

SUMMARY

For the construction of the new port area Maasvlakte 2 in the Netherlands, a large amount of sand has to be extracted from the North Sea. The potential ecological effects of the sand mining activities have been identified in an Environmental Impact Assessment (EIA). One of the identified effects in this EIA was an impact on the number of eider ducks in the Natura 2000 area 'Voordelta'. Within the impact-effect chain from dredging to eider ducks, a large number of uncertainties play a role. In the EIA safe assumptions were used for a lot of these uncertainties. The finally predicted impact is a result of the accumulation of several safe assumptions. Therefore, the probability of occurrence of this predicted impact might be small. Information on this probability of occurrence will be useful in the discussion about the necessity of mitigating or compensating measures. The main objective of this study was to give insight in the probability of occurrence of the possible effects of sand mining on eider ducks in the Voordelta.

A probabilistic approach was used to analyse the uncertainties in the impact-effect chain and to find a method to take these uncertainties into account in the modelling of the ecological effect. The analysis showed that apart from the factors that are directly influenced by the sand mining, also a large number of factors that are not influenced at all by the sand mining have a large influence on the magnitude of the ecological impact. Factors that are not influenced at all by the sand mining are for example weather conditions and natural variations of population sizes. The final result was a probability density function of the impact of the sand mining on eider ducks. This result lead to the conclusion that the probability that the sand mining activities for Maasvlakte have a significant effect on eider ducks in the Voordelta is very small and can be considered negligible. The methodology that is used in this study is expected to be also applicable for the assessment of ecological effects of other human activities.