

# Alberta on Fire:

## A History of Cultural Burning

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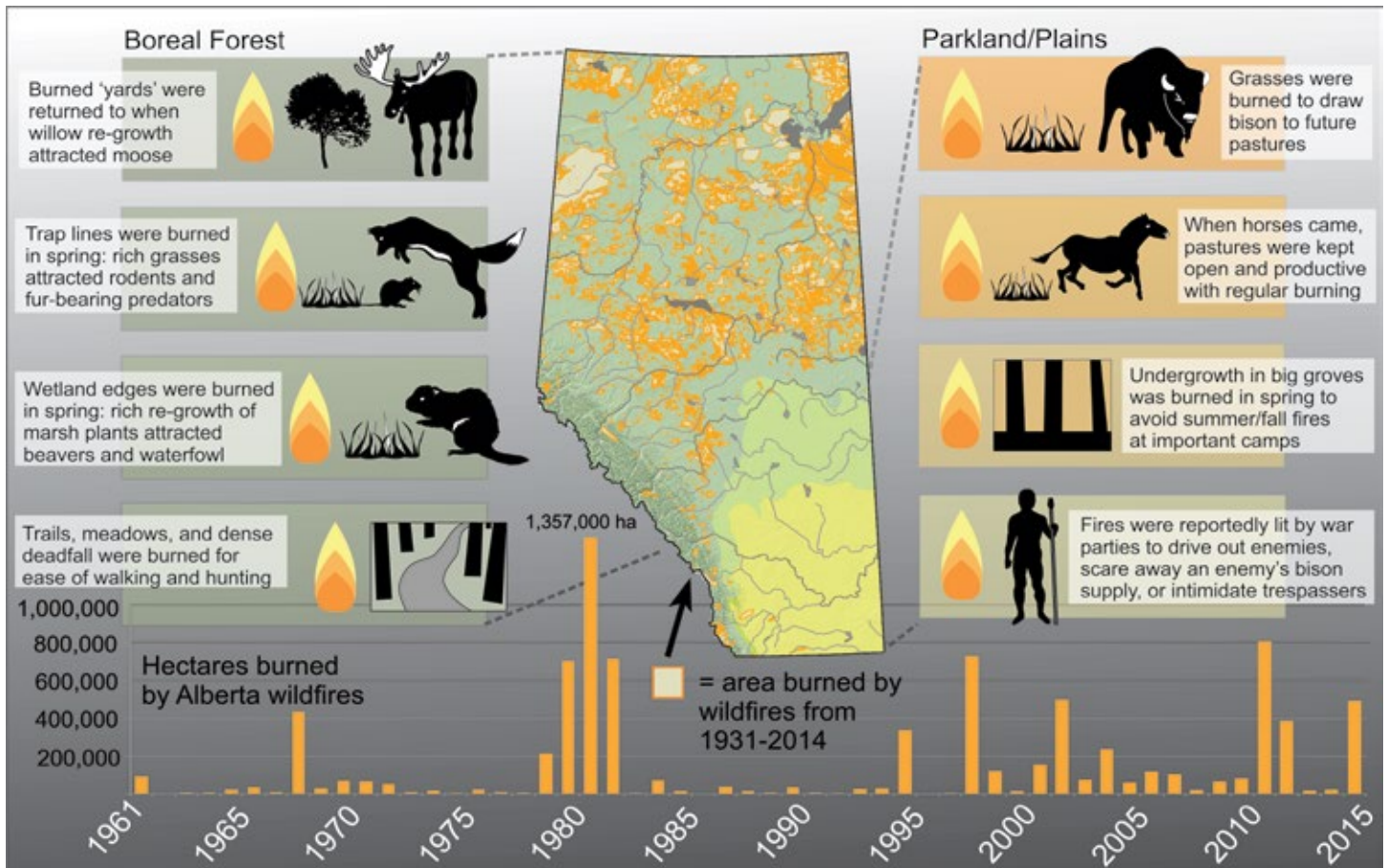
**F**ire science in Alberta has come a long way but the growing practice of prescribed burning is actually a step back to the past. Archaeologists and palaeoecologists are discovering that Western Canada has burned at the hands of people for thousands of years. Henry Lewis, a founding father of First Nations fire research, stated that much of what was thought to be wilderness in Alberta when Europeans arrived was likely a mosaic of manipulated landscapes influenced by controlled burns. Cultural or

anthropogenic burning refers to human creation of fires to maintain preferred stages of ecological succession. These types of controlled burns began in the province millennia ago and continue in our modern forests and grasslands. Alberta has a rich history of fire use – the recognition of it has implications for modern conservation and land management.

### Ancient Fires

Distinguishing cultural from natural burning patterns over the past thousand years is

challenging but new techniques and novel data sources are helping to untangle Canada's fire history. The prairie provinces have a number of stable sand dune fields that were more active in the past. Sediment cores and a technique called optically stimulated luminescence (which dates the time that has elapsed since sand grains were exposed to sunlight) have revealed that fires periodically wiped out dune vegetation, which activated the migration of entire dune fields. Periods of particularly high dune mobility over



The various purposes of First Nations' burning practices in Alberta (by Todd Kristensen). The map and graph at the bottom depict the number of hectares that have been consumed by wildfires across Alberta since these statistics were recorded.

CREDIT: statistics and spatial data are provided by Alberta Agriculture and Forestry's Wildfire website).

the last 4000 years are linked to the arrival of pre-contact cultures and their presumed burning practices.

Researchers are also tabulating fire history patterns in the Rocky Mountains using repeat photography and the analysis of tree rings dating back to the 1700s while others are detecting burnt carbon from fires in the phytoliths of prairie grasses preserved in sediment profiles. International teams are teasing out global fire patterns by analysing 'pyro-proxies' in Greenland ice cores like microscopic coal or levels of atmospheric substances related to fires (e.g., levoglucosan and ammonium).

Cores are also being excavated for pyro-proxies in Alberta's lakes and bogs. Christina Poletto is a Master's student at the University of Alberta who will soon extract long tubes of lake mud from Clear Lake near Fort McMurray to analyse changing layers of charcoal and pollen deposited over thousands of years. This information provides a baseline of natural fire history that she hopes to compare to cultural landscapes surrounding archaeological sites. "I want to learn how First Nations used their knowledge of forest succession, not only to respond to fires but to know how and when to light them to encourage the return of berries, other plants, and game animals."

Airborne pollen settles into lake muds and serves as a proxy indicator of burning, vegetation change, and forest succession. Other researchers have applied this approach to understand long term changes through the Holocene but a very high resolution record is needed to understand how Alberta's forests have responded to fires on the scale of decades and centuries. Poletto is hoping that

her cores will offer centimetre by centimetre glimpses of changing conditions.

## Why Did First Nations Burn?

Based on oral history and early observations, fires were frequently lit by First Nations for many reasons. On the prairies, fires ignited in spring, fall, or early winter encouraged quicker re-growth of lush grass that attracted bison. Fires were lit months in advance around major communal bison hunting areas, like southern Alberta's Head-Smashed-In Buffalo Jump, to attract big herds.

Early Europeans recorded traditional uses of fire by the Blackfoot to drive bison and flush out game. A medicine dance described in the 1830s mimicked bison drives: women played the role of bison and danced until the scent of smoke from a ceremonial fire sent them rushing to a lodge pursued by male dancers. The Blackfoot and other First Nations lit fires to control herd movement, which likely became more important as bison numbers dwindled in the 1800s. According to legend, the Blackfoot were first introduced to fire as a hunting tool by culture hero Napi who wore a pair of flaming leggings to ignite bushes and drive out game such as antelope, elk, and deer.

Plains First Nations also burned the under-story of large groves in spring to protect them from dangerous summer fires. Patches of mature trees on the prairies were significant resources and became favoured camp sites that could be protected from dangerous fires through the use of controlled burns, not unlike the intent of modern FireSmart programs in Alberta communities.

When horses were introduced, First Na-

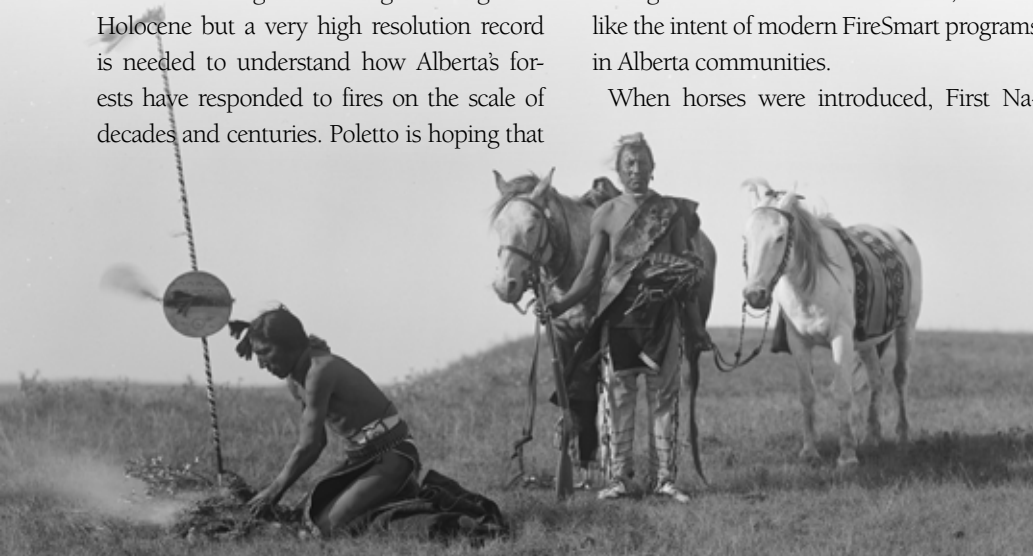
tions burned grasslands in spring and fall to maintain pastures. Fire on the prairies was also used as a warfare tactic: in several battle accounts, war parties employed fire to drive out enemies or drive bison herds away from enemy territory.

Anthropogenic burning played a different role in northern forests. The Dene and Cree burned forest meadows to maintain grazing areas for bison and elk. Surveyors and traders like George Dawson and Henry Moberly in the late 1800s were convinced that Alberta's First Nations were responsible for large swathes of grass otherwise surrounded by forests like Grande Prairie, High Prairie, and Fort Vermilion. These prairies were particularly rich hunting grounds and would require maintenance to prevent encroaching forests.

Some of the most influential research on First Nations fire use is that of the late Lewis Henry with Alberta's Dene. According to Henry, Dene bands used fire to "establish and maintain plant communities, and the animals found there, at preferred stages of ecological succession." Small patches or 'yards' were burned in spring and visited over several years when berries and medicinal plants were ripe. Hunters would later return to harvest moose that targeted burns for willow re-growth.

Spring fires along wetlands, rivers, and meadow fringes maintained trails in places like Fort McMurray, Lac La Biche, and Lesser Slave Lake. So important were fires for human movement that, when burning was outlawed, many bands could no longer access traditional territories. Robert Campbell, the Federal Director of Forestry, felt it so important to prohibit First Nation burning that he translated fire notices (which outlined the \$200 fine for burning outside of one's property) into Cree and Chipewyan syllabics in 1908. Traditional trails and small waterways became choked with vegetation. Anthropologist Marc Stevenson suggests that fire suppression pushed several Alberta Dene groups from semi-nomadic to sedentary lifestyles, which significantly changed their economies, social structure, and health.

Like the Blackfoot, the Dene and Cree adapted fire use into historic times. When the fur trade swept west, trap lines and trails were regularly burned in spring for ease of access and to encourage grasses that attract-



A grassland fire being lit by members of the Blackfoot in 1918. The Blackfoot have legends and special ceremonies associated with cultural burning. PHOTO CREDIT: Image P138 courtesy of the Provincial Archives of Alberta



ed rodents and, eventually, their fur-bearing predators. Wetland meadows were burned to provide food for beaver and muskrat.

The key elements of Indigenous fire use across Alberta, regardless of purpose, included monitoring conditions like snow cover, ground moisture, and fuel loads to keep fires manageable. The high frequency of fires, both natural and cultural, decreased fire loads and maintained fire barriers, which likely decreased the overall severity and extent of burns.

## Modern Burning and Fire Landscapes

Fires were once common and small but have since become less frequent and large. Fire suppression in the early 1900s resulted in the replacement of many patchwork landscapes with dense forests. In mountain parks, land managers have re-introduced prescribed burning to help re-establish mosaic landscapes and the diverse animal/plant communities that they support. Prescribing burning is balanced with the need to maintain areas with mature forest cover that are favoured by species like woodland caribou. Fire is more commonly being used across Alberta during certain seasons to decrease the risk of large, out-of-control fires that threaten infrastructure and consume merchantable timber.

Larger scale prescribed burns tend to occur in Alberta's national and provincial parks. A combination of torches and air drop combustibles are used to create different fire types that mimic natural burns. Years of planning and months of waiting are often necessary until the right moisture and weather regimes are conducive to safe burning.

Colton Reilly with Alberta Agriculture and Forestry has been fighting wildfires in Western Canada for over three years and he specializes in prescribed, preventative burns. "We have to try to burn everything deep in the soil, but it's hard to find a good time to do that. We have to worry about finding the right drought codes (a numbered scale to assess dryness of surface fuels and litter layers to about 10 cm deep), and once we have those, we have to worry about fires starting close to people's homes." Burning deeply into the soil reduces fuel that can be used by future wildfires, but due to the historical build-up

of litter layers, prescribed burns run a high risk of spreading outside anticipated areas if not managed properly. Land planners are re-learning a complex knowledge base required for controlled burns.

## The Value of Fire Paleocology and History

Ecologists are no strangers to the danger of public misconceptions: effective programs can be marred if significant gaps exist between science and public understanding. Dr. Jeanine Rhemtulla, who studies the historical ecology of forests at the University of British Columbia, stresses that there are often misunderstandings of landscape stability: "We tend not to manage for change, we manage for consistency, but landscapes are so dynamic - we need to acknowledge that landscapes change and then manage for resiliency." Historical research reminds us of the positive and dynamic roles of fire in the province.

Anthropological work on cultural burning also corrects a mistaken notion that First Nations were passive ecological agents. Anthropogenic burning involved a library of information to apply fire in different contexts and then adapt fire to suit historical needs, like to maintain horse pastures and support trapping. People have been successfully manipulating landscapes across Alberta for thousands of years: fire can continue to play a positive role in Alberta's ecosystems. ▲

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*The canopies of many river valleys in mountain parks have closed in due to fire suppression. In some instances, this has decreased floral and faunal diversity while creating problematic fire loads adjacent to infrastructure. PHOTO CREDIT: Images courtesy of the Mountain Legacy Project, 2016. Image identification numbers listed clockwise from top left are d20c0d6c-7116-11e2-a556-c82a14ffed2; cd99b202-7116-11e2-a556-c82a14ffed2; 50e1ebac-7059-11e2-a556-c82a14ffed2; 54e49646-7059-11e2-a556-c82a14ffed.*