

A Rapid Assessment of Marine Non-native Species in Harbours and Marinas on the Southwest Coast of Norway and the Northeast Coast of Scotland and the Potential for Coastal Connectivity

Ian Campbell, Thomas P. Adams, Andrew J. Blight,
Elizabeth J. Cottier Cook, Vivian Husa, Jennifer Loxton,

20th International Conference on Aquatic Invasive Species
Fort Lauderdale, Florida
25th October 2017

1. Key research aims

2. Methodology

3. Results

4. Next steps

1. Key research aims

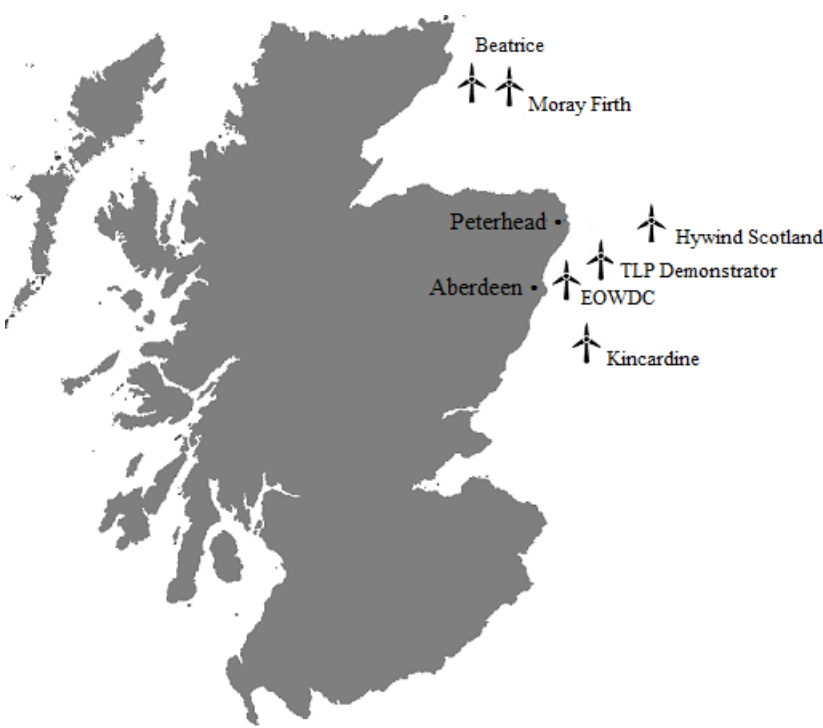
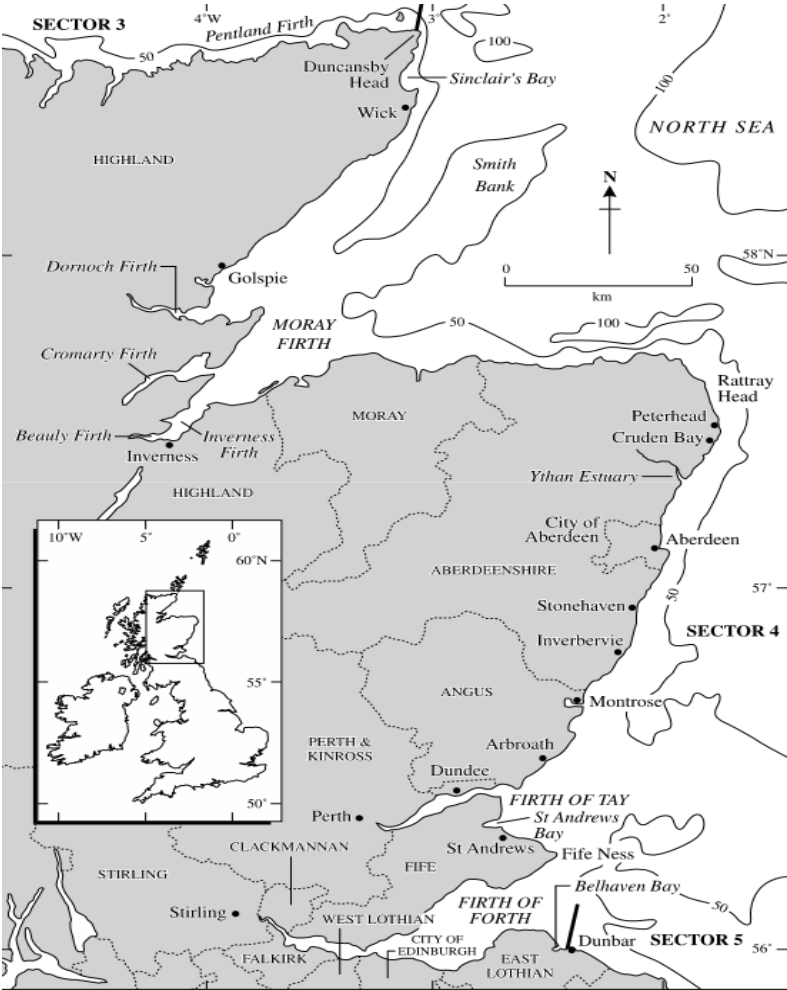
- Study sites for rapid assessment surveys
Improves knowledge of NNS presence in areas previous lack of research effort
- Structural characteristics and location of floating wind turbines
Offers a toolset of methodologies for informing future floating devices
- Number and speed of vessels during the assembly, transport and installation process
Supports environmental monitoring and a full risk assessment for Developer
- Floating wind turbines as a potential vector and ‘stepping stone’ for invasion
“supports research programmes which increase knowledge about ecosystems and biodiversity”

1.1 Study sites

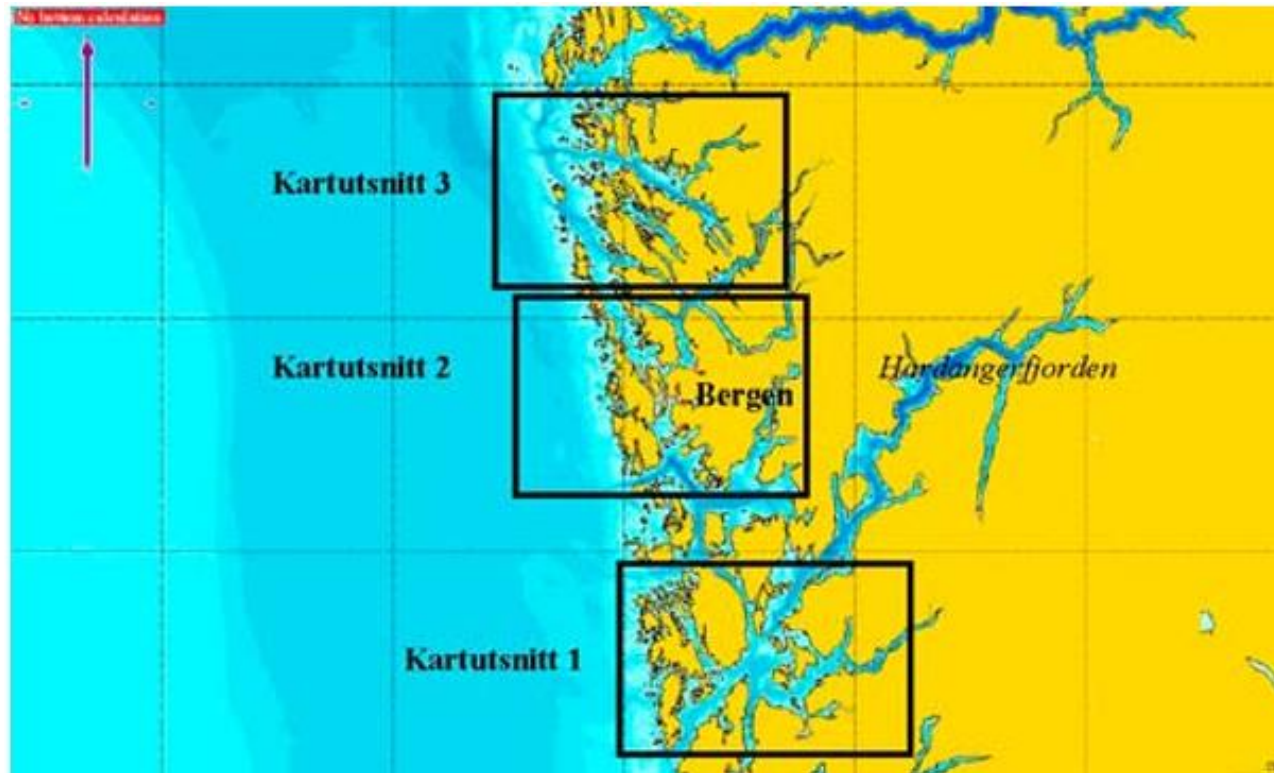
- Many studies investigated fouling species richness and diversity along the same coastline
- Few looked at spatial variation between harbours and marinas separated by a seascape and the potential for habitat connectivity.
- Study focussed on NNS presence on the southwest coast of Norway and northeast coast of Scotland



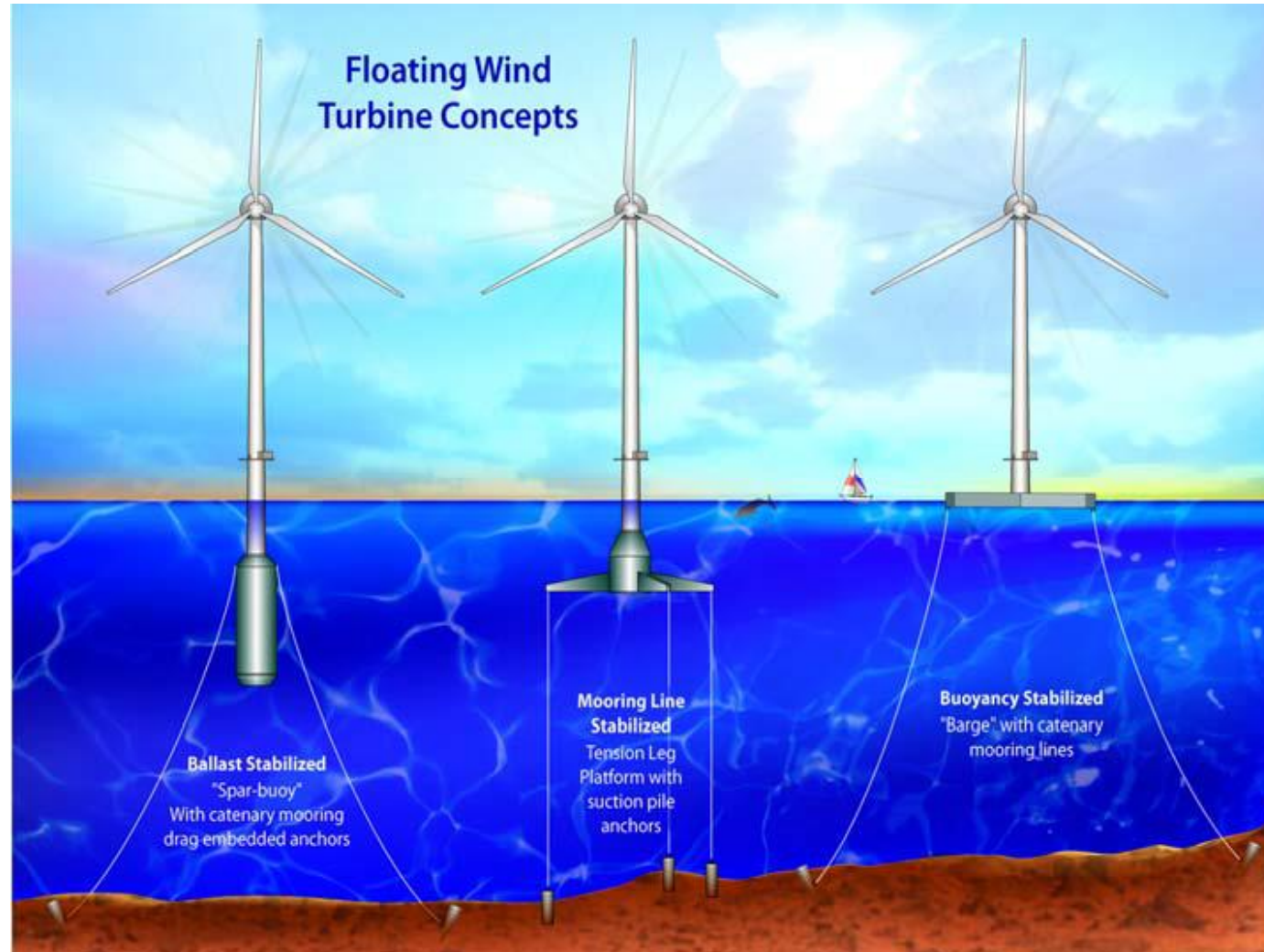
1.2 Scotland



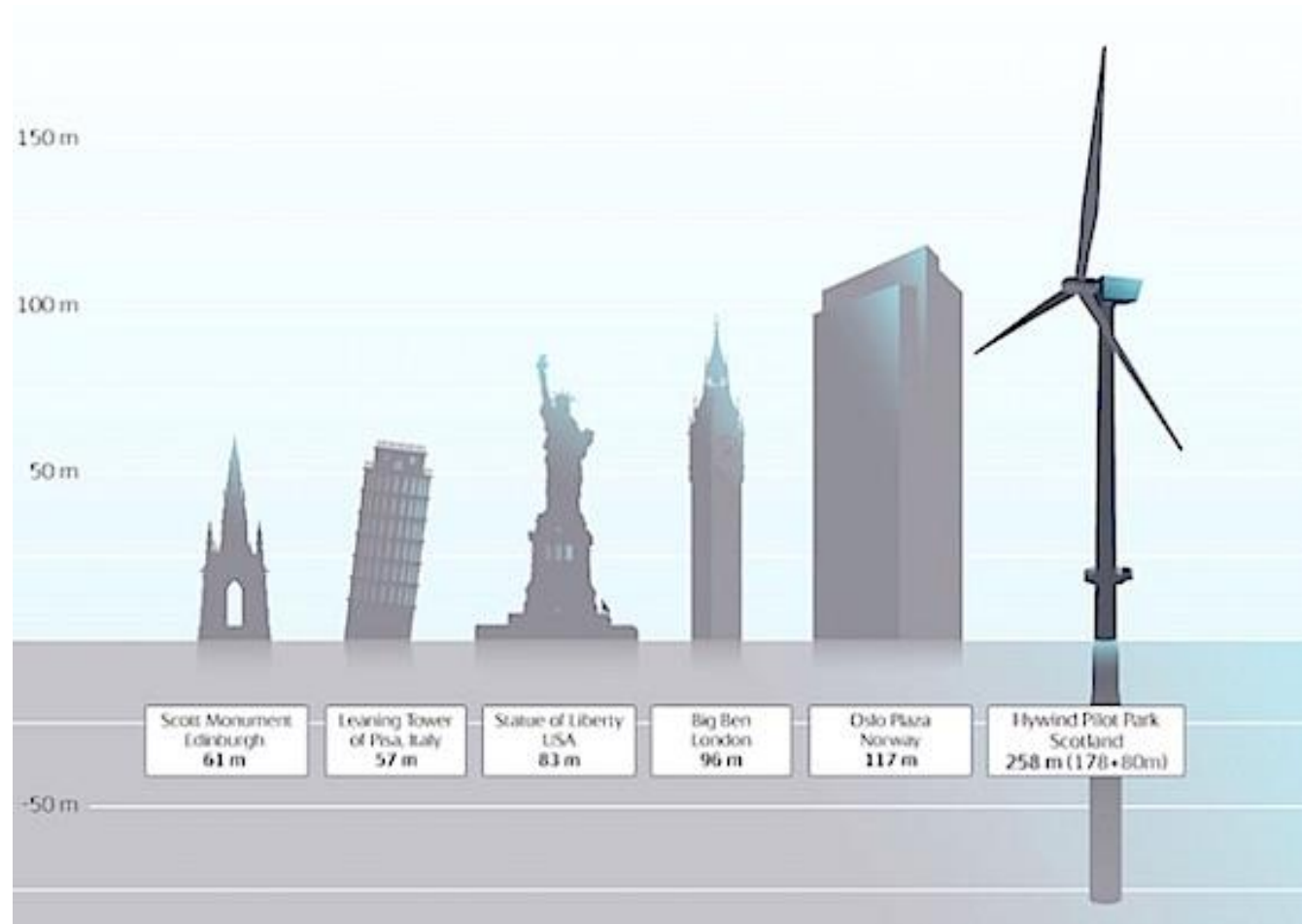
1.3 Norway



1.4 Floating design concepts

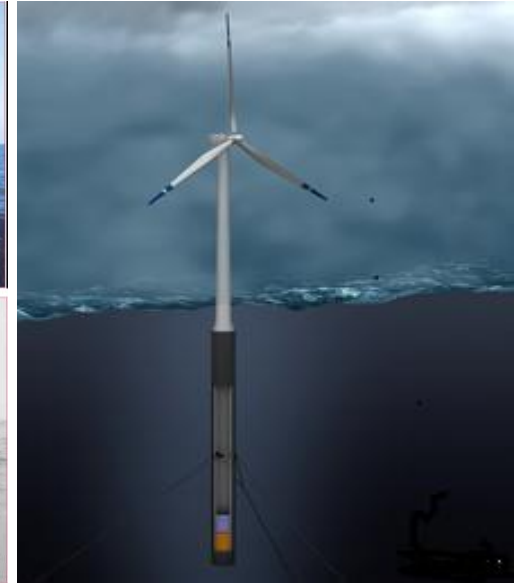


1.5 Hywind Scotland

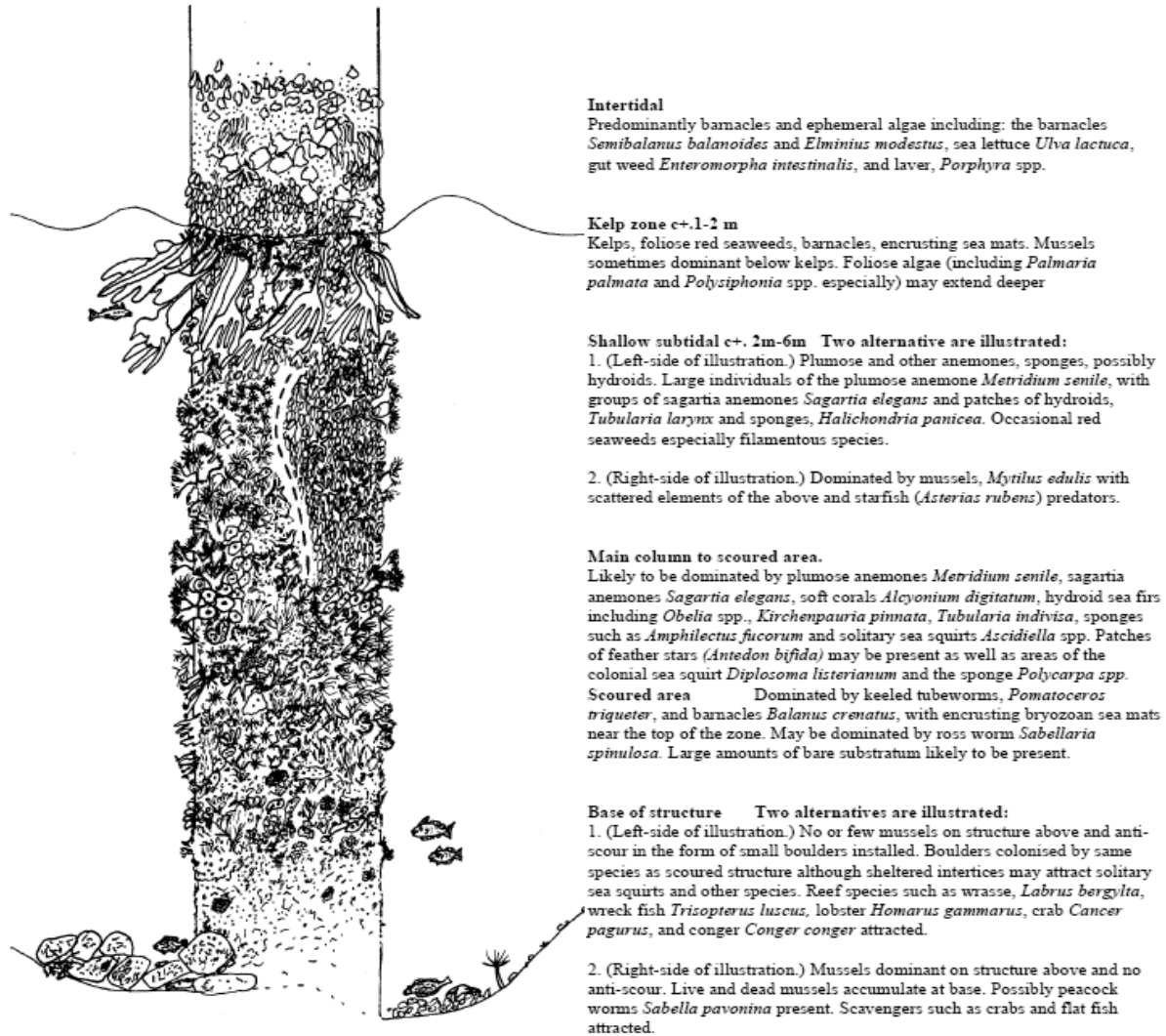


1.6 Deep water locations

- Hydrodynamic conditions deep water very different near shore shallow coastlines
- High tidal environment
- Different flow regime
- Foundations permanently submerged
- Difficult to access
- No analogues for deep water floating devices

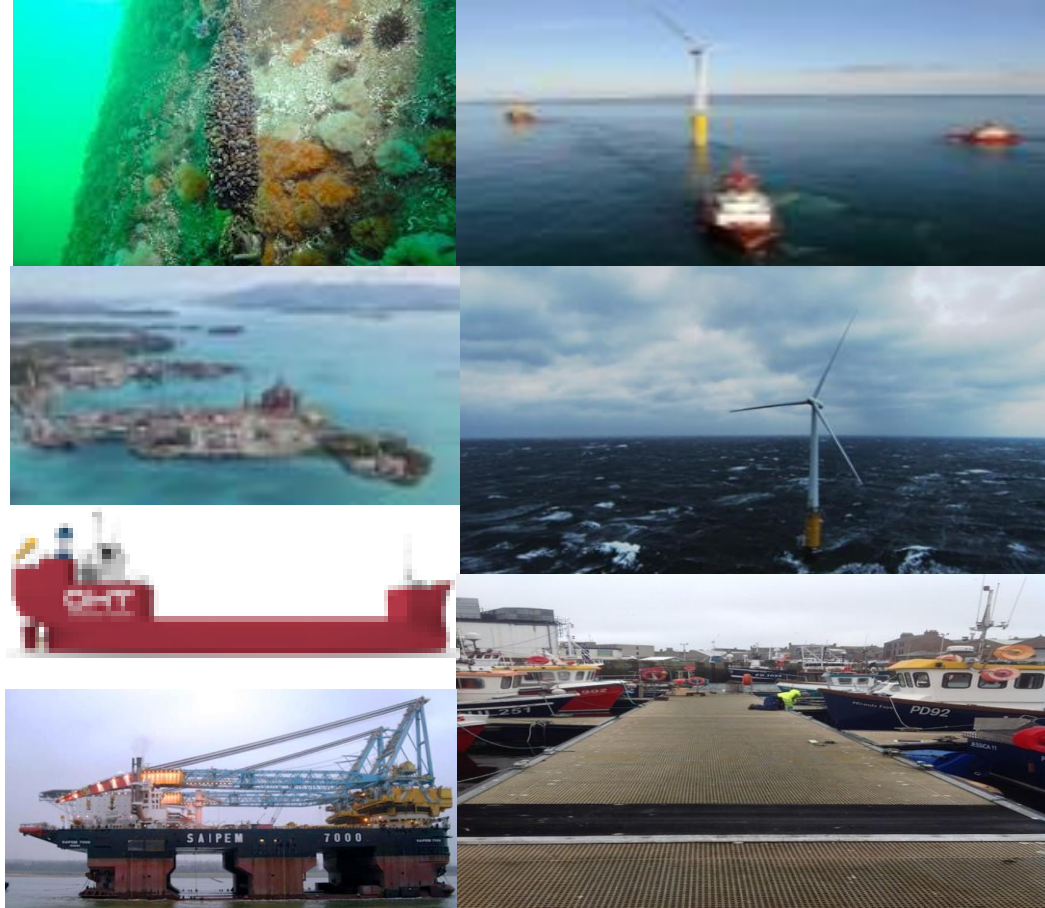


Why should we care?



2. Methodology

1. Full literature review of bio-fouling and INNS on offshore artificial structures and study sites in Norway and Scotland
2. Baseline NNS at ports adjacent to assembly and deployment
3. Scrape sample ATI vessels
4. Attach in-situ panels to Hywind Scotland prior to wet towing to Scotland
5. Operational monitoring of Hywind Scotland foundations
6. Final RAS at ports of assembly and deployment



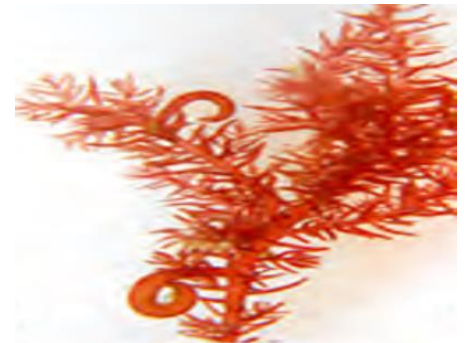
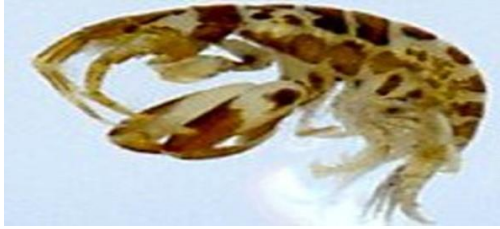
2.1 Methodological challenges

“Everyone has a plan till they get punched in the mouth” Mike Tyson

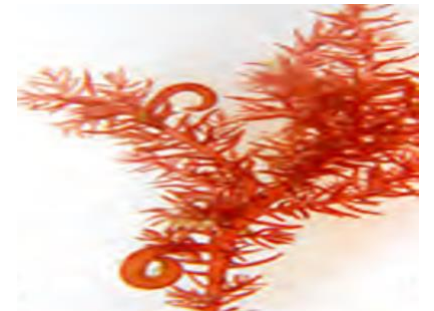
- ✓ Comprehensive literature review
- ✓ RAS at ports of assembly and deployment
- ✗ Scrape sample all ATI vessels
- ✗ Attach in situ panels to Hywind Scotland prior to wet towing to Scotland
- ✗ Operational monitoring of Hywind Scotland foundations
- ✓ Final RAS at ports of assembly and deployment



3. 1 Results Scotland



3. 2 Results Norway



4. Revised methodology

- ✓ Full literature review of bio-fouling and INNS on offshore artificial structures
- ✓ Baseline NNS at ports adjacent to assembly and deployment
- + Assess physical characteristics of each of the study sites in Norway and Scotland
- + Create a coupled biophysical model to quantify non-anthropogenic dispersal of two non-native cirriped species from the port of assembly
- + 2nd proof of concept for operational monitoring of Hywind Scotland
- ✓ Final RAS at ports of assembly and deployment





Acknowledgements



University
of
St Andrews



Scottish Natural Heritage
Dualchas Nàdair na h-Alba

All of nature for all of Scotland
Nàdar air fad airson Alba air fad