

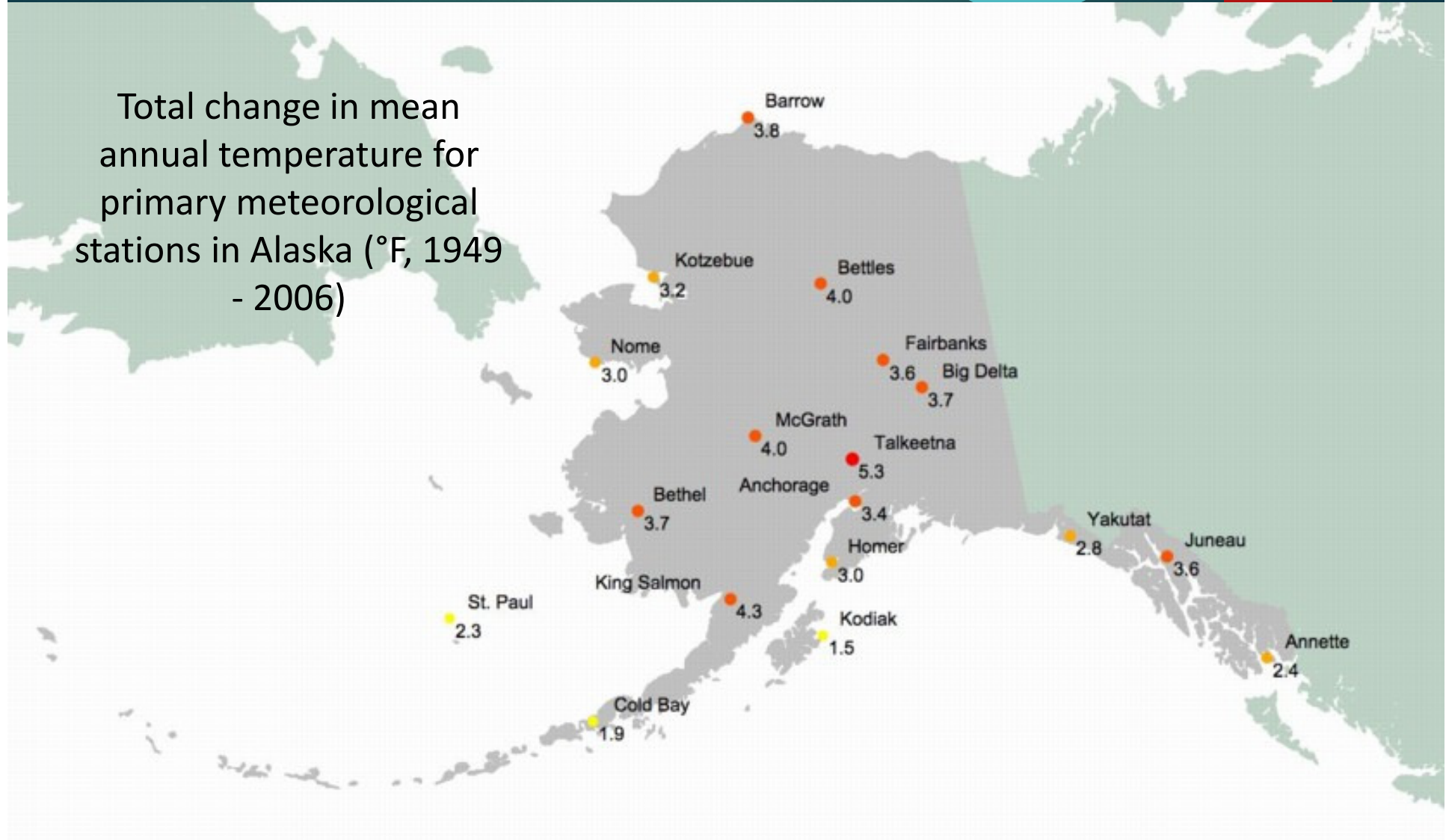
The Changing Biocultural Landscape of Beringia

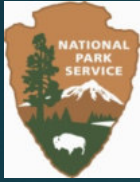
Jim Lawler-National Park Service USA



Many of the temperature observations in Alaska are based on records that go back to the 1950s.

Total change in mean annual temperature for primary meteorological stations in Alaska (°F, 1949 - 2006)



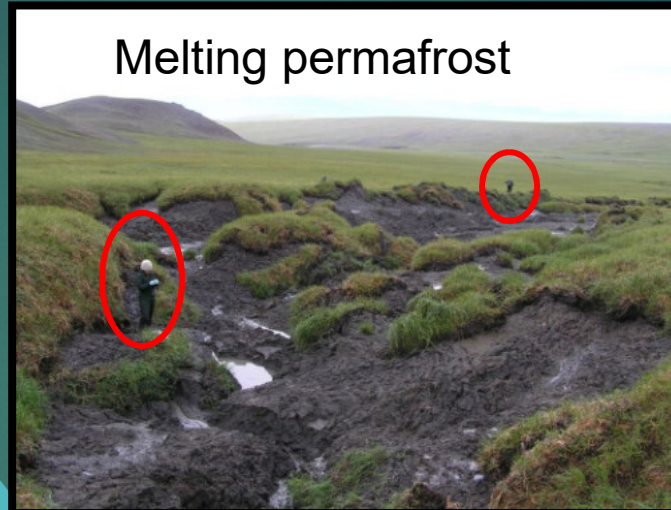


Impacts of Climate Change

Increase in Fire Frequency & Intensity



Melting permafrost



Vegetation Changes



Wildlife distribution and abundance



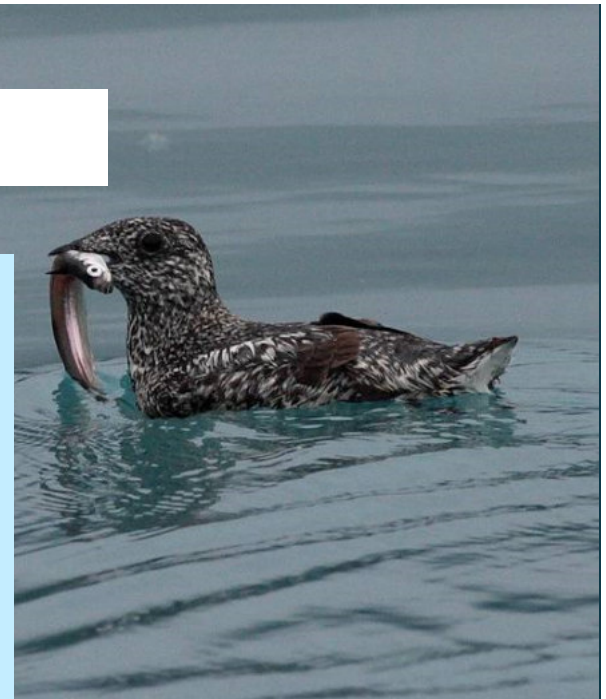
Migrating tree line



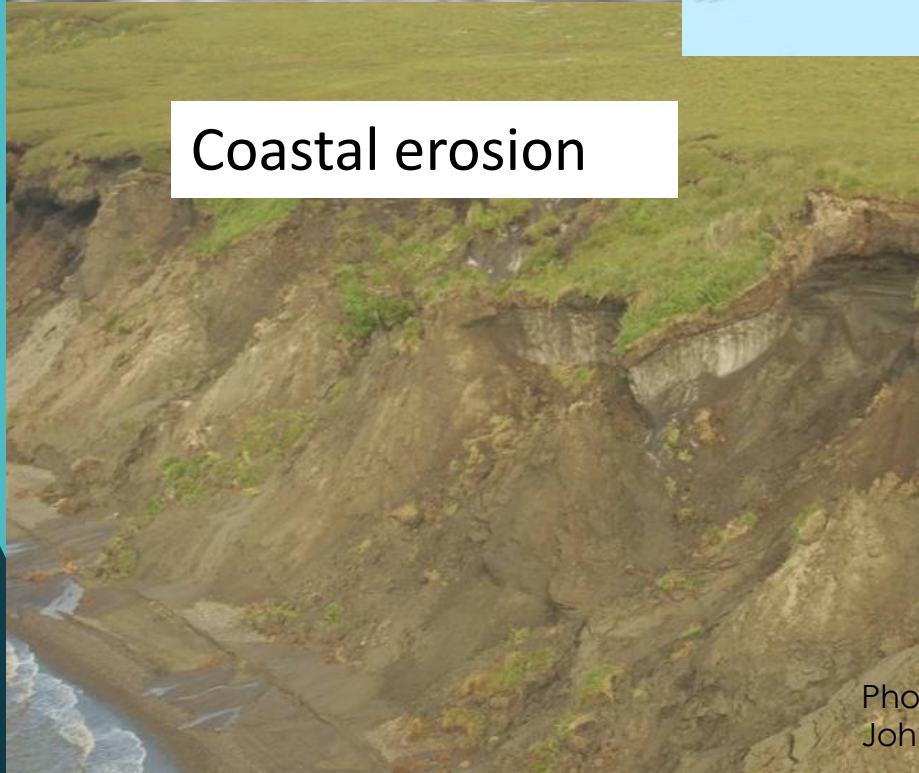
Changes in hydrology



Ocean warming, acidification



Coastal erosion



Extreme
weather
events

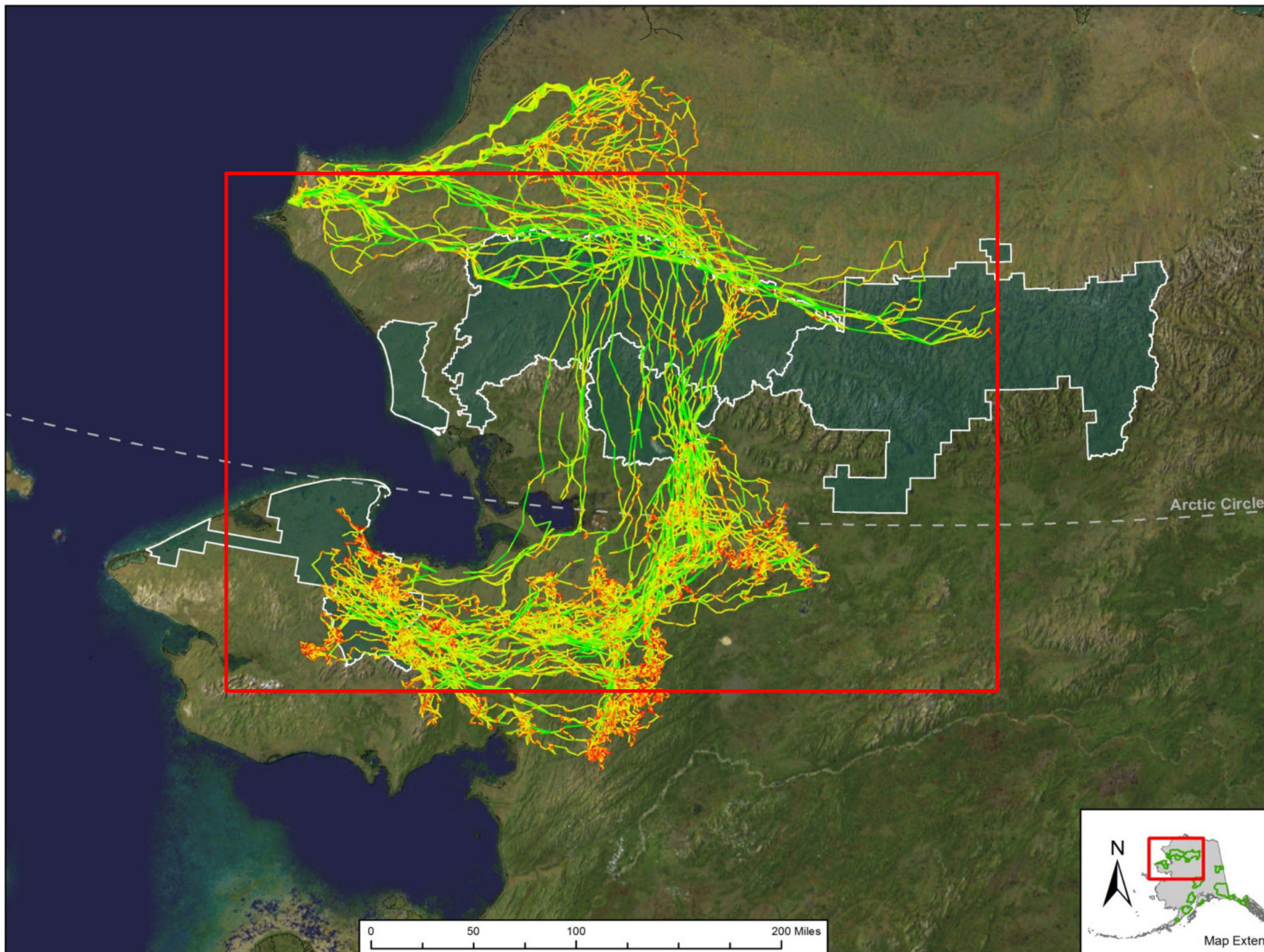


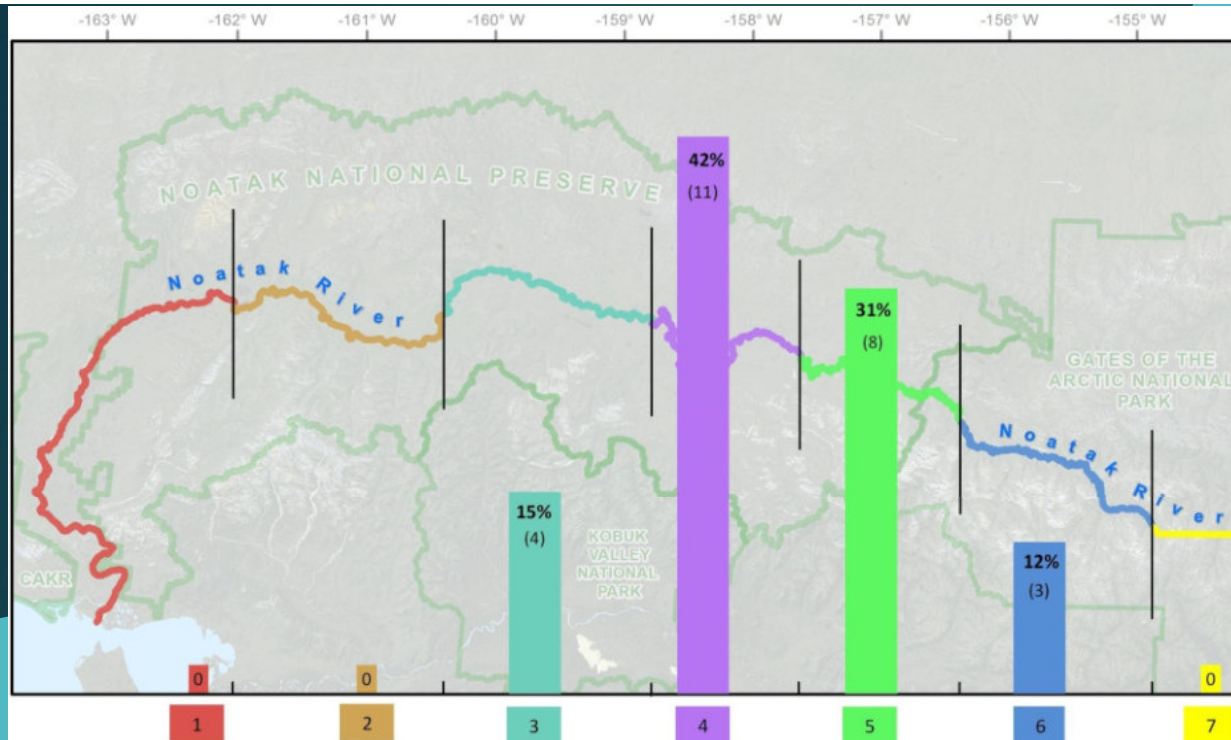
Photo by Marci
Johnson



Caribou Issues

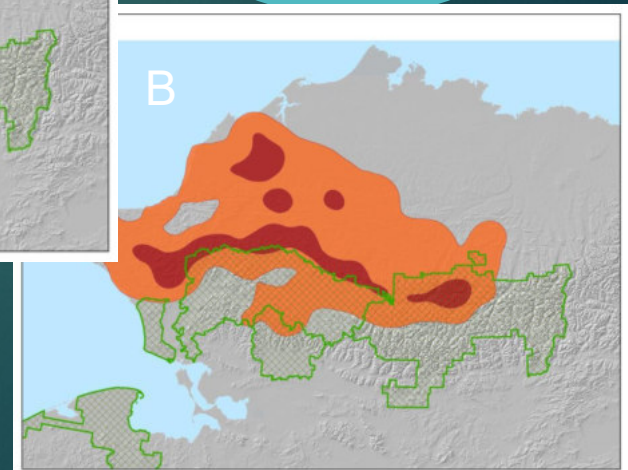
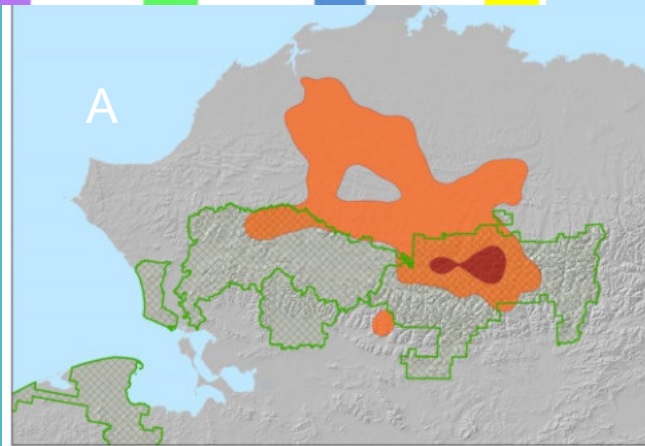
- WAH population changes (490K to 235K)
- Winter icing and extreme weather events becoming more common
- Shrub increase
- Are shrubivores (caribou, ptarmigan) mitigating shrub increase?
- Changes in phenology (migration, greenup, availability)
- Critical subsistence population – 40 villages 13k residents harvest 15k animals
- Sport hunting harvests 1k more.
- Habitat (fire, vegetation, snow, permafrost)



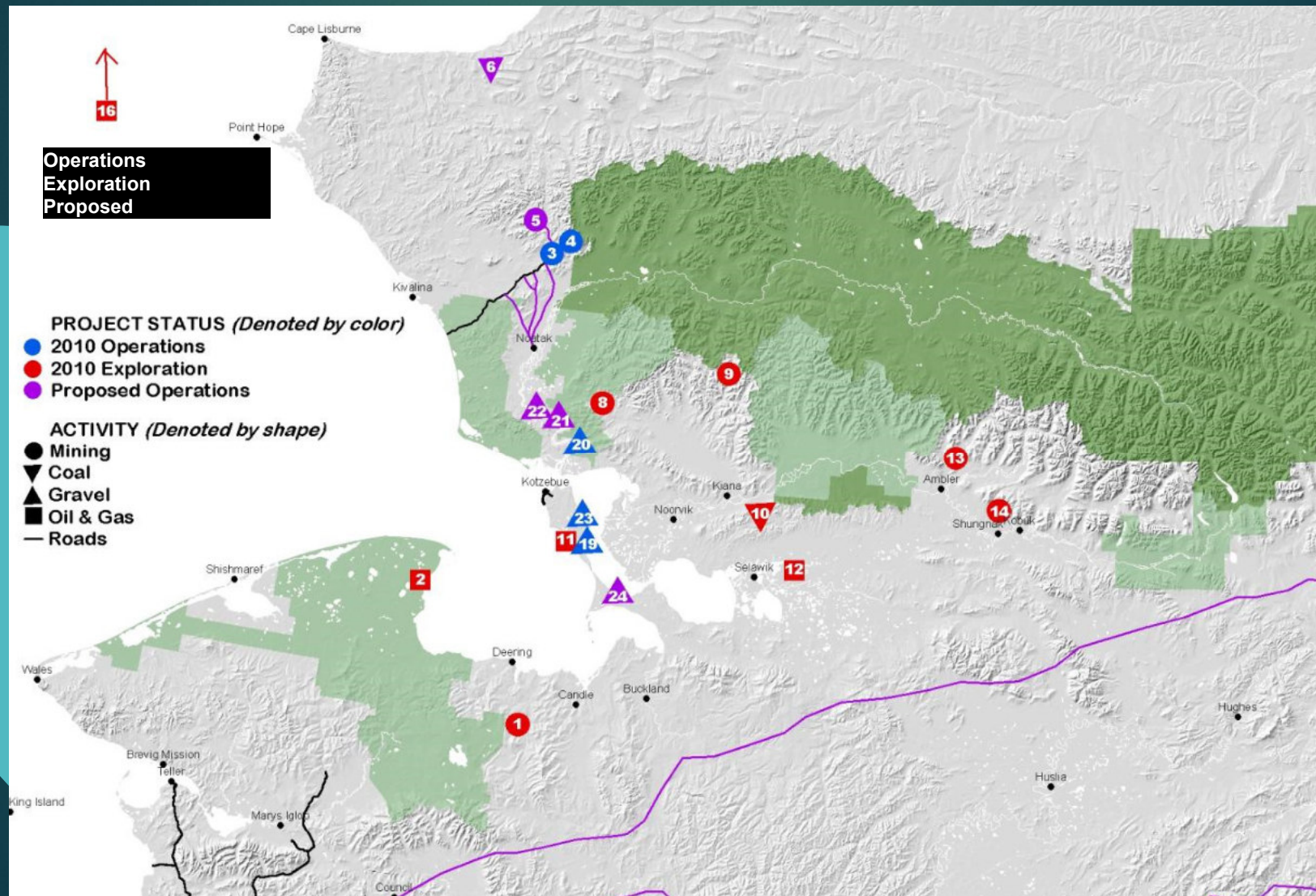


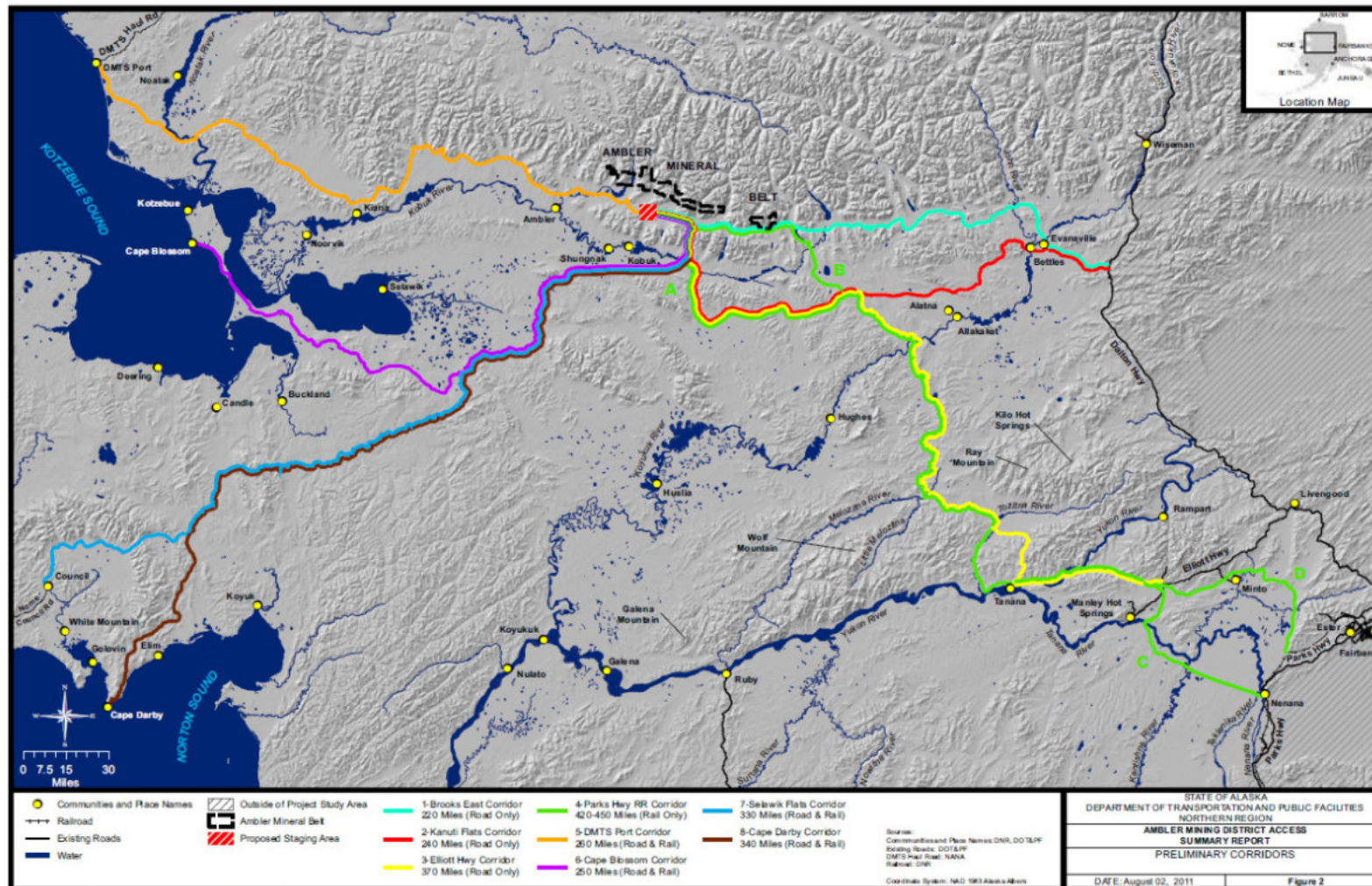
Caribou Crossing Distribution 2011

Late-summer (July 15-August 31) range use of Western Arctic Herd caribou. A) 2010. B) 2011. Light orange depicts the 95% kernel and dark orange the 50% kernel.

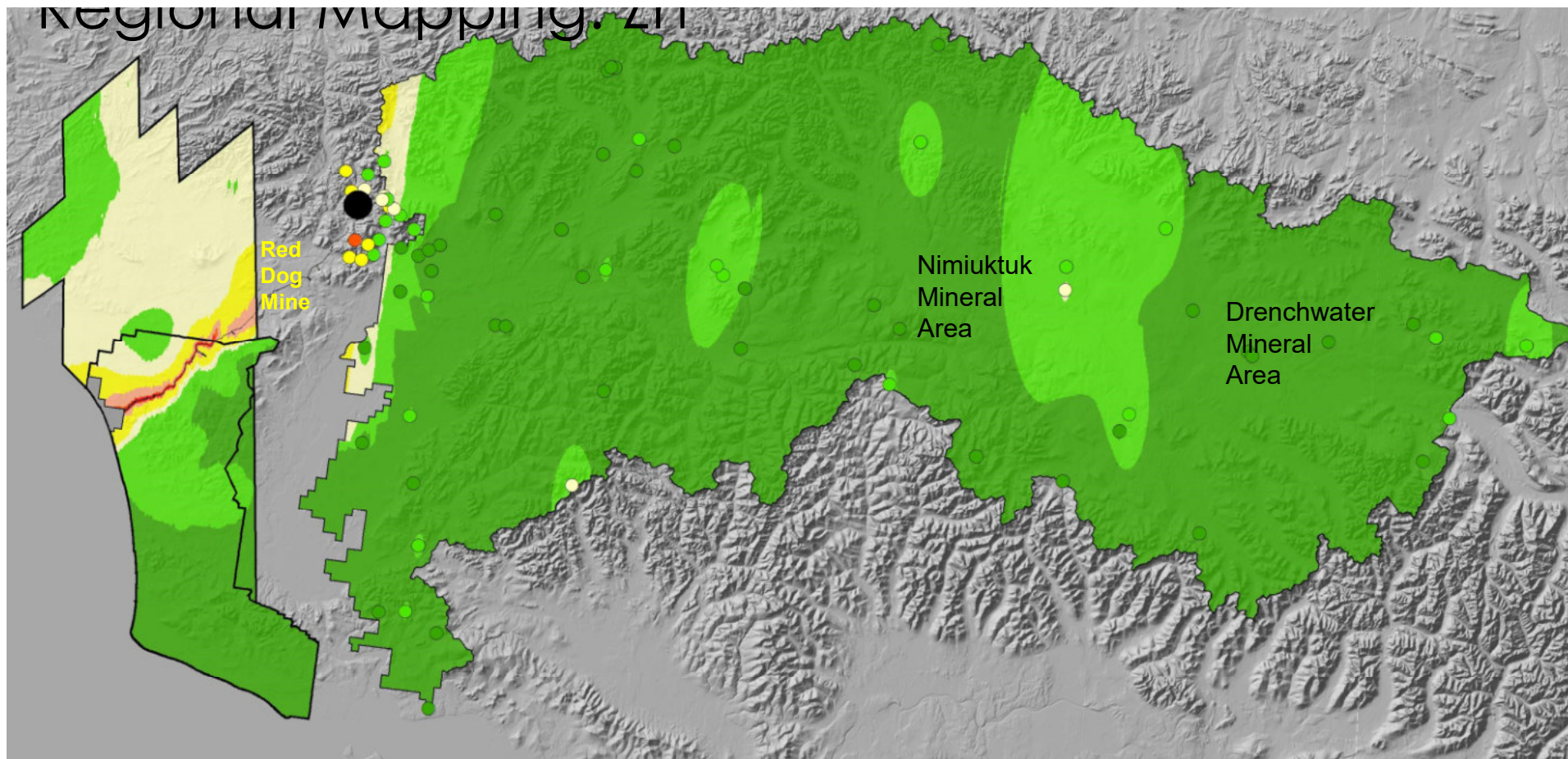


Northwest AK Development Projects

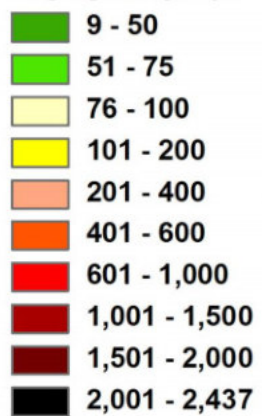




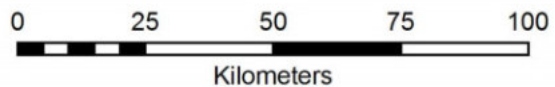
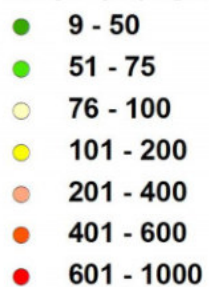
Regional Mapping: Zn



**Zn Interpolation
mg/kg in Hyl spl**



**Zn Concentrations
in Hyl spl (mg/kg)**



Traditional subsistence seasons – Coastal Inupiat

Season	Month/s	Description	Observed Change
Fur-Bearing Mammal Trapping	January	Trapping in the areas with shrub trees takes place for fur-bearing animals. Animals are in full-winter fur (very thick and perfect for use).	Fur Bearing Animals start to lose their winter fur earlier due to warming temperatures. Uncertainty in weather patterns deter people from leaving traps out for too long.
Winter Caribou, Crab, Shiifish, Ptarmigan	February, March	Caribou are hunted on the peninsula by snow machine. Crab sets are put out in the ocean off Sealing Point. Ptarmigan is hunted in the shrubs.	Variable weather conditions, weather is not consistent. Rain makes travel unsafe. Thin sea ice for crabbing. Caribou have a difficult time foraging under ice after rain, and move south to warmer areas for food.
Shiifish	April, May	People travel from Selawik, Noulak, Buckland and Kotzebue to fish for Shiifish through the ice. Nets can be set up as well to catch under the ice. Traditionally the ice is 4-6 feet thick.	Thin ice conditions prohibit people from traveling over the ice, also makes it unsafe for fishermen, shiifish season is shorter. Ice has been much thinner in recent years for net fishing under the ice.
Bearded Seal, Seal, Ducks, Geese, Seagull/Murr Egg gathering, Beach Greens	June, July	Sea ice breaks up and hunters leave to hunt bearded seal and seal species. Also Spring waterfowl hunting takes place, and Egg gathering from Seagulls and other waterfowl. Murr eggs must be gathered from the cliffs off Elephant Point. Beach Greens are gathered to provide roughage in Seal Oil and added nutrients to our diet.	Poor ice conditions make the window to catch bearded seal unsafe, Bearded Seal is one of our main sources of protein, and the oil is our main source of Omega 3. Very little time to hunt safely on the sea ice. Waterfowl are arriving earlier and it is unsafe to travel to catch them in the Spring. It is difficult to collect Seagull Eggs because the ice is too thin to travel on, and the boats can not get to them. Murr only nest on the Cliffs, it is difficult to get to them due to warming temperatures, and they nest earlier than in the past. Beach Greens are growing sooner than normal, so we have to pick them earlier.
Some Summer Caribou, Ocean Chum Salmon, Arctic Char, Whitefish, Berries, Greens	August	Caribou often come down to the coast in summer and can be hunted by boat. Salmon Season is abundant both for Commercial Fisherman and Subsistence Fisherman. Arctic Char and King Salmon are also caught in subsistence and commercial nets. None of this goes to waste. Four major types of berries are gathered in late July – August – September. Berries provide most of the vitamin C, and antioxidants we need throughout the year. Greens are gathered during this time to cook and place in seal oil, or freeze for later use.	Caribou herd has declined, Summer caribou is rarely hunted. Salmon have warm-water parasites now that we have not seen before. The Weather is very warm, which dries the fish quickly on the outside, but the inside doesn't dry which is a health hazard. Berries have been abundant due to the warm temperatures, but the lack of snow to water them at the beginning of the year is seen in smaller berries.
Fall Caribou, Moose, Fall Ptarmigan,	September	Hunting for caribou until freeze up. This is when everyone catches the majority of their caribou for the	Delayed caribou arrival. The decline in the herd is due to warming temperatures and the lack of food that is easily foraged

Source:
Maija Lukin

September

Fall Caribou, Moose, Fall Ptarmigan, Muskox

Description - Hunting for caribou until freeze up. This is when everyone catches the majority of their caribou for the winter and processes it for many different dishes. Falltime Moose is hunted now as well, one moose can feed more than one family. Also, people are hunting ptarmigan and other birds. Musk Oxen is hunted on the Seward Peninsula, outside Deering. Only a few are hunted near Sisualik/Sealing Point.

Observed Change - Delayed caribou arrival. The decline in the herd is due to warming temperatures and the lack of food that is easily foraged in the winter. We have put limitations on our own people to increase the herd numbers. Moose forage in the cool weather, because of warming temperatures, they move further north or come to the coast further into the rut. Ptarmigan are turning color later into the fall, due to warm temperatures. Musk Oxen show greater numbers near Sisualik/Sealing Point.

Source:
Maija Lukin

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