

## The current status and the future of Baltic grey seal population

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**Abstract:** The population size of Baltic grey seals (*Halichoerus grypus*) has substantially increased in recent years leading to a conflict between seals and coastal fisheries in the Baltic Sea. Grey seals damage fishing gear and catches and an unknown number of seals drown in fishing gear. This has led to the need for new management measures and, thus, a better understanding of the current status and future trend of the grey seal population under alternative management scenarios. We build a biologically consistent population dynamics model to estimate the temporal changes in the seal population and predict the development of the population under alternative management options. As the uncertainty related to the subject is high, modelling is conducted by using a probabilistic approach and Bayesian methods. This allows us to include data and prior information from several complementary sources to infer the parameters of the model. These include, for example, survey counts, by-catch estimates, fishing and hunting statistics, data from sampled individuals, expert interviews and literature. Our model is age-sex structured and we provide estimates, among others, for the population size and total by-catch in age-sex classes. The results indicate a clear difference in the hunting and by-catch mortality rates between males and females, and a clear effect of sea ice extent for pup survival. We forecast the population development under a few alternative management decisions related to hunting and by-catch, and different ice extent scenarios in the breeding areas that are based on climate warming scenarios.