

Lemmings versus voles: case study from Yamal (Russia).

Natalya Sokolova^{1,2} (nasokolova@yandex.ru), Aleksandr Sokolov^{1,2}, Victor Shtro¹, Ivan Fufachev³, Dorothee Ehrich⁴

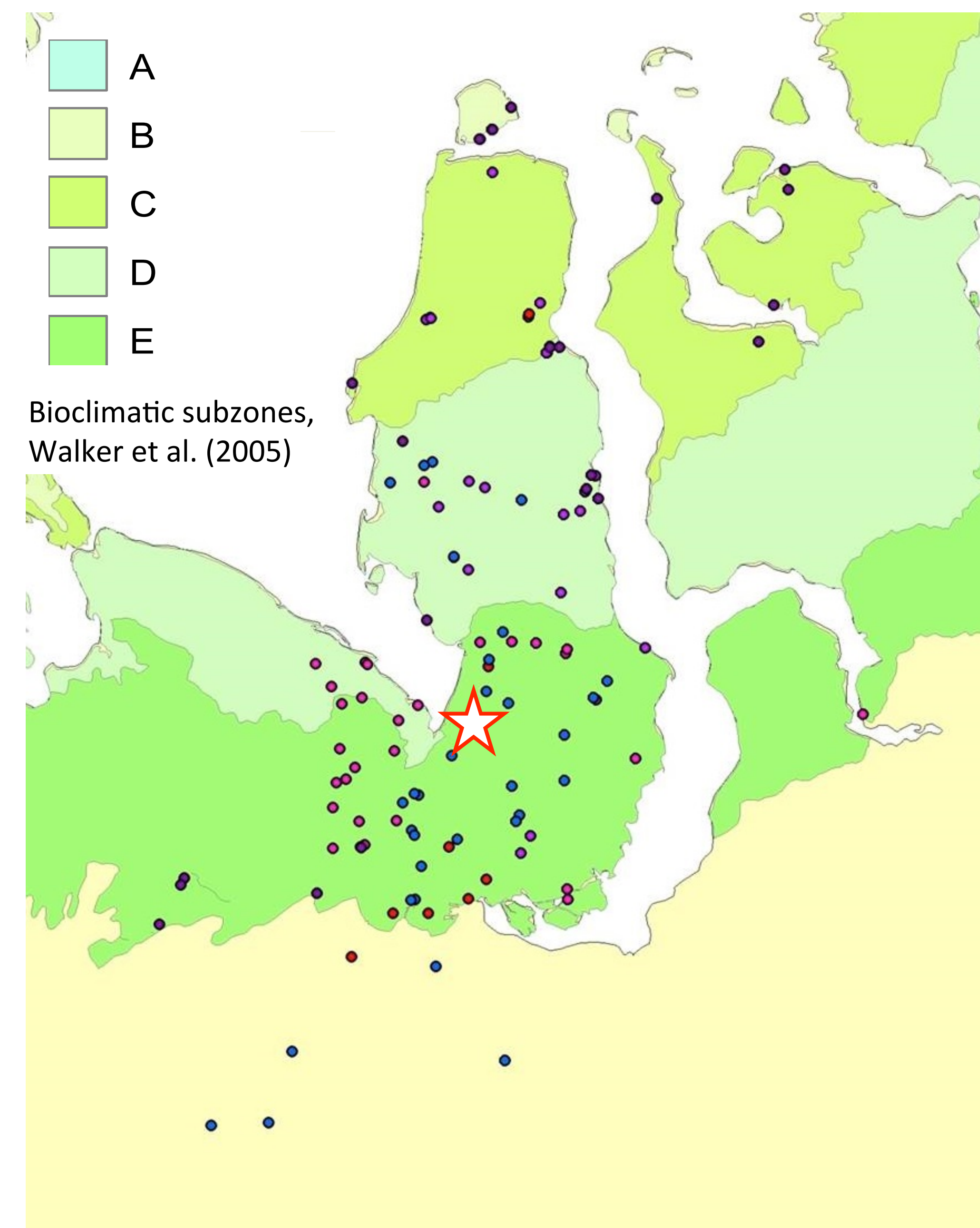
1 - Arctic Research Station, Institute of Plant and Animal Ecology of UB of RAS (Labytnangi, Russia), 2 - Science Center for Arctic Studies, Salekhard, Russia
3 – Perm State University, Perm, Russia, 4 - Department of Arctic and Marine Biology, UiT - The Arctic University of Norway (Tromsø, Norway)

Background

Small rodents constitute a key component for the functioning of many terrestrial arctic ecosystems. Lemmings dominate in the high Arctic, whereas in the low arctic one or several species of voles may outnumber the lemmings. We assembled data about the small rodent community composition in different bioclimatic subzones of the Yamal peninsula (Russia) from the 1950s until 2014.

Methods

In our study we use data from Museum of IPAE (Ekaterunburg) – since 1943, data from the field notes of Vyacheslav Fedorovich Sosin (1963-1991), Victor Shtro collect his data since 1979, N. and A. Sokolovs begin collect their data since 1998, and D. Ehrich is a principal investigator since 2008.



We perform a snap-trapping of rodents according to classic russian method (Kucheruk, 1952). Snap traps set up as a line 50 or 100 items with the 5 m distance between traps, on runways or holes of rodent burrows inside 1 m diameter of estimate point. Bait – raisin. Traps were checked every 12 hours, with duration 2-4 days. Since 1965 we operate by 150 thousands of trap nights. Since 2007 we start use a small-quadrat method (Myllymäki et al., 1971).

Another method investigate small rodents biodiversity is analyzing of content of pellets of birds of prey. We use all small rodents remains define up to species level as 100% and find out a ratio of every single species in particular place and particular year.

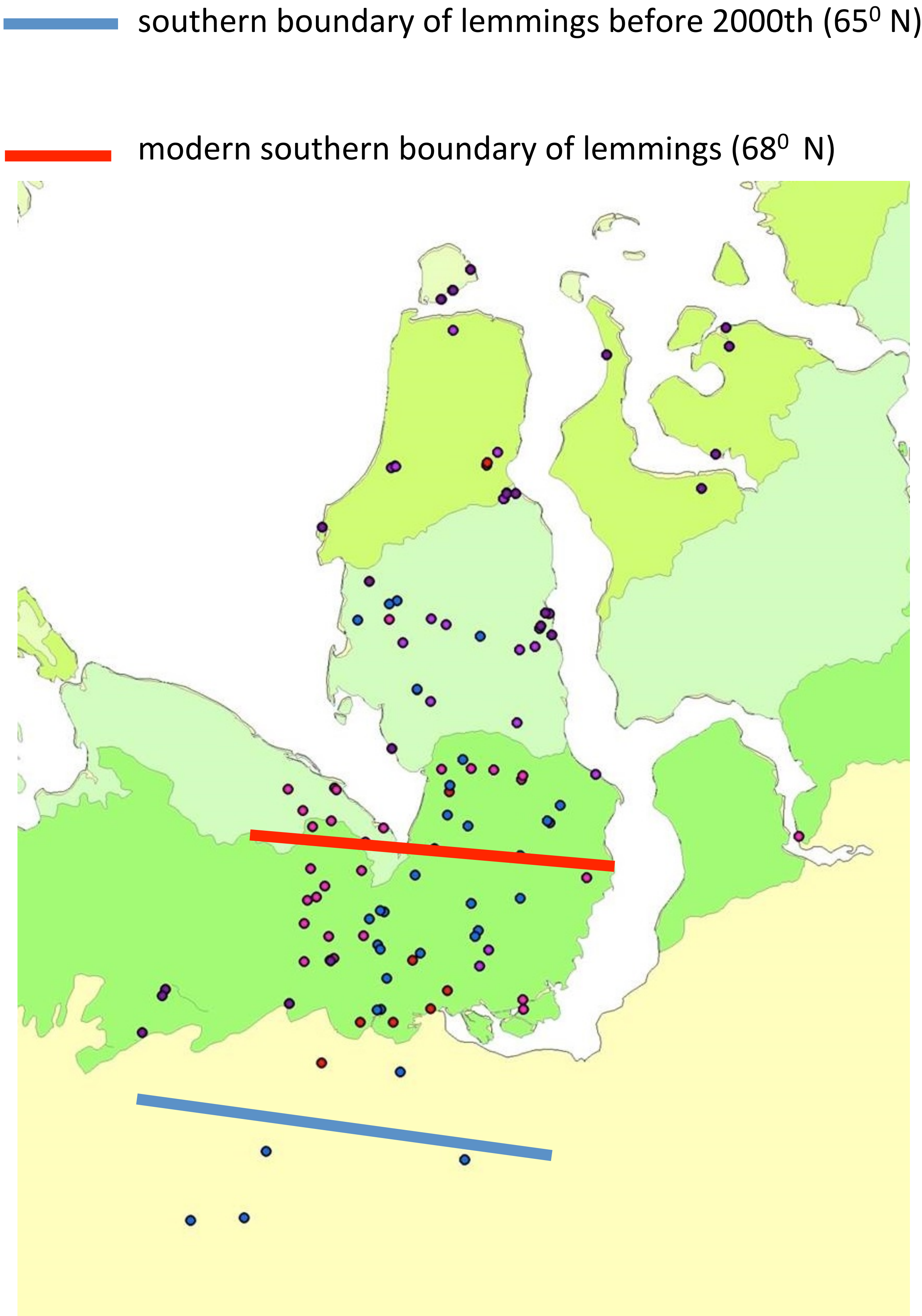
Results

Five species were caught in the high Arctic: narrow-skulled vole (*Microtus gregalis*), Middendorff's vole (*Microtus middendorffi*), collared lemming (*Dicrostonyx torquatus*), siberian lemming (*Lemmus sibiricus*) and the red-backed vole (*Myodes rutilus*).

We document changes in biodiversity of small rodents across the tundra zones of Yamal. Voles, such as *Microtus gregalis* and *Myodes rutilus* move hundreds km northwards, while lemmings (*Lemmus sibiricus* and *Dicrostonyx torquatus*) disappeared from their former southern range. We also preliminary conclude that nowadays outbreaks of Siberian lemming are fading out compared with the 1970-1980s.

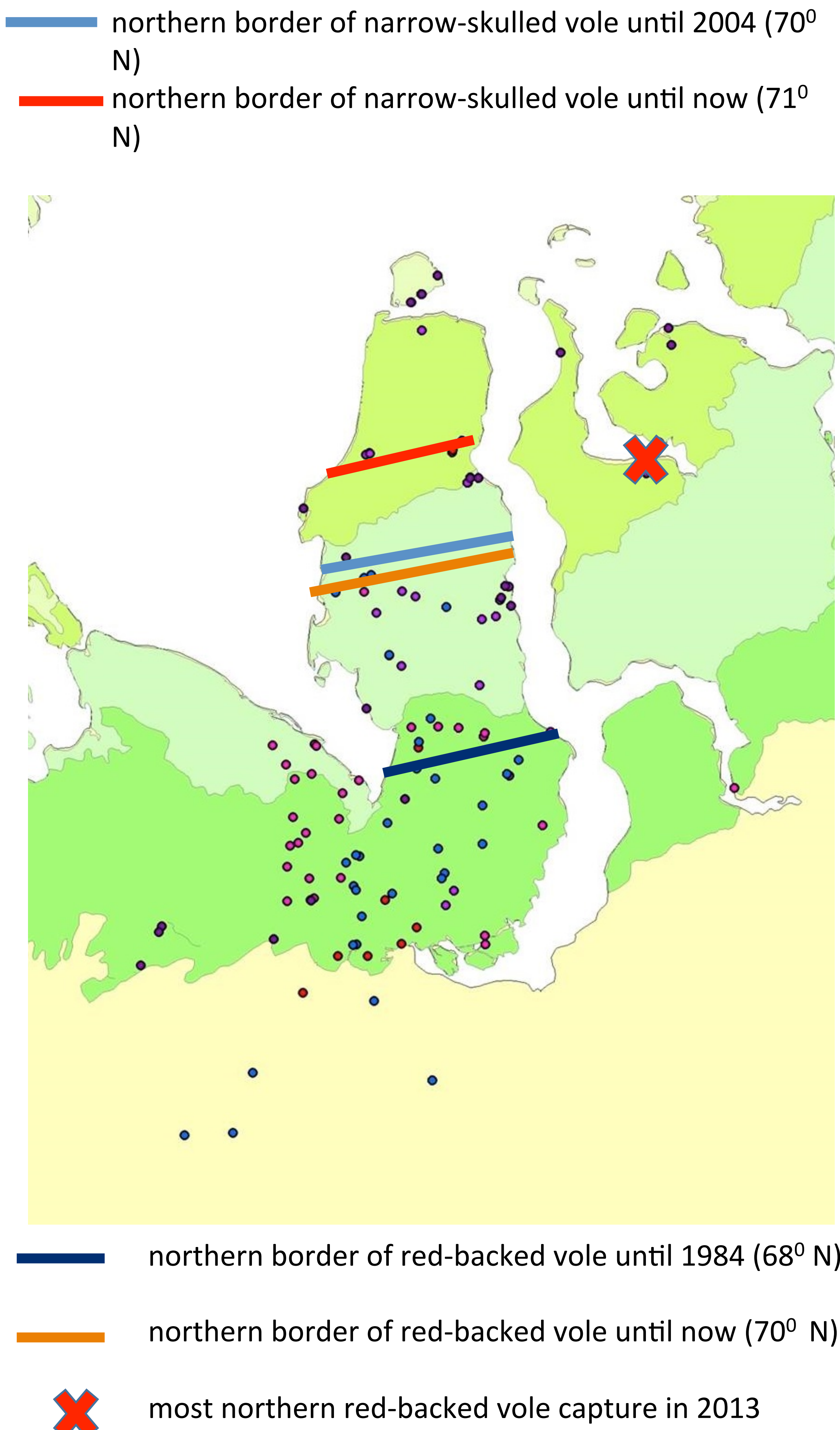
Finding 1

Changing of the distribution boundaries of lemmings



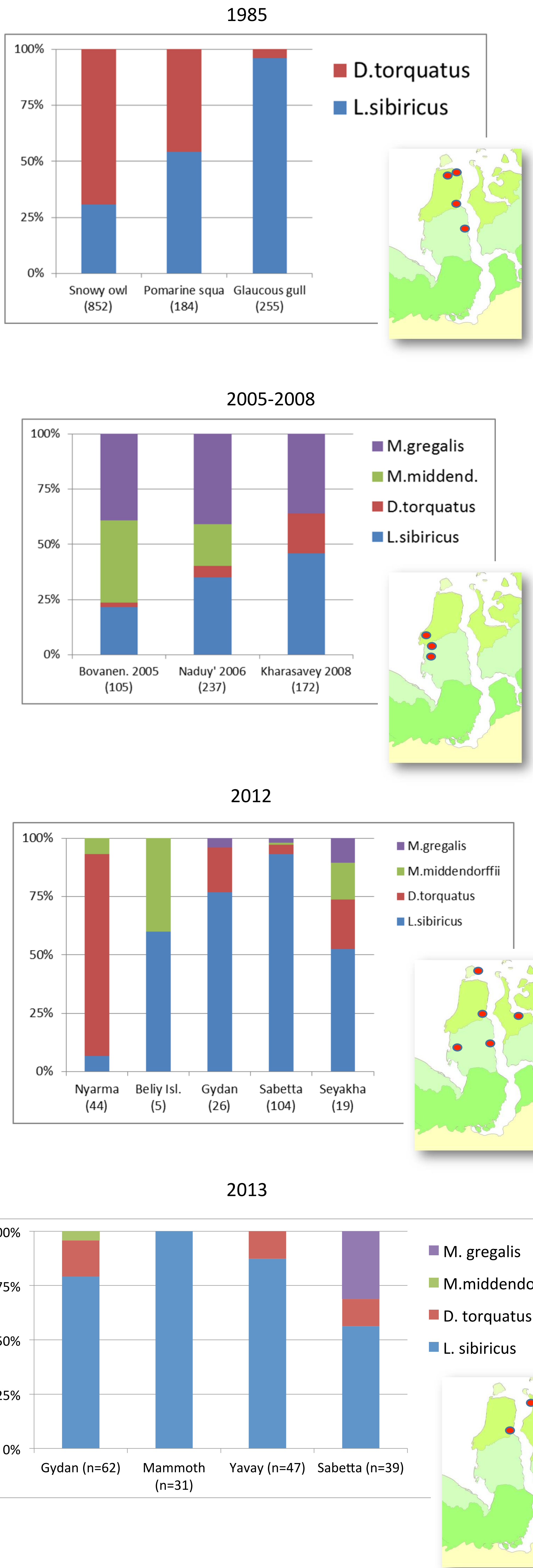
Finding 2

Changing of the distribution boundaries of voles



Finding 3

Changing in the ratio of prey species in pellets of predatory birds



Conclusion

We document that nowadays northern border of distribution of voles move northwards for more than 100 km since 1980th. Simultaneously, lemmings almost disappear from their southern range. Such changes in biodiversity of those two groups of rodent, will, of course, affect the entire food webs in different tundra subzones.

We thank all the people who contribute to data collection. The Laptander family, Victor Sidorov and many others for their help during field work. Trip to Arctic Biodiversity Congress for NS and AS was covered by Government of Yamal.