



# A POSITIVE FUTURE FOR PORPOISES AND RENEWABLES

Assessing the benefits of noise reduction to  
harbour porpoises during offshore wind farm  
construction.

September 2016

# ABOUT WWF-UK

WWF is the world's leading independent conservation organisation. We're creating solutions to the most important environmental challenges facing the planet so people and nature can thrive. This involves working with businesses, communities and governments in over 100 countries. Together, we're safeguarding the natural world, tackling climate change and empowering people to use natural resources sustainably.

Like oceans and seas globally, the health of UK marine ecosystems is under significant threat owing to a variety of external pressures, including the impacts of climate change. WWF recognises the importance of having an ecologically coherent and well managed network of marine protected areas (MPAs) to help tackle these challenges, including areas to protect harbour porpoises and other mobile species. To inform these discussions, we commissioned SMRU Consulting to identify the relative benefits of noise reduction measures during offshore wind farm construction to harbour porpoises in the North Sea.

The views and opinions expressed in this summary document are those of WWF-UK and do not necessarily reflect the views of SMRU Consulting. A full explanation of the methods, results, assumptions and limitations can be found in the original report, which can be downloaded [here](#) and should be cited as:

*Verfuss, U.K., Plunkett, R., Booth, C.G. & Harwood, J.: Assessing The Benefit Of Noise Reduction Measures During Offshore Wind Farm Construction On Harbour Porpoises. Report Number SMRUC-WWF-2016-008.*

## **Further information:**

Alec Taylor, WWF-UK  
Living Planet Centre  
Brewery Road, Woking, Surrey GU21 4LL

ataylor@wwf.org.uk





PHOTO © CHARLIE PHILLIPS

## EXECUTIVE SUMMARY

UK waters are of international importance for the harbour porpoise, holding one of the highest percentages of animals of any European country. As with other cetaceans, these relatively shy animals use sound both to communicate and to find food, and are therefore particularly sensitive to man-made sounds introduced into the marine environment. These include the pulses of noise that spread out from installing pile-driven foundations during offshore wind farm construction. At the same time, an expansion of renewable energy working within environmental limits is essential to mitigate the long-term impacts of climate change, including to marine ecosystems.

This new report, commissioned by WWF-UK, shows that noise reduction measures can clearly help to reduce the risk of a population decline due to the cumulative impacts of wind farm construction. By identifying the difference in impact between a baseline of no noise reduction and reducing noise under certain scenarios, it shows that if, under the assumptions made in the report, all UK wind farms in the North Sea reduced their noise levels by the equivalent of around 8dB, the risk of a 1% annual decline in the North Sea population can be reduced by at least 92% and up to 96%.

The report also discusses that using noise reduction measures in areas with high porpoise densities will be a more efficient than applying the same measures in areas of lower porpoise densities. This is important, as a possible special area of conservation (pSAC) has recently been identified for the harbour porpoise in the Southern North Sea, which overlaps with several existing or planned wind farm sites. If the equivalent noise reductions took place solely within this pSAC, the risk of a 1% annual decline would still be reduced by up to 66%.

This report demonstrates to us that relatively modest reductions, based on previously tested technologies that are becoming ever more widely used, can reduce the cumulative impact of underwater noise significantly, particularly the impacts of behavioural disturbance. By specifically articulating the relative level of these benefits, using scenarios in the context of the requirements to meet the conservation objectives of the Southern North Sea pSAC, this report is also highly topical given the need to find ways in which offshore wind energy can be generated in harmony with well-managed site protection.



## INTRODUCTION

A major expansion in offshore wind construction in the UK part of the North Sea is planned for the next eight to ten years, as part of the UK's efforts to decarbonise its energy system and meet its commitments under the Climate Change Act. This will collectively increase the levels of impulsive underwater noise in the marine environment, particularly during the installation of turbine foundations, which in turn has the potential to affect the behaviour and location of harbour porpoises and other cetaceans.

At the same time, a pSAC for harbour porpoises was consulted upon in early 2016 in the Southern North Sea, as part of the UK's obligations to designate a set of sites for harbour porpoise under the EU Habitats Directive. These areas were selected because they contain persistent high densities of harbour porpoises in both the winter and summer seasons. The Southern North Sea pSAC overlaps several existing or planned wind farm developments, and is likely to mean that added conditions are placed on developments within the site to ensure that their noise levels are compatible with maintaining favourable conservation status (FCS).

## WHY NOISE REDUCTION IS NEEDED

Securing the maximum possible deployment of renewable energy at minimal cost to biodiversity is essential to meet the UK's commitments on climate change and renewable energy generation, and avoid long-term impacts on marine ecosystems. At the same time, a well-managed network of MPAs is one of the best tools we have to protect habitats and species in the face of such profound changes already taking place. A well-managed MPA network is good for renewables deployment, as well as for biodiversity, providing certainty to investors and driving improvements in technology to reduce environmental impacts.

The use of noise reduction as a mitigation measure has the potential to significantly reduce the predicted cumulative effect of wind farm construction on a harbour porpoise population. The effect of these measures on the risk of a population decline is effectively determined by the reduction in the total impact area and the associated reduction in numbers of animals affected. In general, the greater the reduction in the number of animals affected, the greater the reduction in cumulative impact and the greater the benefit.

The report clearly shows that noise reduction associated with tested noise reduction systems is predicted to reduce the risk of population decline outside of environmental variability by up to 66% if just used within the pSAC and up to 96% across all UK North Sea wind farms, compared to a baseline scenario of no noise reduction. Even less ambitious noise reduction levels designed to reflect the potential challenges of installing noise mitigation in UK waters would reduce this additional risk by between 34% and 87%.



## DEMONSTRATING THE BENEFITS

WWF-UK commissioned SMRU Consulting to quantify potential changes in population level consequences of the impacts of underwater noise (auditory injury and behavioural disturbance) associated with reducing underwater noise during offshore wind farm construction using the interim Population Consequences of Disturbance (iPCoD) framework.

All UK wind farms constructed or planned between 2000 and 2024 were included and the effects were considered over a 36 year period up to 2037. Four different scenarios were conducted, in which noise impacts were reduced by varying levels, either at all wind farms or only those wind farms located within or overlapping with the Southern North Sea pSAC.

These scenarios were based on previously tested mitigation measures which were used to reduce noise in the construction of the Borkum West II wind farm in Germany, which reduced the noise level from piling by around 8dB, and therefore the impact area of the piling by 80%. A second set of scenarios were also included to account for the potential challenges in installing such mitigation systems in UK waters, whereby the impact area of the piling was reduced by 60%. This was then used to calculate the number of animals affected.

These scenarios were then tested against a hypothetical piling schedule up to 2024, based on information provided in Environmental Statements for current and planned wind farm projects. Inevitably, some assumptions have been made in the construction of this schedule, partly due to variations in the Environmental Statements themselves, which are clearly explained in the report.

The benefits to harbour porpoise populations were expressed as a reduction in the risk of a 1% annual decline in the North Sea population up to 2037, accounting for environmental variability. This was because a 1% annual decline is used as a benchmark for unfavourable conservation status under the Habitats Directive.

Therefore, we hope the results are relevant to potential SAC management discussions going forward. It is important to note, however, that this report was not aiming to provide absolute values in terms of benefits, but rather highlight the relative differences in these benefits.

The planned increase in piling over the next eight years was apparent in the baseline scenario of no noise reduction, as the risk of a population decline increases dramatically from 2019, reaching its highest level between 2026 and 2031, before reducing slightly up to 2037. Compared to this, however the effects of taking noise reduction were striking, particularly from 2020 onwards.

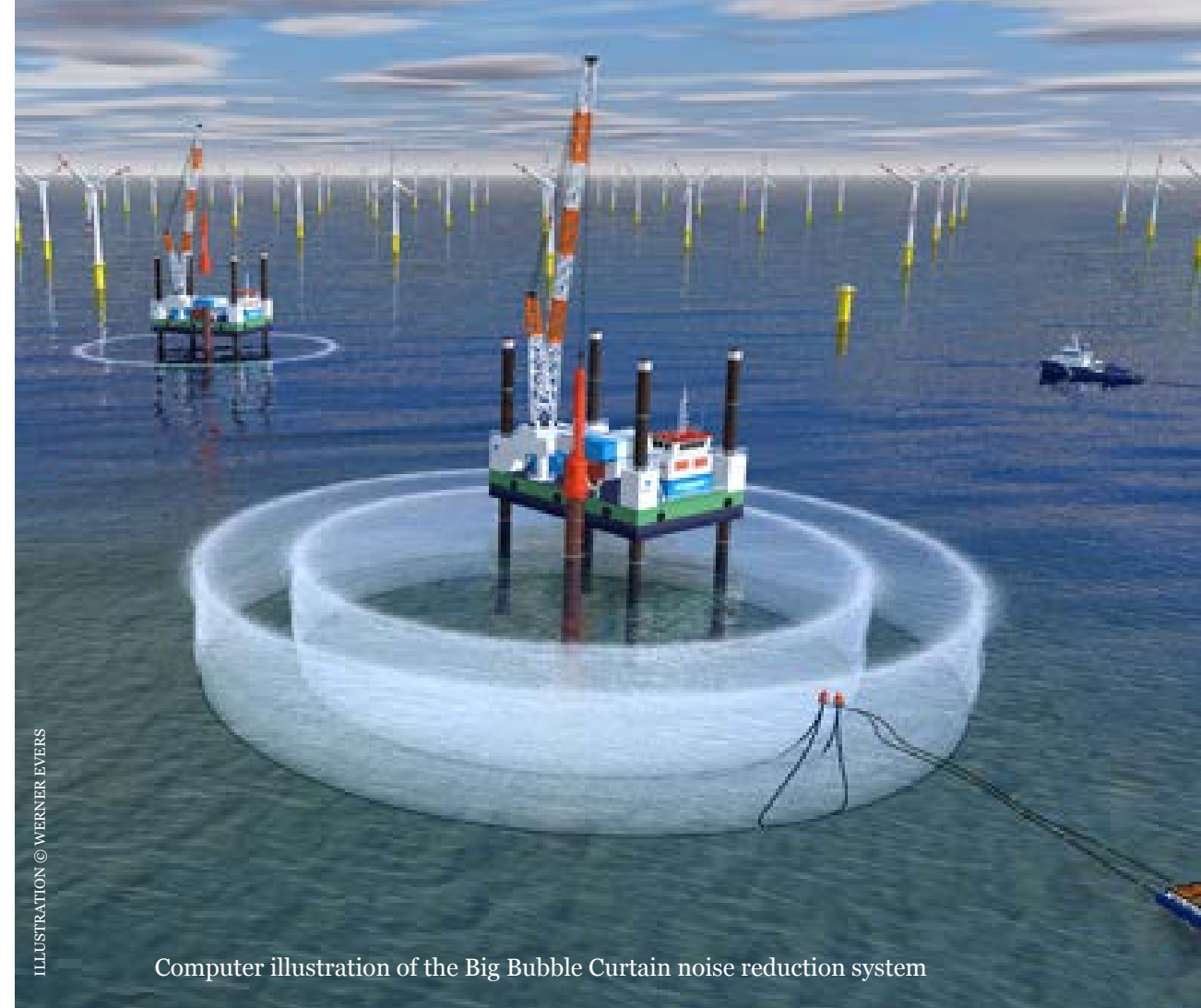


ILLUSTRATION © WERNER EVERS

Computer illustration of the Big Bubble Curtain noise reduction system

### Some key findings include:

- If all UK wind farms took, under the assumptions made in the report, noise reduction measures that reduced their impact area by 80%, the additional risk of a 1% annual decline in the North Sea population is reduced by between 92% and 96%, compared to the baseline scenario.
- If all UK wind farms took action to reduce their noise impact area by 60%, the additional risk of a 1% annual decline would be reduced by between 76% and 87%.
- If only wind farms within the pSAC took this action, this additional risk would be reduced by between 34% and 52%.
- If only wind farms within the Southern North Sea pSAC took these equivalent measures, this additional risk would still be reduced by between 55% and 66%.

# WWF-UK CONCLUSIONS AND RECOMMENDATIONS

This report by SMRU consulting comes at a crucial time for both renewables and biodiversity protection, and we hope it makes a valuable contribution to ensuring that renewable energy can take place sustainably within marine protected areas for cetaceans. WWF-UK commissioned this report to feed into discussions on what level of noise is considered acceptable on a case by case basis for marine protected areas for harbour porpoises, including the Southern North Sea pSAC.

The report shows that harbour porpoise populations can really benefit from relatively small levels of noise reduction. The scenarios used in the report are based on previously used mitigation technology, even allowing for more challenging UK conditions. Noise reduction in all North Sea waters is most effective, but noise reduction measures just in the harbour porpoise SAC, over and above the current requirements of the JNCC Underwater Noise Protocol, are still extremely effective at reducing additional risk by up to two thirds, compared to unmitigated construction. This highlights to us that more benefit is provided by greater mitigation in the pSAC as an area of higher porpoise density, compared to areas of lower porpoise density.

The expansion of offshore wind is much needed to decarbonise the UK energy system and help mitigate the future impacts of climate change. However, WWF-UK believes that a situation of no mitigation is unsustainable, given the step change in offshore wind construction over the next eight years in the UK part of the North Sea. Although the report states that the absolute values of the predicted risk are to be interpreted with caution, in our view, unmitigated pile driving that presents up to a 9.5% additional risk of a 1% annual decline in the North Sea harbour porpoise population is not compatible with the need to maintain the pSAC's site integrity, especially when taking into account potential impacts from other activities, such as fisheries bycatch or pollution. Solutions are therefore urgently needed to ensure the necessary combination of noise avoidance and mitigation is used to ensure that piling inside pSACs for harbour porpoise is compatible with the requirement to maintain FCS.

WWF-UK believes that some form of noise reduction will therefore be required to ensure compatibility with the pSAC conservation objectives. It is important to note that a decline of 1% per year should not be considered as a target to aim for, in relation to maintaining FCS. FCS is defined in population terms as a species being at least at a stable level or increasing. Indeed, UK guidance considers a 1% annual decline to be a "large decline" in relation to reporting under the Habitats Directive (JNCC, 2007).

The SMRU Consulting report also contains some useful reflections from the use of noise thresholds in Germany, particularly on disturbance thresholds, which could be useful to inform UK discussions on what level of disturbance is acceptable inside protected areas for cetaceans.



PHOTO © FLORIAN GRANER / GLOBAL WARMING IMAGES / WWF



## WWF-UK RECOMMENDS IN PARTICULAR THAT:

- Noise reduction and the use of technical mitigation are accepted as a necessary minimum requirement of offshore wind farm construction inside pSACs for harbour porpoises. This will drive down costs and increase use over the next eight years as North Sea construction expands.
- The accepted levels of noise to avoid significant disturbance inside the pSACs are equivalent to the German Sound Protection concept.
- A standard cost-benefit analysis format is used to inform the use of technical noise mitigation, which includes the social and environmental costs of not reducing noise.
- Greater efforts are made to standardise the format and methods of environmental statements for offshore renewable energy developments, allowing for more comparable estimates of cumulative impact.
- Building on this work, further analysis is carried out to establish the benefits of incorporating spatio-temporal alterations in piling schedules and seeking to quantify the benefits of noise reduction across the North Sea.
- The ecologically coherent network of MPAs is completed as soon as possible, backed by clear management measures to provide certainty for renewables developers and effective protection of the site features.
- There is targeted investment in marine monitoring, in particular aerial survey and remote monitoring, to deliver better baseline information on the distribution and abundance of habitats and species sensitive to renewables development.
- An independently-chaired roundtable group of developers, regulators, academics and NGOs is established to discuss key issues around the successful deployment of offshore renewables in and around MPAs for harbour porpoises.



For a future where people and nature thrive | [wwf.org.uk](http://wwf.org.uk)

© 1986 panda symbol and ® "WWF" Registered Trademark of WWF. WWF-UK registered charity (1081247) and in Scotland (SC039593). A company limited by guarantee (4016725)