

Project information

Keywords

migration seabirds habitat use

Project title

Seabird habitat use and migration strategies

Year

2017

Project leader

B Moe

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

78.9°N and 12,22°E; 69,6°N and 18,02°E; 69,6°N and 18,85°E; 68,2°N and 69,1°E

Participants

Project participants in the Fram Centre and/or in Kongsfjorden:

NINA: Sveinn Are Hanssen, Akvaplan-NIVA: Kjetil Sagerup, UIT: Dorothee Ehrich

Norwegian Polar Institute: Geir Gabrielsen, Sebastien Descamps (NPI), NTNU: Claus Bech, CNRS, France: Olivier Chastel

Core partners in the skua networks

Univ Wageningen/IMARES, Netherlands: Rob van Bemmelen

Univ Bourgogne, France: Olivier Gilg

Many national and international collaborators in the research networks on the study species, including researchers from Russia, Denmark, Finland, Faroe Island, UK, Iceland, Germany, Spain, USA.

Flagship

Fjord and Coast

Funding Source

FRAM (350k)

NINA (120k)

SEATRACK (115k)

Leverhulme Trust (10k)

Kartverket (50k)

Summary of Results

This project has provided important new knowledge about habitat use and migration strategies of arctic seabirds, with relevance for conservation management.

The project is focused on the fieldwork we do in Kongsfjorden and in Troms, along with support to field work in Yamal, and we take part in large-scale research networks to ensure multi-colony tracking at many Arctic and sub-Arctic locations.

One highlight is the scientific output, including two published paper, two manuscripts soon to be submitted, one MSc thesis and communication of results at conferences, meetings, education and media.

The published papers (van Bemmelen et al 2017, Bogdanova et al 2017) are both part of a special theme section on Individual variation in

seabird foraging and migration in Marine Ecology Progress Series, which is at the core of this project. Van Bemmelen et al (2017) is our second paper from our collaborative network on long-tailed skuas. It underlines the importance of many years with tracking data from the same individuals and demonstrates that seabirds can be very consistent in their migration strategies among years, but also that individuals exhibit some flexibility. In this case, the skuas were more likely to deviate from the track of the previous years in late winter.

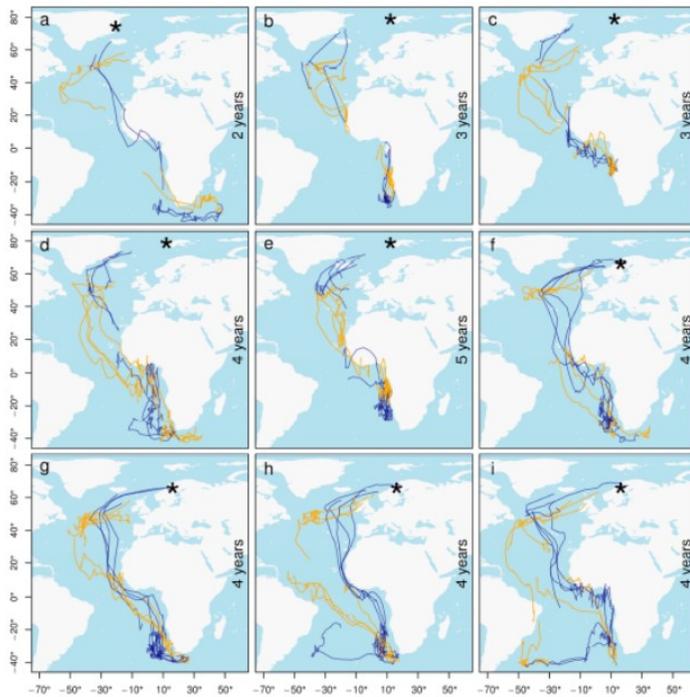


Fig 1. Individual tracks of long-tailed skua with multiple years of tracking data.

We have revealed that there is a spectrum of flexibility of migration strategies among seabird species. An extreme example of large variation among individuals and fixed strategies within individuals comes from our arctic skua studies (van Bemmelen et al 2018 in prep)

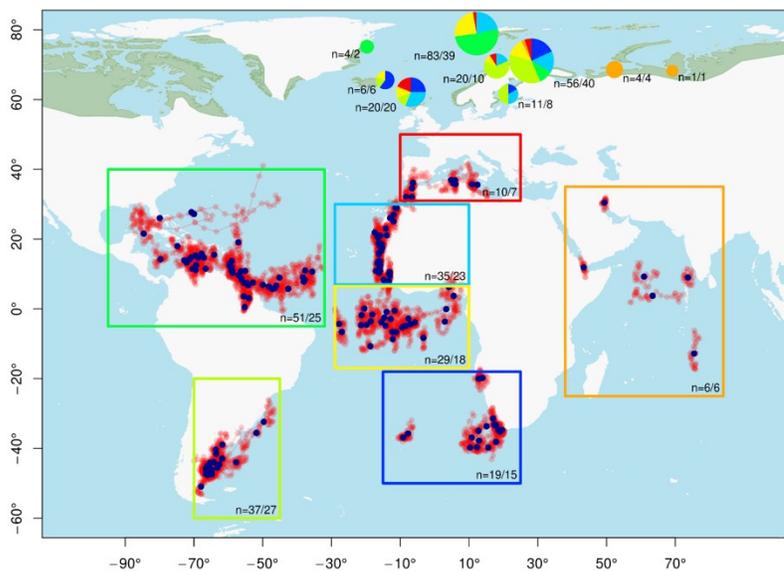


Fig. 2. Migratory connectivity and individual consistency in arctic skuas.

In one of the papers in prep (Moe et al) we reveal the importance of cold Arctic waters as hotspots for black-legged kittiwakes after the breeding season. Two such hotspots are evident, the northern parts of the Barents Sea and NE Greenland. The alternative strategies were to stay close to their colonies. We demonstrate that these hotspots persist over years- and we reveal the composition of these non-breeding populations. Such information is of high relevance for conservation management.

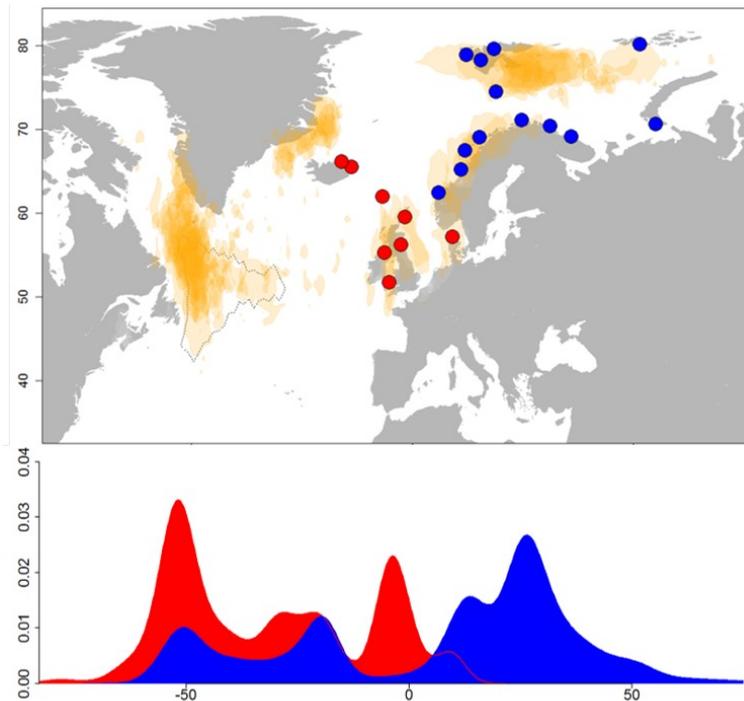


Fig. 3 Post-breeding hotspots in the cold for NE-Atlantic black-legged kittiwakes.

One MSc students in our project, Liv Monica Trondrud, defended her thesis in October 2017 at NTNU.

Another highlight is the fieldwork, which has been successful. For example, in Yamal they succeeded in recapturing arctic skuas. This provided the first tracking data on arctic skuas from Yamal. In contrast to long-tailed skuas from Yamal, which migrate through the Barents Sea and along the Norwegian coast, the arctic skua cross the Eurasian continent over land to reach wintering areas in the Indian Ocean. This project supplied the loggers and equipment for the field team in Yamal.

Finally, the project has contributed to a conservation management process, led by Birdlife international, which has resulted in a proposal to OSPAR for a marine protected area (MPA) in the Mid Atlantic, based on analysis of tracking data of many marine species.

Master and PhD-students involved in the project

Phd:

Rob van Bemmelen (defence spring 2019)

Pierre Blevin (defence spring 2018)

MSc:

Liv Monica Trondrud (Oct 2017)

Eline Rypdahl (final exam and thesis defence spring 2018)

Emily Hill (final exam and thesis defence spring 2018)

For the Management

Long-tailed skuas and arctic skuas show consistent individual variation and connectivity among populations. Individuals spend the winter in one of several distinct areas in tropical or temperate waters on the southern hemisphere, often wintering several thousand kms apart from conspecifics from the same breeding population, and mix with individuals from other populations. The composition of the Barents Sea seabird community changes from summer to autumn. Our kittiwake study shows that the Barents Sea is a hotspot which attract birds from populations breeding more than 1000 km away. Glaucous gulls breeding in Svalbard are opportunistic and seem to migrate to Kvaløya/Troms- where the whales and the herring fisheries offer herring but also pose threats as large numbers of gulls are subjected to by-catch. Arctic seabirds depend on healthy oceans and coasts on local to global scales. This calls for national and international management of our seas.

Published Results/Planned Publications

Published papers:

van Bemmelen, R., B. Moe, S. A. Hanssen, N. M. Schmidt, J. Hansen, J. Lang, B. Sittler, L. Bollache, I. Tulp, R. Klaassen & O. Gilg (2017) Consistency and flexibility in non-breeding movement patterns in a long-distance migratory seabird, the Long-tailed Skua. *Marine Ecology Progress Series* 578: 197-211

Bogdanova, M. I., A. Butler, S. Wanless, B. Moe, T. Anker-Nilssen, M. Frederiksen, T. Boulinier, L. S. Chivers, S. Christensen-Dalsgaard, S. Descamps, M. P. Harris, M. Newell, B. Olsen, R. A. Phillips, D. Shaw, H. Steen, H. Strøm, T. L. Thórarinnsson & F. Daunt (2017) Multi-colony tracking reveals spatio-temporal variation in carry-over effects between breeding success and winter movements in a pelagic seabird. *Marine Ecology Progress Series* 578: 167-181

MSc thesis:

Liv Monica Trondrud (2017) Telomere dynamics and migration patterns in a long-distance migrant, the Arctic skua. MSc thesis. IBI NTNU, Trondheim.

Planned papers:

Elise Skottene, Sveinn A. Hanssen, Bjørn M. Jenssen, Rob Van Bemmelen, Jan O. Bustnes, Olivier Chastel Tomasz M. Cielski, Anette A. Fenstad, Geir W. Gabrielsen, Syverin Lierhagen, Richard .A. Phillips and Børge Moe (2017/2018) Individual Migration Strategies are linked to Element Concentrations in an Arctic Seabird

Moe, B., Strøm, H., Chastel, O., Nilssen, T.A., Angelier, F., Blévin, P., Bogdanova, M.I, Bringsvor, I.S., Bråthen, V., Buzun, V., Chivers, L., Christensen-Dalsgaard, S., Clément, Clément-Chastel, C., Daunt, F., Descamps, S., Erikstad, K.E., Ezhov, A.V., Fauchald, P., Frederiksen, M., Gavrilov, M., González-Solís, J., Goutte, A., Grémillet, D., Guilford, T., Harris, M.P., Helgason, H., Kolbeinnsson, Y., Krasnov, Y.V., Langset, M., Lorentsen, S.H., Merkel, B., Newell, M., Olsen, B., Phillips, R.A., Ponchon, A., Reiertsen, T.K., Shaw, D., Steen, H., Systad, G.H., Tartu, S., Þórarinnsson, Þ.L., Wanless, S., & Boulinier, T. (2017/2018) Post-breeding hotspots in the cold - large-scale tracking of kittiwakes in the north-east Atlantic.

Moe B et al (2018) Early life habitat exploration and migration of black-legged kittiwakes

Van Bemmelen et al (2018) Migratory connectivity and individual consistency in arctic skuas

Bjørnliid N et al (2018) Migratory connectivity and individual consistency in common eiders

Strøm H et al (2018) Migratory connectivity of Svalbard breeding glaucous gulls

Descamps et al (2018) Link between winter habitat use, climate and population dynamics in little auks

Communicated Results

International symposium

Moe, B., Strøm, H., Chastel, O., Nilssen, T.A., Angelier, F., Blévin, P., Bogdanova, M.I, Bringsvor, I.S., Bråthen, V., Buzun, V., Chivers, L., Christensen-Dalsgaard, S., Clément, Clément-Chastel, C., Daunt, F., Descamps, S., Erikstad, K.E., Ezhov, A.V., Fauchald, P., Frederiksen, M., Gavrilov, M., González-Solís, J., Goutte, A., Grémillet, D., Guilford, T., Harris, M.P., Helgason, H., Kolbeinsson, Y., Krasnov, Y.V., Langset, M., Lorentsen, S.H., Merkel, B., Newell, M., Olsen, B., Phillips, R.A., Ponchon, A., Reiertsen, T.K., Shaw, D., Steen, H., Systad, G.H., Tartu, S., Þórarinnsson, Þ.L., Wanless, S., & Boulinier, T. (2017) Post-breeding hotspots in the cold - large-scale tracking of kittiwakes in the north-east Atlantic. Poster presented at the 6th International Bio-Logging Science symposium, Lake Constance, Germany, 25-29 September 2017.

National meetings

Moe, B. 2017. *Hotspots for sjøfugl i nord*. Presentation at the biannual SEAPOPOP seminar, Bergen, Norway, 27-28 April 2017.

Moe, B. Seabird habitat use and migration strategies 2017. Årsmøte i Flaggskipet Fjord og Kyst; 2017-10-17 - 2017-10-18

Moe, B. SEATRACK- storskala sporing av sjøfugl utenfor hekkesesongen. Åpent fagseminar; 2017-10-24.

Education:

Lectures at UNIS by GW Gabrielsen (AB-201, AB-202, AB-203)

Lectures at UIT by SA Hanssen (Marine top predators BIO 3506) and GW Gabrielsen (Bio 3003)

Media:

Moe, B. Olje-ulykke i Barentshavet kan ramme fugl som hekker 1000 km lenger sør. NRK [Internett] 2017-07-31 NINA

Moe, B. Svanefart. Dagens Næringsliv [Avis] 2017-02-25

Moe, B. Å, var jeg en trekkfugl. Dagens Næringsliv [Internett] 2017-02-24

Interdisciplinary Cooperation

The project has benefitted from cooperation between researchers from different disciplines. The listed papers mainly belong to the following disciplines: Distributions/diversity, migration, ecology, climate change biology and ecotoxicology.

Budget in accordance to results

We applied for 400k from the Framcenter and we were granted 350K. We aimed at submitting two-five new manuscripts for publication in 2017. We published two papers in 2017 which were submitted in late 2016. The goal of additional two -five new manuscripts were too

ambitious. Also when taking the financial cut into account. However, we are close to submitting to new manuscripts, and we have accomplished a high degree of outreach. Additionally there are several planned papers from the data collected in this project. Hence, there is a very strong basis for further publication of results.

The 350k funding from the Fram Centre played an important role for financing fieldwork, equipment, tracking analyses and for writing papers, and has thus given us the opportunity to take an active role in the large-scale network of collaborators. The project also benefitted from external funding (Seatrack, Leverhulme Trust, Kartverket) as well as a use of own research hours (NINA egenforskning). The Fram Centre funding has been crucial for obtaining these external funds. This project is linked to huge research networks, involving many researchers and costly field work and analytical work. Its large-scale success has depended on external funding for the field activities of project partners (e.g. extensive field operations in Russia, Greenland, Sweden, Faroes, Iceland and other Norwegian colonies).

Most of the 350k has been allocated to our fieldwork in Kongsfjorden (Svalbard) and Brensholmen (Troms), equipment and tracking analyses, and resources available for writing papers. The funding of this project has been important for our role in the papers, and especially van Bemmelen et al 2017. Furthermore, the funding has also been crucial for the MSc student to take part in this project, and the one MSc theses completed this year. For the other papers the main funding has come from other sources, but they are relevant for the project.

Money allocated to Fram Centre partners within the project:

65k was allocated to NPI and costs at the Sverdrup Station in Ny-Ålesund.

30k was allocated to Sagerup/Akvaplan NIVA for field work contribution in Ny-Ålesund, and approximately 15k was allocated to cost/equipment for Ehrlich (UIT) for field work in Yamal.

Could results from the project be subject for any commercial utilization

No

If Yes

No, but the results may have major implications for management and industry (e.g. oil industry, fisheries, shipping)

Conclusions

The project has established a strong basis for further work. We have a long-term perspective and will further develop the project to focus on climate effects on migratory strategies and habitat use in arctic seabirds, along with consequences of exposure to contaminants. The project has provided a unique basis for assessing inter-annual as well as inter- and intra-individual variation habitat use, since we now have obtained several years of data from the same individuals and population, in a wide collaborative network. This project is now also linked to SEATRACK (funding from the Ministry of Climate and Environment (KLD), Ministry of Foreign Affairs (UD) and the oil industry (NOROG), a large-scale tracking program of seabirds in Norway, Russia, UK, the Faroes and Iceland.

The development of small-sized electronic tags has been a prerequisite for the project. However, there is a constant need for further decreasing the size, increasing the battery life and increasing the precision of the electronic tracking tags