Banff Field Unit

Fire Management Strategy

Banff National Park of Canada

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EXECUTIVE SUMMARY

Guided by national park policies, strategies and directives, Parks Canada in Banff National Park has spent the past 25 years lighting, controlling and researching fire. Over that time, an integrated and adaptive ecosystem-based fire management program has evolved. Key elements to this program include prescribed fire, fuel management, fire suppression, stakeholder consultation and community outreach.

This document provides a program summary and strategic overview of the current situation and future direction of the fire management program for the Banff Field Unit in Banff National Park. This Fire Management Strategy is based on a comprehensive Fire Management Plan that details the history, policy, research, operational procedures and public consultation processes that guide fire management in the Banff Field Unit.

In 2007, a Strategic Environmental Assessment (SEA) was initiated for Banff, Kootenay, Yoho and Jasper national parks. The purpose of the SEA was to provide decision-makers and stakeholders information on the environmental implications of fire and fuel management plans. The SEA has become, and will continue to be, an important tool in the development of fire management plans and proposals for the Banff Field Unit.

Fire managers in the Banff Field Unit are continually improving policies and practices through adaptive management. One of the ways this is done is by examining the current state of fire on the landscape and comparing it to historical fire regimes. Comparing historical fire regimes against current values helps highlight areas that are below expected rates of burning. Fire managers can also gauge the effectiveness of their management actions. Management effectiveness monitoring rates actions taken against the objectives set for fire management in the Banff National Park Management Plan. The data gathered, along with a number of other key factors such as ecosystem health; protection of people, assets and adjacent lands; research data; stakeholder input and smoke impacts help to set priorities for fire management.

Through the process of adaptive management, a number of areas have been identified for future prescribed fire and fuel management within the Banff Field Unit. The areas selected for prescribed fire are large units associated with ecological restoration, community protection and/or mountain pine beetle management and a series of small units adjacent to the Town of Banff that are part of an integrated approach to montane restoration and community protection. Plans and proposals for fuel management include treatments in and around the Town of Banff as well as units strategically placed throughout the field unit to help slow the spread of potential wildfires.

Inherent in all fire management plans is the commitment to ongoing stakeholder involvement, public education and enhanced visitor experience. Parks Canada has designed a program in the Banff Field Unit that encourages dialogue with affected stakeholders so that concerns and interests can be addressed and planning can remain flexible and adaptive. Public education is addressed through the implementation of the Community Outreach Plan that is reviewed and revised every two years. The fire management program will continue to provide opportunities for engaging stakeholders, visitors and the general public through advisory groups, presentations and on-site activities as well as pursue new avenues for involvement such as new-media technology and volunteer programs.

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1. INTRODUCTION

Banff National Park (BNP) encompasses 6 641 square kilometers of the Rocky Mountains on the east side of the Continental Divide. BNP is divided into two distinct management areas - or Field Units. This document applies to the Banff Field Unit located in the eastern half of BNP (Figure 1).

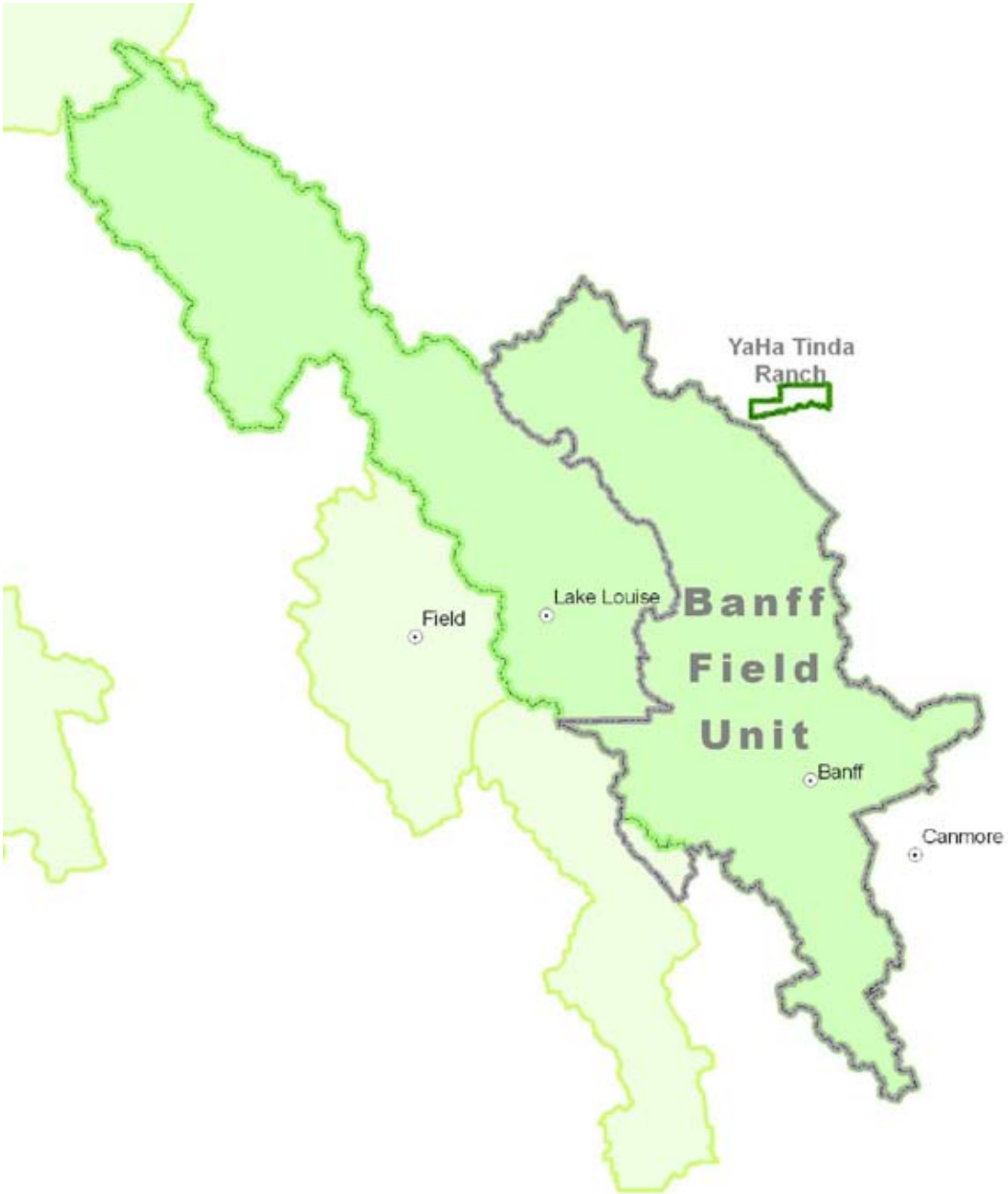

Figure 1. The Banff Field Unit

2. PROGRAM SUMMARY – 1980-2008

2.1 NATIONAL PARK POLICY

During the 1970s, a number of workshops and discussion papers (Revill and Associates 1978, Van Wagner and Methvan 1980) examined fire management policy in Canada's national parks. In 1979, after a period of public consultation, national park policy was revised. The Guiding Principles and Operational Policies document recognizes the importance of ecological processes for maintaining representative landscapes and ecosystems (Parks Canada 1979, 1994). While emphasizing that natural processes should be permitted to function with minimal human intervention, the policy acknowledges several conditions where human intervention would continue to be necessary (e.g. fire control). The policy goes further to indicate that, in situations where human intervention has caused harmful effects, restoration of natural processes is acceptable (e.g. prescribed fire).

2.2 A FRAMEWORK FOR FIRE MANAGEMENT

During the next decade, a number of documents were prepared that provided the framework for moving from fire control to fire management. These included interim Management Directive 2.4.4. (1986), REMS Report (1988), Keepers of the Flame (1989) and Vegetation Management Framework for the Canadian Parks Service (REMS 1991).

Moving from a fire control-based fire management program to an ecologically-based fire management program required answers to a number of questions including:

- What is the long-term role of fire in the Rocky Mountain biome and the area preserved within Banff National Park?
- Has the vegetation been altered by park management or regional land management practices (e.g. fire suppression, fires associated with settlement of the region, or altered land use)?
- How have natural factors (e.g. cyclical weather patterns or stochastic events such as rare droughts, windstorms, or insect outbreaks) influenced fire activity over the past century?
- Is it feasible to implement prescribed fire in Banff and other national parks?

These and other questions have been addressed over the past twenty-five years. White (1985) documented historic wildfires in BNP. Rogeau and Gilbride (1994), Rogeau (1996) Van Wagner (1995) and Van Wagner et al. (2006) used age-class data to examine the role of fire in Banff and adjacent protected areas over the past seven centuries. These studies have documented changes in the frequency of fire, most notably the nearly complete lack of wildfires in the park since 1941. Johnson and Larsen (1991) speculated that wildfire activity declined due to climactic changes, however this theory was not supported by the research of Weirzchowski et al. (2002), Feunekes and Van Wagner (1995), Luckman and Seed (1995) and Kay et al. (1999). Rogeau (unpublished data) examined fire interval and fire size data that also indicated that the recent lack of wildfire is without precedence in the previous five centuries. These studies of fire history, weather, lightning and the fire practices of native populations have established the need for active management of the park vegetation.

2.3 THE PRESCRIBED FIRE PROGRAM 1983-2008

Concurrent with fire research, Parks Canada developed an experimental program of prescribed fire in BNP. From 1983-1994 Parks Canada staff conducted 27 prescribed fires covering 5 845 hectares (ha). These fires generated considerable debate with regard to policy, the risk of prescribed fire and wildfire, and the ecological effects of prescribed fire. In 1995, the prescribed fire program was put on hold while panel members of the Banff Bow Valley Study evaluated park management. At the same time senior park staff and others produced a number of reports including:

- The Policy Context For Fire Management in the Mountain National Parks (Lopoukhine 1996)
- Risk Assessment of Fire Management Alternatives (LaMorte & Associates 1996)
- Scientific Issues – Fire Management (Parks Canada 1996)

As a result of the two-year Banff Bow Valley Study (1996), it was recommended that the prescribed fire program resume. This recommendation was adopted by the Banff National Park Management Plan (1997) and endorsed on a national scale by the Panel on Ecological Integrity (2000).

The Banff fire program resumed in 1998 and since then 54 prescribed fires covering 19 000 ha have been carried out. Research and monitoring of these fires has shown that prescribed fires can be used to achieve a variety of park goals such as improved habitat for bears and ungulates, restoration of fire adapted vegetation, reduced forest fuel loads and the removal of pine stands that are susceptible to mountain pine beetle. Figure 2 shows the distribution of prescribed fires since 1983 (in orange).

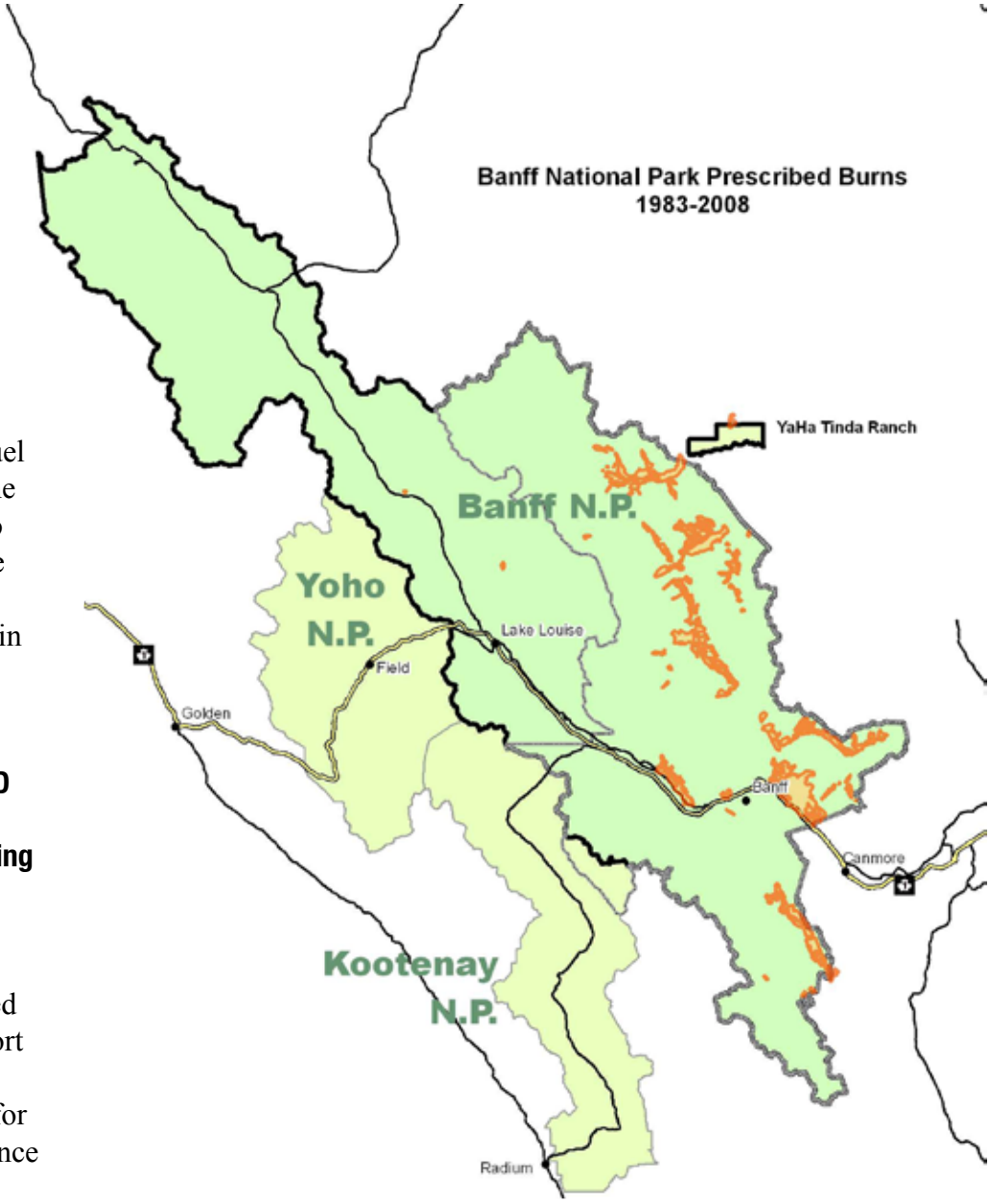

Figure 2. Prescribed Fires Conducted in Banff National Park 1983 - 2008

2.4 VISITOR EXPERIENCE AND EXTERNAL RELATIONS

2.4.1 Evaluating and Enhancing Understanding and Support

Both the Banff Bow Valley Study panel and the BNP Management Plan recognized the need for improved support for the program through communications initiatives for visitors and stakeholders. Since 2002, the fire management program has employed a dedicated fire communications

officer to foster public understanding of Parks Canada's approach to fire. Improved public support is evident in a number of surveys that have been conducted. These include:

- Fire Management in Banff National Park: Attitudes toward the Prescribed Fire Program (Swann 1996)
- Public Perception of Fire in Banff National Park of Canada (McFarlane et al. 2007)
- Fire and National Parks: Visitor Experience, Attitudes and Knowledge (Ipsos Reid 2007)
- Vegetation Management in Banff National Park: A Survey of Local Residents (McFarlane et al. 2008)

Not only do these studies highlight current support and understanding, but they also identify areas for improvement that will be incorporated into future communications and outreach initiatives including strengthening avenues for public input and identifying and implementing more effective methods of providing information.

2.4.2 Stakeholder Consultation and Involvement

Parks Canada's fire management program is moving from simply providing information to stakeholders about fire management activities to having stakeholders actively participate in the planning process and, where appropriate, in on-the-ground program activities. While public discussions are generated through ongoing open houses, field trips and presentations, local stakeholders and interest groups also meet annually at the park management planning forum, Montane Advisory Group meeting, and science workshop to engage in essential dialogue about park management issues.

Stakeholders also have the opportunity to be involved in fire management planning through the Canadian Environmental Assessment Act (CEAA) process. All fire management projects are subject to CEAA and require a detailed analysis to identify potential impacts and mitigation measures. The resulting environmental screening reports are posted for public review and comment prior to the final decision.

Future stakeholder consultation will focus on project-specific issues that will involve directly-affected stakeholders and consultation with external experts. Fire management will identify these specific stakeholders early in the planning process to ensure a relationship that is meaningful, collaborative and engaging.

3. A FRAMEWORK FOR FUTURE FIRE MANAGEMENT

Two documents have recently been revised to provide an administrative framework to guide the future use of prescribed fire in national parks: the National Fire Management Strategy (formerly called Keepers of the Flame) and Management Directive 2.4.4. The Park Management Plan also contains specific objectives and actions with regard to fire management. Recently, a Strategic Environmental Assessment was conducted for the contiguous mountain national parks that provides further guidance for fire managers.

3.1 THE NATIONAL FIRE MANAGEMENT STRATEGY

The revised National Fire Management Strategy (Parks Canada 2005a) sets the strategic direction for fire management for the next 15 years in the national parks and national historic sites. The following strategy sets out a number of principles that provide a foundation for fire management within Parks Canada:

- Public and fire fighter safety is the first concern of all fire management actions.

- National parks with fire-dependent ecosystems will recognize the role of fire in restoring or maintaining ecological integrity and biodiversity.
- Management decisions will support the role of fire in the ecosystem while mitigating social and ecological risks.
- Public communication strategies focusing on building awareness and support for fire management decisions are an integral part of the fire management program.
- Fire is managed using the best available scientific knowledge and principles of adaptive management.
- Fire management is based on approved fire management plans and vegetation management objectives that flow from the park management plan.
- Fire is managed on a landscape basis with regard to the goals and objectives of neighbours.
- The fire management program is sustainable and based on business planning principles.
- Parks Canada operates an integrated fire organization that utilizes people who have a range of duties rather than employees solely dedicated to fire management.
- Fire management planning is integrated with other Parks Canada Agency functions.

3.2 MANAGEMENT DIRECTIVE 2.4.4

Management Directive 2.4.4 (Parks Canada 2005b) provides more detailed direction for the implementation of a fire management program in Canada's national parks and national historic sites, including direction on fire management planning and standard operating procedures for fire-related activities. The directive also outlines actions and processes for implementing effective fire prevention, fire hazard reduction (fuel management), wildfire suppression programs, a fire communications strategy and requirements for monitoring and reporting of wildfires and prescribed fires. The Banff Field Unit Fire Management Plan has been written in accordance with, and meets the requirements of, Management Directive 2.4.4.

3.3 BANFF NATIONAL PARK MANAGEMENT PLAN - GOAL, OBJECTIVES AND KEY ACTIONS

The Banff National Park Management Plan (Parks Canada 1997) provides a strategic fire management goal for the fire management plan:

> *To maintain and, where feasible, restore native vegetation communities to reflect the long-term ecosystem states and processes.*

The Park Management Plan also provides the following specific objectives and actions relating to the use of fire to maintain or restore native vegetation communities within the park:

Objectives

- To restore the role of fire in modifying vegetation communities, except where limited by public safety, public health, major park facilities and neighbouring lands;
- To maintain and restore key structural components of the park's vegetation including aspen, willow and grassland communities;
- To determine suitable vegetation patterns, including age-class structures and distributions that will ensure viable populations and natural biodiversity;
- To improve public awareness of natural disturbances, such as fire, and the management implications of these disturbances and;
- Through prescribed fires and not suppressing fires caused by lightning, achieve a target of 50% of the long-term fire cycle or approximately 1400 hectares (ha) burned annually.

Key Actions

- Consult with stakeholders, municipal and provincial governments, and interested parties in the development of a Vegetation Management Plan;

- Conduct prescribed fires after consultation with affected parties;
- Work with a variety of stakeholders to encourage understanding of and support for the prescribed fire program;
- Complete a Bow Corridor Fire Protection Plan with the Town of Banff, Hamlet of Lake Louise, Harvie Heights, Canmore and operators of other facilities. The plan will include:
  - —the use of prescribed fires to reduce fuel in forested areas;
  - —controlling the supply of fuel for a fire around facilities; and
  - —interagency planning, including joint emergency response, communications, training, use of volunteers, and building standards.
- Increase efforts to reduce non-native plant populations, particularly noxious species that have the potential to invade recently burned areas, native wetlands, and grasslands and;
- Use communication and education programs about fire management and specific fires to promote a greater public understanding of the ecological role of fire.

3.4 OTHER RELATED PLANS

There are a number of other thematic plans and programs that are directly or indirectly related to the Banff Field Unit Fire Management Plan:

- Banff Field Unit Vegetation Management Plan (DeLong and Pengelly 2002)
- Banff National Park Emergency Plan (Parks Canada 2002a)
- Banff Field Unit Developed Area Forest Management Plan (Parks Canada 1993)
- Town of Banff Wildfire Tactical Response Plan (Town of Banff 2008)
- Elk Management Strategy in the Bow Valley Banff National Park (Parks Canada 1999)
- Regional Forest Management Strategy (Parks Canada 2002b)

3.5 STRATEGIC ENVIRONMENTAL ASSESSMENT

In 2007, Parks Canada initiated a Strategic Environmental Assessment (SEA) of fire and fuels management in the contiguous mountain national parks (DeLong 2008). It was identified that project-level environmental screenings do not necessarily consider broad environmental effects over many years, such as cumulative effects over larger spatial and temporal scales. Addressing cumulative effects at a strategic level provides an opportunity to assess the implications of projects and/or activities and to fully evaluate alternatives and trade-offs, including the need for subsequent alternatives, at a broader scale.

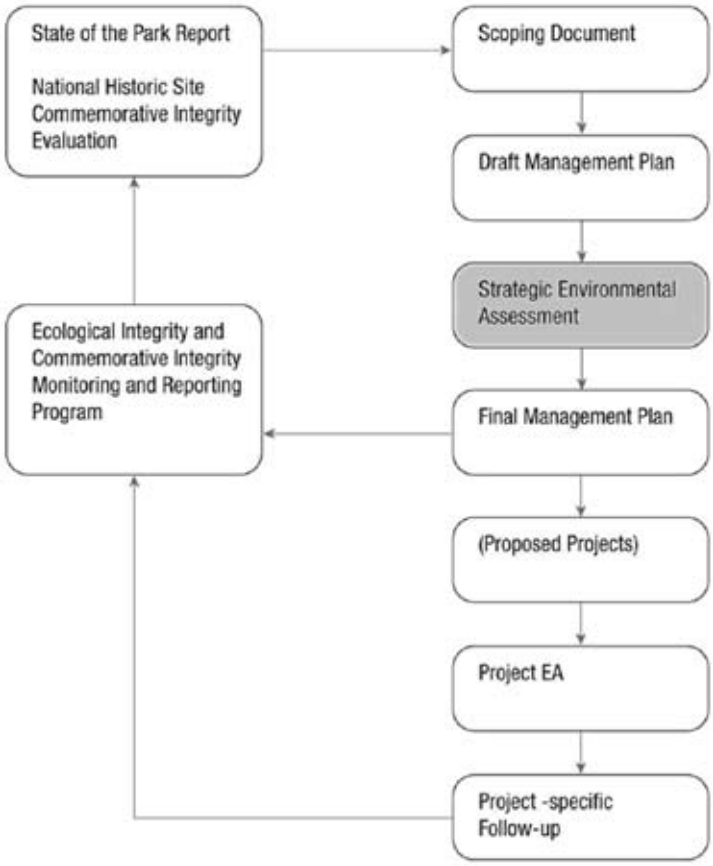

Figure 3. SEA Incorporated into Fire Management Planning

Cumulative effects of past, present and future fire and fuel management activities present a suite of regional ecological, social, economic and

cultural concerns within the contiguous mountain parks. Identifying cumulative effects and the valued resources being affected was an important component of the SEA.

The SEA identifies, describes, evaluates and seeks a degree of resolution to the ecological, social, cultural, and economic issues associated with fire and fuels management in the mountain parks and lays the groundwork for proposed management actions during the next 10 years. The SEA is incorporated into the overall planning process for fire and fuels management (Figure 3). The SEA also involved considerable stakeholder consultation, which identified key issues that will be factored into all fire and fuels management initiatives (Table 1).

Table 1. Key Stakeholder Issues

Key Issues	Related Issues
Timing of prescribed fire implementation	• Smoke • Impact on tourism • Impact to air quality/public health
Proposed Locations of prescribed burns	• Businesses in the Bow Valley economic impacts • Risk to property • Public Safely (attractants for wildlife, fires getting out of control) • Impact on Recreational Users/closures
Sizes	• Flexibility in size of prescribed fire
Sequencing of Prescribed Burns	• Public input relating to proposed sequence of prescribed fire • Public input into fire management zoning boundaries
Fire Cycle Deficits	• Public Safety and wildfire threat • Ecological Health implications of growing fire deficit
Ecological Implications of increased or reduced prescribed fires	• Impact on ecosystem biodiversity, species at risk, aquatic ecosystems, hydrologic processes
Social Impacts of prescribed fires	• Business/tourism • Park visitors/closures • Health

4. CURRENT SITUATION

4.1 MONITORING THE PRESCRIBED FIRE PROGRAM

As guided by park policy, fire managers have established strategies for maintaining or restoring appropriate fire regimes. These include mapping historical fire cycles, determining deviations from historical fire cycles, monitoring management effectiveness and implementing research and monitoring projects. The data collected helps to determine priority areas for future prescribed fires. Other factors that determine priority areas for prescribed fire include current insect and disease outbreaks, smoke, grizzly bear habitat, species at risk, weather and available funds.

4.1.1 Monitoring the Fire Cycle Condition Class and Trend

The fire cycle condition class is one indicator used for monitoring deviations from historical fire cycles. It quantifies the difference between the expected area burned (i.e. what would be expected if historical rates of burning were maintained) and the actual area burned. To determine the fire cycle condition class it is first necessary to model and map the expected pattern of long-term fire activity (i.e. the fire cycle). White et al. (2004) developed a fire cycle map for BNP (corroborated by Rogeau et al. 2004) (Figure 4). This map shows BNP divided by four different fire cycle classes, showing the areas that historically would have burned every 10-50 years, 50-100 years, 100-150 years and 150-300 years.

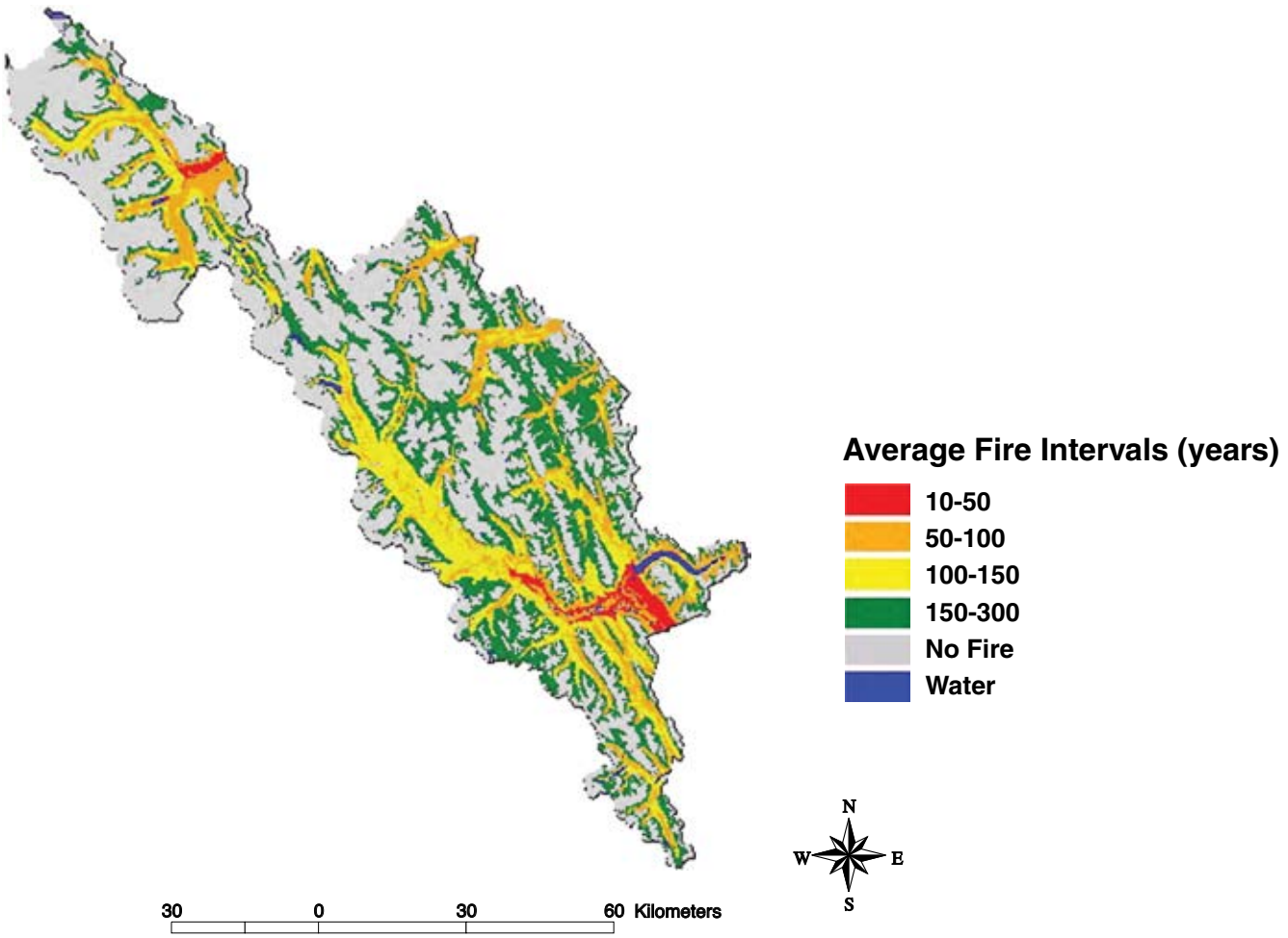

Figure 4. Banff National Park Fire Cycle (White et al. 2004)

The BNP Fire Cycle map is then used to calculate how much area is expected to have burned during a given time for a given area.[1] In this case, calculations were done by Land Management Unit (LMU) (Figure 5).

Figure 5. Land Management Units (LMUs) for Banff National Park

1 A fifty-year period is used for monitoring the 10-50 fire cycle class, in all other fire cycle classes fire activity is measured for the past 100 years (1909-2008). Then for each LMU, the expected area burned is determined (based on median fire cycle and area).

The difference between the expected area burned and the actual area burned provides either a fire deficit or a surplus. Each LMU is classed as either:

- Good (green) - the area burned is within 33% of the expected rated of burning
- Fair (yellow) - the area burned is within 67% of the expected rate of burning
- Poor (red) - the area burned is less than 33% of the expected rate of burning

Each LMU is also given a trend rating, indicating which direction an area is moving relative to the expected rate of burning.[2] Areas are rated for trend as either:

- Declining trend (down arrow)
- Improving trend (up arrow)
- Stable (flat line)

Figure 6 displays condition class and trend aggregating all four fire cycle classes for the time period 1909 - 2008. Further insight into condition class and trend for an area relative to a specific fire cycle class can be found by mapping individual fire cycle classes (Figure 7).

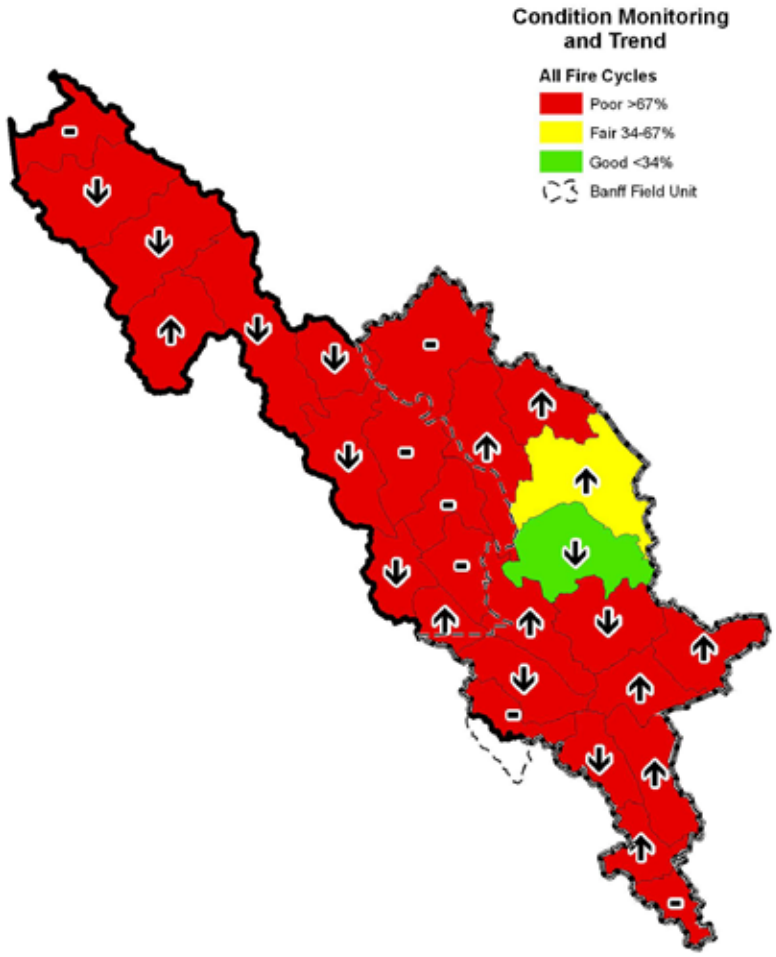

Figure 6. Fire Cycle Condition Class and Trend for All Fire Cycles (1909 - 2008)

2 The trend in fire cycle condition is measured over a shorter time frame equal to one third of the median fire cycle (10-75 years depending on the fire cycle) and then compared to rates of burning established in condition monitoring.

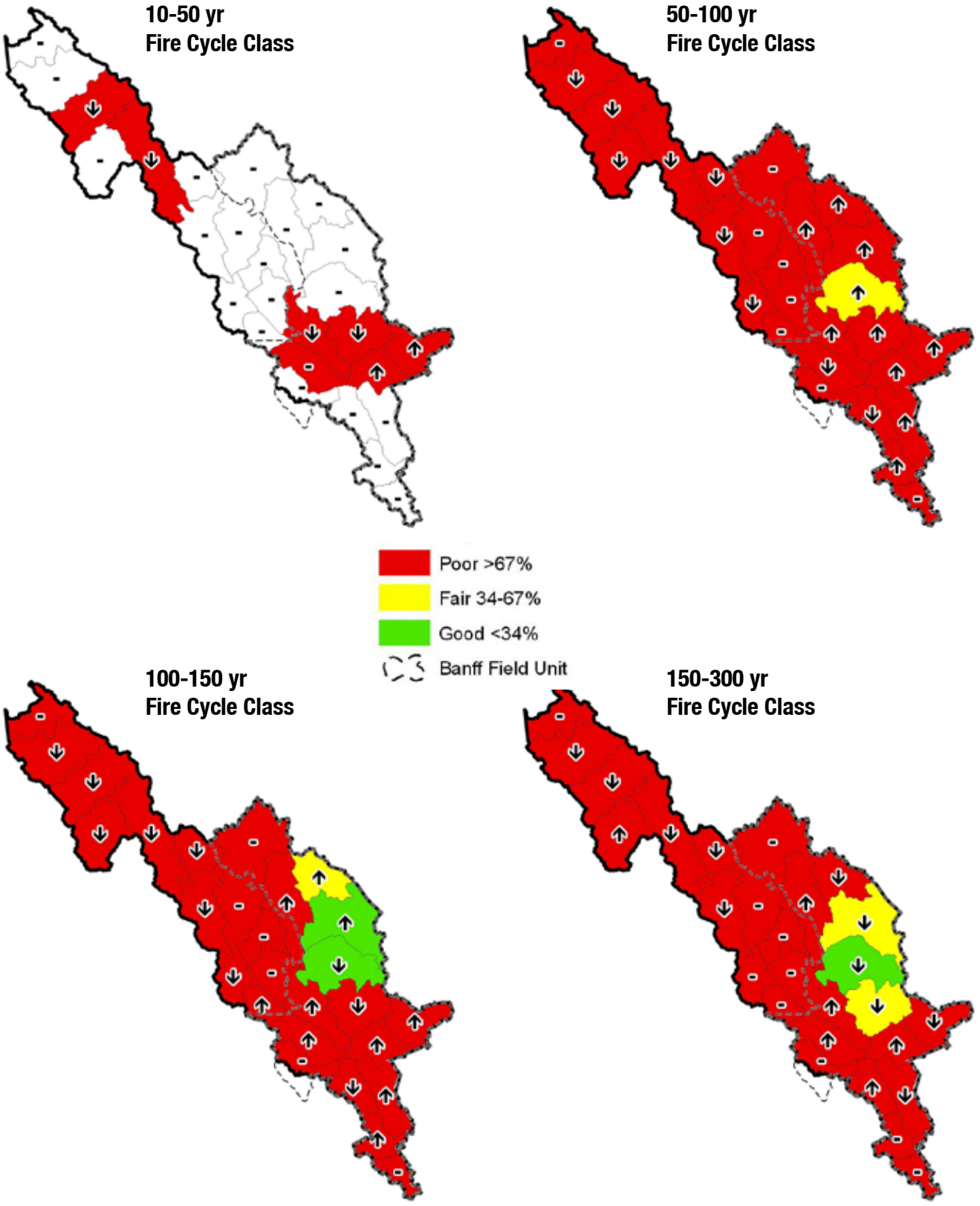

Figure 7. Fire Cycle Condition Class Monitoring and Trend for Individual Fire Cycle Classes

4.1.2 Management Effectiveness Monitoring

A second monitoring measure is management effectiveness. This ties the fire program back to the strategic goals and objectives in the Park Management Plan. In the BNP Management Plan, the objective is to burn approximately 1 400 hectares (ha) per year (i.e. 50% of the long-term fire cycle). Management effectiveness monitoring determines whether this objective is being achieved over a 10-year period. Figure 8 maps management effectiveness in each LMU for all fire cycle classes in BNP. The burned area is displayed as a percentage of the management burning objective and is rated as either:

- Successful (green) - management actions are meeting >50% of burning objective
- Partly successful (yellow) - management actions are meeting 25 - 50% of burning objective
- Unsuccessful (red) - management actions are meeting <25% of burning objective

The data can also be displayed by individual fire cycle classes for each LMU (Figure 9). In Banff, the area burned from 1999-2008 is approximately 18 628 ha or 33% above the management target. In part this reflects the accelerated use of fire to achieve objectives related to the mountain pine beetle control program (3 465 ha of susceptible pine forest burned in the past 6 years), but the area burned may be overestimated due to numerous small unburned patches being included within the burn perimeter. The true burned area can only be measured by remote sensing, something that has not been done for all fires in the database.

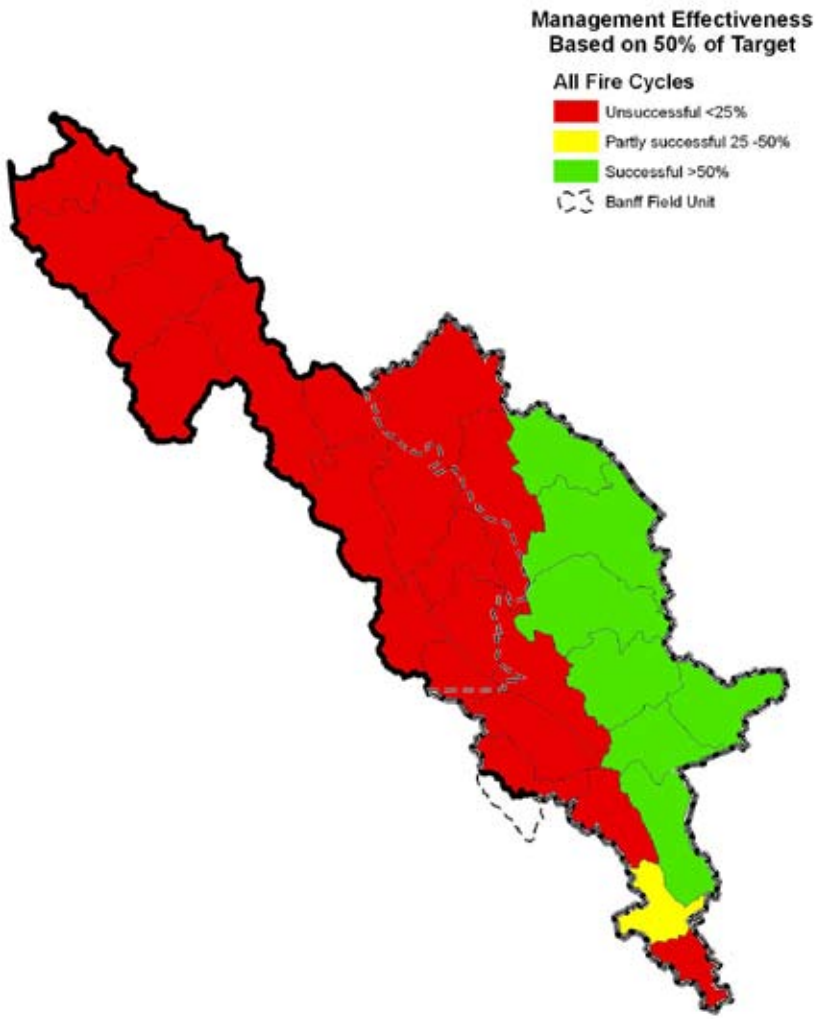

Figure 8. Management Effectiveness (50% target) for All Fire Cycles (by LMU)

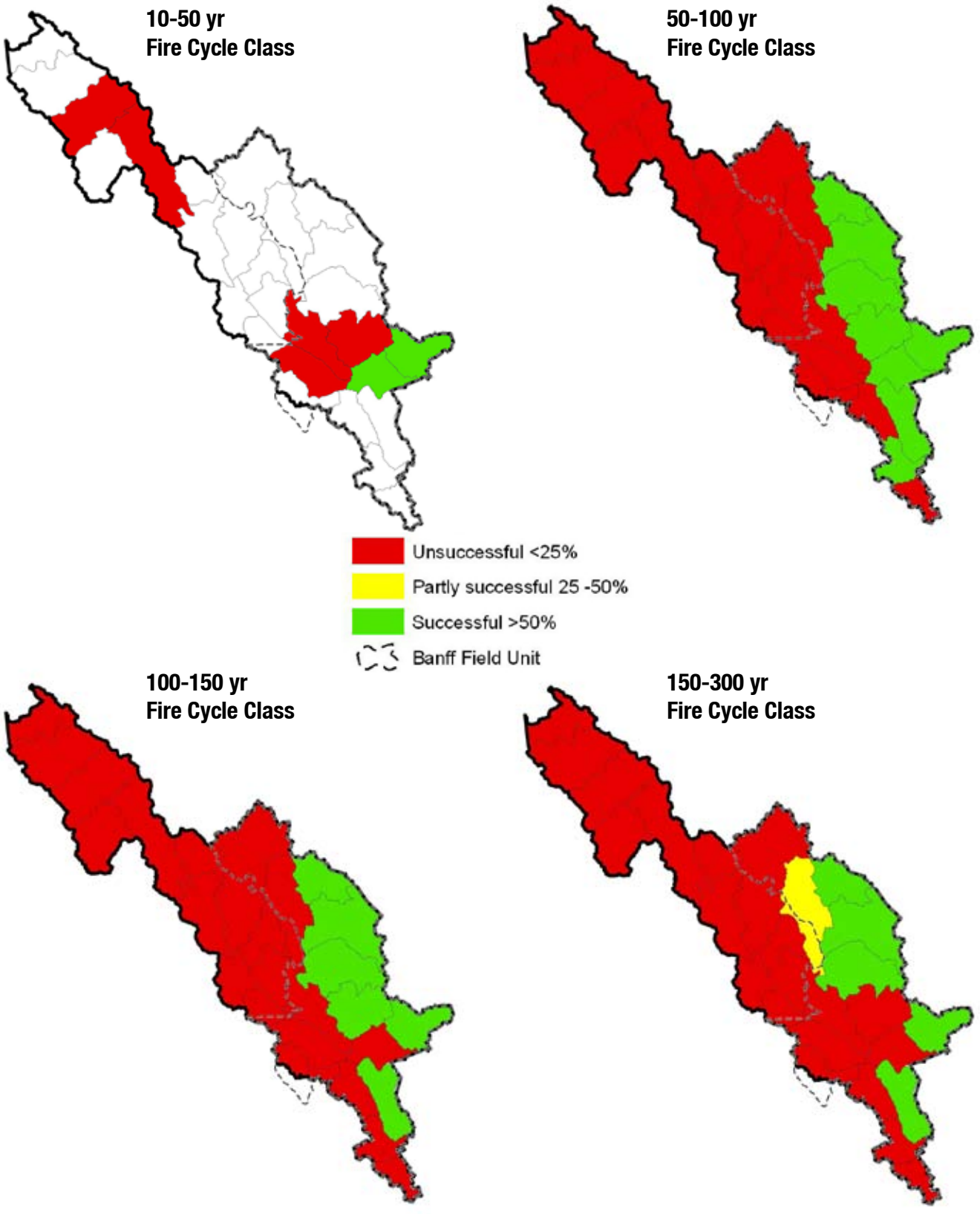

Figure 9. Management Effectiveness (50% target) for Individual Fire Cycle Classes

4.1.3 Stand-level Monitoring and Research

The Banff Field Unit has carried out a number of monitoring studies and research at the forest stand level including:

- Effect of fire and forest succession on Buffaloberry fruit production (Hamer 1995, 1996)
- Effect of fire on grizzly bear use of yellow *Hedysarum* feeding habitat (Hamer 1999)
- Effect of fire on grizzly bear use of pink *Hedysarum* feeding habitat (Pengelly and Hamer 2006)
- Effect of fire and forest succession on *Vaccinium* fruit production (Hamer and Pengelly in progress)
- Effect of fire on summer elk forage in subalpine forests (Sachro et al. 2005)
- Effect of fire on subalpine grasslands (Eastern Slopes Rangeland Seeds 2003)
- Effects of fire and fuel reduction on songbirds (Chruszcz and Breniser 2003)
- Effect of fuel reduction on the damselfly *Argia vivida* (Ham and Kortello 2005, Kortello and Ham 2009)
- Effect of fuel reduction on pine marten (Nietvelt 1998, Chruszcz and Debruyn 2005)
- Effects of fire and fuel reduction on amphibians (Maxcy 2008)

Future monitoring and research could focus on:

- Effects of fire and herbivory on deciduous trees and shrubs and the cascading effects of these on indicator species including beaver and ruffed grouse;
- Factors affecting invasion of intact ecosystems by non-native plant;
- Remote sensing of fire severity to map and monitor vegetation response;
- Micro-scale food selection by bears and ungulates in response to fires and fuel reduction;
- Air quality monitoring and smoke dispersal modeling and;
- An economic impact assessment of the short-term and long-term benefits and costs of prescribed fire and wildfire on local businesses and communities.

4.2 PROTECTION OF PEOPLE, ASSETS AND ADJACENT LANDS

Guiding documents for fire management emphasize the importance of protecting people, assets and adjacent lands from unwanted fire. To achieve this, Parks Canada`s fire management program incorporates planning for the prevention and suppression of wildfires and the reduction of forest fuels through mechanical removal of vegetation and prescribed fire initiatives. Integral to this planning is determining the existing barriers to wildfire spread within the Banff Field Unit (i.e. non-vegetated landscapes, water bodies, existing prescribed fires and constructed fire breaks). Understanding the potential for wildfire movement within the field unit allows for the strategic use of fire control, fire use and fuel management techniques for the protection of people, assets and adjacent lands.

4.2.1 Appropriate Management Response to Wildfires

To ensure an appropriate response to wildfires and effective fire preparedness and fire control planning, the field unit is divided into three Fire Management Zones (Figure 10). These zones are based on values at risk, potential fire behaviour, barriers to fire and defensible boundaries. Each zone identifies priorities for fire detection and suppression as well as the type of tactics that would be considered appropriate. Zone boundaries are not static. With management actions, such as prescribed fires, firebreak construction, wildfires or changing suppression policies on adjacent lands, the zone boundaries or designations may change. Zones are as follows:

Intensive Fire Management Zone (Red)

- Objective: Wildfires will be managed on a priority basis to minimize fire spread using a full range of tactics. Management actions will be focused on reducing fire risk and restricting fire growth to a very limited perimeter.
- Tactics: Rapid detection and initial attack. Air-tankers may deliver foam and long-term retardants. Use

of dozers, skidders, chippers and other heavy equipment is acceptable. Extensive fuel management may be carried out prior to or during wildfires. Some areas may be burned out on low priority sectors of larger fires or to anchor the fire to a natural feature.

The Banff Field Unit has one Intensive Fire Management Zone, located primarily within the Bow Valley and includes some tributaries to the south and west. A wildfire in these areas would pose the greatest threat to the communities of Banff and Canmore.

Intermediate Fire Management Zone (Yellow)

- Objective: Wildfires will be managed to limit fire spread to a defined perimeter with the possibility of achieving ecological objectives. An acceptable perimeter will be defined based on natural and constructed barriers and operational considerations.
- Tactics: Likely to use indirect attack (burning out to a natural or constructed barrier to fire spread). Where indirect attack is used, the objective will be to complete burnout operations and have a line around the downwind perimeter of the fire by 10 p.m. the day after a fire escapes initial attack. Small areas of mechanical fuel reduction may be carried out around isolated facilities and park boundaries. Use of long-term fire retardant and dozers to construct control lines is not permitted under most circumstances.

The Intermediate Fire Management Zone is located along the eastern boundary of BNP and includes land to the south and west of the Town of Banff.

Extensive Fire Management Zone (Green)

- Objective: Wildfires will be managed with minimal intervention. Management actions will be focused on containing fire growth to within the fire zone.
- Tactics: Lowest priority for aerial detection flights. Use of indirect attack followed by

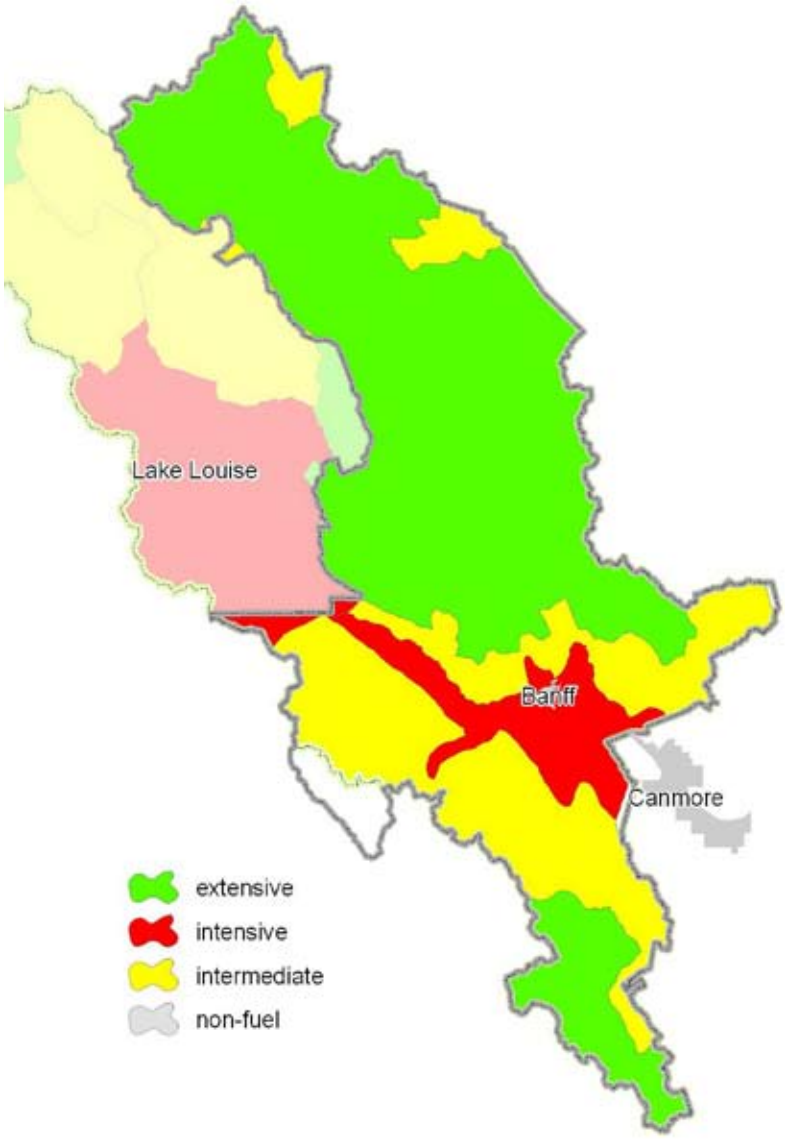

Figure 10. Fire Management Zones

limited manual extinguishment using hose lines. No use of long or short-term fire retardants or dozers for line construction. Isolated structures will be protected with hose lines, sprinkler systems and by burning out vegetation as required.

4.2.2 Fuel Management

Decades of fire suppression have resulted in an increase of forest fuels, which poses a potential for large, fast-moving fires that could threaten communities and facilities. Fuel management involves the removal of vegetation in key locations in an effort to create a `defensible space` in the face of unwanted fire. Treated areas act to reduce the intensity of a fire giving fire suppression techniques a greater chance for success. Treatment of forest fuels within and adjacent to communities (i.e. the Wildland-Urban Interface) and a system of landscape-scale firebreaks are recognized ways of mitigating the threat of fires to communities and infrastructure.

4.2.2.1 Wildland-Urban Interface

The Wildland-Urban Interface (WUI) exists wherever residential, industrial or agricultural structures meet combustible wildland vegetation. Fires that have the potential to involve buildings and wildland vegetation are known as interface fires. Within the Banff Field Unit, much progress has been made to reduce the hazard in this critical area. Fuel treatment around the Town of Banff was initiated by the Parks Canada following a consultant's report (Arbor 1991). The importance of a fuel management plan was also emphasized by the Banff Bow Valley Study (1996) and in the BNP Management Plan (1997). After the 2003 fire season, the Fuel Management Plan was reviewed and a new nine-year plan to expand the existing fuel treatment sites around the Town of Banff was approved (Johnson and Pengelly 2004) (Figure 11). Parks Canada has been working jointly with the Town of Banff`s fire department in preparing for fires in the WUI. These efforts include:

- Completion of a WUI tactical response plan for the Town of Banff;
- Completion and implementation of a four-year plan to treat forest fuels within the Town of Banff (Cibart and Kloppers 2004);
- Design, purchase and testing of new WUI equipment;
- Annual cross-training between fire department and wildland fire crew members and;
- Changes to town bylaws regarding the use of fire-smart building materials.

Parks Canada will continue to work cooperatively with the Town of Banff to prepare for fire in the WUI. Future projects include completing the tactical response plan for Parks Canada lands adjacent to the Town of Banff, completing implementation of Parks Canada's nine-year fuel management plan for the Banff Field Unit and promoting FireSmart® initiatives, a program that guides homeowners in reducing their risk of loss in the event of a fire (Partners in Protection 2003).

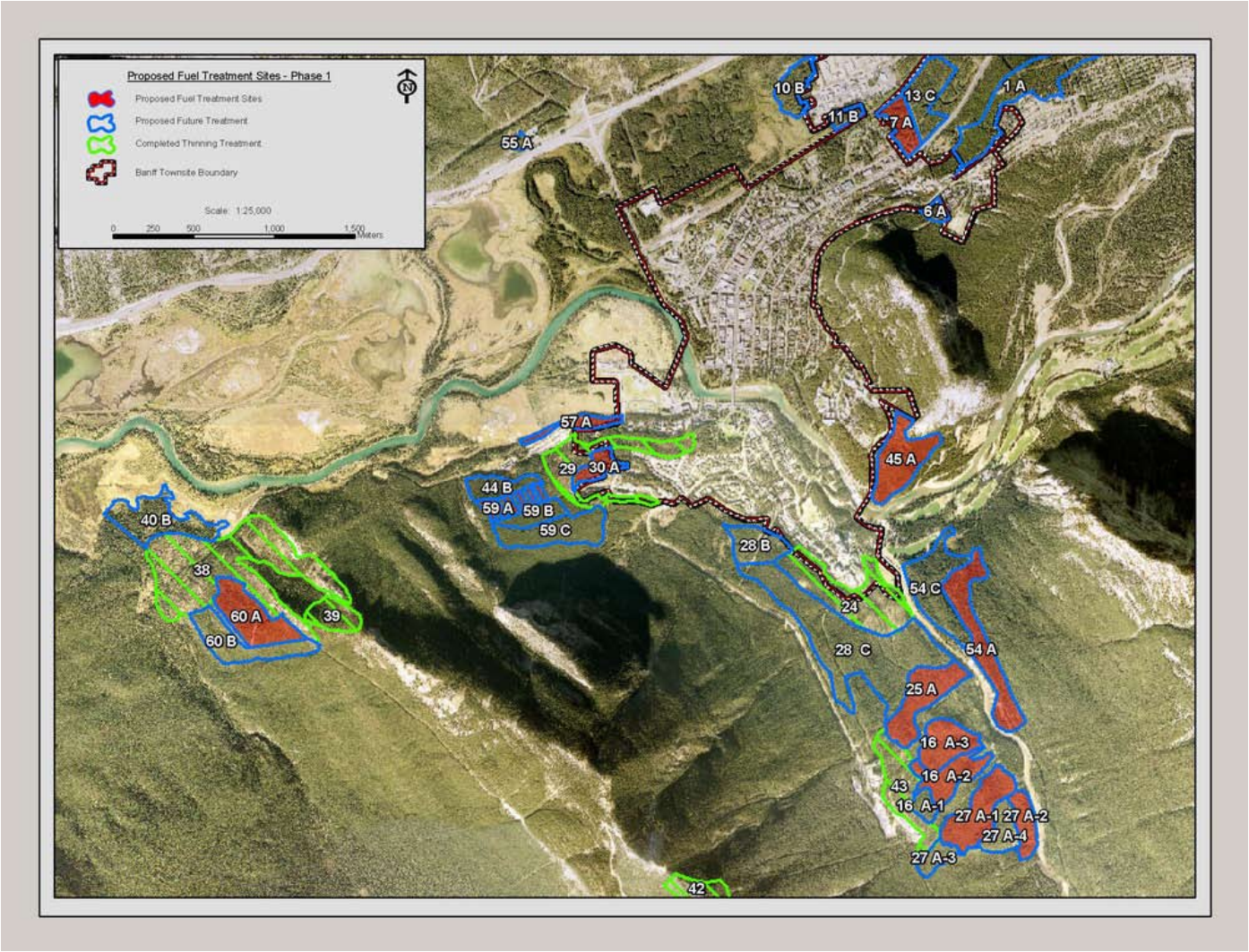

Figure 11. Fuel Treatments Near the Town of Banff - Completed, Planned and Conceptual

4.2.2.2 Landcape-Scale Firebreaks

Landscape-scale firebreak construction typically involves thinning forest fuels and burning off surface debris in strategic areas within the field unit. Strategic firebreaks contribute to an overall "fire-smart" landscape, which combines firebreaks, prescribed fire and natural barriers to limit the potential for the spread of an uncontrollable wildfire (Figure 12). In the Banff Field Unit this is particularly important along the east park boundary from Spray Reservoir to the Red Deer/Clearwater watershed divide. Considerable progress has been made along this boundary, reducing the potential for a fire originating in BNP to spread onto provincial lands. A key part of this system is the Carrot Creek/Nordic Centre firebreak that separates Parks Canada`s active fire restoration program in the Banff Field Unit from the assets and lands in the Bow Corridor east of the park (e.g. Town of Canmore). Other strategic firebreaks include a three-year project to reduce forest fuels around the Yaha Tinda Ranch that will conclude during the fall of 2009.

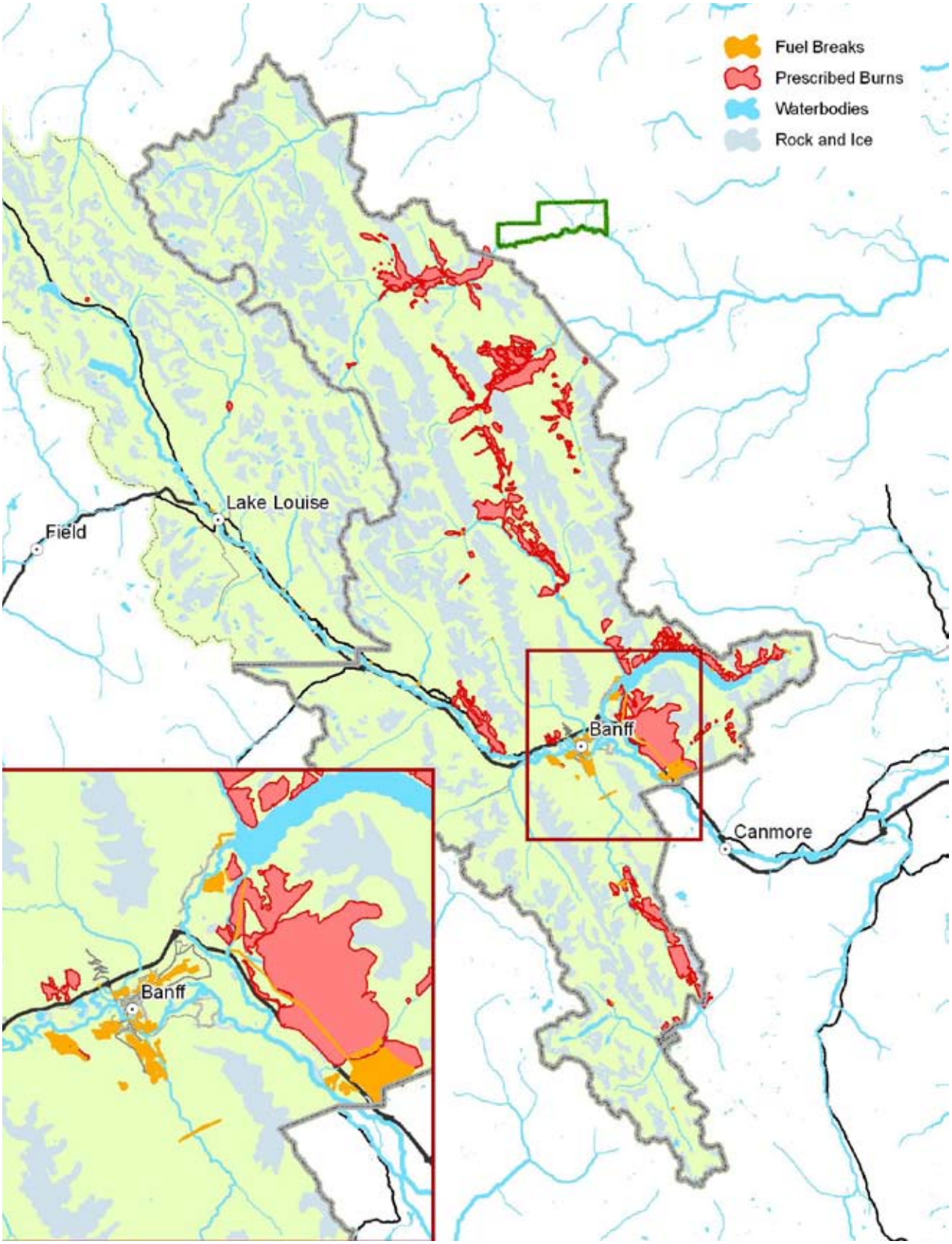

Figure 12. Fire-Smart Landscape - Banff Field Unit

4.2.3 Smoke Management and Air Quality Monitoring

Smoke affects the health of individuals to varying degrees. People at higher risk for being affected by smoke include those with existing heart or respiratory disease and potentially older adults, children and pregnant women. In addition to health, smoke can have a negative impact on visitor experience and, in turn, on local tourism-based businesses. Parks Canada recognizes the importance of minimizing smoke for both health and socio-economic reasons during fire management projects. Although smoke is inevitable when it comes to fire, managers are able to control smoke from prescribed fires more effectively than wildfires because they are able to:

- Control the size, timing and rate of burning to reduce amount and duration of smoke;
- Ignite prescribed fires during good venting conditions, so smoke is dispersed high into the atmosphere and;
- Take advantage of approaching wetter weather to shorten the smouldering period of the fire.

Parks Canada provides smoke advisories through the BNP website (Important Bulletins), circulates community fire information updates and also maintains a contact list of smoke-sensitive residents who are contacted prior to prescribed fire activities.

Parks Canada fire managers in the Banff Field Unit are currently pursuing a partnership with Environment Canada for establishing an air quality monitoring station in the lower Bow Valley. Fire managers will also pursue additional partnerships and funding for both fixed and mobile air quality sampling equipment with the goal of developing protocols relating to smoke dispersal and air quality associated with prescribed fires. Once a monitoring program can be established, Parks Canada will look to partner with the academic community to explore potential research opportunities such as smoke dispersal modeling.

4.2.4 Mountain Pine Beetle Initiative

The current spread of the mountain pine beetle (MPB) in western Canada poses a serious threat to the economic resources of the Province of Alberta lands adjacent to the Banff Field Unit. Parks Canada's policy provides the following direction for the management of MPB:

> *Where insects or disease pose a serious threat to provincial lands, intervention may occur, provided that it is effective and does not damage the park ecosystem.*

Since 2002, Parks Canada has received funding from Natural Resources Canada's (NRCAN) Canadian Forest Service (CFS) for the management of growing beetle populations within the mountain national parks and for the mitigation of their spread onto provincial lands. Parks Canada takes an ecosystem-based approach to managing MPB populations and, in the Banff Field Unit, a variety of tools are implemented. The primary tool for management of MPB is prescribed fire. By using prescribed fire, Parks Canada is reducing the continuous pine forest available for future outbreaks while meeting other management objectives such as improving habitat for a variety of wildlife and reducing the risk of catastrophic wildfire. To further mitigate the effects of the growing MPB population, Parks Canada in the Banff Field Unit conducts annual aerial and ground surveys as well as implements a pheromone baiting and hand fall and burn program in areas adjacent to neighbouring lands. Parks Canada also participates in research and in communications programs to educate the public on forest health. Since the beginning of the Mountain Pine Beetle Initiative, Parks Canada has burned 8 050 ha of susceptible MPB habitat and has removed approximately 9 000 trees colonized by MPB in priority areas of the Banff Field Unit.

As the funding for the Mountain Pine Beetle Initiative through NRCAN comes to a close, Parks Canada is continuing to work closely with its partners (Alberta Sustainable Resource Development, Alberta Tourism

Parks and Recreation and industry) in the management of MPB, guided by the Regional Management Strategy (Parks Canada 2002). Parks Canada will continue to use prescribed fire as the primary tool for the management of MPB. In collaboration with the other mountain national parks (Jasper, Kootenay, Yoho), Parks Canada staff in the Banff Field Unit are helping to develop long term strategies to mitigate future MPB outbreaks.

5. DESIRED CONDITIONS - PLANS AND PROPOSALS

To achieve the objectives of the BNP Management Plan and other related programs over the next decade, a number of areas are proposed or planned for prescribed fire and fuel management. Prior to implementation, all fire management activities require an environmental screening, approval of an operational plan and the development of a communications plan. Figure 13 outlines the steps that are required for a prescribed fire project to move from the conceptual stage to completion. Ongoing stakeholder involvement will be integral to the planning and timing of all future fire management activities and opportunities for visitor experience and education will be incorporated into detailed planning.

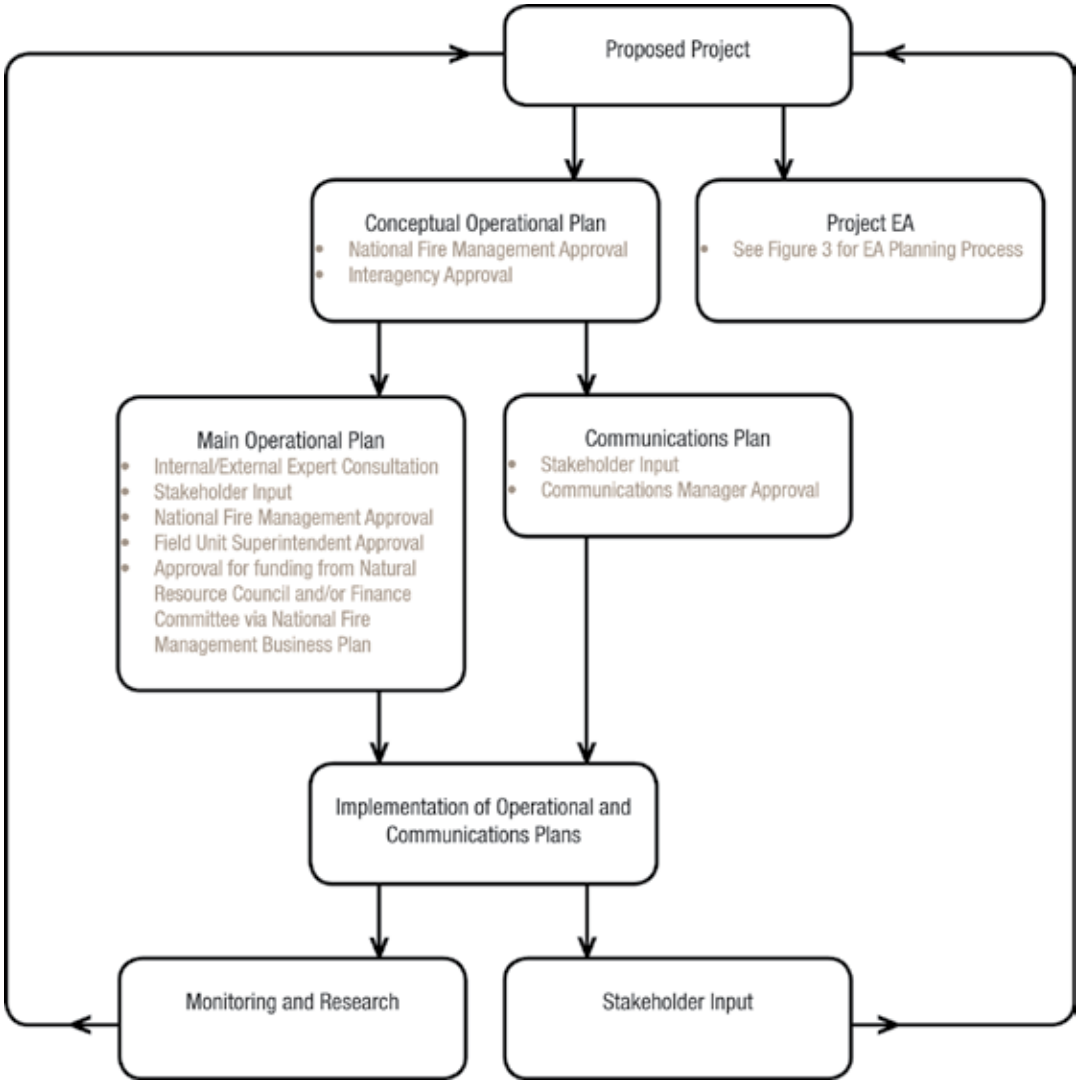

Figure 13. Prescribed Fire Planning Process

5.1 LANDSCAPE-SCALE PRESCRIBED FIRE

Landscape-scale fires are large, moderate-to-high intensity prescribed fires in coniferous forests with the objectives of restoring the ecological benefits of fire, reducing the amount of susceptible mountain pine beetle habitat and/or enhancing protection from wildfire. Figure 14 shows the conceptual and planned landscape-scale prescribed fires, colour-coded by their primary objective. The prescribed fires for ecological integrity and the reduction of mountain pine beetle habitat are primarily found in remote sites where human use is low. These large remote prescribed fires will be the principle way that Parks Canada achieves its target objectives related to fire and vegetation in the Banff Field Unit. Timing of these units will remain flexible to allow for the best possible schedule with respect to current social and environmental conditions.

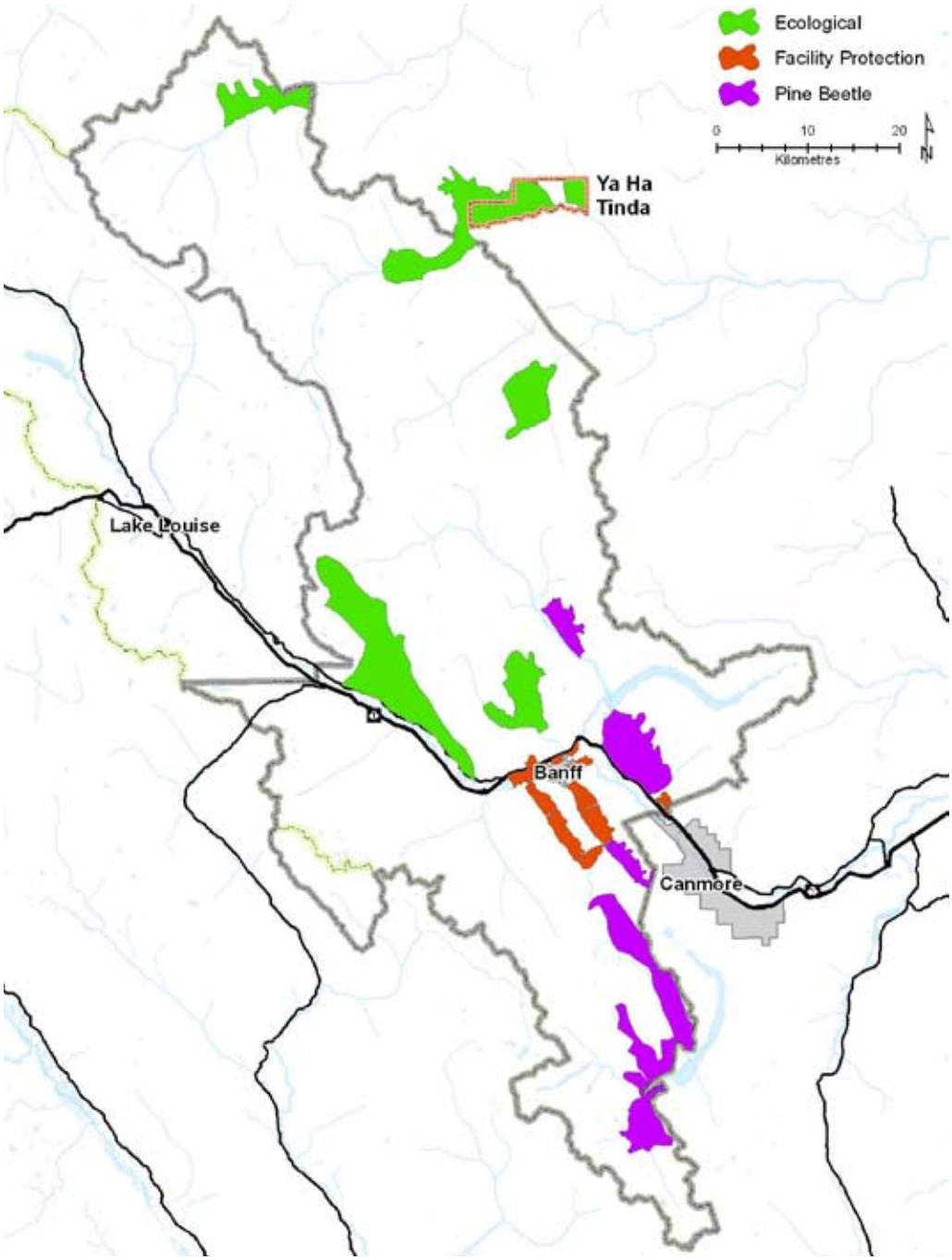

Figure 14. Proposed Landscape-Scale Prescribed Fires

5.2 BOW VALLEY MONTANE RESTORATION PRESCRIBED FIRE

Parks Canada will implement a suite of restoration measures for the montane ecoregion of the Bow Valley. The strategy incorporates prescribed fire, non-native plant control, fuel management, elk management and human use management as an integrated approach to restoration in this important, but intensively used, ecoregion. Projects will be designed to maintain or restore key vegetation communities such as aspen, willow, grassland, Douglas fir and whitebark pine and/or to reduce forest and grassland fuels in key areas to enhance protection from wildfire.

Five priority zones have been identified for fire restoration. Within these zones, complex interactions between fire, other disturbances, and human- and wildlife-use occur. The objective will be to burn approximately 2 000 hectares (ha) within these zones per decade. Each year Parks Canada fire managers in the Banff Field Unit, with advice from advisory group members and other stakeholder input, will select the small units within these zones to be burned the following spring and/or fall. The prescribed fire units range in size from five to 354 ha; Figure 15 and Table 2 outline these units and their size.

The fire cycle condition class monitoring and trend information is one level of information that will be used to decide the priority of the prescribed fire units. A number of other issues such as preferred season of burning, rare or sensitive species (including active nest and den sites), herbivory outside the range of normal long-term variation and smoke impacts on the town and tourism will also affect the prescribed fire unit selection and timing. Program activities will be flexible so that through ongoing stakeholder involvement fire managers are able adapt their plan to changes in local social or environmental conditions. Monitoring, research, education and interpretation will be integral components of the restoration program.

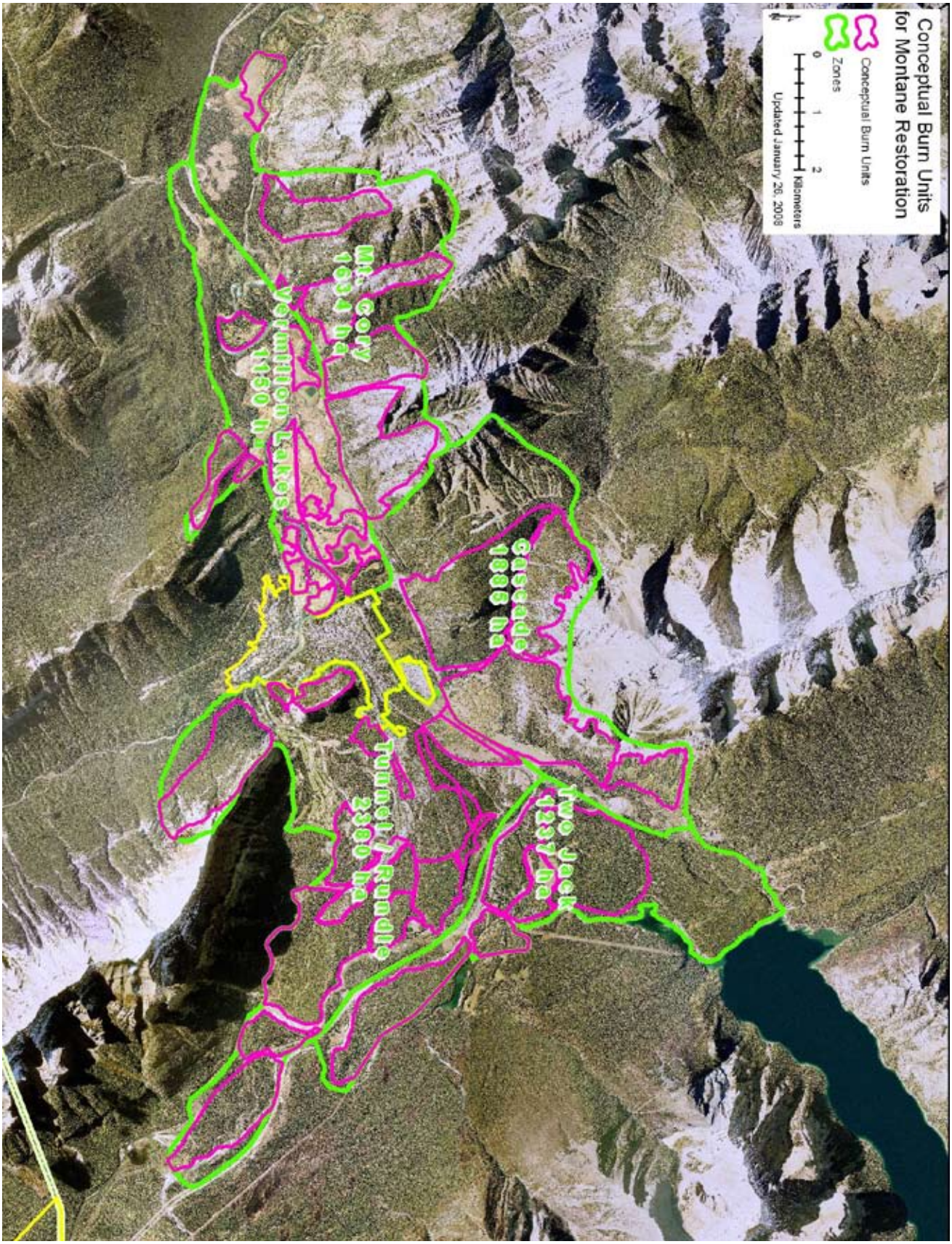

Figure 15. Prescribed Fire Units for Montane Fire Restoration Adjacent to the Town of Banff (yellow)

Table 2. Montane Restoration Prescribed Fire Units and Sizes

Zone Name	Unit Name	Unit Number	Size (hectares)	
A - Mt Cory	BackSwamp	1	49.8	
	Mt Cory	2	130.5	
	Fireside East	3	12.5	
	Mt Edith	4	137.0	
	Norquay West	5	124.6	
	Norquay East	6	235.4	
Total				689.8

Zone Name	Unit Name	Unit Number	Size (hectares)	
B - Vermilion Lakes	Arson Meadow	7	34.4	
	Third Lake West	8	31.0	
	Second Third Lake	9	50.9	
	Hay Meadow	10	60.4	
	First Second Lake	11	46.3	
	Echo Creek North	12	6.3	
	Echo Creek South	13	22.0	
	Warner`s East	14	14.8	
	Warner`s West	15	12.4	
	Warner`s South	16	16.0	
	Cave and Basin East	17	4.7	
	Cave and Basin West	18	6.5	
	Sulphur Ridge East	19	9.8	
	Sulphur Ridge West	20	48.6	
Total				364.0

Zone Name	Unit Name	Unit Number	Size (hectares)	
C - Cascade	Stoney Squaw	21	342.0	
	Cascade North	22	190.8	
	Cascade Central	23	354.7	
	Cascade East	24	82.6	
Total				970.1

Zone Name	Unit Name	Unit Number	Size (hectares)	
D - Two Jack	Two Jack West	25	258.7	
	Penstock West	26	54.9	
	Amphibian World	27	111.1	
	Penstock East	28	52.6	
	Johnson Duthill	29	170.3	
Total				647.6

Zone Name	Unit Name	Unit Number	Size (hectares)	
E - Tunnel Rundle	Indian Grounds North	30	18.0	
	Indian Grounds South	31	57.8	
	Tunnel Campground North	32	34.4	
	Tunnel Road East	33	14.9	
	Peyto Pit North	34	78.8	
	Peyto Pit South	35	48.8	
	Cascade Confluence	36	312.7	
	Bow River Hoodoos	37	48.6	
	Hoodoo Corner	38	69.0	
	Tunnel Hoodoos	40	37.0	
	Tunnel Mountain	41	37.3	
	Surprise Corner	42	9.9	
	Mt Rundle	43	204.3	
	Seven Mile Corner	44	60.3	
	Carrot Creek West	45	169.2	
Total				1201.0

Overall Total	**3872.5 hectares**

5.3 FUEL MANAGEMENT

The strategy for fuel management is to continue to develop an overall "fire-smart" landscape that links fuel treatments in strategic locations with natural features and existing prescribed fire units and firebreaks. This landscape design takes into account the various ways wildfires could move through the field unit and identifies where fuel treatment can be most effective in slowing their spread. Of particular priority is reducing the potential for wildfires to spread from the eastern boundary onto provincial lands as well as reducing the potential for wildfires to impact communities and park infrastructure. Projects that are at the planning stage for fuel management (with an approved environmental screening) include the area adjacent to the provincial Nordic Centre firebreak (south of the CP Rail tracks near East Gate) and Moose Meadows. Fuel reduction work will also continue next to the Town of Banff as part of Parks Canada's nine-year Fuel Management Plan for the Banff Field Unit (Johnson and Pengelly 2004). Further fuel treatment is proposed (at the conceptual stage) for the AltaLink power line right-of-way west of Banff. Figure 16 maps the locations of these planned and proposed fuel treatment sites within the Bow Valley. Long term maintenance of firebreaks is required in order to maintain their effectiveness. This may require the use of low-intensity surface fire to reduce fuel loading in the litter layer and periodic removal of wind thrown trees.

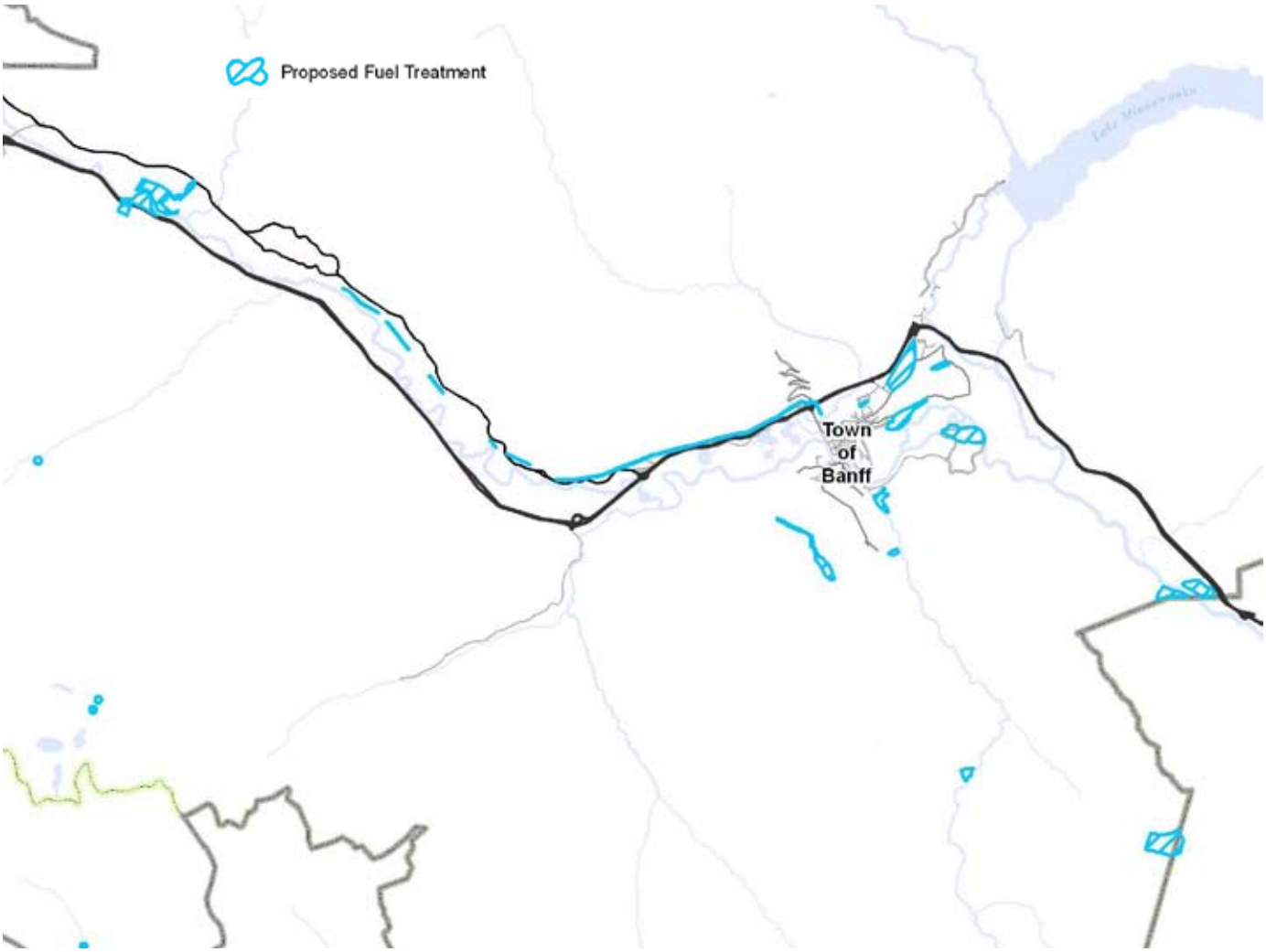

Figure 16. Planned and Proposed Fuel Treatment Units

6. COMMUNICATIONS

The goal of the communications program is to ensure strategic, accurate, persuasive and coordinated communications that develop awareness, improve understanding and encourage support for Parks Canada's management of forest ecosystem health in the Banff Field Unit. The National Fire Information Strategy guides the development of field unit objectives and activities.

6.1 NATIONAL FIRE INFORMATION STRATEGY

The following five communication objectives were developed as part of the National Fire Information Strategy (Parks Canada 2004):

1. Build and maintain public understanding and support for Parks Canada's fire management program – create broad public understanding and stakeholder awareness of the ecological role of fire and the public safety benefits of a fire management program;
2. Provide up-to-date information and opportunities for stakeholder and community input and involvement in Parks Canada's fire management program and communications activities;
3. Integrate fire management communications into national, regional and field unit communication strategies;
4. Create mechanisms for effective, efficient and consistent communication of fire ecology and ongoing fire management programs as well as fire-related emergencies and events across the system and;
5. Create a cross-functional team approach to implementing fire management goals through communication.

Further, the National Fire Information Strategy states:

> *"According to the Parks Canada Agency (PCA) Corporate Plan, the fire management program will move from an era of stakeholder consultation to effective involvement of partners in shaping the vision for National Heritage Areas and their management. The program will be inclusive of all Parks Canada team members in the delivery of fire management. The fire management program will include itself in the overall Resource Conservation and Parks Canada Agency efforts to make the workforce reflective of the Canadian mosaic. Finally the program will contribute to an organizational culture that embraces internal and external engagement and dialogue, allowing alternate views to be expressed in a professional manner."*

6.2 BANFF FIELD UNIT FIRE COMMUNICATIONS OBJECTIVES

Fire management seeks to move communications from a reactive response to a strategy of prepared and proactive communication. This will require enhanced capacity in the visitor experience/external relations sections. In achieving this, managers will seek to retain and develop experienced communications staff. The objectives of the fire communications program for the Banff Field Unit are to:

- Build and maintain public understanding and support for Parks Canada's fire management program in the Banff Field Unit – create broad public understanding and stakeholder awareness of the ecological role of fire and the public safety benefits of a fire management program;
- Provide up-to-date information and opportunities for stakeholder and community input and involvement in the fire management program and communications activities in a manner consistent with the National Fire Information Strategy;
- Build capacity for Parks Canada staff to talk about fire management in an informed and engaging way and;
- Build and maintain collaborative relationships and strategic partnerships with local and regional

government departments and the business community to further public support for fire management.

6.3 BANFF FIELD UNIT FIRE COMMUNICATIONS CORE ACTIVITIES

Fire management communications will centre around the following core activities:

- Develop communications plans for all approved prescribed fires and fuel management projects in the Banff Field Unit, develop all associated products and provide timely and accurate information to appropriate staff, stakeholders and the general public;
- Provide opportunities for engaging visitors in fire management activities;
- Create awareness and understanding of fire management's involvement in other projects and programs (e.g. Mountain Pine Beetle Program) and support these programs with communications products as required;
- Provide a representative to be the first point of contact and liaison between the fire program and the local and regional community (i.e. the `face` of the fire program);
- Maintain a contact database for distribution of communications products;
- Develop and deliver staff training sessions;
- Develop and train other PC staff to deliver programs centred around fire management issues;
- In conjunction with Media and Executive Services office, identify opportunities to work with the media, develop materials for use by media and track related outcomes;
- Implement Community Outreach Plan (Parks Canada 2008) and;
- Explore collaborative communication opportunities with other organizations.

6.4 VISITOR EXPERIENCE AND EXTERNAL RELATIONS

6.4.1 A Connection to Place Through Fire Management

Parks Canada's fire program in the Banff Field Unit will continue to develop opportunities for innovative connections of people to place through fire management activities. The fire program will be integrated with Visitor Experience Product Development and outreach through a range of proactive measures including but not limited to:

- Volunteer involvement in fuel modification, planning and fire effects monitoring;
- Media tours and public viewing opportunities for prescribed fires and wildfires;
- Interpretive tours of post-burn landscapes and;
- Use of the internet and new media to share real-time fire monitoring images and fire personnel experiences.

6.4.2 Stakeholder Consultation and Involvement

Stakeholder support is the cornerstone of Parks Canada`s fire management program in the Banff Field Unit. Fire managers value the varied perspectives of their stakeholders and seek to ensure these points of view are influential on the future direction of the program. Building on the relationships forged through consultation programs such as the annual park planning forum, Montane Advisory Group and science workshop, it will be integral to generate regular dialogue with stakeholders regarding all future fire management planning. Fire management will seek specific discussions regarding proposed projects so that the concerns of stakeholders can be identified and solutions can be incorporated during the planning process. This will be accomplished through forums, advisory groups, open houses, trade shows, presentations, joint initiatives and regular communications with affected stakeholders.

6.5 AUDIENCES, MESSAGES AND MEDIUMS

Fire management recognizes that key audiences must be identified in order to meet communication objectives and to carry out communication activities. For every fire management project, the

communications plan will identify key audiences specific to that project. There is also the need to identify key messages applicable to these groups and the mediums through which those messages may be delivered. Table 2 outlines the general audiences, messages and mediums for Parks Canada`s fire program in the Banff Field Unit.

7. ACKNOWLEDGEMENTS

The shift from fire suppression to fire management that has taken place over the past three decades has occurred through the collective efforts of many individuals. The program owes a great deal to the wisdom of Charlie Van Wagner, retired researcher with The Canadian Forest Service, for his substantial contributions to the fields of fire behaviour, fire ecology and the practice of fire management in national parks. As well, the support and assistance provided by Dennis Dube, Brian Lee, Marty Alexander, Brad Hawkes, Kelvin Hirsch and Bruce Lawson, also with The Canadian Forest Service, is greatly appreciated. As well, the program would not have survived without the valuable leadership provided by BNP Superintendents Dave Day, Charlie Zinkan, Jillian Roulet and Kevin Van Tighem, and Chief Park Wardens (Managers, Resource Conservation Section) Bob Haney and Ian Syme. We would also like to thank all the fire technicians, fire crew members, communications officers, researchers and other staff (operations, info centre, dispatch) that have served us so well through the years.

Table 3. Fire Communications Key Audiences, Messages and Mediums

Key Audiences	Focus Key Messages	Medium
Parks Canada Staff	• The role, benefits and importance of fire to park ecosystems • How Parks Canada manages fire (including fire prevention, fire suppression, fuels management and prescribed fire) • The objectives, methods and results of fire-related monitoring and research projects • Public safety with respect to fire management actions/projects	• Staff updates • Website • Staff training sessions (general fire management presentation) • Local fire tours • Interpretive demonstrations • Opportunities for non-fire management staff to participate in fire training (e.g. basic fire course) • Opportunities for non-fire management staff to job shadow fire management staff (e.g. fire crew member for a day) • Opportunities to train interested interpretive staff to deliver fire programs (roadside fire interpreters, fire demos, fire trailer and displays, tours) • National fire fact sheets • Fire videos • 1 800 PC information line
Media	• The role, benefits and importance of fire to park ecosystems • How Parks Canada manages fire (including fire prevention, fire suppression, fuels management and prescribed fire) • The objectives, methods and results of fire-related monitoring and research projects • Public safety with respect to fire management actions/projects	• Story pitching • Respond to media requests (provide spokesperson) • Media reference guide (includes background on fire management policies and fire terminology) • Opportunities for observing fire management in action (heli-tours/site visits during wildfire/ prescribed fires, site visits during fuel management projects) • FireSmart website and resources • Fire tours • National fire fact sheets • Website • 1 800 PC information line

Key Audiences	Focus Key Messages	Medium
Other Government Agencies: • Federal (e.g. CFS) • Provincial (e.g. AB SRD) • Municipal (e.g. towns of Banff, Canmore, Sundre)	• How Parks Canada manages fire (including fire prevention, fire suppression, risk reduction and fire restoration) • The successes and benefits of the regional team approach to managing multi-agency wildfire, prescribed fire and MPB management • The objectives, methods and results of fire-related monitoring and research projects	• Community information sessions/open houses • Conferences/Regional working groups/Trade shows • Personal contact • Collaboration on interagency fire management projects (e.g. Mt. Nestor Prescribed Fire) • National fire fact sheets • Fire videos • Website • 1 800 PC information line
Other Stakeholders: • Local Communities (Banff, Canmore, Harvey Heights, Sundre, Rocky Mtn House, Calgary) • Tourism Industry (guide and tour providers and other local tourism-based businesses) • Park Visitors • First Nations • General Public • Environmental/ Naturalist Groups	• The role, benefits and importance of fire to park ecosystems • How Parks Canada manages fire (including fire prevention, fire suppression, risk reduction and fire restoration) • The objectives, methods and results of fire-related monitoring and research projects • Public safety with respect to fire management actions/projects	• Community information sessions/open houses • Mountain Parks fire management displays • Fire trailer • Project-specific fact sheets • Media articles/newspaper ads • 1 800 PC information line • Fire information updates • Fire videos • Speaker series presentations • National fire fact sheets • Website • FireSmart website and resources • Guided and theatre interpretive programs relating to fire • Pursue opportunity for permanent fire display at info centres
Schools and other education groups	• The role, benefits and importance of fire to park ecosystems • How Parks Canada manages fire (including fire prevention, fire suppression, risk reduction and fire restoration) • The objectives, methods and results of fire-related monitoring and research projects • Public safety with respect to fire management actions/projects	• Website (Teacher's Resource Centre) • Curriculum-based activities • Professional development presentations • Theatre presentations (Mtn WIT) • Fire videos • Opportunities for classes to be involved in monitoring projects • In-class presentations and demos • Field tours and presentations

Key Audiences	Focus Key Messages	Medium
Academic Community	• The role, benefits and importance of fire to park ecosystems • How Parks Canada manages fire (including fire prevention, fire suppression, risk reduction and fire restoration) • The objectives, methods and results of fire-related monitoring and research projects	• Research opportunities • Speaker series • Opportunities to participate in monitoring

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