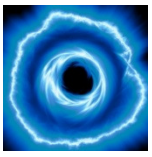


# Falling Supervisor Workload Management Issues Phase I

*Report Version 2.0*

**September 2010**

**Melanie Walls and Dean McGeough**

Note that appendices are included only in the full report. If you are reading the abbreviated version without appendices and would like the full report, please request a copy from the BC Forest Safety Council (contact details on page 37).

## Acknowledgements

A large number of people and organizations have contributed time and expertise in order to support this initiative of the BC Forest Safety Council. This project is intended as a starting point to address the coroner's recommendations to understand and address workload management issues, and it is hoped that when this work is completed the many individuals who have supported this project will feel the outcome is worthwhile, and that they have played a part in reducing the workload management issues facing falling supervisors throughout BC.

Particular thanks go to the 10 supervisors, 10 organizations and many individuals, both fallers and supervisors, who generously allowed us to be a part of their day and to see their hard work first hand. Many thanks also to the 89 supervisors who travelled long distances and gave up their time in order to participate in the July 23rd falling supervisor workshop, and to their supporting organizations.

The workshop would not have been possible without our excellent facilitators:

David Gaskill, Occupational Safety Officer, WorkSafeBC

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This project was sponsored by the BC Forest Safety Council, and was supported throughout by Bill Bolton, Allison Thompson, Wendy Gaskill, Fiona Macinnes and Reynold Hert of BC Forest Safety Council.

The contents of this report were prepared by Melanie Walls and Dean McGeough. Contact details for the authors and BC Forest Safety Council representatives are on page 37.

Please address all requests for copies of this report to BC Forest Safety Council.

**Falling Supervisor Workload Management Issues: Phase I**

**Report Version 2.0**

## Executive Summary

The BC Forest Safety Council ('the Council') commissioned a study of falling supervisor workload analysis in 2010. This report outlines the results of the study. The purpose of the study was to "Conduct a small scale study as the first stage of addressing coroner's recommendations". This included a recommendation: "*to develop a better understanding of these workload management issues and identify tools and strategies for facilitating effective supervision.*"

In order to achieve this, ten site visits were conducted, to a variety of operations including Vancouver Island and sites from Northern to Southern mainland BC. A workshop was also conducted, attended by 89 falling supervisors from across BC.

The following factors were identified as key causes of high workload:

- Documentation requirements

  Supervisors expressed concerns that documentation may create the appearance of safety, whilst actually decreasing time spent with the fallers in the field.

- Economic pressures

  Volume based payment was frequently referred to as an issue that impacts on safety.

- The challenges and complexities inherent in falling

  The progression into cutblocks with complex falling plans, remote and challenging terrain means fallers need more support and supervision.

- Planning that does not focus on faller safety

  Supervisors feel they lack the authority to influence planning decisions, and may be left with a layout that makes it difficult to position fallers safely and hazards in the cutblock.

- Congestion and multiphase projects

  Congestion was repeatedly highlighted as an issue, particularly for multiphase projects.

- Large amounts of time spent in transit

  Supervisors frequently spend hours driving, in addition to their working day. This is often very early in the morning when fatigue issues are maximized.

Data from both the site visits and the workshop suggested that supervisors are working long days with very few breaks. After working a long day in the field, supervisors then spend considerable time in the evenings on administrative tasks and documentation. 10 – 12 hour days are the norm, with some

supervisors working over 14 hours on a typical working day. During the course of these long days, supervisors take very minimal breaks. Data from the site visits and the workshop suggested that 10 – 30 minutes throughout the day is the norm.

It is not clear that the demands placed on supervisors are the result of any one task. The impact of falling timber while supervising was discussed during the workshop, and supervisors identified both positive and negative impacts of this practice. For example, supervisors who fall are able to keep their skills up to date, but may experience production pressure.

However, 'supervision only' supervisors also have additional demands on their time. For example, some take responsibility for supervising non-fallers. There were also indications that 'supervision only' supervisors typically supervise a larger number of fallers.

One concern, raised during the workshop, is that supervisors who also fall may be distracted by their supervisory duties, and so be more at risk of injury themselves.

Another potential source of risk is fatigue. The long days, coupled with short breaks and early mornings, are likely to lead to problems with fatigue that will accumulate over the course of a multi-day shift. This is likely to decrease effectiveness of supervision, and also impact the supervisor's own safety when falling or driving, or simply walking in a high hazard environment.

Supervisors in the workshop identified the following ways in which workload could impact on safety:

- General reduction in supervisor performance, leading to less effective supervision
- Reduction in planning time and time spent walking the block
- Missing out tasks or rushing them

In addressing workload issues, different options for creating guidelines and recommendations were explored.

Data from the site visits and the workshop revealed that supervisor days are extremely variable, so any guidelines or regulations based on generalizations are likely to be a poor fit in many cases.

Workshop feedback also indicated that the number of fallers who can be safely supervised is extremely variable, and depends on a large number of factors. Developing this kind of guidance would therefore be extremely challenging.

Discussions based on frequency of inspection were more fruitful. Supervisors showed broad consensus about frequency of inspections, with recommended frequency varying depending on the type of faller being inspected (e.g. problem versus experienced). This suggests that guidelines on inspection frequency should take into account the faller being inspected.

Based on the data collected during this study, the following recommendations were made:

- Investigate ways to reduce the amount of time supervisors spend on documentation
- Ensure supervisors are involved in the planning process for multi-phase operations, with the authority to influence decisions in order to ensure faller safety
- Provide support for supervisor risk assessment
- Investigate means of encouraging near miss investigations in the Industry
- Investigate options to ensure investment in safety does not disadvantage companies during the bidding process, and that safety plans are complied with once work commences
- Investigate opportunities for delegation of some supervisory tasks
- Provide supervisors with decision support, memory aid and checklists to reduce supervisor mental workload

The study also identified areas where more information is required in order to maximize the impact of any interventions intended to reduce workload management issues and increase the effectiveness of supervision:

- Verify the relationship between causal factors (e.g., workload) and safety outcomes (e.g., near misses), and identify which factors have the greatest impact on safety
- Investigate differences between supervisors who fall and those who do not
- Investigate whether fatigue is having an impact on safety outcomes for supervisors
- Investigate and categorize near misses
- Investigate whether distraction is impacting safety for supervisors who also fall trees

This study has collected a large volume of rich data, with value that extends beyond the scope of this report. It provides evidence-based data about the tasks performed by falling supervisors, and valuable insight into workload and supervision from a large number of supervisors.

There is potential for developing some of these insights into training materials or guidance, and also for providing supervisors with a yardstick for assessing their own operation.

Whilst only the first step in addressing workload management issues and enhancing effective supervision in BC's forestry industry, this study has been valuable in laying the groundwork for the future.

# Introduction

## Purpose

The BC Forest Safety Council ('the Council') commissioned a study of falling supervisor workload analysis in 2010. This report outlines the results of the study. The purpose of the study was to: "Conduct a small scale study as the first stage of addressing coroner's recommendations". The coroner's recommendations referred to are reproduced below:

**That the Council consider leading a study into falling supervisor workload management issues.**

*Chair's Comment: The Panel acknowledged that the level of supervision and its effectiveness varies greatly across the industry. Falling supervisors who are responsible for their own production quota, and even dedicated supervisors who may be directing the work of fallers spread out over distant operations, may be facing workload challenges which interfere with effective supervision, especially as it relates to ensuring a safe work environment for fallers. The Panel identified the need to develop a better understanding of these workload management issues and identify tools and strategies for facilitating effective supervision.*

In order to complete the study, the Council engaged two consultants to undertake ten site visits, one workshop, and produce a written report. The site visits covered a variety of operations including Vancouver Island and sites in Northern and Southern mainland BC. The workshop was attended by 89 falling supervisors from across BC.

One of the consultants was a Human Factors professional with experience in workload analysis, specializing in safety critical industries, and the other was a Registered Professional Forester (RPF) with years of operational experience in the forestry industry, specializing in risk assessment and faller safety.

## Objectives:

The objectives of this study were as follows:

- **Develop an understanding of how supervisors spend their time through field observations**

  This was achieved through the site visits (see page 25: 'How much time does it take to do the job?' and also page 41: 'Appendix B – Site Visit Data')

- **Collect data about the workload associated with supervisory tasks**

  This was achieved through the site visits, and also through collection of data at the workshop (see page 14: 'Workload assessment in this study', page 28: 'How much time does it take to do the job?', and also page 22: 'Task timing data from the workshop').

- **Identify, through workload analysis, which combinations of supervisory and falling tasks lead to excessive workload**

This was achieved through workshop data (see page 30: 'Which situations or scenarios lead to particularly high workload and/or are particularly challenging from a supervisory point of view?') and site visits (see page 27: 'How may task conflict and overload be experienced when multi-tasking?').

- **Develop understanding of factors impacting on supervisor workload through a workshop**

This was achieved through the workshop (see page 30: 'Which situations or scenarios lead to particularly high workload and/or are particularly challenging from a supervisory point of view?')

- **Analyze and evaluate data to support the understanding of workload management issues facing supervisors**

This was achieved through analysis and evaluation of data from the site visits and the workshop (discussed throughout the report).

- **Provide recommendations on the most effective tools and strategies to facilitate effective supervision based on workshop data**

This was achieved through the workshop (see page 30: 'Which tools and strategies do supervisors feel will be most effective in addressing supervisory and workload issues?' and also page 31: 'Recommendations').

## Method

The Human Factors specialist familiarized herself with background to the project by reviewing documents provided by the Council, and also accompanied the RPF on two of the site visits. The remainder of site visits were conducted by the RPF. A data collection template was developed, and workload analysis methodologies were reviewed.

During each of the ten site visits, an individual supervisor was observed for the full time in the field, and where possible during morning preparation and in the evening. Supervisors were briefed to ignore the observer(s) as much as possible, and to conduct themselves as if it were a normal working day. Information was also collected in interviews during or shortly after the site visits to establish context for the data – such as timber type, type of crew, worksite layout, job title of supervisor, and whether it had been a 'typical' working day. Data from the sites was compiled, and tasks were classified using the DACUM Research Chart for Falling Supervisors (available from the Council), and a second task categorization developed specifically for this study. The results, as reported in Appendix B – Site Visit Data (page 41), provide data about how much time it took to perform various tasks, and a breakdown of how supervisors spend their days.

Note: see page 38: 'Appendix A - Notes on methodology' for further discussion of methods and a table showing the categorization used to classify tasks.

The following table provides an overview of the sites visited:

| Site name | Location | Crew type | Crew size1 | Access | Notes |
|---|---|---|---|---|---|
| Site A | Island | Union | Medium | Road | Supervisor responsible for individuals falling (hand + mechanical) and also yarding/ loading/ etc. |
| Site B | Island | Contractor | Medium | Road | Working BB |
| Site C | Island | Contractor | Large | Boat | Working BB |
| Site D | Island | Union | Large | Road | Salary BB |
| Site E | Island | Contractor | Large | Road | Supervisor responsible for mechanical + hand falling |
| Site F | Mainland/ Mid coast | Contractor | Large | Helicopter | Helicopter operation |
| Site G | Mainland / South coast | Contractor | Small | Road | Working BB |
| Site H | Mainland/ South | Contractor | Medium | Road | Supervisor responsible for individuals falling (hand + mechanical) and also yarding/ loading/ etc. |
| Site I | Mainland/ North coast | Contractor | Small | Road | Working BB |
| Site J | Island | Contractor | Small | Road | Training site |

[1] Crew size is rated based on average company set up, not size on day of visit

Small Crew: <5 fallers; Medium Crew: 5 - 10 fallers; Large Crew: >10 fallers

The sites were selected in order to survey a range of operations. However, in order to capture the diversity of BC's falling sector a far larger number of visits would have been required than was possible. A workshop was therefore conducted to collect data from a wider cross-section of industry. See page 36 for a discussion of 'Pros and cons of further site visits'.

On July 23, 2010 the Council sponsored a workshop in Nanaimo, attended by 89 supervisors. The supervisors were divided into six groups supported by six facilitators. Each facilitator led their group through a series of semi-scripted exercises to collect data on topics relating to supervision and workload. Data from the six groups were combined, and the results provide information based on a wide variety of operations and geographical locations to complement the ten in-depth site visits. Key points from each of the groups were also captured, based on workshop data and interviews with the facilitators.

## Research questions

The data from the workshop and site visits is intended to answer the following questions:

- What workload management issues do supervisors experience?
- How much time does it take to do the job?
- Is falling timber while supervising likely to lead to unacceptable workload?
- How may task conflict and overload be experienced when multi-tasking?
- How much time is spent on task vs. on secondary tasks?
- Are supervisors having their breaks?
- Does workload have an impact on safety?
- Which situations or scenarios lead to particularly high workload and/or are particularly challenging from a supervisory point of view?
- Which factors affect the safe ratio of supervisors to fallers?
- Which tools and strategies do supervisors feel will be most effective in addressing supervisory issues?

## Report structure

The remainder of the report is structured as follows:

- Background
- Summary of task timing data
- Answers to research questions drawing on both workshop and site visit data
- Conclusions and recommendations
- Appendix A: Comments on methodology
- Appendix B: Site visit data for the ten sites
- Appendix C: Workshop data for the six groups

Note that appendices are included only in the full report. If you are reading the abbreviated version without appendices and would like the full report, please request a copy from the BC Forest Safety Council or report authors (contact details on page 36).

# Background

## Workload – theoretical background

Overload, or excessive workload, occurs when individuals feel they have too many tasks to do and too little time to do them. Workload is a characteristic of an individual and a situation – the same situation may be acceptable, in terms of workload, for one individual, but lead to an overload for another individual. Often this is related to skills and experience in completing the task in question. For example, a novice faller would find it challenging to safely fall the same trees as an experienced faller during the course of a day, and would be very likely to experience excessive workload if he attempted to do so.

Humans respond to workload in a number of different ways. If workload is too low, they may begin to engage in secondary tasks, productivity and arousal may decrease, and in extreme cases they may fall asleep. At a moderate level of workload, performance is optimized. At high levels of workload, individuals begin to use coping strategies in an attempt to maintain performance despite the high workload.

One coping strategy for high workload is increasing effort (working harder), which may be sufficient to maintain performance at the same level. This has a cost, however. It accelerates the onset of fatigue (in the short term) also leading to stress (in the long term). Another coping strategy is task shedding. When this occurs, tasks that are judged to be less important are missed out altogether. For example, many supervisors do not take a lunch break (this 'task' has been shed).

However, these coping strategies cannot maintain performance in the face of continuing increases in workload. There is a limit to how hard an individual can work, and once a supervisor has cut breaks and social discussions to a minimum, he has no choice but to extend his day and/or shed work-related tasks.

The impact of high workload can include:

- Making decisions based on less information or without considering all of the options
- Using rules of thumb instead of working things out systematically
- Use of techniques that save time but are less effective or safe

For example, some supervisors at the workshop reported that they don't have enough time to walk every block and place every faller. This means that their decisions and actions are based on less information, and is also an example of a technique (cutting back on pre-work) that saves time but can be less effective and safe.

High workload also has cumulative effects. Extended periods of excessive workload can lead to a condition known as 'burnout' where performance (and health) can be impaired for long periods of time.

High workload has been associated with an increase in injuries and incidents in other industries, both because of the impact on job performance (increasing risk because job performance is impaired) and also because of impacts on the individual themselves (such as injuries due to fatigue).

## Workload assessment in this study

This study used two different approaches to explore workload management issues. The first was by developing an understanding of tasks performed by supervisors throughout the day, and how long these tasks take to complete. Total time required to complete all tasks (i.e. length of day) was used as an indicator of the job demands placed on supervisors, and hence of workload (see page 38: 'Appendix A - Notes on methodology' for further discussion).

Information about time taken to perform daily tasks was collected during both the site visits and also during the workshop. During site visits this was achieved by recording every observable task the supervisor did throughout the day, and how long it took. This data was almost all based on visual observation. However, in some cases, when safe visual observation was not possible, it was achieved by monitoring the radio and clarifying with the supervisor afterwards where necessary.

During the workshop, participants were asked questions about the time taken to perform various tasks. The data for individual tasks and the length of day reported by workshop participants were consistent with the data collected from the site visits. This increases confidence in both sets of data – it suggests that site visits are broadly representative of the wider falling community, and also that supervisors were not obviously over- or under-estimating the time taken for various tasks during the workshop.

There were wide variations in the time taken for similar tasks, however. These were seen both during the course of a single day with the same supervisor (who might do inspections varying from 20 minutes to nearly two hours) and when comparing different supervisors talking about the same task (e.g. workshop participants gave estimates of time required for pre-work varying from 30 minutes to a full day). Discussions with supervisors during the site visits and the workshop support the view that task timings are genuinely extremely changeable, depending on a large number of factors (e.g., length of inspections depend on: type of inspection, number of issues, faller experience), so this variability is likely a true reflection of the situation rather than just reflecting inaccurate measurement or estimates.

The second approach to understanding workload management issues used in this study was to collect extensive data about the supervisor perceptions of the causes, consequences, and management of workload. This information was collected during the workshops, and provided more in depth information about:

- Supervisor perceptions of workload management issues
- Supervisor's experiences of the impact of workload on effective supervision
- Supervisor's recommendations for improving workload management issues (amongst other topics).

Information from subjective research techniques such as workshops is inevitably shaped by the personal beliefs and experiences of the participants, but with 89 falling supervisors attending, their collective view represents the insights and feelings of a wide cross section of the community, and as such is extremely valuable for gaining and insight into workload from falling supervisors' point of view.

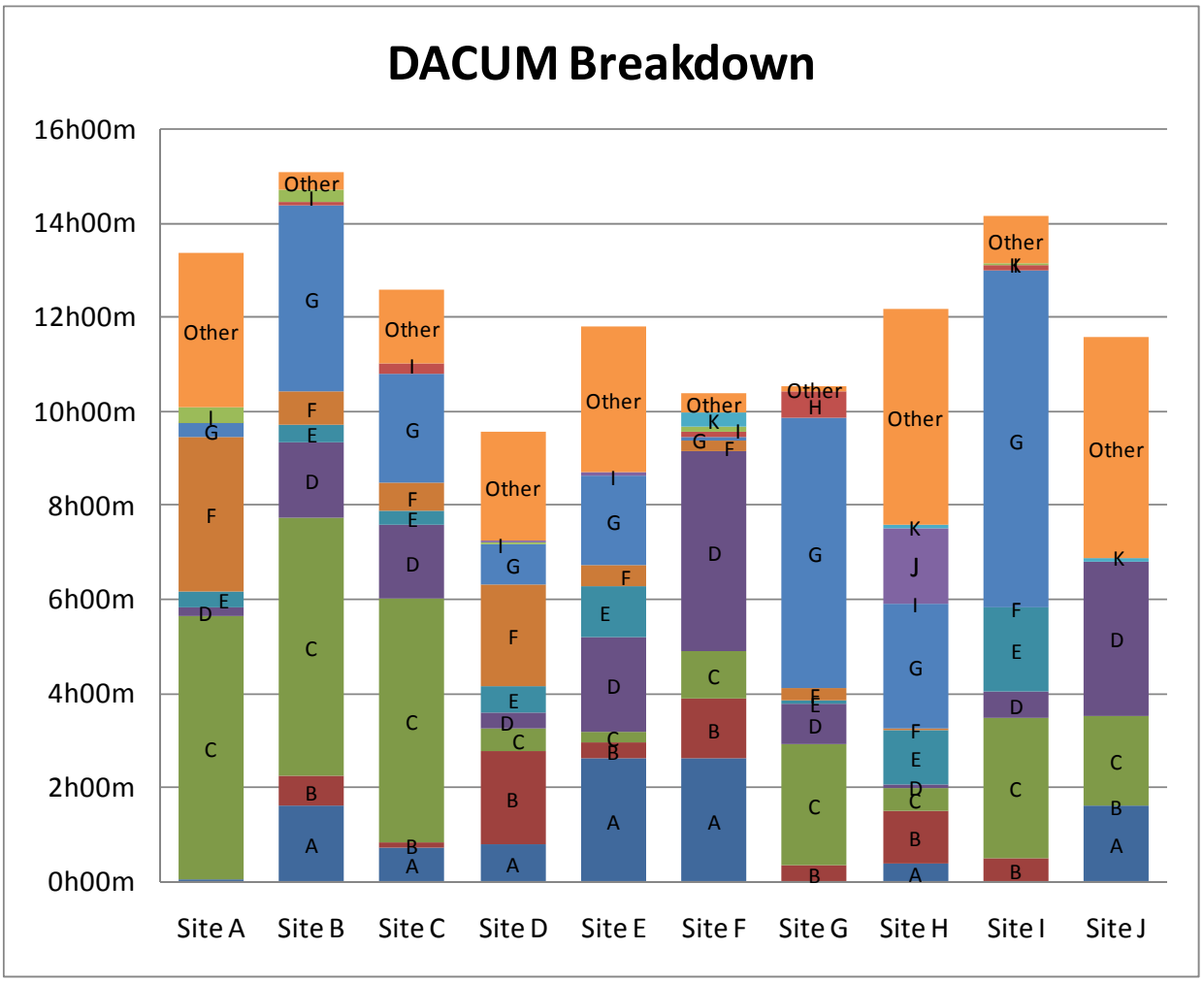
# Summary of task timing data

This section contains key data on task times, from the 10 site visits and workshop. Further data is provided in Appendix B – Site Visit Data (page 41) and Appendix C – Workshop Data (page 125).

## Task timing data from site visits

### DACUM breakdown

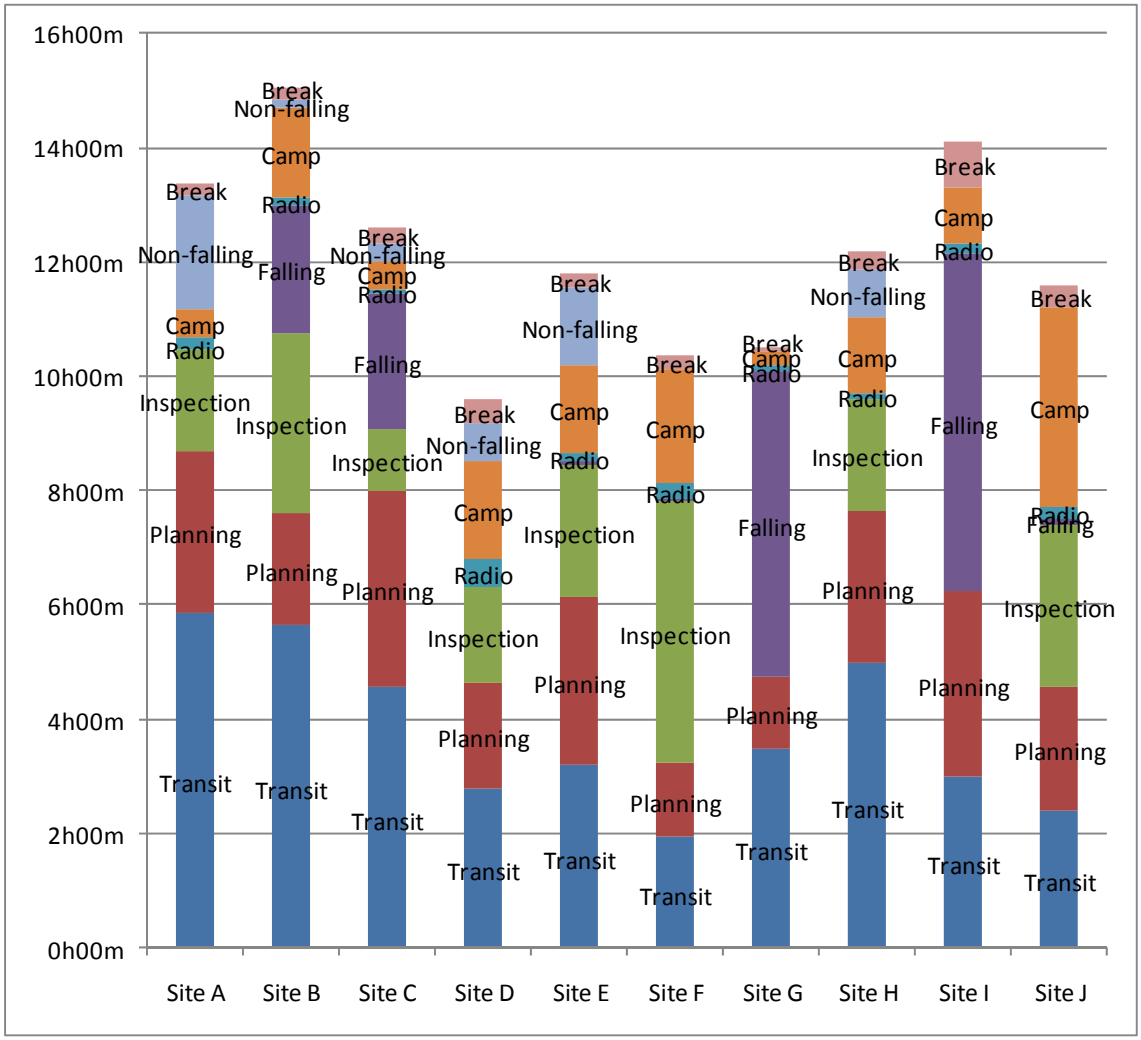
The graph on the following page shows time spent on different DACUM categories throughout the day. 'Other' is used for tasks which did not fall under a DACUM category, including breaks and supervision of individuals who are not fallers. Transit by vehicle (truck/ boat/ helicopter) is classified as C9: Drive crew to work.




| Category | DACUM Description |
|---|---|
| A | Conduct inspections on fallers |
| B | Control falling activity on the worksite |
| C | Ensure adequate tools to do the job are available |
| D | Develop a block falling plan |
| E | Coordinate with other phases |
| F | Manage people |
| G | Manage the business |
| H | Maintain block falling plan |
| I | Manage environment |
| J | Participate in safety program |
| K | Train workers |
| Other | Not classified |

### High Level Category Breakdown

This shows time by category, using categories developed specifically for this study.




Category descriptions are listed below:

| High level category (used for color coding) | Term used in diagrams | Detailed categories | Term used in diagrams |
|---|---|---|---|
| **Transit** | Transit | Walking block/ hazard plan | Walking |
| | | Car/ helicopter/ boat | Vehicle |
| **Falling related planning/ organization** | Planning | Weather monitoring/ discussion | Weather |
| | | Waiting | Waiting |
| | | Supplies | Supplies |
| | | Briefing/ tailgate/ discuss plans with fallers/ organize fallers | Organize |
| | | ERP related activities | ERP |
| | | Pre-work site inspection | Pre-work |
| | | Vehicle maintenance | Maintenance |
| **Faller inspection** | Inspection | Documentation (in field) | Doc (field) |
| | | Quality control/ bucking specs | Quality |
| | | Measure stumps | Stumps |
| | | Observe faller working (incl. Discussion) | Observe |
| | | Review area/ worksite | Worksite |
| | | Discussion with faller | Discuss |
| **Falling** | Falling | | Falling |
| **Radio communication** | Radio | Used when other categories don't apply (e.g. man check). Planning over the radio would be classified as planning. | Radio |
| **Documentation/ administration (in camp)** | Camp | | Camp |
| **Phase planning/ supervision of other phases** | Non-falling | | Non-falling |
| **Breaks/ social discussions** | Break | | Break |

## Site comparison

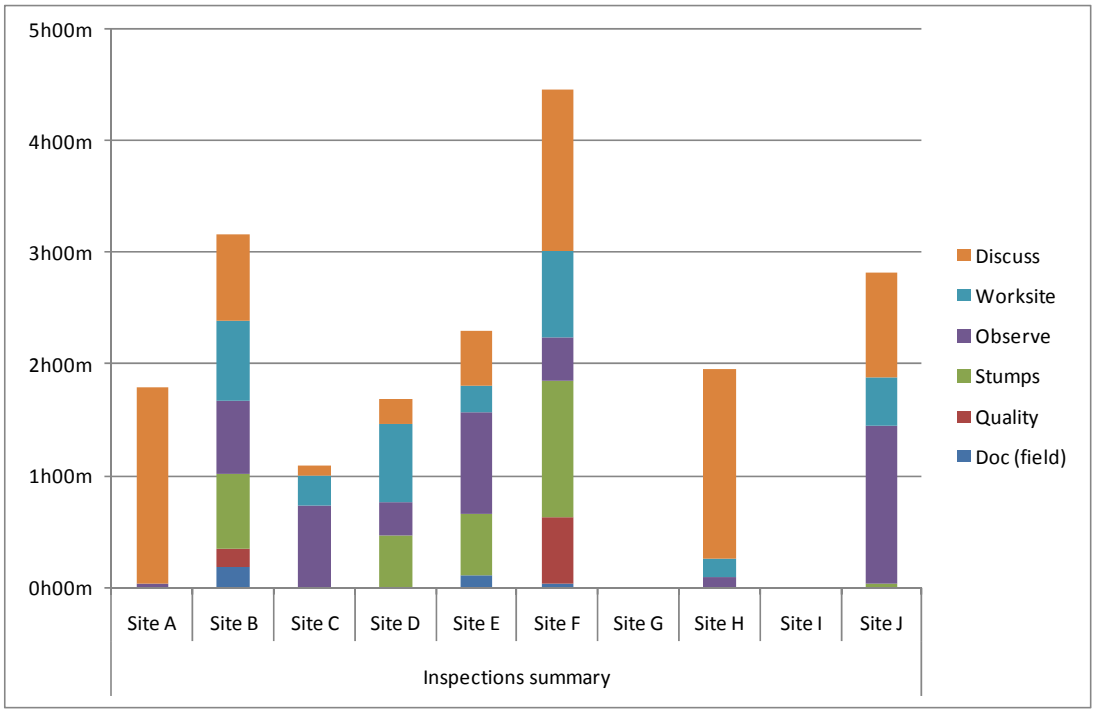
The table below summarizes data from the site visits

| Site name | Location Access | Crew type Crew size[1] | Notes | Number of inspections and average duration | Length of day | Time spent falling |
|---|---|---|---|---|---|---|
| Site A | Island Road | Union Medium | Supervisor responsible for falling (hand + mechanical) and also yarding/ loading | 2 (average 0h59m) | 12h59m | None |
| Site B | Island Road | Contractor Medium | Working BB | 4 (average 0h56m) | 14h58m | 2h13m |
| Site C | Island Boat | Contractor Large | Working BB | 3 (average 0h28m) One inspection was the supervisor being inspected by the owner | 12h33m | 1h31m |
| Site D | Island Road | Union Large | Salary BB | 4 (average 43m) | 9h12m | None |
| Site E | Island Road | Contractor Large | Supervisor responsible for mechanical + hand falling | 2 (average 1h15m) | 11h41m | For demonstration / assistance 0h4m |
| Site F | Mainland Helicopter | Contractor Large | Helicopter operation | 5 (average 1h14m) | 10h23m | For demonstration/ assistance 0h2m |
| Site G | Mainland / Southern BC Road | Contractor Small | Working BB | 0 | 10h06m | 5h20m |
| Site H | Mainland Road | Contractor Medium | Supervisor responsible for falling (hand + mechanical) and also yarding/ loading | 4 (average 37m) | 12h00 | None |
| Site I | Mainland/ Northern BC Road | Contractor Small | Working BB | 0 | 13h02m | 5h54m |
| Site J | Island Road | Contractor Small | Training site | N/A continuous inspection (training site) | 10h05m | For demonstration / assistance 0h7m |

[1] Crew size is rated based on average company set up, not size on day of visit
Small Crew: <5 fallers; Medium Crew: 5 - 10 fallers; Large Crew: >10 fallers

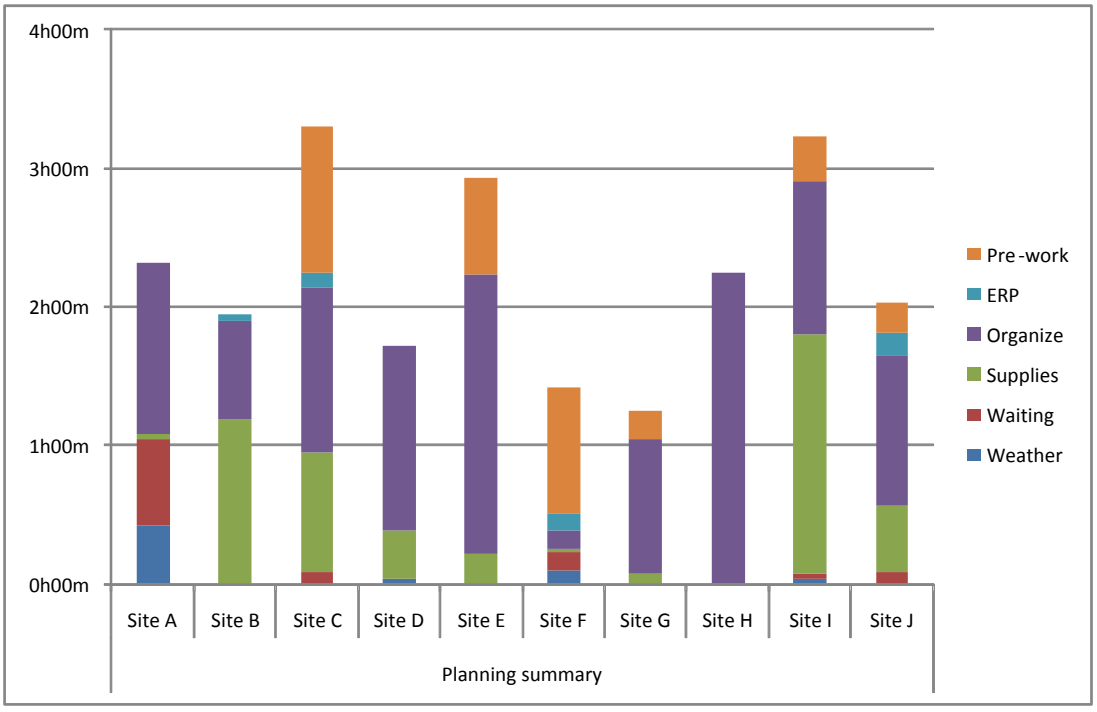
## Inspections

The following graph shows a breakdown of time spent during inspections




## Planning

The following graph shows how planning time was spent



## Task timing data from the workshop

### How long do the following tasks typically take?

| Task description | Typical duration | Notes |
|---|---|---|
| Pre-work planning/ hazard plan (before the faller is on site, walk block, identify hazards) | 30 mins – 1 day | For each **worksite** |
| Paperwork (that is filled in 'at the camp') relating to safety or faller management | 2 – 8 hours | For each **week** |
| Paperwork and coordination (that is completed 'at the camp') relating to finding new business, organizational/ general management | 2 – 4 hours | |
| Falling independently (actively falling yourself) | 2 hours → more than 8 hours | |
| New faller training, providing support to inexperienced fallers (in the field and at the camp) | 1 – 2 hours → more than 8 hours | |
| Safety meetings | 30 mins – 1 hour | |
| Daily preparation (oil and gas, supplies, vehicle maintenance) | 10 – 30 mins | For each **day** |
| Transit to the worksite (from camp) | 1 – 2 hours | |
| Transit between fallers (from block to block) | 1 – 2 hours | |
| Breaks (Lunch, rest breaks. Total all breaks.) | 10 – 30 mins | |

### How often do you do the following?

| Task description | Typical frequency |
|---|---|
| Fall a tree yourself to help a faller with a problem tree | Several times a week OR every few months |
| Provide for alternative methods (e.g., blasting, helping fallers with non standard means of removing danger trees) | Every few months. In some cases more often, up to several times a week. |
| Give advice on tackling particular trees (falling plan). | Once a week → several times a week |
| Watch a faller fall a tree | Several times a day → several times a week |
| Watch a faller buck a tree | Several times a week |

### How long does a typical faller inspection take? What is the minimum and maximum time?

Includes time spent writing up paperwork back in the camp, but not travel time to and from the block.

| Type of inspection | Notes | Minimum | Average/ typical | Maximum |
|---|---|---|---|---|
| Informal inspections. Used when there are no particular issues, just checking up. | For each inspection | 15 minutes | 30 minutes | 30 minutes – 1.5 hours |
| Formal inspections (e.g. including the stump audits, or the 23 pager). | For each inspection | 1 hour | 1.5 hours (some reported up to half a day) | 2 hours – ½ day |

### How many inspections are typically done in a day?

**Informal**: 2 per day up to 4 – 6 per day

**Formal**: 1 – 3 per day up to 4 per day

### During a typical inspection, how much time is spent on the following tasks?

| Task description | Formal inspection Average/ typical time (minutes) | Informal inspection Average/ typical time (minutes) |
|---|---|---|
| Walking block, looking for problems, noticing danger and problem trees that will need to be tackled, monitoring man check. | ½ hour – ½ day | ½ – 1 hour |
| Inspecting faller's equipment | 2 – 5 mins | 2 – 5 mins |
| Discuss emergency response plan | 10 – 20 mins | 1 – 10 mins |
| Reviewing faller's quarter, identifying danger trees, snags, fall of wood, checking trail | 10 -30 mins | 5 – 10 mins |
| Measuring and examining stumps | 20 mins – 1 hour | 5 – 15 mins |
| Measuring bucked logs and reviewing quality | 10 – 30 mins | 5 – 15 mins |
| Observing faller bucking and falling | 10 – 30 mins up to ½ day | 5 – 20 mins |
| Giving advice/ feedback, discussing inspection with faller | 5 – 30 mins | 5 – 15 mins |
| Paperwork (that is filled in 'in the field' relating to inspection or notes on the block, supplies etc.) | 15 mins – 4 hrs (for some groups already covered by previous items) | 1 – 10 mins |
| Paperwork (that is filled in 'at the camp' relating to inspection or notes on the block, supplies etc.) | 30 mins up to 2 hours | 5 – 10 mins |

# Answers to research questions

This section lists each research question that this study was intended to address, and draws on site visit and workshop data to give answers. It should be noted that workshop data is based on opinions, and site visit data is based on a small number of sites. However, the opinions are those of a large number of experienced supervisors and the site visits involved the collection of extensive data, so the answers are as complete and reliable as the current study allows.

## What workload management issues do supervisors experience?

The following factors were identified as key causes of high workload:

- **The requirement to document everything in order to cover themselves in case of legal issues**

Several supervisors commented that documentation focuses on creating a paper trail, to protect themselves from liability in case of an incident. They expressed doubts that safety was really being improved by the documentation, whilst the time it takes reduces time available to spend in the field with fallers, increases the length of the supervisor's day, or both.

- **Economic pressures**

Supervisors reported that economic pressures lead to workload management issues by forcing bid prices down. Pricing which is based on timber volumes ($m^3$) of timber results in a focus on production that appears to have minimal allowance for the increasing costs associated with supervision. The result is difficulty finding the money, and hence the time, for good effective supervision. Supervision is perceived by the contractor community to be a necessary duty, but also an expensive overhead burden. If a company makes this investment they may lose out to lower bidders. Supervisors reported pressure to balance the need for effective supervision with the need to fall timber in order to improve production, and thereby stay competitive. In turn this means supervisors who also fall are under pressure to meet their quota as well as complete their supervisory duties.

- **The challenges and complexities inherent in falling (hazards, nature of worksite)**

The progression into cutblocks with complex falling plans, remote and challenging terrain means fallers need more support and supervision. These factors also reduce the number of fallers a supervisor can effectively supervise. However, decisions may be made on supervision requirements during the bidding phase when there is not always enough information to make the right decision.

- **Planning that does not focus on faller safety**

Supervisors often pay the price for engineering decisions. Aggressive timber chasing can compromise faller safety requirements, and planners may prescribe treatments that do not account for safety in the falling/ bucking process (e.g., corridors that are too narrow for the size of trees, or layouts that make it difficult to arrange assistance within 10 minutes). This makes it difficult for the supervisors to position fallers safely, and also leads to inefficiency and hazards in the cutblock. Supervisors also feel they lack the authority to influence planning decisions.

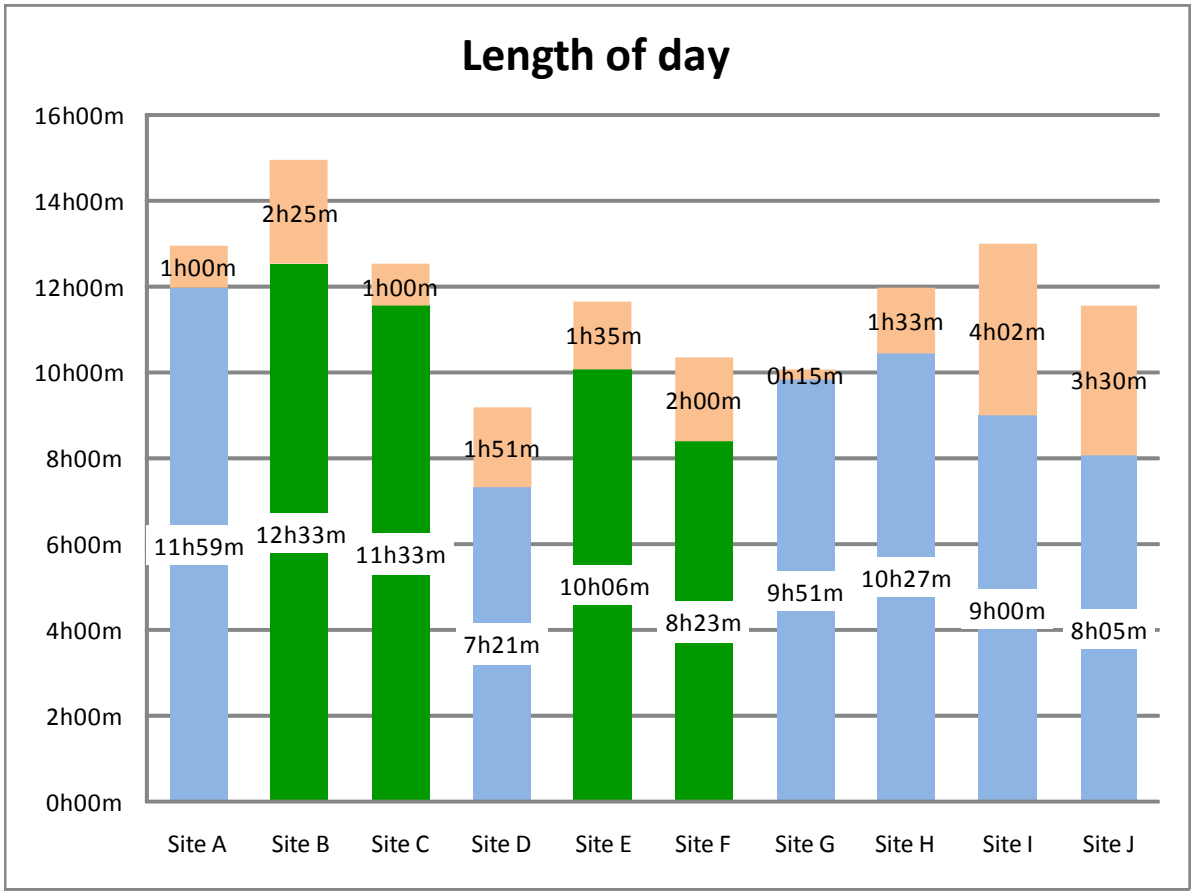
- **Congestion and multiphase projects**

Multiphase projects suffer from conflicts and congestion as several work groups attempt to get their tasks done within a limited amount of time. For example, fallers and supervisors may find themselves falling before the road crews have finished.

- **Large amounts of time spent in transit (see page 28)**

## How much time does it take to do the job?

Data from the ten site visits is shown below.




From the site visit data summarized above, it can be seen that supervisors are working long days in the field, and then spending considerable time in the evenings on administrative tasks and documentation. Data from supervisors who fall trees during the site visit is shown in green, and data from supervisors who did not spend time on the saw, or who fall trees only for demonstration or assistance is shown in blue. Administrative time in the evening is shown in orange.

Note: Site D had a shorter working day than usual due to a seasonal shut down, and work also finished slightly early at Site J due to the observer's transportation arrangements.

Data from the workshop confirmed that 10 – 12 hour days are the norm, with some supervisors working over 14 hours on a *typical* working day.

Even though work often occurs in shifts (e.g. 10 days on followed by a few days off) rather than continuing like this throughout the year, these figures still give cause for concern, from both an individual and a wider safety standpoint. When individuals work long days over a period of time, a number of negative side effects occur, including loss of productivity, stress, poor health, home life impact, and an increase in human error. This final impact has the potential to lead to incidents and accidents for the supervisor himself, as the supervisor's judgment is impaired.

A survey of the length of working day combined with shift length would be valuable to assess the extent to which cumulative fatigue is a problem (see page 36: 'Future Research'). From a broad safety perspective, the long days are indicative of excessive workload, and strongly suggest that some tasks will be missed (termed 'task shedding') in order to fit everything in (see page 29: 'Does workload have an impact on safety?'). It would be useful to validate the relationship between length of day/ shift and safety by investigating whether they are related to safety outcomes such as injuries and near misses (see page 36: 'Future Research').

## Is falling timber while supervising likely to lead to unacceptable workload?

This is not a simple question to answer. The site visit data revealed no clear difference in length of day between supervisors who spent time on the saw, compared to supervisors who didn't fall at all, or who only fall for demonstration purposes/ assistance. Of the supervisors who fall trees, two didn't conduct any worker inspections during the site visit. However, both of these were small crews so inspections would not be expected every day. By contrast on site B the supervisor conducted 4 inspections, as well as spending over 2 hours on the saw. He did, however, have the longest working day of any of the sites. Two of the 'supervision only' supervisors (Site A and Site H) spent a large amount of time in discussions during inspections, as compared to the other sites where more time was spent on stumps and observations, but there was no obvious difference in the duration of inspections between supervisors who did and did not fall frees. However, these observations are not conclusive. The sample size is too small for statistical analysis (See Appendix A, page 38), and the length of day and amount of time spent on different tasks is very variable. Therefore, comparisons of supervisors who fall versus those who do not can only be achieved using a survey method with a larger sample size.

In one sense, any task that requires time is going to increase demands on the supervisor, and there are indications that supervisors are already overloaded. However, workload can be managed in various ways. Several of the workshop groups indicated that 'supervision only' supervisors are able to supervise a larger number of fallers, suggesting that supervisors who spend time on the saw may have reduced workload because they supervise fewer fallers. In this case falling timber would not necessarily lead to unacceptable workload. In addition, 'supervision only' supervisors may have additional duties such as supervising non fallers. It wasn't possible to determine whether supervisors who fall do, in fact, supervise fewer fallers, although the site visit data did support this view.

Some supervisors also commented that supervisors who also fall can conduct inspections more efficiently, for example by reviewing a cutblock as they walk through it in the morning. They may also spend more time with the crew in transit, enabling them to have discussions on the way to and from

worksites. Supervisors at the workshop and on site visits also commented that falling trees is important in order to keep skills current, to enable them to demonstrate, and is also motivational and enjoyable for them. Negative side effects of working on the saw whilst supervising include increased potential for distraction. Distraction could lead to decreased safety for the supervisor himself, and potentially lower performance on supervisory tasks. The supervisor's 'partner' may also be unable to continue falling if the supervisor is called away to deal with an issue.

In summary, falling timber whilst supervising is likely to lead to excessive workload and/or task shedding (such as missing inspections/ planning) under the following conditions:

- Workload is already excessive or near to excessive even when the supervisor does not fall trees
- Adjustments are not made to take account of the time spent falling (e.g. supervising fewer fallers) and opportunities for efficiency gains (e.g. checking blocks on the way to falling) are limited

## How may task conflict and overload be experienced when multi-tasking?

Task conflict occurs when two incompatible tasks are attempted at the same time. One approach considered was to use multiple resource workload analysis scales to assess the workload arising from various combinations of supervisory tasks. However, this approach proved to be unsuitable, in part because supervisor tasks appeared to be conducted sequentially rather than in parallel (discussed further in Appendix A). The nature of supervision (e.g., the need to be in a particular physical location to conduct an inspection) means that workload issues related to consecutive (rather than concurrent) tasks pre-dominate. In other words, the problem is not with conducting many tasks in parallel, but with having enough time to perform all of the necessary tasks one after another. At no point did any of the 99 supervisors (89 workshop participants + 10 field visits) involved in the study complain that they had too many things to think about at one time, which again suggests that although the job involves considerable multi-tasking, the supervisors in the study felt able to cope with that aspect of workload.

The workload problems identified related to length of day, amount of time taken to complete the necessary tasks, and fatigue issues, rather than any one task or combination of tasks being difficult. Rather than workload analysis scales, the contribution of different tasks to overall workload has been assessed using task duration. The following remarks are based on observation and discussion with supervisors rather than formal analysis.

Incompatibility due to limited verbal and auditory capacity (e.g. two tasks loading the auditory channel at the same time) did not appear to be an issue, perhaps because of a tendency to pause falling when a radio call comes in, and because the nature of the Push to Talk "PTT" radio button means only one call can be made or received at a time.

In terms of physical conflict, operating the chainsaw is a complex task requiring a high degree of skill and concentration (particularly in challenging worksites). Consequentially, falling was not conducted at the same time as other physical tasks, as this would be impractical and unsafe. Other physical tasks (e.g.,

walking, writing, driving) were conducted one after the other. Geographical conflict (supervisor responsibilities being geographically separated) was definitely an issue.

Task conflict due to cognitive effort involved in switching between falling and supervisory tasks was mentioned as an issue that could impact the supervisor's own safety. The site visit data also showed the frequency with which supervisors were interrupted with various radio calls throughout the day. The impact of distraction and interruptions on the safety of supervisors who actively fall is an area that should be investigated further.

## How much time is spent on task vs. on secondary tasks?

Falling Supervisor Regulation 26.22.1 states that supervisors: "must not undertake or be assigned activities which interfere with performance of duties under section 2".

When analyzing the site visit data, each 'inspection' time segment was analyzed for activities that were not directly inspection related. This includes planning tasks and radio checks. In general the time spent on non inspection related activities (during inspections) was very small, and unlikely to have a significant impact on other duties.

Transit is necessary for supervisors to complete their tasks, but it not valuable in itself, and reduces the time available for other tasks. Transit is therefore considered to be a secondary task. Time spent in transit is significant, both during inspections and during the working day in general. Transit times (including walking and vehicle) were around 3 – 5 hours for the majority of the site visits. This is higher than the 2 – 4 hours estimated by workshop participants. Much of this driving occurs at times of the day (e.g., very early in the morning) when alertness is low due to circadian rhythms.

Unfortunately, transit times are largely beyond the control of the supervisor. There may be potential for block planning and block layout to be made more efficient in order to reduce transit times, and if this is possible there is potential to achieve significant efficiencies for the operation in general. The impact of transit times should certainly not be underestimated, from a workload or from an economic point of view, when planning the operation.

Time spent on multiphase coordination during site visits was minimal for most of the supervisors who fall trees, and around 1 hour for 'supervision only' supervisors. This probably reflects the larger size of the operations. Much of this time was spent co-ordinating falling with other activities.

Some supervisors also supervised non-fallers. For example, at Site A, the supervisor also supervised non-fallers including road crew/ processor operator/ hoe chucker and spent nearly 2 hours on these activities. Supervision of non fallers could be considered to be a secondary activity from the point of view of 'falling supervision'.

When considering a supervisor's duties, falling could be considered to be a secondary activity which could potentially interfere. Two of the supervisors who spent time on the saw did not conduct any inspections. However, given the size of their crews, they would not be expected to conduct inspections

every day, based on a weekly inspection of each faller. Of the other supervisors who also fall trees, there was no obvious difference in length or number of inspections. It was not possible to draw firm conclusions due to the small number of site visits, and this topic is recommended for further investigation (see page 35: Future Research).

Very little time was spent on secondary tasks such as breaks and social discussions (discussed in more detail below).

## Are supervisors having their breaks?

In a word – no. Workshop participants reported an average of 10 – 30 minutes per day, and this was born out by the site visit data. For 8 out of 10 visits, despite the long days, breaks ranged from 13 to 26 minutes. One visit (Site G) included only 4 minutes of break time throughout the day. This included all the time taken for eating, comfort breaks, and social discussions. It is possible that the supervisor in question also took some breaks whilst refueling, as he spent several hours falling. On another site the supervisor appeared to take 48 minutes of breaks, but 33 minutes of this time was a break in the evening after finishing in the field. While fallers are restricted to a 6.5 hour day in the field, and may take breaks when refueling, supervisors on the whole do not get these natural breaks.

The long days, coupled with short breaks and early mornings, are likely to lead to significant problems with fatigue, which will be cumulative over the course of a multi-day shift. This is likely to decrease safety whilst falling, and also when driving home at the end of the day. Human Error is also significantly increased by fatigue, and can mimic inebriation when individuals get sufficiently tired. This data suggested that supervisor performance may be significantly impaired, and potentially impacting on safety, due to fatigue.

## Does workload have an impact on safety?

Workload impacts safety in the following ways (based on workshop data).

- The supervisor's performance is reduced, leading to less effective supervision
- Supervisors may reduce planning time and time spent walking the block (one workshop group reported that it was 'impossible' to walk all of the blocks and place all of the fallers)
- Supervisors may report having done things that haven't actually been done
- Tasks may be rushed or not completed
- Supervisors did not report cutting down on the frequency of inspections or on the length of inspections as a result of workload. This may be because they cut other things first (like planning, or breaks) or may be due to social desirability (when an individual gives answers that will present them in a good light). An anonymous survey could be a useful way of identifying whether this happens, and if so how frequently.

It would be useful to verify the link between workload and safety with quantitative data relating workload with safety outcomes such as near misses and incidents. Workshop participants identified

a number of other factors that also impact safety, and although high on the list, it isn't clear that workload is the most important factor.

## Which situations or scenarios lead to particularly high workload and/or are particularly challenging from a supervisory point of view?

Based on workshop data:

- Assessing new fallers
- Poor planning and congestion in multiphase operations
- Volume of paperwork, lack of standardization and amount of redundancy in documentation
- Economic pressures to bid low and get the job done quickly
- The factors listed in response to the next question also impact workload

## Which factors affect the safe ratio of supervisors to fallers?

Based on workshop data the following factors decrease the number of fallers that can be effectively supervised:

- Characteristics of worksite – small, fragmented, poorly planned, cut blocks; long travel times; challenging terrain and hazards; poor quality timber/ specialty logging; town based (as opposed to camp)
- Environmental issues – extreme weather, fires, poor visibility
- Organizational and economic issues (especially aspects outside their control) – low bid rates, time pressure, multiphase congestion, engineering complications and conflicts, and documentation requirements
- Other responsibilities – organizing supplies and equipment, managing their business and other types of worker, quality of timber, coupled with limited availability of qualified support available
- Crew – low morale, union issues, unstable industry, inexperienced fallers, drugs and alcohol problems
- Supervisor characteristics – experience and organizational ability

## Which tools and strategies do supervisors feel will be most effective in addressing supervisory and workload issues?

- More integrated planning for multi-phase operations; involving supervisors in the decision making process and giving them the authority they need to make changes to cutblock timing and resolve layout and tree retention issues
- Support for documentation requirements; streamlining and time saving devices to help documentation
- Matching the effort (and documentation) to the need, especially for inspections and incident investigations
- Bidding processes that take into account the cost of safety, coupled with enforcement of safety plans once work starts

- Opportunities to delegate

# Recommendations

The following recommendations are based on data collected during the course of this study. However, they have not been developed into detailed approaches, or assessed for effectiveness or practicality in the context of the forestry industry. This should be a first stage before implementation proceeds.

## Documentation

### To the Council:

Investigate ways to reduce the amount of time supervisors spend on documentation

- Implement an initiative to reduce the amount of documentation required and to reduce redundancy and repetition in documentation
- Identify forms and documents that require a long time to complete and objectively compare their effectiveness to shorter versions
- Identify or develop tools and support that will enable supervisors to complete their documentation more quickly (e.g., voice recorders, voice activated forms, electronic devices)
- Require new documentation to be assessed and justified in terms of safety impact, taking into account the possible negative impact of an increase in workload. Consider implementing a 'one in one out' policy on documentation whereby new documentation requirements must be accompanied by a comparable reduction in existing documentation.
- Provide support (e.g., templates, sample forms, data packs) to reduce the amount of time companies spend creating documentation, particularly smaller operators
- Investigate means of increasing standardization across companies
- Implement a feedback loop to ensure forms and documents reflect the needs of industry
- Consider whether documentation can be replaced by other approaches (e.g., field guides that a supervisor can use as a memory aid, but which don't require completion of a form), or whether supervisors can limit themselves to recording problems rather than documenting aspects that are acceptable

## Planning of multi-phase operations

### To the Industry:

Ensure supervisors are involved in the planning process for multi-phase operations, with the authority to influence decisions in order to ensure faller safety

- Identify the decision points for multi-phase operations
- Review common conflicts and issues that arise during multi-phase operations
- Engage supervisors to identify which decisions should have falling supervisor input
- Identify means of exerting authority (other than the right to refuse unsafe work)

### To WorkSafeBC and the Council:

Support industry in achieving the above objectives. Consider providing guidance on safe and effective planning of multi-phase operations.

## Risk assessment

Supervisors appear to be generally confident in their ability to assess the level of risk when falling, but are less confident of their ability to fully understand what is required by regulation. For example, regulation states that inspections are to be done according to the risk. However, supervisors do not appear to be confident in their ability to make this assessment and may be doing more than is required in some cases.

### To the Council:

- Provide guidance so that supervisors are aware of their options for adjusting inspection frequency and documentation requirements based on individual faller needs
- Break down inspections into component parts, and provide guidance on the optimum frequency of each part (e.g., should a supervisor observe a faller every week, or are stump measurements sufficient?)
- Provide examples of acceptable strategies for conducting inspections (e.g., spreading them over several visits)
- Provide guidance on regulations for fallers and supervisors who work for several different companies (e.g., is a 23 page assessment required for every company?)
- Provide supervisors with access to assistance in risk assessment and decision making
- Encourage knowledge sharing so supervisors can assess where they are relative to their peers (e.g., are they spending too long on documentation and if so, why?)
- Consider developing a definition of effective supervision that is based on supervision as experienced by the faller, rather than factors such as frequency, or ratio of fallers to supervisors (e.g., does the faller get support and advice when he needs it)

## Incident investigation

Supervisors commented that incident investigation effort appears to be determined by the severity of the injury rather than the value of the investigation. For example, some slips, trips and falls which lead

to severe injuries are heavily documented, even though there is little to be learnt from it, and near misses with no injuries are not investigated, even though they might potentially reveal more serious issues.

### To WorkSafeBC and the Council

- Investigate means of encouraging near miss investigations in the Industry, if possible without increasing documentation
- Investigate whether a streamlined process for slips, trips and falls is practical/ possible whilst still capturing the data needed to reduce injuries

## Economic pressures

Investing in safety should not cause companies to lose out on contracts. However, the perception amongst supervisors was that this did happen. In addition, some supervisors commented that safety plans that were submitted during the bidding process were not always adhered to afterwards.

### To the Council:

- Investigate options to ensure investment in safety does not disadvantage companies during the bidding process

### To WorkSafeBC:

- Review methods for ensuring compliance with safety plan (supervisors do not appear to be convinced that the current documentation based approach is effective in monitoring compliance)

## Delegation and supervisor role definition

The definition of a supervisors role includes a very broad set of tasks, including many that fall outside a narrow 'falling supervisor' definition (e.g., supervising non-fallers). Delegation was identified as an effective strategy by supervisors at the workshop.

### To the Council:

- Identify tasks performed by falling supervisors that are not captured by the DACUM
- Review DACUM activities and other tasks in detail and identify tasks that could be delegated without impacting on safety.
- Consider alternative role definitions and re-allocation of tasks that could reduce supervisor workload by re-defining the supervisor role (and other roles within the crew/ company).
- Provide supervisors with guidance on tasks that are appropriate for delegation
- Consider whether alternative role definitions are required for supervisors who have duties other than supervising fallers

## Decision support

Supervisors are required to make many complex decisions, based on a large number of variables. This kind of decision making is extremely challenging, yet supervisors make many of these decisions with no support other than their own experience.

To the Council:

- Identify which decisions supervisors find particularly challenging, or where supervisors appear to be making non optimal decisions at times
- Investigate the most effective means of providing decision support (e.g., is it required in the field? Does it need to be used under time pressure?)
- Develop decision support 'tools' (this could include a wide range of options, from online resources to a pocket sized lookup card)

Some examples of decisions that may benefit from support:

- How often should I inspect a particular faller?
- How challenging is the supervisory task for this bid? How much effort should I allocate to supervision?
- How do I know if a faller is suffering from personal problems? At which point do I send him home?

## Checklists/ field guides/ memory aids

Checklists and memory aids are known to be effective in reducing mental workload, and also reduce human error. Supervisors may benefit from this support, particularly when performing tasks that rely on memory or which involve a number of steps.

To the Council:

- Identify which tasks involve remembering information or performing a number of steps
- Investigate the most effective means of providing support
- Develop checklist and memory aids (as with decision support tools, this could include a wide range of options)
- Identify whether there is potential for some of the documentation used by supervisors to be replaced with a memory aid, to ensure every point is covered, and a short sign off when there are no issues

Some examples of tasks that might benefit from support:

- Briefings
- Informal inspections

## Effective faller supervision and safety impact

There is a great focus on conducting and documenting inspections in the Industry, but there is little information about what elements of these practices make them effective or indeed whether they have a

measurable impact on safety outcomes. It is possible that effort is being focused on areas that have little safety impact, at the expense of areas that would be more effective.

To the Council:

- Review suggestions for future research
- Conduct investigations to ensure effort is directed in the most effective manner, with the greatest safety impact

## Future Research

The following research questions have been identified during the course of this study as providing information that will be important in determining the most effective intervention strategies. In making these recommendations, specific techniques have not been identified (e.g., questionnaire versus workshop). This is because the selection of the most appropriate technique will in most cases require an assessment of practical constraints and an assessment of the optimal approach to ensure the data is reliable and valid. In some cases a general methodology has been mentioned (e.g., survey, denoting data gathering from a wide audience).

### Verify the relationship between causal factors and safety outcomes, and identify which factors have the greatest impact on safety

There is an assumption, in some cases backed up by anecdotal evidence, that the following factors are related to safety outcomes. However, this relationship has not (as far as this author is aware) been validated by relating the factors to safety outcomes such as near misses and incidents. It would also be useful to identify which factors have the greatest impact, so effort can be allocated appropriately.

- Perceived effectiveness of supervision
- Perceived workload
- Frequency and duration of inspections
- Use of documentation as opposed to informal review during inspections
- Length of day (including travel time and evening work as well as time in the field) and shift length for fallers and supervisors
- Quantity and quality of paperwork
- Standard of fallers equipment maintenance
- Stump quality/ conformance to regulations
- Use of particular items of equipment (radio headsets, safety chain)
- Availability of alternative means of overcoming falling difficulties (e.g. blasting, ability to make area deletions, substitution options for pre-defined leave trees)

### Investigate differences between supervisors who fall and those who do not

The sample size was too small to enable a statistical comparison of supervisors who fall and those who do not. Workshop data indicated that the number of fallers that could be supervised would be smaller if the supervisor also fall trees. Site visit data is also suggestive that this is the case. In assessing whether

working on the saw has an impact on workload, it would be useful to collect data to answer the following questions:

When comparing supervisors who fall to those who don't:

- Does one group experience higher workload than the other?
- Does the number of fallers being supervised differ?
- Do fallers being supervised experience a different frequency of safety outcomes?
- Do inspections differ?
- Are distraction and interruptions more of an issue for one group than another?

### Investigate whether fatigue is having an impact on safety outcomes for supervisors

There were indications that supervisors work long days, and the impact of this on fatigue will tend to be cumulative over the course of a shift. In order to assess the impact of fatigue it would be useful to answer the following questions:

- Do supervisors show symptoms of sleep deprivation or fatigue?
- What is a typical length of day for supervisors?
- How many days in a row do supervisors work?
- Is fatigue related to safety outcomes for supervisors?

### Investigate and categorize near misses

Near miss data is often more informative than incident data. This is because the frequency of near misses is higher, and factors that prevented the near miss becoming an incident can better be reviewed. It would be useful to collect and review data about near misses, to help understand causal factors, and to identify the most effective interventions for preventing both near misses and incidents.

### Investigate whether distraction is impacting safety for supervisors who fall

During the workshop, supervisors commented that supervisors who also fall may become distracted by their supervisor duties, leading to an increase in risk. There may also be issues of skill fade for supervisors who only fall occasionally.

### Pros and cons of further site visits

The initial proposal for this study included 4 site visits, with an additional 6 added later (giving a total of 10). Even within a single site, with the same supervisor, data is very varied (e.g., inspections range from 20 minutes to over 2 hours). Because of the small number of sites, and the variability of the data, it is not possible to draw conclusions about the impact of site characteristics (e.g., union versus contractor, or supervisors who fall trees versus those who do not), on factors such as length of day and length of inspections. Additional site visits would increase the amount of data available, but the variability of the data is such that there is no guarantee statistical comparison would be possible even if 20 or 30 sites were visited. If this kind of comparison is desired, a large scale survey method is likely to be more appropriate. This is not to say that additional site visits would not provide valuable data, only that the purpose of the additional visits should be clearly defined.

## Conclusions

This study has collected a large volume of rich data, with value that extends beyond the scope of this report. It provides evidence-based data about the tasks performed by falling supervisors, and valuable insight into workload and supervision from a large number of supervisors.

There is potential for developing some of these insights into training materials or guidance, and also for providing supervisors with a yardstick for assessing their own operation.

This is only the first step in addressing workload management issues and enhancing effective supervision in BC's forestry industry, but it has been valuable in laying the groundwork for the future.

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Note that appendices are included only in the full report. If you are reading the abbreviated version without appendices and would like the full report, please request a copy from the BC Forest Safety Council.