accident year on the month or day of the accident, where accidents are occurring earlier in the year ($p < 0.001$). It is not clear what the source of the change towards earlier accident dates is; this is definitely an area that warrants further investigation.

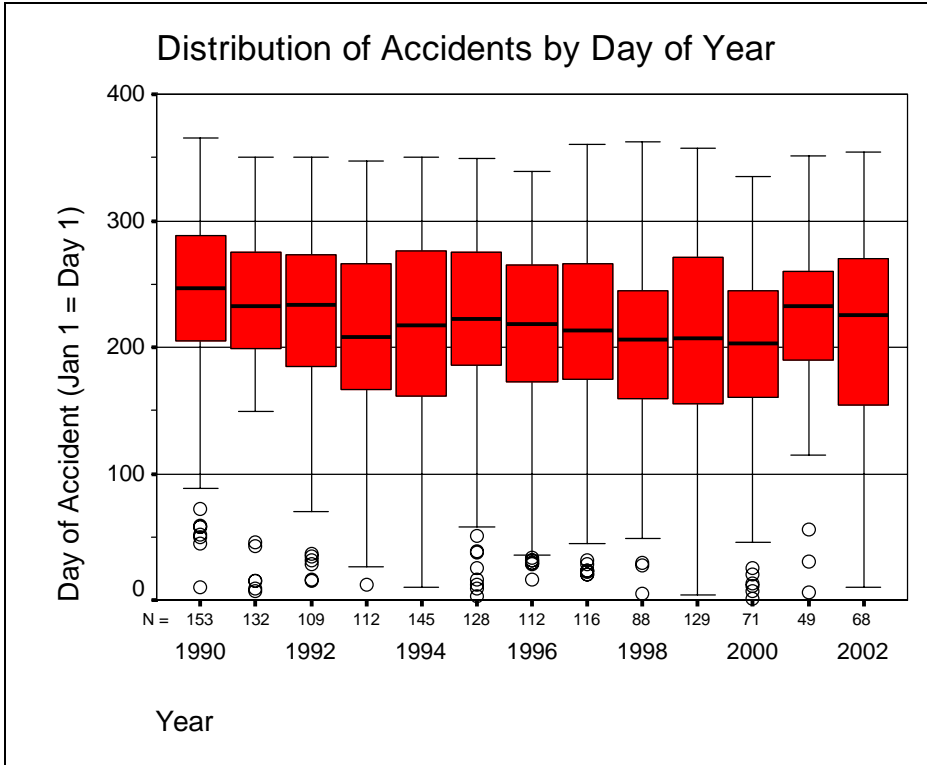


Figure 4: Accident Day by Year (Box Plot)

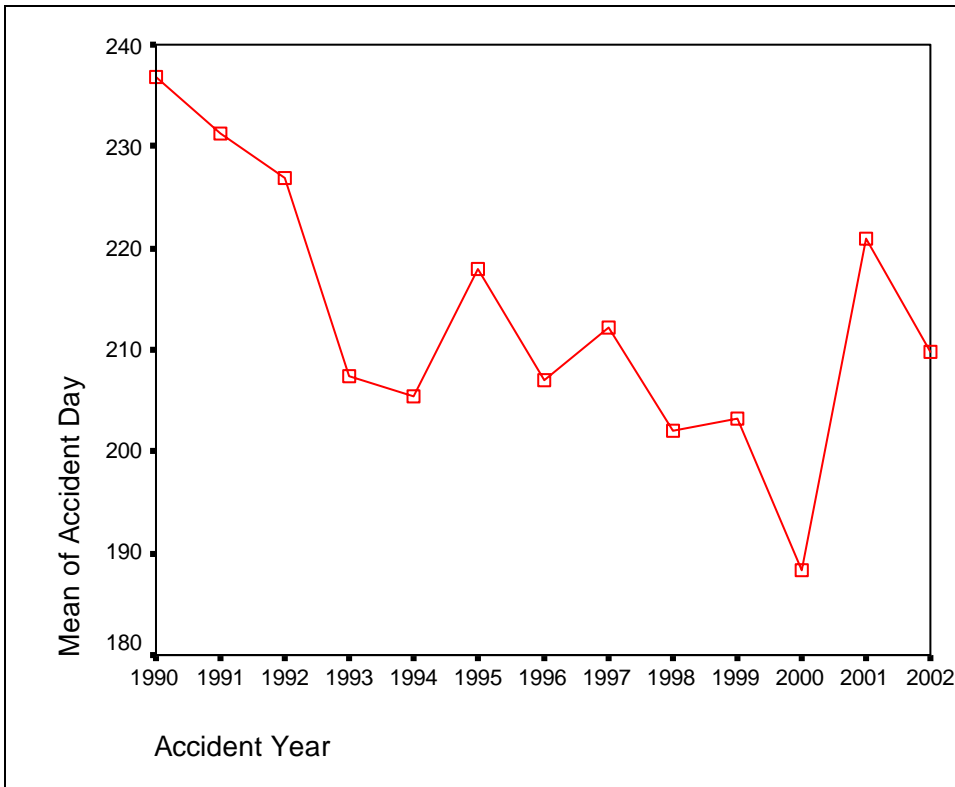


Figure 5: Mean of Accident Day by Year

Most of the claims (93.2%) for loggers come from individuals described as Timber Cutters and Related Occupations (Table 2). The majority of these claims were from enterprises listed as Logging companies (Table 3). The majority of claims came from the west coast of Newfoundland (557) or central Newfoundland (409) (Table 4). These regions also had the highest rates of accidents per employer, with an average of 8.07 accidents per employer during the study period for the west coast and 6.93 for the central region. These findings are most likely an indication of the relatively larger sizes of logging companies in the western and central regions of the province. Regions with fewer companies that have a proportionately higher number of workers will tend to have a higher rate of accidents per employer.

Occupation	Frequency	Percentage
Timber Cutting and Related Occupation	1316	93.20%
Forest/Logging Occupations NEC	67	4.75%
Forest/Log Labour Occupation	21	1.49%
Log Hoist/Sort/Move Occupation	8	0.56%
Total	1412	100%

Table 2: Logger Sub-group Claims by Occupation Classifications

Newfoundland Industry Code	Frequency	Percentage
Logging Industry (per cubic metre)	1175	83.22%
Sawmill & Planning Mill Products Industry	136	9.63%
Sawmill and Planning Mills	46	3.26%
Other Industries	45	3.19%
Total	1411	99.93%
<i>Missing</i>	<i>1</i>	<i>0.07%</i>

Table 3: Logger Sub-group Claims by Industry Classifications

Region	Employers	Claims	Ratio (Claims/Employers)
Avalon	15	43	2.87
Eastern	89	371	4.17
Central	59	409	6.93
West Coast	69	557	8.07
Labrador	7	23	3.29
<i>Missing</i>		<i>9</i>	

Table 4: Logger Sub-group Claims and Employers by Region

The average Lost Time in Weeks for claimants in the Logger sub-group was 13 and the Lost Time in Dollars was \$3,941. Medical Aid Dollars were, on average, slightly less at \$3,314. However, the high standard deviation for both (Lost Time in Dollars std dev.= \$7,505; Medical Aid Dollars std dev.= \$8,229) indicate that there is a great deal of variability in the claim amounts for lost time, lost time dollars and medical aid. This will be further addressed in the cluster analysis.

Tables 5-8 summarize all the claims during the study period in terms of Nature of Injury, Source of Injury, Type of Accident and Part of Body respectively. They provide basic descriptions of the accidents involved in the claims and an indication of the most common characteristics of the accidents for the Logger sub-group.

Forestry OHS

Nature of Injury Group	Freq.	Percent
Traumatic injuries to muscles, tendons, joints etc.	566	40.08%
Open wounds	306	21.67%
Surface wounds and bruises	200	14.16%
Disorders of the ear, mastoid process, hearing	97	6.87%
Traumatic injuries to bones, nerves, cranium	78	5.52%
Back pain, hurt back	46	3.26%
Nonspecific injuries and disorders	44	3.12%
Multiple traumatic injuries and disorders	28	1.98%
Musculoskeletal system and connective tissue disorders and diseases	19	1.35%
Other	20	1.42%
Total	1405	99.50%
<i>Missing</i>	7	0.50%

Table 5: Nature of Injury, All Claims Logger Sub-group

Source of Injury Group	Freq.	Percent
Persons, plants, animals and minerals: Trees, logs	359	25.42%
Tools, instruments and equipment: Chainsaws	228	16.15%
Persons, plants, animals and minerals: Person-injured or ill worker	206	14.59%
Persons, plants, animals and minerals: Plants, trees, vegetation-not processed	162	11.47%
Other sources: Noise	97	6.87%
Structures and surfaces: Ground	84	5.95%
Parts and Materials: Wood, lumber	78	5.52%
Parts and Materials	36	2.55%
Tools, instruments and equipment	26	1.84%
Vehicles	13	0.92%
Structures and surfaces	12	0.85%
Machinery	11	0.78%
Other (Various Sources)	37	2.62%
Total	1392	98.58%
<i>Missing</i>	20	1.42%

Table 6: Source of Injury, All Claims Logger Sub-group

Type of Accident Group	Freq.	Percent
Body reaction and exertion: Overexertion	289	20.47%
Body reaction and exertion	193	13.67%
Contact with object & equipment: Struck by object	182	12.89%
Fall	150	10.62%
Contact with object & equipment: Struck by flying object	102	7.22%
Contact with object & equipment: Struck by swinging or slipping object	98	6.94%
Exposure to harmful substances or environments: Noise	96	6.80%
Contact with object & equipment: Struck against object	60	4.25%
Contact with object & equipment: Struck by falling object	54	3.82%
Contact with object & equipment: Rubbed/abraded by friction/pressure	41	2.90%
Contact with object & equipment: Caught or compressed by equipment or object	38	2.69%
Contact with object & equipment	22	1.56%
Transportation accident	11	0.78%
Body reaction and exertion: Repetitive motion	8	0.57%
Exposure to harmful substances or environments	8	0.57%
Total	1396	98.87%
<i>Missing or Unknown</i>	59	4.18%

Table 7: Type of Accident, All Claims Logger Sub-group

Part of Body Group	Freq.	Percent
Trunk: Back, including spine, spinal cord, unspecified	407	28.82%
Lower Extremities: Leg(s)	126	8.92%
Lower Extremities: Knee(s)	110	7.79%
Head: Ear (Inner/Middle)	93	6.59%
Upper Extremities: Arm(s)	81	5.74%
Upper Extremities: Wrists and Hand(s), except finger(s)	79	5.59%
Trunk	74	5.24%
Upper Extremities: Finger(s)	74	5.24%
Lower Extremities: Feet	67	4.75%
Trunk: Shoulder, including clavicle, scapula	56	3.97%
Head	45	3.19%
Head: Eye(s)	34	2.41%
Lower Extremities: Ankle(s)	26	1.84%
Neck including throat	24	1.70%
Lower Extremities: Multiple	14	0.99%
Upper Extremities: Multiple	12	0.85%
Other	90	6.37%
Total	1412	100.00%

Table 8: Type of Accident, All Claims Logger Sub-group

Tables 9-12 describe the cross-tabulations for Nature of Injury, Source of Injury, Type of Accident and Part of Body by year. The cross-tabulations use the re-categorized values for each field. The tables provide a temporal map for the accident descriptors during the thirteen year study period. The cross-tabulations analysis also provides statistical tests that indicate whether or not the accidents are randomly distributed over the variables; not surprisingly, this is not the case for any of the variables included (more details on this below).

The four claim descriptor fields (Nature of Injury, Source of Injury, Type of Accident and Part of Body), the indicators of severity (Lost Time Weeks to Date, Lost Time Dollars to Date and Medical Aid Dollars to Date) and the temporal fields (Accident Year, Accident Month, Accident Day) have been combined to explore how the data clusters along these dimensions. The statistical procedure, a two-step cluster analysis, finds concentrations of accidents, or “clusters”, within the multi-dimensional array of data; the number of accident in each cluster is shown in Figure 6 on page 11.

***Please note:** In order to protect the privacy and confidentiality of workers and employers, counts of less than five for any research results are presented as “<5”.*

The analysis indicates how each cluster is represented by the continuous variables (Table 13-14). The continuous variables each yield a centroid, which can be interpreted as the centre point for the claims included in the cluster.

Forestry OHS

Abbreviations		
BRE: Body reaction or exertion	CWOE: Contact with object or equipment	LE: Lower extremities
PPAM: Persons, plants, animals and minerals	UE: Upper extremities	

Nature of Injury Group	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Traumatic injuries to muscles, tendons, joints ...	79	56	51	46	62	53	40	45	30	41	20	18	25	566
Open wounds	43	44	25	27	25	33	30	22	17	16	6	7	11	306
Surface wounds and bruises	19	19	17	14	34	20	16	18	16	10	5	6	6	200
Disorders of the ear, mastoid process, hearing		<5	6	8	9	11	12	15	5	10	7	<5	9	97
Traumatic injuries to bones, nerves, cranium	9	8	6	11	8	<5	7	<5	<5	9	<5	5	<5	78
Back pain, hurt back									<5	19	14	<5	7	46
Nonspecific injuries and disorders					<5			<5	<5	15	11	<5	7	44
Multiple traumatic injuries and disorders	<5	<5	<5	<5	<5	<5	<5	7	<5	<5	<5	<5		28
Musculoskeletal system and connective ...	<5	<5			<5	<5	<5	<5	<5	<5	<5		<5	19
Burns				<5										<5
Other	<5	<5	<5	<5	<5	<5			6	<5	<5		<5	20
Total	153	131	109	112	144	126	110	115	88	129	71	49	68	1405

Table 9: Nature of Injury by Year, All Claims Logger Sub-group

Source of Injury Group	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
PPAM: Trees, logs	27	36	27	20	40	18	18	31	29	44	28	18	23	359
Tools, instruments and equipment: Chainsaws	40	38	12	25	21	19	17	11	9	16	7	6	7	228
PPAM: Person-injured or ill worker	18	7	16	10	23	26	15	14	13	28	14	5	17	206
PPAM: Plants, trees, vegetation-not processed	38	27	14	26	12	20	24				<5			162
Other sources: Noise		<5	6	8	9	11	12	15	5	10	7	<5	9	97
Structures and surfaces: Ground	13	11	6	9	5	<5	<5	5	<5	13	<5	5	<5	84
Parts and Materials: Wood, lumber	<5	<5	10	6	13	11	5	<5	7	8	6	<5	<5	78
Parts and Materials	5	<5	<5	<5	11	6	<5		<5	<5		<5		36
Tools, instruments and equipment	<5	<5	10	<5		<5	<5	<5	<5					26
Vehicles	<5	<5			<5			5		<5	<5	<5		13
Structures and surfaces	<5			<5	<5	<5				<5	<5	<5	<5	12
Machinery		<5	<5		<5	<5			<5	<5			<5	11
Other	<5	<5	<5	<5	5	<5		<5	<5	<5	<5	<5	<5	32
Unknown								26	14	<5				43
Total	152	131	108	112	145	123	101	116	88	129	71	49	67	1392

Table 10: Source of Injury by Year, All Claims Logger Sub-group

Forestry OHS

Type of Accident Group	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
BRE: Overexertion	37	29	27	24	35	20	19	15	14	23	23	12	11	289
BRE	20	7	11	9	22	26	16	13	10	24	14	5	16	193
CwOE: Struck by object	25	36	6	8	21	34	23	5	<5	<5	<5	<5	11	182
Fall	17	19	10	13	12	10	7	10	7	22	7	11	5	150
CwOE: Struck by flying object	14	14	9	15	18	7	7	<5	<5	7		<5	<5	102
CwOE: Struck by swinging or slipping object	12	8	14	8	5	5	5	6	9	14	7	<5	<5	98
Exposure to: Noise		<5	6	8	9	11	12	14	5	10	7	<5	9	96
CwOE: Struck against object	7	8	5	8	6	5	11	5	<5				<5	60
CwOE: Struck by falling object								11	12	11	8	7	5	54
CwOE: Rubbed/abraded by friction/pressure	8	<5	5	15	5	<5	<5			<5		<5	<5	41
CwOE: Caught/compressed by equip/object	<5	<5	6	<5	8	<5	<5	<5	6	<5			<5	38
CwOE	9	<5	8		<5							<5		22
Transportation accident	<5	<5			<5			<5		<5	<5		<5	11
BRE: Repetitive motion				<5				<5	<5	<5			<5	8
Unknown								26	14	<5				43
Total	153	131	109	112	144	125	102	116	88	129	71	49	67	1396

Table 11: Type of Accident by Year, All Claims Logger Sub-group

Part of Body Group	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Trunk: Back, including spine, spinal cord	45	37	32	32	45	39	29	24	24	43	26	14	17	407
LE: Leg(s)	13	11	12	10	13	15	7	9	6	16	5	5	<5	126
LE: Knee(s)	14	12	10	10	10	8	9	9	6	11	5	<5	<5	110
Head: Ear (Inner/Middle)		<5	5	6	8	11	12	15	5	10	7	<5	9	93
UE: Arm(s)	8	11	5	<5	10	<5	12	5	6	7	3	<5	<5	81
UE: Wrists and Hand(s), except finger(s)	9	8	8	6	5	12	<5	5	<5	7	<5	6	<5	79
Trunk	9	11	<5	5	7	<5	5	8	<5	7	5	<5	<5	74
UE: Finger(s)	11	10	7	9	7	5	5	<5	8	4	<5		<5	74
LE: Feet	8	13	<5	8	<5	7	6	6	<5	<5	<5	<5	<5	67
Trunk: Shoulder, including clavicle, scapula	8	7	<5	<5	5	7	5	<5	5	<5	5	<5	<5	56
Head	7	<5	<5	7	5	6	5	<5	<5	<5	<5		<5	45
Head: Eye(s)	6	<5	<5	<5	<5	<5	<5	<5	5	<5		<5	<5	34
LE: Ankle(s)	<5		<5	<5	<5			3	<5	<5	<5	<5	<5	26
Neck including throat	<5		<5		6		<5	<5	<5	<5	<5	<5	<5	24
LE: Multiple		<5	<5	<5	<5	<5	<5	<5	<5				<5	14
UE: Multiple		<5		<5		<5	<5	<5		<5	<5		<5	12
Other	7	<5	8	7	13	7	6	13	8	8	<5	<5	5	90
Total	153	132	109	112	145	128	112	116	88	129	71	49	68	1412

Table 12: Part of Body by Year, All Claims Logger Sub-group

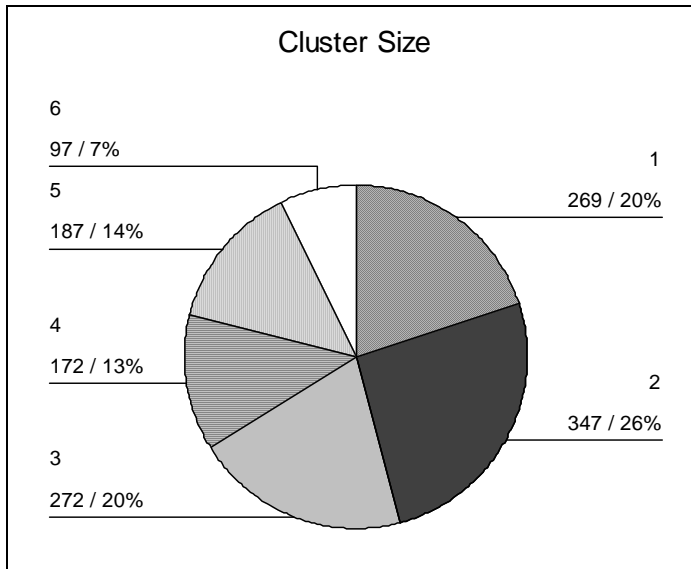


Figure 6: Number of accidents per cluster

Clusters: Number of Claims and Percent of Claims				Centroids					
Cluster	Claims	% of Combined	% of Total	Accident Year		Accident Month		Accident Day	
				Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
1	269	20.01	19.05	1994.15	3.42	7.71	2.19	219.15	66.78
2	347	25.82	24.58	1994.80	3.38	7.59	2.70	215.80	81.87
3	272	20.24	19.26	1994.90	3.64	7.26	2.66	205.85	80.34
4	172	12.80	12.18	1995.59	3.99	8.04	2.51	229.81	75.34
5	187	13.91	13.24	1996.08	3.57	7.80	2.75	220.78	83.27
6	97	7.22	6.87	1996.77	2.96	6.15	3.37	172.91	101.89
Combined	1344	100.00	95.18	1995.11	3.60	7.53	2.67	213.85	80.77
Excluded	68		4.82						
Total	1412		100.00						

Table 13: Cluster Analysis Results and Centroids for Temporal Fields

Clusters: Number of Claims		Centroids					
Cluster	Claims	Lost Time Weeks To Date		Lost Time Dollars To Date		Medical Aid Dollars To Date	
		Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
1	269	11.00	21.48	\$3,022.16	\$5,680.11	\$2,771.00	\$7,311.19
2	347	8.51	13.41	\$2,767.12	\$4,234.93	\$1,413.21	\$3,241.33
3	272	10.81	14.07	\$3,386.68	\$4,367.17	\$2,070.02	\$3,947.62
4	172	43.18	51.89	\$12,542.47	\$15,065.63	\$11,886.87	\$17,559.40
5	187	11.50	15.41	\$3,630.95	\$4,686.51	\$2,306.83	\$4,317.06
6	97	0	0	\$0	\$0	\$3,714.35	\$3,517.77
Combined	1344	13.71	26.26	\$4,115.05	\$7,616.87	\$3,448.69	\$8,372.34

Table 14: Cluster Analysis Centroids for Accident Severity Fields

The clusters also group together accidents, or claims, based on the values in the categorical variables (Nature of Injury, Source of Injury, Type of Accident and Part of Body). Each categorical variable may be described in terms of how the categorical values are distributed among the clusters (Table 15-18). The clusters provide a conceptual way

Forestry OHS

to group together accidents in terms of both severity (estimated by the continuous variables described above) and type.

Abbreviations	
BRE: Body reaction or exertion	CWOE: Contact with object or equipment
PPAM: Persons, plants, animals and minerals	

Nature of Injury Group	Cluster						All
	1	2	3	4	5	6	
Open wounds	260	31					291
Surface wounds and bruises	<5	174	<5	10			187
Multiple traumatic injuries and disorders	<5	14	<5	9			27
Nonspecific injuries and disorders	<5	15	9	6	10		41
Traumatic injuries to bones, nerves, cranium	<5	67		5	<5		78
Burns		<5					<5
Musculoskeletal system and connective tissue...		<5	<5	5	8		18
Traumatic injuries to muscles, tendons, joints etc.		33	247	111	151		542
Other		11	<5	<5	<5		17
Back pain, hurt back			8	24	13		45
Disorders of the ear, mastoid process, hearing						97	97
Total	269	347	272	172	187	97	

Table 15: Nature of Injury distribution across clusters

Source of Injury Group	Cluster						All
	1	2	3	4	5	6	
Tools, instruments and equipment: Chainsaws	217	<5	7	<5			228
Tools, instruments and equipment	22	<5	<5				26
Other	5	17	<5	5			31
Machinery	<5	8	<5				11
PPAM: Plants, trees, vegetation-not processed	<5	116	40	<5			162
Persons, plants, animals and minerals: Trees, logs	8	144	164	42			358
Parts and Materials	6	14	13	<5			36
Parts and Materials: Wood, lumber	<5	34	32	8			78
Containers		<5	<5	<5			5
Structures and surfaces	<5	<5		10			12
Structures and surfaces: Ground	<5	5		78			84
Vehicles		<5		11			13
PPAM: Person-injured or ill worker			7	9	187		203
Other sources: Noise						97	97
Total	269	347	272	172	187	97	

Table 16: Source of Injury distribution across clusters

Type of Accident Group	Cluster						All
	1	2	3	4	5	6	
CWOE	22						22
CWOE: Rubbed/abraded by friction/pressure	27	9	<5		<5		38
CWOE: Struck against object	33	26		<5			60
CWOE: Struck by object	116	60	<5	<5			181
CWOE: Struck by swinging or slipping object	48	47	<5	<5			98
CWOE: Caught/compressed by equip/obj	<5	37					38
CWOE: Struck by falling object		41		13			54
Exposure to harmful substances or environments		8					8
CWOE: Struck by flying object	<5	86	9	<5			101
BRE: Overexertion			258	31			289
Fall	20	33		97			150
Transportation accident			<5	10			11
Other				<5			<5
BRE: Repetitive motion				<5	6		8
BRE				8	180	<5	189
Exposure to harmful environments: Noise						96	96
Total	269	347	272	172	187	97	

Table 17: Type of Accident distribution across clusters

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Part of Body Group	Cluster						All
	1	2	3	4	5	6	
Head: Eye(s)		28					28
Head	6	34				<5	44
Upper Extremities: Finger(s)	48	23					71
Upper Extremities: Multiple	<5	5		<5	<5		11
Upper Extremities: Arm(s)	23	23	17	<5	10		77
Upper Extremities: Wrists and Hand(s), except finger(s)	32	13	8	11	6		70
Lower Extremities: Leg(s)	82	29	<5	<5	5		119
Lower Extremities: Feet	25	33	<5	<5	5		65
Lower Extremities: Knee(s)	38	20		14	34		106
Lower Extremities: Multiple	<5	9		<5			14
Lower Extremities: Ankle(s)		9		<5	14		24
Other	<5	43	6	26	<5		81
Trunk	<5	34	22	6	6		70
Trunk: Shoulder, including clavicle, scapula	<5	17	24	5	6		54
Neck including throat	<5	8	<5	9	<5		23
Trunk: Back, including spine, spinal cord, uns		19	188	92	95		394
Head: Ear (Inner/Middle)						93	93
Total	269	347	272	172	187	97	

Table 18: Part of Body distribution across clusters

It is important to remember that the clusters are derived from the data only, and do not incorporate any *a priori* knowledge aside from the inclusion or exclusion of variables into the analysis. In other words, the cluster analysis does not test any hypothesis, but rather offers a statistical description of the data. The analysis indicates six clusters:

1. The first cluster (269 claims) is characterized by open wound injuries (260 claims), which consist mostly of deep cuts and lacerations, caused by being struck by or against chainsaws and other tools (239 claims). The injuries affected all areas of the upper and lower extremities. On average, claims from this cluster received 11 weeks of lost time. The mean amount paid for medical aid was \$2,771; however, the variance in amounts paid (standard deviation = \$7,311) indicates that there is considerable variability in the severity of the injuries.
2. The second cluster (347 claims) is the largest, and is characterized by a mixed bag of traumatic injuries to hard and soft tissues and surface bruises. Most injuries were caused by processed or un-processed wood, through a range of forms of being struck by or against the source of injury. This cluster affects all parts of body, including head, trunk and both upper and lower extremities. The injuries in this cluster are, on average, the least severe among the claims for loggers.
3. The third cluster (272 claims) consists mostly of traumatic injuries to muscles, tendons and joints (247 claims) that were caused by overexertion (258 claims) injuring the back, shoulders and arms. The source of injury consists mainly of processed and un-processed wood. The severity of the injuries in this cluster is moderate, slightly higher than for cluster #2.
4. The fourth cluster consists of notably more severe injuries (172 claims). These injuries are characterized by traumatic injuries to muscles, tendons and joints that affect the back and torso of the claimant. The main type of accident consists of falls and overexertion. A key defining characteristic of this cluster is that the injuries have resulted in more lost time (mean time lost: 43 weeks) and greater

medical aid expenses (mean amount paid: \$11,886). These injuries also tend to happen later in the season.

5. The fifth cluster (187 claims) is also made up mostly of traumatic injuries to muscles, tendons and joints (151 claims), as well as back pain and musculoskeletal system and connective tissue damage. All claims were caused by a physical reaction by the injured or ill worker that mostly affected the back (95 claims) or lower extremities (59 claims), in particular knees (34 claims).
6. The sixth cluster describes loss of hearing injuries (97 claims). These injuries affect the inner and middle ear exclusively, and were caused by exposure to noise. The accidents in this cluster of claims happened earlier in the summer (mean month: June). No lost time is associated to any of these claims.

The inclusion of location fields in a separate analysis indicated that the clusters were distributed proportionately over the different employer districts; the exception was that the West Coast and Central Newfoundland regions tended to have a higher proportion of hearing related accidents and severe accidents compared to Labrador, Eastern Newfoundland or the Avalon Peninsula.

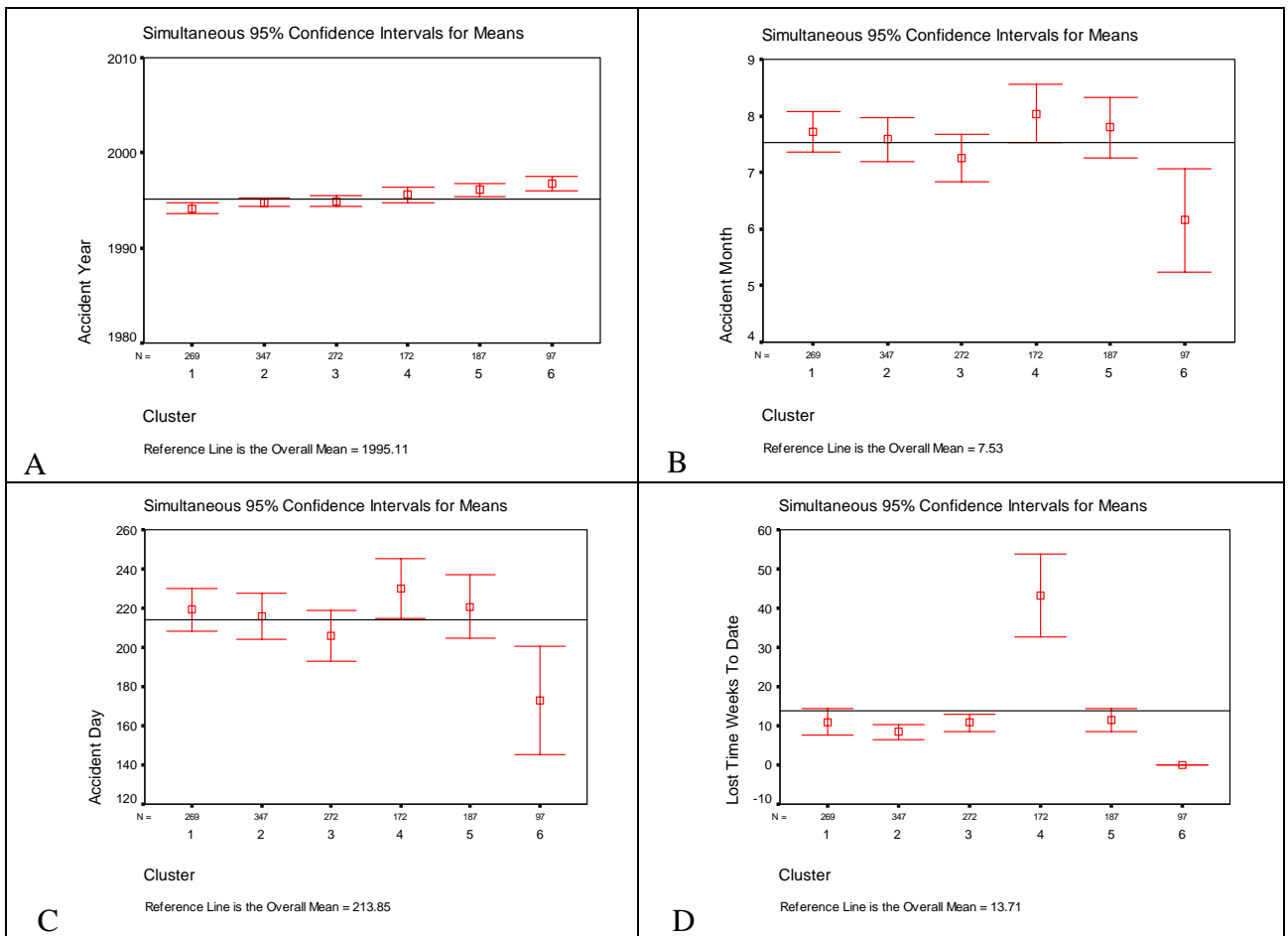


Figure 7: Within Cluster Variation (continued on next page)

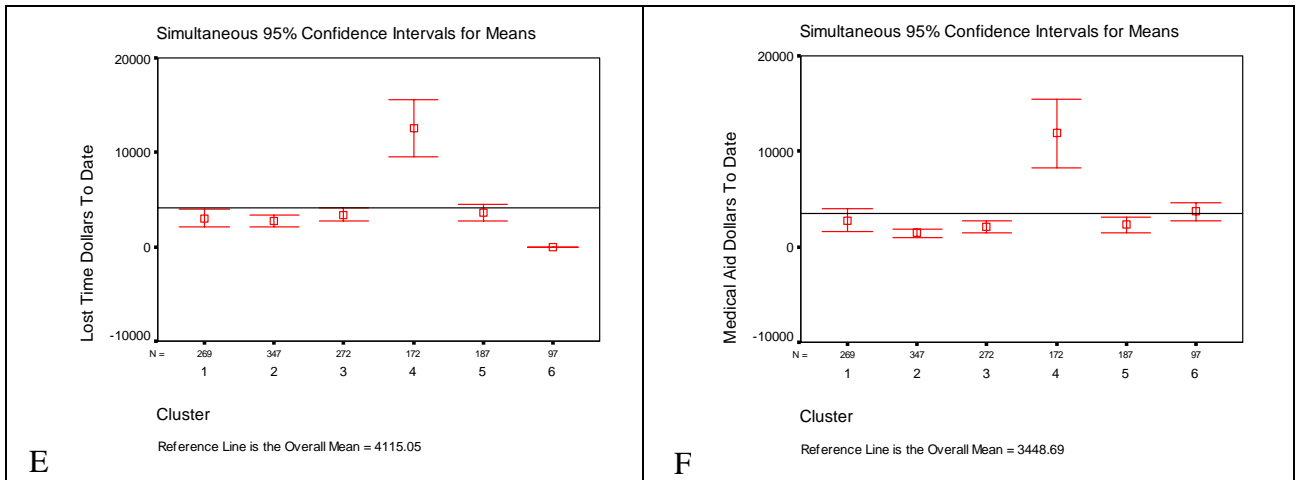


Figure 7: Within Cluster Variation (continued)

The Within Cluster Variation graphs (Figure 7) indicate how the clusters centre on the continuous variables and their 95% confidence intervals. The graphs suggest how the clusters may reflect certain aspects of the accidents reported in the claims.

In Figure 7A, there is a weak trend among the clusters. This suggests a temporal factor in the clusters over the study period. Cluster 1 and 2 are representative of accidents that tended to occur earlier in the study period, while Cluster 5 and 6 show accidents that occurred later. This may represent large-scale changes in the logging industry, for example changes in the terrain being harvested or harvesting techniques that took place gradually within the industry over the 12 year study window.

Figures 7B and 7C show how the clusters are temporally related over the course of a logging season. Cluster 6 represents accidents that clearly occurred earlier in the season. One possible explanation is that a certain kind of equipment or technique associated with Cluster 6 accidents (predominantly hearing loss-related accidents) tends to be used earlier in the season. A possible second explanation is that as work starts to pick up in the warmer months, increased numbers of new and/or returning workers are not as likely to wear hearing protection. The accidents in Cluster 4 meanwhile occur later in the season, and may be indicative of claims related to cumulative injuries, fatigue or changes in work environment.

Figures 7D, 7E and 7F all show how the clusters are related in terms of accident severity as indicated by lost time (in weeks and dollars) and medical aide. As mentioned above, Cluster 4 stands out for including the most severe accidents.

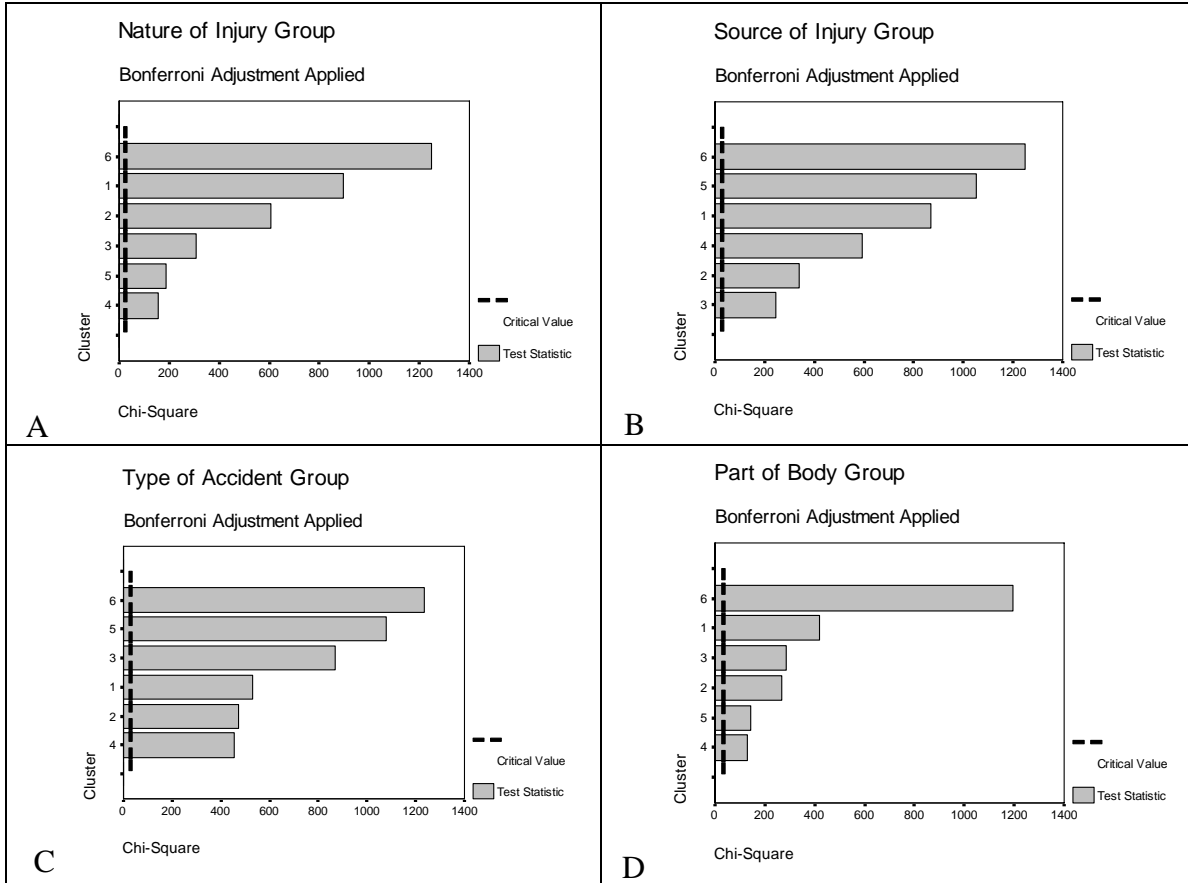


Figure 8: Clusterwise Importance by Accident Descriptors

The graphs in Figure 8 indicate how well a cluster was able to differentiate individual accidents according to a given variable. These graphs are helpful in picking out which of the variables characterize a cluster (i.e., those with the highest score). They also give an indication of the specificity of a cluster with relation to a given variable. For example, Cluster 6 is a very specific and narrowly defined cluster related to hearing-loss injuries, where the SOI (i.e. noise) is an excellent predictor of whether or not an accident belongs to this cluster. In comparison, Cluster 2 is a broad-based cluster with the highest number of claims and is, relative to the other clusters, poorly differentiated. Of note, each accident descriptor, i.e. NOI, SOI, TOA and POB, has statistical significance in terms of its contribution towards the development of a cluster. These fields differ from the location fields that only partially contributed to cluster development.

Previous research carried out by Clouthier and Laflamme (1985) indicates that loggers have work-activity profiles that can be associated with a higher probability for certain types of accidents. Their research consisted of a detailed analysis of case files and was able to reconstruct accident scenarios for workers that were “typical” for certain work activities or tasks. Our data does not contain any information on the work activities of the claimants at the time of their accidents. However, while the data in this study do not allow for the same kind of analysis, there are some comparisons that can be drawn between the two studies.

Clouthier and Laflamme describe certain accident scenarios that may be applied to work-activity profiles. These scenarios may provide a means to interpret the results from the cluster analysis. For example, they describe an accident scenario common to loggers who use chainsaws in which the logger is cut by the saw. The authors were able to determine that most of these accidents are the result of the saw being struck or entangled in the falling tree. The cuts tended to be on the lower extremities. This accident-scenario bares a strong resemblance to the accidents described in Cluster 1 (see above). It may be the case that other characteristics described by Clouthier and Laflamme are also present in the Cluster 1 accidents, for example that the claimants tended to be younger and less experienced. While no direct association was found between age and any of the injury descriptors, age was found to be highly correlated to the injury cluster ($p < 0.0001$). This finding appears to be due largely to the older age of workers (mean birth year: 1938; compared to all loggers 1956) whose injuries were in Cluster 6 (i.e. non-traumatic hearing loss injuries).

Another scenario described by the authors consists of loggers lifting heavy loads, often the base of fallen trees, and sustaining back injuries as a result. This description has similarities to Cluster 3. Cluster 4, which was characterized by severe injuries and claims with significantly higher lost time and medical aid, has similarities to a scenario involving workers who have been in the field for long periods of time, and who have sustained injuries by falling from equipment in colder weather.

The lack of detail regarding the work-activity profile of the claimants in our data set makes this kind of analysis impossible to carry out. Nonetheless, there are several recommendations posited by Clouthier and Laflamme that may be pertinent to loggers in Newfoundland and Labrador. Of particular relevance, they suggest an approach to risk reduction that targets specific work-activity profiles that can be straightforwardly identified. As an example, loss of hearing injuries or the more severe injuries characterized by falls may be designated by health and safety committees as suitable targets for an occupational health and safety program. The authors suggest the possibility of having mobile maintenance units that would enable loggers to fix or service equipment on site. This would reduce the likelihood of loggers using equipment that is not working optimally as well as reduce the potential for falls occurring walking to or from the service centre. Clouthier and Laflamme also direct attention to the high number of back injuries that occur among loggers, in particular due to over exertion from pulling, pushing and lifting logs, as well as from falls from machinery or tripping. They recommend setting a work pace that allows for a suitable level of attention to be paid to surroundings and tasks that have considerable physical demands.

Part III. The Processor sub-group

The Processor sub-group analysis parallels that of the Logger sub-group. Like the Logger sub-group, the Processor claimants are overwhelmingly male (>99%) and have a similar age distribution (Figure 9). There does not appear to be any downward trend in the number of accidents during the study period (Figure 10); however, without data on the size of the workforce or amount of exposure (i.e. hours worked), it is not possible to tell if the rate of accidents follows any trends. Note that there is a spike for the 2002 year, and this may be indicative of an increase in the workforce or an increase in the number of companies employing people in these occupations.

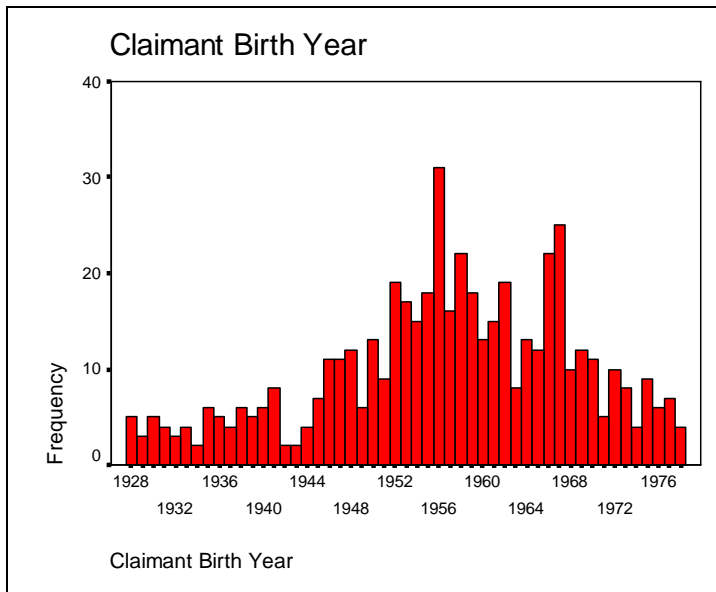


Figure 9: Claimant Birth Year, Processor Sub-group

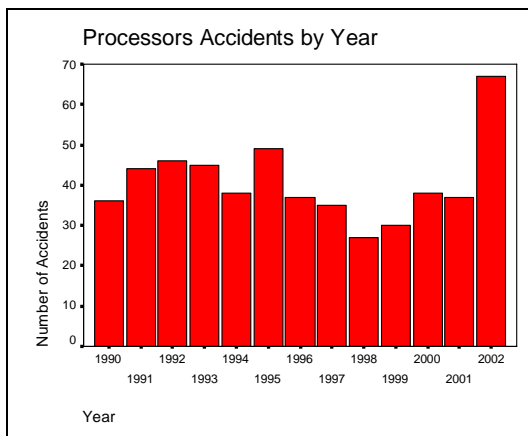


Figure 10: Frequency of Accidents by Year, Processor Sub-group

The periodicity of accidents over the course of a year appears to be similar to the Logger sub-group, in that the peak numbers of accidents occur during the summer months (Figure 11); however, the variation within a year (or between months) appears to be much lower. A one-way ANOVA to test for a longitudinal effect on number of accidents

by month or by day shows no significant changes during the study period. This indicates that the timing of accidents has not significantly changed during the study period.

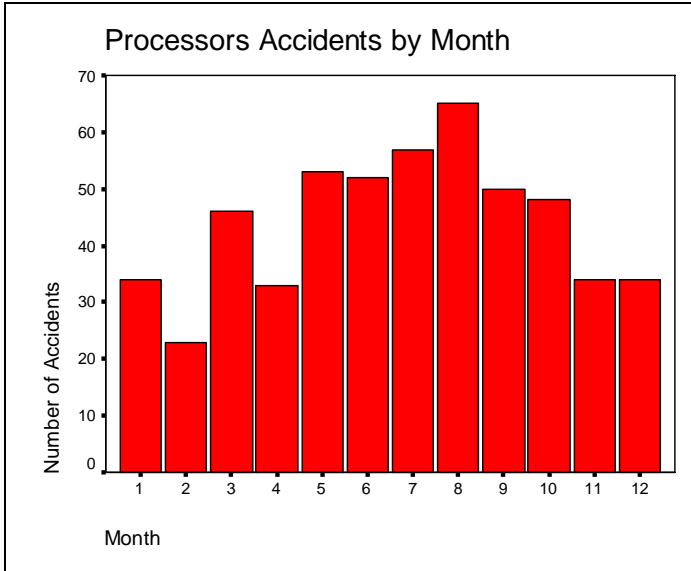


Figure 11: Accidents by Month, Processor Sub-group

Region	Employers	Claims	Ratio (Claims/Employers)
West Coast	14	210	15.00
Central Newfoundland	18	154	8.56
Eastern Newfoundland	31	141	4.55
Other	16	24	1.50
Total	79	529	6.70

Table 19: Processor Sub-group Claims and Employers by Region

The Processor sub-group of claimants consists of several occupation classification codes, including Sawmill/Sawyers Occupations, Papermaking Finishing Occupation and Pulp/Papermaking Labour Occupation. The industry classifications for these workers are divided mostly between Pulp and Paper Mills and Sawmill & Planing Mill Products Industry. However, the small number of employers in both these industries precludes a more detailed breakdown of claims by occupation or by industry classification in order to protect the privacy and confidentiality of the employers represented in the data.

Nature of Injury Group	Freq.	Percent
Traumatic injuries to muscles, tendons, joints etc.	157	29.68%
Surface wounds and bruises	90	17.01%
Disorders of the ear, mastoid process, hearing	71	13.42%
Open wounds	68	12.85%
Traumatic injuries to bones, nerves, cranium	54	10.21%
Nonspecific injuries and disorders	28	5.29%
Back pain, hurt back	17	3.21%
Burns	15	2.84%
Multiple traumatic injuries and disorders	12	2.27%
Musculoskeletal system and connective tissue disorders and diseases	11	2.08%
Other	6	1.13%
Total	529	100.00%

Table 20: Nature of Injury, All Claims Processor Sub-group

Forestry OHS

Source of Injury Group	Freq.	Percent
Persons, plants, animals and minerals: Person-injured or ill worker	84	15.88%
Machinery	70	13.23%
Other sources: Noise	70	13.23%
Parts and Materials: Wood, lumber	47	8.88%
Parts and Materials	40	7.56%
Containers	37	6.99%
Persons, plants, animals and minerals: Trees, logs	35	6.62%
Structures and surfaces	35	6.62%
Tools, instruments and equipment	25	4.73%
Structures and surfaces: Ground	13	2.46%
Vehicles	7	1.32%
Tools, instruments and equipment: Chainsaws	5	0.95%
Persons, plants, animals and minerals: Plants, trees, vegetation-not processed	<5	
Other	38	7.18%
Total	508	96.03%
Missing	21	3.97%

Table 21: Source of Injury, All Claims Processor Sub-group

Type of Accident Group	Freq.	Percent
Contact with object & equipment: Caught/compressed by equipment / object	80	15.12%
Body reaction and exertion: Overexertion	80	15.12%
Body reaction and exertion	75	14.18%
Exposure to harmful substances or environments: Noise	71	13.42%
Fall	49	9.26%
Contact with object & equipment: Struck against object	37	6.99%
Contact with object & equipment: Struck by object	32	6.05%
Contact with object & equipment: Struck by flying object	23	4.35%
Contact with object & equipment: Rubbed/abraded by friction/pressure	20	3.78%
Exposure to harmful substances or environments	19	3.59%
Contact with object & equipment: Struck by swinging or slipping object	11	2.08%
Contact with object & equipment: Struck by falling object	9	1.70%
Body reaction and exertion: Repetitive motion	5	0.95%
Contact with object & equipment	<5	
Transportation accident	<5	
Other	<5	
Total	516	97.54%
Missing	13	2.46%

Table 22: Type of Accident, All Claims Processor Sub-group

Part of Body Group	Freq.	Percent
Trunk: Back, including spine, spinal cord, uns	97	18.34%
Upper Extremities: Finger(s)	72	13.61%
Head: Ear (Inner/Middle)	65	12.29%
Upper Extremities: Wrists and Hand(s), except finger(s)	41	7.75%
Other	41	7.75%
Upper Extremities: Arm(s)	33	6.24%
Trunk	26	4.91%
Lower Extremities: Feet	25	4.73%
Lower Extremities: Ankle(s)	23	4.35%
Lower Extremities: Leg(s)	22	4.16%
Lower Extremities: Knee(s)	20	3.78%
Trunk: Shoulder, including clavicle, scapula	18	3.40%
Head	17	3.21%
Head: Eye(s)	17	3.21%
Upper Extremities: Multiple	6	1.13%
Neck including throat	<5	
Lower Extremities: Multiple	<5	
Total	529	100.00%

Table 23: Part of Body, All Claims Processor Sub-group

The majority of claims came from the west coast of Newfoundland (210) which has 14 different employers in the wood processing industries (Table 19). Central and Eastern

Newfoundland had comparable numbers of claims. Consequently, the West Coast region had the highest rates of accidents per employer, with an average of 15 accidents per employer during the study period, the highest rate of accidents per employer in this sub-group. The second highest rate was 8.56 accidents per employer in the Central Newfoundland region, which had 18 separate employers.

Statistics describing the accidents themselves indicate that the Processor sub-group had, on average, less severe accidents than the Logger sub-group. The mean number of time lost weeks was 7 (compared to 13) and dollars was \$2,375 (compared to \$2,941). The average medical aid amount was \$2,020 (compared to \$3,314).

Global summaries and yearly cross tabulations are included for Nature of Injury (Table 20), Source of Injury (Table 21), Type of Accident (Table 22) and Part of Body (Table 23). The tables for global summaries indicate the total number of accidents by category. The cross-tabulations provide a breakdown of accidents by variable category by year (Table 24-27). You will notice that there are a greater number of low cell counts in this group than with the Logger sub-group. The data have both similarities and differences from the Logger sub-group. In particular:

- The Nature of Injury categories are similar between both sub-groups; the same kinds of injuries appear to occur among both kinds of workers.
- The Source of Injury among processors emphasizes containers and machinery over chainsaws; this is the reverse of the results found with the Logger sub-group.
- Bodily reaction (i.e., overexertion) and contact with objects are the most important Types of Accidents for both sub-groups.
- Back injuries are the most common injuries for processors, followed by injuries to extremities (similar to the Logger sub-group); however, the Processor sub-group tended to have more upper extremities injuries (e.g. fingers, wrists, hands and arms) compared to the Logger sub-group who have more lower extremities injuries (e.g. legs and knees).

There does not appear to be any trends in the accident day within the year. The same cluster analysis that was carried out with the Logger sub-group is applied to the Processor sub-group (Table 28-31, page 24-25).

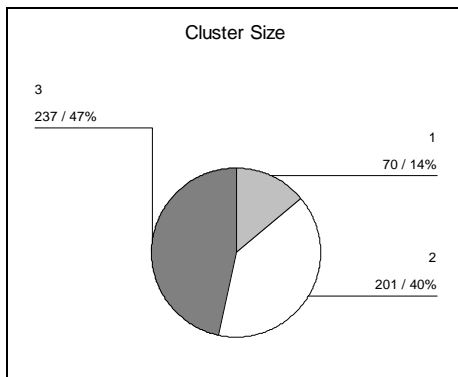


Figure 12: Clusters in Processor Sub-group

Abbreviations		
BRE: Body reaction or exertion	CWOE: Contact with object or equipment	LE: Lower extremities
PPAM: Persons, plants, animals and minerals	UE: Upper extremities	

Nature of Injury Group	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Traumatic injuries to muscles, tendons, joints...	14	18	17	12	14	7	9	10	9	6	5	11	25	157
Surface wounds and bruises	9	14	6	7	7	13	6	8	5	<5	<5	<5	5	90
Disorders of the ear, mastoid process, hearing			<5	17	6	16	12	<5	<5	<5	<5	<5	6	71
Open wounds	<5	5	6	<5	6	<5	8	6	<5	6	5	11	<5	68
Traumatic injuries to bones, nerves, cranium	5	<5	6	<5	<5	6		<5	5	<5	<5	<5	11	54
Nonspecific injuries and disorders								<5	<5	5	9	<5	8	28
Back pain, hurt back					<5				<5	<5	<5	<5	6	17
Burns	<5	<5	<5	<5		<5	<5	<5					<5	15
Multiple traumatic injuries and disorders	<5		<5	<5	<5			<5	<5		<5			12
Musculoskeletal system and connective ...						<5			<5		<5	<5	<5	6
Other		<5	<5	<5			<5			<5	<5	<5	<5	11
Total	36	44	46	45	38	49	37	35	27	30	38	37	67	529

Table 24: Nature of Injury by Year, All Claims Processor Sub-group

Source of Injury Group	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
PPAM: Person-injured or ill worker	<5	6	11	5	8	6	<5	<5	7	5	7	7	13	84
Machinery	5	12	5	<5	<5	7	<5	6	4	<5	6	7	7	70
Other sources: Noise			<5	17	6	16	11	<5	<5	<5	<5	<5	6	70
Parts and Materials: Wood, lumber			<5	<5	<5	<5	<5	5		7	9	<5	12	47
Parts and Materials	5	6	5	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	40
Other	5	6	7	<5	<5	5	<5	<5	<5		<5	<5	<5	38
Containers	7	<5	<5	<5		<5		<5	<5	<5	<5	<5	10	37
PPAM: Trees, logs	<5	<5		<5	<5	<5	5	<5	<5	<5	<5	<5	<5	35
Structures and surfaces	<5	<5	<5	<5	<5	<5			<5	<5	<5	<5	7	35
Tools, instruments and equipment	<5		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5	25
Structures and surfaces: Ground	<5		<5		<5				<5	<5			<5	13
Vehicles		<5	<5			<5							<5	7
Tools, instruments and equipment: Chainsaws					<5	<5	<5	<5				<5		5
Total	35	41	45	44	37	48	36	29	22	30	37	37	67	508

Table 25: Source of Injury by Year, All Claims Processor Sub-group

Forestry OHS

Type of Accident Group	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
CWOE: Caught/compressed by equip./object	5	10	<5	5	6	7	<5	<5	<5	5	8	6	12	80
BRE: Overexertion	7	10	7	5	<5	<5	5	<5	<5	<5	7	5	18	80
BRE	<5	6	8	5	8	6	<5	<5	6	<5	7	6	11	75
Exposure to harmful environments: Noise			<5	17	6	16	12	<5	<5	<5	<5	<5	6	71
Fall	5	<5	5	<5	6	<5	<5		<5	<5	<5	8	5	49
CWOE: Struck against object	<5	<5	6	<5		<5	<5	<5	<5	<5	<5	<5	<5	37
CWOE: Struck by object	<5	<5	<5		<5	6	5	<5	<5		<5	<5	<5	32
CWOE: Struck by flying object	<5			<5	<5	<5		<5		<5	6	<5	<5	23
CWOE: Rubbed/abraded by friction/pressure	<5	5	<5	<5	<5	<5	<5		<5					20
Exposure to harmful substances or env.	<5	<5	<5	<5	<5	<5	<5	<5				<5	<5	19
CWOE: Struck by swinging or slipping object		<5	<5	<5			<5	<5			<5	<5		11
CWOE: Struck by falling object								<5		<5			<5	9
BRE: Repetitive motion									<5	<5		<5	<5	5
Total	36	44	46	45	37	49	37	29	22	30	37	37	67	516

Table 26: Nature of Injury by Year, All Claims Processor Sub-group

Nature of Injury Group	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
Trunk: Back, including spine, spinal cord...	<5	13	11	9	10	<5	<5	5	<5	6	7	7	17	97
UE: Finger(s)	<5	8	6	<5	6	6	5	<5	<5	6	<5	8	9	72
Head: Ear (Inner/Middle)			<5	13	<5	16	12	<5	<5	<5	<5	<5	6	65
UE: Wrists and Hand(s), except finger(s)	5	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5	13	41
UE: Arm(s)		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		33
Trunk	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	26
LE: Feet	<5	5	<5	<5		<5		<5	<5	<5	<5		<5	25
LE: Ankle(s)	<5	<5	<5		<5	<5	<5		<5		<5	<5	<5	23
LE: Leg(s)	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5		<5	22
LE: Knee(s)	5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5		20
Trunk: Shoulder, including clavicle, scapula	<5		<5		<5	<5		<5		<5	<5	<5	5	18
Head	<5		<5	<5	<5	<5		<5		<5	<5	<5	<5	17
Head: Eye(s)	<5	<5	<5	<5	<5	<5		<5	<5		<5	<5	<5	17
UE: Multiple								<5		<5	<5	<5		6
Other	<5	<5	5	<5	<5	5	<5	<5	<5	<5	<5	<5	<5	41
Total	36	44	46	45	38	49	37	35	27	30	38	37	67	529

Table 27: Nature of Injury by Year, All Claims Processor Sub-group

Abbreviations	
BRE: Body reaction or exertion	CWOE: Contact with object or equipment
PPAM: Persons, plants, animals and minerals	

Nature of Injury Group	Cluster			
	1	2	3	All
Traumatic injuries to muscles, tendons, joints etc.		145	6	151
Traumatic injuries to bones, nerves, cranium		14	38	52
Surface wounds and bruises		12	67	79
Open wounds		<5	64	68
Nonspecific injuries and disorders		<5	25	28
Musculoskeletal system and connective tissue d and d		<5	<5	6
Multiple traumatic injuries and disorders		<5	10	12
Disorders of the ear, mastoid process, hearing	70			70
Burns			15	15
Back pain, hurt back		17		17
Other		<5	8	10
Total	70	201	237	508

Table 28: Nature of Injury distribution across clusters

Source of Injury Group	Cluster			
	1	2	3	All
PPAM: Person-injured or ill worker		79	5	84
Machinery		11	59	70
Other sources: Noise	70			70
Parts and Materials: Wood, lumber		11	36	47
Parts and Materials		8	32	40
Other		5	33	38
Containers		25	12	37
Persons, plants, animals and minerals: Trees, logs		15	20	35
Structures and surfaces		29	6	35
Tools, instruments and equipment		<5	23	25
Structures and surfaces: Ground		12	<5	13
Vehicles		<5	<5	7
Tools, instruments and equipment: Chainsaws			5	5
PPAM: Plants, trees, vegetation-not processed		<5	<5	<5
Total	70	195	231	506

Table 29: Source of Injury distribution across clusters

Type of Accident Group	Cluster			
	1	2	3	All
CWOE: Caught/compressed by equip/obj		<5	79	80
BRE: Overexertion		74	6	80
BRE		75		75
Exposure to harmful substances or environments: Noise	70			70
Fall		41	8	49
CWOE: Struck against object		6	31	37
CWOE: Struck by object		<5	31	32
CWOE: Struck by flying object		<5	22	23
Exposure to harmful substances or environments			18	18
CWOE: Rubbed/abraded by friction/pressure		<5	13	14
CWOE: Struck by swinging or slipping object			11	11
CWOE: Struck by falling object			9	9
BRE: Repetitive motion			5	5
CWOE			<5	<5
Transportation accident		<5	<5	<5
Other			<5	<5
Total	70	201	237	508

Table 30: Type of Accident distribution across clusters

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Part of Body Group	Cluster			
	1	2	3	All
Trunk: Back, including spine, spinal cord		90	5	95
Upper Extremities: Finger(s)		<5	69	72
Head: Ear (Inner/Middle)	64			64
Upper Extremities: Wrists and Hand(s), except finger(s)		11	30	41
Other		15	26	41
Upper Extremities: Arm(s)		12	20	32
Lower Extremities: Feet		9	15	24
Trunk		8	15	23
Lower Extremities: Ankle(s)		19	<5	23
Lower Extremities: Leg(s)		<5	19	22
Head	6		11	17
Trunk: Shoulder, including clavicle, scapula		15	<5	17
Lower Extremities: Knee(s)		10	7	17
Head: Eye(s)			8	8
Upper Extremities: Multiple		<5	<5	6
Neck including throat		<5		<5
Lower Extremities: Multiple			<5	<5
Total	70	201	237	508

Table 31: Part of Body distribution across clusters

The results indicate that three clusters may be detected in the data:

1. The first cluster consists of hearing loss injuries (70 claims). Over the study period, these do not occur noticeably earlier in the year, as with the Logger subgroup. There was no lost time, in weeks or dollars, for these accidents, and the mean medical aid amount was \$2,580.
2. The second cluster (201 claims) consists of the more severe accidents in the data, with 11 weeks in time lost (\$3,830 in lost time dollars) and over \$3,000 in medical aid on average. Most of the accidents involved traumatic injuries to muscles, tendons and joints (i.e. sprains, strains and tears). The Source of Injury is diverse, including containers (25 claims), machinery (11 claims), wood or lumber (11 claims) and the injured person themselves (79 claims). Most accidents were caused by bodily reaction or overexertion (149 claims). Almost half of the accidents resulted in back injuries (90 claims) with the remainder affecting lower and upper extremities.
3. The third cluster is the largest, with 237 claims. These accidents were relatively less severe, with an average of 6 lost time weeks (\$2,024 in lost time dollars) and \$2,111 in medical aid payments. The main Nature of Injury categories are hard tissue injuries (traumatic injuries to bones, nerves, cranium, 38 claims), open wounds (64 claims) and surface wounds or bruises (67 claims). The Source of Injury categories are also spread out, with the highest number of accidents occurring with machinery (59 claims), parts and materials (68 claims, combined) and tools and instruments (23 claims). The main Type of Accident categories were a form of contact with the Source of Injury (accounting for a total of 198 claims) or an exposure to a harmful substance (18 claims). The most common Part of Body to be affected by accidents in this cluster was upper extremities (combining fingers to shoulder, 124 claims). These accidents do tend to occur earlier in the year at the end of the study period when compared to the start.

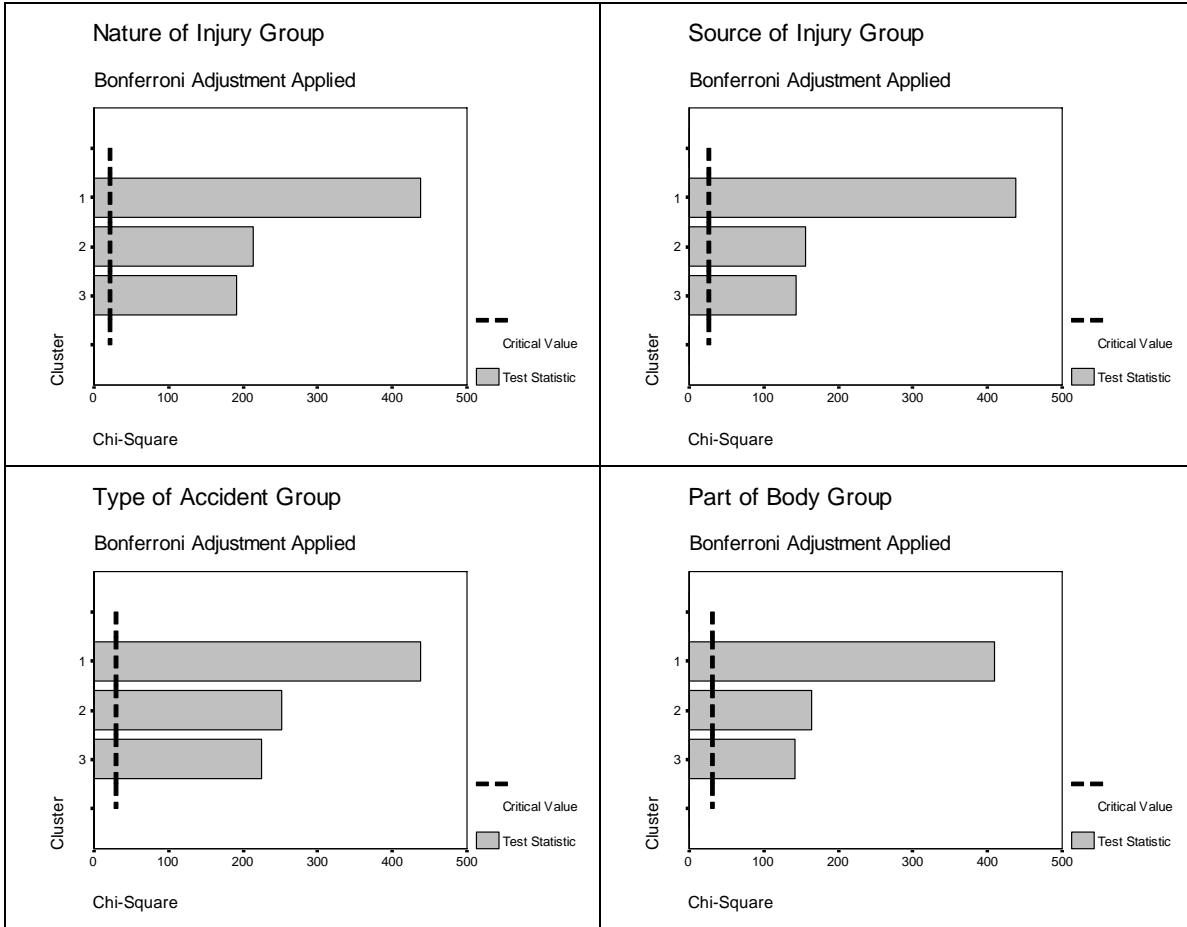


Figure 13: Clusterwise Importance by Accident Descriptors

These clusters are not as robust as the ones detected with the Logger sub-group in terms of their relationship to temporal factors. None of the temporal fields (Accident Year, Accident Month or Accident Day) were significant for the clusters formed by the analysis. Figure 13 indicates that the clusters did have significance in terms of being able to differentiate the accidents in terms of their descriptors (NOI, SOI, TOA and POB). That is to say, that the grouping of the accidents according to the clustering results is not a random grouping (indicated by the “Critical Value” line).

Part IV. The Supervisor sub-group

This sub-group has a small number of claims compared to the other two (103 claims total). Due to reasons of privacy and confidentiality, the resultant low cell counts cannot be disclosed. Since so much of the results from the analysis comprise low cell counts (<5), the statistical output files for this sub-group are not included in this report, i.e. nearly all cells would read “<5”. A general description of the occupational injuries from the Supervisor sub-group follows.

Claimants in this sub-group were predominantly male (~99%). The age distribution of the claimants was skewed towards younger claimants; the mean birth year was 1955 and the median birth year was 1958. The number of accidents per year shows a non-significant downwards trend (see graph below). Seventy percent of the accidents happened in the late summer and early fall (July to October), which appear to be the peak months in terms of both accidents and productivity in the forestry and primary wood processing sectors. There does not appear to be any detectable trends over the study period for the Supervisor sub-group in terms of the annual number of accidents.

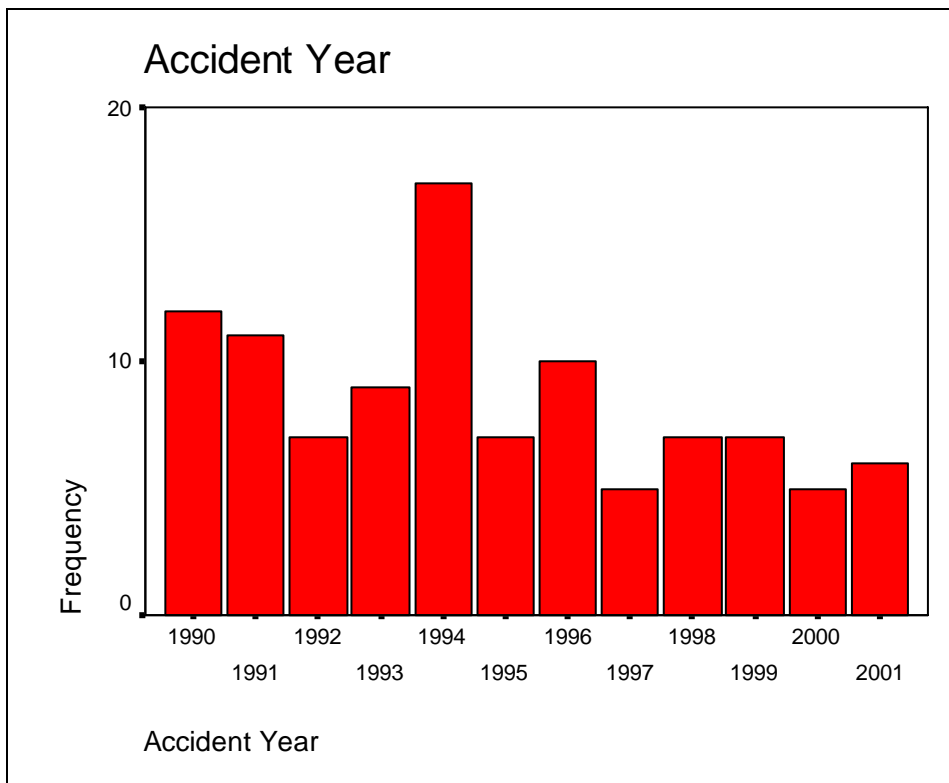


Figure 14: Accident Frequency in Supervisor Sub-group

Most of the claimants in this sub-group were Forestry Conservation workers (52%) and foremen in other wood processing industries (27%). Enterprises classified as “Logging Industry” had the most claims (57%). Pulp and Paper Mills and Sawmills and Planing Mills combined accounted for 31% of the claims. The majority of claims were from the West Coast region, 56 claims (54%) from 8 separate employers. The Central Region had

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the second highest number of claims for this sub-group, with 30 claims (29%) filed from 9 different employers. The remainder of the claims was spread over the island.

Nature of Injury	Claims	%
Traumatic injuries to muscles, tendons, joints etc.	47	45.6
Open wounds	15	14.6
Surface wounds and bruises	13	12.6
Disorders of the ear, mastoid process, hearing	9	8.7
Traumatic injuries to bones, nerves, cranium	7	6.8
Other	12	11.7
Source of Injury	Claims	%
Person, Plant, Animal or Mineral: Person-injured or ill worker	22	21.4
Structures and surfaces: Ground	16	15.5
Tools, instruments and equipment: Chainsaws	11	10.7
Other sources: Noise	9	8.7
Parts and Materials	7	6.8
Person, Plant, Animal or Mineral: Plants, trees, vegetation-not processed	7	6.8
Machinery	6	5.8
Structures and surfaces	6	5.8
Other	19	18.4
Type of Accident	Claims	%
Fall	32	31.1
Body reaction and exertion	22	21.4
Contact w/ object & equipment: Struck by object	9	8.7
Exposure to harmful substances or environments: Noise	9	8.7
Body reaction and exertion: Overexertion	8	7.8
Contact w/ object & equipment: Struck against object	7	6.8
Contact w/ object & equipment: Caught/compressed by object & equipment	5	4.9
Other	11	10.6
Part of Body	Claims	%
Trunk: Back, including spine, spinal cord, unspecified	29	28.2
Trunk	10	9.7
Head: Ear (Inner/Middle)	9	8.7
Upper Extremities: Wrists and Hand(s), except finger(s)	9	8.7
Lower Extremities: Knee(s)	9	8.7
Upper Extremities: Finger(s)	7	6.8
Trunk: Shoulder, including clavicle, scapula	5	4.9
Lower Extremities: Leg(s)	5	4.9
Other	20	19.7

Table 32: Accident Descriptors for All Claims, Supervisor Sub-group

The above table summarizes the major characteristics of the accidents in the Supervisor sub-group. A cluster analysis of this data indicates that the accidents could be grouped into two clusters. The first cluster consists of 32% of the claims (33 claims) and is characterized by more severe injuries (mean lost time in weeks: 21; mean medical aid: \$7,065). This cluster included the more serious traumatic injuries to soft tissue (e.g. muscles, tendons, ligaments, etc; 20 claims) and hearing loss injuries (9 claims). The Source of Injury was either the worker, or in the case of hearing loss injuries, noise. The Type of Accident was either overexertion on the part of the worker and exposure to noise. The main Part of Body involved was either the trunk (especially back injuries) or the inner ear.

The second cluster consists of the remainder of the claims (70 claims, 68%). These injuries were less severe (mean lost time in weeks: 9; mean medical aide: \$2,021) and include a greater range of injury characteristics. The Nature of Injuries in this cluster

included open wounds (14 claims), surface wounds (13 claims), and traumatic injuries to both hard and soft tissue (32 claims). The Source of Injury includes machinery and equipment (including chainsaws) (19 claims combined), the ground and other surfaces (22 claims combined), pats and materials including processed and unprocessed wood (19 claims). Falls were the most common Type of Accident (32 claims). Different forms of contact with objects and equipment, e.g. being struck by, struck against or falling, accounted for a total of 28 claims. The most frequent Part of Body involved in this cluster was the trunk (18 claims), with the remaining claims spanning the upper and lower limbs, head and neck.

Conclusion

This study provides a description of reported occupational injuries within the primary wood industries in Newfoundland and Labrador. The data was divided into three groups of workers based on their work activity: workers directly involved with harvesting trees (Logger); workers directly involved in primary processing, in particular pulp and paper workers and sawmill workers (Processor); and the Supervisor sub-group who oversee the first two groups. The division of claims is based on occupational titles that, in turn, are based on work activity descriptions. The creation of sub-groups increases the potential to distinguish injury profile characteristics.

The analysis of claims strongly suggests that there are distinct injury profiles, particularly among the Logger sub-group. This is consistent with the findings of Clouthier and Laflamme (1985, 1997) who found a number of accident scenarios among loggers from Quebec. Their data included data on work activity and conditions, and they were able to link this information with the injury data. The data in this study is only on the injury side, and does not include information on the work activity or conditions at the time of the injury. Nonetheless, some distinct injury profiles did emerge, for example hearing-loss injuries among older loggers early in the season. Other injury profiles were less distinct and each sub-group had one injury profile cluster that was essentially the miscellaneous cluster. This suggests that any additional information on work activity or the claim would allow for a clearer description of typical injury profiles or scenarios in these industries.

Most of the well defined injury profiles came out of the Logger sub-group, which had the largest number of claims. The importance of identifying and interpreting injury profiles is that it provides the foundation for developing effective workplace health and safety programs. In the case of the hearing-loss accidents, one possible interpretation is that older workers who are returning to work are less likely to wear protective head gear. A simple program could be to post signs, at the beginning of the season, where equipment is picked up that remind all Logger to wear protective head-gear and show how many hearing-loss claims were submitted the year before. The remaining injury profiles are less clear, but field research with loggers, processors and Supervisor would provide the necessary data to develop accident scenarios.

The data that was used in this study had some limitations that blurred the descriptions of injury profiles. Changes in the coding system for key variables (Nature of Injury, Source

of Injury, Type of Accident and Part of Body) meant that a less specific coding schema had to be used in the analysis. There was very little or no information on work activity or conditions, except for broad interpretations based on variables like date and the location of the employer. A small amount of information on the location of the work site and, if the work is taking place outside, the weather conditions, would go a long way to interpreting the potential risk of injury.

The main limitation of this study is that it did not have the necessary data to generate the rates of accidents among the worker sub-groups. The analysis of total number of accidents is relatively meaningless if the size of the workforce is not taken into account. The key feature to using workforce data to calculate rates of injury is that it must be based on the same coding system as the one used in processing claims. This information is fundamental to any research on occupational health and safety and the subsequent development of any safety programs.

A possible next step for this research would be to follow the lead of Clouthier and Laflamme and to collect some field data that would inform the results from the cluster analysis. The results of this study could be used to develop groups of workers for interview or focus groups. Their descriptions of work activity and conditions at the time of injury could be used to refine or restructure the injury profiles found so far.

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Appendix A: Forestry Data Log Sheet

Forestry OHS CUS Monday, June 28, 2004

Note to investigators:

This document contains a log of the processes involved in the preparation of the forestry claims data. It describes standard data cleaning and data checking procedures that were used on the raw or original data provided by WHSCC. It also contains two sections where your input is required.

1. Four fields (Nature of Injury, Source of Injury, Type of Accident and Part of Body) are being re-categorized. The rationale for this and the re-categorization are described in Appendix B. Investigators are asked to review the tables and to provide feedback on the re-categorization.
2. Before carrying out any further analyses, we will want to create subgroups based on the employer's industry code and/or the employee's occupation code. Appendix C provides a description of the distribution of claims according to occupation and industry code. Investigators are asked to provide suggestions for the creation of these sub-groups.

Contents:

Forestry Data Log Sheet

- Data Fields: Description and Coding
- Data Preparation
 - Missing and unknown data
 - Potential data entry errors
- Filters

Output Files

- Descriptive and exploratory statistics
 - All claims

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Forestry Data Log Sheet

Data Fields: Description and Coding

Field	Description	Notes
LTNUMC	Claim Number	Encrypted
LTEMPC	Employer Number	Encrypted; specific to the employer
LTSINC	Claimant SIN Coded	Encrypted; specific to the claimant
LTSEX	Claimant Sex	
LTDBT	Claimant Birth Year	Recoded from birth date
LTACD	Accident Year	Recoded from accident date
LTACDD	Accident Date	
NOI	Nature of Injury Code	Coded at WHSCC and labeled
NOIG	Nature of Injury Group	Re-categorized NOI (see below)
SOI	Source of Injury Code	Coded at WHSCC and labeled
SOIG	Source of Injury Group	Re-categorized SOI (see below)
TOA	Type of Accident Code	Coded at WHSCC and labeled
TOAG	Type of Accident Group	Re-categorized TOA (see below)
POB	Part of Body Code	Coded at WHSCC and labeled
POBG	Part of Body Group	Re-categorized POB (see below)
LTTCC	Type of Claim Code	Coded and labeled
LTTWK	Lost Time Weeks To Date	
LTTDL	Lost Time Dollars To Date	
LTTMA	Medical Aid Dollars To Date	
LTOCC	Occupation Classification Code	Coded
LTEST	Employer Status	Operational status of employer
LTENC	NIC Code	Coded and labeled
LTEIC	Industry Code	Coded
LTEID	Industry Description	
LTEAR	Employer Assessment Rate	Based on payroll amounts, except logging industry (per m ³)
LTEAY	Employer Assessment Year	
LTEPY	Employer Last Payroll Year	
LTEPR	Employer Payroll Amount	
LTEDC	Employer District Code	
LTEDD	Employer District Description	
LTELC	Employer Location Code	
LTELD	Employer Location Description	

Data Preparation

- Data received in Excel format, two files: claims and employers
- Data processed:
 - Date fields converted to date format
 - Data imported to SPSS
 - Data fields labeled and re-formatted
- Data error detection
 - Missing and unknown data checked (see table)
 - Code and description fields checked for data entry errors (see table)

Missing and unknown data

Field	Label	Code	Count	Notes
LTSEX	Claimant Sex	Blank	5	Queried
LTDBTX	Claimant Date of Birth	Missing	19	Re-coded as missing
NOI	Nature of Injury Code	99990	7	Re-coded
NOID	Nature of Injury Description	Unknown	7	Re-coded
SOI	Source of Injury Code	Missing 99990	54 30	Re-coded as missing Re-coded
SOID	Source of Injury Description	Blank Unknown	54 30	Re-coded as missing Re-coded

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Field	Label	Code	Count	Notes
TOA	Type of Accident Code	99990	2	Re-coded
		Missing	18	Re-coded as missing
TOAD	Type of Accident Description	Blank	54	Re-coded
		Unknown	18	Re-coded as missing
POB	Part of Body Code		7	Query—recoded to 100
LTTMA	Medical Aid Dollars To Date	-49	1	Query—left as is
LTEINC	NIC Code	Missing	1	Query—recoded as missing
LTEEND	NIC Description	Blank	1	Query—recoded as Not Applicable (outside Canada)
LTEIC	Industry Code	Blank	1	Query—recoded as missing
LTEID	Industry Code Description	Blank	1	Query—recoded as Not Applicable (outside Canada)
LTEAR	Employer Assessment Rate		1	Query—recoded as missing (999)
LTEAY	Employer Assessment Year		1	Query—recoded as missing (9999)
LTEPY	Employer Last Payroll Year		12	Query—recoded as missing (9999)
LTEPR	Employer Payroll Amount		12	Query—left as is
		1 (?)	15	Query—left as is
		<100 (?)	17	Query—left as is

Data Preparation (continued)

- Notes on birth year recoding (in effect in **Forestry OHS Data Cleaned June 2004 v2.sav**):
 - If there are three or more entries, and one birth year value is repeated, the most common birth year is used;
 - If there are only two entries and the difference in birth years is only one year, the even year is used.
- Coded variables labeled (NOI, SOI, TOA, POB, Type of Claim, Occupation Classification Code, Employer Status, NIC Code, and Employer District Code) in version five of the data file: **Forestry OHS Data Cleaned June 2004 v5.sav**.
- Categorization to be determined for: NOI, SOI, TOA, POB.
 - Coding conventions: new and discontinued codes.
 - First draft of re-categorization in effect in version six of the data file: **Forestry OHS Data Cleaned June 2004 v6.sav** (see Appendix A)
- Occupation and industry sub-groups need to be defined (see Appendix B)
 - Sub-groups are defined by occupation classification
 - No sub-groups have been set by industry classification
 - The rationale for this is that within industry variation is expected to greatly exceed within occupation variation. This is due to the occupational plurality of the workforces within industry units (i.e. enterprises) for most, if not all, of the industries in this data. At the same time, the occupational classifications are expected to be relatively similar across industries.
 - The sub-groups are detailed in Appendix B.
 - Sub-groups defined by variable **LTOCCG** (Occupation Classification Group)
- Date fields
 - The date fields for the accident date have been re-formatted to work with SPSS. Since we do not have time series data (observations at regular intervals), that function is not applicable to our data. Instead, three fields have been created to represent the accident date: year of accident, month of accident and day of accident, measured from January 1st of the year of the accident.

Filters

Partitioning of cases according to occupational classification:

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- The rationale for using occupational classification is that the industry classification comprises management and front line workers, while similar occupational areas may span multiple industry classifications.
- Classifications for “Logger”:
 - Foreman Forestry/Logging Occupation (7510)
 - Forest Conservations Occupation (7511)
 - Timber Cutting and Related Occupation (7513)
 - Log Inspection/Grade/Scale Occupation (7516)
 - Log Hoist/Sort/Move Occupation (7517)
 - Forest/Log Labour Occupation (7518)
 - Forest/Logging Occupations NEC (7519)

Joshua Pike’s Filters

- Filter 3: NIC for 411 (Logging) and 4565 (Forest Products Trucking Industry)
- Filter 4: Occupation codes for 7513, 7519, 7518, 7517

Descriptive and Exploratory Statistics (to date)

Descriptive Statistics Vol 1.spo

All of the following statistics have been computed using all of the claims in the database. Cases have not been selected based on any occupational or industry classification sub-groups.

Descriptives:

- Compensation variables: Lost Time (Weeks/Dollars), Medical Aid Dollars,

Frequencies—claims per

- Employers (encoded, no names are produced in output)
- Employees (encoded, no names are produced in output)
- Sex
- Birth year and histogram
- Claim year and histogram
- NOI, SOI, TOA, POB, Type of Claim
- Claimant occupation, industry code
- Employer status, location
- Occupation X Type of Claim
- NIC X Type of Claim
- District X Type of Claim

Descriptive Statistics Vol 2b.spo

Tables:

- Claim counts: NOI X Claim Year
- Claim counts: SOI X Claim Year
- Claim counts: TOA X Claim Year
- Claim counts: POB X Claim Year
- Claim counts: Type of Claim X Claim Year
- Claim counts: occupation X Claim Year
- Claim counts: NIC X Claim Year
- Claim counts: District X Claim Year

Analyses

The following analyses have been carried out on sub-groups of data based on occupation and/or industry classification, and that will include a re-categorization of four claim description fields (Nature of Injury, Source of Injury, Type of Accident and Part of Body). In most cases, the analyses have been tried out with the full data set.

- Description of data (detailed above)
- Trends in injuries (detailed above)
 - NOI/SOI/TOA/POB over study period, within season
 - Claim type, lost time/dollars over study period
 - Employer trends over study period, within season
 - Employee trends over study period, within season
- Chi-square analyses for Nature of Injury, Source of Injury, Type of Accident and Part of Body
- Associations between employer variables and injuries
- Associations between work activity variables and injuries
- HLM? Industry->Employer->Year; would require additional data

Appendix B: Re-Categorization

The WHSCC claims database contains four fields that describe the occupational injury or fatality: Nature of Injury, Source of Injury, Type of Accident and Part of Body. There are several issues with these codes that make the analysis of the data problematic. Most important, the coding protocol changed in 1997, such that there are some older codes that were phased out and some newer ones that were introduced. An additional problem is that there are a number of codes that have a high degree of specificity that are rarely used. These codes, while useful in describing an individual accident, make producing aggregate and generalized results difficult.

The objectives of the re-categorization are to group the codes into categories that are meaningful and may be reasonably expected to apply evenly over the study period. The coding standard for occupational injury and fatality claims is developed by the Canadian Standards Association and is referred to as CSA Z795. The Association of Worker Compensation Boards of Canada assists in updating the coding system on a yearly basis and promotes its usage in Canada.

The coding system is hierarchical, with a small number of upper level categories that are differentiated by three sub-levels. This taxonomy works the same as that used in biology. The system allows, to a limited degree, for more detailed, lower-level codes to be grouped together without reviewing the occupational injury or fatality report. Also, the higher levels have remained largely unchanged during the study period.

The re-categorization process grouped individual fourth sub-level codes into a higher level code grouping. The initial step was to re-code all of the original codes to the first/highest level. These categories were then sub-divided on an ad hoc basis with the objective of obtaining approximately 10 codes that had a high degree of descriptive validity. The process of defining categories relied on feedback from the entire research team. The re-coding process is informed by previous work conducted in forestry occupational health and safety research (Clouthier & Laflamme, 1985).

The tables below detail the re-categorization. The original codes are grouped together by new group (ordered by the groups with the highest number to the lowest number of claims). The number of claims for each original code and new group is indicated as a percentage of the total number of claims, which are approximately 2000. Small cell counts have been recoded to less than one percent (approximately 20 cases) in order to mask the number of claims.

Forestry OHS

Nature of Injury Re-Categorization

Nature of Injury Re-Categorization			
New Group (Description and Number)	Original Code (Description and Number)		Total
Traumatic injuries to muscles, tendons, ligaments, joints etc. 2000	Rotator cuff tear, traumatic (repetitive motion use 17391)	2101	<1%
	Sprains, strains, tears	2100	35.37%
	Sprains, strains,tears, n.e.c. (normally whiplash)	2190	<1%
	Traumatic Epicondylitis	2903	<1%
	Traumatic injury to muscles, joints, etc. uns	2000	1.27%
	Traumatic Synovitis	2906	<1%
	Traumatic tendonitis (Due to repetitive motions use 17330)	2902	<1%
	Traumatic Tenosynovitis	2907	<1%
Traumatic injuries to muscles, tendons, ligaments, joints etc. Total			37.67%
Open wounds 3000	Amputations, except fingertip	3190	<1%
	Amputations, fingertip	3110	<1%
	Amputations, UNS.	3100	<1%
	Animal or insect bites	3200	<1%
	Avulsions	3300	<1%
	Cuts, lacerations	3400	18.00%
	Punctures, except bites	3700	<1%
Open wounds Total			19.03%
Surface wounds and bruises 4000	Abrasions, scratches	4100	1.96%
	Bruises, contusions	4300	12.33%
	Foreign bodies (superficial splinters, chips)	4400	<1%
Surface wounds and bruises Total			14.82%
Disorders of the ear, mastoid process, hearing 12600	Deafness, hearing loss or impairment	12610	8.66%
Disorders of the ear, mastoid process, hearing Total			8.66%
Traumatic injuries to bones, nerves, spinal cord, cranium 1000	Concussions	6200	<1%
	Dislocations	1100	<1%
	Fractures	1200	6.26%
	Multiple intracranial injuries	6800	<1%
Traumatic injuries to bones, nerves, spinal cord, cranium Total			6.80%

Forestry OHS

Nature of Injury Re-Categorization			
New Group (Description and Number)	Original Code (Description and Number)		Total
Nonspecific injuries and disorders 9700	Crushing injuries	9710	<1%
	Multiple nonspecified injuries and disorders	9780	<1%
	Nonspecific Injuries and Disorders, UNS.	9700	<1%
	Soreness, pain, hurt, except the back	9730	2.84%
Nonspecific injuries and disorders Total			3.72%
Nonspecific injuries and disorders: Back pain, hurt back 9720	Back pain, hurt back	9720	3.18%
Nonspecific injuries and disorders: Back pain, hurt back Total			3.18%
Multiple traumatic injuries and disorders 8000	Burns and other injuries	8500	<1%
	Cuts, abrasions, bruises	8100	<1%
	Fractures and other injuries	8400	<1%
	Multiple traumatic injuries and disorders, uns	8000	1.03%
	Oth combinations of traumatic inj. & disorders, n.e.c.	8900	<1%
	Sprains or strains and bruises	8200	<1%
Multiple traumatic injuries and disorders Total			2.05%
Other 90000	Carpal tunnel syndrome	12410	<1%
	Damage to or loss of prosthetic devices	51000	<1%
	Dermatitis, uns	18200	<1%
	Effects of heat and light, uns	7200	<1%
	Electrocutions, electric shocks	9300	<1%
	Hernia, n.e.c.	15390	<1%
	Hernia, uns	15300	<1%
	Internal inj. to organs & blood vessels of the trunk	9400	<1%
	Multiple symptoms	41800	<1%
	Non-specific Allergic Reaction	41150	<1%
	Other poisonings and toxic effects, n.e.c.	9590	<1%
	Other respiratory system diseases, n.e.c.	14990	<1%
	Spasms or tremors, n.e.c.	41210	<1%
	Ventral hernia	15330	<1%
Welder"s flash	12560	<1%	
Other Total			1.57%

Forestry OHS

Nature of Injury Re-Categorization				
New Group (Description and Number)		Original Code (Description and Number)		Total
Musculoskeletal system and connective tissue diseases and disorders	17000	Bursitis	17310	<1%
		Disc disorders, UNS.	17230	<1%
		Epicondylitis	17393	<1%
		Herniated disc, including slipped and ruptured disc	17231	<1%
		Lumbago	17220	<1%
		Muskuloskel. sys. & connect. tissue dise. & disor., uns	17000	<1%
		Rotator cuff syndrome	17391	<1%
		Sciatica	17210	<1%
		Tendonitis	17330	<1%
		Tenosynovitis	17340	<1%
Musculoskeletal system and connective tissue diseases and disorders Total				1.32%
Burns	5000	Burns, uns	5000	<1%
		Chemical burns, uns	5100	<1%
		Heat burns, scalds, uns	5300	<1%
		Second-degree heat burns, scalds	5302	<1%
Burns Total				<1%
Grand Total (remaining are missing data)				99.66%

Forestry OHS

Source of Injury Re-Categorization

Source of Injury Re-Categorization				
New Group (Description and Number)	Original Code (Description and Number)			Total
Persons, plants, animals and minerals: Trees, logs 58700	Branches, limbs	58703		<1%
	Logs, limbed or unlimbed	58702		11.99%
	Stumps	58706		<1%
	Trees, Logs, NEC.	58790		<1%
	Trees, Logs, UNS.	58700		4.45%
	Trees, not yet horizontal; usually "falling"	58701		1.76%
Persons, plants, animals and minerals: Trees, logs Total				19.47%
Persons, plants, animals and minerals: Person-injured or ill worker 56000	Bodily motion or position of injured, ill worker	56200		15.26%
Persons, plants, animals and minerals: Person-injured or ill worker Total				15.26%
Tools, instruments and equipment: Chainsaws 72210	Chainsaws--powered	72210		11.94%
Tools, instruments and equipment: Chainsaws Total				11.94%
Other sources: Noise 93910	Noise	93910		8.61%
Other sources: Noise Total				8.61%
Persons, plants, animals and minerals: Plants, trees, vegetation-not processed 58000	Plants, trees, vegetation, uns	58000		8.27%
	Plants, trees, vegetation--not processed, n.e.c.	58900		<1%
Persons, plants, animals and minerals: Plants, trees, etc				8.37%
Parts and Materials: Wood, lumber 41000	Dimensional Lumber, n.e.c.	41519		<1%
	Plywood, wood panelling; particle, chip, flake board	41520		<1%
	Wood pieces, trim pieces, n.e.c.	41530		<1%
	Wood, lumber, n.e.c.	41590		3.13%
	Wood, lumber, uns	41500		2.50%
Parts and Materials: Wood, lumber Total				6.21%
Structures and surfaces: Ground 62300	Ground	62300		5.53%
Structures and surfaces: Ground Total				5.53%

Forestry OHS

Source of Injury Re-Categorization			
New Group (Description and Number)	Original Code (Description and Number)		Total
Machinery	30000	Chippers	32310 <1%
		Conveyors--belt	34210 <1%
		Conveyors--chain	34230 <1%
		Conveyors--powered, uns	34200 <1%
		Conveyors--roller	34120 <1%
		Derricks--A-frame	34510 <1%
		Elevators, uns	34600 <1%
		Forging machinery	35330 <1%
		Forwarder/yarder, skidder	32350 <1%
		Grinding, polishing machinery, uns	35400 <1%
		Harvesting and threshing machinery, uns	31100 <1%
		Heating and cooking machinery and appliances, uns	33200 <1%
		Jacks, n.e.c.	34790 <1%
		Log loaders, including heel boom	32340 <1%
		Logging & wood processing machinery--specialized, n.e.c.	32390 <1%
		Logging and wood processing machinery--specialized, uns	32300 <1%
		Machinery, n.e.c.	39990 1.08%
		Machinery, uns	30000 <1%
		Overhead hoists, n.e.c.	34490 <1%
		Paper production machinery, n.e.c.	37490 <1%
		Paper production machinery, uns	37400 <1%
		Pile drivers, tamping machinery	32930 <1%
		Planing machines	35220 <1%
		Presses, except printing, uns	35600 <1%
		Pumps	37970 <1%
		Rolling mills, rolling, calendering machinery	35130 <1%
		Sawing machinery--stationary, uns	35700 <1%
		Slitters, winders--paper production	37450 <1%
		Table saws	35730 <1%
		Winders, unwinders	34910 <1%
Machinery Total			4.26%

Forestry OHS

Source of Injury Re-Categorization			
New Group (Description and Number)	Original Code (Description and Number)		Total
Parts and Materials 40000	Belts, hoses	48220	<1%
	Building materials, uns	41000	1.37%
	Chains, n.e.c.	42230	<1%
	Concrete or clay pipes and conduits	41210	<1%
	Drums, pulleys, sheaves	44230	<1%
	Fasteners, uns	42100	<1%
	Grates	41340	<1%
	Hooks, shackles, magnets, clamshells	43200	<1%
	Motors	44140	<1%
	Parts & materials, n.e.c.	49000	<1%
	Pipes, ducts, tubing, uns	41200	<1%
	Rails	41360	<1%
	Relays, rheostats, starters, controls	44160	<1%
	Rollers	44270	<1%
	Rope, twine, string	42240	<1%
	Ropes, ties, uns	42200	<1%
	Saw blades--unattached	44320	<1%
	Strapping	42250	<1%
	Structural metal materials, n.e.c.	41390	<1%
	Structural metal materials, uns	41300	<1%
Tires, inner tubes, wheels, uns	48100	<1%	
Trailers	48300	<1%	
Vehicle & mobile equip. parts, n.e.c.	48900	<1%	
Vehicle & mobile equip. parts, uns	48000	<1%	
Wheels, tire rims	48140	<1%	
Parts and Materials Total			4.06%

Forestry OHS

Source of Injury Re-Categorization				
New Group (Description and Number)		Original Code (Description and Number)		Total
Other	90000	Alkalies, n.e.c.	2900	<1%
		Chemicals & chemical products, n.e.c.	9900	<1%
		Chips, particles, splinters, n.e.c.	95190	<1%
		Chips, particles, splinters, uns	95100	<1%
		Clothing, uns	92100	<1%
		Co-worker, former co-worker of injured or ill worker	57200	<1%
		Dirt particles	95110	<1%
		Fire, flame	93410	<1%
		Heat--environmental	93620	<1%
		Ice, sleet, snow	93730	<1%
		Insects, arachnids	51400	<1%
		Liquids, n.e.c.	96290	<1%
		Metal chips, particles	95130	<1%
		Nonmetallic minerals, except fuel, uns	55000	<1%
		Other Environmental Conditions, UNS.	93900	<1%
		Other Sources, n.e.c.	98000	<1%
		Petroleum, crude oil	8300	<1%
		Pulp and paper items	98001	<1%
		Rocks, crushed stone	55500	<1%
		Scrap, waste, debris, uns	95000	<1%
		Shoes, boots, slippers, sandals	92140	<1%
		Steam, vapours--nonchemical	96100	<1%
Water	96210	<1%		
Wood chips	95141	<1%		
Wood chips, sawdust	95140	<1%		
Other Total				3.72%

Forestry OHS

Source of Injury Re-Categorization				
New Group (Description and Number)		Original Code (Description and Number)		Total
Tools, instruments and equipment	70000	Hammers--power not determined	73310	<1%
		Handtools--nonpowered, n.e.c.	71990	<1%
		Handtools--powered, n.e.c.	72990	<1%
		Knives	71240	<1%
		Knives--powered	72230	<1%
		Ladders, n.e.c.	74900	<1%
		Mallets	71620	<1%
		Picks	71320	<1%
		Planes	71720	<1%
		Saws	71250	<1%
		Saws--power not determined	73230	<1%
		Saws--powered, except chainsaws	72240	1.37%
		Vises, clamps	71420	<1%
		Welding torches--powered	72630	<1%
		Wrenches	71820	<1%
Tools, instruments and equipment Total				2.64%
Structures and surfaces	60000	Ditches, channels, trenches, excavations	62710	<1%
		Doors	63100	<1%
		Floor of building	62210	<1%
		Floor, n.e.c.	62290	<1%
		Floor, uns	62200	1.03%
		Floors, walkways, ground surfaces, n.e.c.	62990	<1%
		Other structural elements, uns	63000	<1%
		Ramps, runways, loading docks	62920	<1%
		Scaffolds--staging, n.e.c.	64690	<1%
		Sidewalks, Paths, Outdoor Walkways, UNS.	62400	<1%
		Stairs, steps, uns	62500	<1%
Structures and surfaces Total				2.59%

Forestry OHS

Source of Injury Re-Categorization				
New Group (Description and Number)		Original Code (Description and Number)		Total
Containers	10000	Bags, sacks, totes	11100	<1%
		Barrels, kegs, drums	11200	<1%
		Bundles, bales	13100	<1%
		Cans	11600	<1%
		Containers--pressurized, n.e.c.	12900	<1%
		Hoses	12200	<1%
		Pressure lines, except hoses	12400	<1%
		Reels, rolls	13300	1.27%
		Skids, pallets	16000	<1%
		Tanks, bins, vats	11800	<1%
Containers Total				2.10%
Vehicles	80000	Animal or human powered vehicle, n.e.c.	83190	<1%
		Bus	82200	<1%
		Cart, dolly, handtruck	86100	<1%
		Highway vehicle, uns	82000	<1%
		Plant & industrial powered vehicles, uns	85000	<1%
		Semitrailer, tractor trailer, trailer truck	82540	<1%
		Snowmobile	84300	<1%
		Tractor	85300	<1%
		Vehicle, uns	80000	<1%
		Vehicles, n.e.c.	89000	<1%
		Water vehicle, uns	88000	<1%
Vehicles Total				1.13%
Grand Total (remaining are missing data)				95.89%

Forestry OHS

Type of Accident Re-Categorization

Type of Accident Re-Categorization				
New Group (Description and Number)		Original Code (Description and Number)		Total
Bodily reaction and exertion	20000	Bending, climbing, crawling, reaching, twisting	21100	4.26%
		Bodily conditions, n.e.c.	27000	<1%
		Bodily reaction, n.e.c.	21900	1.03%
		Bodily reaction, uns	21000	7.93%
		Bodily reactions & exertion, n.e.c.	29000	<1%
		Slip, Trip, Loss of Balance--Without Fall, UNS	21500	<1%
		Slipping on Something, Without Fall	21501	<1%
		Static posture without application of force to an object	25000	<1%
		Stepping In a Hole, Without Fall	21503	<1%
		Sudden reaction when surprised, ..., startled	21200	<1%
		Bodily reaction and exertion Total		
Fall	10000	Fall down stairs or steps		<1%
		Fall from ground level to lower level	11100	<1%
		Fall from ladder	11240	<1%
		Fall from loading dock	11300	<1%
		Fall from nonmoving vehicle	11230	<1%
		Fall from piled or stacked material	11800	<1%
		Fall from scaffold, staging	11400	<1%
		Fall on same level, n.e.c.	11600	<1%
		Fall on same level, uns	13900	<1%
		Fall onto or against objects	13000	3.47%
		Fall through existing floor opening	13200	<1%
		Fall to floor, walkway, or other surface	11210	5.82%
		Fall to lower level, n.e.c.	13100	<1%
		Fall, n.e.c.	11900	<1%
		Fall, uns	19000	<1%
		Jump from nonmoving vehicle	10000	<1%
		Fall Total		
Contact with objects and equipment: Struck by object	2000	Struck by object, n.e.c.	2900	10.08%
		Struck by object, uns	2000	<1%
		Struck by rolling, sliding obj. on floor or ...	2400	<1%
Contact with objects and equipment: Struck by object Total				10.91%

Forestry OHS

Type of Accident Re-Categorization				
New Group (Description and Number)		Original Code (Description and Number)		Total
Bodily reaction and exertion: Lifting	22100	Overexertion in lifting	22100	10.67%
Bodily reaction and exertion: Lifting Total				10.67%
Exposure to harmful substances or environments: Noise	35000	Exposure to noise over time		8.51%
		Exposure to noise, uns	35100	<1%
Exposure to harmful substances or environments: Noise Total				8.61%
Bodily reaction and exertion: Overexertion	22000	Overexertion in holding, ..., or wielding	22300	<1%
		Overexertion in pulling or pushing objects	22200	6.51%
		Overexertion in throwing objects	22400	<1%
		Overexertion, n.e.c.	22900	<1%
		Overexertion, uns	22000	<1%
Bodily reaction and exertion: Overexertion Total				7.78%
Contact with objects and equipment: Struck by flying object	2200	Struck by discharged object or substance	2220	<1%
		Struck by dislodged flying object, particle	2210	<1%
		Struck by flying object, n.e.c.	2290	4.40%
		Struck by flying object, uns	2200	<1%
Contact with objects and equipment: Struck by flying object Total				6.21%
Contact with objects and equipment: Caught in or compressed by equipment or objects	3000	Caught in or compressed by equip./objects, uns	3000	<1%
		Caught in running equipment or machinery	3100	2.15%
		Caught in/compressed by equip./obj., n.e.c.	3900	3.67%
		Compressed/pinched by rolling, sliding/shifting obj.	3200	<1%
Contact with objects and equipment: Caught in or compressed by equipment or objects Total				6.02%
Contact with objects and equipment: Struck by swinging or slipping object	2300	Struck by or slammed in swinging door or gate	2310	<1%
		Struck by slipping handheld object	2320	4.89%
		Struck by swinging or slipping object, n.e.c.	2390	<1%
		Struck by swinging or slipping object, uns	2300	<1%
Contact with objects and equipment: Struck by swinging or slipping object Total				5.38%
Contact with objects and equipment: Struck against object	1001	Stepped on object	1100	<1%
		Struck against moving object	1300	<1%
		Struck against object, n.e.c.	1900	<1%
		Struck against object, uns	1000	<1%
		Struck against stationary object	1200	2.74%
Contact with objects and equipment: Struck against object Total				5.09%

Forestry OHS

Type of Accident Re-Categorization				
New Group (Description and Number)		Original Code (Description and Number)		Total
Contact with objects and equipment: Rubbed or abraded by friction or pressure	5000	Rubbed or abraded by foreign matter in eye	5300	1.13%
		Rubbed or abraded by friction or pressure, n.e.c.	5900	<1%
		Rubbed or abraded by friction or pressure, uns	5000	<1%
		Rubbed or abraded by objects being handled	5200	1.76%
Contact with objects and equipment: Rubbed or abraded by friction or pressure Total				3.18%
Contact with objects and equipment: Struck by falling object	2100	Struck by Falling object	2100	3.13%
Contact with objects and equipment: Struck by falling object Total				3.13%
Exposure to harmful substances or environments	30000	Contact with electric current, uns	31000	<1%
		Contact with hot objects or substances	32300	<1%
		Contact with temperature extremes, uns	32000	<1%
		Exposure to caustic, noxious, or allergenic subs.	34000	<1%
		Exposure to environmental heat	34900	<1%
		Exposure to welding light	32100	<1%
		Inhalation of substance, uns	36200	<1%
Exposure to harmful substances or environments Total			34100	1.37%
Contact with objects and equipment	1000	Caught in/crushed in collapsing materials, n.e.c.	4900	<1%
		Contact with obj. & equipment, uns		<1%
		Contact with objects and equipment, n.e.c.	9000	<1%
		Rubbed, abraded, or jarred by vibration, uns	6000	1.03%
Contact with objects and equipment Total				1.22%
Bodily reaction and exertion: Repetitive motion	23000	Repetitive motion, n.e.c.	23900	<1%
		Repetitive placing,/moving objects, except tools	23300	<1%
		Repetitive use of tools	23200	<1%
Bodily reaction and exertion: Repetitive motion Total				<1%

Forestry OHS

Type of Accident Re-Categorization			
New Group (Description and Number)		Original Code (Description and Number)	Total
Transportation accident	40000	Fall from moving vehicle, mobile equipment - Nonhighway	<1%
		Highway accident, n.e.c.	42310 <1%
		Jack-knifed or overturned--no collision	41900 <1%
		Moving in same direction	41410 <1%
		Noncollision accident, n.e.c.	41120 <1%
		Noncollision accident, n.e.c. - Nonhighway accident	41490 <1%
		Nonhighway accident, uns	42390 <1%
		Overtuned - Nonhighway accident	42000 <1%
		Ran off highway--no collision	42330 <1%
		Vehicle struck stationary obj./equip. in roadway	41420 <1%
Transportation accident Total		41200	<1%
Other	80000	Explosion of pressure vessel or piping	<1%
		Hitting, kicking, beating	52200 <1%
Other Total		61200	<1%
Grand Total			96.48%

Forestry OHS

Part of Body Re-Categorization

Part of Body Re-Categorization				
New Group		Original Code		Total
Trunk: Back, including spine, spinal cord, uns	23000	Back, including spine, spinal cord, n.e.c.	23900	1.03%
		Back, including spine, spinal cord, uns	23000	3.18%
		Low(er) back, unspecified location	23901	7.34%
		Lumbar region	23100	13.06%
		Lumbo-sacral region	23301	<1%
		Multiple back regions	23800	<1%
		Sacral region	23300	<1%
		Thoracic region	23200	<1%
		Thoraco-lumbar region	23202	<1%
Trunk: Back, including spine, spinal cord, uns Total				26.08%
Head: Ear (Inner/Middle)	2000	Inner ear(s)	2003	3.52%
		Middle ear(s)	2002	4.65%
Head: Ear (Inner/Middle) Total				8.17%
Lower Extremities: Leg(s)	41000	Leg(s), n.e.c.	41900	2.01%
		Leg(s), uns	41000	1.81%
		Lower leg(s)	41300	1.61%
		Thigh(s)	41100	2.05%
Lower Extremities: Leg(s) Total				7.49%
Upper Extremities: Finger(s)	34000	Finger(s), fingernail(s), UNS.	34000	4.79%
		Fingers, except thumb	34002	2.30%
		Thumb or thumb and other finger(s)	34001	<1%
Upper Extremities: Finger(s) Total				7.49%
Other	90000	Body Systems, UNS.	50000	<1%
		Eye glasses or corrective lenses	91005	<1%
		Multiple Body Parts, n.e.c.	80090	1.22%
		Multiple body parts, uns.	80000	5.14%
		Neck and shoulder	80001	<1%
Other Total				6.85%
Lower Extremities: Knee(s)	41200	Knee(s)	41200	6.80%
Lower Extremities: Knee(s) Total				6.80%

Forestry OHS

Part of Body Re-Categorization				
New Group		Original Code		Total
Upper Extremities: Wrists and Hand(s), except finger(s)	33000	Hand(s), except finger(s)	33000	4.11%
		Wrist(s)	32000	2.20%
Upper Extremities: Wrists and Hand(s), except finger(s) Total				6.31%
Upper Extremities: Arm(s)	31000	Arm(s)	31000	1.03%
		Arm(s), n.e.c.	31900	<1%
		Elbow(s)	31200	1.57%
		Forearm(s)	31300	1.81%
		Multiple arm(s) locations	31800	<1%
		Upper arm(s)	31100	<1%
		Upper extremities	30000	<1%
Upper Extremities: Arm(s) Total				5.68%
Trunk	20000	Abdomen, except int. loc. of diseases or disorders	24000	<1%
		Abdomen, uns	24009	<1%
		Chest, except int. loc. of diseases or disorders	22000	<1%
		Chest, uns	22009	2.10%
		Groin	25400	<1%
		Internal abdominal location, uns	24100	<1%
		Internal chest location, uns	22100	<1%
		Multiple trunk locations	28000	<1%
		Pelvic region	25000	<1%
		Pelvic region, uns	25100	<1%
		Trunk, n.e.c.	29000	<1%
		Trunk, uns	20000	<1%
Trunk Total				5.38%
Lower Extremities: Feet	43000	Foot(feet), except toe(s), uns	43000	3.18%
		Foot(feet), n.e.c.	43900	<1%
		Heel(s)	43230	<1%
		Toe(s), toenail(s)	44000	<1%
Lower Extremities: Feet Total				4.60%
Trunk: Shoulder, including clavicle, scapula	21000	Shoulder, including clavicle, scapula	21000	3.86%
Trunk: Shoulder, including clavicle, scapula Total				3.86%

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Part of Body Re-Categorization				
New Group		Original Code		Total
Head	1000	Brain	1100	<1%
		Cranial region, including skull	1000	<1%
		Ear(s), UNS.	2000	<1%
		Face, n.e.c.	3900	<1%
		Face, UNS	3000	<1%
		Forehead	3100	<1%
		Head	100	<1%
		Head, n.e.c.	9000	<1%
		Jaw/chin	3500	<1%
		Mouth, n.e.c.	3690	<1%
		Mouth, uns	3600	<1%
		Multiple face locations	3800	<1%
		Multiple head locations	8000	<1%
		Multiple mouth locations	3680	<1%
		Nose, except int. location of diseases or disorders	3300	<1%
		Nose, uns	3309	<1%
		Outer ear(s)	2001	<1%
		Skull	1300	<1%
		Tooth(teeth)	3630	<1%
		Head Total		
Head: Eye(s)	3200	External eye (ex. For superficial corneal abrasions)	3201	<1%
		Eye(s), UNS.	3200	1.61%
		Eyes(s), NEC.	3290	<1%
Head: Eye(s) Total				2.59%
Lower Extremities: Ankle(s)	42000	Ankle(s)	42000	2.59%
Lower Extremities: Ankle(s) Total				2.59%
Neck including throat	10000	Cervical region (cervical vertebrae)	10001	<1%
		Neck, except int. location of diseases or disorders	10000	<1%
		Neck, NEC.	10009	<1%
Neck including throat Total				1.37%

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Part of Body Re-Categorization				
New Group		Original Code		Total
Lower Extremities: Multiple	48000	Foot(feet) and ankle(s)	48200	<1%
		Foot(feet) and leg(s)	48100	<1%
		Foot(feet) and toe(s)	48300	<1%
		Lower extremities, n.e.c.	49000	<1%
		Multiple leg(s) locations	41800	<1%
		Multiple lower extremities locations, uns	48000	<1%
		Multiple lower extremities, n.e.c.	48900	<1%
Lower Extremities: Multiple Total				<1%
Upper Extremities: Multiple	38000	Hand(s) and arm(s)	38300	<1%
		Hand(s) and finger(s) or thumb(s)	38100	<1%
		Hand(s) and wrist(s)	38200	<1%
		Multiple upper extremities locations, uns	38000	<1%
Upper Extremities: Multiple Total				<1%
Grand Total				100.00%

Appendix C: Occupation sub-groups

Occupation and industry subgroups:

- Claimants are grouped according to industry or occupational activity sub-groups. The matrix below shows a cross-tabulation of the claims for the occupational classification (in rows) and industry classification (columns).
- The data consist of a range of workers involved in primary wood-related industries. With the exception of logging, all employers are assessed based on their payroll. Logging companies pay assessment rates based on volume of wood produced.

	Field Crop Combination Farms	Logging Industry (per cubic metre)	Silviculture	Sawmill and Planing Mills	Sawmill & Planing Mill Products Industry	Kitchen Cabinet and Bathroom	Other Millwork Industries	Wooden Box and Pallet Industry	Other Wood Industries n.e.c.	Pulp and Paper Mills	Corrugated Box Industry	Forest Products Trucking Industry (per cubic metre)	Bundling Materials, Wholesale--Other	Total
Legend: + = 1-10 ++ = 11-100 +++ = 101-1000														
Foreman Forestry/Logging Occupation 3		++			+									++
Forest Conservations Occupation 3		++	++		+									++
Timber Cutting and Related Occupation 1	+	+++	+	++	+++		+		+			+	+	+++
Log Inspection/Grade/Scale Occupation 3		+												+
Log Hoist/Sort/Move Occupation 1		+												+
Forest/Log Labour Occupation 1		++			+	+		+						++
Forest/Logging Occupations NEC 1		++	+	+	+								+	++
Foreman Pulp/Paper Processing 3		+		+	+									+
Sawmill Sawyer Occupations 2		++		++	++		+		+					+++
Plywood Making Occupations 2		+				+								+
Wood Treating Occupations 2		+												+
Wood/Paper Inspect/Test/Grade 3					+									+
Wood Processing Occupation NEC 2		+		+	+	+	+							++
Foreman Pulp/Paper Making 3														n/a
Cellulose Pulp Preparing Occupation 2														n/a
Papermaking/Finishing Occupation 2														n/a
Paper/Pulp Inspect/Test/Grade 3														n/a
Pulp/Papermaking Labour Occupation 2														n/a
Pulp/Papermaking Labour NEC 2														n/a
Pulp/Paper Labour Occupations 2														n/a
Total	+	+++	++	++	+++	+	+	+	+	n/a	+	+	+	+++

Sub-group 1: Logger

Sub-group 2: Processor

Sub-group 3: Supervisor

Indicators for Pulp and Paper industry and occupational classifications are not included because of the small number of employers, and the subsequent residual identification of employers from the data.