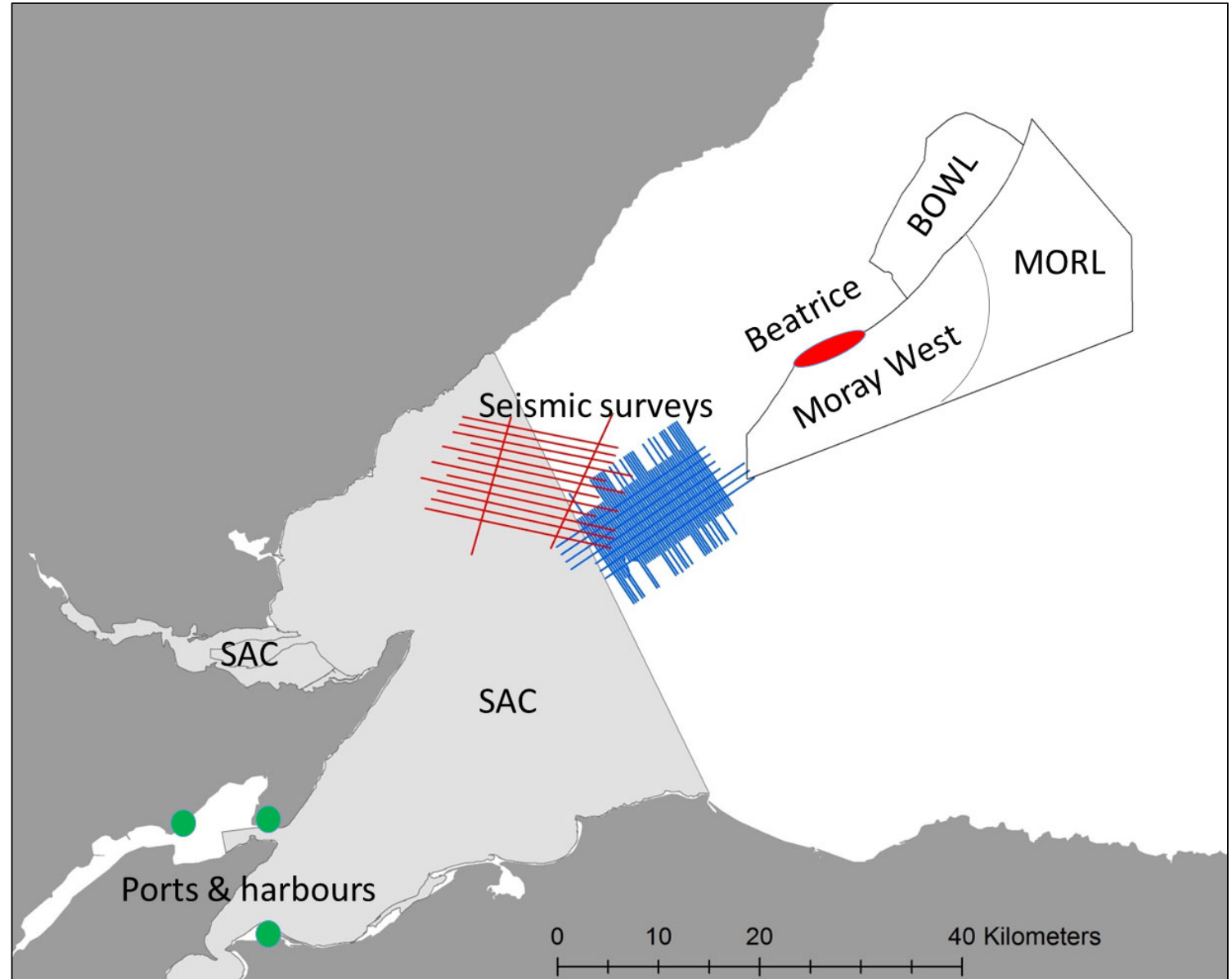


# Strategic monitoring of marine mammals and offshore wind

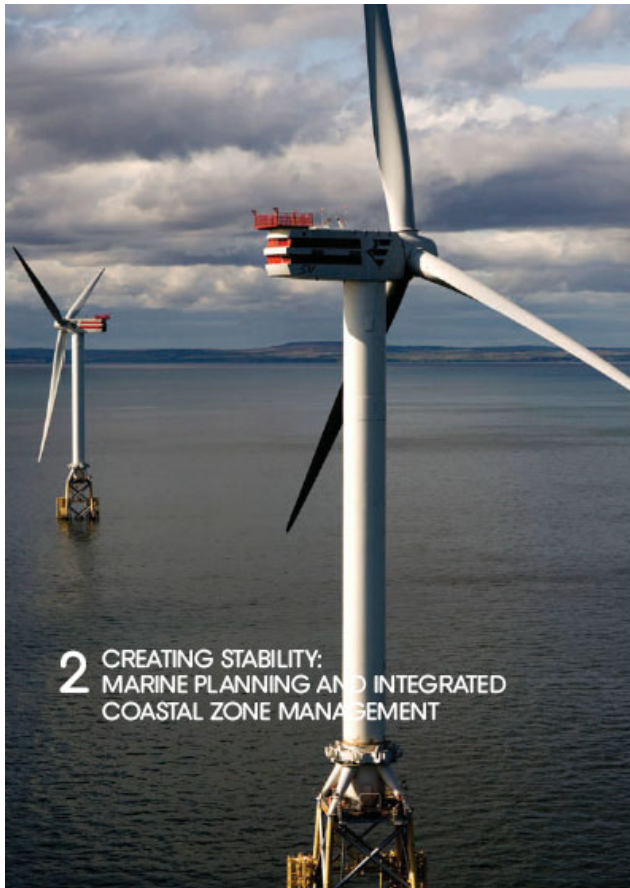
Paul Thompson

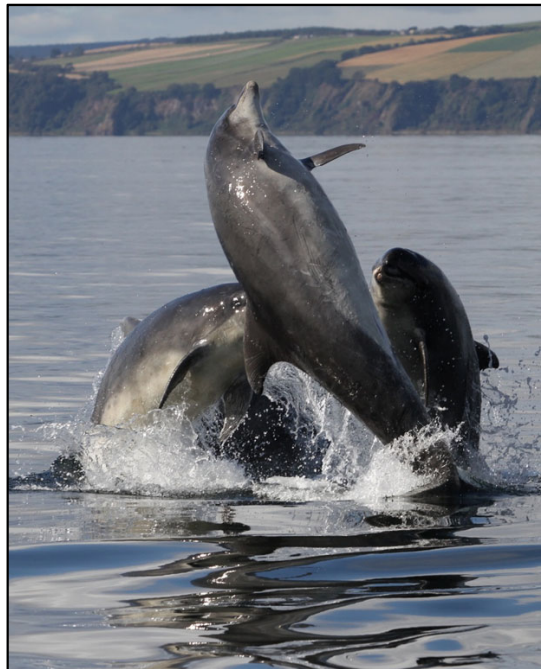
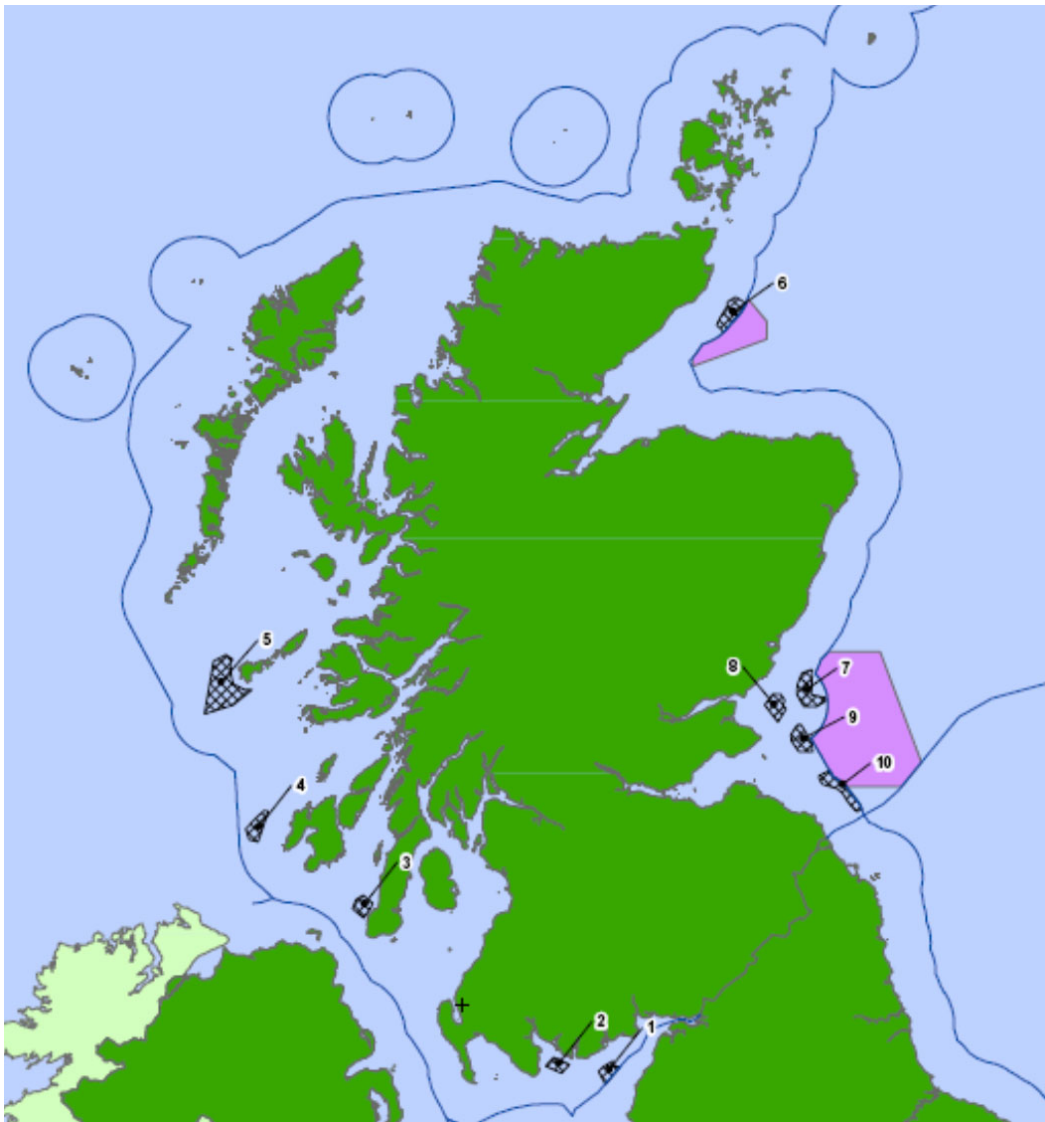
University of Aberdeen





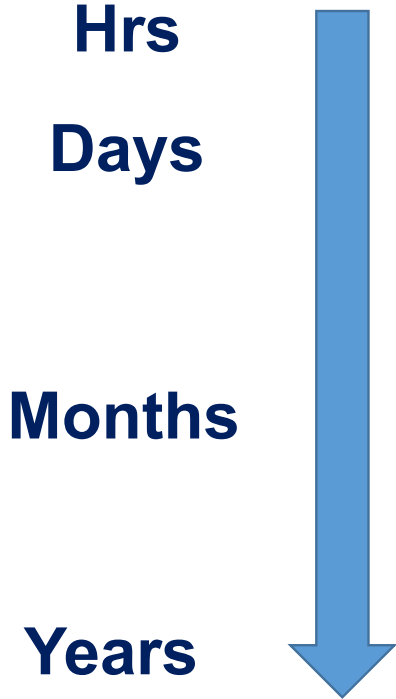
# *The challenge of balancing nature conservation & sustainable development*





# Potential impacts of construction noise

## Temporal Scale



- Traumatic Injury
- Displacement
- TTS/PTS
- ↓ condition
- ↓ breeding success
- ↓ survival
- ↓ population size

## Spatial Scale

**Site-specific**



**Regional Population**



# Devt. of Strategic Marine Mammal Monitoring

2010

2012

2013

2014

**Integrating marine mammal research and monitoring to support conservation and development in the Moray Firth**

This document highlights the potential for developing high quality integrated marine research and monitoring in the Moray Firth, NE Scotland. Its initial focus on marine mammals results from a combination of urgent policy issues, particularly relating to marine renewables, from a combination of regulatory requirements and unique research opportunities (Box 1). The unusually onerous regulatory requirements involved in these issues (Box 2) provides an opportunity to develop new models for delivering marine science, and overcoming some of the barriers to broad range of stakeholders identified in the UK Marine Science Strategy. If successful, work through organisations such as MASTS would permit expansion to a broader suite of ecosystem studies.

**The challenge.** Many organisations have a requirement for data on marine mammal populations, and the existence of these core population studies provides widespread common benefits within and beyond the region. The value of these population studies depends heavily on sustained annual data collection (Box 3), yet they have generally been maintained through a patchwork of short-term funding. The current economic climate is and at worst it can result in loss of expertise and data gaps. The current economic climate is particularly challenging in this respect, as previous work has often been maintained through charitable donations. Currently, there is no funding contract in place for bottlenose dolphin and harbour seal photo-identification studies beyond the end of the 2012 field season.

At the same time, lack of co-ordination in other aspects of research and monitoring can lead to duplication of effort, inefficient use of scarce funds, and competition for limited infrastructure such as research vessel support. Without careful planning, new funding opportunities can fail to deliver the required data because suitable research capacity is unavailable at critical times.

**A way forward?** The pressing need for data to support marine renewable developments now provides an opportunity to develop a more strategic framework for integrating and sustaining marine mammal research and monitoring in the Moray Firth.

As a first step, this paper identifies the resources required to maintain these studies of Scottish bottlenose dolphin and harbour seal populations through the period running up to 2020. This core programme would directly produce much of the key data required by industry and regulators. In addition it would provide critical infrastructure to attract other research activities, and develop training opportunities that will build future research capacity in this area.

This document aims to encourage the development of a new funding model that allows different stakeholders to buy into this framework, in ways that suit their budgetary and tendering constraints, whilst ensuring that the overall programme maintains critical mass and builds sufficient capacity to deliver high quality science beyond 2020.

University of Aberdeen Outline Proposal, In Confidence, Paul Thompson, 25<sup>th</sup> April 2012

**Beatrice Offshore Wind Farm**

**Annex 6B. Integrating marine mammal research and monitoring to support conservation and development in the Moray Firth.**

**Prepared for consideration by a funding partnership involving Beatrice Offshore Wind Farm Ltd**

Professor Paul Thompson, University of Aberdeen

**Beatrice Offshore Wind Farm Ltd**

**MORAY**

**Annex 1: Scoping document for the BOWL & MORL Marine Mammal Monitoring Programme**

**Purpose**  
This document outlines a draft scope for the Marine Mammal Monitoring programme (MMMP) surrounding the construction and operation of the BOWL and MORL wind farms in the Moray Firth.

**Background & Rationale**  
There are five priority species when considering the impacts of offshore wind farm developments in UK waters; harbour seals, grey seals, bottlenose dolphins, harbour porpoises and minke whales. We understand that the requirement for different UK developments to monitor each of these species is likely to vary in relation to the relative importance of local populations (eg. proximity to SACs) or local constraints on the type of monitoring that can be carried out (eg. accessibility of populations that permit individual based studies.)

These proposals have therefore been developed on the assumption that:

1. Different developers will be required to individually adapt their monitoring programmes such that they collectively address higher level UK marine mammal monitoring requirements (eg. linking with ORIP to gather data to support the development of PCAD based monitoring models).
2. Monitoring programmes should focus on collecting data that can refine and test key assumptions within Environmental Assessments, thereby reducing uncertainty and conservatism in future assessments.
3. The wide-ranging nature of most marine mammals, and the potential for far-field effects of construction noise, will require integration of individual developer's monitoring activities.

**Beatrice Offshore Wind Farm Ltd**

**MORAY**

**Proposal for a strategic regional Pre-Construction Marine Mammal Monitoring Programme in respect of the BOWL and MORL Wind Farm Developments**

Professor Paul Thompson  
University of Aberdeen

25<sup>th</sup> March 2014

Rev	Prepared by	Checked by	Approved by	Date of Issue
01	20 MAR 2014	MORAY	MORAY	
02	27 MAR 2014	MORAY	MORAY	
03	16 APR 2014	MORAY	MORAY	26 Mar 2014
04	04 APR 2014	MORAY	MORAY	

# Devt. of Strategic Marine Mammal Monitoring

Pre-construction				Construction				Post-construction?	
2013	2014	2015	2016	2017	2018	2019	2020	2021	2022

marinescotland

Beatrice  
Offshore Windfarm Ltd

Scottish Natural Heritage

MORAY  
OFFSHORE RENEWABLES

THE CROWN  
ESTATE

Highlands & Islands  
ENTERPRISE

1495  
UNIVERSITY OF  
ABERDEEN

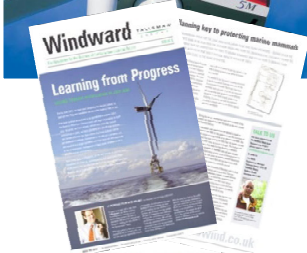
Beatrice  
Offshore Windfarm Ltd

MORAY EAST  
OFFSHORE WINDFARM

Scottish Natural Heritage



# Underpinning studies in the Moray Firth



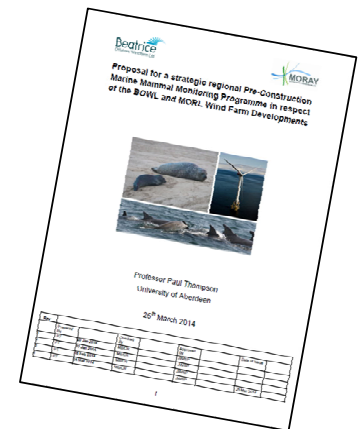
*Collaboration - Continuity*



# *Moray Firth Strategic Marine Mammal Marine Mammal Monitoring Plan (MMMP)*

AIMS

- 1) meet requirements of BOWL & MORL to monitor protected harbour seal and bottlenose dolphin populations
- 2) underpin strategic research on impacts of windfarm construction & operation on marine mammals
  - testing assessment frameworks
  - assessing population consequences of disturbance
  - exploring ecosystem effects



# Moray Firth Renewables Advisory Group



marinescotland

marinescotland  
science



MORAY  
OFFSHORE RENEWABLES



# *MMMP Workplan: Pre-construction*

## *Harbour Seal Monitoring*

- 1) Individual based studies of reproduction and survival
- 2) Trends in abundance
- 3) Characterisation of foraging areas

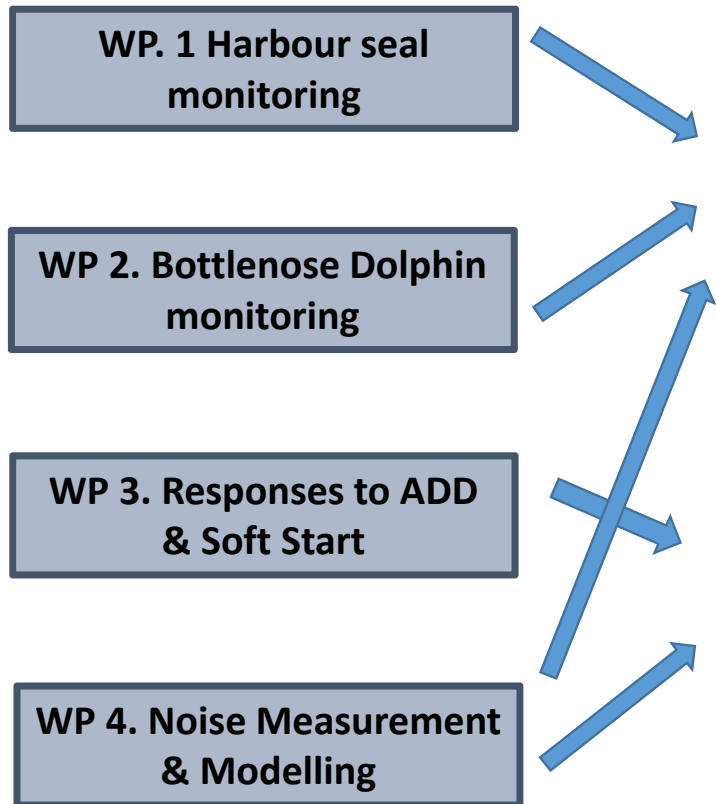


## *Bottlenose Dolphin Monitoring*

- 1) Individual based studies of reproduction and survival
- 2) Trends in abundance
- 3) Baseline occurrence of dolphins in favoured areas

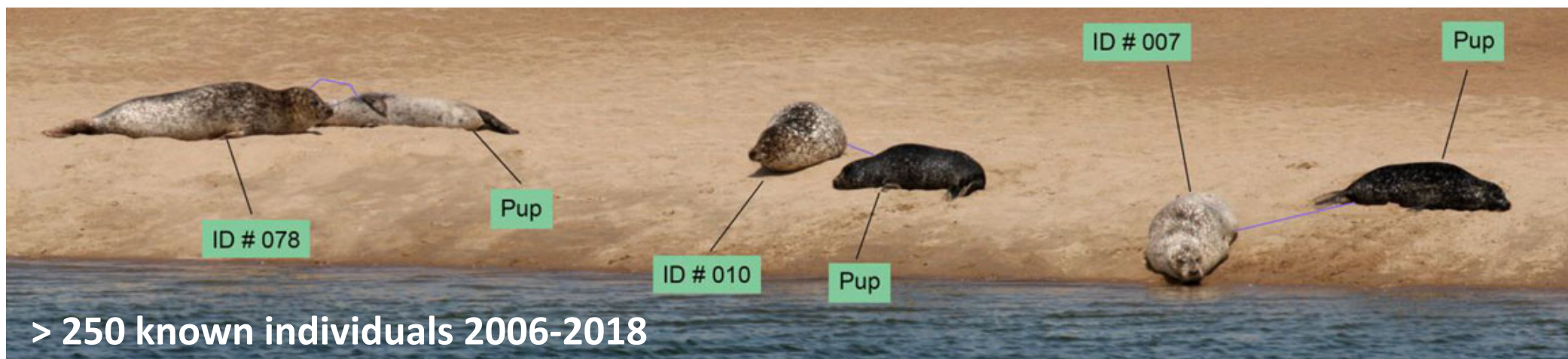
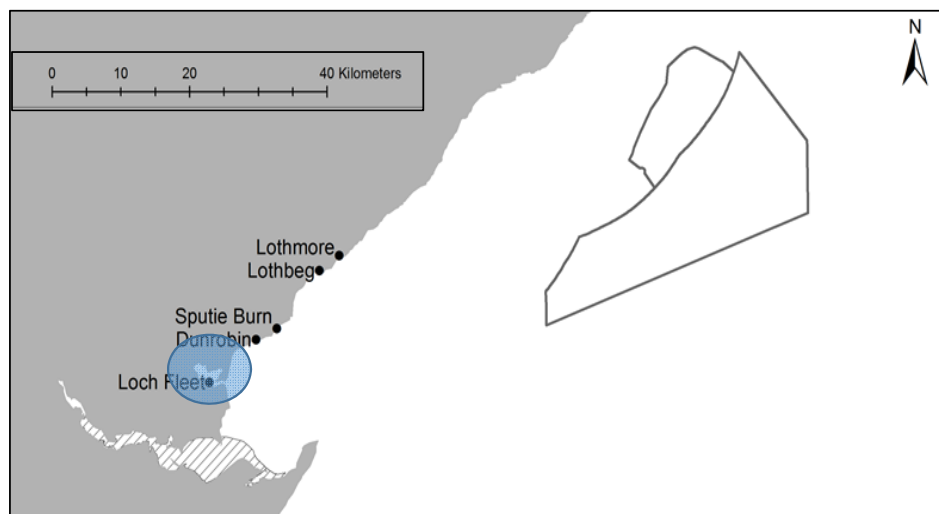


# MMMP Workplan: Construction

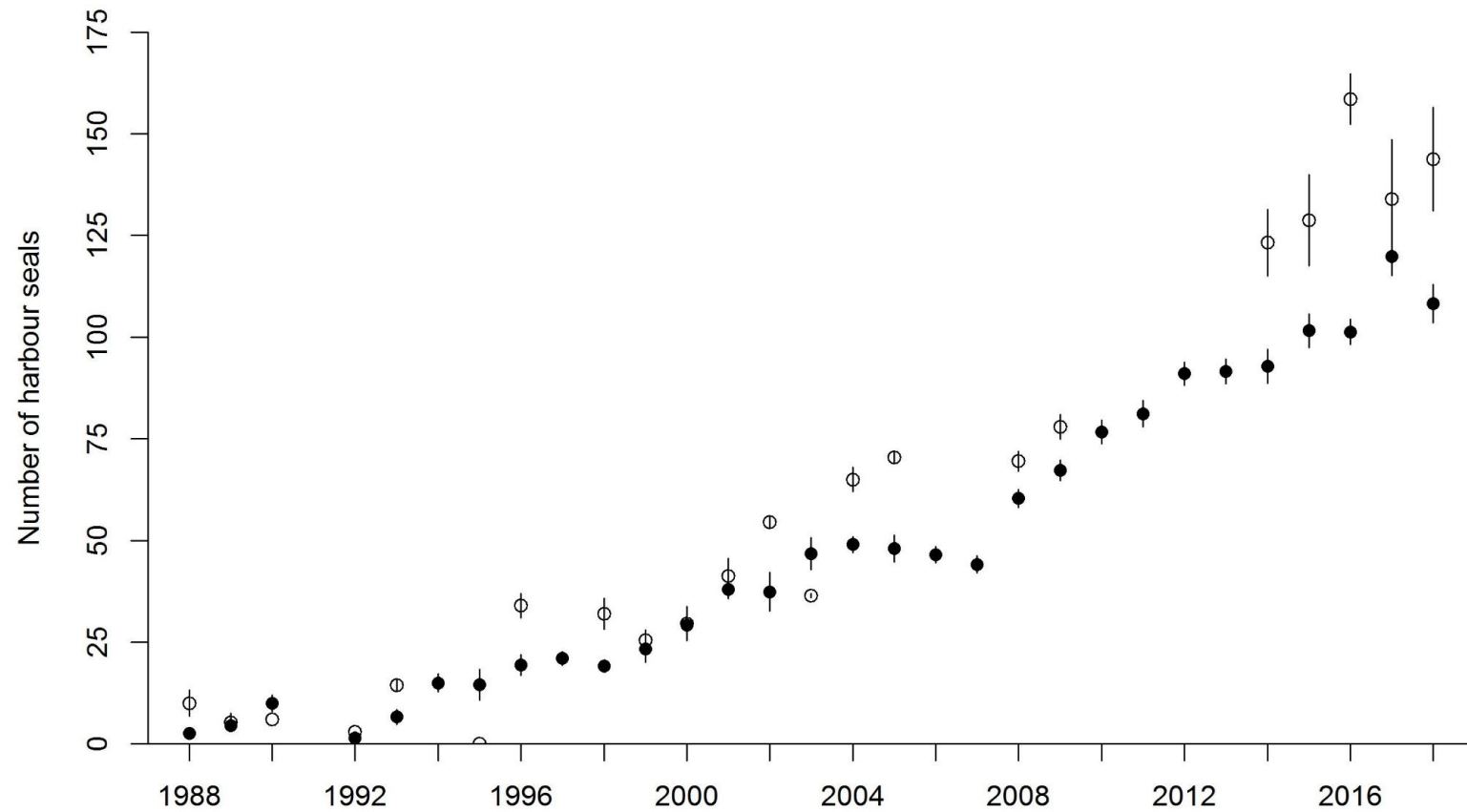


- Aim to assess population consequences of disturbance
- Focus on characterising shorter term responses to piling & ADD use

# WP1 Harbour seal demography & trends



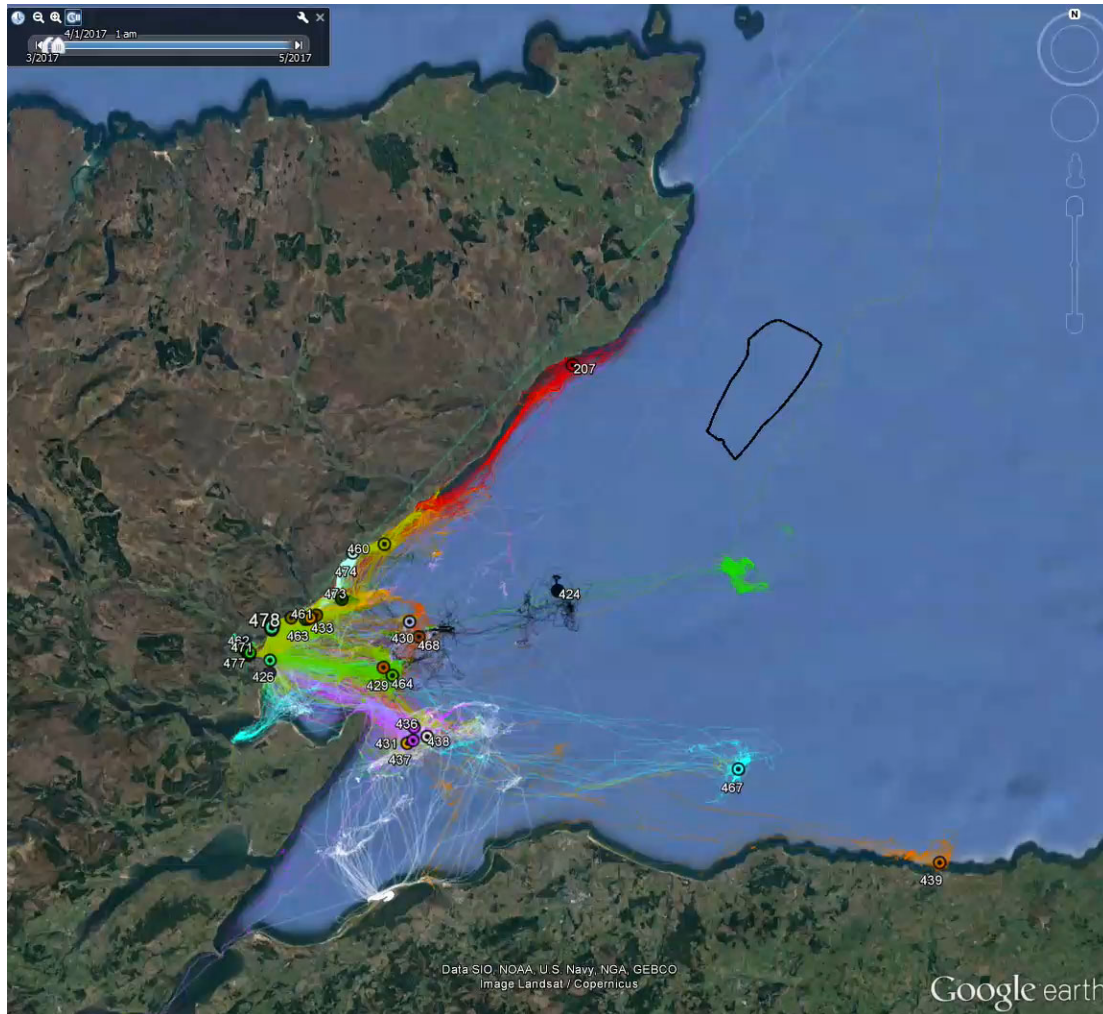
# WP 1 Trends in Loch Fleet mean counts during pupping (●) & moult (○)



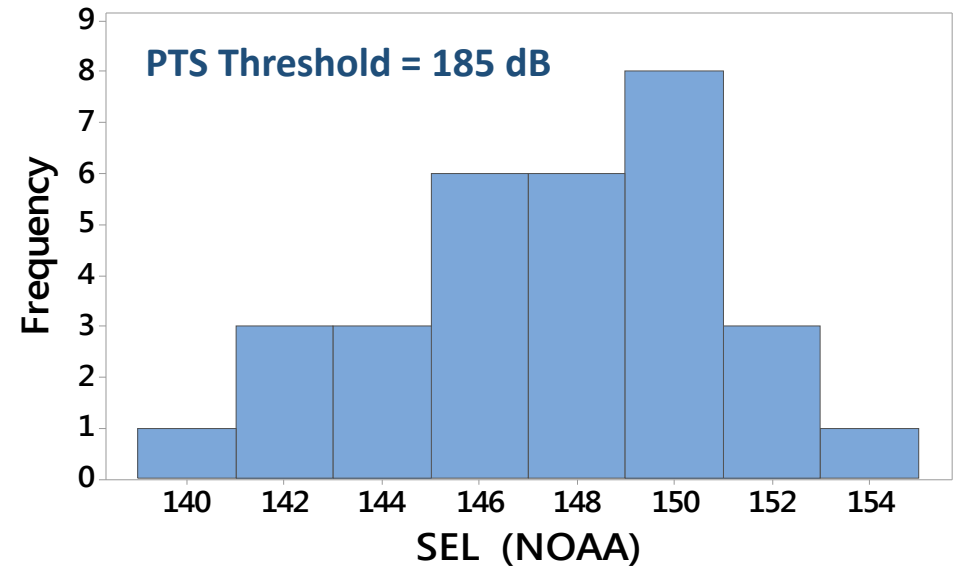
Year	Max pup count	Known births
2014	51	54
2015	51	57
2016	51	59
2017	51	59
2018	60	69



# WP 1 Characterisation of foraging areas and noise exposure



Maximum 24 hr cumulative SEL (NOAA weightings) for 32 GPS tagged harbour seals during piling in 2017



# WP2 Bottlenose dolphin monitoring



#11 Muddy: born 1988



#970  
born 2002

#1024  
born 2007

#1109:  
born 2010

#1144  
born 2012

#1192  
born 2014

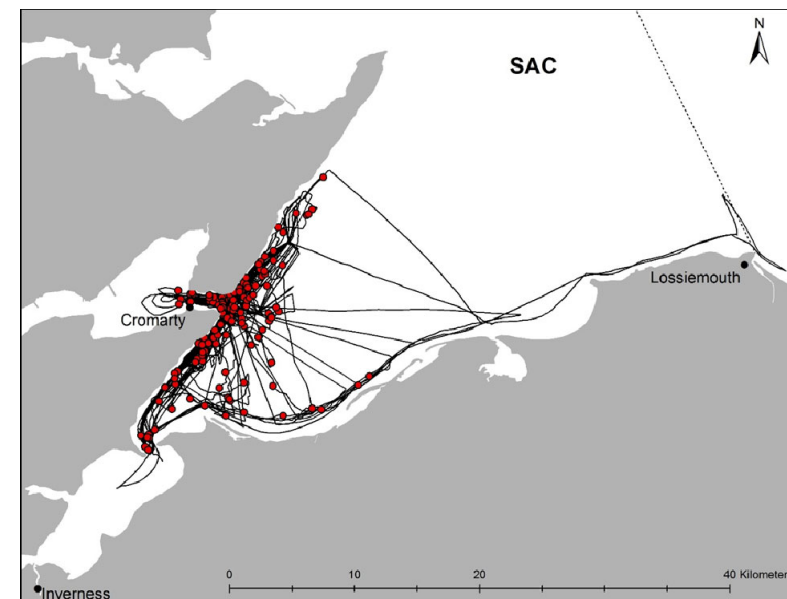
#1238  
born 2016



#1200: born 2015

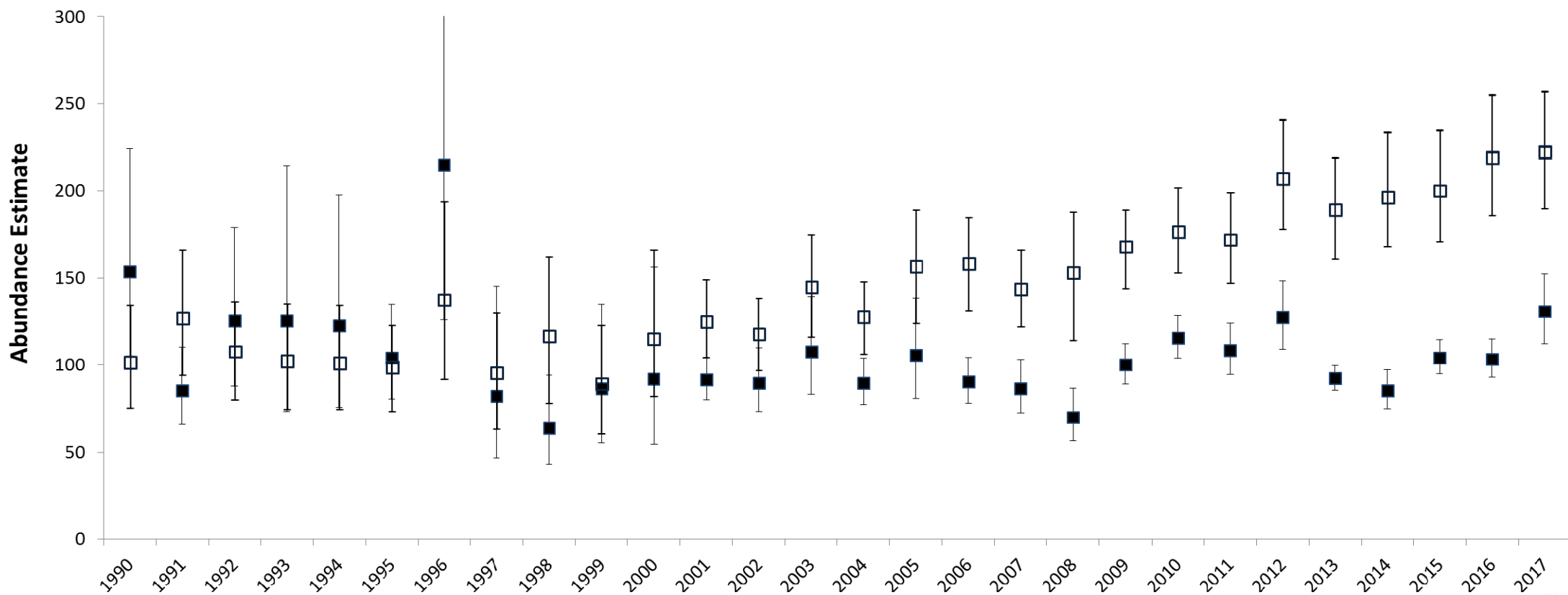


born 2018

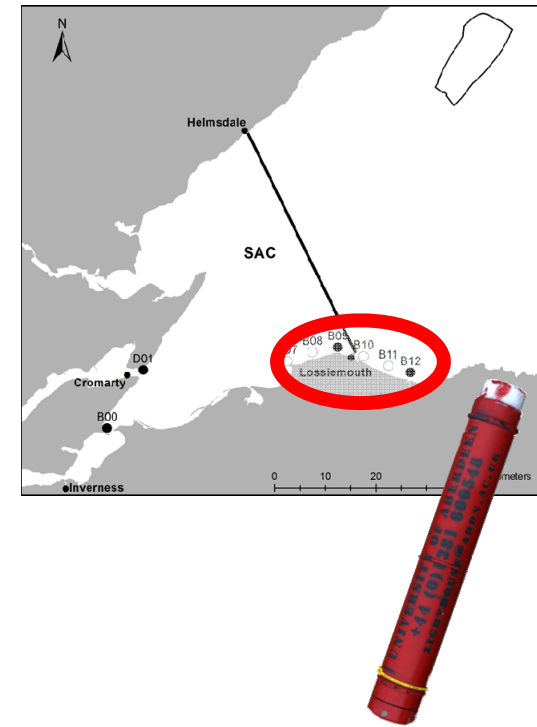
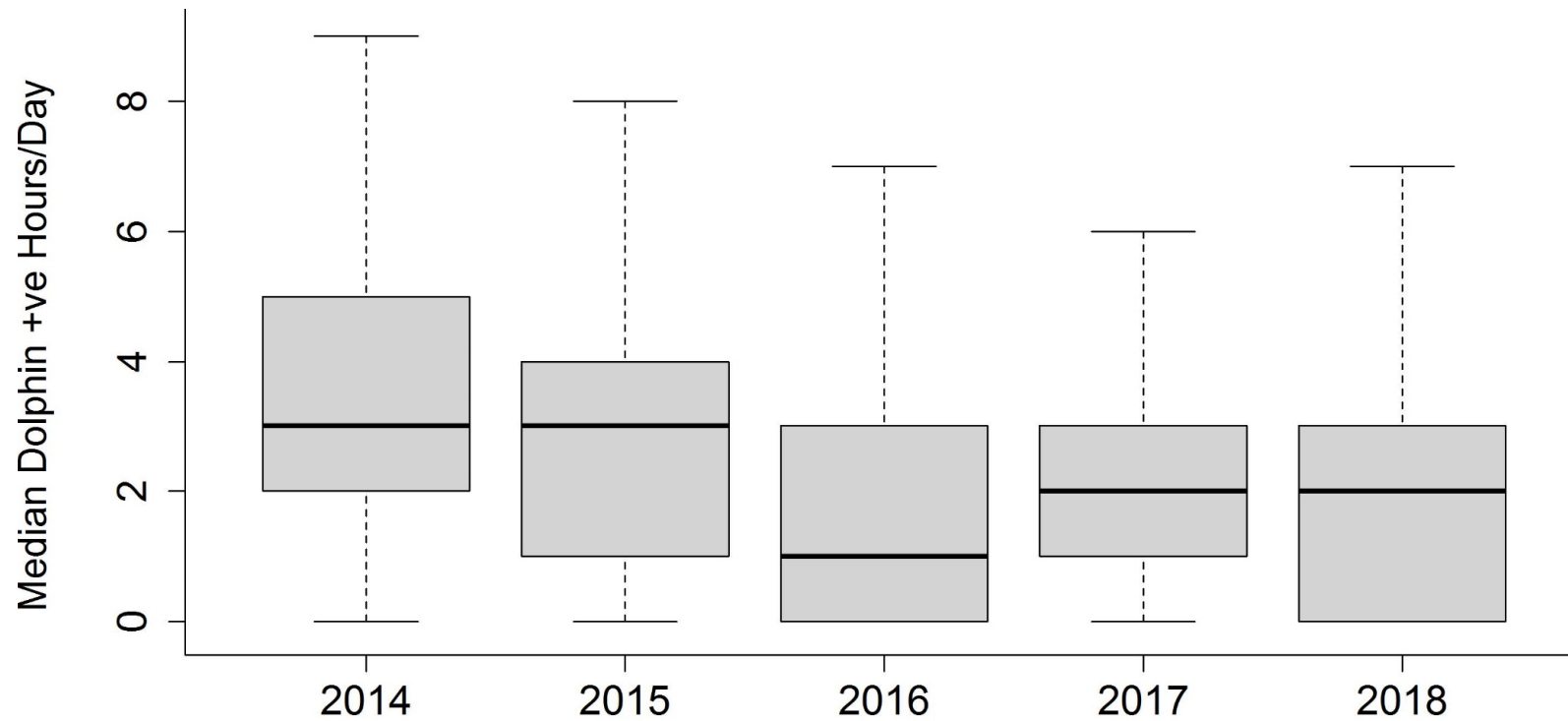




## WP 2 Trends in abundance within SAC (■) and population size (□)



## WP 2 Passive acoustic monitoring of dolphins

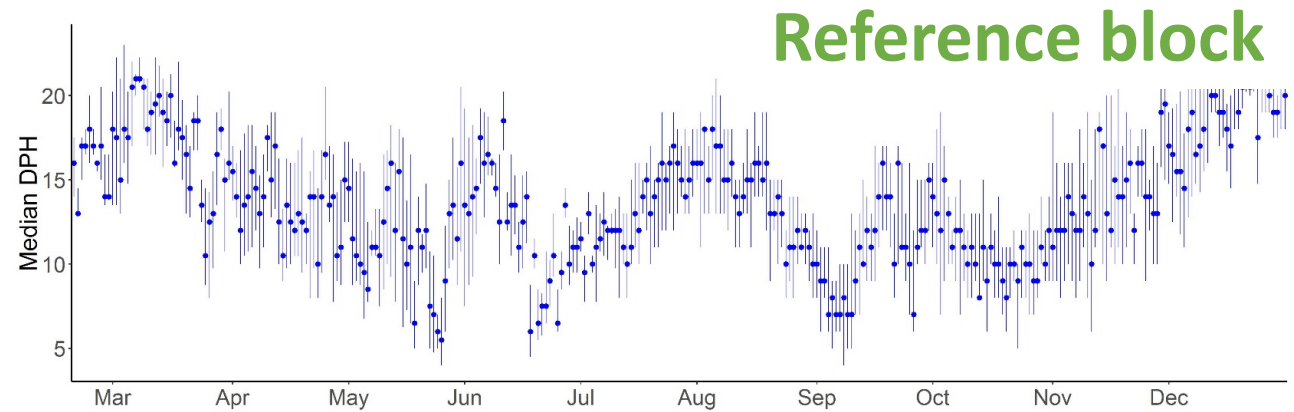
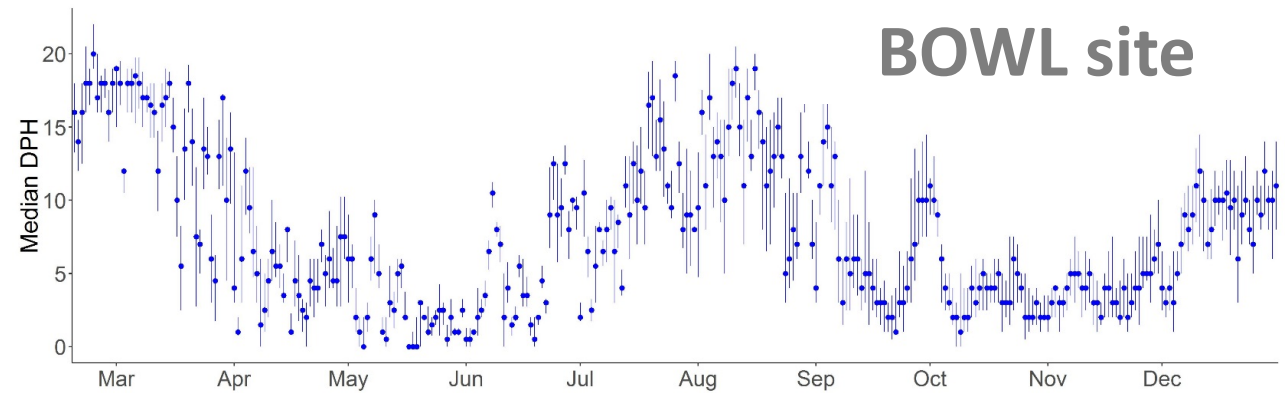
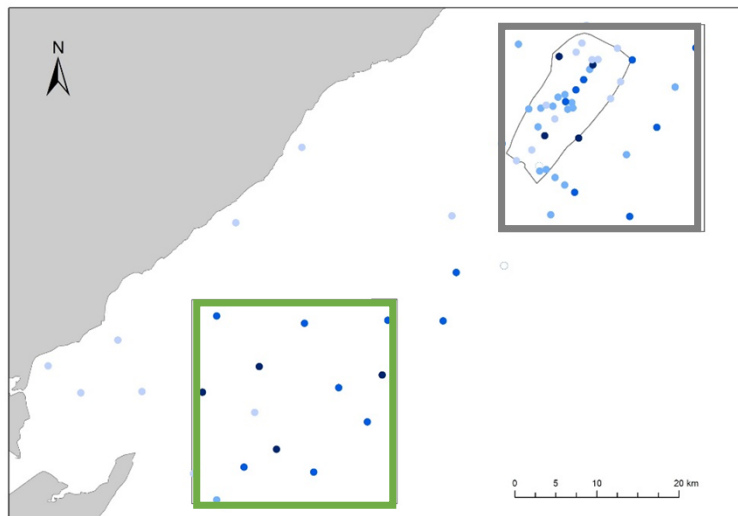


Patterns dominated by high inter-annual & seasonal variation

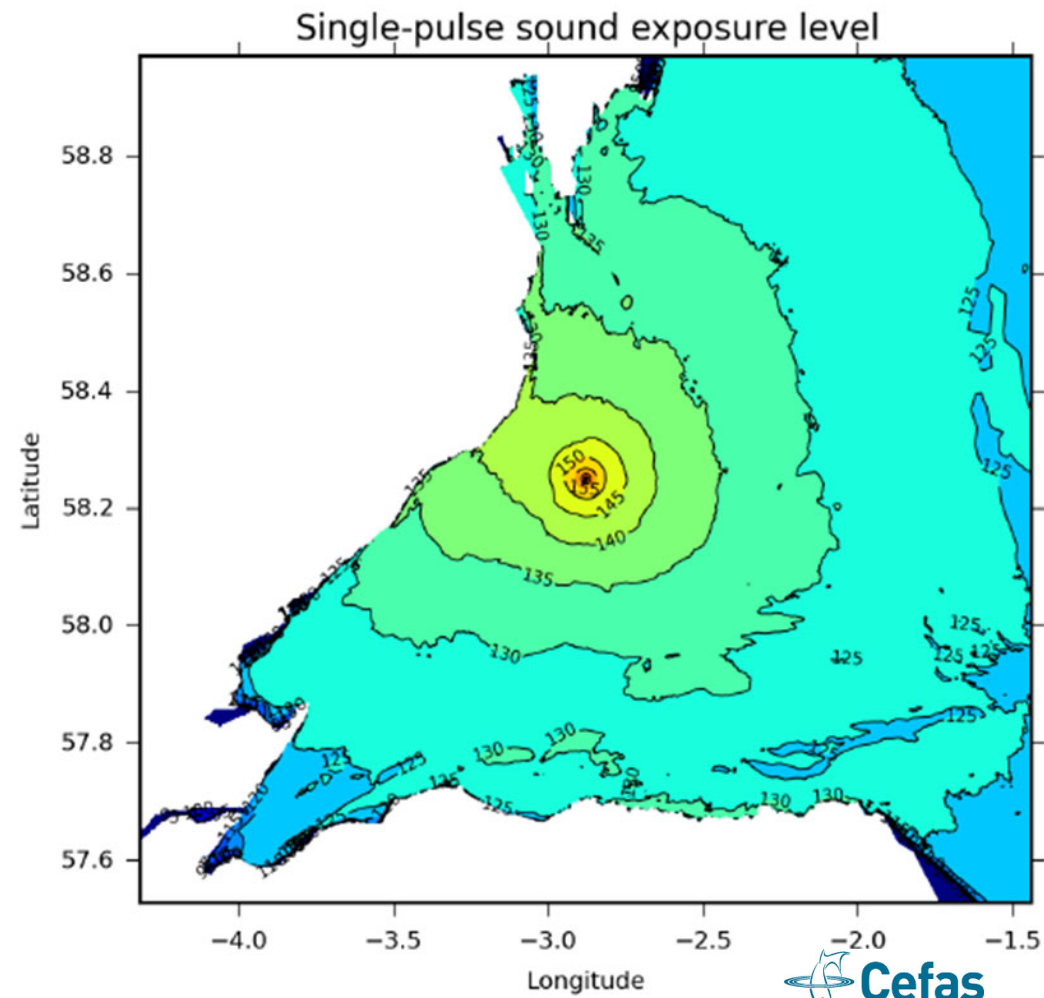
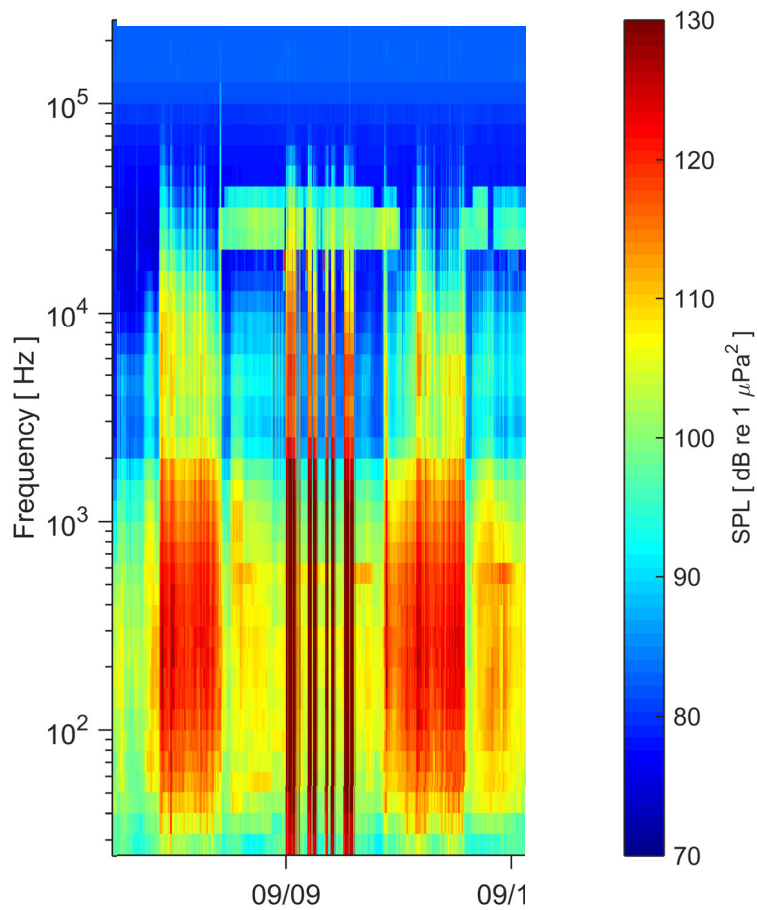
# WP3 Responses of porpoises to ADD & piling noise



105 CPOD deployments  
@ 68 locations  
Feb – Dec 2017



# WP 4 Noise measurement & modelling



*Everyone's come a long way in 12 years*



# *Remaining uncertainties relevant to consenting*

- Drivers of seasonal and inter-annual variation in occurrence
- Relative importance of vessel noise, piling activity and ADD use
- Mechanisms underlying marine mammal responses to noise
- Variation in responses in relation to habitat quality and construction techniques
- Longer-term effects of wind farms on marine mammals & their prey



# *Lessons learned*

- Ensure monitoring programmes are strategic, designed to reduce uncertainties in key processes
- Continuity in support for strategic research maximises science outputs
- Conversely, short & unpredictable lead times constrain science
- Opportunities remain for more integrated monitoring



# *Collaboration has been key*

- Between Industry, Academia, Government
- Environmental scientists and engineers
- Early discussions with all stakeholders (eg. MFRAG)
- Industry collaboration to support the MMMP
- Academic collaboration to deliver work programme





# **With thanks to all colleagues and collaborators**

Isla Graham, Barbara Cheney, Becky Hewitt, Saliza Bono, Tim Barton, Aude Benhemma-Le Gall, Line Cordes, Oihane Fernandes, Virginia Iorio, Gordon Hastie, Phil Hammond, Monica Arso Civil, Adrian Farcas, Nathan Merchant, Simon Moss, Ailsa Hall and many others....

