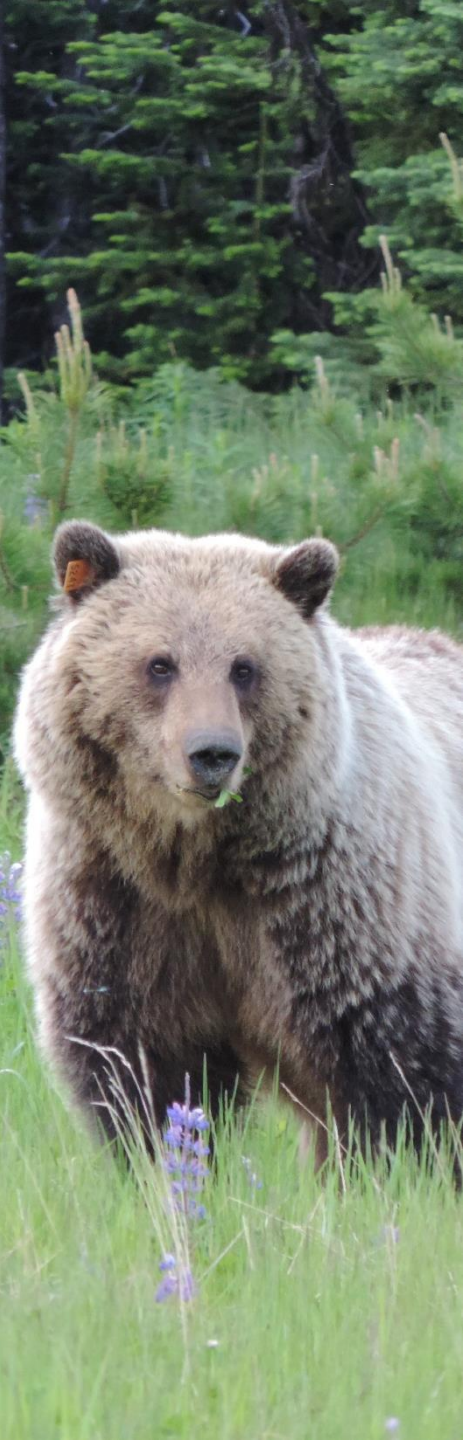


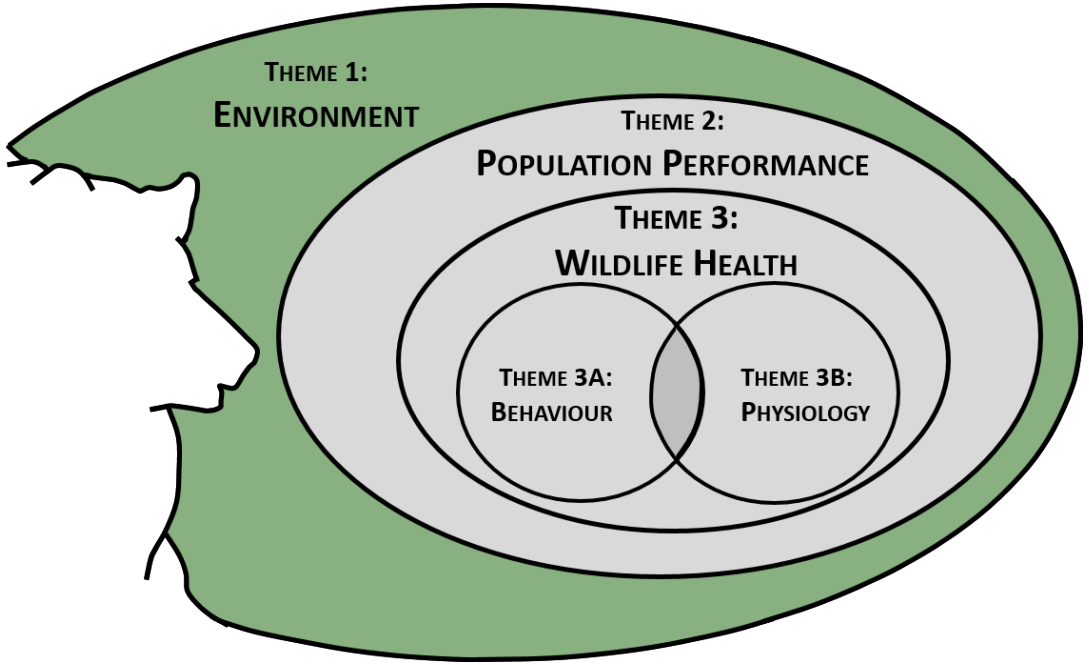
Snow Dynamics Surrounding Den Emergence

Presented by

Ethan Berman
MSc Candidate
Integrated Remote Sensing Studio
Forest Resources Management
UBC Faculty of Forestry
ethan.berman@ubc.ca

THE UNIVERSITY OF BRITISH COLUMBIA

NSERC CRSNG



Research need

Have changing landscape conditions (natural and anthropogenic change) and structural configuration influenced the region's grizzly bear populations?

Q1.2 What are the temporal and spatial dynamics of snow melt and spring flush and how do these interact to affect den emergence and spring habitat use and selection?

Why are Snow Dynamics Important?

- Wildlife management
  - Behavior and movement patterns
  - Changing landscape conditions
- Environmental management
  - Water resources, fire
- Industrial access
  - Road conditions
  - Seasonal closures

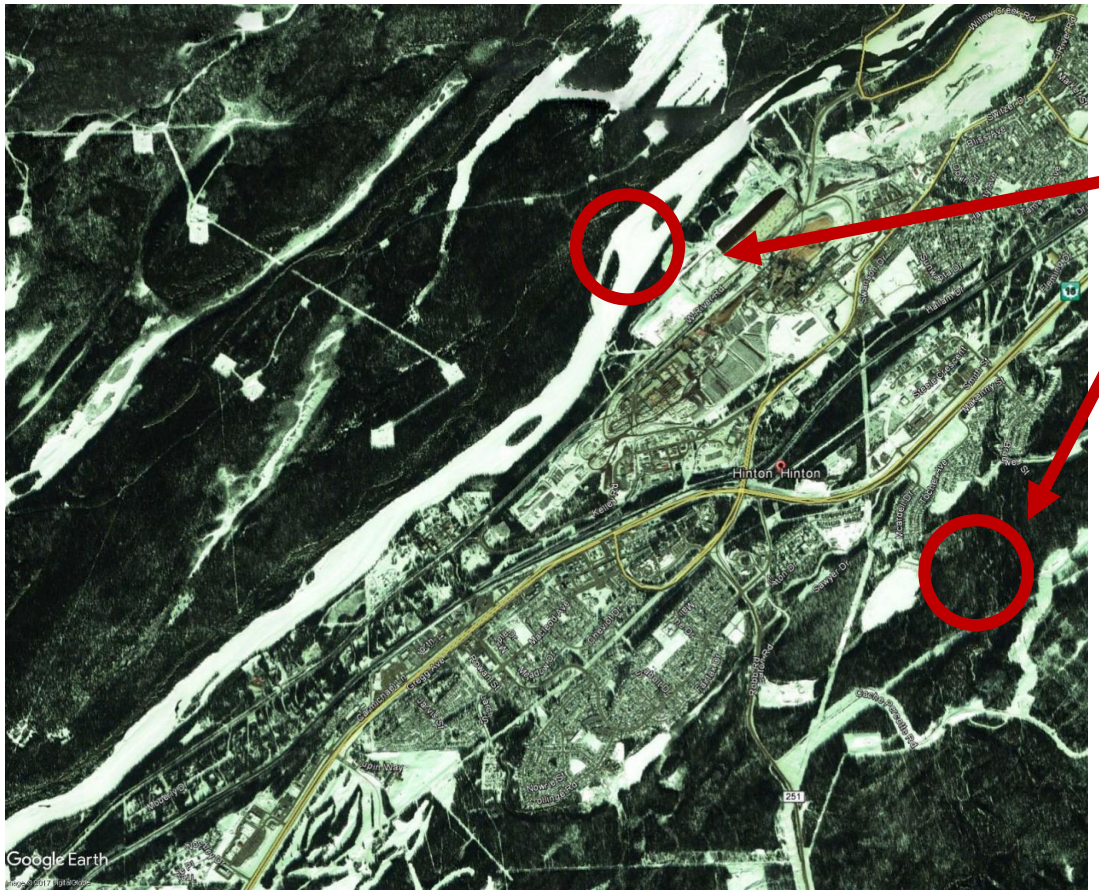
Credit: FRI Research

Research Objectives

1. Create a remote sensing product to improve our understanding of the spatial and temporal snow dynamics in the Yellowhead region of Alberta

2. Use a remote sensing snow dynamics product to inform our understanding of grizzly bear movement and habitat use

Remote Sensing of Snow

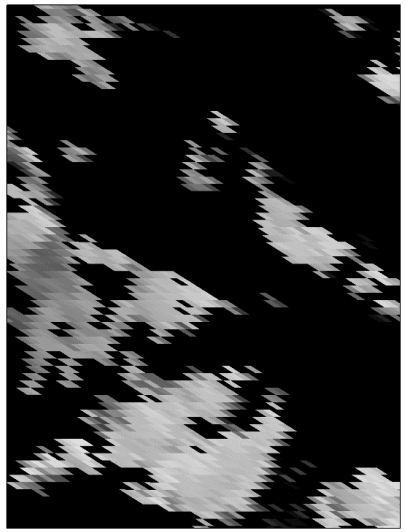


Google Earth Landsat image of Hinton, Alberta from March, 2013.

- Snow cover vs. snow depth
- Snow in open areas
- Snow in forests
- No product exists that fits our needs

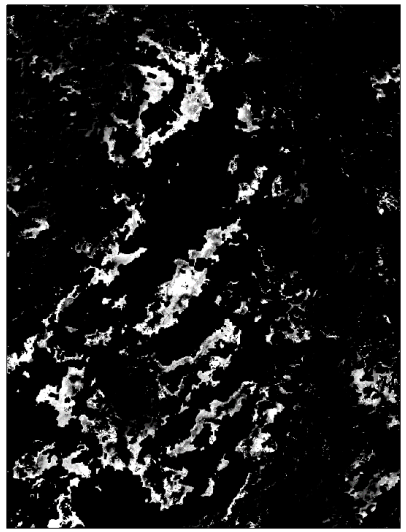
Fusion of Optical Satellite Imagery

- MODIS
  - USGS, free
  - 2000-present
  - 500 m spatial resolution
  - Daily imagery



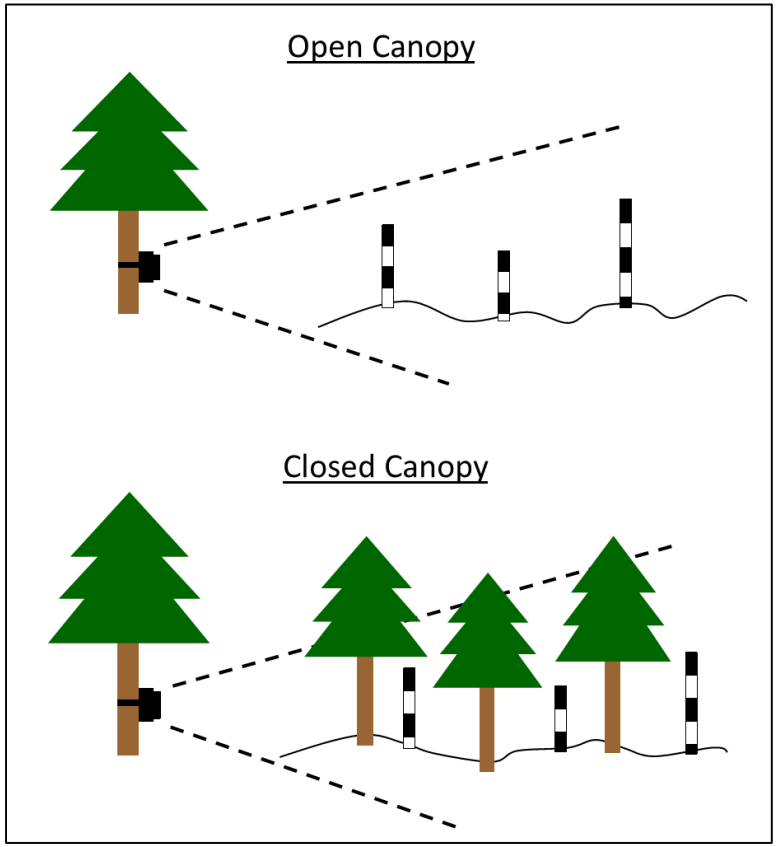
Data from MOD10A1, USGS.

- Landsat
  - USGS, free
  - 1984-present
  - 30 m spatial resolution
  - 16 day repeat cycle

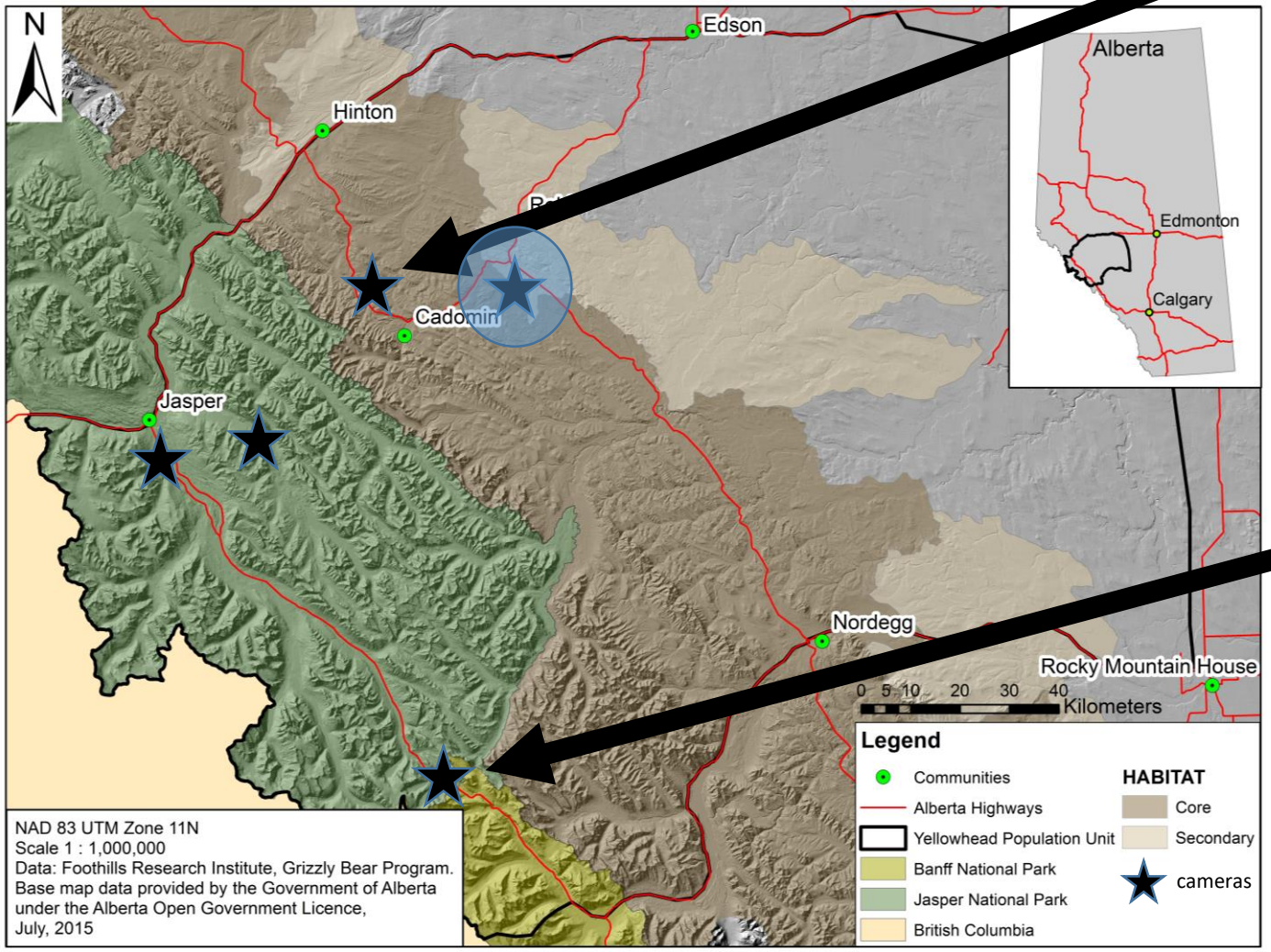


Data from TMSCAG, USGS

Ground Imagery



Ground Imagery



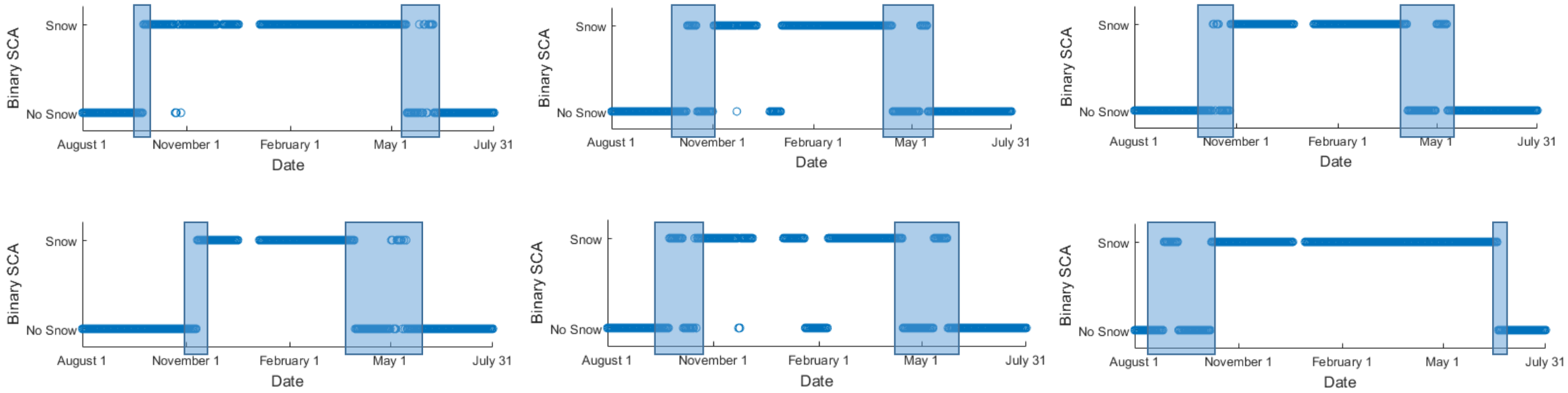
Snow and Bear Behavior

- Transition periods and den emergence
- Availability of spring food
- Human-bear interactions
- Access management

A grizzly at Marmot Basin Ski Resort. Credit: Mike Gere

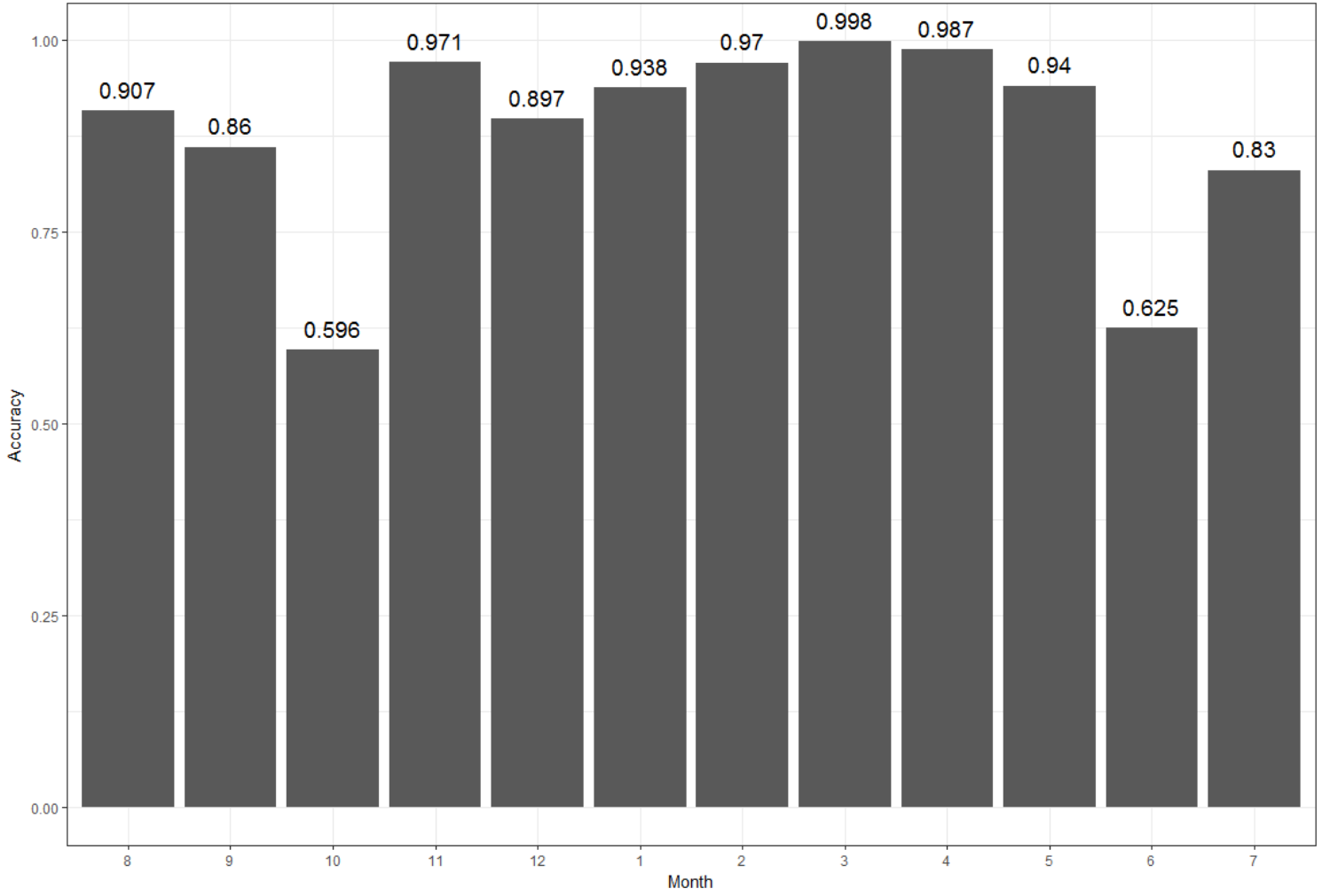
Initial Results

Near-daily, 30 m resolution, 2000-present



Daily binary SCA values shown throughout year.

Accuracy Assessment



Accuracy of snow algorithm throughout year. Daily binary values tested against validation sites.

- Easy detection in winter/summer
- Difficult during transitions
- Improvements: weekly transitions?

Next Steps

- Collect ground imagery for winter 2017-2018
- Apply snow algorithm to entire Yellowhead BMA for years 2000-2017
- Test against movement data
- Look for patterns relevant to bear management

Location of camera validation site near Marmot Basin. Credit: Mark Bradley

Thank You

Credit: Isobel Phoebus

Ethan Berman
MSc Candidate
Integrated Remote Sensing Studio
Forest Resources Management
UBC Faculty of Forestry
ethan.berman@ubc.ca

IRSS
Integrated Remote Sensing Studio

UBC Forestry
University of British Columbia