

An  
Bord  
Pleanála

# **IPI Marine Spatial Planning CPD: Introduction to Marine Ecology for Planners Appropriate Assessment in the Marine Environment**

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# Introduction to Marine Ecology

## Overview of presentation



- » Irelands coastal and marine biodiversity
  - » Protected sites and species
  - » Implications of development in the marine environment
- » Appropriate Assessment in MSP
  - » Plans (SEA), Projects (EIA),
  - » Stages
  - » Specific marine issues, (scale, uncertainty, best scientific knowledge, in-combination)
- » Other ecological considerations and marine protected areas





# Introduction to Marine Ecology

Ireland's coastal and marine biodiversity

- » 880,000km<sup>2</sup> marine territory
- » 24 species of seabirds
- » 25 species of whale and dolphin
- » 71 species of sharks and rays, skate and chimaera





# Nature photographers tell tales behind this epic photo gallery

Love Your Coast 2023 photo competition is about more than just beautiful images — it's a celebration of people striving to protect Ireland's coastline and the oceans of the world



This image, entitled 'Humpback Feeding', was the overall winner of the Love Your Coast 2023 photo competition. It was taken by photographer Stephen Dunbar in Broadhaven Bay, Co Mayo.

FRI, 03 NOV, 2023 - 18:20

# Whale 'superhighway' off the west coast of Ireland



A fin whale lunge feeding on sprat with common dolphins and Manx shearwater Co Cork. Picture: Tom Ormond

FRI, 18 FEB, 2022 - 12:30

PÁDRAIG HOARE



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## 'Life on edge': Irish cold water corals found thriving over 3,500m abyss



Cold-water coral grows at 750m in the Porcupine Bank Canyon. Photo: UCC Marine Geology Research Group

Lorna Siggins

Wed 11 Nov 2020 at 02:30



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Humpback whale photographed off Wexford coast

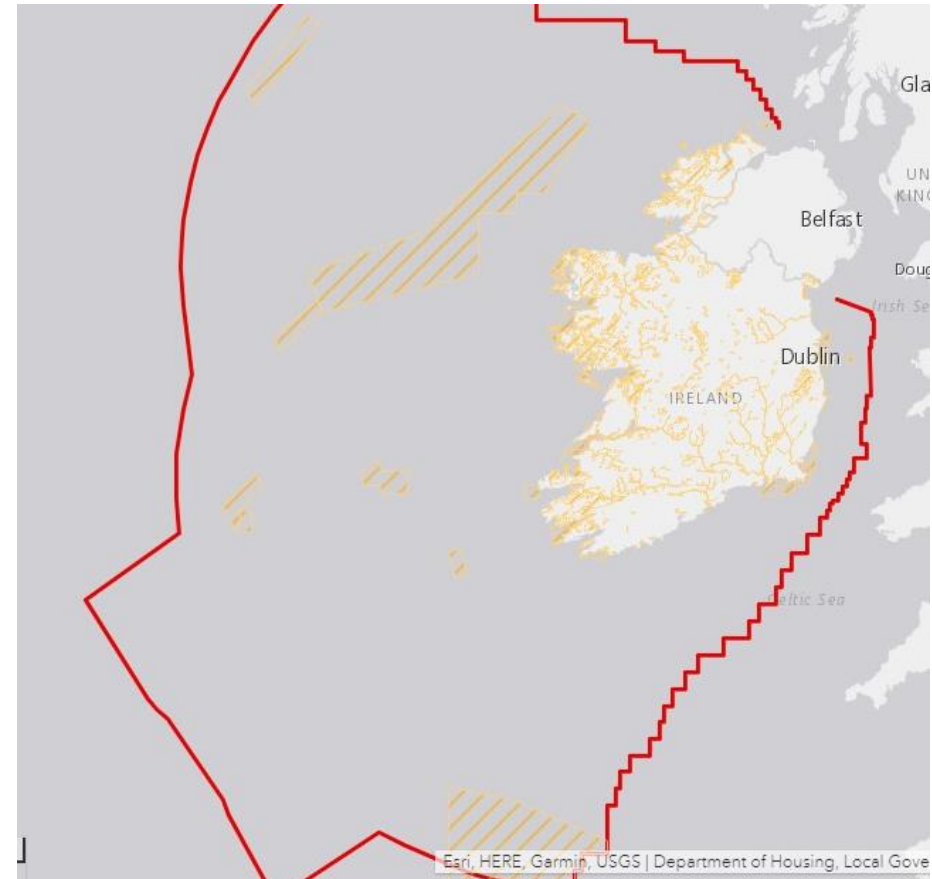
CLIP • 5 MINS • 26 JAN 10 • MORNING IRELAND

Pádraig Whooley, Irish Whale and Dolphin Group, says sightings of humpback whales are becoming more common off Irish coasts

# Marine Ecology

## Statutory protections: EU Habitats Directive

- » Special Areas of Conservation
- » Marine Habitats (Annex I)
  - » 1110 Sandbanks which are slightly covered by sea water all the time
  - » 1130 Estuaries
  - » 1140 Mudflats and sandflats not covered by seawater at low tide
  - » 1160 Large shallow inlets and bays
  - » 1170 Reefs
  - » 1180 Submarine structures made by leaking gases
  - » 8330 Submerged or partially submerged sea caves
- » Marine Species (Annex II)
  - » 1349 Bottlenose dolphin (*Tursiops truncatus*)
  - » 1351 Harbour porpoise (*Phocoena phocoena*)
  - » 1364 Grey seal (*Halichoerus grypus*)
  - » 1365 Harbour seal (*Phoca vitulina*)

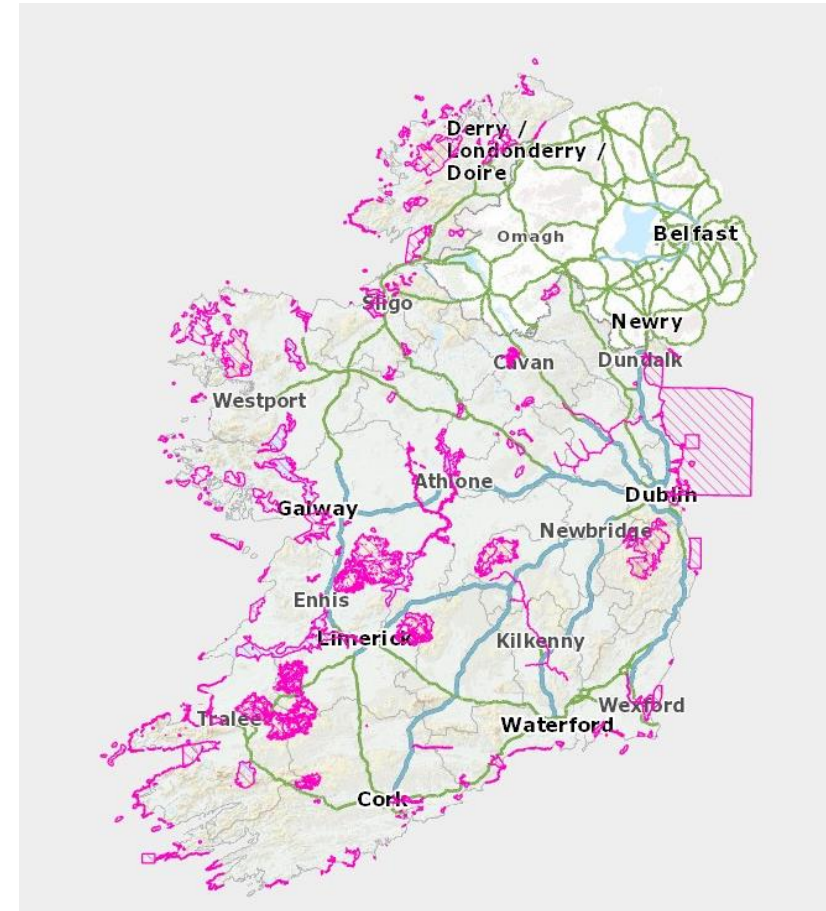




# Marine Ecology

## Statutory protections: EU Birds Directive

- » Special Protection Areas
  - » Birds
  - » Wetland habitats
- » Coastal- wintering waterbirds, Breeding seabirds,
- » Marine waters
  - » North-west Irish Sea cSPA 004236 (233,343ha) adjoins 12 existing SPA
  - » More to come..





*Additional Natura 2000 sites are required for offshore reef and seabirds at sea in line with Habitats Directive requirements. A process is already underway to achieve this.* From: Marine Protected Area Advisory Group (2020).  
Expanding Ireland's Marine Protected Area Network:





# Marine Ecology

## Other protections

- » Annex IV species-Strict protection
  - » All Whale and Dolphin species



## » OSPAR Convention for the North East Atlantic)

Table 1.8 – OSPAR List of Threatened and/or Declining Species and Habitats occurring in Ireland's maritime area that are not listed in the EC Birds or Habitats Directives.

Fish species	Invertebrate species
European eel	Dog whelk
Portuguese dogfish	Flat oyster
Gulper shark	Habitats
Leafscale gulper shark	Carbonate mounds
Basking shark	Coral gardens
Common skate	Deep-sea sponge aggregations
Spotted ray	Intertidal <i>Mytilus edulis</i> beds on mixed and sandy sediments
Cod	<i>Lophelia pertusa</i> reefs
Long-snouted seahorse	<i>Modiolus modiolus</i> beds
Short-snouted seahorse	Oceanic ridges with hydrothermal vents/fields
Orange roughy	<i>Ostrea edulis</i> beds
Porbeagle	<i>Sabellaria spinulosa</i> reefs
Thornback ray / skate	Seamounts
White skate	Sea-pen and burrowing megafauna communities
[Northeast Atlantic] spurdog	<i>Zostera</i> beds
Angel shark	
Bluefin tuna	



# Marine Ecology

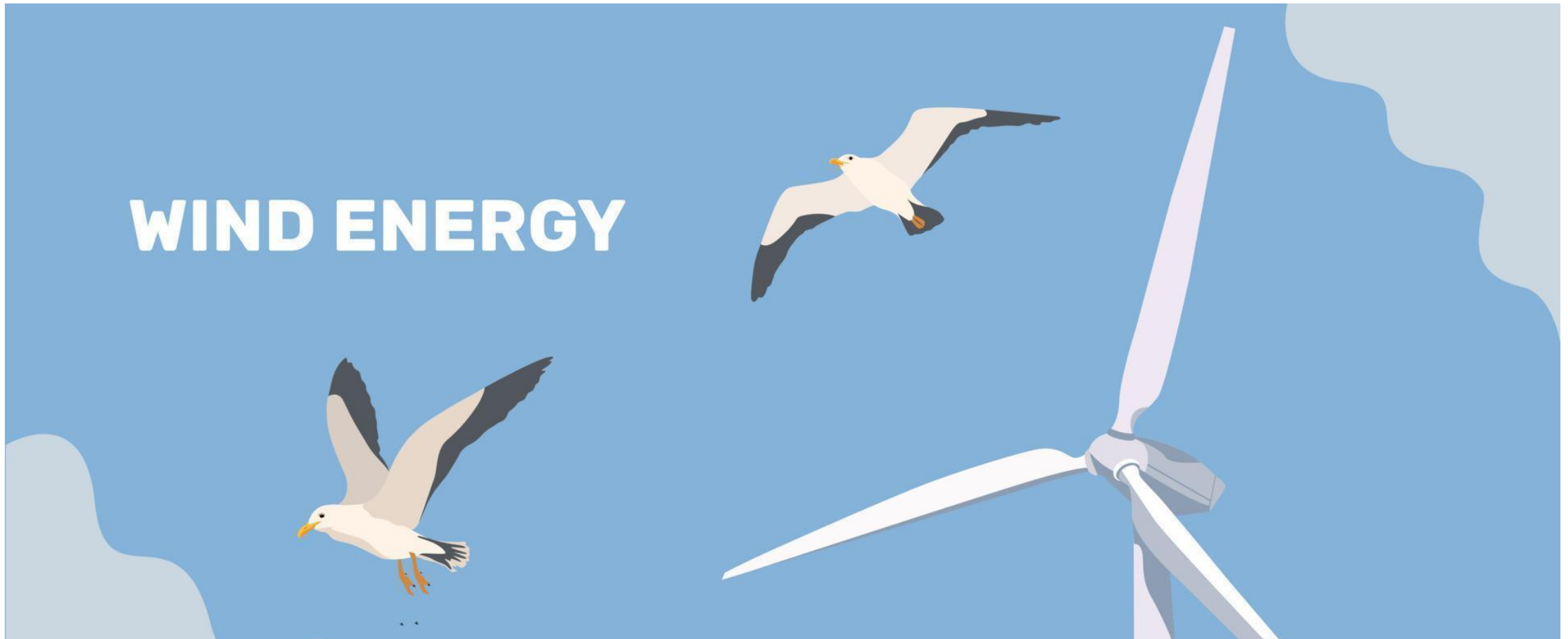
## Legislation

- EU Environmental Impact Assessment (EIA) Directive
- EU Strategic Environmental Assessment (SEA) Directive
- EU Habitats Directive
- EU Birds Directive
- EU Maritime Spatial Planning Directive (implemented as NMPF in Ireland)
- **Maritime Area Planning Act 2021**



# Marine Ecology

Offshore wind energy projects- example of development





# Marine Ecology

## Types of impacts- example from offshore wind energy

Table 6-1 Overview of potential types of impacts on major offshore receptor groups

Receptor	Potential impacts of offshore wind energy developments
Habitats	<ul style="list-style-type: none"> <li>Marine habitat loss</li> <li>Marine habitat disturbance and degradation</li> <li>Smothering from suspended sediments falling out of suspension</li> <li>Creation of new marine habitats</li> <li>Changes to physical processes from the presence of new structures</li> <li>Contaminant release or mobilisation of historic contaminants</li> </ul>
Fish	<ul style="list-style-type: none"> <li>Electromagnetic fields</li> <li>Underwater noise disturbance</li> <li>Reef effects</li> </ul>
Birds	<ul style="list-style-type: none"> <li>Habitat loss and degradation</li> <li>Disturbance and displacement</li> <li>Collision</li> <li>Barrier effect</li> <li>Indirect effects</li> <li>Attraction (e.g. roosting opportunities)</li> </ul>
Marine mammals	<ul style="list-style-type: none"> <li>Habitat loss and degradation</li> <li>Noise disturbance and displacement (pile-driving noise and noise from shipping/helicopters)</li> <li>Acoustic impairment (injuries from underwater noise)</li> <li>Communication masking</li> <li>Collision with vessels</li> <li>Barrier effect</li> <li>Reduction of fishing pressure (no fishing zones)</li> <li>Water quality changes (contaminants + marine waste)</li> <li>Electromagnetic field effects on navigation</li> <li>Indirect effects</li> <li>Reef effect</li> </ul>
Bats	<ul style="list-style-type: none"> <li>Disturbance and displacement</li> <li>Collision</li> <li>Barrier effect</li> <li>Barotrauma</li> <li>Loss/ shifting of flight corridors and roost sites</li> <li>Indirect effects</li> </ul>
Other species	<ul style="list-style-type: none"> <li>Noise disturbance and displacement</li> <li>Electromagnetic fields</li> <li>Heat effects</li> <li>Creation of new habitats</li> <li>Water quality changes (contaminants + marine waste)</li> <li>Indirect effects</li> </ul>



European Commission, Directorate-General for Environment, *Guidance document on wind energy developments and EU nature legislation*, Publications Office of the European Union, 2020, <https://data.europa.eu/doi/10.2779/457035>

# Marine Ecology

## AA in Marine Spatial Planning



	Marine Spatial planning Strategic, area based	Environmental Impact Assessment (EIA)	Appropriate Assessment (AA)
	Plan level Strategic Environmental Assessment (SEA) And Appropriate Assessment (AA)	Project assessment for planning application/consent	Assessment of any plan or project that is likely to have a significant effect on a Natura 2000 site; considered at plan and project stages
Example	<a href="#"><u>OREDPA II Draft SEA</u></a>		<a href="#"><u>OREDPA II AA - NIS</u></a>



# Marine Ecology

## Appropriate Assessment

*In view of the conservation objectives of the European site*

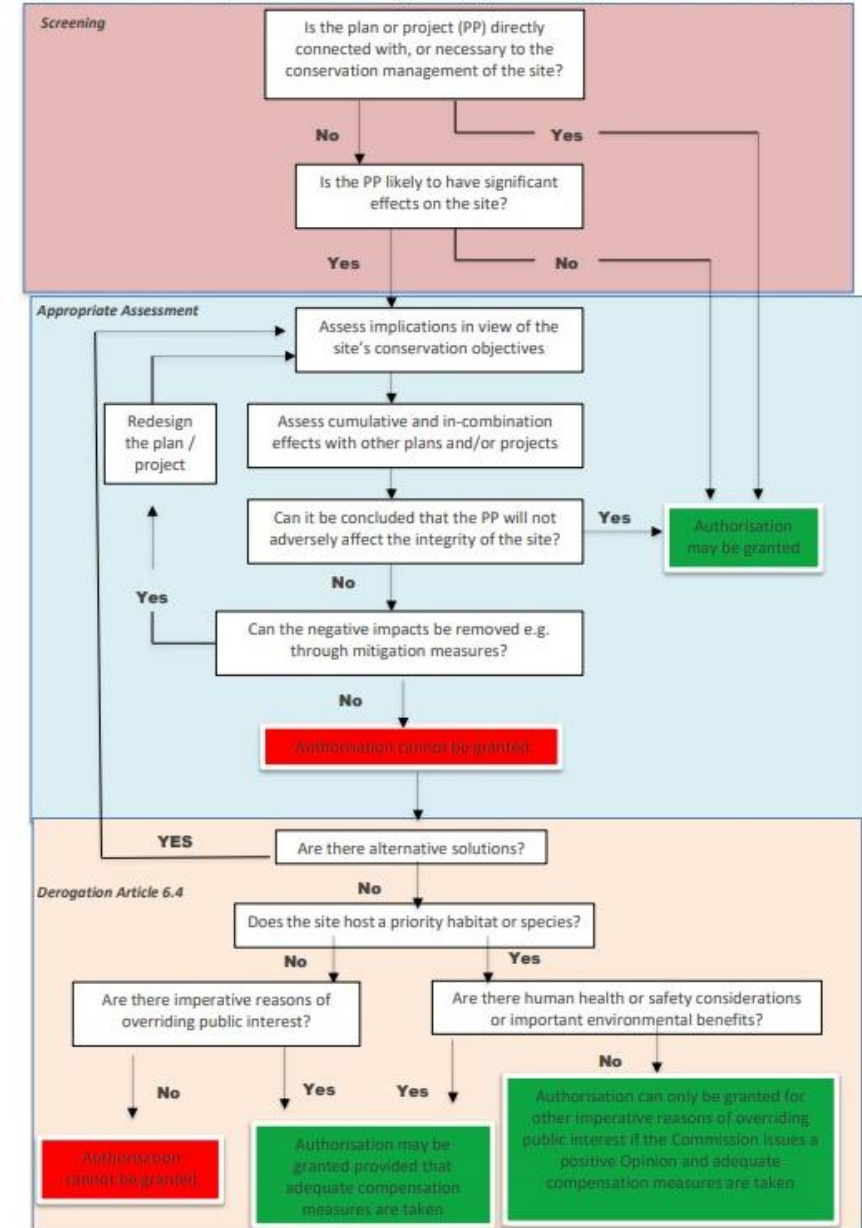
Article 6(3)

- » Screening for likely significant effects
- » Appropriate Assessment – detailed assessment.  
Can adverse effects on site integrity be ruled out?

Article 6(4)

- » Are there alternatives
- » IROPI and compensatory measures

Figure 2-1 Flowchart of the procedure under Article 6(3) and 6(4) (based on European Commission methodological guide)



# Marine Ecology

## Appropriate Assessment : in view of conservation objectives

### Conservation Objectives for : North-west Irish Sea SPA [004236]

#### A013 Manx Shearwater *Puffinus puffinus*

To maintain the favourable conservation condition of manx shearwater in North-west Irish Sea SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population size	Number	No significant decline	Dean et al. (2015) identifies an area of marine waters near the Irish Sea front and the stratified waters of the western Irish Sea as being an important foraging resource for manx shearwater breeding in several colonies located around the periphery of the Irish Sea; the North-west Irish Sea SPA overlaps with this area. One summer aerial survey, conducted in 2016, estimated 13,010 individual manx shearwater within the SPA (Jessopp et al., 2018, NPWS unpublished data analysis). A follow up survey in September 2016 provides an estimate of 457 individuals occurring in the SPA
Spatial distribution	Hectares, time and intensity of use	Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population	Distribution encapsulates the number of locations and area of potentially suitable habitat for the population and its availability for use. The suitability and availability of habitat areas may vary through time. This will affect the spatio-temporal patterns of use of the habitats by manx shearwater. Jessopp et al. (2018) noted that particularly during the summer survey manx shearwater were sighted throughout the survey area, but were not observed in the nearshore waters, instead generally being recorded at least 4km from the shore. Manx shearwaters had a clear preference for deeper waters in the survey area, with a marked absence of this species over shallow areas and sandbars with less than 20m water depth
Forage spatial distribution, extent, abundance and availability	Location and hectares, and forage biomass	Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target	Primarily clupeiform fish, during the chick rearing period; outside of this period squid and other marine invertebrates may form a larger part of the manx shearwater's diet (Brooke, 1990)
Disturbance across the site	Intensity, frequency, timing and duration	The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population size and spatial distribution	The impact of any significant disturbance (direct or indirect) to the breeding population will ultimately affect the achievement of targets for population size and/or spatial distribution. Disturbance contributes to increased energetic expenditure which can result in increased likelihood of mortality or reduced fitness (if energy expenditure is greater than energy gain) and, in turn, negatively impact population trends. Factors such as intensity, frequency, timing and duration of a (direct or indirect) disturbance source must be taken into account to determine the potential impact upon the targets for population size and spatial distribution. Seabird species can make extensive use of the marine waters adjacent to their breeding colonies for non sites-specific maintenance behaviours (e.g. courtship, bathing, preening) as defined in McSorley et al. (2003)

Barriers to connectivity

Number; location; shape; area (hectares)

The number, location, shape and area of barriers do not significantly impact the site population's access to the SPA or other ecologically important sites outside the SPA

Manx shearwater require regular access to marine waters ecologically connected to their colonies during the breeding season and on migration. Barriers limiting the population's access to this SPA or ecologically important sites outside the SPA will ultimately affect the achievement of targets for population trend and/or spatial distribution. Factors such as the number, location, shape and area of potential barriers must be taken into account to determine their potential impact. Access to ecologically important sites outside the SPA must also be considered as a single SPA may not satisfy all the ecological requirements of the population, and it may require access to other SPAs or undesignated sites for certain activities, such as breeding and additional foraging locations when preferred foraging areas are unavailable due to disturbance, prey availability, or other factors



# Marine Ecology

## Challenges for AA Marine environment



How can the decision maker come to complete, precise and definitive conclusions and remove all reasonable scientific doubt as to absence of adverse effects?

Access to expertise?

### Challenges for assessment include:

- » Wide scale- Zone of influence at screening stage to identify sites
- » Uncertainty: lack of data, patchy distribution
- » Best scientific knowledge: data collection, scientific studies
- » In-combination effects- multiple projects
- » IROPI – RePower EU



Niall T. Keogh

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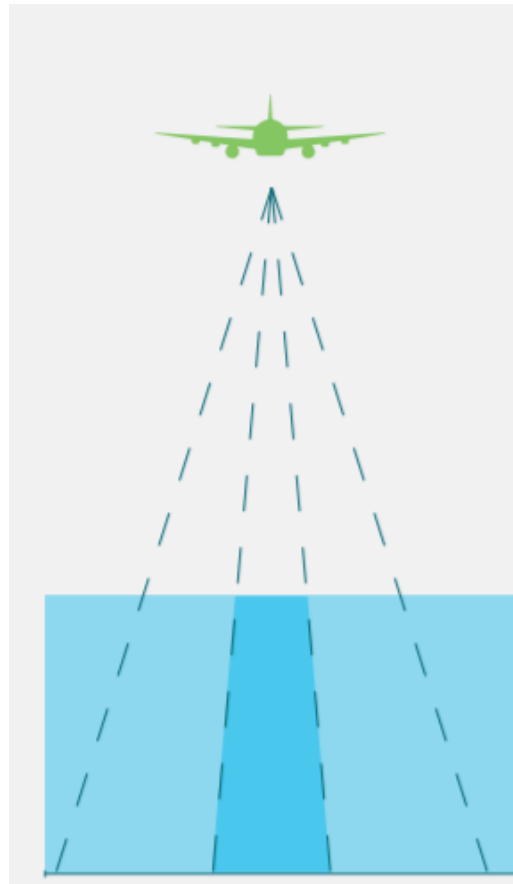
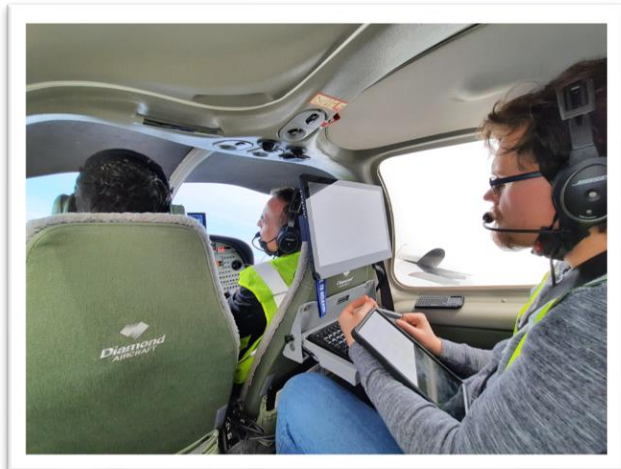
[http://scientistsatsea.blogspot.com/2015/10/celtic-sea-herring-acoustic-survey\\_12.html](http://scientistsatsea.blogspot.com/2015/10/celtic-sea-herring-acoustic-survey_12.html)





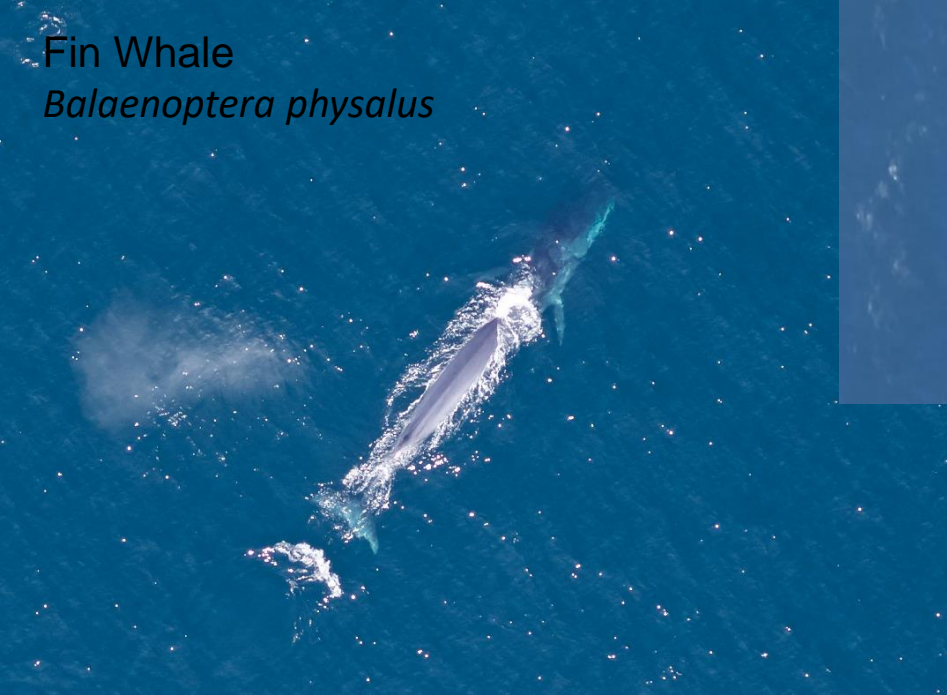
AA

## Dealing with uncertainty and best scientific information: Data Collection



- :: Survey design
- :: Flight planning
- :: Data acquisition
- :: Processing & Analysis
- :: Reporting

Fin Whale  
*Balaenoptera physalus*



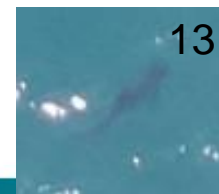
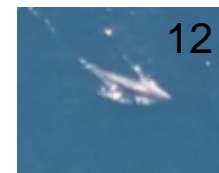
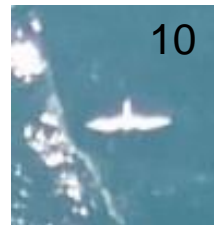
Basking Shark  
*Cetorhinus maximus*



Northern Gannets  
*Morus bassanus*



White-beaked dolphin  
*Lagenorhynchus albirostris*

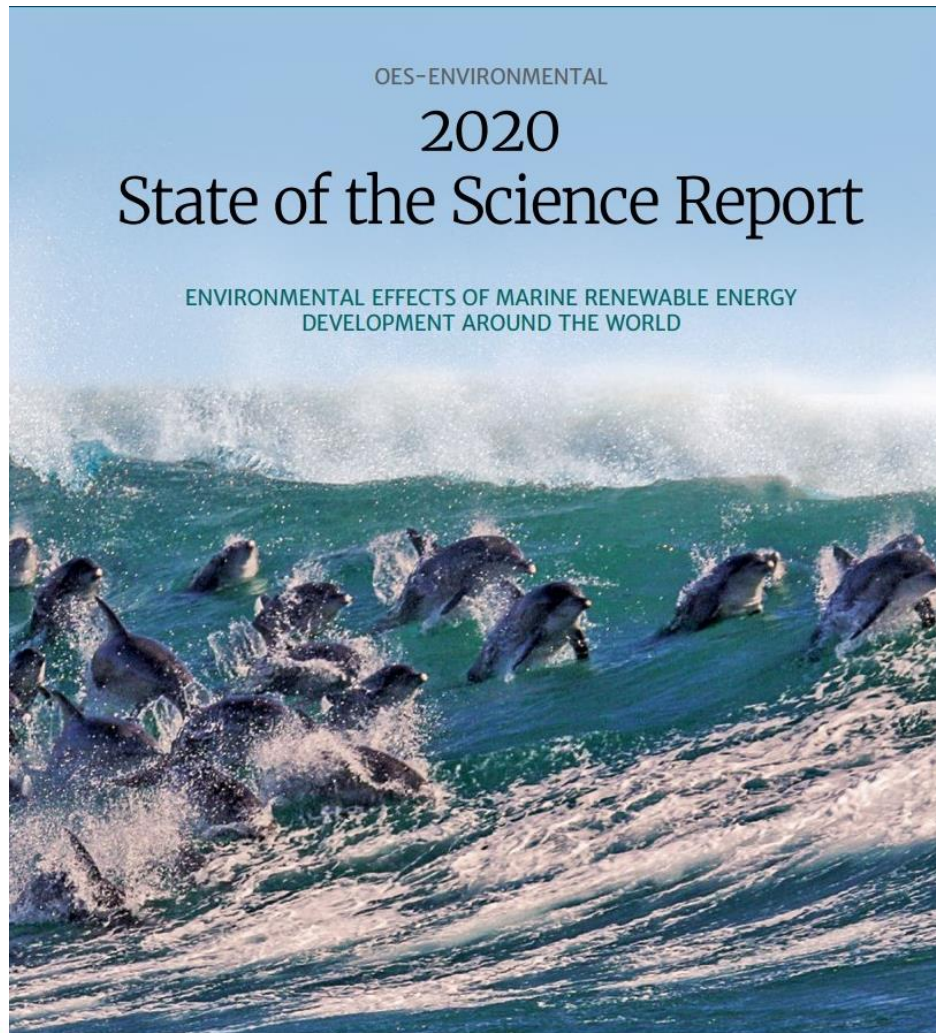


Great Frigatebird  
*Steganopleura*



# Marine Ecology

Best Scientific information and guidance- examples



# Marine Ecology

## Best Scientific information

- » Example from Tethys platform
- » Fixed Offshore Wind | Tethys (pnnl.gov)

Type of Content:	Technology:	Stressor:	Receptor:			
- Any -	- Any -	- Any -	- Any -			
Search:						
<div>Apply</div>						
Title	Author	Date	Content Type	Technology	Stressor	Receptor
Decommissioning of offshore wind farms and its impact on benthic ecology	Spielmann, V., Dannheim, J., Brey, T.	December 2023	Journal Article	Wind Energy, Fixed Offshore Wind	Habitat Change	Fish, Physical Environment, Human Dimensions
Fish distribution in three dimensions around the Block Island Wind Farm as observed with conventional and volumetric echosounders	Jech, J., Lipsky, A., Moran, P.	October 2023	Journal Article	Wind Energy, Fixed Offshore Wind	Attraction	Fish
Energy Conversion Factors in Underwater Radiated Sound from Marine Piling: Review of the method and recommendations	Wood, M., Ainslie, M., Burns, R.	October 2023	Report	Wind Energy, Fixed Offshore Wind	Noise	
Morphological Modelling to Investigate the Role of External Sediment Sources and Wind and Wave-Induced Flow on Sand Bank Sustainability: An Arklow Bank Case Study	Creane, S., O'Shea, M., Coughlan, M.	October 2023	Journal Article	Wind Energy, Fixed Offshore Wind, Floating Offshore Wind	Changes in Flow	Physical Environment, Sediment Transport
Vibration Mechanism and Noise Characterization of Offshore Wind Turbines	Yang, C., Li, R., Lu, L.	October 2023	Journal Article	Wind Energy, Fixed Offshore Wind	Noise	
Spatiotemporal Variations of Ocean Upwelling and Downwelling Induced by Wind Wakes of Offshore Wind Farms	Liu, K., Du, J., Larsén, X.	October 2023	Journal Article	Wind Energy, Fixed Offshore Wind, Floating Offshore Wind		
Impacts of offshore wind power development on China's marine economy and environment: A study from 2006 to 2019	Liu, G., Kong, Z., Sun, W.	October 2023	Journal Article	Wind Energy, Fixed Offshore Wind, Floating Offshore Wind		Human Dimensions, Environmental Impact Assessment, Social & Economic Data
Potential Hydrodynamic Impacts of Offshore Wind Energy on Nantucket Shoals Regional Ecology: An Evaluation from Wind to Whales	National Academies of Sciences, Engineering, and Medicine	October 2023	Report	Wind Energy, Fixed Offshore Wind	Changes in Flow	Ecosystem Processes, Invertebrates, Marine Mammals, Cetaceans
Assessing the Relationship between				Wind Energy,		



# Marine Ecology

## Challenge of assessing in-combination effects, Transboundary

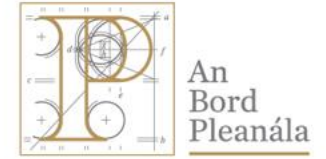


- » Plan lead approach- e.g. D-Map
- » Multiple Projects? Common methods of survey and analysis – communication
- » Monitoring of effects



# Marine Ecology

## IROPI



- » The need for renewable energy projects are considered of imperative reasons overriding public interest
- » That doesn't mean that renewable projects override any provisions of the habitats Directive- it means that the IROPI question doesn't have to go to the commission

- » UK example: [Habitats Regulations Assessment -EastAnglia One](#)

East Anglia One-The Secretary of State could not rule out adverse effects on integrity beyond reasonable scientific doubt:

- » **In combination effects on Lesser-black backed gull from collision mortality**, a qualifying feature of the Alde-Ore Estuary SPA and Ramsar site;
- » **In-combination impacts on kittiwake** from collision mortality, a qualifying feature of the Flamborough and Filey Coast SPA; and
- » **In-combination impacts on red-throated diver from displacement/ disturbance**, a qualifying feature of the Outer Thames Estuary SPA.





# Marine Ecology

Marine Protected Areas: protect 30% of Ireland's marine areas by 2030

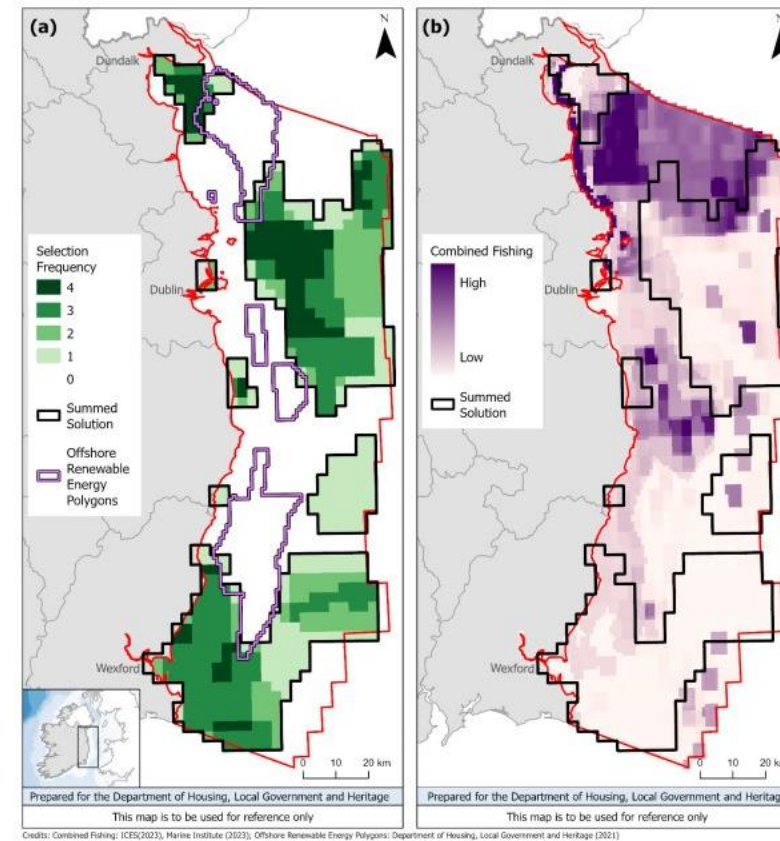
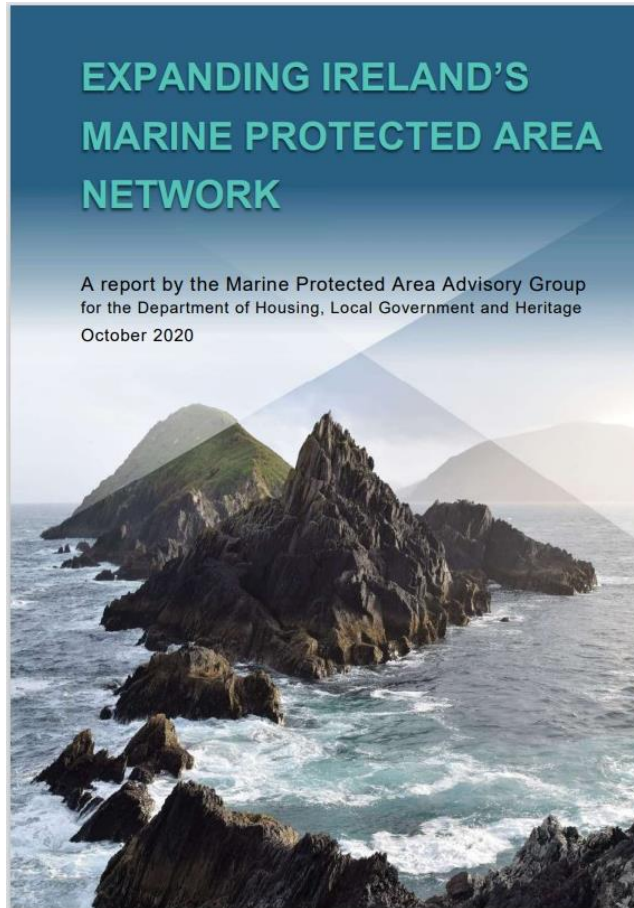


Figure 1. Two-panel presentation of key outcomes from conservation prioritization analyses of the western Irish Sea, completed by the MPA Advisory Group in April 2023.



**IWDG**

COMMON DOLPHINS

HUMPBACK WHALES



# Marine Ecology

## references

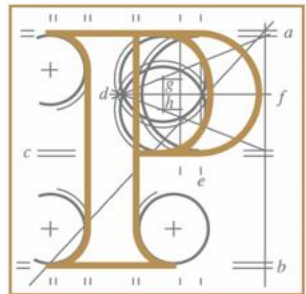
- » Marine Protected Area Advisory Group (2020). Expanding Ireland's Marine Protected Area Network: Report for the Department of Housing, Local Government and Heritage, Ireland .
- » [marineplan.ie](https://marineplan.ie)
- » [gov.ie - The Second Offshore Renewable Energy Development Plan \(ORED II\): Public consultation \(www.gov.ie\)](https://www.gov.ie/en/publication/4bc80-ecological-sensitivity-analysis-of-irish-sea-main-report/)
- » <https://www.gov.ie/en/publication/4bc80-ecological-sensitivity-analysis-of-irish-sea-main-report/>
- » [Guidance document on wind energy developments and EU nature legislation - Publications Office of the EU \(europa.eu\)](https://eur-lex.europa.eu/legal-content/en/txt/PDF/?uri=CELEX:32017R1025&id=32017R1025-01&from=doj)
- » [Tethys | Environmental Effects of Wind and Marine Renewable Energy \(pnnl.gov\)](https://www.pnnl.gov/publications/tethys-environmental-effects-of-wind-and-marine-renewable-energy)



### Thanks to:

Irish Whale and Dolphin Group for use of video

Dr Sarah Kandrot of Green Rebel



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