The background image shows a construction site for a pipeline in a field. Several large, grey pipes are laid out on wooden supports. In the foreground, there is a large pile of gravel. In the background, a herd of reindeer is visible, some standing and some grazing. The sky is overcast and grey.

North Slope Science Relevant to ANWR

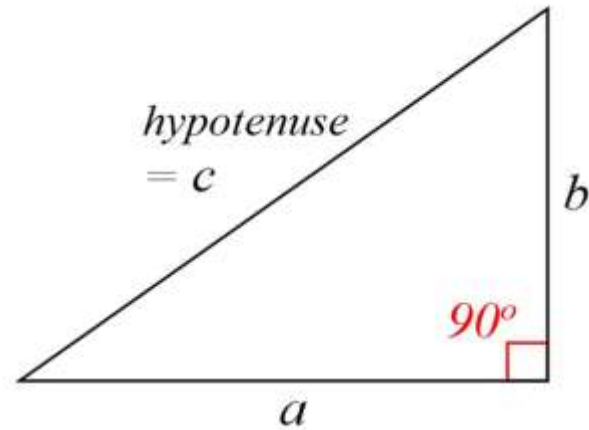
For the Alaska Support Industry Alliance

11 April 2019

Matthew A. Cronin

Northwest Biology Company LLC

Math: Correct or Incorrect



$$c^2 = a^2 + b^2$$

Math Applied
to Science
Test with
Observations

■ $p + q = 1$

■ $(p + q)^2 = 1$

■ $p^2 + 2pq + q^2 = 1$

p = frequency of allele A

q = frequency of allele a

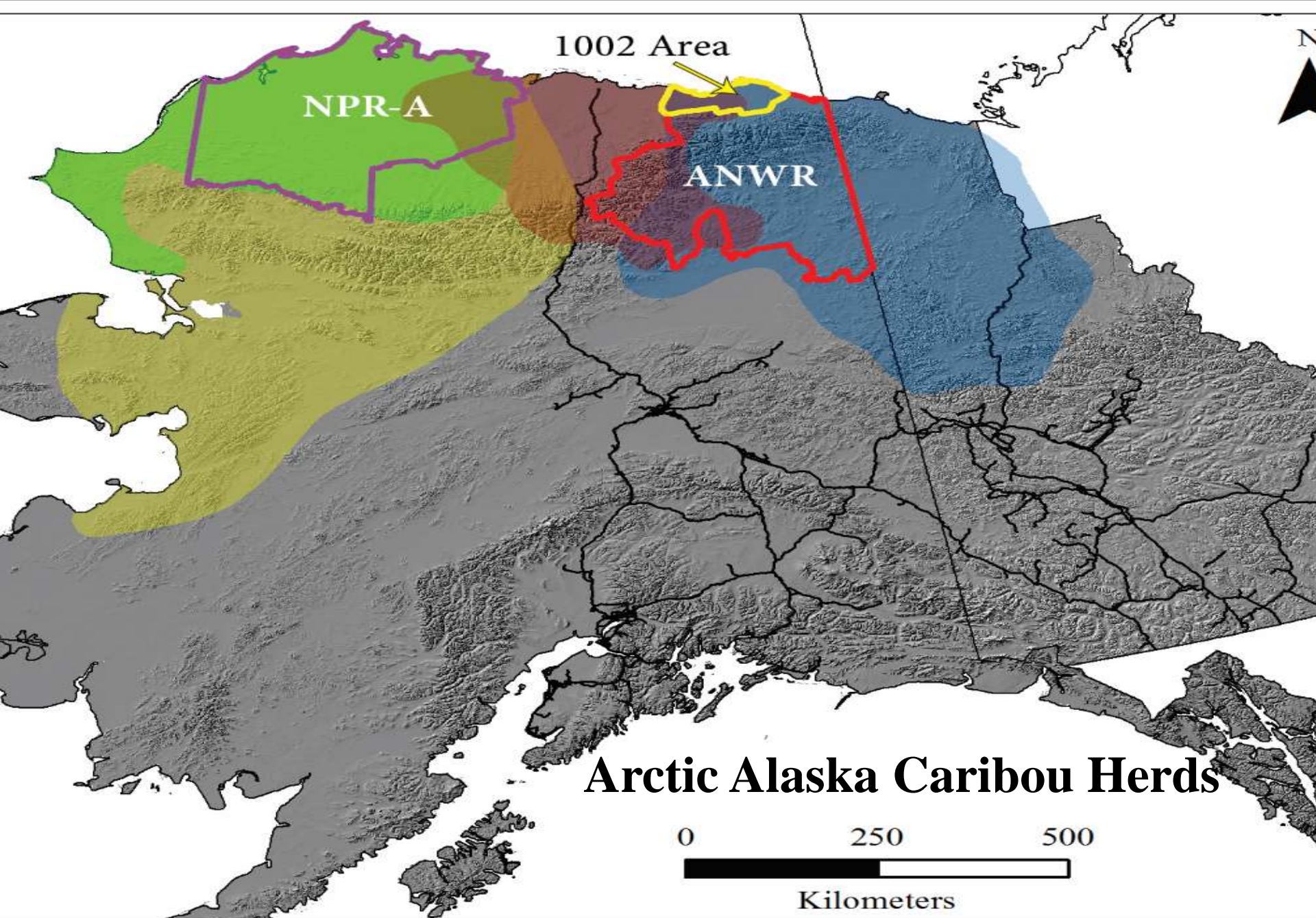
p^2 = frequency of AA genotype

$2pq$ = frequency of Aa genotype

q^2 = frequency of aa genotype



Science on the North Slope



1002 Area

NPR-A

ANWR

Arctic Alaska Caribou Herds

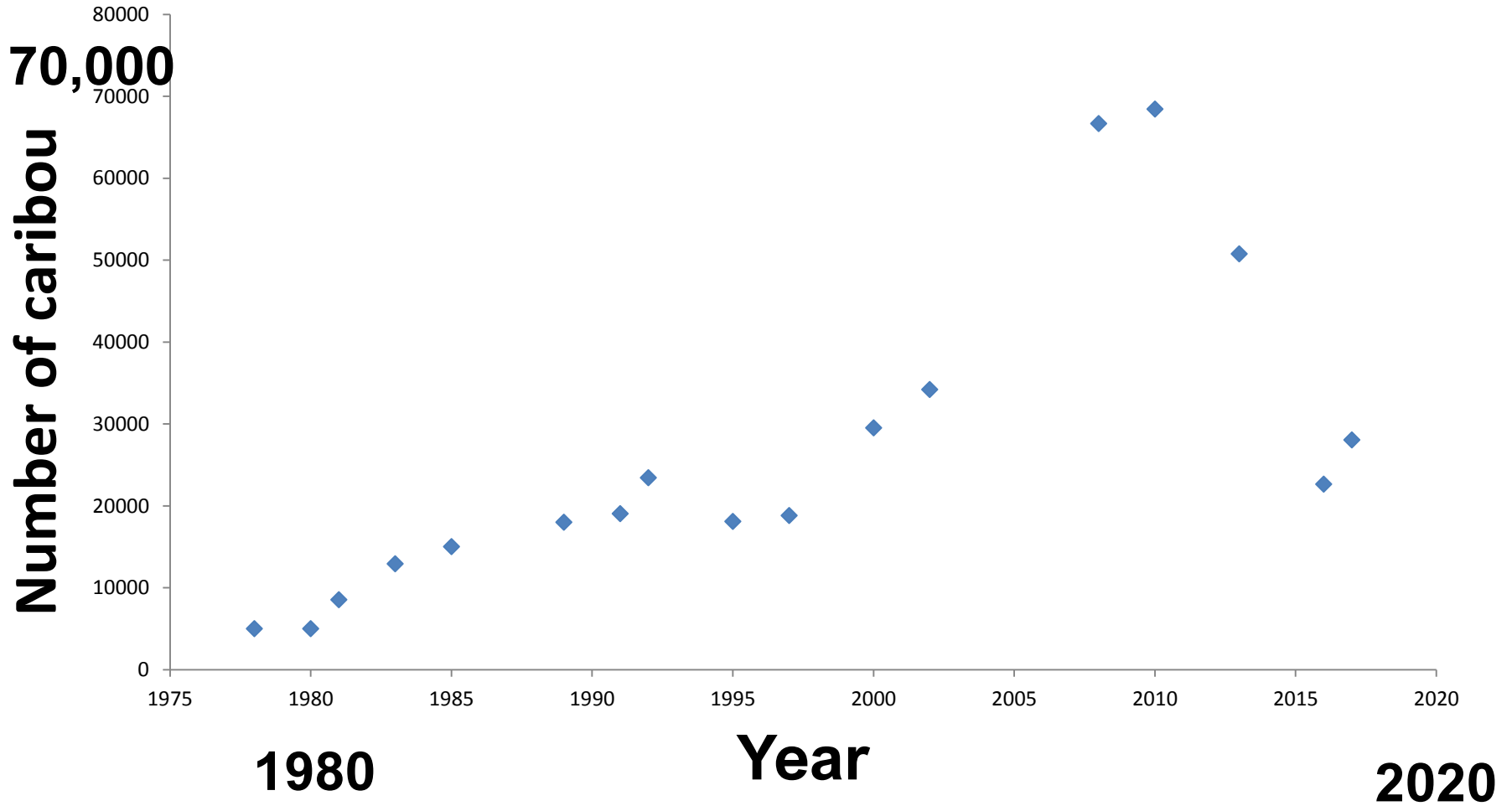
0 250 500



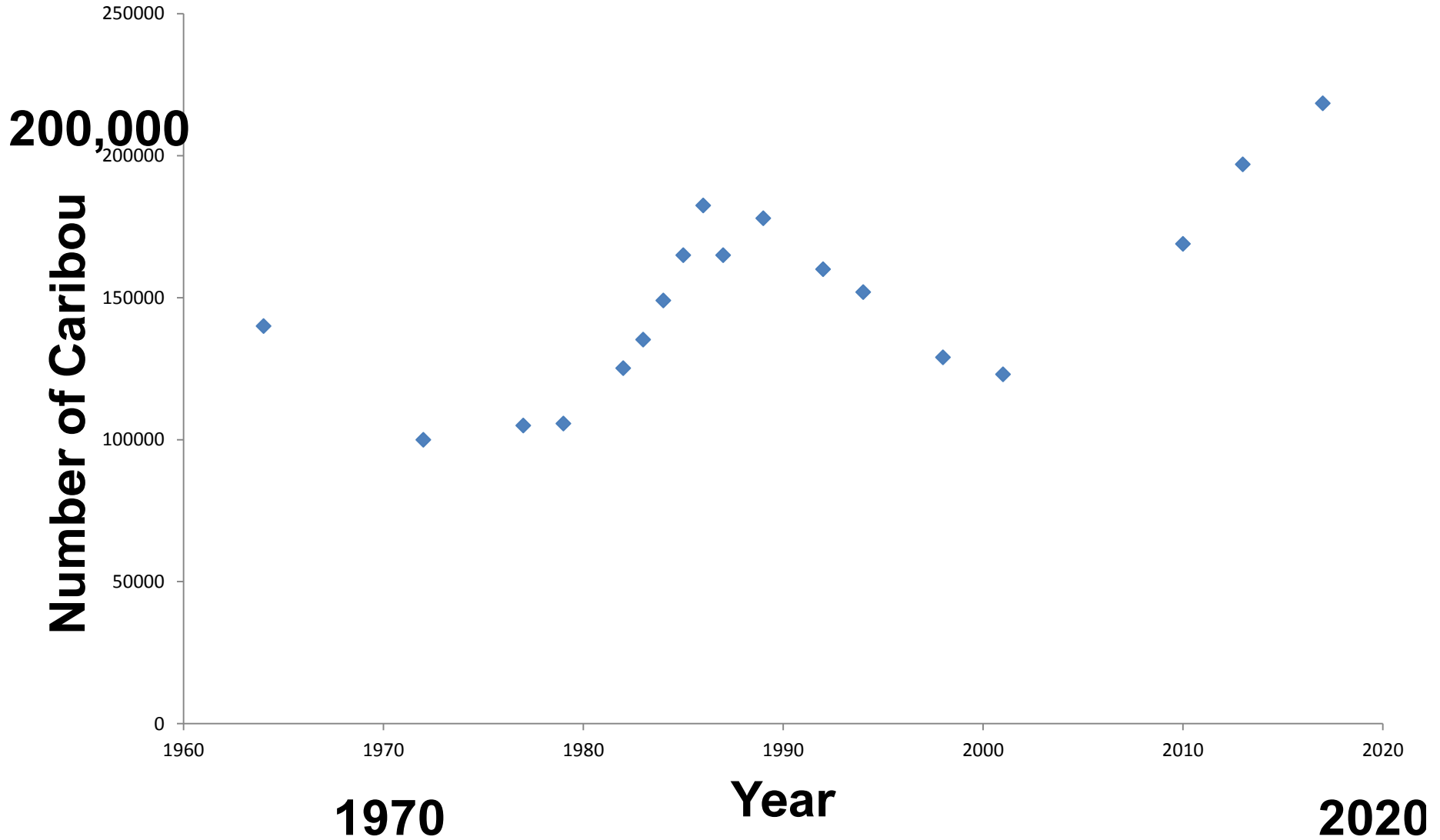
Kilometers

r roads Western Arctic Teshekpuk Central Arctic Porcupine

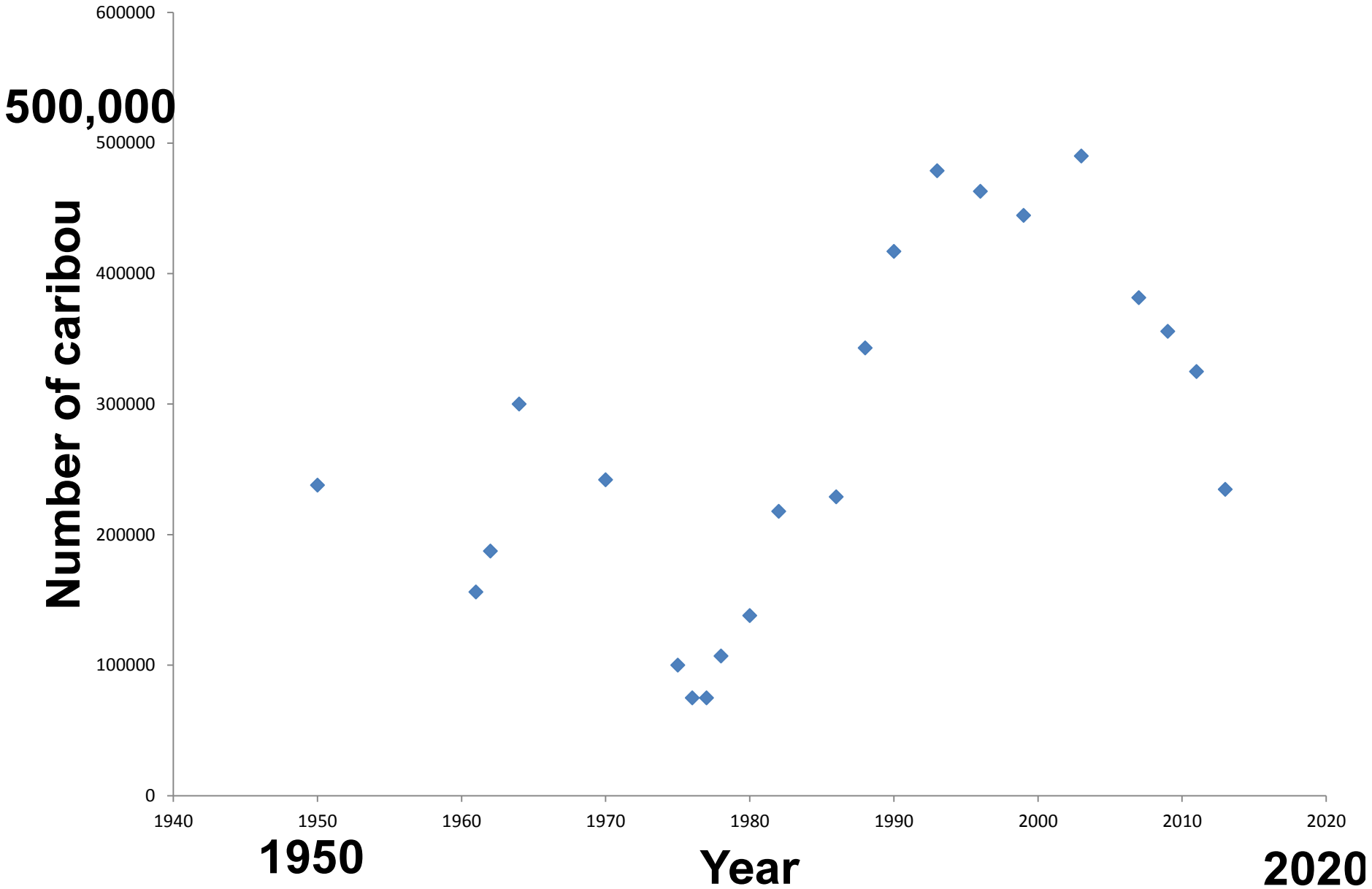
Central Arctic Caribou Herd



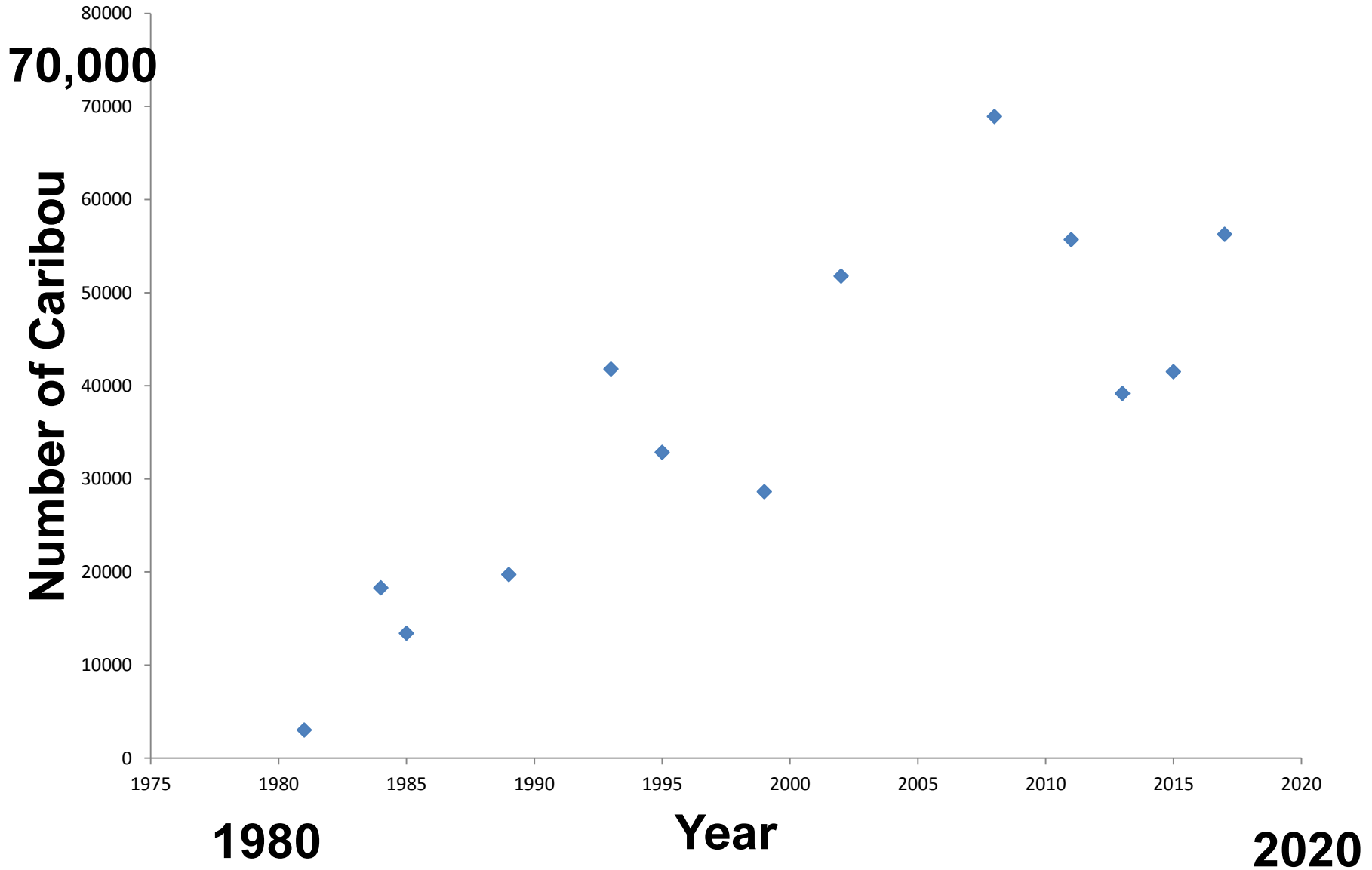
Porcupine Caribou Herd



Western Arctic Caribou Herd



Teshekpuk Lake Caribou Herd



Caribou Herds

- Herds fluctuate due to several factors (predation, winters, immigration, hunting)
- Climate change in the Arctic may have multiple, counteracting, effects on caribou (dEIS 2018)
- Oil field impacts on caribou have been studied extensively



Caribou Herds

- Oil field impacts on caribou
- Displacement from calving areas
- Reduced calf production and survival
- The 2018 dEIS estimates the area within 2.49 miles (4 km) of infrastructure for potential displacement of calving caribou during the construction phase in ANWR
- This is not supported by Milne Point Studies (Noel et al. 2004, 2006)



Caribou Herds

- Central Arctic herd decline between 2010 and 2016 was thought to be due to two factors:
- Adult female mortality
- Emigration of some CAH caribou to the Porcupine and Teshekpuk herds
- Not oil field impacts
- (ADFG 2016 cited in dEIS 2018, USGS 2018)





ANWR

- Caribou calving occurs in the 1002 area, but not every year
- Between 1983 and 2001, 42.7% Porcupine Herd females calved in the 1002 Area
- Some caribou calved in Canada in 1991
- Calving was entirely in Canada in 2000 and 2001
- From 2002 to 2017 caribou calving concentrated in Alaska, or Canada, or both Alaska and Canada

0 250 500

Kilometers

Major roads

Western Arctic

Teshekpuk

Central Arctic

ANWR

- Science ≠ Policy/Management
- Mitigation
- Reduce activity when calving caribou are present
- Other existing measures (e.g., elevated pipelines)

1002 Area

NPR-A

ANWR

0 250 500

Kilometers

Major roads

Western Arctic

Teshekpuk

Central Arctic