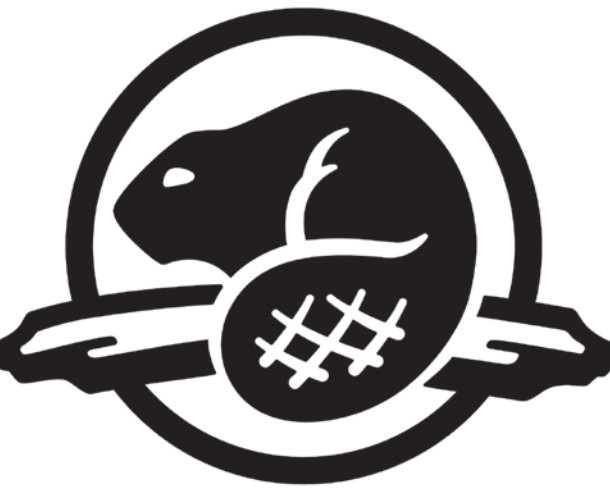


# Evaluating the success of using prescribed fire for the restoration of Douglas-fir (*Pseudotsuga menziesii*) grasslands: Banff National Park, Alberta, Canada



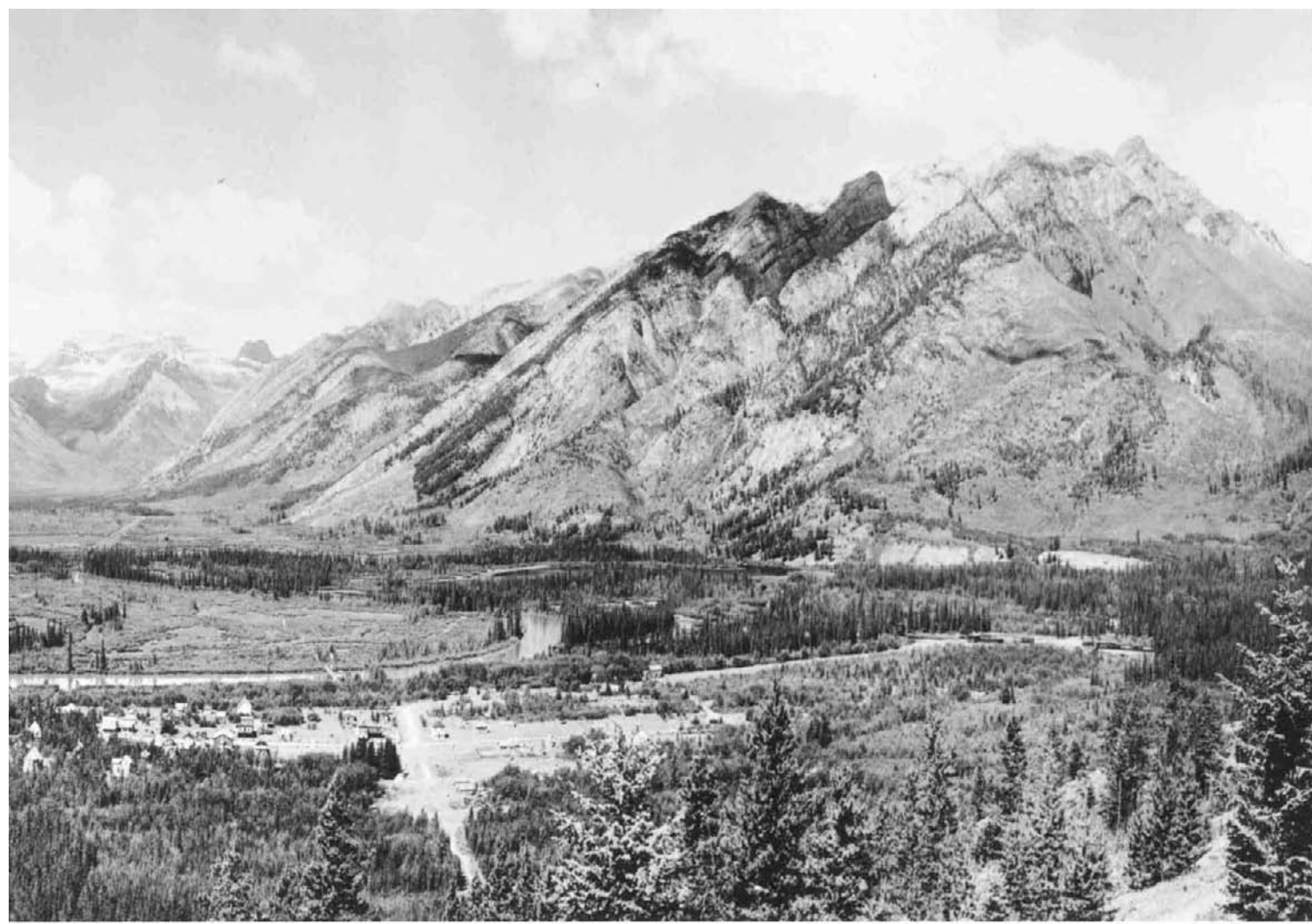
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## Objectives

- To determine the effectiveness of the Douglas fir protection strategy on the survival of old growth Douglas fir during the Fairholme Prescribed fire
- To determine the feasibility of introducing prescribed fire into historic open Douglas fir forest stands while minimizing old growth Douglas fir mortality

## Background

- Open Douglas-fir grasslands historically dominated the Bow Valley of Banff National Park
- Douglas-fir trees up to 700 years old can be found in Banff
- Douglas-fir grasslands were maintained by frequent low intensity fires intentionally set by First Nations
- Current conditions lead to low frequency, high intensity fires
- Prescribed fire is the main tool for reintroducing fire onto the landscape and for restoring historic stand structure to Banff
- One of the primary objectives of the fire was to protect old-growth Douglas-fir stands while removing mature lodgepole pine to reduce susceptibility to Mountain Pine Beetle (*Dendroctonus ponderosae*)



Historic Stand Structure (ca 100 yr ago)



Present Stand Conditions (ca 2000)

## Douglas-fir Protection Strategy

- 164 plots were established prior to the Fairholme Prescribed Fire (Spring 2003)
- 13 plots were hand raked and subsequently hand lit to remove fuel from old growth douglas-fir stands
- Remaining plots ignited either by helitorch (aerial) or burned during holdover fire (Fall)
- Plots assessed for fire effects and composite burn index (CBI) immediately following the fire
- Burn severity mapping conducted following the prescribed fire (2004)
- Re-assessment of Douglas-fir survival conducted in 2011. All trees assessed for current state (alive/dead), presence of other forest insects and disease and cored to determine year of death

## 2004 Findings

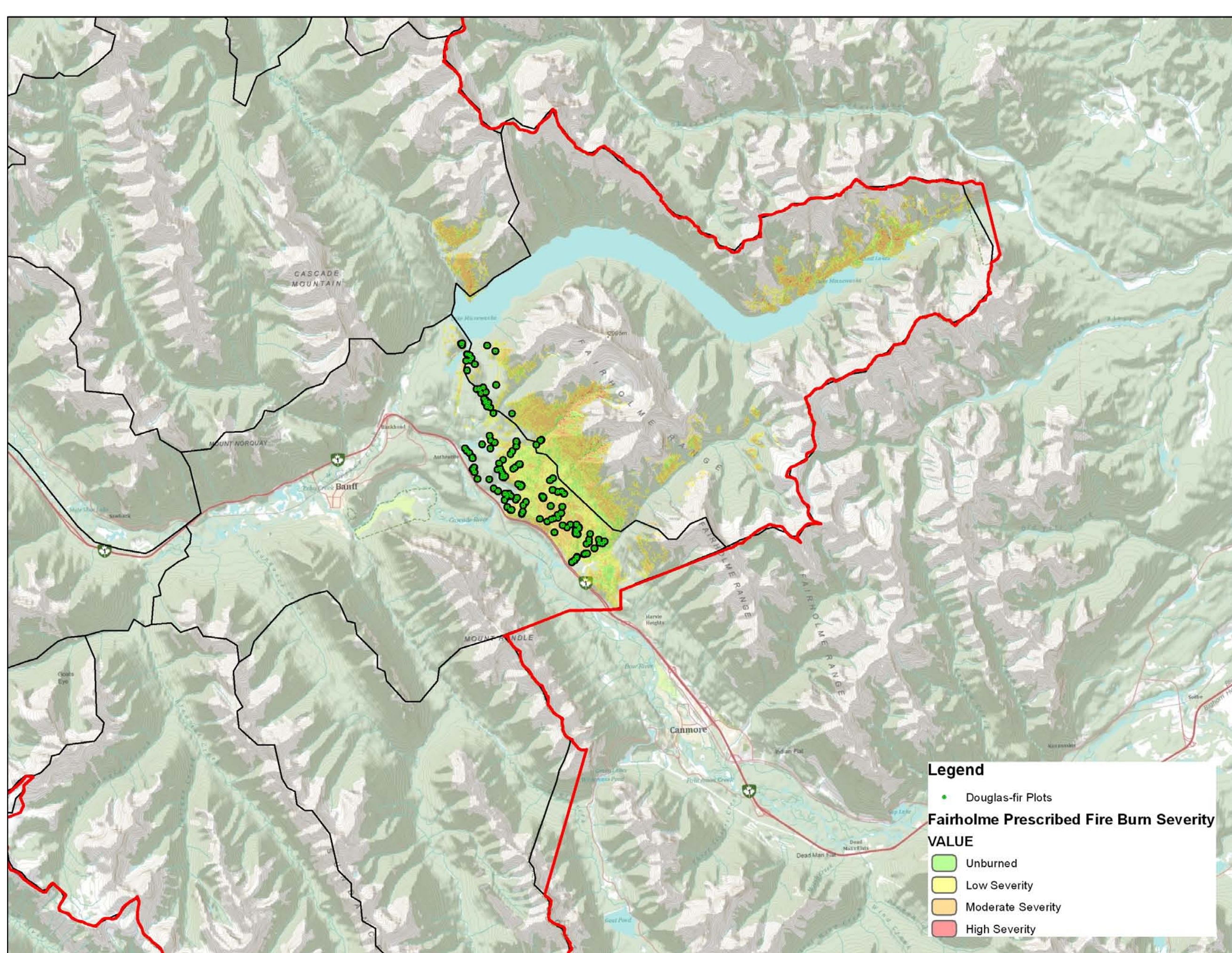
- Hand lit plots had significantly lower Composite Burn Index values than holdover/wildfire plots ( $p < 0.05$ )
- Hand raking increased the probability of survival for Douglas-fir compared to aerial ignition with no pre-treatment
- Too early to determine amount of survival following fire given the low/moderate severity of fire



Photo: Catherine Mardell

## Fairholme Prescribed Fire

- Conducted in Spring 2003 to reduce the threat of wildfire to adjacent communities, reduce mountain pine beetle habitat and to introduce low/moderate intensity fire to old age Douglas-fir stands while minimizing mortality of mature overstory.
- Major drought caused significant holdover and fire growth throughout summer/fall
- Total area burned approximately 4968 ha



## 2011 Data Collection

- All plots revisited summer 2011/12
- All trees assessed for survival and if dead, trees were cored to determine year of death.
- Degree of bole scorch for each tree also recorded
- Data Analysis to be completed by winter 2012

## Management Implications

- This research project will allow fire and vegetation managers to determine the pre-fire treatments and desired fire severity to maximize survival of old growth douglas-fir and allow for low and moderate severity fire to be re-introduced into the montane ecosystem of the Canadian Rockies.

## Acknowledgements

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