

MOFING; predicting Movement Of Fishes In response to aNthropoGenic noise

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Talk Outline

- Background
- Knowledge Gap
- Work during Internship
- Benefits MREKE and current situation
- Conclusions

Background

Anthropogenic noise is a global problem



... on land

Background

Anthropogenic noise is a global problem



... under water

Impacts of UW noise on fish



Stress

(Wysocki et al. 2006)



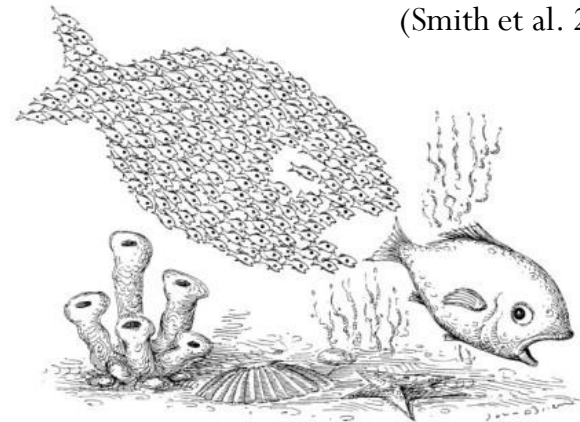
Damage hearing

(Smith et al. 2004)



Group aggression

(Bruitjes & Radford 2013)



Impair communication

(Vasconelos et al. 2007)

Knowledge Gap

- Impacts of noise on marine environment included in national and international legislation (EU 2008; DEFRA 2009)
 - important for industry
- Accurate assessment of the impacts of underwater noise is missing!
 - Underpinned by scientific research
- HR Wallingford has modelling tool which predicts movements of marine fish in relation to noise

AIM of the NERC MREKE

- Improve this tool ecologically and use scientifically obtained data as parameters for the predictions.

Modelling tool

1. An underwater acoustic propagation model
2. A hydrodynamic model
3. An ecological response model

(HAMMER; Hydro-Acoustic Model for Mitigation and Ecological Response)

Parameters concerning number of fish species:

- 30'000 different fish species world wide
- 300 fish species in the North Sea

Work during Internship

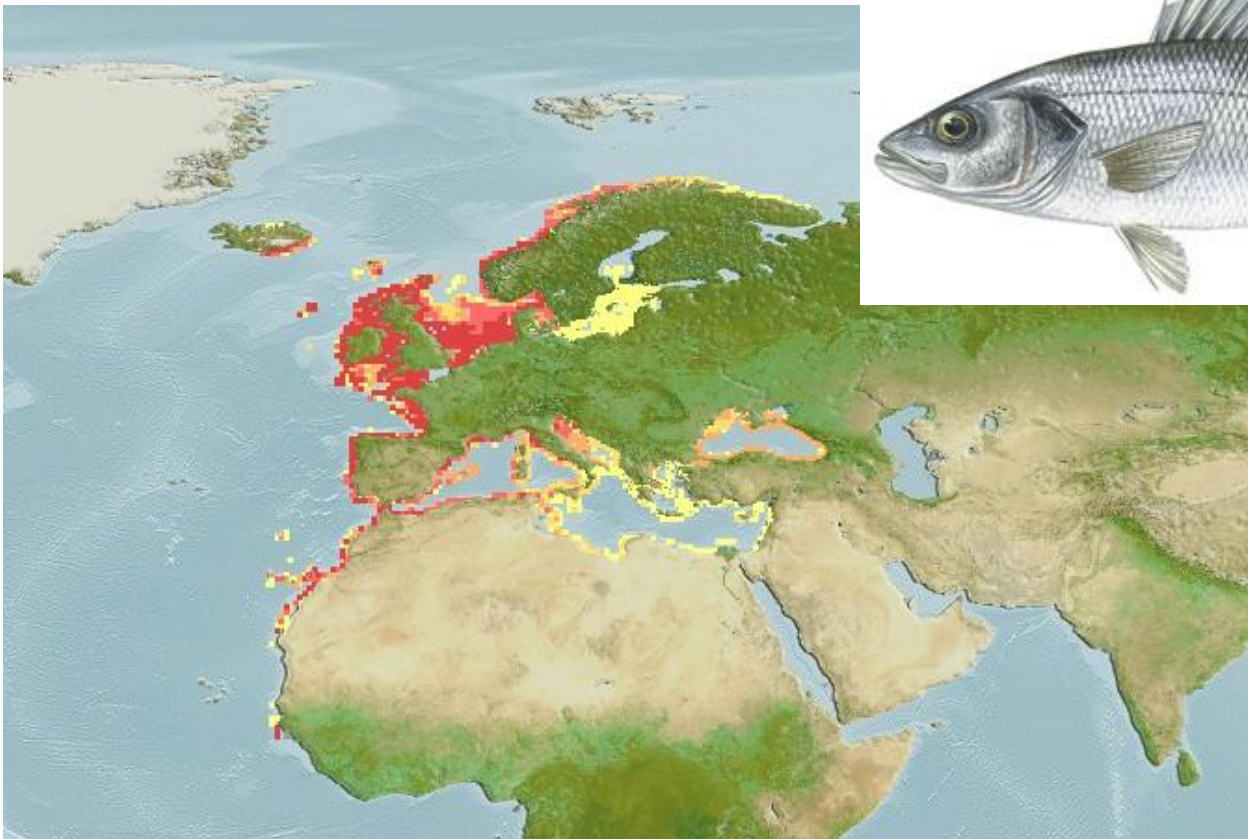
- Hands-on experience HAMMER (hrw)
- Decide which parameters important (hrw)
- Decide noise source (hrw/UoB)
- Make species list for possible effected areas around England (hrw/UoB)
- Decide which study species (hrw)

- Experiments (UoB)
 - Opercular Beat Rate (stress)
 - Novel field (locomotion/anxiety)

- Analyses results (hrw/UoB)
- Parameters into HAMMER (hrw)
- Report (hrw/UoB)

Example several results - OBR

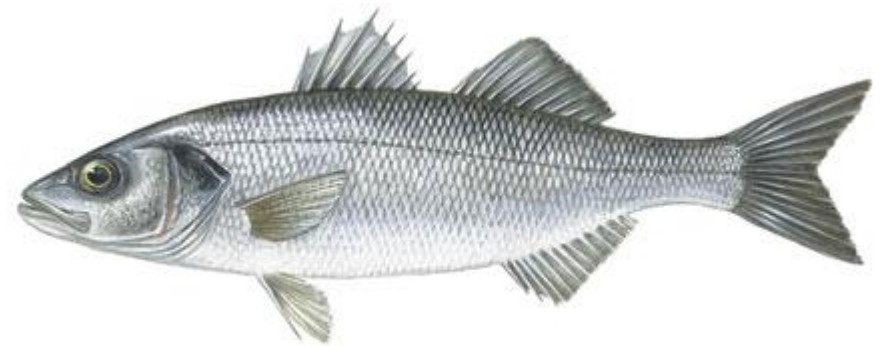
Does pile driving noise impact on Opercular Beat Rates?



Example several results - OBR

Does pile driving noise impact on Opercular Beat Rates?

Juvenile seabass (*Dicentrarchus labrax*)

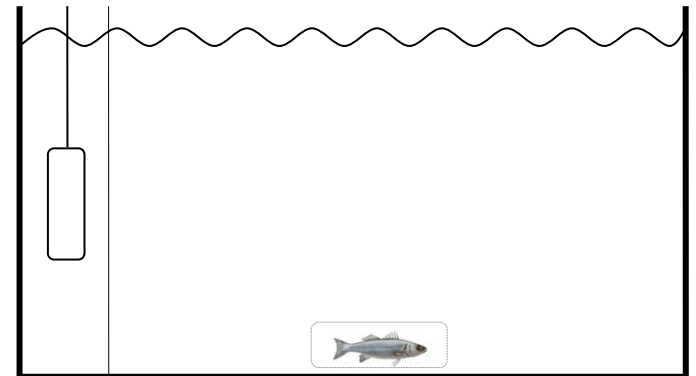


Mesh tube

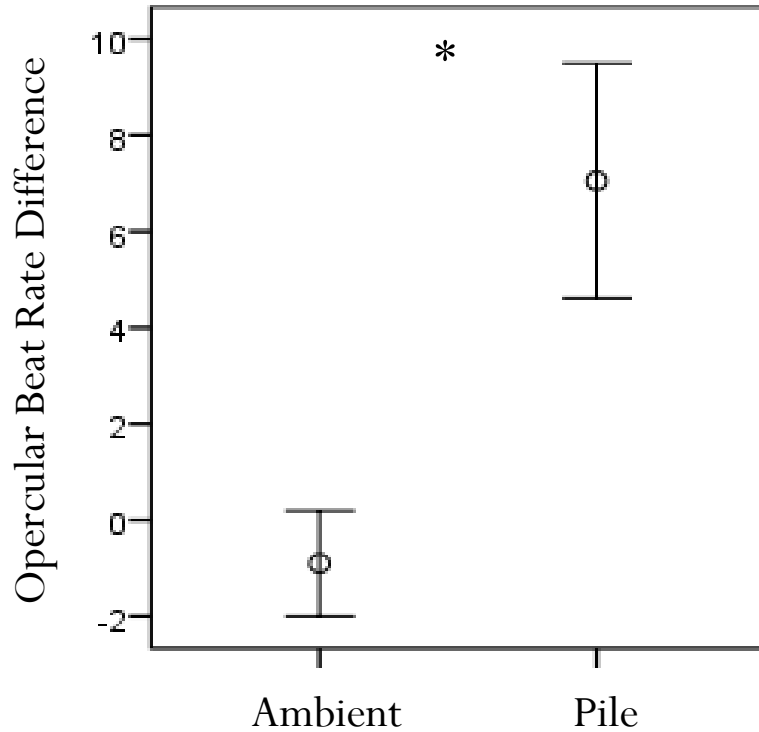
Playback of pile driving (~ 144 dB RMS re 1 μ Pa)

- Ambient: Amb - Amb - Amb (2 min)
- Pile: Amb - Pile - Amb (2 min)

Count opercular beat rates / min

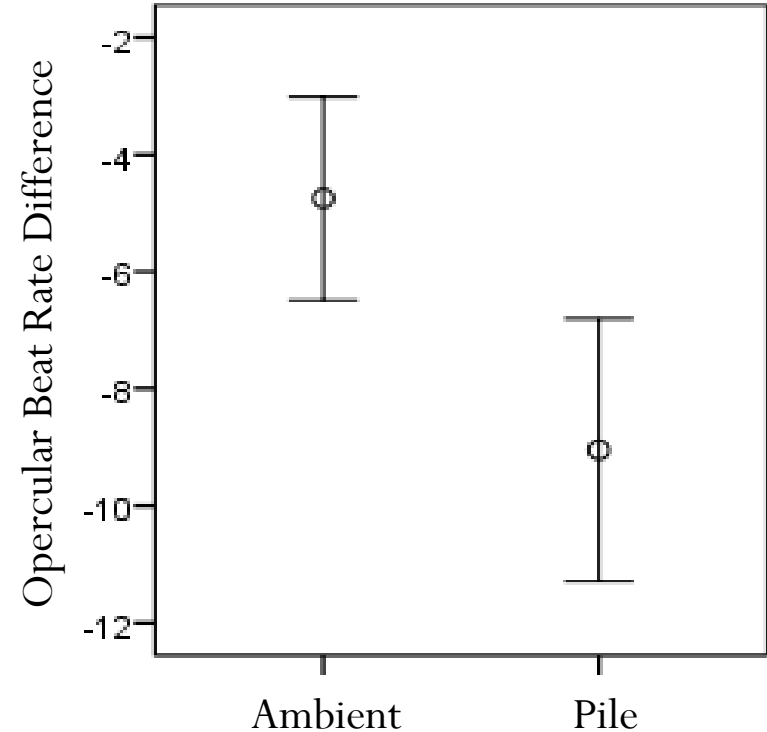


Physiological effects - Results



During pile driving noise seabass **increase** their frequency of **opercular beat rates**.

$$p = 0.005$$



No difference in **OBR** decrease **following** ambient or **pile driving noise**.

$$p = 0.138$$



Benefits MREKE

For HR Wallingford:

- Improvement of HAMMER model (ecologically)
- New ideas to improve HAMMER further
- Input of a new species → important for overall use HAMMER
- Trying-out a collaboration with minimal expenses
- Expert in the field
- Landing of a 3-year KTP grant

For University of Bristol & me:

- Four months funding for science
- Publication (good for the REF: Research Excellence Framework)
- Potential to matter in 'real-world problems'
- Collaboration with industry

For me:

- Trying out HR Wallingford
- Becoming the associate for the KTP grant?

Present & Future

Present

- Working at UoB
 - short-term fee-based reimbursement (June & July 2013)

Near future

- KTP Associate (starting August 2013)
 - Having a 3 year post

Conclusions

MREKE scheme has been very valuable for HR Wallingford,
University and me

- Improved the HAMMER tool
- Successfully landed a 3-year KTP grant

Thanks for your attention.

For further information or questions please contact:

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