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ABSTRACT

Fate or free will - the Little Auks' nesting sites and foraging ground preferences in the changing Arctic environment

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In biogeography, species distribution and probability of occurrence are among the most important/key topics in plant and animal ecology.

In the seabirds ecology it is important to understand the linkage between at-sea distribution (foraging grounds) and the distribution of colonies (reproductive sites), as it is known that many species exhibit a marked relationship between the colony placement and the distance from the foraging grounds.

In this study, we attempted to assess the linkage between habitat characteristics, distance to foraging grounds and the occupancy probability in the Little Auk. Little Auks colonies are spread along the West coast of Spitsbergen from Sørkapp up to the islands north of Spitsbergen (including Sjuøyane). The birds forage, depending on the colony placement, from 30 to 150 km away from the colonies.

Being the most abundant seabird species on Svalbard, Little Auk seems to be quite robust when it comes to the observed changes in Arctic in last years, owing to the ability of adapting to changing conditions (e.g. availability of highly nutritious zooplankton).

With the prospect of the changes in the Arctic environment expected to increase, it is important to understand the possible reactions of the ecosystem components. In this example we focus on Little Auk, the key species that links the marine and terrestrial ecosystems in Spitsbergen by transporting nutrients from the sea to the land and deposition of faeces, which in turn, affect herbivores relying on this food source (i.e., the tundra biomass).

Field data was collected between 2009 and 2011 along the coast of West Spitsbergen, with special focus on Hornsund, Bellsund, Magdalenefjorden and Fuglesangen Island areas, known to hold the highest colony densities in the study area. Obtaining data in the field was possible by developing the technique of remote colony selecting with the use of GPS and Laser Range Finder. At-sea surveys were made in 2007-2010.

The total Little Auk population size in the surveyed colonies is estimated between 900 000 and one million pairs. Birds prefer moderate slope angle (20-38 degrees), placed from 30 meters asl up to 170 m asl, choosing S, S-W, W and S-E slopes, i.e., the ones with the highest values of incoming solar radiation.

The highest densities at-sea were present along the coast, approximately 20 km from the coast, up north and down south from the entrance of Hornsund Fiord, at

the entrance of Isfjorden, 20 km north-west from the northern tip of Prins Karl Forland and up to 150 km west from Magdalenefjorden and Smeerenburgfjorden. The results discussed here show the present distribution of colonies and at-sea distribution of the Little Auks in to be related to geographical and ecological factors such as solar radiation, distance from the foraging grounds, altitude, size of the colony patches, rock formations and many more. Also, the theoretical total carrying capacity of the environment is presented (probability of occurrence) as the basis for further discussion about the future of the Little Auks population as well as their foraging ground on Svalbard in the matter of potential deepwater drilling and increased marine traffic.