

Kanuglu Tuttulu: Potential Impacts of Ikpikpuk Snow Geese on Teshekpuk Caribou Herd's Insect Relief Habitat on the Teshekpuk Lake and Ikpikpuk River Delta

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Background

The Arctic is home to caribou, moose, fish, migratory birds, bears, and marine mammals. The Arctic region is experiencing climate change at a rapid rate causing an increase of Arctic vegetation and a decrease of sea ice extent. Arctic vegetation growth is modifying faunal distributions and fluctuating faunal populations. Caribou seek locations with cold winds and waterbodies to escape from intense summer heat. Overpopulation of insects causes caribou to become sick, destroy fur, and irritate the caribou's foraging and calving (Witter et al. 2012). Since 1999, biologists noticed a rapid increase in the Ikpikpuk Snow Goose population. The population increase contributed to changes in habitat and food availability in the Arctic and the Lower 48 (Burgess et al. 2017). The Teshekpuk Caribou Herd and geese are important food sources for subsistence hunters and community members in the North Slope. Gaining a greater understanding of the impacts of increasing Lesser Snow Goose populations in sensitive habitats will be critical for future planning and management under projected climate change.

Research Question: How will the increasing Ikpikpuk Snow Goose population affect the Teshekpuk caribou herd's insect relief habitat in the Teshekpuk Lake and Ikpikpuk River Delta?

Lesser Snow Goose and Caribou

Lesser Snow Goose (*Chen caerulescens caerulescens*)

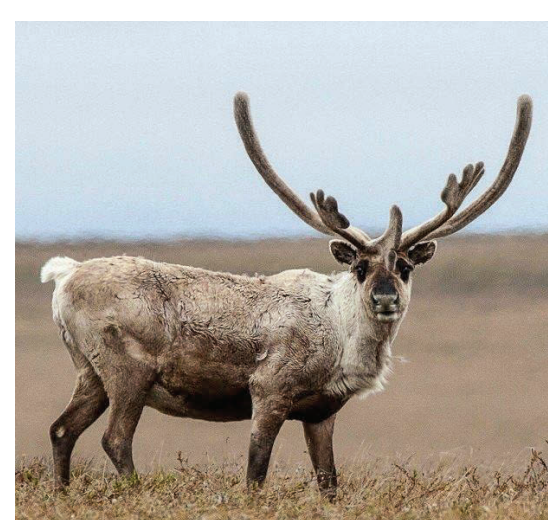
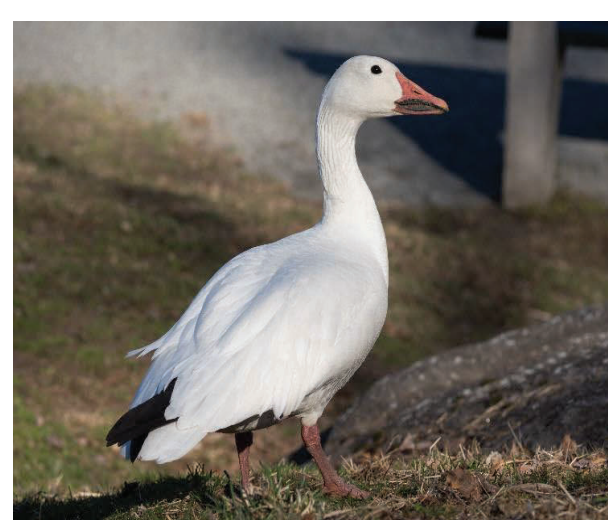
Inupiaq name: Kanuq

- Distribution: Lesser Snow Geese are migratory, spending the summer on the tundra by marshes, grain fields, lakes, ponds, and bays, and overwinter in California, Gulf Coast of Louisiana, Texas, and the Atlantic Coast
- Diet consists of seeds, leaves, and roots of wild grasses, sedges, bulrushes, and horsetail. Lesser snow geese feeding habits can prohibit regrowth of plants, which can alter ecosystems (Kaufman, 2014).
- Ikpikpuk Snow Goose colony nest, molt, and breed around the Ikpikpuk River and the Teshekpuk Lake (Figure 3).
- Since 1995, the Ikpikpuk Snow Goose population increased by 10,222%.

Caribou (*Rangifer tarandus granti*)

Inupiaq name: Tuttu

- Distribution: Teshekpuk caribou herd (TCH) is at the Teshekpuk Lake area year-round. Since caribou are sensitive to weather changes, TCH move to locations along the Teshekpuk Lake and Ikpikpuk River for better calving grounds, foraging, and insect relief.
- Summer diet consists of leaves from willow, sedges, flowering tundra plants, and mushrooms. In the winter, caribou eat lichen, moss, dried sedges, and small shrubs (Audubon Alaska, 2019).
- The cool winds, low vegetation or TCH preferred vegetation, and water availability provide insect relief for the TCH (Figure 4).



Study Area



Figure 1. Map of Alaska. Study site is located in the yellow box.

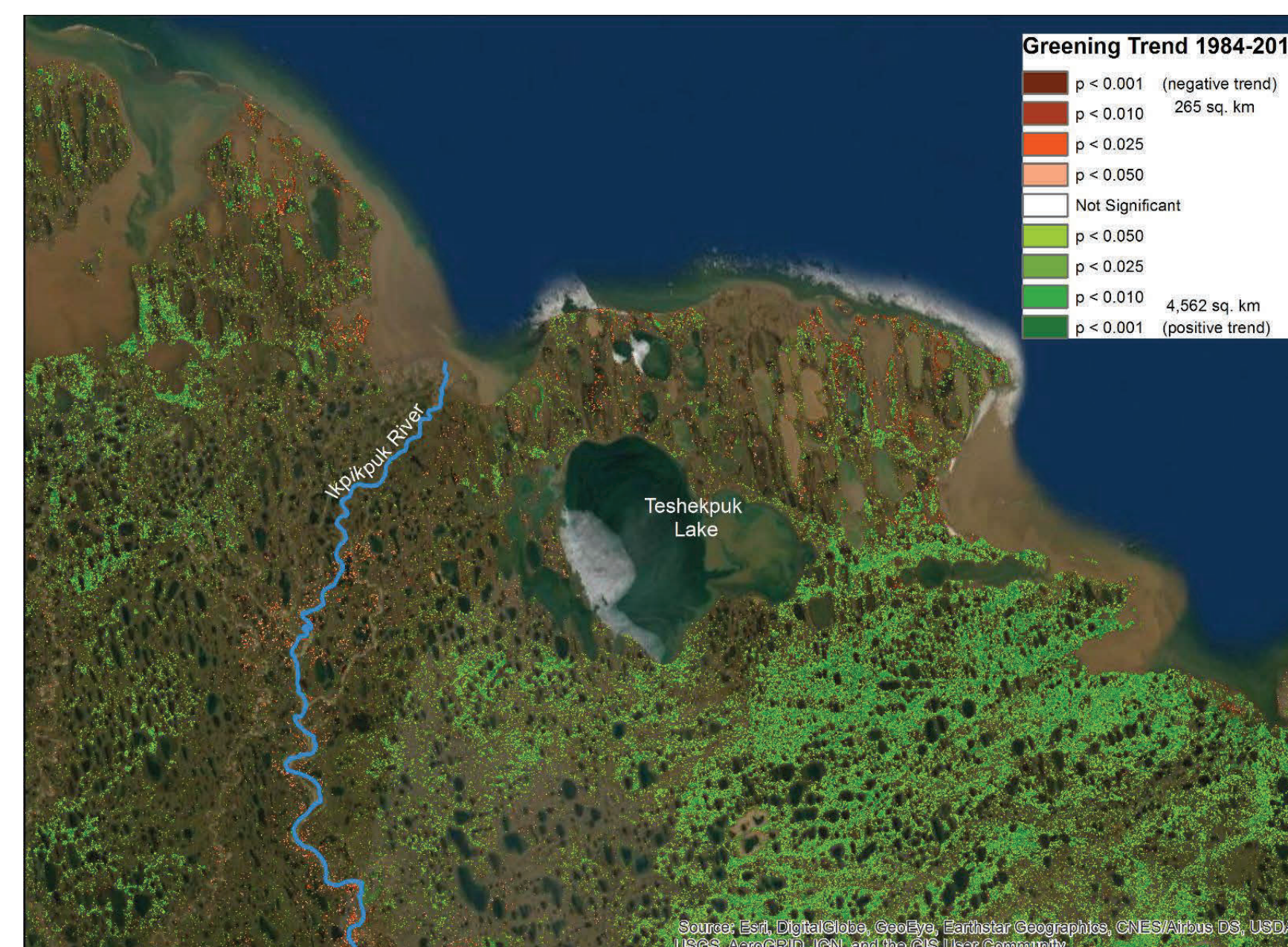


Figure 2. Map indicates study area of Ikpikpuk River Delta and Teshekpuk Lake. Green regions indicate vegetation growth of 4,562 square kilometers and brown/orange regions indicate vegetation loss of 265 square kilometers. The p-values indicate significance of growth.

Distribution Maps

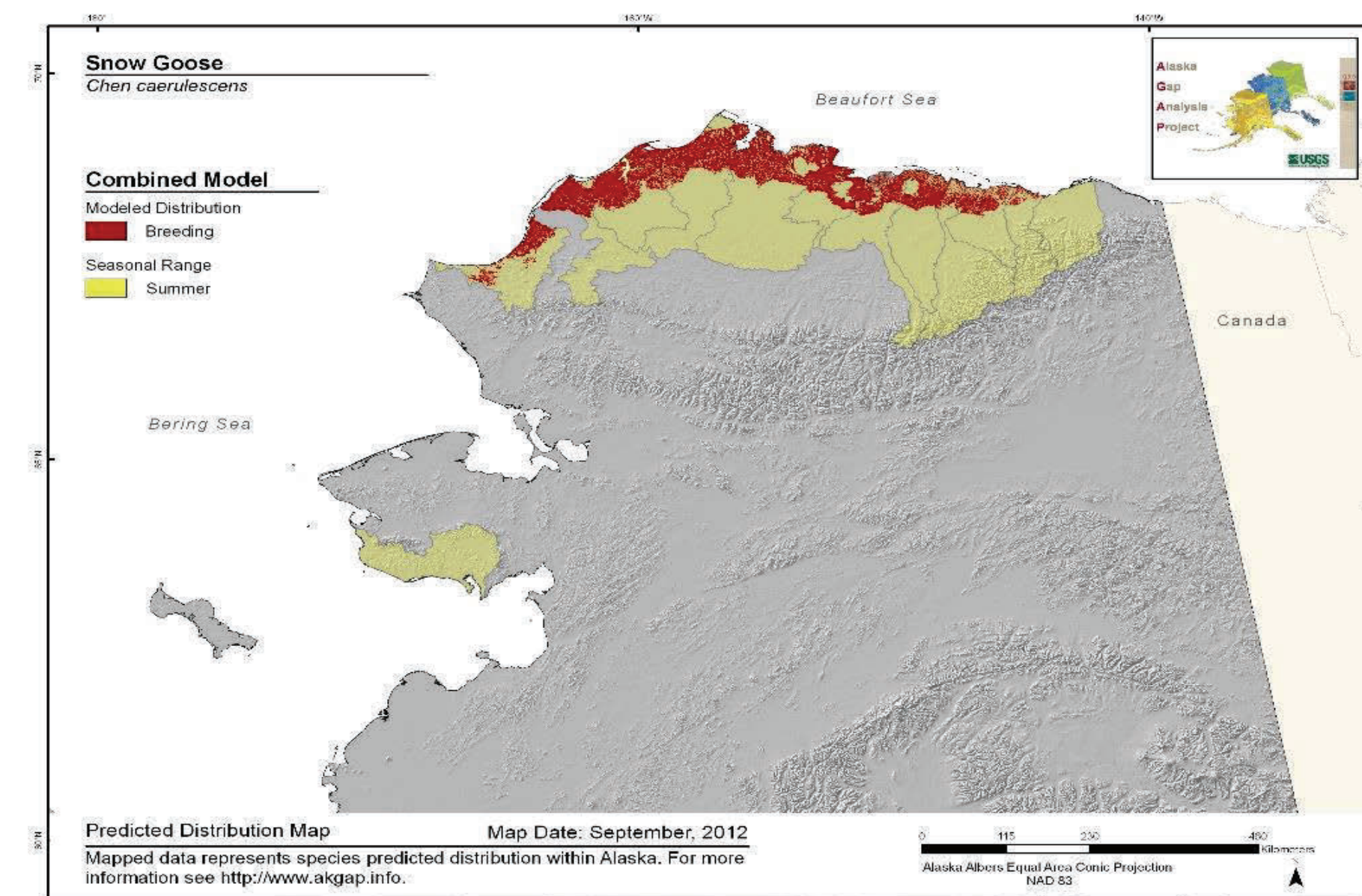


Figure 3. Ikpikpuk Snow Goose breeding and summer range distribution map. (AK Gap, 2012)

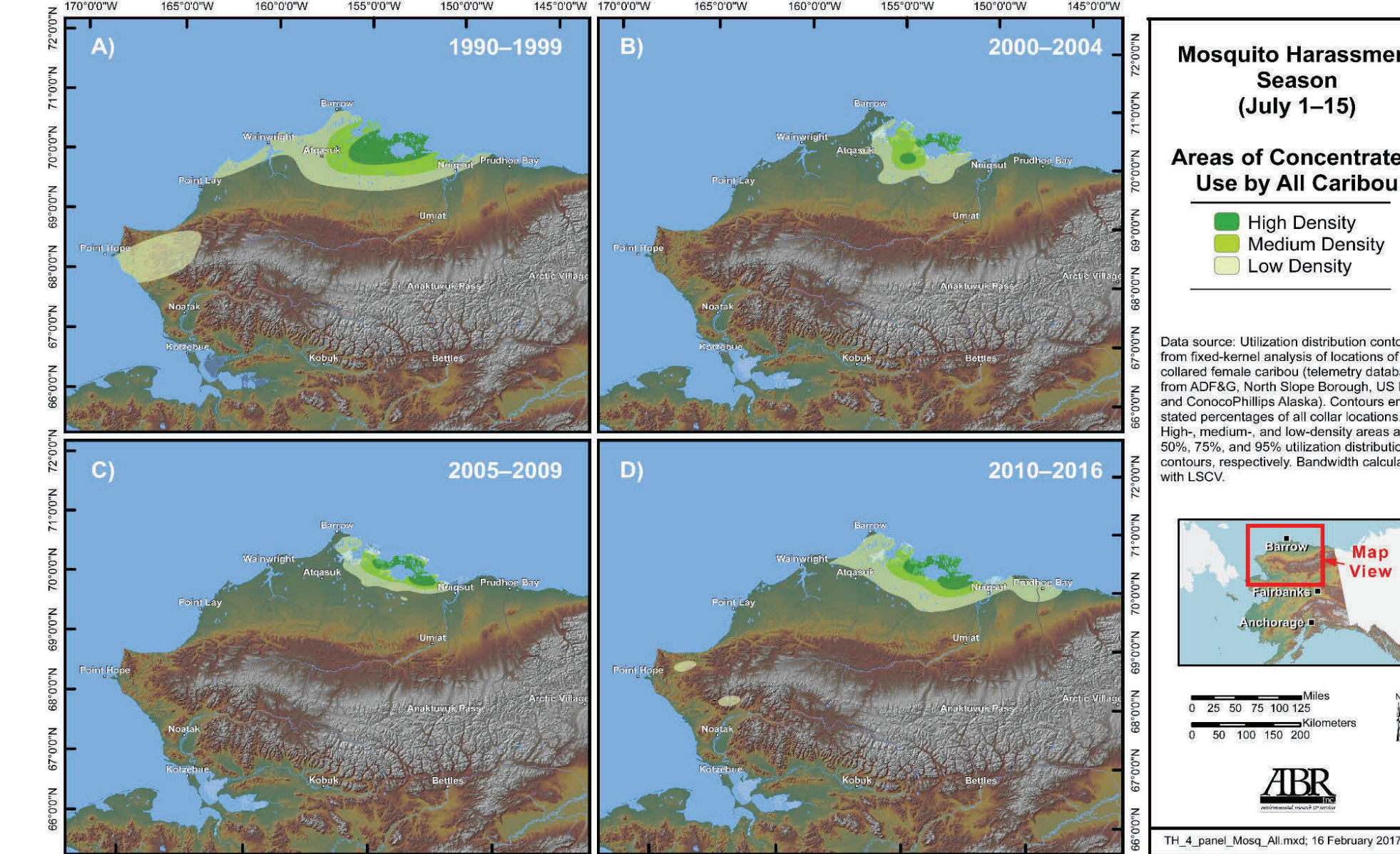


Figure 4. Teshekpuk Caribou insect relief distribution from 1990-2016 (ConocoPhillips Alaska et al. 2015)

Kanuq Population and Potential Effects to Tuttu Insect Relief

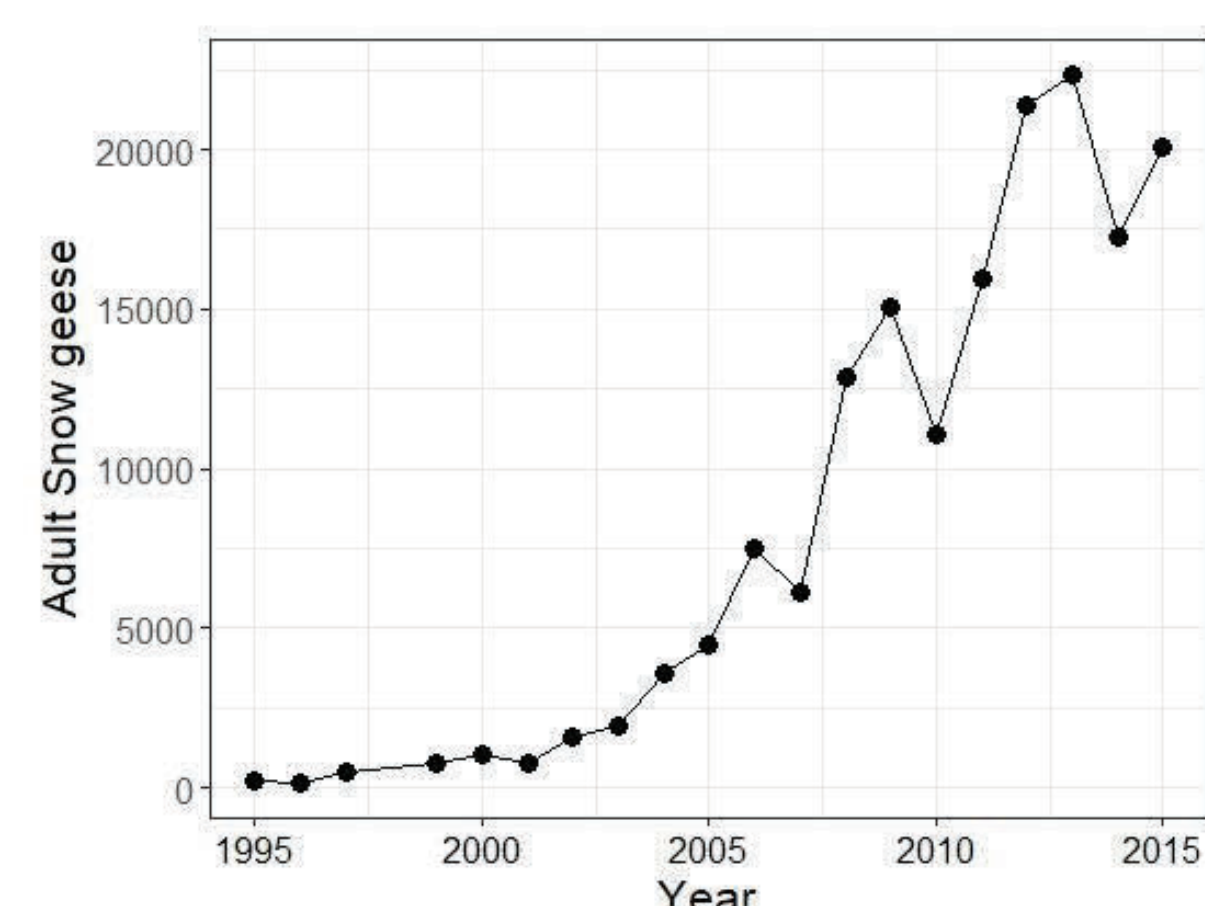


Figure 5. Population growth of adult Ikpikpuk Snow Geese from years 1995-2015

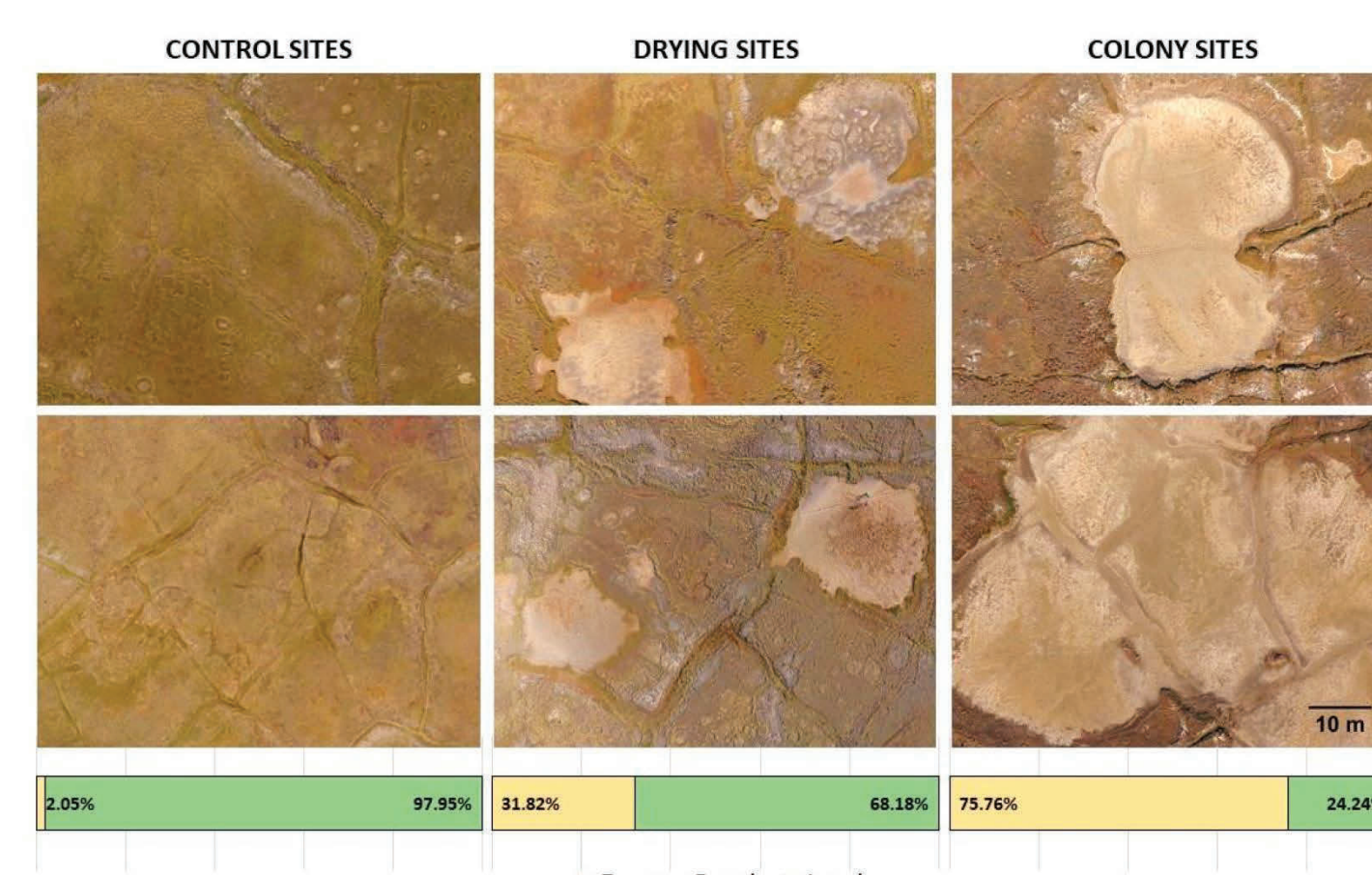


Figure 6. Results of overabundant snow geese in high Arctic lakes and ponds in Canada. The bars below the image indicate proportion of field transects classified as former pond basins and land (Campbell, Lantz, and Fraser 2018).

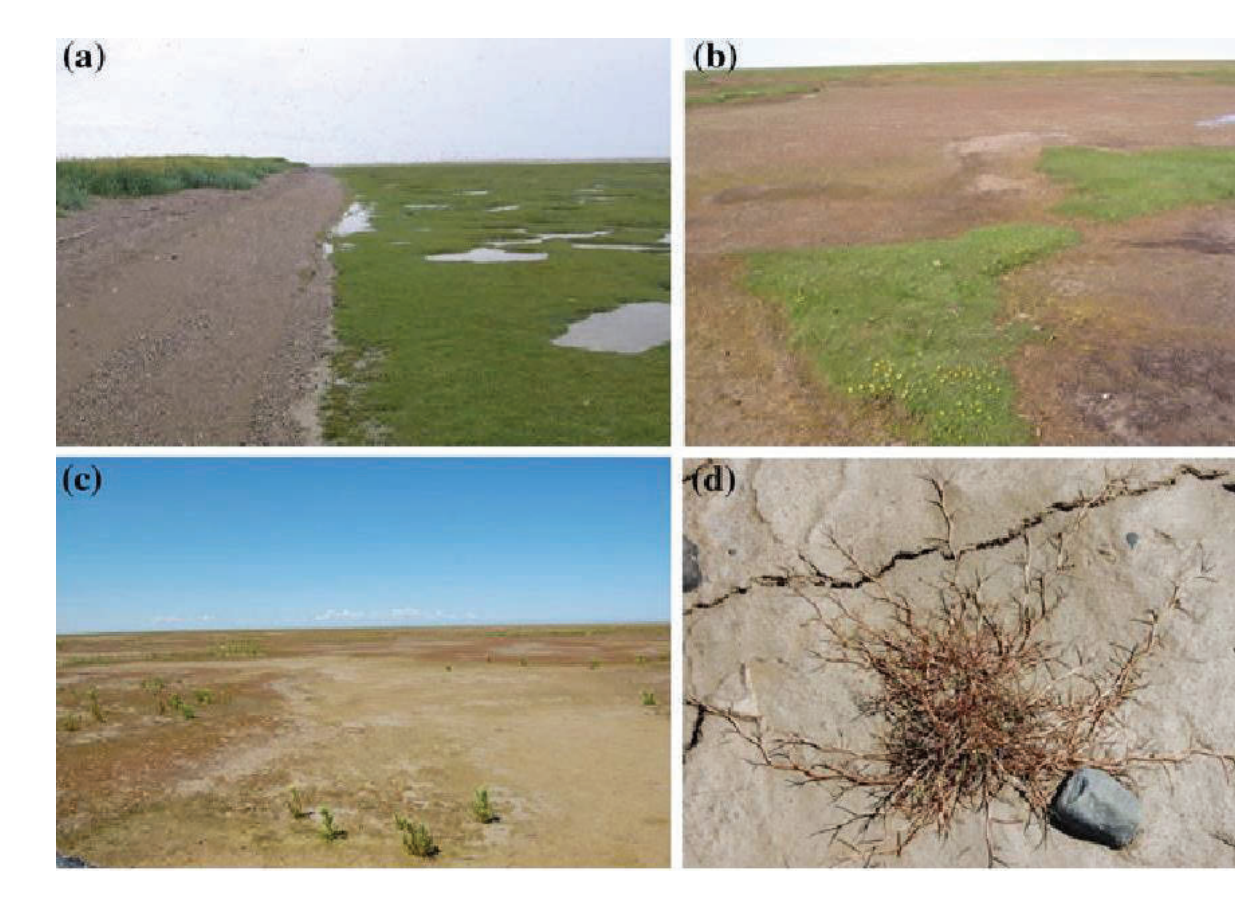


Figure 7. Results of grazing snow geese in Hudson Bay Lowlands in Canada: a) no snow geese present; b) snow goose brood-rearing location; c) barren-ground from (a); d) barren-ground from (b) (Kotani and Abraham 2013)

Potential Impacts: The rapid increase of Ikpikpuk Snow Geese (Figure 5) alters Teshekpuk Caribou's insect relief habitats by creating plots of barren-ground (Figure 7). Caribou's preferred vegetation will become less abundant, water will dry up (Figure 6), and near-surface ground temperatures will rise, causing insect populations to increase. The loss of insect relief habitats could shift the caribou's distributional patterns or make caribou ill, which is a problem for subsistence hunters.

Discussion

The increasing Ikpikpuk Snow Geese population in the Teshekpuk Lake and Ikpikpuk River region are exacerbating climate change impacts on tundra and soil. In coastal Arctic regions, vegetation shifts resulting from climate change and avian herbivores impacts both the land and sea (Bhatt et al. 2010). If Snow Geese are contributing to drying waterbodies and raising Arctic temperatures (Schreiber 2019), the Teshekpuk Caribou Herd will have less resources for insect relief. Lesser Snow Geese are not only an issue in Alaska's North Slope, but also in the Northwest Territories. The increased nesting colonies of Lesser Snow Geese in the Northwest Territories altered microtopography, near-surface ground temperatures, and water retention (Campbell, Lantz, and Fraser 2018). Furthermore, Lesser Snow Geese contributed to the population decrease of lemmings and voles (Samelius and Alisauskas 2009). To see if snow geese impacts other migratory animals in the Arctic, further studies could be focused on the nesting distribution and density.

Conclusions

It is critical to understand how Arctic animals interact and respond with their habitats to a changing climate. The Lesser Snow Geese are a threat to ecosystems because of the cumulative effects of vegetation loss and water resilience. The potential caribou habitat alterations caused by snow geese will disrupt regular caribou distributions. Caribou distribution changes make subsistence hunting challenging because the caribou are less accessible to hunters.

Policy Recommendation: Subsistence hunters, community members, and waterfowl hunters in the Lower 48 should create and enforce regulations on snow goose harvest in order to reduce vegetation loss and stabilize water availability in the Arctic and the Lower 48.

References

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