Role of historical fire regimes in current forest management

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Presentation Outline

- What is a Fire Regime Study?
- Fire histories of southern Alberta
- Lead fire causes
- Subalpine vs Montane & Foothills fire regimes
  - What makes them different
- Historical fires of southern Alberta
  - Upper Foothills – N. of Hwy 1
  - Elbow (Castle)
  - Highwood (Oldman)
- Ecosystem departure
- Forest Management in the Castle

Some Definitions

- **Fire regime study:** is the understanding of the prevailing cause of forest fires, their frequency, size and spatial distribution. It also documents the season of burning, area burned by month, fire cycle, the annual disturbance rate of the forest, as well as the prevailing intensity and severity of these fires.

- **Fire cycle:** the number of years required to burn an area equivalent to the size of the study area. Some portions may burn more than once, while others will not burn at all.

- **Fire history study:** one of the components of the fire regime assessment. It involves the collection of tree age and fire scar data to date all fires that occurred in the past. It also uses fire occurrence reports, old newspapers and journals of explorers to date historical fires. Fires are tabulated in a chronological order to determine the fire return interval. They can also be mapped to produce a stand origin map or fire origin map.

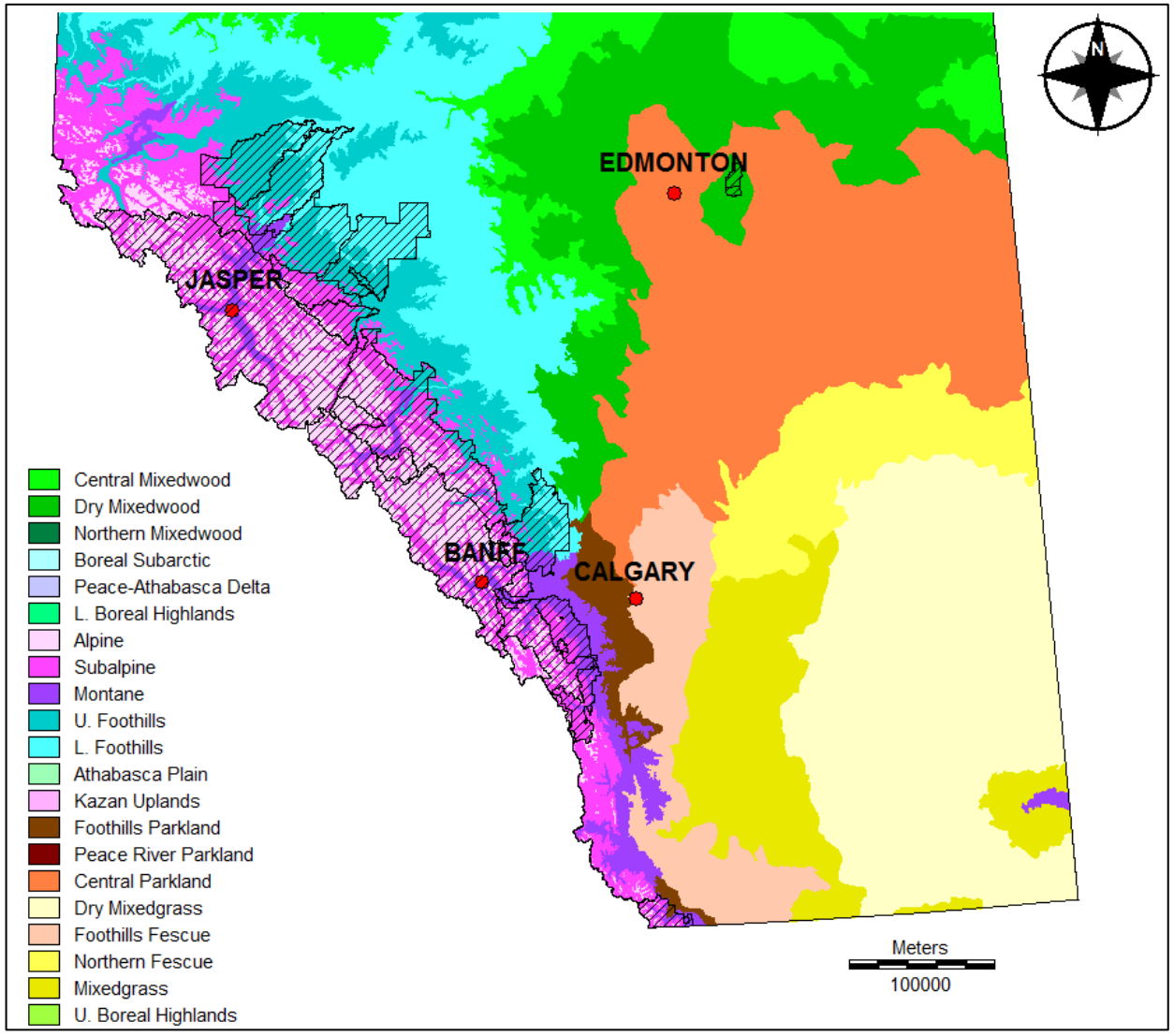
Research Objectives

- **Forest Reserves, Protected Parks and Wilderness Areas:** fire restoration program to maintain and protect biodiversity and sustain a healthy ecosystem. Need to know where and when to burn.

- **Logging industry:** harvesting practices that are more in line with natural disturbances. Need to know where, how large and how much they can cut.

- **FireSmarting:** fuel reduction program - need to know where, how much and how frequently fuels should be reduced. Also very important with public education program…. with knowledge comes understanding and acceptance.

Fire History Studies



Jasper N.P.,
Hinton Pulp FMA,
ASRD FMUs: E4, E5, E11, R11,
Banff N.P,
Kananaskis Country,
Spray Lake Sawmills FMA,
Whitegoat & Siffleur Wilderness Areas,
Waterton N.P.,
Cypress Hills P.P.,
Elk Island N.P.,
Blackfoot-Cooking Lk Rec. Area

42,662 km² or 16,472 mi²

Probabilities of Ignition

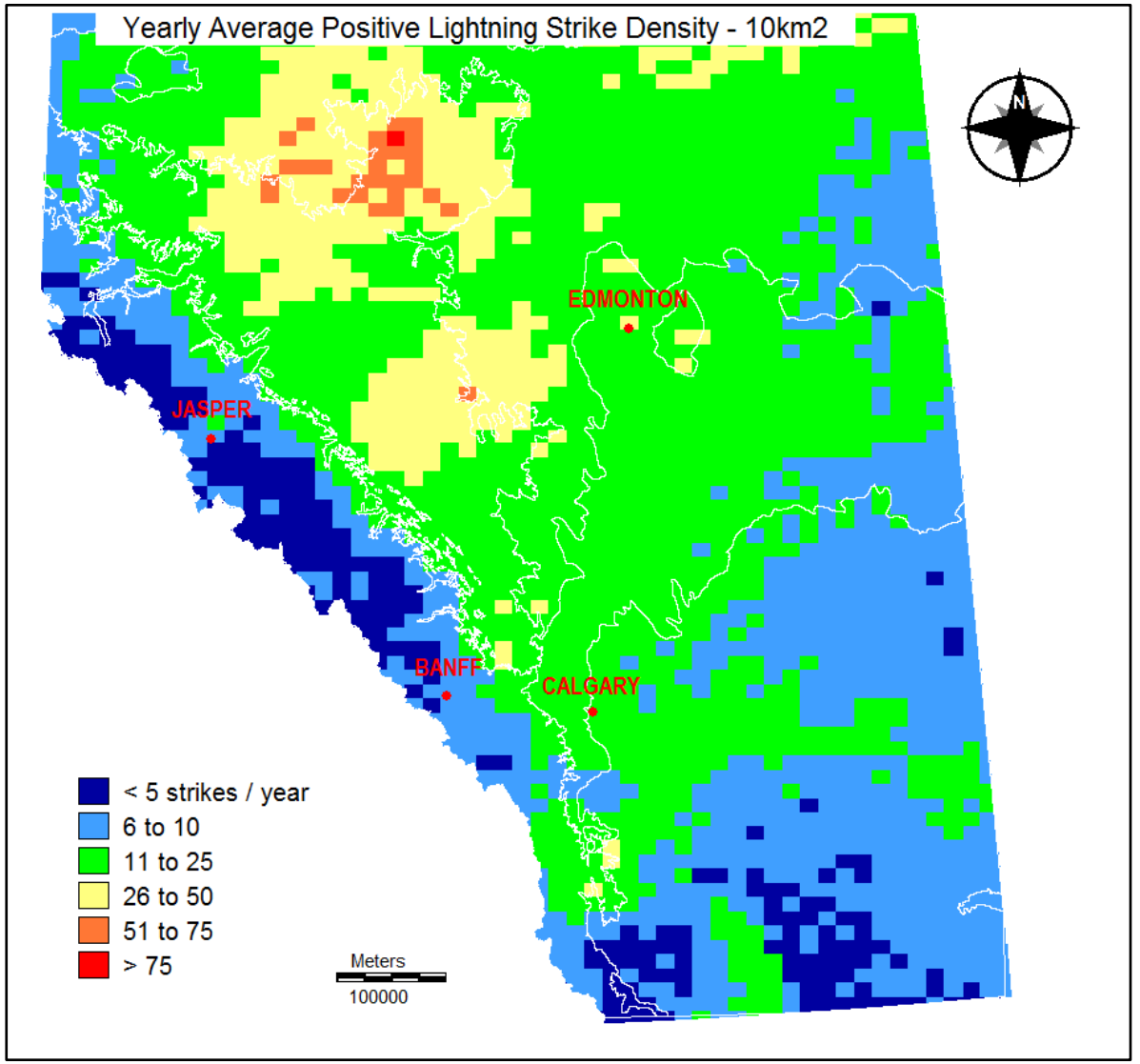
Lightning Strike Shadow

- Areas o f high ignitions correspond with strike density zones that are mod. to very high.

-Lightning fires are not randomly distributed.

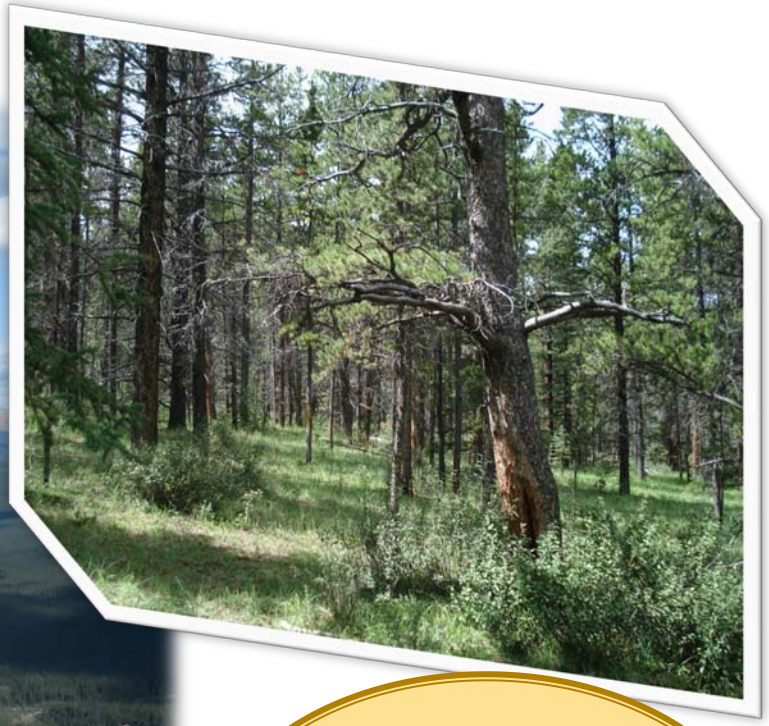
-More lightning ignitions at lower elevations

-Crowsnest corridor is an exception



Traditional burning

Clearwater River east of Banff N.P.

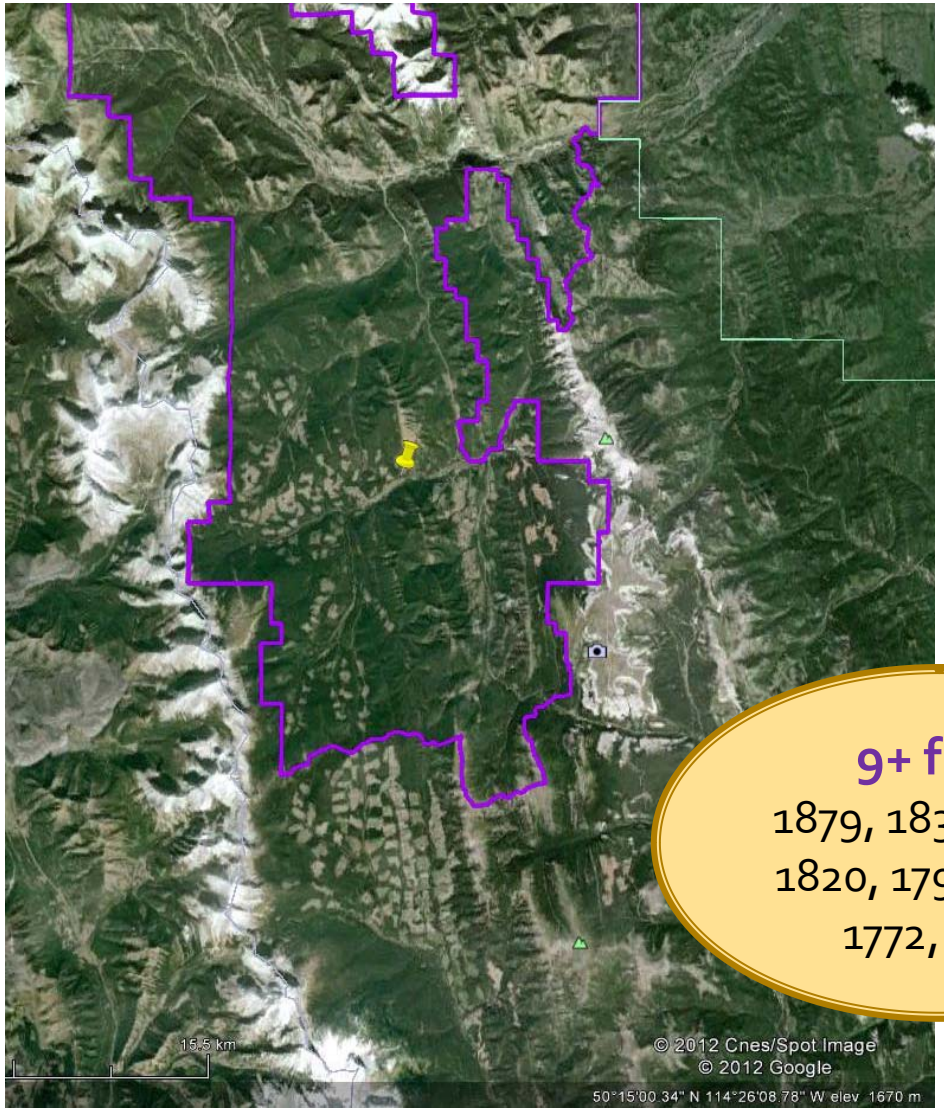


11+ fires

1905, 1892, 1875, 1856, 1804, 1820, 1795, 1778, 1768, 1765, 1725

Traditional burning

Cataract Creek, SLS FMA

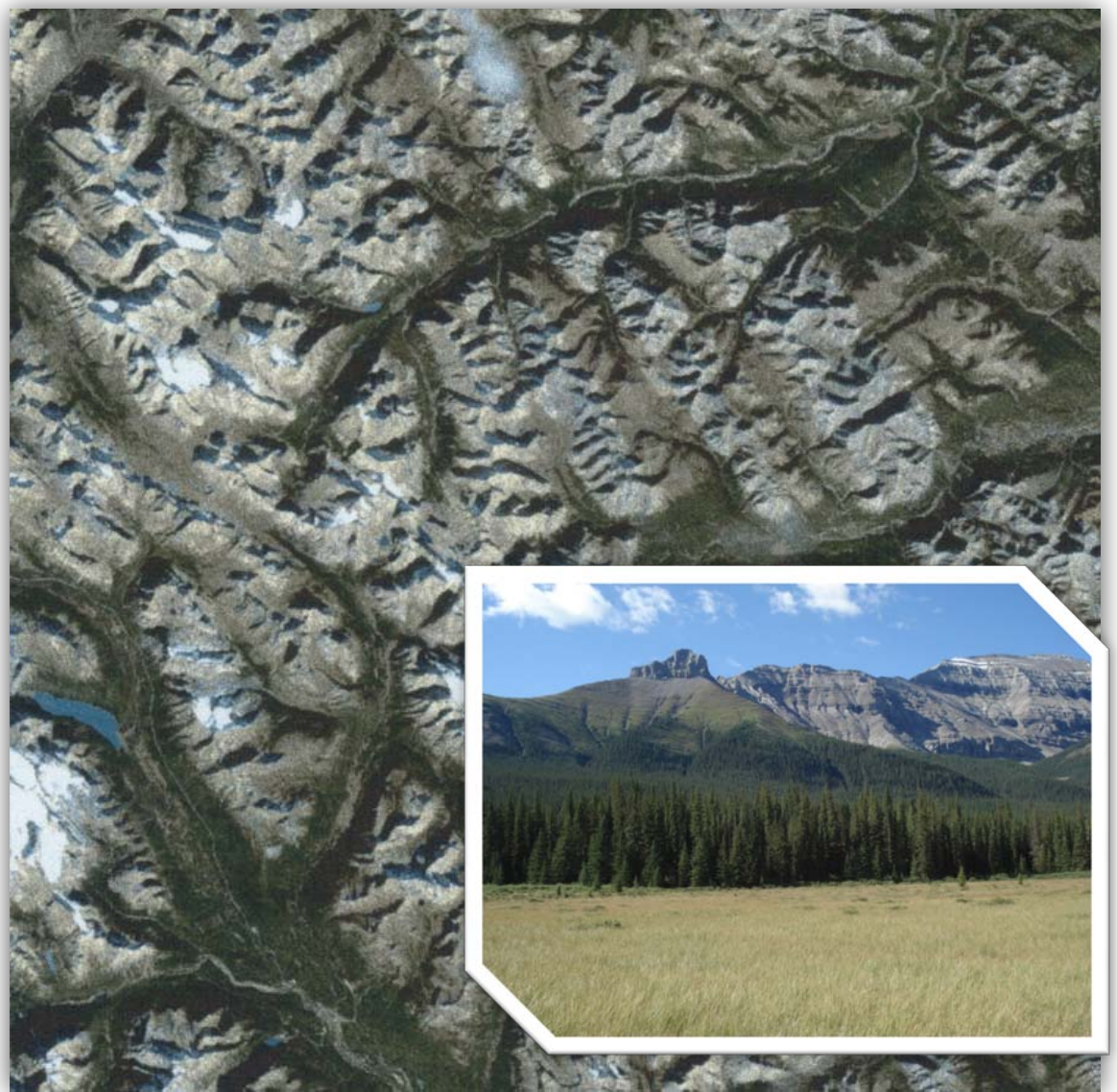


9+ fires

1879, 1838, 1832,
1820, 1792, 1776,
1772, 1725

Mountain Subalpine Landscape

- High intensity -stand replacement
- Low veg. complexity
- Mean fire size remains small: < 1000ha (2500 ac.)
- Max. size: up to 10,000 ha
- Long intervals
- Fire cycle > 100yrs
- Summer burning
- Effect of topography is significant



Foothills / Montane Landscape

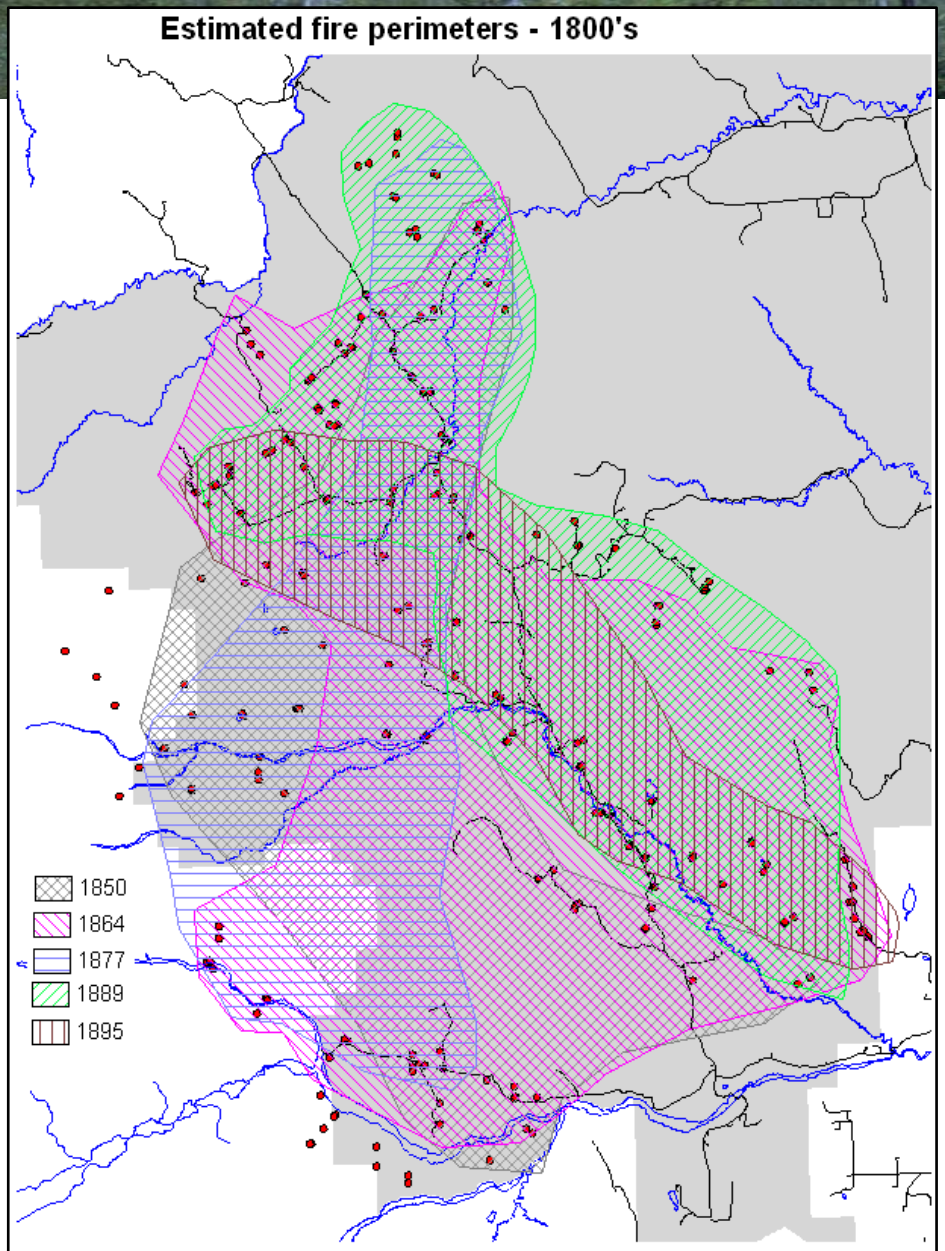
- Mixed intensities partial to full stand replacement
- Complex veg. mosaic
- Mean fire size: 1400ha (3500 ac.)
- Max. size: 20 to 50,000 ha
- Short intervals
- Fire cycle: 30 – 50 yrs
- Spring burning
- Effect of topography not as significant

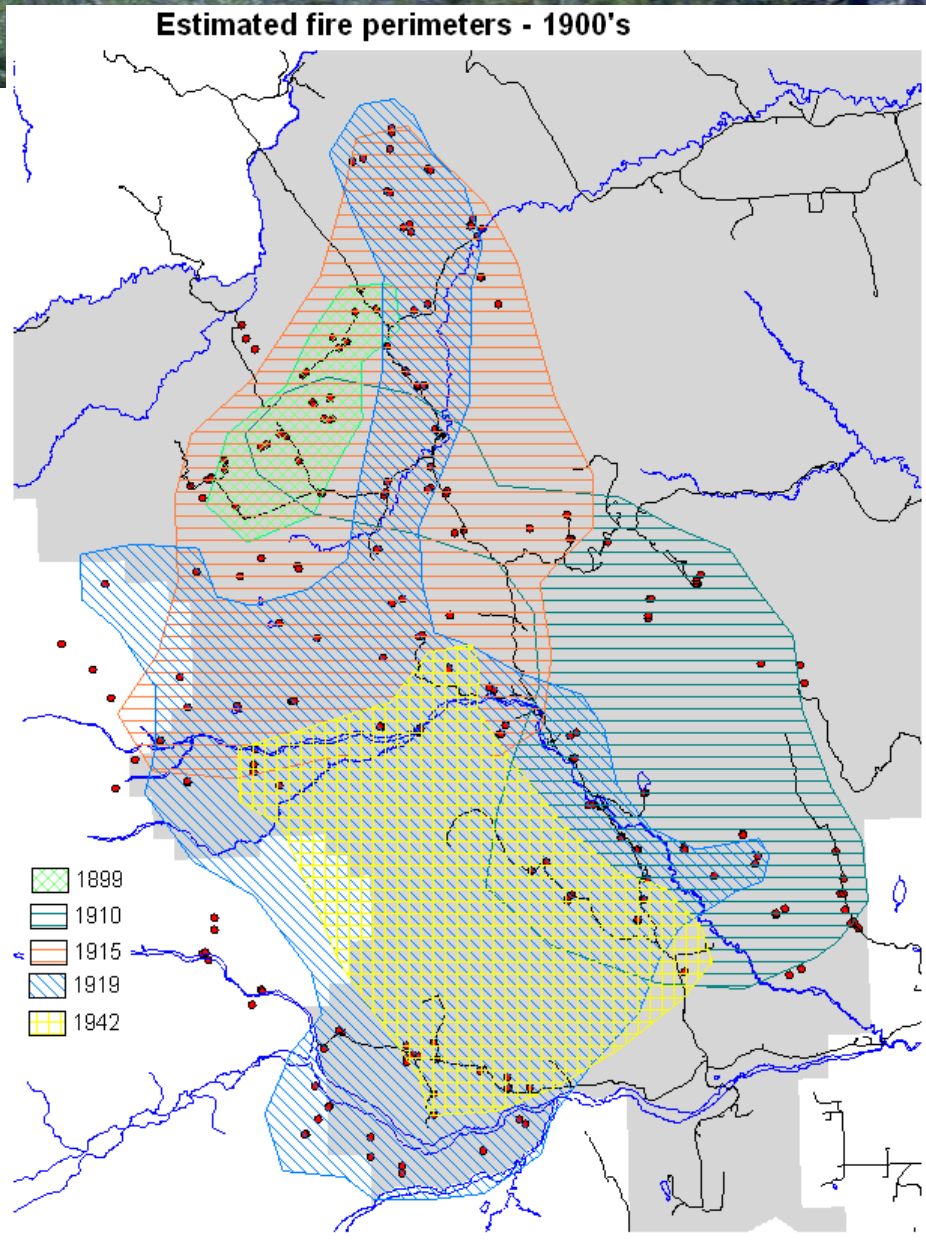
15 Severe Fire Seasons since 1840's

1. 1843 – 45
2. 1848 – 50
3. 1863 – 64
4. 1867 – 68
5. 1869 – 70
6. 1875 – 77
7. 1885
8. 1888 – 89
9. 1894 – 96
10. 1909 – 10
11. 1913 - 15
12. 1917 - 19
13. 1924 – 25
14. 1927 – 29
15. 1934 - 36

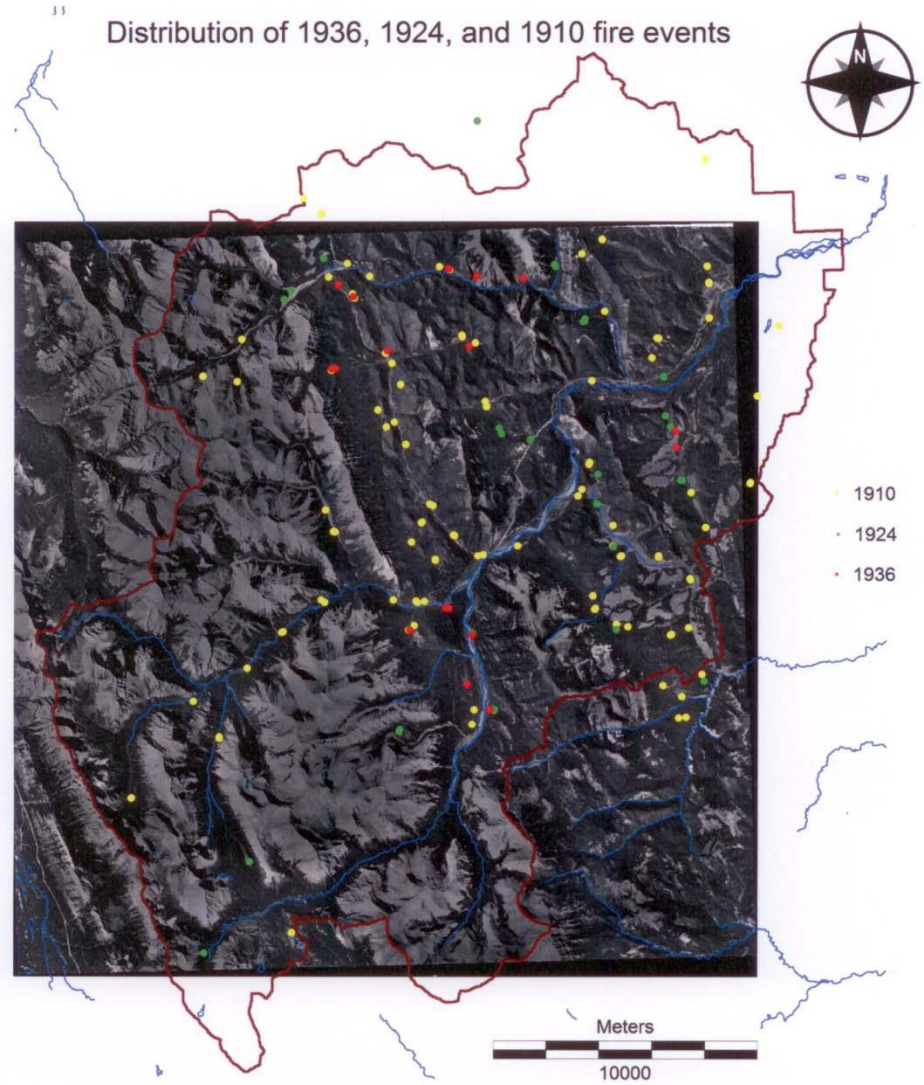
2003 Verendrye Fire, Kootenay N.P.

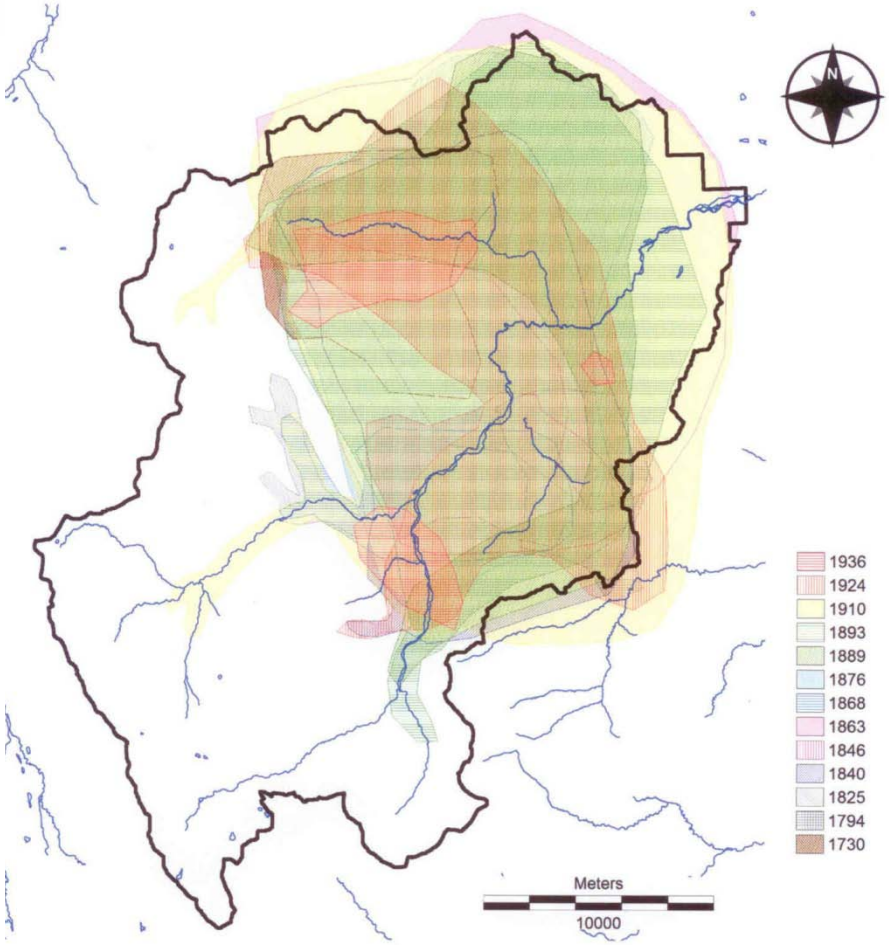
Historically: MFRI 10 yrs, FC 40 yrs



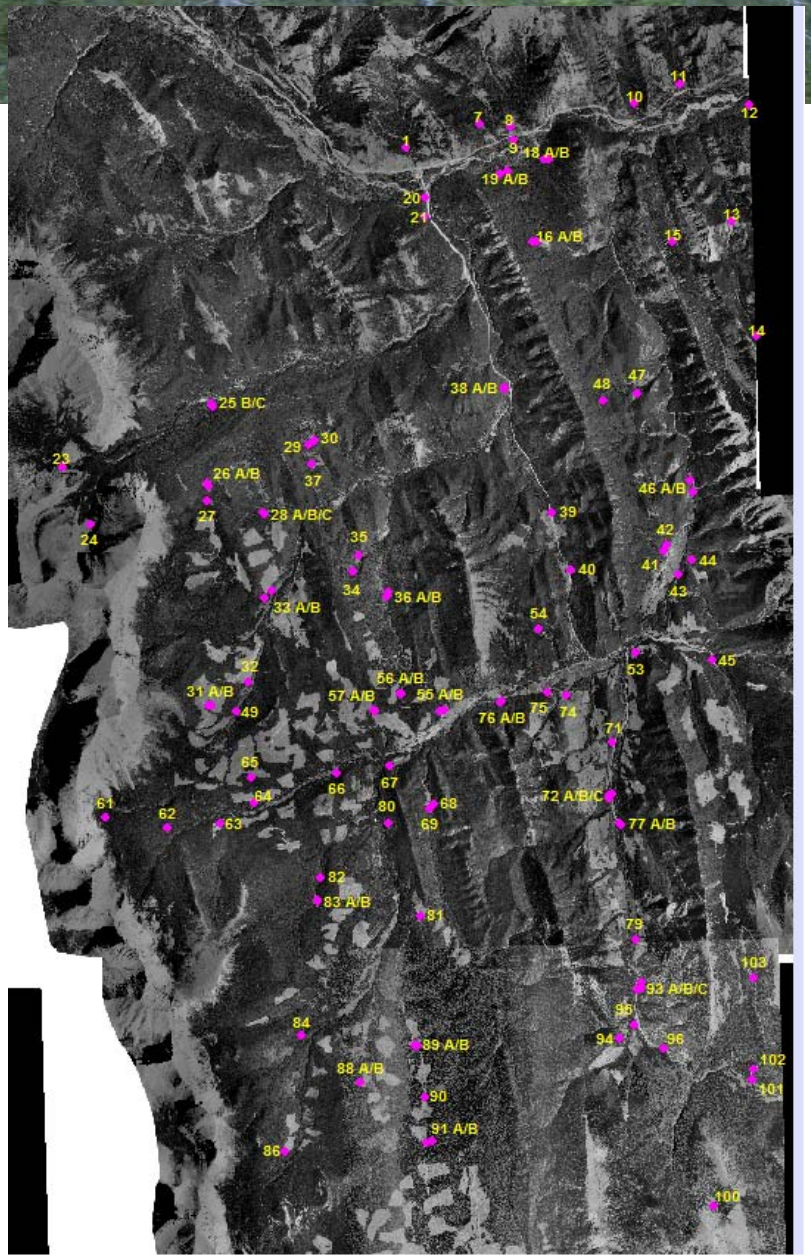


Fire spread dynamics at the interface



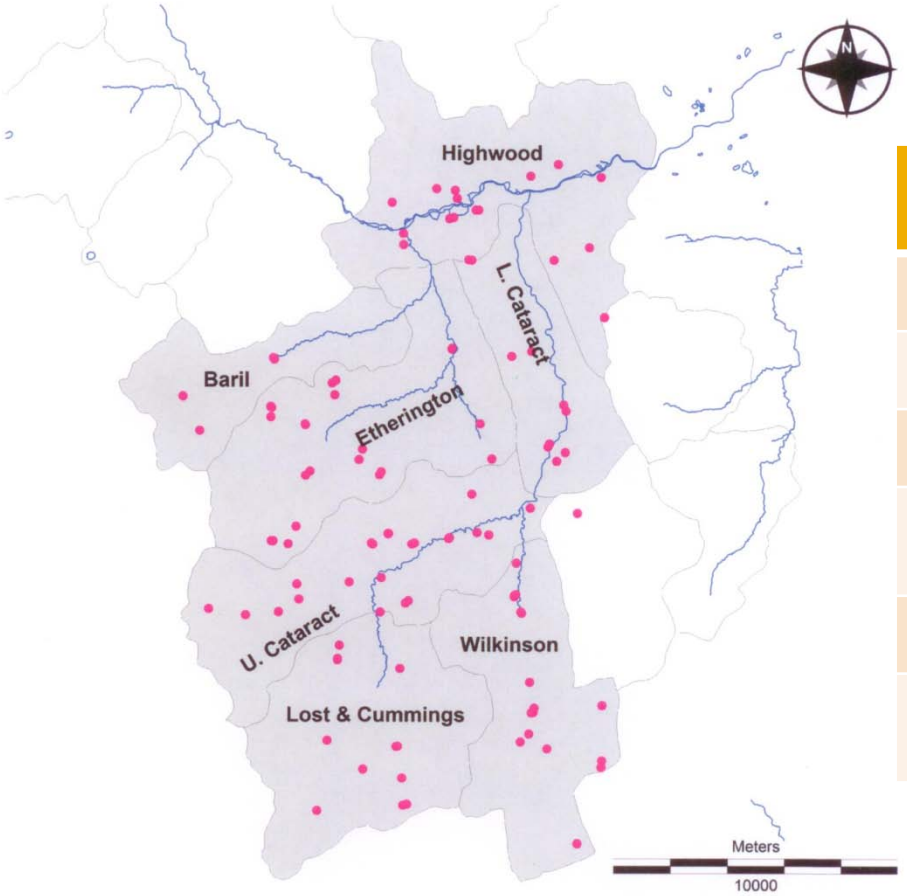


Highwood fire history - 2011



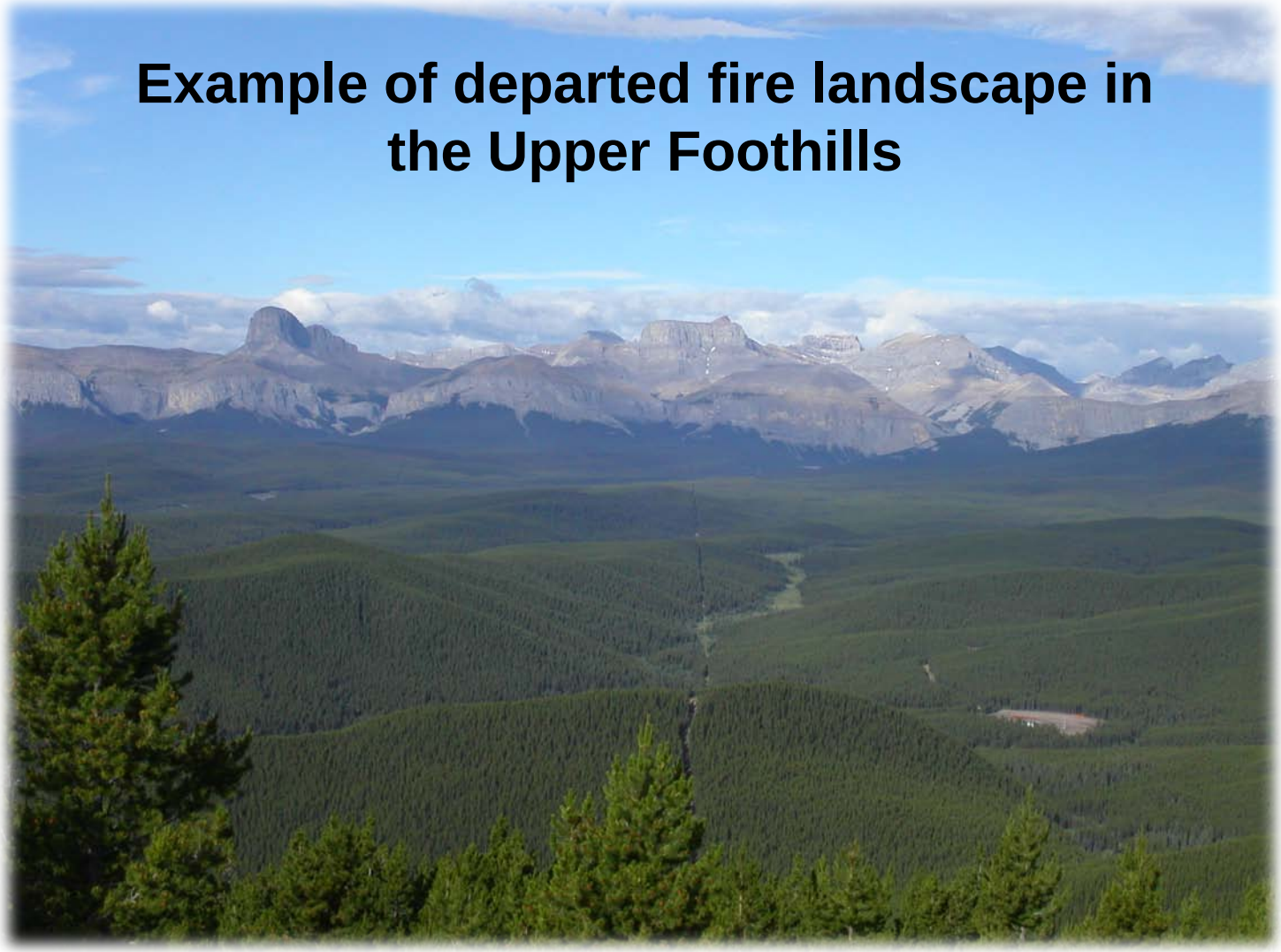
Significant fire years			
post 1850		pre-1850	
Fire years	FRI	Fire years	FRI
1936	22	1850	12
1914	15	1838	6
1899	22	1832	12
1877	6	1820	19
1871	3	1801	29
1868	6	1772	19
1862	12	1753	13
1850		1740	21
		1719	4
MFRI:	**12.29**	1715	5
		1710	
		MFRI:	**14**

Highwood fire history - 2011



Watershed	MFRI	Number fires/site	Avg TSF	Max TSF (oldest)
Highwood	32	6	122	206
L. Cataract	54	4	139	416
U. Cataract	49	8	184	386
Ethering-ton – Baril	89	5	173	356
Wilkinson	62	4	248	366
Lost-Cummings	48	3	244	366

Ecosystem Condition Departure

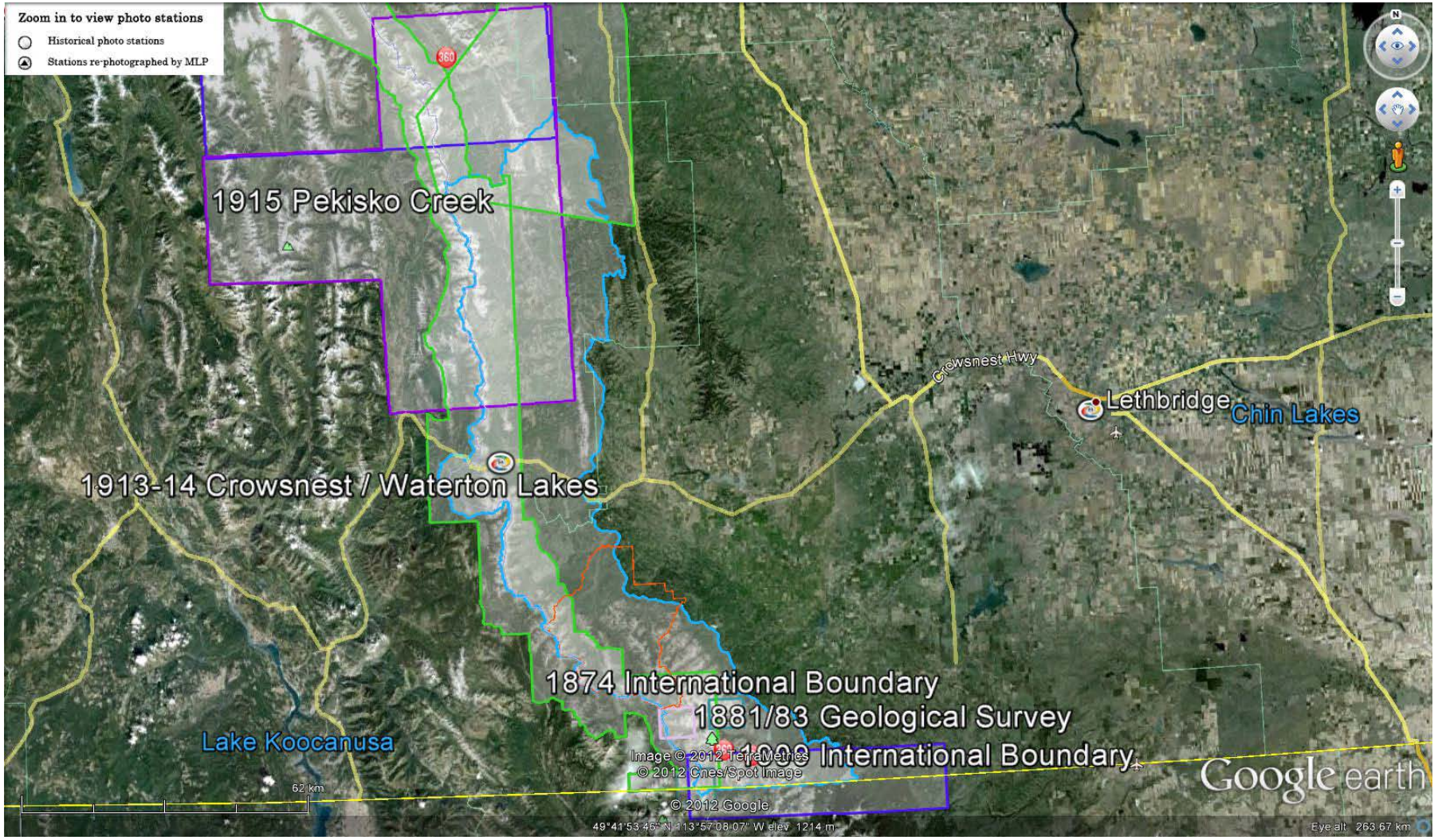


The Montane in the 1890's

Bow Valley – Mount Yamnuska
July 16 1890, MacArthur Surveying Party

Photo credit: Mountain Legacy Project

Mountain Legacy Photography



http://mountainlegacy.ca/

Mountain Legacy Photography

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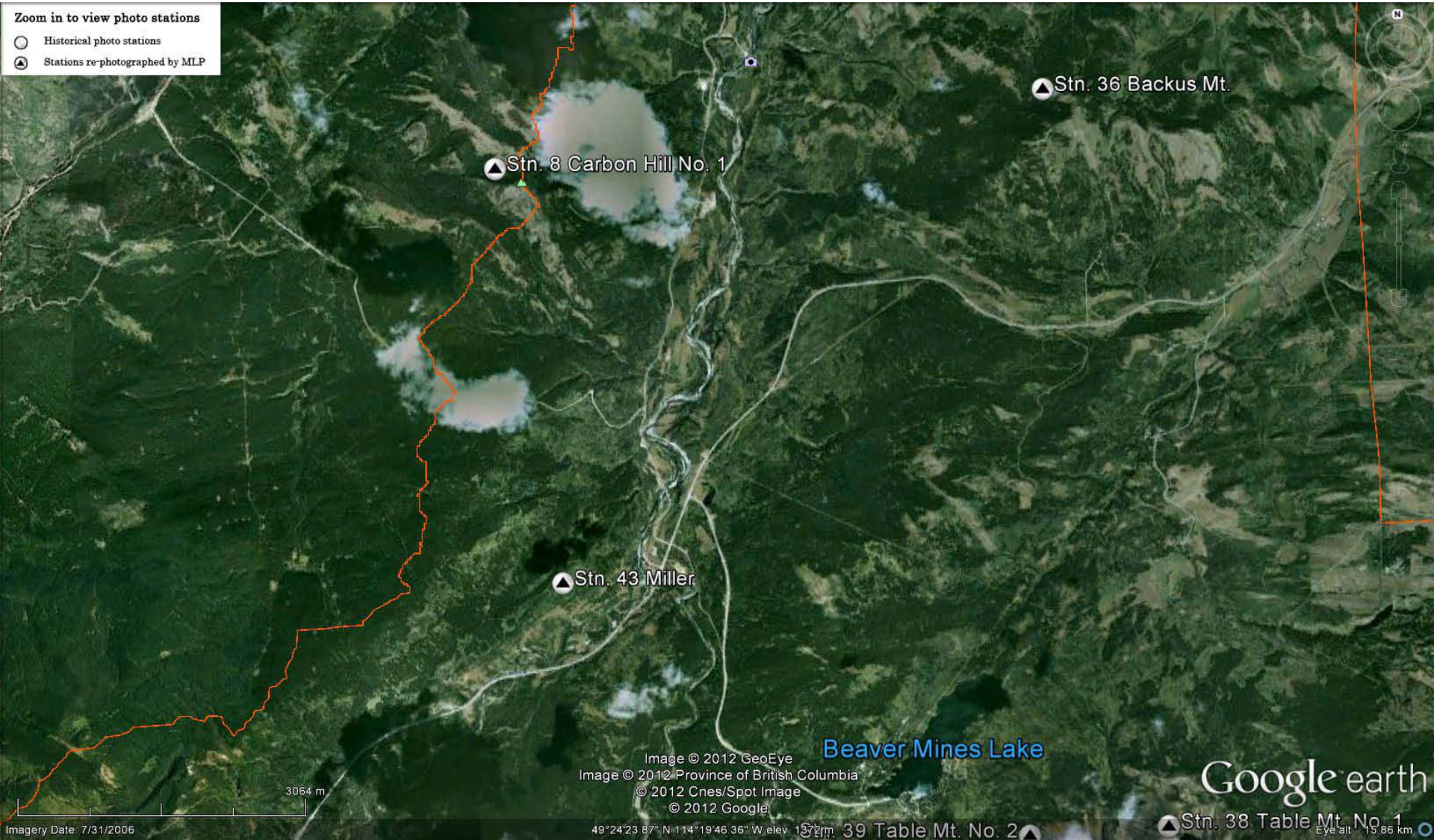


Carbon Hill Station

Photo credit: Mountain Legacy Project

Bridgland - 1914

Table Mountain No. 2

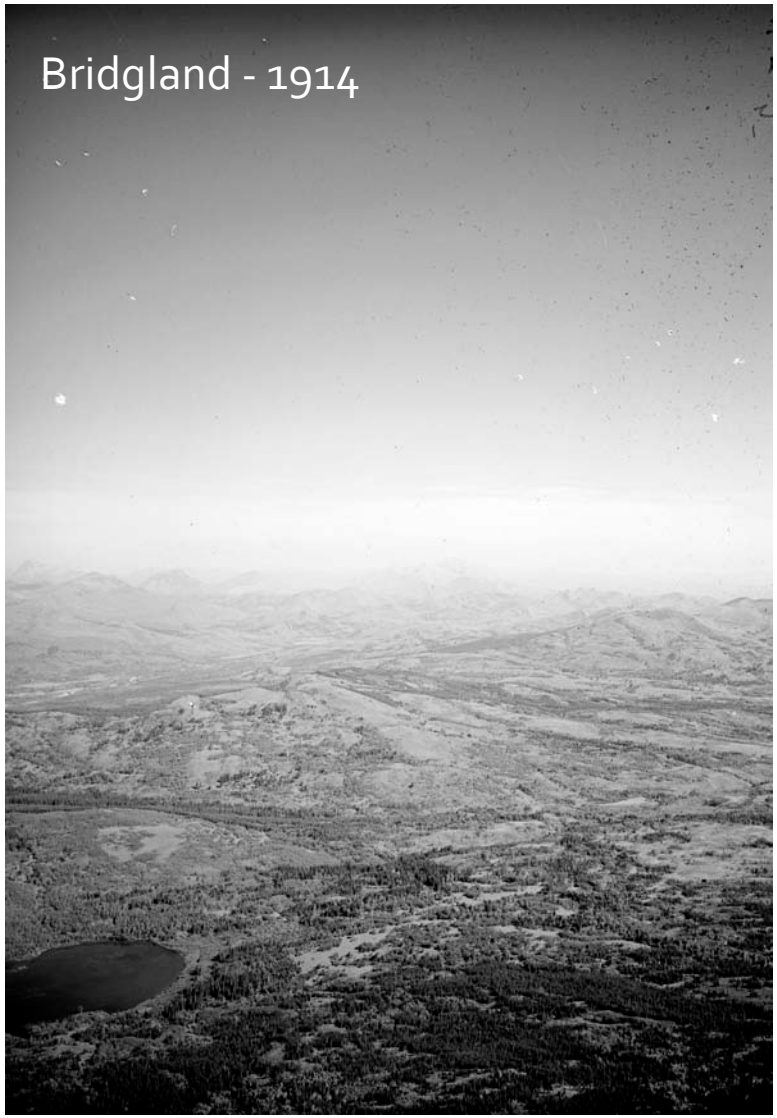
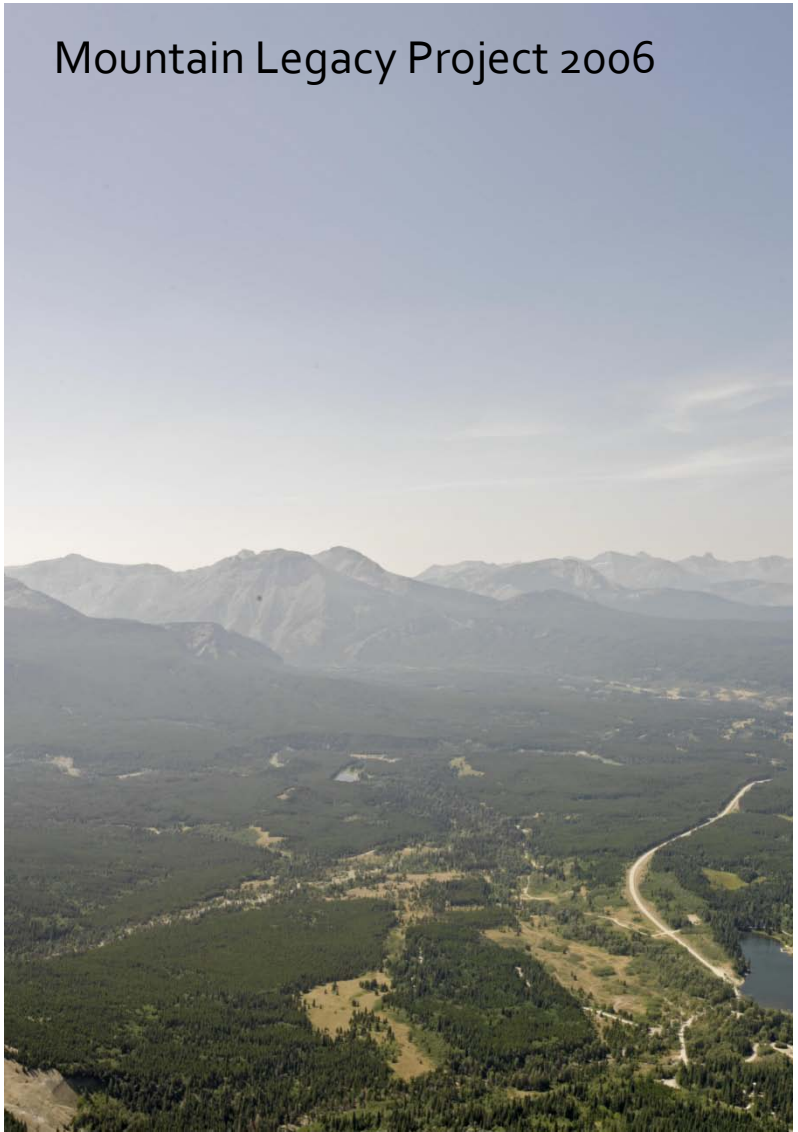
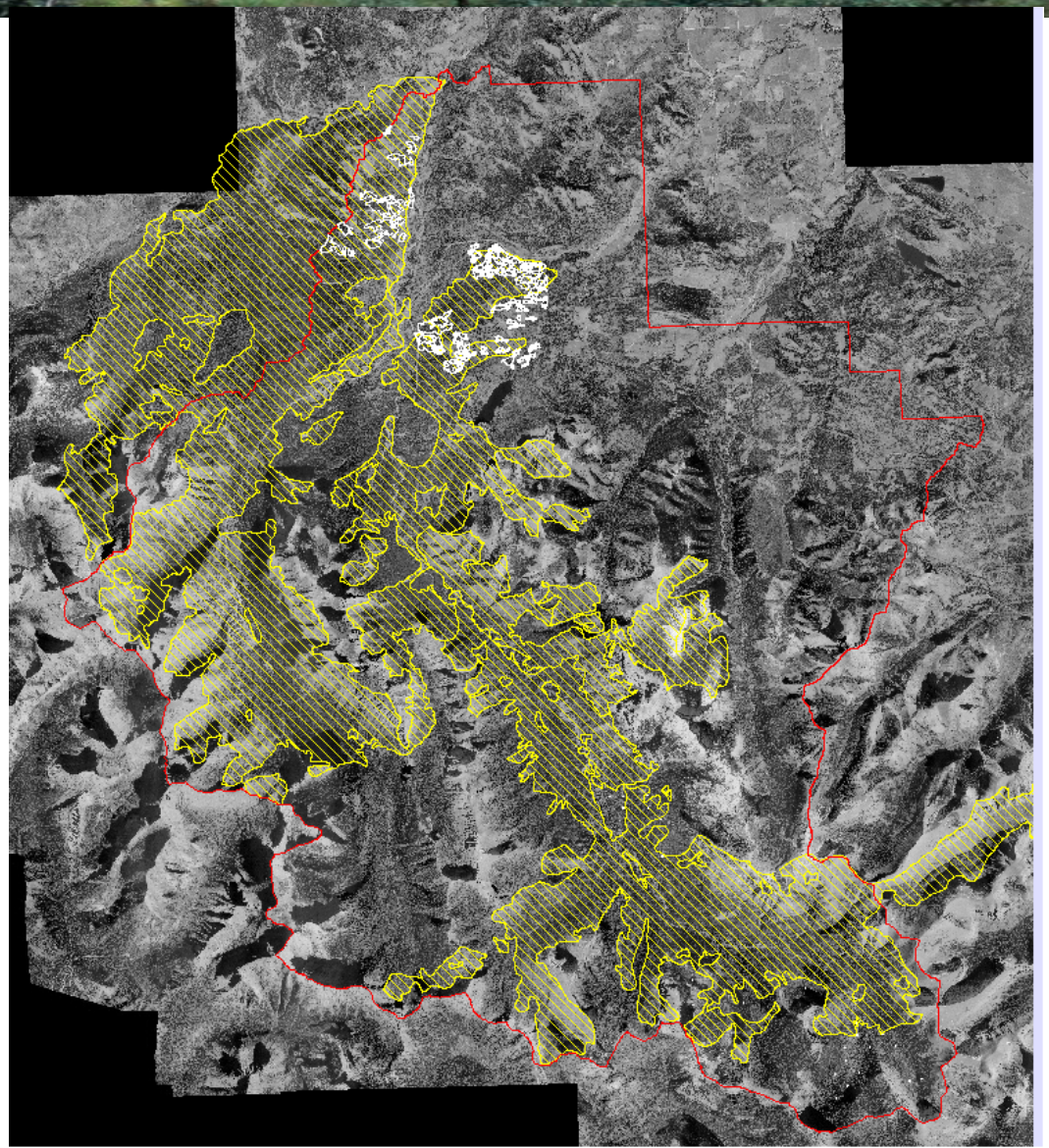


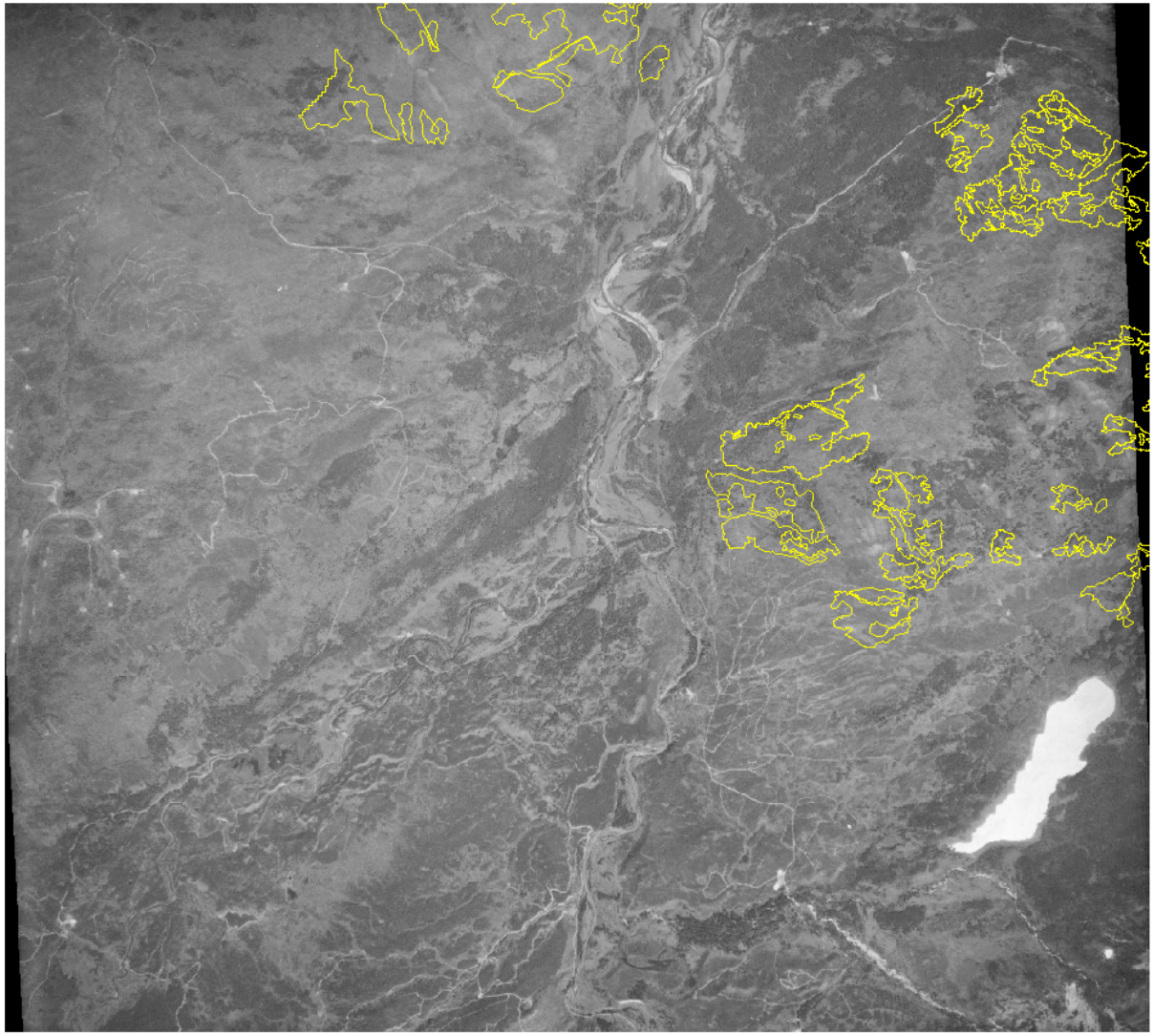
Table Mountain No. 2



1934 to 1936 Castle fires



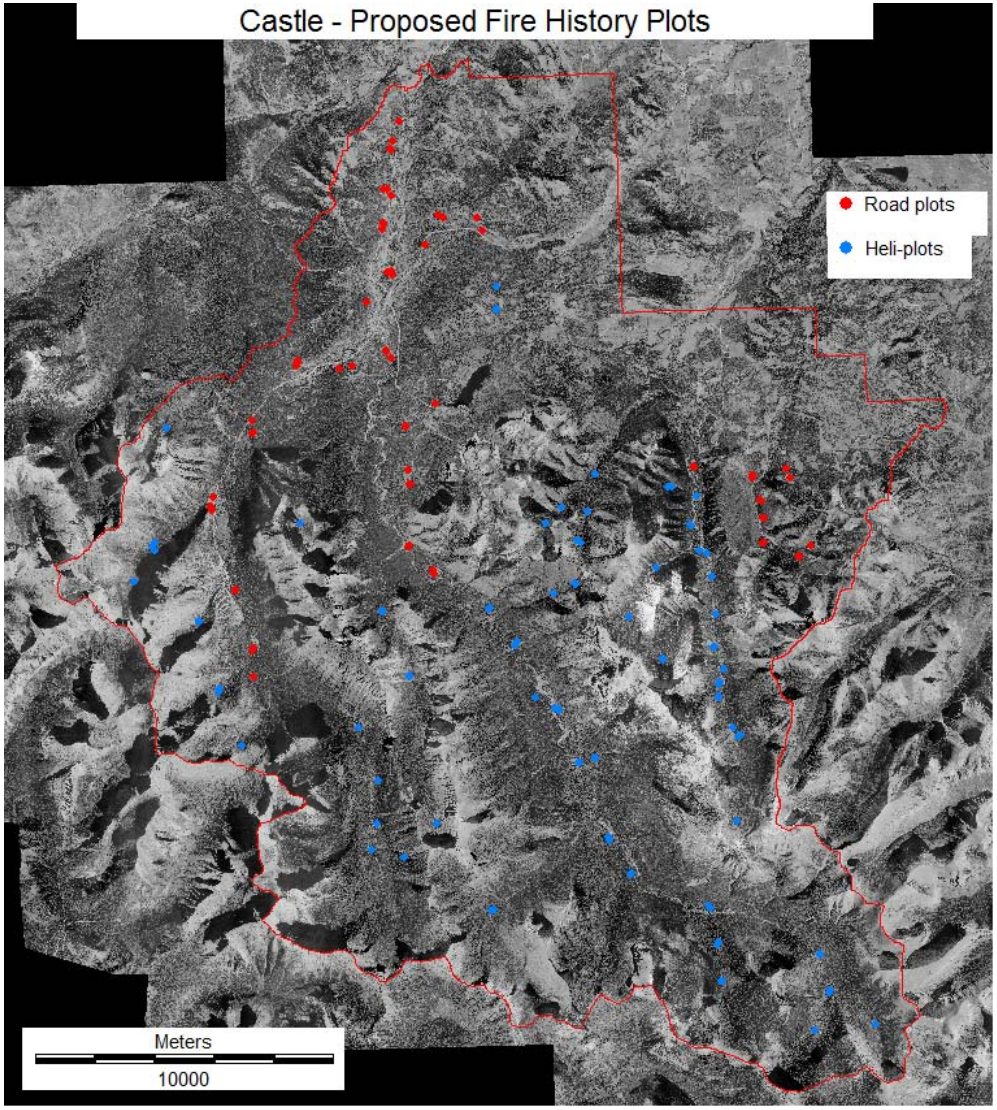
2012 Castle cut blocks



Benefits of Fuels Management via logging and prescribed burning

- Wildfire suppression will be more effective under moderate burning conditions:
  - Decrease the fuel load
  - Break-up the forest cover
- Less carbon release with repeat light prescribed burns over one large high intensity stand replacing fire.
- Stream banks and headwaters can be better protected under managed conditions than out of control forest fires.

Castle fire history sampling plots



Acknowledgements

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