



Climate Change in the NWT A Transportation Perspective

Northern Transportation Conference

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Presentation Overview

- Climate Change Explained
 - DOT Impacts – Potential and Experienced
 - Winter Roads
 - DOT Response
 - Impacts and Adaptation Study
 - Conclusion
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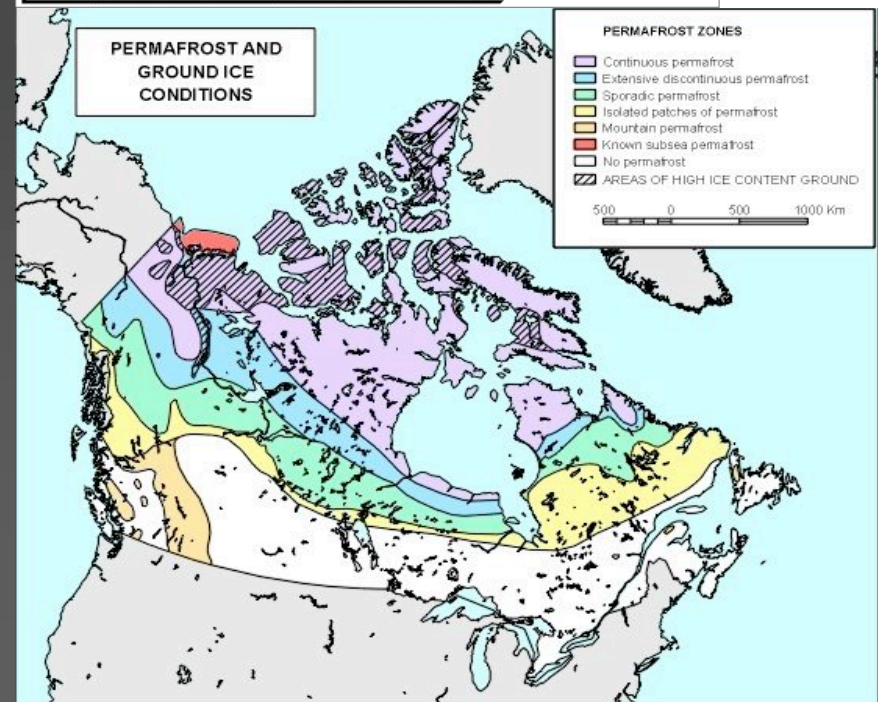
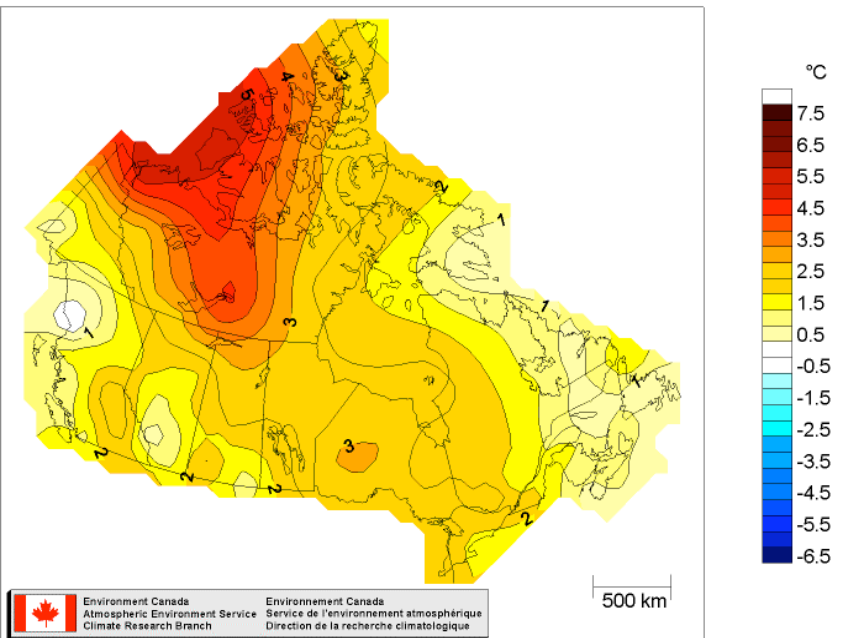
Climate Change

- What is it?
 - Regional
 - Global
 - Influencing Factors
 - Natural
 - Human-induced
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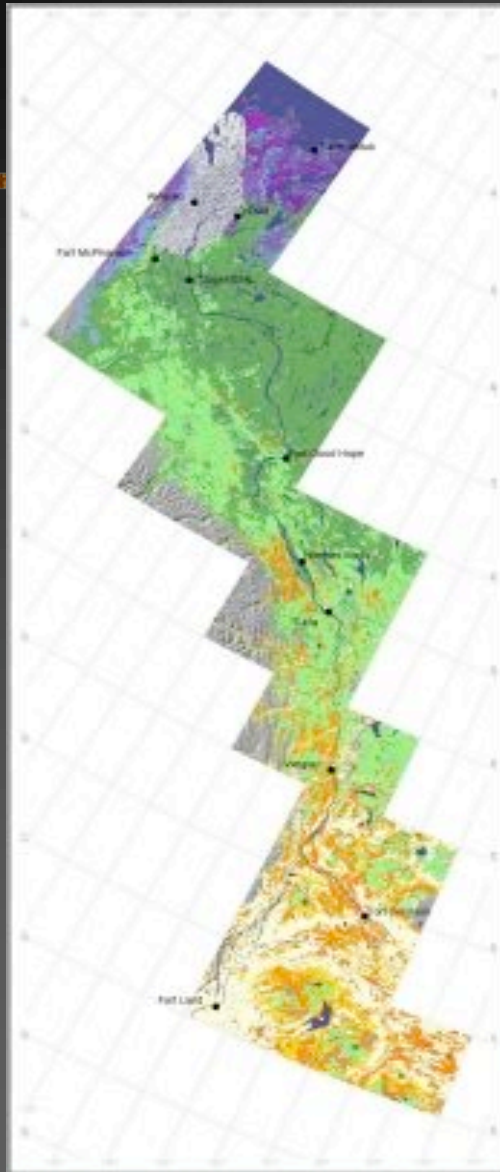
Climate Change Impacts

- Permafrost boundary movement
- Changing sea levels
- Extreme weather events
- Temperature & Precipitation shifts
- Water Resources
- Animal impacts

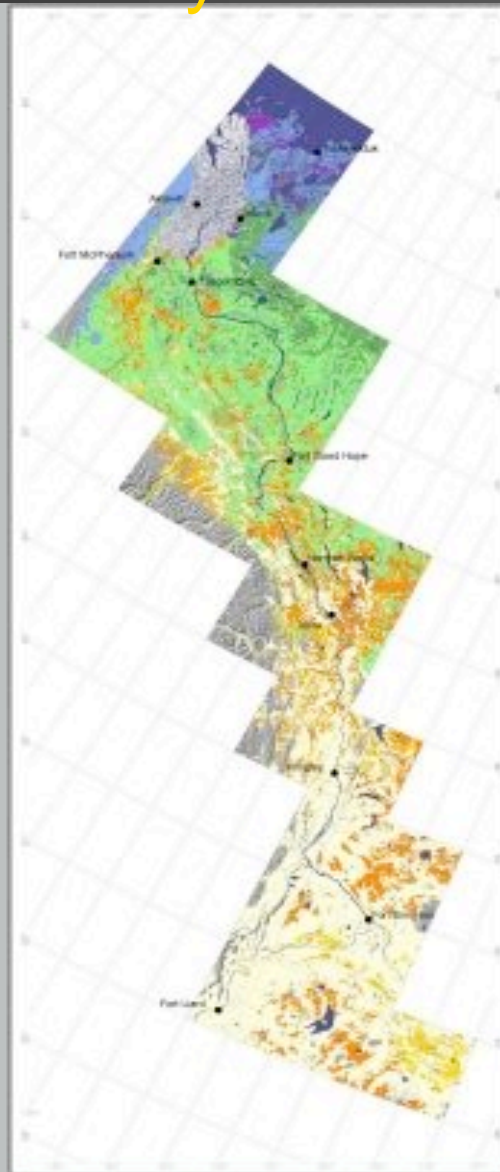
TEMPERATURE DEPARTURES FROM NORMAL
ANOMALIES DE LA TEMPERATURE PAR RAPPORT A LA NORMALE
Annual/Annuelle (Jan-Dec) 1998



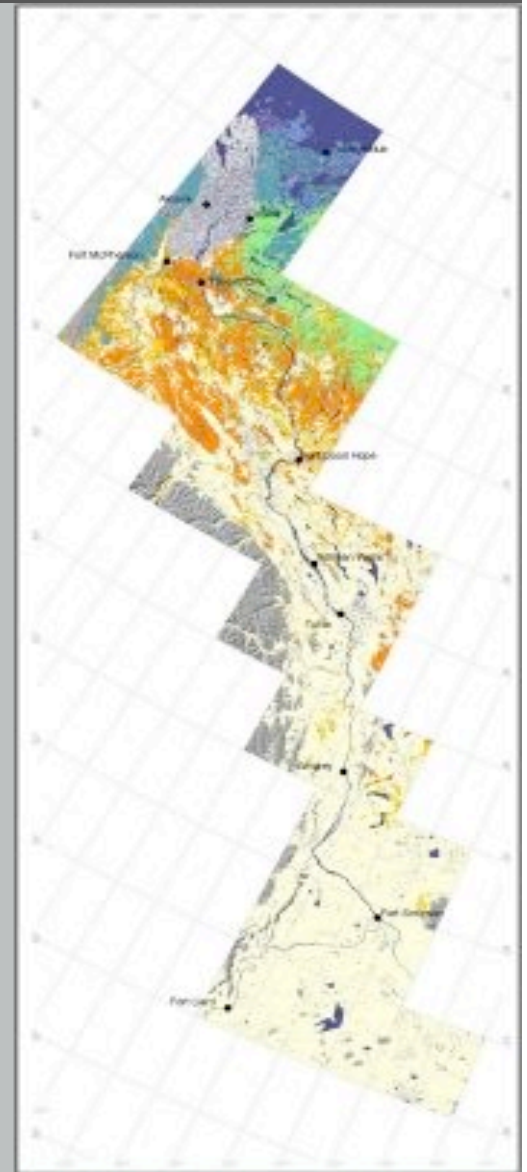
Potential changes to permafrost in the Mackenzie Valley



Baseline climate



2°C warming



4°C warming

Increased Frequency of Catastrophic Events



**Washout at Bluefish
Creek - Hwy 3, 2002**



**Mackenzie River Flood, Hay
River Airport- May, 2003**

DOT Impacts – Air

- Infrastructure
 - Permafrost degradation
 - Increase in freeze/thaw events
 - Increase in de-icing agent use
- Wind change



DOT Impacts – Water

- Water levels
 - Community re-supply
 - Hay River route

- Ice
 - Northwest Passage
 - Sea-Ice
 - Inuvik to Tuktoyaktuk
 - Aklavik winter road

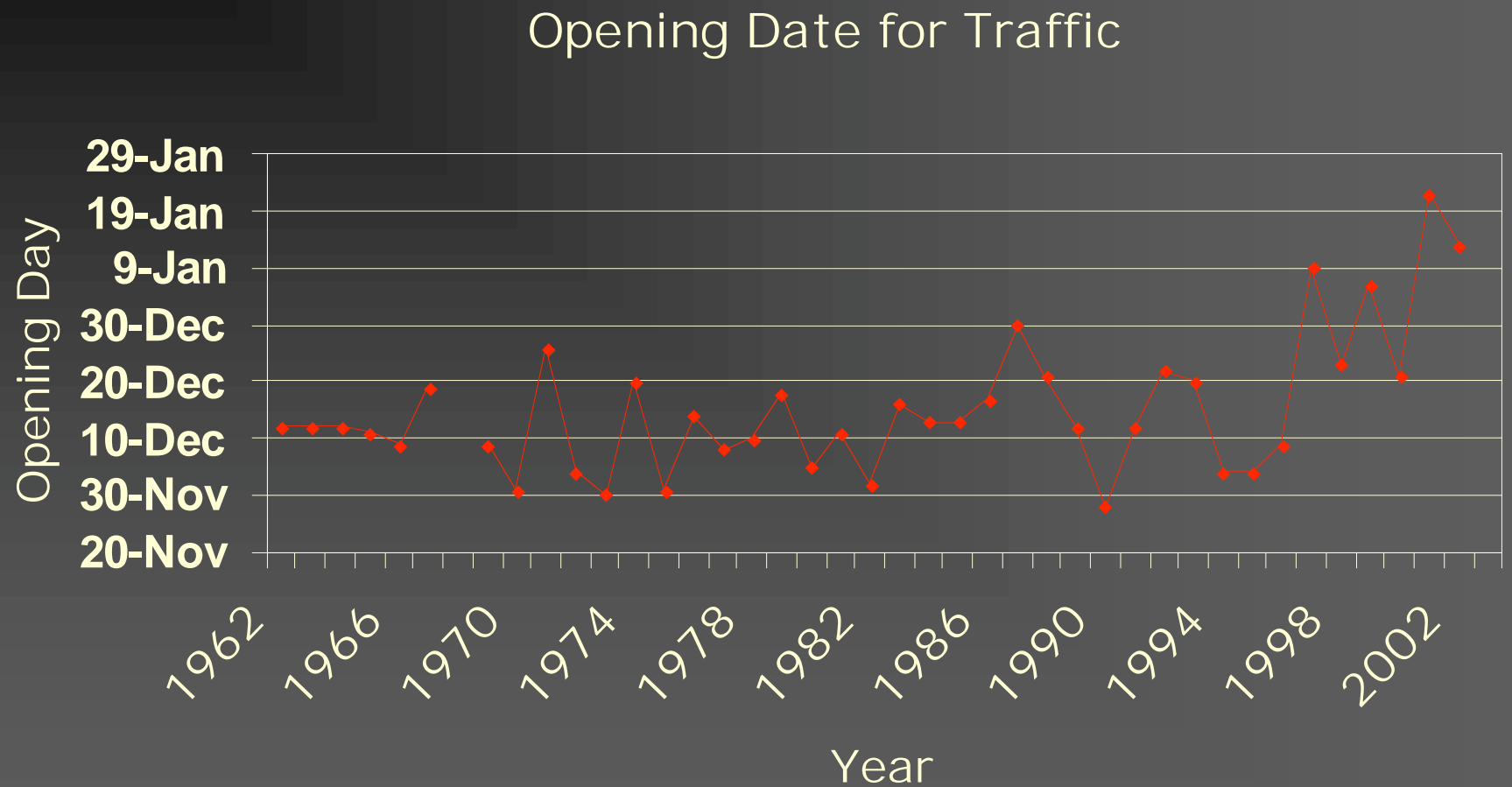


DOT Impacts – Road

- Permafrost degradation
- Freeze-thaw events
- Winter roads
- Ice bridges



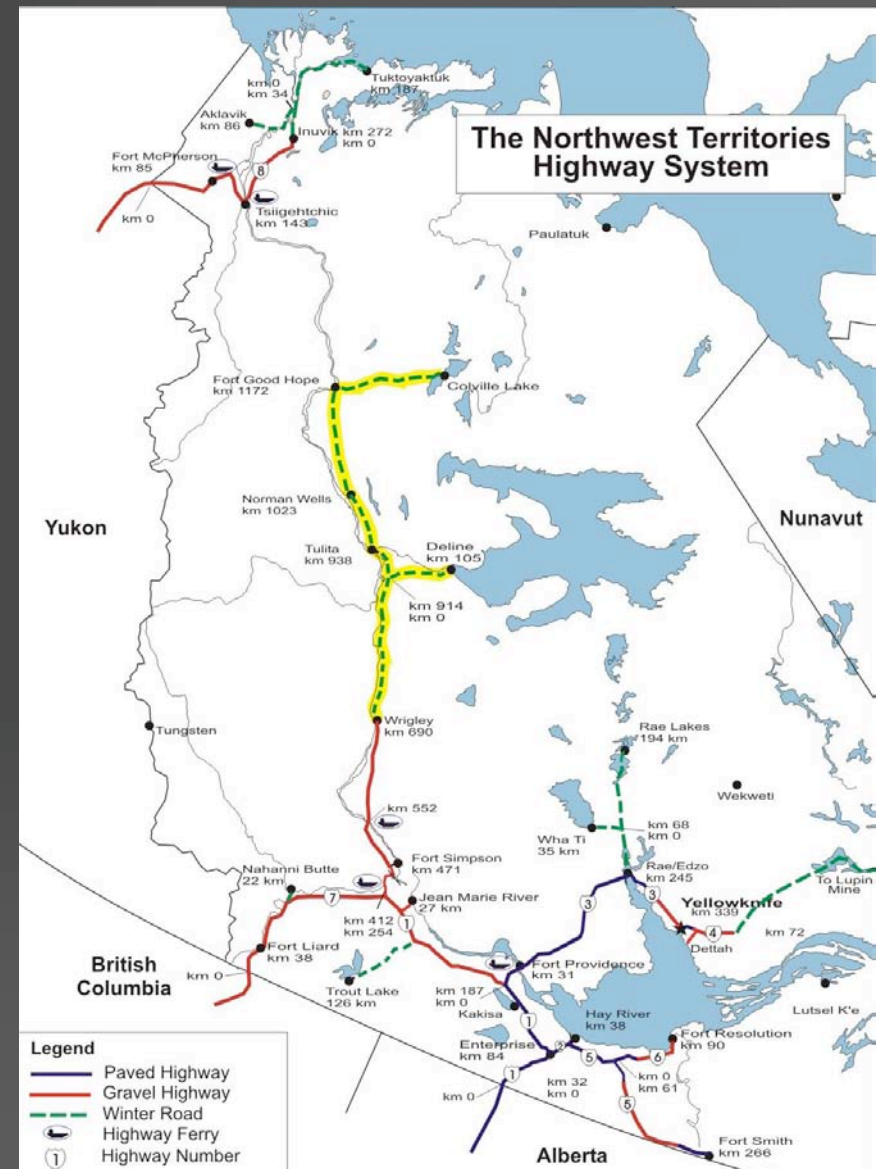
Ice Bridge Opening Delays



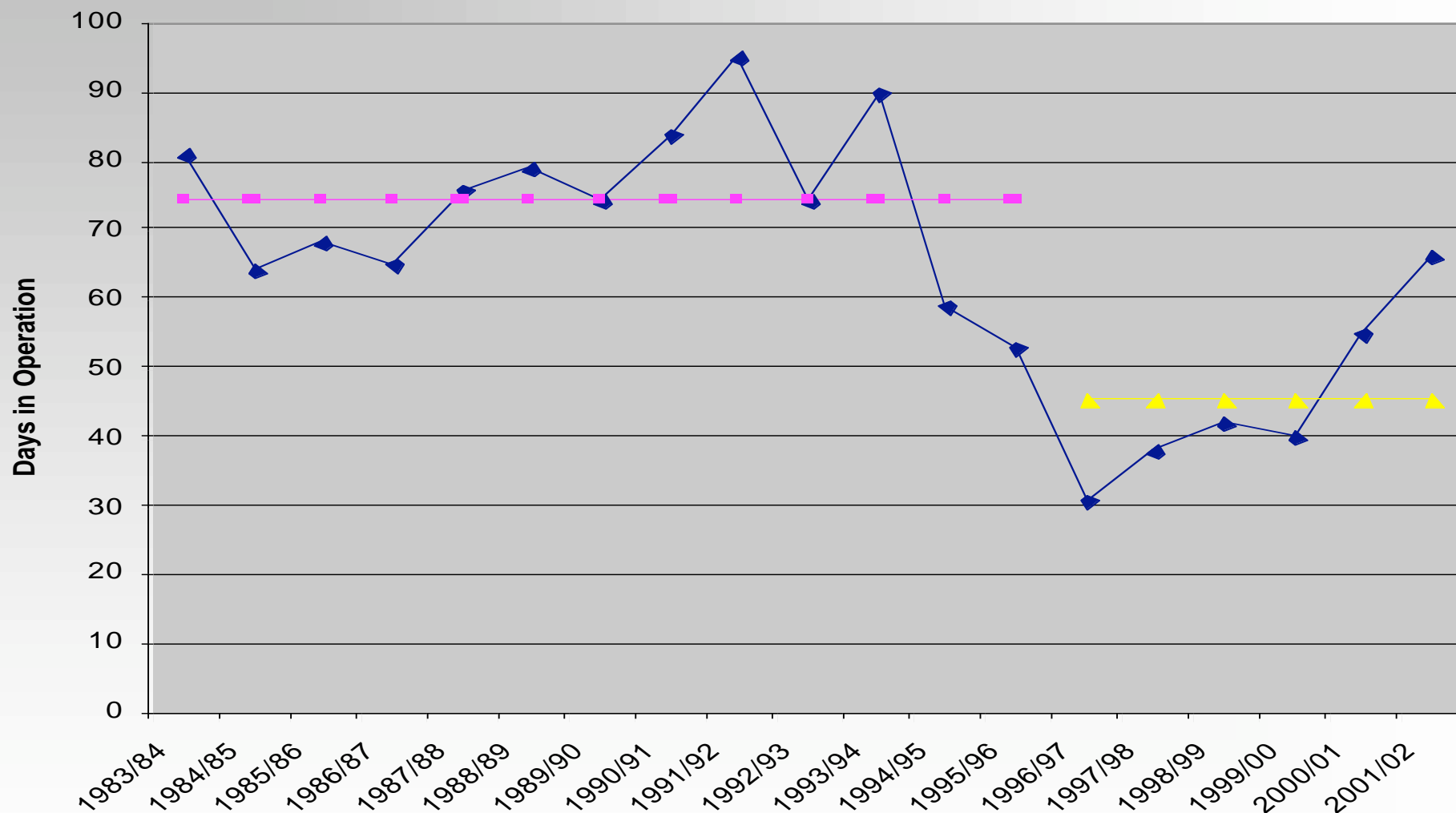
Mackenzie River Ice Crossing

Mackenzie Valley Winter Road

- Length of season
- Communities
 - Travel & well-being
 - Re-supply
- Oil & Gas
 - Infusion of \$\$'s into local economies
 - Level of service



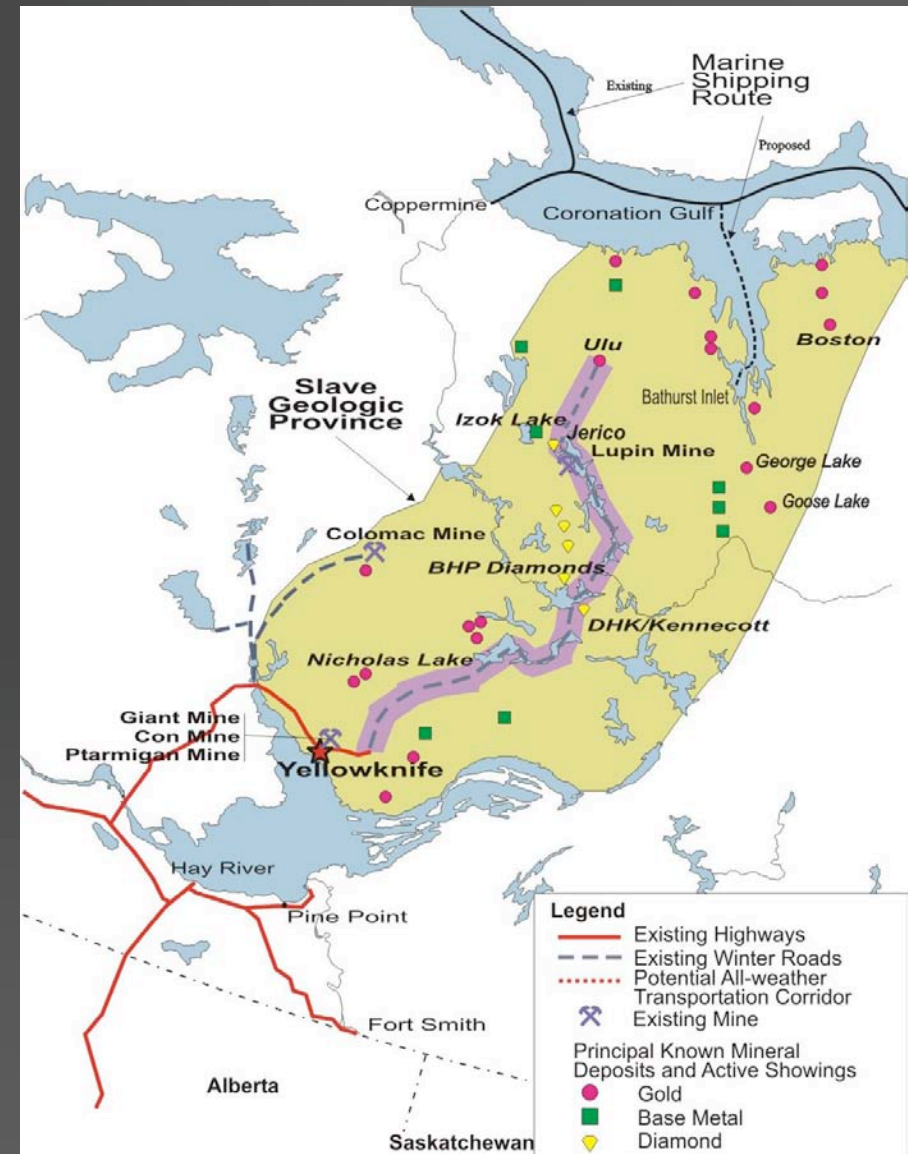
Reduced Winter Road Operating Season



Mackenzie Valley Winter Road

Lupin Winter Road

- Diamonds
- Private consortium
- Climate Impacts
 - Construction
 - Length of season
 - Threshold traffic levels
- Impacts the rest of the system



DOT Response

- Winter Road Bridges
- Technology
 - Ice-spray
 - Adaptive building techniques
- Deh Cho Bridge
- Anti-idling Campaign
- Impacts and Adaptation Study



Climate Change Adaptation and Transportation in the NWT

Partnership among:

Natural Resources Canada, Transport Canada, Environment Canada, & GNWT (DOT)

Co-Coordinators: GNWT/DOT: Shane LeBouthillier and Jayleen Robertson

NRCan/GSC Hazards and Environmental Geology: Fred Wright

Environment Canada MSC Atmospheric and Hydrologic Sciences: Bob Kochtubajda

Transport Canada Prairie and Northern Region: Darryl Pederson

Project Goals

- Identify and characterize possible impacts of climate change on transportation infrastructure to date;
 - Develop models and protocols for predicting and assessing potential future impacts;
 - Investigate critical thresholds for infrastructure instability;
 - Analyze the cost impacts, and;
 - Synthesize the best practices for climate change impact adaptation
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Project Challenges

- Data
 - Data history
 - Low confidence level and not collected in a systematic way
 - Large data gaps
 - Data scarcity
 - Separation and identification of climatic impacts
 - Balancing the range of predictions to make meaningful recommendations
 - Legacy
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Project Opportunities & Successes

- GIS and data warehousing
 - Share results and experiences with other professionals in the field
 - Delivery of Service
 - Further studies
 - Raising awareness and profile of transportation and climate change
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Conclusions

- Improve our understanding of the physical, economic, and social implications of Climate Change in the NWT
 - Demonstrate the complex issues faced by DOT
 - The Impacts and Adaptation Study will produce a decision making framework from which DOT can deal with climate change implications
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