

Arctic Beaver Observation Network and the future of lowland tundra ecosystems

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Beavers affect all aspects of lowland ecosystems

- Permafrost hydrology
- Carbon cycling
- Water quality
- Fish
- Biodiversity
- Invertebrates, food webs
- Boat access
- Riparian vegetation

UAF, February 2024



Arctic Beaver Observation Network

Pan-Arctic coordination of

- Research
- Indigenous Knowledge
- Management



Arctic Beaver Observation Network Feb 2024 Meeting



University of Alaska Fairbanks





Seward Peninsula, western Alaska



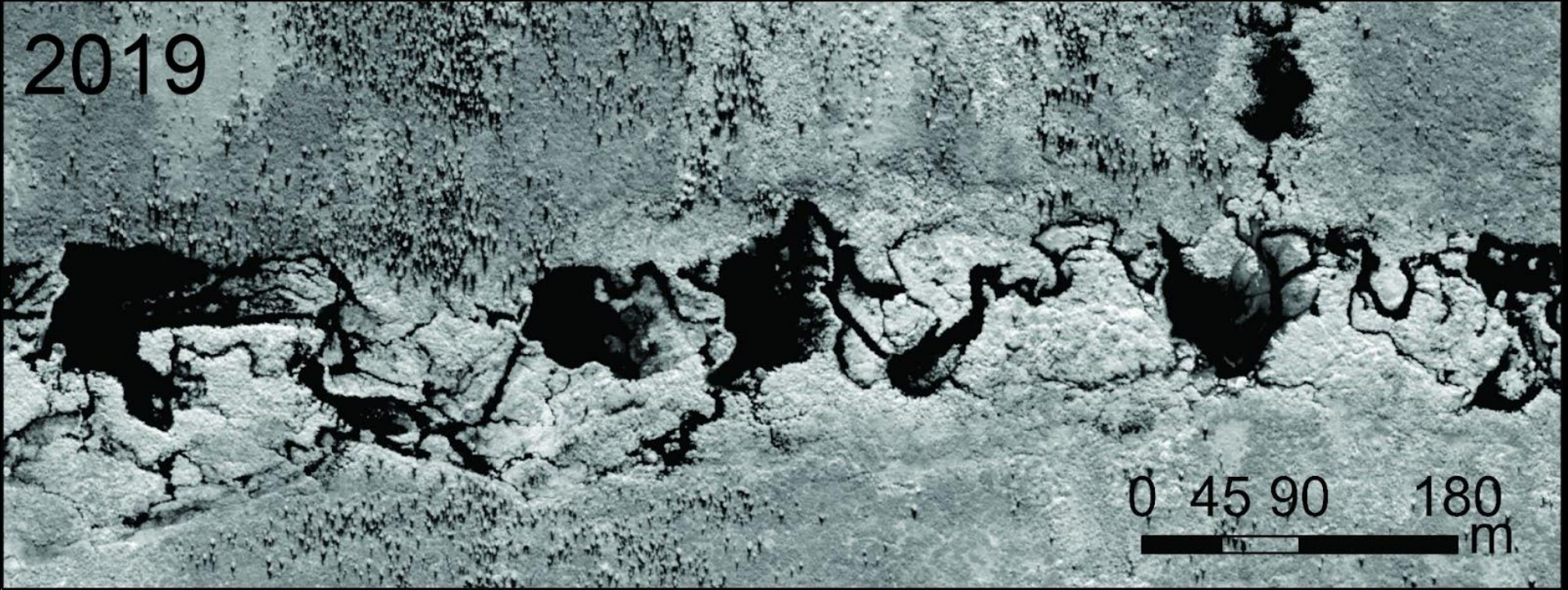
Denali Highway, Alaska

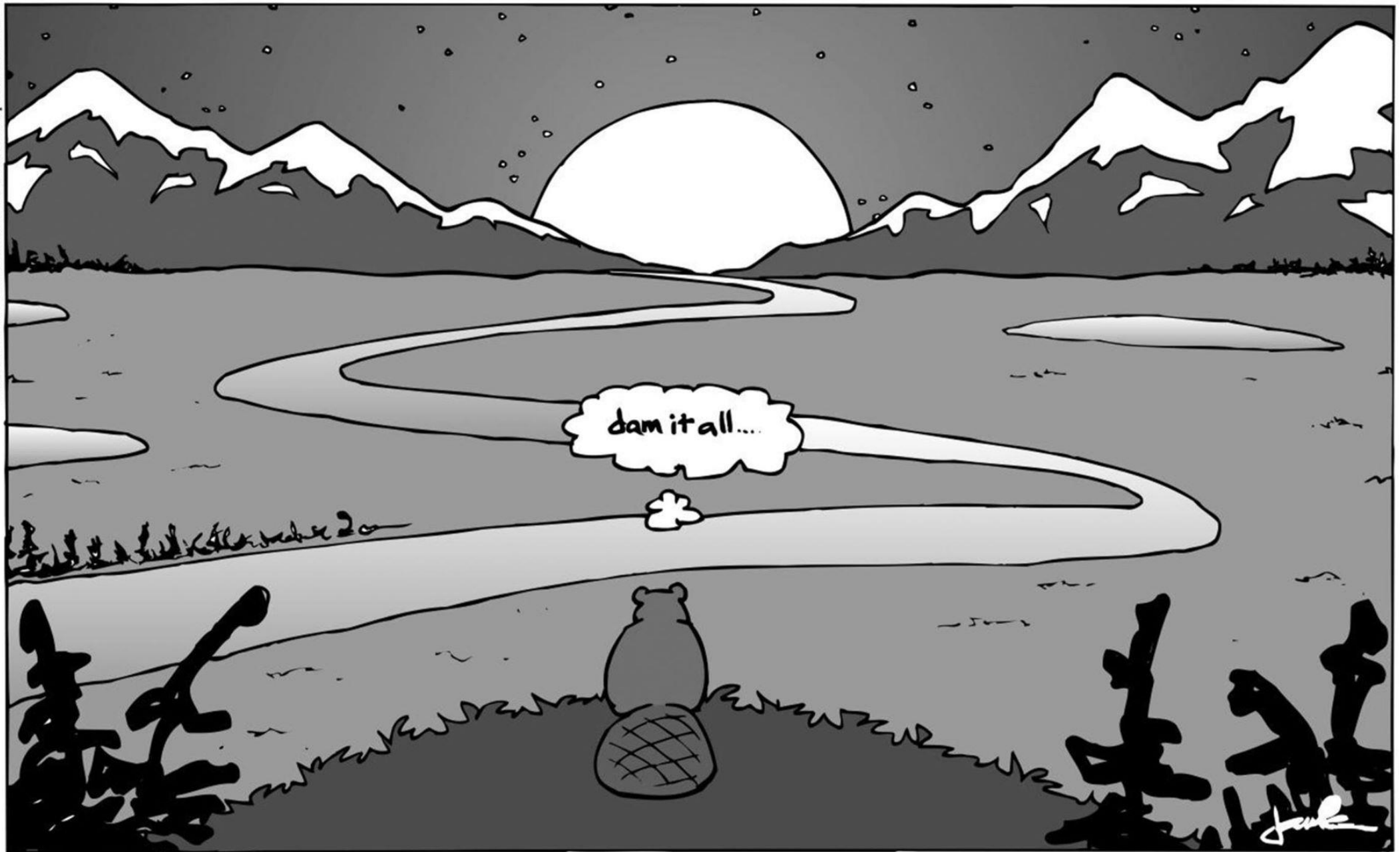


1980



2019





the Humble Beaver pauses to reflect upon the Infinite Mysteries of Life...

2003

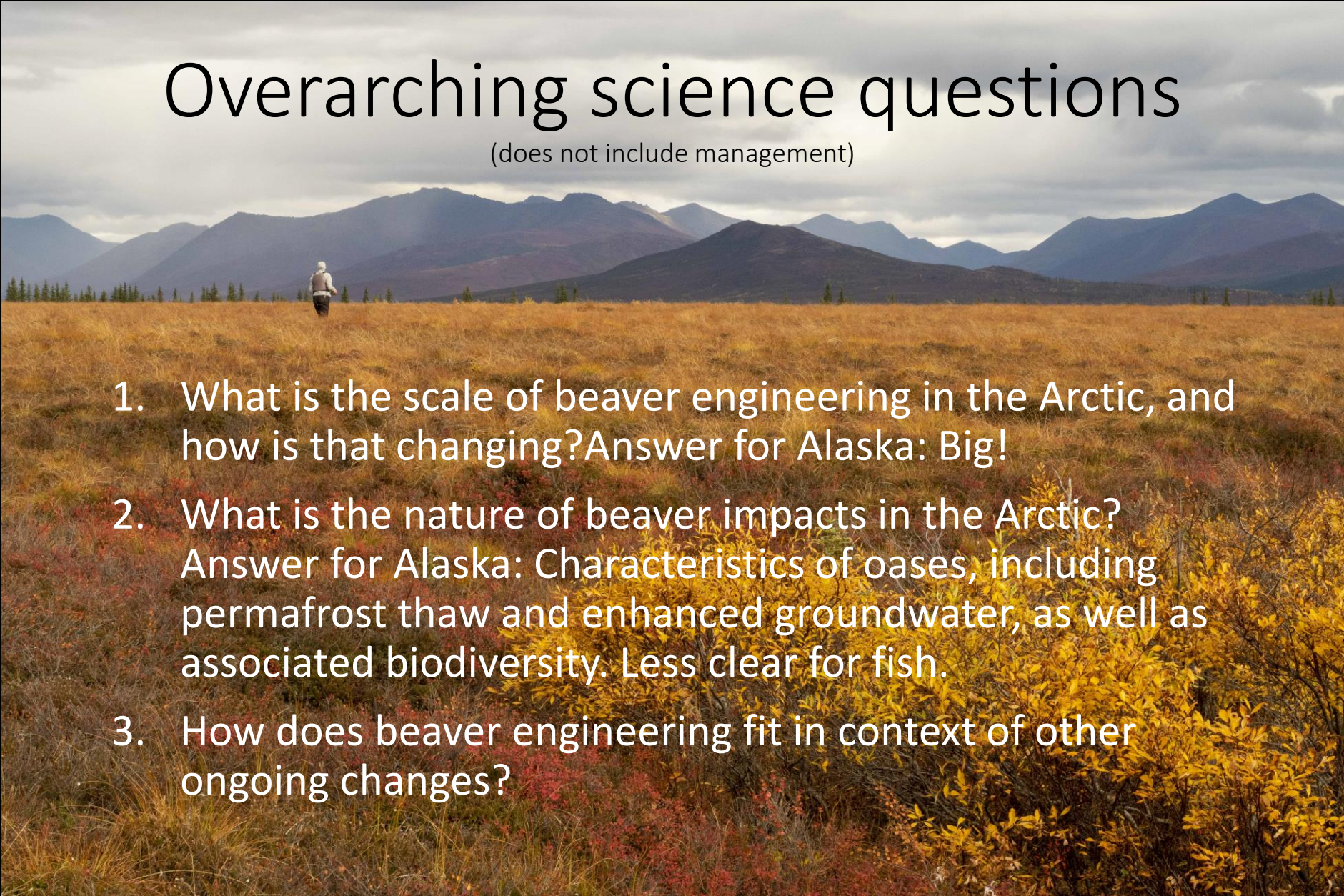
2016



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Overarching science questions

(does not include management)

- 
- A photograph of a vast, open landscape. In the foreground, there is a field of tall, dry grass and some low-lying shrubs with yellow and red leaves. In the middle ground, a person is standing, looking out over the landscape. In the background, there are several mountain ranges under a cloudy sky.
1. What is the scale of beaver engineering in the Arctic, and how is that changing? Answer for Alaska: Big!
 2. What is the nature of beaver impacts in the Arctic? Answer for Alaska: Characteristics of oases, including permafrost thaw and enhanced groundwater, as well as associated biodiversity. Less clear for fish.
 3. How does beaver engineering fit in context of other ongoing changes?

Indigenous Knowledge

- A-BON works with communities of Shungnak, Kotzebue, Nome, Selawik, Noatak (Alaska) + Inuvik (NWT), and Ungava Bay (Nunavut)
- Knowledge co-production examining many of the same issues already mentioned, focus on WQ and fish

What is the nature of beaver impacts in the Arctic?

Paige Kehoe, UAF
carbon cycling

Rodrigo Rangel
Univ Toronto
subsurface imaging

Mike Loranty
Colgate
ecosystem processes

Katey W. Anthony
UAF, methane
(not pictured)

Will Samuel, UAF
fish biology
(not pictured)

Tom Glass, UAF
groundwater ecology
in permafrost

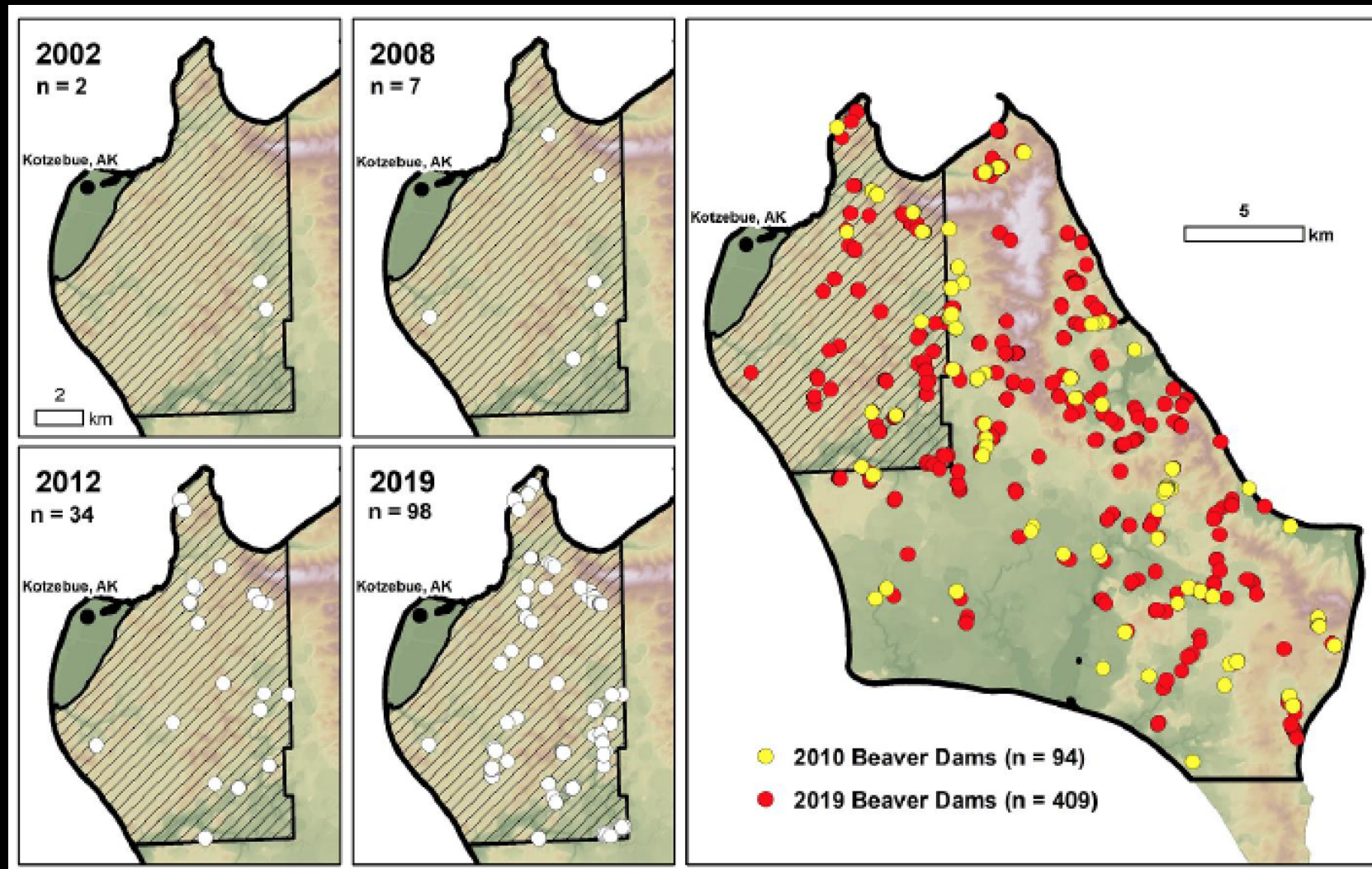
Sebastian Zavoico, UAF
biodiversity

Ben Jones, UAF
permafrost

Emily Graham, UAF
permafrost
(not pictured)

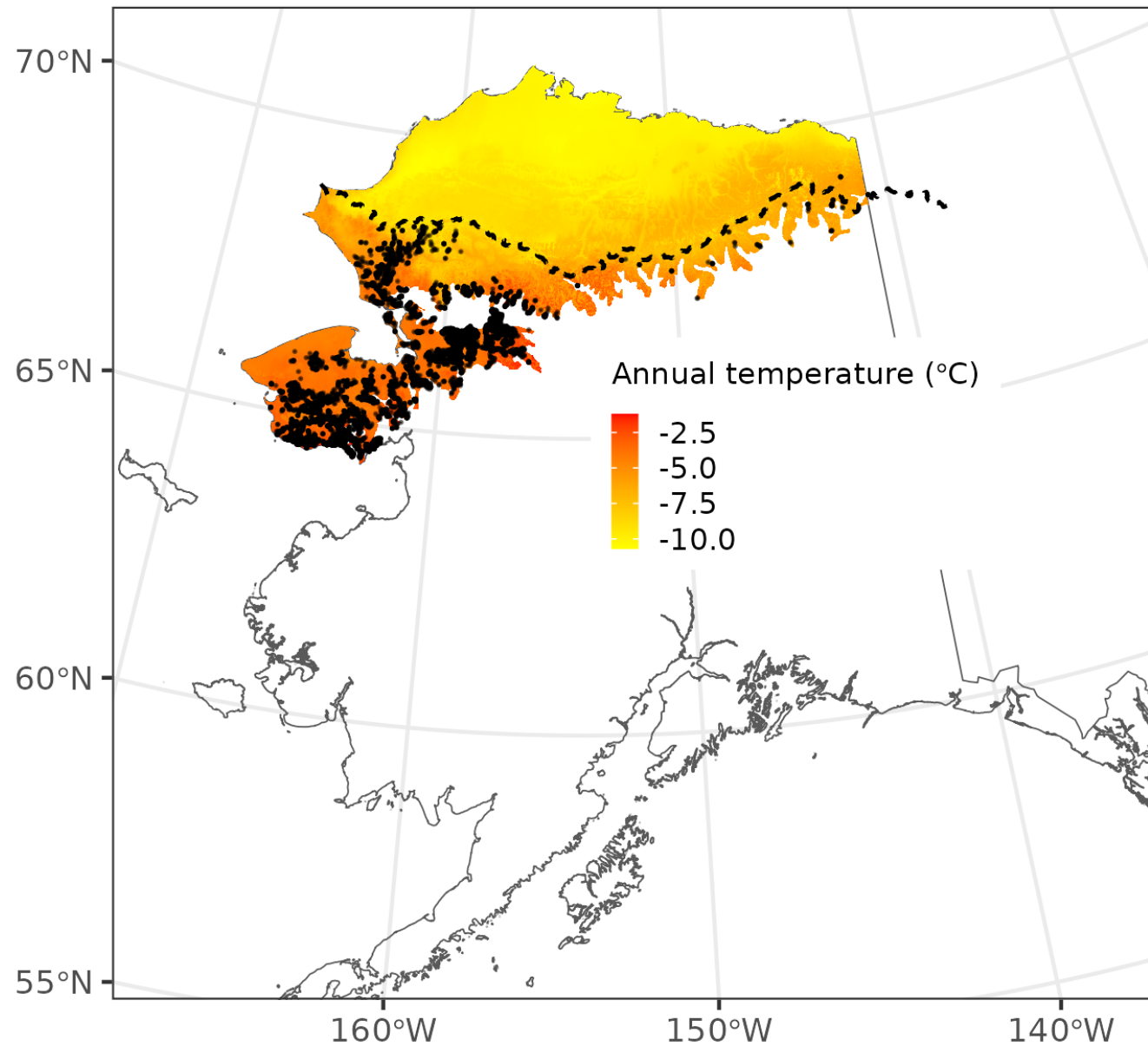


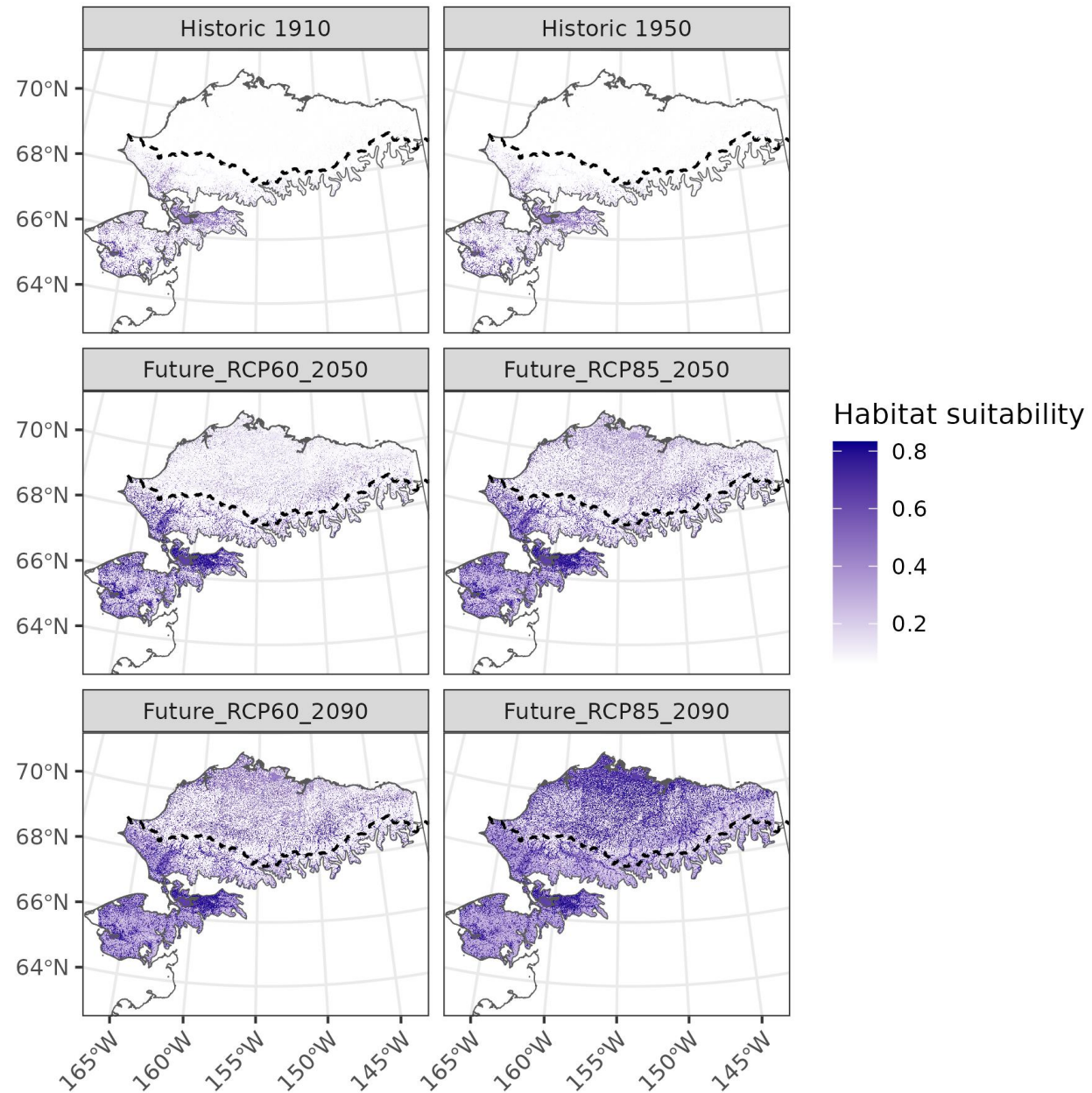
Increase in beaver ponds near Kotzebue, 2002-2019



Jones, BM, KD Tape, I Nitze, JA Clark, J Disbrow, G Grosse, 2020. Increase in beaver dams controls surface water and thermokarst dynamics in an arctic tundra region, Baldwin Peninsula, NW Alaska. *Environmental Research Letters*.

Distribution of >12,000 beaver ponds in western Alaska
Doubling of beaver ponds from 2003 to 2017





Modeling: Entire North Slope colonized by 2050 under RCM 8.5, initial colonization under RCM 6.0

Environmental factors determining beaver dam establishment and persistence in the Arctic

- Freezing Degree Days (-)
- Rate of vegetation green-up (-)
- Mean June temperature (+)
- Median weekly river(+) discharge during summer
- Percent shrub cover (+)

= WARM, WET, & LUSH

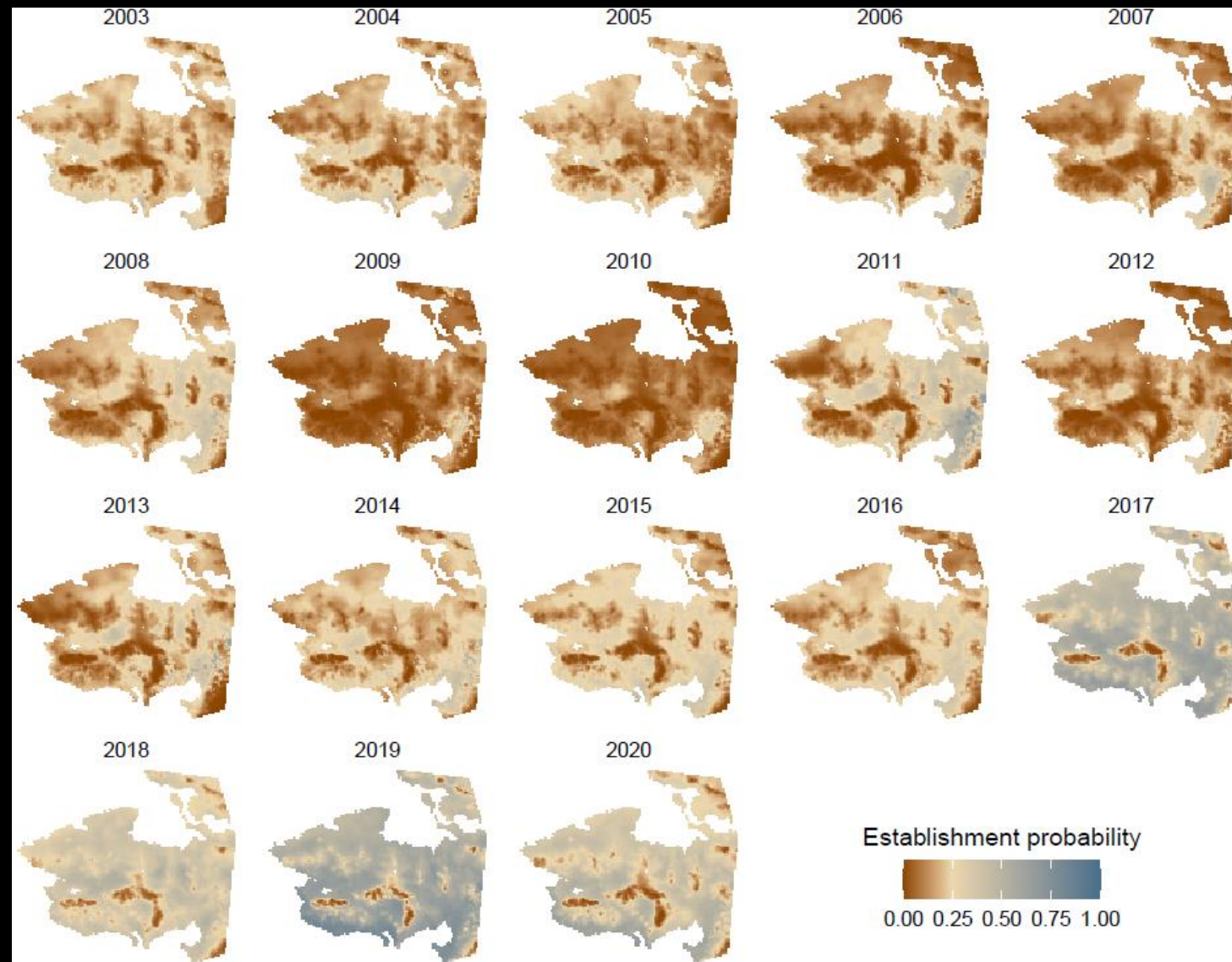
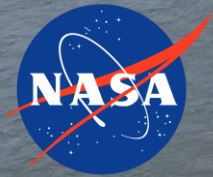


Figure 8. Mean modeled probability of a new beaver pond being established on the Seward Peninsula and surrounding areas in Northwest Alaska between 2003 and 2020.



Do bears predate on (new) beavers? Yes

Thank you



Thank you

