

# Arthropods and the CAFF State of Arctic Terrestrial Biodiversity Report 2021



Steve Coulson, UNIS  
Polar Night Week 2022



ARCTIC COUNCIL



**UNIS**

The University Centre in Svalbard

# Conservation of Arctic Flora and Fauna



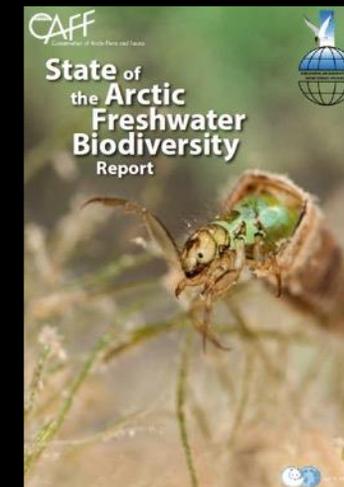
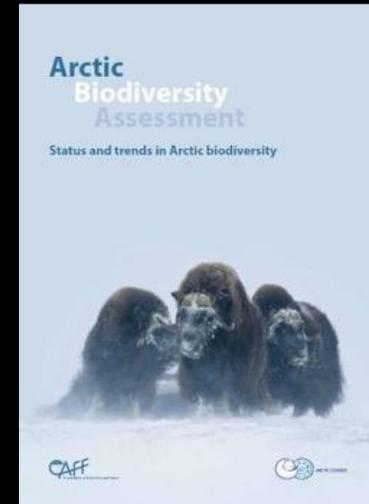
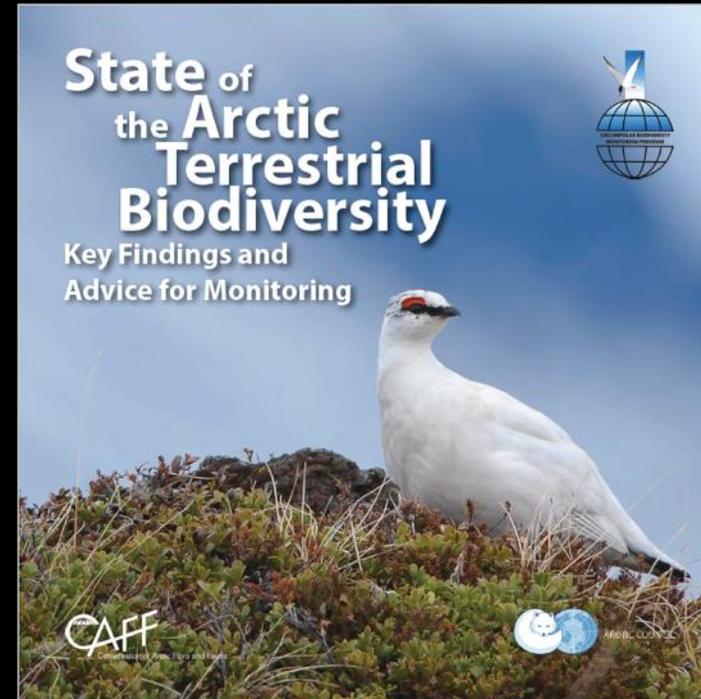
- CAFF boundary
- 32 million km<sup>2</sup>
- 6% of Earth
- Key global role



# State of the Arctic Terrestrial Biodiversity Report (START)



2013



Report based on 13 peer reviewed articles

## Ambio Special Issue 2020

- 11 species group assessments
- 2 START reviews



## Volume 49, issue 3, March 2020

Special Issue: Terrestrial biodiversity in a rapidly changing Arctic

### Issue editors

Niels Martin Schmidt & Hrefna Jóhannesdóttir

15 articles in this issue

### Developing a circumpolar programme for the monitoring of Arctic terrestrial biodiversity

Tom Christensen, Tom Barry ... Niels M. Schmidt

Terrestrial Biodiversity in a Rapidly Changing Arctic |

Published: 18 January 2020 | Pages: 655 - 665

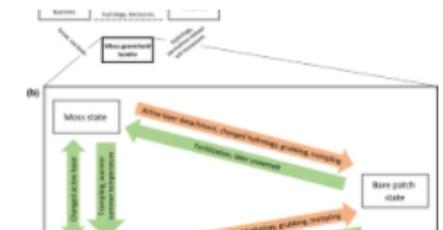


### High Arctic ecosystem states: Conceptual models of vegetation change to guide long-term monitoring and research

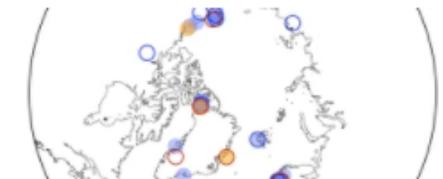
Virve Ravolainen, Eeva M. Soininen ... Åshild Ø. Pedersen

Terrestrial Biodiversity in a Rapidly Changing Arctic |

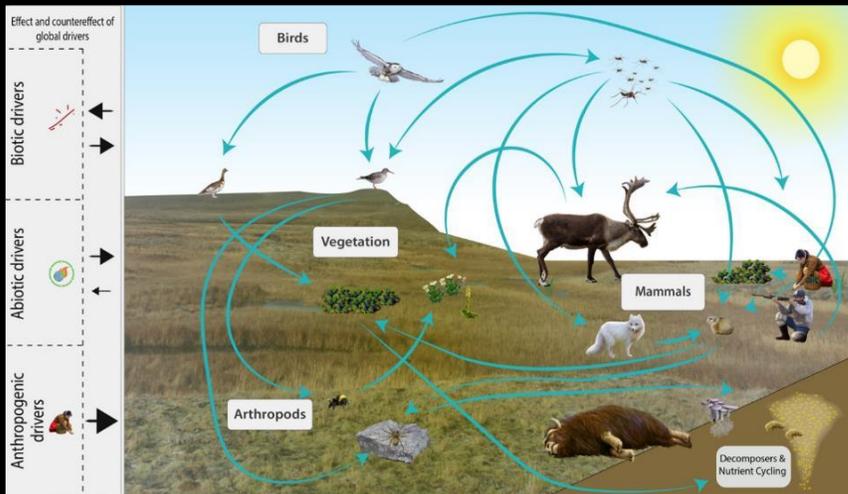
[Open Access](#) | Published: 18 January 2020 | Pages: 666 - 677



### Status and trends in Arctic vegetation: Evidence from experimental warming and long-term monitoring



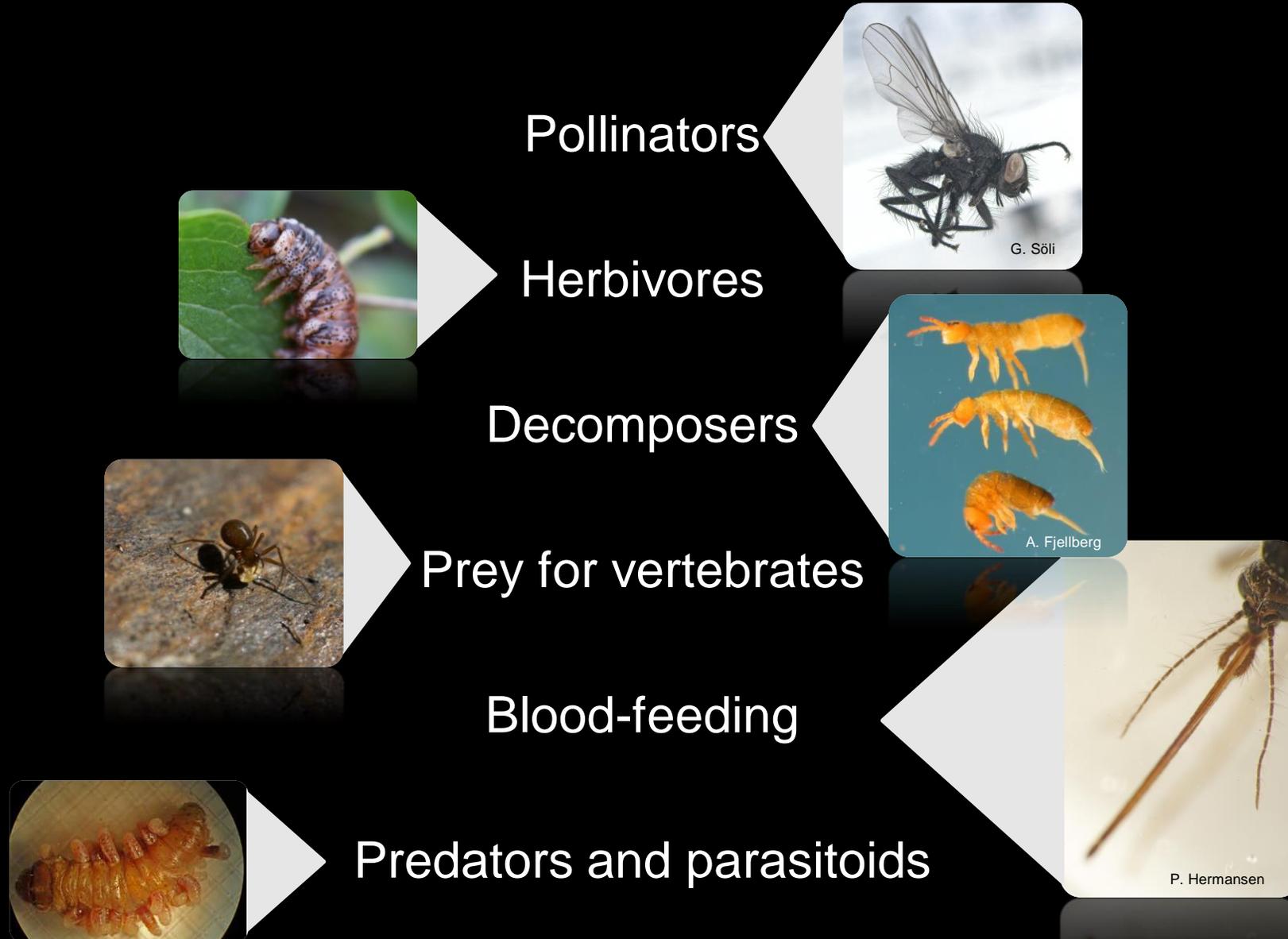
# State of the Arctic Terrestrial Biodiversity Report (START)

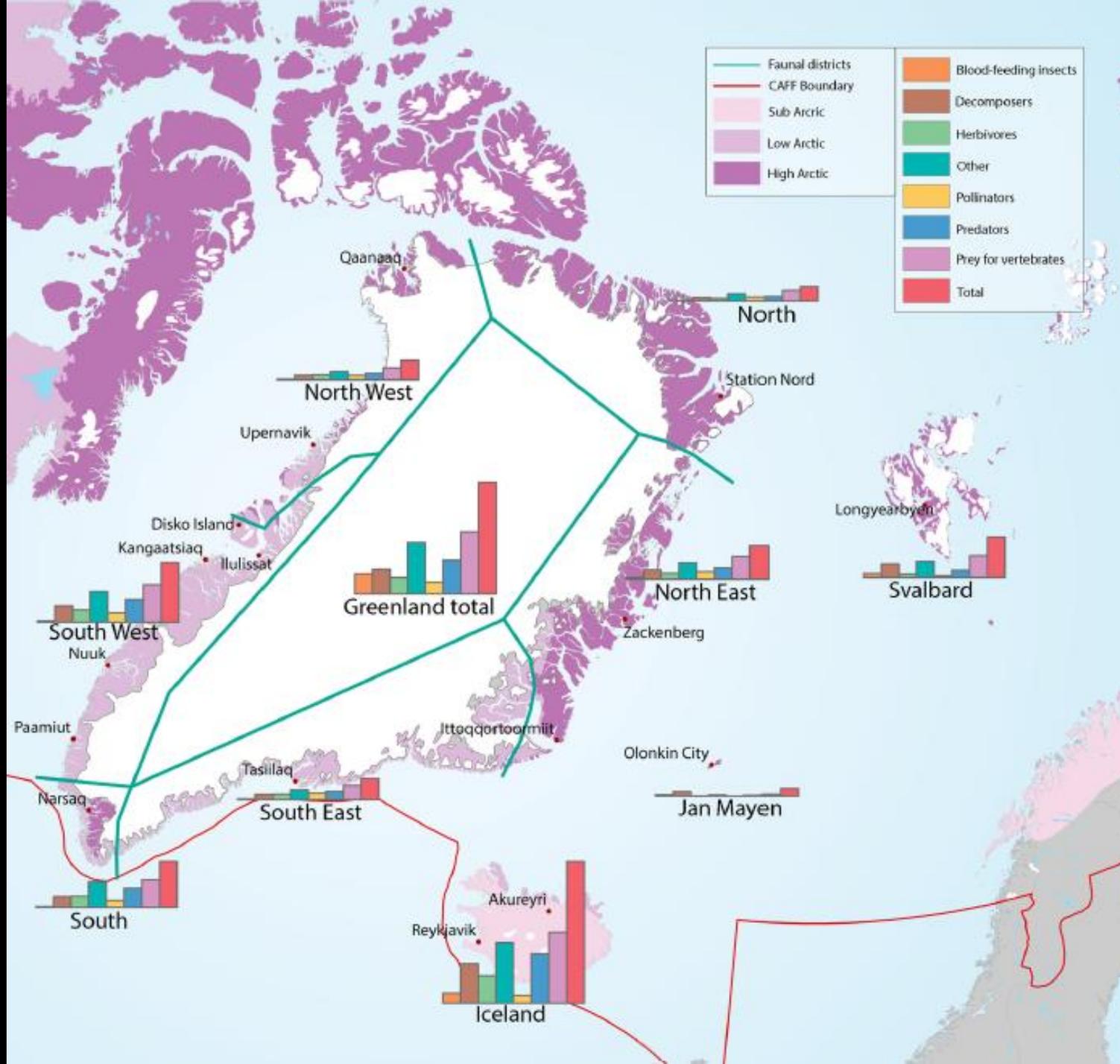


*Conceptual model of energy flow through the high Arctic terrestrial food web*



# Six 'Functional Ecosystem Components'





- START report **only** considers microarthropods. Enchytraeidae, Nematoda, etc are excluded.
- Not even all microarthropods included.
- Eg. Mites excluded due to difficulties comparing regions

## Svalbard

- 178 species (Seniczak and Seniczak 2020)
- 25% first recorded / named from Svalbard
- 36 only recorded once often in 'early years'

New observations e.g. *Scutozetes clavatosenillus*

Seniczak et al. 2017

# New observations e.g. *Scutozetes clavatosenillus*



Seniczak et al. 2017

# Edgeøya (Ávila-Jiménez et al. 2019)

- 140 invertebrate species identified
- 16 (11%) are new records for Svalbard.



# *Plutella polaris*

- 1873 - 7 individuals
- Not seen again until 2015

Søli *et al.* 2018

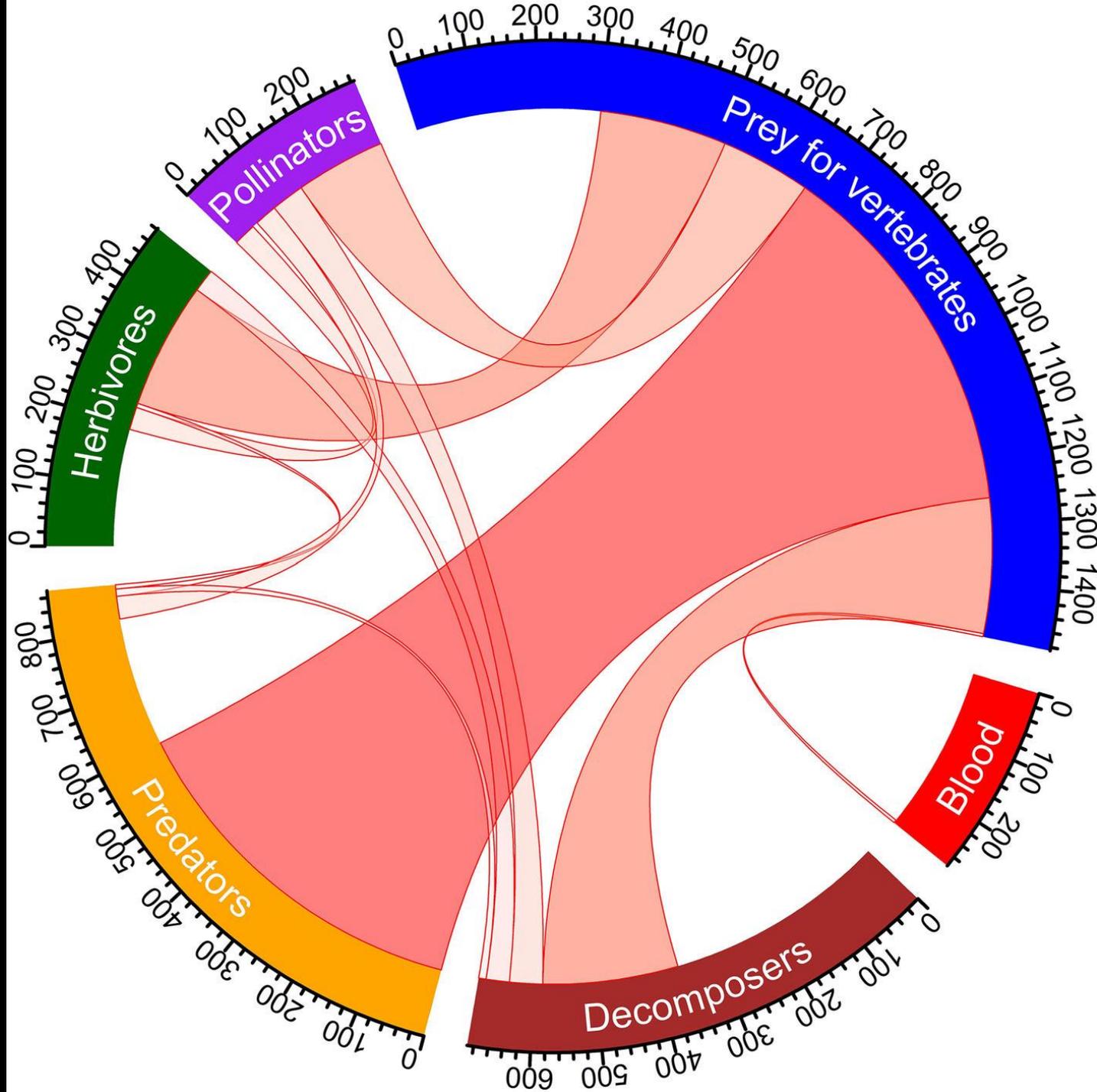


**Figure 1.** *Plutella polaris* Zeller, 1880. The single female recorded from Wijdefjorden, Svalbard in July 2015 (Photo: Karsten Sund, NHMO).



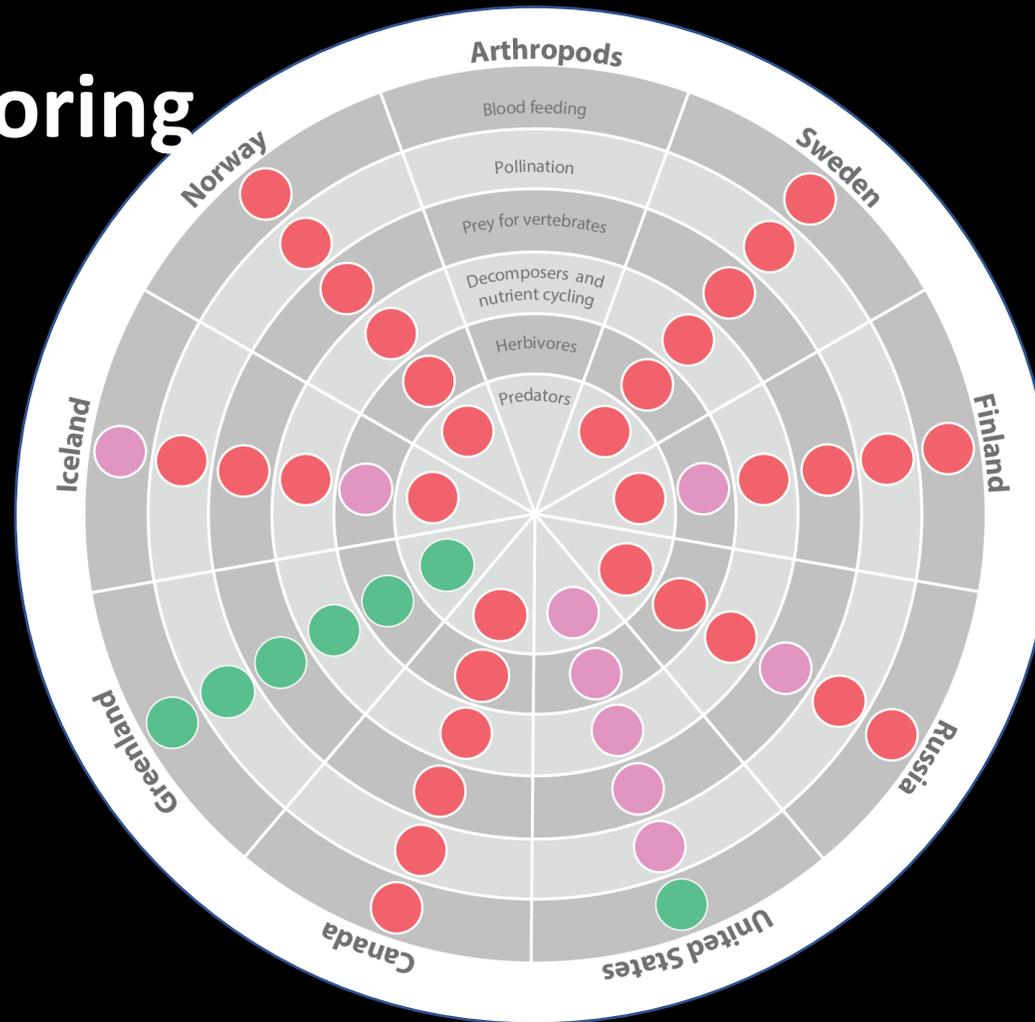
**Figure 2.** Ringhornsdalen in Indre Wijdefjorden National Park where *Plutella polaris* was rediscovered in 2015. The inserted map shows Svalbard with the exact position of the locality (red circle). (Photo: G. Søli).

**Number of species**



**Number of species**

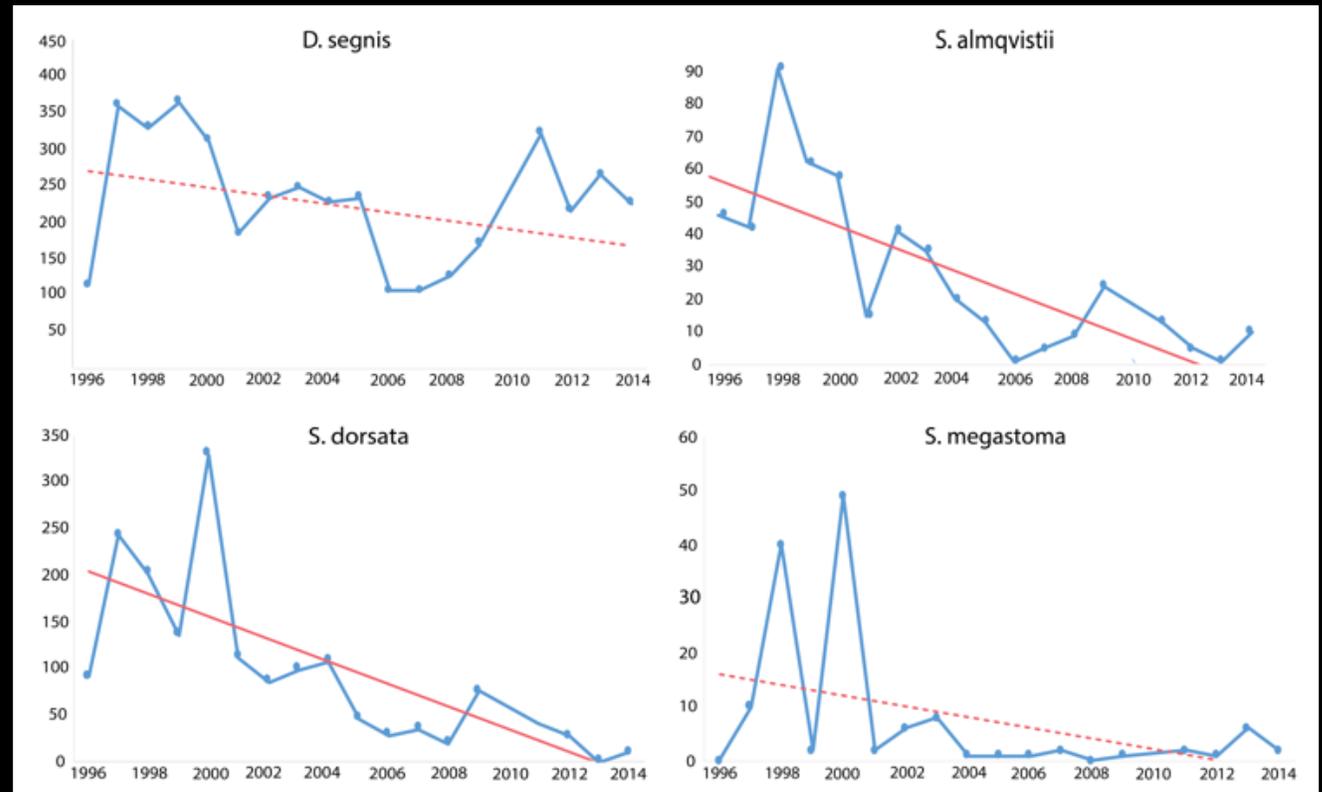
# Arthropod monitoring



- Monitoring with good spatial coverage across ecoregions, consistent funding
- Monitoring with poor spatial coverage, consistent funding;
- Monitoring with good spatial coverage across ecoregions, sporadic funding
- Monitoring with poor spatial coverage, sporadic funding
- No monitoring/ short-term projects only

# Arthropod trends

- Among important pollinating flies, trend information exists for east Greenland (Zackenbergl), where analysis shows dramatic decreases (80%) in abundance between 1996 and 2014.

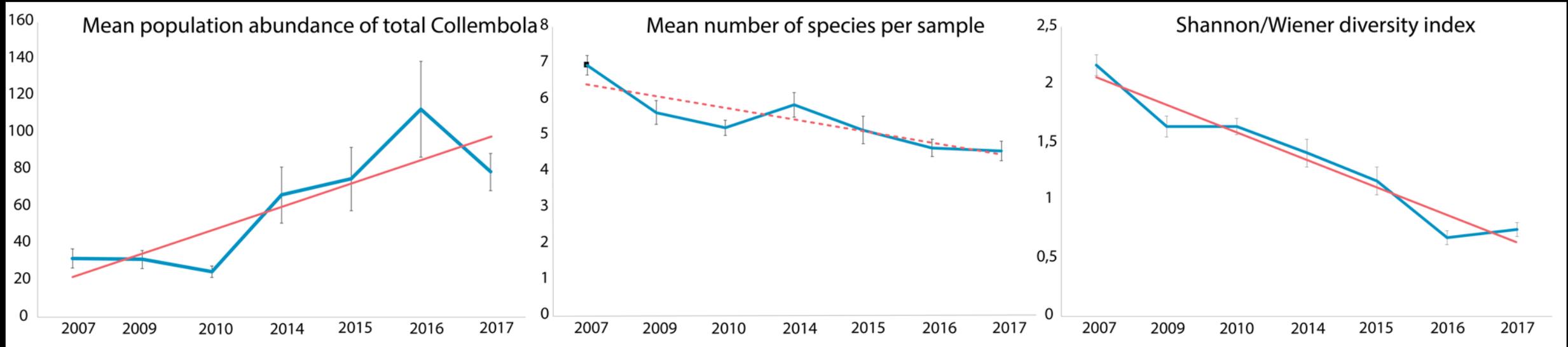


Trends in four fly species occurring at Zackenberg Research Station (east Greenland), 1996-2014. Adapted from Loboda et al 2018 in Gillespie et al 2020.

# Arthropod trends (continued)

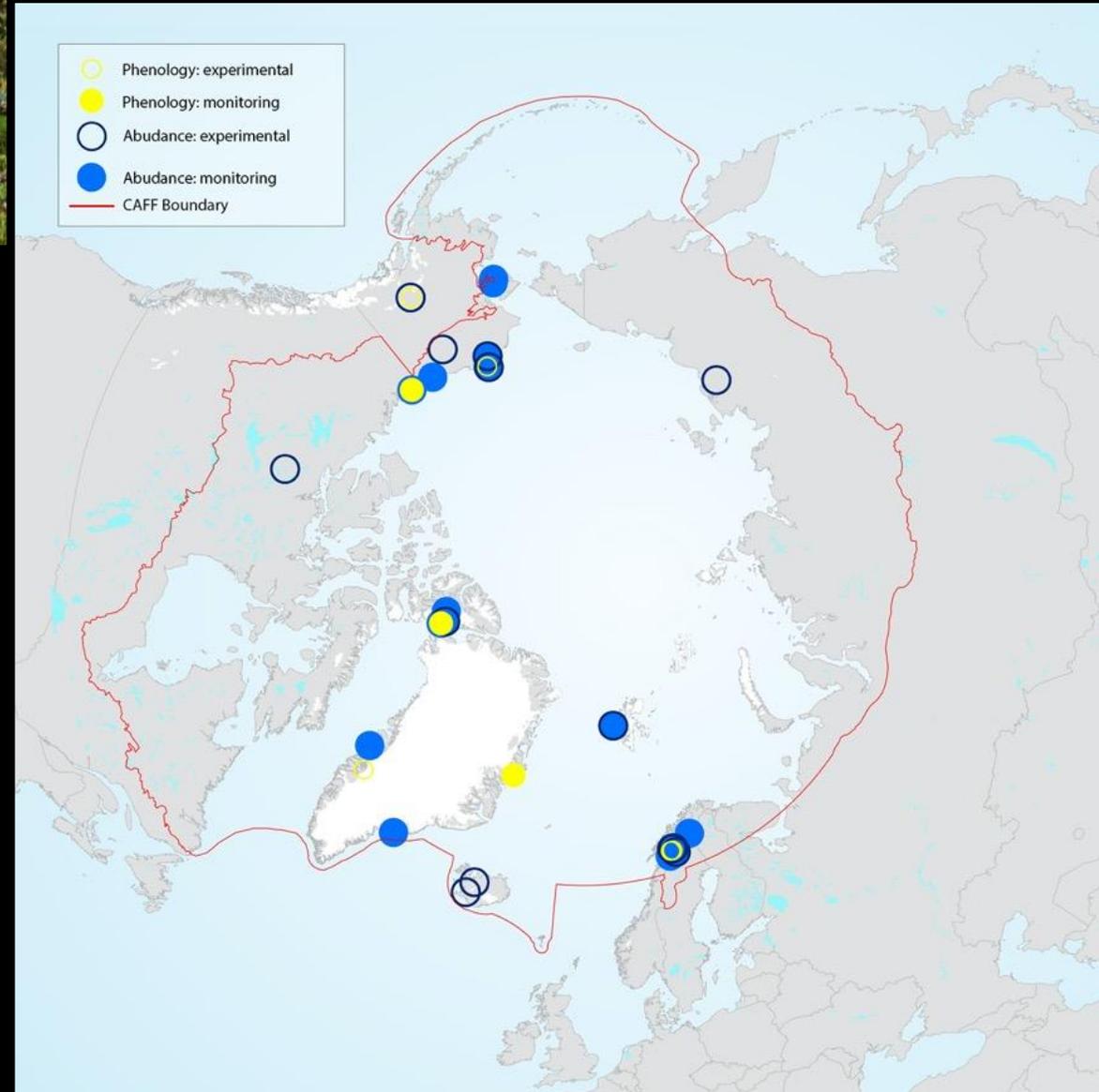


- A major group of decomposer arthropods, the springtails (Collembola), showed overall increases in abundance but declines in diversity in some habitats in west Greenland (Kobbefjord), with some contrasting patterns in east Greenland.



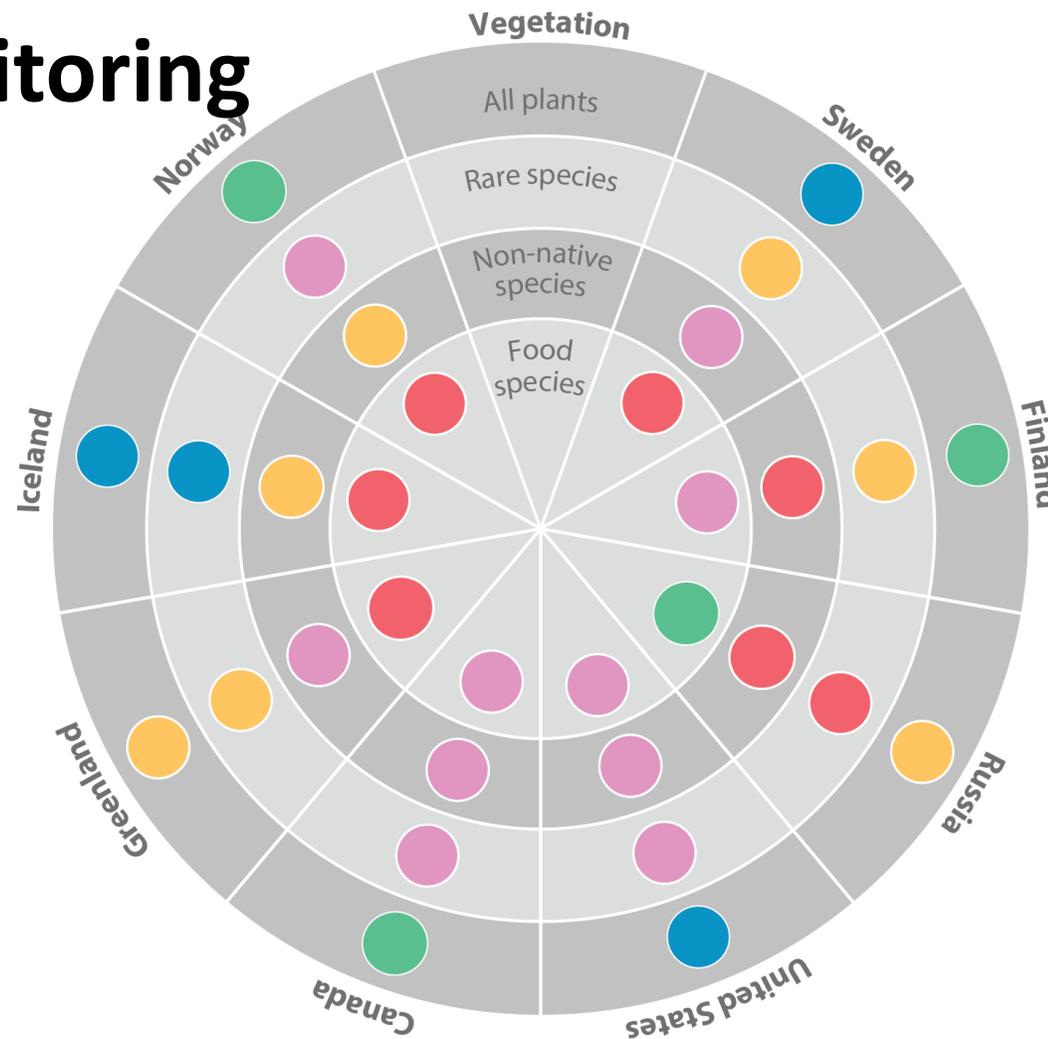
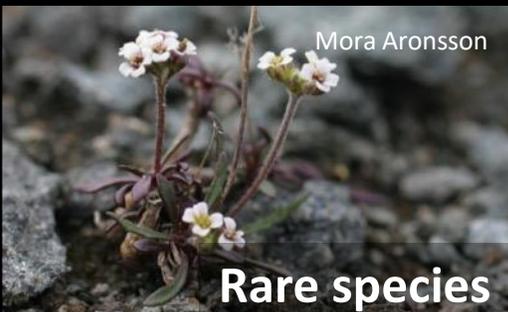
Population trends for springtails in *Empetrum nigrum* plant community in Kobbefjord, Greenland, 2007-2017. Adapted from Koltz et al 2018 in Gillespie et al 2021.

# Vegetation



*Distribution of long-term studies  
of monitoring sites of abundance  
and phenology of plants*

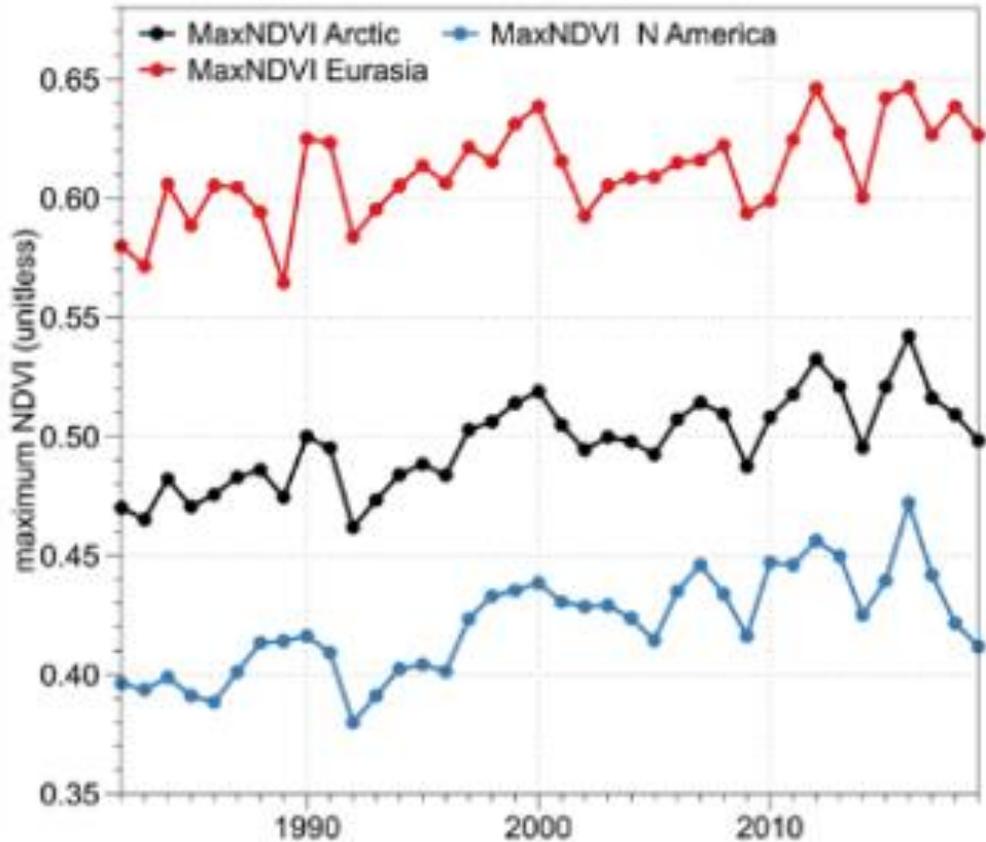
# Vegetation monitoring



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# Vegetation trends

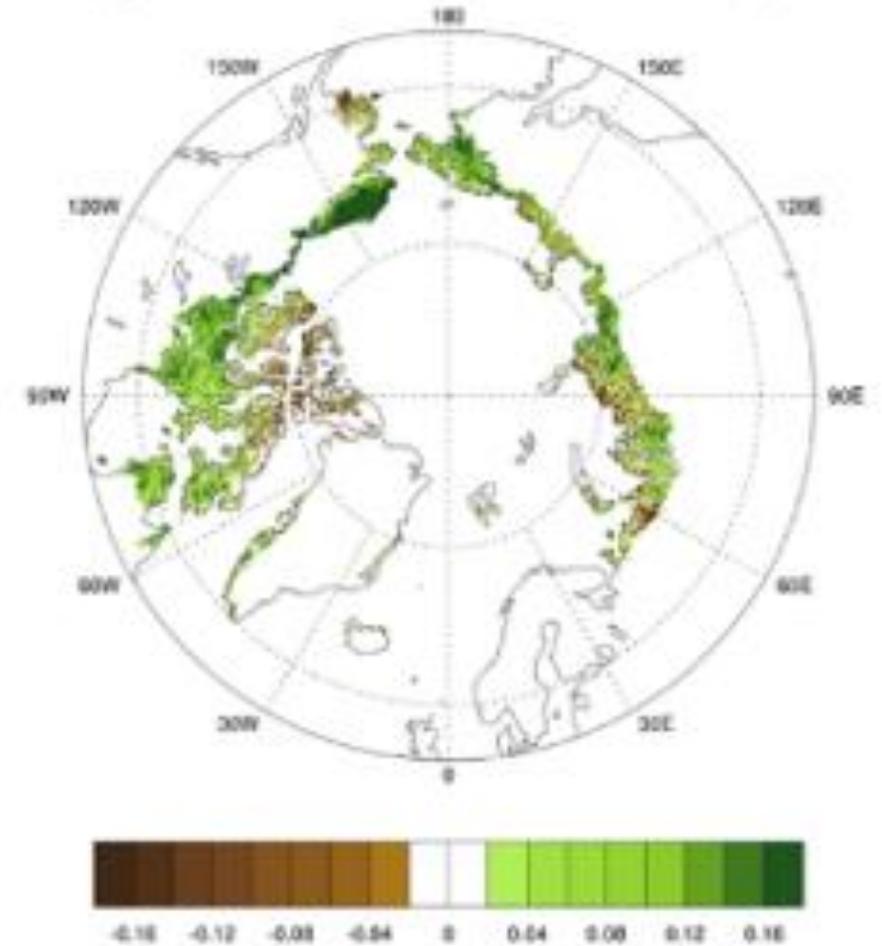
- Since 2001 there has been a significant increase in vegetation productivity across the Arctic, and an earlier start of the growing season in the sub and low Arctic.



*Circumpolar trends in primary productivity as indicated by the maximum Normalized Difference Vegetation Index, 1982-2017*

## GEO NDVI3g v1.2 MaxNDVI trend 82-19

Trend unitless /38 years



# Bird monitoring



Frank\_Fichtmueller/Shutterstock.com



*Geographical coverage of terrestrial bird FEC monitoring in the Arctic.*

# Bird monitoring

## Carnivores



Frank\_Fichtmueller/Shutterstock

## Omnivores



D. Longenbaug/Shutterstock

## Insectivores

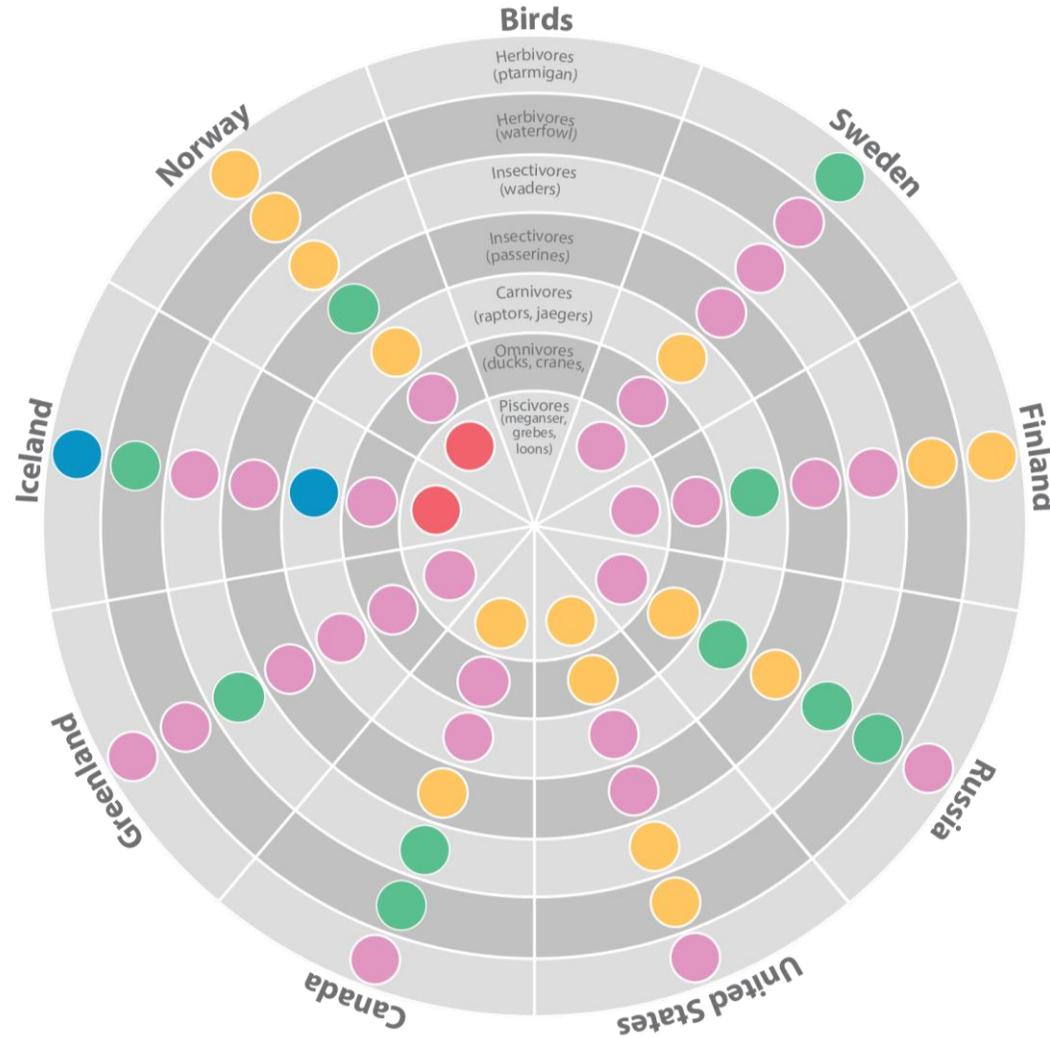


Martin Pelanek/Shutterstock.com

## Herbivores



Nick Pecker/Shutterstock.com



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- Monitoring with poor spatial coverage, sporadic funding
- No monitoring/ short-term projects only

# Bird trends

- Of the 88 species of birds examined, 20% experienced declines in all populations, while well over half had at least one population in decline.



Knud Falk

Arctic-breeding populations of gyrfalcons and peregrine falcons are relatively stable.

Populations of rock and willow ptarmigan showed both positive and negative trends.



Knud Falk

Richard Fitzer/Shutterstock.com



Nearly half of all geese species are increasing.

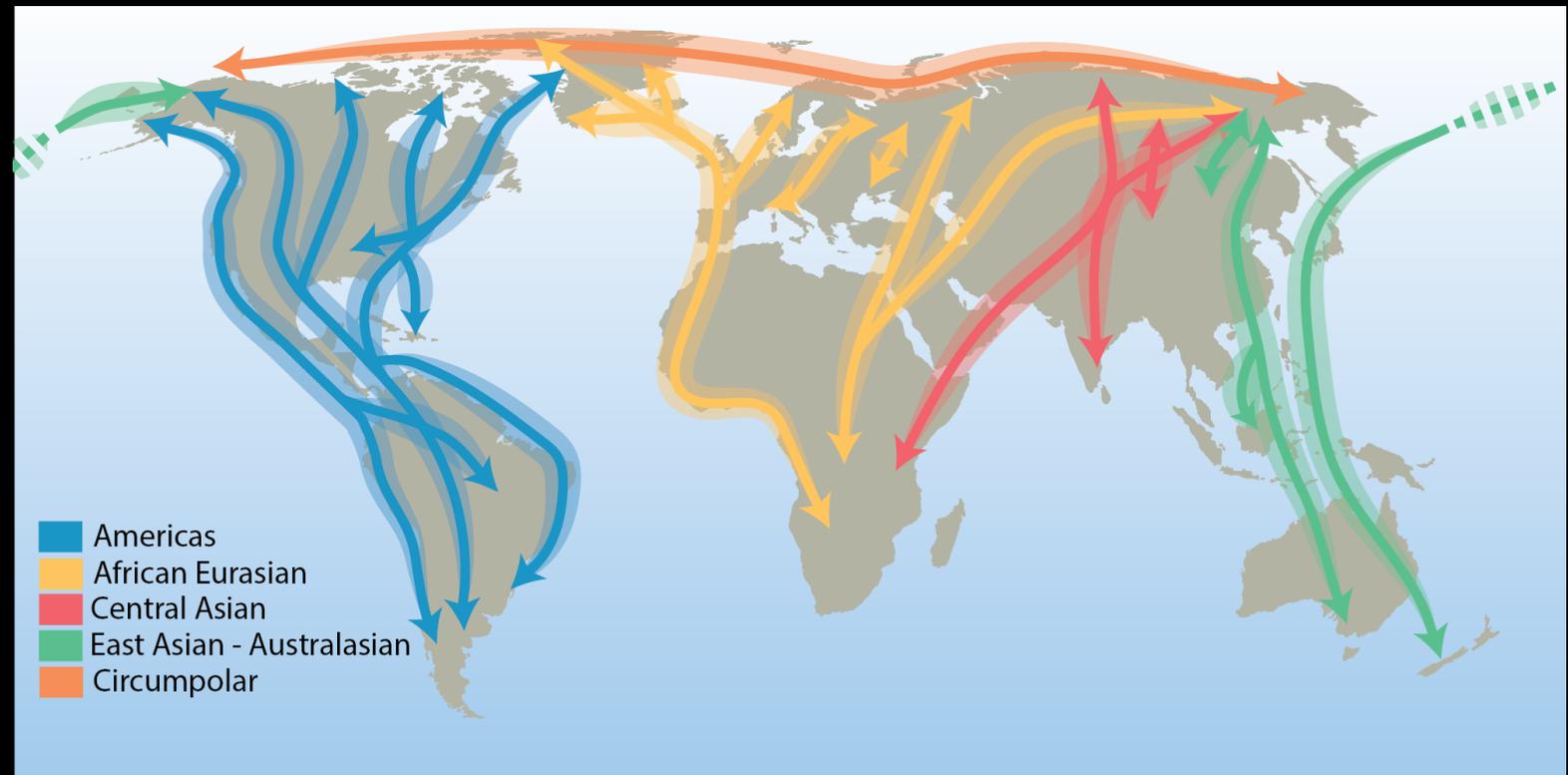
# Bird trends (continued)



More than half of all wader species are declining, but large variation across flyways: 88% declining in East Asian-Australasian Flyway, but 70% stable or increasing in the African-Eurasian Flyway.



Rudiger Zwitzer/Shutterstock.com



# Mammal monitoring



Lars Hols

Medium-sized predators



Small herbivores

Frank\_Fichtmueller/Shutterstock.com

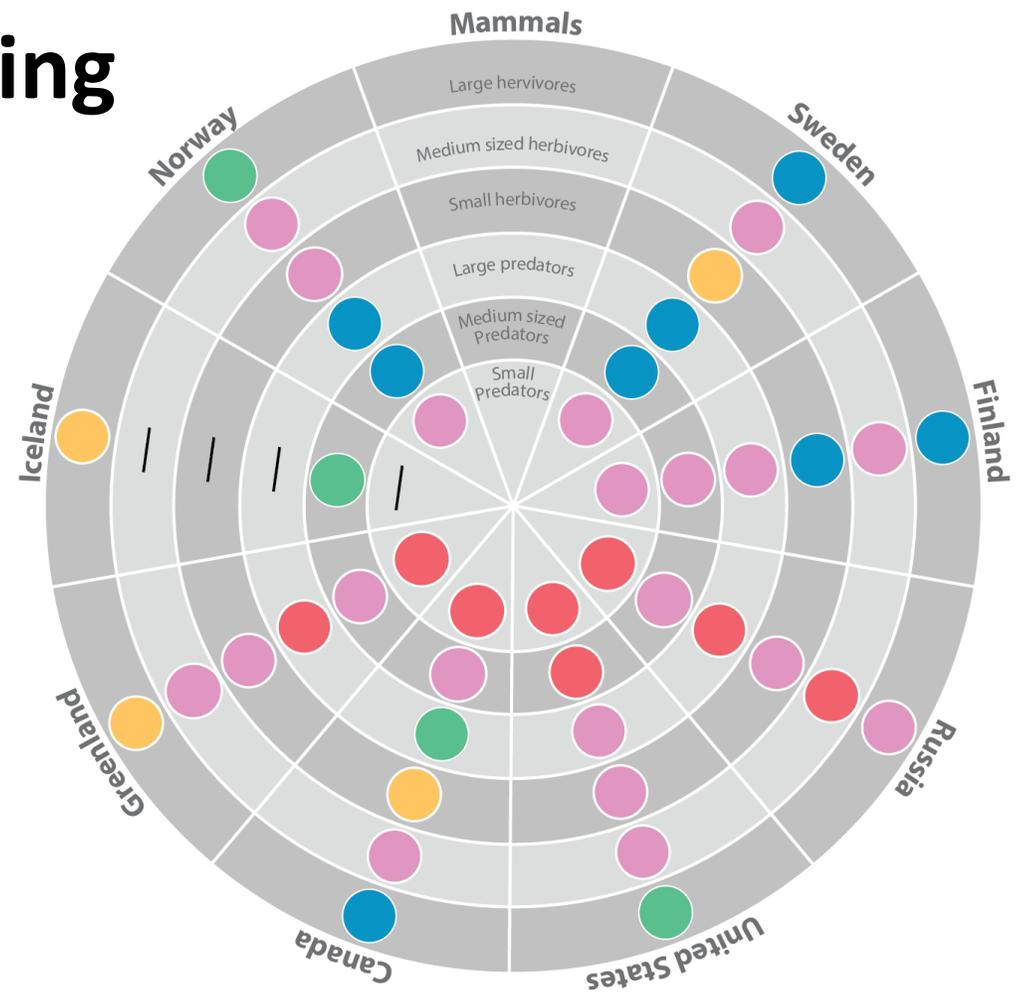


Lars Holst Hansen

Large herbivores



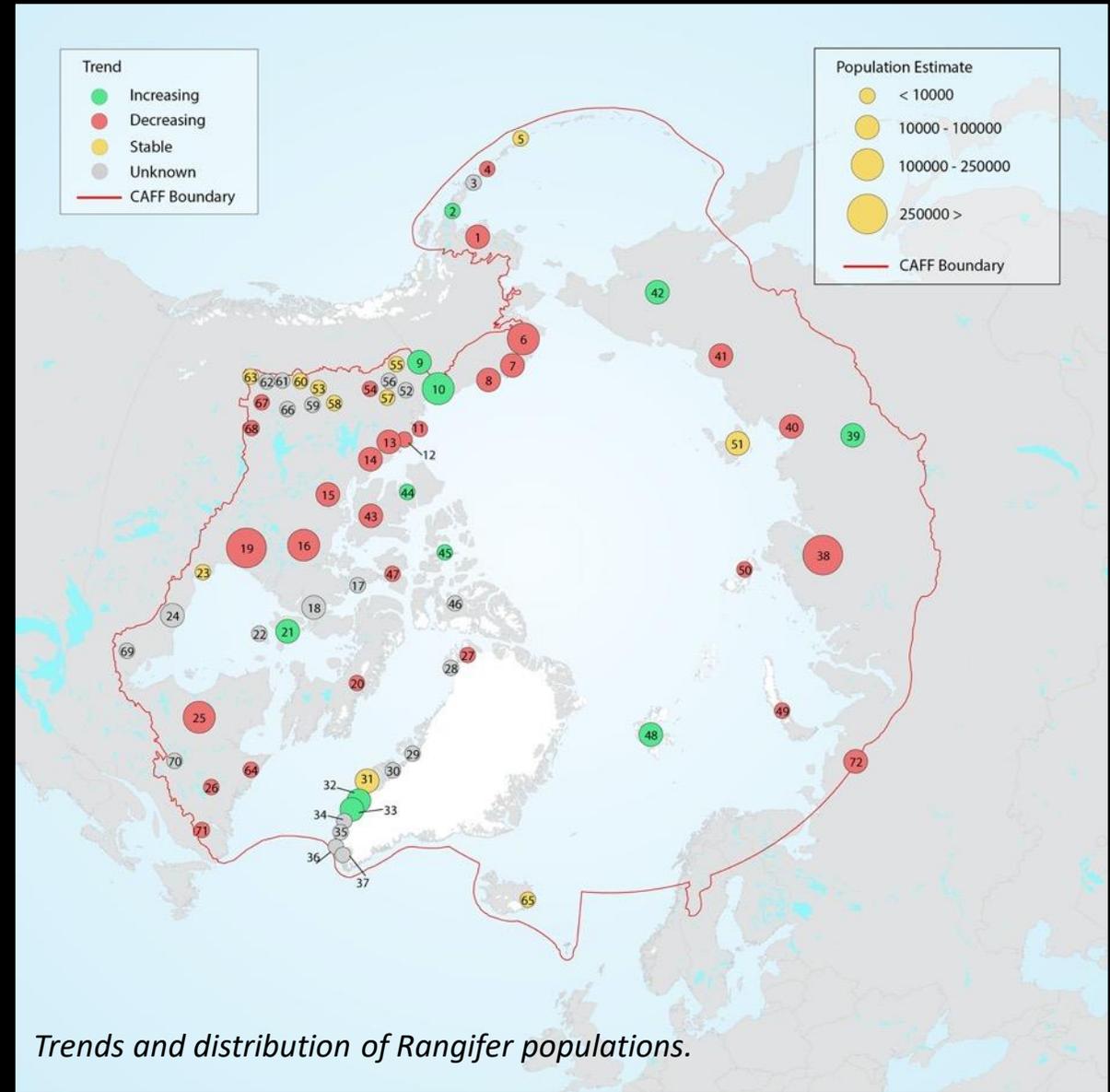
mside Adventures/Shutterstock.com



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- Monitoring with poor spatial coverage, sporadic funding
- No monitoring/ short-term projects only
- Not applicable

# Caribou/reindeer trends and monitoring

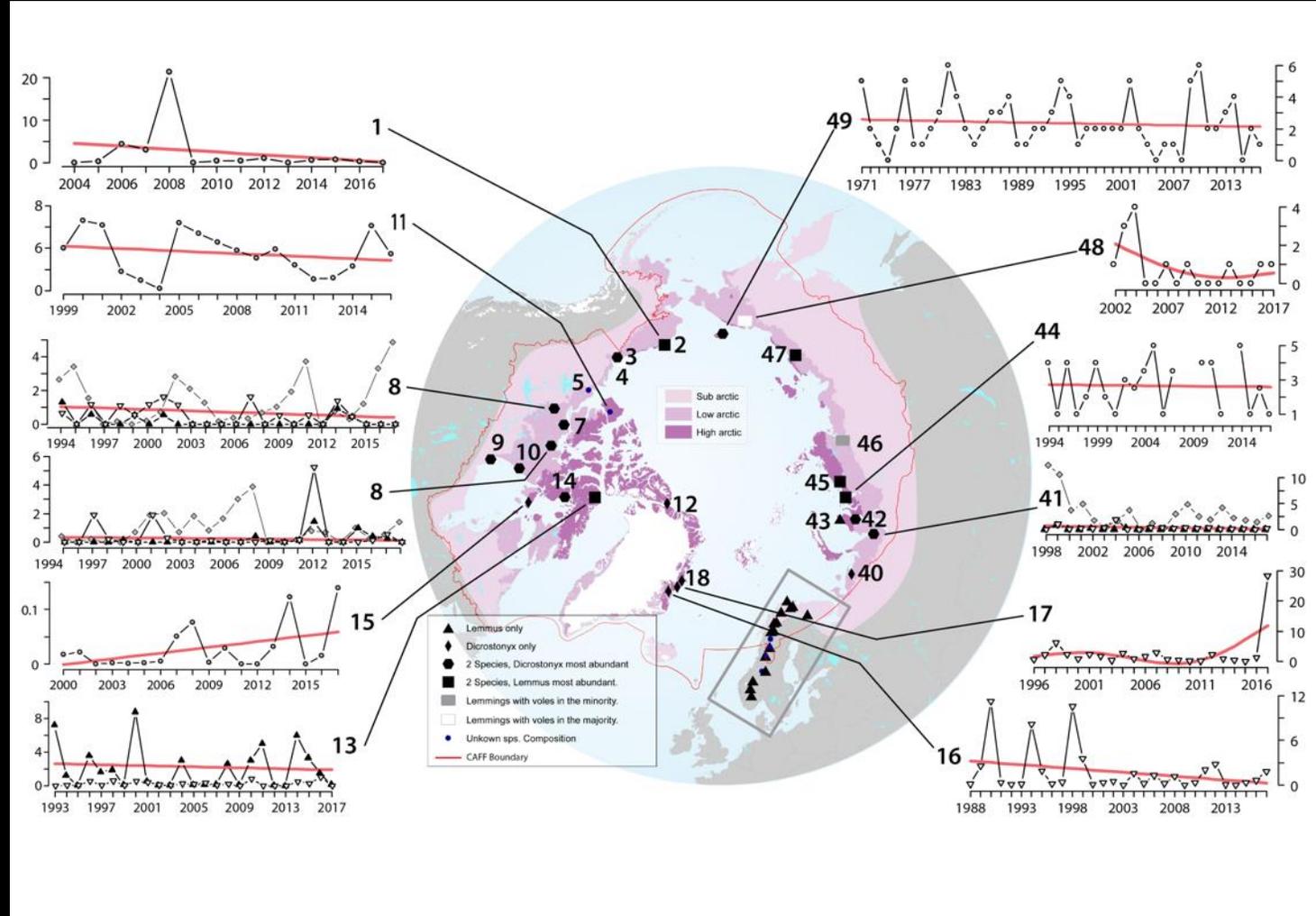
Circumpolar populations of caribou/reindeer have declined since the 1990. Some exceptions eg Svalbard reindeer.



# Lemming monitoring and trends

There have been no detectable trends in circumpolar lemming populations over the last 25 years.

BMJ/Shutterstock.com



# Arctic fox monitoring and trends

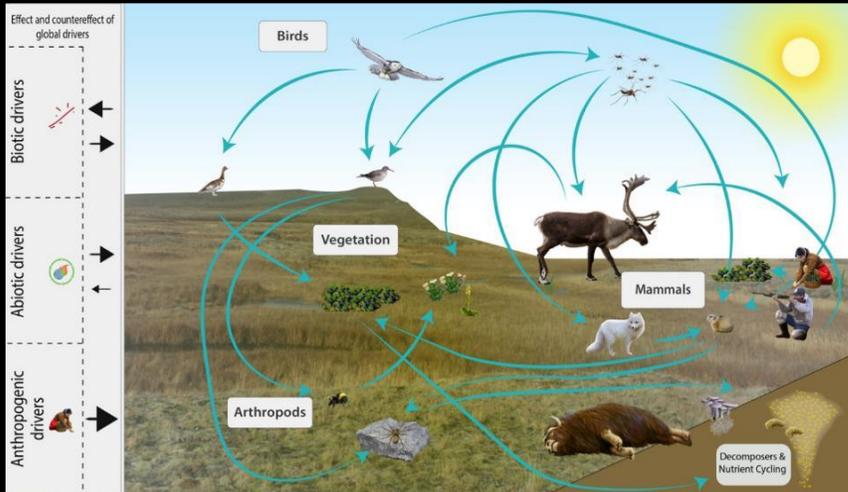


Arctic fox abundance was either stable or increasing in most monitoring sites.



# State of the Arctic Terrestrial Biodiversity

Report (START): <https://www.caff.is/terrestrial>



*Conceptual model of energy flow through the high Arctic terrestrial food web*



# START Key Findings;

- Climate change the overwhelming driver of change.
- Changing frequency, intensity, and timing of extreme and unusual weather.
- Species from southern ecosystems - an “Arctic squeeze”.



# START Key Findings

- Some trends but natural variability and large information gaps make it difficult to assess and summarize pan-Arctic trends.
- For most species groups or FECs the monitoring is poor with unpredictable funding
- Range and complexity of drivers –
  - the need for comprehensive, integrated, ecosystem-based monitoring programs,
  - coupled with targeted research projects to help decipher causal patterns of change.

# What do we need?

- Improved information exchange.
- Standardised monitoring; e.g. COAT in Ny-Ålesund, BIG in Bjørndalen.
- Overview on what sampling is being undertaken?
- Resources to coordinate the analysis of these samples.
- Establishing of monitoring using standardised protocols.
- Evaluation of advances in new methods; e.g. eDNA.



# Citizen science

Sites with only protected findings are shown as red dots/polygons.

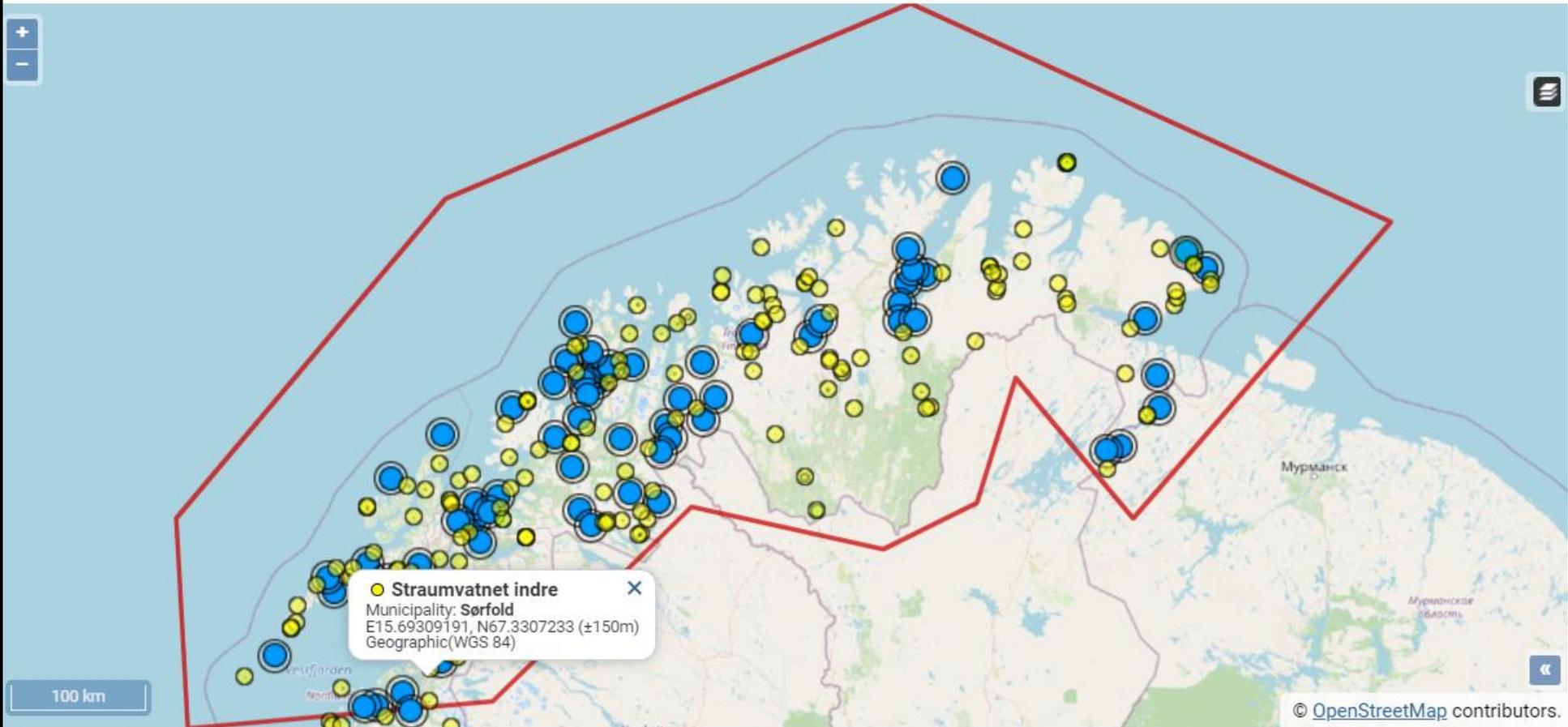
Search parameters: **Bombus** × **1900 - 2021**

**This search is limited to an area/polygon** ×

**Do not show sightings currently being determined or collated** ×

Below are the parameters used to produce the following result set.

Click on the search form or go directly and [change search criteria](#).



**i** Select a site on the map to show sightings here

Show legend

Show map in fullscreen

Artsobservasjoner.no

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## Thank you!

Steve Coulson, UNIS,  
Polar Nigh Week 2022



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