

## Project information

### Project title

The role of seaducks in benthic fiord ecosystems in relation to invasive red king crabs and varying ice conditions

### Year

2012/2013

### Project leader

Sveinn Are Hanssen, NINA

### Participants

NINA (Dr. Sveinn Are Hanssen and Geir Helge Systad) is the leading institution of this project.

#### Participants:

Other projects like Epigraph (IMR, UiT), can deliver prerequisite material for the project.

International collaboration includes Magella Guillemette and Élisabeth Varennes, Université du Québec à Rimouski. Dr Magella Guillemette is a distinguished expert in sea duck physiology and behavior. Élisabeth Varennes is a PhD student specializing in seaduck diving behavior.

### Flagship

Fjord and coast, Theme: Physical-biological coupling - oceanography and habitat use by predators and their prey

### Funding Source

Fram Centre, internal

### Summary of Results

#### Data collection in Svalbard:

- 22 TDR (temperature, depth and geolocation logger) were instrumented on breeding common eiders in Kongsfjorden in June-July 2012

#### Data collection in Balsfjord/Tromsø:

- Distribution of common eiders in the fjord during two periods: March and September (Figure 1)
- 7 TDR (temperature, depth and geolocation logger) were instrumented on breeding common eiders in Grindøya in June 2012

#### Data collection in Porsanger:

- Distribution of common eiders in the fjord during two periods: March and September (Figure 2, 3).

30 TDR loggers were purchased on this year's budget. The use of loggers tracking location, time under water and diving depth will give extremely relevant and exciting data. After retrieving the loggers next year we will be able to reconstruct diving patterns of eiders in relation to location and date throughout the year. This data may be used to estimate energy budgets in relation to migration, reproduction and local resources. In addition the loggers register sea temperature and in combination with geographic position and depth during dives it will deliver data on temperature profiles in the water masses linked to position and date.

Counts of birds in Porsanger have been conducted since 1981, and several times a year since 2010. The methods used are counts from land and airplane. All seasons are relatively well covered over several years. The eider population in Porsanger has decreased from more than 3000 pairs in the 1980's to about 2000 pairs in 2005. All seaduck species have been mapped in the area.

We have mapped the distribution of eiders in Porsanger in relation to the most probable King Crab areas and ice distribution (Figure 2, 3) The analyses show that eiders are pushed from the innermost parts of the fjord during winter, due to ice cover. This may have an effect of the benthic fauna in the innermost parts since it is heavily used by eiders in summer/autumn but not available during winter/spring. Whether crabs use the frozen area, we do not know.

Seabirds in Balsfjord have been surveyed systematically since 2004, with counts winter, spring and summer after the project was started. The population is

significantly smaller than in Porsanger (Figure 1). Anyhow, several other seaduck species like King Eider, Long-tailed Duck, Velvet and Common Scoter, have also been mapped during the surveys, and will be brought into the analyses. The mentioned species are migratory, with differences in habitat use and endurance in the area compared to the Common Eiders.



Figure 1. Eider distribution in Balsfjord in spring (April, yellow) and autumn (October, black) 2012. These data are now merged with a database containing counts from 2004-2011 (NINA/G.Systad 2012).



Figure 2. Eider distribution in Porsanger during winter counts in February 1999 (black), March 2010 (light green), March 2012 (green) and April 1999 ( beige), The lack of eiders observed in the innermost parts of the fjord is due to ice cover during the survey, restricting the feeding to a few open spots due to strong currents. The April counts (beige) show the spring break up of ice. Red rings point to areas that may be important for king crabs. (NINA/G.Systad 2012)



Figure 3. Eider distribution in Porsanger during autumn counts in 1999 (October, light blue and November, dark blue) and October 2012 (green). There is no ice in autumn and eiders use the innermost parts of the fiord that is inaccessible during winter/spring. Red rings point to areas that may be important for king crabs. (NINA/G.Systad 2012).

Published Results/Planned Publications

No published results yet

Communicated Results

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Interdisciplinary Cooperation

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Budget in accordance to results

The funding from the Fram Centre in 2011 helped releasing money through the Marine NINA SIS, giving opportunities to follow the three fjords over a longer period. It also makes it possible to use new logger techniques for the activity pattern of common eiders. However, in 2012 we got a substantial cut from the Flagship which resulted in some cuts in activity. We therefore chose to concentrate on purchasing and instrumenting birds with loggers, as we consider this to be the most promising and novel part of the initial proposal. Continued funding from the Flagship will allow us to collect loggers and continue instrumentation of loggers. This is important both in order to track the climatic variation over several years, and in different areas with variations in ice cover during the year, and to

estimate energy budgets of birds in relation to wintering area, local climate and competition.

If Yes

Eiders feeding on benthos are an important factor when establishing mussel farms. Knowledge about eider food preferences, diving depth, habitat use and energy need are important information for the localization of mussel farms.

Conclusions

a) Indicate future research and/or perspectives which the project results have led to

The project is in a phase gathering data and experimenting with the methods for obtaining good enough data to show the eider influence on the benthic communities in the three different fjord areas.

We are now working on combining current knowledge of king crab distribution, ice distribution and common eider temporal and geographical distribution (Figure XX). In 2013 we will collect loggers from the birds that were instrumented in 2012 which will give a lot of new knowledge of habitat use, energy consumption and local climate in the wintering areas of common eiders. Combining these approaches will give a more dynamic view of these problems.

b) List and describe new methods or techniques that have been developed during the project or that the project has revealed a need for

The use of loggers tracking location, temperature, time under water and diving depth gives information which will be useful both regarding energy budgets of eiders and will at the same time monitor local climate. Loggers have been purchased and instrumented on 29 eider ducks on this year's budget.