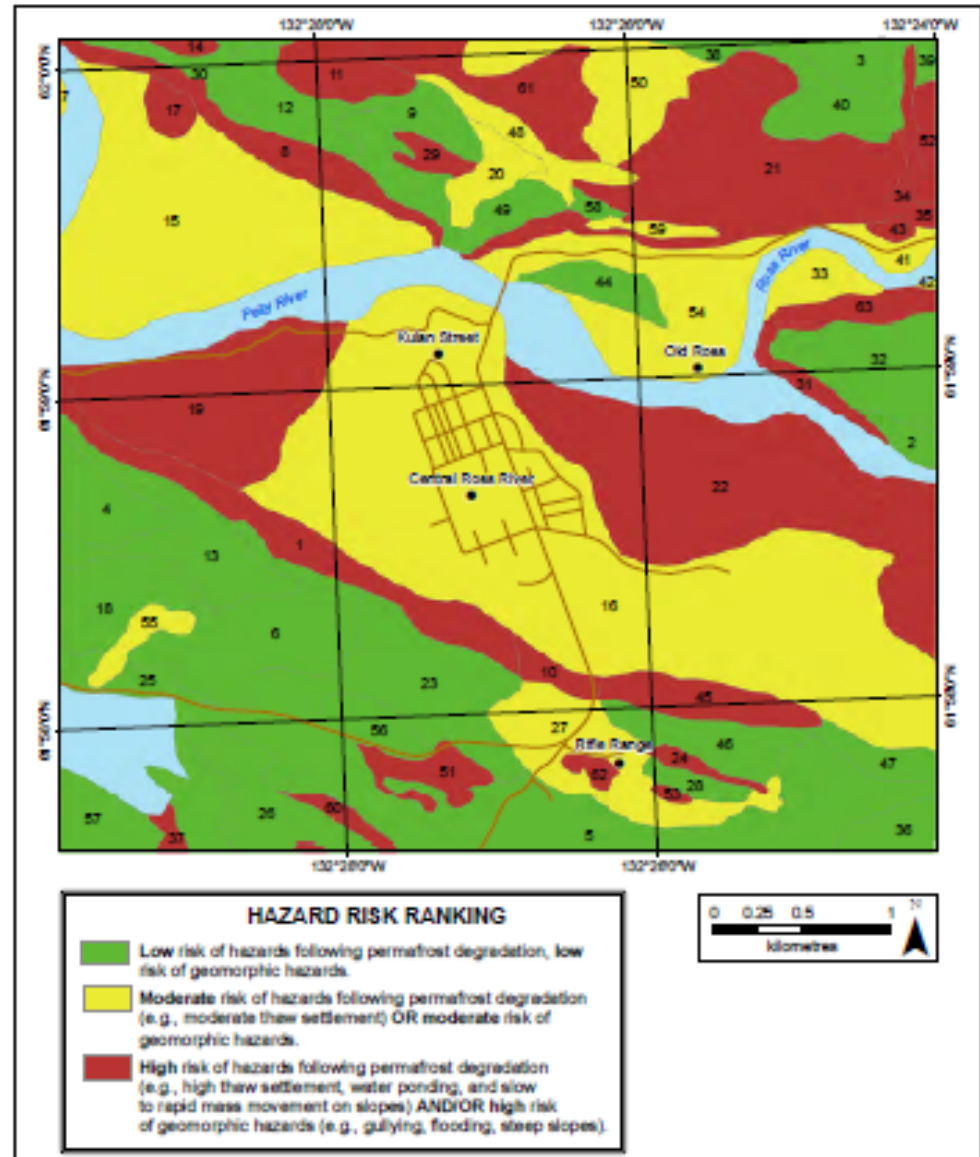
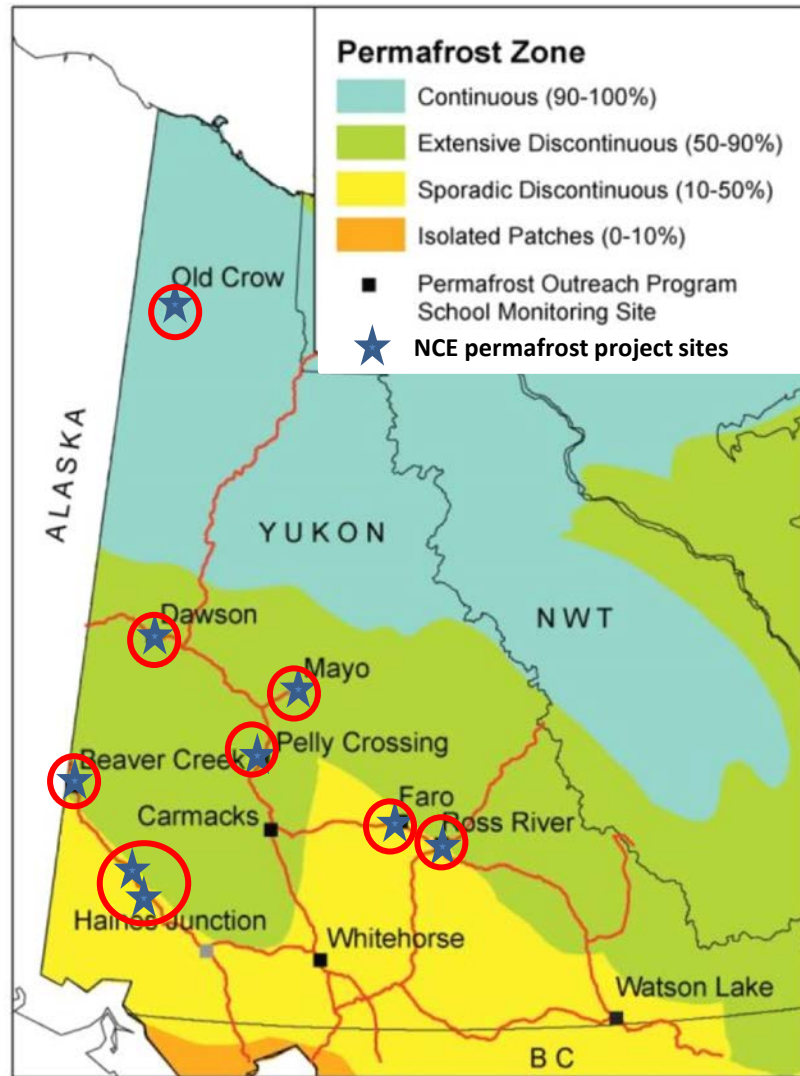


Methods to map hazards

- Geomorphology
- Drilling, probing, shoveling
- Ground Temperature monitoring
- Geophysics (ERT, GPR)
- Traditional knowledge

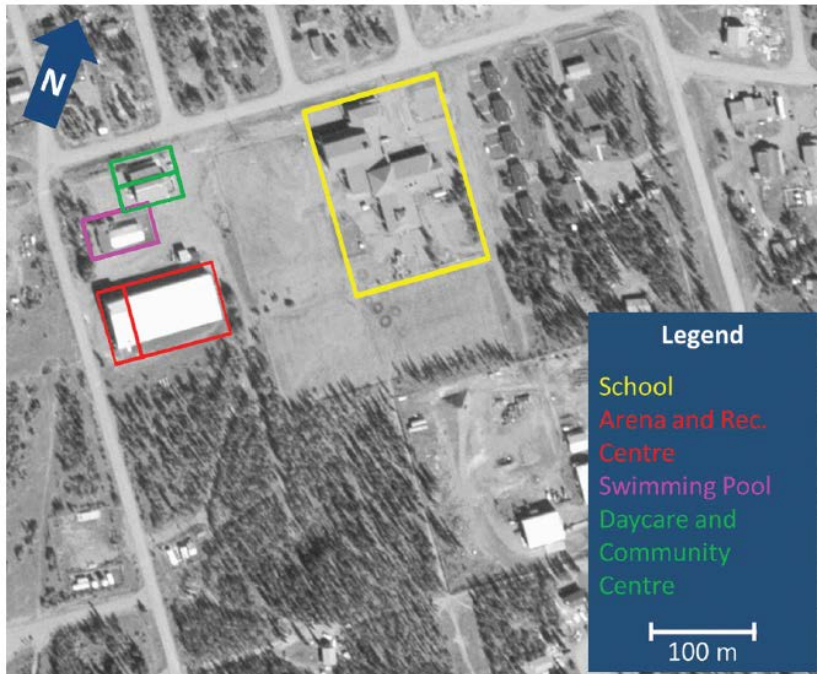


Communities - Hazard mapping

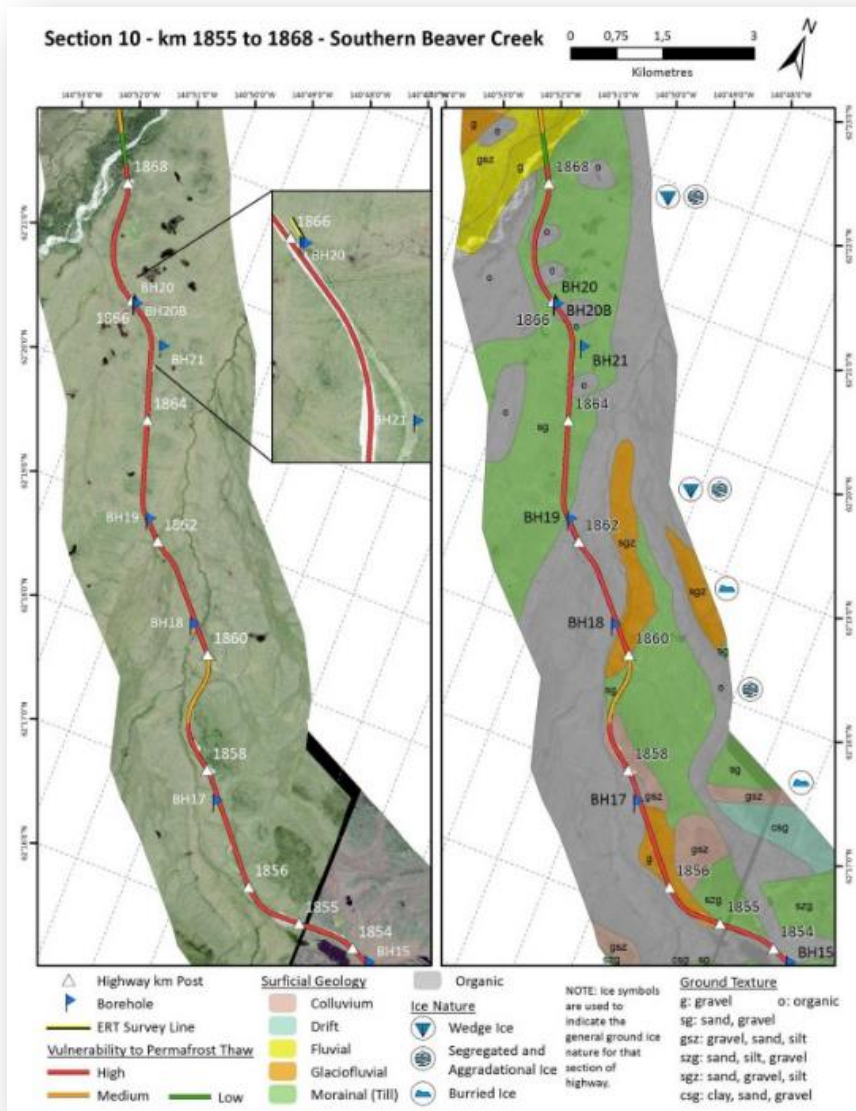


Source: Yukon Permafrost Network

Vulnerability to permafrost thaw for buildings



Vulnerability to permafrost thaw of roads



- Vulnerability of North Alaska Highway km 1700 to km 1902
- 3 years project with NCE Yukon College, 2012-2015, funded by INAC and Climate Change Secretariat Government of Yukon

43% highly vulnerable:

- Intense Subsidence
- Long duration

38% moderately vulnerable:

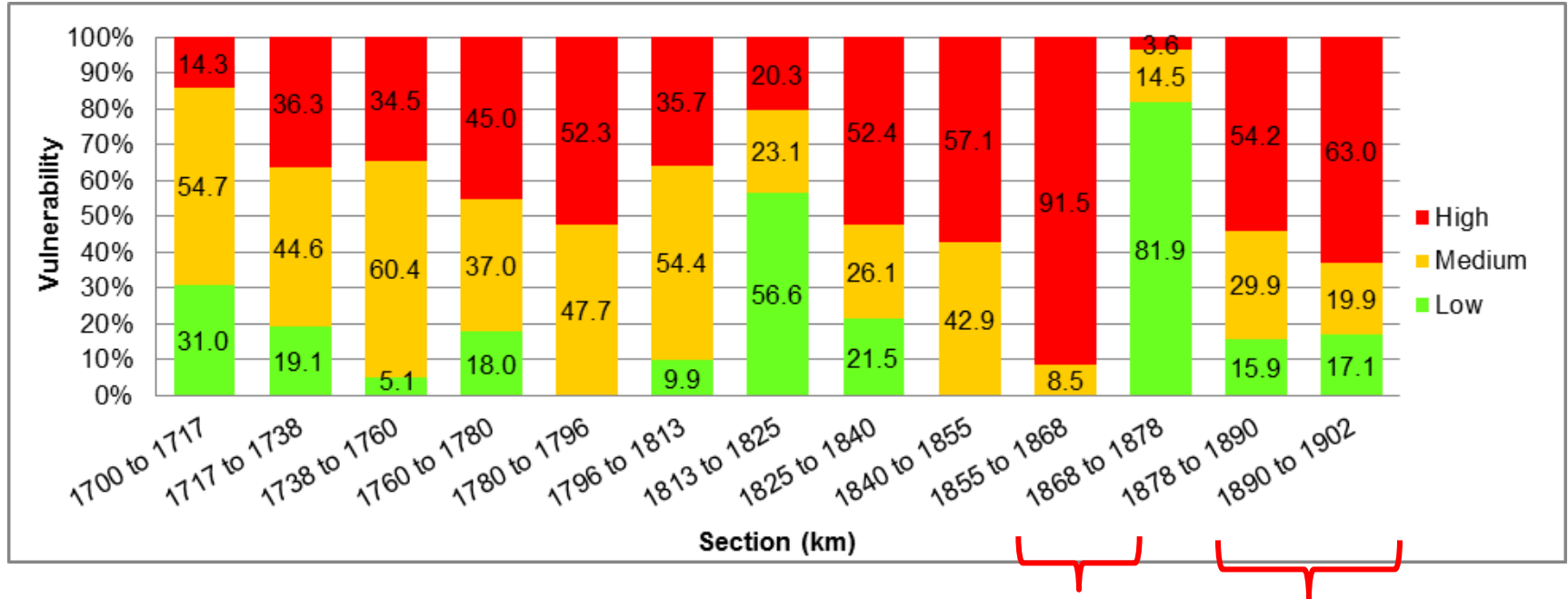
- Short Duration
- Moderate subsidence

19% low vulnerability

- No permafrost
- No ground movement



Vulnerability to permafrost thaw of roads



Vulnerability

High

Moderate

Low

Glaciofluvial/massive ice
Unglaciaded / wedge ice



Vulnerability to permafrost thaw of roads



- Notes:
- (ICE) indicates ground ice greater than 2.65 cm thick, observed as massive ground ice
 - Individual ice crystals (Vx).
 - Random orientated ice structures (Vt) or stratified ice structures (Vs) in the form of ice lenses
 - Visual description of ground ice not available for all boreholes

srk consulting

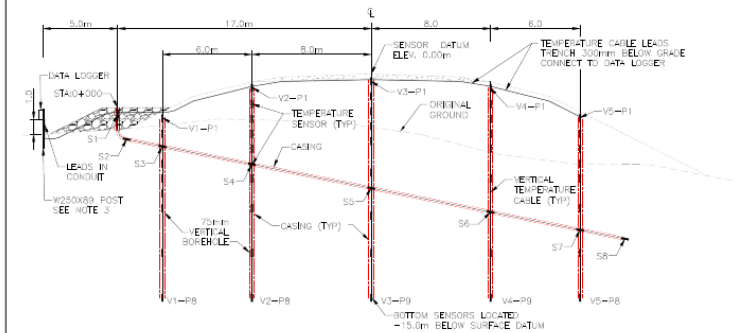
Job No. 100023303
 Filename: Thermal_Monitoring_Figures_Final.pptx

Yukon
 Highways and Public Works
 Transportation Engineering Branch

DRY CREEK HIGHWAY PROJECT, YUKON

Location of Massive Ground Ice

Date: 11/10/2017 Approver: DBS Figure: 4



TEMPERATURE CABLE SENSOR LOCATIONS	
SENSOR STATION	STATION
S1	0+003.5
S2	0+003.0
S3	0+003.0
S4	0+011.6
S5	0+019.8
S6	0+026.0
S7	0+034.1
S8	0+037.2

VERTICAL TEMPERATURE CABLE SENSOR LOCATIONS					
SENSOR STATION	ELEVATION (EARTH ELEVATION) (ELEVATION)				
V1	1.00	17.00	25.00	33.00	40.00
P1	-3.0	-1.0	-0.5	-1.0	-3.0
P2	-4.0	-2.0	-1.5	-2.0	-5
P3	-6.0	-3.0	-2.5	-3.0	-5
P4	-7.0	-4.0	-3.5	-4.0	-8
P5	-8.0	-5.0	-4.5	-5.0	-7.0
P6	-9.0	-7.0	-7.0	-7.0	-9.0
P7	-12.0	-9.0	-9.5	-12.0	-12.0
P8	-15.0	-12.0	-12.0	-15.0	-15.0
P9	-15.0	-15.0	-15.0	-15.0	-15.0

Temperature Monitoring Station - Stakeout Information	
Cantenna Information	
Borehole No.	Station
12	2804+22.50
13	2804+22.50
14	2804+22.50
15	2804+22.50
16	2804+22.50
17	2804+22.50
18	2804+22.50
19	2804+22.50
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25	2804+22.50
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96	2804+22.50
97	2804+22.50
98	2804+22.50
99	2804+22.50
100	2804+22.50

GROUND TEMPERATURE MONITORING STATION - DETAIL

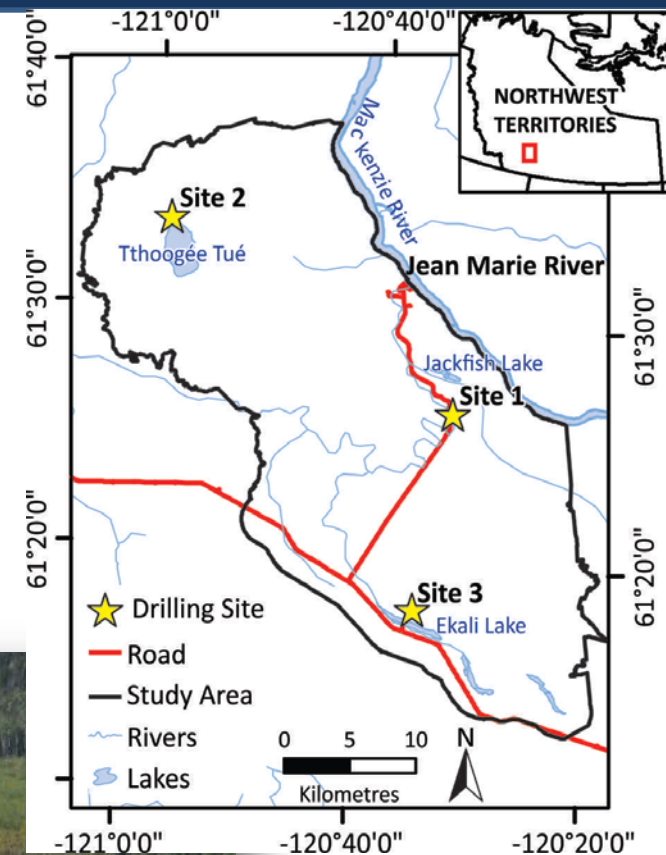
SCALE: 1:2000
 INSTALL AT STATIONS: 1940+552.50, 1940+752.50, 1940+852.50
 SEE GENERAL CONSTRUCTION NOTES FOR MORE INFORMATION



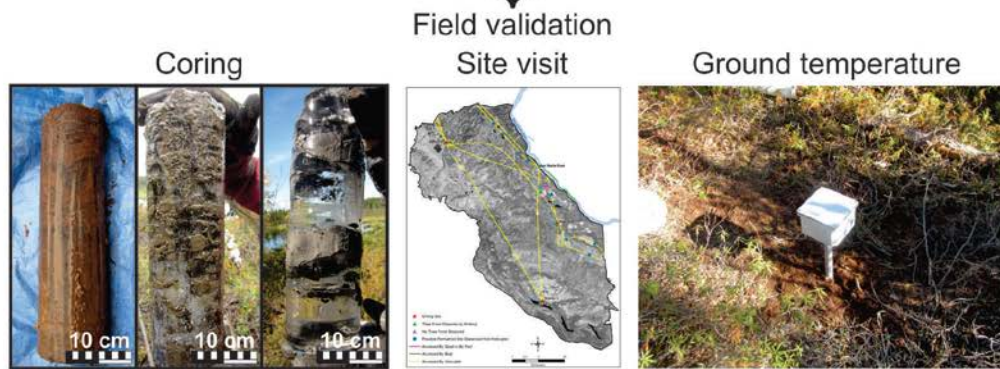
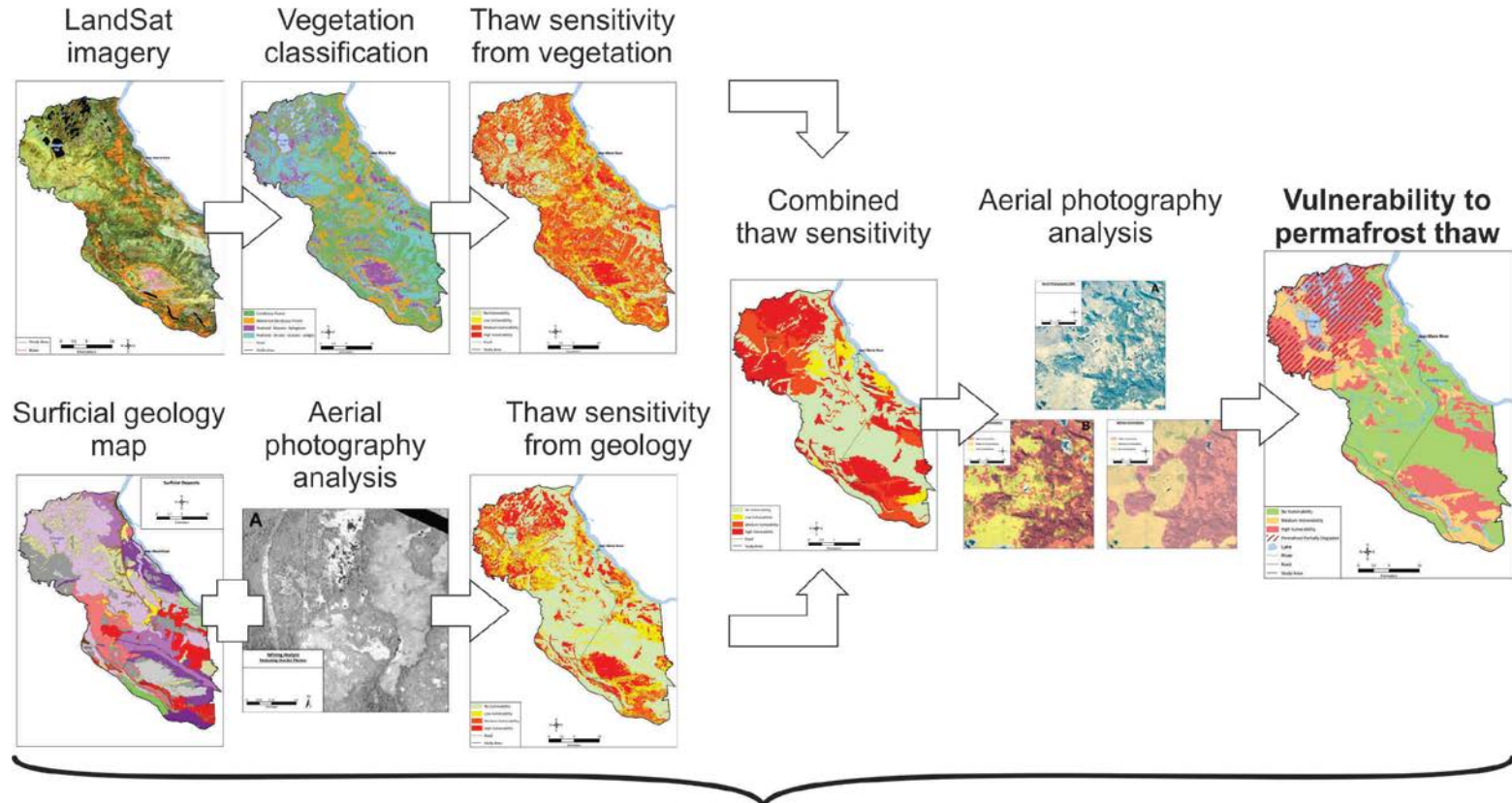
Northern Climate ExChange
 YUKON RESEARCH CENTRE • Yukon College

Traditional territory - Jean Marie River

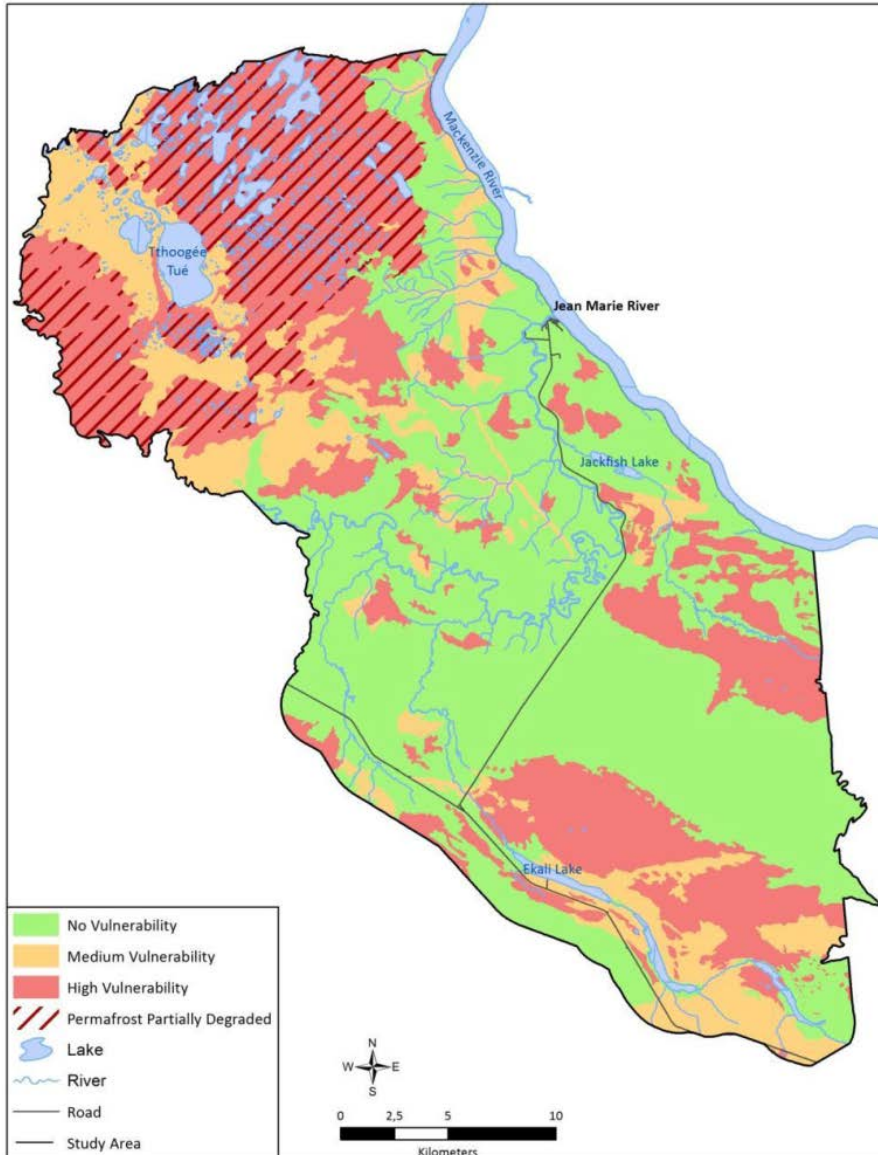
- Evaluate the impact of permafrost thaw on the community on country food supply.



Jean Marie River

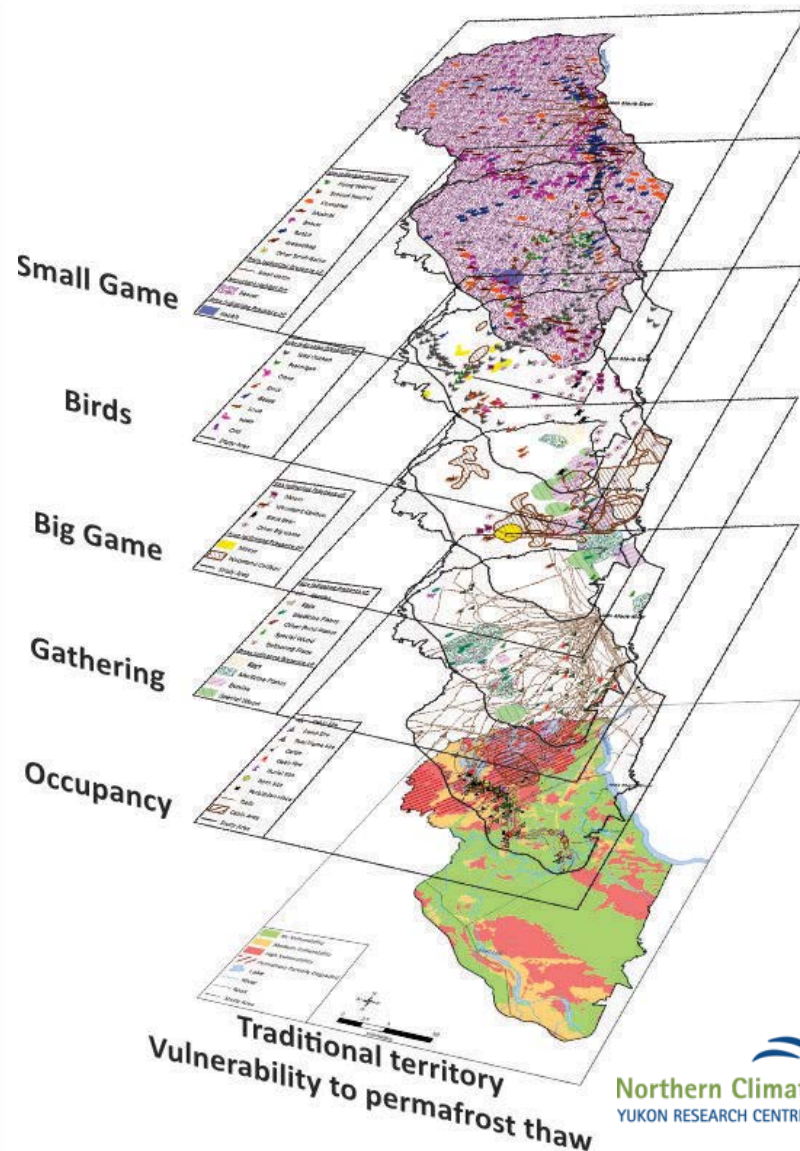
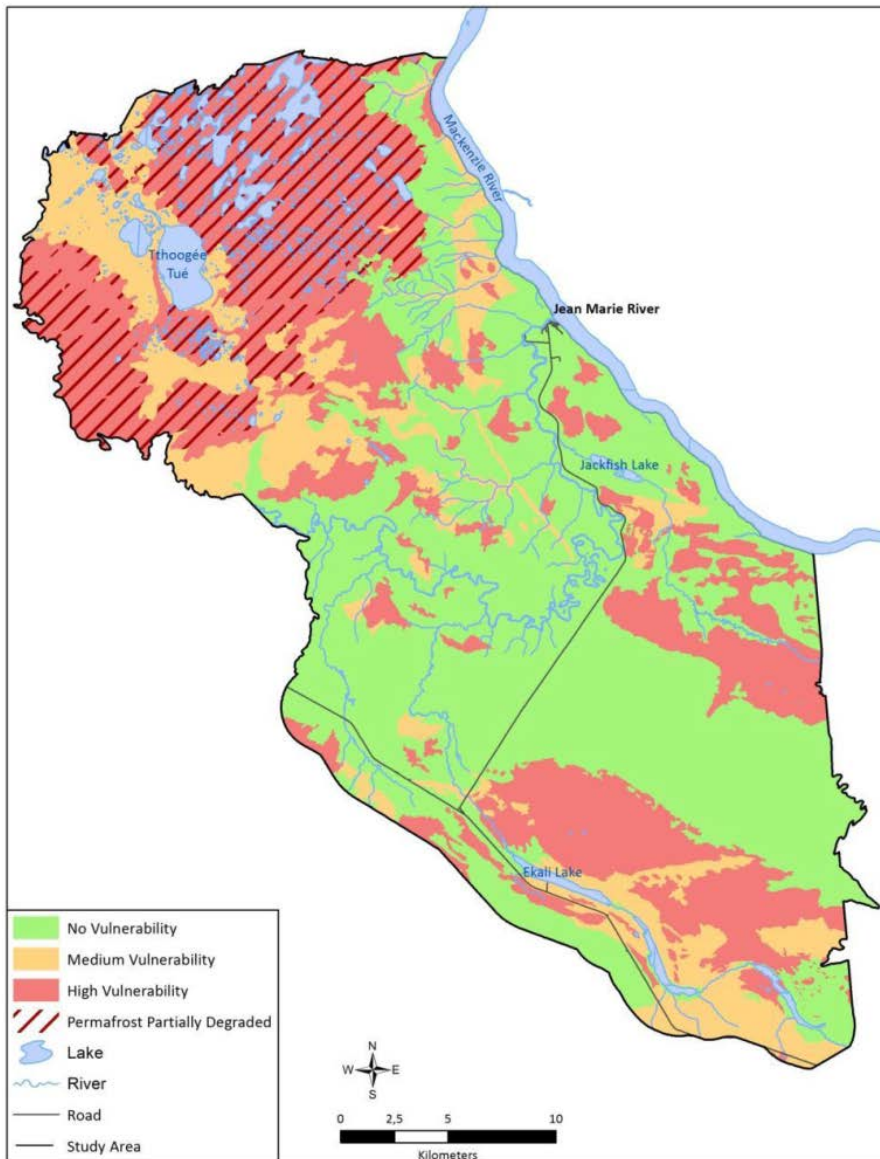


Jean Marie River



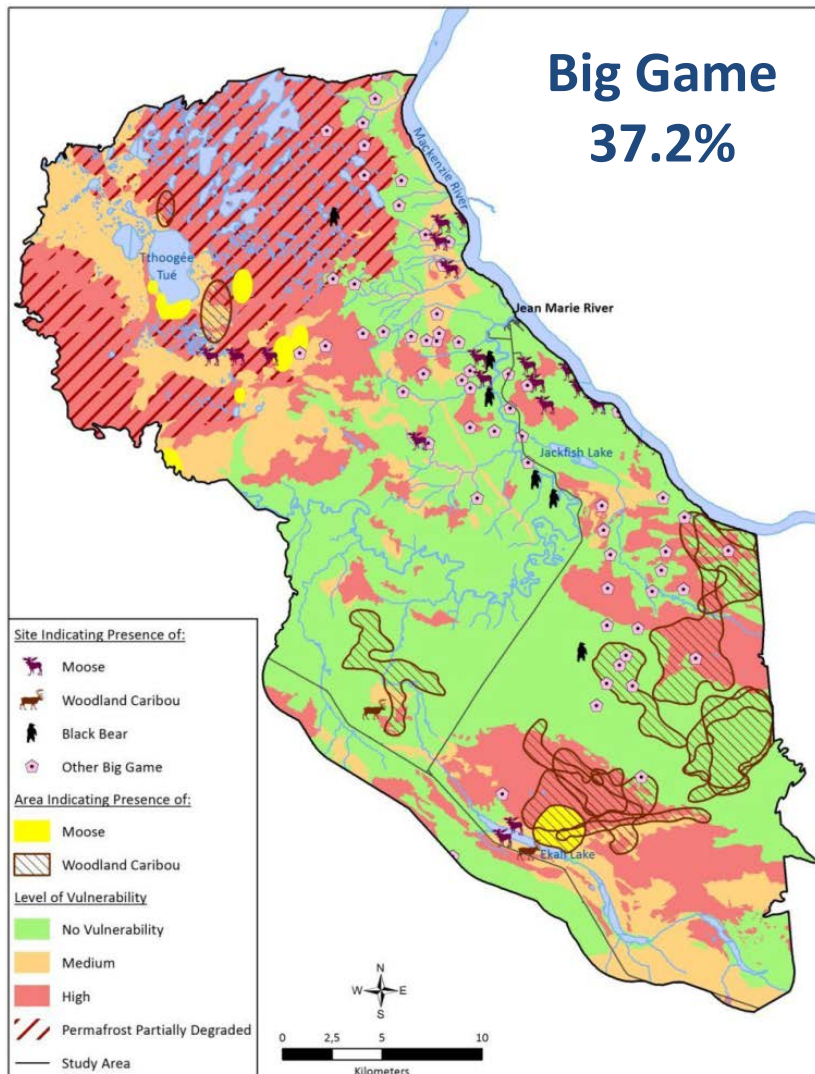
Thaw Sensitivity	Land area (%)
Low	48.9
Medium	15.9
High	35.2
Medium + High	51.1

Jean Marie River

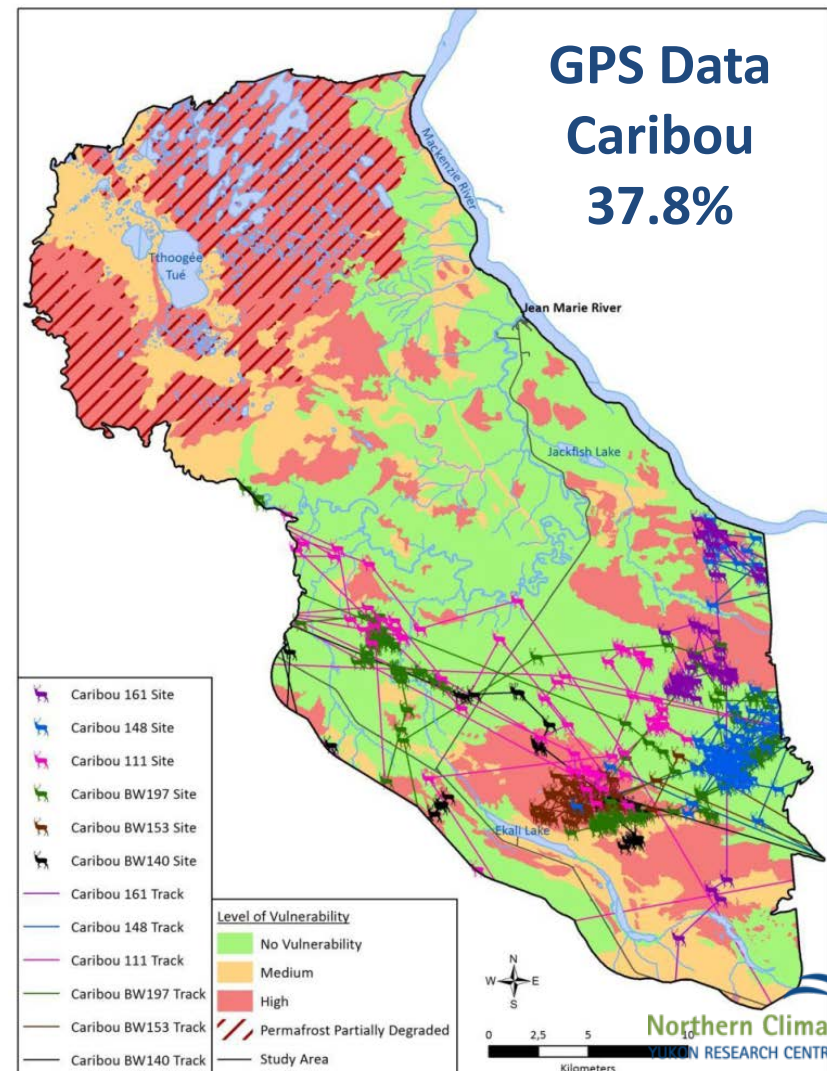


Impacts of Landscape Changes on Big Game

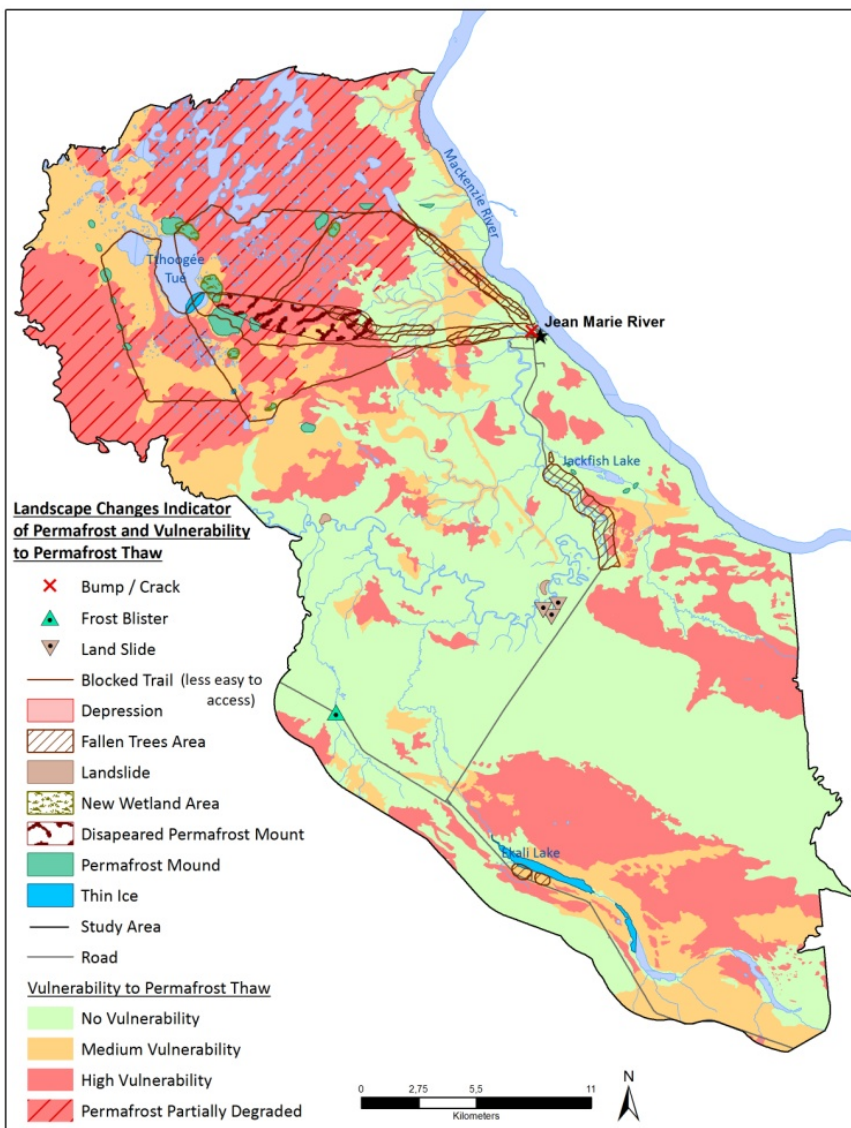
From TK



From animal behaviour



Impacts of Landscape Changes



73% of the observed changes are located in the medium to high vulnerability areas (25 and 48%, respectively).

if falling tree areas are excluded:

1. Extreme event combining freezing rain loading the trees followed by a strong windy storm,
2. Large trees more susceptible to collapse in none permafrost area;

Then 92% of the observation falling in medium to high vulnerability areas (25 and 68% respectively).



Conclusion

- Geomorphology
- Geophysics
- Civil Engineering
- Ecology
- Traditional knowledge
- Remote sensing
- Land planning
- Etc., Etc., Etc., Etc., Etc., Etc., Etc., Etc., Etc.,
- Climatology
- Animal Biology
- Isotope chemistry
- Contaminants
- Health Sciences
- Geotechnical Engineering
- Land planning

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