

## Project information

### Keywords

Tundra ecosystem, food web, adaptive monitoring, small rodents, arctic fox, geese, vegetation change, climate impacts, herbivory

### Project title

Yamal EcoSystem (YaES) - Collaboration for monitoring of climate related ecosystem change on Yamal, Russia

### Year

2018

### Project leader

Dorothee Ehrich

### Geographical localization of the research project in decimal degrees (max 5 per project, ex. 70,662°N and 23,707°E)

The three northern monitoring sites of YaES, which are located in a latitudinal gradient along Yamal Peninsula, Russia: Kharp in the forest tundra ecotone Erkuta in the low Arctic (68.2°N, 69.1°E); Sabetta at the border between the low and the high Arctic (71.2°N, 71.5°E)

### Participants

From the Polar Institute: Virve Ravolainen

From NINA: Audun Stien, Torkild Tveraa, Arnaud Tarroux

International participants: Aleksandr and Natalya Sokolov, Arctic Research Station of the Institute of Plant and Animal Ecology of the Ural Branch of the Russian Academy of Sciences, Labytnangi, Yamalo-Nenetsky AO, Russia.

Administrative responsible: Terje Aspen, UiT

### Flagship

Terrestrial

### Funding Source

Most of the field work of YaES is carried out by the Russian part and financed by Russian funding. The major infrastructure (boats, housing) is provided by the Arctic Research Station in Labytnangi and research support from the Yamal Government. The funding from the flagship (258 000 NOK) covered the expenses for the collaboration from the Norwegian side.

## Summary of Results

In line with the proposal, we continued the collaborative work between Fram Centre Researchers working with COAT and the Arctic Research Station in Labytnangi (Yamal, Russia) on monitoring climate related changes in the tundra ecosystem on Yamal. This collaboration involved common field work at Erkuta, a meeting in Tromsø in October, and participation in the Arctic biodiversity Congress in Rovaniemi, where we organized a side event about research on terrestrial socio-ecological systems on Yamal.

Concerning the four monitoring targets in focus of the project the following results were obtained:

Small rodents: trapping was carried out at all four monitoring site in the Yamal gradient. At Erkuta densities were extremely low, probably because of an unusual flood of most of the study area in June. Work on the paper analyzing small rodent distribution changes over the whole Yamal Peninsula for the last 40 years is in progress. Going through the archives of the station in Labytnangi, we obtained data about the snap-trapping based small rodent index for Erkuta since 1998. The time series was harmonized between different trapping protocols. The resulting 20 years time series shows a significant

decrease of lemmings and a simultaneous increase of narrow-headed voles. This series was included in an overview paper about lemming populations in the Arctic, which will be part of a special issue of AMBIO dedicated to status and trends report of the terrestrial part of the Circumpolar Biodiversity Monitoring Program (CBMP).

Arctic and Red fox: All data from baited automatic cameras obtained in late winter during 10 years at Erkuta were assembled. Analyses using an occupancy approach indicated an increase of red fox use at the camera stations and a parallel decline in arctic fox use. Work on a publication is in progress. The monitoring of arctic fox dens were continued. Despite very low small rodent densities, four dens were active in the study area this year. As an addition to the original project plan, Arnaud Tarrow from NINA contributed to the arctic fox work at Erkuta.

Vegetation changes: Our plans regarding vegetation monitoring changed, because a botanist from the institute of Plant and Animal Ecology of the Ural Branch of the Russian Academy of Sciences, Svetlana Sokovnina, joined our team in Erkuta. Therefore, we collected data about the biomass of functional groups of plants on permanent monitoring plots using the point intercept method. Similar data were collected in 2007 on part of the same plots. These data will allow to infer changes in vegetation composition over the last 10 years. In particular, we will use these data to assess the expansion of willow thickets into the adjacent meadow plots, and the amount of small willow recruits in the meadows. In 2018, we also measured plant biomass in an ongoing herbivore enclosure experiment, which addresses the impact of small, medium sized and large herbivores.

We initiated collaboration with reindeer herders, and take with them about the idea to assess pastures through the eyes, or the body condition, of reindeer. Some herders were willing to start collecting data about the dates when calves are born, and possibly weights of animals they slaughter. This idea was also presented to the Department of Science and Innovation of the Yamal Government. In the same meeting we gave an introduction to adaptive management, presenting the idea that management actions should be tested in an experimental way to assess their effects. The discussion was positive, but will have to be continued.

Geese: Unfortunately, the expedition to Belyi island was cancelled, because the Yamal region did not provide the helicopter flight. Therefore, there was no progress regarding this point.

Master and PhD-students involved in the project

Anne Meløe (Msc student, UiT)

Ivan Fufachev (PhD student, Perm State University, collaboration with UiT)

For the Management

Our work about plant herbivore interactions will provide relevant background information for the amangement of reindeer pastures. The initiated work to collect data about reindeer body condition in collaboration with interested reindeer herders will, if it succeeds, provide the management with an alternative approach to pasture assessment to the geobotanical method used at present. This idea was also presented to the Department of Science and Innovation of the Yamal Government. In the same meeting we gave an introduction to adaptive management, presenting the idea that management actions should be tested in an experimental way to assess their effects. The discussion was positive start, but will have to be continued.

Published Results/Planned Publications

**Ehrich D**, Schmidt NM, Gauthier G, Alisauskas R, Angerbjörn A, Clark K, Ecke F, Eide NE, Framstad E, Frandsen J, Franke A, Gilg O, Giroux MA, Henttonen H, Hörnfeldt B., Ims RA, Kataev GD, Kharitonov SP, Krebs CJ, Killengreen ST, Lanctot RB, Lecomte N, Menyushina IE, Morris DW, Morrisson G, Oksanen L, Oksanen T, Olofsson J, Pokrovsky IG, Popov IY, Reid D, Roth JD, Samelius G, Sittler B, Sleptsov SM, Smith P, **Sokolov AA**, **Sokolova NA**, Soloviev MY, Solovyeva D. Documenting lemming population change in the Arctic: Are we keeping the pace? *Submitted to AMBIO*, as part of a special issue of the Circumpolar Biodiversity Monitoring Program

Rheubottom SI, Barrio IC, Kozlov MV, Alatalo JM, Andersson T, Asmus AL, **Baubin C**, Brearley FQ, Egekraut DD, **Ehrich D**, Gauthier G, Jonsdottir IS, Konieczka S, Lévesque E, Olofsson J, Prevéry JS, Slevan-Tremblay G, **Sokolov AA**, **Sokolova NA**, **Sokovkina SY**, Speed JDM, Suominen O, Zverev V, Hik DS. Hiding in the background: community-level patterns in invertebrate herbivory across the tundra biome. *Submitted to Polar Biology*.

Planned publications:

Sokolov AA, Sokolova NA, Ehrich D et al.: Changes in the predator community in late winter in a low arctic tundra site.

Sokolova NA, Ehrich D, Sokolov AA et al.: Are changes in small rodent community composition on Yamal over the last 40 years driven by climate?

#### Communicated Results

**Sokolov AA, Ehrich D, Sokolova NA, Fufachev IA**. 2018. Yamal EcoSystems – monitoring terrestrial ecosystems of Yamal peninsula under changing climate and human impact. 2018. Oral presentation at the Arctic Biodiversity Congress, 9-12 October 2018, Rovaniemi, Finland.

**Ehrich D, Sokolov AA, Sokolova NA**. 2018. Research and management of changing tundra ecosystems or socio-ecological systems in Yamal. Side event at the Arctic Biodiversity Congress, 9-12 October 2018, Rovaniemi, Finland. During this side event, D Ehrich, AA Sokolov and NA Sokolova had small presentations about different parts of YaES.

**Sokolova NA, Sokolov AA, Ehrich D, Fufachev IA, Sabard B, Léandri DJ, Gilg O**. 2018. Influence of predators on shorebirds' breeding success during the low phase of a rodent cycle in Sabetta, high arctic Yamal (Russia). Poster at the Arctic Biodiversity Congress, 9-12 October 2018, Rovaniemi, Finland.

Outreach:

There were several news on TV about our project and collaboration, for instance

[https://vesti-yamal.ru/ru/sobytiya\\_njedjeli/kakie\\_peremenyi\\_preterpevaet\\_jivotnyiy\\_mir\\_yamala\\_i\\_chno\\_ob\\_etom\\_dumayut\\_uch168788?fbclid=IwAR04R7F9IZ5aIha9WilQIOqW8mkvf2TFAnUf-Jr9mV8JDgu4Dg96GougV0](https://vesti-yamal.ru/ru/sobytiya_njedjeli/kakie_peremenyi_preterpevaet_jivotnyiy_mir_yamala_i_chno_ob_etom_dumayut_uch168788?fbclid=IwAR04R7F9IZ5aIha9WilQIOqW8mkvf2TFAnUf-Jr9mV8JDgu4Dg96GougV0)

#### Interdisciplinary Cooperation

This project is in the first place ecological.

Budget in accordance to results

The funding from the Fram Centre was used according to the project plan. It covered one month of salary for DE to work with the project, fieldwork expenses for DE, a master student (Anne Meløe) and Arnaud Tarroux from NINA, and travel expenses for meetings.

Could results from the project be subject for any commercial utilization

No

Conclusions

Yamal EcoSystems is developing as a program for monitoring climate related ecosystem change on Yamal in close collaboration with COAT. Our activities are also becoming more relevant for management, and well integrated in International tundra monitoring networks (Ehrich et al. submitted, Rheubottom et al. submitted)