



‘MSM4PCoD’ Marine Species Monitoring for the Population Consequences of Disturbance

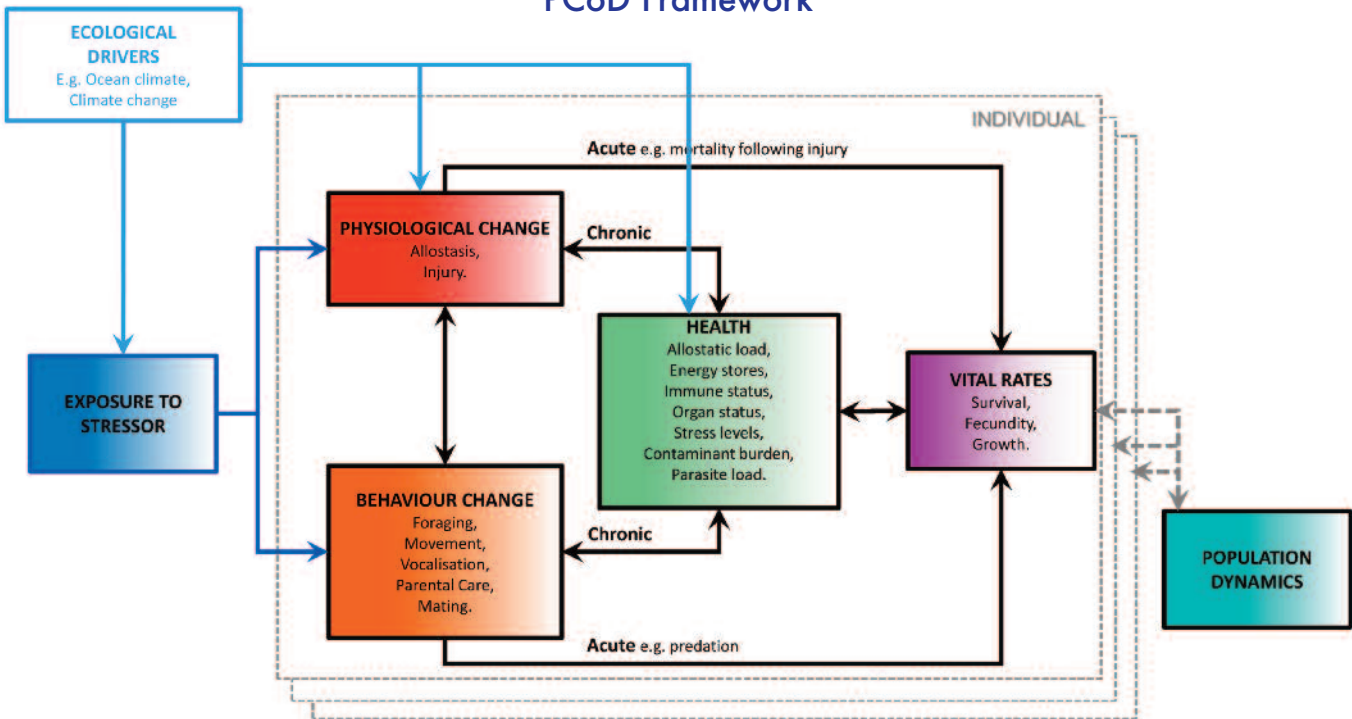
NEED

The population consequences of disturbance (PCoD) framework provides a conceptual framework which can be used to forecast a plausible range of outcomes for the possible effects of disturbance (e.g. from Navy training/testing activities) on marine mammals. However, significant data gaps exist and it may take decades to fill these gaps. There is interest in identifying current methods for monitoring populations subject to disturbance that may also provide insights into the processes through which disturbance may affect these populations. The Navy is interested in a study that will inform the Navy Marine Species Monitoring program in terms of the methods and approaches that will enable the future ability to conduct PCoD analyses.

SOLUTION

The overall objective of the ‘MSM4PCoD’ project is to review the US Navy Marine Species Monitoring (MSM) program to date and identify how current monitoring efforts could be adapted to supply appropriate data for future analyses of the consequences on marine mammals from possible disturbance by Navy activities. A working group supported by the Office of Naval Research previously developed a mathematical framework for assessing PCoD. However, the PCoD framework requires a specific set of input data. It is critical to identify the data gaps that need to be filled in order to improve such models. This project will assess how well current Navy MSM program efforts can support PCoD analyses and recommend what could be improved.

PCoD Framework



METHODOLOGY

The project team will begin by holding a workshop with Navy stakeholders to go over monitoring objectives and efforts to date and to discuss and potentially refine the scope of the project. Following the workshop, the team will pursue the project's three core steps.

- 1. Review applicable current and historical MSM projects and methodologies for priority areas and species and compile information into a reference database.**

This will include assessing the monitoring that has been conducted over the past 10–15 years of the MSM effort. For each monitoring study the team will document the methods employed, the species sampled and the sample sizes obtained for different species/method combinations. The elements of monitoring determined to be relevant for PCoD will be compiled into a database.

- 2. Select suitable metrics for monitoring populations of deep diving odontocetes and large baleen whales using PCoD models that already exist or are currently in development.**

The results of the first step will be used to identify appropriate metrics, or population characteristics, that may be suitable for monitoring and that could support PCoD analyses. The modeling outputs developed (and conclusions drawn) from previous PCoD-related projects will help to define the most appropriate metrics for the power analyses planned in the third step.

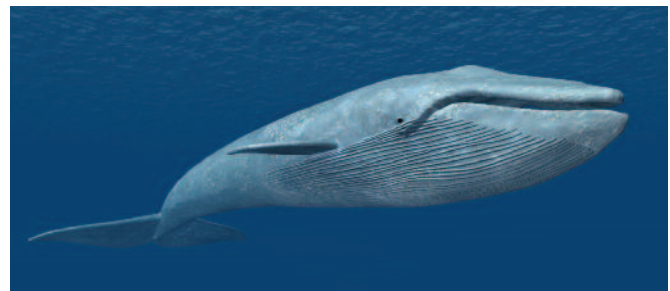
- 3. Conduct power analyses to assess the power of these metrics to inform PCoD analyses when collected within existing MSM projects and determine the effort required to increase this power.**

Power analyses ensure sample sizes are sufficiently large to allow detection of an effect, such as changes in population size and demographics. Conducting power analyses on information from the monitoring program will indicate whether MSM efforts to date can support PCoD analyses and will help to identify what efforts would be

required for different species/method/metric combinations. A series of power analyses for a minimum of two priority case study species (likely one deep diving odontocete and one large whale species), as determined by the most suitable species from the MSM review, are expected.

Power depends on effect size (in this case magnitude of the long-term decline or sudden decrease) and so an important early task is to develop a range of scenarios for what determines a biologically meaningful change. After the initial power analyses, a set of simulation scenarios will be developed to determine the amount and type of sampling effort that would be required for different approaches to inform PCoD in the future.

The results of these efforts will be synthesized in a report that also provides recommendations for how the MSM program could inform PCoD analyses.



Blue whale (a baleen whale).

SCHEDULE

Efforts during 2020 will include holding a workshop that includes all Navy stakeholders to give an overview of the MSM program effort to date and discuss how best to focus the project on meeting the Navy's need for recommendations. In 2021, the team will begin reviewing past MSM efforts in further detail, developing the database and selecting power analysis metrics. Power analyses will be developed throughout 2022 and completed in 2023. Based on stakeholder feedback, a technical report on recommendations on the practical steps that could be taken within the existing MSM program to support PCoD analyses will be prepared by the end of 2023.

NAVY BENEFITS

Results will include a set of practical recommendations of how PCoD elements could be incorporated into existing MSM efforts. This offers the opportunity for Navy monitoring of consequences to target those species and populations best studied for identifying PCoD. This will help to enhance the information collected and the analyses produced by marine species monitoring, which will increase monitoring benefits.

TRANSITION

Products will include a database that catalogs the MSM program effort carried out to date on priority species in priority regions that might inform PCoD analyses, a spreadsheet of the data and a database guide. A report on results and recommendations will be provided to the Navy and shared through conference presentations and manuscript submissions to peer-reviewed journals.

ABOUT THE PRINCIPAL INVESTIGATOR

Cormac Booth is Principal Scientist at SMRU Consulting, University of St Andrews, UK. Dr. Booth has served as lead scientist and project manager for multiple projects involving investigating the potential impacts of marine activities on marine mammal species, including a number of population consequences of disturbance (PCoD) projects. He has extensive experience in marine mammal biology, statistics and acoustics. Dr. Booth earned his Ph.D. at the University of St Andrews, UK.



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About the LMR Program

The Living Marine Resources (LMR) program seeks to develop, demonstrate, and assess data and technology solutions to protect living marine resources by minimizing the environmental risks of Navy at-sea training and testing activities while preserving core Navy readiness capabilities. For more information, contact the LMR program manager at exwc_lmr_program@navy.mil or visit www.navfac.navy.mil/lmr.

