



**Forest  
Practices  
Board**

## **Fire Management Planning**

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*Special Investigation*

**FPB/SIR/34**

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# Board Commentary

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This report concerns a 2011 investigation by the Forest Practices Board into fire management planning in British Columbia. Specifically, the Board looked at the status and use of fire management plans and fire analyses to determine whether accurate and complete land and resource information is adequately incorporated into fire control activities.

Fire management plans are important because they help ensure that wildfire management decisions are prudent, transparent and consistent with land management objectives for threatened values. Wildfire management officials have considerable discretion in making decisions and expending public resources and in return the public expects them to be able to explain their choices. When responding to wildland fires, quick decisions are required and it is necessary to have considered objectives and options in advance. Fire management plans and the more tactically oriented fire analyses help fulfill that need.

Since the Board first commented on provincial fire management in 2005, government has developed fire management plans for every forest district. Also, in 2009, government developed a general guideline for setting priorities and allocating fire suppression resources. The Board found that fire management plans currently have a narrow but useful function, and that they provide the basic information needed to help plan a response to unwanted wildland fire not controlled by initial attack. Overall, the Board is encouraged by the progress it observed, but recommends that government continue to develop its approach to fire management planning.

The Board feels that it is important to acknowledge the broader context for wildland fire. The province has experienced several dramatic and damaging fire seasons over the past decade, and witnessed similar or worse conflagrations in neighboring provinces and elsewhere. There is strong evidence of a trend toward more severe and costly fires. This trend likely has many causes, including the direct and indirect effects of climate change as well as the encroachment of development into the forest.

However, the answer to the pressing question of how to handle increased fire risk is not to simply increase fire suppression capacity, although that may also be necessary. Instead, the Board agrees with findings of a recent assessment<sup>1</sup> of so-called “mega-fires,” which points out that even in jurisdictions that have considerable fire-fighting capacity, attempts to match escalating fire threat with greater force has not eliminated the problem. What is needed, then, are proactive policies and programs that account for the inevitable occurrence of fire in the forest environment. Such approaches may include: discouraging some types of development in the most fire-prone areas; designing other activities to reduce risk or withstand fire; and restoring the natural cycle of lower-impact fire on some landscapes.

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<sup>1</sup> Available at <http://www.nss-dialogues.fr/IMG/pdf/5thIWFCConference2011.pdf>

The BC government recognized this by adopting a *Wildland Fire Management Strategy* in September 2010. The Board supports this plan to move toward more proactive fire management, which, combined with continuing improvements to the efficiency of response, will require a sustained effort and ongoing coordination at many levels. The Board strongly encourages government to place a high priority on full implementation of the strategy at all levels, including maintenance and use of fire management plans.

Several matters touched on by the strategy were outside the scope of this investigation though they will likely be of future interest to the Board. For example:

- Is fire management adequately integrated with other activities and objectives on the forest land base?
- Is fire a consideration in the design of old growth management areas, timber harvesting, recreation developments, transmission corridors and other relevant decisions?
- Is information available to policy makers and developers to inform them of potential wildland fire risks, and do they use it?
- How do the current fire management and suppression priorities and capacity address and balance protection of forest and non-forest values at risk?

# Executive Summary

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Each year, wildfires in British Columbia damage resources and consume large amounts of public funds. Given the economic and social importance of BC's forest and range resources, the need to protect life, property and infrastructure, and the competing demands on the public purse, it is vital that actions to contain these fires are consistent with the values at risk, the cost of suppression, and the probability of success. There is also an emerging consensus in the resource management community that fire is an inevitable – and often necessary – component of forest ecosystem health. The trend toward increasing damage and suppression costs is often attributed to successful fire control, a general move away from prescribed fire and resultant changes in forest structure. In other words, the more successfully we remove fire from the landscape, the more costly and damaging wildfires become.

Fire management plans, prepared before fires start, support wildfire management decisions by identifying the values on the landscape and the objectives of the land manager, including where fire might be wanted and where it is not. Fire management planning is important because it can guide the use of limited suppression resources and helps government make and communicate fire suppression decisions. Perhaps most importantly, fire management plans are key to moving beyond the idea that all fire is bad and must be suppressed toward the return of the natural role of fire on the forest landscape.

In early 2011, the Board decided to investigate fire management planning, and this is its report. The Board's objective is to determine whether accurate and complete land and resource management information is adequately incorporated into fire management planning and fire control activities. To do this, the Board interviewed land managers who prepare fire management plans and the wildfire management staff who use them. The Board also reviewed 69 fire analysis documents, which describe values at risk and how the fire will be managed, and visited the sites of 11 fires to see how plans had been implemented in the field.

Government is taking a staged approach to planning. Stage one plans, which identify the values on the landscape that could be affected by wildfire, are in place for all districts. The identification of values is good, although the maps that display those values can sometimes be cumbersome. In future stage two plans, thought will be given to the prioritization of values – in other words what should be protected first. Stage two plans will also identify areas where fire is wanted and under what conditions, or where it is not.

A fire analysis is a tactical plan, prepared once a fire starts, that documents values at risk and objectives and strategies, and estimates the cost of suppression versus the values of resources at risk. A fire analysis incorporates information from the fire management plan and/or the land manager. The Board found that some wildfire managers routinely consult fire management plans as part of the fire analysis process while others rely on experience and one-on-one consultation with the land manager. In the future when FMPs become more than a list of values

(e.g., areas where fire may be wanted and not wanted), it is expected that FMPs will be routinely consulted by fire management staff.

The Board found that the quality, completeness, and timeliness of fire analyses were very good, with 94 percent being adequate for their intended purpose. Fire analyses are generally more complete and timely during periods of lower fire activity. The process works when it is followed: costs and losses are contained and land manager objectives are met where the fire analysis is accurate and complete, and where the incident commander follows it. While the fire analysis process includes a monitoring and updating component, it isn't used often or consistently across the province.

Assigning a monetary value to the values at risk from a wildfire is an ongoing issue and is not applied consistently across the province. For example, some forest districts estimate the value of merchantable timber at stumpage (the fee paid to the Crown for the timber) while others use average market value of the logs. Also, it is difficult to assign value or priority to non-consumptive resources such as critical wildlife habitat, watersheds, air sheds, or how to address the beneficial effects of fire in areas lacking seral ecosystems, or where plant communities require periodic fire to maintain health.

Based on these findings, the Board is making seven recommendations to the Ministry of Forests, Lands and Natural Resource Operations. The Board requests that the Ministry advise it of the steps taken to implement these recommendations by March 31, 2013.

#### *Fire Management Planning*

1. Government make fire management planning a high priority by ensuring current plans are up-to-date and moving quickly to Stage 2, which prioritizes values and defines where fire is wanted or unwanted, and under what circumstances.
2. WMB and land management staff collaborate to refine the current Fire Management Plan model to focus on information important to fire managers while remaining simple and easy to access. First Nations, licensees, BCTS, local governments, and the public should also be included where appropriate.
3. WMB implement the digital delivery of geographic and land management information for fire management planning through an existing software platform such as Fireview.

#### *Fire Analysis*

4. Standardize and automate resource valuation to the greatest extent possible to ensure that resources are valued consistently.
5. Develop a provincially consistent process to estimate potential fire spread so values at risk can be assessed consistently and efficiently.
6. Review monitoring practices for FAs to ensure that plans are regularly updated and that resource and wildfire managers' decisions are carried out according to the plan.
7. Ensure those completing the FA state clear objectives, strategies and tactics.

The Board also believes that Wildfire Management Branch has a role to play in managing public expectations around fire response. Its motto of “hit hard and hit fast” has conditioned the public to expect action on fires and it will be a challenge to help the public understand that smoke and fire are inevitable, and that not all actions are the same in all situations.

Finally, the Board strongly encourages government to place a high priority on full implementation of the *Wildland Fire Management Strategy* at all levels, including maintenance and use of fire management plans.

# Introduction

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When a wildfire is discovered in BC, the first question Wildfire Management Branch (WMB) staff needs to answer is “what is at risk?” Values such as life, property, timber, and community watersheds dictate how a wildfire is managed and what fire-suppression resources are deployed. Fire management plans (FMPs) can support wildfire management decisions by identifying the values on the landscape and the objectives of the land manager<sup>2</sup>, including where fire might be wanted and where it is not. Fire management planning is important because it is neither possible nor desirable to actively suppress every wildfire, and knowing where and when fire might be beneficial means that limited suppression resources can be used efficiently.

In 2005, the Forest Practices Board recommended that government conduct fire management planning before the fire season began and secure the agreement of the land manager on the general response to a fire<sup>3</sup>. In 2008, government approved a fire management planning policy which stated that fire management planning is intended to ensure collaboration between programs while working toward cost efficient and effective protection of resource values. Three regional fire management planning specialists were put in place and fire management plans have since been completed for each forest district.

Recently, fire management decisions have been under increasing public scrutiny, and having good information about values and land management objectives can help to explain and support those decisions. As fire is also a natural part of many ecosystems in BC, it needs to be returned to the landscape, and FMPs are a step beyond simply fire suppression towards the restoration of the natural role of fire.

In early 2011, the Board decided to investigate fire management planning, as a way to determine whether accurate and complete land and resource management information is adequately being incorporated into fire management planning and control activities. The Board interviewed land managers who prepare FMPs and the WMB staff who use them. The Board also reviewed 69 Fire Analysis (FA) documents which describe values at risk as well as how the fire will be managed, and visited the sites of 11 fires from either 2009 or 2010 to see how plans had been implemented on the ground.

## Structure of this report

This report is divided into five parts. The Background section defines fire management terms used in the report and explains what happens when a wildfire report is received. Fire Management Planning presents and discusses the results of the FMP review and the interviews with land management and WMB staff. Fire Analysis summarizes the results of the review of 69

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<sup>2</sup> Crown land managers include forest district managers and parks managers. This report focuses on fire management planning on Crown lands outside of parks.

<sup>3</sup> Available at [http://www.fpb.gov.bc.ca/SIR12\\_Post\\_Fire\\_Site\\_Rehabilitation\\_Final\\_Report.pdf](http://www.fpb.gov.bc.ca/SIR12_Post_Fire_Site_Rehabilitation_Final_Report.pdf)



FA documents. Field Samples presents the results of the field review of 11 fires and the office review of 1 fire. The final section pulls it all together and offers Conclusions and Recommendations.

## Background

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### Terms used in this report

**Fire Management Plan (FMP)** - a document prepared by the land manager (district manager or parks manager) that identifies values, priorities, and restrictions on practice to assist wildfire managers during wildfire management and wildfire control activities. In the future, FMPs will be expanded to include guidance on applying fire to the landscape including fuels management and prescribed fire.

**Fire Analysis (FA)** - a document prepared after a wildfire starts that identifies the values at risk if a fire grows, including public safety, private land, parks, timber and environmental values. The FA sets out the general fire control objectives, strategies and tactics, and alternatives. It estimates the cost of suppression and sets out trigger points where the FA must be reconsidered. An FA is developed in consultation with the land manager. An FA must be completed when initial attack (see below) fails, and for all fires where modified response is contemplated.

**Initial Attack** - the action taken to halt the spread or potential spread of a fire by the first fire fighting force to arrive at the fire. Initial attack is considered successful if the fire is contained to four hectares or less (except in the C-2 boreal spruce fuel type where it is eight hectares).

**Expanded Attack** - the actions taken to protect identified resources in the event that the initial attack is not successful. Expanded attack may take the form of full response or modified response. 'Monitor only' is a form of modified response.

**Full Response Fire** – a wildfire that requires immediate, aggressive initial attack and/or sustained suppression action until the fire is declared out.

**Modified Response Fire** - a wildfire that is allowed to burn within set policy and management guidelines or may be actioned in such a manner as to bring the wildfire back within those guidelines.

**Monitor only fire** - a modified response fire that is not receiving suppression action at a specific point in time.

**Incident Commander (IC)** – the individual responsible for the on-site management of a fire.

**British Columbia Emergency Response Management Strategy (BCERMS)** – the emergency management system adopted by all British Columbia emergency response agencies. BCERMS

facilitates interagency response through the use of common terms and organizational structures, and includes provincial emergency response priorities.

**Resource Strategic Wildfire Allocation Process (RSWAP)** - a provincial prioritization and resource allocation process used when resources are insufficient to meet the current and projected demands of two or more fire centres.

## What happens when a wildfire is discovered?

British Columbia's Wildfire Management Branch pursues a policy of “hit hard, hit fast,” which means that the response to all new fires is carried out as quickly as possible with enough resources to ensure that a fire does not grow to more than four hectares in size. WMB also prioritizes initial attack ahead of expanded attack to ensure that the number of new expanded attack fires is minimized. As a result of these two policies, WMB reports that 92 percent of all wildfires in BC are kept to less than four hectares.

When a person calls the provincial hotline to report a fire, information about the fire is forwarded to one of six fire centres in Parksville, Kamloops, Castlegar, Prince George, Smithers or Williams Lake. The fire centre determines the appropriate response to the fire report and dispatches suitable resources. These may include air tankers from one of 18 tanker bases and/or helicopter or vehicle-based crews from one of the 35 fire bases located throughout the province.

The fire centre also identifies an incident commander (IC) who is responsible for all aspects of the fire response until he/she is relieved by the fire centre or the fire is declared out. The ICs first tasks are to assess the fire's potential to spread, to formulate a response plan, and to order additional resources if they are required. The assessment, response plan, and resource request collectively form an “incident action plan” and this process is repeated daily by the IC until the fire is contained.

Forest fires are managed so as to be consistent with the British Columbia Emergency Response Management Strategy (BCERMS). The response goals within BCERMS are, in order of importance:

- provide for the safety and health of all responders
- save lives
- reduce suffering
- protect public health
- protect government infrastructure
- protect property
- protect the environment, and
- reduce economic and social losses.

WMB has aligned its response priorities and allocation of suppression resources with those of BCERMS (see Appendix 1). This ensures that incident response is focused on provincial

priorities. Based on those priorities, operational staff must consider the following to make good decisions:

- which fires have (the highest) potential to spread and do damage?
- what values can be adversely affected by the fires?
- which values are most important?
- what special values can be adversely affected by the fire control actions?
- where is fire wanted and not wanted?

To answer these questions, accurate land and resource management information must be available to WMB staff without delay, and that is one of the purposes of fire management plans.

Fires that grow beyond four hectares enter the expanded attack phase. Expanded attack fires may grow very large, do considerable damage, and cost a lot to extinguish. When a fire reaches this stage, WMB moves from its “hit hard hit fast” policy to a more measured approach, balancing values at risk against the cost of suppression and the probability of success, to arrive at a plan of action.

How does this work? When a fire grows beyond four hectares and is not expected to be quickly contained, or if a fire is burning in an area or under conditions where less than full response is contemplated, a fire analysis (FA) is completed. The FA estimates the potential spread of the fire if no action is taken and identifies the values that the fire may damage or destroy; lists a number of suppression options along with their associated cost, damage, and probability of success; and recommends a course of action. The FA is completed by an experienced WMB officer; the resources at risk are agreed to by the land manager, and the complete package is approved by the fire centre manager. The incident commander is then briefed on the FA. Land and resource information is again critical to this process.

From time to time the demand for fire suppression resources in some parts of the province exceeds the supply, and resources need to be imported from either elsewhere in the province, or from other jurisdictions. British Columbia has mutual-assistance agreements with other governments for this purpose.

To ensure that resources within BC are employed where they are needed most, and to ensure that resources are not ordered from outside the province when they are in fact available here, WMB has developed the Resource Strategic Wildfire Allocation Process (RSWAP). RSWAP is activated when the resources of two or more fire centres are fully committed and the demand from expanded attack fires is expected to remain or increase. Senior managers and operations staff from across the province jointly assess the overall values at risk and assign priorities for resource allocation. RSWAP is meant to ensure that scarce resources go to where they are needed most, and that local or regional priorities are placed within the proper provincial hierarchy of importance. The foundation of this process is, once again, the identification and ranking of values based on land, resource and infrastructure information, and an understanding of fire behavior.

# Fire Management Planning

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## Introduction

The first part of this investigation focused on the planning process and the individual fire management plans. The Board interviewed stewardship staff in 27 forest districts throughout the province, WMB staff in the six fire centres, and the three regional fire management specialists. Several of the district office interviews also included local WMB zone staff. The purpose of the interviews was to determine if FMPs:

- exist for all areas,
- are used by wildfire management branch staff,
- identify and prioritize values at risk from wildfire,
- identify areas that may be adversely affected by specific fire control activities,
- reference all relevant plans for overlapping or nearby areas e.g. community wildfire protection plans, and
- are revisited and updated on a regular basis.

The Board also expected to learn through these conversations about the challenges and opportunities associated with fire management planning.

## The Planning Framework

It is government policy<sup>4</sup> that the Ministry of Forests Lands and Natural Resource Operations (MFLNRO) will have approved fire management plans to support land, resource and fire management objectives. The policy envisions fire management planning as collaboration between forest regions, districts, and WMB.

As part of this policy, the three regional fire management specialists must coordinate a provincially consistent fire management planning framework. This involves providing expertise and advice to district staff; supporting the development, maintenance and improvement of plans; and promoting increased capacity for planning. District staff collaborates with WMB staff to prepare and maintain the plans. They may solicit First Nations involvement and ensure the plan recognizes government objectives, including land use orders, fuel management plans and ecosystem restoration activities. As partners in the development, maintenance and review of the plans WMB staff provide fire-related expertise.

Fire management planning is a big job, so regional FMP specialists take a staged approach. First (stage 1), they identify and map identified values on the landscape. Second (stage 2), they identify areas where fire may be wanted or even encouraged, and then modify the response appropriately.

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<sup>4</sup> Policy 9.4 – Fire Management Planning, effective July 11, 2008.

Ultimately plans are critical for returning fire to the landscape of BC, and must include provisions for fuel management and prescribed burning, as the goal is to continue to move towards integrated fire management and away from simply fire response.

All districts have completed stage 1, with most working from a template developed by the regional specialists. A few districts have moved to stage 2 and have identified areas where fire might be wanted. A typical plan consists of text and maps depicting various themes including: communities and infrastructure, fuel types, land ownership and tenure, land cover and wildlife habitat, among others.

## What we heard

### *Priorities*

The Board was interested to find out whether or not fire management planning is a high priority in each district. Investigators found that in 2010, stage 1 FMPs were in place for all districts, but more than half the districts said they were doing fire management planning “off the side of their desk” because it wasn’t a district priority. Although required by policy, fire management planning is not a legislated requirement and so is not reflected in MFLNRO’s service plan. But even in instances where FMPs were not considered a priority, plans were still completed mainly due to the support of the regional specialists and a key individual within the district who believes FMPs are important. As of November 2011, only 13 of 28 plans had been updated for 2011, in part due to a vacant fire management planning specialist position. This does not mean, however, that plans were necessarily out of date.

The current organizational structure can create challenges to planning. Regional specialists do not supervise district staff and cannot compel them to prepare plans, nor is there any provincial champion for fire management planning who can address strategic issues, as there is with forest health and fuel management. So, with no one to advocate at the provincial level, and regional specialists focussed on helping the districts, fire management planning is not a priority in some districts.

### *Collaboration*

Before 1995, WMB staff were part of the district office structure and some individuals had both fire management and resource management experience. Today the organizations are separate and it is widely acknowledged that WMB has less resource management expertise, and districts have less fire management expertise. The Board asked each district about its relationship with local WMB staff and whether or not fire management planning was a collaborative process. Not surprisingly, when the relationship was close, WMB staff actively participated in the planning, and all parties felt that the end result was useful. Where that close relationship did not exist, district staff had no idea if the plan was used by or useful to WMB, and did not follow up. Several district staff also said they would like to know exactly what WMB needs in a plan. In other words they would appreciate feedback. Communication issues can be attributed to planning being a low priority, and likely also to physical location. Where the WMB zone office

was at or near the district (e.g. Kootenay Lake), communication was reported as excellent. Overall, 15 of 26 districts reported good collaboration with staff at the local WMB zone.

### *Mapping*

Maps are arguably the most important part of the current FMPs. Maps are meant to show all the values on the landscape of concern to the land manager for WMB to consider as it manages a wildfire. These values range from infrastructure – such as homes, transmission lines and communication towers – to community watersheds, old growth management areas and cultural heritage values. The challenge is to present this information in an easily understood format so that it can support good decisions in an emergency situation. WMB also needs to know what could be threatened by a fire in the near and medium term (e.g. 1 km or 5 km radius from the fire).

Currently, FMP mapping ranges from a 1:450 000 (3' X 5') wall map covering the entire Fort Nelson forest district to 385 individual landscape unit maps at various scales of the Rocky Mountain forest district. Some districts have chosen to build pdf format maps where layers can be turned on and off. The regional specialists have encouraged standardization, suggesting five themes be prepared for each landscape unit: Community and Archaeology; Fire Behaviour; Timber and Range; Tenure; and Wildlife and Recreation.

The benefit of standardization is that FMP maps look similar regardless of the geographic area, which can be helpful for wildfire management staff working outside of their home base. But one size does not fit all and there are regional differences and personal preferences. Recognizing that, mapping is considered acceptable if the district and the WMB zone agree on the scale and the information provided.

And along with ensuring that maps are complete, it is also a challenge is to ensure that they remain up to date. The oil and gas industry is particularly active in northeast BC, and the location of oil and gas infrastructure can be out-of-date as soon as an FMP map is produced. Forest licensees log and replant cutblocks, independent power generation facilities are built and the interface (where homes meet the forest) continually expands. Many districts suggested that an electronic system could offer a solution to the ever-changing nature of activities and values, but such a system would require a significant commitment of resources from management. However, the idea is appealing – rather than search for paper or electronic maps that cover the area of a fire, the fire coordinates could be entered into the system and all of the values and information critical to the land manager and WMB staff would be displayed around it.

The bulk of the information used to prepare FMP maps comes from government's data warehouse and most of it is updated each night. For example, land registry information provides accurate contact information for landowners and WMB staff can quickly determine who to call about nearby fires. So, with the bulk of relevant information available electronically with automatic updates, to create a mapping system that is electronically updated, all that

would be required is a way to access and view this information in an operationally useful manner.

An application called “Fireview” provides an internet-based viewer for fire management and geographic data is already available to government users and may be worth considering as a tool for fire management. This system was originally developed to provide a quick and easy way for WMB staff to make and print maps of fires and to view imagery. Unfortunately not many people are aware of it and so it is not widely used or supported. However, the system is quite user-friendly: once the user zooms to a fire location, various themes can be selected and displayed and the user can select a radius around the fire and get a list of information within it, including links to names and addresses of property owners. For people who prefer paper maps, Fireview provides templates for easily printing them.

WMB geomatics staff believe that Fireview could offer an effective solution to mapping issues if it was supported, promoted and made a priority. To make it particularly effective, however, some thought would have to be given to exactly what critical information is needed (i.e. what themes would make sense, and what information fire managers need to effectively plan). Also, people would have to become aware of the application and be trained in its use.

Although getting properly setting up and running Fireview would require an investment, it would be worth it because the huge task of yearly map updates would be eliminated and WMB staff would always have the latest information.

### *Consultation*

First Nations and the general public are not currently consulted during the preparation of FMPs, and only a handful of licensees have been offered the opportunity to participate. Some land managers mentioned that the public or others may have serious objections to the identification of areas where fire might be wanted, or where modified response might be appropriate – especially when fire could affect where they live, work and play. As an example, the BC Cattlemen’s Association told the Board that there was no public consultation around Cariboo area fire management plans, and it was concerned that some areas received a modified response during the 2010 fire season even though they contained significant silviculture and range investments.

Certain information, such as cultural heritage values, is sensitive and not suitable to make public. However, the location of cabins, improvements, or areas where licensees have invested in preparation for harvesting or ranching is important for WMB to know, especially when life and property is involved. Participation by the public and others in fire management planning could not only help identify previously unknown values, but also engage them in discussions about the return of fire to the landscape.

## Use of the FMP

The fire management planning policy requires WMB to ensure that its fire response complements the objectives of the FMP, and this is done through the fire analysis (FA). The FA sets out the objectives, strategies and tactics for managing the wildfire. Depending on the fire centre, FAs are prepared at the fire centre or at the zone. As experienced staff retire and are often replaced by those without a resource management background, some fire centres centralize the preparation of FAs to make the best use of experienced staff. The Board asked fire centre staff if they consult the appropriate FMP when preparing a FA.

### *Coastal Fire Centre*

A senior protection officer and a fuel management specialist review all of the FMPs for the coast annually. Although FMPs were not routinely looked at during the FA process in 2009, the MFLNRO land manager participated in the process. FAs are typically developed by an experienced officer after a flight with the land manager to look at a fire. The land manager is familiar with the FMP and also with recent development in the area.

### *Cariboo Fire Centre*

The Cariboo fire centre takes a centralized approach to FA. During the extremely active fire season in 2010, a team including two retired employees and a First Nations liaison was formed to prepare FAs. Similar to Coastal fire centre, the first approach was to consult the land manager and the FA documents reflect that. The FMP, however, can be referenced when a land manager is not available.

### *Southeast Fire Centre*

Recently the Southeast fire centre experienced a significant turnover of staff and so the fire centre provides support to on-site staff to complete the FA. Fire centre staff consults FMPs both for FA preparation and also for initial attack prioritization when new fire starts outnumber available initial attack crews.

### *Kamloops Fire Centre*

Staff at the Kamloops fire centre and the fire zones are partners in the development, maintenance and use of the FMP. When FAs are initiated within zones they are checked to ensure consistency with the FMP and when FAs are approved at the fire centre the FMP is checked again. Staff experience is relied upon to estimate values.

### *Prince George Fire Centre*

FAs are developed through conversations with the land manager and FMPs are routinely reviewed before the fire season and revisited during FA development.



### *Northwest Fire Centre*

The Northwest fire centre reviews FMPs before the fire season but reports that during busy periods, FMPs are not always consulted as the FA is prepared because they don't provide the information needed in terms of priorities. However, FAs are generally completed with the input of the land manager.

## **Plan Content**

The Board reviewed each FMP to determine if they: 1) identify and prioritize the values at risk from wildfire; 2) identify areas that may be adversely affected by specific fire control activities; and 3) reference all relevant plans for overlapping or nearby areas e.g. community wildfire protection plans.

The majority of FMPs reflect the phased approach to planning mentioned above, identifying values on the landscape. However, there were occasionally mapping issues and missing information which underscores the importance of a collaborative review process to ensure information is accurate. Moving to an electronic system could help to address this.

The Board found that most plans do not currently prioritize values. For example, some plans might identify old growth management areas, ungulate winter range and specific areas as important to licensees for mid-term timber supply, but do not suggest priorities for protection when resources are limited. Prioritization is planned in the next phase of fire management planning.

However, a few districts have thought about what values and areas should receive priority action when demands exceed available resources. For example, the 2010 Fort Nelson FMP combined the provincial wildfire response priorities guideline with local knowledge to prioritize geographic areas based on resource management zones (RMZs). By doing this, when there are multiple fires to manage, it becomes easy to see the relative rankings of each RMZ, which assists decision-making. In contrast, Prince George's FMP provides initial attack priorities from a district perspective. For example, immature and mature forest contributing to the allowable annual cut is second in priority only to life and property, which sends the message that timber supply is important in the district.

Other plans, including community wildfire protection plans, land and resource management plans, ecosystem restoration and FMPS for parks and protected areas are relevant to FMPs. Most FMPs provide hyperlinks to these plans, although fuel management treatments around communities were often not referenced. District staff mentioned that fuel management treatments are, by nature, located in and around communities, and they will always receive an immediate and full suppression response. Even so, fuel treatments are certainly useful information for fire managers.

In general, plans identify areas where fire suppression activities could impact resource values, including community watersheds, steep terrain, cultural heritage values and environmentally significant areas. As well, most plans discourage the use of fire retardant within community watersheds and recommend ensuring that cultural heritage resources are not disturbed.

## Summary

First generation fire management plans FMPs were in place for all districts in 2010. The plans do a good job of identifying the values on the landscape, though at times the mapping is cumbersome. Most plans do not prioritize the values needed to assist WMB in managing and prioritizing multiple fires, which contributes to the observation that FMPs are not providing all the information WMB staff needs. Communication is key – district staff need to know what WMB requires in an FMP, and WMB staff need to know what the priorities of the land manager are.

Whether or not FMPs are routinely consulted by WMB staff depends on experience, familiarity with the local area, and availability of a land manager. In their current form, FMPs identify the values, and local officers either already have the knowledge they need to plan, or can consult with the land manager to ensure that land management objectives are considered in response to a fire. However, FMPs are important and useful to those from outside the area or the province, so, in the future when FMPs become more than a list of values (e.g. identify areas where fire may be wanted and not wanted), it is expected that FMPs will be routinely consulted by fire management staff.

FMPs generally do a good job at identifying locations and situations where resource values may be adversely affected by fire suppression activities, and a good plan will often include suggestions for mitigation. Plans relevant to district FMPs are generally referenced as a way to ensure all relevant information is available, and often hyperlinks are provided for those interested in more detail.

## Fire Analysis

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### Fire Analysis and Expanded Attack

The WMB has a long-standing fire control philosophy of “hit hard, hit fast” as a way to minimize fire costs and damage by limiting the size of fire as quickly as possible. Initial attack is considered to be successful if final fire size is less than four hectares, the threshold above which historical fire costs increase rapidly. This approach has so far served the province well, providing effective resource protection at competitive cost.

Every year, however, a relatively small number of fires escape initial attack, and these fires often do extensive damage to values and resources and consume large amounts of public funds. Given the economic and social importance of BC’s forest and range resources, the need to

protect life, property and infrastructure, and the competing demands on the public purse, it is vital that actions to contain these fires are consistent with the values at risk, the cost of suppression, and the probability of success. There is also an emerging consensus in the resource management community that fire is an inevitable – and often necessary – component of forest ecosystem health, and that the trend toward increasing damage (and cost of suppressing them) is partly due to changes including successful fire control and a general move away from prescribed fire and resultant changes in forest structure. In other words, the more successfully we remove fire from the landscape, the more costly and damaging wildfires become.

Partly in response to this, fire fighting agencies across North America are changing their business models from *wildfire control* to *wildfire management* in order to meet these challenges. Wildfire management attempts to return fire to its historic role as a 'driver' of forest ecosystems, while minimizing damage to people, property, and resources. Wildfire management is much more challenging to practice than wildfire control, and, like fire control, it entails significant and inevitable risks. When faced with wildfire, managers must predict the potential extent of the wildfire and its impact on the environment, value and prioritize the resources at risk, consider a number of response strategies with an eye to cost and probability of success, and select an appropriate response strategy. All this must be implemented without delay and with full participation of the appropriate resource managers, while subject to public and media scrutiny. And while this sounds, and is, complex to initiate, wildfire management is the only approach that offers affordable resource protection over the longer term.

WMB is already moving in this direction. Current policy requires that an FA be completed for any fire that escapes initial attack; for any fire where less than full response is contemplated; and for any fire where special values or circumstances are involved. The purpose of an FA is:

- to ensure that fire response is consistent with resource management goals and objectives,
- to ensure that the expenditure of public funds is prudent and appropriate, and
- to assist with the provincial prioritization of large fires when strategic resources are in short supply.

FAs estimate the potential size and location of the fire if left unchecked; identify and quantify the values at risk; estimate cost and probability of success for a number of control strategies; and select the strategies and tactics that will be most useful in fighting the fire. FAs are signed by the incident commander, (the person responsible for implementing fire control measures); the land manager (the person responsible for identifying and quantifying the values-at-risk and restrictions on practice); and the fire centre manager (the senior manager responsible for determining the appropriate response to wildfires). It is important to note that fire response continues as the FA is prepared.

The Board discussed the FA and expanded attack process with senior staff in all six fire centres; examined 69 FAs to determine the accuracy and completeness of plans and consistency of the process; and visited 11 large fires that burned in 2009 and 2010 with either the incident

commander or knowledgeable WMB staff to determine how the process was carried out in the field and if the process was working.

## **What we heard from senior staff**

Responsibility for FA completion varies across the province. In some fire centres FAs are completed by the senior protection officers, while in others they are completed by zone officers and/or qualified incident commanders. We also found that during busy times it was not unusual for FAs to be completed by retired WMB staff or by consultants. In all cases there was a sincere effort to ensure that the process was carried out by qualified individuals, and the variations in the process reflect local efforts to complete the task in a timely and sensible manner.

With the exception of the Southeast and Kamloops fire centres, district FMPs are generally not consulted during FA development. FAs require detailed geographic and land management information that is best provided by resource management and/or forest industry staff, or by direct access to the appropriate computer systems. In other words the values at risk and management's approach to planning are generally formed through conversations with the land manager.

The FA process works best where WMB staff and resource management staff have a good working relationship at the local level. Staff availability is greater, the process is completed more quickly and completely, and there is more ongoing dialogue at the implementation stage. This appears to stem from a greater sense of ownership on the part of resource management staff. We heard almost universally that the quality of this working relationship was more critical to success than any plan or process.

Southeast and Kamloops fire centres are working to integrate the use of FMPs into the FA process. The Southeast fire centre has developed a spreadsheet which uses FMP information to assign a preliminary response classification to each fire, so that the author of the FA is better-informed regarding the resource manager's wishes. Also, the Kootenay Lake forest district has developed a 'values worksheet' to ensure that both consumptive and non-consumptive values are considered when making a decision on appropriate response. Finally, the fire centre has a dedicated fire behaviour specialist working in the weather office during busy times, so that fire behaviour and fire growth predictions are immediately accessible to the staff that are developing and implementing plans.

Assigning a monetary value to the values at risk is an ongoing issue and is not applied consistently across the province. For example, some forest districts estimate the value of merchantable timber at stumpage (the fee paid to the Crown for the timber) while others use average market value of the lumber. No FAs estimated the value of chips or other secondary products. This lack of consistency has serious implications for the RSWAP process, where timber in one district may be valued up to 20 times higher than the same timber in another district.

Also, we did not encounter anyone who knew how to assign value or priority to non-consumptive resources such as critical wildlife habitat, watersheds, or air sheds, or how to address the beneficial effects of fire in areas lacking seral ecosystems or where plant communities require periodic fire to maintain health.

One fire management plan dealt with at least some of these issues. The Vanderhoof forest district has a map-based plan that assigns maximum disturbance levels to non-consumptive resources (e.g. caribou habitat) by landscape unit. This gives wildfire managers clear guidance on acceptable loss while avoiding the need to quantify the value. Also, in conjunction with resource management staff they have identified portions of their land base where 'full response' or 'no response' are considered appropriate in the absence of a more detailed plan. This gives staff time to do a full analysis while responding to the fire in accordance with the resource manager's wishes.

## **Fire Analysis Document Review**

We examined 69 FAs – four from 2009 and 65 from the 2010 fire season. The review focused on: timeliness; the clarity of objectives, strategies, and tactics; estimation of values; whether resource managers had input; and whether the FA was adequate in our opinion to meet its intended purpose to guide the management of the fire.

### ***Timeliness***

Fire analyses are prepared for fires that escape initial attack, for fires receiving anything less than a modified response, and for fires affecting special values. Overall, 78 percent of the FAs were completed within seven days of a fire start, based on the document date. Results by fire centre varied from 57 percent to 100 percent completed within seven days. For the fires sampled in the field, it took an average of four days to complete the fire analysis.

The time required to complete a fire analysis reflects the time needed to include land management staff in the process, the complicated nature of identifying and quantifying values, and in some cases the low priority assigned to completing the FA. We heard a number of times that there are two types of FAs –the 'quick and dirty' ones done in the first day or two, and the complete ones that are done up to a couple of weeks after the fire has started. In other words, FAs are usually timely or complete, but not necessarily both.

### ***Clarity of objectives, strategies, tactics***

The instructions for completing a fire analysis include the following definitions:

*Objective:* what are you aiming at achieving, what is your goal? An objective might be to prevent a fire from crossing a road and burning regenerated cutblocks.

*Strategy:* how do you plan to achieve your objective? A strategy might be full response using direct attack.

*Tactics:* what are you going to do to achieve your strategy? Tactics might include use of two unit crews and two excavators to complete a fuel break.

Seventy-one percent of the FAs provided clear objectives, strategies and tactics. For the remainder it was the objective that was either missing or unclear – in other words what the manager is trying to accomplish.

### ***Estimation of Values***

Ninety-three percent of the FAs estimated the values at risk. It is the responsibility of the land manager to determine the values at risk, but to do so, one needs to know how big a fire might get. Twenty-one of the 69 FAs indicated a fire growth analysis was required but only 8 were done. Faced with aggressive wildfires, incident commanders made quick decisions with the best information at hand in order to get on with controlling the fire. The result is that values and costs used to make strategic decisions are based on an ad hoc process rather than the consistent and accurate process envisioned in policy. This has implications for the provincial prioritization of fires (RSWAP), and makes the comparison of suppression costs and values at risk highly variable between fires.

Some values at risk from a wildfire are easy to estimate, including houses, timber and forestry investments. Others such as wildlife habitat, fresh air and water quality are more difficult to value. The monetary value of structures is easily derived from the BC Assessment Authority. Forestry improvement projects and plantations are generally valued on a per-hectare basis, and consist of a basic cost for plantation establishment plus an annual addition reflecting tree growth and species value. Again, this provides a quick and consistent value and seems to be working well. Timber values however are not handled consistently. In some cases the value of timber is deemed to be the stumpage charges, while in other cases the value is deemed to be the average market value of the lumber. On one fire stumpage value was used for Crown timber and average market value for private timber. In the Board's opinion timber is often significantly under-valued in the current process and it needs to be valued in a consistent way. Undervaluing timber has negative implications for both RSWAP and 'cost versus damage' decisions.

None of the FAs quantified values such as wildlife habitat, air or water quality, visual quality objectives, etc. Fire effects are highly variable and sometimes positive and they vary between the site and landscape level and assigning a value is difficult.

### ***Resource Manager Input***

A key section of a FA is the land manager's comments and agreement on the general approach to managing the fire. Eighty-four percent of the FAs examined included input from the land manager or licensee.

**Table 1. Summary of fire analysis review**

	Cariboo	Coastal	Kamloops	Northwest	Prince George	Southeast	Overall
Number of FAs	16	7	10	20	8	8	69
Timeliness (completed within 7 days)	10 (63%)	4 (57%)	10 (100%)	14 (70%)	8 (100%)	8 (100%)	54 (78%)
Clear objectives, strategies, tactics?	3 (19%)	4 (57%)	10 (100%)	19 (95%)	8 (100%)	5 (63%)	49 (71%)
Values estimate?	16 (100%)	4 (57%)	10 (100%)	19 (95%)	7 (88%)	8 (100%)	64 (93%)
Land manager input?	16 (100%)	4 (57%)	7 (70%)	18 (90%)	6 (75%)	7 (88%)	58 (84%)
Adequate overall?	16 (100%)	4 (57%)	10 (100%)	19 (95%)	8 (100%)	8 (100%)	65 (94%)

Note: information for one fire analysis in the Coastal fire centre is missing a page so it cannot be determined whether the FA was completed in a timely manner or if there was an estimate of values. Adequacy of that FA is unknown. For another Coastal incident, the original FA is missing and only the 3<sup>rd</sup> update was reviewed. Adequacy of the original update is unknown.

Overall the standards of quality, completeness, and timeliness were very good, with 94 percent of FAs being adequate for their intended purpose. It is worth noting that FAs are generally more complete and timely during quieter fire seasons. The 2010 fire season was extremely busy for the Cariboo fire centre, and in July and August of 2009, the Coastal fire centre was busy with several fires including the high-profile fire at Blackcomb.

Based on this review, there appear opportunities for improvement in the following areas:

- ensuring timely completion of fire analyses during busy periods,
- ensuring that the objective, or what the fire manager is trying to accomplish, is clearly listed,
- developing a consistent and accurate method for valuing the values at risk,
- automating the FA, and
- fire growth modelling.

## Field Samples

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The Board visited 11 fires and conducted an office review of one fire to examine the implementation of fire analyses in the field. Twelve fire summaries (two from each fire centre) appear in Appendix 2.

Overall we found field staff working diligently to make the FA process work. FA strategies were consistent with land manager wishes, plans were followed, actions were successful, and costs

and losses were consistent with estimates. However, there were two fires where the FA was not followed.

## Fire 1

A fire was estimated to be 123 hectares and was not expected to grow further. The FA specified tactics of trying to burn out between guards and the fire, however this was not done. A subsequent wind event spread the fire through the unburned fuel and over control lines, increasing fire size by over 5000 hectares with consequent increases in suppression costs and damages.

## Fire 2

The FA specified a strategy of indirect attack with burning off from existing roads and trails. Instead, the incident commander chose to 'tightline' (direct attack each and every margin of the fire) large portions of the fire within areas planned for ecosystem restoration burning. This resulted in a substantial and unnecessary increase in fire costs and increased risk.

In the case of two other fires public opposition to smoke was cited as a reason to pursue an expensive fire control strategy of heavy helicopter bucketing within the burned area. This is called "bucketing in the black." Timber in the area was either inaccessible or unmerchantable, and the main values were structures in the valley bottom.

Smoke leads to public complaints in many parts of the province. If we accept the reality that fire is a natural component of most forest ecosystems throughout the province, we accept that it's all going to burn sooner or later. It follows that government is in the business of managing smoke rather than eliminating it, and that FAs should identify the specific values that are compromised by smoke and devise strategies to accommodate them while recognizing that the smoke itself is part of an inevitable natural process. These two fires were highly visible to the public and widely reported in the media and there was certainly pressure to be seen to be doing something. This demonstrates that there is work to be done to change public perceptions to recognize that smoke is inevitable and that direct attack with helicopters is not always effective.

Our discussions in the field also raised concerns about liability. We visited fires where the full range of fire control actions were constrained by local 'policies' that, for example, precluded burning off or dictated full response to every fire. We also heard concerns from field staff that burning off was a risky operation from a personal or professional perspective and that it was less risky to simply let the fire burn to the control line by itself. These actions and statements appear to reflect a wish to limit risk to the organization and/or its staff, which is understandable as fire control outcomes are somewhat unpredictable. It also reflects public pressure to be seen to be doing something even though it may be appropriate to simply monitor the situation. Nevertheless, risk-avoidance of this nature, if allowed to continue, could significantly increase the cost of suppression with little benefit to the public and its resources.



Finally, we heard from field staff that in some parts of their land base they know immediately that management will be either full response or monitor-only based on their knowledge of the overall threat in that area. In situations like this it would be more appropriate to delay the FA until the first incident management team (IMT) is in place, or to forego it altogether. IMTs work closely with local resource management staff, and if it is clear that a full response is appropriate then the FA uses up valuable time and is of limited benefit.

## Summary

Our general conclusion from reviewing 12 fires is that where the FA is accurate, complete and the incident commander follows it, costs and losses are contained and land manager wishes are met. In other words, the process works when people follow it.

While the FA process includes a monitoring and updating component, it doesn't appear to be used consistently across the province. We believe that greater attention to monitoring, controlling, and debriefing will result in better plans that are followed more consistently, creating additional learning opportunities for WMB staff, and ultimately reducing suppression cost and damage to the public resource.

## Conclusions and Recommendations

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The Board's objective for this special investigation was to determine whether accurate and complete land and resource management information is adequately incorporated in fire management planning and fire control activities. Our conclusions and recommendations relating fire management planning and fire analysis process appear below.

### Fire Management Plans

Much good work has gone into the development of a new model for district fire management plans, and updated, phase one plans are now in place for all of British Columbia.

FMPs do a good job of identifying the values on the landscape although at times the mapping can be cumbersome. Most plans do not prioritize those values to assist WMB in managing and prioritizing multiple fires and that contributes to the observation that FMPs are not providing all of the information that WMB staff needs. WMB staff needs a better indication of resource managers' priorities, resource emphasis, and zoning if appropriate. In other words, which values are the most valuable in the event that they cannot all be protected? Prioritization of values was envisioned as the second phase of planning, and it is time to begin that now.

Communication and a collaborative relationship is key – district staff need to know what WMB requires in a fire management plan and WMB staff need to know the priorities of the land manager. Furthermore, as a result of organizational changes, district managers are no longer in a position to speak to the full range of resource management issues and priorities, and parties such as BCTS, the forest industry and First Nations need to be brought into this process. WMB

relationships with government and industry partners should be fostered and maintained to add value to the planning process rather than to replace it.

Time is of the essence when responding to a wildfire, and it is apparent that the current FMP format needs to be simpler, easier to reference, and more focused on the operational needs of WMB. It may be possible to significantly reduce the size and complexity of current plans and maps by focusing on resource managers' wishes and by providing information in a standardized fashion through an existing web-based geographic information viewer such as Fireview. The cost should be relatively modest and would provide immediate savings by reducing or eliminating the cost of developing and distributing periodic updates. Further, WMB staff would be much more likely to utilize information that is current and readily accessible.

Most fire centres do not automatically refer to FMPs during initial attack prioritization or FA development. Instead, they rely on staff experience and consultations with the land manager to ensure that land management objectives and values are considered in the response to a fire. This process can however break down during busy times. We expect that as FMPs are further refined WMB will employ them more frequently and with more confidence.

Leadership is needed to send the message that fire management planning is a government priority, consistent with its Wildland Fire Management Strategy and that it is time to move toward true fire management.

## Recommendations

### *Commitment*

- Government make fire management planning a high priority by ensuring current plans are up to date and moving quickly to Stage 2 which prioritizes values and defines where fire is wanted or unwanted, and under what circumstances.

### *Planning process and content*

- WMB and land management staff collaborate to refine the current Fire Management Plan model to focus on information important to fire managers while remaining simple and easy to access. First Nations, licensees, BCTS, local governments, and the public should also be included where appropriate.
- WMB implement the digital delivery of geographic and land management information for fire management planning through an existing software platform such as Fireview.

## Fire Analyses (FA)

The FA process often takes place once a fire has escaped initial attack efforts and is growing quickly. Staff are therefore juggling the desire to complete the FA quickly against the need to accurately and completely understand the resource managers' wishes. Anything that can speed the process without sacrificing accuracy and completeness is good. As discussed above, providing a standard suite of geographic and land management information directly to WMB

staff through an existing software platform could significantly speed up the process without sacrificing the product.

The FA helps managers to choose the most cost-beneficial response strategy that is reasonably available. To do this, they need to accurately estimate the fire's potential for spread and damage. WMB has highly trained specialists who are up to the task of fire spread prediction, but we found that in most cases they weren't available within the required time frame and that very few FAs had a fire growth estimate completed by a qualified professional. The Board understands that WMB is currently exploring the potential of “probabilistic fire analysis” (currently residing with the Canadian Forest Service), in hopes that this may serve as an automated and accurate predictor of fire spread for FA purposes. We recommend WMB to adopt this, or another, automated system of fire spread prediction to ensure that FA are subject to a consistent and timely method of predicting the damage potential of large fires.

Wildfire managers also have to determine the extent and value of the damages that a wildfire could cause. While some of these are difficult to quantify (eg: the cost of lost opportunity from smoke) and some are unique (eg: the cost of power transported in a high-tension line), many can be accessed from existing government systems and could be valued according to a standard protocol for pricing (eg: assessment value, timber volume by species). Accessing and valuing this information automatically to the greatest extent possible would improve the accuracy of FAs while reducing the amount of time it takes to complete them.

Consultation aimed at understanding the resource managers' wishes will remain the foundation of the fire analysis process. FMPs and automated queries of geographic and land management systems should be considered base information to improve and enhance collaboration with the land manager, rather than replacing that relationship.

Of 12 large fires that we reviewed with local field staff, 8 FAs reflected the wishes of the local resource managers, the plans were followed, and the operations were successful. Operational plans for two fires were not followed and that resulted in extra cost and/or resource damages. The FAs for the remaining two fires were incomplete. Greater attention to monitoring and updating FAs could help to address this issue.

### ***Recommendations***

- Standardize and automate resource valuation to the greatest extent possible to ensure that resources are valued consistently.
- Develop a provincially consistent process to estimate potential fire spread so values at risk can be assessed consistently and efficiently.
- Review monitoring practices for FAs to ensure that plans are regularly updated and that resource and wildfire managers' decisions are carried out according to the plan.
- Ensure those completing the FA state clear objectives, strategies and tactics.

In accordance with section 132 of the *Forest and Range Practices Act*, the Board requests that the Ministry of Forests, Lands and Natural Resource Operations report its progress on implementing the recommendations in this report by March 31, 2013.

## **RSWAP**

The Resource Strategic Wildfire Allocation Process (RSWAP) is designed to ensure that during times of significant suppression resource demand, scarce resources go to the most important fires. The process is well-designed and executed, and in our opinion provides the public with significant savings in suppression cost and damages during difficult times.

As the data going into the RSWAP process is gleaned from FMPs and FAs, the process is subject to the same issues of the source documents. We are confident that the RSWAP process will continue to improve as the FMP and FA processes are further refined.

## **Managing public expectations**

WMB has a role in managing public expectations around fire response and smoke. “Hit hard and hit fast” has conditioned the public to expect full suppression action on fires and it will be a big challenge to change perceptions as WMB moves from wildfire suppression to wildfire management. Similarly, the public needs to understand that smoke and fire are inevitable.

# Appendix 1

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## Wildfire Management Branch's Guideline for setting priorities and allocation of wildfire suppression resources

### Application

This guideline applies when it is necessary to set priorities for:

- Multiple fire initial attack,
- Containment objectives and allocation of resources to fires beyond initial attack, and
- Strategic positioning of resources in anticipation of new fires occurring.

The information set out here provides decision makers with guidance that can be used in conjunction with consequence management plans, local fire management plans and other relevant information.

### General considerations

When setting priorities and allocating resources, decision makers will normally assess and consider a variety of factors, including:

- Safety of fire responders and emergency personnel
- Present and forecast weather and fire behaviour
- Availability of suitable fire attack resources
- Guidance or information in fire response plans
- Values at risk in the immediate vicinity and surrounding area
- Potential smoke and public health impacts
- Information available from local sources
- The probability of success

### Priorities

It is recognized that the degree of risk to defined values (e.g., high, medium, or low), and timing of that risk (e.g., imminent within 72 hours, or longer term) is determined by many variables, and can change in a very short time. When setting objectives and allocating resources, priority will be given to protecting values on the basis of the following ranking, in descending order:

1. Human life and safety
  - a. Evacuation
  - b. Emergency protection of occupied interface areas, evacuation travel corridors, and other occupied sites
2. Property
  - a. Infrastructure or assets important to public health and safety, (e.g., public buildings, drinking water sanitation systems, major communication, transmission and transportation facilities, etc.)

- b. Concentrated areas of residences and infrastructure facing imminent threat
  - c. Dispersed residences and associated infrastructure facing imminent threat
  - d. Communities or rural residences where threat is greater than 3 days away
  - e. Other public infrastructure, including park facilities
  - f. Infrastructure, installations or assets covered by client agreements, (e.g., communications and transmission infrastructure, resource extraction equipment or assets etc.)
  - g. Other private and commercial property.
3. High environmental values
- a. Community watersheds / drinking water catchment areas
  - b. Known and identified species at risk critical habitat
4. Resource values
- a. Active resource extraction sites or timber harvesting and silviculture investment areas
  - b. Timber covered by a client protection agreement
  - c. Other commercially valuable timber
  - d. Areas identified as a priority in BC Parks Fire Response Plans
  - e. Other forest resource values

# Appendix 2

## Fire Summaries

### SOUTHEAST FIRE CENTRE: Nine Bay Lake (N2-0534)



Post-fire salvage logging – June 2011.



Nine Bay Lake fire – June 2011.

Nine Bay Lake is a popular fishing lake located about seven kilometres west of Harrogate in the Invermere fire zone. The fire started near the lakeshore on August 26, 2010, and it was likely person-caused.

Values in the area include a user-maintained recreation site on Nine Bay Lake, private land with a cabin, and timber values.

### The Fire Analysis (FA)

The FA was completed on August 29, 2010, by a senior protection officer from the fire centre and the incident commander. The fire was estimated at 700 hectares. Weather was forecast as cool and windy for the next three days, with a possible return to seasonal temperatures thereafter. The predicted afternoon wind gusts of up to 40 kilometres per hour were definitely a concern to fireline staff. A long-term fire growth analysis was not required as the fire was contained by the time the FA was prepared.

The general control objectives and strategies were to provide for safety of responders and to prevent further spread of the fire into timber resources and infrastructure.

Tactics for the fire were:

- Direct attack with a combination of machine and hand guard
- Some heli-bucketing required to support line construction
- Establish tight line with machines, tie in with hand line, use natural features
- Mop up 100 feet around perimeter

The incident commander was aware of the planned objectives, strategies and tactics as he was one of the authors of the FA. The FA was signed off by a forest district representative and the fire centre manager.

Operations were conducted in accordance with FA and the planned objectives were achieved. The FA estimated the final fire size at 750 hectares, and that is reasonably consistent with the 680 hectares final fire size. The cost of fire suppression was estimated at \$1.58 million and actual costs were \$1.73 million.

Staff at the fire centre consulted the 2010 fire management plan and hard copy maps from 2009. The 2010 fire management plan mapping was incomplete for this area – the private land boundary was not shown, and the fire behaviour and timber maps were incomplete. The values-at-risk were identified by wildfire management staff in conjunction with district and licensee representatives, and the private land boundary was confirmed with the landowner.

The values potentially affected by the fire were estimated at \$1 350 000 for Option A (tight line) and \$1 700 000 for Option B (burn off from existing lines). Both fire suppression options were more expensive than the estimate of the values. Interestingly, Crown timber was valued using stumpage rates while private timber was valued using average market value.



Farm below the camel humps.



## COASTAL FIRE CENTRE: Camel Humps (V30940)

The Camel Humps lie between the Ryan River and the Lillooet River in Pemberton Meadows. Pemberton Meadows is an agricultural area home to farms and residences and the Camel Humps rise abruptly from the flat valley bottom. Lightning started two fires on one of the humps on July 25, 2009, and the two fires joined into one. The fire was on steep, rocky and mostly inaccessible terrain, and it burned mainly mature Douglas fir. The fire was highly visible to the public.

Values potentially affected by the fire include life and property, timber, visuals, and silvicultural investments (plantations) in the Ryan River valley.

The Pemberton fire zone was very busy at the time. Lightning was responsible for 82 fires between July 21<sup>st</sup> and 26<sup>th</sup>. There were not enough resources to go around so fires were prioritized based on the risk to values. There were a number of higher priority fires in the region including a fire on Blackcomb Mountain at Whistler and the Mt. McLean fire at Lillooet. The weather forecast called for extreme drying over the following four days due to a high pressure ridge with no precipitation forecast.

### The Fire Analysis (FA)

Due to the heavy fire workload a “short form” FA consisting of two pages from the full FA was prepared on July 27<sup>th</sup>. It noted fuel types, values, tactics, objectives, strategies and land manager comments. The fire was estimated at 0.4 hectares and was expected to grow to 50 hectares before it was controlled. The FA listed the general control objectives and strategies as “full suppression”. The tactics were listed as “full suppression”. The FA was prepared after a senior forest officer and the acting district manager took a look at the fire from the air. The senior fire centre officer did not consult the fire management plan but instead relied on the local knowledge of the acting district manager.

Another FA was completed later by a retired protection employee and signed by the incident commander. The date of the second FA is unknown as the first page is missing. The second FA provided more detail and two options. The first listed objectives and strategies for each flank of the fire:

- North Flank** – prevent spread on valley floor to protect houses and improvements. Use ground crews and helicopter.
- West Flank** – prevent spread of fire through regeneration with ground crews and helicopters.
- South Flank** – prevent fire from spreading downhill in Ryan Valley using helicopters and ground crews where safe.
- East Flank** – use helicopters and ground crews where safe to prevent spreading to east in Pemberton valley.

The second option contemplated burning off on the north and east flanks. The south and west flanks were to be attacked by ground crews and helicopters to prevent spread.

The Incident Commander was briefed on the FA and operations were conducted in accordance with the first option. Burning off from the valley bottom (option 2) was certainly viable for this particular fire, however the incident commander explained that there is a reluctance to burn off in the fire centre due to the huge population, values at risk and concerns about adding smoke to the Sea to Sky corridor.

The fire crept down slope on the north and south (long) flanks until it reached the valley floor where it met fireguards. Fire on the east and west flanks was contained with machine and hand control lines. It is not possible to determine whether



extensive heavy-helicopter bucketing action had any tangible effect on final fire size or risk of escape, but officials were concerned that the sudden increase in temperatures and lowering of relative humidity greatly increased the rate of spread potential. Officials determined that allowing this fire to creep down the slope until the control lines were constructed was the best fire suppression strategy in the circumstances.

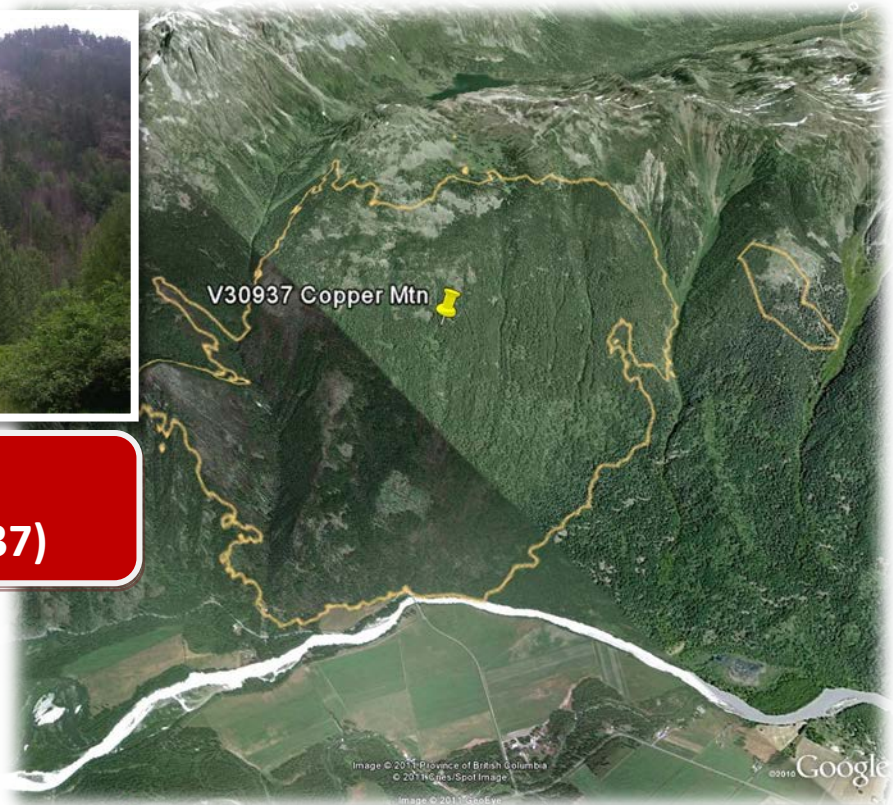
Although stumpage values of either \$1.2 or \$4 million were listed in the FA as 'at risk', there was agreement during the Board's field visit that timber burned on the Camel Humps was generally non-merchantable or inaccessible, so in the end no valuable timber appears to have been lost.

The first FA estimated final fire size at 50 hectares and the second FA is missing that portion. Final fire size listed on the rehabilitation plan maps is 658 hectares. The original estimate was based on direct attack, which was abandoned due to terrain, safety considerations and available resources. A fire growth estimate was not prepared as no fire behaviour specialists were available.

The original FA projected total suppression cost as \$550,000, or \$70,000/day for 8 days. The second FA projected total suppression cost as \$2,167,000. Final fire costs appear to be \$975,000. Final cost was 45% of planned cost, apparently as limited resources did not allow for the full planned response. Resources were also moved from this fire to the nearby Copper Mountain fire because the ground was safer to work on. When the Camel Humps fire burned down to the control lines, crews were redeployed back to it from Copper Mountain. Failure to fully deploy resources did not appear to affect final fire size or damage to values at risk. The FA does not provide details on how the values at risk were calculated, however a \$10,000,000 value for homes and land improvements is reasonable.



Copper Mountain fire above a homestead.



**COASTAL FIRE CENTRE:  
Copper Mountain (V30937)**

Copper Mountain is located on the north side of the Lillooet River valley at Pemberton Meadows. Lightning started a fire on the mountain on July 25, 2009.

Pemberton Meadows is an agricultural area home to farms and residences.

The fire was on steep, rocky inaccessible terrain, and it was highly visible to the public. Values potentially affected by the fire included life and property including an outdoor school, timber, wildlife habitat, visuals, and a recreational trail to Tenquille Lake.

The Pemberton fire zone was very busy at the time. Lightning was responsible for 82 fires between July 21 and 26<sup>th</sup>. There were not enough resources to go around so fire response was prioritized based on the values at risk. The weather forecast called for extreme drying over the following four days due to a high pressure ridge with no precipitation forecast. On July 30<sup>th</sup>, a fire began on Blackcomb Mountain at Whistler, and it was obviously a high priority and required significant resources.

On July 31<sup>st</sup> an evacuation order was issued for residences north of the Lillooet River on the Lillooet River Forest Service Road (FSR) up to the Howe Sound outdoor school. On August 1<sup>st</sup> the Cascades and Squamish forest districts closed the Hurley FSR to all public access to ensure public safety during periods of extreme fire behaviour. This decision was not taken lightly because the Hurley FSR provides one of two routes to access Bralorne and Gold Bridge, and the alternate route via Highway 40 was closed due to a fire at Lillooet.

Structures potentially threatened by the fire were identified and structural protection units (sprinklers) were set up on two properties by August 1<sup>st</sup>.

**The Fire Analysis (FA)**

A FA was completed on August 3, 2009, by a retired protection employee and signed by the incident commander. The fire was estimated at 350 hectares. The FA was prepared after senior fire centre staff and the acting district manager took a look at the fire from the air. The senior officer did not consult the FMP prior to the flight but instead relied on the experience and local knowledge of the acting district manager.

The general control objectives and strategies were to protect property and improvements on the southwest flank, including the outdoor school and private property. Specific tactics were not listed. The FA was valid for three days and the plan was to update it by August 7<sup>th</sup>.

The FA was updated on August 12<sup>th</sup>, and the fire was estimated at 838 hectares. The general control objectives and strategies were to protect values and improvements on the southwest and east flanks; limit spread to Pemberton and residents in Pemberton Meadows; and limit spread to the northwest which would affect forest values. Tactics were to direct attack the fire where feasible. The forecast at the time called for clouds with a chance of showers.

The Incident Commander was briefed on the original FA and signed it off. The updated FA was not signed.

No tactics were specified in the FA but the update indicated direct attack. Two sections of fire guard totalling 1400 metres were built at the valley bottom. Operations were conducted in accordance with the second FA. The objective of protecting property and limiting spread were met.

The first FA did not estimate final fire size. The second FA estimated final fire size at 900 hectares and the final fire size was 838 hectares which is reasonably close to the estimate.

The original FA projected total suppression cost as \$300,000 based on \$100,000 per day for three days, after which a new fire analysis would be prepared. The updated FA projected total suppression cost as \$2,802,000, with \$2,286,000 having already been spent. The final fire cost is not known however the strategy of direct attack where possible meant a heavy reliance on aircraft because the terrain was too steep to safely use ground crews. There values at risk due to the fire were estimated at \$4.5 million.

## SOUTHEAST FIRE CENTRE: Danaird Creek (N40274)

Danaird Creek is located in the Beaverfoot Valley about 50 kilometre southeast of Golden. On July 28, 2010, lightning started a fire in a cutblock on the west slope of the Beaverfoot range. The timber had been felled and bunched in 2008, but had not been yarded to roadside. Values potentially affected by the fire included plantations and mature timber. WMB staff worked with BCTS to identify the values at risk. The fire management plan was not consulted.



*Danaird Creek fire.*

### The Fire Analysis (FA)

A FA was completed on July 30<sup>th</sup> by the incident commander and he estimated the fire at 85 hectares. The general control strategy and objectives were to prevent the fire from spreading into adjacent timber values and to prevent further damage to regenerated blocks. Tactics for the fire were:

1. Direct attack with ground crews, helicopters with buckets, and burn-off operations
2. Fuel free and small scale burnout along northwest flank
3. Direct attack along roads and into regeneration blocks using water
4. Burn off half of major drainage to prevent fire spread into BCTS blocks

The incident commander was aware of the objectives, strategies and tactics as he wrote the FA. The incident commander, deputy fire centre manager and a land manager representative agreed on the approach to manage the fire and signed the FA. Operations were conducted in accordance with the planned strategies and tactics and the objectives were met.

The FA estimated the final fire size at 120 hectares. Fire growth modelling was not employed. The final fire size was 82 hectares and that is consistent with the original estimate.

The FA estimated the cost of fire suppression at \$1,178,000. The actual suppression cost was \$885,000. The values at risk from the fire were estimated at \$1,598,000 which included timber at \$1.4 million, spaced regeneration at \$120,000 and regeneration at \$78,000. A licensee and the district supplied specific costing for values.

## CARIBOO FIRE CENTRE: Dog Creek (C20243)

The Dog Creek fire began on July 28, 2010. The area is a mixture of private ranch land and the Dog Creek reserve (Canoe Creek First Nation) in the valleys with forested Crown land above. The southwest and southeast flanks of the fire immediately threatened the reserve and nearby ranches. The northern and eastern margins of the area have good timber values and numerous logged openings of various ages.

On July 30<sup>th</sup> an evacuation order was issued for the Dog Creek reserve.



*New fence construction with burned timber in the background.*

### The Fire Analysis (FA)

The FA was completed on August 2 and the fire was estimated at 6500 hectares. The only objective stated is “safety of fireline personnel.” The strategy was full suppression, with the caveat that the response would be modified until more resources became available. Interim tactics were structural protection unit deployment and burnoff from existing roads and natural breaks.

The Incident Commander was briefed by senior staff at CFC prior to taking command of the fire. Operations were conducted in accordance with the planned strategies and tactics.

The original anticipated fire size of 12 000 hectares was an 'ad hoc' estimate made by senior fire centre staff. A long term fire growth estimate was completed by the incident management team but we were not able to obtain a copy. The final fire size was 7495 hectares. The unstated objective of limiting timber loss was achieved, and the objective of ensuring public and firefighter safety was met and no improvements were lost.

The FA estimated total suppression cost as \$12,000,000, or \$500,000/day for 20 days plus the money already spent. The FA cost estimator, however, indicates \$368,000/day which would produce a final cost closer to \$9,000,000. We do not know if the actual cost of suppression varied from the estimate because WMB is unable to provide the final cost of the fire.

Stewardship foresters for Central Cariboo and 100 Mile House forest districts provided values-at-risk and cost estimates. Timber costs were based on stumpage value, rather than average market value. Silviculture values were assessed per hectare, with no cost added for the age of the stand. Grazing values are estimated at \$1,775,000 for this area. Power lines are valued at \$10,000,000.

The fire management plan identified the values in the area including a community watershed, points of diversion, and the area covered by a volunteer fire department protection area. There is no indication that any values were missed in the management of the fire.

There is an issue with the maps for this fire management plan on the provincial website—several of the landscape unit “tenure” maps including Dog Creek have the Williams Lake landscape unit map in place of the correct map. The Cariboo Chilcotin forest district is aware of the issue.

## NORTHWEST FIRE CENTRE: Duck Lake (R20165)



Hydro line to the Huckleberry mine.



Duck Lake fire shortly after detection.

Duck Lake is located about 43 kilometres south of Houston. Lightning started a fire on a rocky hilltop on July 27, 2010. The fire was not detected until August 1, 2010, due to smoke in the region from numerous other fires. Values potentially affected by the fire included plantations, timber, recreation sites and a transmission line to the Huckleberry mine.

### The Fire Analysis (FA)

An FA was completed on August 6<sup>th</sup> by retired members of the Wildfire Management Branch. The fire was estimated at 123 hectares and further fire growth was not expected. The general control objectives were to hold the fire within established guards and the strategy was described as full response. Tactics were to mop up one hose length into the black and to try to burn out between the guard and the fire. The Incident Commander was briefed on the objective, strategy and tactics. The FA was signed by a district representative and the fire centre manager, but not the incident commander.

Weather was forecast to be cool and showery for two days, then returning to seasonal or above seasonal temperatures for the next week.

Crews worked on mopping up the fire but burning off was not undertaken. Winds increased on August 11<sup>th</sup> and crews were pulled off. On August 12<sup>th</sup>, the fire blew over fireguards and crossed roads. Another wind event passed through the area on August 18<sup>th</sup>. The fire eventually grew to 5422 hectares. The FA was not updated after the fire escaped control lines.

The FA estimated total suppression cost at \$399,250, but that was based on a final fire size of 123 hectares. The final fire cost was \$2,947,733.

Wildfire management branch zone staff worked with forest district representatives to identify values at risk. Local knowledge was used to determine values, rather than the fire management plan. The fire management plan is in essence an outline of response categories and does not identify values on the landscape. Timber values were estimated based on average market value rather than stumpage.

The values at risk were underestimated for this fire, as the area at risk was estimated at 460 hectares while the final fire size was 5422 hectares.

## PRINCE GEORGE FIRE CENTRE: Greer Creek (G40151)



*Greer Creek shortly after ignition.*



*Greer Creek one year later.*

The Greer Creek fire began on June 18, 2010, approximately 30 kilometres southwest of Vanderhoof. The Vanderhoof fire management plan classifies the area as “high priority, full suppression.” Values in the area include cabins, lodges, homes, cultural heritage, silvicultural investments and timber.

The fire cause is under investigation, but given the time of year and fuel type, this fire was predominately driven by high temperature and low relative humidity. The fire intensity made control difficult—dead, dry standing and downed timber and slash contributed to large ember release, which lead to long-range spotting. This made it difficult to establish control lines while ensuring the safety of ground personnel.

An evacuation alert was issued for farms and homes on the Kluskus FSR, the Kenny Dam Road and residences and farms along Nulki Lake.

### The Fire Analysis (FA)

An FA was completed on June 20<sup>th</sup> by the regional wildfire coordination officer. He estimated the fire at 3000 hectares.

The general control objectives and strategies were to protect government infrastructure; prevent or limit loss to private property; ensure public safety; and contain fire to 8000 hectares. The tactics were to deploy structure protection units (sprinklers) if necessary and to attack the fire directly and indirectly with ground crews, heavy equipment, and helicopters.

Weather was forecast to be “warm and dry with a somewhat unstable air mass”, indicating possible problems with drying fuels, unpredictable gusty winds, and the possibility of further lightning.

The incident commander was briefed on the objectives, strategies and tactics. The incident commander, district representative, fire centre manager and regional wildfire control officer all signed the FA.

Operations were conducted in accordance with the planned strategies and tactics although tactics were changed to reflect changing field conditions. For example, due to the intensity of the fire, roads were not wide enough to be safely used to burn off from. Feller bunchers were used to widen the clearing width to a five-pass width, and the resulting bunches were partially burned. The FA objectives were met.

The anticipated final fire size was estimated at 8000 hectares based on local knowledge. No fire-growth model was completed. The actual final fire size was 6102 hectares.

Total suppression cost was estimated at \$7,000,000, and the actual cost was \$1,426,410, due to successful burnoff and control tactics.

Wildfire management branch zone staff worked with district representatives to identify values at risk. The values at risk were estimated at \$15.2 million. The FMP may have been consulted during early stages, but was supplemented by local knowledge. Timber values were likely under-valued, as stumpage value was used rather than average market value.

## KAMLOOPS FIRE CENTRE: Mayson Lake (K20262)



The Mayson Lake fire, located about one kilometre southeast of Bonaparte Lake, was caused by lightning. It was discovered on July 27, 2010.

Values at risk from the fire included mature timber, plantations, life and private property including a lodge and cabins on Bonaparte Lake, forest research investment, cultural heritage, and recreational and tourism values including fish-bearing lakes and streams. An evacuation order was issued during the fire for the east side of Bonaparte Lake and it affected 11 properties and 50 individuals. The Jamieson Creek forest service road was also closed to the public during the fire.

### The Fire Analysis (FA)

The FA was completed on July 29<sup>th</sup>. At the time the fire was estimated at 114 hectares.

The general control objectives and strategies for the fire were:

- "Safety of the public and fire responders"
- "Minimize impact to improvements"
- "Maintain access/egress for responders and public"
- "Contain the fire"
- "100% mop-up"

The general tactics for the fire were to use ground crews and heavy equipment to construct containment lines and to use aircraft to support guard construction to minimize the risk of escape. Specific tactics included:

5. "Heavy equipment to construct fuel breaks"
6. "Ground crews to burn off or go direct"
7. "Aircraft for retardant guards, bucketing support, and crew transport"
8. Locate and assess structures for deployment of sprinkler protection units (SPU)

The fire management plan was consulted during the preparation of the FA. Although key personnel had extensive local knowledge of the area, the FMP was especially useful in identifying cultural heritage values and the appropriate individual to contact for more detailed information. District staff and a licensee were consulted to confirm values at risk.

The fire analysis was prepared by the incident management team's plans chief, and the incident commander was briefed on the objectives, strategies and tactics. Operations were conducted in accordance with the FA and the objectives were met. Burning off was not a tactic used on the fire.

Final fire size was estimated at 150 hectares and the actual fire size was reasonably close to that at 130 hectares. Fire growth modelling was not employed.

Suppression cost was estimated at \$1,000,000. The final suppression cost was roughly \$1,300,000, mainly due to high air tanker cost, including the Martin Mars, on initial attack, and heavy use of medium helicopters while the fire was uncontained.

The FA estimated that \$30,000,000 in values were at risk from the fire although no details of this estimate were provided. The incident commander said that based on the teams' experience, predicted fire behaviour and the values at risk, there was no doubt that full suppression was the best option and that the cost of suppression was a fraction of the values protected.



## CARIBOO FIRE CENTRE: Meldrum Complex —Till Lake ( C20189)



*Meldrum Complex fire burning in a cutblock.*



*Lightning caused fires in Meldrum Creek.*

The Meldrum Creek fire began on July 28, 2010. Initially a five-person crew lead by a forest officer managed the fire. When resources became available a week later, a fire analysis was prepared and the fire was taken over by an incident management team.

The west flank of the fire was within a military reserve that is regularly used for weapons training. The military is engaged in an on-going program of ecosystem restoration in cooperation with local First Nations communities, consisting of hand-slashing conifers followed by prescribed burning to reverse encroachment of historic rangelands by conifers.

The east flank of the fire was primarily Provincial Crown land with some private land and homes. Fuels were a mosaic of open range, deciduous and mixed-wood patches of range encroachment, and closed conifer forest. The area has many roads and trails throughout, and there is an ongoing ecosystem restoration program as well.

### The Fire Analysis (FA)

The objective for the portion of the fire within the weapons range was to limit fire spread while ensuring the safety of fire personnel. The strategy was full suppression and tactics were to burn-off from existing roads and trails, with guard construction and ground action specifically excluded for safety reasons.

The objective for the east side of the fire was point protection of improvements and limiting fire damage to merchantable timber. The strategy was full suppression and tactics were to deploy structural protection units (sprinklers) on the improvements with indirect attack consisting of burn-off from existing roads and trails with guard construction where necessary, followed by perimeter mop-up.

The Incident Commander had a formal briefing with senior staff at the fire centre and a Department of National Defence representative before taking command of the fire. It is not known whether a written turnover plan was prepared.

Operations were not conducted in accordance with the planned strategies and tactics. The Incident Commander halted the ongoing indirect attack operations, and commenced direct attack operations consisting of 'tight-lining' the fire boundary and extinguishing the perimeter and isolated patches of burning timber with ground crews. Tight-lining means directly attacking each twist and turn of the fire boundary.

Senior fire centre staff was unaware of the change in tactics for some time. Once it was discovered that there had been a deviation from the original tactics a significant amount of investment had been made. This created tension with fire centre staff, but due to the very large fire suppression workload, and the investment of suppression activities, the new tactics remained in place. Public and firefighter safety objectives were met, and no improvements were lost. Damage to Crown timber was much less than the original area deemed "at risk," as the bulk of the fire remained within the military reservation.

A significant portion of the perimeter visited had control lines running parallel to existing roads and trails (100-400 metres away) that could have been used for burn-off, while the unburned areas are scheduled for current or future ecosystem restoration activities.

The original anticipated fire size was 12 000 hectares, and was an "ad hoc" estimate made by senior fire centre staff. A long term fire growth estimate was completed by the incident management team, but we were not able to obtain a copy.

Final fire size on the Final Fire Report is listed as 15 657 hectares. The original estimate is quite good, considering the fire behaviour and the 'ad hoc' nature of the process.

The original FA on August 3<sup>rd</sup> projected total suppression cost as \$4,000,000. Update 1 raised the total cost to \$6,000,000 on August 5th. An August 22<sup>nd</sup> estimate put the daily cost at \$555,740. As this fire was part of a complex of fires, specific costs for this incident were not recorded. The cost of this incident is not known. Costs were recorded for the Meldrum complex as whole, not individual incidents.

Stewardship Foresters and Range Agrologists from Central Cariboo and Chilcotin Forest Districts provided the values-at-risk and value estimates. Timber costs were based on stumpage value, rather than average market value. Also, a significant area of candidate ecosystem restoration areas and existing grassland lies within this area, which would add value from fire.

The fire management plan identified private land, interface areas, a recreation site, permanent sample plots, ungulate winter range, and approved wildlife habitat areas at Meldrum and Knox lakes. The Cariboo Fire Centre has also prepared a detailed, colour map book which clearly shows the weapons range boundary, infrastructure, dwellings, cultural heritage values and fuel types. There is no indication that any values were missed in the management of this fire. However, if candidate ecosystem restoration were identified in the values section of the FA, it might have helped to resolve the issue of changing tactics. The FMP notes that through the fire analysis process, wildfire might be used to accomplish the objectives of ecosystem restoration.

## NORTHWEST FIRE CENTRE: Parrott Lakes (R20242)



Lightning started the Parrott Lakes fire on August 16, 2010, approximately 26 kilometres directly south of Houston. Values in the area include recreation sites at Parrott Lake, plantations and mature timber.

Because of other fire activity, an area restriction order was in effect to prevent public access to the area.

### The Fire Analysis (FA)

An FA dated August 20<sup>th</sup> estimated the fire at 1800 hectares. The general control objectives and strategies were to prevent the fire from moving north into Buck Flats and moving to the south, east and west into plantations and timber.

The tactics were listed as:

- full response using indirect attack
- contingency guards using heavy equipment linking up existing roads and cutblocks
- burn off unburned material
- tight line if weather changes

Weather was forecast to be cool and unsettled with scattered showers for the next 3-4 days, with temperatures remaining below normal through the next 10 days. Forecasters were confident that the weather was changing into a typical fall pattern.

The incident commander was briefed on the objectives, strategies and tactics. He signed off on the FA as did the district manager's representative and the fire centre manager.

Operations were conducted in accordance with the planned strategies and tactics and the objectives were achieved. The final fire size was estimated at 5500 hectares based on local knowledge; no fire growth projection was completed. The actual final fire size was 2084 hectares, roughly 40% of anticipated final fire size.

Total suppression cost was estimated at \$342,620. Final cost was \$407,781.

Wildfire management branch zone staff worked with district representatives to identify values at risk. Local knowledge was used to determine values, rather than the fire management plan. The fire management plan is in essence an outline of response categories and does not identify values on the landscape. Timber values were estimated based on average market value rather than stumpage. The values at risk were estimated to be \$70,000,000.

## KAMLOOPS FIRE CENTRE: 36 km Pimainus FSR (K60131)

The Pimainus fire is located in the Merritt fire zone, 20 kilometres southwest of Logan Lake. It began on July 9, 2010, in an active logging operation. The fire burned felled and bucked timber, log decks, parts of plantations and standing red and dead timber. A logging crew was on site and provided workers and equipment to help suppress the fire.

Life and property values in the area include a recreation site, cabins and a fishing camp on Pimainus Lake.

The area is an important contributor to timber supply and the landscape is covered by a patchwork of roads, cutblocks, plantations and standing dead pine. These values were identified in the fire management plan.

### The Fire Analysis (FA)

The FA was completed on July 10, 2010, by a forest protection technician in the Merritt zone. At the time the fire was estimated at 31 hectares. Weather was forecast to be hot and dry with no precipitation for 72 hours and the fire season was just starting. The decision was made to hit the fire hard.

The general control objectives and strategies were to hold the fire at its current size and prevent spread with 100% suppression and mop-up. The tactics were listed as "Machine guard for the control lines. Secure control lines with 3 type 1 Unit Crews, 3 tenders, 2 medium bucket machines."

The incident commander was briefed on the objectives, strategies and tactics and operations were consistent with the FA. After initial attack with four air tankers and two helicopters failed, three unit crews, two helicopters and the industry crew and equipment got control of the fire within a day and were able to hold it at a final fire size of 30 hectares. Total suppression cost was estimated at \$600,000 and the final cost was approximately \$306,000, which reflected the fact that crews gained control of the fire sooner than expected.

WMB staff and licensee staff identified the values at risk based on local knowledge and a review of the FMP at both the zone and the fire centre to ensure consistency. No estimate of values, including timber values was provided in the FA however the value of processed and standing timber, regenerated blocks, logging equipment, recreation opportunities and property vastly exceeded the suppression estimate.

Industry representation was a key asset to the team managing the fire. In addition to men and equipment, local knowledge was very useful. For example, a road that had been located but not yet built was developed into a fire guard.

*Pimainus fire after salvage logging.*



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## PRINCE GEORGE FIRE CENTRE: Tsacha Lake (G4-0353)

The Tsacha Lake is in the Chilcotin, approximately 65 kilometre north of Anahim Lake. Lightning started a fire there on July 28, 2010. Values in the area include a lodge, homes, timber and silvicultural investments. The Tsacha Lake fire saw five evacuation orders and four evacuation alerts issued between August 13 and September 2, 2010.

### The Fire Analysis (FA)

The FA #1 was completed July 30, 2010, by a zone protection officer. The fire was estimated at 4 hectares. FA #2 was completed on August 14<sup>th</sup> when the fire was estimated at 1100 hectares. The FA was updated on August 23<sup>rd</sup> when the fire was estimated at 10 000 hectares.

The fire was managed through a modified response. Forest Service staff monitored the situation, structural protection units were set up in the area, and crews took limited action on the fire for the protection of plantations and structural values in the area.

The strategy and objectives described in the two FAs and the update were:

- **#1:** "Manage for natural disturbance as per district fire management plan. Re-evaluate if fire reaches trigger points."
- **#2:** "Modified response – occupied structure protection only."
- **Update:** "Limited suppression to protect plantations in Vanderhoof District."

Tactics for the fire were listed in each FA:

9. **#1:** "Monitor with aircraft as per fire weather and fire behaviour."
10. **#2:** "Ground crews and sprinklers to provide structural protection."
11. **Update:** "Limited suppression to protect plantations."

The Incident Commander was briefed on the objectives, strategies and tactics, and he signed the FA, as did a district representative and the fire centre manager. Operations were conducted in accordance with the planned strategies and tactics and the objectives were met. The district fire management plan allowed for wildfire damage to identified resources, and the fire was managed with observation and trigger points to remain within specified limits. Structural protection efforts were successful.

FA #1 estimated final fire size at 2000 hectares, and FA #2 estimated final fire size at 13 000 hectares. Fire growth modelling was not employed. The final fire size was 13,087, which is remarkably close to the second FA estimate.

FA estimated the cost of fire suppression at \$20,000, FA #2 estimated it at \$370,000, and the update at \$495,000. Final fire cost was \$625,740.

Zone WMB staff worked with district representatives to identify values at risk. The FMP was consulted to determine maximum acceptable disturbance levels, and was augmented with local knowledge and GIS information.





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## **Wildfire management plans step in right direction**

VICTORIA – An investigation into the state of fire management planning has found that fire management plans have been prepared in all forest districts in the province, and that they provide the basic information needed to help plan a response to a wildfire, according to a report released today.

“The plans prepared to date identify values at risk, such as dwellings, infrastructure, wildlife habitat and timber,” said board chair Al Gorley. “However, the initial plans are narrow and need to be improved to include local priorities for protecting values as well as areas where fire may be allowed to burn under certain conditions. It will be important to involve First Nations, local governments and the public in setting these priorities.”

The report makes seven recommendations aimed at improving fire management planning and response.

The report also recommends that government fully implement its 2010 *Wildland Fire Management Strategy*, which will move the province toward more proactive fire management.

“Globally, we see a trend toward more severe and costly fires,” said Gorley. “Other jurisdictions have found that simply adding more fire fighting capacity alone doesn’t solve the problem. We need proactive policies and programs that account for the inevitable occurrence of fire in the forest environment.”

The Forest Practices Board is B.C.’s independent watchdog for sound forest and range practices, reporting its findings and recommendations directly to the public and government. The board can investigate and report on current forestry and range issues and make recommendations for improvement to practices and legislation.

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More information can be obtained by contacting:

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