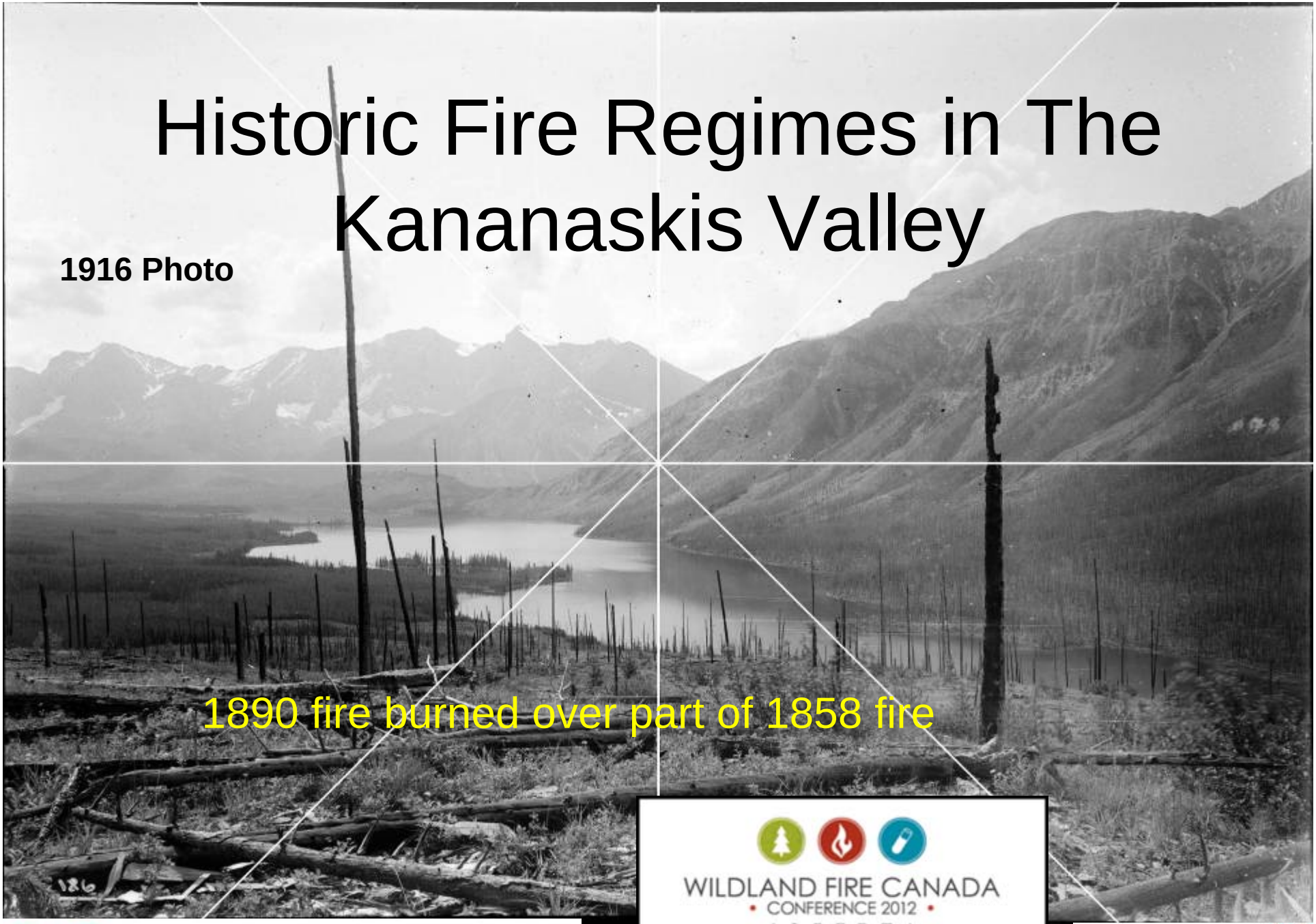
Historic Fire Regimes in The Kananaskis Valley

1916 Photo



Natural Resources Canada | Ressources naturelles Canada

WILDLAND FIRE CANADA
• CONFERENCE 2012 •
ALBERTA
OCTOBER 2-4, 2012 KANANASKIS, ALBERTA

Canada

Talk Outline

Special Thanks to MP Rogeau and Ric Arthur for Material used for this presentation

Discuss people that have studied, observed, reported and influenced the Historic Fire Regimes in Southern Rockies

A few definitions of fire terms

Fire Evidence used

Summarize fire ecology/history studies in Kananaskis Valley

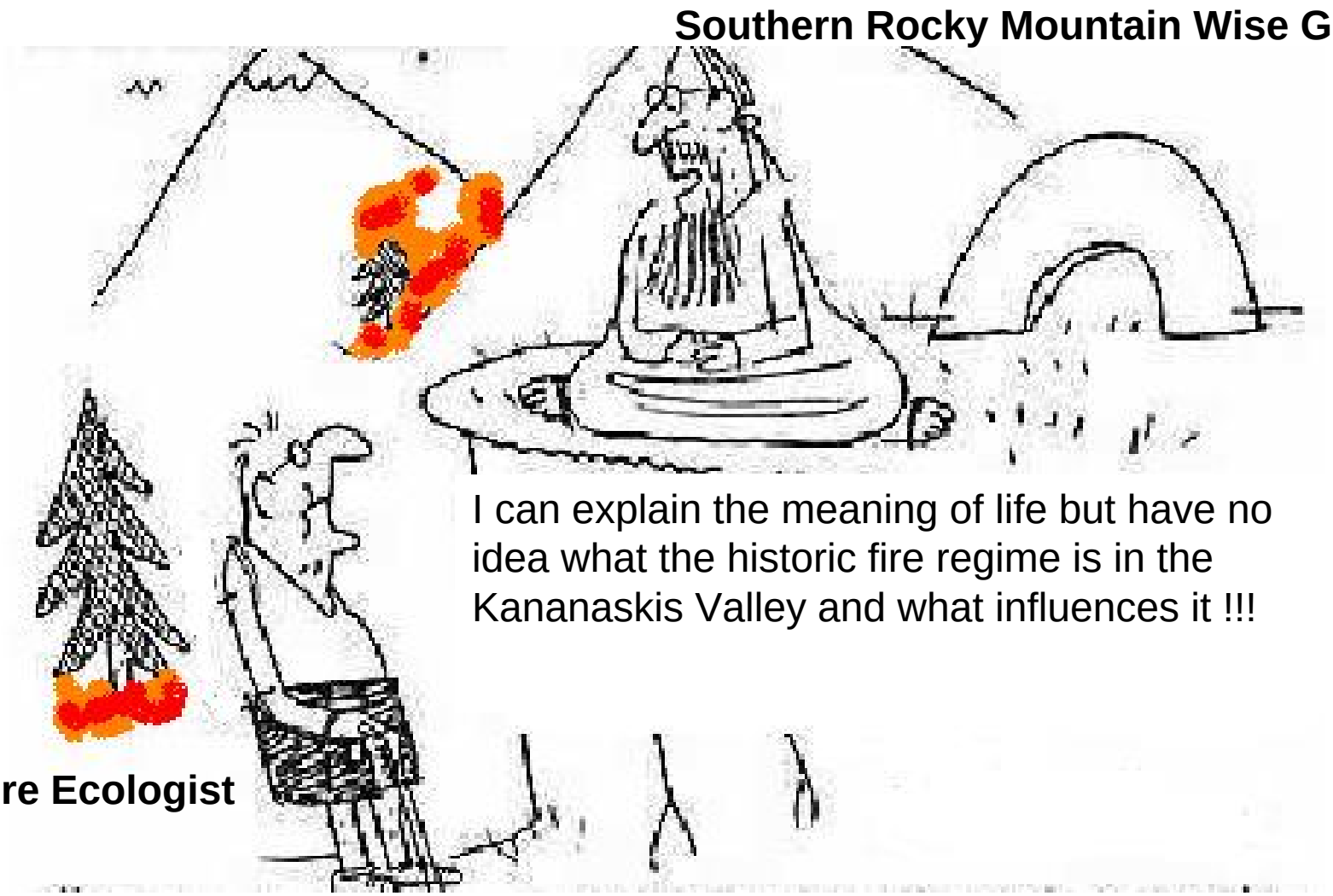
Fire Patterns

Discuss the findings of fire cycles/return intervals and influences on those among researchers

The fire behaviour and impact of the 1936 Galatea fire, the most recent large wildfire in the part of the valley were are located for this conference and salvage logging history. How fire history can be linked to surface woody fuel load

Discuss the current landscape and how past fire's influence

Controversy over historic fire regimes and reasons for lack of fire



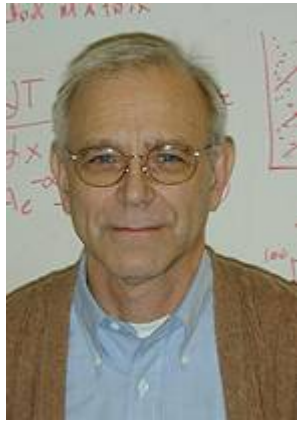
Studying, Observing, Reporting and Influencing Historic Fire Regimes in Southern Rockies

Pocaterra

Palliser

Rogeau

Arthur



Johnson/students

Van Wagner

Photo credit: Ric Arthur

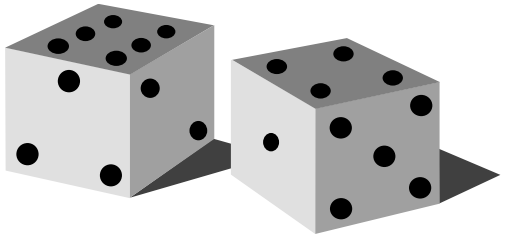
Rummel

Hawkes

White

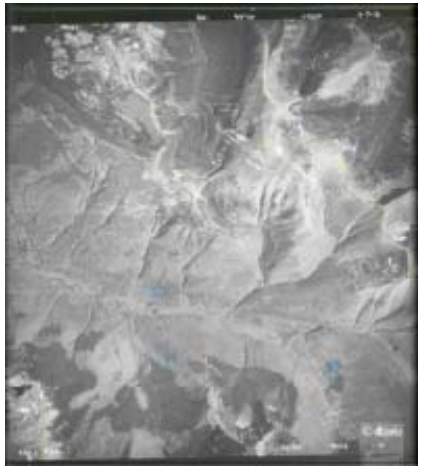
E.A. Johnson, K. Miyanishi, G.I Fryer, C.P.S. Larson, W.J. Reed, M.P. Rogeau, S. Jevons, C.E. Van Wagner, B.C. Hawkes, S. Barrett, C. White, M. Heathcott, and R. Arthur.

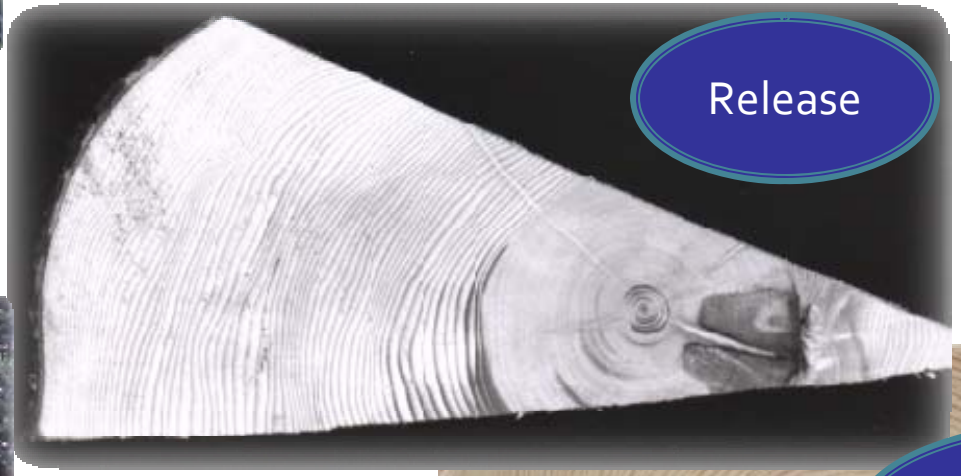
Definitions



- **Fire Regime:** type, frequency, size, seasonality, severity, spatial pattern, and cause
- **Mean Fire Return Interval:** represents the average from all fire intervals calculated at each sampling site (stand level).
- **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. Roughly equal to the average stand age

Fire Evidence



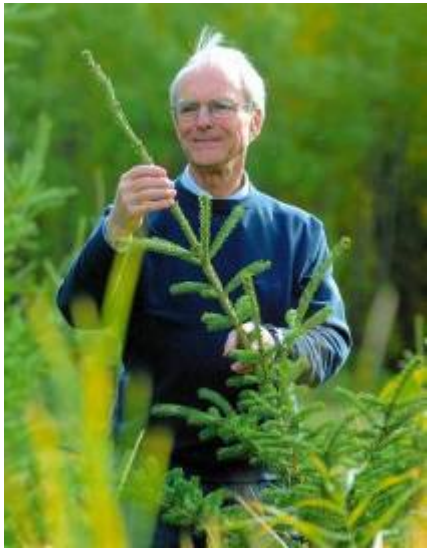


Release

Burnt stump

External and Internal scar

Fire History and Fuel Appraisal Study of Peter Lougheed (PL) Provincial Park 1977-79



George R. Fahnestock

THE AUTHOR is project leader, Fuel Appraisal Systems, Pacific Northwest Forest and Range Expt. Sta., Forest Service, U. S. Dept. Agric., Seattle, Washington.

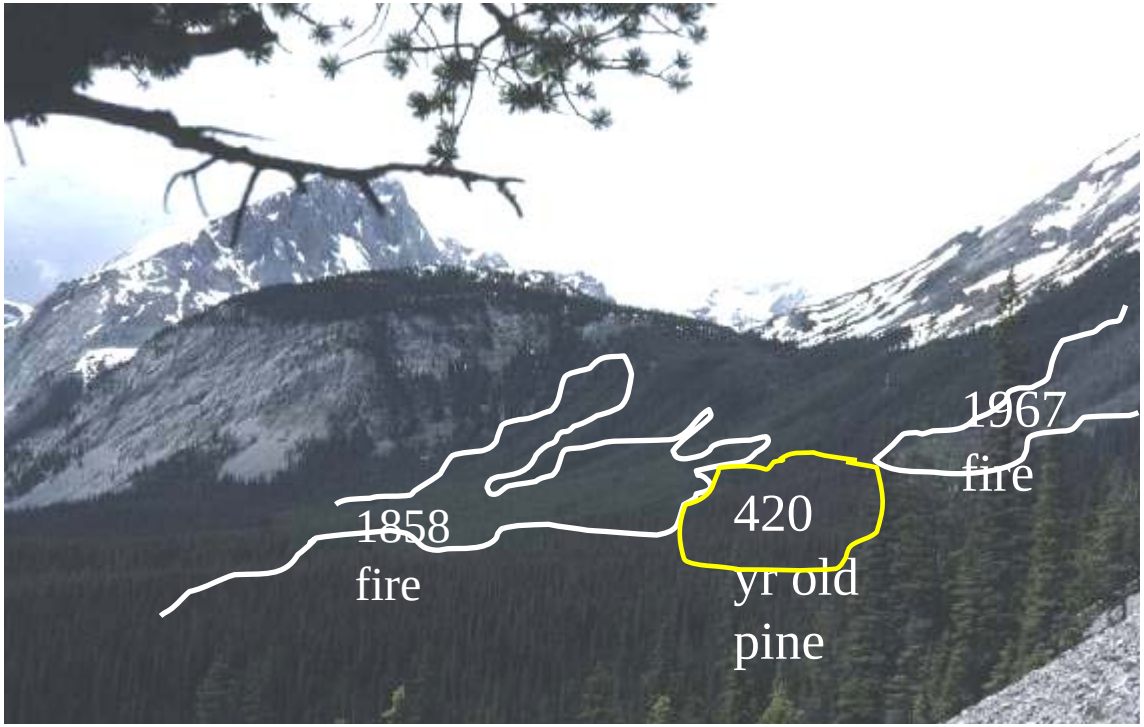
Mean Fire Return Interval – PL Prov Park

Low Elevation 90 yrs

High Elevation 153 yrs

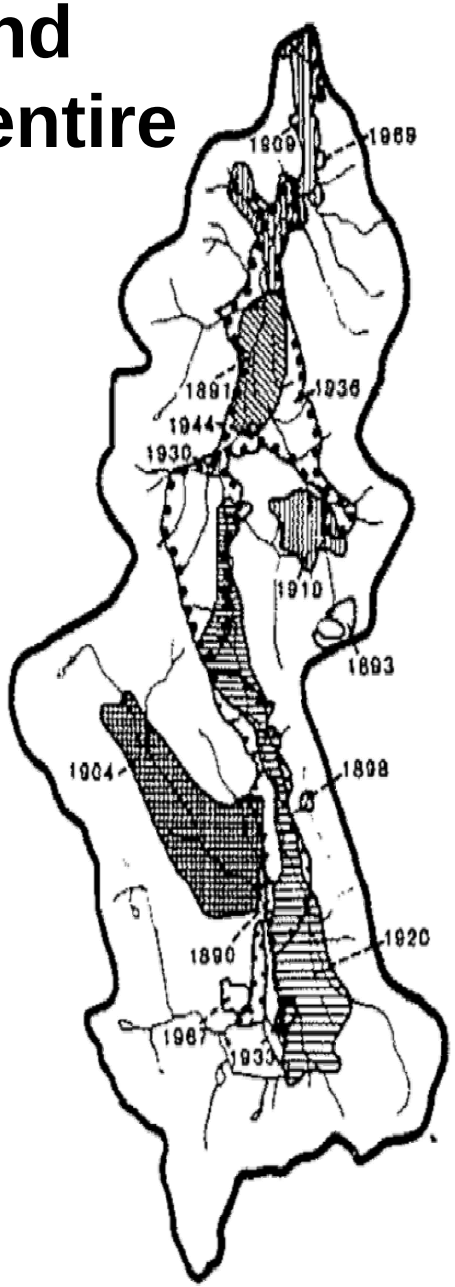
Avg 123 yrs

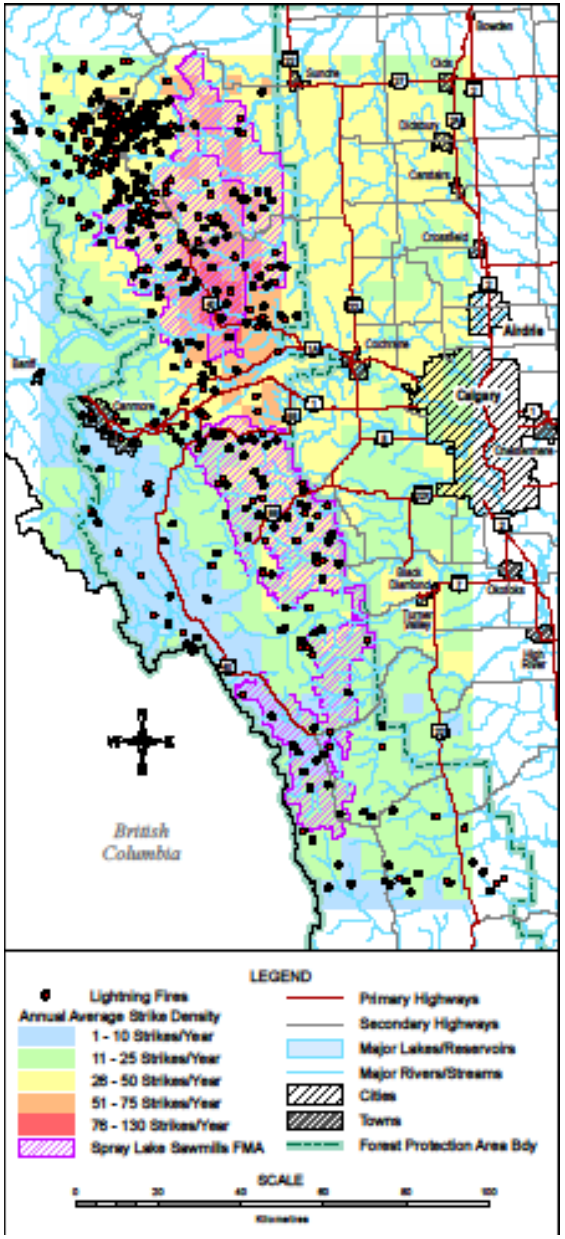

420 yr old
stand
1920s picture of upper
Kananakis Lakes
before damming. Nice
Islands.


1858
fire
420
yr old
pine
1967
fire

Reed, et al 1998 using Johnson and Larsen 1991 time since fire data for entire Kananaskis Valley

- time-since-fire map data (included data from Hawkes fire history in PL Prov Park)
- the study area regarded as homogeneous from a fire history perspective
- Spatial autocorrelation in time-since-fire data is handled by using an overdispersed model, with associated quasi-likelihood function.
- Fire Cycle 131 yrs (87-192 yrs)



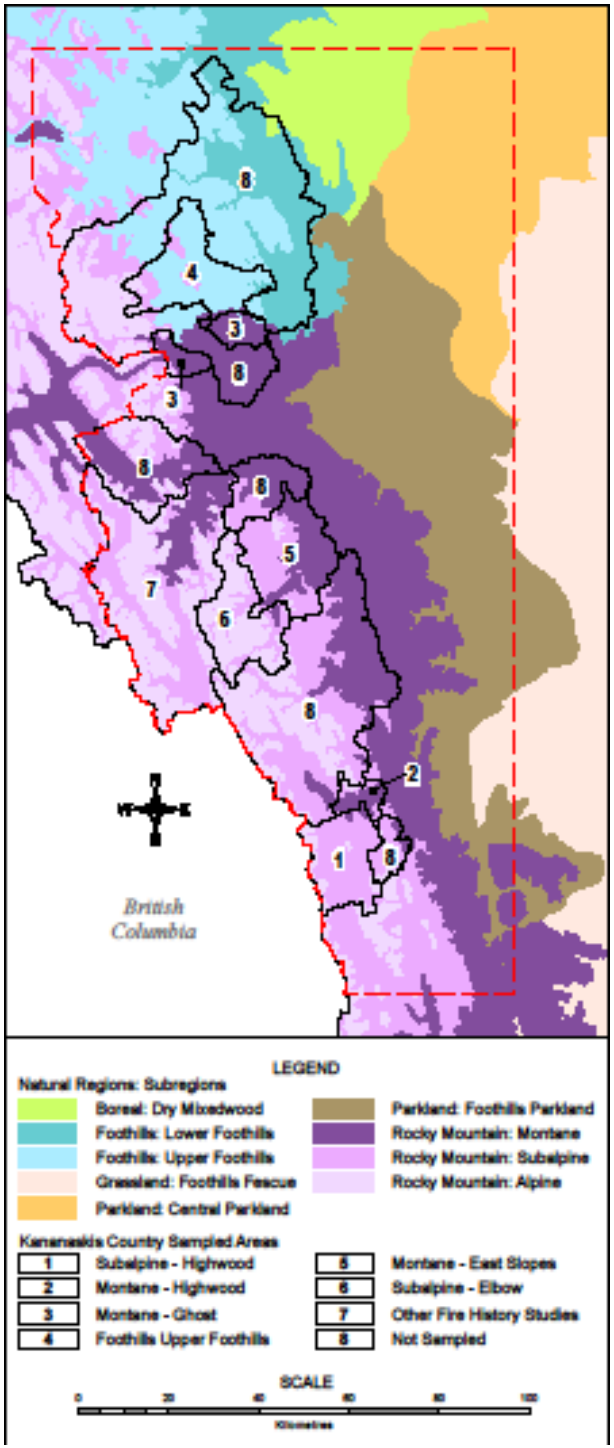


Lighting Strikes and Fire Distribution – MP Rogeau

Month	Lightning %	Human %	Area burned ha
January	0.00	2.16	101.95
February	0.00	1.87	2,175.14
March	0.22	6.27	442.26
April	0.22	12.01	515.98
May	4.53	17.39	542.29
June	10.78	12.54	127.09
July	42.89	13.43	352.04
August	38.15	12.91	2,467.54
September	3.23	9.25	9,241.86
October	0.00	6.94	266.44
November	0.00	3.58	147.01
December	0.00	1.64	194.74
			16,574.34

1961-2003

	Alpine	Subalpine	Montane - Ghost	Mont.-East Slopes	Upper Foothills	Lower Foothills
avg strike/year	13	16	43	24	47	43
probability lightning fire/year	3.23%	3.85%	3.70%	3.85%	9.09%	4.00%
1 fire every *x* years	31	26	27	26	11	25



Study area 6 - Subalpine – Highwood (MFRI 59 yrs)

Study area 1 -Subalpine – Elbow (MFRI 87 yrs)

Study area 2 - Montane – Highwood (MFRI 27 yrs)

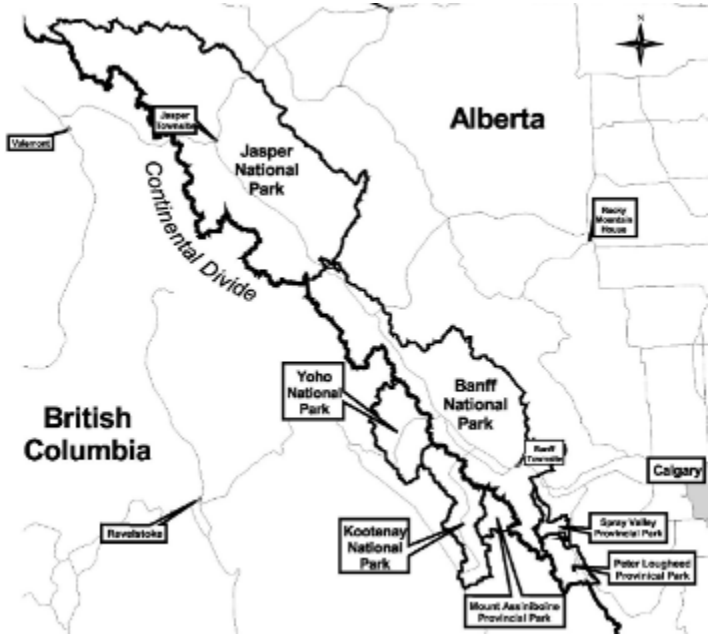
MP Rogeau Project

In terms of fire seasonality, fire scarring tissues suggested a preponderance of burning during the Spring and dormant period (Fall or early Spring) for the Montane subregion

Historical Fire Cycles in the Canadian Rocky Mountain Parks

Charles E. Van Wagner, Mark A. Finney, and Mark Heathcott

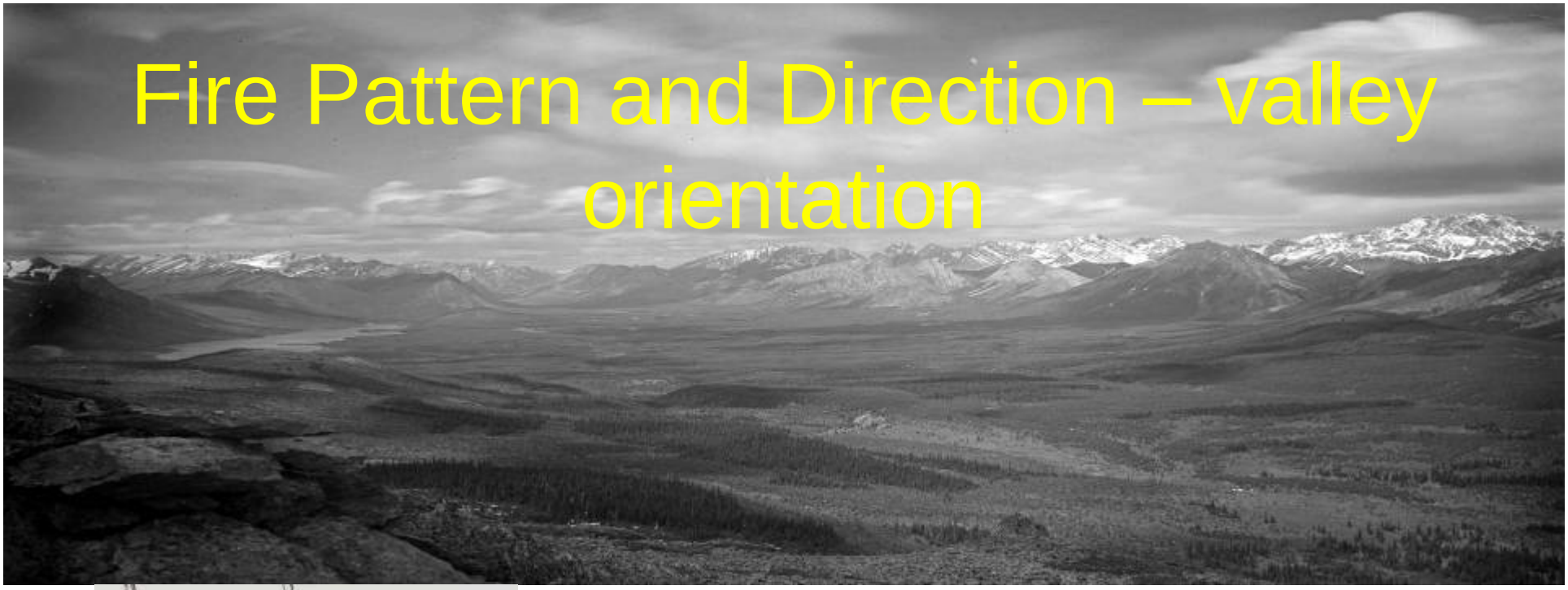
- Jasper, Banff, Peter Lougheed, Spray Lakes – east side parks
- Trend to lower burning rate with transitions in 1760 and 1940
- four centuries before 1760, fire cycle from 60 to 70 yr
- After 1760 fire cycle was reduced to about 175 yr ending in 1940
- From 1940 to 2000,less than 1% of the forest has burned

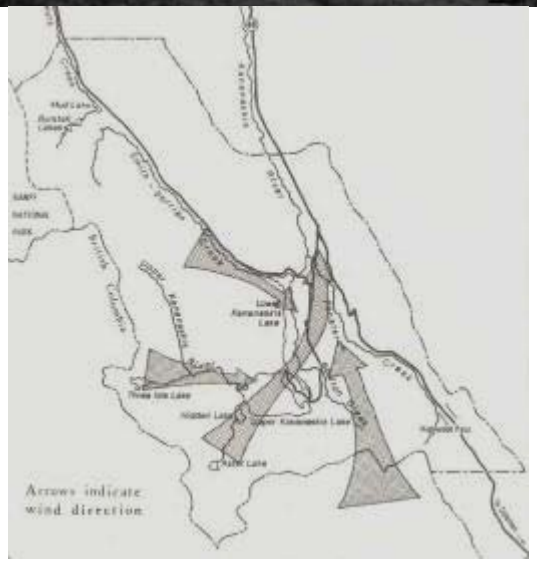


How do the fire cycles and fire return intervals compare?

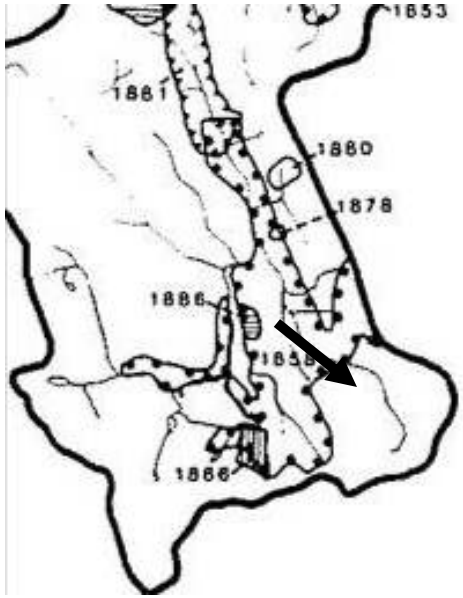
- PL Prov Park MFRI 123 (90-153)
- Whole valley Reed FC 131 (87-192)
- Subalpine Highwood Rogeau MFRI 59
- Subalpine Elbow Rogeau MFRI 87
- Van Wagner (Mtn parks) FC 120 (65-175)

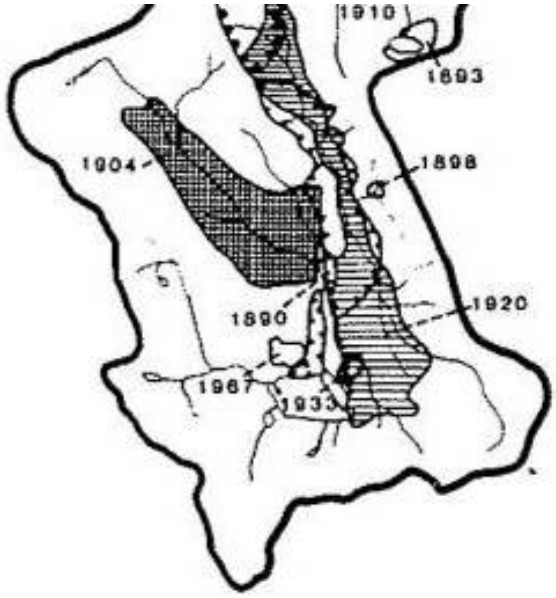
Fire Pattern and Direction – valley orientation



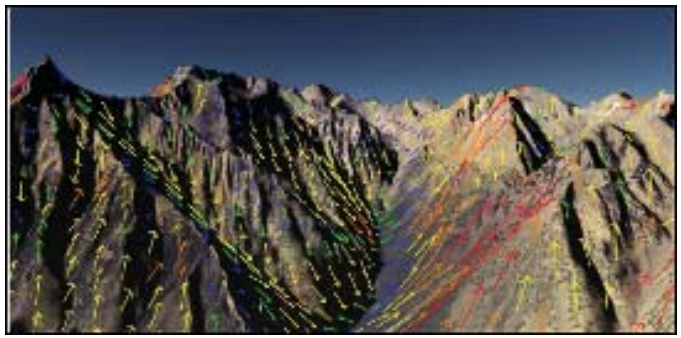


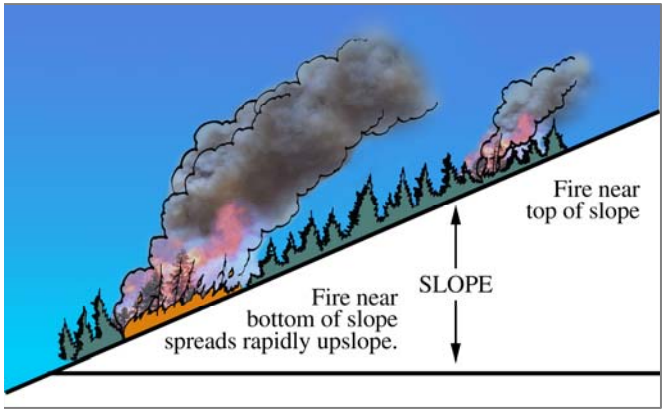
Kananaskis Lookout 1966-1971 prevailing wind directions in July and August

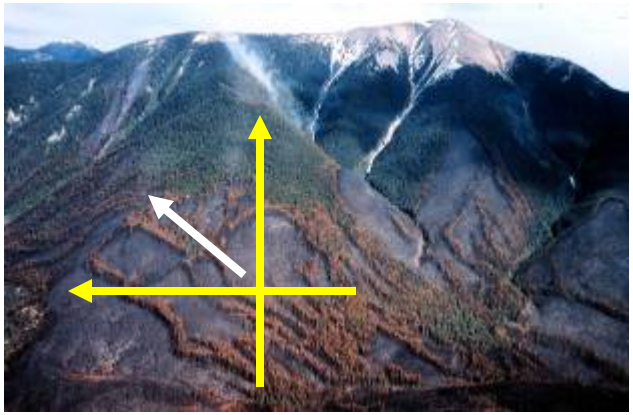


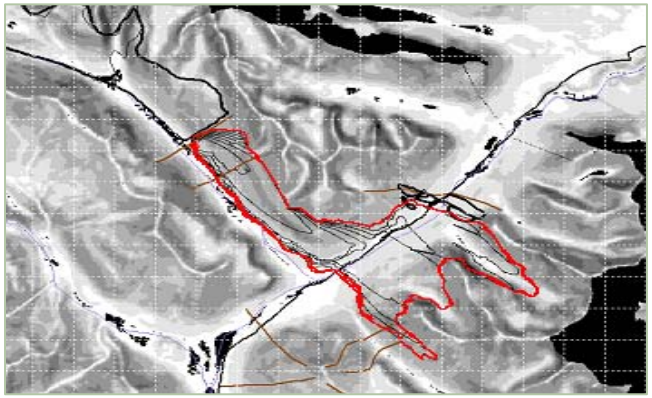


Topography and Fire Behaviour

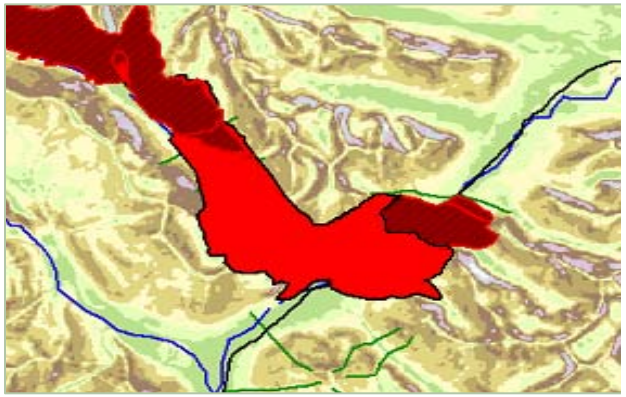








Prometheus prediction
Aug 19th



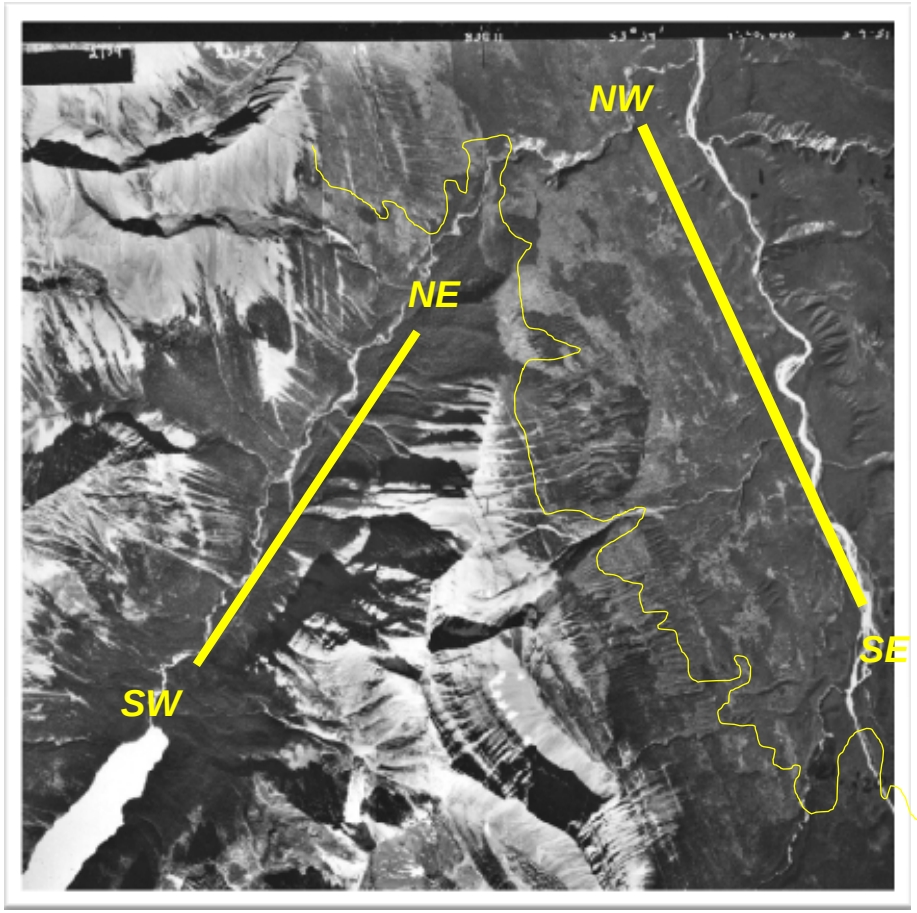
Actual Area Burned
Aug 20th

Effect of Topography on Burning Patterns and Fire Return Interval

MP Rogeau found that the topographic stand age model she developed for Banff National Park and Kananaskis Country concluded:

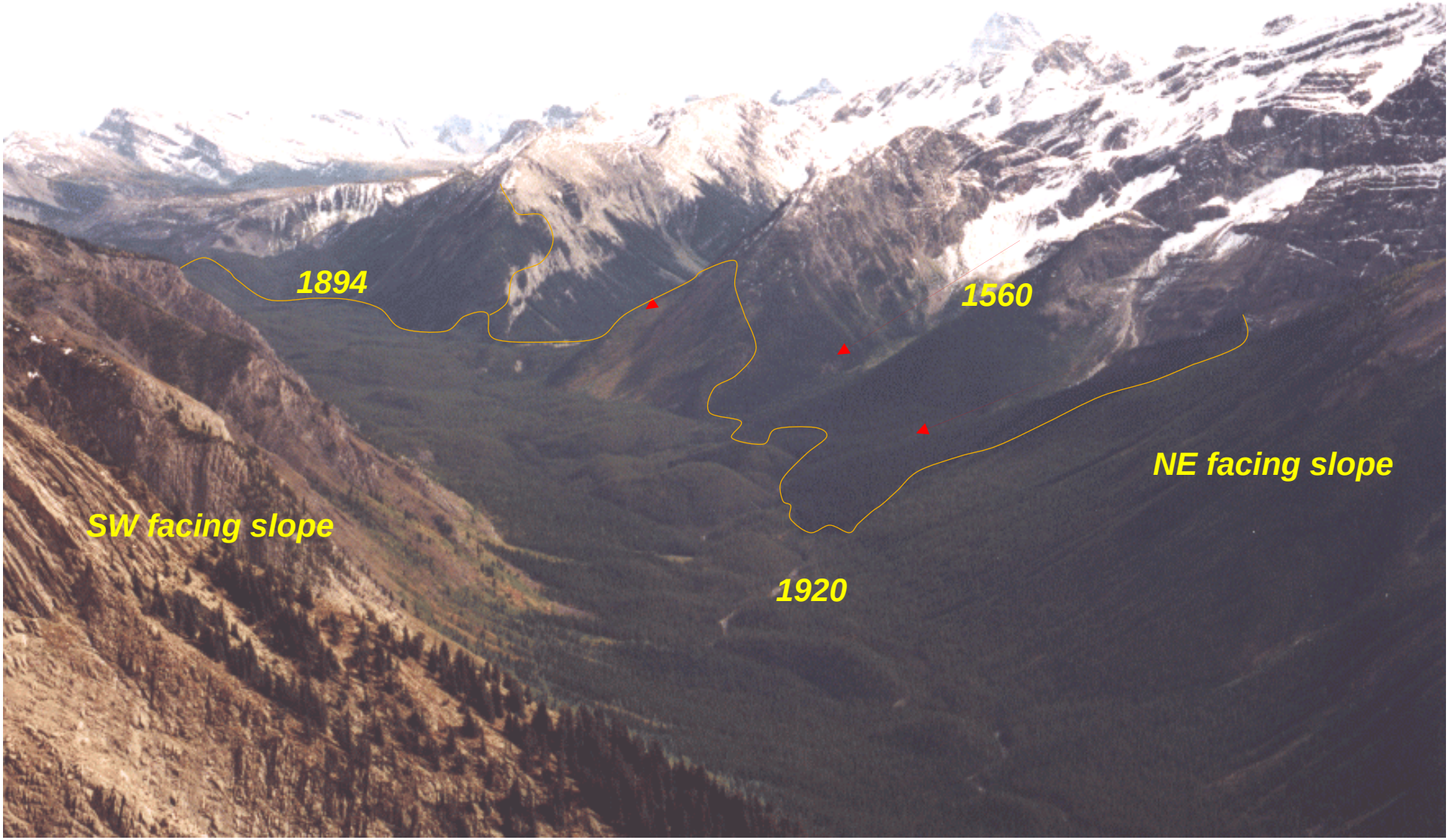
64% of stand age patterns in the Subalpine and 70% of stand age patterns in the Montane are explained by:

1.Valley Orientation
2.Elevation
3.Proximity to the Continental Divide
4.Aspect



Fire Refugia

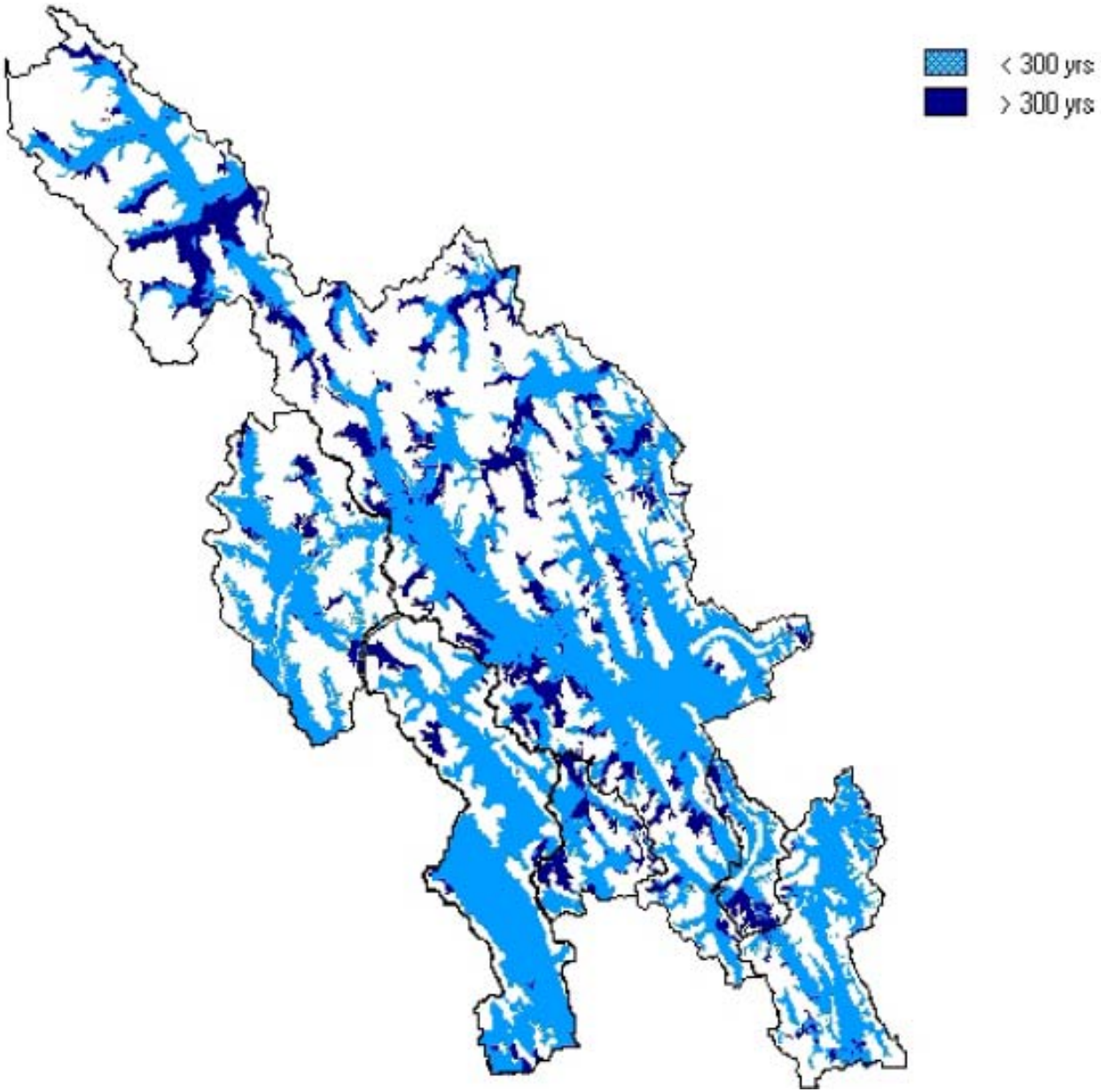
Simpson River, Mount Assiniboine Provincial Park - BC



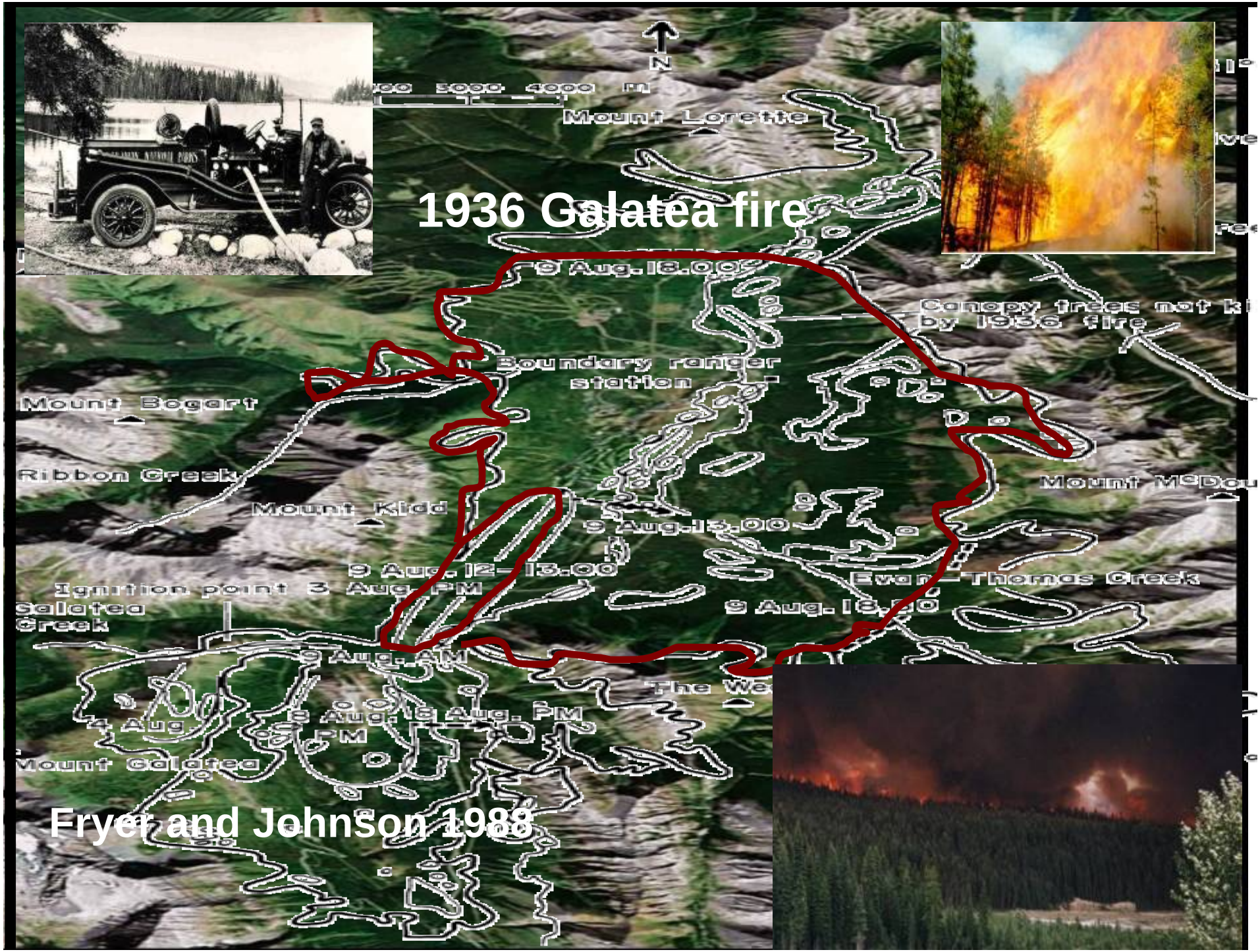
Peter Lougheed Prov Park – Lawson Lake versus Highwood Pass

Isolated landscape versus continuous forest

Old Growth Distribution – MP Rogeau




Do new burn patterns follow old ones?

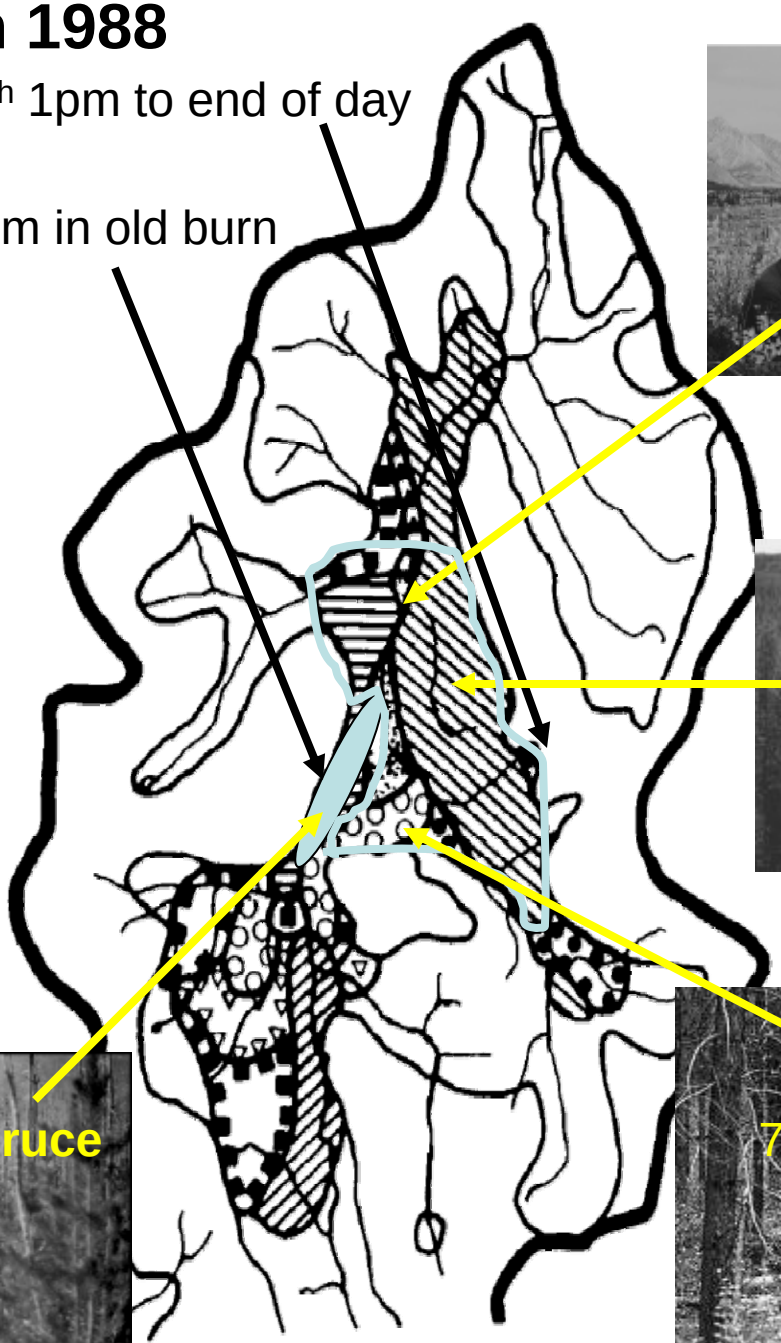

1936 Galatea fire
Mount Lorette
Boundary ranger station
Canopy trees not ki
by 1936 fire
Mount Bogart
Ribbon Creek
Mount Kidd
Mount McDou
9 Aug. 13.00
9 Aug. 12-13.00
Ignition point 3 Aug. PM
Galatea Creek
Evan-Thomas Creek
9 Aug. 18.00
9 Aug. AM
4 Aug.
PM
Mount Galatea
Fryer and Johnson 1988

Fryer and Johnson 1988

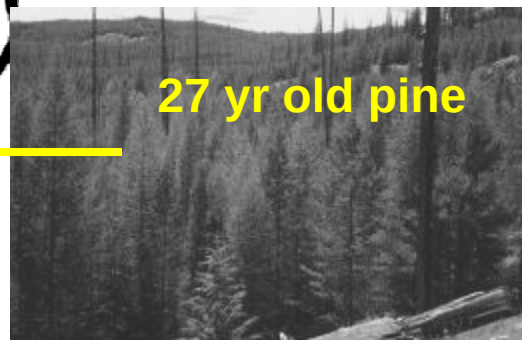
Aug 9th 1pm to end of day

Aug 9th noon – 1pm in old burn

Year	Fuel type	
1925	C-4	≡
1920	C-4	//
1909	C-4	//
1891	C-3	
1881	C-3,2	ooo
1870	C-3	●●●
1865	C-2	▲▲▲
1850	C-2	▽▽▽
1808	C-3	●
1799	C-2	■■■



N



Overlap of Fires in Kananaskis – surface fuel

Previous fires 1890 and 1858

3012 stems/ha
21 t/ha total surface woody

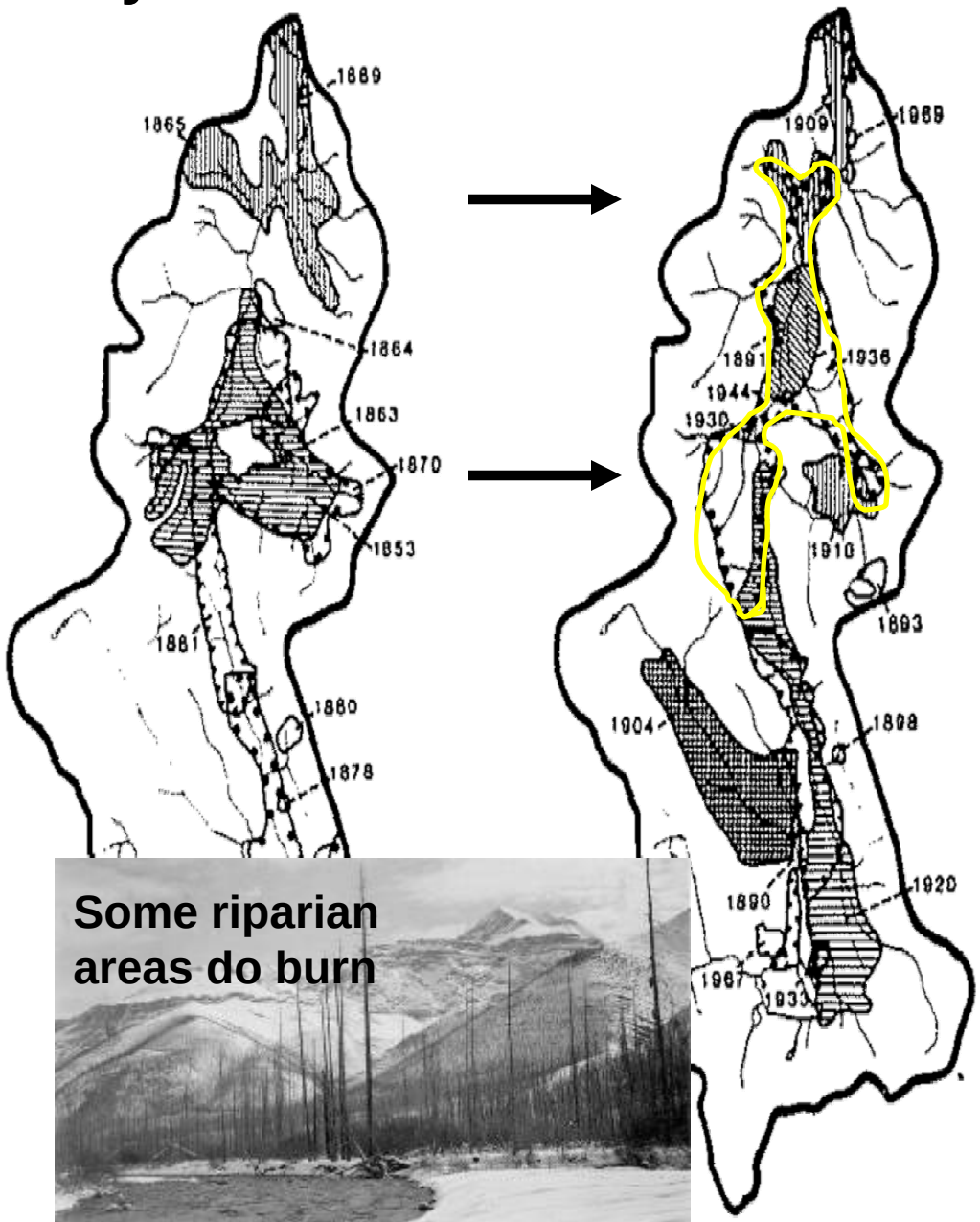
Previous fire 1858

15346 stems/ha
57 t/ha total surface woody

Previous fire 1732

4521 stems/ha
150 t/ha total surface woody

Fryer and Johnson 1988



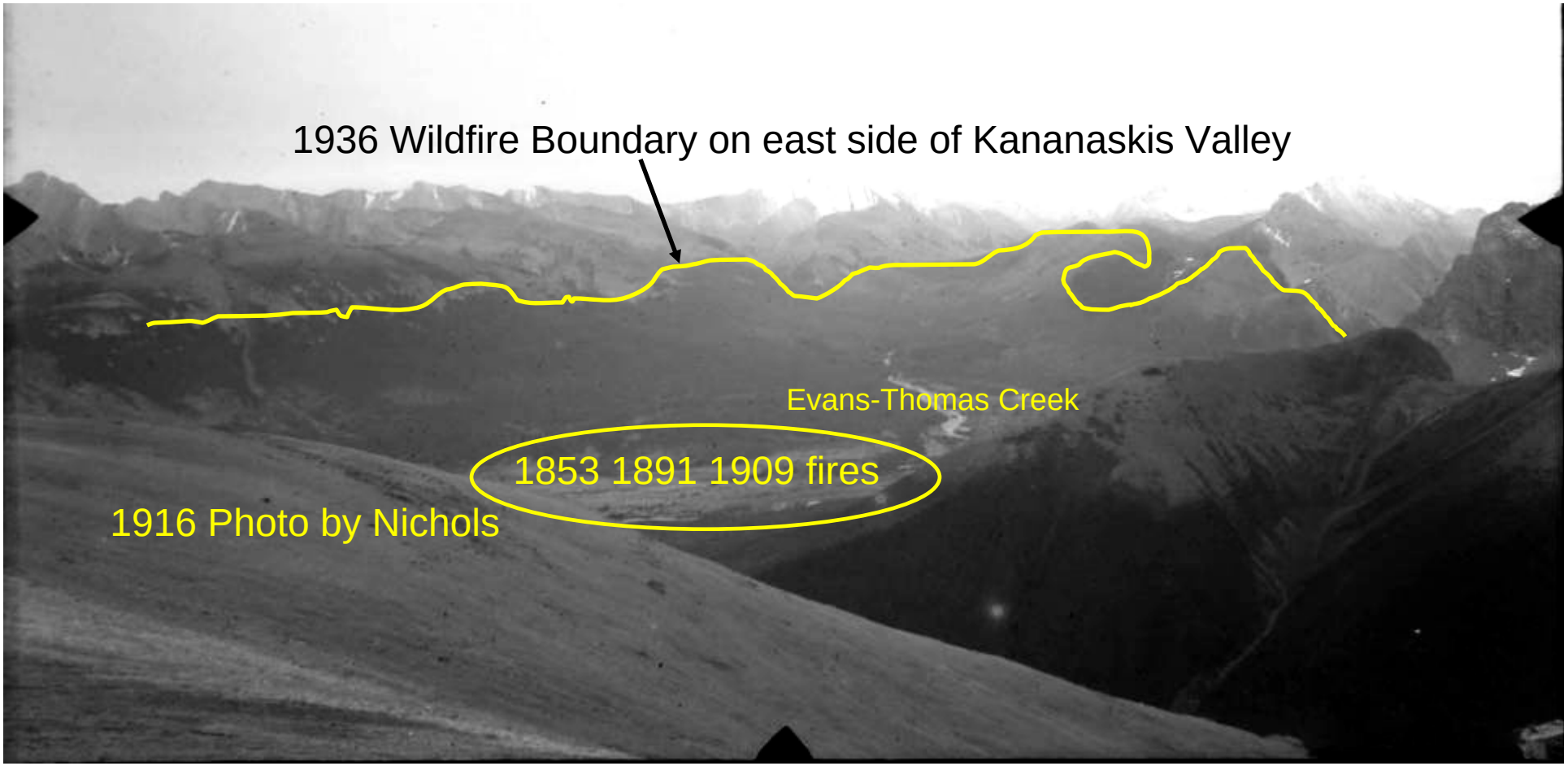
1891-1910 stand origin burned by 1936 Galatea fire was previously burned 1853 – 1870

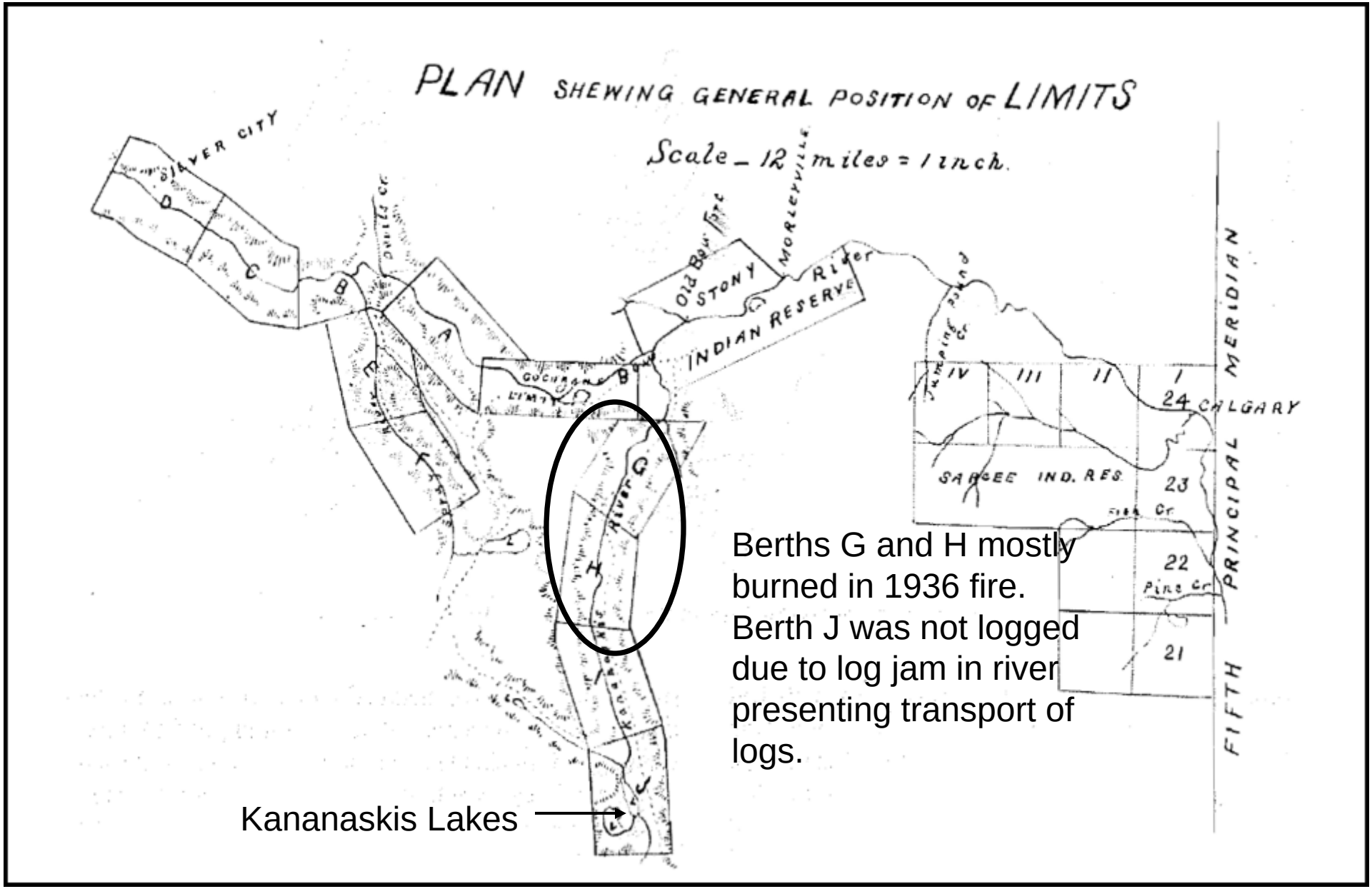
What would be the surface woody fuel load in 1936? What would be the tree density and height?

Riparian area left after 1936

Some riparian areas do not burn frequently

Overlap of Fires at Low Elevation in Lower Kananaskis Valley





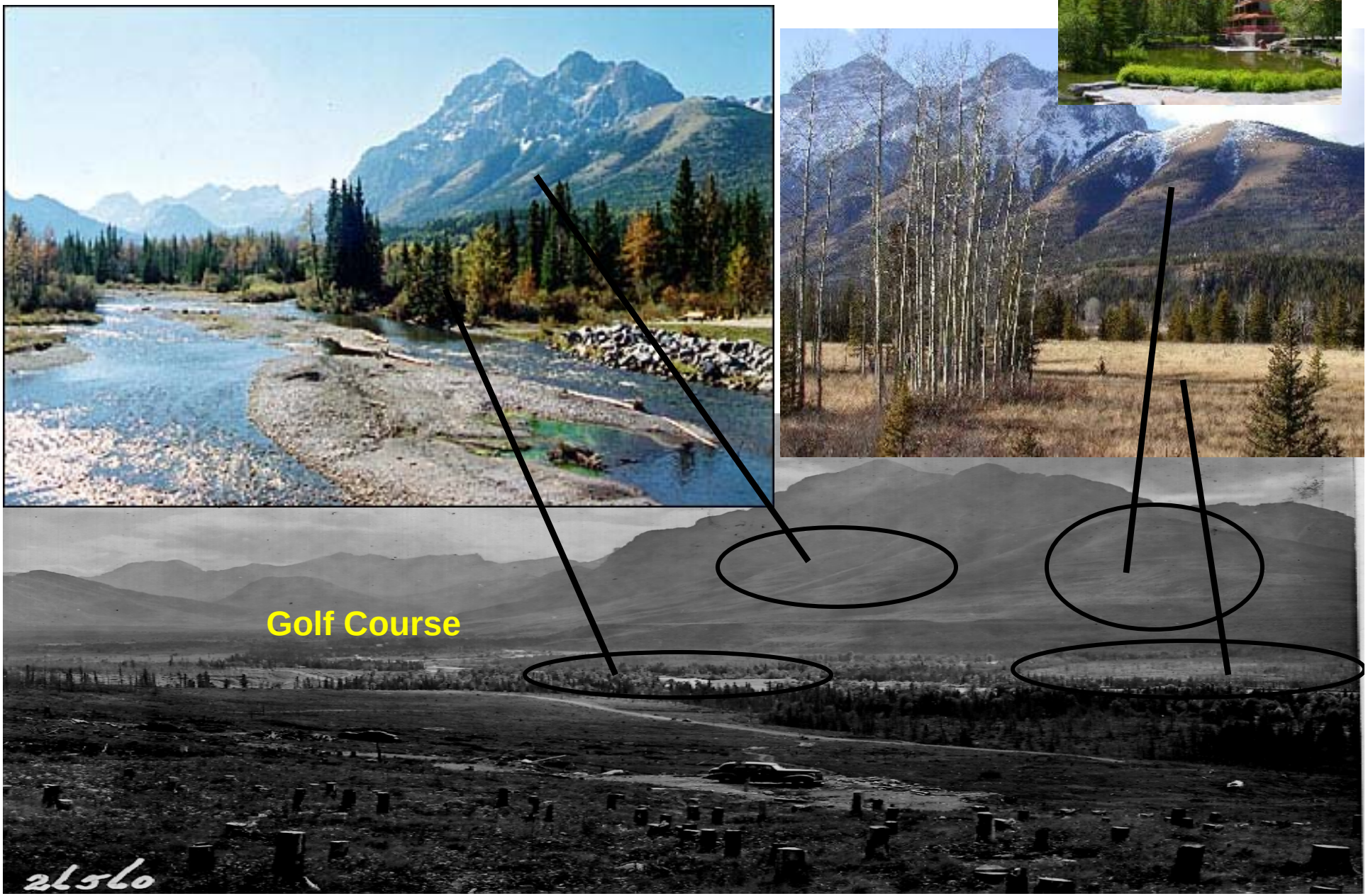
Eau Claire & Bow Lumber Company L.B. Stewart survey 1883

Salvage Logging of 1936 fire

Ribbon Creek 1945

Looking south adjacent to Mile 11 mine props and fuel wood cutting 1941

The Lower Kananaskis Valley Today



This presentation reminded me of my start in fire research and the variety of studies over 32yrs


TECHNOLOGY TRANSFER NOTES

A Wildfire Threat Rating System

B. Hawkes and J. Beck

Introduction

Background