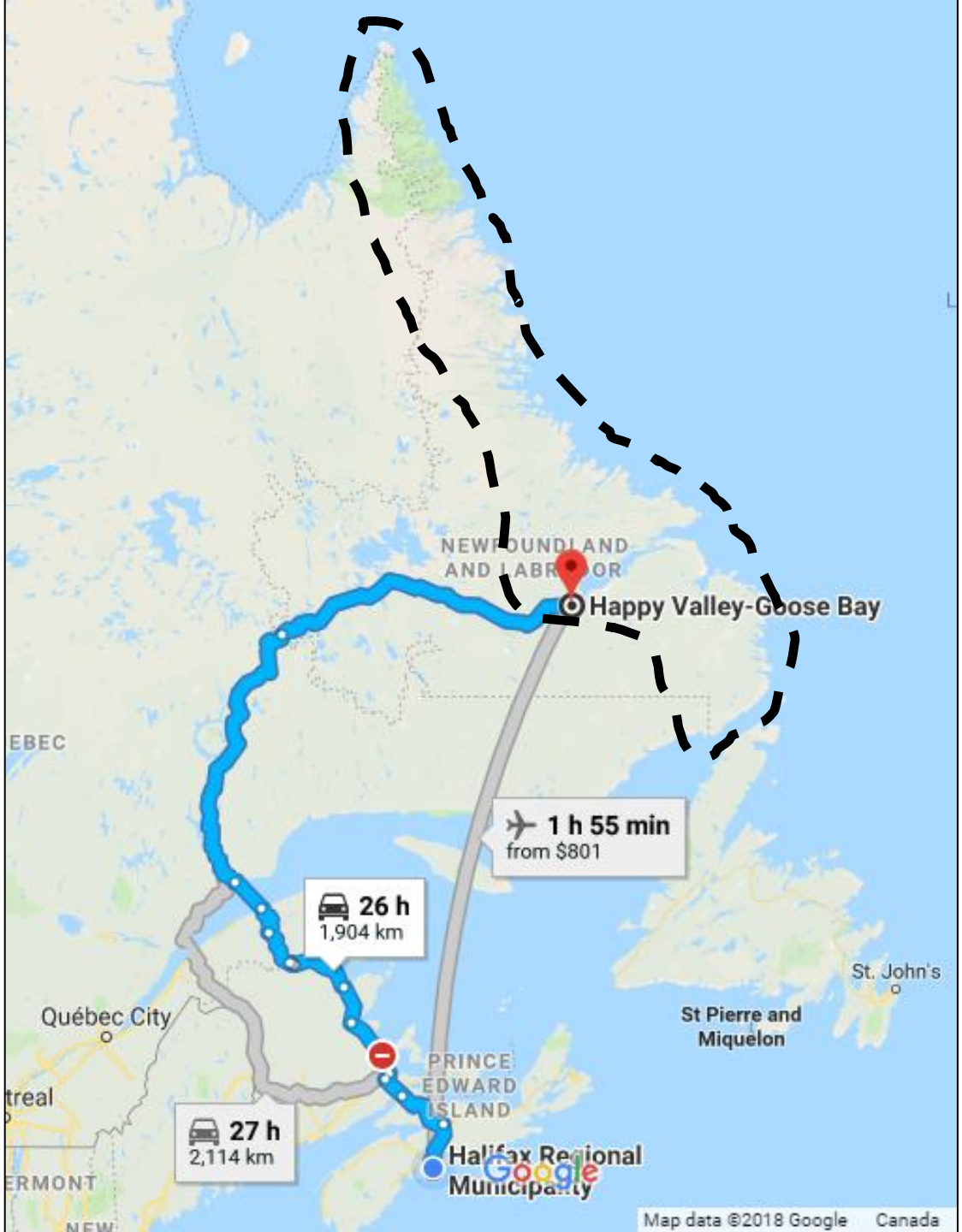
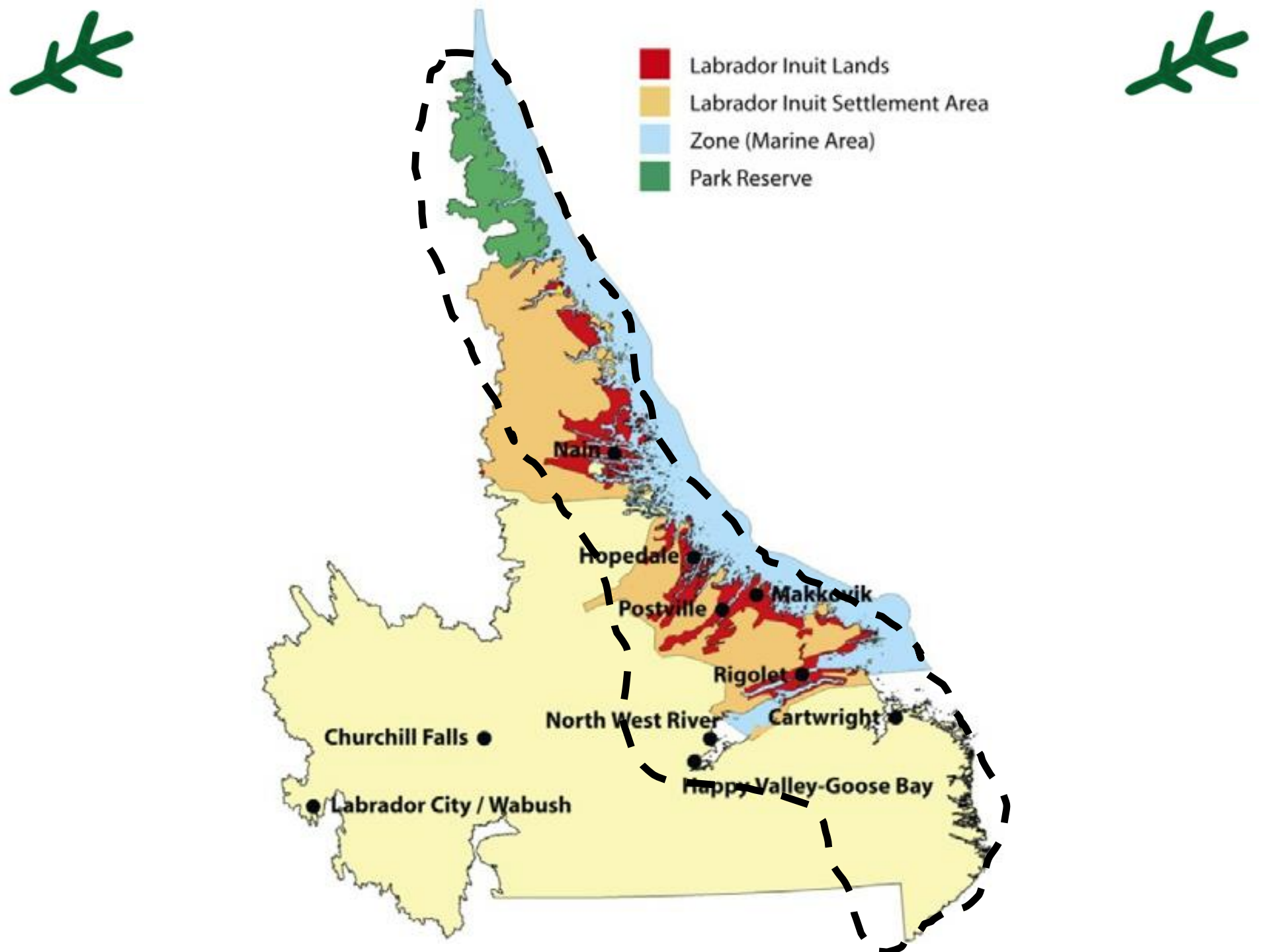
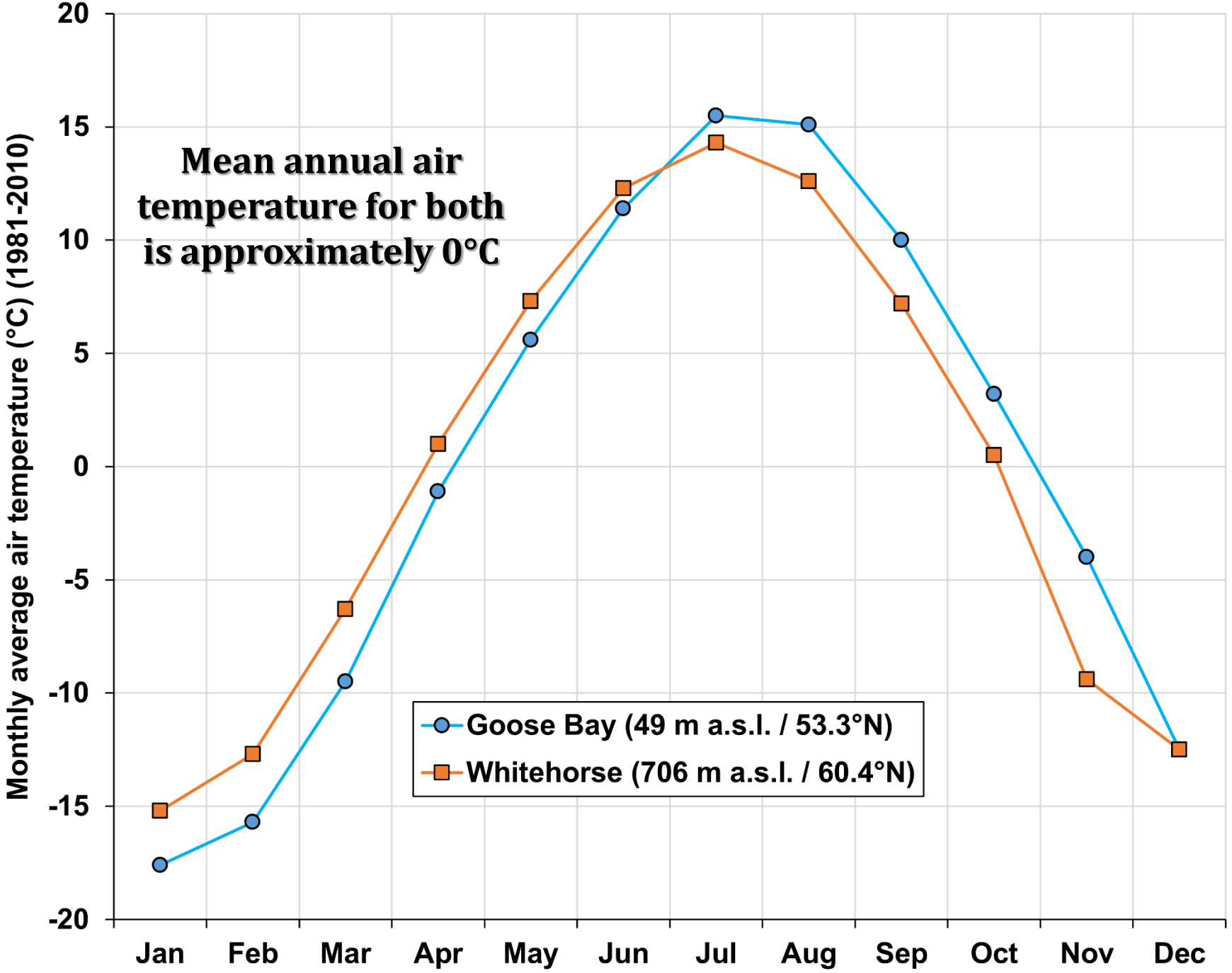
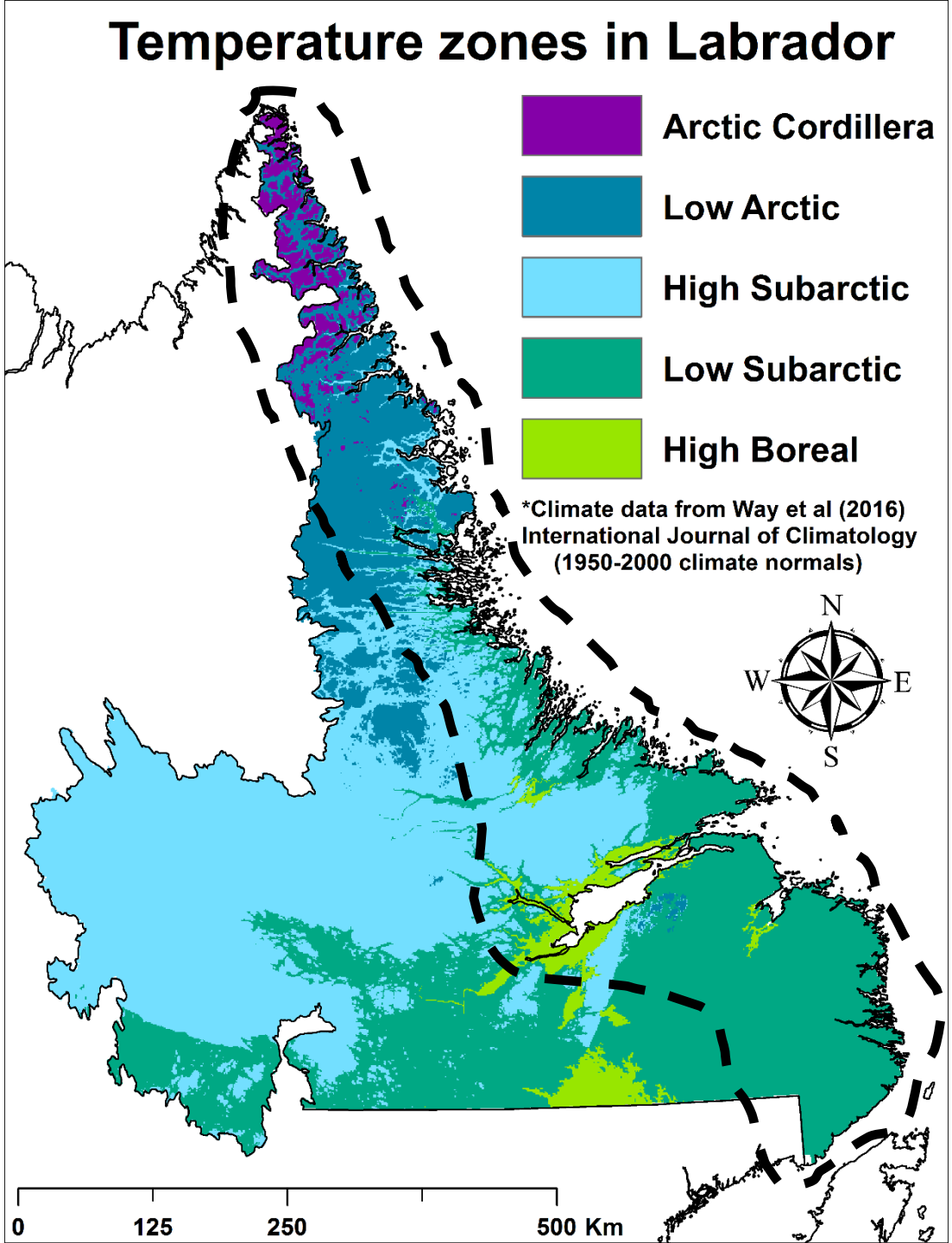
Impacts of changing cold environments on Indigenous people in coastal Labrador, northeast Canada

Robert G. Way, B.A., M.Sc., Ph.D.
Nunatsiavummiut from HVGB
Postdoctoral Fellow, Labrador Institute
Memorial University of Newfoundland


Happy Valley-Goose Bay
1 h 55 min
from $801
26 h
1,904 km
27 h
2,114 km
Québec City
St. John's
St Pierre and Miquelon
PRINCE EDWARD ISLAND
Google
Map data ©2018 Google
Canada

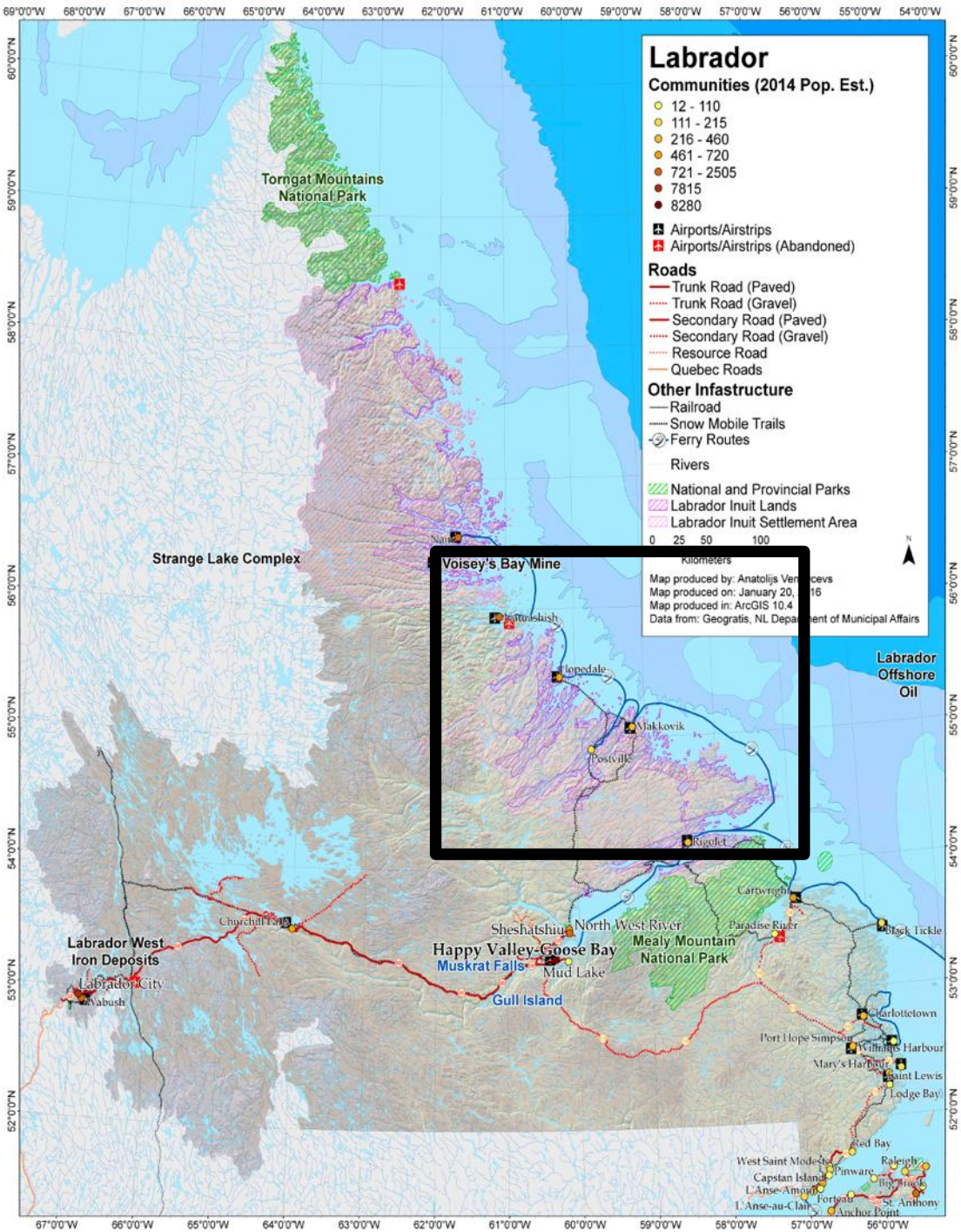

Labrador Inuit Lands
Labrador Inuit Settlement Area
Zone (Marine Area)
Park Reserve
Nain
Hopedale
Makkovik
Postville
Rigolet
North West River
Cartwright
Churchill Falls
Happy Valley-Goose Bay
Labrador City / Wabush


Mean annual air temperature for both is approximately 0°C
Monthly average air temperature (°C) (1981-2010)
20
15
10
5
0
-5
-10
-15
-20
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Goose Bay (49 m a.s.l. / 53.3°N)
Whitehorse (706 m a.s.l. / 60.4°N)


Temperature zones in Labrador
Arctic Cordillera
Low Arctic
High Subarctic
Low Subarctic
High Boreal
*Climate data from Way et al (2016)
International Journal of Climatology
(1950-2000 climate normals)
N
W
E
S
0
125
250
500 Km

Indigenous Labradorians rely on snow and ice

Figure 4-4: Different examples of trail use in Makkovik and Postville. (A) Travelling between the communities; (B) ice-fishing; (C) hauling firewood; (D) caribou hunting. Photos A – C by R. Riedlsperger. Photo D by B. Jacque


Labrador
Communities (2014 Pop. Est.)
12 - 110
111 - 215
216 - 460
461 - 720
721 - 2505
7815
8280
Airports/Airstrips
Airports/Airstrips (Abandoned)
Roads
Trunk Road (Paved)
Trunk Road (Gravel)
Secondary Road (Paved)
Secondary Road (Gravel)
Resource Road
Quebec Roads
Other Infastructure
Railroad
Snow Mobile Trails
Ferry Routes
Rivers
National and Provincial Parks
Labrador Inuit Lands
Labrador Inuit Settlement Area
0 25 50 100
Kilometers
N
Map produced by: Anatolijs Ven cevs
Map produced on: January 20, 16
Map produced in: ArcGIS 10.4
Data from: Geogratis, NL Depa ent of Municipal Affairs
Torngat Mountains National Park
Strange Lake Complex
Voisey's Bay Mine
Hopedale
Makkovik
Postville
Rigolet
Labrador Offshore Oil
Labrador West Iron Deposits
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Labrador City
Wabush
Sheshatshiu
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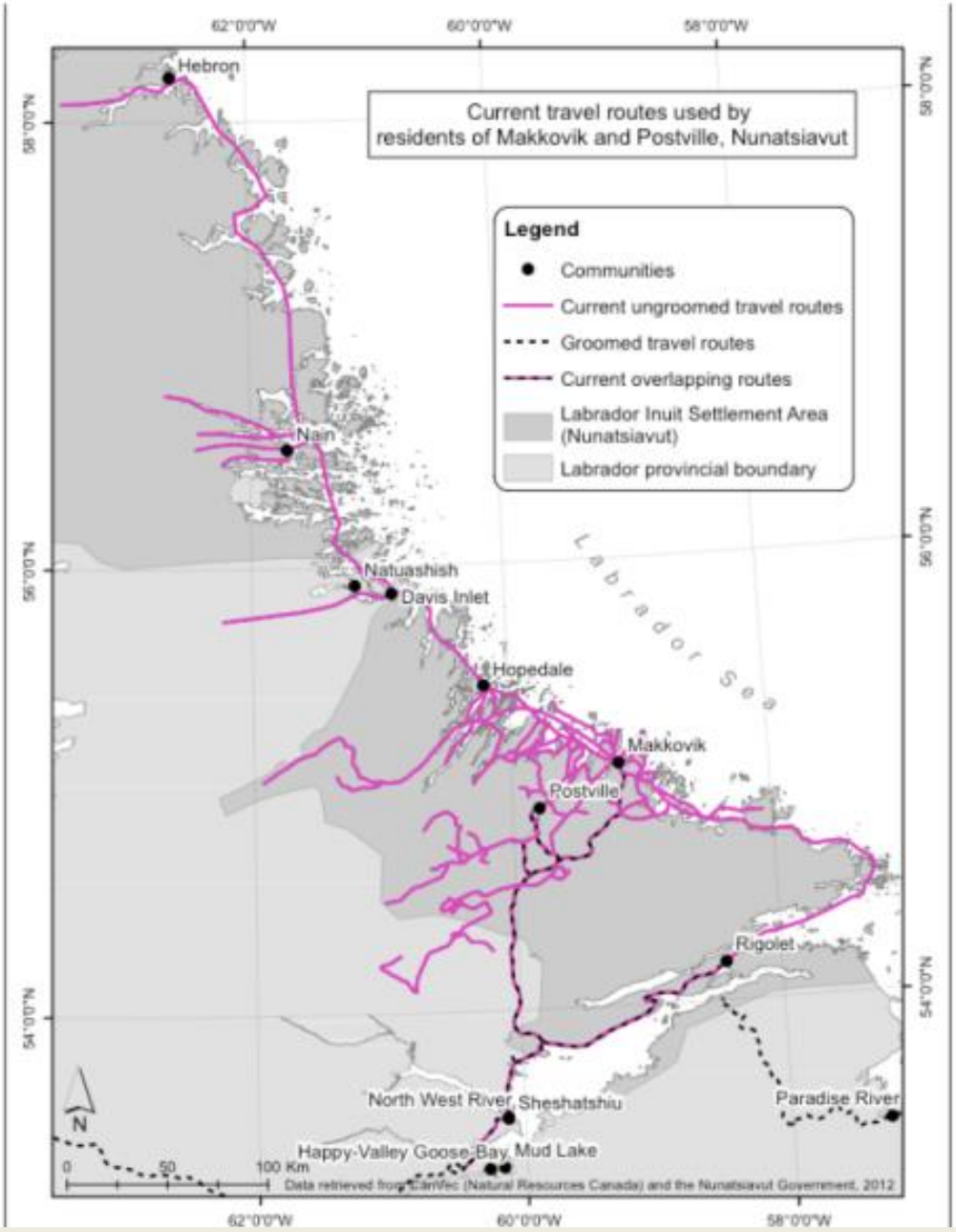
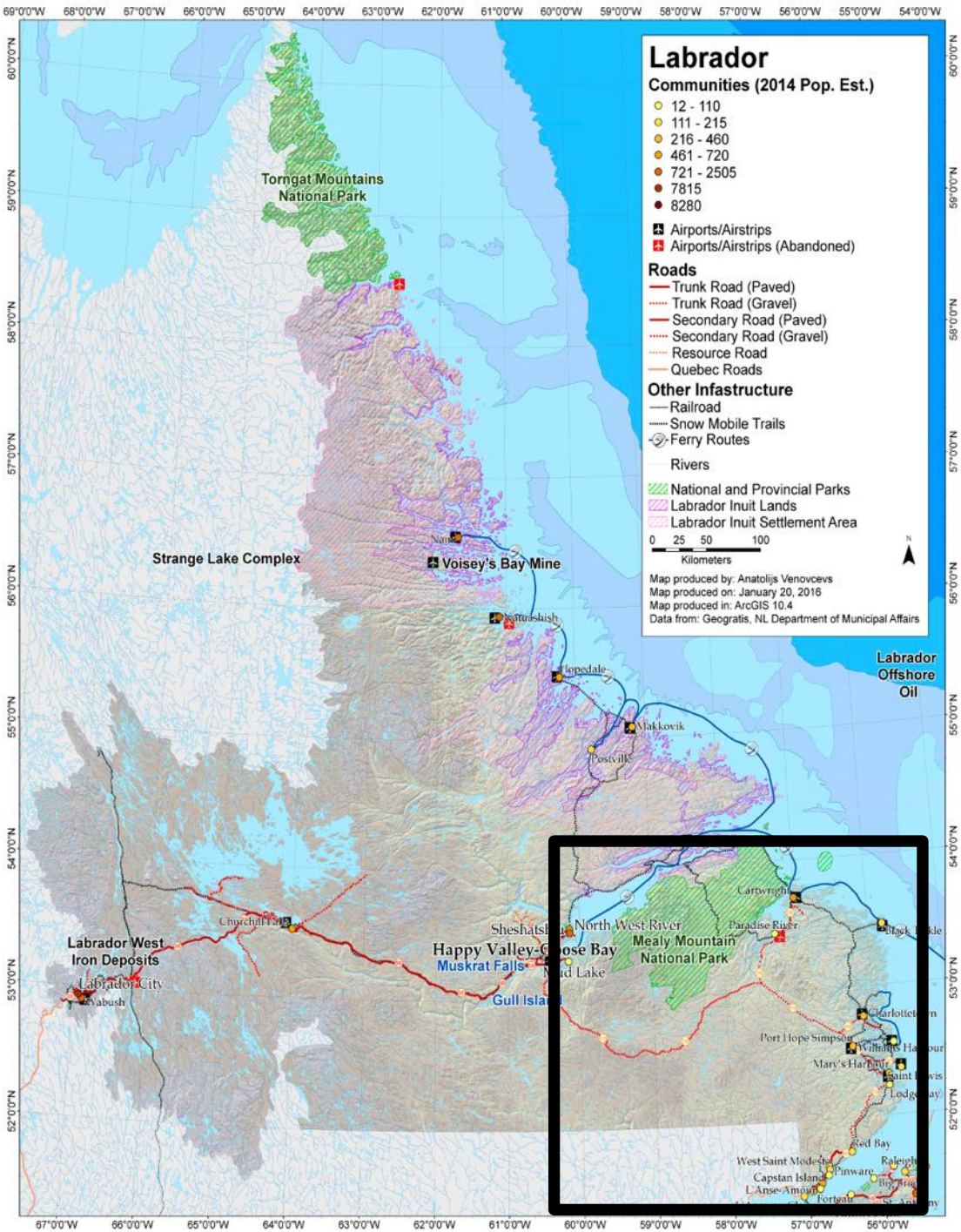
Mealy Mountain National Park
Paradise River
Cartwright
Black Tickle
Charlottetown
Port Hope Simpson
Williams Harbour
Mary's Harbour
Saint Lewis
Lodge Bay
Red Bay
West Saint Modeste
Capstan Island
L'Anse-Amour
L'Anse-au-Clair
Pinware
Forteau
Anchor Point
St. Anthony
Raleigh



Winter trails in Nunatsiavut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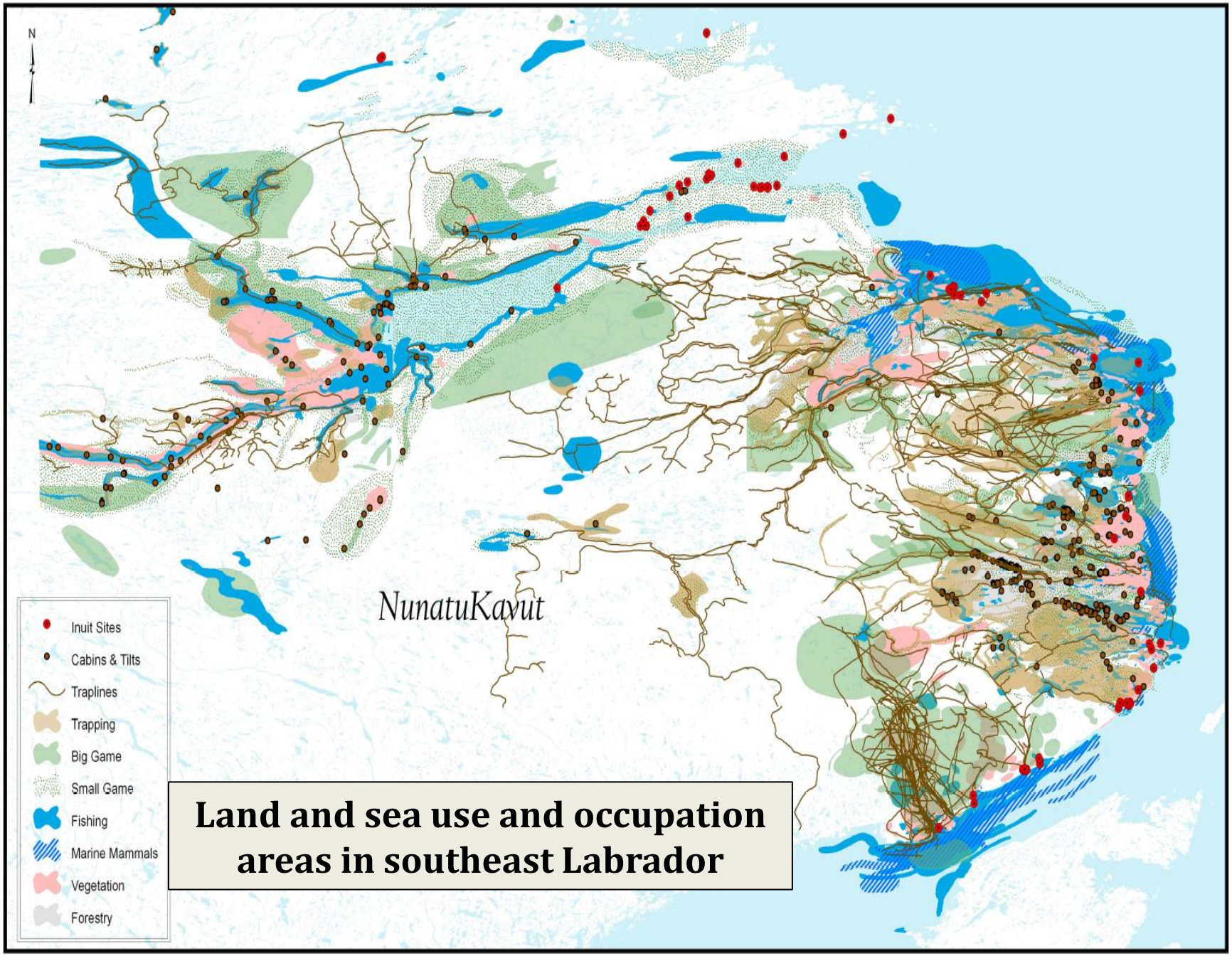
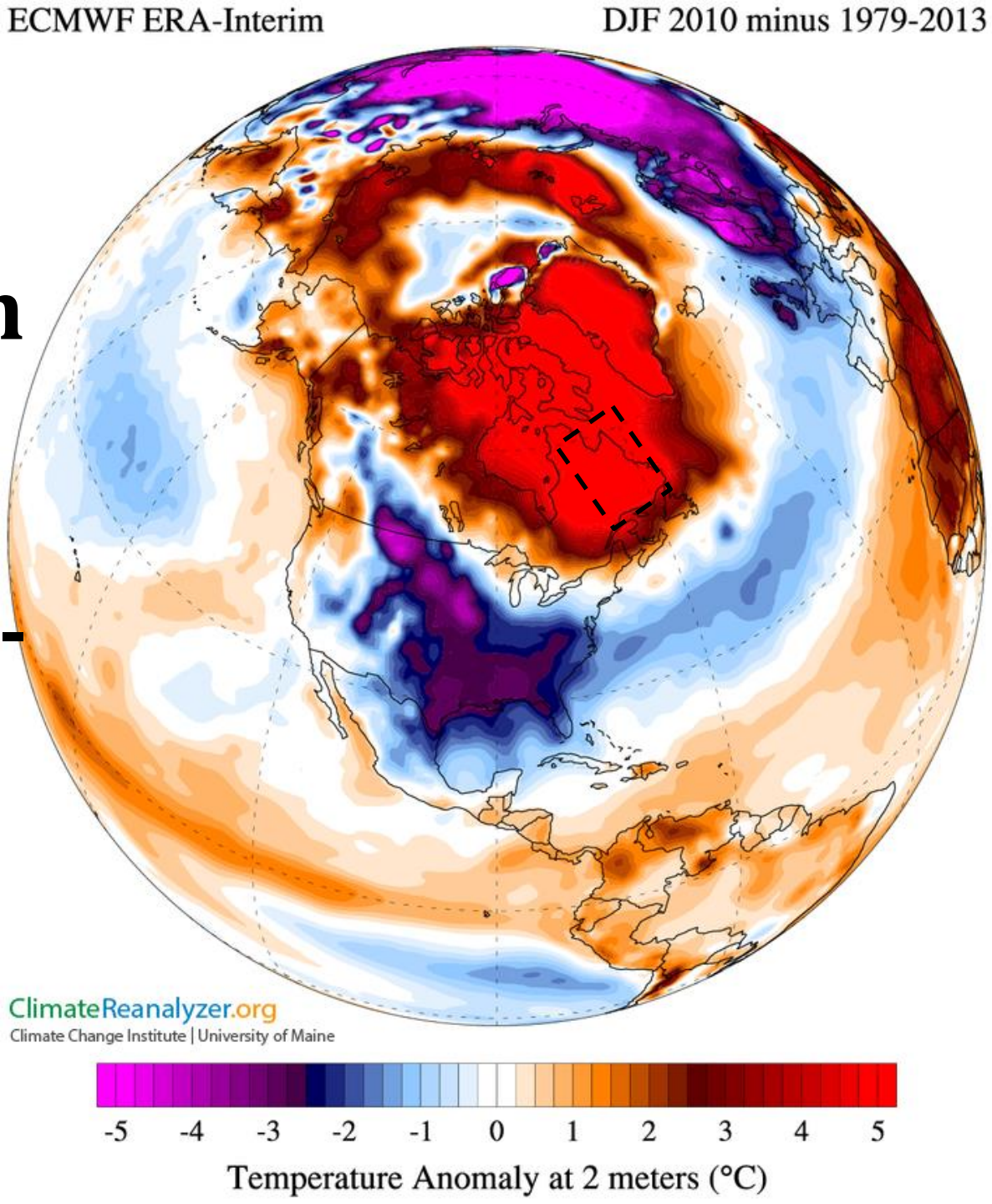
Lodge Bay
West Saint Modeste
Pinware
Capstan Island
L'Anse-Amour
Forteau
67°0'0"W
66°0'0"W
65°0'0"W
64°0'0"W
63°0'0"W
62°0'0"W
61°0'0"W
60°0'0"W
59°0'0"W
58°0'0"W
57°0'0"W
56°0'0"W
60°0'0"N
59°0'0"N
58°0'0"N
57°0'0"N
56°0'0"N
55°0'0"N
54°0'0"N
53°0'0"N
52°0'0"N

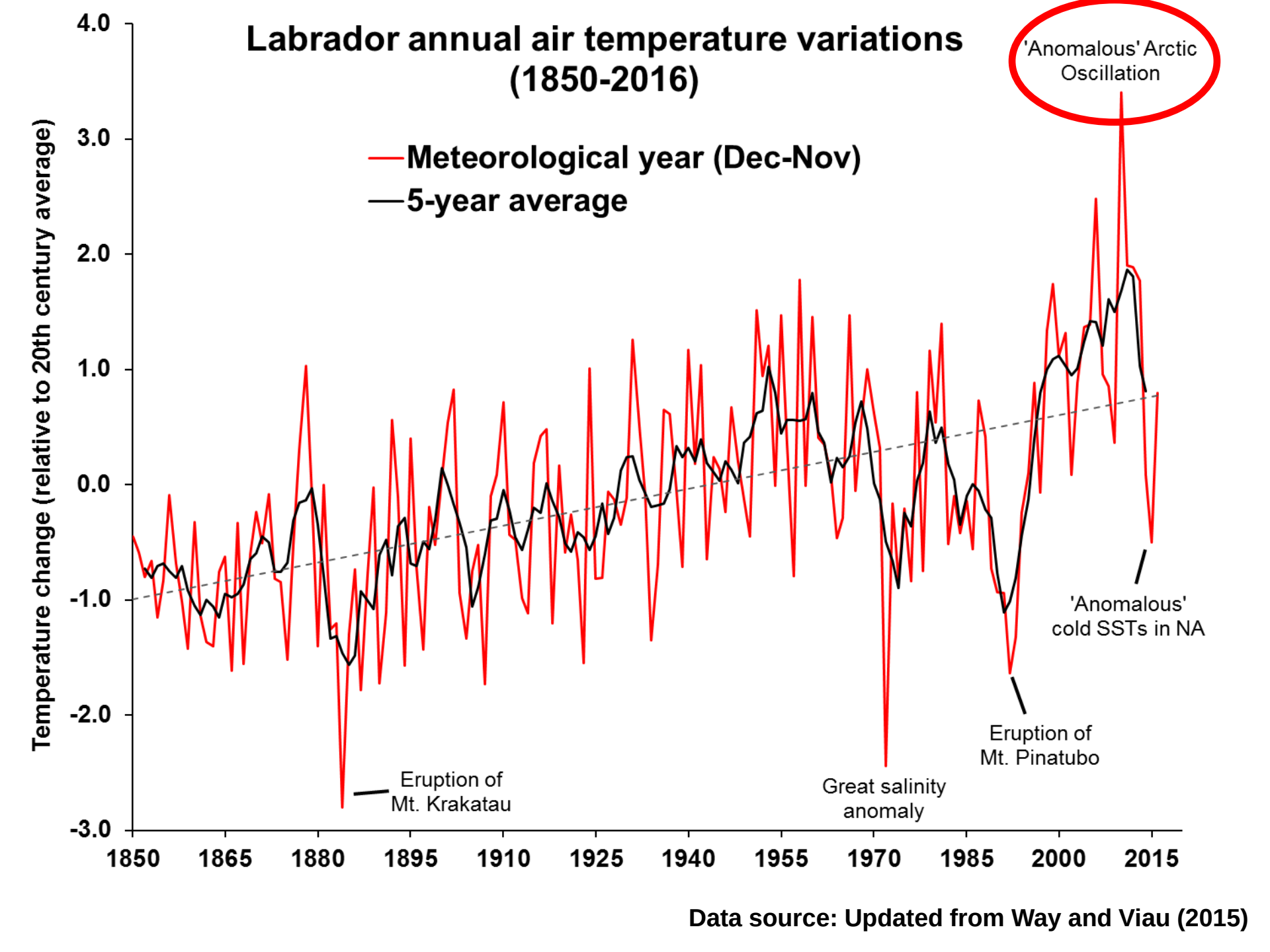


Land and sea use and occupation areas in southeast Labrador

Ice conditions along winter trail route near Happy Valley-Goose Bay in Winter 2011

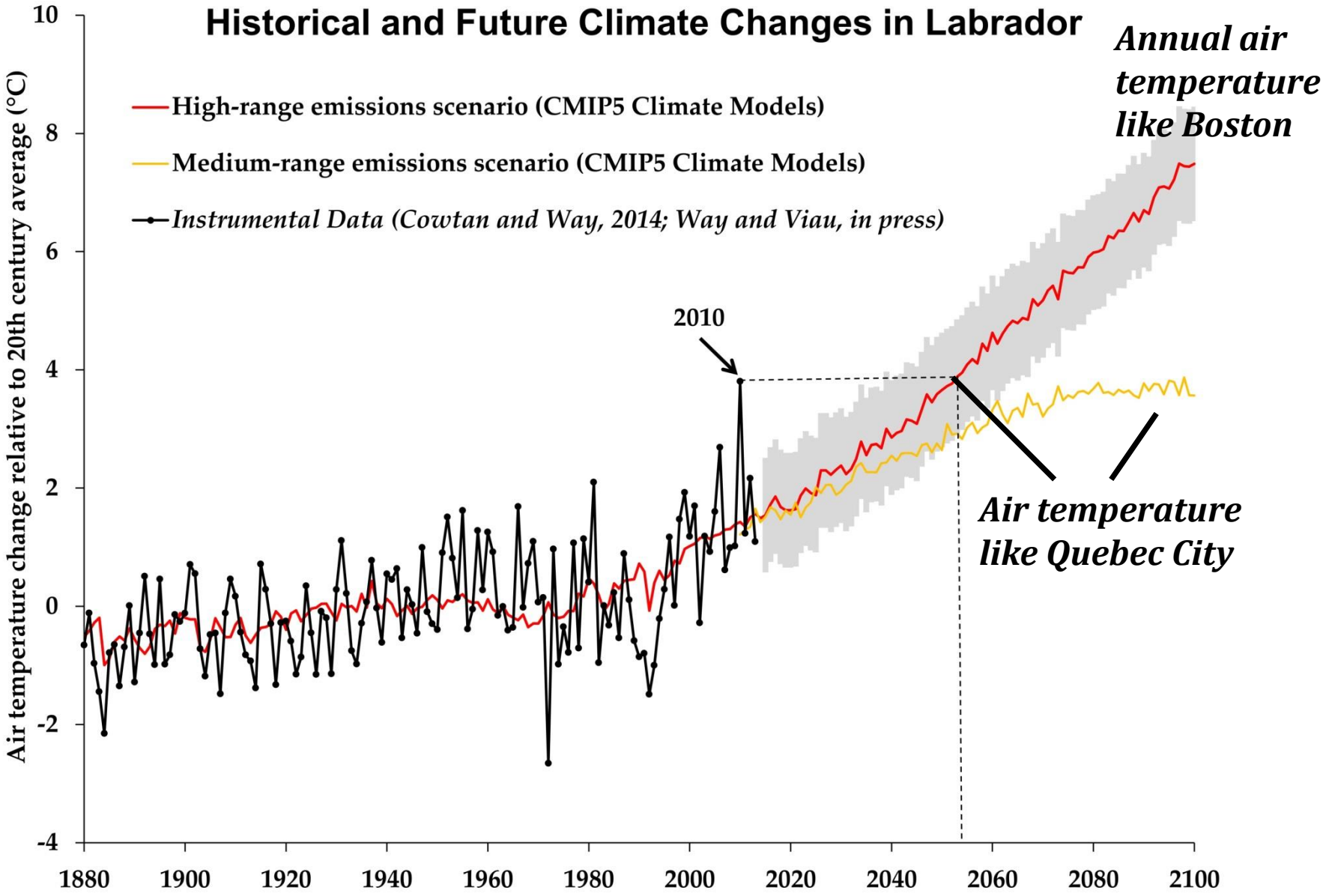
Locally known as the “year without a winter”: 2010-2011





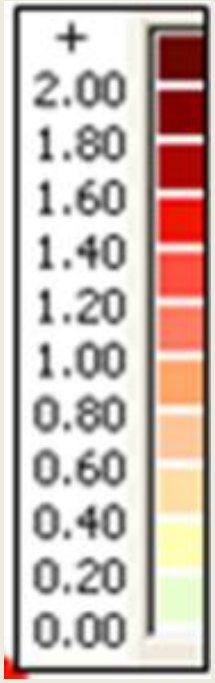
Data source: Updated from Way and Viau (2015)

Projected changes in Happy Valley-Goose Bay

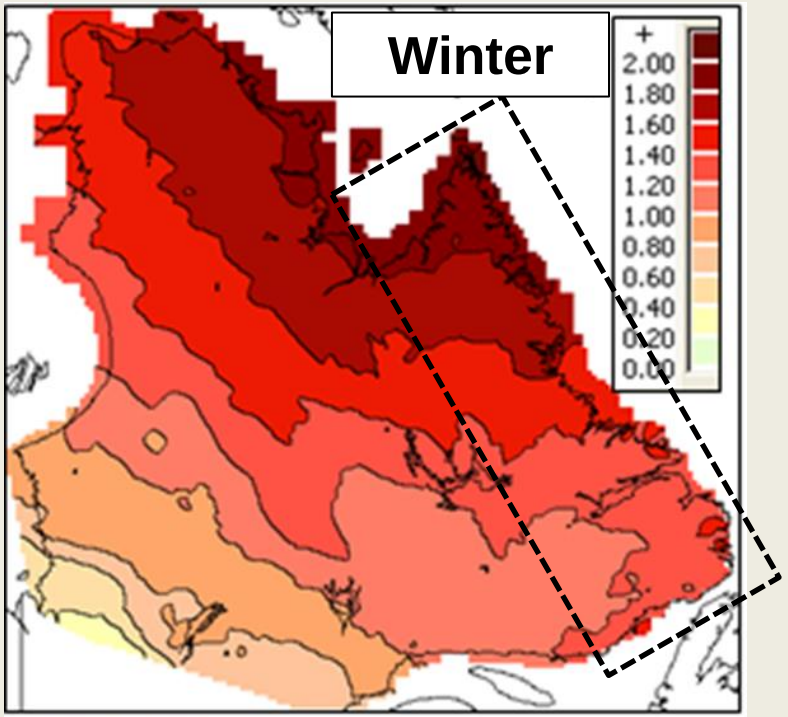


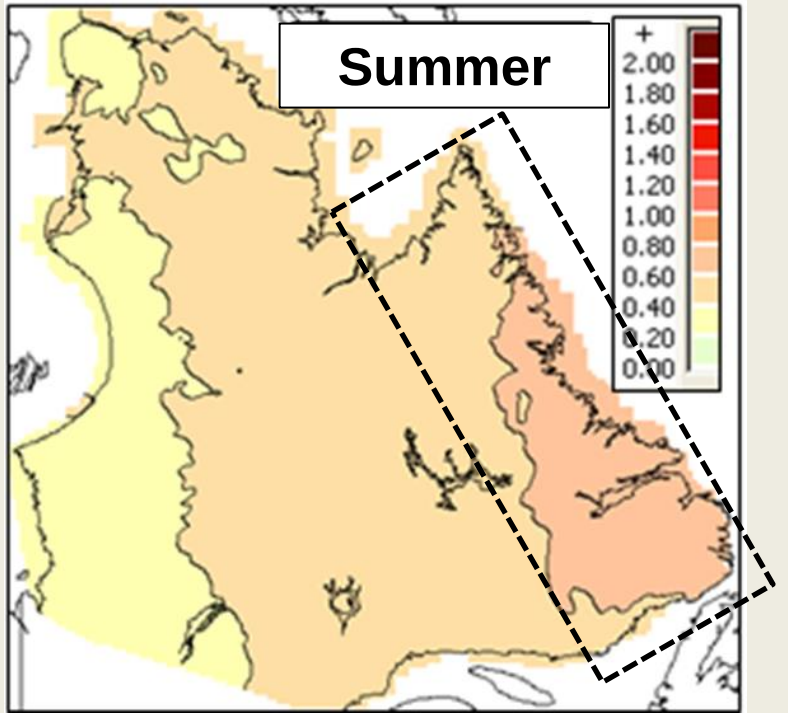
Spatial pattern of warming (1987-2016)

Temperature increase per decade (°C/10 yrs)



Data source:
Way et al., 2016



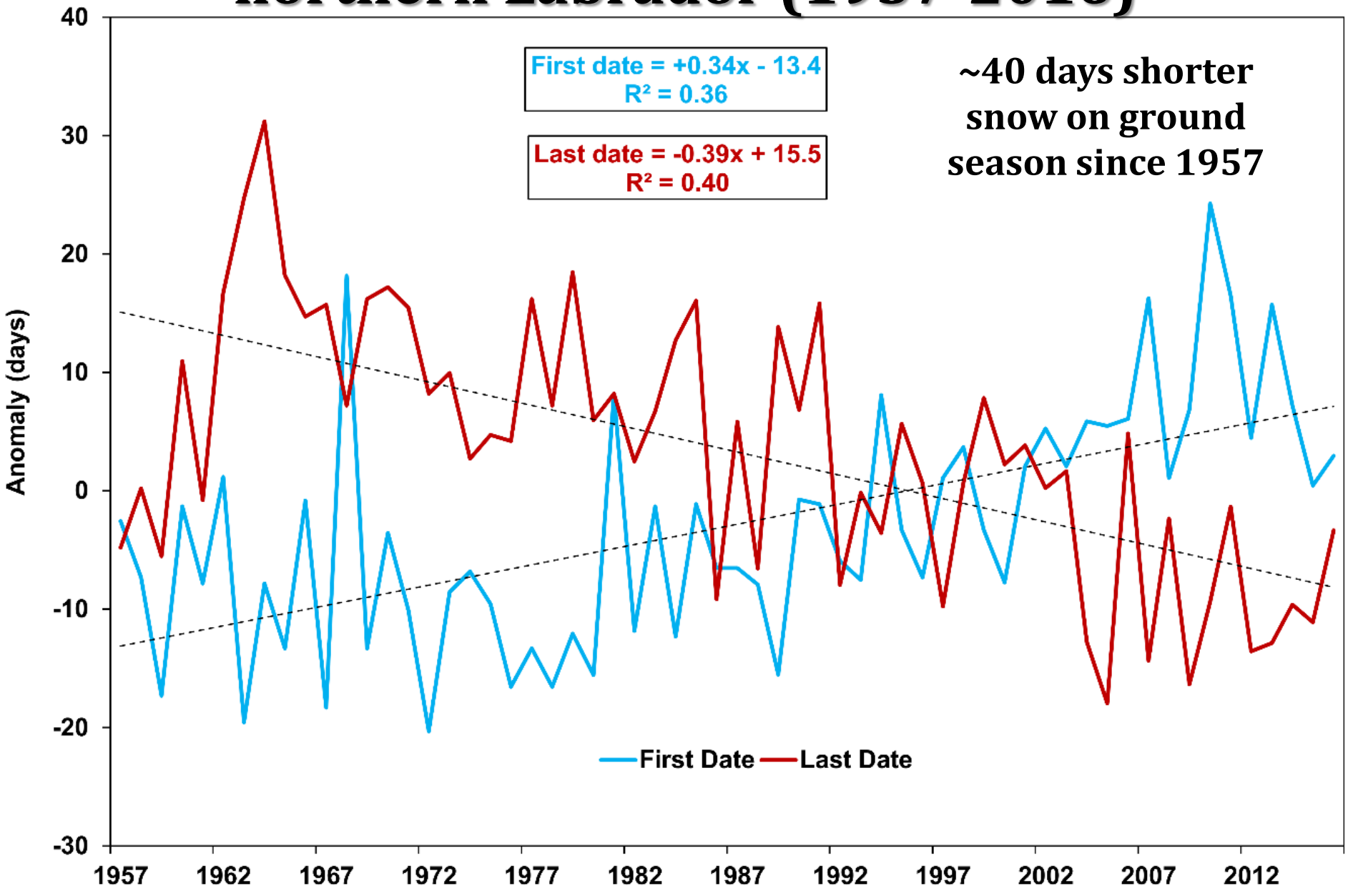


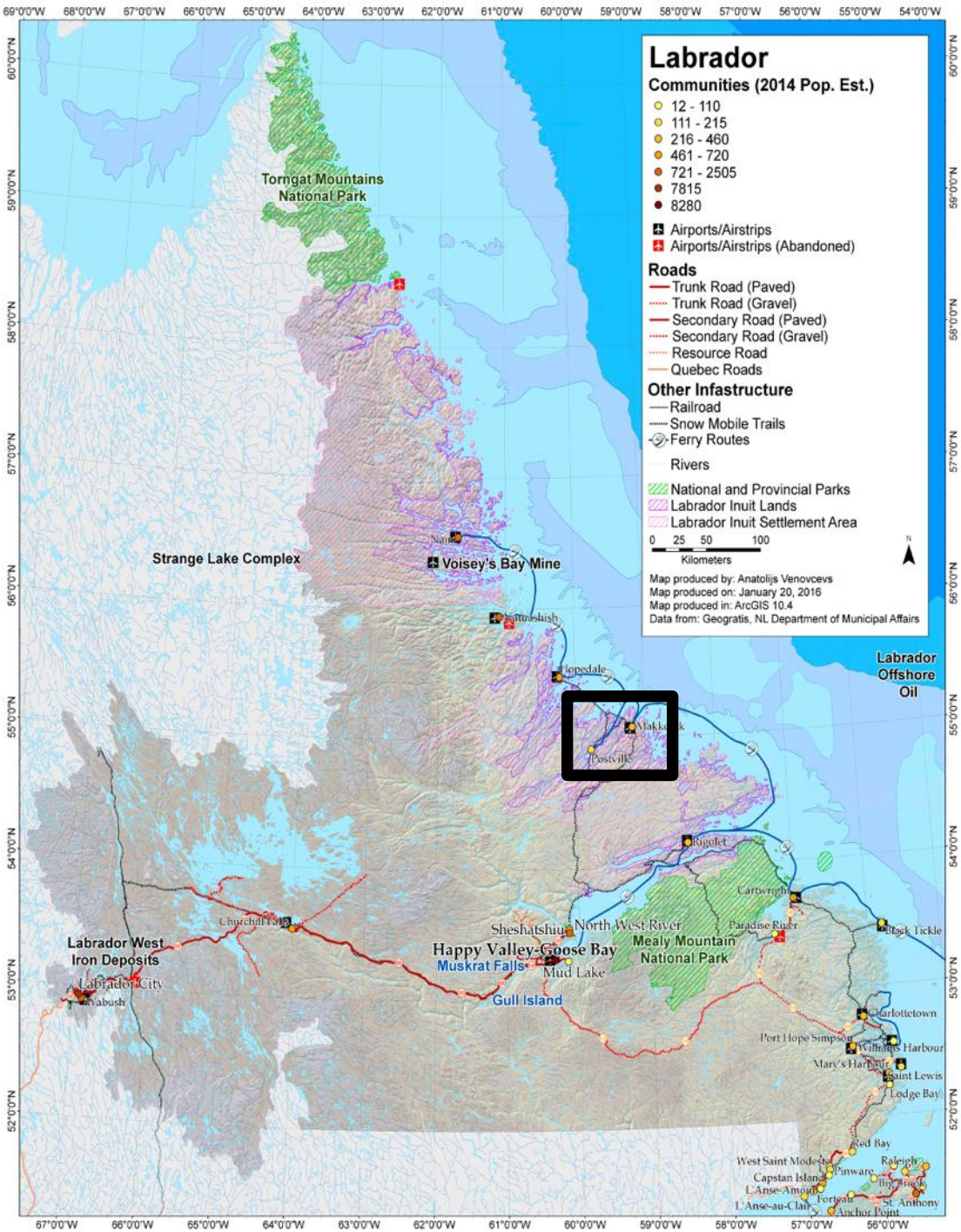
Northern Labrador

- **Rapid vegetation growth in Tundra**

Fraser et al (2011) – Environmental Research Letters

First and last dates of snow on ground in northern Labrador (1957-2016)

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N
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53°0'0"N
52°0'0"N

Loss of winter trail routes

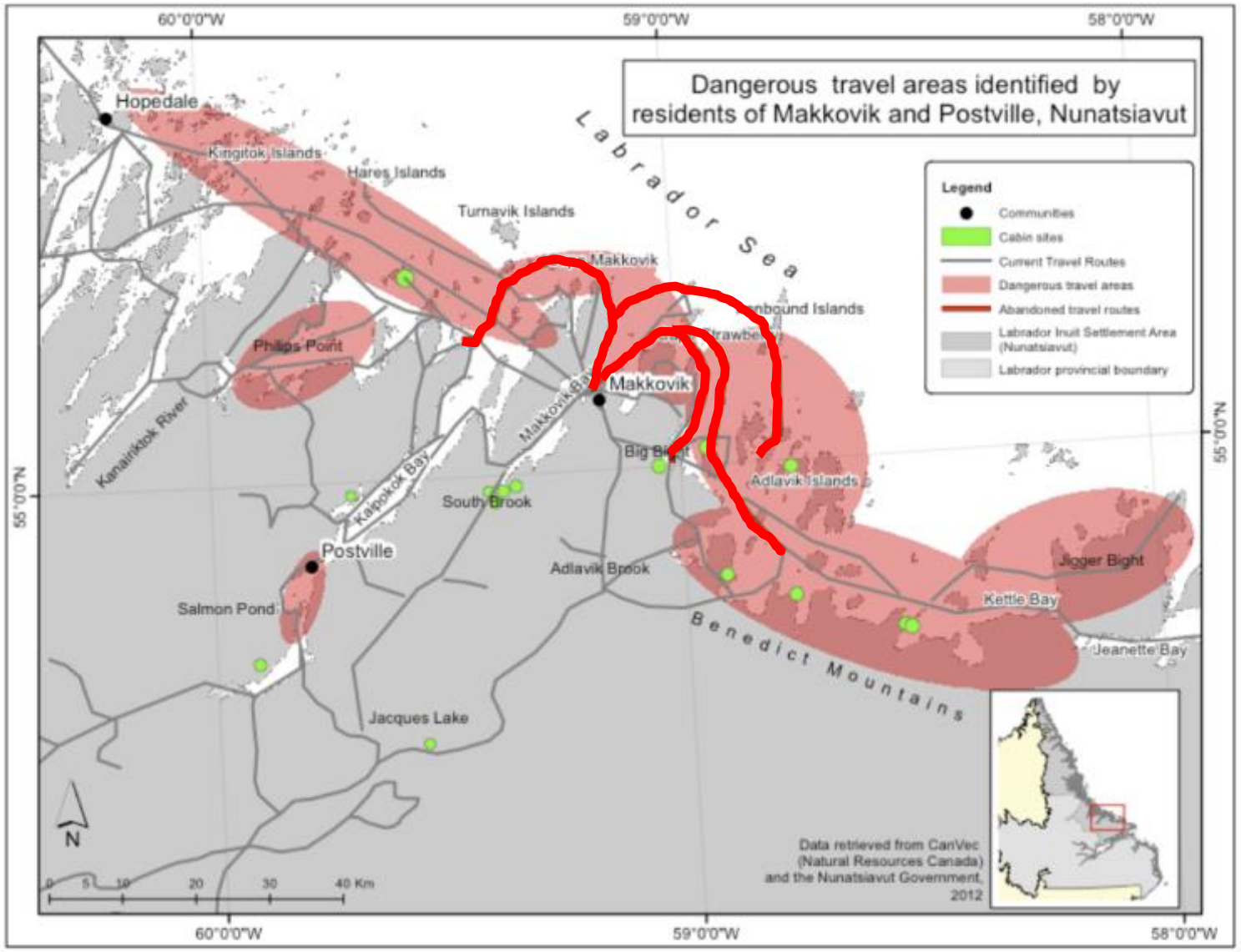
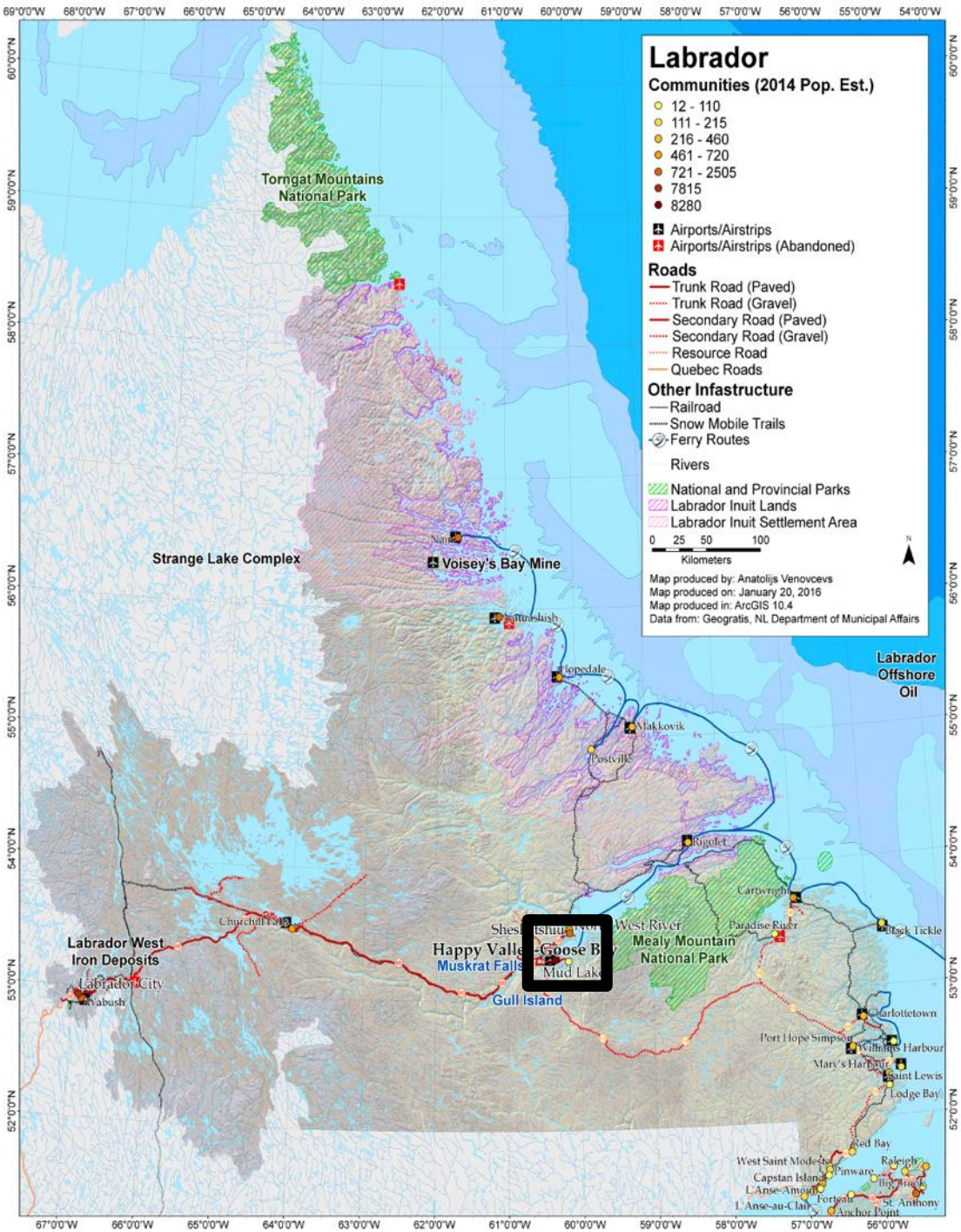


Figure 5-5: Dangerous travel areas identified by residents of Makkovik and Postville, Nunatsiavut. Map produced by R. Riedlsperger.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L'Anse-au-Clair
Forteau
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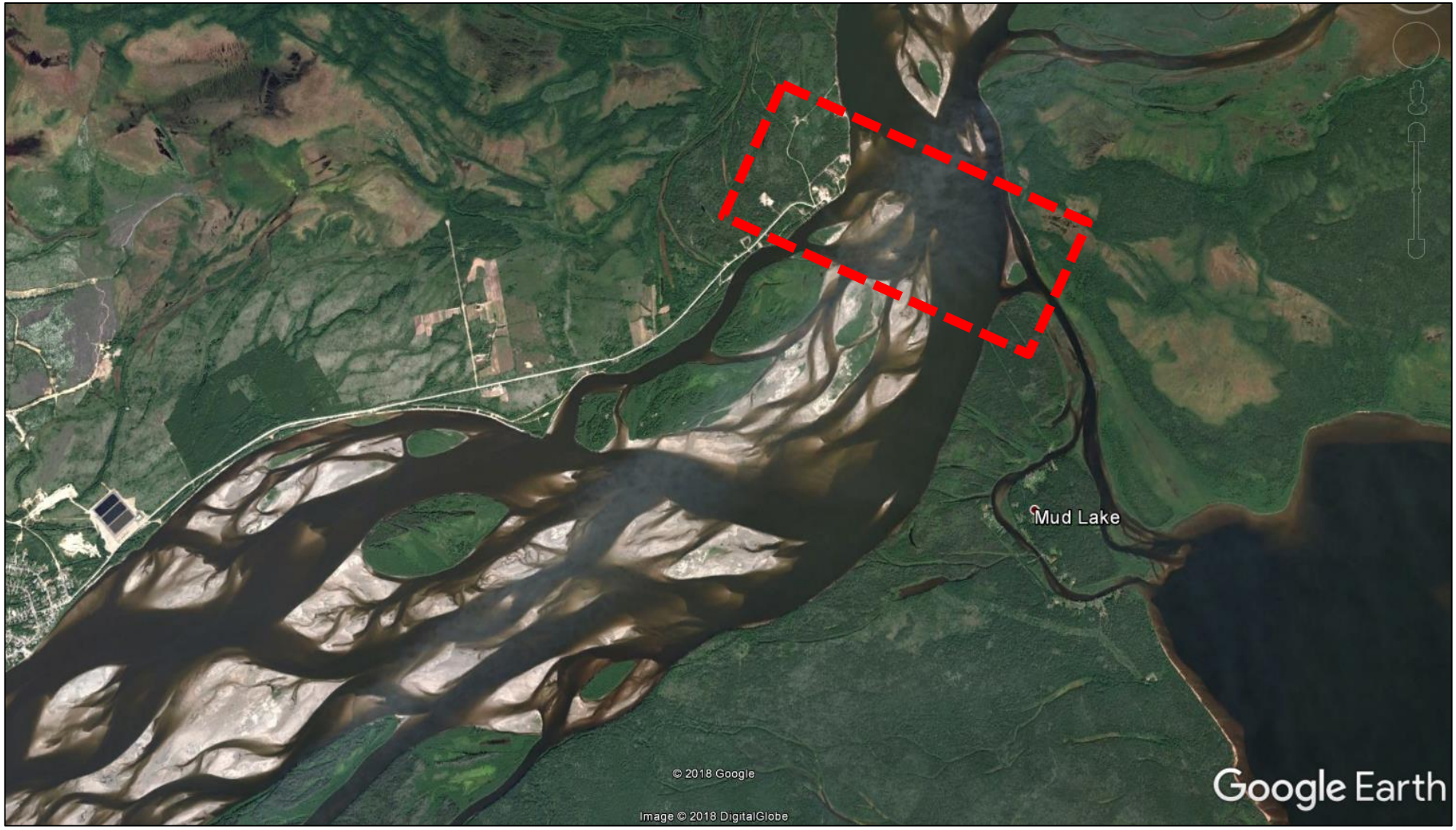
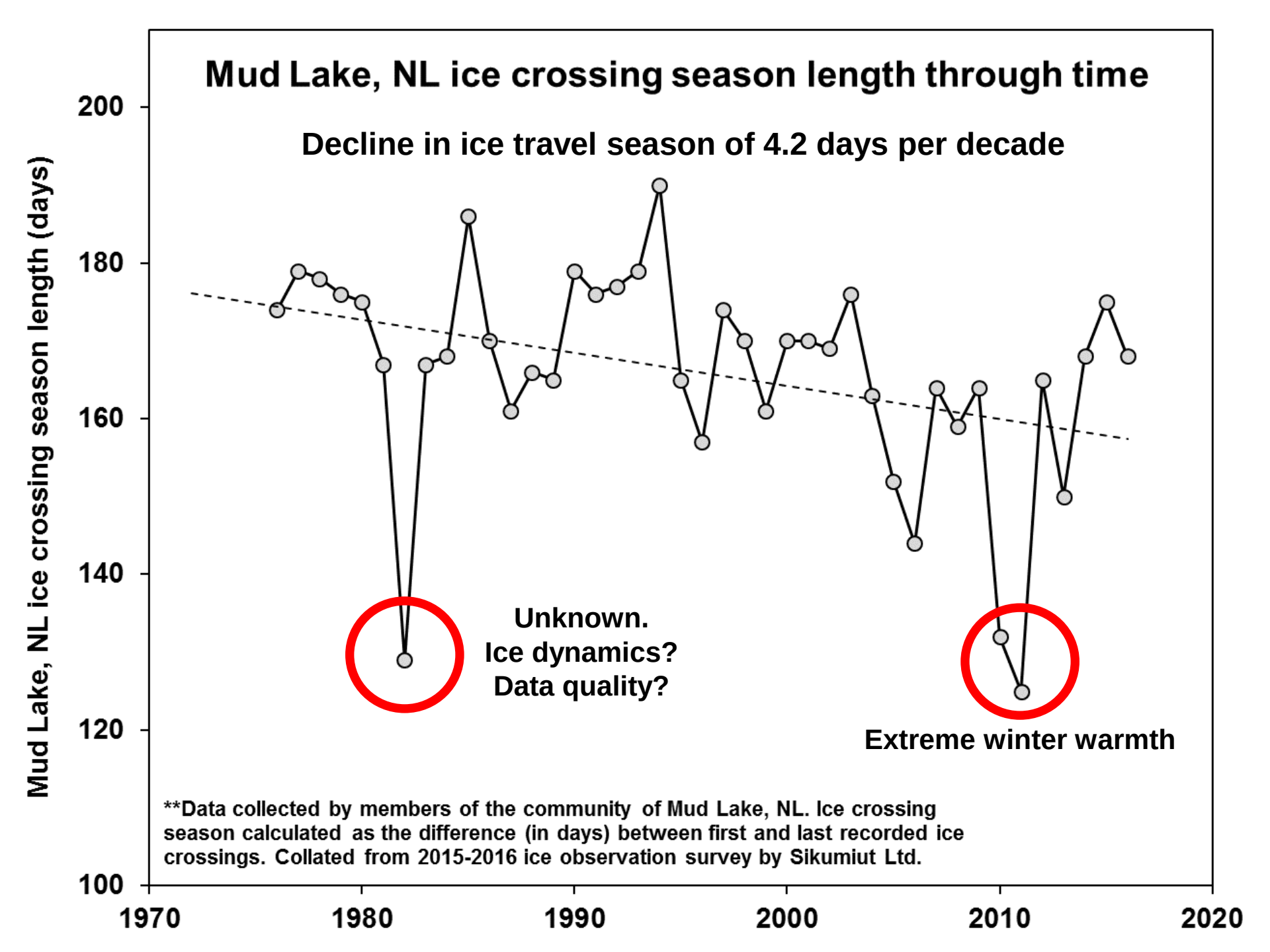
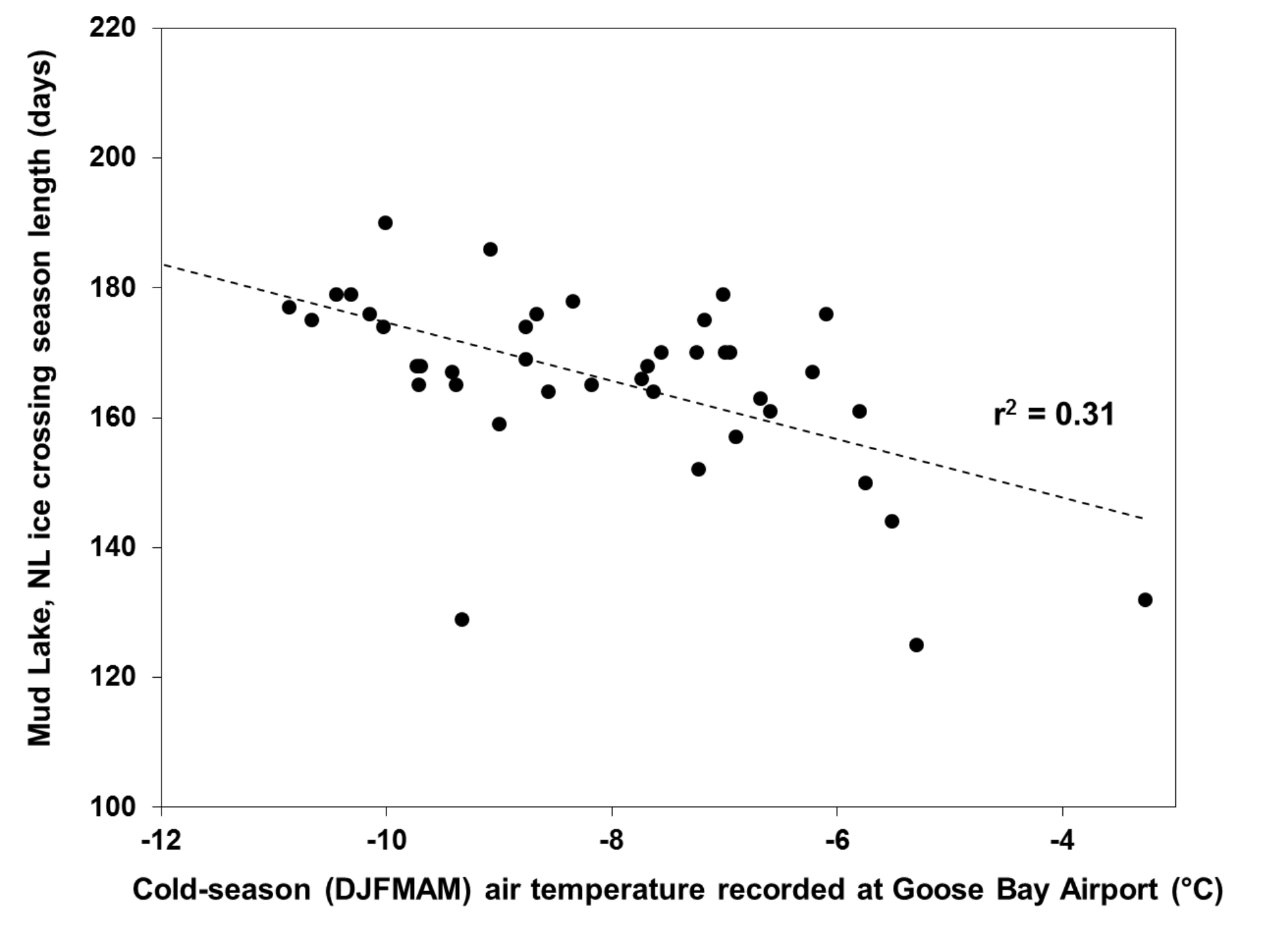
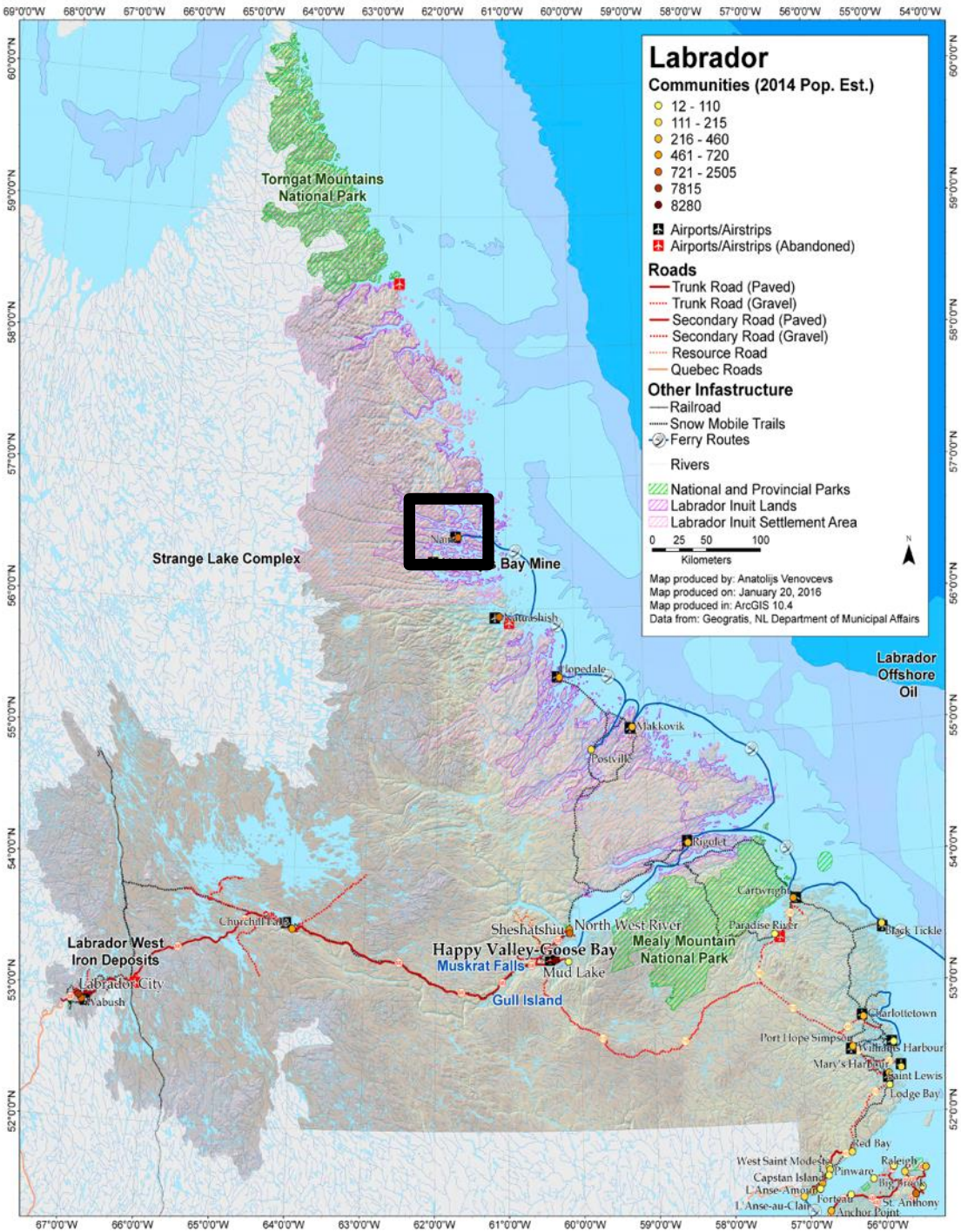

Mud Lake
© 2018 Google
Image © 2018 DigitalGlobe
Google Earth


Mud Lake, NL ice crossing season length through time
Decline in ice travel season of 4.2 days per decade
Mud Lake, NL ice crossing season length (days)
200
180
160
140
120
100
1970
1980
1990
2000
2010
2020
Unknown.
Ice dynamics?
Data quality?
Extreme winter warmth
**Data collected by members of the community of Mud Lake, NL. Ice crossing season calculated as the difference (in days) between first and last recorded ice crossings. Collated from 2015-2016 ice observation survey by Sikumiut Ltd.


Mud Lake, NL ice crossing season length (days)
220
200
180
160
140
120
100
-12
-10
-8
-6
-4
Cold-season (DJFMAM) air temperature recorded at Goose Bay Airport (°C)
r2 = 0.31

Ice jam flooding at Mud Lake, NL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Permafrost thaw in Nain, Nunatsiavut, Labrador

*Allard et al. (2012)

Key impacts on Labrador Inuit

- **Air temperature change**
  - Reliability of travel and access routes
  - Enhanced risk due to uncertain ice conditions
  - Loss of intergenerational knowledge transfer
- **Vegetation change ('shrubbification')**
  - Wildlife (caribou decline, moose increase, bird species)
  - Foraging (berries, medicinal plants)
  - Travel on the land (reduced visibility in summer, changes to snow)
- **Climate variability and extremes**
  - Increase in winter rain events (danger)
  - Perceived increase in high winds (less safe boat travel)
  - Reduced ability to forecast weather changes
  - Ecological grief

Acknowledgements

Parks Canada Parcs Canada

CMOS-SCMO
Canadian Meteorological and Oceanographic Society
Société canadienne de météorologie et d'océanographie

NUNATSIAVUT
kavamanga Government

RCGS SGRC

Association of Canadian Universities for Northern Studies

Fisheries and Oceans Canada
Pêches et Océans Canada

NunatuKavut
our ancient land

PRN Permafrost Researchers Young Network

THE W. GARFIELD WESTON FOUNDATION

NSERC CRSNG

uOttawa

MEMORIAL UNIVERSITY

Natural Resources Canada Ressources naturelles Canada
Canada

Thank you and Nakummek!