Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat

Summary multi-annual plan Programme Wozep

2024-2030

DUTCH GOVERNMENTAL OFFSHORE
WIND ECOLOGICAL PROGRAMME

Published by	Wozep – Rijkswaterstaat WVL en ZD
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Date	May 26th, 2023

Summary

The offshore wind ecological programme Wozep started in 2016, now seven years ago. The assignment that the Ministry of Economic Affairs and Climate Policy gave to Rijkswaterstaat back than for this research programme runs up to and including the current year (2023). It is therefore time to work on the follow-up assignment. This Multi-year Programme is the result of that: it gives direction to Wozep's research plans for the next seven years. In those seven years, from 2024 to 2030, we will build on the knowledge, insights and results that we have acquired in the past period. The scope of the programme and working from a solid (scientific) basis and experience remain the same. This way, well considered choices can be made regarding the knowledge questions to which the Offshore Wind Energy programme (WoZ) seeks answers, and helps in refining the associated research questions.

We are also dealing with new developments. One of these developments is the Monitoring, Research, Nature Enhancement and Species Protection programme (MONS), which was recently launched. The aim of this programme is to provide insight into the effect of the three transitions happening in the North Sea: the energy transition, the food transition and the nature transition. From January 1st 2024, Wozep will be an independent sub-programme of MONS. Substantive collaboration and, where possible, integration of research projects from Wozep and MONS, will be of great common added value. In 2023 we are already be giving this substance in a number of areas, including the joint approach to basic monitoring of zooplankton and phytoplankton and ecosystem modelling.

In the coming years we will have to deal with an enormous increase in the number of offshore wind farms. At the end of this year, all wind farms in the Dutch part of the North Sea will together produce approximately 4.8 gigawatts of energy. The ambition for 2030/2031 is to supply 21 gigawatts, which is more than four times as much. In the early years, Wozep mainly focused on the most urgent cumulative ecological effects of existing and future offshore wind farms. It soon became clear that the intended size of offshore wind energy in the longer term - 2030, 2040 and beyond - can also lead to indirect effects on the protected species groups that Wozep focuses on. The presence of large areas with artificial offshore structures can influence hydromorphological processes and thus affect those species groups via the food web. Next to this, loss of good habitat is also one of the concerns. So in addition to investigating only the more pressing, direct assumptions needed in WoZ decision-making, Wozep is already paying attention to these indirect (ecosystem) effects. Working towards acquiring this knowledge in time for good decision-making.

Wozep is part of the Offshore Wind Energy programme for which Rijkswaterstaat is the executor commissioned by the Ministry of Economic Affairs and Climate Policy. As a result, there is close contact between knowledge development and use of this knowledge, for example in spatial planning, site decisions, EIAs and regulations such as mitigating measures. The Framework for Assessing Ecological and Cumulative Effects (KEC) has been developed in order to properly assess plans or site decisions

for new wind farms. This knowledge instrument, abbreviated to KEC, helps to test in advance whether new wind farms will have a significant effect on the population size of protected species of birds, bats and marine mammals. In the coming years, model development and new input parameters from Wozep will continue to improve the KEC instrument. In turn, the improved KEC tool will partly guide the type of research Wozep will conduct.

This Multi-year Programme is not set in stone. We closely follow developments in the field of ecological research and use newly acquired relevant knowledge. Every year we supplement this Multi-year Programme with an Annual Plan, in which we indicate the priorities in the research projects and refine the question. If necessary, we will also adjust the course of the Multi-year Plan 2024-2030 if current events, such as developments in renewable (wind) energy at sea, give reason to do so.

Wozep is divided into five research themes: coastal and seabirds, migratory birds, marine mammals, bats, ecosystem/food web. When drafting the research programming, a broad knowledge gap inventory within the themes was eventually conceptualized towards a programme of concrete projects. In making this selection, consideration was given to both the most relevant ecological knowledge required for good decision-making and what knowledge is needed when. Below we provide a summary of these five research themes within Wozep. For each theme, we discuss the problem definition, previous research and then the focus for the coming years.

Coastal and seabirds
Coastal and seabirds are species that use the North Sea all or part of the year. These species can be affected by offshore wind energy in various ways, such as loss of habitat, collisions with the spinning blades of the turbines and/or indirect effects via offshore wind energy-induced ecosystem changes. About 15 species of coastal and seabirds are potentially affected to one or more of these effects:

Habitat loss
Some bird species avoid wind farms, while others are attracted to them. A wind farm can also form a barrier that makes it difficult or impossible for birds to reach a certain area. As a result of avoidance and barrier effects, less habitat is available with negative consequences on the fitness of these birds. Habituation may set in over time, making the effect smaller. By conducting research in the coming years into the driving factors behind the distribution of coastal and seabirds, we can better estimate the extent to which habitat loss occurs and what the consequences are. We will look at which methods and models are most suitable for this and develop them. We will also further validate these models with field data that we obtain by, among other things, tracking and tracing birds and by collecting high-definition images of the birds for distribution purposes.

Collisions
Possible numbers of collision victims are calculated using collision risk models. In recent years, Wozep has done a lot of research into the behavior of birds in wind farms and thus has already improved the input of these models. This will also continue. In addition, our commitment in the coming years is to register direct collisions and compare these outcomes with the outcomes of collision risk models. This gives us a better picture of the workability of the models, how to improve them and how to use them.

Ecosystem Effects
As a result of the large-scale roll-out of WoZ, shifts in spatial ecological functioning may occur over the course of the seasons. These changes in the ecosystem can have consequences for the availability and accessibility of food for seabirds. We want to visualize these consequences with the help of models.

Ultimately, we want to be able to estimate the consequences of one or more effects for the populations of the relevant species. (Population) models are used for this and are being further developed the coming years. Finally, we want to investigate the possibilities for mitigating the above-mentioned effects, such as an adapted wind farm layout or raising the tip layer of the turbine blades. The species we want to focus most on in this Multi-year Programme are gannets, kittiwakes, greater and lesser black-backed gulls, herring gulls, razorbills and guillemots.

Migratory birds
Migratory birds are land birds that only fly over the North Sea for their – often nocturnal – migration. These migratory movements take place both north-south and

west-east, to and from Great Britain. Habitat loss and ecosystem effects are logically irrelevant to these species. However, when flying at rotor height, they can become a collision victim. Barrier effects may also play a role regarding the planned large-scale increase in the number of wind farms in the North Sea, but this will play a minor role for the time being. The migration patterns and conditions under which migration occurs are only roughly known. That is why we will investigate the (night-time) migration across the North Sea and the influence of meteorological conditions or other relevant factors on the temporal and spatial patterns in migratory behavior. For the time being, with current knowledge, it is assumed that possible collision victims among migratory birds probably have no significant effect at the population level for most species of migratory birds. We still need to get more certainty about this though. There are still knowledge gaps when we talk about nocturnal bird migration and specific migratory bird species that are affected by offshore wind farms. That is why we want to find out which migratory bird species are most vulnerable to collisions with offshore wind farms and how large this effect is compared to the effects of other activities. In the follow-up study, the focus is on the species that can experience a relatively large effect at population level due to offshore windfarms. With research into flight behavior of these species, we want to be able to determine the number of collision victims more accurately. We also want to be able to better estimate the effects at the population level using population models including research into relevant parameters. Finally, we want to continue investigating options for mitigating collision victims, in addition to the regulation already included in the wind farm site decisions, which obliges wind farm owners to shut down the wind farms in the event of massive bird migration.

Marine mammals

The three different phases of a wind farm (construction, operational and decommissioning phase) have different effects on marine mammals. In recent years, the focus of the Wozep research has been on the effects of the construction phase. This has led to a better understanding of the effect assessment, the setting of standards and mitigation during this phase. Due to the increase in scale of offshore wind energy and the larger turbines, the model calculations, i.e. based on current knowledge and precaution, reach ecological limits when it comes to the disturbance of harbor porpoises. Although this can still be technically mitigated at the moment, there is a (future) bottleneck here. To get a grip on this, Wozep will conduct further research. First, Wozep will work on validating assumptions in the population models with better measured population parameters. Secondly, Wozep will also conduct research into the effects of alternative foundation techniques, possibly also with standards, so that it becomes clear whether, and if so under what conditions, these can be licensed. Thirdly, Wozep will focus on research into the effects of the operational phase of wind farms on existing populations of marine mammals, in particular on harbor porpoise, harbor seal and gray seal. Until now, the operational phase and its effect on marine mammals has been underexposed. The central question here is whether the habitat within the wind farms is and remains suitable – also in view of possible effects at the ecosystem level – for these species. Finally, attention will be paid to the decommissioning of wind farms. No research has been done on this so far. This concerns the direct disruptive or harmful effects of the removal of (part of) the turbines on the one hand, but also the possible indirect effects on the ecosystem and habitat on the other hand.

Bats

Bats migrate across the North Sea every year. There is a realistic risk of collisions (including barotrauma) with offshore wind farms in the North Sea and therefore of a negative impact. Extensive earlier Wozep research with bat detectors in the North Sea west of the Netherlands has shown that it almost exclusively concerns Nathusius' pipistrelle. This research has also provided knowledge about the presence at sea of

this bat species in relation to weather and wind conditions. This has led to curtailment measures for wind turbines in the event of a migration peak, which has been included in the Site Decisions. In order to estimate the effects at the population level, knowledge about the size of the population is required, combined with knowledge on the behavior of the animals in the wind farms. Unfortunately, the size of the population of Nathusius' pipistrelles could not be determined within the margins of a meaningful bandwidth, while the behavior of these animals in the parks could hardly be investigated by Wozep within reasonable budgets. The programme for the coming years is therefore to use genetic research to determine the (genetic) vulnerability of the population. Accurate data on behavior will be difficult to obtain through research, and at most at very high cost. This type of research is therefore not high on the list of priorities. However, Wozep wants to gain better insight into flight altitude and migration patterns by means of telemetry in the coming years, which at the same time could be used for nocturnal bird migration. In addition, we want to gain insight into the potential maximum effects and sensitivities for the population of Nathusius' pipistrelles in relation to offshore wind energy by means of a generic modeling approach. Finally, we are committed to using mitigating measures as effectively as possible, such as well-founded curtailment measures per location. To this end, we will set up additional monitoring in the North Sea in the north of the Netherlands and we will also conduct research into possible other forms of mitigation.

Ecosystem/Food Web

The increase in large-scale wind energy areas in the North Sea has potentially substantial effects on the ecological functioning of the ecosystem in space and time. Initial model results from Wozep already suggest that structural changes may occur in the future large-scale roll-out of offshore wind energy as a result of changes in hydromorphological processes such as currents, stratification and sediment transport. As a result, changes will also occur in the spatial and temporal availability at the basis of the food web, the plankton. These changes are not limited to wind energy areas, but potentially have an effect many kilometers from the wind farms. These effects can therefore influence the availability and/or accessibility of food for marine mammals and birds, among others. These indirect effects on protected natural values, within larger space and time scales than just the wind farms themselves, are better visualized through modeling exercises. This also means that the effects of all wind farms in the international North Sea must be taken into account even more closely in order to obtain a good picture of these effects. In the coming years, we will therefore continue to work on expanding and validating the ecosystem model, by adding new modules, but also by looking internationally and working on validation of the input parameters. In addition, we also work on the related knowledge development regarding plankton, benthos and fish, including the effects of electromagnetic fields (EMF). We also look at the connection with the other themes within Wozep and we look for collaboration with other programmes, such as MONS and international research.