Historical Ecology and Changes in Burn Probability of the Southern Alberta Rocky Mountains, AD 1900-2010

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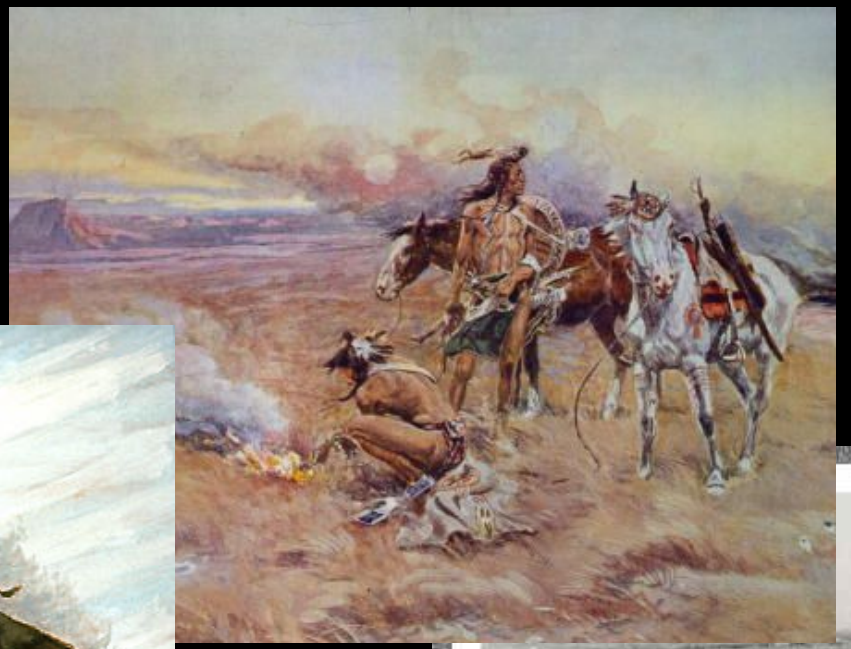
WESTERN PARTNERSHIP FOR WILDLAND FIRE SCIENCE

UNIVERSITY OF ALBERTA — QUAECUMQUE VERA

Mountain Legacy
The Canadian Rockies 1861 to the Present

History



http://mountainlegacy.ca/

Phototopographic surveying: 1880's-1950's
Repeat Photography (Mountain Legacy Project):
1998-Ongoing

Mountain Legacy
The Canadian Rockies 1861 to the Present


McArthur, 1888


Higgs, 2009


Wheeler 1895


Higgs, 2009

Structure of ecosystems along the North American Rocky Mountains is widely believed to have changed considerably over the past century.

Chapter 1: Historical Ecology of the Southern Rockies/Foothills Ecosystem

- Boundary of the Great Plains

- Fire/insect/disease
- Bison/grazers
- First Nations
- Climate*
- European Settlement

Mountain Legacy Photos 1885-1924

- Signing of Treaty 6 (1876), Treaty 7 (1877)
- Bison extirpation (by 1880)
- Railway construction (1880-1900)
- Settlement
  - Ranching
  - Cities and towns
- Fire suppression

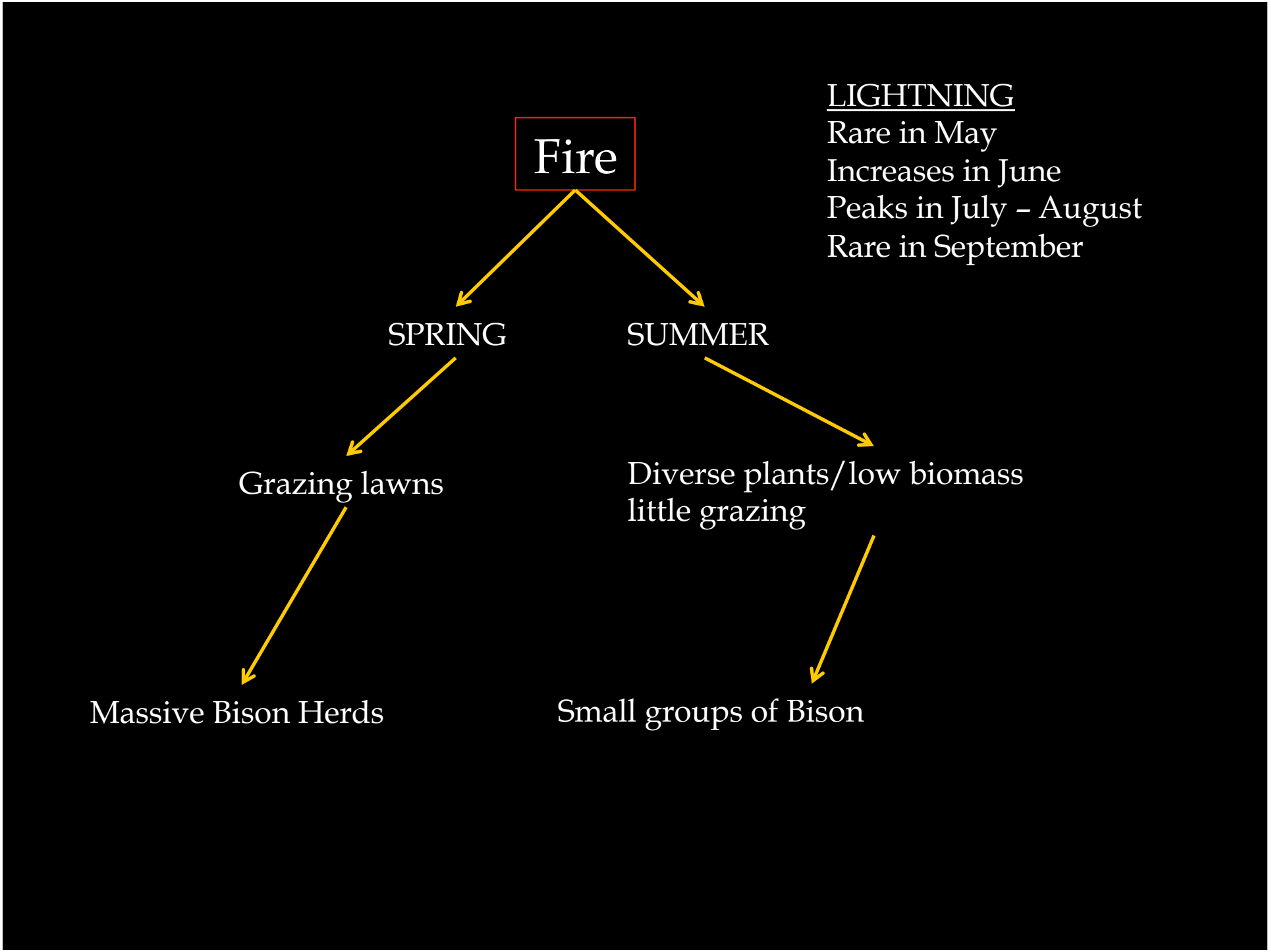
McArthur, 1888

Grazing and trampling

http://www.biohabitats.com/v1/ndg_newsite/newsletter/images/2010summer/buffalo.jpg

Lightning Wildfire

[http://www.nps.gov/archive/yell/slidefile/fire/wildfire88/misc/Images/13868.jpg


Fire
LIGHTNING
Rare in May
Increases in June
Peaks in July – August
Rare in September
SPRING
SUMMER
Grazing lawns
Diverse plants/low biomass
little grazing
Massive Bison Herds
Small groups of Bison

First Nations

<u>10,000 years</u>

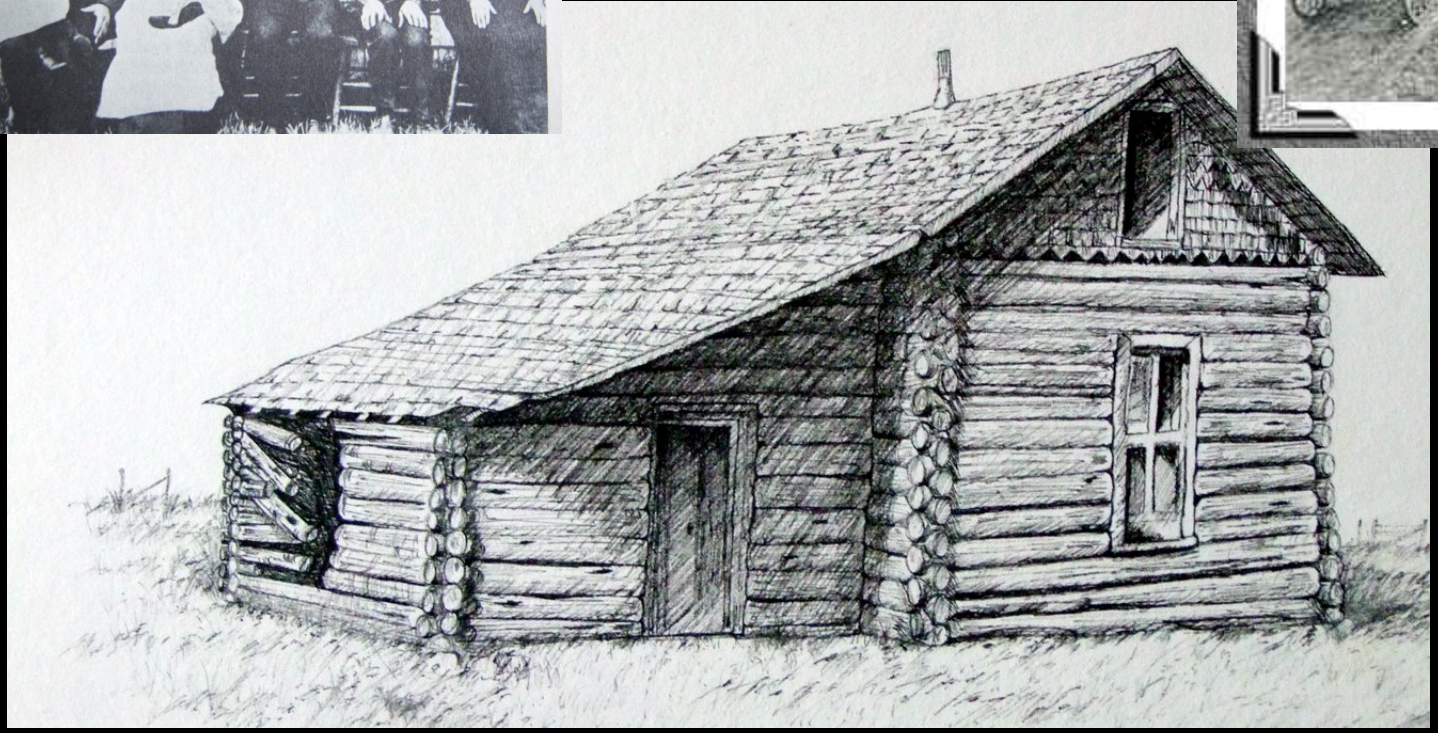
Hunting
Burning

http://www.charlesmarionrussell.org/Blackfeet-Burning-Crow-Buffalo-Range.html

European Settlers

Was this a rapid disturbance?

Horses (early 1700s)
Smallpox (late 1700s)
Traders (late 1700s-1800s)
Settlers (late 1800s)
Industrialization (1900s)



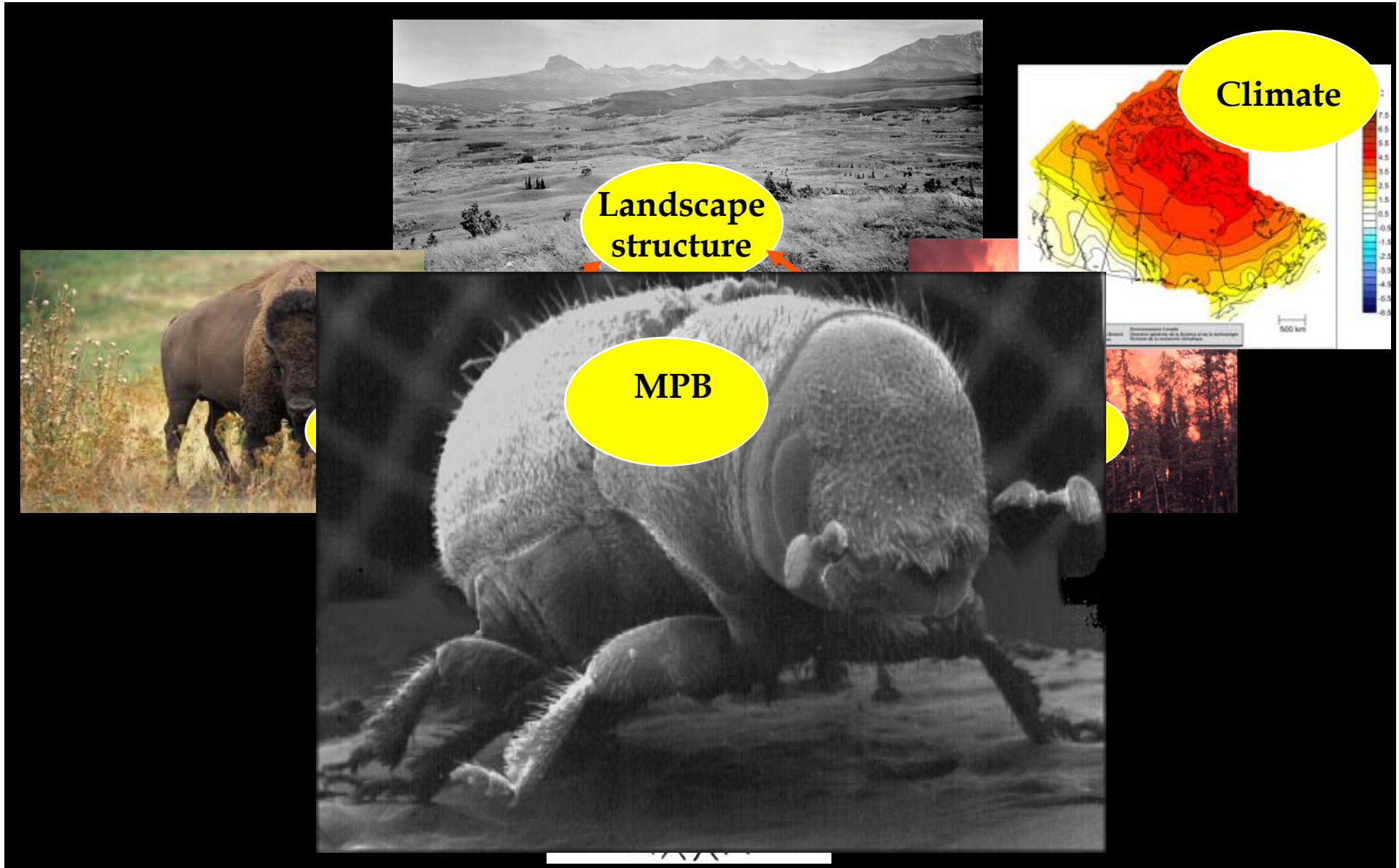


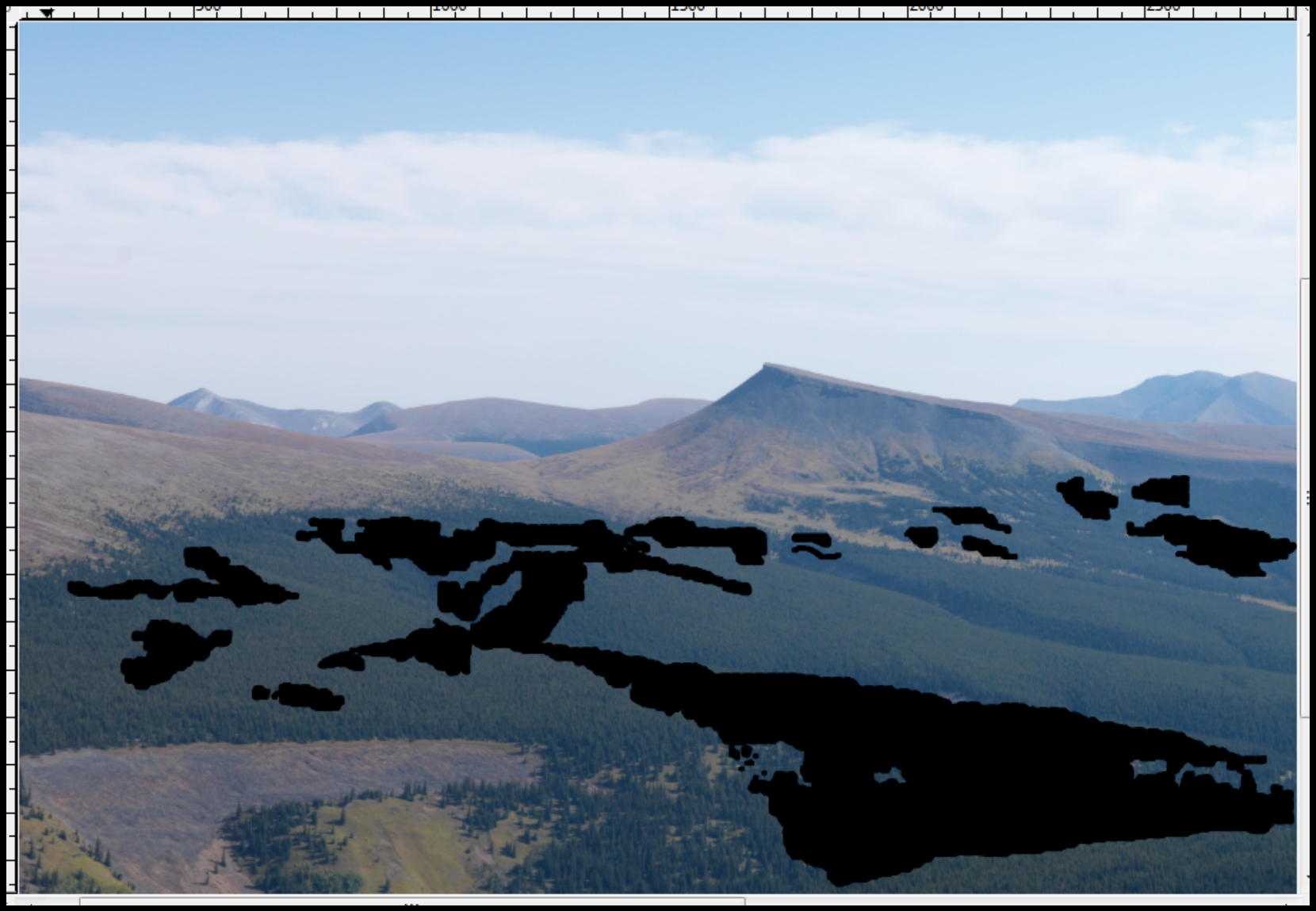
photo credits: Natural Resources Canada, Canadian Forest Service

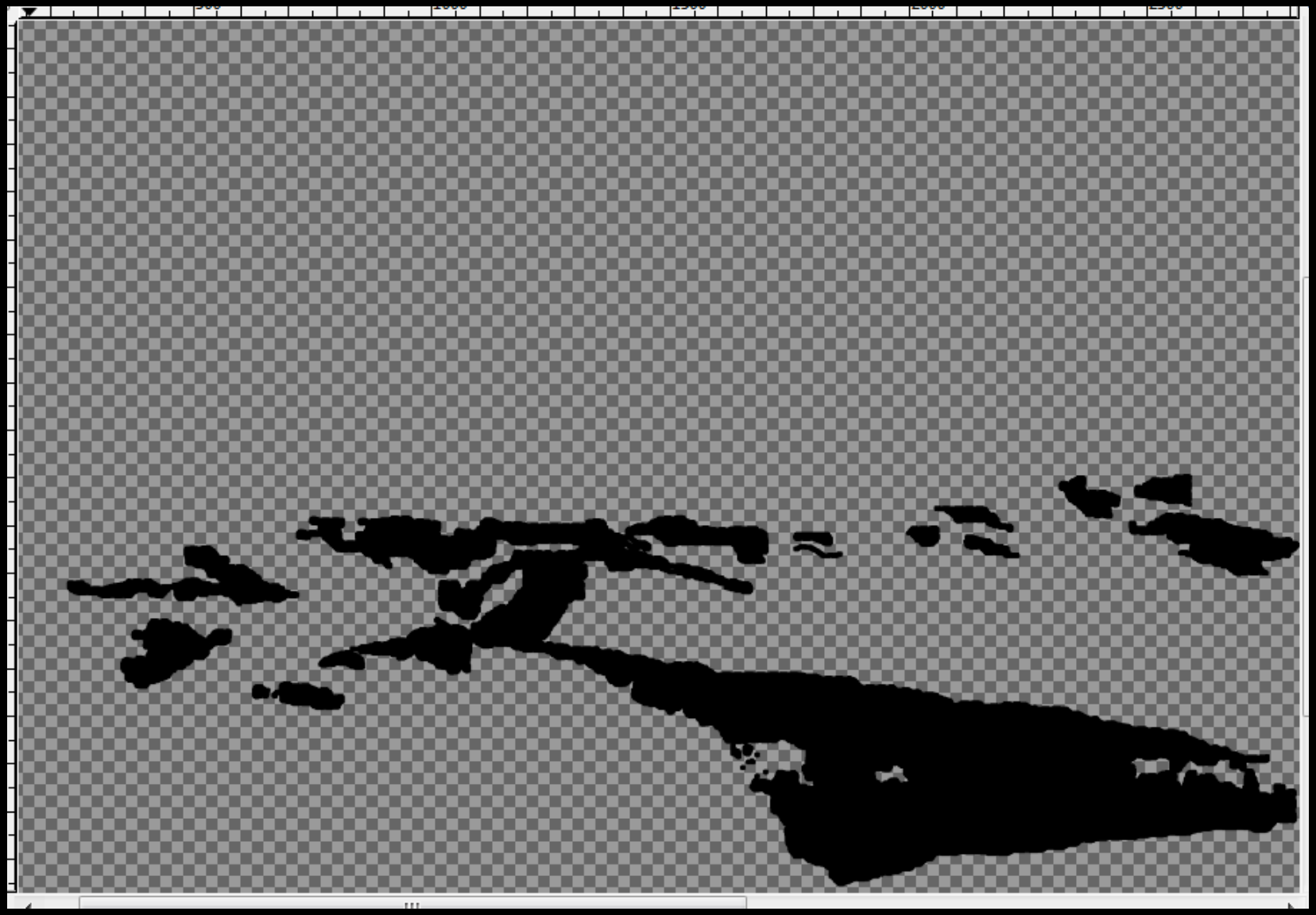
Chapter 2: Treeline Ecotone Shifts

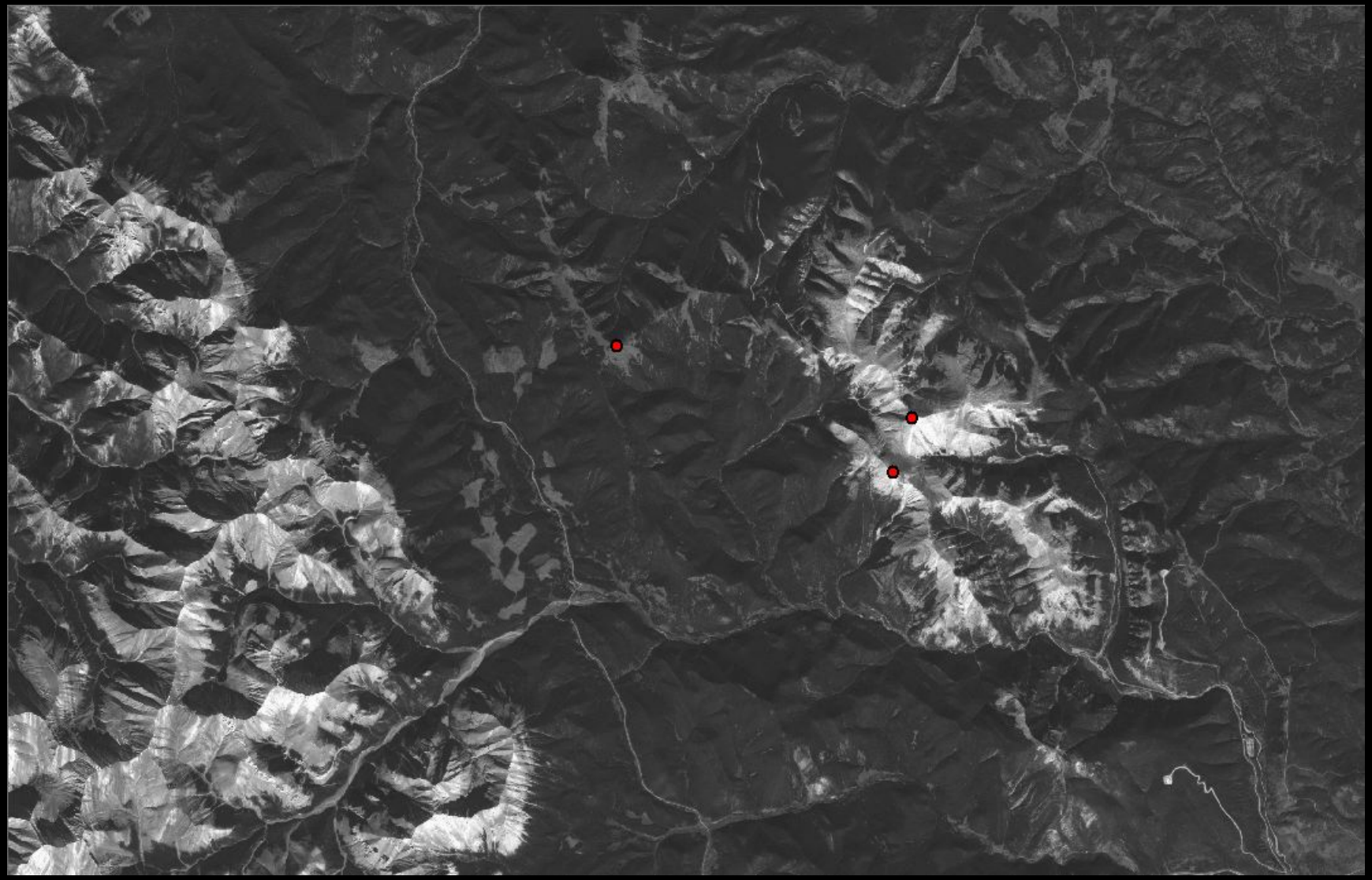
HOW TO MEASURE

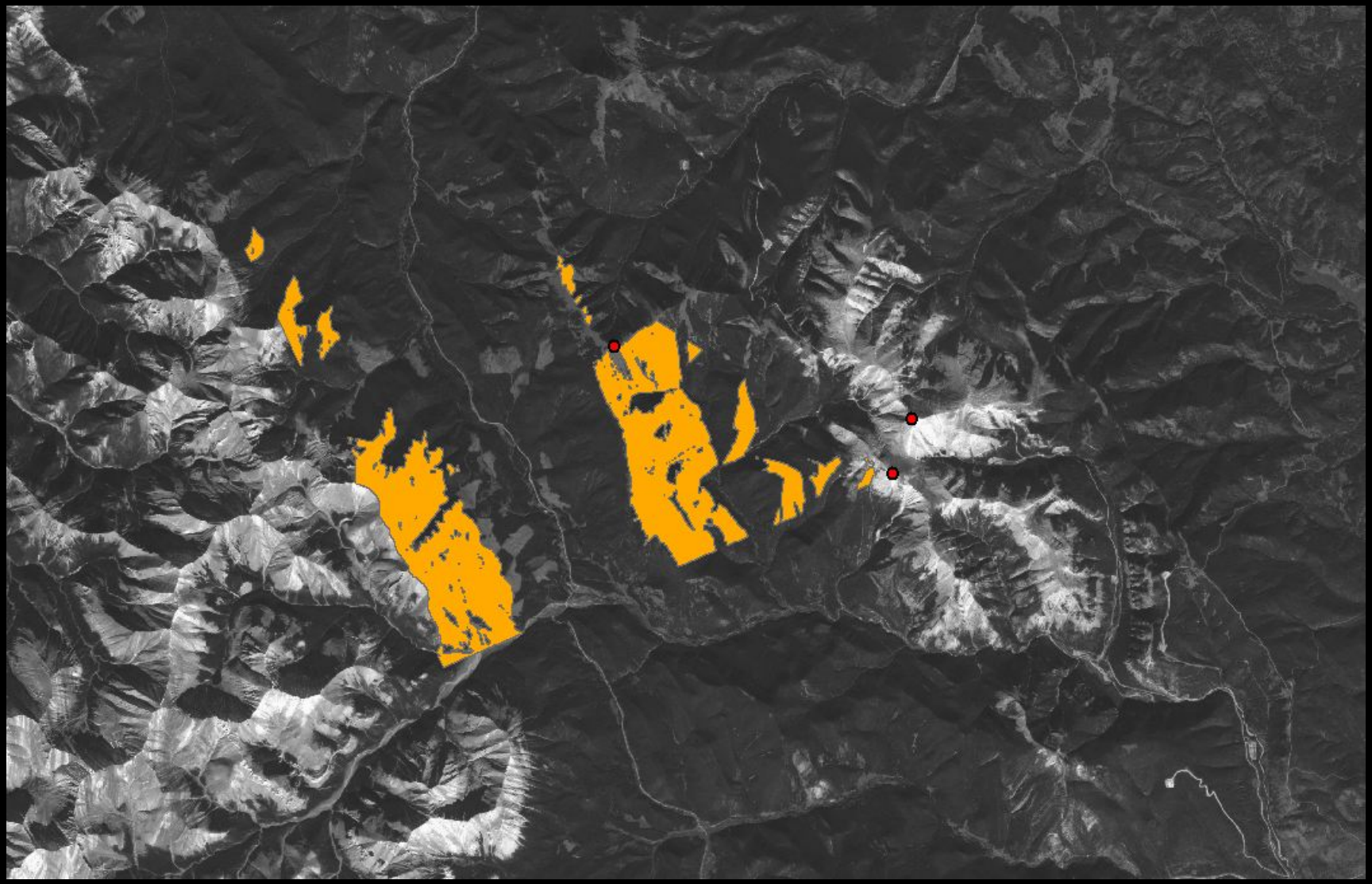
- Oblique photos… Not aerial.
- Nearly every software tool available will only georeference PLAN VIEW photos

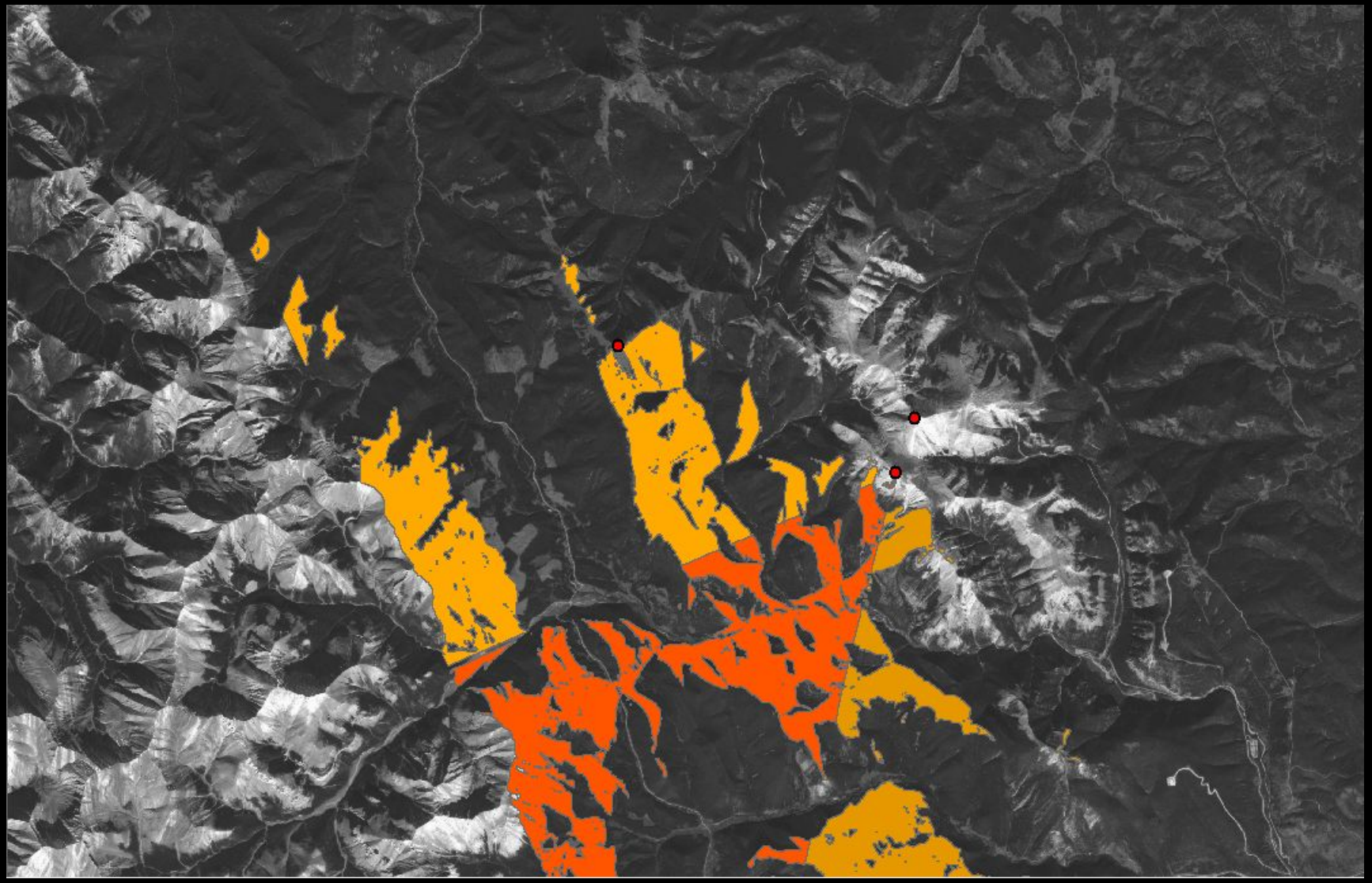

Bridgland, 1913

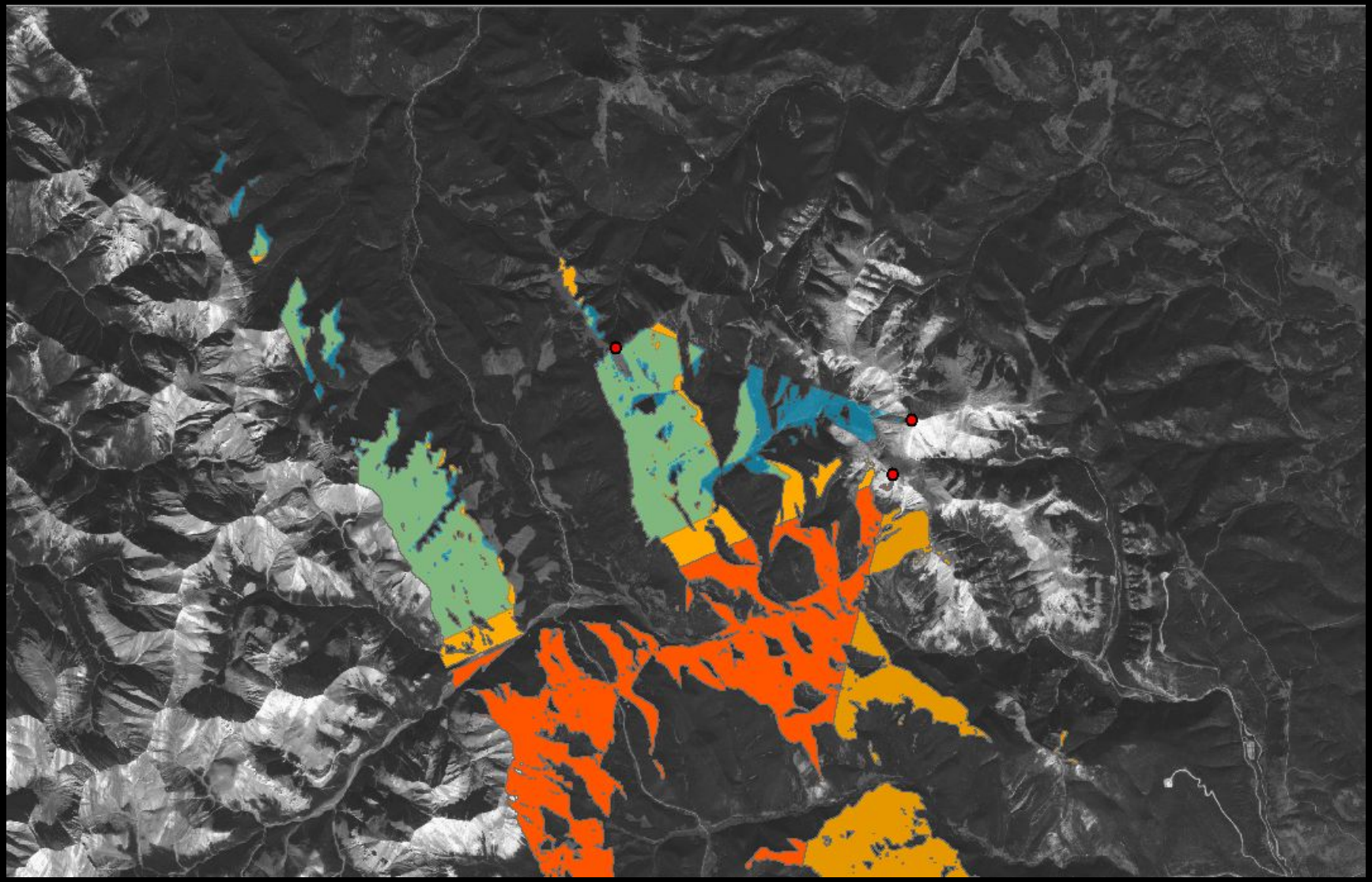


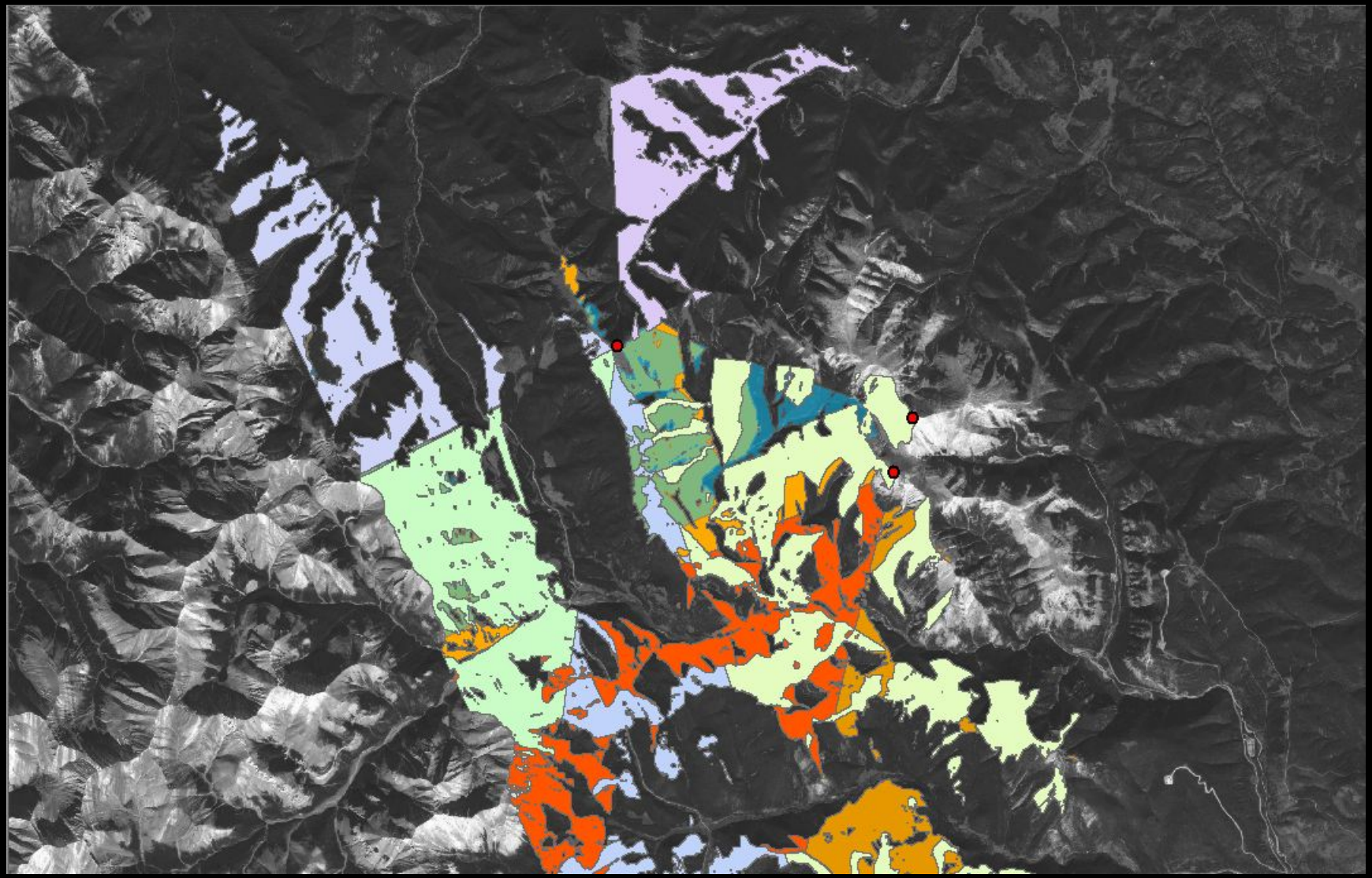


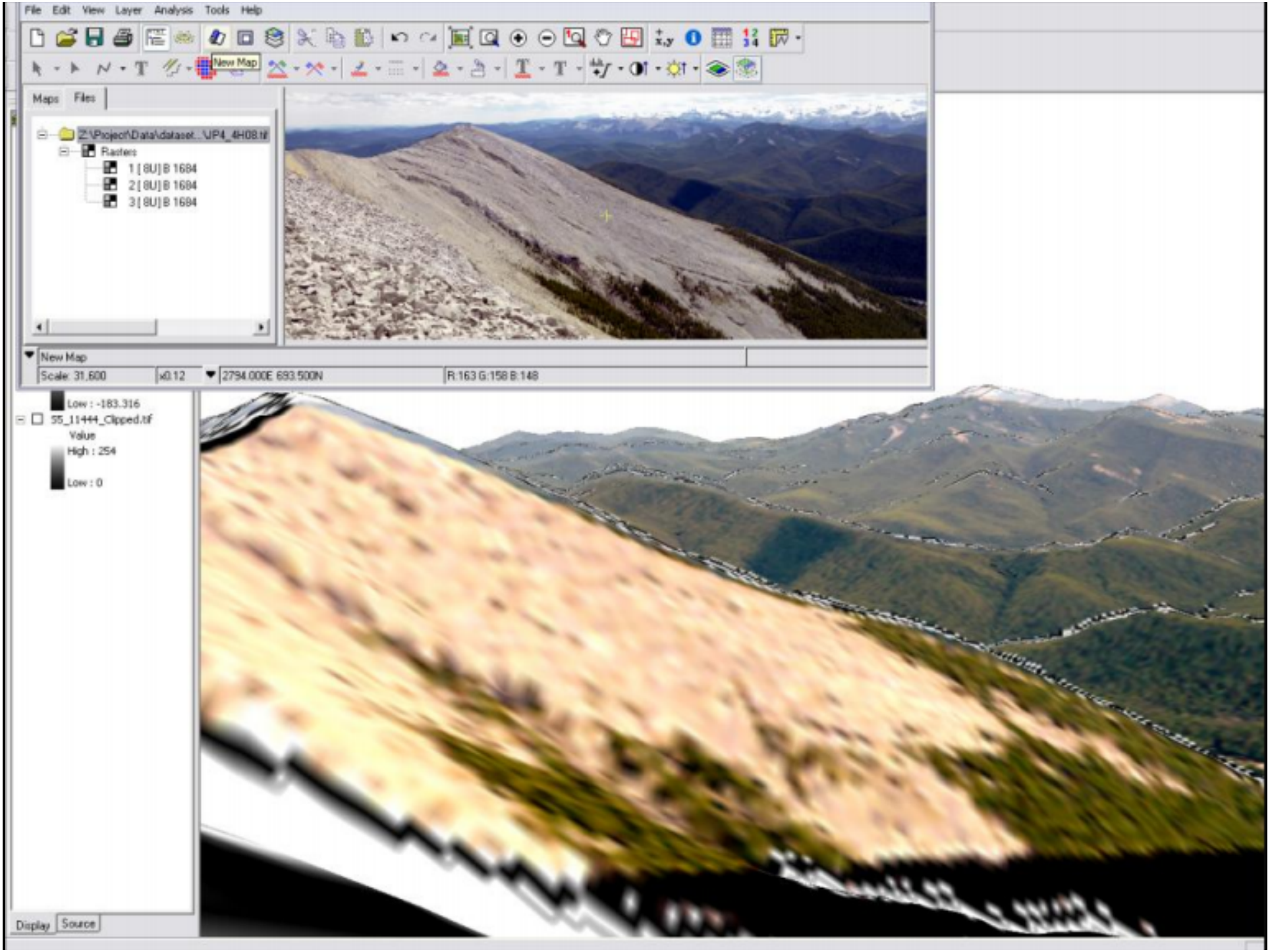








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Maps Files
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Rasters
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2 [8U] B 1684
3 [8U] B 1684
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R:163 G:158 B:148
Low : -183.316
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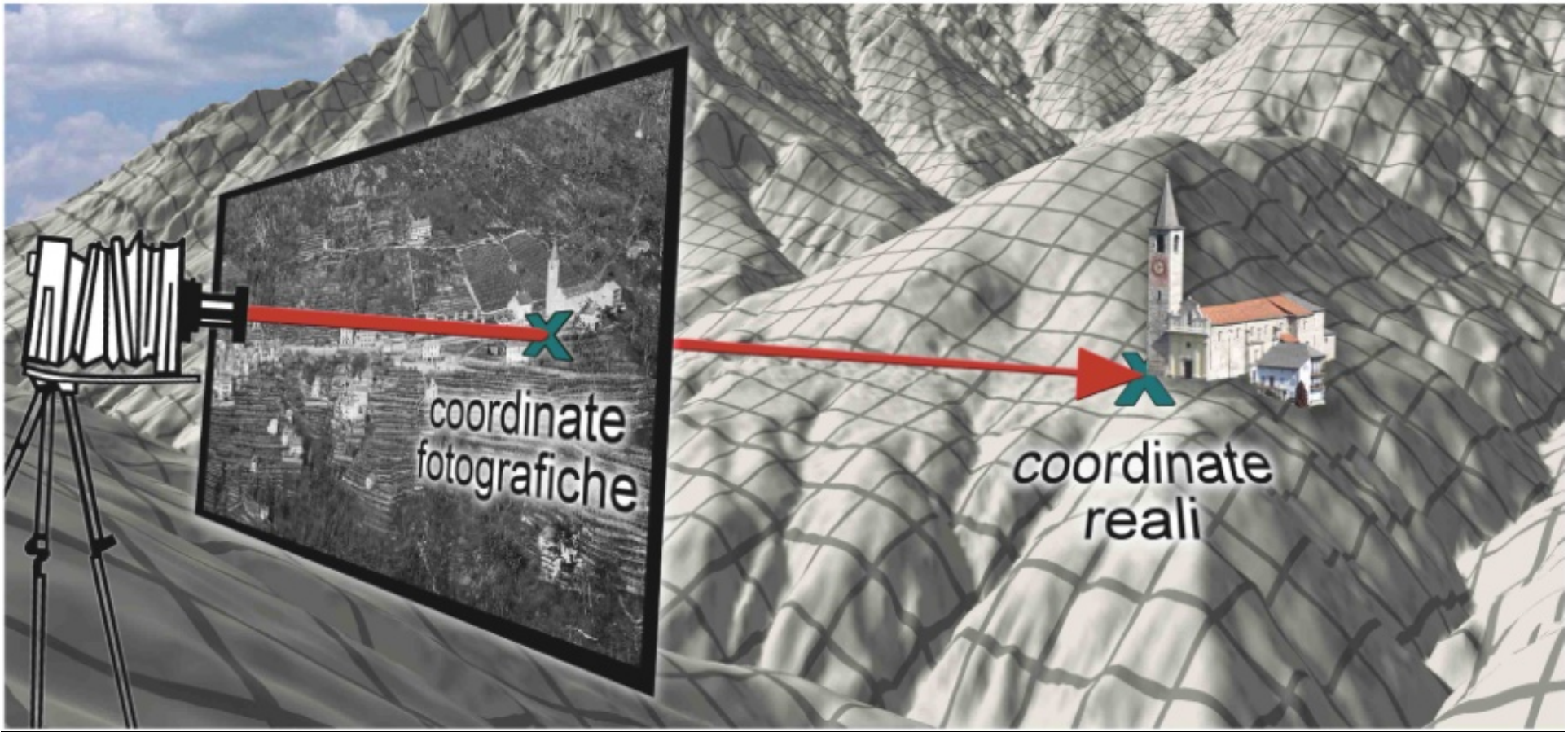
High : 254
Low : 0
Display
Source

“Have you ever heard of monoplotting?”

- Werner Muecke

Digital Monoplotting for Georeferencing Oblique Photography



From: C. Bozzini, M. Conedera, P. Krebs 2012. In press. A New Monoplotting Tool to Extract Georeferenced Vector Data and Orthorectified Raster Data from Oblique Non-Metric Photographs. *International Journal of Heritage in the Digital Era*

1885

2004

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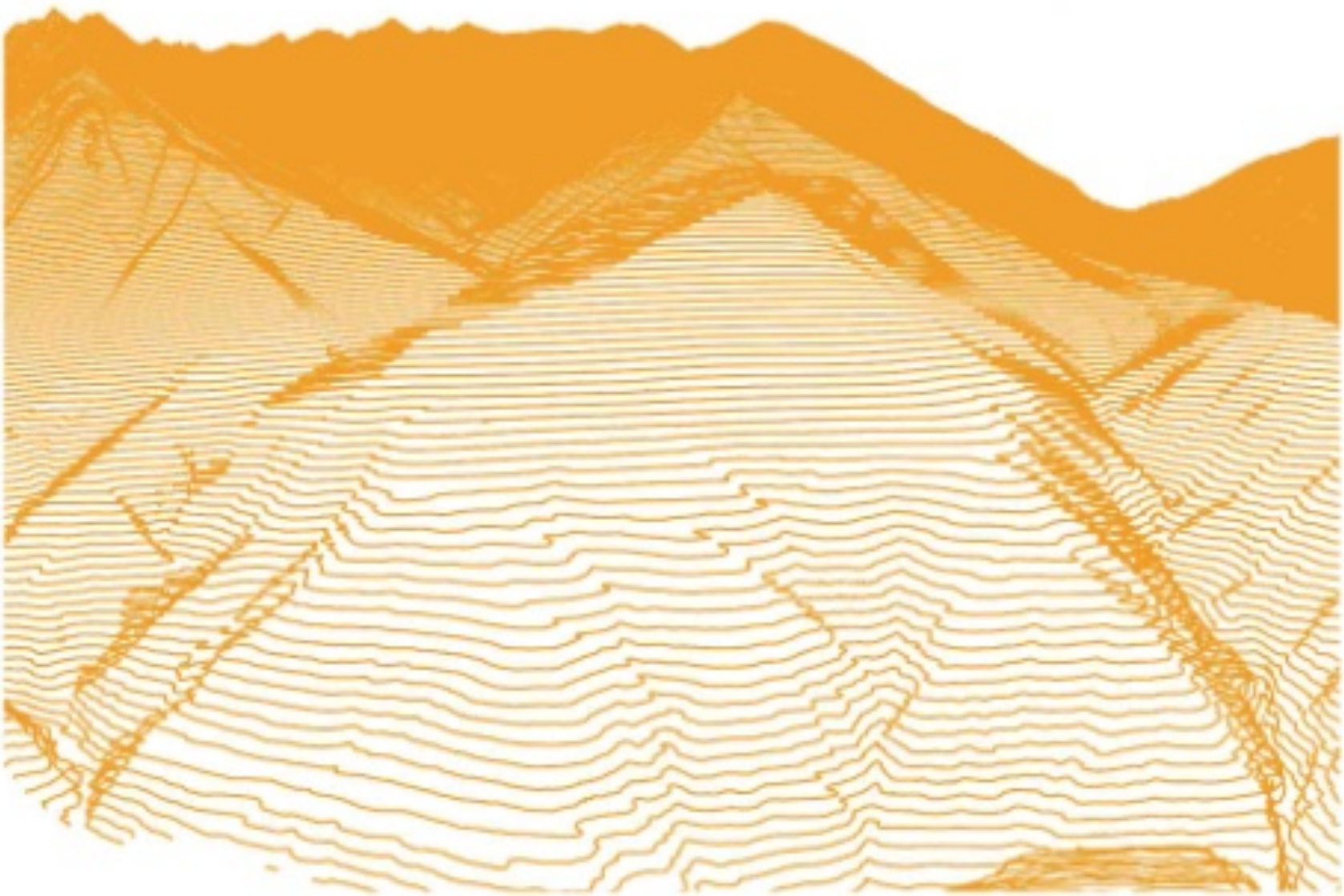
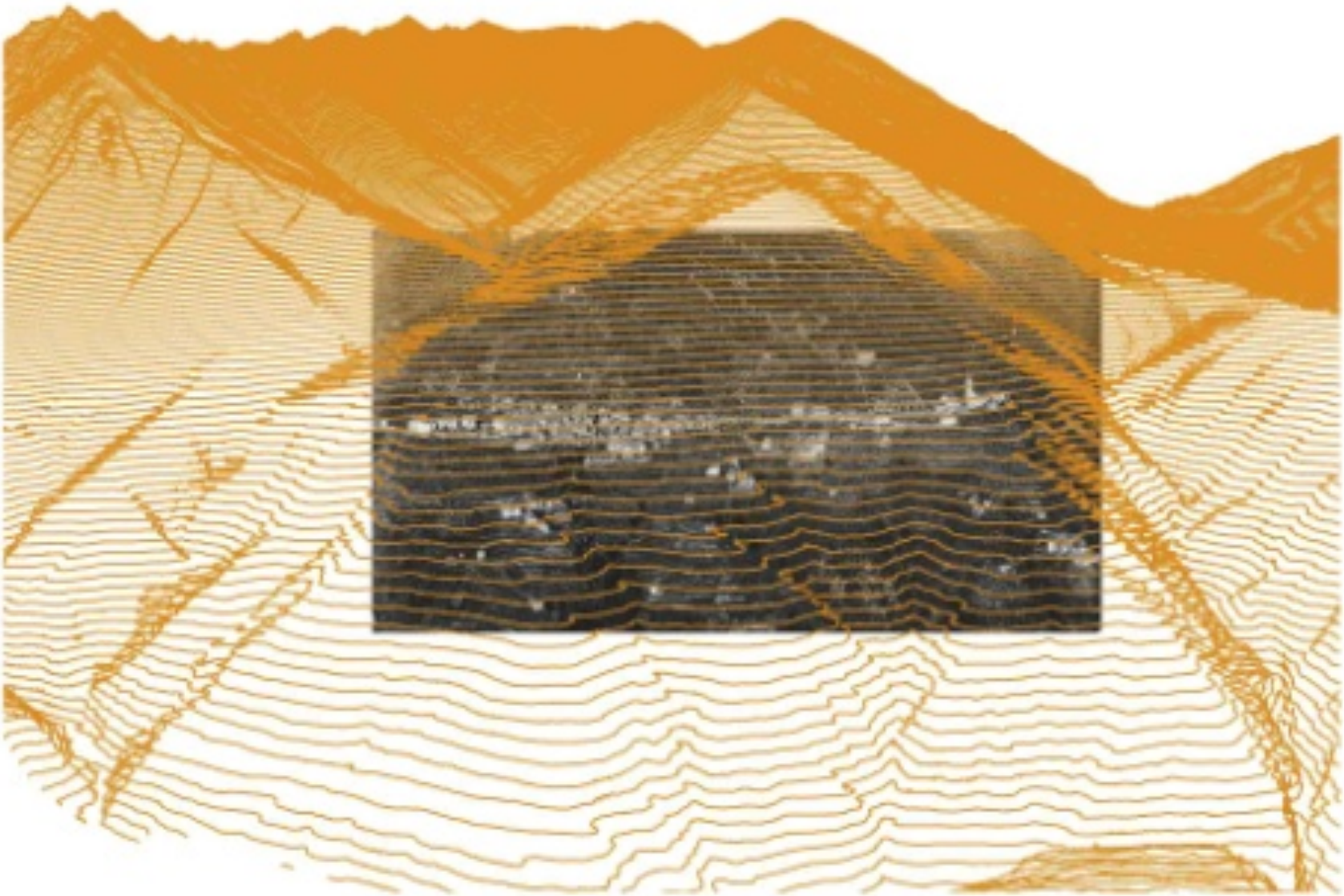
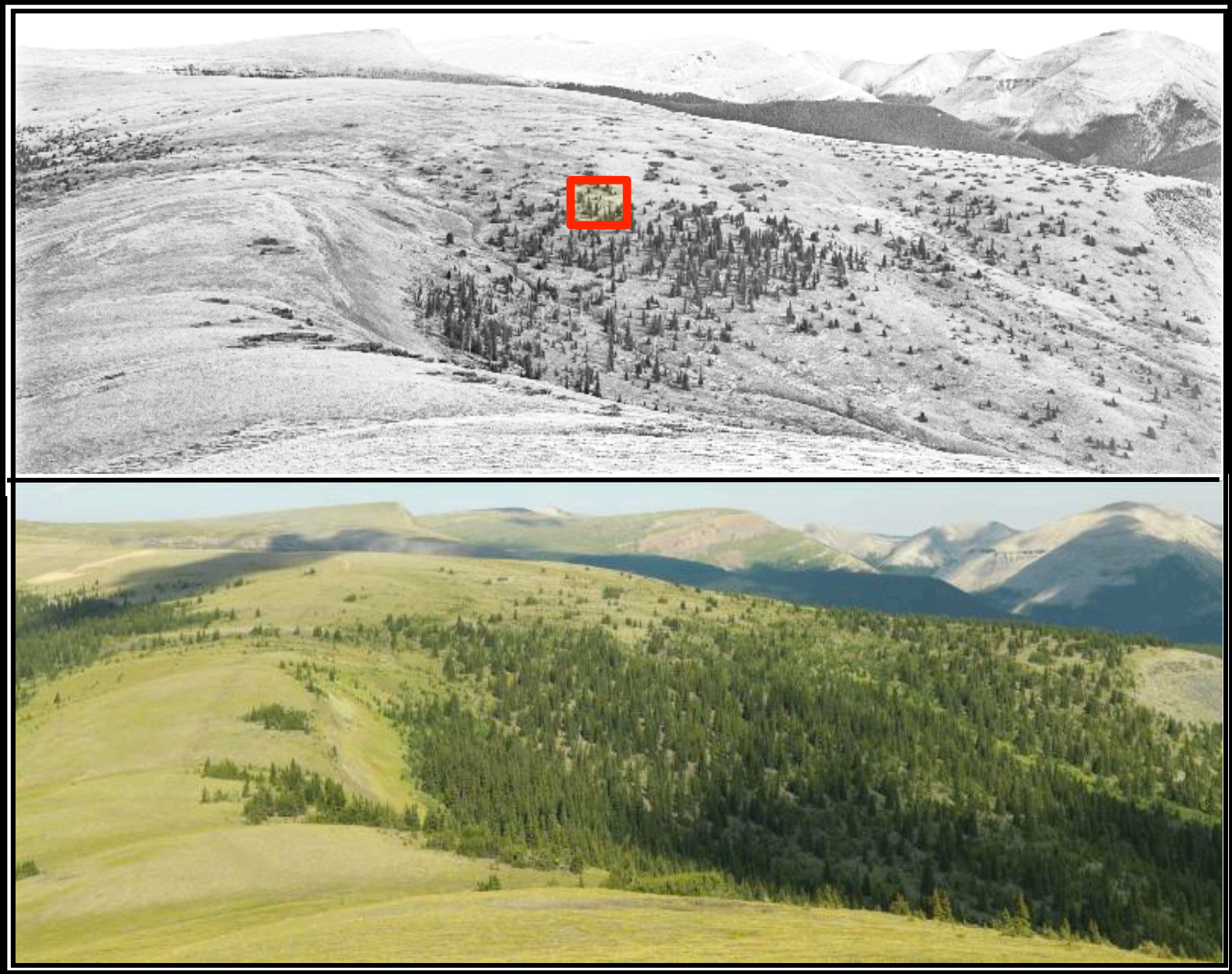


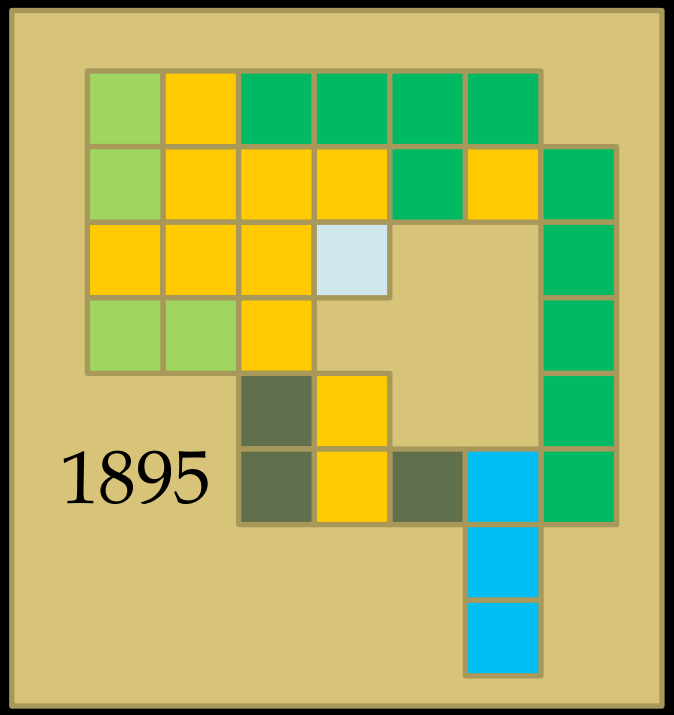


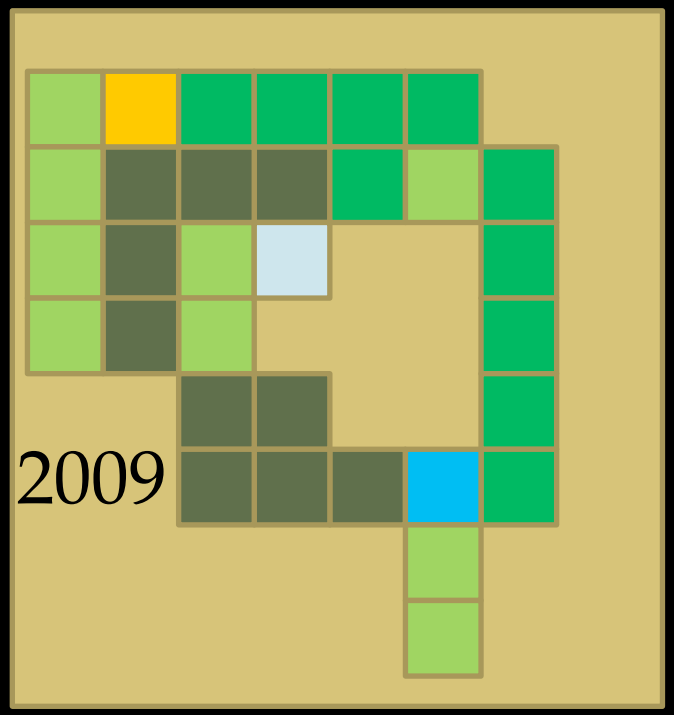
Chapter 3: Forest Structure Changes

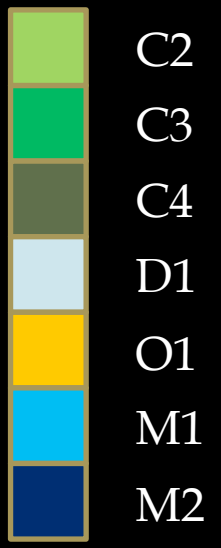


Chapter 4: Fire

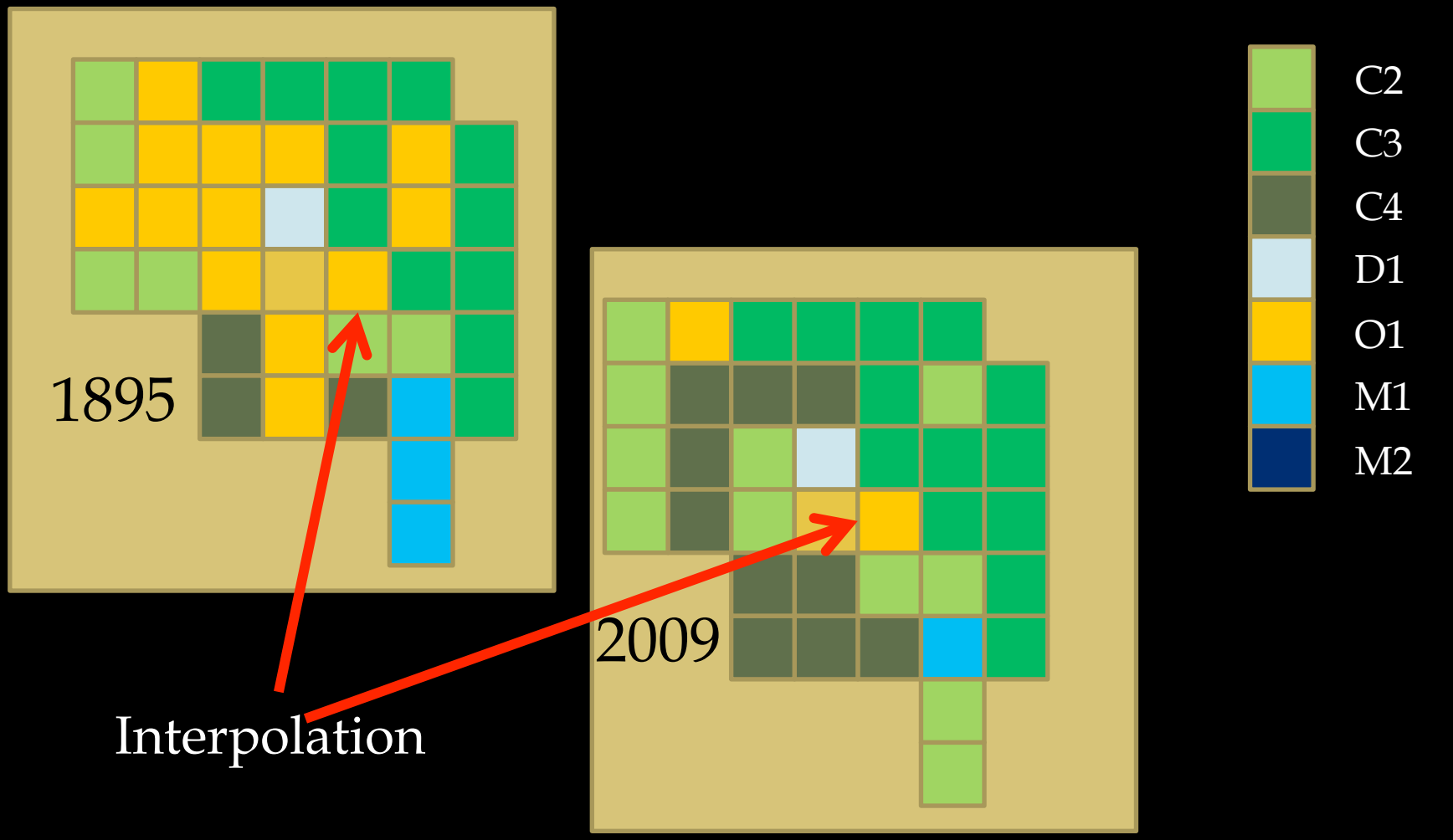
Fuel Grid Changes







Fuel Grid Changes



PhD Plan

- Document and map historical ecology
- Refine Photogrammetric and GIS methods.
- Measure changes in:
    - forest-grassland ecotone migration
    - vegetation structure
    - correlate historical factors with degree of landscape change
- Model changes in burn probability between landscape structures AD1900 – 2012

FUEL MANAGEMENT = ECOSYSTEM MANAGEMENT

Primary Funding Sources

Natural Sciences and Engineering Research Council of Canada

www.nserc-crsng.gc.ca

Alberta Innovates Technology Futures

Additional Funding Sources

WESTERN PARTNERSHIP FOR WILDLAND FIRE SCIENCE

In-Kind Support

Mountain Legacy

The Canadian Rockies 1861 to the Present

Initial Pilot Study and Literature Review Funding

foothills RESEARCH INSTITUTE
research growing into practice.

burning ecoLogic


Alberta
Environment and Sustainable
Resource Development


Alberta
Culture