

## A REVIEW OF NOISE ABATEMENT SYSTEMS FOR PILING NOISE AND THE POTENTIAL FOR THEIR APPLICATION IN SCOTTISH WATERS

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### Background & Objectives

Pile driving introduces noise into the sea, potentially impacting marine life. We reviewed underwater noise abatement systems (NAS) to investigate their potential suitability to mitigate pile-driving noise in Scottish waters, their practicality of use and potential reduction in noise levels including their benefit to marine fauna.

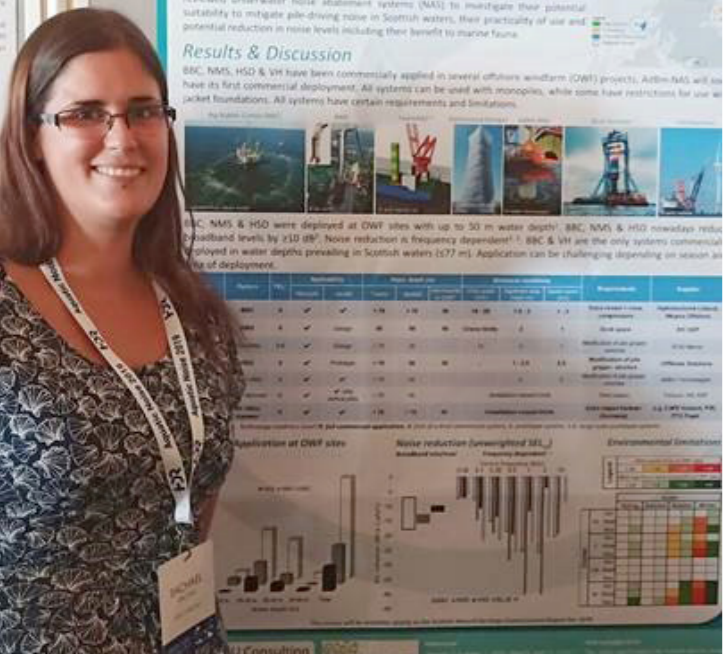
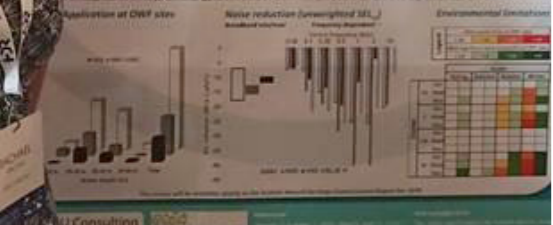
### Results & Discussion

BBC, NMS, HSD & VH have been commercially applied in several offshore windfarm (OWF) projects. Active NAS will have its first commercial deployment. All systems can be used with monopiles, while some have restrictions for use with jacket foundations. All systems have certain requirements and limitations.



BBC, NMS & HSD were deployed at OWF sites with up to 30 m water depth. BBC, NMS & HSD nowadays reduce sound levels by 20 dB. Noise reduction is frequency dependent. BBC & VH are the only systems commercialised in water depths prevailing in Scottish waters (277 m). Application can be challenging depending on ocean site of deployment.

System	Water Depth (m)	Frequency (Hz)	Reduction (dB)	Notes
BBC	0-30	100-1000	20	Commercial
NMS	0-30	100-1000	20	Commercial
HSD	0-30	100-1000	20	Commercial
VH	0-30	100-1000	20	Commercial
Active NAS	0-30	100-1000	20	First commercial deployment



## What did you do at the Lighthouse ?

In the summer of 2012 and 2013 I was an honorary research assistant, working with Barbara on the bottlenose dolphin photo ID project. I mainly assisted with the fieldwork and data processing, including recording data during weekly surveys, processing data and matching photos of dorsal fins to the catalogue. I also got to help out on seal surveys, and learnt to set up, deploy and retrieve acoustic devices to monitor vocalising marine mammals.

## What are you doing now ?

I am a consulting marine mammal scientist at SMRU Consulting (based at the University of St Andrews). My work mainly involves assessing the potential impacts of offshore wind farms on marine mammals in UK waters. I work with a mix of offshore developers, government and regulators and academic colleagues to bridge the gap between academia and industry – making sure the latest scientific research is applied to industry projects to improve assessments and reduce uncertainty.

## What advice would you give someone who wants to follow in your footsteps ?

I would highly recommend that anyone interested in marine biology and marine mammal science learns good quantitative skills. Collecting the data is one thing, but you also need to know how to process and analyse it. Focusing on statistical analysis early on in the undergrad years would be really beneficial.



**Rachael Sinclair**  
Honorary RA • 2012 & 2013