Environmental monitoring strategies from the SEA Wave project

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seawave-emff.eu

Co-funded by the European Commission
European Maritime and Fisheries Fund

SEAWave

- Knowledge gaps remain in understanding environmental interactions of wave energy:
  - Typically individual devices (to date)
  - Many devices not at commercial scale
  - Diverse range of PTO technologies and device shapes
  - Broad range of deployment habitats
  - Variable deployment durations (months, seasons, years)
- Hence, poor predictive ability to assess environmental interactions (for upscaling) with such fragmented, piecemeal and uncoordinated data
- Two decades on since the resurgence of wave energy we are still challenged by concerns regarding environment interactions at commercial scale

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SEA Wave

- SEA Wave (3y project; started Nov. 2018, ends Oct. 2021)
- Multi-partner endeavour:
  - Device developers
  - Test site owners
  - Consultancies
  - Universities
- Deploy multiple wave-energy technologies (and multiple devices) @ EMEC
- Use standardised methods to interrogate environmental responses
- Multi-device and multi-annual data collection opportunity -> improved predictive power to understand upscaling effects

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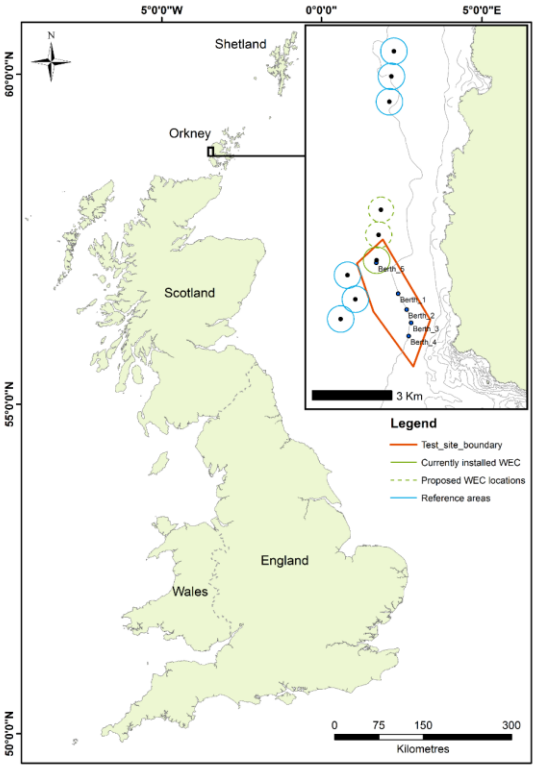
SEA Wave

- EMEC@Orkney, Scotland (2018-2021)
- Multiple device types to be monitored
- Use of reference areas throughout to contextualise environmental variability
- Monitoring across three themes:
  - Seabed response
  - Water column response
  - Ambient noise
- Harmonised online platform for data sharing (Hidromod) marendata.eu

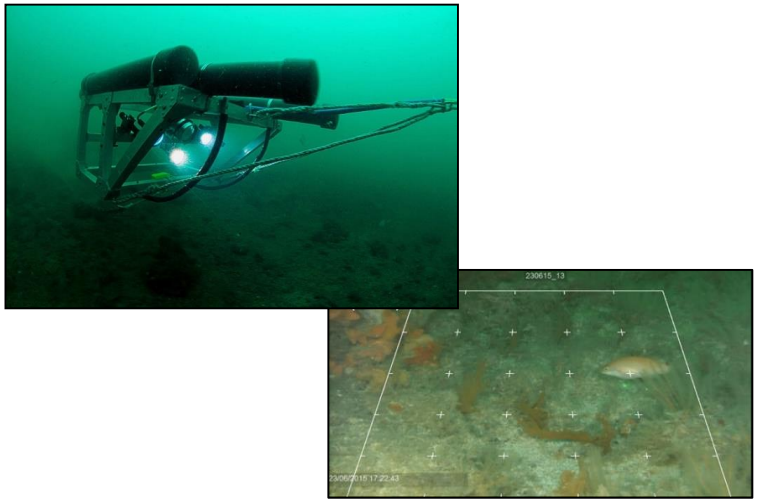


SEA Wave monitoring locations

Seabed

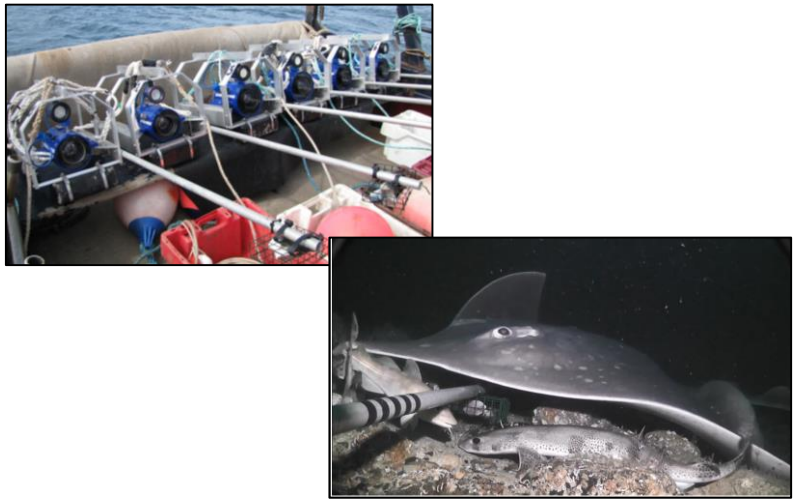
- Data collection on habitat type and ecology
- Two methods used to rapidly and reproducibly observe seabed
- Wide area coverage in ‘experimental’ and in near and far ‘reference’ areas

Towed video:
Habitat type & sessile species



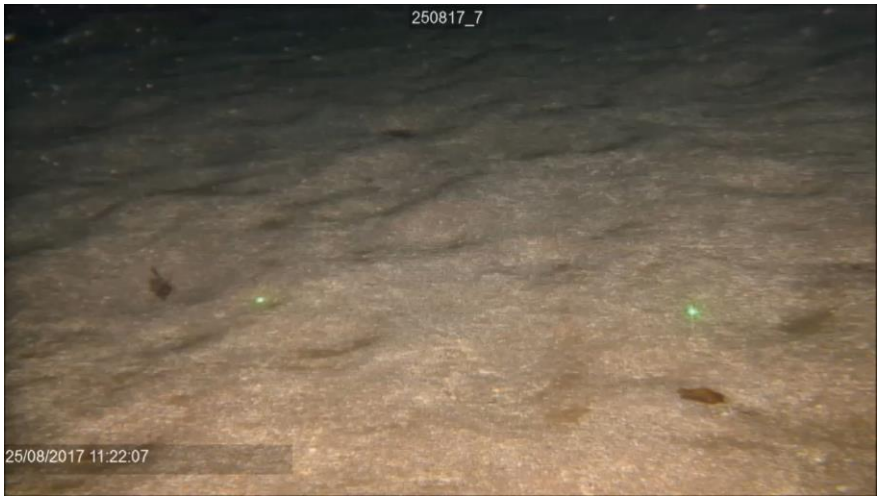
Sheehan *et al*. (2010) PLoS ONE 5: e14461

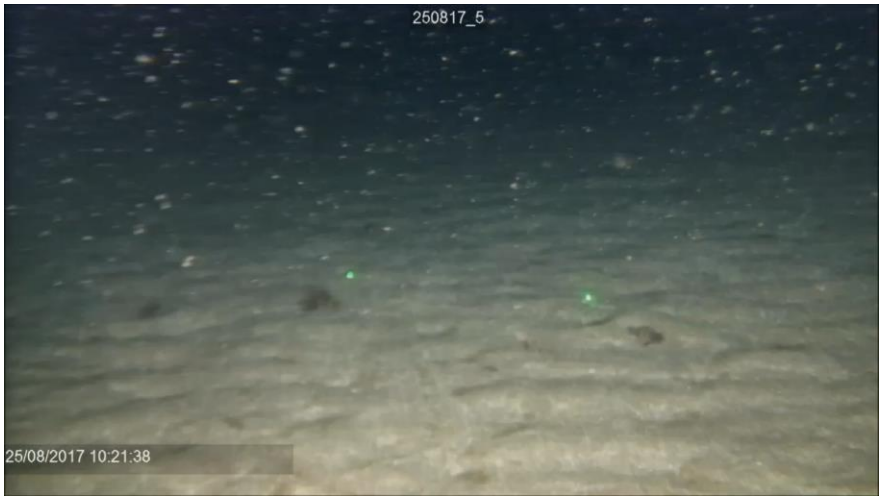
Baited video:
Mobile benthic & demersal species

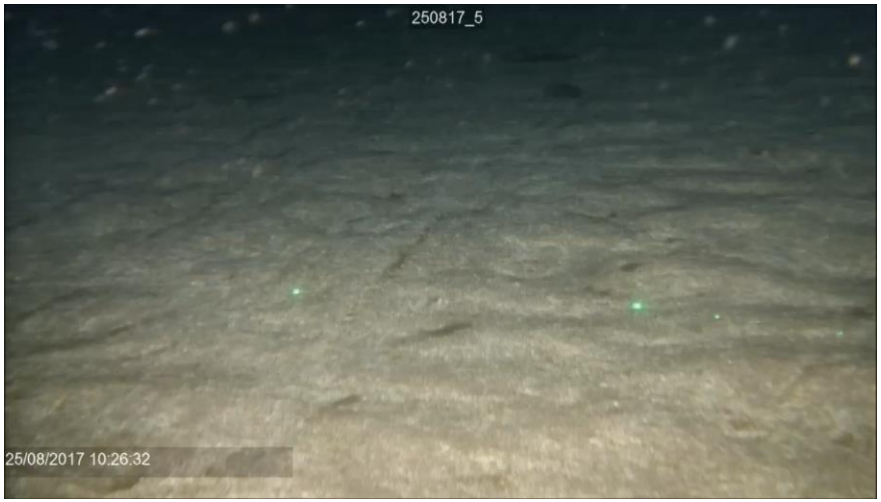


Bicknell *et al*. (2019) Mar. Environ. Res. 147: 126-137

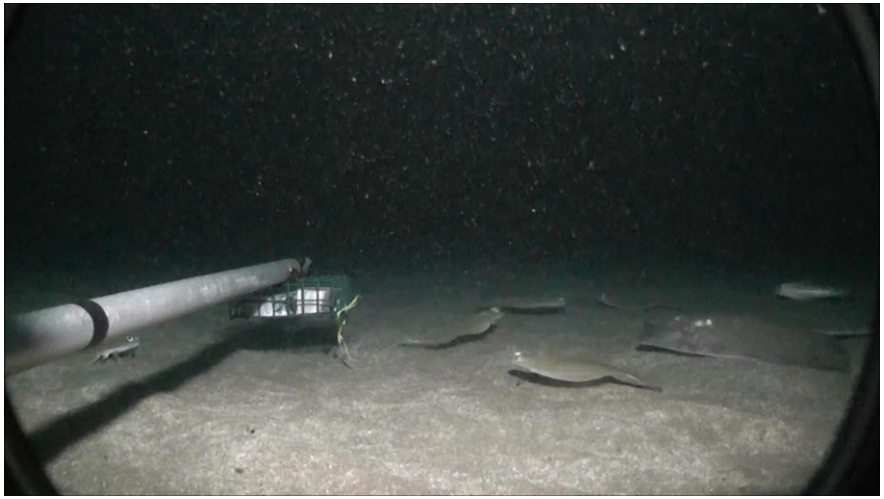
Seabed towed video







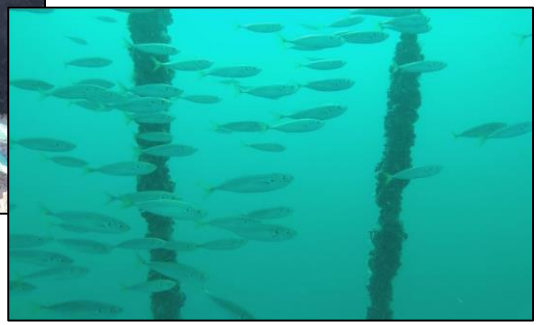
Seabed baited static video



Water column science

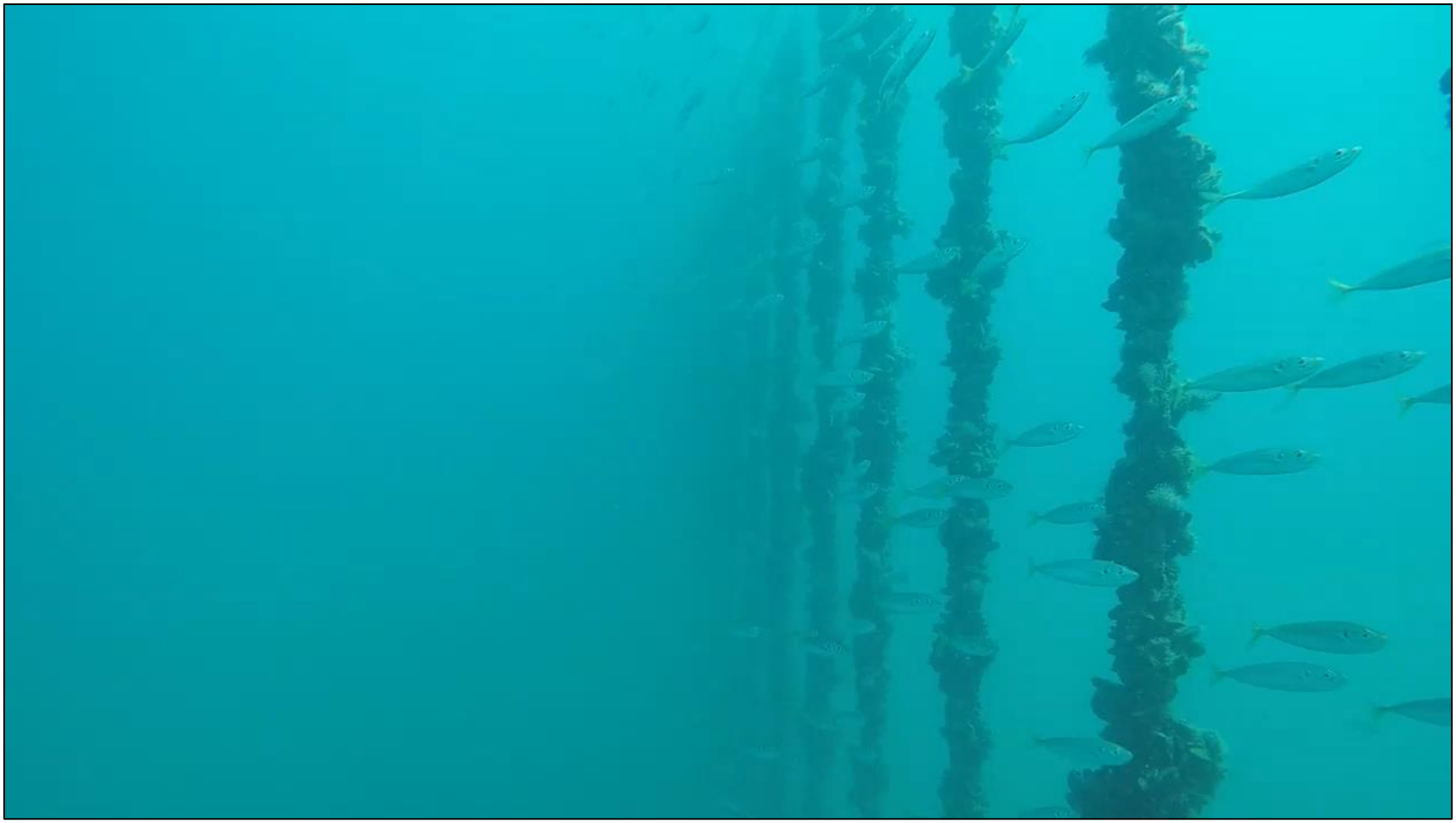
- Investigating interactions between pelagic species and wave energy converters, moorings and anchoring systems

Pelagicam: Near-device effects; FAD effect



Sheehan *et al*. (2019) Environ. Monit. Assess. 192 (11)

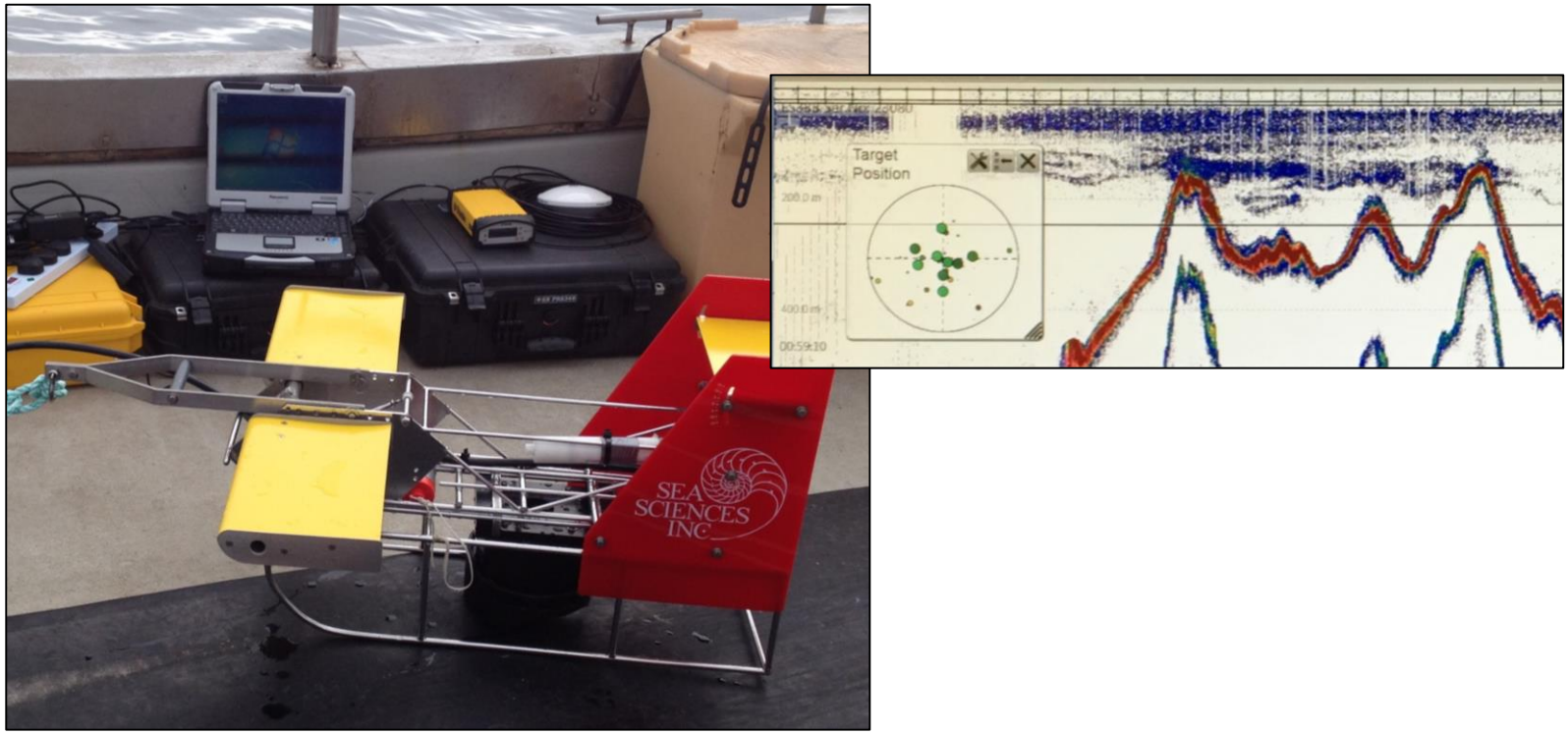
Pelagicam



Water column science

- Investigating interactions between pelagic species and wave energy converters, moorings and anchoring systems

Fisheries acoustic assessment: Fish distributions over fine and coarse spatial scales



Ambient Noise Monitoring

- Acoustic recorders deployed inside / outside of development areas
- Collecting data over short (days) and longer (weeks) timescales
- Characterise ambient soundscape (to understand consequences of added noise)

Garrett *et al*. (2016) Mar. Poll. Bull. 110: 438-448
Garrett et al. (2016) Effect. Aquati. Env. (Chapter 39)

Noise not only from WECs; characterising the complete soundscape is essential

Summary

- Data collected in 2019 as planned, we have access to historic data also (->2017)
- Current challenges :
  - Changing device technologies
  - Altered deployment schedules
  - Political decisions regards subsidies and impacts to developers
- Progress is encouraging – expanding on past experience working in wave energy installations and building relationships between sectors
- Data to be made available via marendata.eu (platform managed by Hidromod)
- As for many, COVID-19 represents significant logistical and financial challenges

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