

# Options for biodiversity-friendly designs and approaches for offshore wind farms in Ireland

Desktop study  
Executive summary





## REVISION HISTORY

Revision	Revision Text	Initials	Date
01	Draft issued for client review	LOB	29/02/24
02	Revision in response to client feedback	LOB	05/04/24
03	Issue for Use	LOB	17/05/24

Developed for  
the Climate Change Advisory Council



## ACRONYMS

<b>ABP</b>	An Bord Pleanála
<b>AI</b>	Artificial Intelligence
<b>ARC</b>	Activity Requiring Consent
<b>BACI</b>	Before-After Control-Impact
<b>CAP</b>	Climate Action Plan
<b>CSO</b>	Central Statistics Office
<b>cSPA</b>	Candidate Special Protection Areas
<b>CPUE</b>	Catch per Unit Effort
<b>DECC</b>	Department of the Environment, Climate and Communications
<b>DHLGH</b>	Department of Housing, Local Government and Heritage
<b>DMAP</b>	Designated Marine Area Plan
<b>EEZ</b>	Exclusive Economic Zone
<b>EIA</b>	Environmental Impact Assessment
<b>EIAR</b>	Environmental Impact Assessment Report
<b>EOI</b>	Expression of Interest
<b>FEED</b>	Front End Engineering Design
<b>FID</b>	Final Investment Decision
<b>GLS</b>	Global Location Sensor
<b>GPS</b>	Global Positioning System
<b>ICES</b>	International Council for the Exploration of the Sea
<b>IUCN</b>	International Union for the Conservation of Nature
<b>IWDG</b>	Irish Whale and Dolphin Group
<b>LCOE</b>	Levelised Cost of Energy
<b>MAC</b>	Marine Area of Consent

<b>MAP</b>	Maritime Area Planning
<b>MARA</b>	Maritime Area Regulator Authority
<b>MPA</b>	Marine Protected Area
<b>MSFD</b>	Marine Strategy Framework Directive
<b>NBS</b>	Nature-Based Solution
<b>NGO</b>	Nongovernmental Organisation
<b>NHA</b>	Natural Heritage Areas
<b>NID</b>	Nature-Inclusive Design
<b>NMPF</b>	National Marine Planning Framework
<b>NORRI</b>	Native Oyster Reef Restoration Ireland
<b>ORE</b>	Offshore Renewable Energy
<b>ORED</b>	Offshore Renewable Energy Development Plan
<b>ORESS</b>	Offshore Renewable Electricity Support Scheme
<b>OWF</b>	Offshore Wind Farm
<b>pNHA</b>	Proposed Natural Heritage Areas
<b>SAC</b>	Special Areas of Conservation
<b>SEAI</b>	Sustainable Energy Authority of Ireland
<b>SFPA</b>	Sea Fisheries Protection Authority
<b>SPA</b>	Special Protection Areas
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organisation
<b>WREN</b>	Working Together to Resolve Environmental Effects of Wind Energy
<b>WTG</b>	Wind Turbine Generator

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## EXECUTIVE SUMMARY

Ireland's Climate Action and Low Carbon Development Act (2015) and the 2021 Amendment Act, National Marine Planning Framework, as well as the Future Framework for Offshore Renewable Energy, including its Designated Maritime Area Plan (DMAP) mechanism, and the upcoming Marine Protected Areas Bill provide a normative system with conditions for biodiversity protection in offshore wind energy expansion and energy transition. Recently enacted, the EU Restoration Law would reinforce Ireland's national policy system by providing a legally binding imperative from an overarching EU level for the restoration of degraded ecosystems.

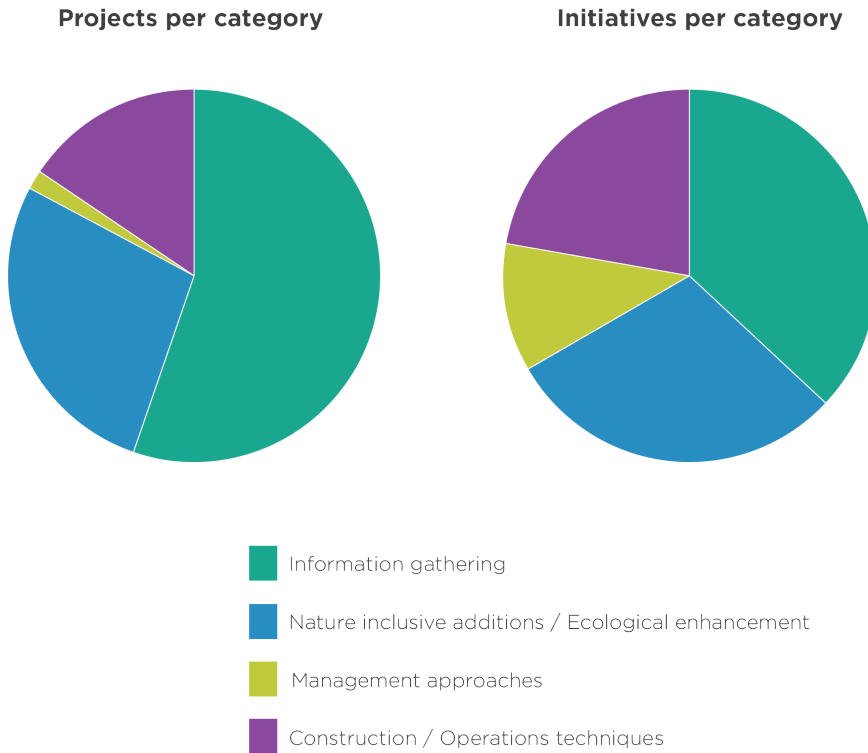
This report presents the findings of a literature review and analysis of initiatives for integrating biodiversity aspects into the design, construction, operation, and decommissioning of offshore wind farms (OWFs) in Ireland. The aim of this study was to identify and evaluate options for enhancing biodiversity in offshore wind projects.

The study identified 123 relevant nature-based solutions (NBS) projects from around the world, which were then rated based on their suitability and efficacy potential for Ireland.

The methodology involved a systematic literature review using various research databases and keyword searches to identify relevant papers and reports. The review primarily focused on projects and initiatives conducted in North America and Europe that are particularly relevant to the species and habitats found in Ireland.

Oyster reef deployment in Hernando County. Photo: Camila Guillen (UF/IFAS) / Flickr.





**Figure 4 1:** Breakdown of number of NBS projects and Initiatives Identified per Category.

The review was complemented by a gap analysis, highlighting blind spots in the available scientific literature on the topic.

Most of the Nature Based Solutions (NBS) projects identified in the reviewed scientific literature focused on information gathering, comprising over 55% of those identified. Significantly less projects on nature inclusive additions/ecological enhancement (28%) and construction/operation (15%) were identified. Projects focusing on management approaches were few, (<2%). These screening results likely reflect the early develop-

Category	Sub-Category
A. Information gathering	A.1 Modelling/simulation/mapping
	A.2 Monitoring/surveys
B. Nature Inclusive Additions/ Ecological Enhancement	B.1 Artificial habitat provision
	B.2 Rewilding/habitat restoration
	B.3 Hatcheries/captive breeding
C. Management Approaches	C.1 Co-Use
	C.2 Fisheries restriction
D. Construction/operation techniques	D.1 Decommissioning existing infrastructure
	D.2 Sustainable materials/recycling
	D.3 Minimising construction impacts

**Table 3 1:** A list of the categories and sub-categories of NBS Projects.

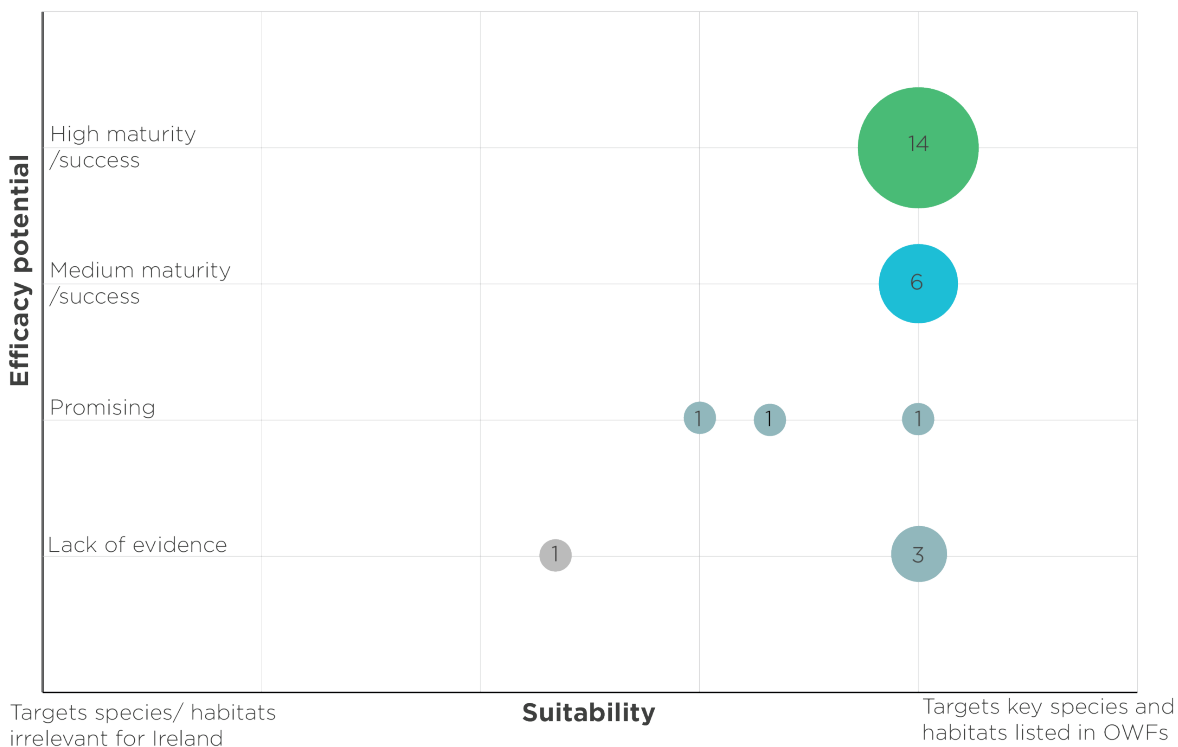
ment stage of biodiversity integration within the offshore wind industry.

Projects were analysed to provide an understanding of the efficacy and suitability of certain types of initiatives for application to offshore wind farm development in Ireland.

For the purpose of analysis, the 123 NBS projects reviewed in the literature search have been matched with one or more of 27 biodiversity friendly initiatives. A systematic process was developed with set criteria for evaluating each initiative in terms of their environmental benefits (Efficacy Potential) and viability in an Irish context (Suitability).

The resulting evaluation score was used to identify which NBS projects have the potential to be most successful and impactful in the context of Irish OWFs. Initiatives which are highly suitable and potentially effective were assigned the highest score (16) and are therefore the most suitable based on current knowledge.

### Evaluation of biodiversity-friendly initiatives for Irish offshore wind farms



**Figure 4 8:** Bubble diagram showing the results of the Evaluation of biodiversity-friendly initiatives for Irish Offshore wind farms.

The analysis identified 14 options for integrating biodiversity-friendly design into the development of offshore wind farms in Ireland.

For clarity in communication, the „Bat/Bird Curtailment“ and „Bat/Bird Deterrence“ solutions have been consolidated into a single solution, thereby reducing the total number of solutions from 14 to 13.

Listed in no particular priority, the following options have high efficacy potential; have a good fit for Ireland’s biodiversity profile; and are most suitable for near-term implementation.

The most suitable initiatives for near-term implementation are listed below:

- ~ Analysis Software for OWF monitoring
- ~ Machine Learning / AI simulation
- ~ Fisheries Monitoring
- ~ Bat and Bird Monitoring
- ~ Marine Mammal Monitoring
- ~ Artificial Reefs
- ~ Optimised Scour Protection
- ~ Optimised Cable Protection
- ~ Rewilding Oysters
- ~ Marine Protected Areas around OWF
- ~ Sustainable Materials
- ~ Bird / Bat Curtailment and Deterrence
- ~ Noise Reduction

The above initiatives are generally well-established, in many cases with applications beyond the scope of offshore wind. Some of these activities are legally required as part of environmental impact assessment requirements, with a wide variety of projects at different implementation stages. Incorporating the analogues of these NBS activities into Irish offshore wind farms would require consideration of factors specific to Ireland’s context, e.g. legislation and regulation, environmental conditions, species, etc.

Other types of initiative (further discussed in chapter 4 of the Report), classified as “Promising”, are equally as suitable but are at a lower level of maturity than the higher scoring types



Artificial reef deployed in Gulf of Mexico offshore, Alabama. Photo: Reefmaker / Wikimedia.



of initiatives. It is recommended to support or follow NBS projects involving these initiatives as they mature, and their knowledge gaps are filled. It is likely that, in the coming years more of the NBS projects within the “Promising” category will reach maturity, and that their outputs and findings will be easier to assess in terms of applicability for Irish offshore wind farms.

The remaining seven types of initiative may be suitable, but the review concluded that there is insufficient information and results available to assess their efficacy and that further research is required.

The analysis leads to a number of key take aways (further elaborated in chapter 5 of the Report) for government and OWF developers which could address some of the gaps highlighted throughout this report and address obstacles constraining the inclusion of biodiversity friendly initiatives into Irish offshore wind farm (OWF) developments. Key takeaways and areas for consideration are as follows:

- ~ Comprehensive regulatory frameworks and guidelines for monitoring and mitigation should be considered
- ~ Nationwide scale projects should be supported to fill known data gaps
- ~ A catalogue for integrating NBS into Irish OWF developments should be developed
- ~ Ongoing development of immature but “promising” initiatives should be considered
- ~ Synergies between different initiatives should be developed
- ~ Stakeholder engagement should be undertaken to help foster awareness, collaboration and action needed to ensure the implementation of NBS in the future development of OWFs in Ireland

Overall, this report provides a comprehensive overview of biodiversity-friendly initiatives for offshore wind projects in Ireland. It highlights the importance of considering biodiversity in the design, construction, operation and decommissioning of offshore wind energy farms, and identifies areas that require further study or state interventions. Careful consideration and balance of issues such as practicality, flexibility, and effectiveness of NBS are crucial when enforcing or regulating their use. Immature NBS projects should be closely followed through their development to gauge their efficacy and overall suitability, and more research is recommended for understudied initiatives.

It is worth noting that, at the time of writing this report, the ORE policy system in Ireland has not been completed and guidance is still evolving. Therefore, the considerations for NBS for ORE projects in Ireland provided in this report are general and high-level in nature.

Recommendations for practical, context-specific, and precise NBS for offshore wind energy infrastructure in Ireland are required. Guideline identifying the most appropriate NBS for offshore wind projects in Ireland must take the geology, habitats and species present within different proposed offshore wind sites into account, in addition to the specifics of the technology being used (e.g. fixed, floating, monopile or jacket foundation). The report notes that the OWDT/DHLGH are currently

working on the preparation of the ORE Planning

Guidelines could consider the inclusion of requirements for integration of NBS within the consent and planning process. In support of this, DECC could support consultation on these guidelines with industry through the planned Government-Industry working group. It is recommended that relevant stakeholders, in particular relevant government departments and agencies, including the OWDT, are engaged to disseminate and consider the findings of this report.

BlueWise Marine provides stakeholder engagement, marketing, communications, health and safety (HSEQ), fisheries monitoring and infrastructure management services for the marine and offshore renewable energy initiatives, projects and infrastructures.

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**Cover image credit:**

Aerial view of an Oyster Reef. Damon Noe (TNC) / Wikimedia.



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**BlueWise Marine Ltd.**

ATU iHub Galway City,  
Dublin Road, Galway, Ireland,  
H91 DCH9

**T:** +353 91 394251  
**E:** info@bluewisemarine.ie  
**W:** bluewisemarine.ie

 @BlueWise\_Marine  
 BlueWise Marine