

# Tracking Emerging Infectious Diseases in Wildlife of Inuit Nunangat through Researcher Surveys



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## BACKGROUND

- *Erysipelothrix rhusiopathiae* and *Brucella suis biovar 4* are Arctic emerging infectious diseases (EID) of concern
- Need better understanding of host range, transmission, and distribution of wildlife EID
- Challenges: remoteness and landmass of study region, wildlife elusiveness<sup>1,2,3</sup>



**OBJECTIVE:** Address knowledge gaps in Arctic wildlife EID through stakeholder surveys focused on unusual/undocumented morbidities and mortalities in wildlife

## SURVEY METHODOLOGY

- Electronic surveys asked participants to share any unusual wildlife observation (illness, mortality, unexpected range, unusual behaviour, population alterations, etc)
- Contacts identified from publicly available government, academic, and research review board databases
- Surveys excluded when incomplete (n=21), participant had no fieldwork (n=6), or focused only on environmental observations (n=3)
- Survey responses were analyzed thematically (NVivo) and spatiotemporally (ArcGIS)
- Ethical permits and logistics for including Northern residents outside of project scope, planned for future surveys

## PARTICIPATION

	contacted	completed	Proportion
Academic/ Research	271	36	13.3%
Federal Government	118	19	16.1%
Industry	28	5	17.9%
Nongovernmental Organizations	3	0	0.0%
<b>Total</b>	<b>420</b>	<b>60</b>	<b>14.3%</b>

Table: Contact and participation numbers for each sector

- Participation was similar across sectors, with 60 total complete surveys
- 74.1% of participants had 10+ yrs experience in Arctic fieldwork

## REFERENCES

1. Lawson B, Petrovan SO, Cunningham AA. Citizen science and wildlife disease surveillance. *EcoHealth*. 2015 Dec;12:693-702.
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3. Duncan C, Backus L, Lynn T, Powers B, Salman M. Passive, opportunistic wildlife disease surveillance in the Rocky Mountain Region, USA. *Transboundary and Emerging Diseases*. 2008 Sep;55(7):308-14.
4. Wobeser GA. *Disease in wild animals*. Berlin, Germany: Springer; 2007.
5. Dirk. *Participatory research: Why and how to involve people in research*. Sage, 2019.

## SURVEY RESULTS

- 32 different wildlife species, across 3 decades (1991-2023)

Table: Number of observations for each animal species or grouping. Other indicated species for which only one observation was shared.

Species	Number of Observations	Proportion of Observations
Avian	22	30.6%
Caribou	14	19.4%
Muskox	11	15.3%
Fox	4	5.6%
Fish and Bivalves	4	5.6%
Grizzly	3	4.2%
Polar Bear	3	4.2%
Mosquito	2	2.8%
Other	9	12.5%

- Four Themes discussed in the surveys:
  1. Change in Abundance (62.2%, 46/74)
  2. Illness (20.3%, 15/74)
  3. Mortality (13.5%, 10/74)
  4. Altered Range (5.4%, 4/74)
- 10/74 observations (13.5%) consistent with symptoms of *E. rhusiopathiae* and *B. suis* infections
- 13 observations of illness/mortality had no match in location, date (within a 2 year +/- range), or syndrome in the Canadian Wildlife Health Cooperative (CWHC) dataset

## CONSIDERATIONS

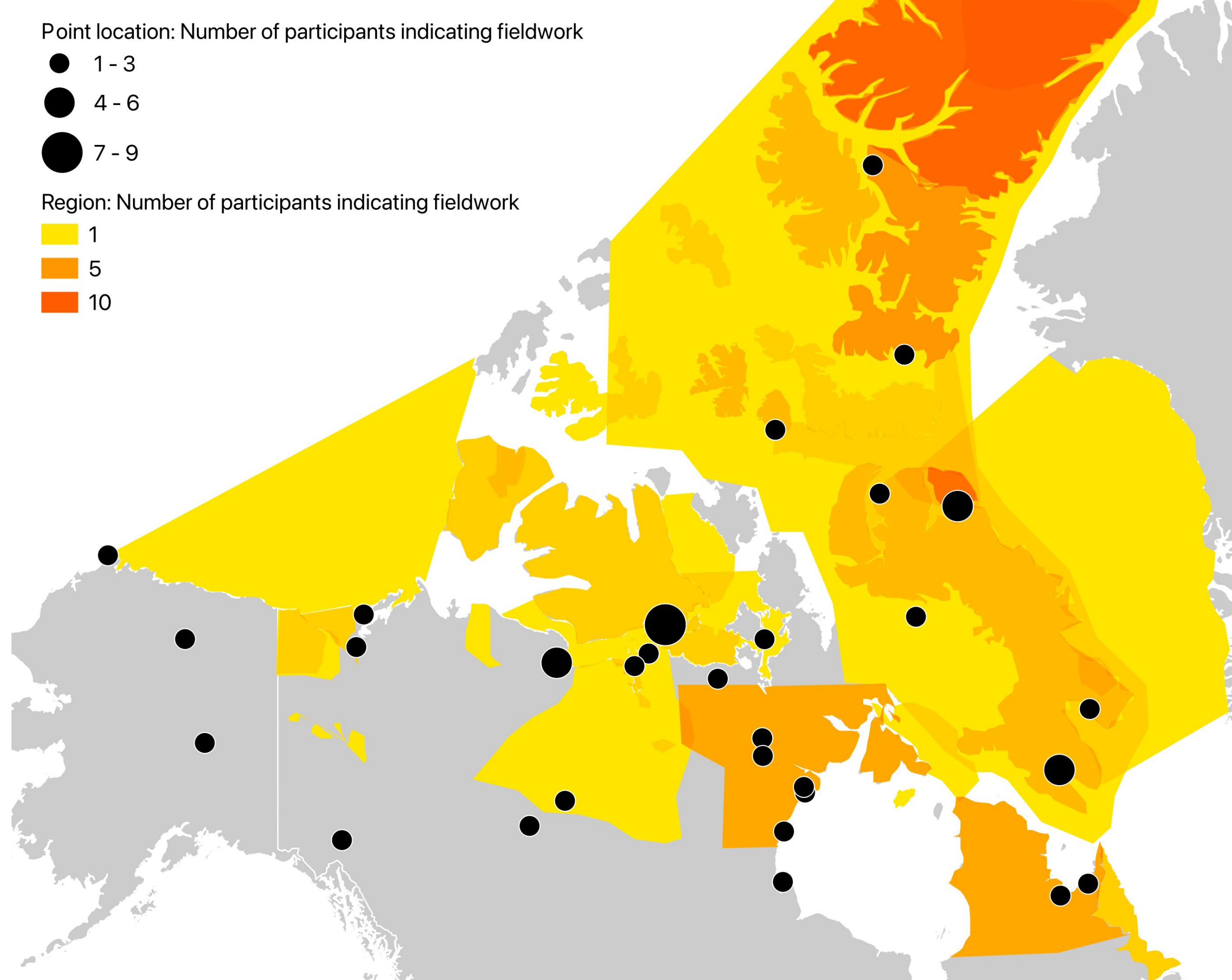
- Wildlife disease outbreaks and mortalities are typically underreported<sup>4</sup>
- Surveys have low engagement, typically only 10% of participants respond<sup>5</sup>
- Responses to questions required frequent follow up due to confusion around wording. Follow-up often was unsuccessful
- Case clustering and previously unreported cases were captured. With refinement, this survey may be a useful tool in Arctic wildlife surveillance



## NEXT STEPS:

- Develop improved survey questions with examples
- Northern resident engagement and further expansion of survey use

## SPATIAL TEMPORAL ANALYSIS



### Regions Surveyed:

- 9 participants indicate fieldwork based out of Cambridge Bay
- Many indicated fieldwork on Ellesmere Island, but no observations were reported on this Island

### Observation Clustering:

- The largest cluster of observations was on Victoria Island. It covered all observation themes and all dates
  - This is likely a result of the degree of surveillance within the region
- In a 4 yr timeframe (2018-2021) in a 50km radius around Rankin Inlet, 3 observations of infectious disease processes in caribou were observed alongside reports of declining populations

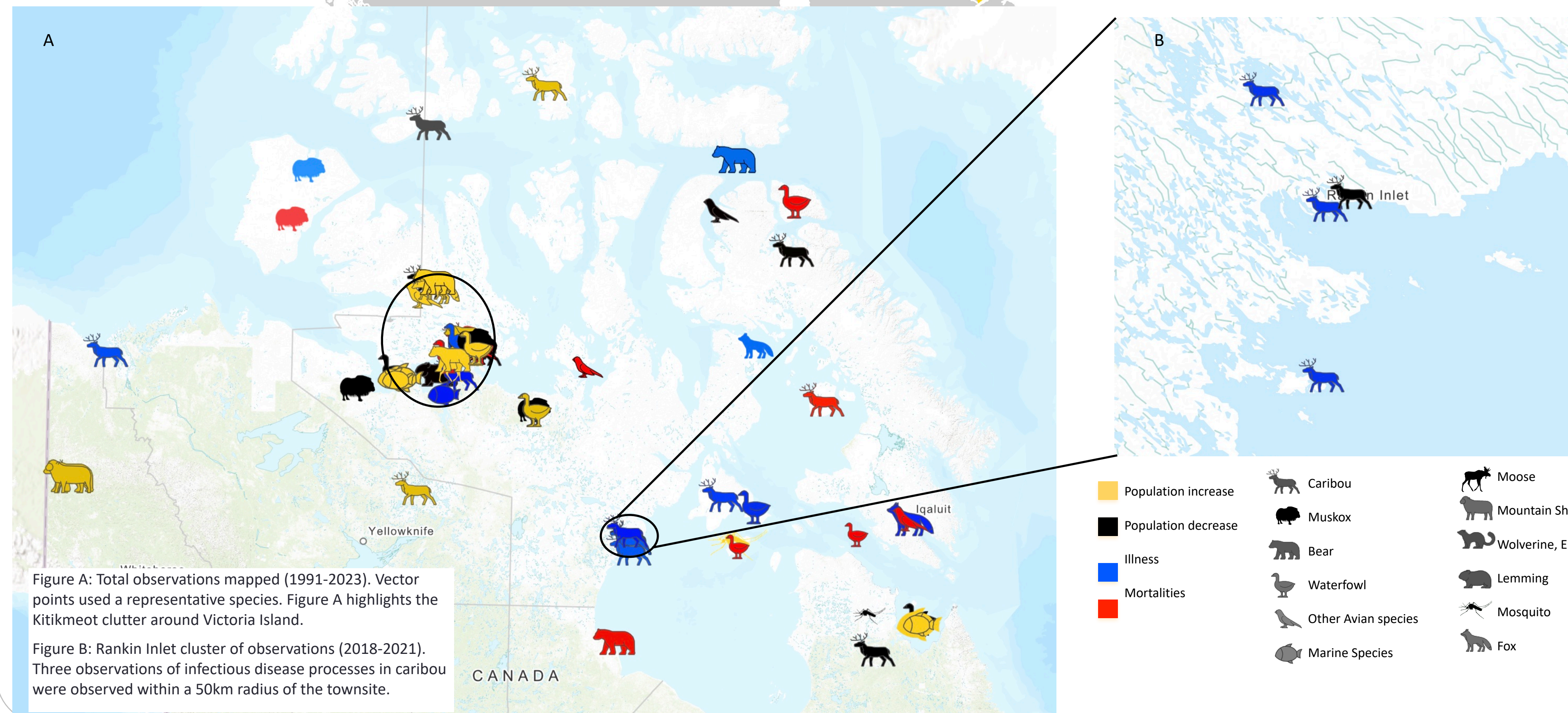


Figure A: Total observations mapped (1991-2023). Vector points used a representative species. Figure A highlights the Kitikmeot cluster around Victoria Island.  
Figure B: Rankin Inlet cluster of observations (2018-2021). Three observations of infectious disease processes in caribou were observed within a 50km radius of the townsite.



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