

The impact of food resources, reproductive rate and hunting pressure on the Baltic grey seal population in the Finnish sea area

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The Baltic grey seal (*Halichoerus grypus*) is a top predator whose numbers have fluctuated during the 2000s in the Finnish sea area. Changes in population size may be due to changes in e.g. population density, food resources and hunting pressure. Here, we examined (1) the trends in grey seal abundance, birth rate of mature females, quality of the main food resource (weight of herring *Clupea harengus*), and hunting pressure (including the proportions of adults and pups in the catch) in 2003–2015, and (2) the possible effects of birth rate, hunting pressure, and herring weight on abundance index, as well as the possible effects of herring weight and abundance index on birth rate. Results indicated an increasing trend in the grey seal abundance index during the study period. Hunting pressure, especially towards adult seals, explained well the variation in abundance index, suggesting a limiting effect of hunting on population numbers. Herring weight explained well the variation in birth rate but the impact of other factors cannot be ruled out. In recent years, the increasing herring weight and birth rate, and a decreasing hunting pressure and adult hunting mortality probably enabled population growth. A negative relationship between birth rate and abundance index suggested a possibility of some density-dependence of the grey seal population.

Introduction

Understanding the reasons behind changes in species abundance is essential in ecological research. Changes in birth and death rates, as well as migration, and factors affecting them determine the changes in population growth rate

and size. These factors may be either regulating (i.e. density-dependent) or limiting population numbers.

The grey seal (*Halichoerus grypus*) is a top predator in the Baltic Sea ecosystem, whose numbers fluctuated during the past 100 years. According to an estimation, there were about