



U.S. Navy Living Marine Resources Program FY19 Need Topics

The U.S. Navy Living Marine Resources (LMR) program issued a call for pre-proposals pertaining to six FY19 need topics.

SOLICITATION OPEN PERIOD: 4 September – 22 October 2018.

SOLICITATION ADVERTISEMENT:

- BAA Solicitation N39430-18-S-2086 posted at www.neco.navy.mil and www.fbo.gov on 4 September 2018.
- Announcement posted on LMR Program website at <https://www.navysustainability.dodlive.mil/lmr> on 5 September 2018.
- Announcement posted to MARMAM, CTURTLE, and bioacoustics-I listservs on 6 September 2018.

NEED TOPIC N-0203-19: IMPROVEMENT OF MEDIUM-TERM TELEMETRY TAG ATTACHMENT DURATION

Marine mammal baseline behavioral data (diving, movement) and behavioral and physiological response to sonar exposure data derived from animal telemetry provide the foundation for behavioral response criteria in the Navy's acoustic effects modeling, among other uses.

Over the past two decades, biologists have been especially successful in attaching tracking devices to cetaceans at the small and large end of their size range. A solution for tagging all sizes (small, medium, and large-sized) cetaceans using 4-6 cm darts is the Low Impact Minimally Percutaneous External-electronics Transmitter (LIMPET) tag system, which is a readily available commercial product being deployed on a wide range of cetacean species (~ 28) across the globe. The current time-scale for LIMPET and other tag packages (some under development) using darts ranges from a few days to a few weeks, with the occasional tag lasting several months. It's possible that the rigid materials and connection between the tag body and dart attachments are limiting tag durations. Improvements in dart design are needed to increase tag deployment durations to one to several months on average.

LMR is seeking pre-proposals focused on research towards the re-design and/or improvement of medium-term tag attachment methods for dart-style tag attachments for marine mammals. This might include designs that limit the transfer of forces between the tag body and dart attachments, changes in materials and design used in dart attachments, and tag and attachment designs that are more tolerant of wider angles of approach when deploying tags.

NEED TOPIC N-0204-19: DEMONSTRATION AND VALIDATION OF PASSIVE ACOUSTIC MONITORING (PAM) BASED DENSITY ESTIMATION METHODS USING VISUALLY VERIFIED SURVEY DATA

Marine mammal density estimates are a critical input for the Navy's acoustic effects modelling. Traditional ship and aerial visual survey estimates of marine mammal density are viable for the Navy, but very limited in their spatial and temporal coverage and many species are difficult to sight. The use of fixed-PAM for density estimation has the potential to increase the amount of density data in all US-waters and Navy ranges that can be used in the Navy's acoustic effects modeling. However, these relatively new statistical approaches still need to be demonstrated and validated.

LMR is seeking pre-proposals demonstrating and validating fixed-PAM based density estimation methods using vessel or shore-based visual surveys on species that have a high confidence level in being sighted. The objectives of the study should include:

- 1) Collection of concurrent visual sightings groups from cliff-based or boat-based observation sites, and localization of vocally active individuals or groups of animals using an array of time-synchronized fixed-PAM data recorders.
- 2) Obtain visually-estimated group sizes, group counts, and acoustic detection ranges by focal-group tracking.
- 3) Comparison of density estimates obtained using multiple fixed-PAM density estimation methods (cue-counting, point-transect sampling methods, Spatially Explicit Capture-Recapture - SECR);
- 4) Validation of PAM density estimation approaches against visual survey density estimates, and evaluate which PAM density method work best for which species and circumstance.

NEED TOPIC N-0205-19 INVESTIGATION OF THE EFFECTS OF CUE RATE AND CUE STABILITY ON PASSIVE ACOUSTIC MONITORING (PAM) BASED DENSITY ESTIMATION METHODS

Marine mammal density estimates are a critical input for the Navy's acoustic effects modelling. Traditional ship and aerial visual survey estimates of marine mammal density are viable for the Navy, but very limited in their spatial and temporal coverage and many species are difficult to sight. The use of fixed-PAM for density estimation has the potential to increase the amount of density data in all US-waters and Navy ranges that can be used in the Navy's acoustic effects modeling. However, these relatively new statistical approaches still need to be demonstrated and validated.

In some PAM based density estimation methods, the "cue rate" or the marine mammal sound production rate is an important multiplier to get to a final density estimate. Cue rates can vary in marine mammals as a function of time of day, year, group size, season, bottom depth, location, etc. Also often cue rates are determined from limited data sets and assumed to be representative for the species.

LMR is seeking pre-proposals that investigate cue rate and cue stability for use in PAM-based density estimation methods. Priority will be given to pre-proposals that focus on species groups listed in Appendix A. This can include a model-based approach using existing data. The ultimate result of this research should inform us on the most appropriate cue rates for species/context that can be characterized and make recommendations of most appropriate species to further collect cue rate data for.

NEED TOPIC N-0206-19: DEMONSTRATION AND VALIDATION OF PASSIVE ACOUSTIC MONITORING SPARSE ARRAYS TO ESTIMATE THE DENSITY OF LOW-FREQUENCY WHALES OVER LARGE SPATIAL AREAS

Marine mammal density estimates are a critical input for the Navy's acoustic effects modelling using NAEMO. Traditional ship and aerial visual survey estimates of marine mammal density are viable for the Navy, but very limited in their spatial and temporal coverage.

The ONR Marine Mammals & Biology program has developed Passive Acoustic Monitoring (PAM) approaches using sparse arrays where sensors are distributed evenly over a large area of interest, and are often referred to as 'platforms of opportunity' because their primary monitoring purpose is not for marine mammals. Sparse arrays, including Ocean Bottom Seismometers (OBS) and Comprehensive Nuclear Test Ban Treaty Organization International Monitoring System (CTBTO IMS) data, have been used to detect and track blue and fin whales. Traditional and novel density estimation methods have been applied to data from OBSs and then adapted for CTBTO IMS data. There are a variety of density estimation approaches that have been successfully used on OBS data to estimate density of fin and blue whales; whereas, for CTBTO IMS data it has worked well on stereotyped vocalizations like fin whale 20-Hz calls, but additional development is required for the more variable blue whale calls. While these studies have demonstrated the utility of OBS and CTBTO IMS data, the techniques to 1) estimate range to calling animals, and 2) density estimation methods still need to be compared and validated under different conditions to be able to fully utilize the worldwide dataset.

LMR is seeking pre-proposals that will identify a suite of case studies of OBS data for blue and fin whales and CTBTO IMS data for fin whales from around the world that represent the variability of environmental conditions at OBS and CTBTO IMS locations worldwide, with the goal of determining the best methods to estimate the detection range of fin and blue whales and the most appropriate application of acoustic based density estimation methods. Deliverables should include a set of tools, training materials, and documentation that will help stakeholders to use OBS and CTBTO IMS data in a given geographic area to produce density estimates for blue and/or fin whales.

NEED TOPIC N-0207-19: IDENTIFICATION OF MONITORING PRIORITIES FOR STUDYING THE POPULATION CONSEQUENCES OF DISTURBANCE ON MARINE MAMMALS

The population consequences of disturbance (PCoD) framework provide a conceptual framework which can be used to forecast a plausible range of outcomes for the possible effects of Navy activities on marine mammals. However, significant data gaps exist and it may take decades to fill these gaps. Therefore, there is significant 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. Recent reports have indicated that monitoring for health variables, capture-recapture, individual tracking (e.g. telemetry), remote tissue sampling and (vertical) photogrammetry were considered the most useful methods for PCoD analysis involving baleen whale and deep-diving cetacean species.

The overall approach of the Navy Marine Species Monitoring (MSM) Program for both Atlantic and Pacific range complexes is captured in four conceptual framework categories (DoN 2016a, b): Occurrence, Exposure, Response, and Consequences studies. These categories parallel the PCoD framework described in New et al. (2014), where 'Occurrence' and 'Exposure' are integral to the assessment of numbers of animals disturbed, 'Response' captures the link between disturbance and

behavioral and physiological changes, and 'Consequences' is concerned with how such changes might impact upon health, vital rates and ultimately population dynamics.

The LMR program is seeking pre-proposals that evaluate the Navy MSM program in terms of how to specifically inform future PCoD analyses. Given the effort currently being conducted and that has been conducted over the past 10 years of the Navy MSM program, proposals should assess existing data collected to date to determine what might be achieved retrospectively in a PCoD analysis. A review of existing data might include a review of effort conducted to date, sample sizes obtained for different species/variables and species/method-specific power analyses to determine the levels of effort required to collect sample sizes to inform future PCoD analyses.

The results of the study should inform the Navy MSM program of the methods and approaches the program could take to enable the future ability to conduct PCoD analysis. The recommendation of integrating future additional monitoring data collection or analyses should be done in the context of the existing Navy MSM programs. For example, photo-ID, biopsy, vertical photogrammetry, and individual tracking methods could be suggested as secondary efforts to already funded visual surveys.

NEED TOPIC N-0208-19: TURTLE TTS FEASIBILITY STUDY

The Navy, National Marine Fisheries Service (NMFS), and other federal agencies require quantitative thresholds to examine the potential impacts of underwater sound on protected species. General audiometric information is available for most sea turtle species, however, data on the susceptibility of sea turtles to noise induced hearing threshold shifts is lacking.

LMR is partnering with NMFS Office of Protected Resources and the Office of Science and Technology to conduct a feasibility study on obtaining temporary threshold shift (TTS) information for sea turtles. Due to animal care concerns associated with inducing TTS in Endangered Species Act (ESA)-listed sea turtles, this project should be undertaken in a two stage process. First, to determine the feasibility of generating TTS in a closely related surrogate - a non-ESA listed turtle species (e.g. diamondback terrapin, red-eared slider, pond slider, etc.). If this step is successful, the second stage would be to obtain TTS information for an ESA listed sea turtle, preferably a loggerhead or green sea turtle. Proposals should encapsulate the methods and costs associated with both stages of the study's feasibility. All associated animal handling permits and agreements (i.e. Institutional Animal Care and Use Committee (IACUC), etc.) should be in place prior to award. If the offeror currently possesses a permit or other documentation, it should be mentioned in the preproposal and submitted as part of the full proposal. In addition, all costs, logistics and schedule requirements associated with obtaining NMFS and US Fish and Wildlife permits for the second stage should be outlined prior to full commitment of the first stage of the study.