MARINE MAMMAL SCIENCE, 31(2): 405–426 (April 2015)

DOI: 10.1111/mms.12160

Rapid recovery of Dutch gray seal colonies fueled by immigration

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Abstract
Gray seals were first observed breeding in the Dutch Wadden Sea in 1985, after centuries of absence. The breeding colony there is now the largest on the European continent. We describe the changes in gray seal numbers and their geographical expansion, and estimate how these processes were influenced by immigration from other colonies. Counts of hauled out animals were carried out between 1985 and 2013, monitoring three different periods of the seals' annual cycle. Using priors determined for the UK population, a Bayesian demographic model was fitted to pup numbers to estimate the population parameters driving the growth. This included immigration of subadults into the breeding population, which contributed to an average growth rate in the pup counts of 19%/yr, much higher than expected in a closed population. This immigration may account for approximately 35% of the total annual growth. In addition, at least 200 gray seals from the UK visit the area temporarily. Recovery of the population in the Netherlands occurred more than 50 yr after gray seals were protected in the UK. These time scales should be taken into account when studying long living marine mammals, e.g., in impact and conservation studies.

Key words: gray seal, Halichoerus grypus, population development, Bayesian demographic model, North Sea, Dutch Wadden Sea, aerial survey, molt, pups, migration.

Local extinction has occurred in many mammalian species, often as a result of a changing environment or human activities (Hoffmann et al. 2011, Schipper et al. 2008). However, in some cases recovery may occur through immigration from populations nearby, if conditions are favorable. Gray seals (Halichoerus grypus Fabricius, 1791) in the Netherlands are such a case. After centuries of virtual absence, they have recolonized Dutch waters and shown rapid population growth in recent decades.

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