

Expert Survey on Environmental Effects of Decommissioning Options in North Sea

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North Sea Futures

Objectives of the Survey

- Gain experts' opinion on various decommissioning options
- For offshore wind and oil & gas structures
- Identify key environmental considerations for decommissioning decisions
- Explore environmental trade-offs inherent in decommissioning decisions



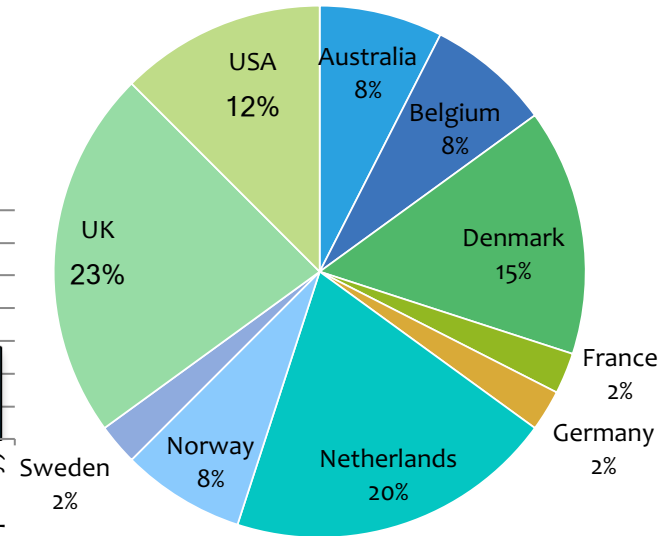
Survey Methodology

- Mixed-method survey developed by A.M. Jørgensen (North Sea Futures), A.M. Fowler (UTS), J.W.P. Coolen (WMR), J.C. Svendsen (DTU-Aqua) & D.J. Jones (University of Southampton) based on environmental criteria from Fowler et al, 2014.
- Held between April 6th and June 19th, 2017
- Sent out to 200 researchers with min. 2 publications published on relevant topics or recognized by others as experts within government or consulting.
- Questions related to:
 - 1. Country of work;
 - 2. Areas of expertise;
 - 3 and 4: Environmental criteria important for decommissioning decisions for offshore oil and gas installations in the North Sea (ranking 23 randomized criteria and open question allowing to add more).
 - 5. Decommissioning options for offshore oil and gas installations in the North Sea (14 options, several choices allowed);
 - 6 and 7: Environmental criteria important for decommissioning decisions for offshore wind farms in the North Sea (ranking 23 randomized criteria and open question allowing to add more);
 - 8. Decommissioning options for offshore wind farms in the North Sea (12 options, several choices allowed);
 - 9. Level of agreement with various statements relating to preference for decommissioning options, interpretation of and trade-offs between environmental criteria (46 statements, one of 5 levels of agreement allowed);
 - 10. Contact information of the respondent (need not be filled in).

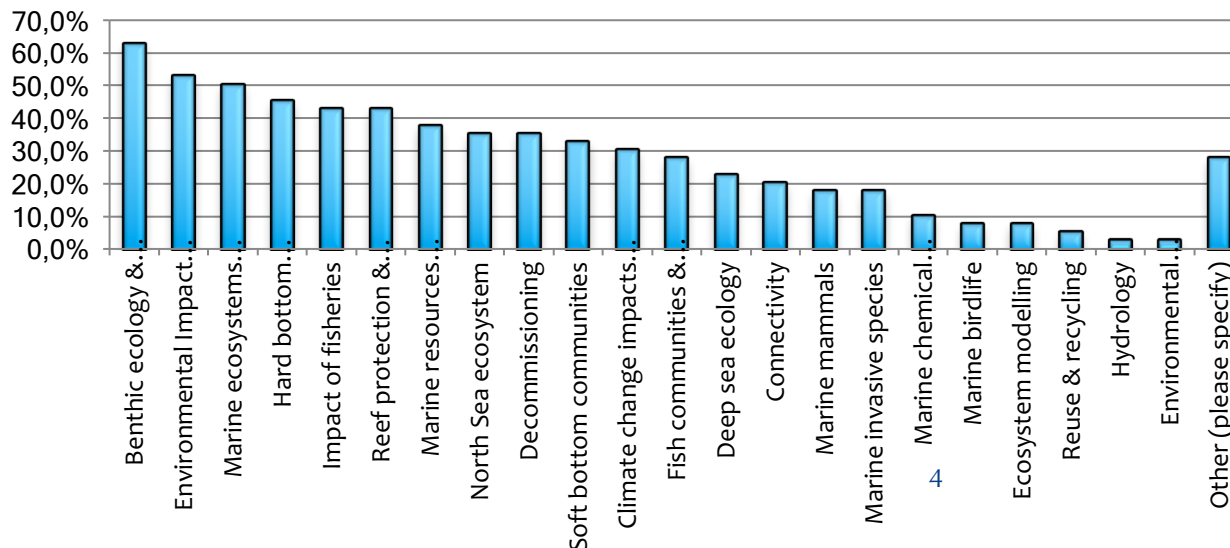
Survey Participants

- 52 responses downloaded June 19th, 2017.
Respondents, who filled in only country of work and areas of expertise excluded.
- 40 full responses (20%)
- 10 different countries; 80% in NS region
- 38 different organisations: 29 academic; 11 other

In what country do you work?



What are your specific areas of expertise?



Results 1: Flexible, case-by-case approach to decommissioning

- **Environmental benefits of a more flexible, case-by-case approach** to offshore decommissioning in the North Sea (94.7% agree)
- **Decommissioning options should be evaluated for groups of ecologically interconnected installations** instead of individual installations only (90% agree)
- When offshore installations have been in the marine environment for >20 years, **we know more about what happens if we leave them in place than about what happens if we remove them** (64.9% agree).
- **Contaminated installation parts should always be removed** to shore (57% agree).
- Solutions for **contaminated seabed depend on expected disturbance by trawling**:
 - Should be removed if there is a risk that they will later be disturbed by trawling (71% agree).
 - In some cases it is better to leave chemical contamination undisturbed offshore (64% agree).
- Some **concern** (18 – 32%) about
 - Installations functioning as stepping stones for **invasive species**, especially intertidal parts.
 - Risk and importance of potential negative long-term impacts of leaving material offshore such as **ghost-fishing and vessels colliding** with reefed. ***Impact of installation falling apart is NOT a major concern.***

Results 2: Installations can have Ecological Value

- ***Offshore Installations = hard substrate = artificial reef habitat***
- **Valuable artificial reef habitats should be maintained and protected** (95% agree)
- **Artificial reef habitat = environmentally valuable when it:**
 - **Replaces lost natural reefs** (92%)
 - Provides **habitat for species that are endangered** or under pressure (89%) – removing them may form additional threat (76% agree)
 - Forms a crucial **stepping stone for larval exchange between natural reefs** (87%)
 - Provides **shelter and foraging opportunities for mobile species/biomass** (84%)
 - **Supports commercial species** (78%)
- **71% disagree with the notion that hard substrate should always be removed from soft sediment habitat**, because it does not 'belong' there.
- **Protection from trawling is crucial:**
 - **No-fishing zones around installations may be of significant importance to key species** (even though it accounts for <1% of the North Sea area) (81% agree)
 - **Installation may add value even if it only attracts fish** if it is protected from trawling/fishing (87% agree).
 - Disused offshore **installations could effectively be used to protect valuable marine ecosystems** from trawling and to **enhance the value of natural reefs** (82% and 68% agree).

Results 3: Preferred decommissioning options include partial removal & 'reefing' in place

- **Preferred decommissioning options for oil & gas installations:**
 - Partially remove (>25m free draught), transport to shore & recycle (47.4%)
 - Top and leave both sections in place (44.7%)
 - Topple in place (42.1%)
 - Completely remove, transport to shore, recycle (42.1%)
- **Preferred decommissioning options for offshore wind installations:**
 - Partially remove (leaving foundations & scouring protection), transport to shore, reuse/recycle/scrap (42.1%)
 - Completely remove, transport to shore, reuse, recycle or scrap (42.1%)
- **Least preferred option for both:** complete removal and relocation to deep water

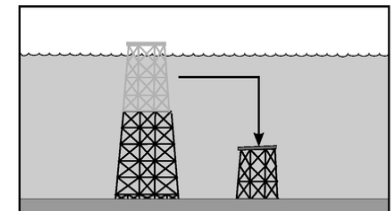


Figure 6-The partial removal platform reefing method

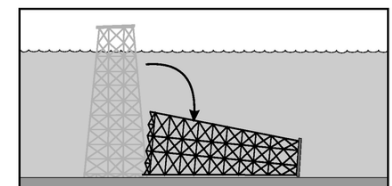
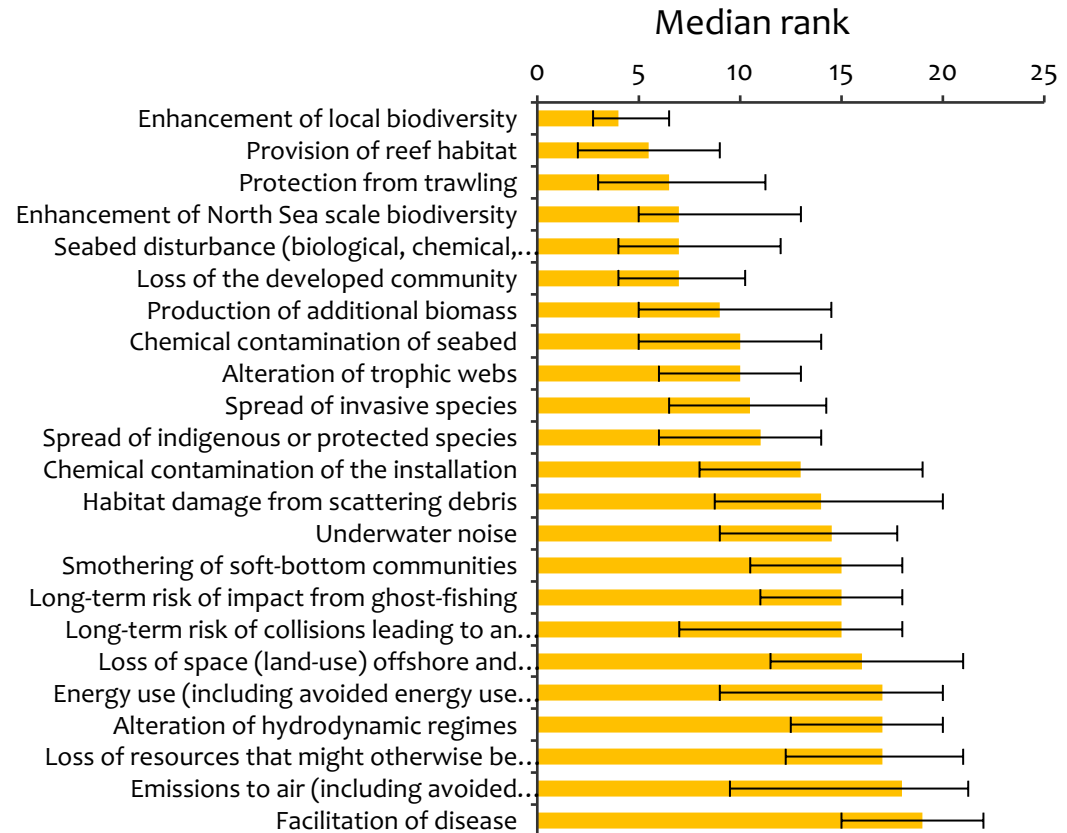


Figure 5-The topple-in-place platform reefing method

Results 4: Ranking Environmental Criteria for Decommissioning of Oil & Gas Installations

1. Enhancement of local biodiversity
2. Provision of reef habitat
3. Protection from trawling
4. Loss of the developed community
5. Seabed disturbance
6. Enhancement of North Sea scale biodiversity
7. Alteration of trophic webs
8. Production of additional biomass
9. Chemical contamination of seabed
10. Reduced spread of indigenous or protected species
11. Reduced spread of invasive species



Results 5: Ranking Environmental Criteria for Decommissioning of Offshore Wind Installations

1. Provision of reef habitat
2. Enhancement of local biodiversity
3. Protection from trawling
4. Enhancement of North Sea scale biodiversity
5. Loss of the developed community
6. Production of additional biomass
7. Reduced spread of invasive species
8. Seabed disturbance
9. Alteration of trophic web
10. Reduced spread of indigenous or protected species

