

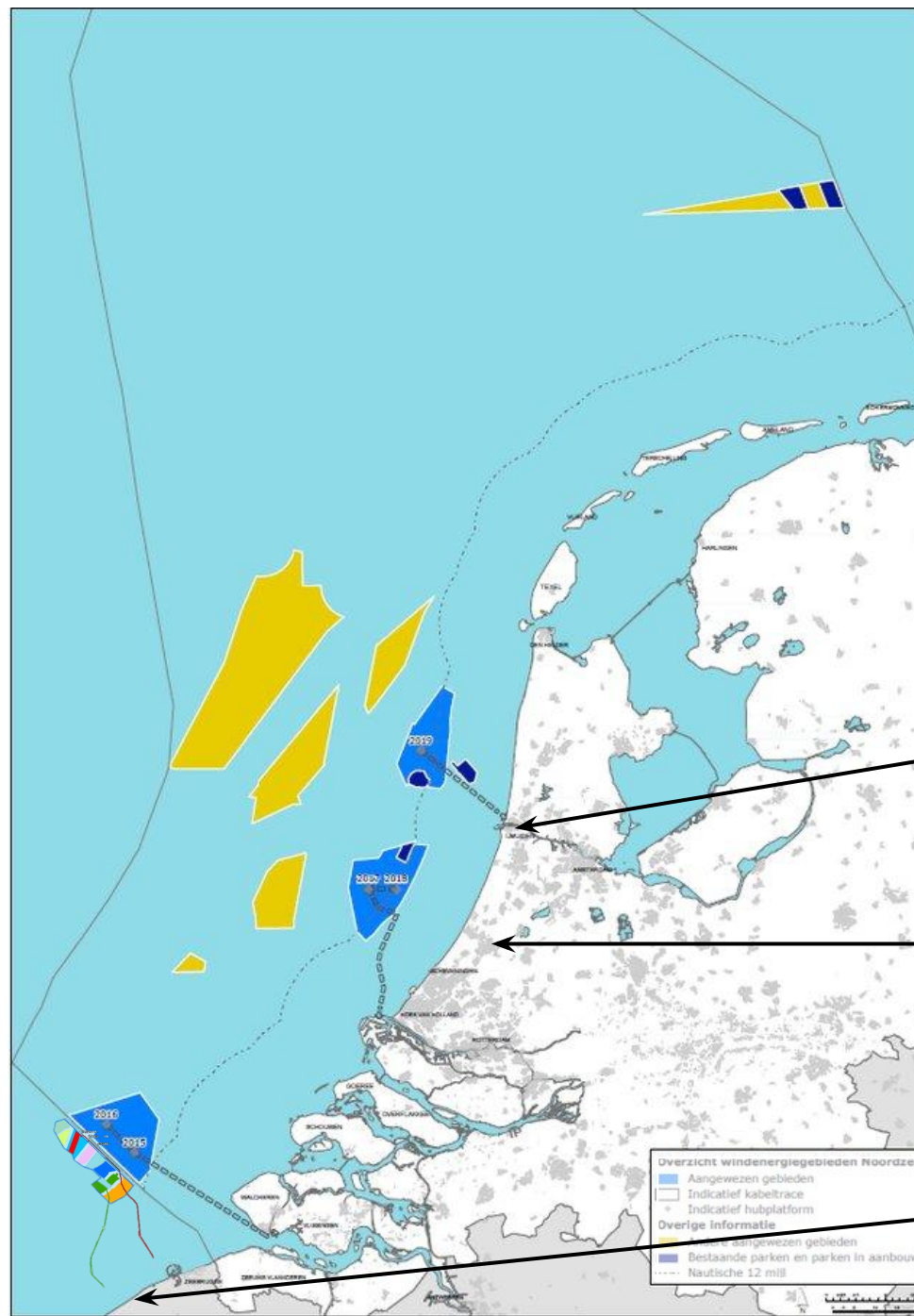
Atlantic cod and pelagic fish in windfarms

Jeroen Hubert

Postdoctoral researcher at Leiden University, The Netherlands

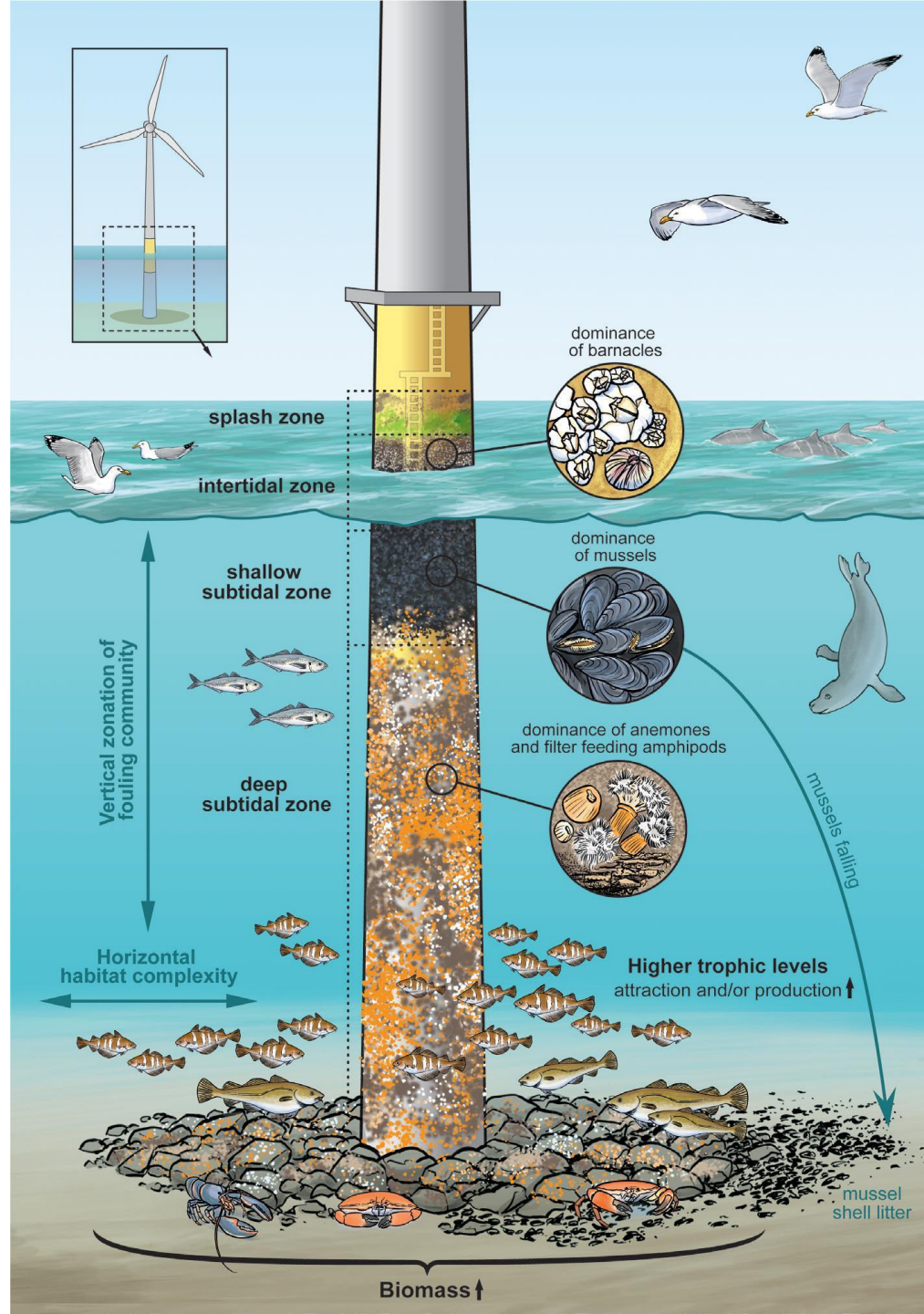


Universiteit
Leiden



Core team:





Ecological succession at windfarm construction



Pre-activity phase



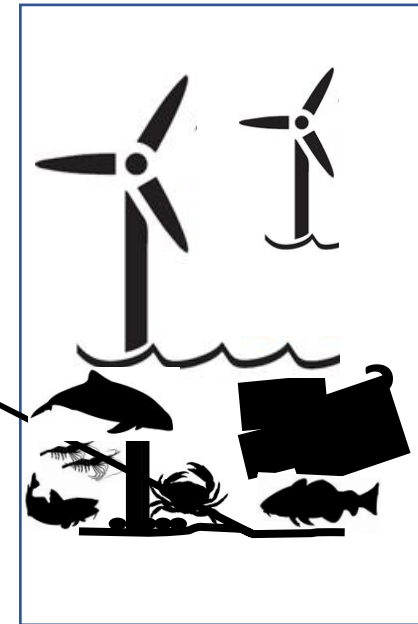
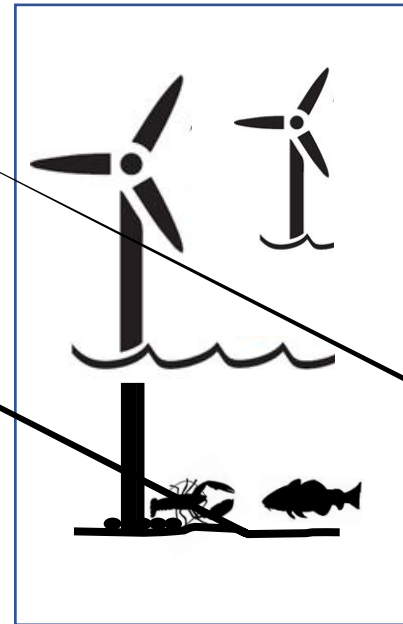
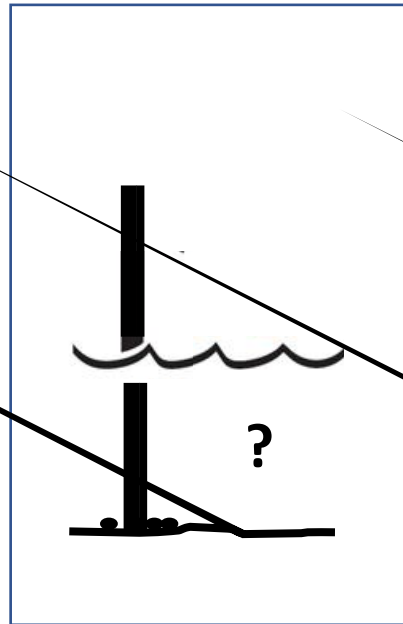
Construction phase



Operational phase



Time →



Acoustic event train for windfarm construction



Seismic survey



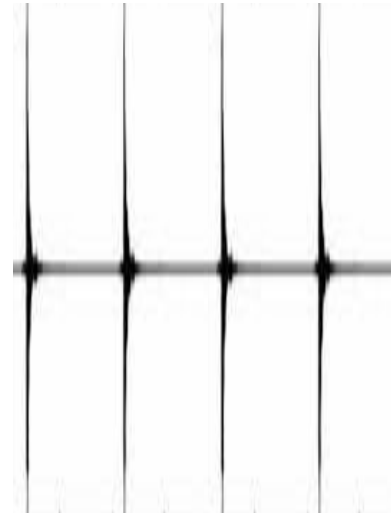
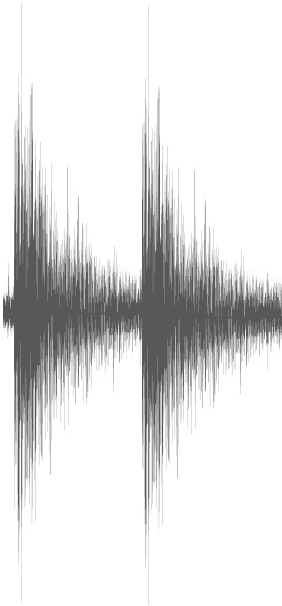
On-site preparation



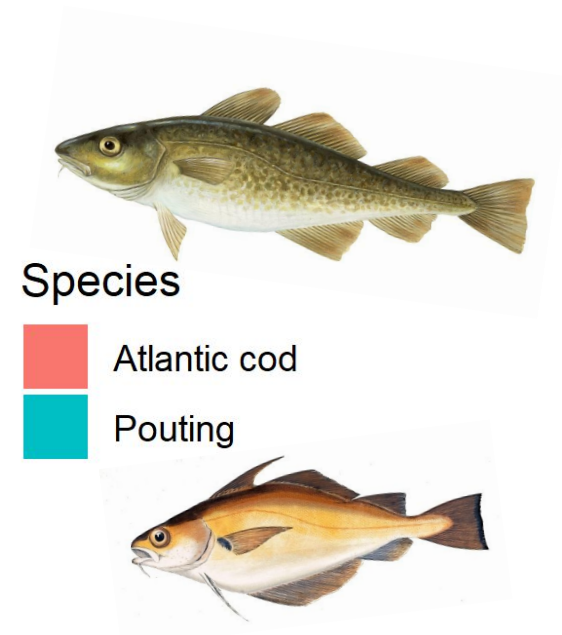
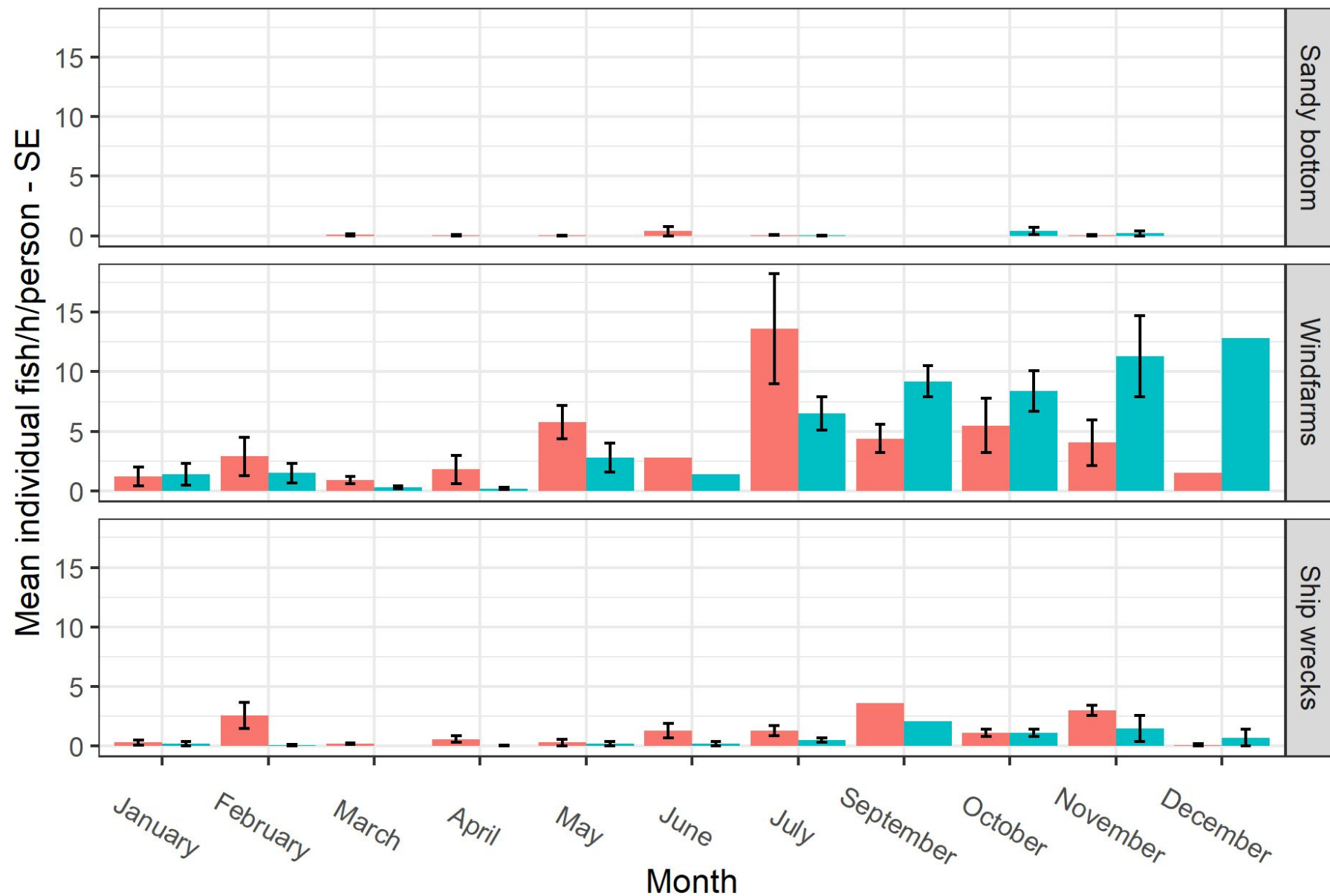
Pile driving



Operational phase



Catch per unit effort (CPUE)



Species

- Atlantic cod
- Pouting

Atlantic cod diet in windfarms



Decapod
a
(60.5%)



Amphipod
a
(7.2%)



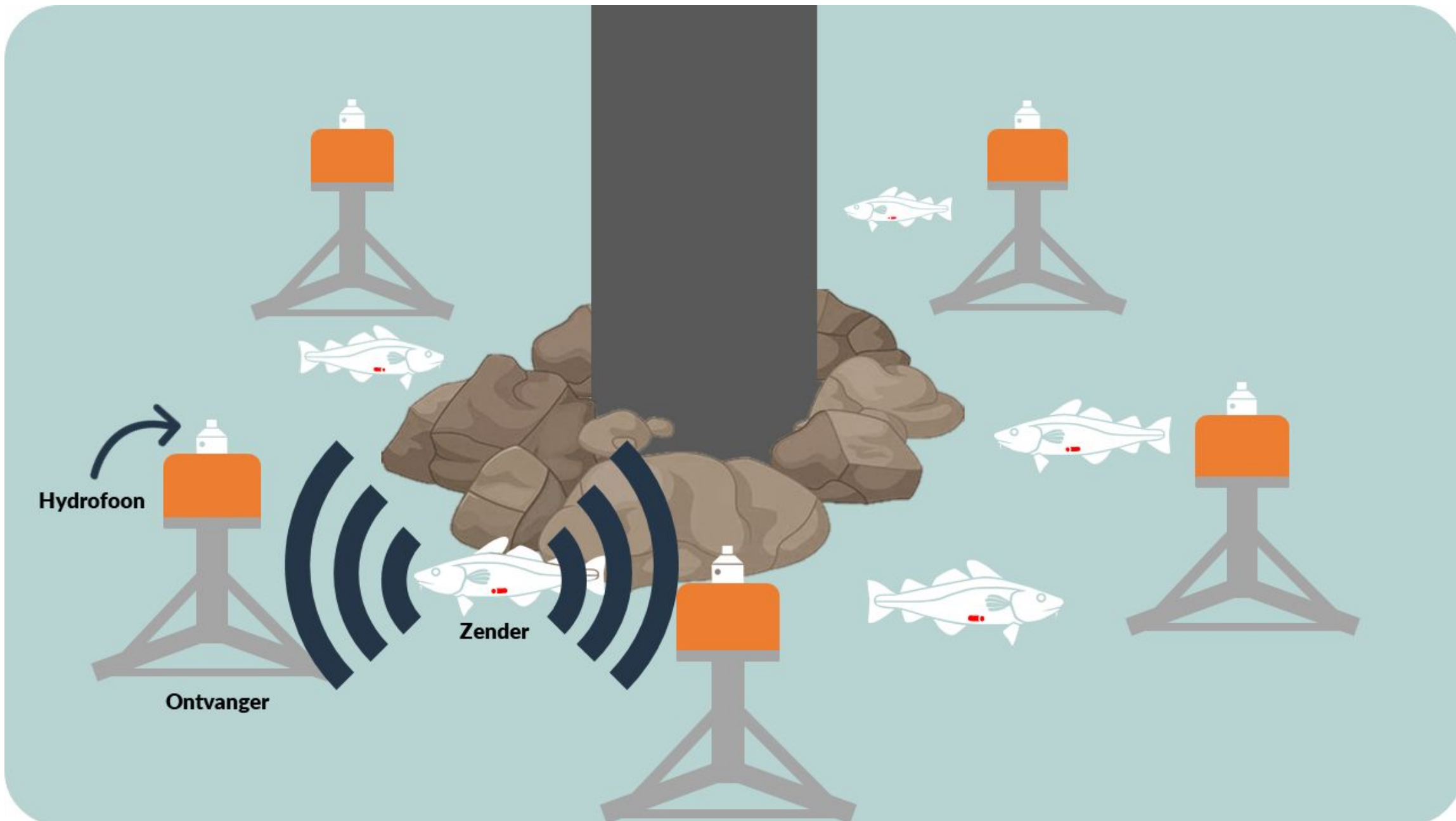
Polychaet
a
(1.36%)



Bryozo
a
(1.37%)



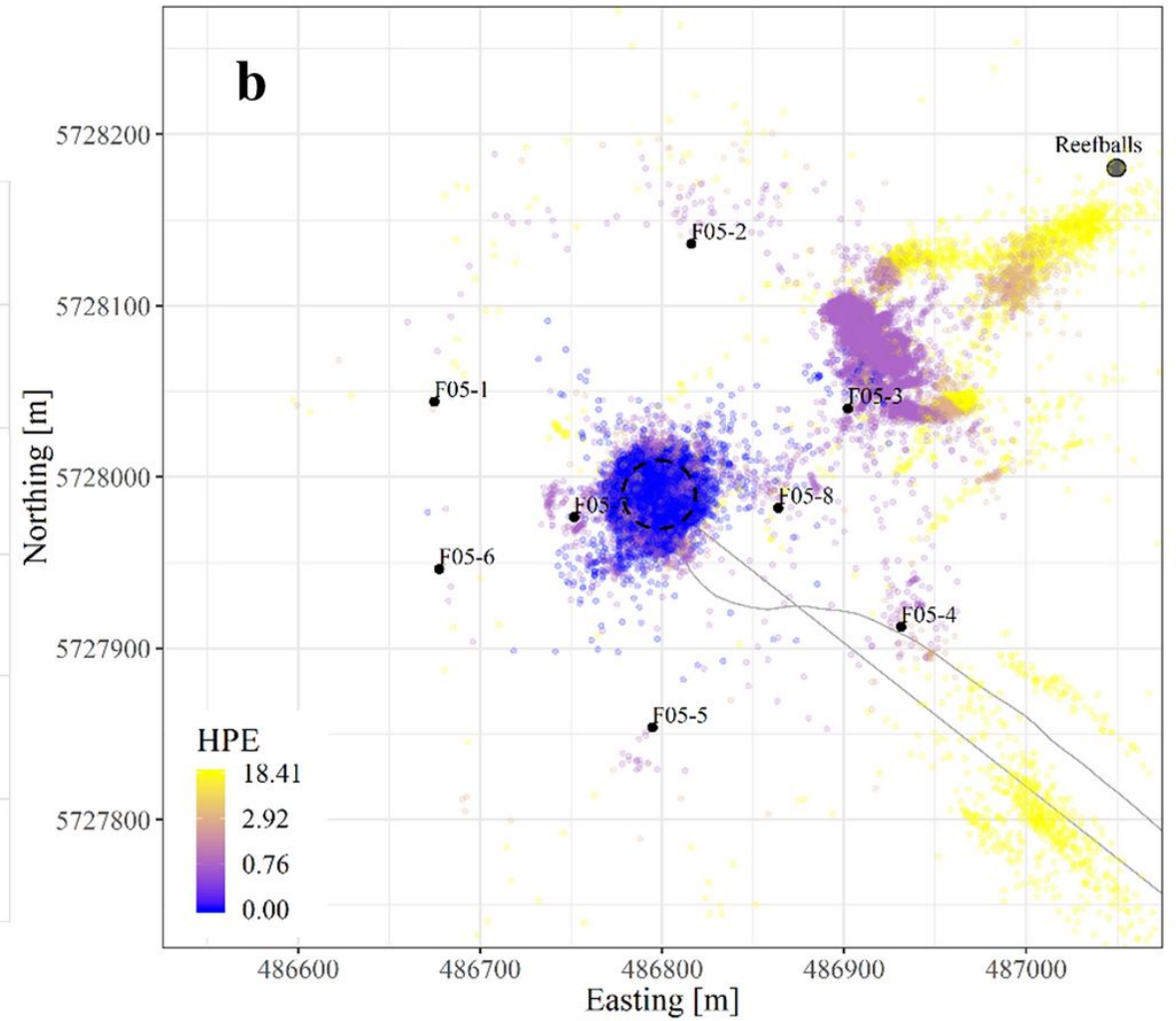
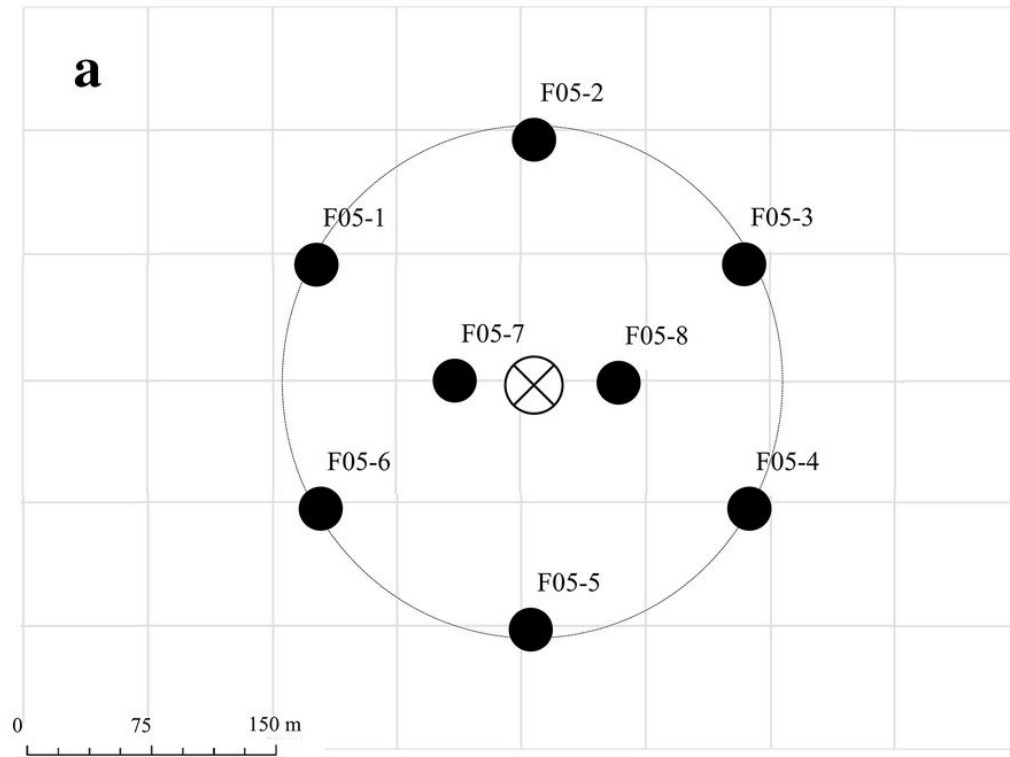
Pisces
(4.11%)

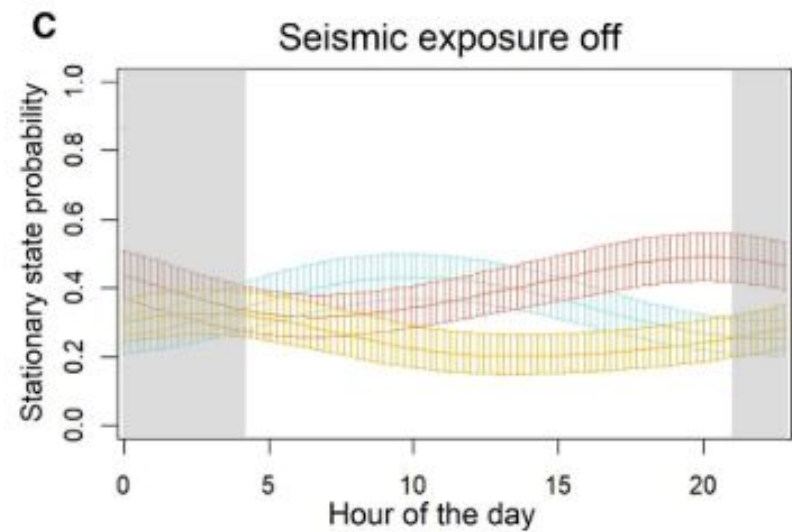
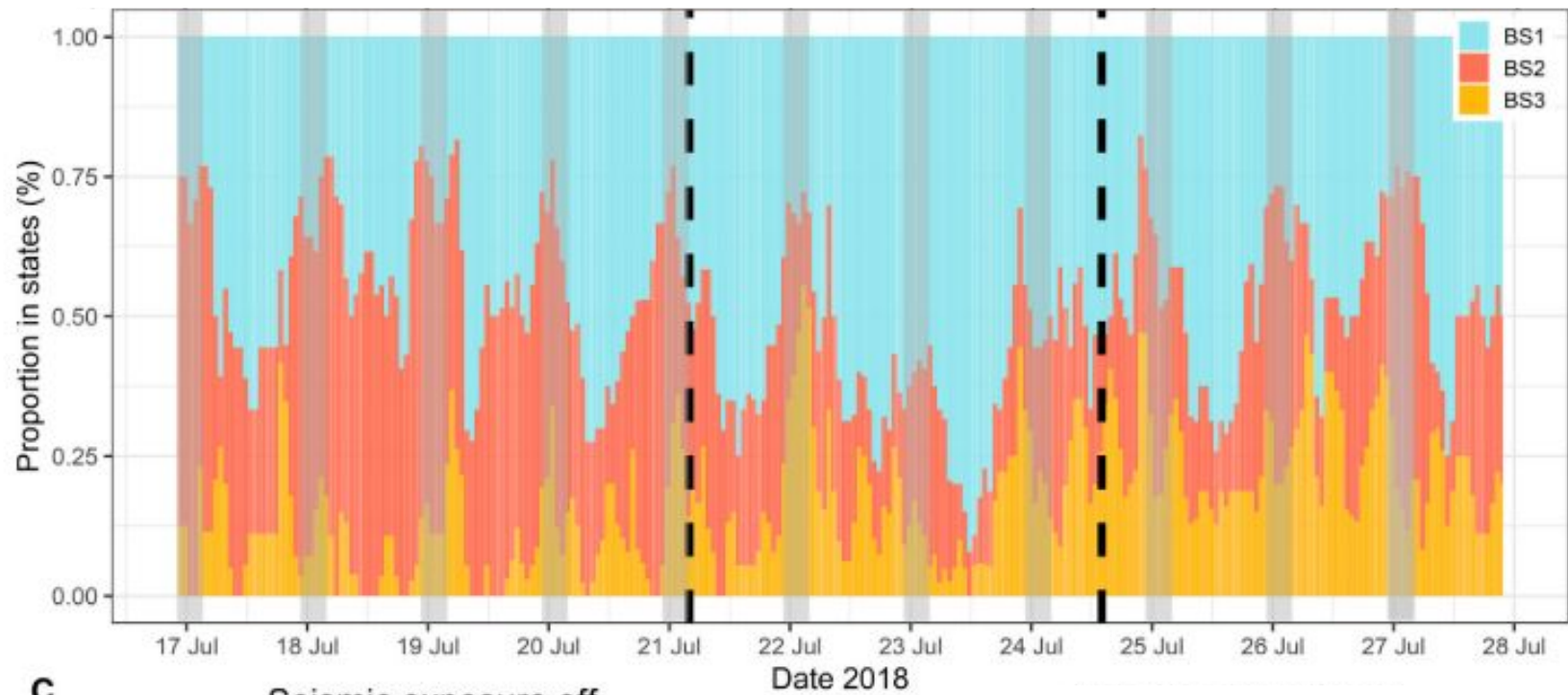


Belwind
Jul – Aug 2017

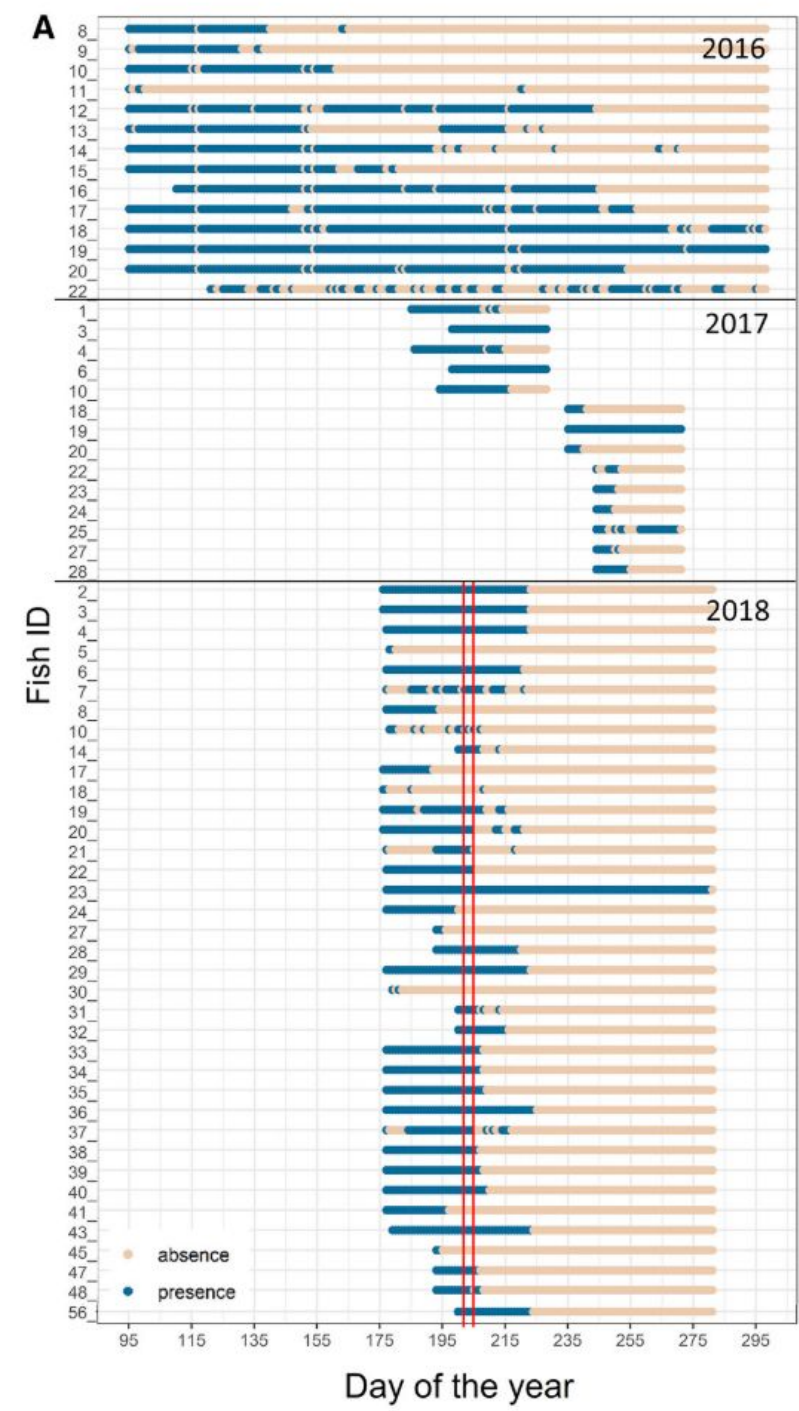


Turbine F05

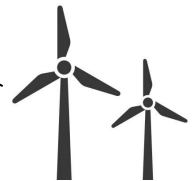
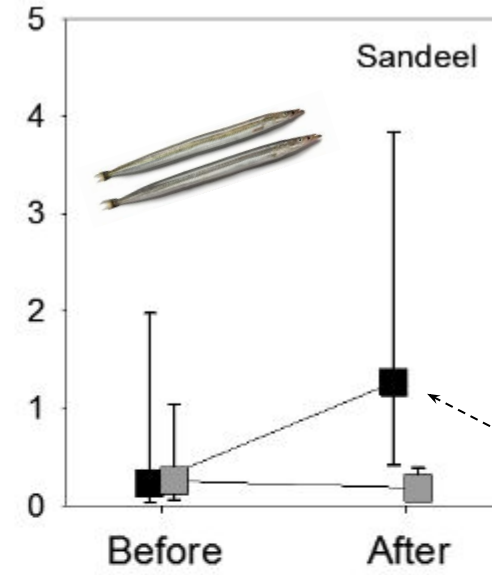
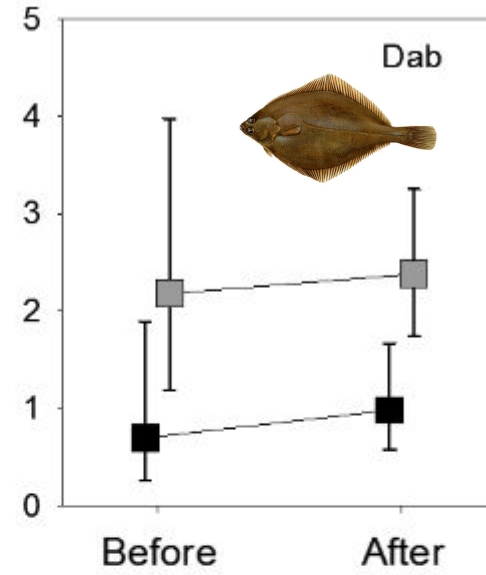
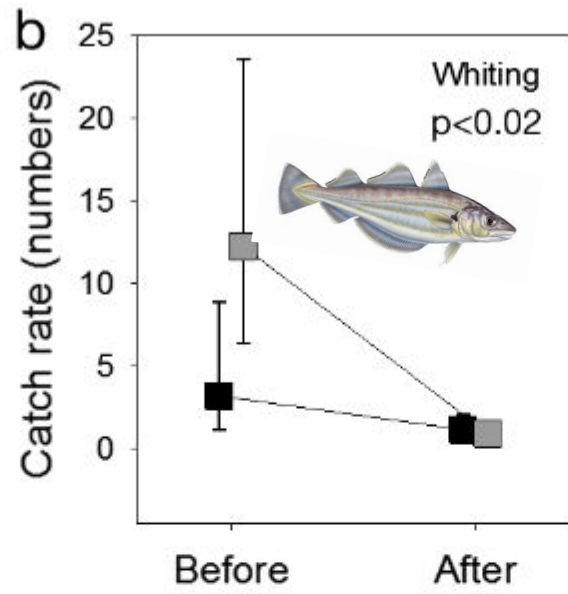


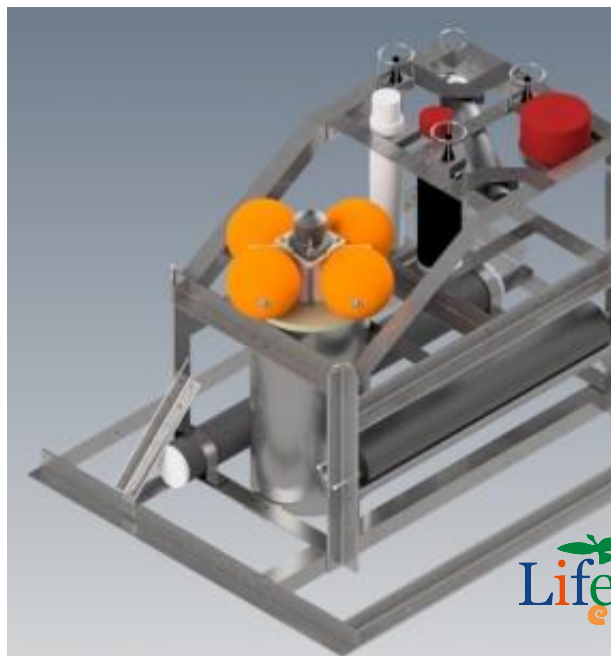


Belwind

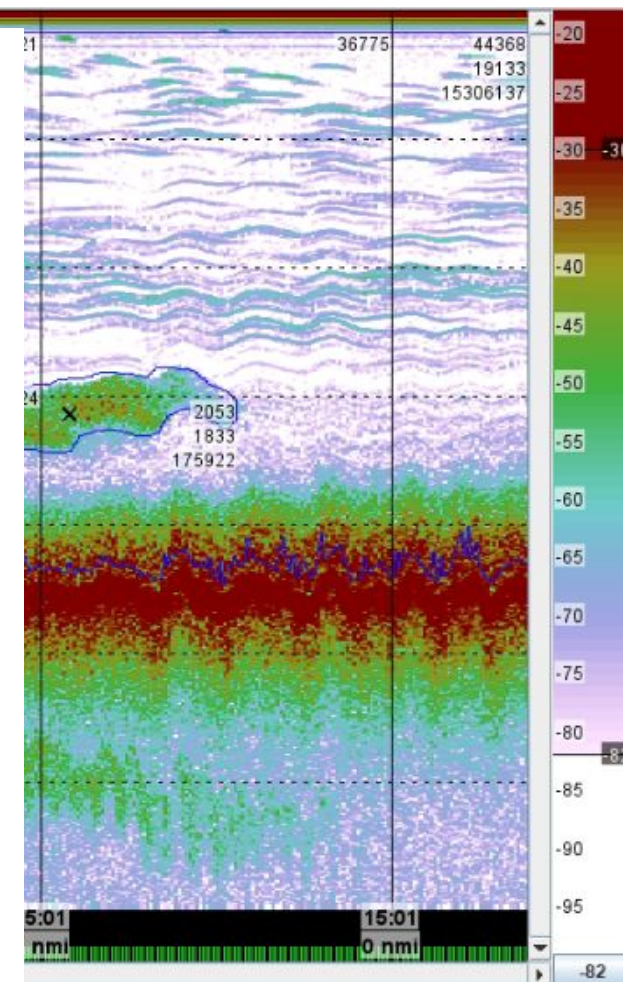
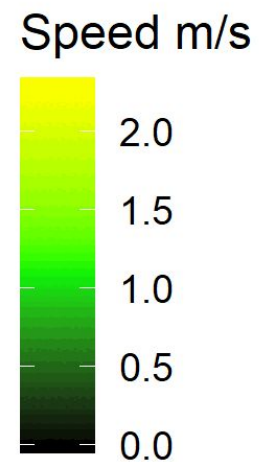
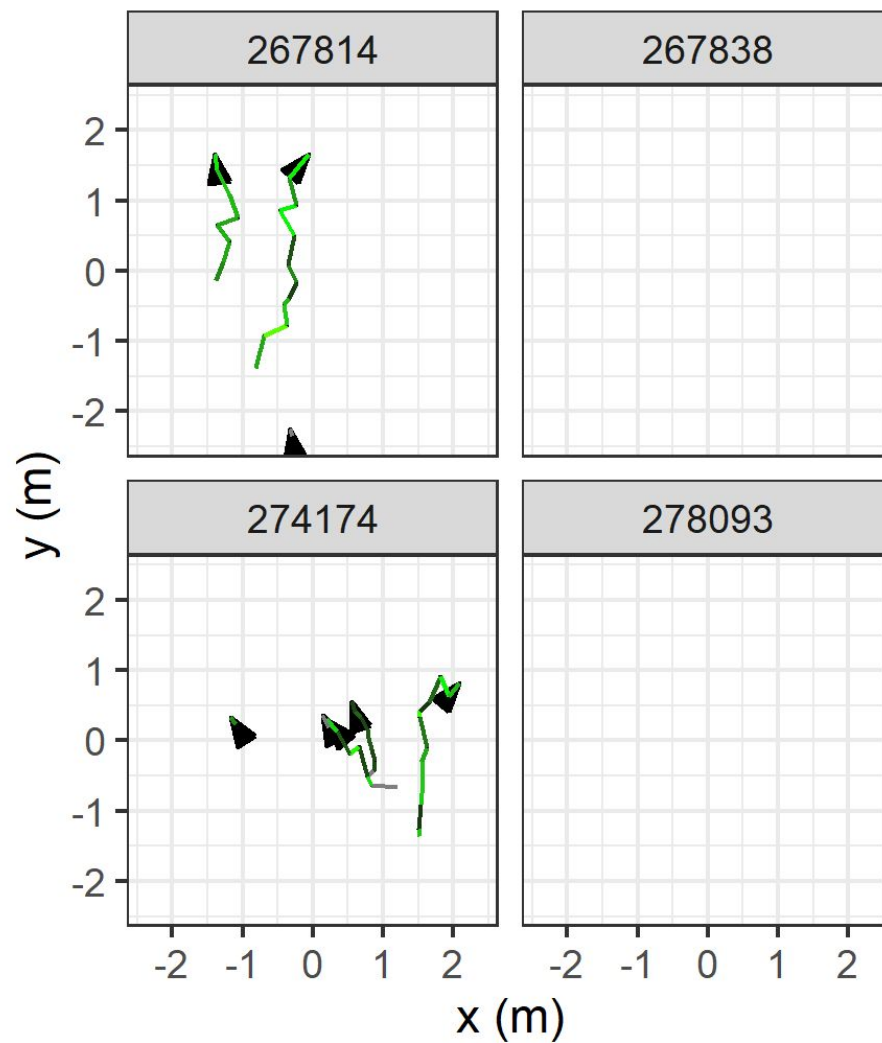


Van der Knaap et al., 2021b

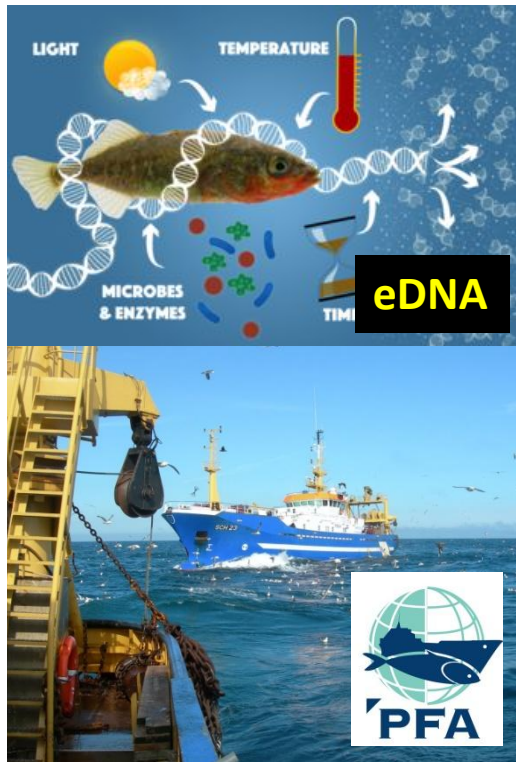




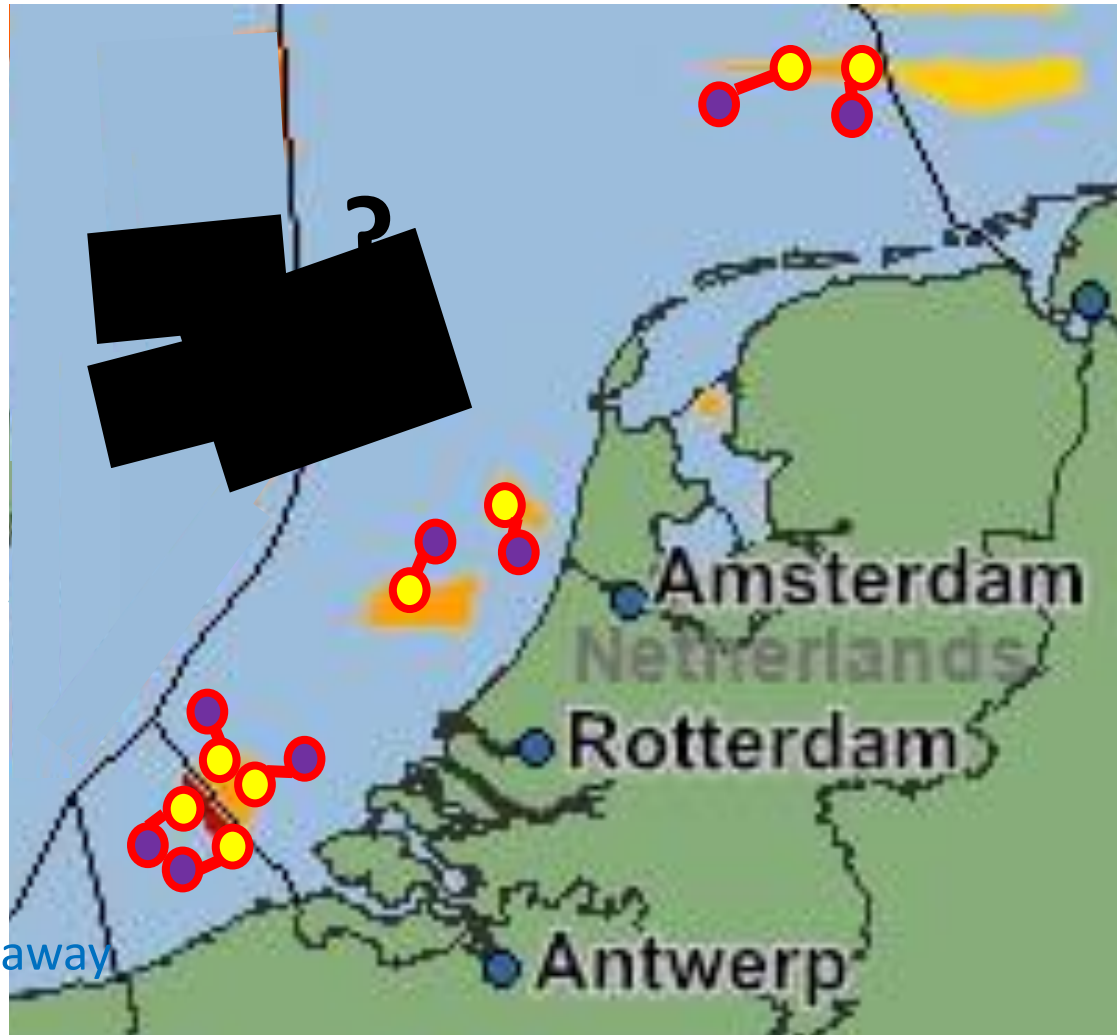
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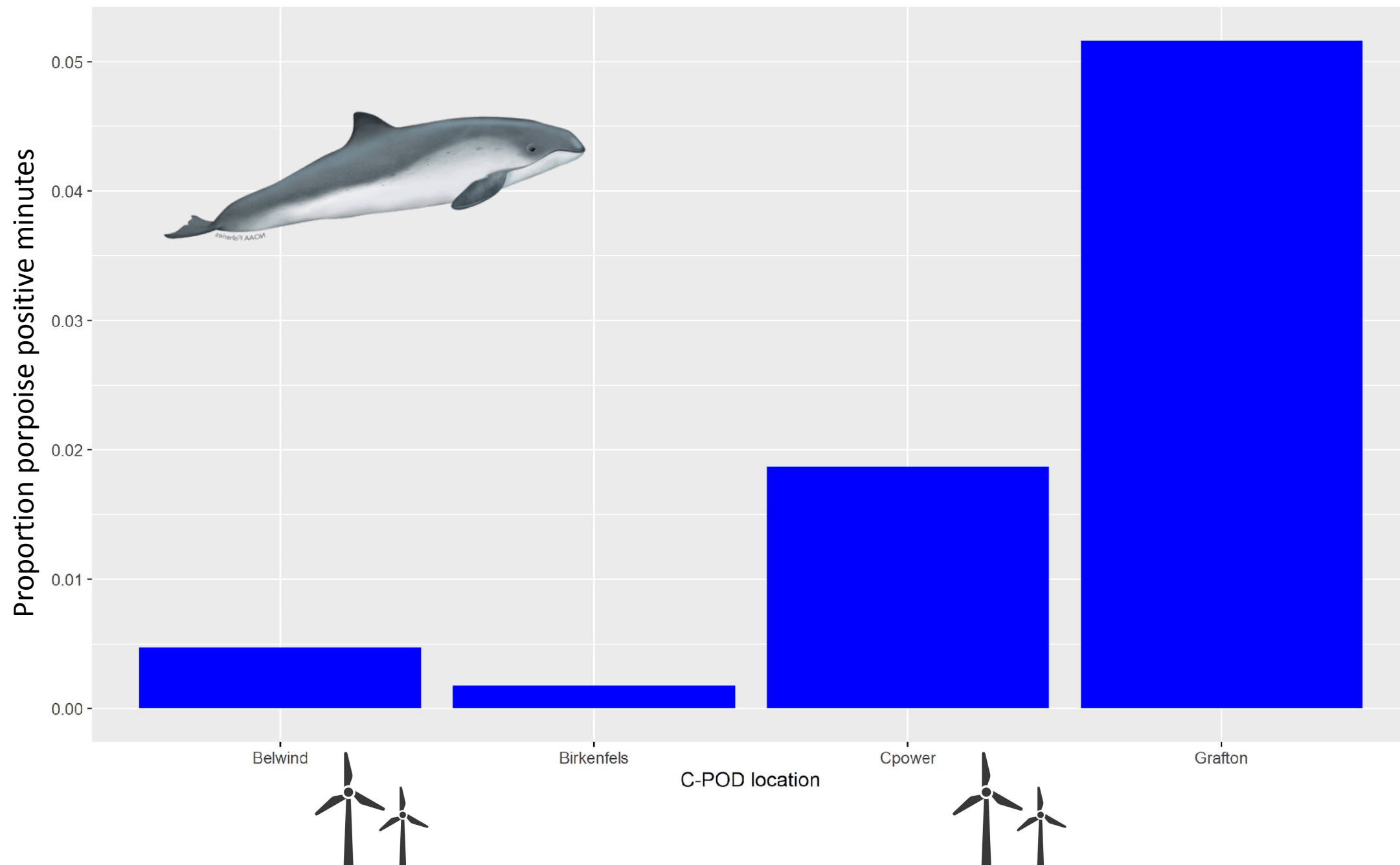


Operational windfarms: paired design



Replicate at pairs of sites at and away from windfarms





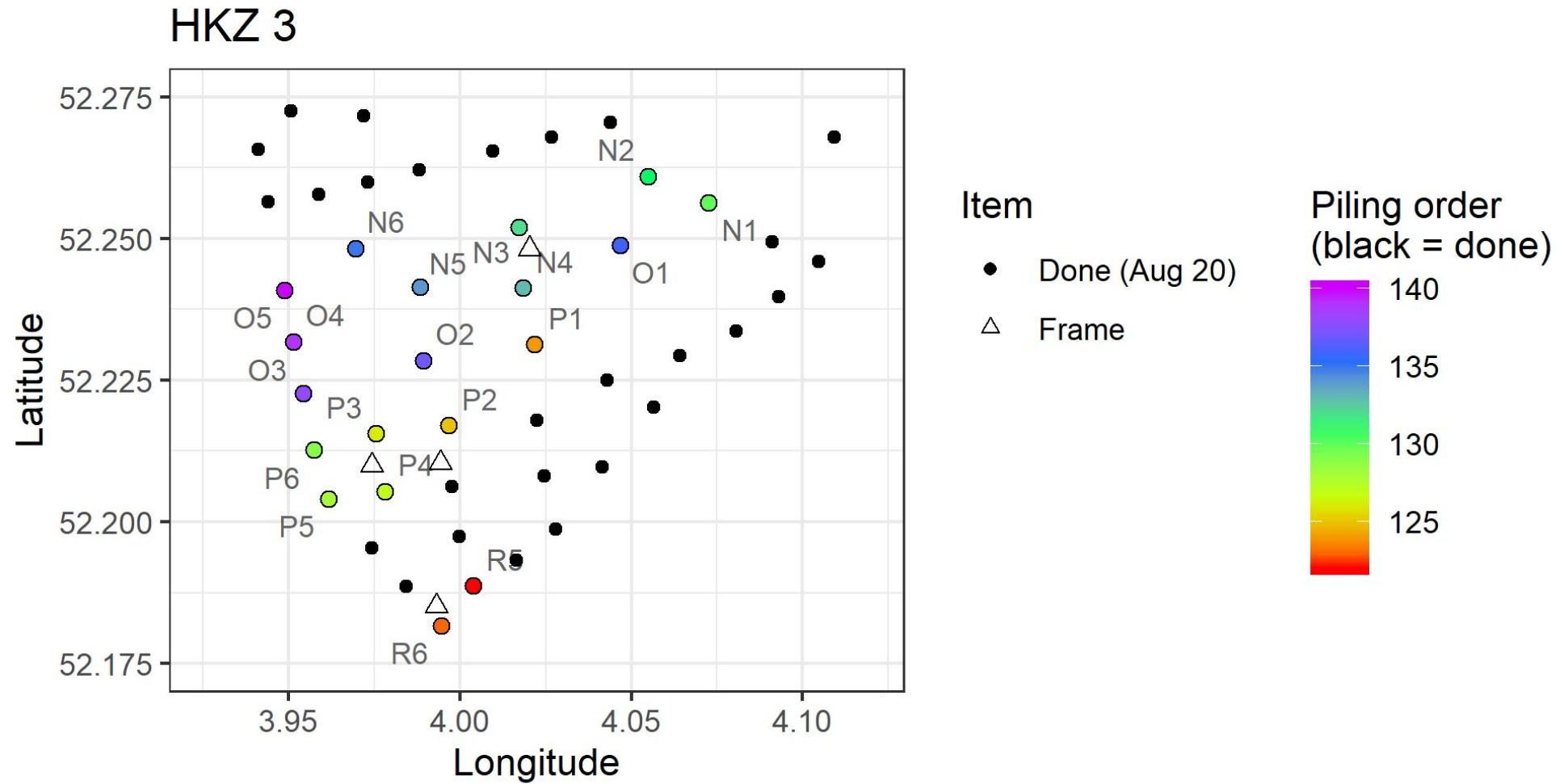
Potential pro/cons

Artificial reef effect
Fishing restriction

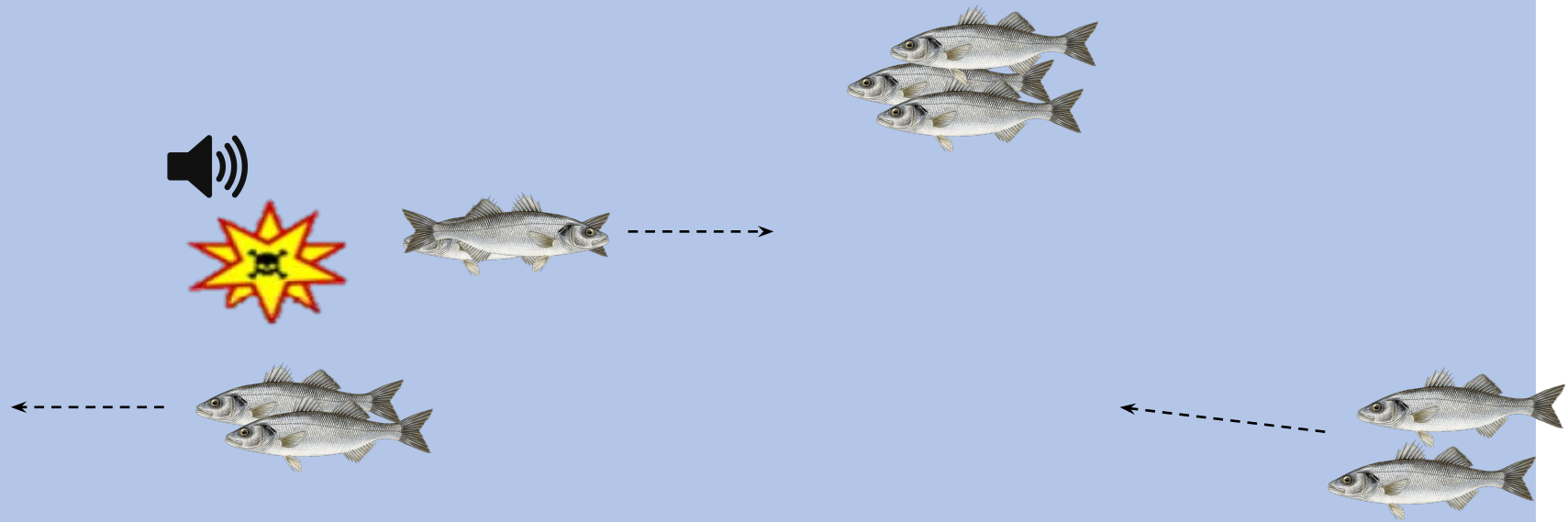
Large scale environmental change
Operational noise/vibrations
Maintenance vessels/activities
Cables(?)



Construction

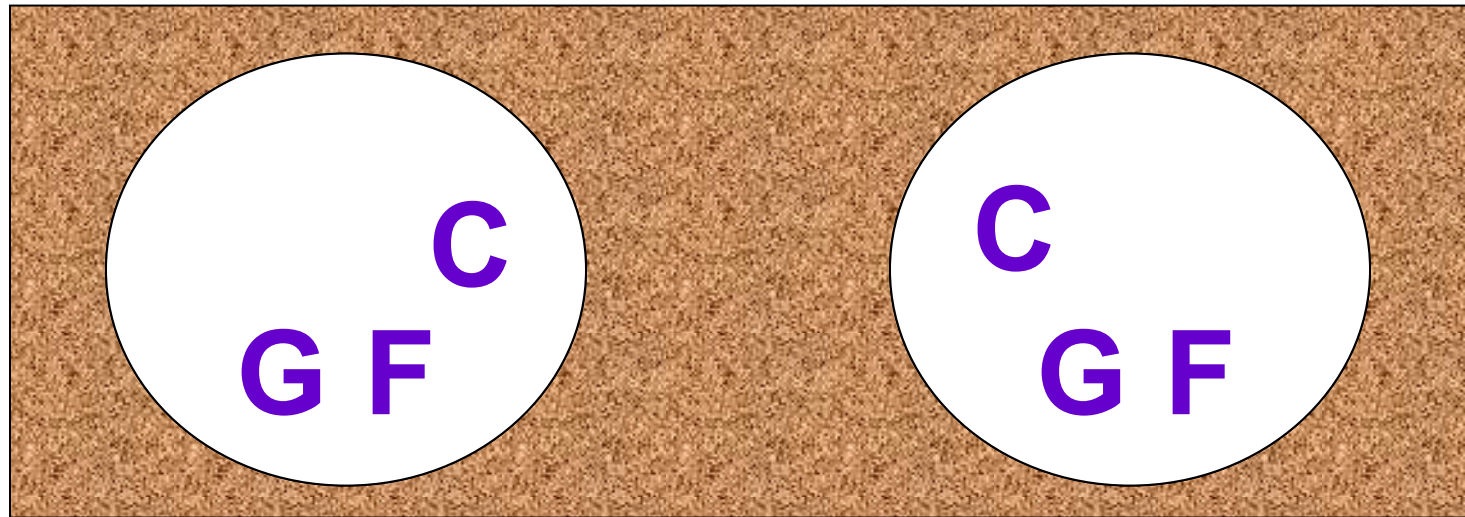


Acoustic Deterrent Device (ADD)



Site of Acoustic Danger

Bird communities: Urbanization leads to homogenization



Locally not necessarily less species, but everywhere the same: Biodiversity loss at large scale

Conclusions

- Windfarms change the marine ecosystem
 - May not lead to a lower biodiversity
 - But knowledge gaps remain
- Research is required
 - In paired design, or before-during-after-control
 - Replication is essential
- This should guide nature-inclusive construction & operation of windfarms

Thanks for your attention!

Hans Slabbekoorn

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Benoît Bergès

Jan Reubens

Inge van der Knaap

Dafne Remmelzwaal



VATTENFALL

museum

Royal Belgian Institute of Natural Sciences

