Monitoring and Mitigating Rail-Related Moose Mortality in Northern BC

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Outline

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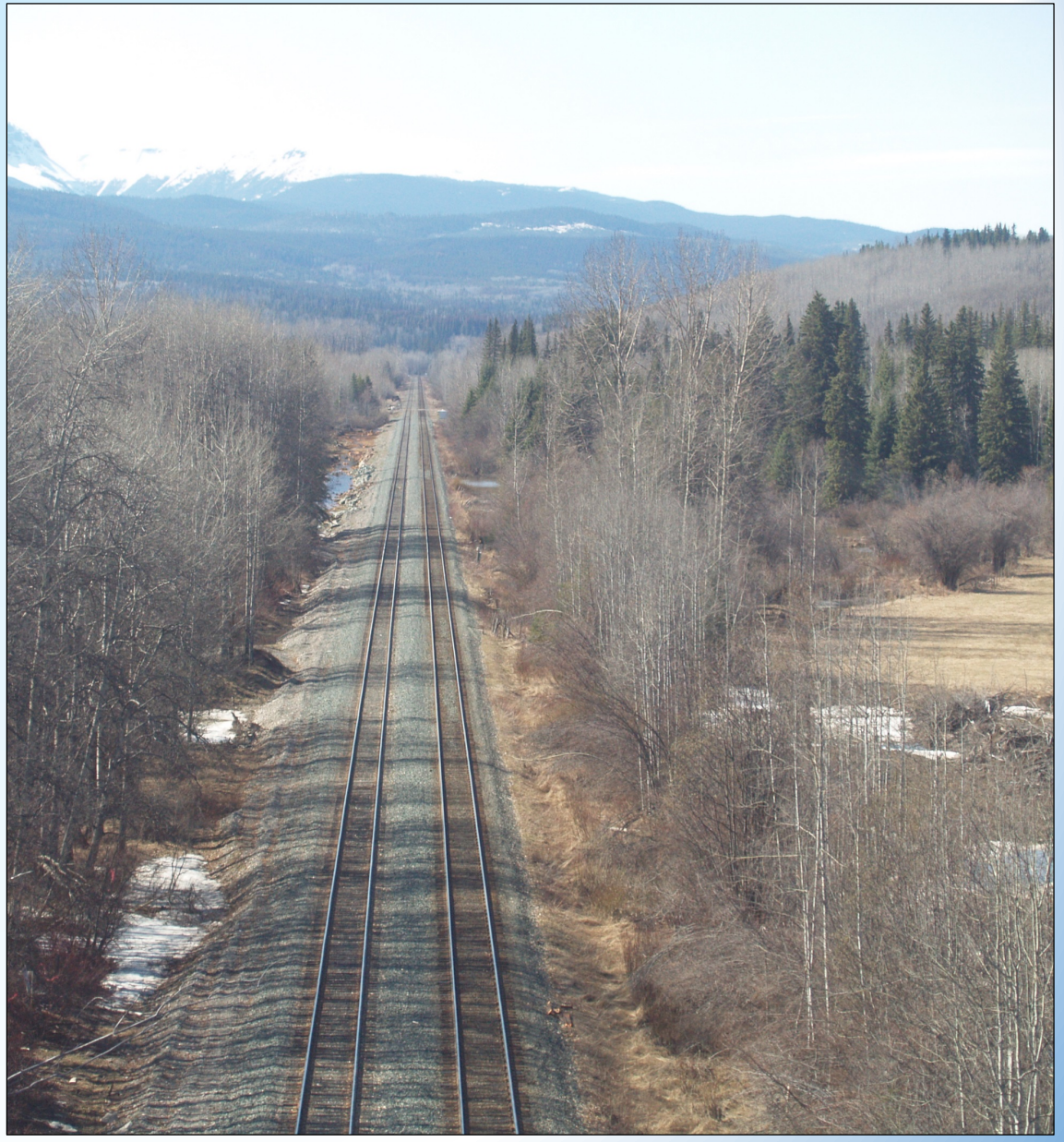
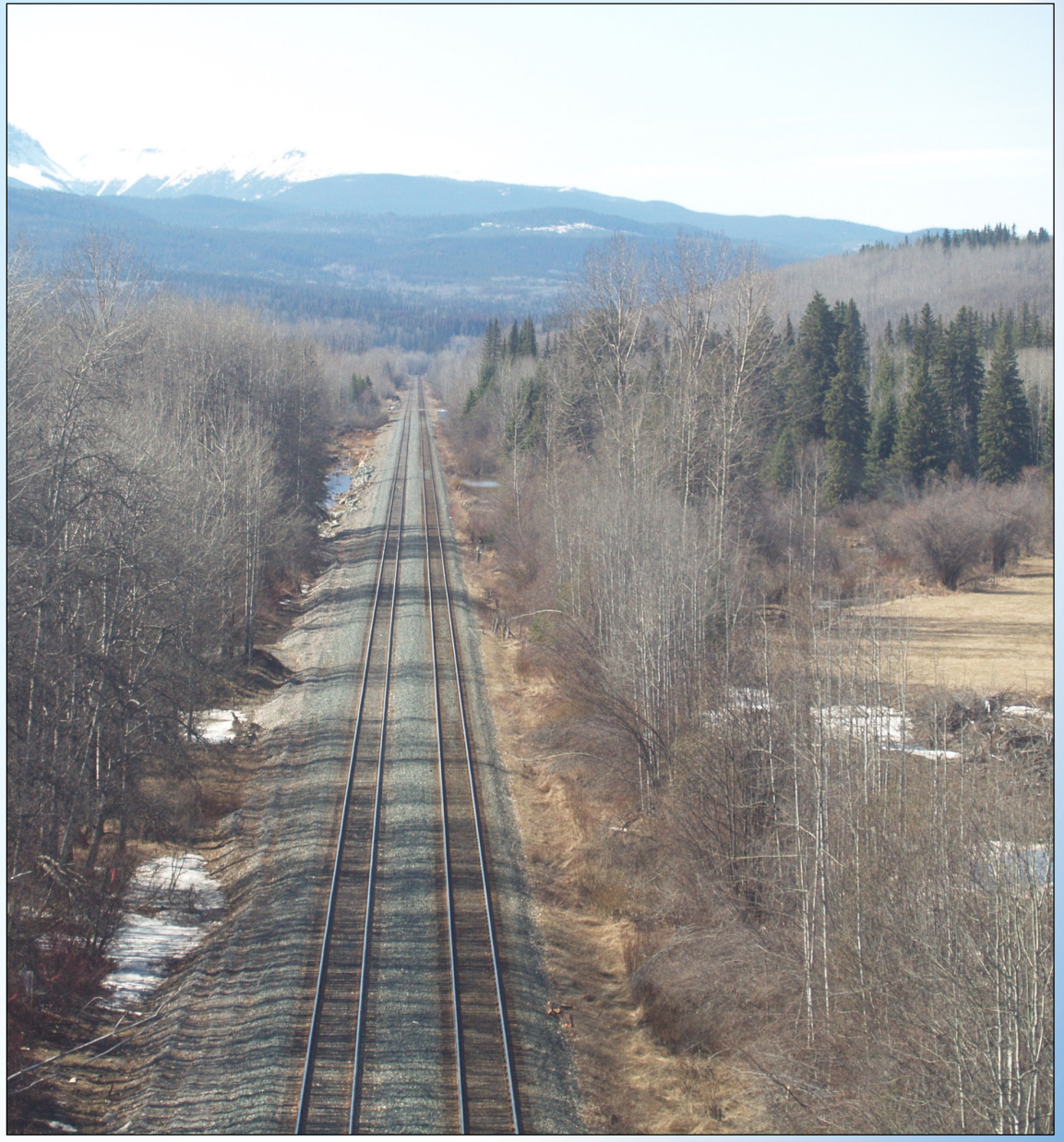


Rail Mortality of Wildlife

- Worldwide issue
- Variety of species
- Moose issue across northern hemisphere
- In BC, represent 64% of wildlife collisions reported by CN
- Highly valued in northern BC



Background

Moose-Train Collisions – Root Cause

- Moose spread across landscape in summer
- Migrate to valley bottoms for winter
- Lower snow depths, better forage access
- Rail corridor along floodplains
- Moose end up on rail grade
- Natural predator response ≠ train avoidance

Background

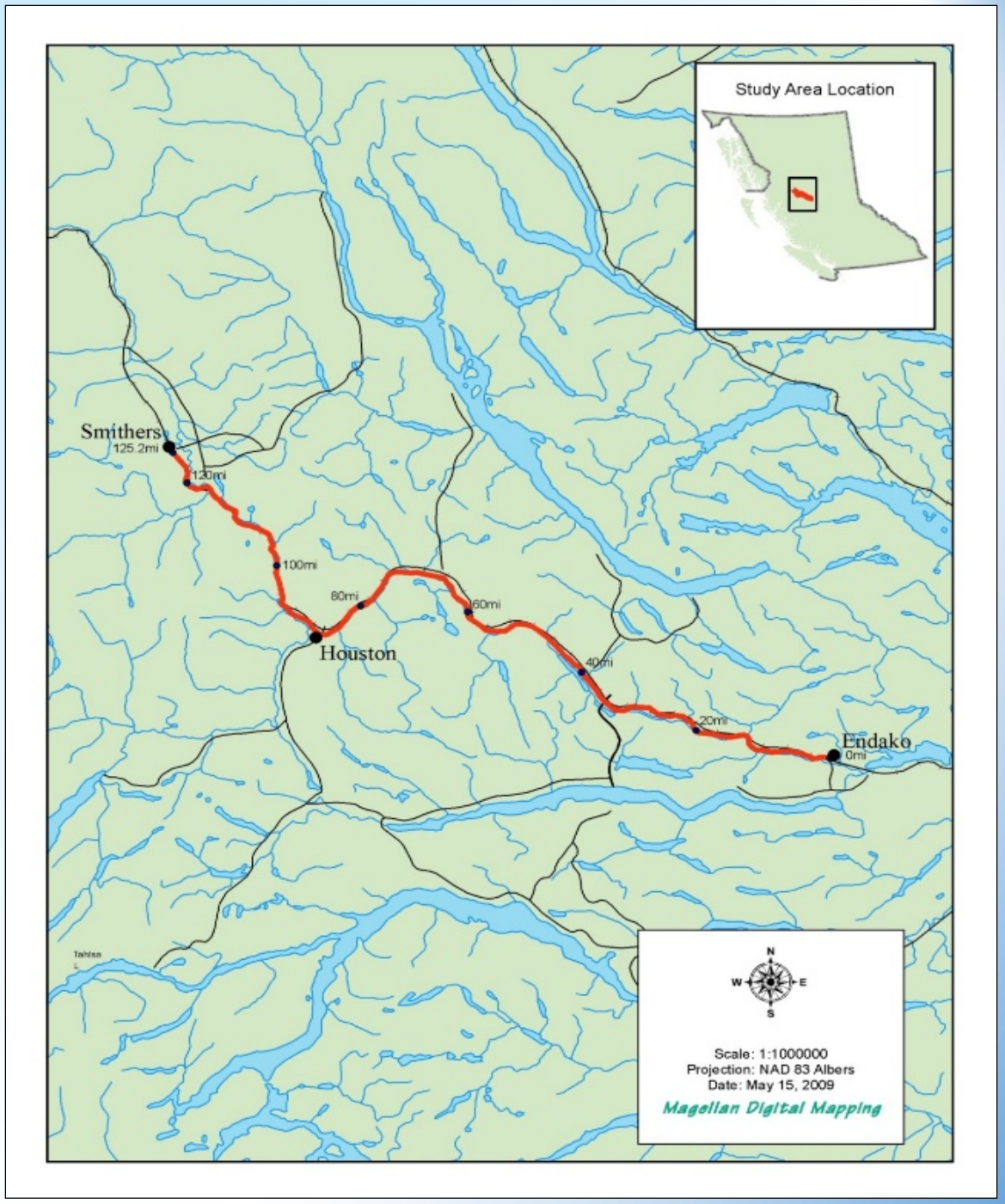
Moose-Train Collisions – Reporting

- *BC Wildlife Act* permit – w/ conditions
- Reporting accuracy questioned
- 2006-2007 winter
  - Severe snow conditions
  - Alarming reports east of Smithers

Background

Telkwa Subdivision

- Endako to Smithers
- 125 miles (201 km)
- Runs along Endako and Bulkley Rivers
- Very high moose population – declining



Background

Moose-Train Collisions – Reporting

- Spring 2007 govt aerial survey
- Estimated >200 mortalities
- <10% reported
- Extrapolated across BC
- Calls for action

Working Group

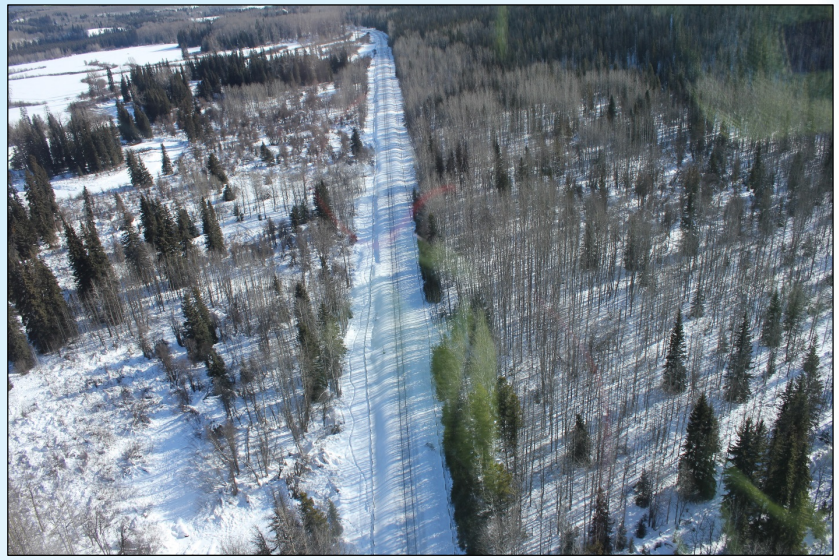
- FLNRORD biologists
- Academic specialists
- CN Environment
- Local consultants
- Other stakeholders

Working Group

- Habitat Mapping
- Mortality Surveys
- Weather Data Review
- DNA Analysis
- Mitigation

Habitat Mapping

- Ecosystem mapping w/in 500 m of rail
- Ecosystems, stand age vs. collision hotspots
- ~50% of Telkwa Subdivision adjacent to suitable Moose Winter Range



Mortality Surveys

Hi-Rail

Aerial

Hi-rail Surveys

- December to April
- 40 surveys over 7 years
- Record environmental data
  - Snow depth, topography, vegetation
- Examine carcasses (species, sex, age)
- Collect DNA samples

Aerial Surveys

- Annual helicopter flight
  - Early April
- Estimate winter mortalities
- Correction factor adapted from Huso (2011) and Olson (2013)
  - Carcass scavenging, decomp
  - Visibility biases
  - F = 1.87±0.30

Results – Forest Cover

- Habitat vs. collisions
- Collision levels highest near 40-80-year old stands
- Oldest forests along subdivision
- Good snow interception, plus forage

Results – Snowfall

- Annual variation correlated with collision levels (r=0.071, p-value=0.033)
- Influences timing, magnitude of migration (obligate vs. facultative)
- Increased moose density in valley bottom

Results – Other Snow Variables

- Snow Depth – small sample size
  - U-shaped curve?
- Snow Distribution – few weather stations
- Snow Timing – no real-time data

Results – Sex Ratio

- Assess based on carcass characteristics
- If necessary, DNA analysis
- No significant difference vs. population
- Age ratio undetermined

Mitigation

Literature Review

- Pilot Cars
- Speed Reduction
- Warning Systems
- Scent Deterrence
- Vegetation Manipulation
- Exclusion Fencing

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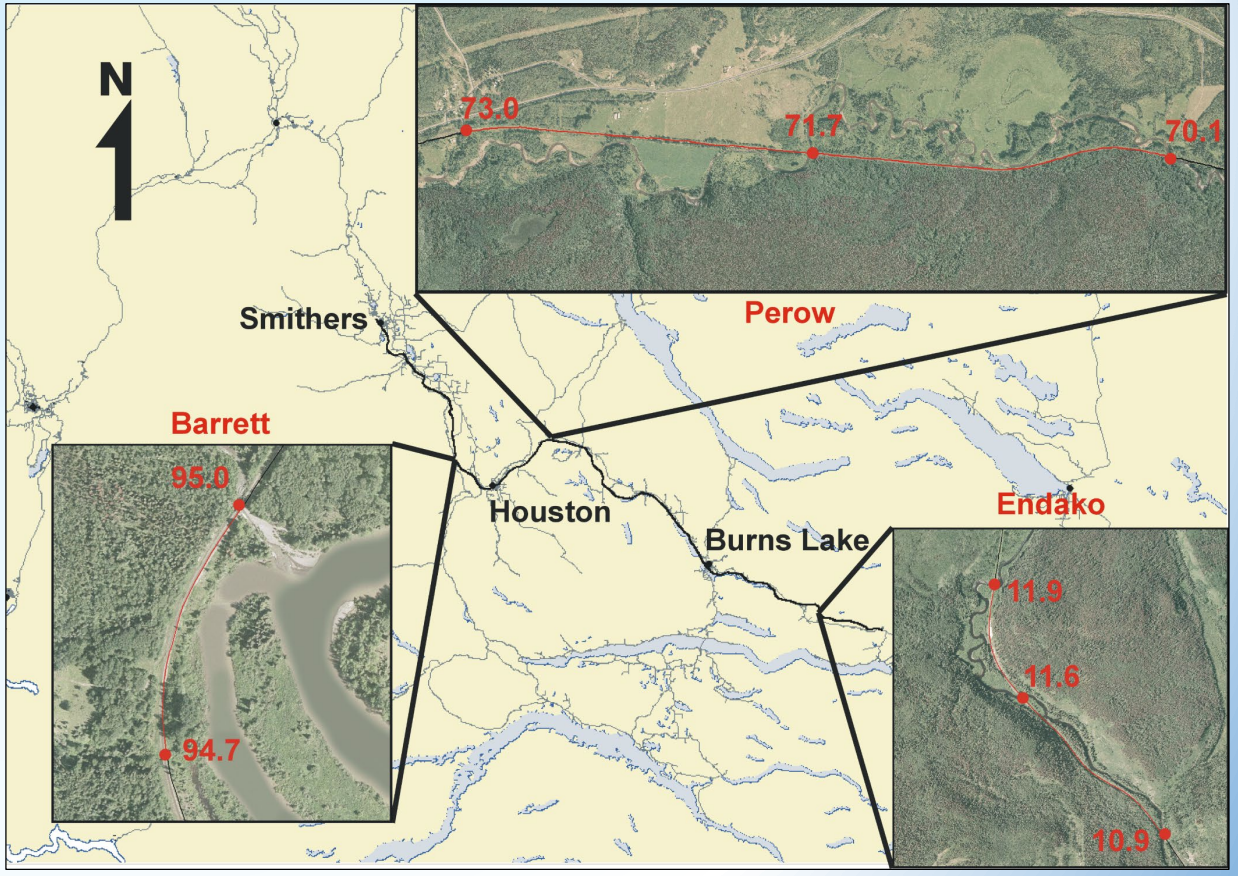
Exclusion Fencing



Exclusion Fencing

- 8’ Page wire
- Three sites – 4.3 mi total
- Bridge to bridge
- High collision areas
  - 9.8% of MTCs 1990-2008
- Wildlife cameras

Exclusion Fencing – Results

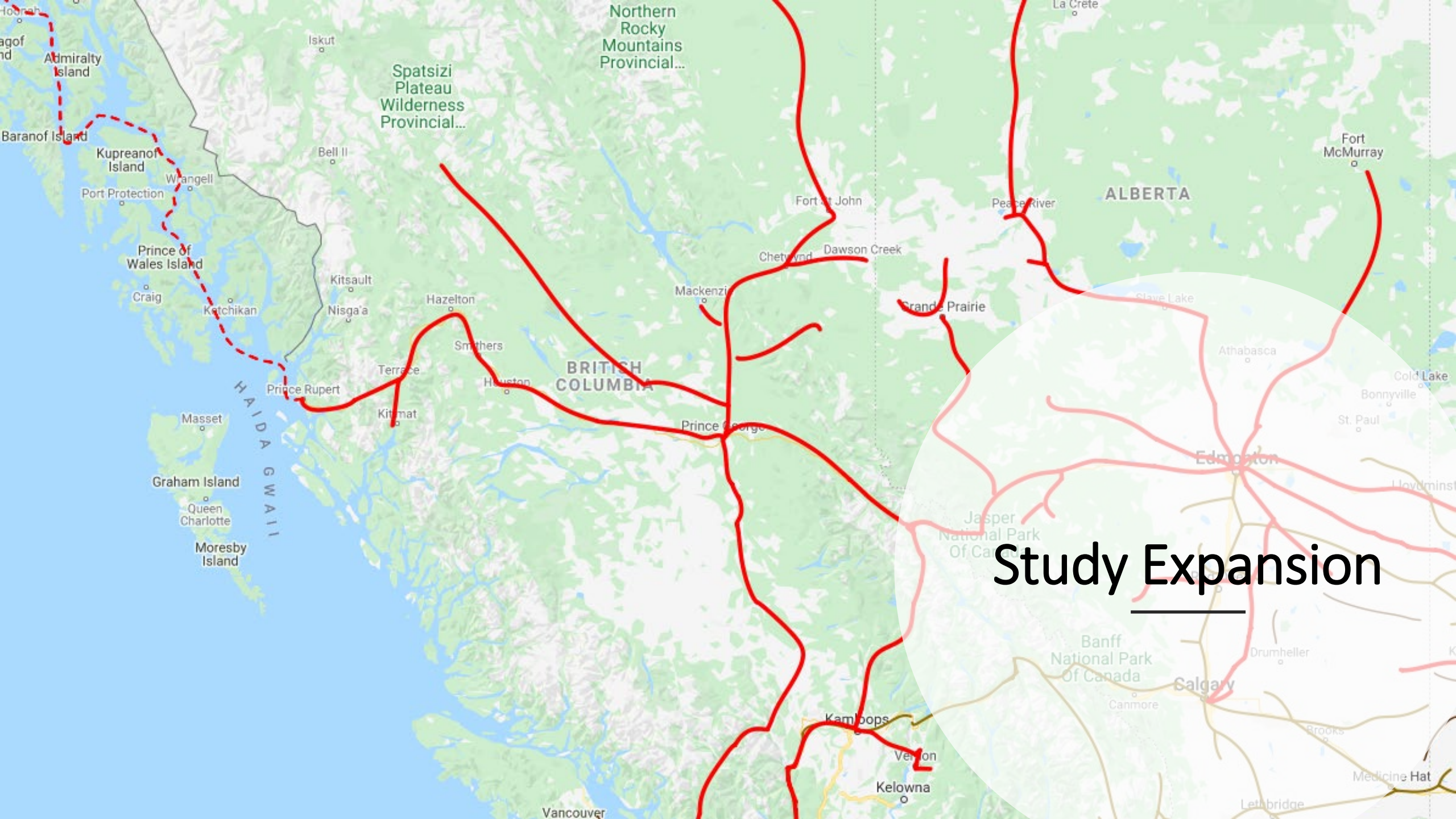
- After fencing (2010-2019) – 3.3%
  - Two-tailed Z-test: *p*-value = 0.014
- No significant increase in adj miles (i.e., displacement effect)
- 7/8 bridges → underpasses

Exclusion Fencing – Limitations

- Not 100% effective (3.3% ≠ 0)
  - Frequently damaged
  - Bridges as fence ends
  - Trestle bridges → concrete tubs
- Application constraints

Application Constraints

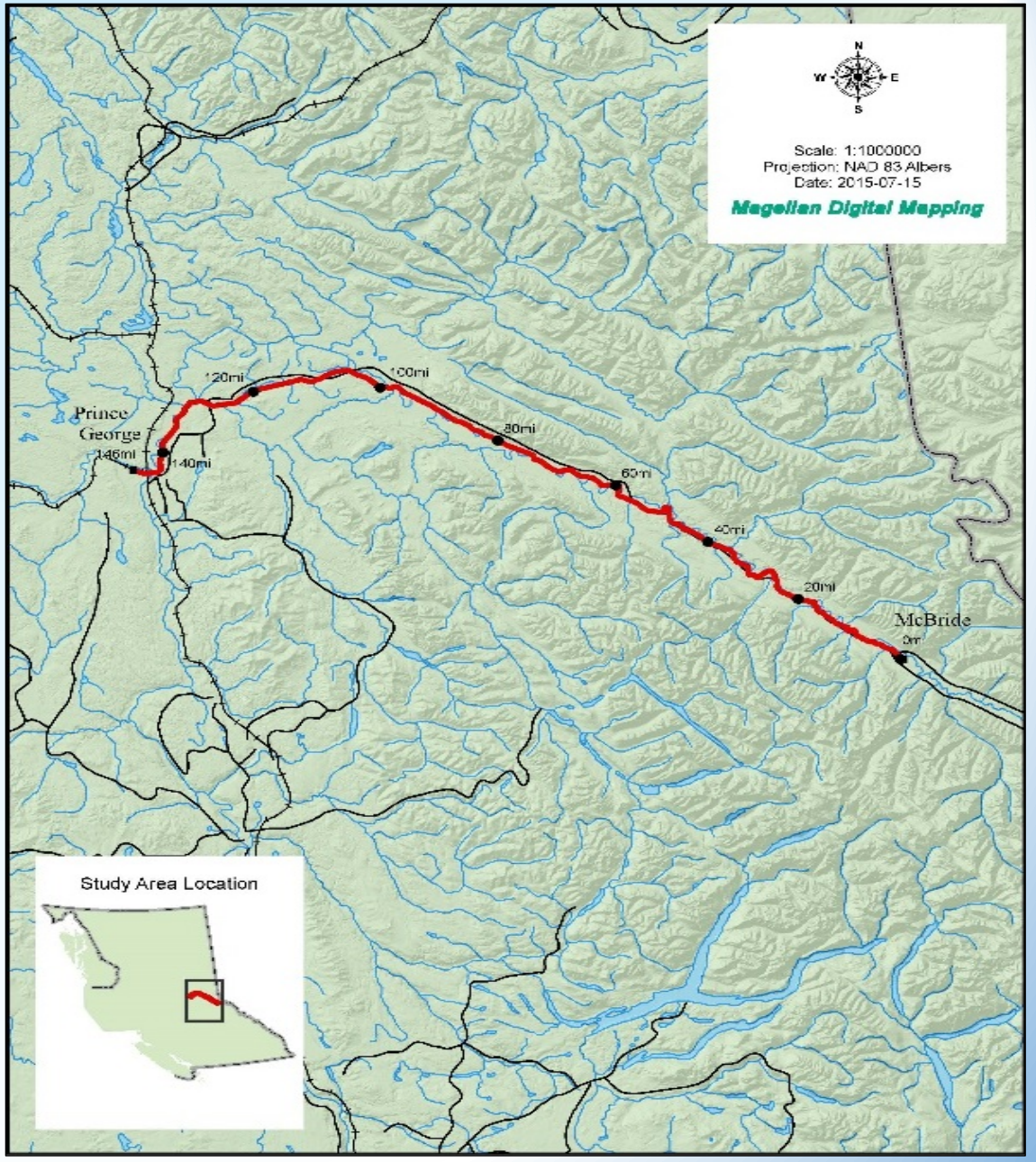
- Length limits
  - Migration, gene flow
- Need bridges
  - Underpasses
- Avoid highways, public roads, crossings
- Fenced what we could on Telkwa Subdivision


Study Expansion
Admiralty Island
Baranof Island
Kupreanof Island
Port Protection
Wrangell
Prince of Wales Island
Craig
Ketchikan
Kitsault
Nisga'a
Hazelton
Smithers
Terrace
Prince Rupert
Kitimat
Masset
Graham Island
Queen Charlotte
Moresby Island
HAIDA GWAII
Iskut
Bell II
Spatsizi Plateau Wilderness Provincial...
Northern Rocky Mountains Provincial...
BRITISH COLUMBIA
Mackenzie
Fort St John
Dawson Creek
Chetwynd
Peace River
Grande Prairie
La Crete
Fort McMurray
ALBERTA
Slave Lake
Athabasca
Cold Lake
Bonnyville
St. Paul
Edmonton
Jasper National Park Of Canada
Banff National Park Of Canada
Canmore
Drumheller
Calgary
Brooks
Medicine Hat
Lethbridge
Kamloops
Vernon
Kelowna
Vancouver

Study Expansion

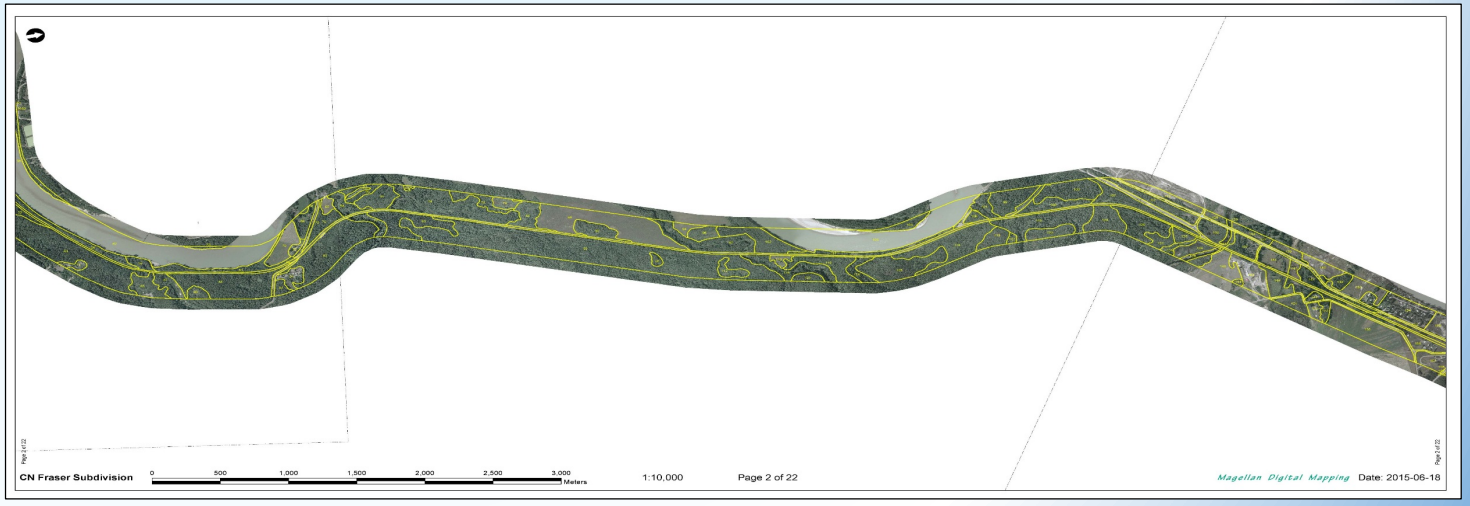
Fraser Subdivision

- McBride to Prince George
- 146 miles (235 km)
- Along the Fraser River
- Geography, climate, topography different from Telkwa Subdivision
- Similar population issues



Fraser Subdivision

- Habitat mapping
- Mortality surveys
  - Hi-rail and aerial
- Mitigation potential



Results

- Substantially lower collision levels than Telkwa Sub (~1/2)
- Less winter range intersected
- Suspect lower winter moose densities along rail
- Mitigation potential low

Mitigation Potential

- Fewer hot spots
- Fewer bridges
- Private and public roads and/or crossings

Next Steps

- Investigate other subdivisions
- Telkwa Subdivision an outlier?
- Improve fence effectiveness
- Increase mitigation opportunities

Alternate Mitigation

- PVC “cattle guard” tested
- Hoped to disrupt moose movement along rail bed
- Possibly improve fence ends

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- Hoped to disrupt moose movement along rail bed
- Possibly improve fence ends
- Insufficient clearance for plows

Fencing Improvements

- HDPE sheets used at tunnels in Jasper
- Would similar sheeting restrict moose movement?
- Trial at existing fence end

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- HDPE sheets used at tunnels in Jasper
- Would similar sheeting restrict moose movement?
- Trial at existing fence end
- Unable to confirm effectiveness

HDPE Trials

- Work w/ Northern Lights
- Install sheeting around feeding trough
- Analyze feeding behaviour before and after

HDPE Results

- Avoidance of sheets
  - 99% decrease in approaches
- Application as fence ends?
- Use in isolation?
- Difficult to replicate rail grade conditions
- Behaviour under chase still unknown

Additional Studies

- Working with academics from UNBC (Roy Rea), Poland (Karolina Jasińska)
- Investigating wide array of variables
- Results pending publication

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Questions?