MASTS PECRE Final Report:
Dr Denise Risch

Dates: September 8th – October 13th 2018

Home Institution:

Scottish Association for Marine Science (SAMS), University of the Highlands and Islands, Oban/Argyll, PA371QA, Scotland, UK

Host Institutions:

Northeast Fisheries Science Center (NEFSC), NOAA, 166 Water Street, Woods Hole, MA 02543, USA

San Diego State University, Department of Computer Science, San Diego State University 5500 Campanile Drive, San Diego, CA 92182-7720

Hosting Faculties:

Dr Sofie M. Van Parijs, Passive Acoustics Program Leader, NEFSC/NOAA

Prof Marie A. Roch, Professor of Computer Science, San Diego State University

Background:

The aim of this PECRE fellowship was to learn how to effectively use the current version of the Tethys database system for passive acoustic monitoring (PAM) metadata storage (https://tethys.sdsu.edu). Specifically, the fellowship was set up to explore Tethys' utility to store and access PAM metadata collected as part of Scottish and wider European research projects, e.g. the SEUPB funded Interreg project COMPASS (https://compass-oceanscience.eu/cetaceans). This project will collect terabytes of data during each deployment. Systematic and efficient long-term storage and backup of acoustic raw data and metadata thus becomes imperative for planned research on diel, seasonal and inter-annual occurrence patterns of soniferous species, long-term ambient noise statistics or anthropogenic activities. A flexible and modular database is essential to enable such long-term data storage and allow effective analysis of increasingly larger acoustic data sets. It also enables advanced acoustic analyses within and across different research institutions. The database is intended to house the metadata from acoustic research, allowing the user to perform meta analyses or to aggregate data from many experimental efforts based on a common attribute. The database can be queried based on time, space, or any desired attribute and the results may be integrated with external datasets such as climate and oceanographic data, tidal state or lunar cycle.

The PECRE funding facilitated collaboration between the fellow and two experts at US research institutions over the space of a one month period. The first part of the exchange was carried out at the Computer Science Department of San Diego State University. This visit served as an introduction to the current version of Tethys by Prof Marie Roch. The database

was prepared and installed on the fellows laptop computer, and server setup issues and other software issues were discussed. The time in San Diego was also spent with the creation of project specific schema for data input into Tethys. In addition, the fellow met with colleagues (Shannon Rankin and Taiki Sakai) of the NOAA Southwest Fisheries Science Center in San Diego to discuss PAM data analysis strategies and new open-source software currently being developed in R for flexible processing and analysis of long-term acoustic data.

The second part of the PECRE fellowship was carried out in Woods Hole, where the exchange with Dr Sofie Van Parijs and her acoustic group at the NOAA Northeast Fisheries Science Center was invaluable to get more familiar with Tethys and discuss and test different data entry approaches. The acoustic group at NOAA has long-standing experience in collecting towed hydrophone and long-term static acoustic data and it was invaluable to exchange thoughts on common data analyses and workflows. In addition to time spent at NOAA in Woods Hole, exchanges on fish acoustics and PAM data processing and new software with colleagues from Woods Hole Oceanographic Institution (Drs Paul Caiger and Jenni Stanley) and the Bioacoustic Research Program at Cornell University (Peter Dugan) were also very useful and sparked new ideas for data analysis and long-term collaboration on PAM data for marine megafauna research.

Outputs completed and expected:

1. Tethys installation and tutorial as well as discussion with current users

2. Tethys transfer to and hosting on SAMS servers

3. Preparation of COMPASS acoustic metadata (deployments and detections) schema for import into Tethys database

4. Installation and discussion of RavenX acoustic detection software for PAM data analysis (Cornell University, Bioacoustic Research Program)

5. Installation and discussion of NEFSC/JASCO cod detector for PAM data

6. New collaboration on PAM data processing tools developed in R by the NOAA Southwest Fisheries Science Center

Future plans for building on the PECRE:

Continued collaboration with Prof Roch and Dr Van Parijs and their groups are planned going forward. Since Tethys is still under development, it was agreed that the fellow will test new versions of the software in the framework of the COMPASS project and provide feedback to help to further develop the system. Prof Roch agreed to provide support where needed. Dr Van Parijs group in Woods Hole is using Tethys for very similar long-term acoustic project and will be available for discussions and additional support. It is planned to implement and use Tethys for acoustic data collected during the COMPASS project in 2019. The database will be first shared between COMPASS project partners at SAMS, Marine Scotland Science (MSS) and the Agri-Food and Bioscience Institute (AFBI). In 2019 it is planned to organize a Tethys workshop during the MASTS annual meeting to demonstrate its utility for sharing PAM detection and metadata across Scottish research institutions. The workshop will be an introduction to Tethys capabilities and will aim to stimulate discussion on wider data sharing of long-term passive acoustic data.

Award Size and Expenditures:

Total award: £4,400. Total expenditure: £4,392. Travel: £1,666. Subsistence: £2,726.