

# Dominion Diamond Corporation

Jay Project Developer's  
Assessment Report –  
Caribou Energy Model  
Meeting



# Assessment Approach

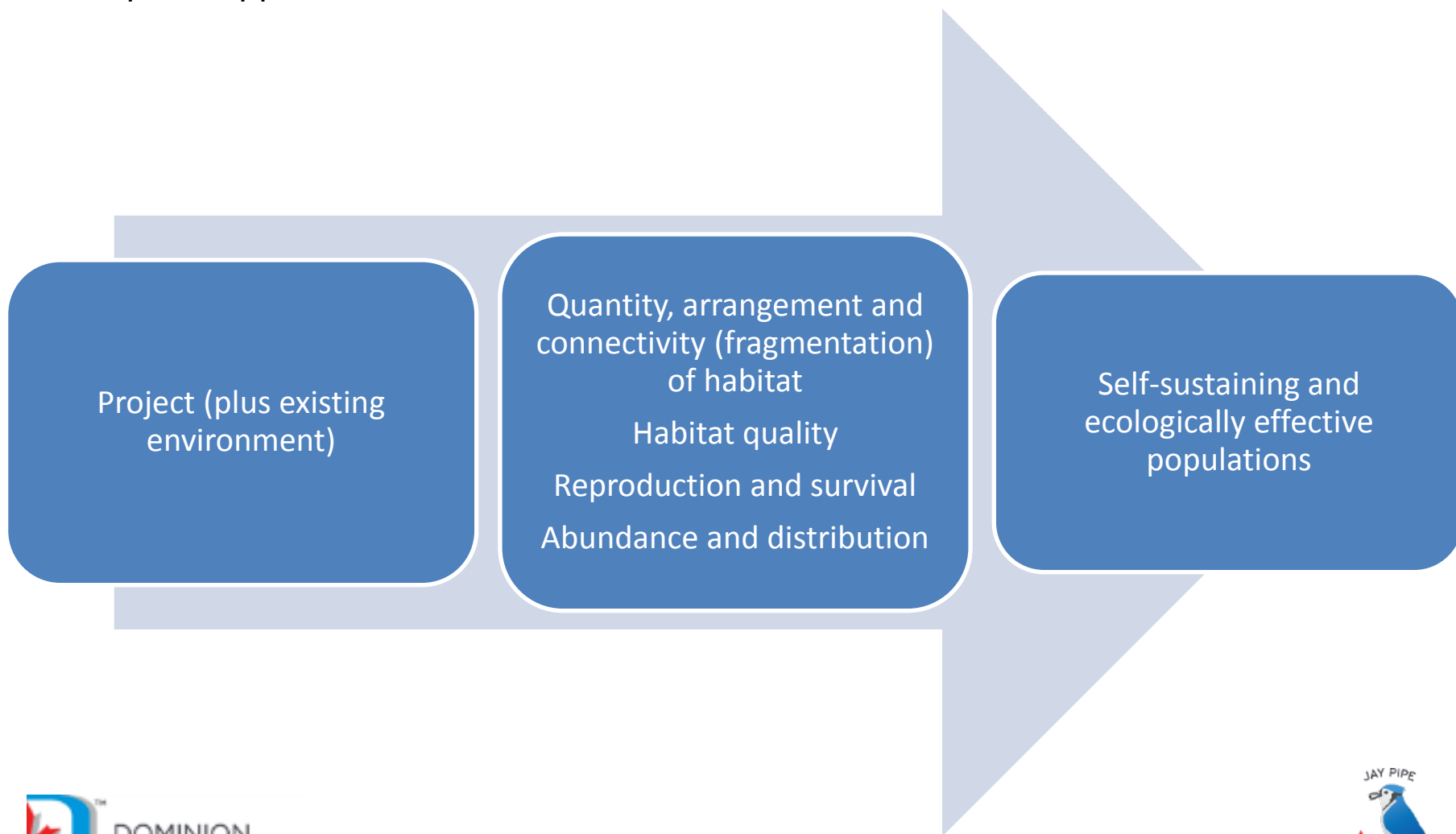
## Terrestrial Valued Components, Assessment Endpoints and Measurement Indicators

- The TOR identified Barren-ground caribou and wildlife VCs that were included in the assessment of effects on the terrestrial environment

Valued Component	Assessment Endpoint	Measurement Indicator
Barren-ground Caribou	<ul style="list-style-type: none"><li>• self-sustaining and ecologically effective populations</li></ul>	<ul style="list-style-type: none"><li>• habitat quantity</li><li>• habitat arrangement and connectivity (fragmentation)</li><li>• habitat quality (occupancy, movement and behaviour)</li><li>• survival and reproduction</li><li>• abundance and distribution</li></ul>

# Assessment Approach

## Conceptual Approach to the Assessment



# Assessment Approach

## Assessment Cases

Base Case		Application Case	Reasonably Foreseeable Development Case
Reference Condition	2014 Baseline Condition		
No or little human development	Conditions from all previous, existing, and planned approved developments before the Project	Base Case plus the Project	Application Case plus reasonably foreseeable developments.

# Assessment Approach

## Previous, Existing, and Reasonably Foreseeable Developments

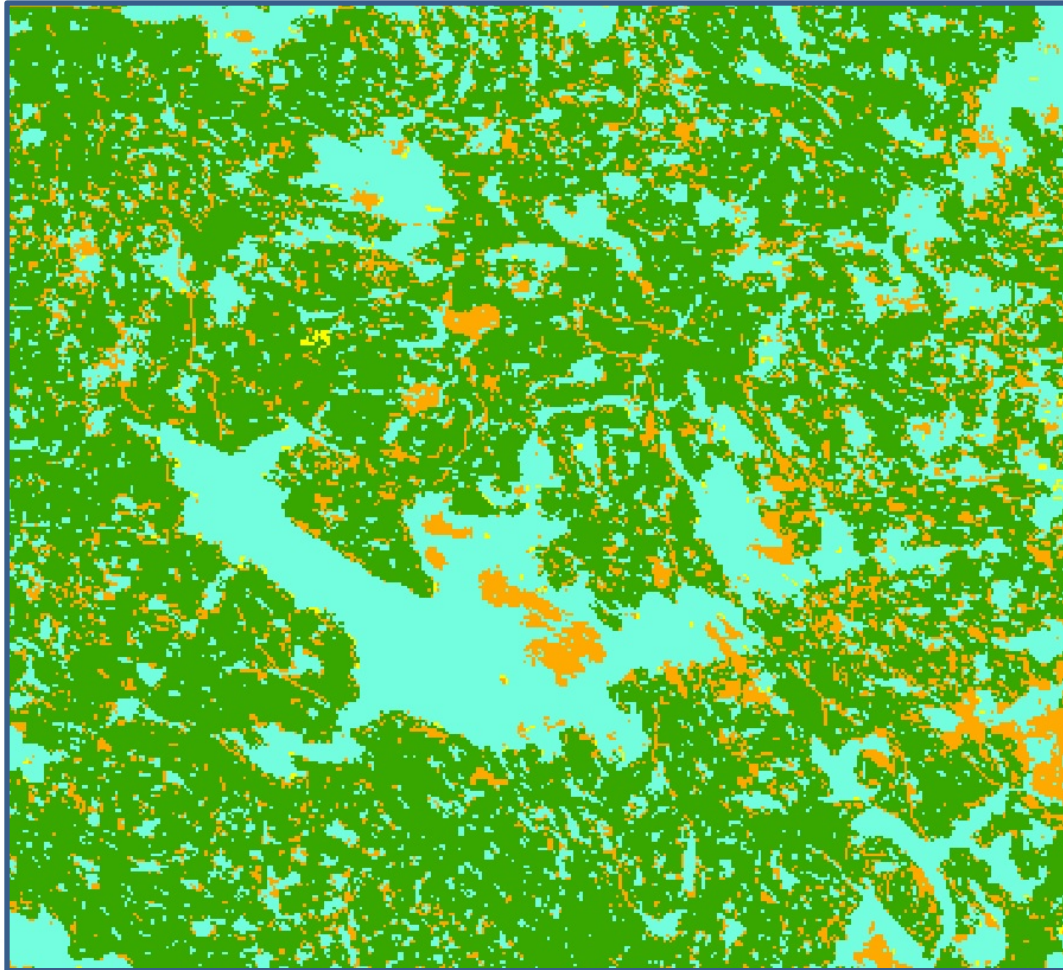
- Point features were buffered with a circular footprint
- Linear features were buffered with a corridor
- Winter roads were buffered - only the portages crossing terrestrial areas were used during non-winter months

Disturbance Type	Feature Type	Footprint Extent (m)
Mine	Polygon	Actual
Mineral Exploration	Point	500
Tourism (e.g., lodges)	Point	200
Transmission Line	Line	200
All-Season Road	Line	200
Winter Road	Line	200



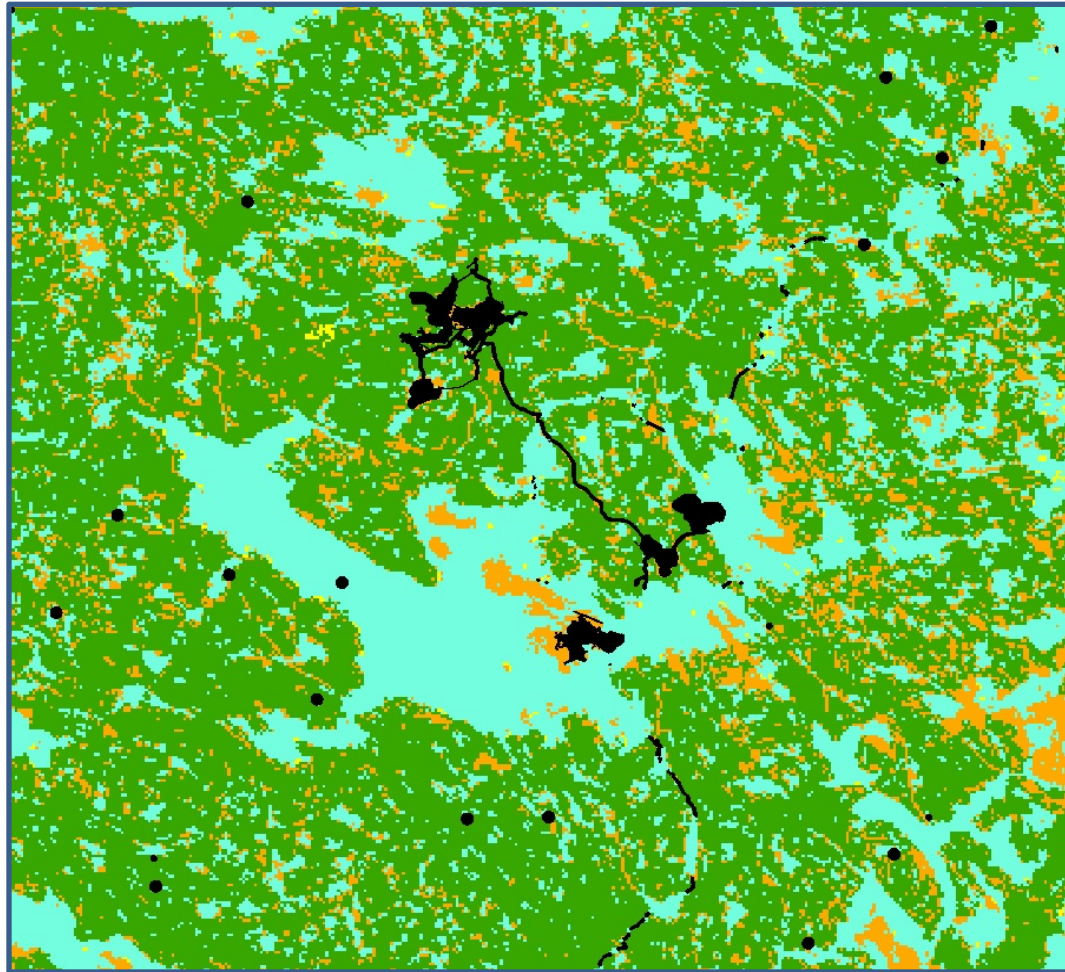
# Subject of Note: Wildlife and Wildlife Habitat – Assessment Methods

Example: Reference landscape



# Subject of Note: Wildlife and Wildlife Habitat – Assessment Methods

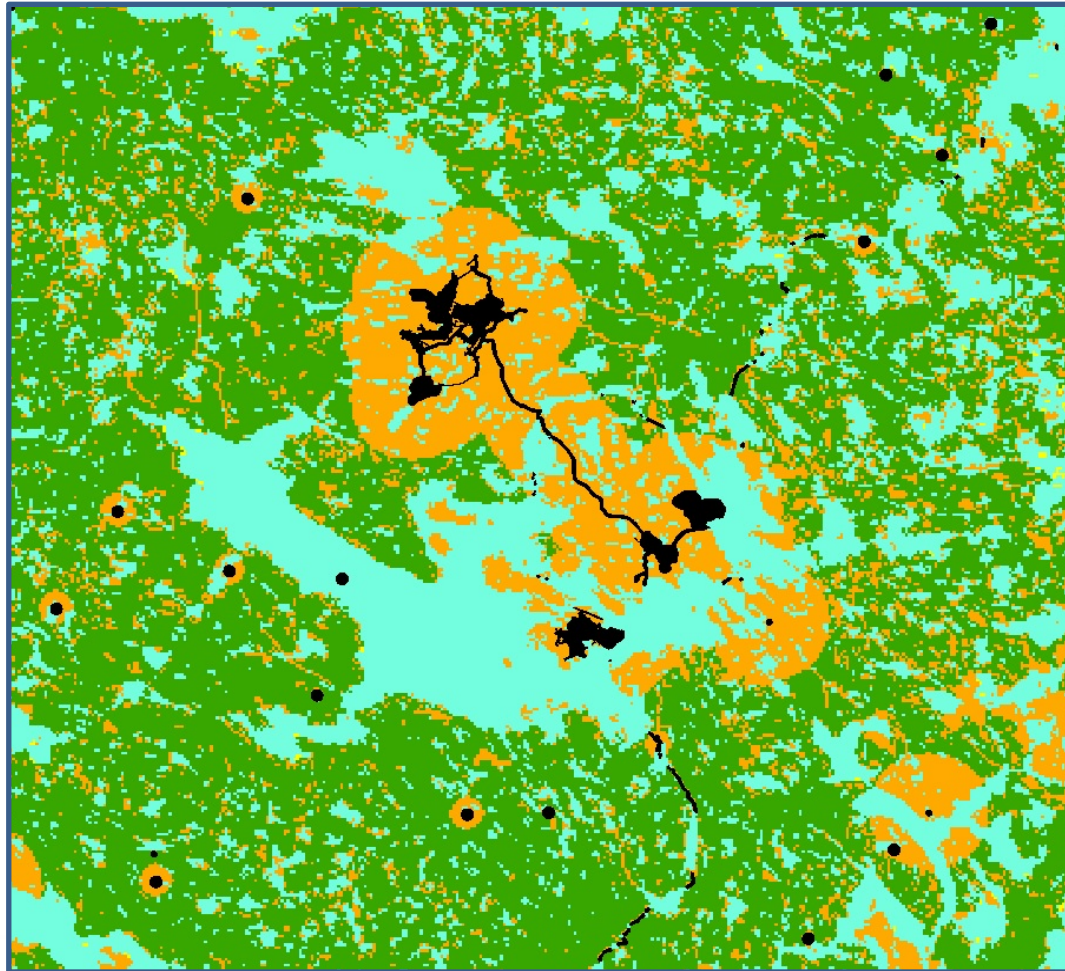
Example: Direct changes to habitat





# Subject of Note: Wildlife and Wildlife Habitat – Assessment Methods

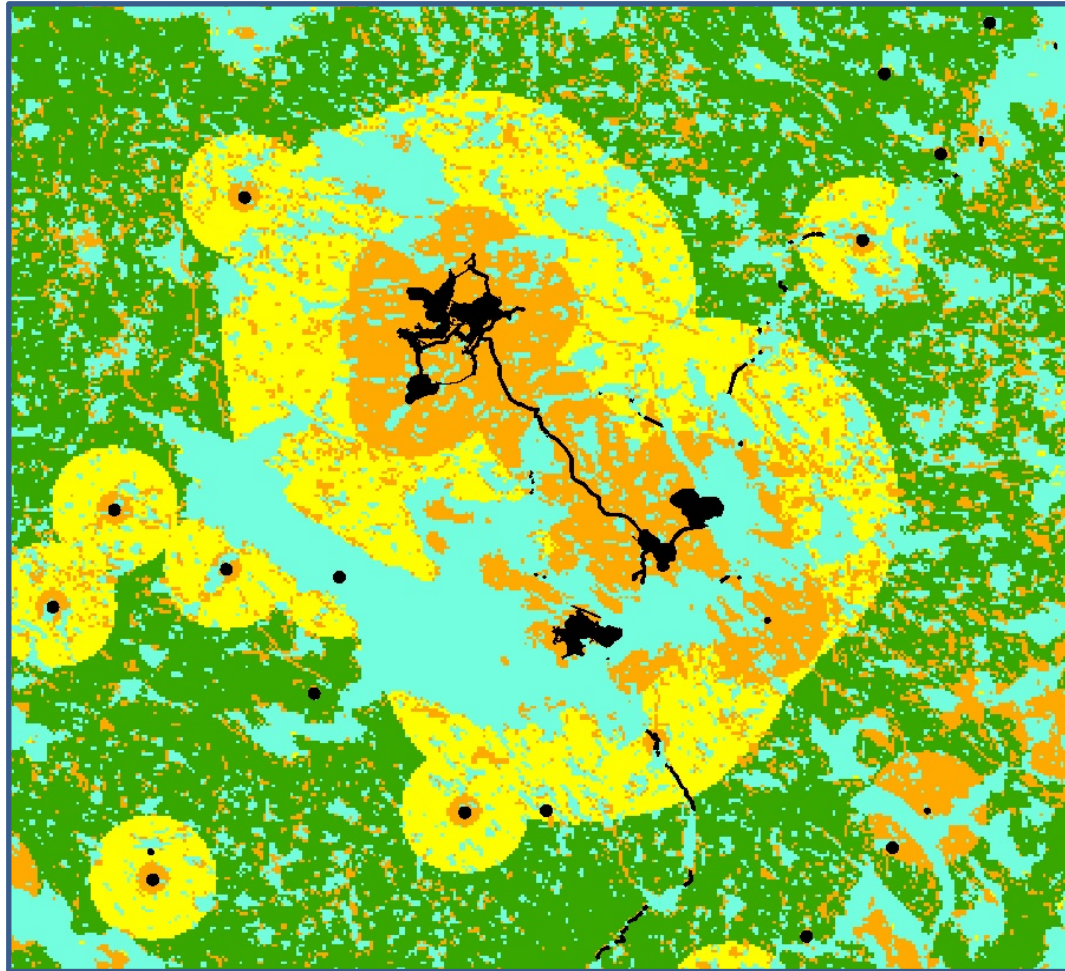
Example: 5 km Zone of Influence





# Subject of Note: Wildlife and Wildlife Habitat – Assessment Methods

Example: 15 km Zone of Influence





## Key Line of Inquiry: Barren-Ground Caribou

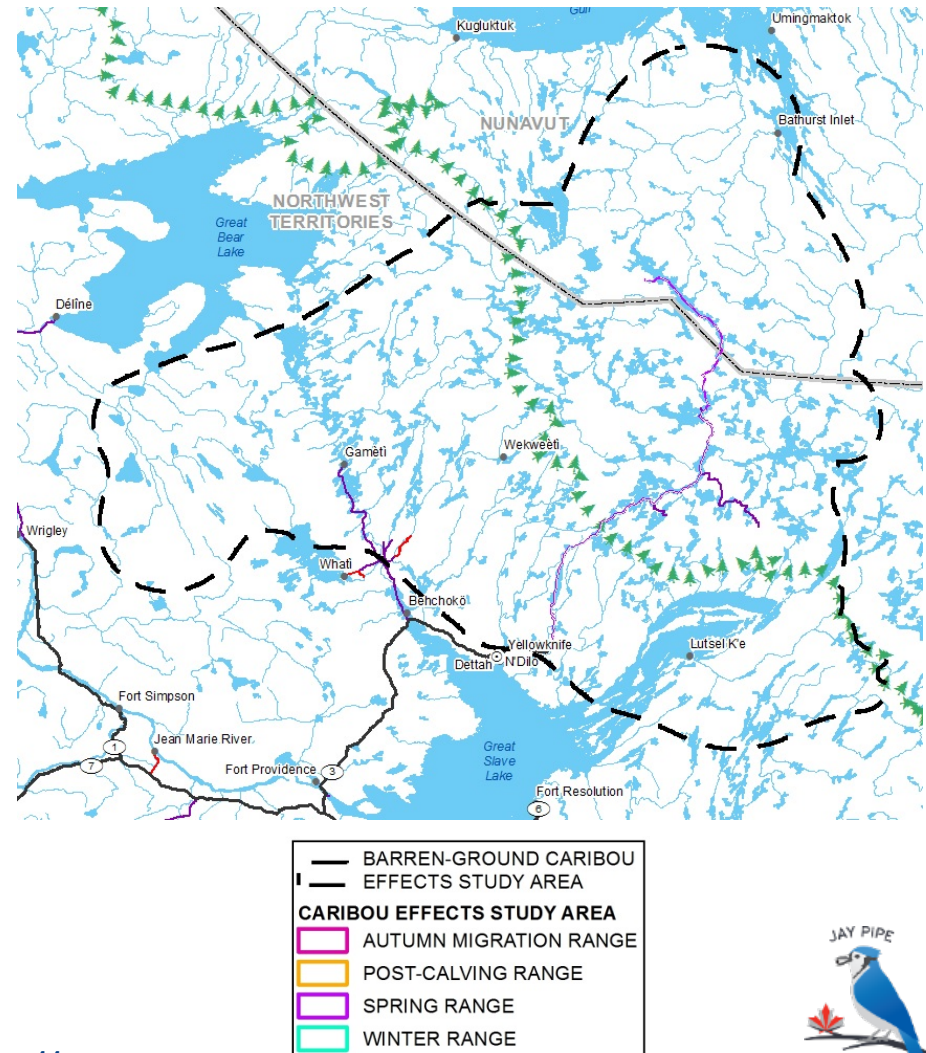




# Key Line of Inquiry: Barren-Ground Caribou – Effects Study Area

## Effects Study Area – Barren-Ground Caribou

- The ESA for caribou includes the 4 seasonal ranges (spring, post-calving, autumn, and winter) of the Bathurst caribou herd
- Ranges delineated from radio-collar and GPS collar data collected from April 1996 to October 2013
- Total area is 305,780 km<sup>2</sup>

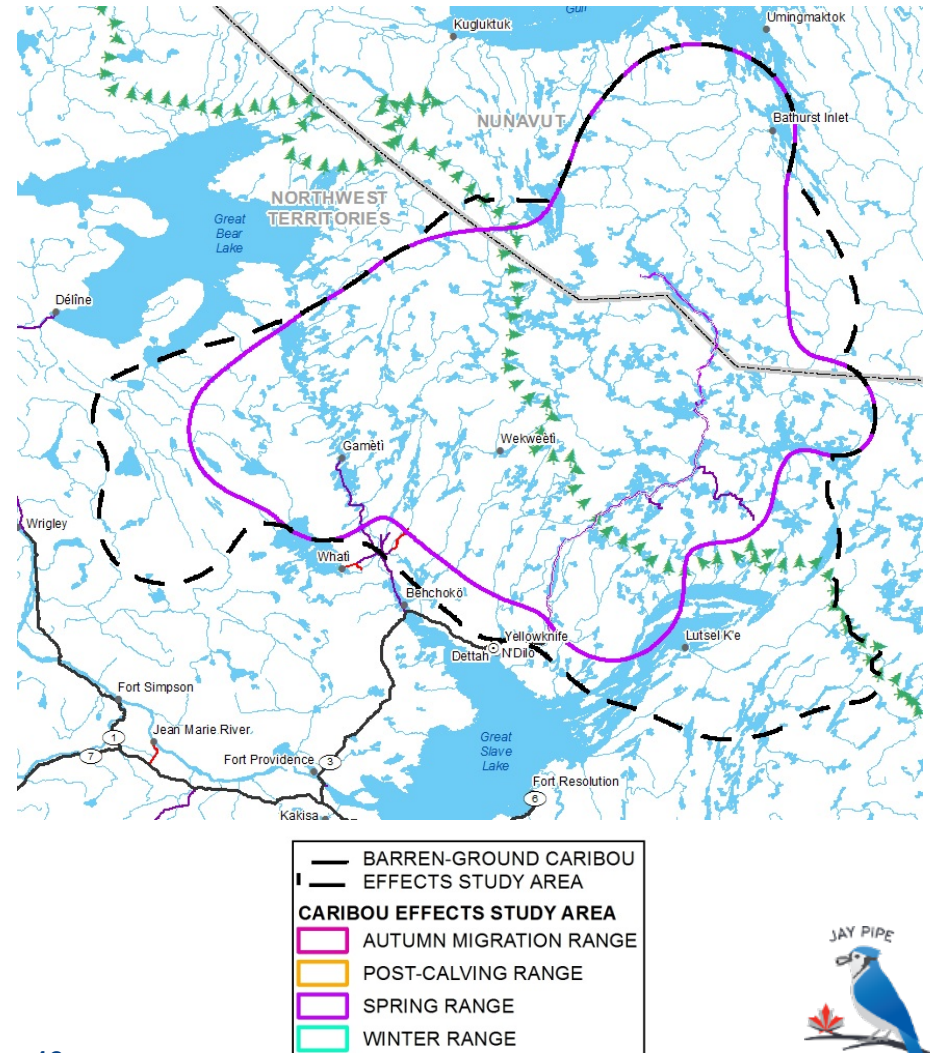




# Key Line of Inquiry: Barren-Ground Caribou – Effects Study Area

## Effects Study Area – Barren-Ground Caribou

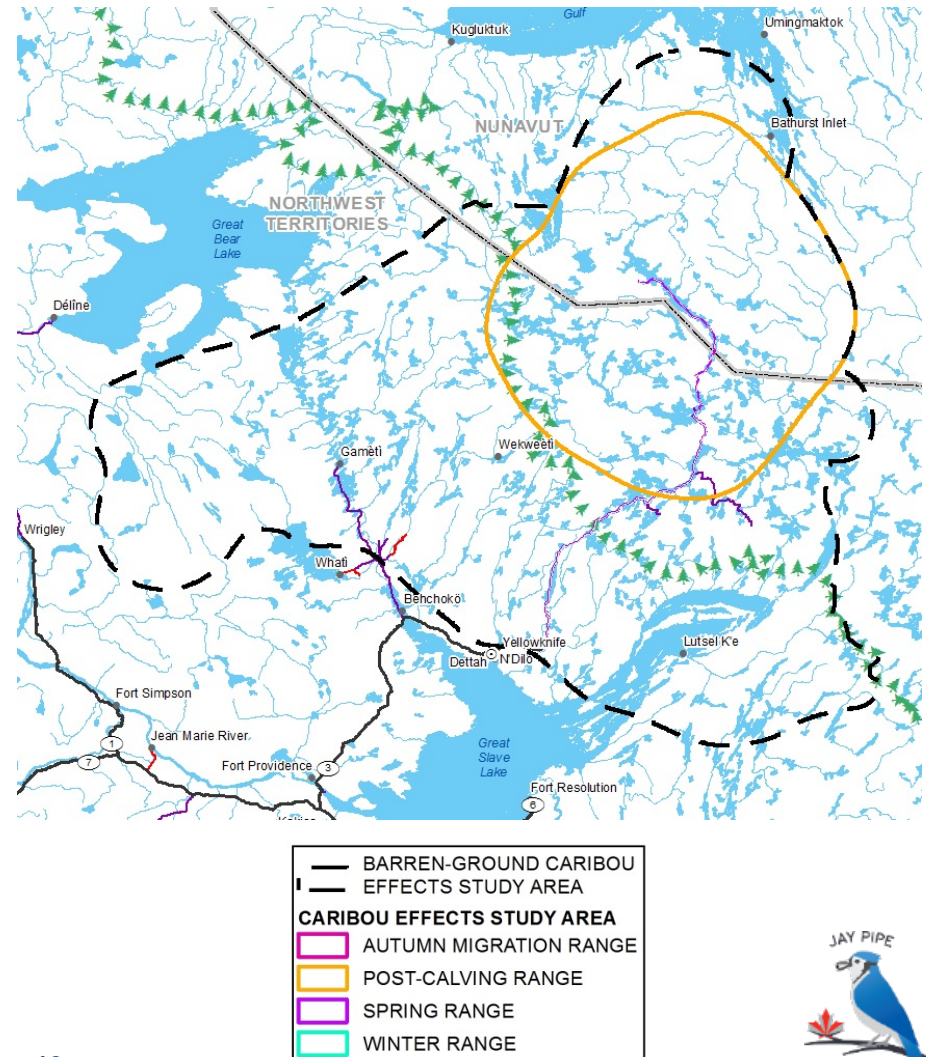
- Spring Range includes calving period and calving grounds



# Key Line of Inquiry: Barren-Ground Caribou – Effects Study Area

## Effects Study Area – Barren-Ground Caribou

- Post-calving Range

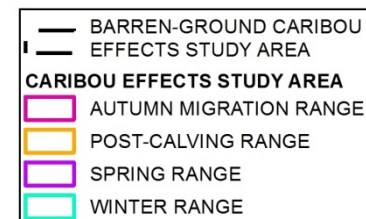
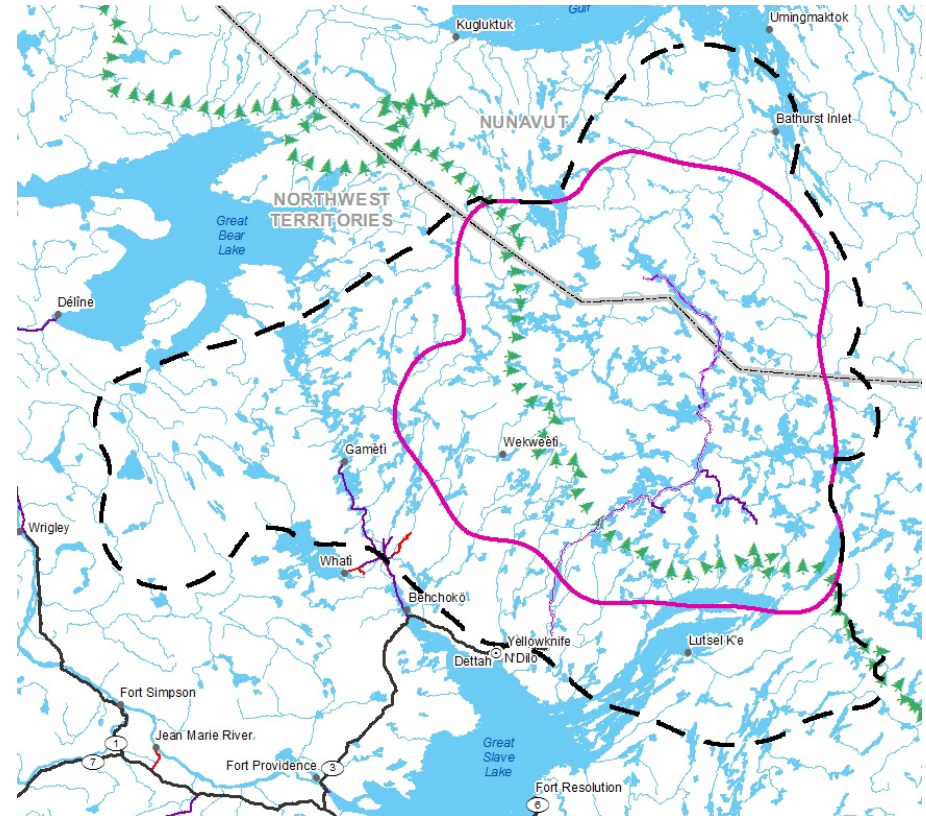




# Key Line of Inquiry: Barren-Ground Caribou – Effects Study Area

## Effects Study Area – Barren-Ground Caribou

- Autumn Range

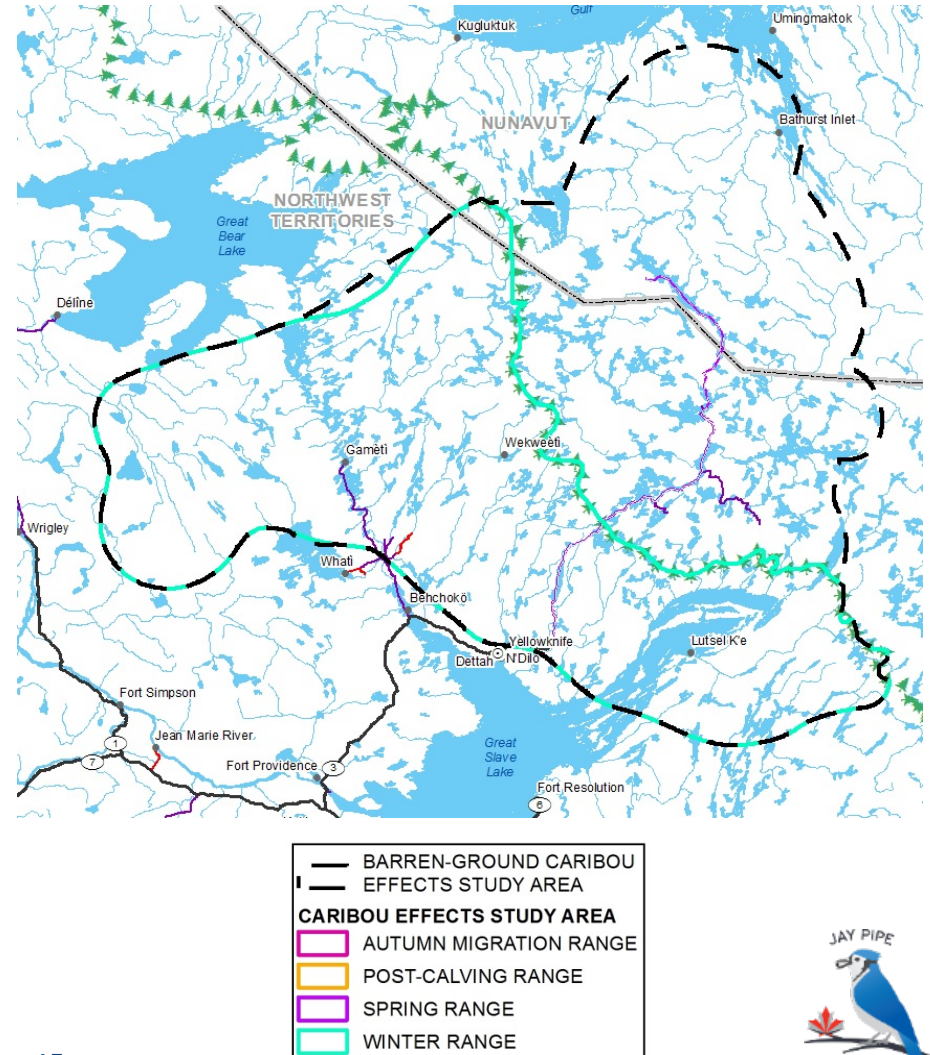




# Key Line of Inquiry: Barren-Ground Caribou – Effects Study Area

## Effects Study Area – Barren-Ground Caribou

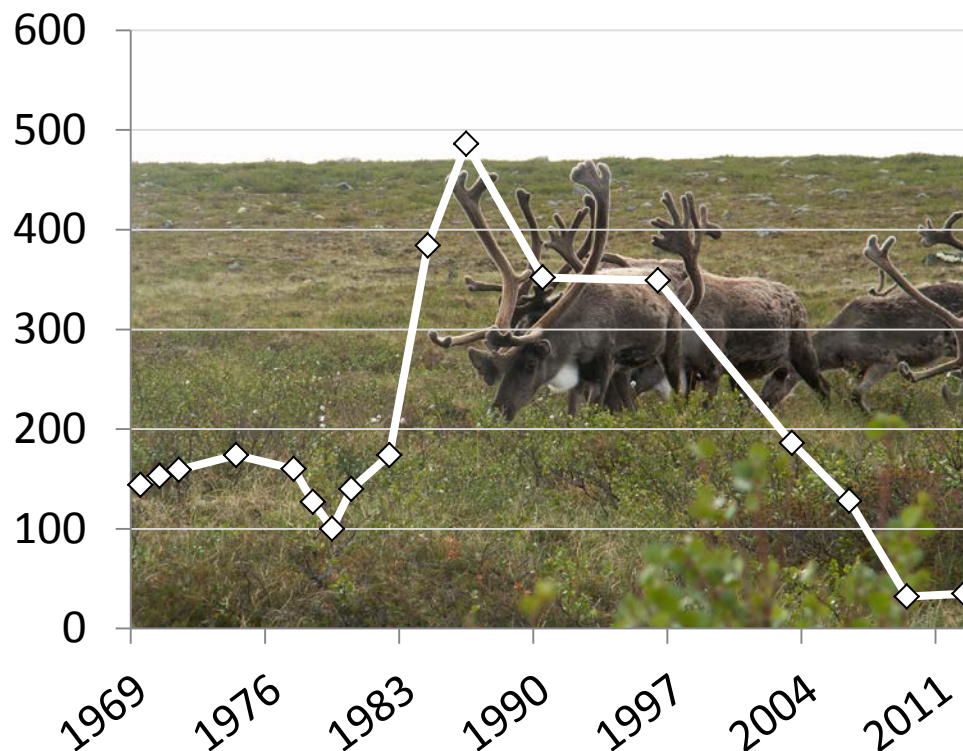
- Winter Range restricted to below treeline
- Winter RSF developed from EOSD data



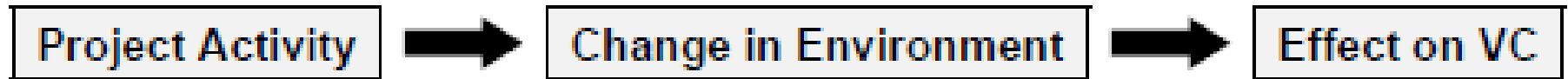
# Key Line of Inquiry: Barren-Ground Caribou – Overview of Existing Environment

- Bathurst herd population cycles
- TK indicates:
  - Lows in 1920s, 1950s to 1970s
  - Highs in 1940s and 1990s
- Bathurst herd is presently at a low point in its cycle

Population Estimates from Aerial Surveys (x 1,000)



# Key Line of Inquiry: Barren-Ground Caribou – Assessment Methods

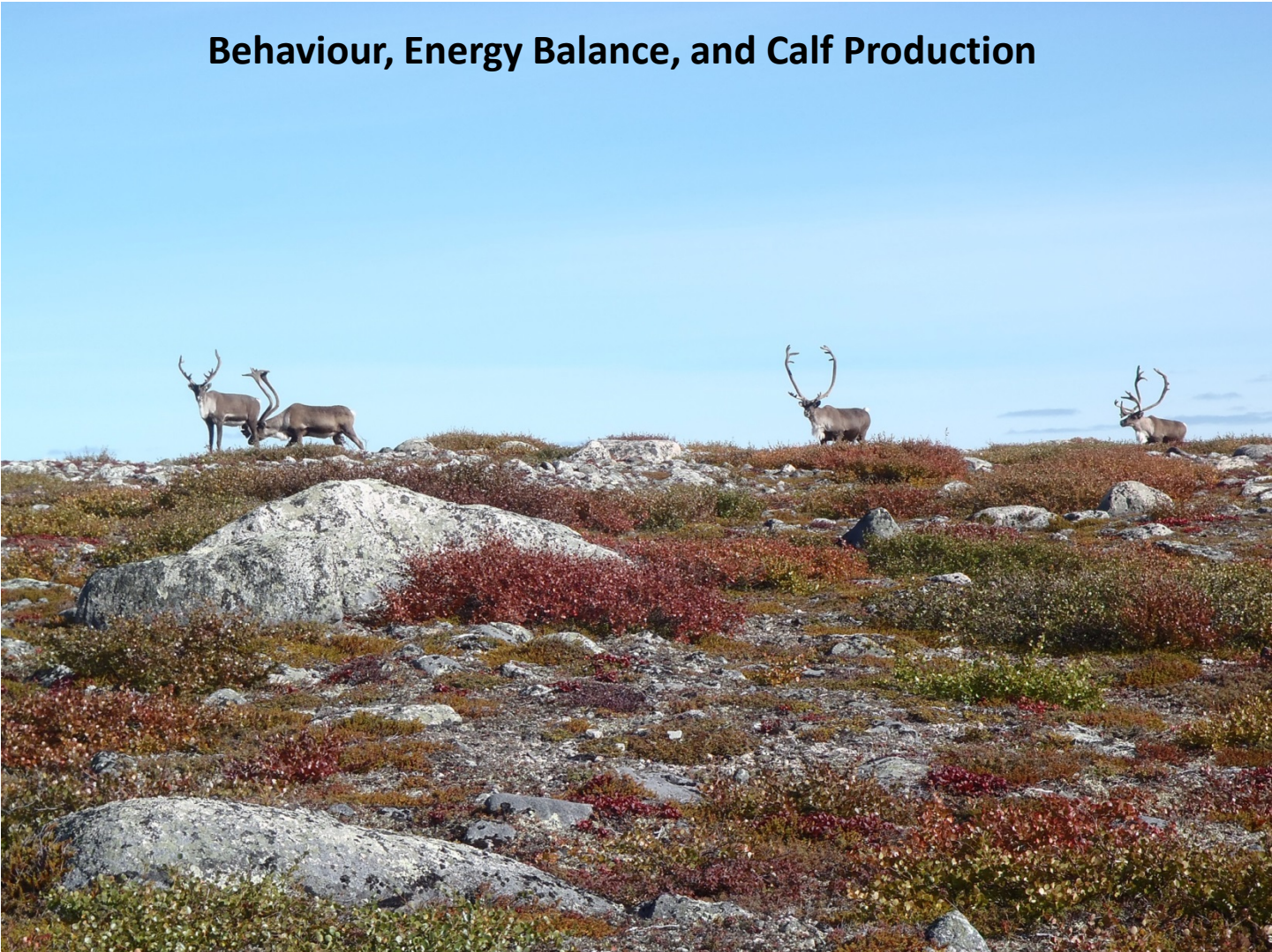


- 17 potential pathways were assessed to examine the linkages between Jay Project components and the effects on barren-ground caribou, and 14 were classified as either no linkage or secondary pathways
- 3 primary pathways were identified:
  - Direct loss and fragmentation of habitat from the Project footprint causes changes in caribou abundance and distribution
  - Sensory disturbance (lights, smells, noise, dust, viewscape) and barriers to movement causes changes to caribou distribution and behaviour, and changes to energetics and reproduction
  - Increased traffic on the Misery Road and Jay Road and the above-ground power line along these roads may create barriers to caribou movement, change migration routes, and reduce population connectivity



# Key Line of Inquiry: Barren-Ground Caribou

## Behaviour, Energy Balance, and Calf Production

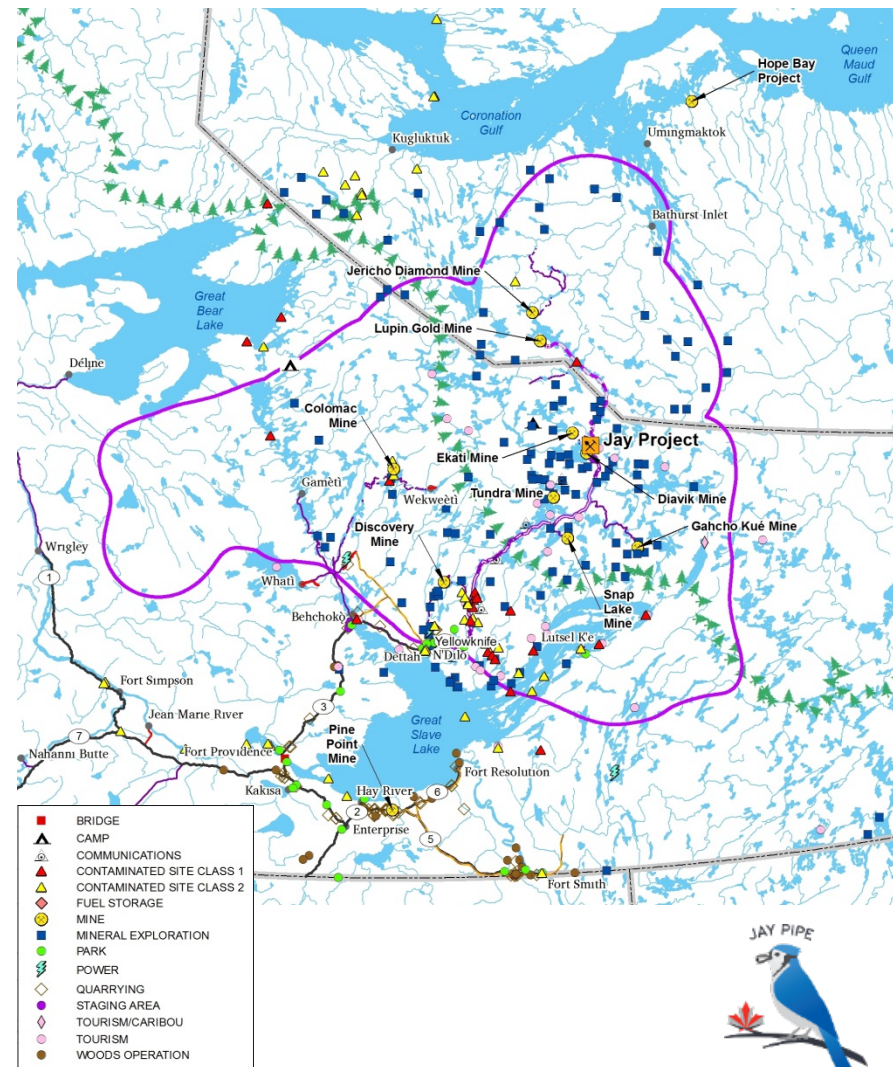




# Key Line of Inquiry: Barren-Ground Caribou – Assessment Methods

## Barren-Ground Caribou – Development Disturbance

- Development Database used to identify developments associated with each assessment case
- Actual development footprints applied for previous, existing, and future developments
- Jay Project infrastructure buffered by 250 m, access roads and adjacent pipeline and power line buffered to yield a 250 m right-of-way
- Applied ZOIs on active developments (e.g., 15 km ZOI around active mines)



# Key Line of Inquiry: Barren-Ground Caribou – Assessment - Methods

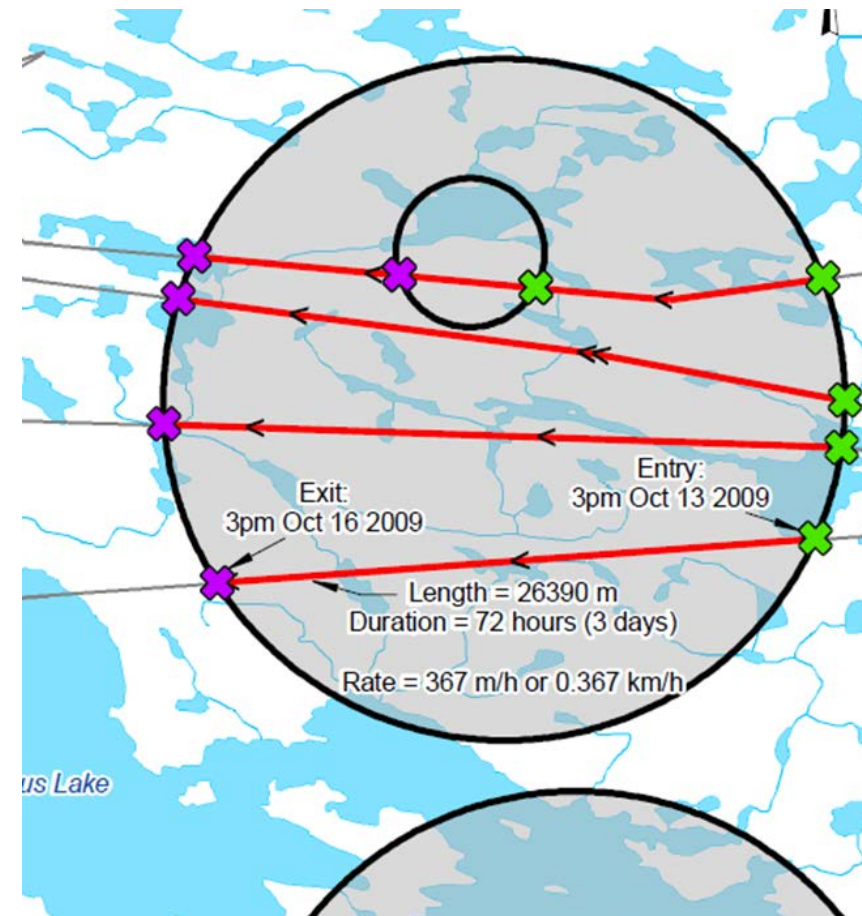
## Zone of Influence Residency and Encounters

### Approach:

- Identified caribou paths
  - Used GNWT caribou data
  - 138-day exposure period
- Identified encounters with ZOIs

### Calculated energy loss (Bradshaw et al. 1998; Weladji et al. 2003)

- About 0.08 kg cost / disturbance
  - Assumed deflection cost from Jay, Misery, and Sable roads
- About 0.19 kg cost / days of potential insect harassment

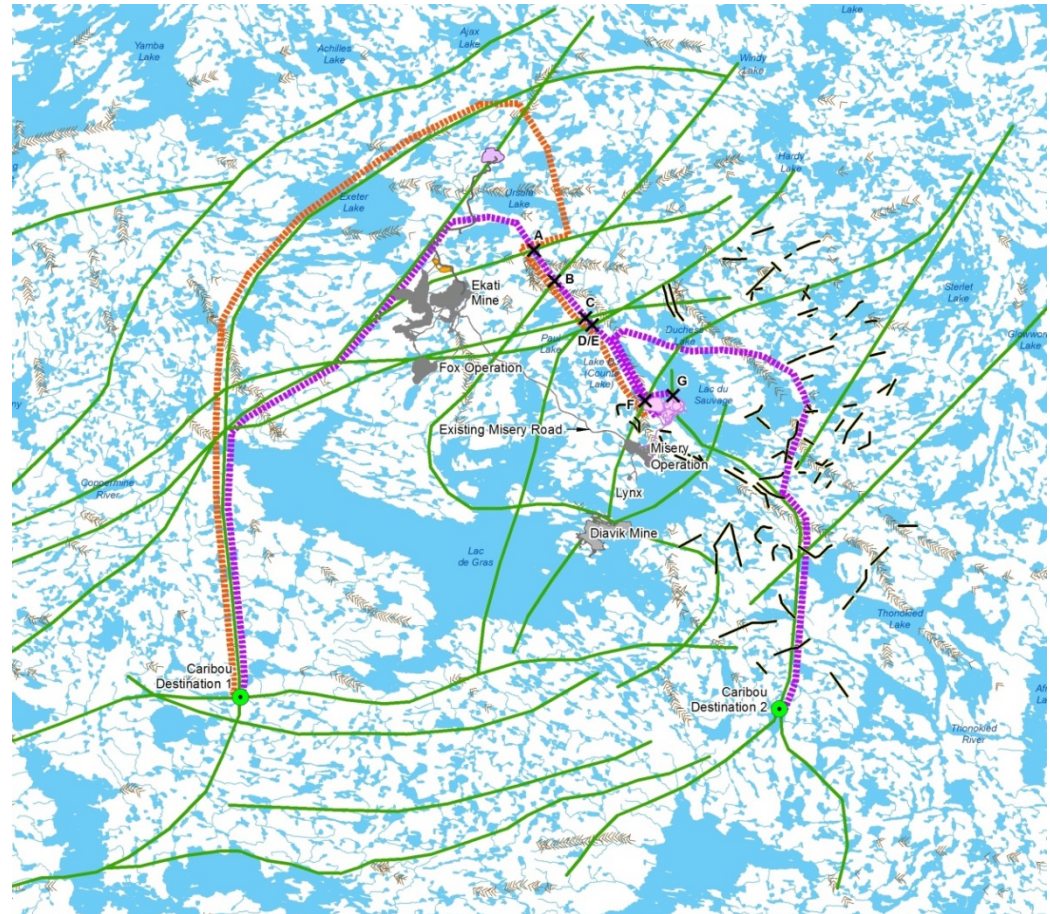




# Key Line of Inquiry: Barren-Ground Caribou – Assessment Results

## Barren-ground Caribou – Encounters and Energy Balance

- Maximum number of encounters with ZOI based on 1996 to 2013 collared caribou data = 19 per year
- Incorporated caribou migration routes from TK (green routes)
- Animals encountering roads assumed to go around and follow migration routes
- Body mass loss per encounter and deflection = 0.08 kg
- Body mass loss from insect harassment = 0.19 kg



# Key Line of Inquiry: Barren-Ground Caribou – Assessment Results

## Barren-ground Caribou – Encounters and Energy Balance

### Proportional Decrease in Parturition Rate

$$= \frac{((IHI - 15) \times 0.185 \text{ kg}) + (DE \times 0.55 \times 0.069 \text{ kg})}{20 \text{ kg}}$$

Where:

*IHI* is measured as oesterid harassment days;

0.185 kg is the *decline* in body mass per oesterid harassment day;

*DE* is number of disturbance events, defined as one zone of influence encounter (or one day within a ZOI);

0.55 is the frequency that caribou respond to a disturbance event;

0.069 kg is the decline in body mass loss per disturbance response; and,

20 kg is 20% of the autumn body mass (100 kg) of a healthy caribou cow.

# Key Line of Inquiry: Barren-Ground Caribou – Assessment Results

## Barren-ground Caribou – Mitigation Measures for Misery and Jay Roads

- Stockpiling of Ore
- Staged monitoring of Bathurst caribou herd to track migratory movements
  - Satellite radio-collars
  - Reconnaissance surveys near the road
  - Road surveys
- Plan and design hauling of ore
- Adaptive management of traffic to permit opportunities for caribou to move across the roads





# Key Line of Inquiry: Barren-Ground Caribou – Summary

The caribou ESA was based on the seasonal ranges of, and effects to, the Bathurst caribou herd as the Bathurst herd has a greater likelihood of being affected by the Project relative to the Ahiak and Beverly herds

- DAR used multiple approaches and best practices to provide confident and ecologically relevant impact predictions
- Caribou habitat remains intact so:
  - No fragmentation of populations
  - Traffic manipulation mitigation for Misery, Jay, and Sable roads
  - No strong mechanism causing a long-term or irreversible change in reproduction or survival rates

