Interaction of Marine Activities in Irish Waters Eugene Nixon TUD

- Marine Activities
  - Fishing
  - Shipping
  - Offshore Wind
- Interactions
  - Where these activities occur (Co-existence)
  - What pressures they exert on the ecosystem (JNCC)
  - Modelling pressures in space and time
  - Sensitivity of receiving ecosystem in space and time
- An <u>attempt</u> to conceptualise:







Areal extent
 (sub-)regions
 subdivisions
 Fished c-squares
 Highest 90% of SAR (2013-2018) per subdiv.
 Highest 90% of SAR (2013-2018) per metier and subdiv.
 90% of SAR (2013-2018) per metier and subdiv. with fragmentation penalty
 Highest 90% of SAR per metier and subdiv. in multiple years during the period 2013-2018

With a reduction of 18% of the effort, focused in the least fished (important) grounds, you achieve 60% of all MSFD areas not impacted by bottom trawled.

Area unfished
(sub-)regions
subdivisions
Unfished
5% unfished area, 0.1% effort loss
10% unfished area, 0.5% effort loss
20% unfished area, 1.7% effort loss
30% unfished area, 3.9% effort loss
50% unfished area, 1.8% effort loss
50% unfished area, 11.8% effort loss
50% unfished area, 11.8% effort loss
50% unfished area, 11.8% effort loss



Layers show the area where closures are needed (sorted from low to high fished grid cells) to reach x % of unfished area for each MSFD habitat in each subdivision and the resulting loss in total fishing effort



- Contains 92 Polices
- Apply an ecosystem-based approach
- Optimise the use of space, co-existence and co-operation
- Best available
  - Data
  - Scientific knowledge & science
  - Evidence
- **Decision-makers will need to apply the best available evidence** and the precautionary principle.
- Natural native habitat connectivity, trophic guilds & foodweb, ability to adapt to climate change, natural capital, functioning and provision of ecosystem services.

### The 2023 Ocean Economy report shows that Ireland's ocean economy, in nominal terms:

- generates over €7 billion in turnover;
- has a direct economic contribution, as measured by Gross Value Added, of €2.85 billion; and
- employs approximately 33,500 Full-Time Equivalents.



Table 1: Direct Turnover, GVA and Employment by industry, 2022

2022 (estimates)	Direct Turnover € 000's	Direct GVA € 000's	Direct Employment (FTEs)
Shipping & Maritime Transport	2,446,006	664,725	4,728
Tourism in Marine & Coastal Areas	1,229,072	535,799	18,325
International Cruise	33,743	13,119	
Marine Retail Services	152,694	64,131	925
Marine Commerce	305,884	91,516	479
Sea Fisheries	239,626	119,904	1714
Marine Aquaculture	186,071	68,000	1170
Seafood Processing	618,010	172,786	2695
Seaweed, Marine Biotechnology & Bioproducts	122,890	47,872	768
Marine Manufacturing, Construction & Engineering	170,523	75,115	937
Oil and Gas Exploration & Production	1,272,297	886,151	160
Marine Renewable Energy	83,859	54,148	642
Advanced Marine Technology Products & Services	151,016	58,896	909
Total	7,011,691	2,852,162	33,452







- Managed by quotas -> ecosystem triggers
- CFP Spatial measures VME/Irish Box
- Impact SAR mobile bottom gear 0.43



- Construction
- https://map.4coffshore.com/offshorewind/
- Bed preparation
- Installation of infrastructure



- IMO vessel operations
- Ballast water and NIS
- Speed controls
- Navigational dredging/dumping



enu × progracuvityPressureRelationships				
MasterID • CategoryTitle	-Y ActivityTitle	✓ PressureTitle →	APJustificationDesc • RPPTitle • RiskFactorDesc • EvidenceStand	ardDesc - ConfidenceScore
734 Extraction of living resources	Demersal seine netting	Abrasion/disturbance of the substrate on the surface of the seabed		nce follows N/A rds, ysis of 24) and ≥ for MPAs" re for more aturalengland 9710
732 Extraction of living resources	Demersal seine netting	Changes in suspended solids (water clarity)	<ul> <li>Changes in suspended solids (water clarity)</li> <li>Collision ABOVE water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)</li> <li>Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)</li> <li>Deoxygenation</li> <li>Electromagnetic changes</li> <li>Habitat structure changes - removal of substratum (extraction)</li> <li>Hydrocarbon &amp; PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.</li> <li>Introduction of microbial pathogens</li> <li>Introduction or spread of invasive non-indigenous species (INIS)</li> <li>Litter</li> <li>Nutrient enrichment</li> </ul>	nce follows N/A rds, ysis of 24) and a for MPAs" re for more aturalengland 9710
730 Extraction of living resources	Demersal seine netting	Penetration and/or disturbance c the substrate below the surface c the seabed, including abrasion	<ul> <li>Organic enrichment</li> <li>Organic enrichment</li> <li>Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion</li> <li>Physical change (to another seabed type)</li> <li>Physical change (to another sediment type)</li> <li>Removal of non-target species</li> <li>Removal of target species</li> <li>Smothering and siltation rate changes (Light)</li> <li>Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.</li> <li>Underwater noise changes</li> <li>Visual disturbance</li> </ul>	nce follows N/A rds, ysis of 24) and e for MPAs" re for more aturalengland 9710
735 Extraction of living resources	Demersal seine netting	Physical change (to another seabed type)	Water flow (tidal current) changes, including sediment transport considerations     Wave exposure changes     OK     Cancel     Aprasion pressure), writist the and time and the sensitivity of (NESTIND030), see in	nce follows N/A rds, ysis of 24) and a for MPAs" ere for more

🛚 MainMenu 🛛 🛪 📑	Qry_ActivityPressureRelationships $\times$					
APJoinMasterID -	CategoryTitle 🖓	ActivityTitle 🗸	PressureTitle +	X APJustificationDesc - RPPTitle - RiskFactorDesc -	EvidenceStandardDesc -	ConfidenceScoreTitle
1870	Energy generation	Offshore wind: Construction (if relevant see also Cables)	Abrasion/disturbance of the substrate on the surface of the seabed	2↓ Sort A to Z         X↓ Sort Z to A         ✓ Clear filter from PressureTitle         Text Eilters         ○ Above water noise         ② Abrasion/disturbance of the substrate on the surface of the seabed         ○ Barrier to species movement         ② Changes in suspended solids (water clarity)         ○ Collision ABOVE water with static or moving objects not naturally found in the marine environment (e.g., boats, mac	The associated evidence follows VE's evidence standards, particularly for "Analysis of evidence" (NESTND024) and Conservation Advice for MPAs" NESTND036). See here for more nformation: http://publications.naturalengland org.uk/category/3769710	N/A
1867	Energy generation	Offshore wind: Construction (if relevant see also Cables)	Changes in suspended solids (water clarity)	Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g., boats, mac Deoxygenation Electromagnetic changes Emergence regime changes, including tidal level change considerations Genetic modification & translocation of indigenous species Habitat structure changes - removal of substratum (extraction) Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC. Introduction of tight Introduction or spread of invasive non-indigenous species (INIS) Litter Nutrient enrichment	he associated evidence follows VE's evidence standards, particularly for "Analysis of evidence" (NESTND024) and Conservation Advice for MPAs" NESTND036). See here for more nformation: http://publications.naturalengland org.uk/category/3769710	N/A
1866	Energy generation	Offshore wind: Construction (if relevant see also Cables)	Penetration and/or disturbance c the substrate below the surface c the seabed, including abrasion	<ul> <li>Organic enrichment</li> <li>Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion</li> <li>Physical change (to another seabed type)</li> <li>Physical change (to another sediment type)</li> <li>Physical loss (to land or freshwater habitat)</li> <li>Radionuclide contamination</li> <li>Salinity decrease</li> <li>Salinity increase</li> <li>Smothering and siltation rate changes (Heavy)</li> <li>Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substant</li> </ul>	The associated evidence follows VE's evidence standards, particularly for "Analysis of evidence" (NESTND024) and Conservation Advice for MPAs" NESTND036). See here for more nformation: http://publications.naturalengland org.uk/category/3769710	N/A
1865 ecord: 14 4 1 of 131 )	Energy generation	Offshore wind: Construction (if relevant see also Cables)	Physical change (to another seabed type)	Competitive decrease       Temperature increase       OK       Cancel	he associated evidence follows VE's evidence standards, particularly for "Analysis of vidence" (NESTND024) and Conservation Advice for MPAs" (NESTND036). See here for more	N/A
ressure Title					Num I	ock Filtered 🛱 SOL 🕅

	Transport Pressures	Offshore Wind Pressures	Fishing Pressures
1	Above water noise	Above water noise	Above water noise
2	Abrasion/disturbance of the substrate on the surface of the seabed	Abrasion/disturbance of the substrate on the surface of the seabed	Abrasion/disturbance of the substrate on the surface of the seabed
3	Barrier to species movement	Barrier to species movement	Barrier to species movement
4	Changes in suspended solids (water clarity)	Changes in suspended solids (water clarity)	Changes in suspended solids (water clarity)
	Collision ABOVE water with static or moving objects not naturally	Collision ABOVE water with static or moving objects not naturally	Collision ABOVE water with static or moving objects not naturally
	found in the marine environment (e.g. boats machinery and	found in the marine environment (e.g. boats machinery and	found in the marine environment (e.g. boats machinery and
5	structures)	structures)	structures)
	Collision BELOW water with static or moving objects not naturally	Collision BELOW water with static or moving objects not naturally	Collision BELOW water with static or moving objects not naturally
	found in the marine environment (e.g., boats, machinery, and	found in the marine environment (e.g., boats, machinery, and	found in the marine environment (e.g., boats, machinery, and
e	structures)	structures)	structures)
7	Deoxygenation	Habitat structure changes - removal of substratum (extraction)	Deoxygenation
	Hydrocarbon & PAH contamination. Includes those priority	Hydrocarbon & PAH contamination. Includes those priority	,0
5	substances listed in Annex II of Directive 2008/105/FC	substances listed in Annex II of Directive 2008/105/FC	Electromagnetic changes
	Introduction of light	Introduction of light	Habitat structure changes - removal of substratum (extraction)
-			Hydrocarbon & PAH contamination. Includes those priority
10	Introduction of other substances (solid liquid as ses)	Introduction of other substances (solid liquid as see)	substances listed in Append I of Directive 2009/105/55
-10	Introduction of other substances (solid, inquid of gas)	Introduction of other substances (solid, right of gas)	substances listed in Annex II of Directive 2008/105/EC.
11	Introduction of spread of invasive non-indigenous species (INIS)	Introduction or spread of invasive non-indigenous species (INIS)	Introduction of light
12	Litter	<b>•</b> •	il pathogens
		Science can man t	hoco
13	Nutrient enrichment		f invasive non-indigenous species (INIS)
14	Organic enrichment	•	
	Penetration and/or disturbance of the substrate below the surfac		
15	of the seabed, including abrasion	ητρατιτρα	
16	Physical change (to another seabed type)	pressures	
			urbance of the substrate below the surface
17	Physical change (to another sediment type)	Smothering and siltation rate changes (Heavy)	of the seabed, including abrasion
18	Physical loss (to land or freshwater habitat)	Smothering and siltation rate changes (Light)	Physical change (to another seabed type)
		Synthetic compound contamination (incl. pesticides, antifoulants,	
		pharmaceuticals). Includes those priority substances listed in Annex	
19	Smothering and siltation rate changes (Light)	I of Directive 2008/105/EC.	Physical change (to another sediment type)
	Synthetic compound contamination (incl. pesticides, antifoulants,	Transition elements & organo-metal (e.g. TBT) contamination.	, , ,
	nharmaceuticals) Includes those priority substances listed in	Includes those priority substances listed in Annex II of Directive	
20	Anney II of Directive 2008/105/EC		Removal of non-target species
- (	Transition elements & organo-metal (e.g. TRT) contamination		
	Includes those priority substances listed in Anney II of Directive		
21	2009/105/EC	Underwater noise changes	Removal of target species
21	2000/ 103/ EC.	Vibration	Smothering and ciltation rate charges (Linkt)
22	onderwater noise changes		Smothering and sittation rate changes (Light)
			synthetic compound contamination (incl. pesticides, antifoulants,
_			pharmaceuticals). Includes those priority substances listed in Annex
23	Visual disturbance	Visual disturbance	II of Directive 2008/105/EC.
			Transition elements & organo-metal (e.g. TBT) contamination.
	Water flow (tidal current) changes, including sediment transport	Water flow (tidal current) changes, including sediment transport	Includes those priority substances listed in Annex II of Directive
24	considerations	considerations	2008/105/EC.
25	Wave exposure changes	Wave exposure changes	Underwater noise changes
26			Visual disturbance
			Water flow (tidal current) changes, including sediment transport
27			considerations
25			Wave exposure changes
_			



Sensitivity of the receiving Ecosystem



- 1. NATURA: Species & Habitats Conservation Objectives
- 2. NMPF: Important Species/Habitats
  - Co-existance/Space Ecosystems Services – spawning/seed
- 3. MSFD: GES 11 Descriptors

#### MSFD

- Descriptor 1: Biodiversity is maintained
- Descriptor 2: Non-indigenous species do not adversely alter ecosystems
- **Descriptor 3:** Populations of commercial fish and shellfish species are healthy
- Descriptor 4: Food webs ensure long-term abundance and reproduction of species
- Descriptor 5: Eutrophication is reduced
- **Descriptor 6:** Sea floor integrity ensures the proper functioning of ecosystems
- Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect ecosystems
- **Descriptor 8:** Concentrations of contaminants give no pollution effects
- Descriptor 9: Contaminants in seafood are at safe levels
- Descriptor 10: Marine litter does not cause harm
- Descriptor 11: Introduction of energy (including underwater noise) does not adversely affect the ecosystem

#### **Ecosystem Considerations**

#### Understanding of the effects on the ecosystem requires information on:

- Activity (fishing/shipping/ORE) spatial extent, duration and intensity.
- Sensitivity of the receiving ecosystem
  - Protected Area (NATURA, MPA, CFP)
  - Protected Species (Habitats Directive, OSPAR, Wildlife Act, IUCN Red Lists, Birds of Conservation Concern)
  - Everywhere else the MSFD and GES applies
- Prioritise pressures and map their spatial extent, duration and intensity
  - fishing(28)
  - Shipping (25)
  - ORE (25)
- Examine ecosystem effects of cumulative pressure spatial extent, duration and timing and intensity on ecosystems.

# Ocean Knowledge 2030 - Registration now open

23/08/2024



The Marine Institute is pleased to announce that registration is now open for the Ocean Knowledge 2030 conference to be held in Dublin on 20th - 21st November 2024.

The conference will bring together a diverse national ocean community including academic and public research bodies, government departments, state agencies, ocean business and civil society. The event will provide a forum for exchange of information, fostering syngeries and collaboration across the national system and identifying key knowledge, research and innovation actions to address ocean sustainability and blue economy challenges. It will also formally launch Ocean Knowledge 2030, Ireland's new marine research & innovation strategy.

## Many thanks