

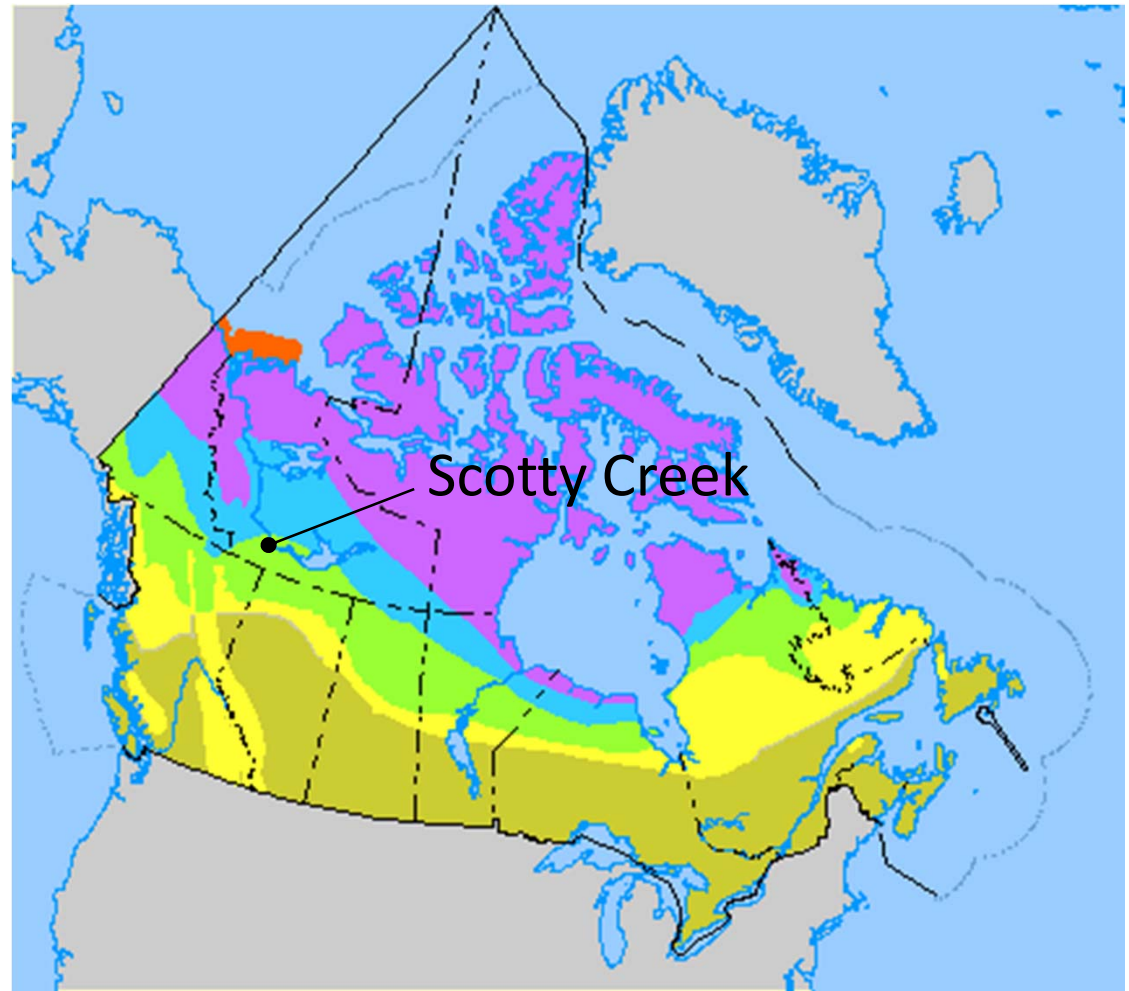
Impacts of permafrost thaw on hydrology and vegetation in the Taiga Plains

Jennifer Baltzer and William Quinton
Wilfrid Laurier University

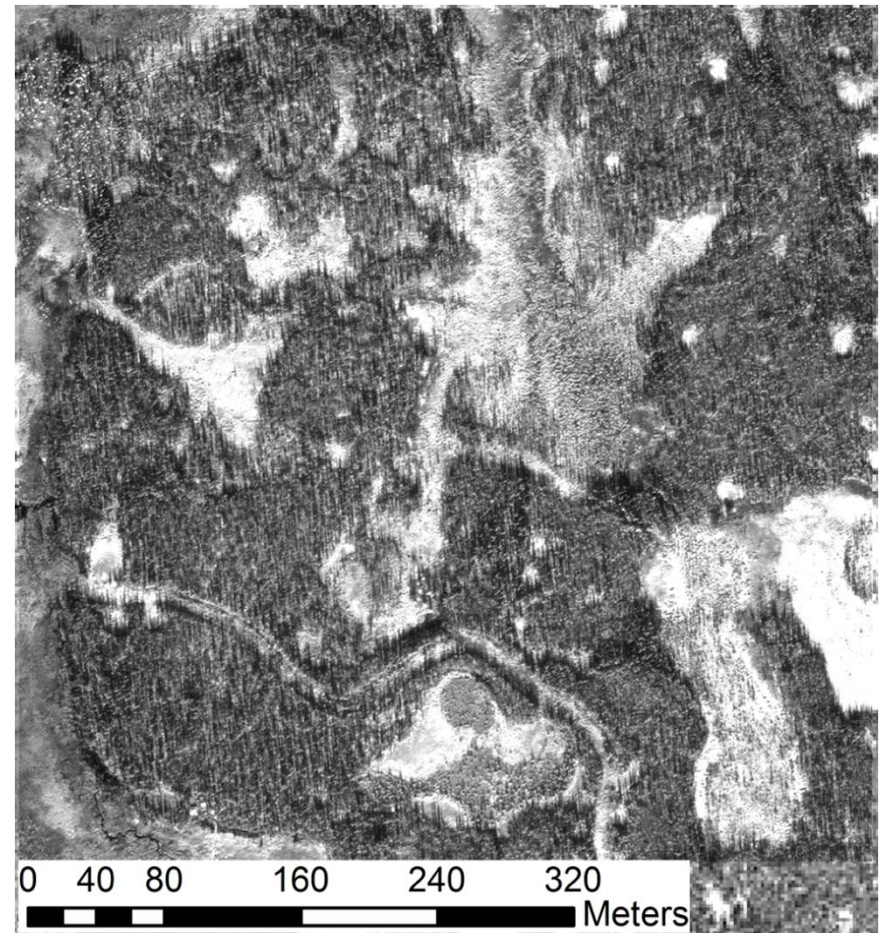
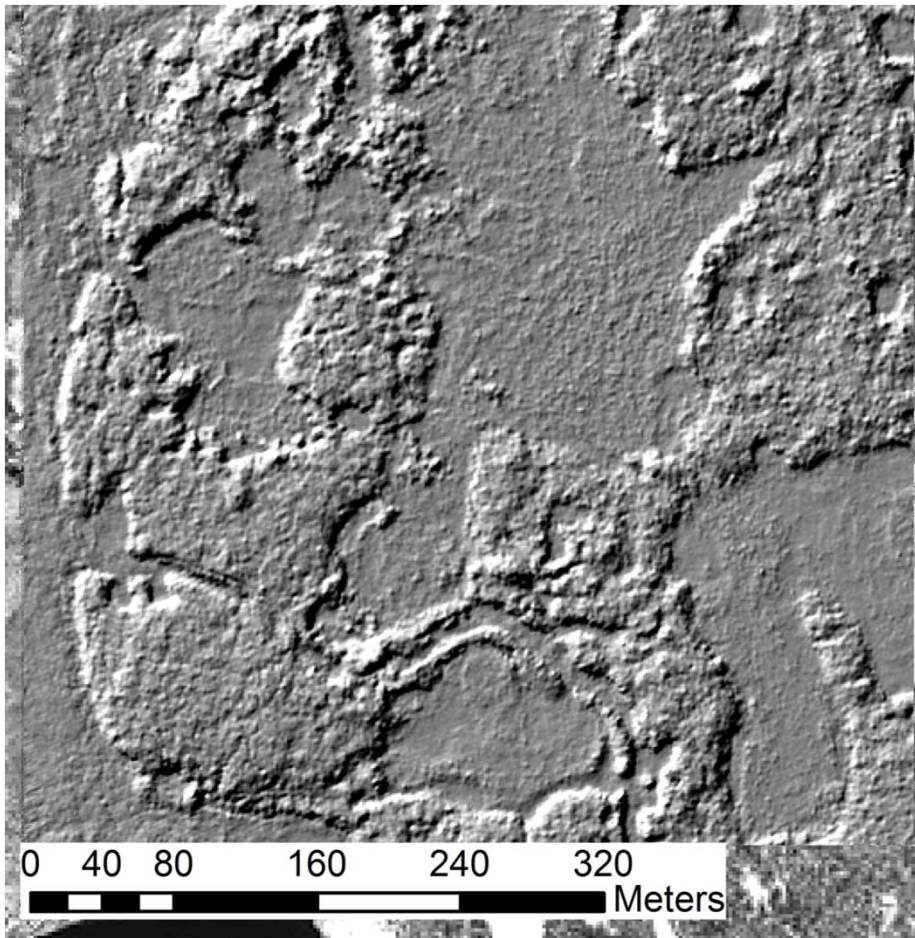
The “front-line” of permafrost thaw:

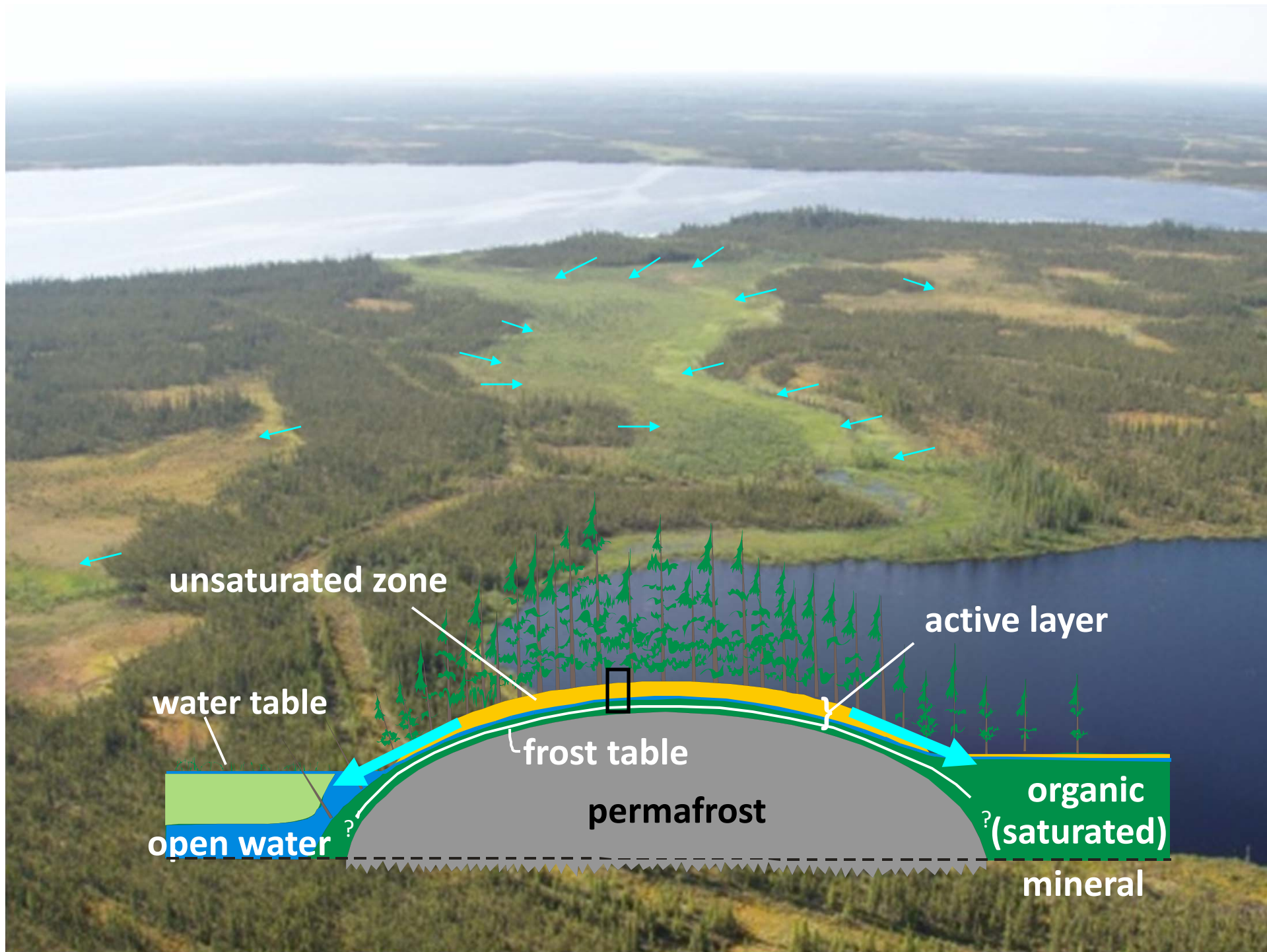
Permafrost Cover:

-  Continuous (> 90%)
-  Discontinuous (50-90%)
-  Discontinuous (10-50%)
-  Isolated patches (< 10%)
-  No permafrost

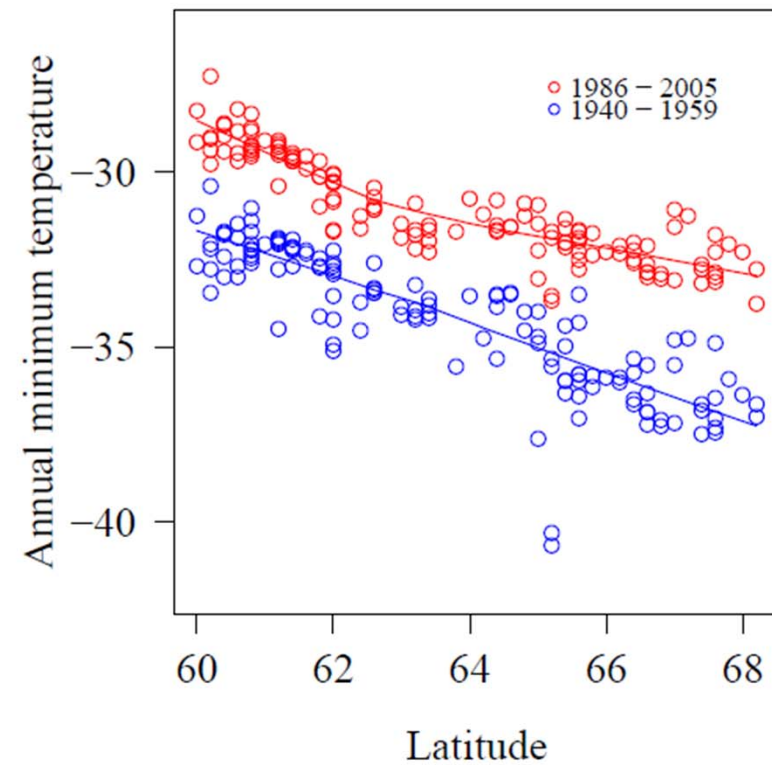
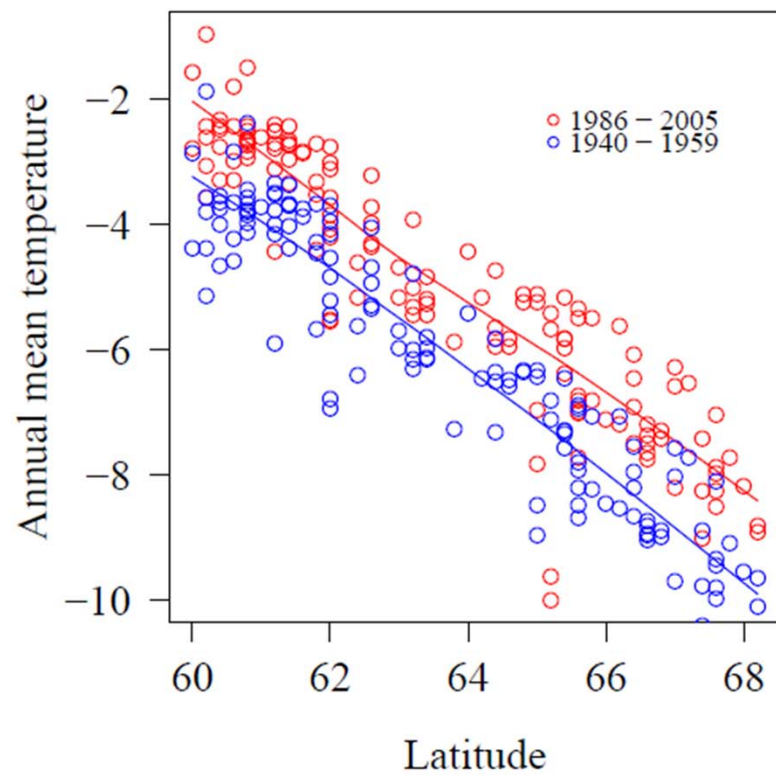


Presence of permafrost drives forest distribution



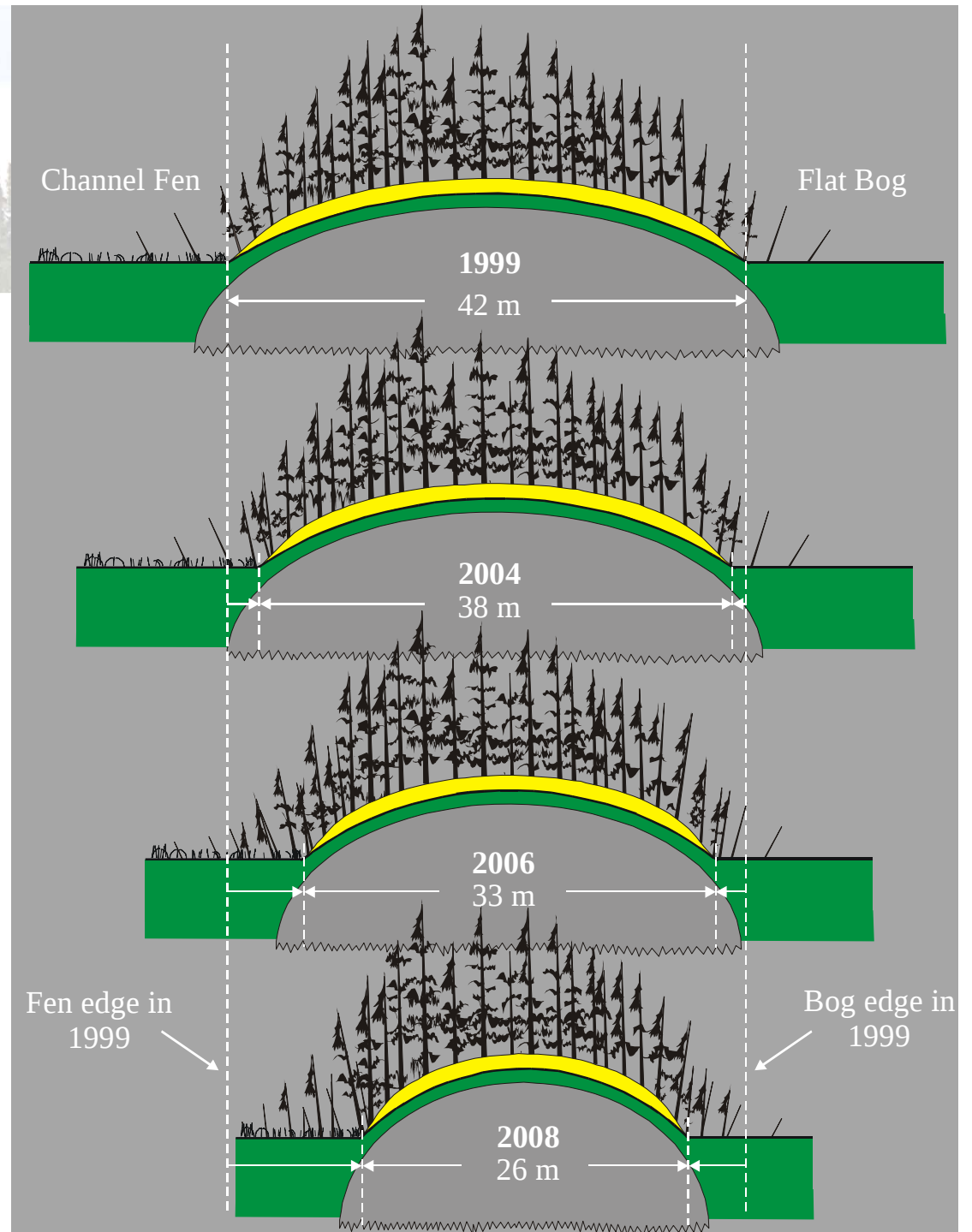


Permafrost in a warming climate



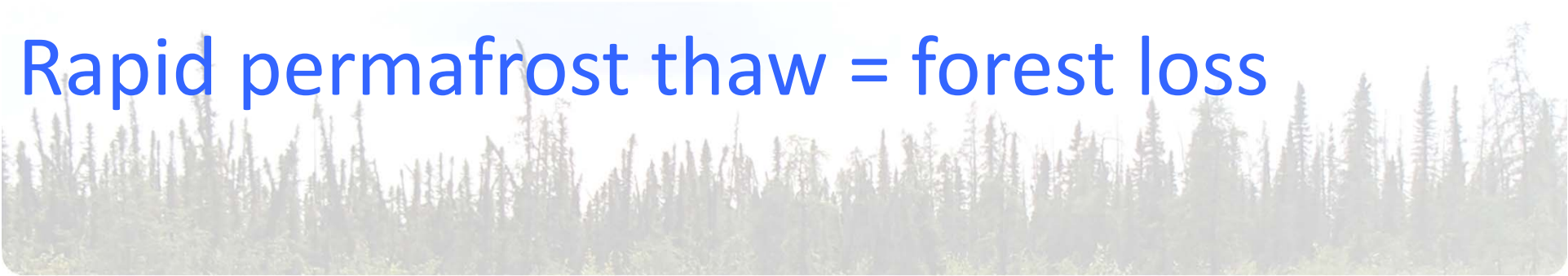
Marshall and Baltzer, in prep

Horizontal Thaw:





Rapid permafrost thaw = forest loss



Peat Plateau Area

1947: 70%

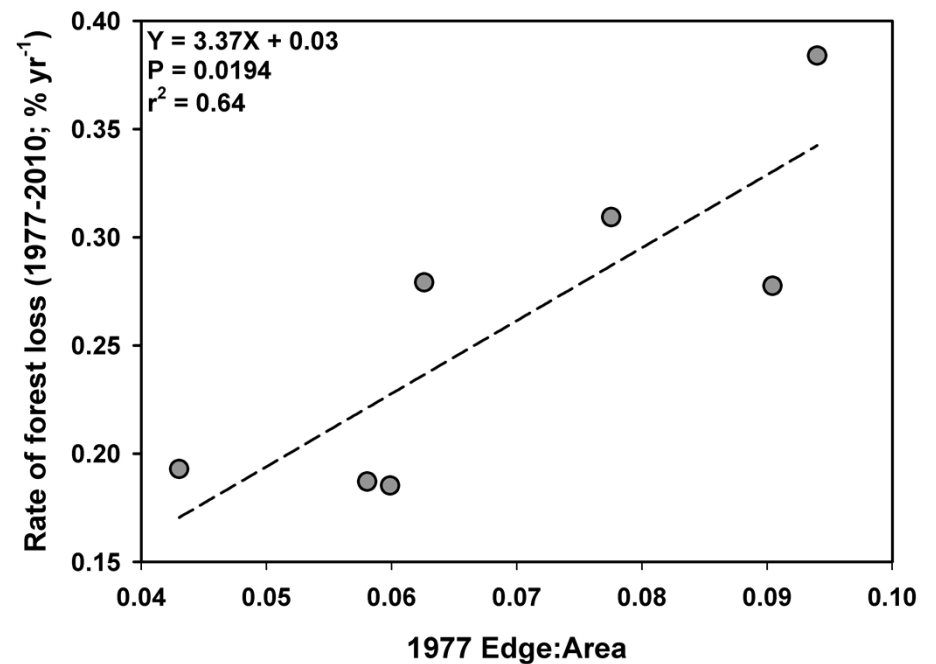
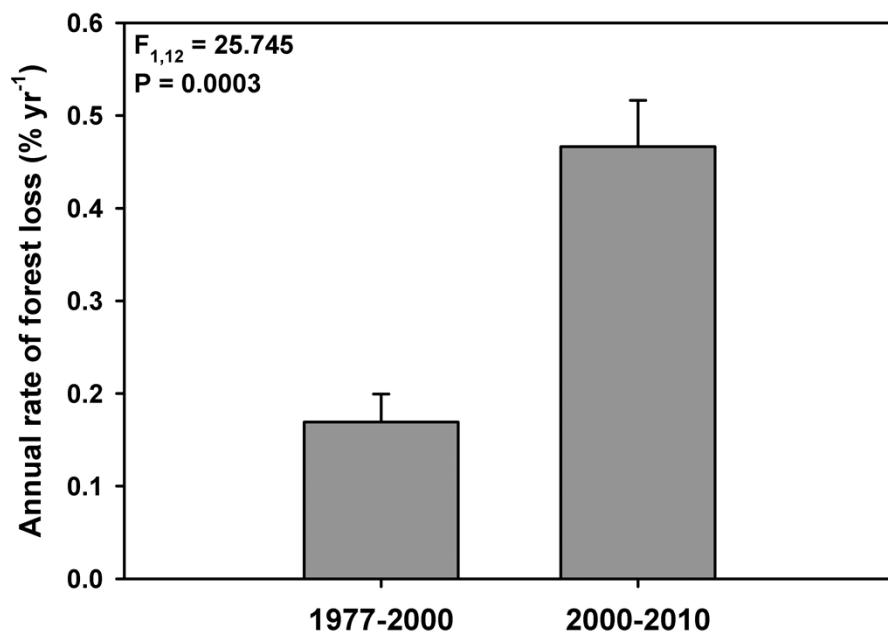
1970: 54%

1977: 53%

2000: 49%

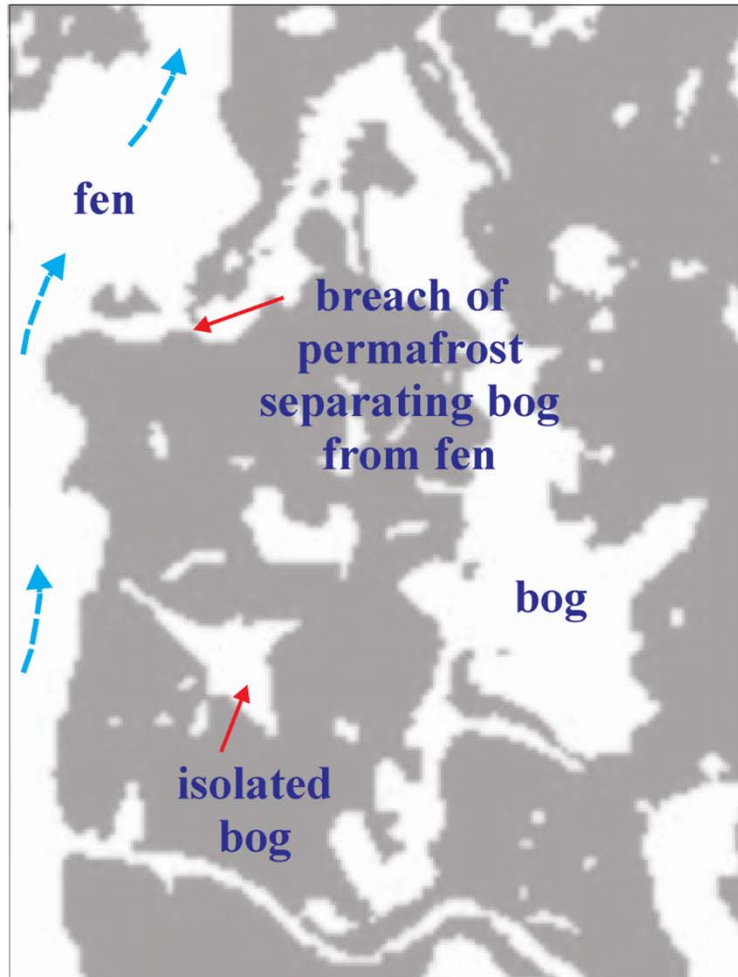
2008: 43%

Fragmentation accelerates rate of thaw

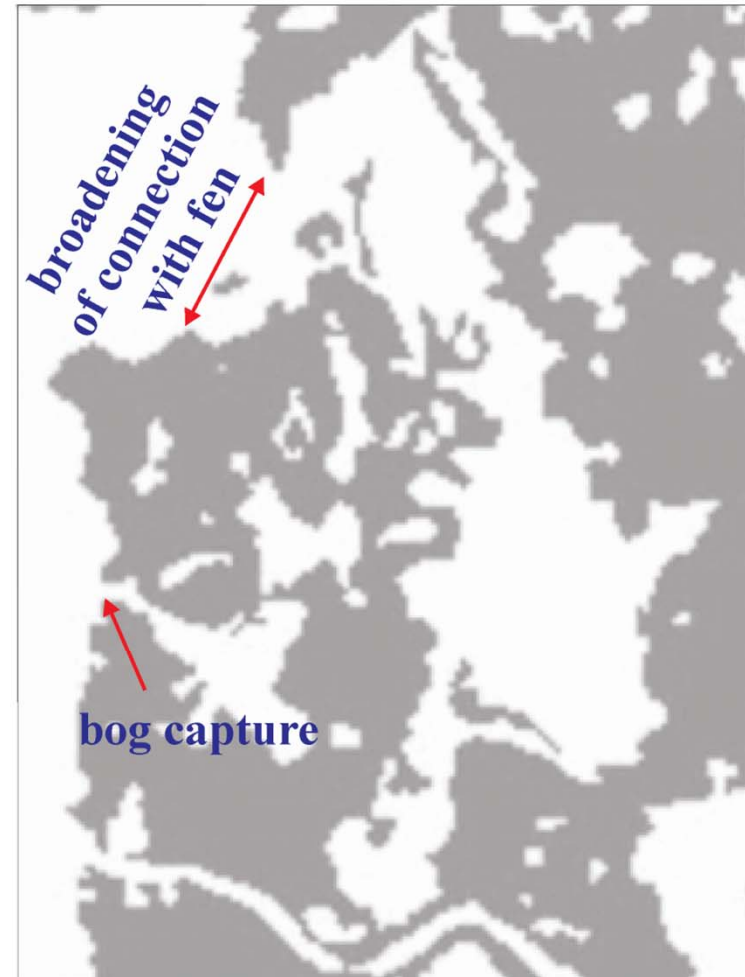


Expanding runoff contributing areas

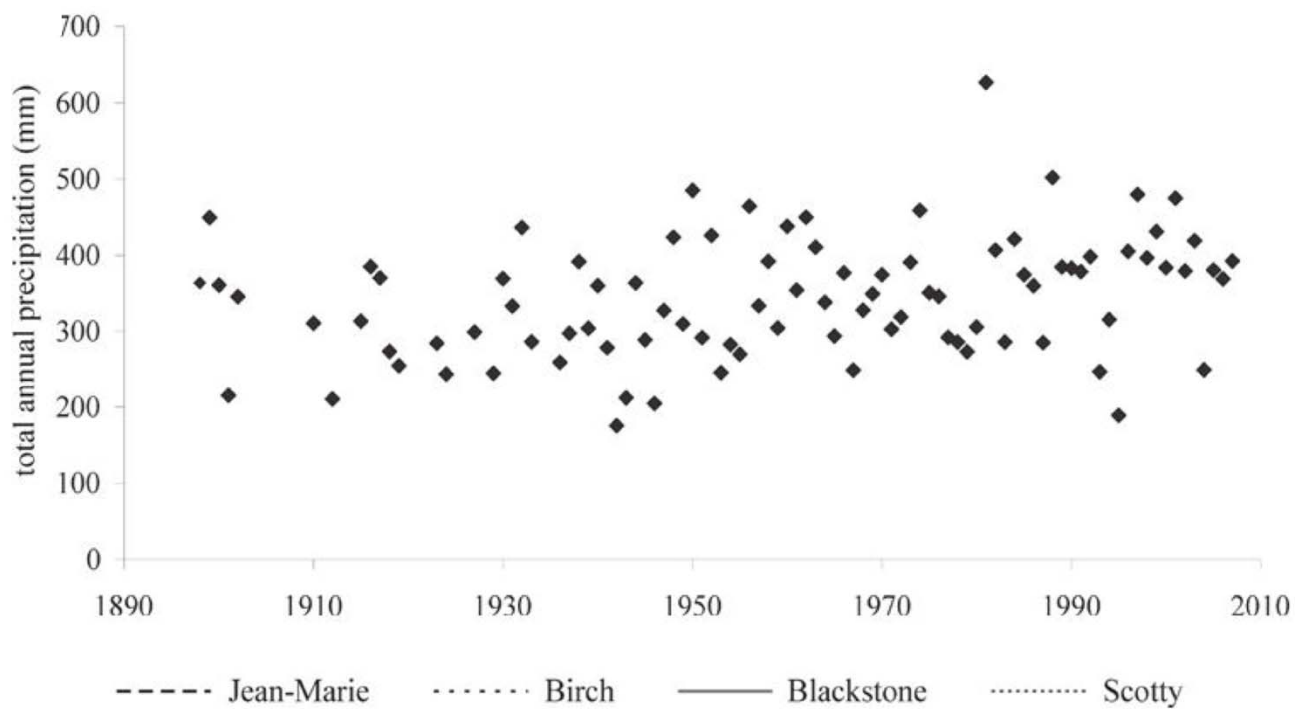
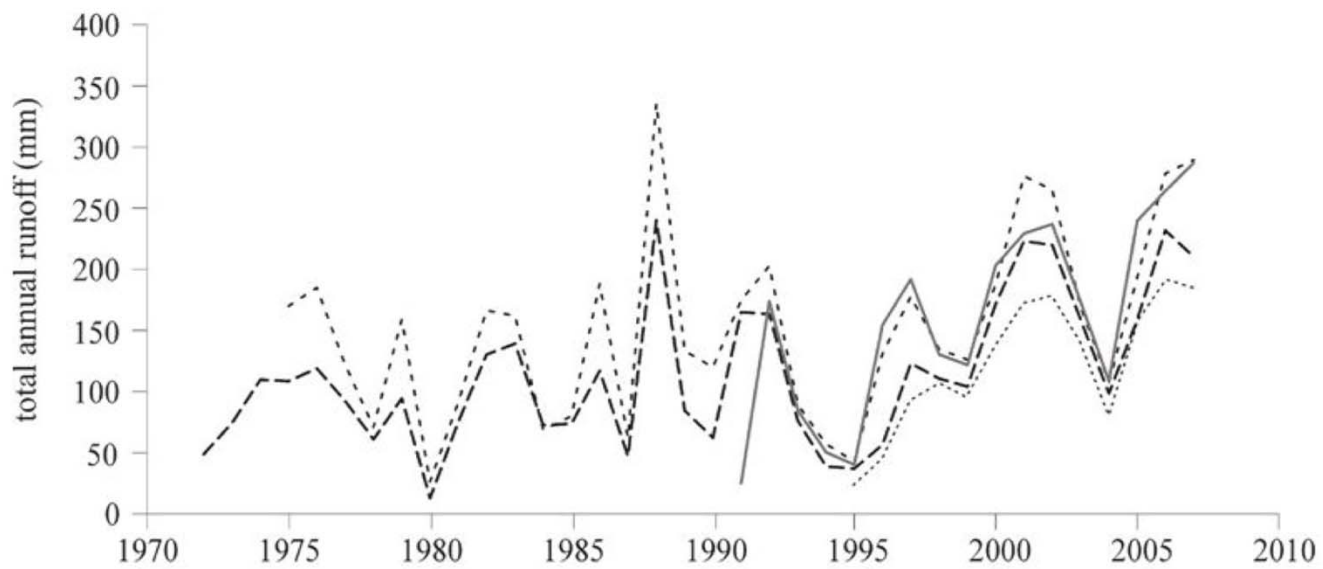
1977: 53% Permafrost



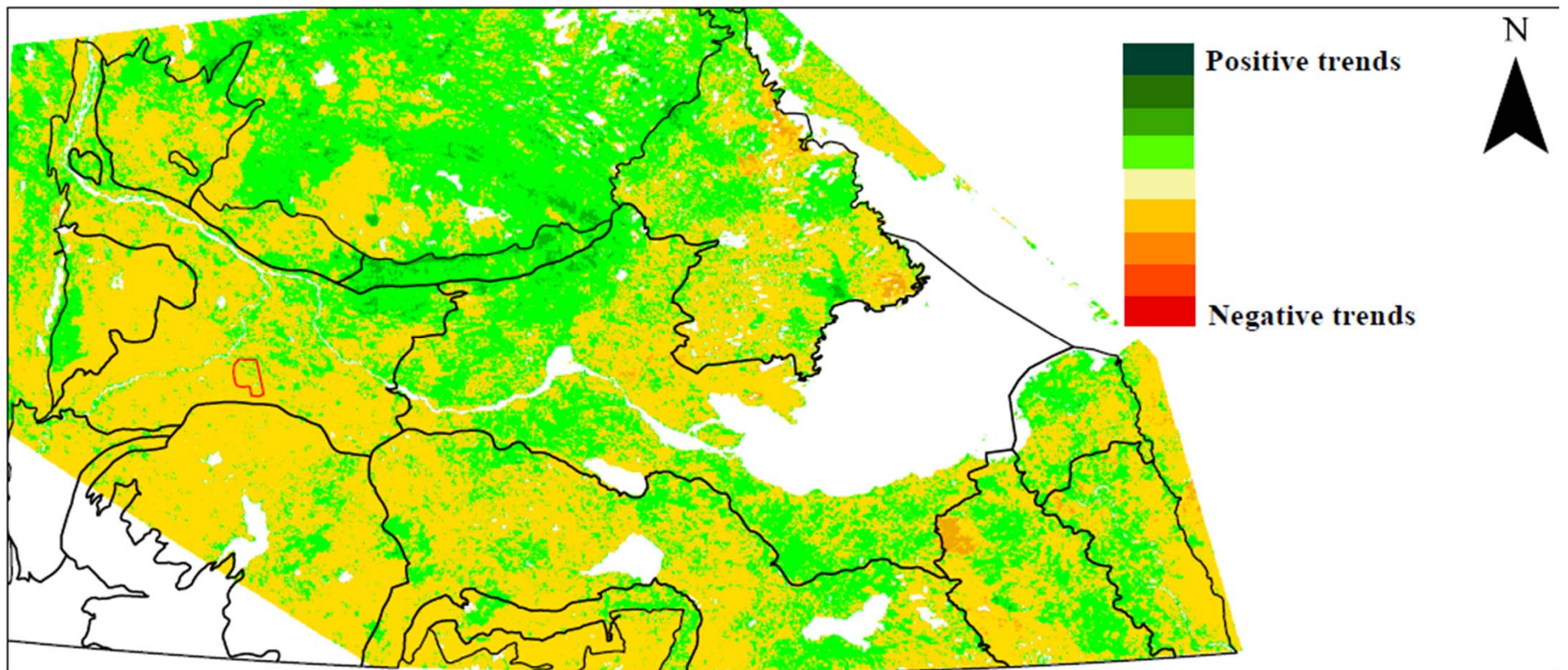
2008: 43% Permafrost



Quinton and Baltzer (2013) IAHS 60: 85



Widespread evidence of change



Rahimzadeh et al., in prep



Landscape changes in the Dehcho

Climate warming induced permafrost thaw:

- 1) Conversion of forests to permafrost-free wetlands
- 2) Increasing run-off attributable to wetland connectivity



Implications for wildlife

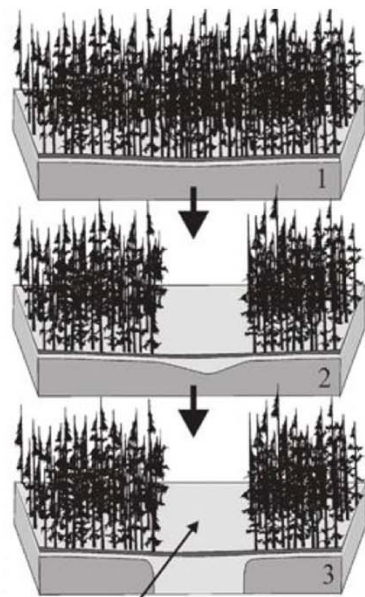
“With climate change, loss of forest habitats due to permafrost thaw may have significant future effect on boreal caribou populations”

– NWT Species at Risk Committee

Thank you!

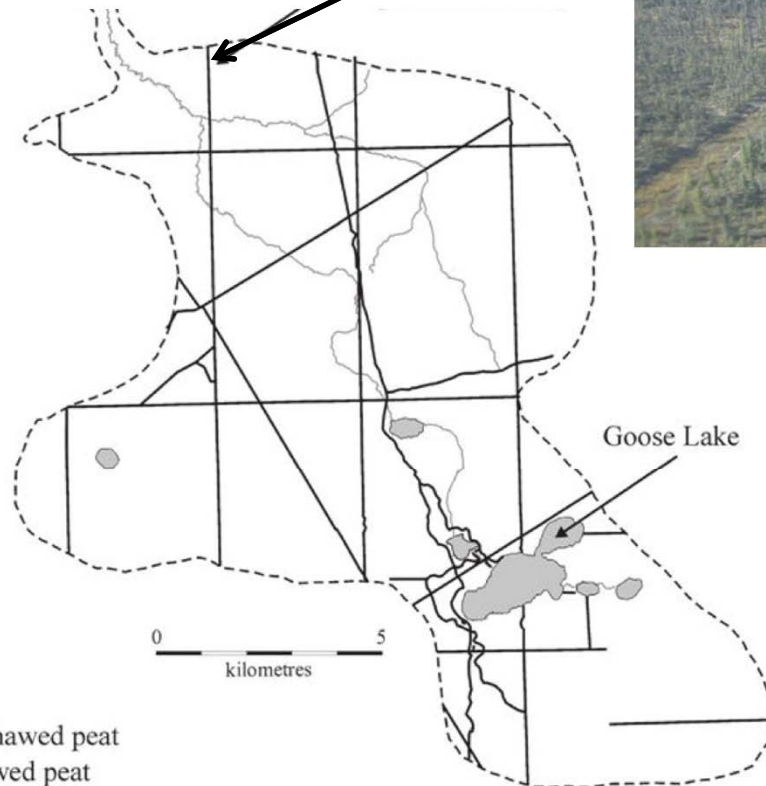


Linear disturbances and permafrost thaw

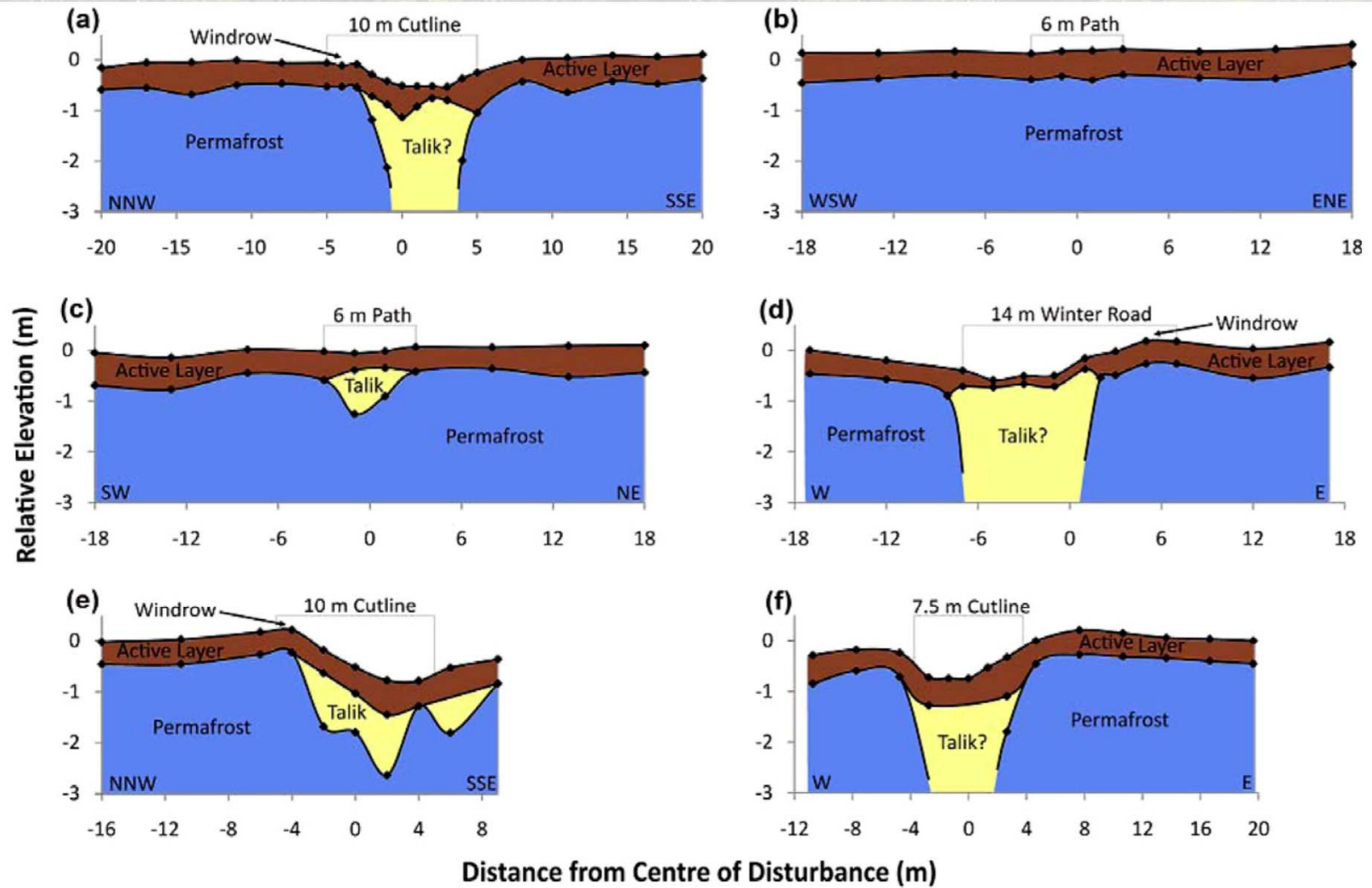


linear disturbance
(permafrost-free)

- unsaturated, thawed peat
- saturated, thawed peat
- saturated, frozen peat



Quinton et al. (2009) CWRJ 34: 311



Williams et al. (2013) ERL 8: 025006

