

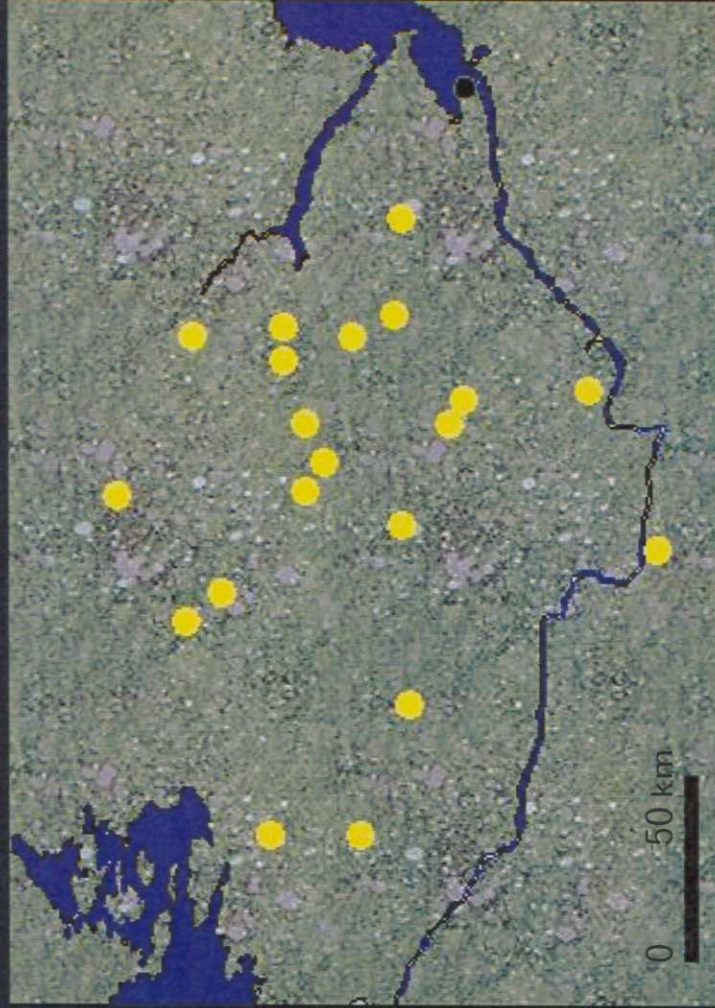


Caribou and the Keeyask Generation Project

James Schaefer
Trent University

Space

A key to understanding and conservation



Red Wine Mountains
herd

Calving locations
1984

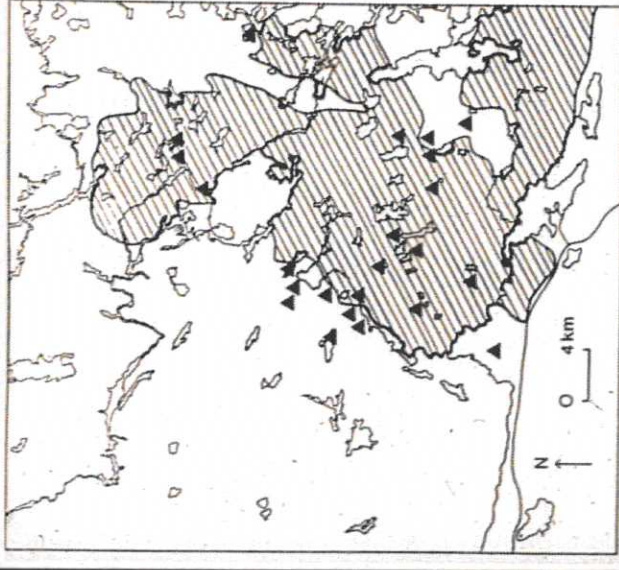
Brown (1986)

Time

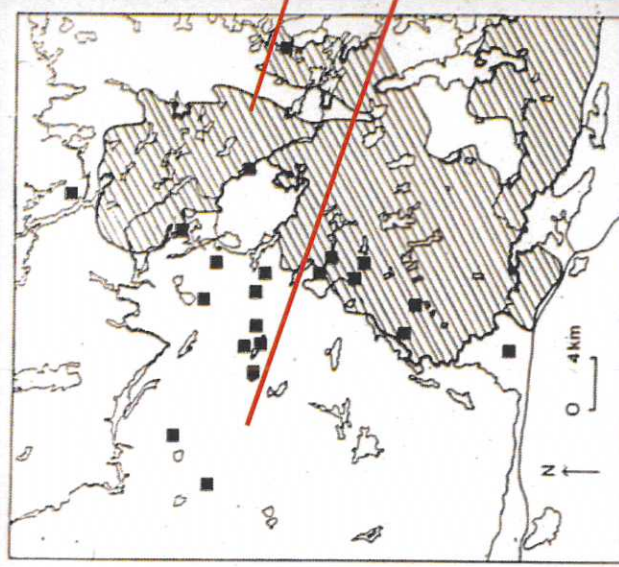
Dependence on old forests



4 years after fire



5 years after fire



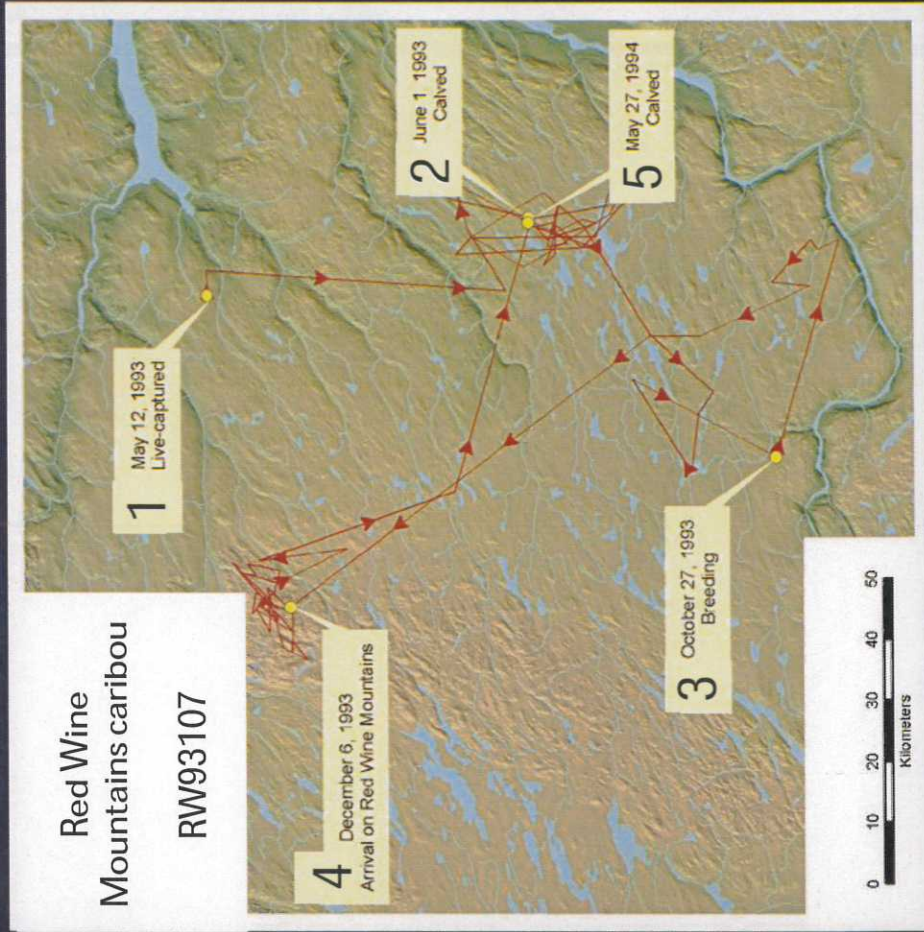
Schaefer & Pruitt (1991)

Site fidelity

Tendency to return to the same place

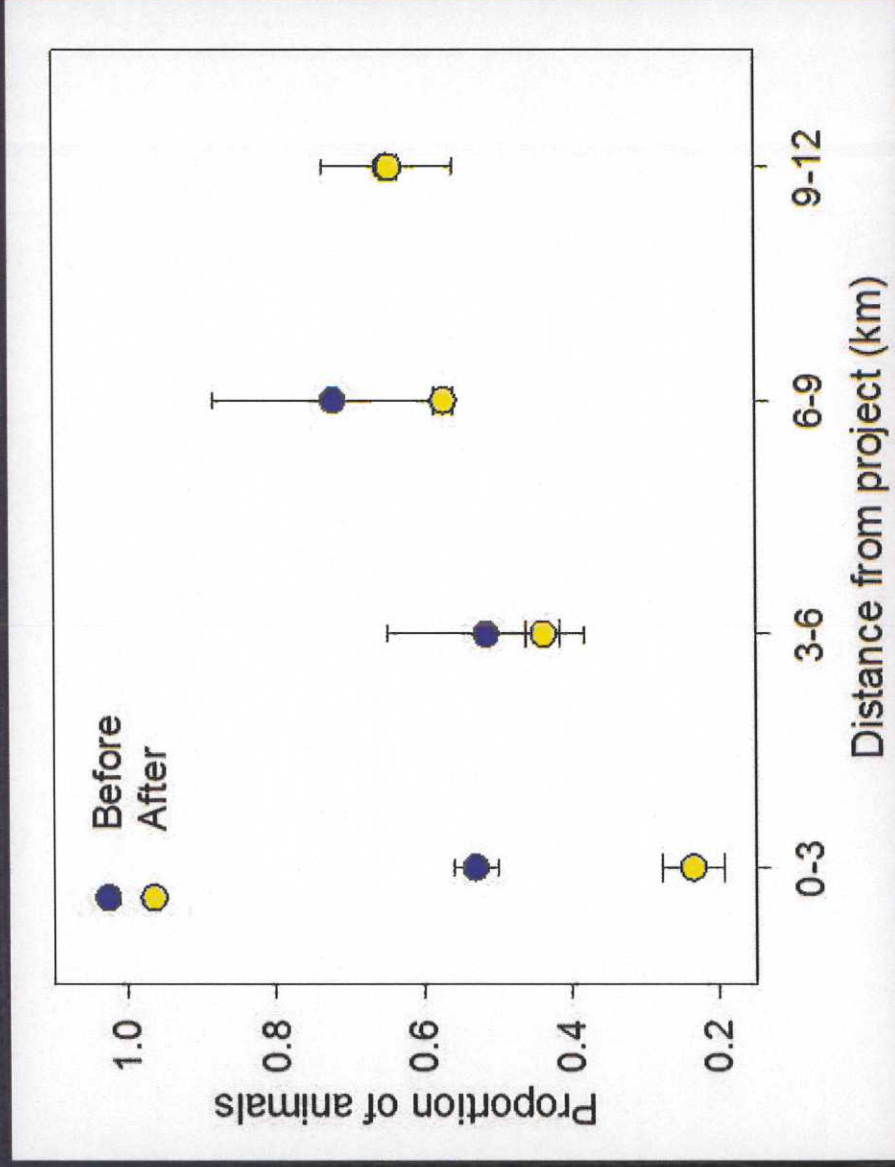


Red Wine
Mountains caribou
RW93107



Avoidance of industrial disturbances

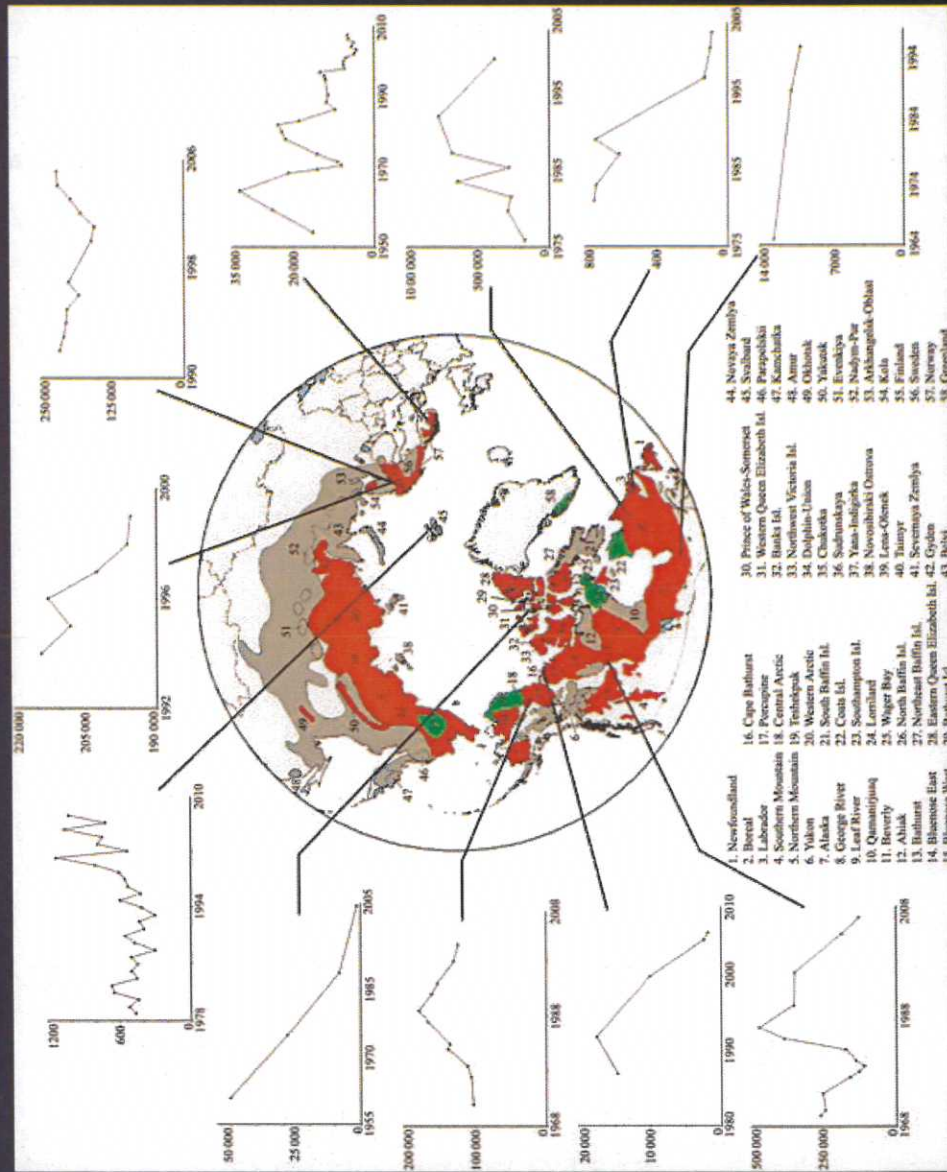
Star Lake hydroelectric development



Mahoney & Schaefer (2002)

Global trends

80% of caribou populations are declining



Vors & Boyce (2009)

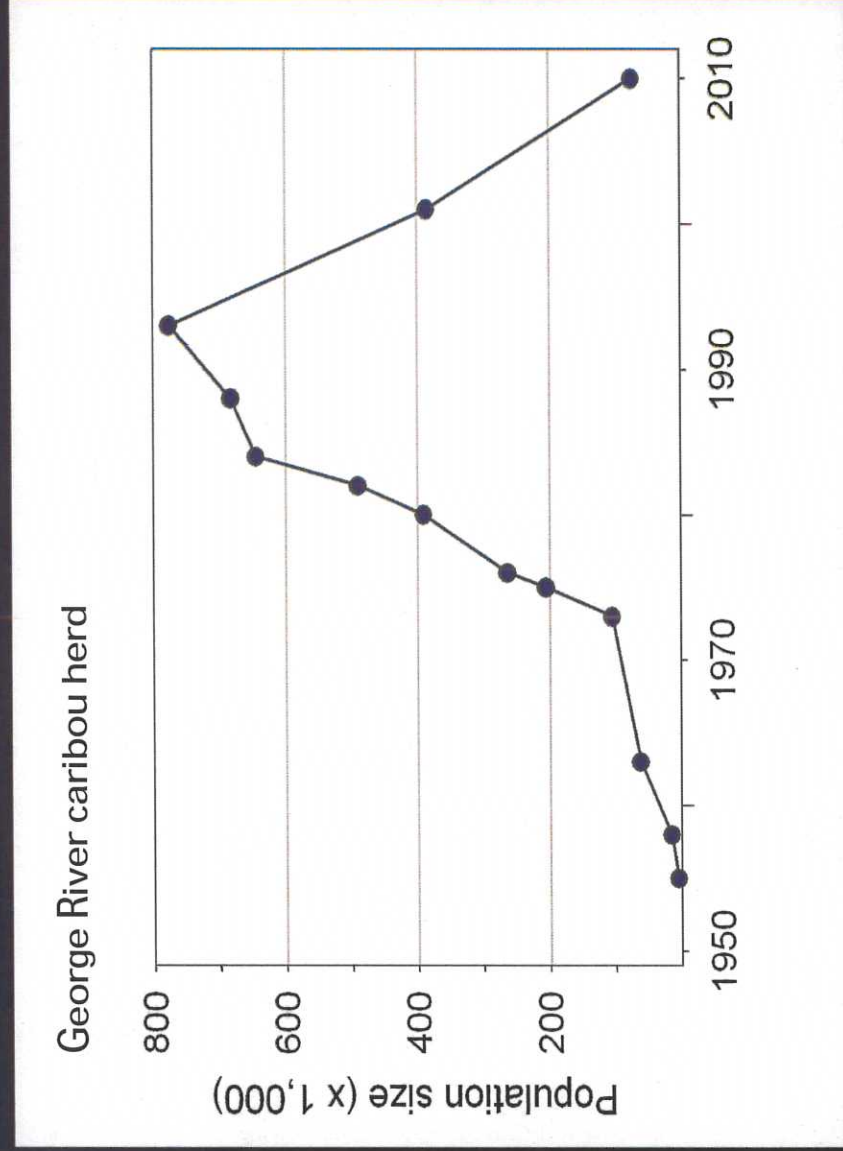
Two ecotypes

An important distinction

- ! Sedentary ecotype (Forest-dwelling, woodland, boreal caribou)
 - " Short distance movements
 - " Dispersion at calving – females “space out”
- ! Migratory ecotype (Forest-tundra, barren-ground, coastal caribou)
 - " Long distance movements
 - " Aggregation at calving – females “space away”

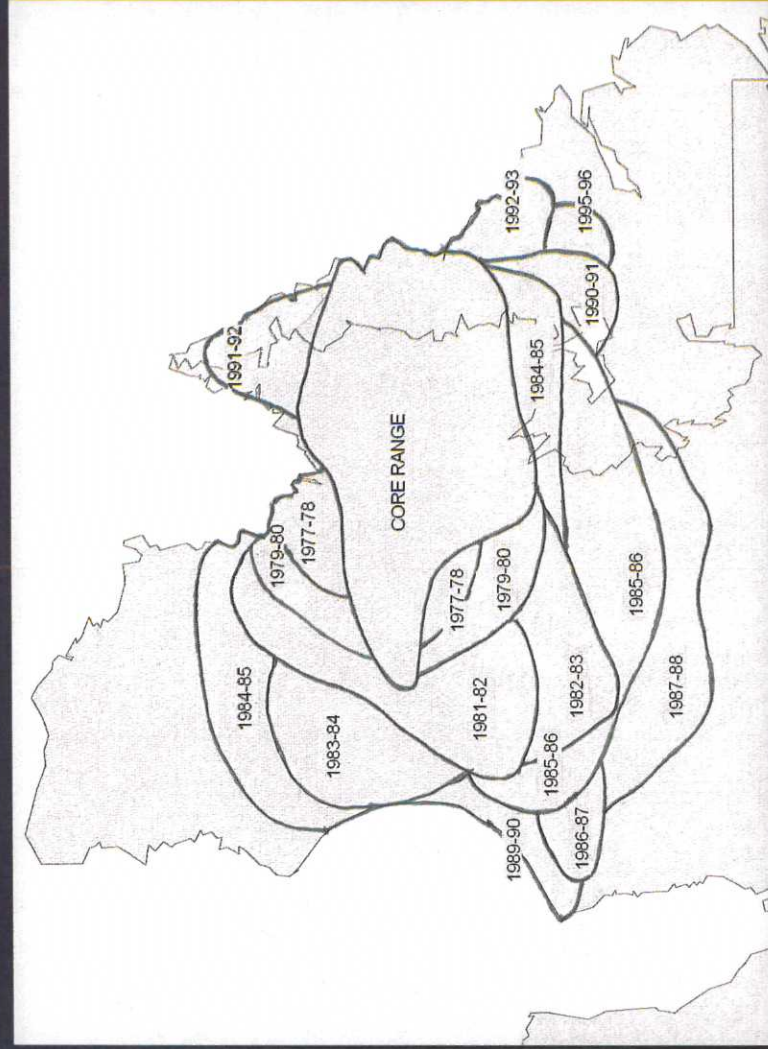
The migratory ecotype

Dramatic changes in abundance



Range expansion and contraction

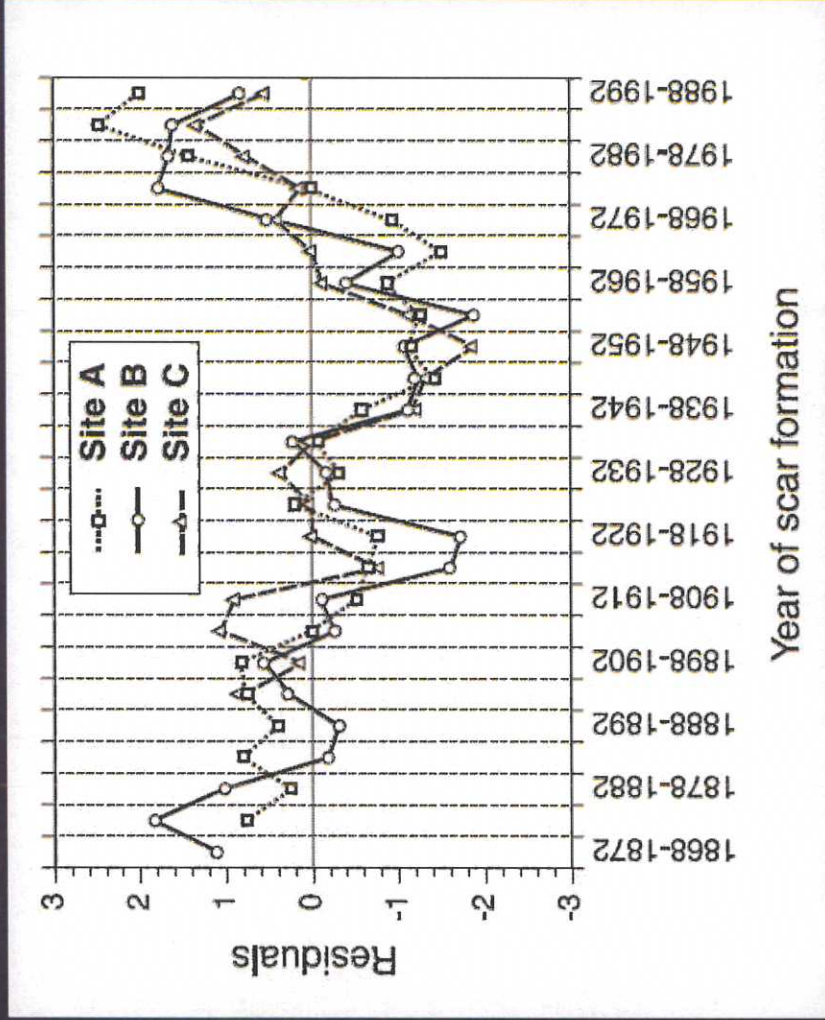
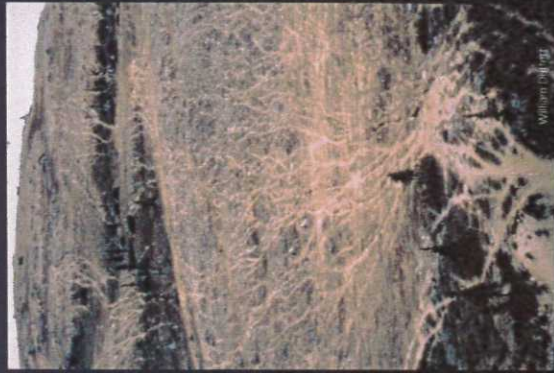
George River caribou herd



Adapted from Bergerud et al (2008)

Dendrochronological evidence

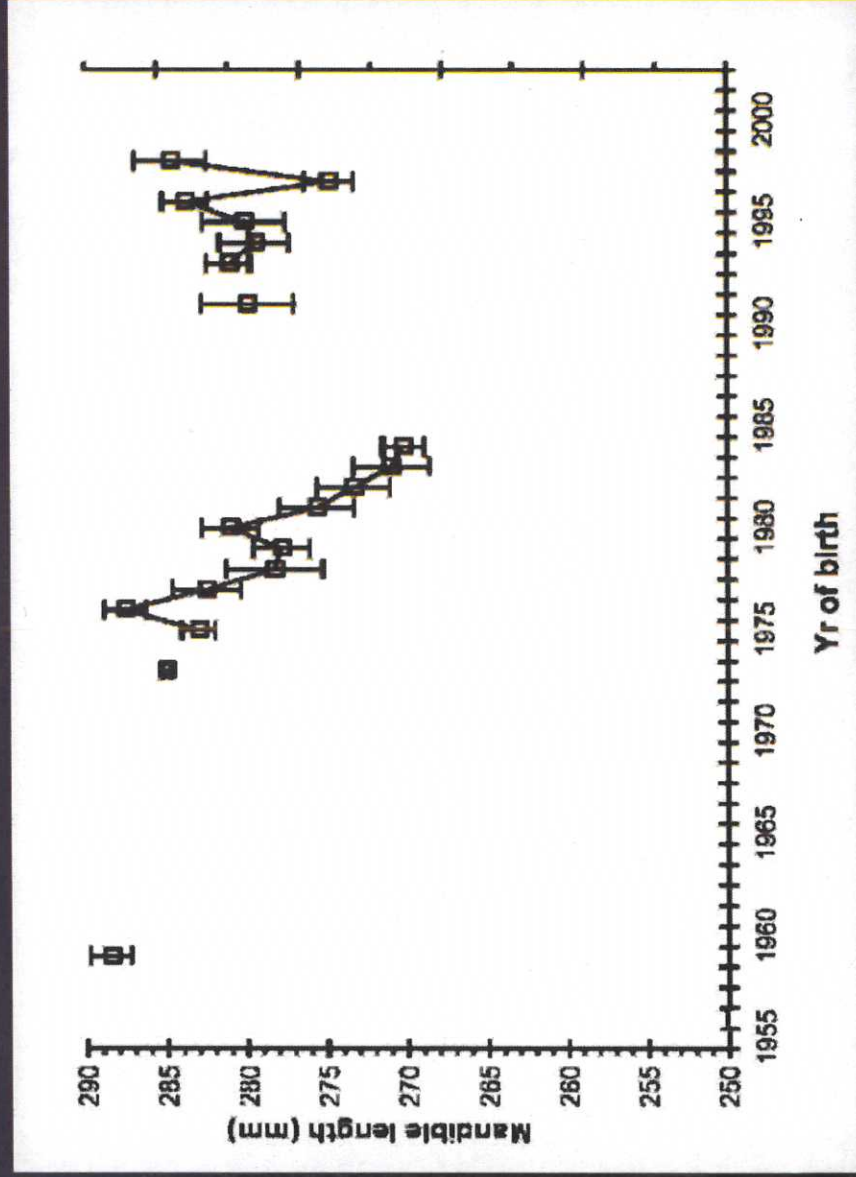
Trampling scars



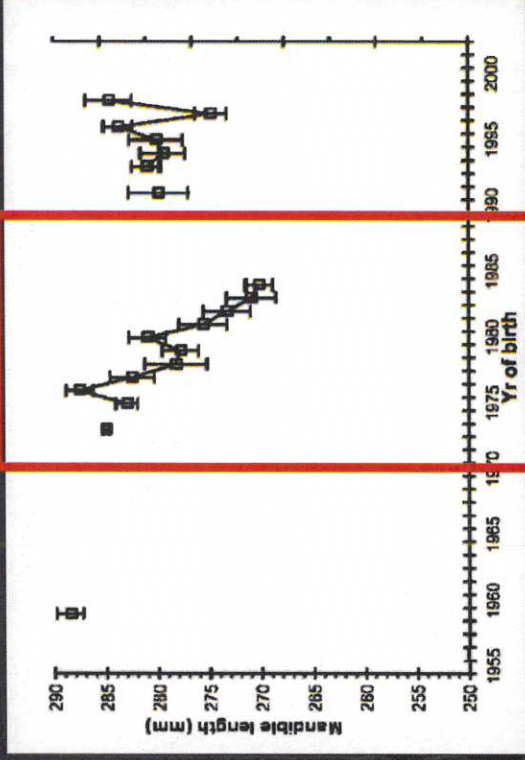
Morneau & Payette (2001)

Changes in body size

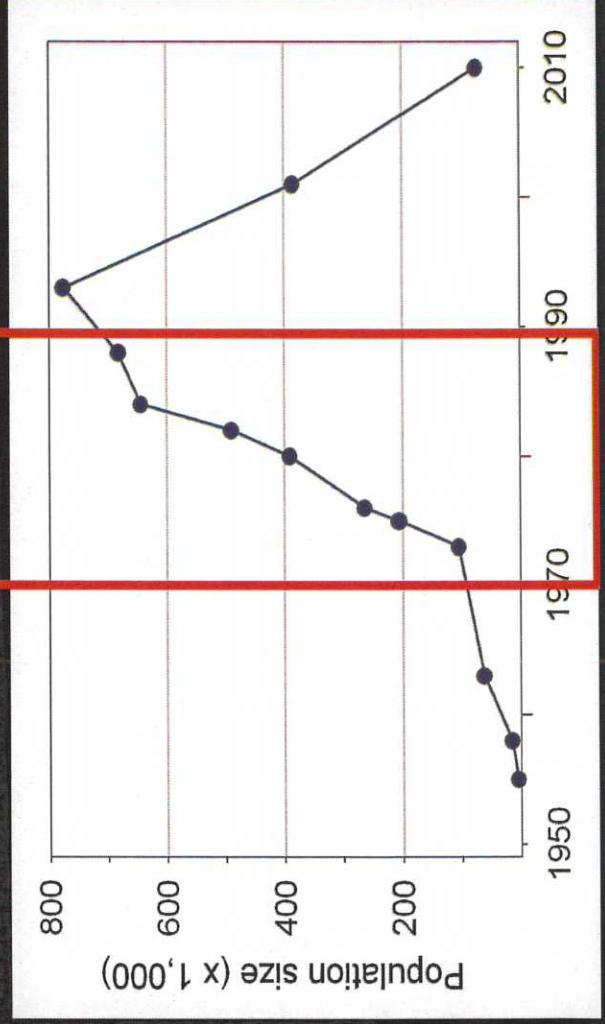
Reflective of changes in abundance



Limited by forage



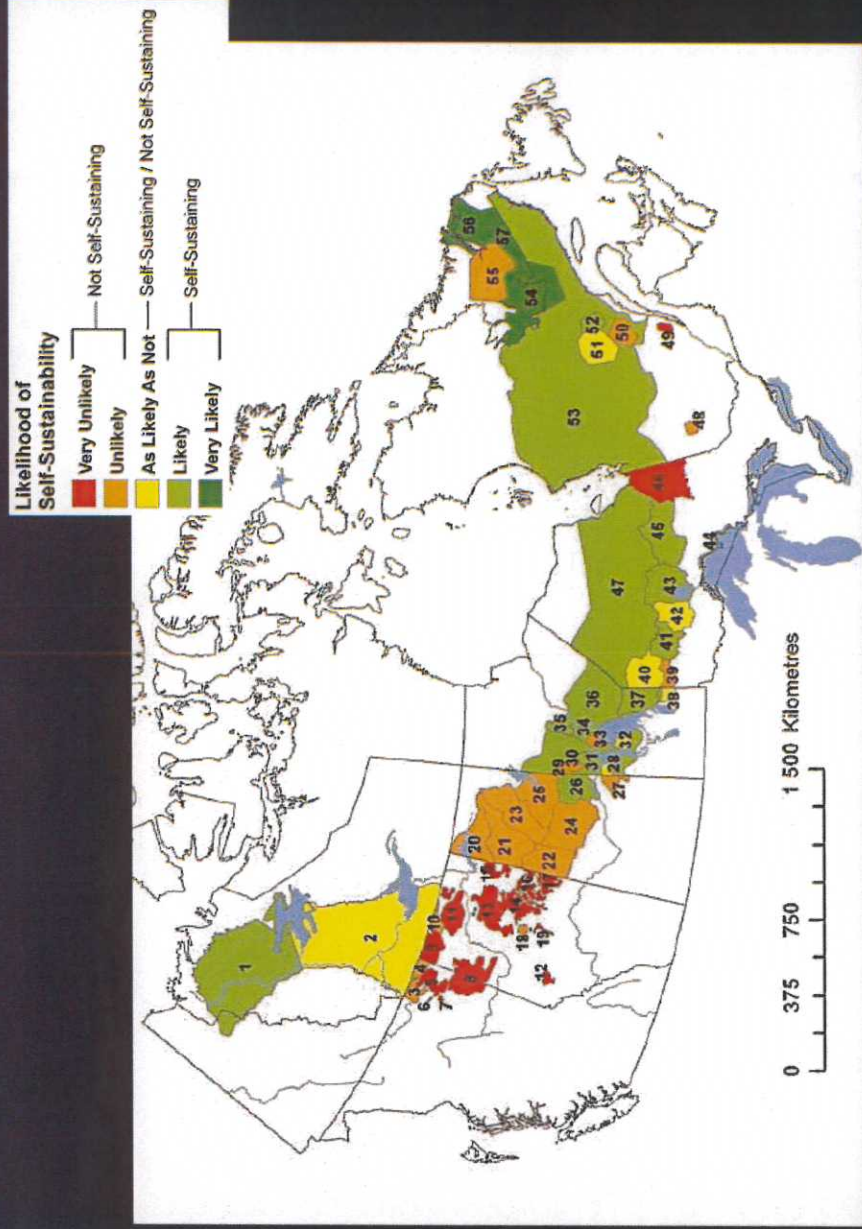
Decline in body size



Population growth

The sedentary ecotype

“Boreal” population

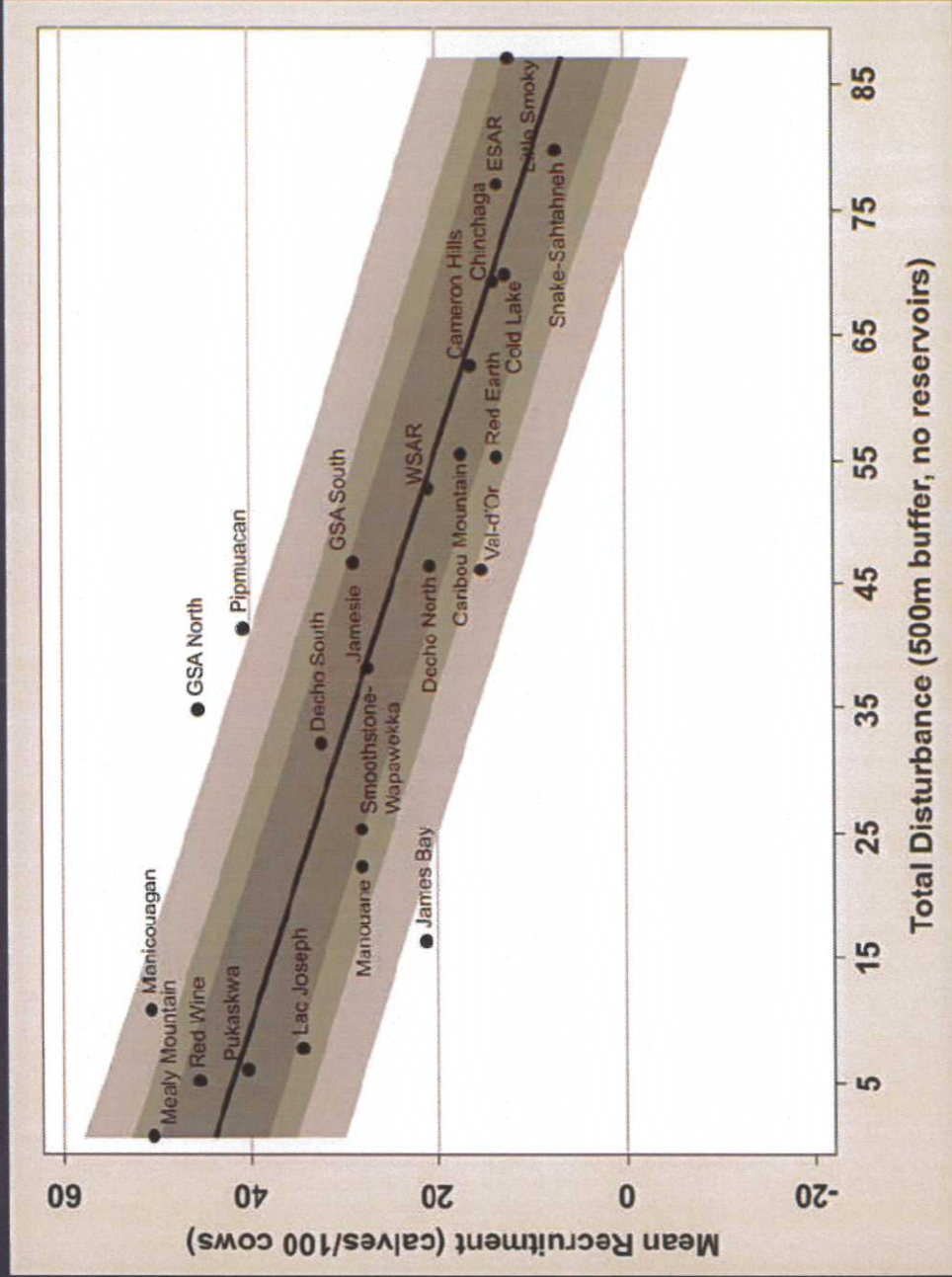


Habitat loss

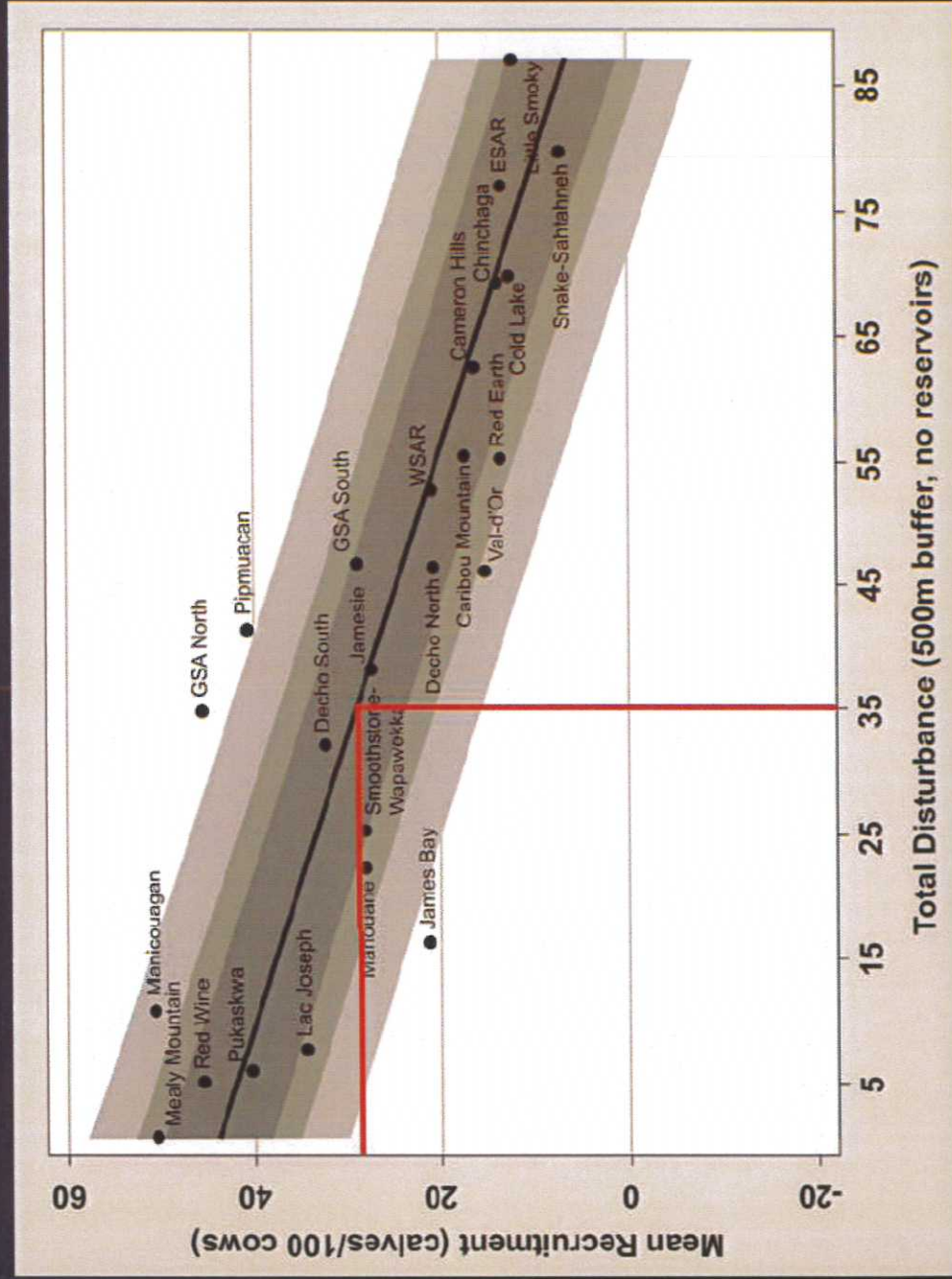
Increased predation

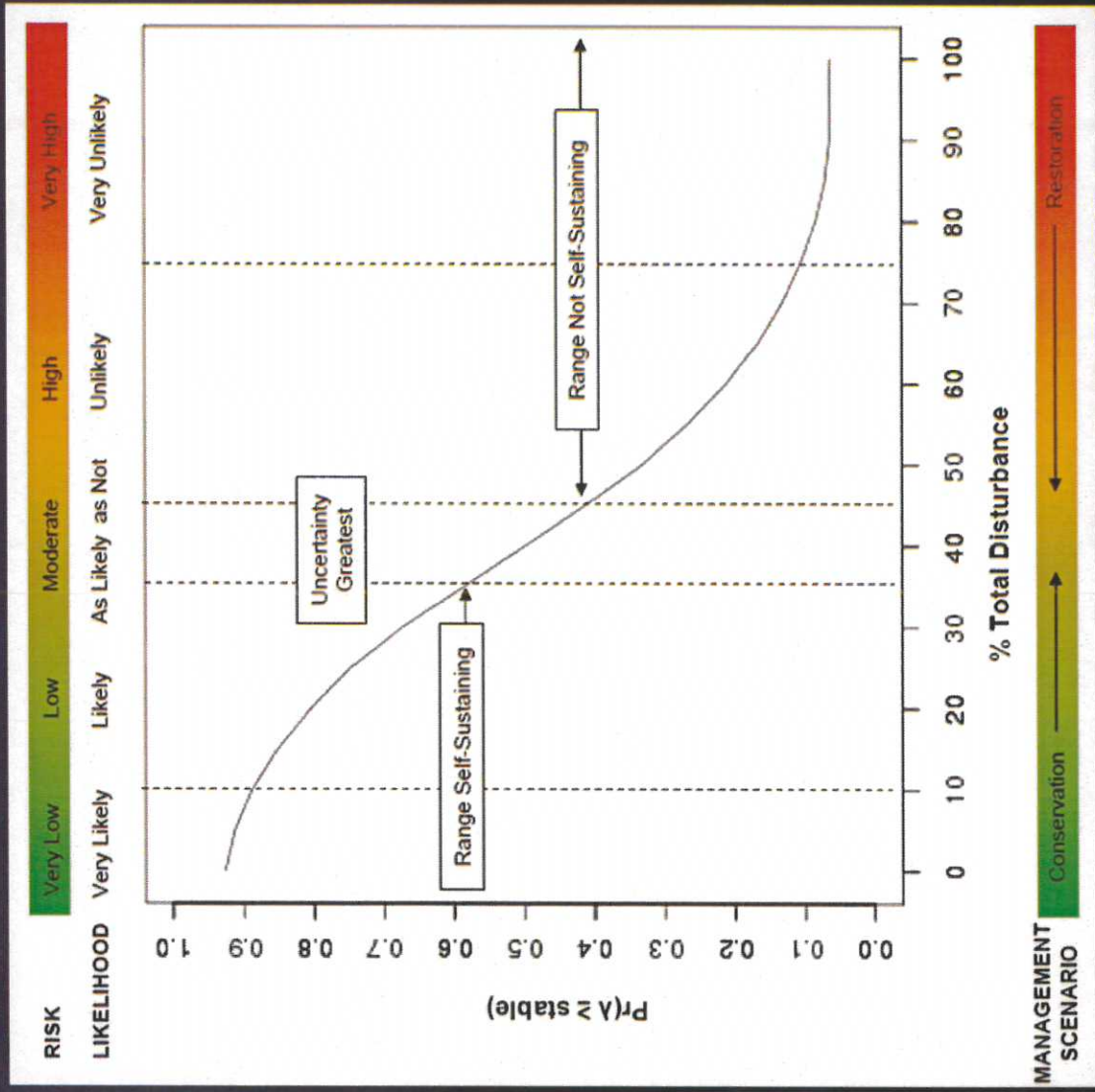


Linking habitat to demography



Linking habitat to demography





Environment Canada (2011)

Chief limiting factors

Key to conservation

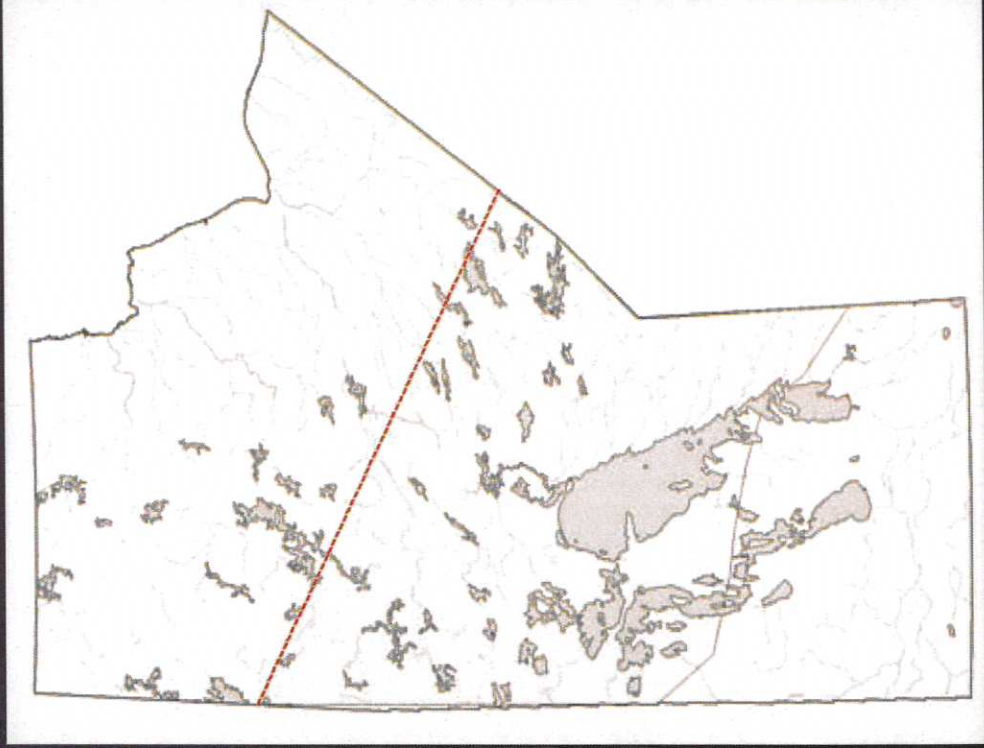
- ! Migratory ecotype – summer food
- ! Sedentary ecotype – predation (due to habitat disturbance)

Three questions

Consequences for evaluating Project impacts

- 1 Do boreal woodland caribou reside in the Project area?
- 2 Is caribou habitat underutilized?
- 3 What are the future prospects for caribou?

1. Do boreal caribou inhabit the Project area?



Evidence from the EIS

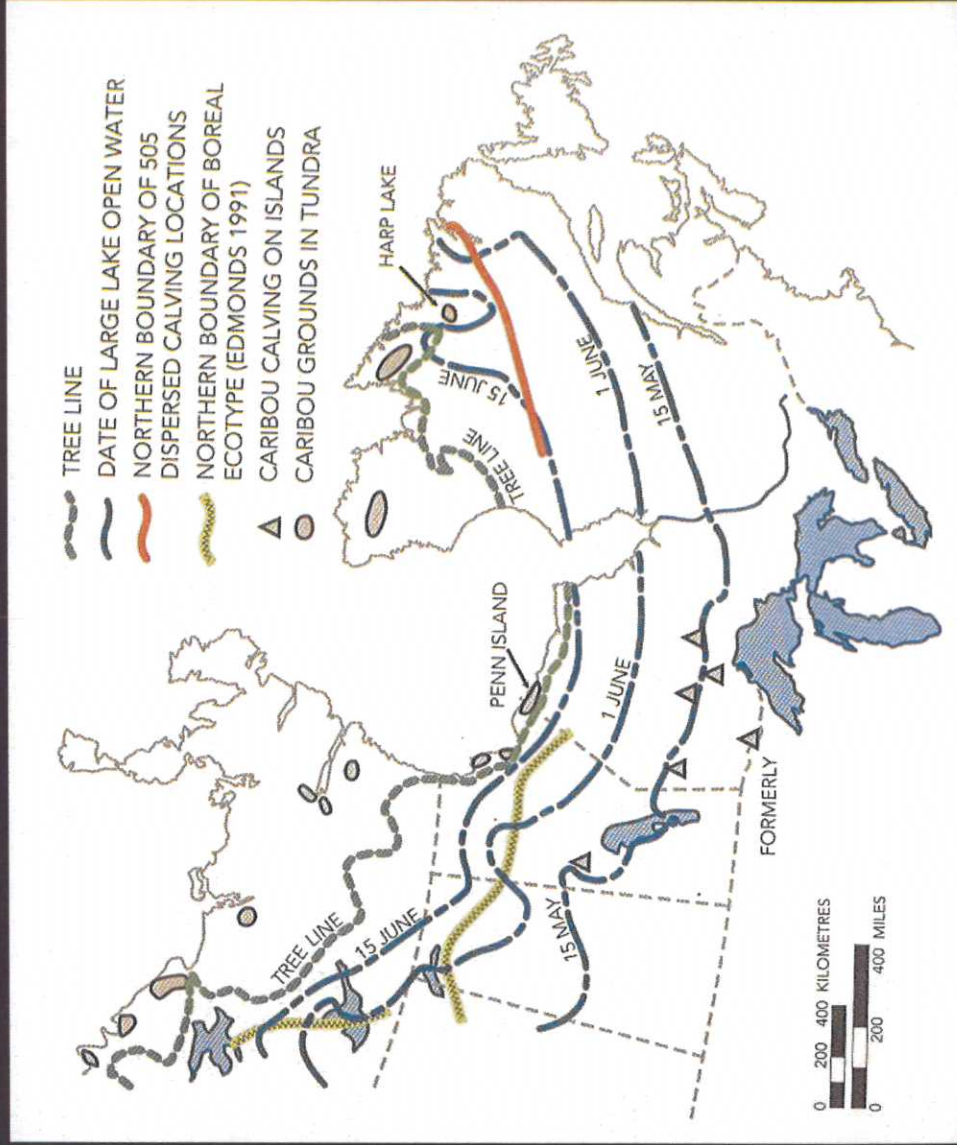
Features of summer resident caribou

- ! Dispersed calving distribution
- ! Harem breeding
- ! Low population density
- ! A historically identified population
 - " Nelson-Hayes herd
 - " Similar to herds in Quebec-Labrador



Northern limits of sedentary caribou

Open water at calving time (June 15)



Known open water in the Project area

Year	Keyask Area	Stephens Lake
2001	May 25	May 25
2002	Jun 13	Jun 23
2003	May 29	May 26
2004	Jun 11	Jun 6
2005	May 29	May 18
2006	May 12	May 7
2007	May 26	May 19
2008	Jun 9	May 31
2009	Jun 2	Jun 8
2010	May 7	May 15
2011	May 26	May 26
2012	May 14	May 22
2013	May 25	May 29

Woodland caribou in Manitoba

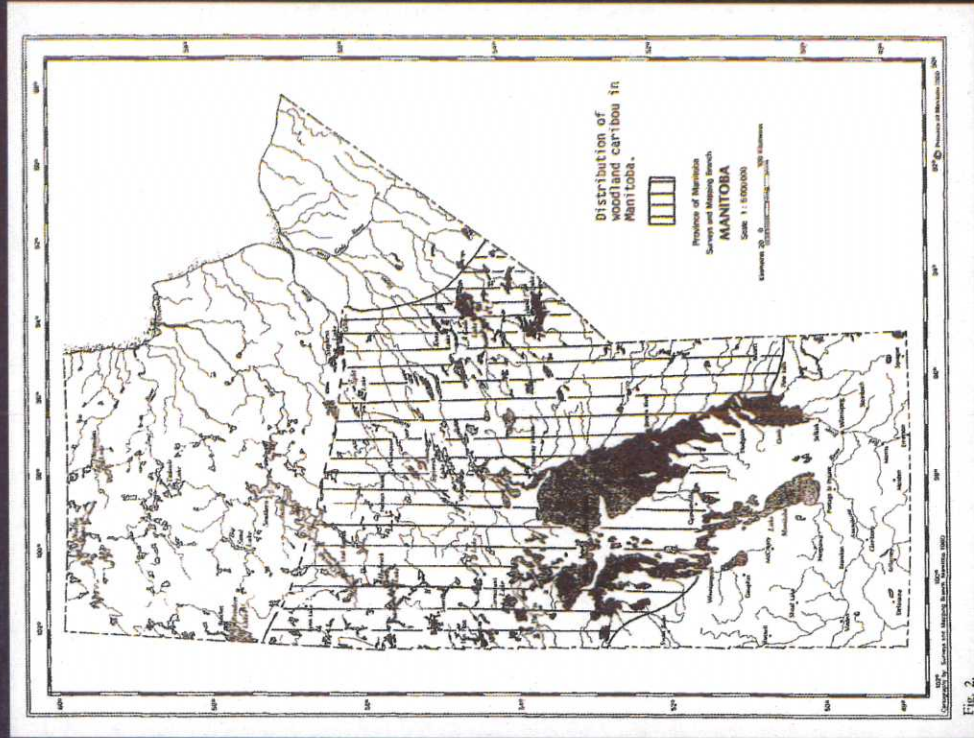
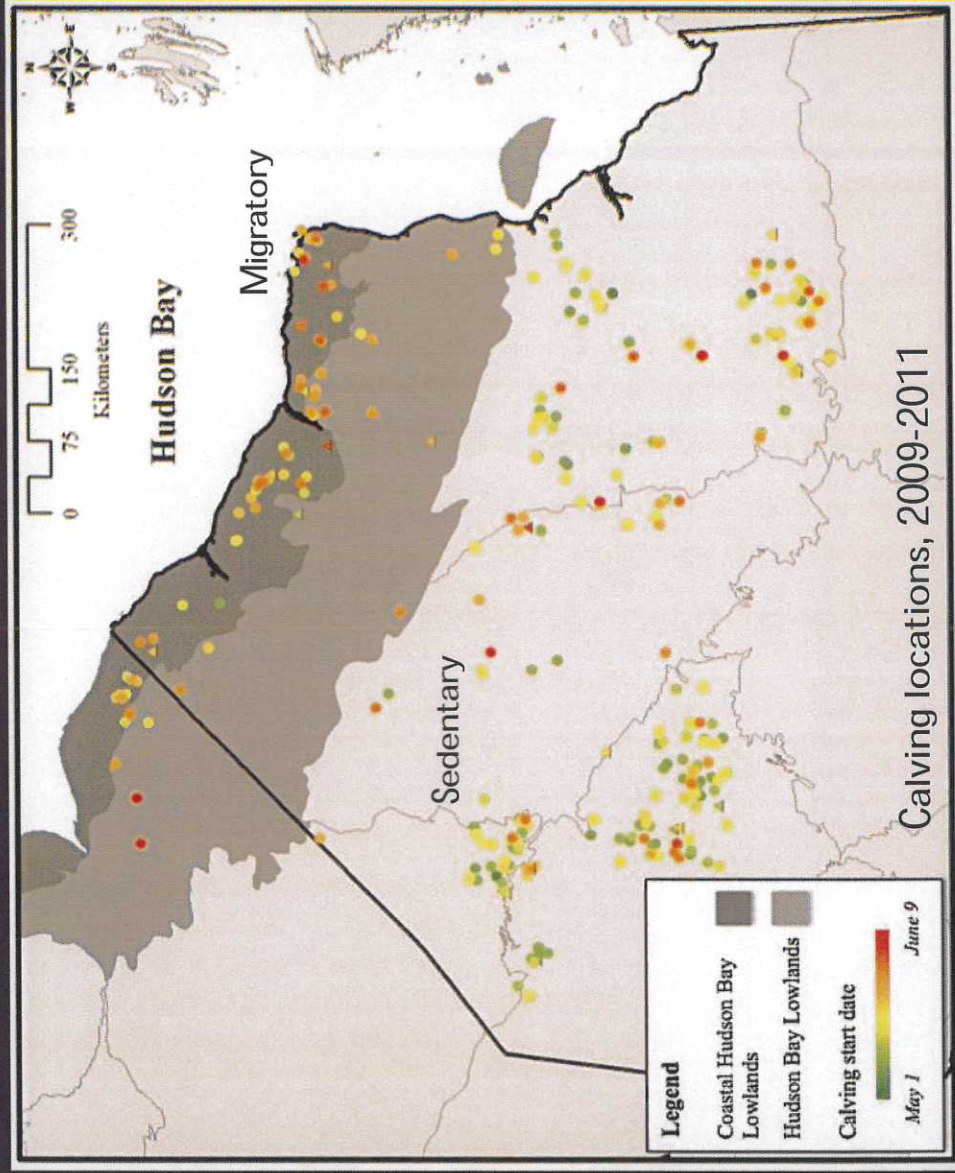


Fig. 2.

Edmonds (1991)

Radio-tracked caribou in Ontario

Sedentary caribou north to Hudson Bay Lowlands



Antler morphology



Photo 2010-08-08

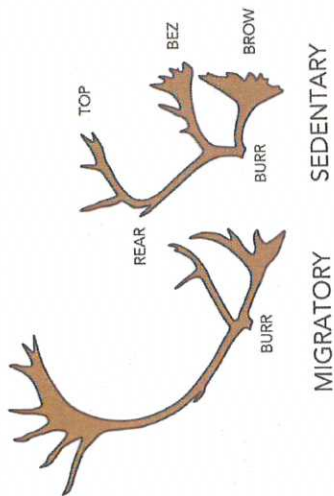


Fig. 2.8 A comparison of the general morphology of the antlers of the migratory ecotype (left) and the sedentary ecotype (right) from Butler (1986: fig. 11.2, 436). Antlers were drawn to scale from measured and photographed cast antler sets of large males from the migratory Delta herd in Alaska and the sedentary caribou on Brunette Island, Newfoundland.

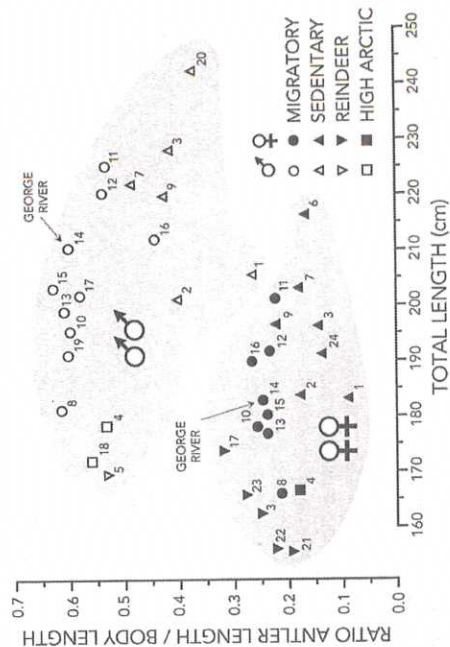


Fig. 2.9 Antler length/body ratios compared with total length. The migratory ecotype has larger antlers in comparison to body size than the sedentary ecotype (adapted from Butler 1986, fig. 11.12, 490). Butler used the nomenclature of barren-ground and woodland rather than migratory and sedentary in her thesis. The names of the herds can be found in Butler (1986, 490).

Antler morphology

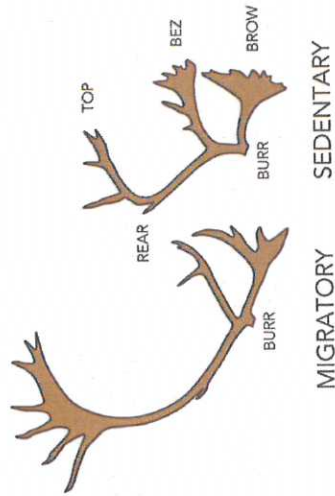


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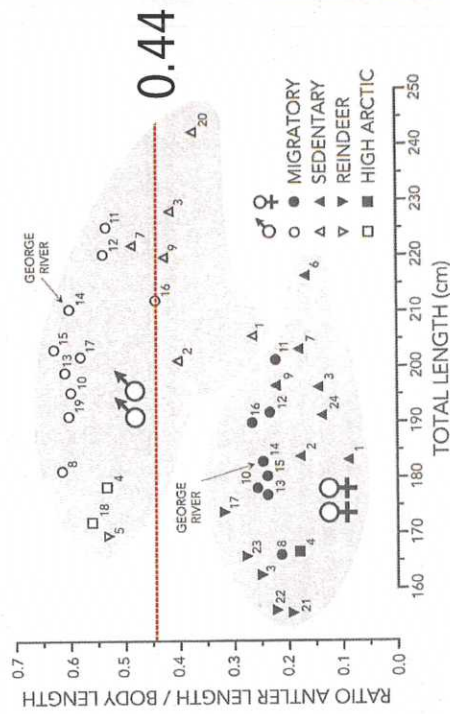


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Photo 2010-08-08

Summer resident caribou

Bergerud et al (2008)

2. Is habitat underutilized?

Two views of habitat

“Place where an organism lives”
(EIS)

“Not limiting to summer cows and calves” (EIS)

Appears “underutilized” (EIS)

More available than used; displaced caribou “will find suitable habitat elsewhere” (EIS)



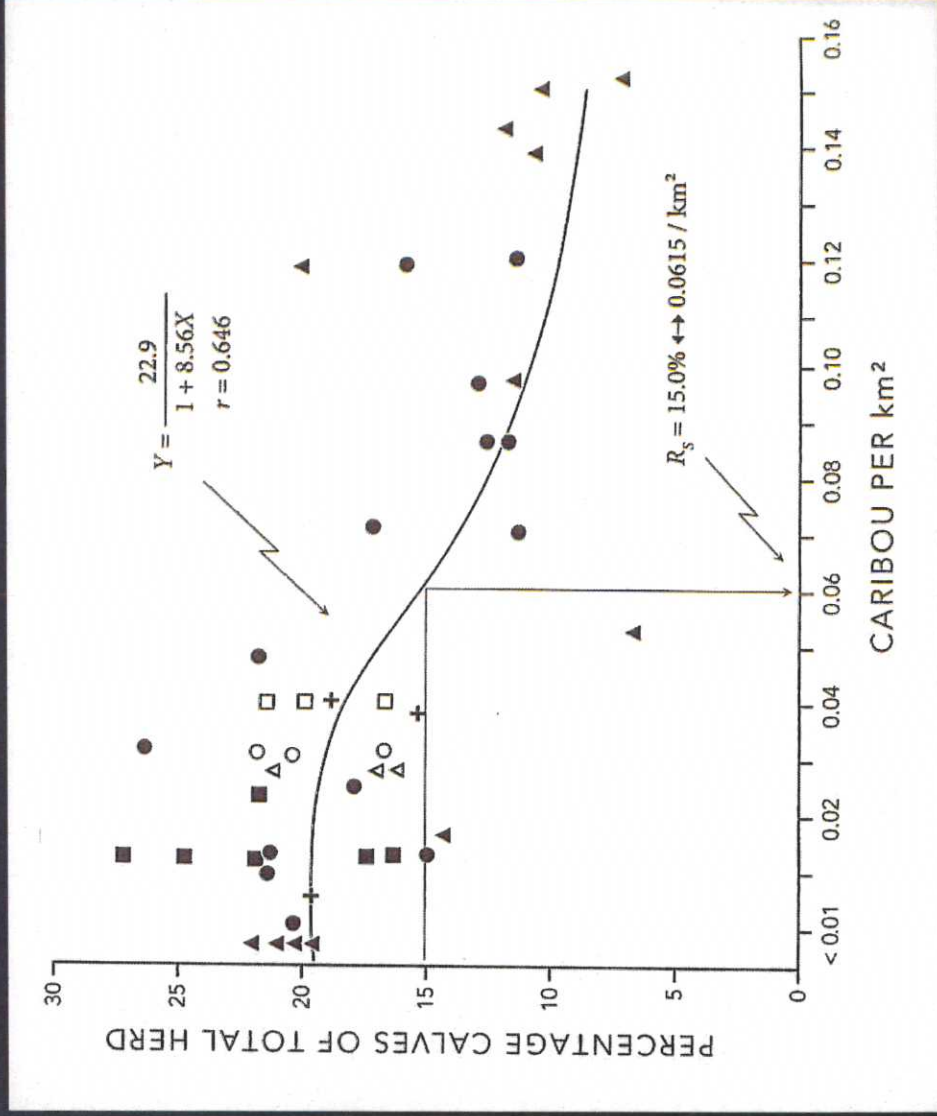
Resources and conditions governing presence, survival and reproduction of a population (Caughley & Gunn 1996)

Space is habitat

- Crucial for predator avoidance

Space is habitat

Stabilizing density = 0.06 animals/km²



3. What are the future prospects for caribou?

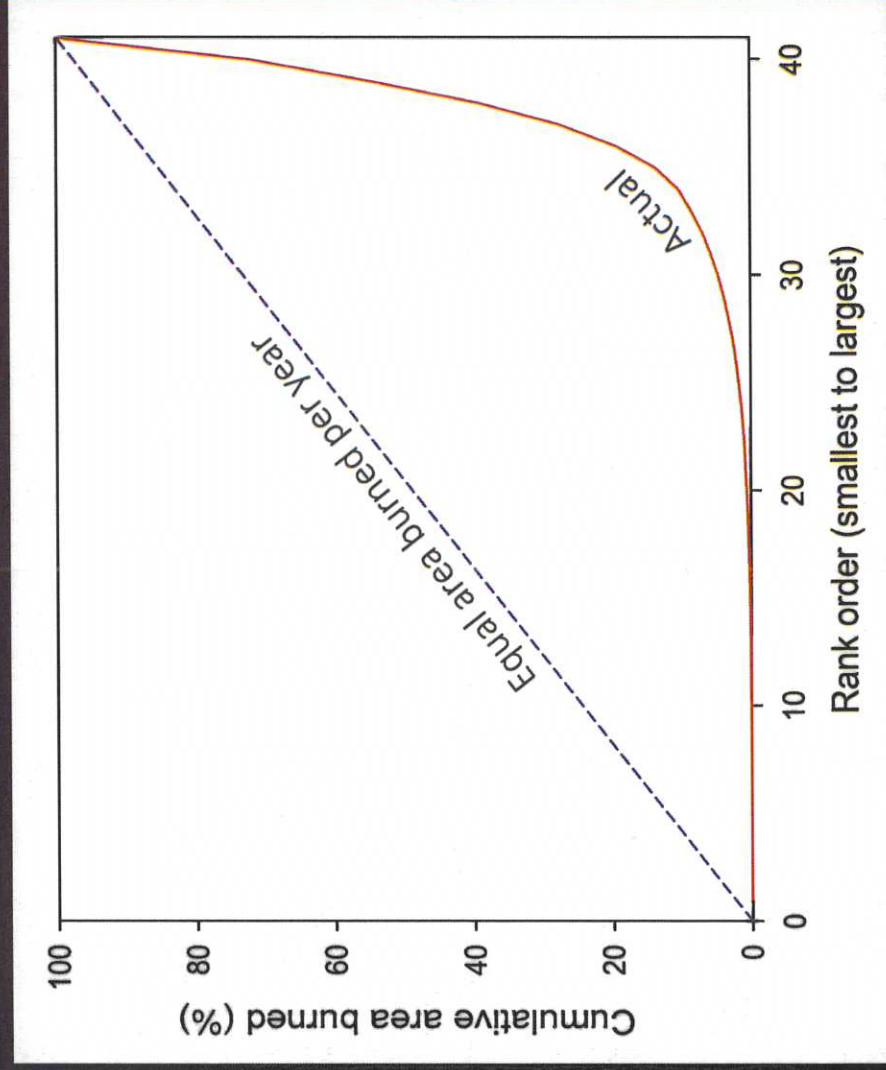
“A single large and/or severe fire could substantially alter habitat composition over the long term, which could alter many of the terrestrial environment predictions.”

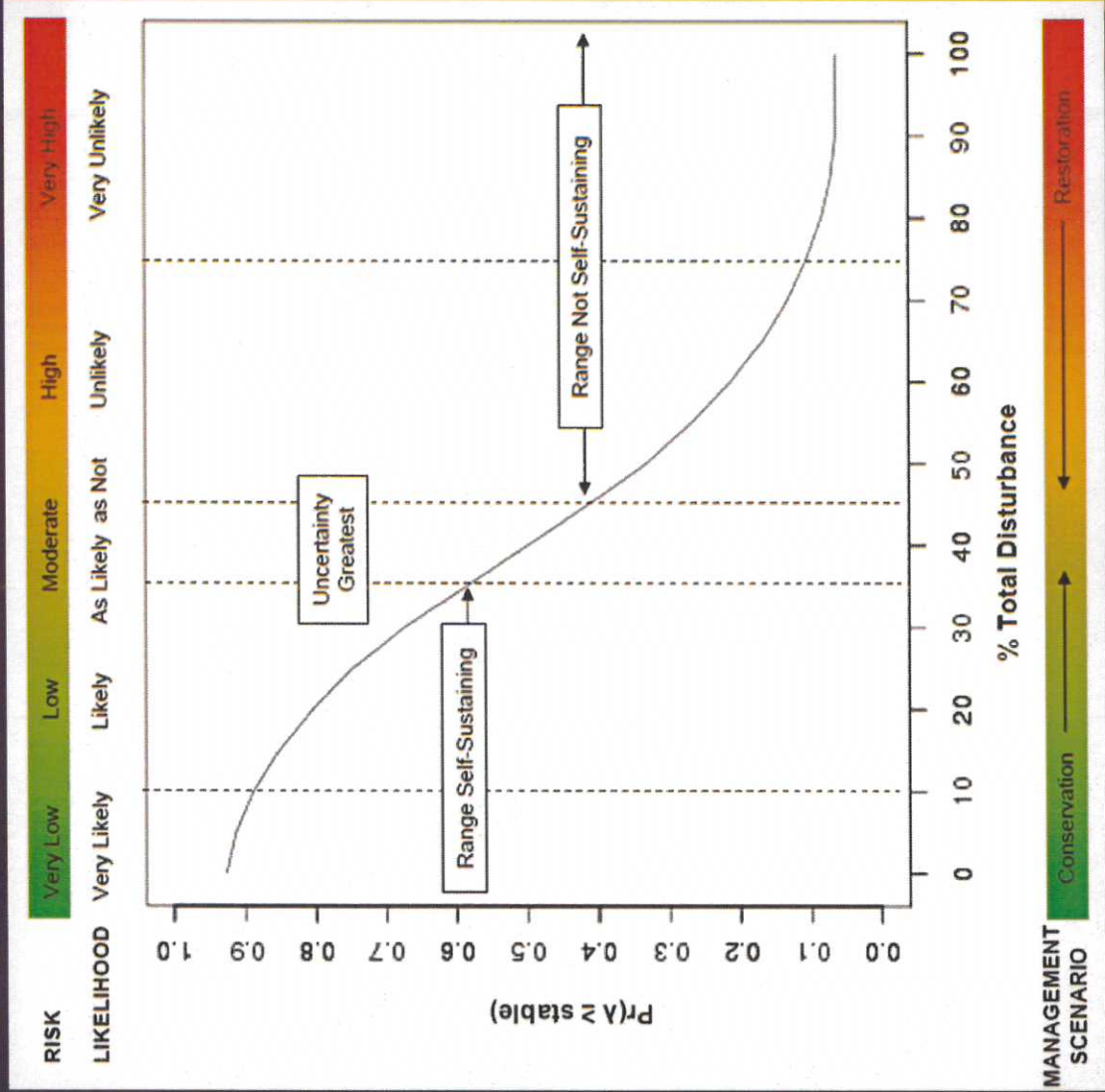
Terrestrial Environment, Supporting Volume, Section 2.5.4.5



A fire-prone ecosystem

Few years account for most of the area burned





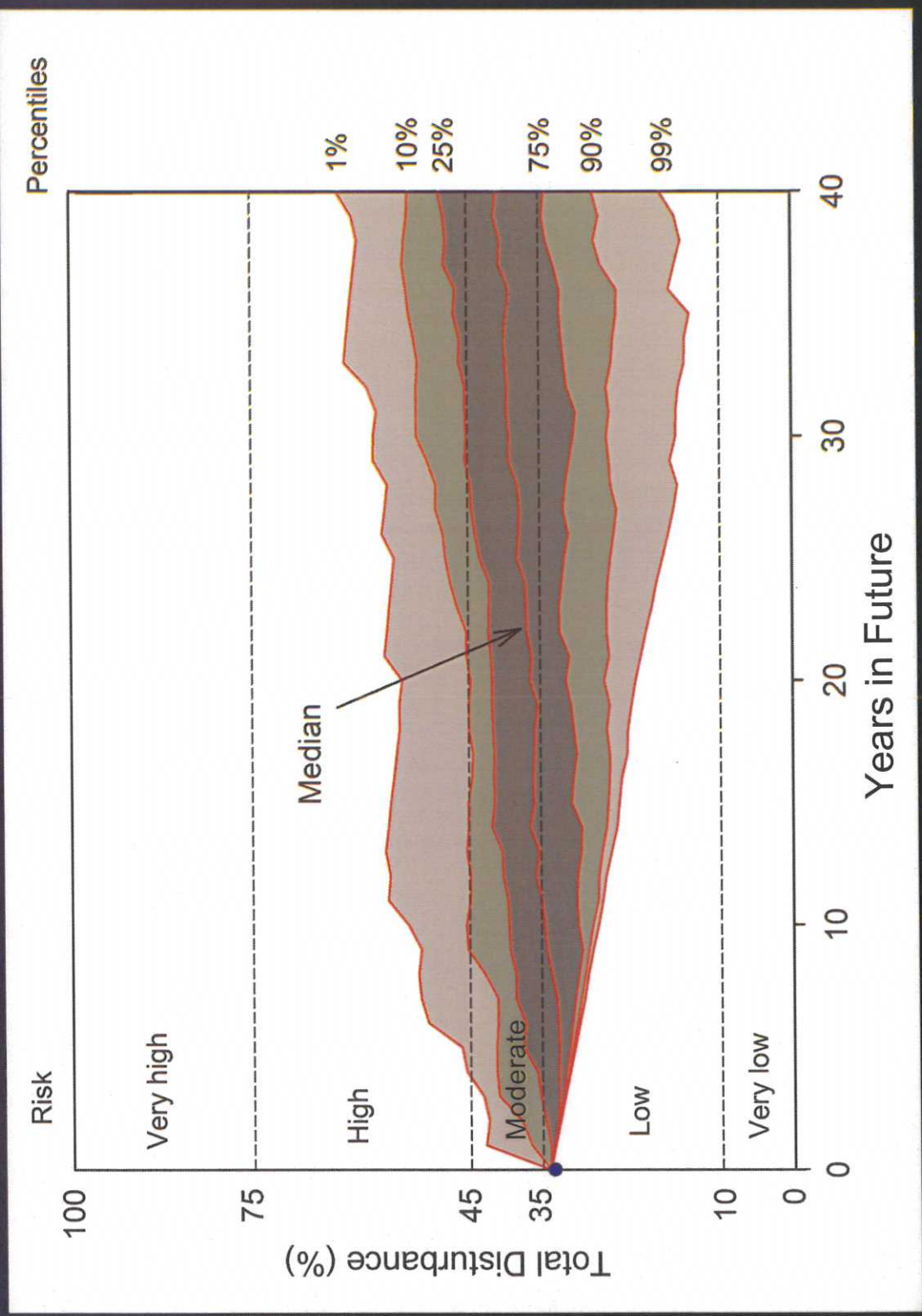
Environment Canada (2011)

A model of future fire hazard

Implications for caribou habitat

- ! The model
 - " Each year, area burned from random draw
 - Fire history, 1979-2008
 - " Each year, forest stands age by 1 year
- ! Begin in 2009
 - " Total range disturbance = 33.9%
- ! 40 years into the future, 1000 replicates





Conclusions

Caribou and the Keeyask Generation Project

- ! Two major uncertainties:
 - " Ecotype of summer resident caribou
 - " Extent of their population range
- ! Project would occur on "highly altered landscape"
 - " "Small" impact may exacerbate habitat loss for caribou
 - " Piecemeal development is history of conservation failure