

VULNERABILITY TO PERMAFROST RELATED HAZARD IN JEAN MARIE RIVER FIRST NATION, NWT: HOW TO GET A BIG PICTURE OF THE FUTURE IMPACTS OF CLIMATE CHANGE ON NORTHERN COMMUNITIES



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Project Objectives

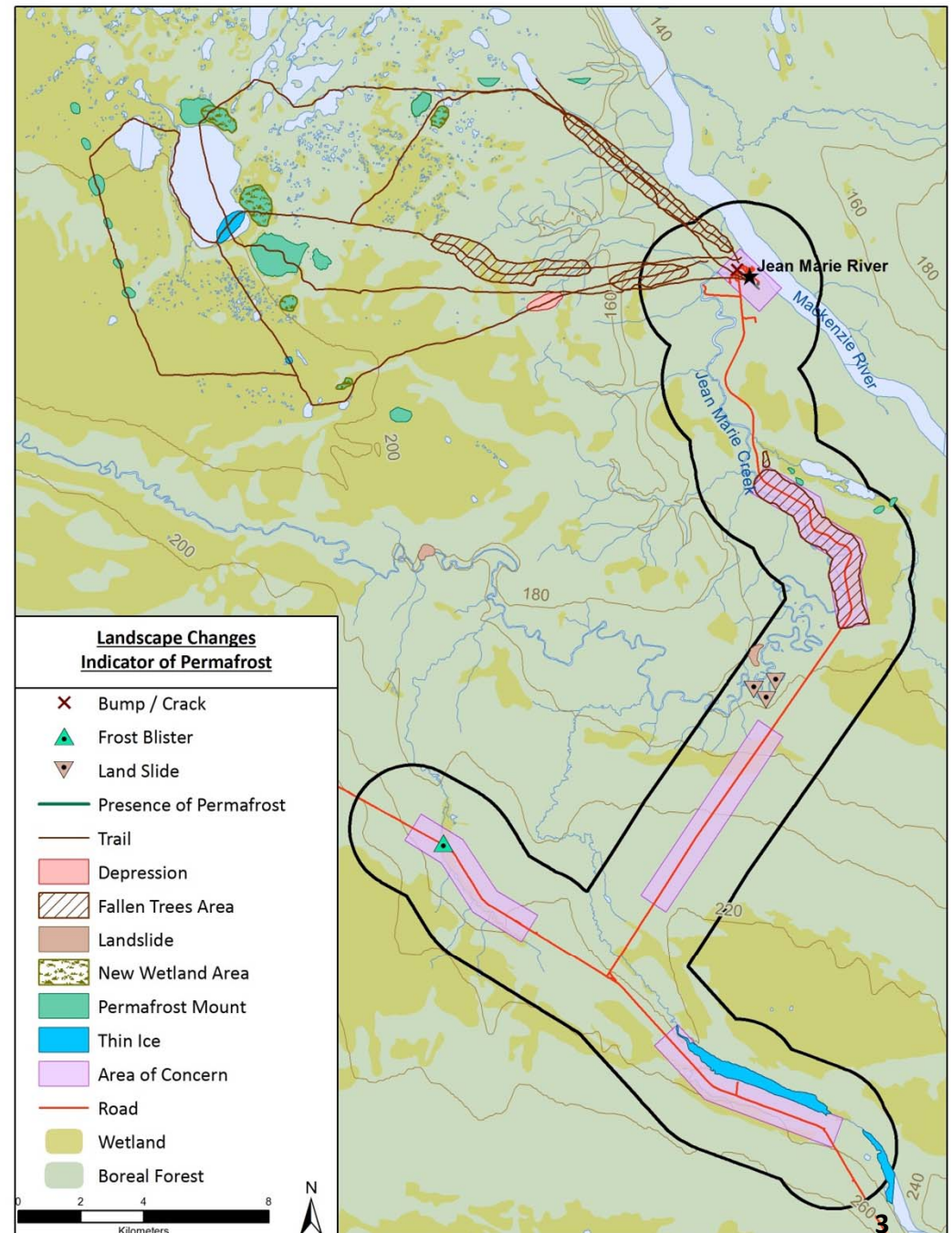


- To have a vulnerability hazard map for decision making for sustainable development and land use;
- Evaluate the impact of permafrost thawing on the community on safety and country food supply;
- Start to explore adaptation strategies.

1. Landscape changes observed by the community
2. Mapping:
 - Field observations
 - Vegetation classification
 - Surficial geology
 - Air photo interpretation
3. Impacts of Landscape Changes to the JMRFN
4. Next steps

1- Mapping of the landscape changes observed by the community

- Collapsing of permafrost mounds resulting in the formation of new wetland areas (in particular, the *Neethugo* area).
- Occurrence of stands of fallen trees, including in areas where trails are located.
- Erosion of the banks along the Jean Marie Creek, causing landslides.
- Thin ice on waterways
- Thin ice on waterways everywhere.



1- Mapping – Field observations

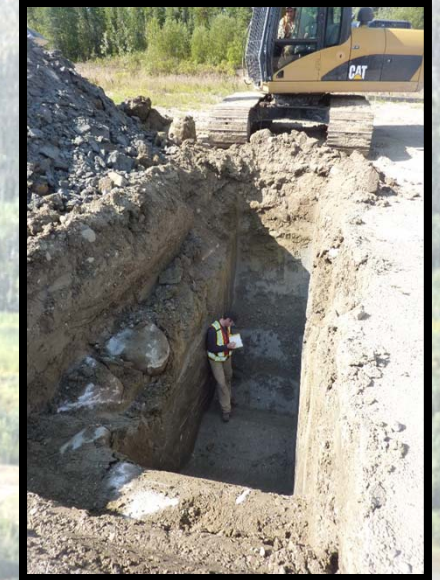
Probing and digging



Coring



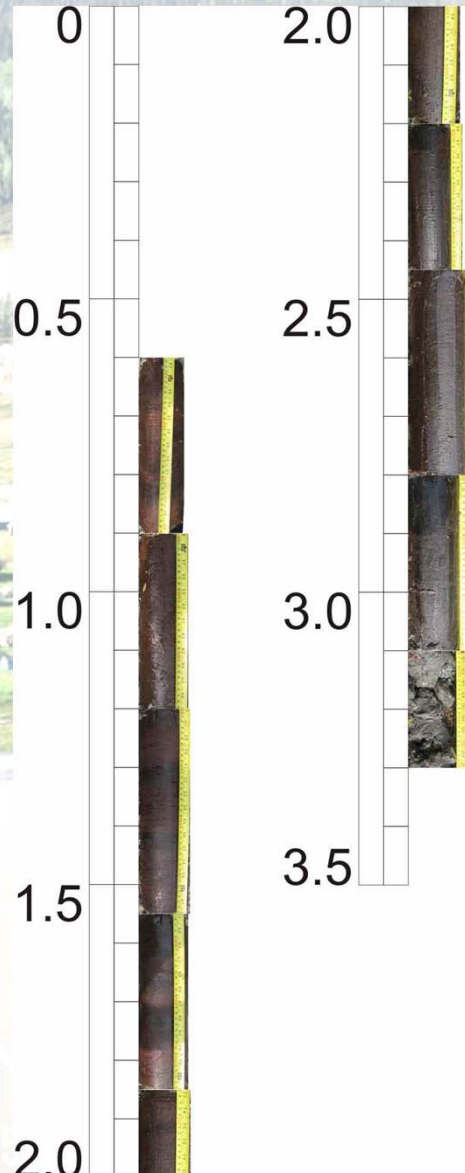
Excavations



Vegetation characterization

1- Mapping – Field observations

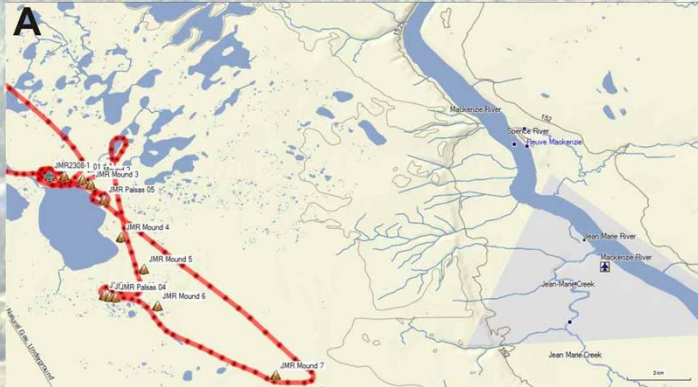
Permafrost in JMR community area



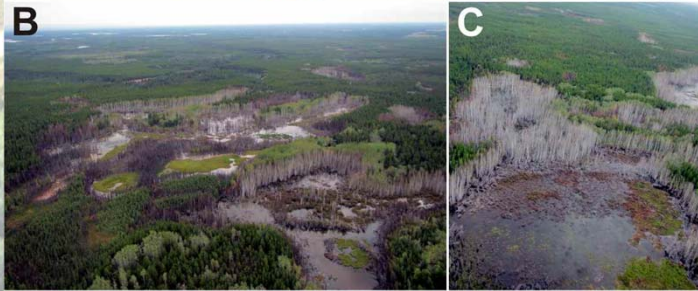
- Palsa: In Peatland with moss;
- Clay/poorly drained terrain;
- Shallow (no more deep than peat thickness).

1- Mapping – Field observations

Permafrost in JMR traditional land (former delta)

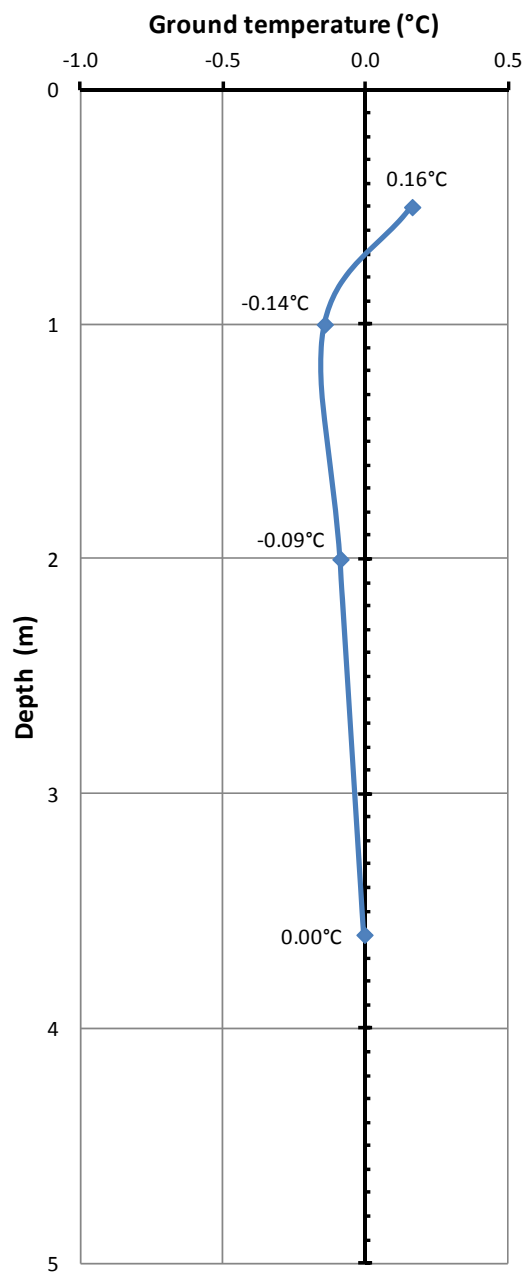


- In forest and Peatland;
- Thicker (Lithalsas);
- Extensive degradation;



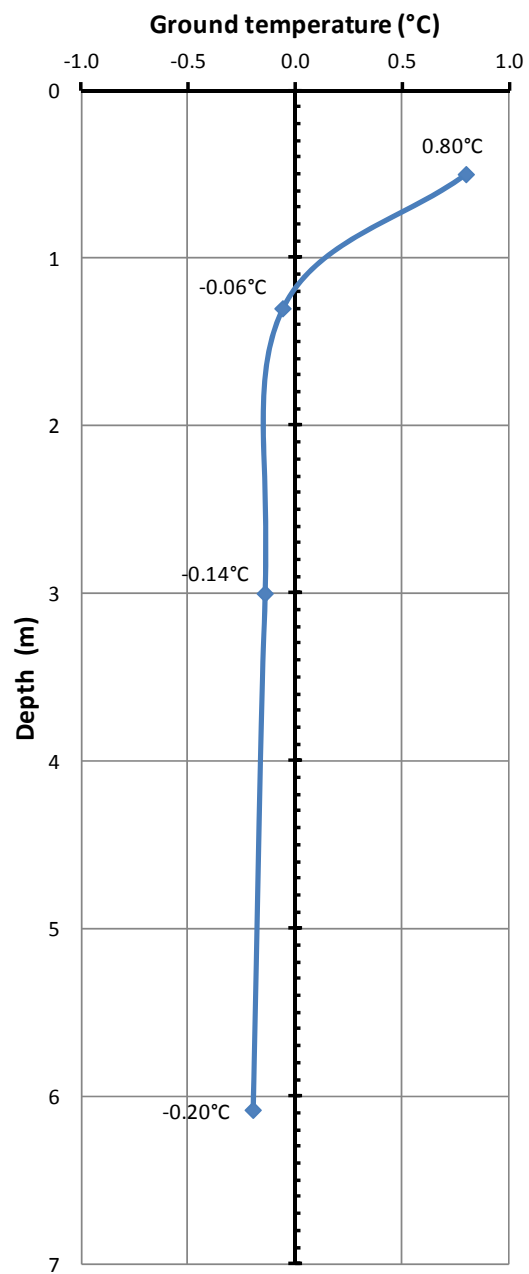
Temperature JMR 1

4 Sep. 2013, 12 am



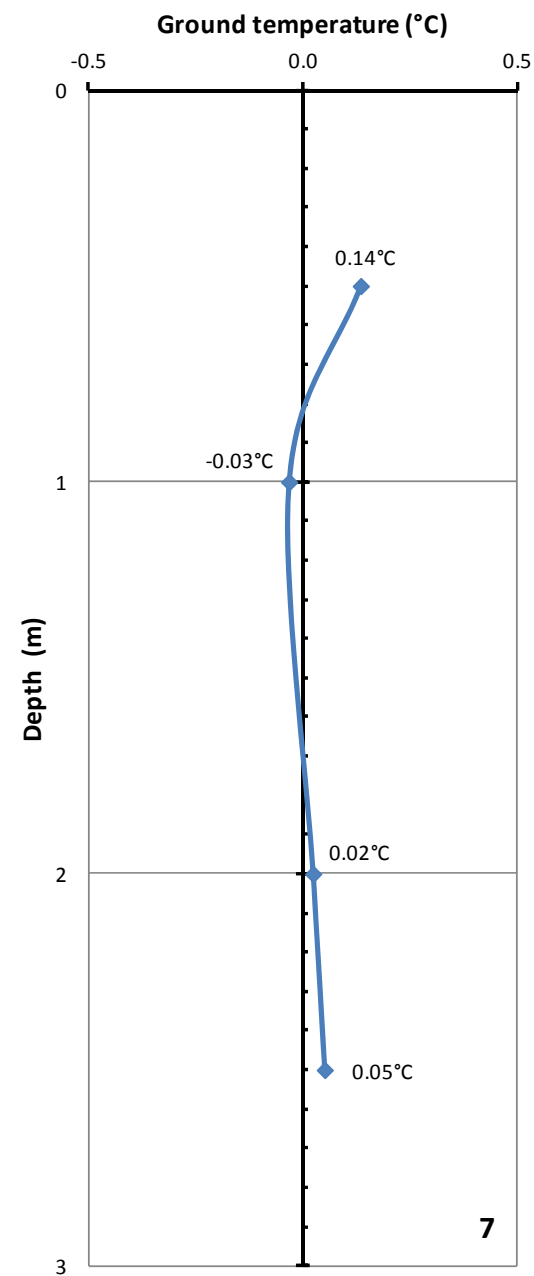
Temperature JMR 2

4 Sep. 2013, 12 am



Temperature JMR 3

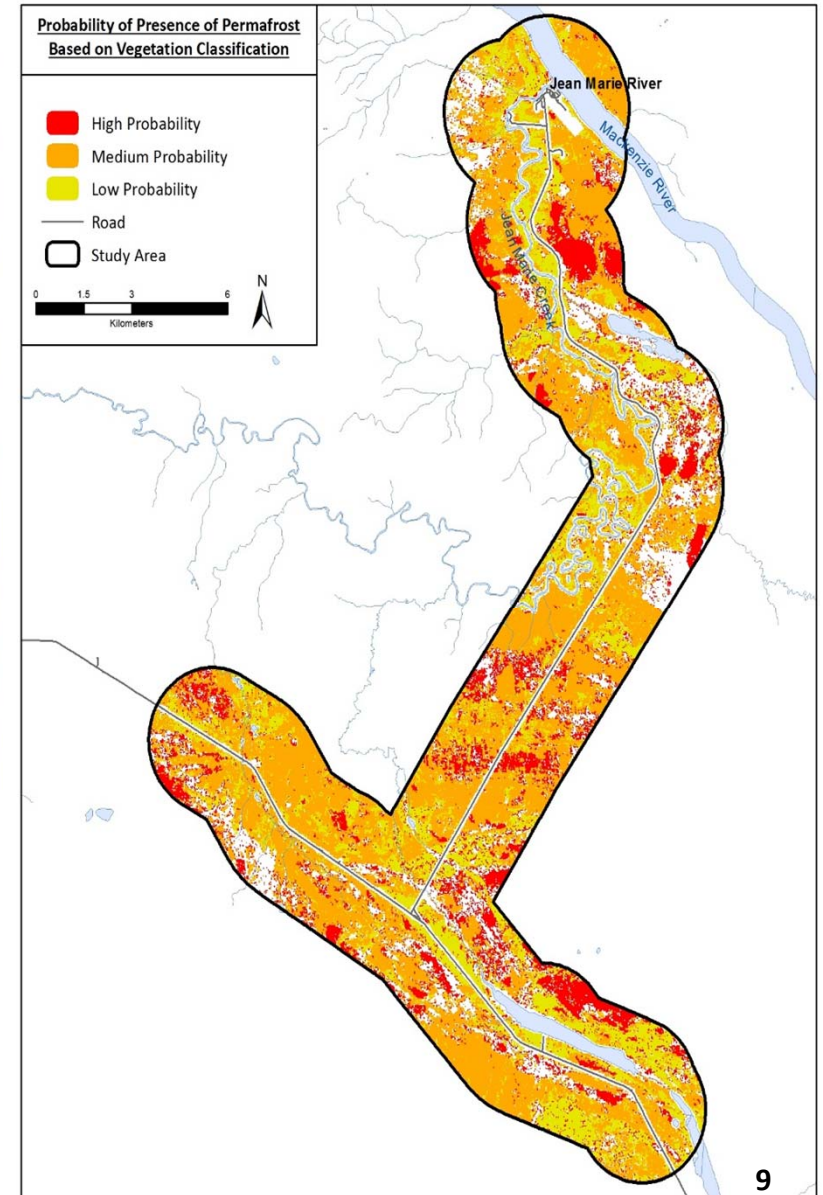
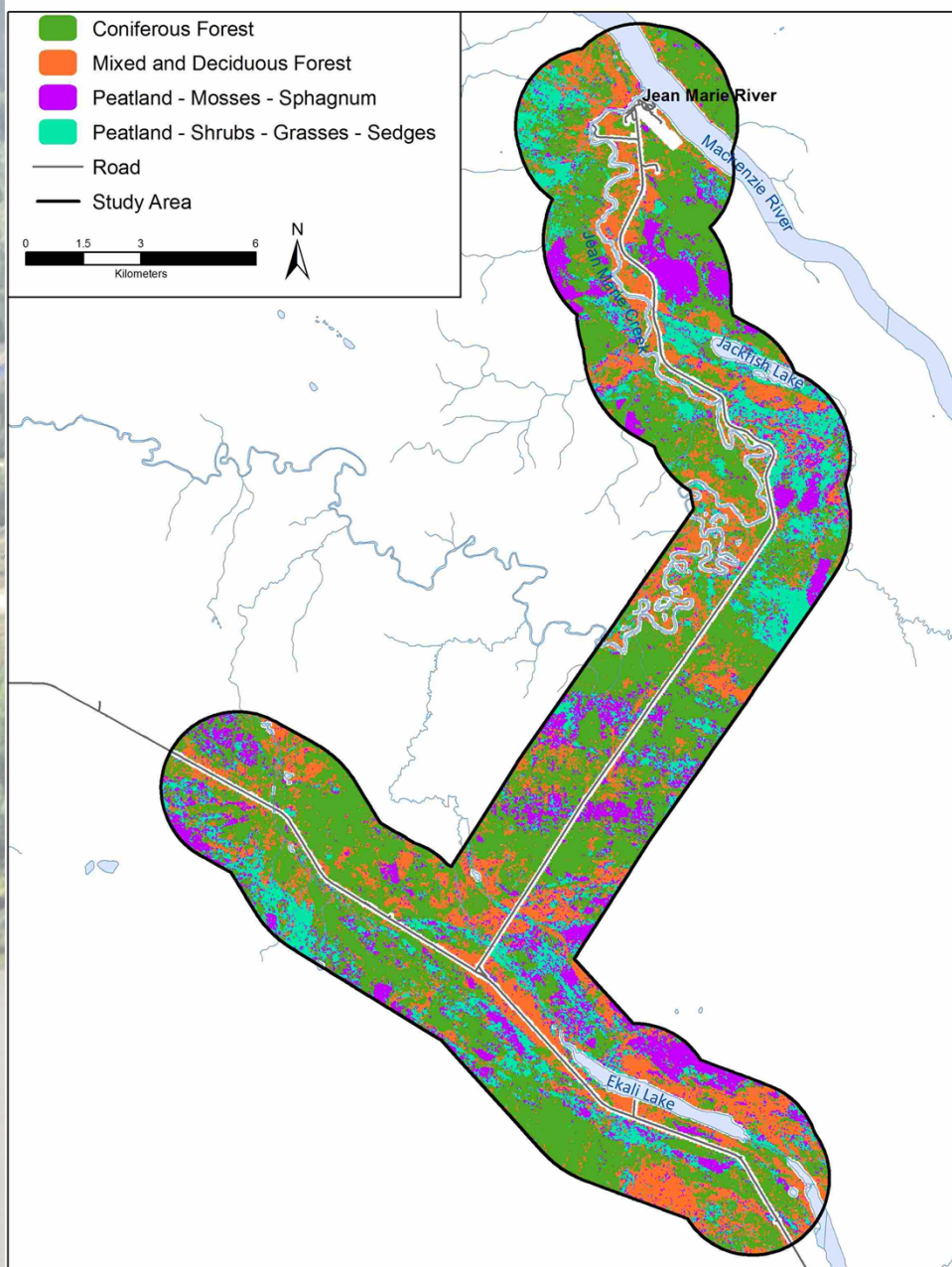
4 Sep. 2013, 12 am



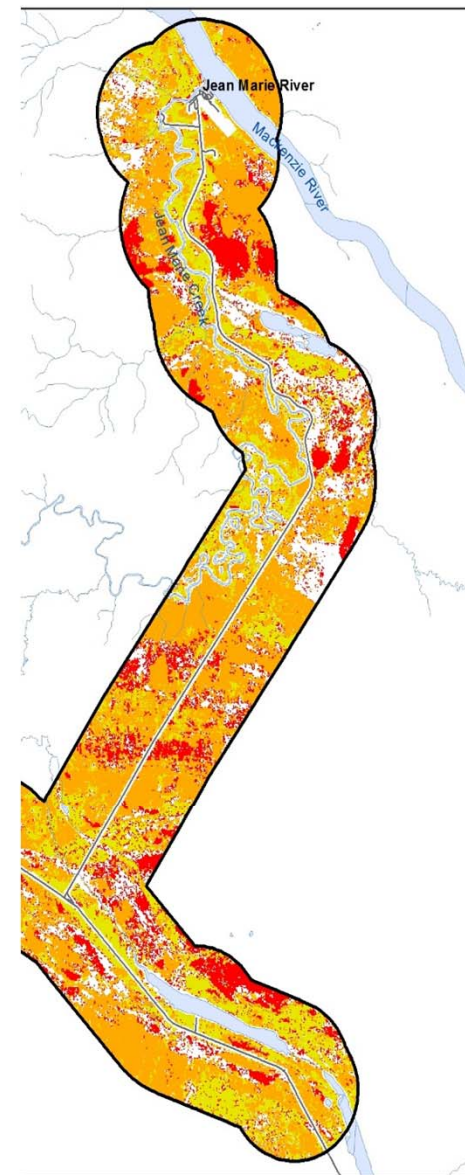
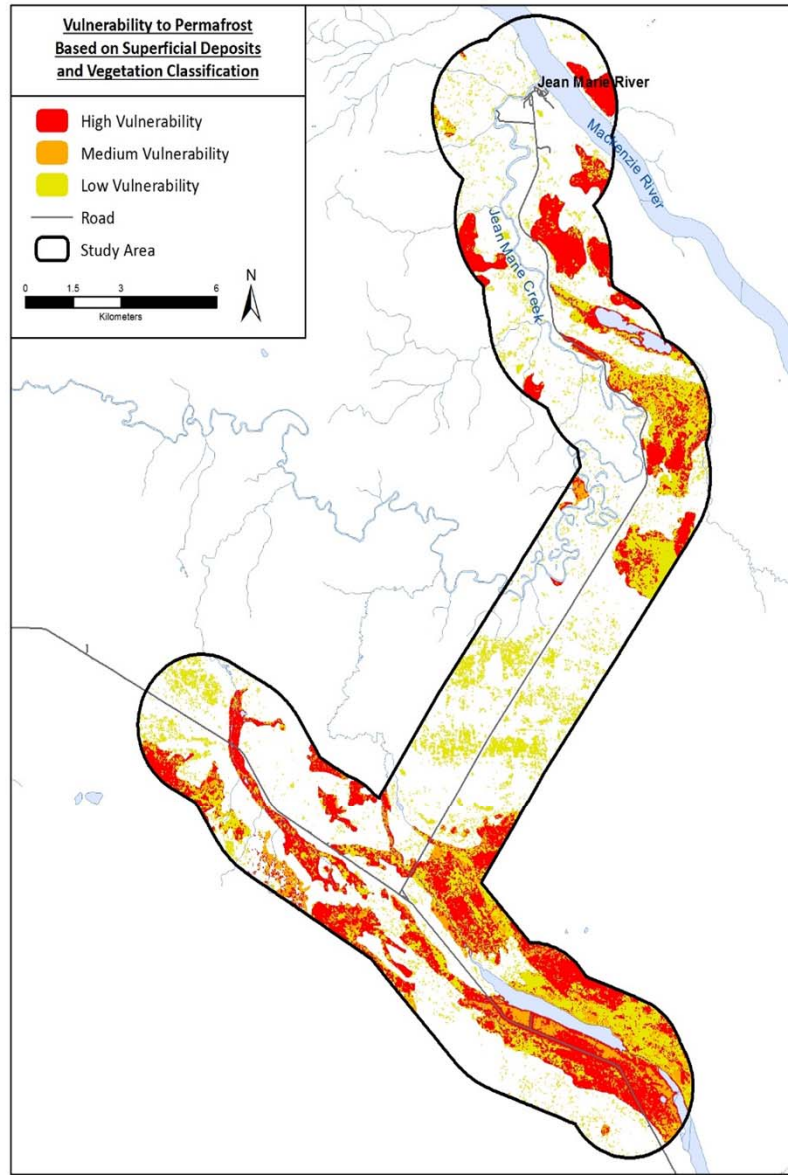
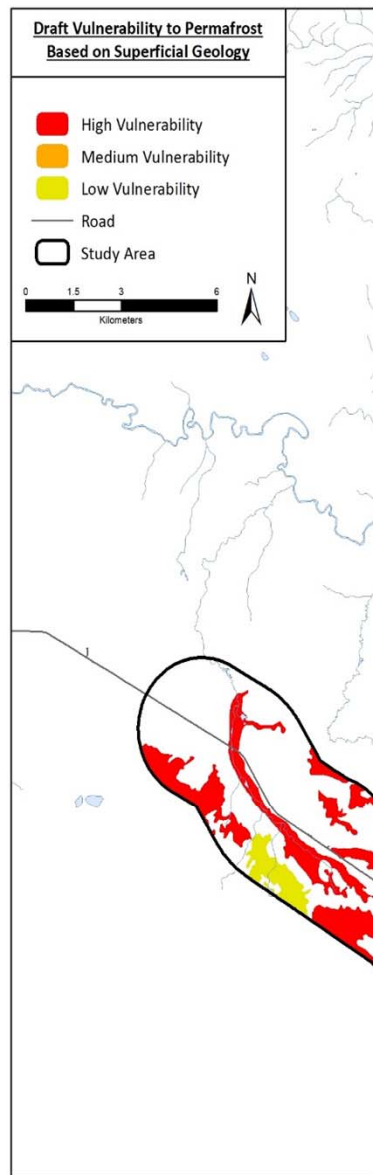
**Fenland & peatland,
Lacustrine plains associated with eolian complex
Glacio-fluvial plains**



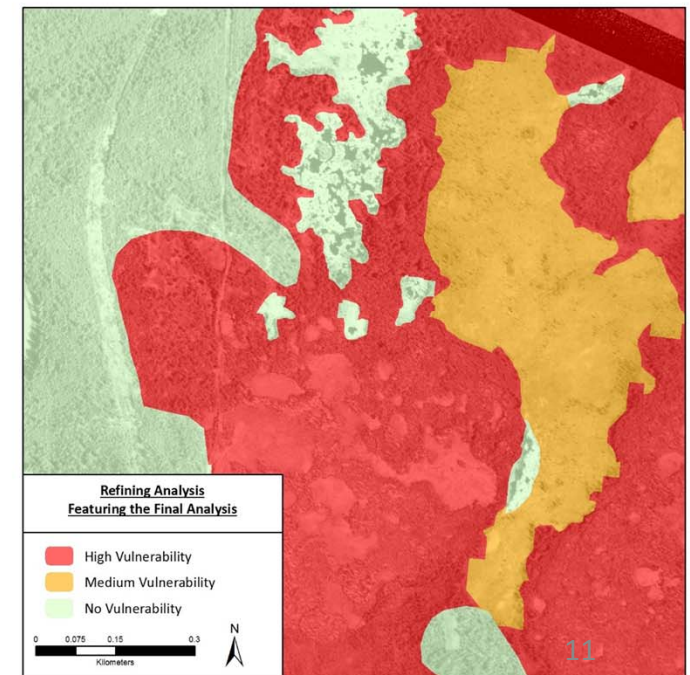
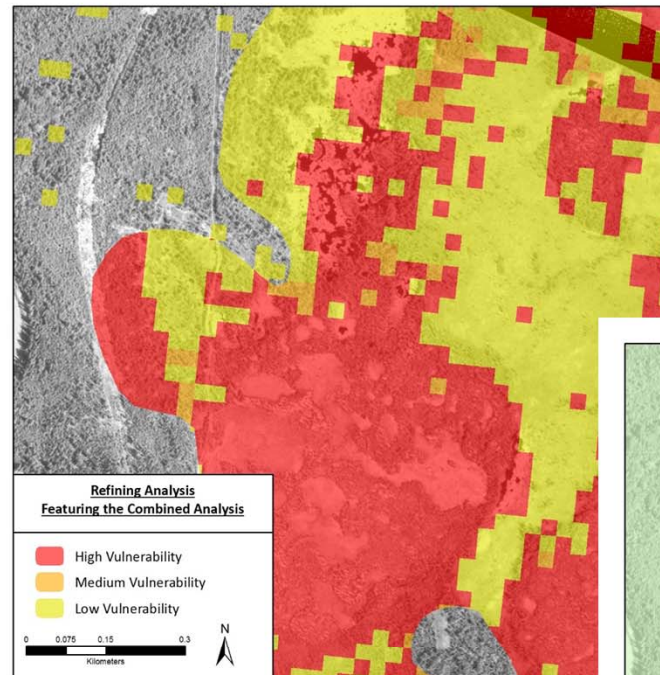
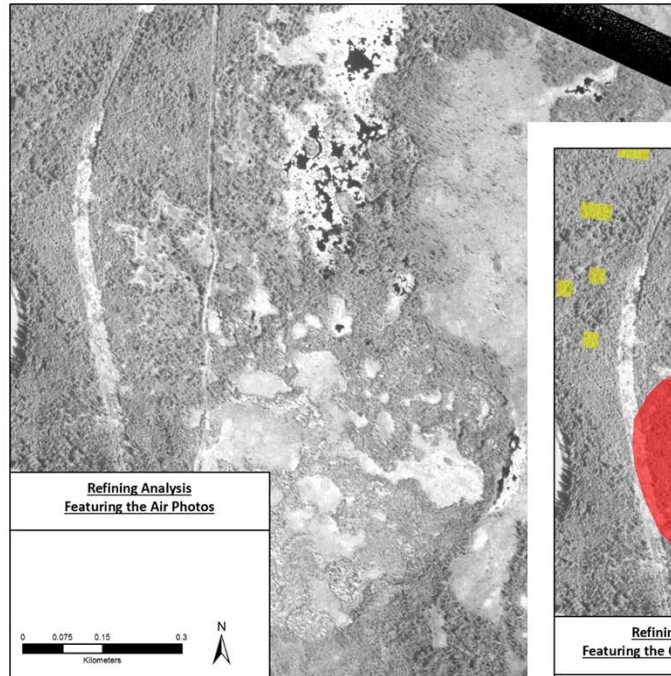
1 Mapping – Vegetation Classification Analysis



1- Mapping: Combined Analysis

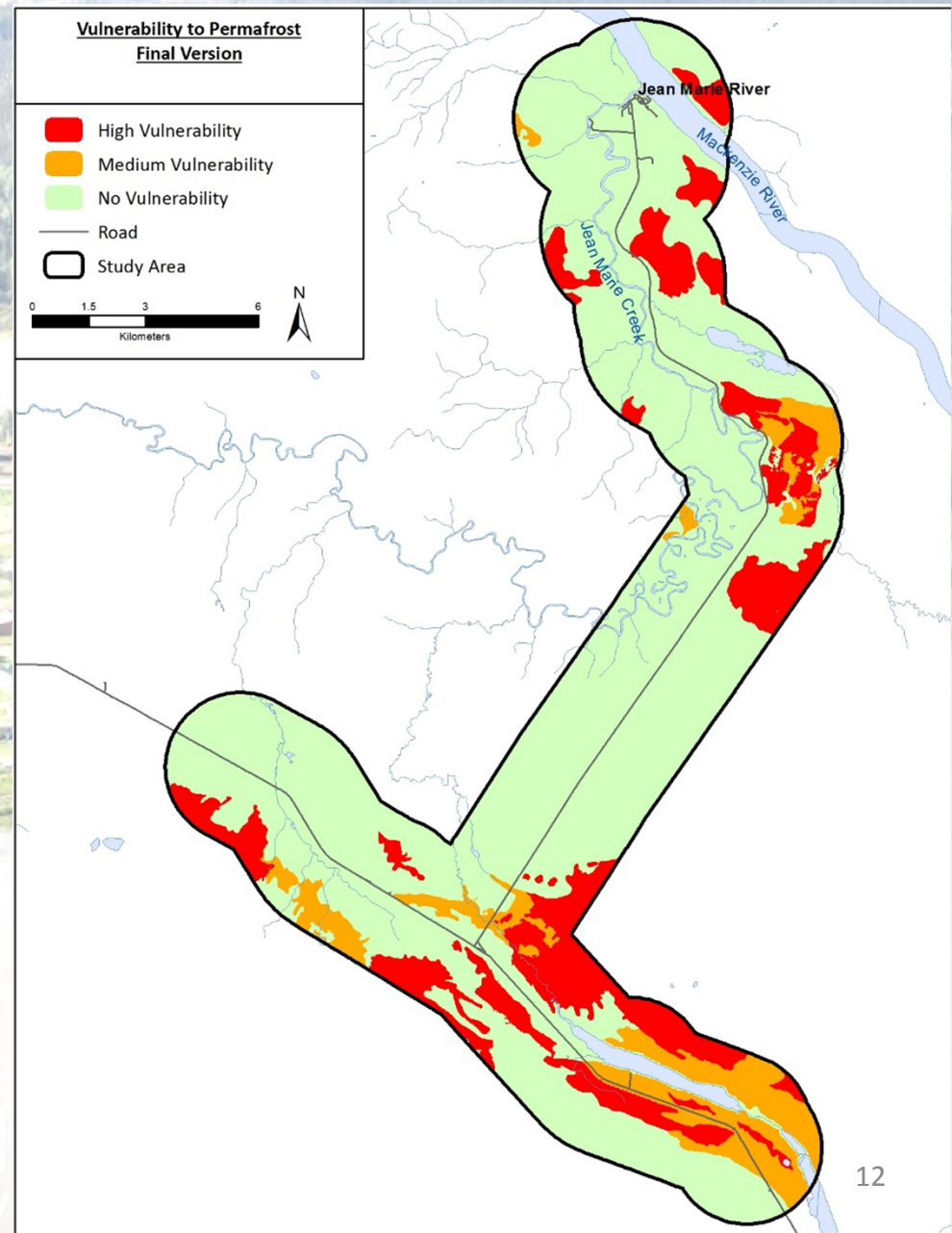


1 – Mapping: Refining the Analysis



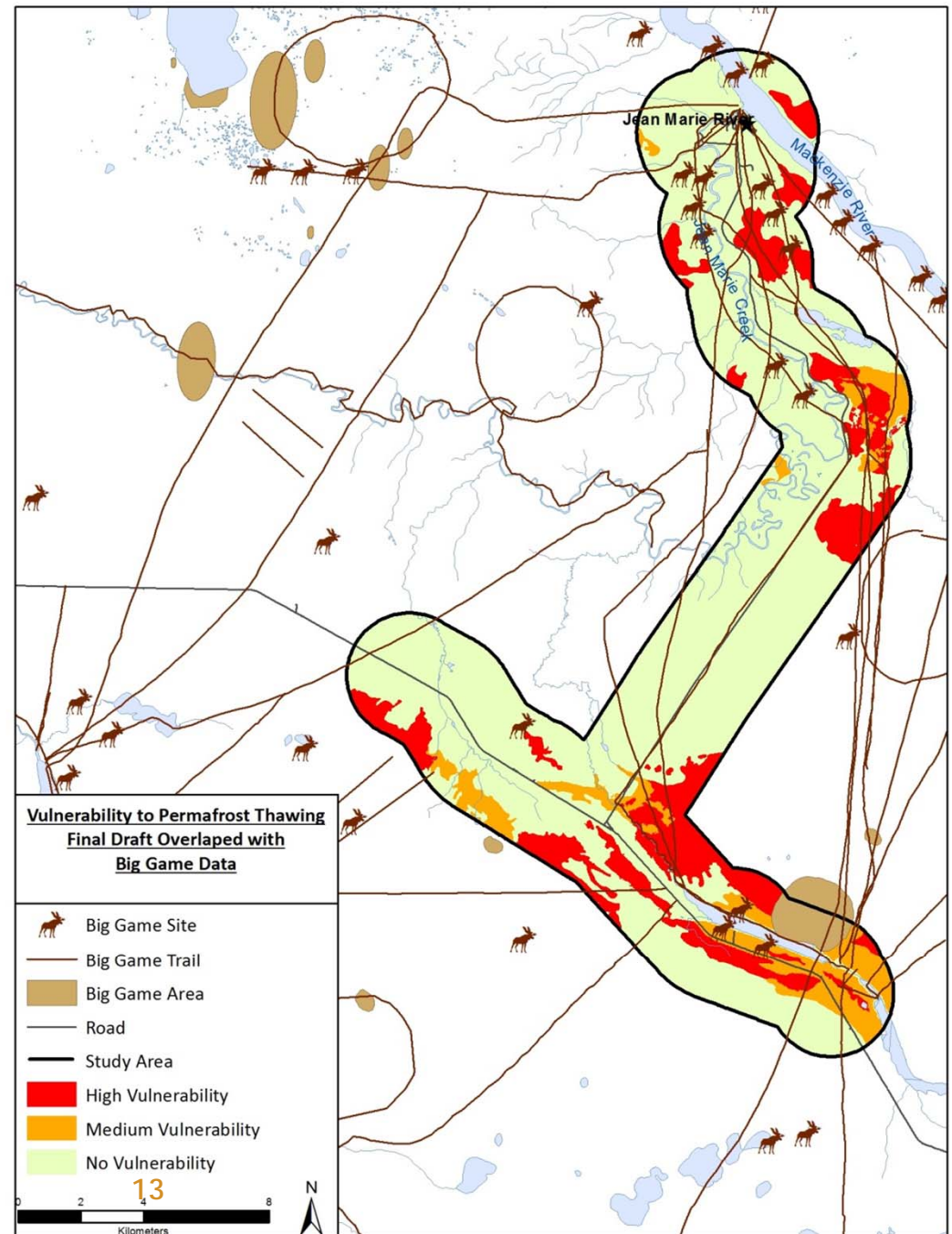
Final Vulnerability Map

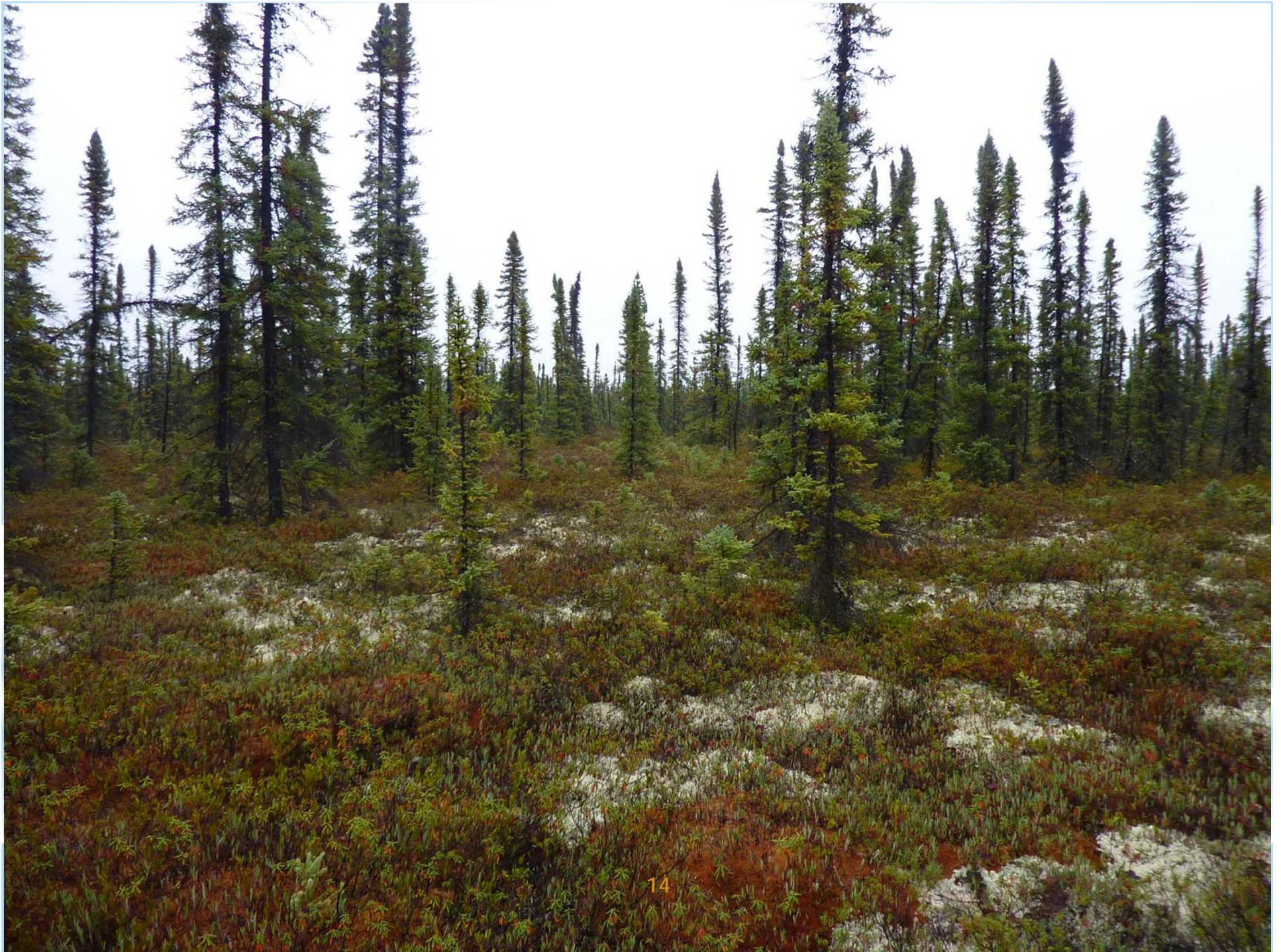
- In the refining analysis the areas categorised as “low vulnerability” were re-categorised in the “medium vulnerability”.
- Confirmation that the village is safe
- There are few vulnerable areas crossing or close to the access road



Vulnerability to Permafrost Thawing: Big Game

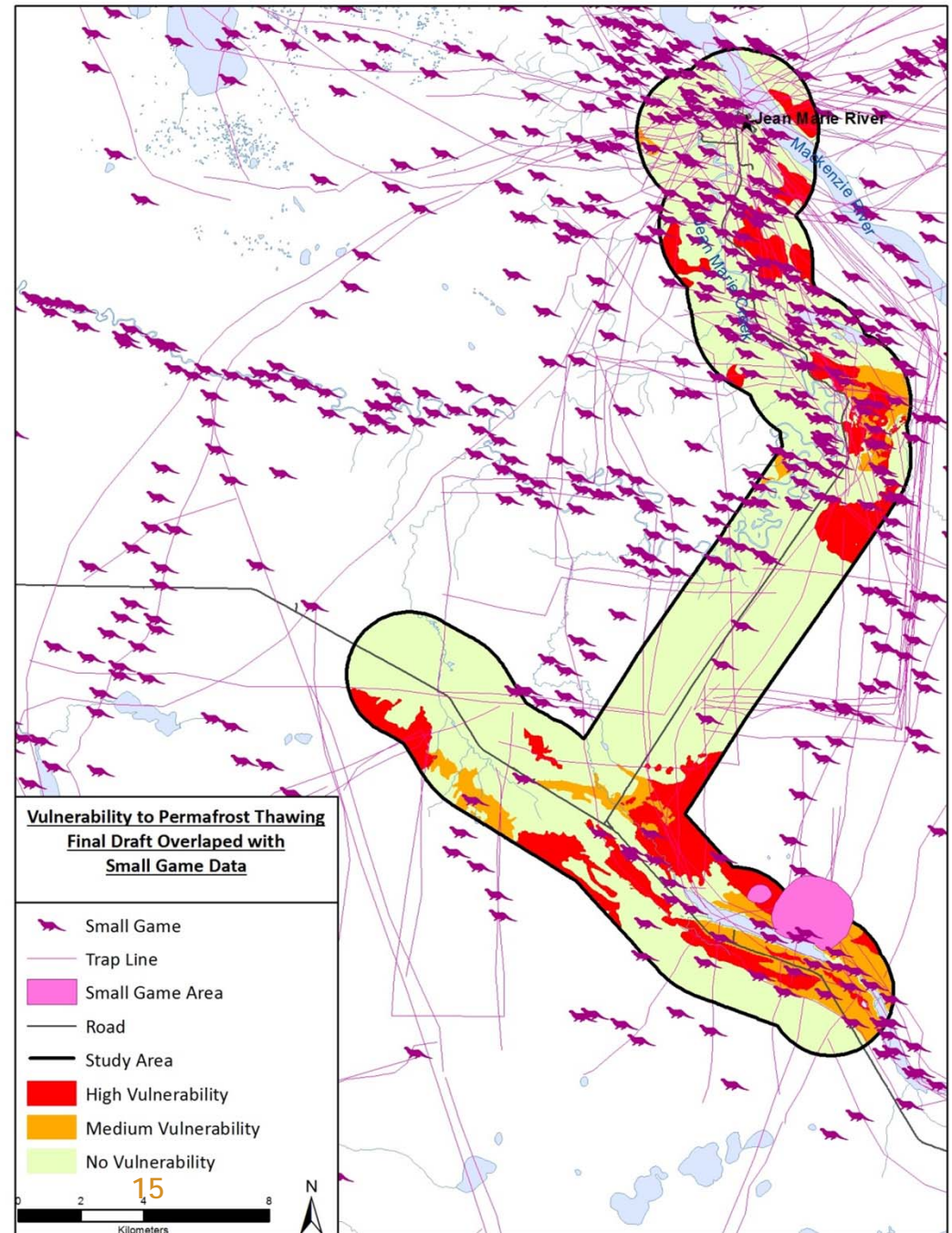
- Important big game areas are located at or near collapsing permafrost mounds, or are located in area with high to medium vulnerability.
- Some big game trails have been obstructed by fallen trees.





Vulnerability to Permafrost Thawing : Small Game

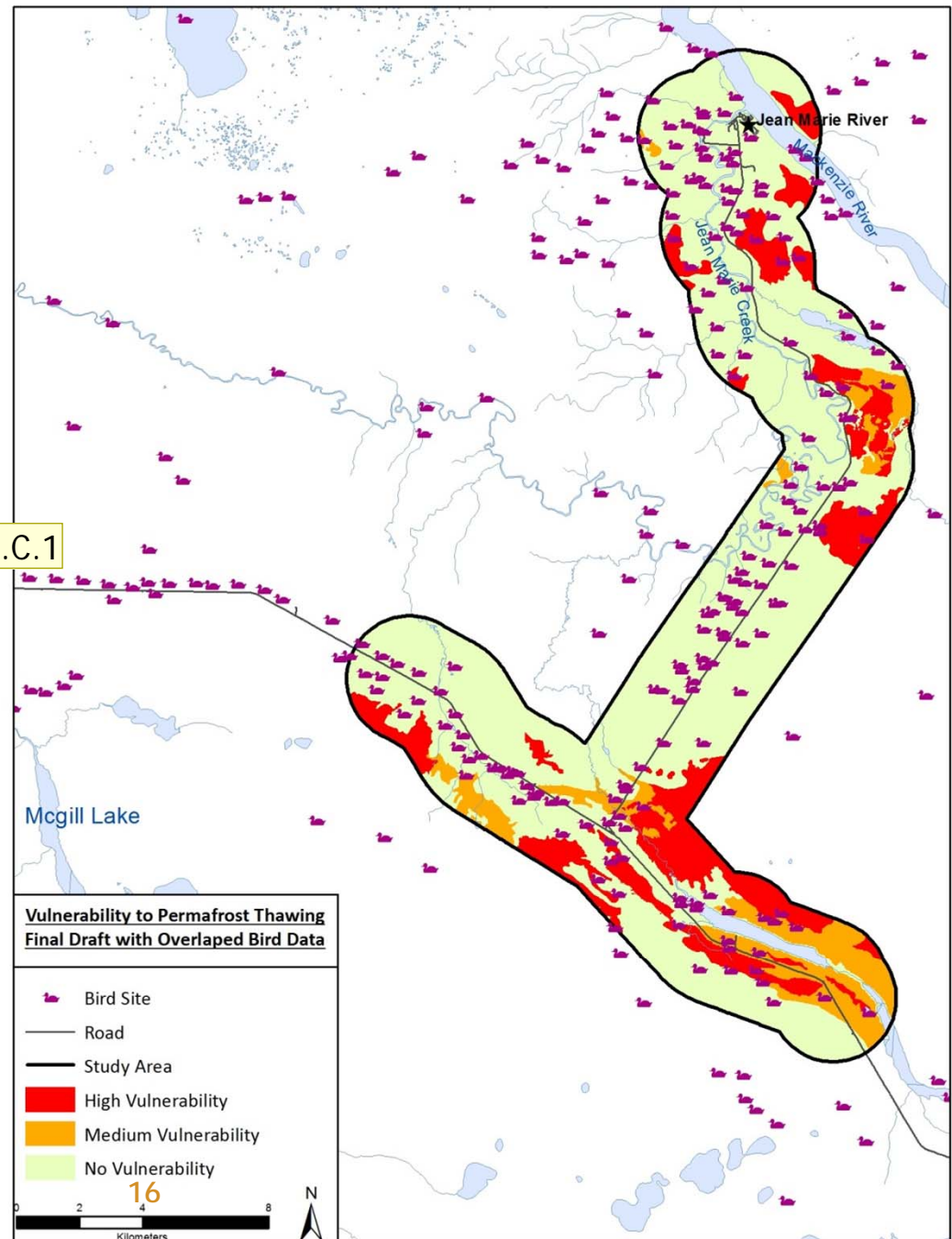
- Important small game areas are located at or near collapsing permafrost mounds, or are located in area with high to medium vulnerability.
- Many trails and trap lines also pass through, or in close proximity to, places where vulnerability is High to Medium.
- Several trap lines/trails have been obstructed with fallen trees, thin ice, and depressions.



Vulnerability to Permafrost Thawing: Birds

- New wetland areas that are forming could become new habitat for migratory birds (waterfowl).
- Community members noted there are far fewer birds along roads and rivers than there used to be.
- *Community members also observed fewer birds, especially water fowl, where vulnerability to permafrost thawing is High to Medium*

F.C.C.1



Slide 16

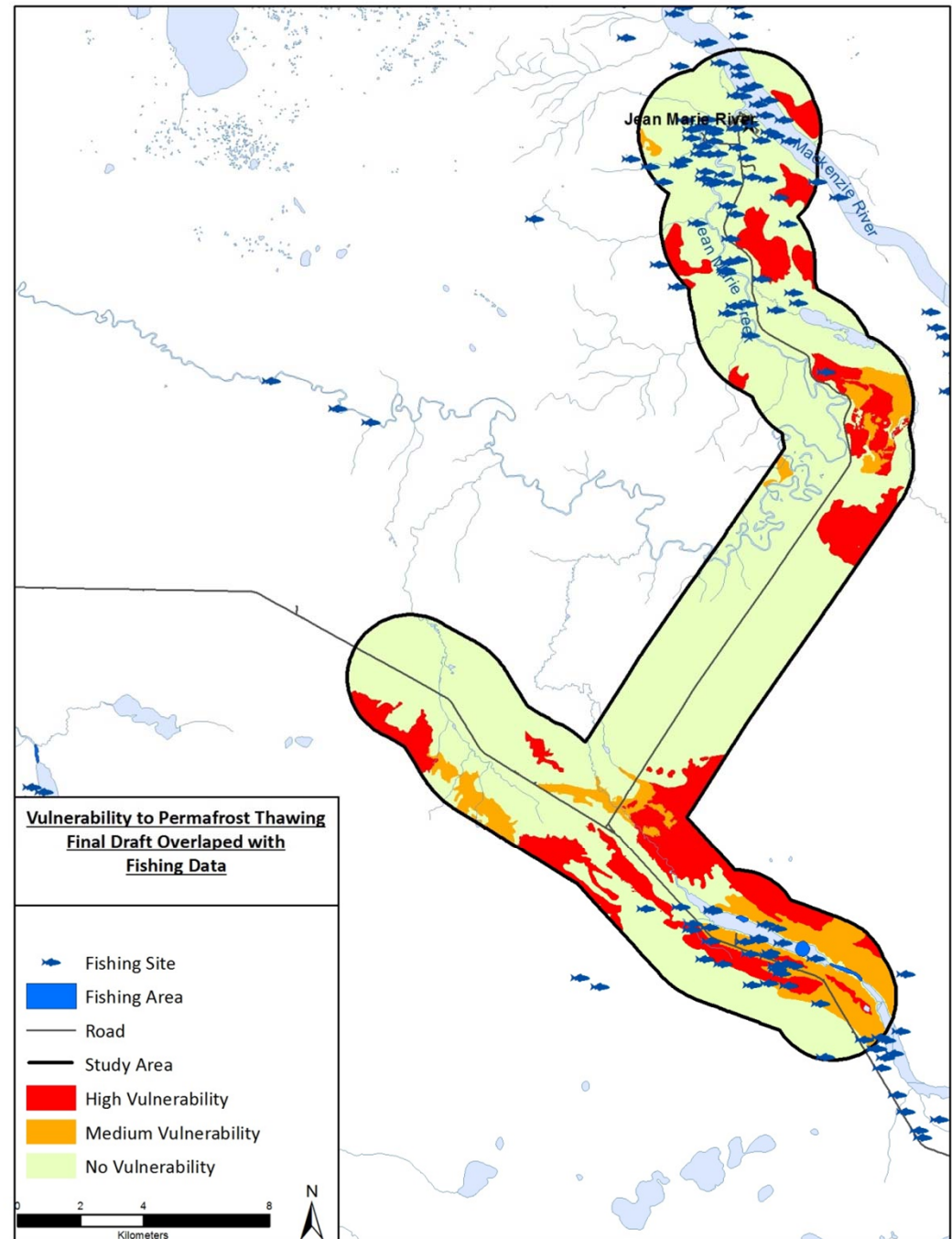
F.C.C.1

What mechanism?

Fabrice Calmels, 3/22/2013

Vulnerability to Permafrost Thawing: Fish harvesting

- Apparently landscape changes should not impact the fish harvesting areas.
- Yet, community members pointed out a decline in quantity and quality of fish.
- Many fish harvesting sites areas are contiguous to vulnerable sites to permafrost thaw.
- *Mercury contamination of fish in Ekali Lake area.*
 - *Are contaminants leaching from degrading permafrost?*



Next steps

Extend the mapping to JMRFN
additional lands;

Recast impact of permafrost
degradation on country food;

Investigate thawing permafrost as
possible origin of the mercury
contamination.

Acknowledgements:

People of JMRFN

Health Canada

Aboriginal Affairs and Northern Development Canada

