LMR news

FALL 2014

Welcome!

Welcome to the fall 2014 issue of *LMR News*—the quarterly newsletter from the Living Marine Resources (LMR) program. Our goal is to provide you with the latest information about program operations, significant accomplishments, and future focus areas for the LMR program. We hope you will find the content useful and that it provides insights into our efforts to better understand and protect living marine resources and support U.S. Navy readiness training.

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WHO WE ARE

The LMR program is one of the Navy's applied research (6.4) programs, sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division (CNO N45) and managed by the Naval Facilities Command Engineering and Expeditionary Warfare Center (NAVFAC EXWC) in Port Hueneme, CA. The mission of the LMR program is to develop, demonstrate, and assess information and technology solutions to protect living marine resources while preserving core Navy readiness capabilities.

PROGRAM OFFICE INSIGHTS

A few of the topics we are sharing from this past quarter include new program support staff, Introduction to Density Estimation using Acoustics (IDEA) workshops, and summaries of two of our new projects that are underway.

Anu Kumar, Program Manager

As a result of our Fiscal Year (FY) 2014 Broad Agency Announcement, we received 62 pre-proposals submitted under three needs topic areas:

1. N-0077-15: Density Estimation from Passive Acoustic Monitoring Data
2. N-0088-15: Marine Species Monitoring Data Collection Toolkit Development
3. N-0096-15: Hearing Measurements in a Broad Range of Marine Mammal Species.

Due to a temporary reduction in LMR's FY15 budget that limits available funds, we had to be extraordinarily selective in our call for full proposals. The limited funds combined with the number of good pre-proposals made it particularly challenging for the LMR Advisory Committee (LMRAC) members, who had to make some tough choices. We worked very hard, with support from our resource sponsor, to restore the budget next year. That makes FY16 a more promising year to take on more new projects. If your pre-proposal was not selected this time around, we urge you to apply again next year. By early winter we hope to announce the new starts selected for FY15 funding

Mandy Shoemaker

The LMR program is happy to welcome Mandy Shoemaker to the team. Mandy most recently was the Marine Resources Branch Head at Naval Facilities Engineering Command (NAVFAC) Atlantic and brings a breadth of expertise to supporting the LMR program. She has a B.S. in Marine Biology from the University of California at

Santa Cruz and a Masters in Coastal Environmental Management from Duke University. In 2005, Mandy started working at NAVFAC Atlantic in the Environmental Division. Her work there focused on analyzing the potential effects of Navy training and testing activities on marine species, preparing at-sea environmental compliance documentation, obtaining required permits and consultation documents, and helping to manage and implement the Navy's marine species monitoring program. This work involved ensuring that the Navy is in compliance with laws such as the National Environmental Policy Act (NEPA), Marine Mammal Protection Act (MMPA), and Endangered Species Act (ESA). In 2009, she began managing all the biological sections of the Atlantic Fleet Training and Testing (AFTT) Environmental Impact Statement (EIS), as well as the associated MMPA permitting process and ESA consultation. Some of Mandy's notable accomplishments include the NAVFAC Atlantic Team of the Year Award in 2008, and the CNO Environmental Award in FY 2010 and FY2012 for best environmental planning team. In 2013, she received a Meritorious Civilian Service Award for her support in obtaining environmental compliance for U.S. Fleet Forces Command training activities and enabling the Second Fleet to maintain uninterrupted environmental readiness.

Humpback whale.
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As Mandy notes, "My experience helped me to gain a solid understanding of the critical data gaps and research needed to help the Navy maintain environmental compliance for training and testing activities. I understand the challenges associated with environmental compliance and the importance of coordinating efforts to improve the necessary inputs, data and technology, and look forward to bringing this perspective to the LMR program. As I step into an LMR support role, my initial goal is to support continued improvement integrating LMR program results into an easily usable format for the end-users to incorporate back into the environmental compliance process. I am excited to be part of the team and to begin making a contribution to the important ongoing and future work."

"My experience helped me to gain a solid understanding of the critical data gaps and research needed to help the Navy maintain environmental compliance for training and testing activities."

—Mandy Shoemaker

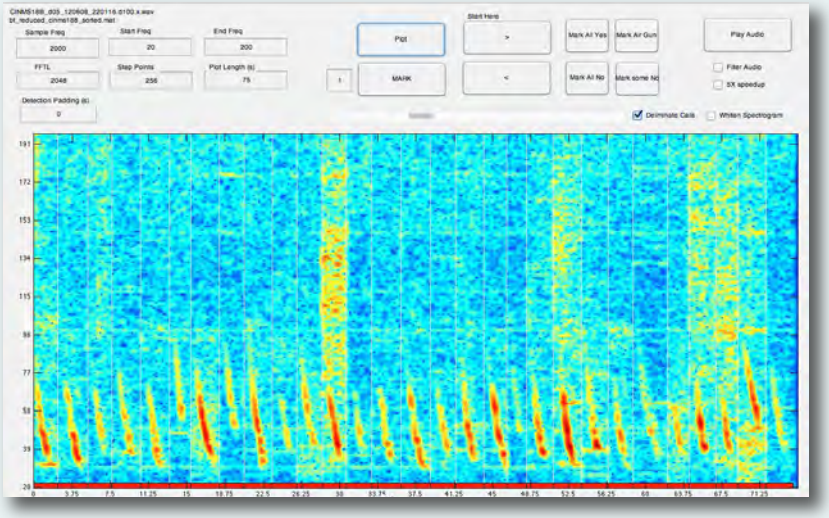
LMR PROJECT SPOTLIGHT

Wondering about some of the new LMR projects? This section provides a brief overview of some of the new start projects launched this year. This quarter's project spotlight presents Tyler Helble's "Improving Automated Methods for Passive Underwater Acoustic Monitoring of Marine Mammals," and James Finneran's "Electrophysiological Correlates of Subjective Loudness in Marine Mammals."

Improving Automated Methods for Passive Underwater Acoustic Monitoring of Marine Mammals

Passive Acoustic Monitoring (PAM) is a proven means of detecting and classifying vocally active marine mammals, as well as a number of fish species through an underwater signal processing system. PAM is often an available method at Navy test, evaluation and training ranges where marine mammals might be present.

As these systems continue to evolve, a process is needed by which new and emerging systems are evaluated against common, shared benchmarks. Over the last few years, the sonar/radar signal processing community has developed various detectors for signals of interest. One such development, the Generalized Power Law (GPL) processor has been used extensively with great success in humpback whale data collection by the autonomous High-frequency Acoustic Recording Packages (HARP) that are currently being used for PAM at several Navy testing and training ranges. The GPL was developed by this project's Principal Investigator, Tyler Helble with resources provided by the Office of Naval Research (ONR).



Spectrograms of GPL detections shown in the graphical user interface for blue whale D calls, calls often made during foraging.

Working closely with other LMR-sponsored projects, the team will first adjust GPL algorithms for use with specific marine mammals and then test and implement these algorithms with data from existing PAM systems. To date, the project team has tuned and calibrated the GPL detectors for three species of marine mammals at the Pacific Missile Range Facility in Hawaii and three species from HARP recordings deployed throughout southern California.

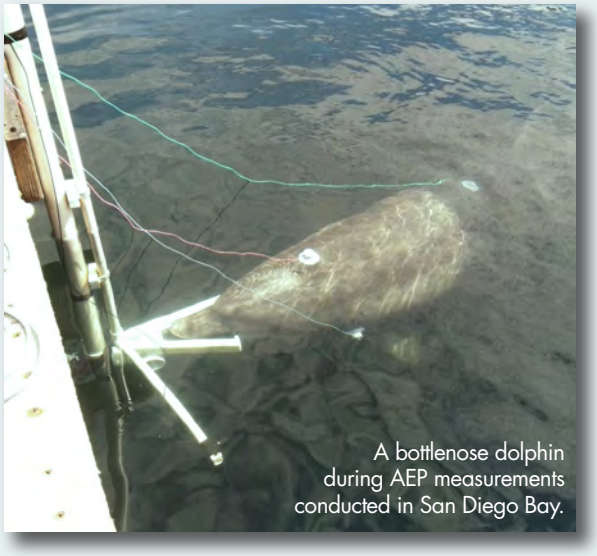
Any algorithms developed for GPL processing are constrained by the need for pre-processing adaptation to accommodate the local noise environment as well as noise created by the platform itself. In addition, ocean bathymetry greatly influences PAM readings. For these reasons, creation of a fully automated system is not feasible. This project will design a system that "calls out" potential signals of interest for examination by a human operator.

This project will improve the Navy's PAM capabilities in two critical areas. First, it will implement automated detectors optimized for specific marine mammal species that will vastly reduce the time and cost for human operators to manually examine a data set. This effort will also provide the methods for calibrating the detector output call counts for spatially and temporally varying ocean environmental conditions.

Electrophysiological Correlates of Subjective Loudness in Marine Mammals

Determining the effect of sonar and other underwater sounds on marine mammals is difficult without a thorough understanding of how these animals hear and the relative effects of sounds at different frequencies.

This project is employing electrophysiological measurements to determine how sound affects marine mammals. These techniques use non-invasive surface electrodes to measure small voltages (called auditory evoked potentials (AEP)) generated by the brain and auditory nervous system when an animal hears a sound. The AEP technique was developed by Principal Investigator James Finneran with resources provided by ONR.



A bottlenose dolphin during AEP measurements conducted in San Diego Bay.

Previous studies have examined the feasibility of utilizing AEPs to predict perceived loudness in humans. In order to determine whether similar techniques can be used in dolphins and sea lions, a feasibility study will be conducted during which sounds will be delivered to the animals via electrodes and/or headphones. AEPs will be measured at a variety of sound frequencies and levels. The AEP data will then be analyzed to determine which, if any, features are correlated with loudness. If a suitable correlation is found, measurements will be expanded to include additional dolphins and sea lions.

The data and results of this study will be incorporated into Navy acoustic impact analyses, criteria and thresholds for at-sea compliance. This data will allow for more realistic predictions of the effects of Navy sonars and explosive sources on marine mammals.

INTRODUCTION TO DENSITY ESTIMATION USING ACOUSTICS (IDEA) WORKSHOPS

The LMR program supported a series of workshops to introduce methods of using PAM to estimate marine mammal density. The primary aim of the IDEA courses was to present the latest methodologies for estimating the number and density of marine mammals in an area using passive acoustic data to scientists supporting the Navy's monitoring program. The three specific teaching objectives of the IDEA courses were for participants to:

1. Understand the issues involved in going from processed acoustic data to animal density
2. Be aware of the main methods that are currently available to do this
3. Understand which method(s) may work for a given scenario.

The course was divided in four components:

1. Introduction to the software R, a statistical analysis program, in the first morning
2. Afternoon of introductory lectures, covering all the basic steps of estimating animal abundance and then focusing on adaptation of the methods to acoustic data
3. Practical computer session, where participants had the opportunity to work through several analyses involving different survey scenarios and species

Orca.
shutterstock.com

4. Discussion session where the group discussed optimal acoustic survey design for a number of real case studies.

Three IDEA courses were delivered at Virginia Beach, San Diego and Honolulu between May and September 2014. A total of 83 participants took part, with 17 coming for the initial half-day overview and 67 staying on for the full three-day program. The course had to cater to a broad audience, from

those requiring a high-level understanding of acoustic density estimation for project management purposes, to those more technical personnel involved in survey design and data analysis. Despite this challenge, the feedback from participants suggested that the main objectives were achieved—this was evident from the lively and interesting discussion sessions that were held on the final afternoon of each course.

Beluga whale.
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This area of research is still undergoing development and refinement, but these workshops helped the end users understand the capability, limitations, and experimental design requirements to achieve density estimates from acoustic data. An additional important benefit of the IDEA courses was to create an opportunity for the University of St. Andrews lecturers to, firstly, gain feedback from users of the statistical methods and software routines, many of which were developed in part through Navy funding (both ONR and LMR) and, secondly, better understand the requirements of users, which will be invaluable for future method and software development.

IN-PROGRESS REVIEW

The program held its most recent In-Progress Review (IPR) 17–21 November, 2014 at the Space and Naval Warfare Systems (SPAWAR) Transducer Evaluation Center in San Diego. The IPR provides a forum for the LMRAC and program Principal Investigators (PIs) to discuss project status and direction to ensure the work will meet Fleet needs. The November IPR included presentations on recently funded and initiated projects. Highlights will be shared in the winter-15 issue of *LMR News*.

The 2015 IPR is tentatively scheduled for the week of 19–23 October in Port Hueneme, California.

OUR WEB SITE—NEW LOOK AND FEEL

Our web site (www.lmr.navy.mil) has received a bit of a makeover, which we hope will improve your user experience. The new format provides a cleaner interface with new navigation options. The public component includes links to more program details, defined environmental needs, pre-proposals, project highlights and *LMR News*. The home page also lists program happenings.

The management side of the site, which requires a user account login, is a work flow application that serves all aspects of program management. It provides a collaborative interface that program participants can use to review and evaluate needs, research proposals and project progress to support sound program investment decisions.

The web site continues to provide information on submitting needs, pre-proposals and proposals. For questions on these or any other function of our web site, contact our webmaster Eric Rasmussen at 732-323-7481 or eric.rasmussen@navy.mil.

www.lmr.navy.mil

PROGRAM INVESTMENT AREAS

The LMR program's Standard Operating Procedures lay out the following five key investment areas.

1. **Data to Support Risk Threshold Criteria**

   Conduct applied research to establish risks to marine mammals, birds, fish, turtles and invertebrates from effects of naval training, exercise and R&D activities on Navy maritime ranges and operating areas, primarily risks from sound, vessel collisions and habitat degradation.

2. **Improved Data Collection on Protected Species and Critical Habitat within Navy Ranges**

   Develop means to improve the quality, quantity and cost-effectiveness of protected species information and habitat monitoring capabilities on Navy at-sea ranges. Work should not include operational data collection that is part of required mitigation monitoring, but should offer proof-of-concept demonstrations of improved means for obtaining such data.

Minke whale.
istockphoto.com

3. **New Monitoring and Mitigation Technology Demonstrations**

   Demonstrate new technologies that offer to improve the effectiveness or endurance of monitoring and mitigation or reduce costs of required mitigation. Demonstrations should be undertaken with the cooperation and coordination of the Fleet or SYSCOM sponsor that would be accepting the technology if successfully demonstrated.

4. **Database and Model Development**

   Address issues pertaining to data needs of Navy environmental documents and ongoing adaptive management evaluations of Navy activities on range marine life.

5. **Education and Outreach, Emergent Opportunities**

   Provide information and capabilities developed under this or other programs both to potential users and experts in the field to facilitate application of new information and capabilities and to the concerned public and regulatory community to facilitate acceptance of new Navy science and technology applications. This investment area also covers emergent needs or opportunities that present a requirement for quick response on a topic of high Navy interest with a relatively quick and straightforward solution, but which is not covered by the preceding four Priority Areas of Investment.

PROGRAM SCHEDULE

A tentative program schedule for key program activities is provided below. Schedule changes are not uncommon, so please check the LMR web site (www.lmr.navy.mil) for the most current information.

No.	What	When
1.0	**Proposal Solicitation, Review & Contract Process**	
1.1	Issue BAA Solicit Pre-proposals	27 April 2014
1.2	Submit Pre-proposals	16 June 2014
1.3	Complete Pre-proposal Review (LMRAC and TRC members)	14 August 2014
1.4	Request Full Proposals	20 August 2014
1.5	Full Proposals Due	7 October 2014
1.6	Collect Comments on Full Proposals (LMRAC and TRC members) Rank Full Proposals	8–29 October 2014
1.7	Obtain Sponsor Review & Approval of Full Proposals	January 2015
1.8	Announce Project New Starts	January 2015
2.0	**Quarterly Status Reports (QSR)**	
2.1	Winter QSR	5 January 2015
2.2	Spring QSR	6 April 2015
2.3	Summer QSR	6 July 2015
2.4	Fall QSR	5 October 2015
3.0	**Sonobuoy Requests**	
3.1	Solicit Sonobuoy Requests	1 October 2014
3.2	Approve Sonobuoy Requests	15 January 2015
4.0	**Needs Process**	
4.1	Revisit Program Needs & Broad Agency Announcement	28 August 2015
4.2	Complete Needs Ranking (LMRAC)	16 October 2015
5.0	**Conduct In-Progress Review**	18–20 November 2014

Check out our web site at www.lmr.navy.mil for the latest version of our program schedule.

CALL FOR LMR-RELATED PHOTOS

We know that many of you have wonderful high resolution photographs of marine mammals taken during your survey work, as well as photos of personnel who were involved and the equipment that you used. We'd like to include some of those images in a future issue of the LMR newsletter and give you credit—right there with your photo.

So please, go through those photos and send us a few that you're particularly proud of. Include a caption, photo credit and permit number (as applicable) and be sure that the photos are in high resolution format. And who knows, you may see one of those photos in a future issue of the LMR newsletter. Submit your photos via email to: exwc_lmr_program@navy.mil

North Pacific right whale.
Amy S. Kennedy, NMML Permit #782-1719

HELP WITH OUR MAILING LIST

If you want to subscribe to or unsubscribe from *LMR News*, please send your email address to Lorraine Wass at 207-384-5249 or ljwass@outlook.com.

CONTACT THE LMR PROGRAM

For more information about the LMR program and its operations, contact Anu Kumar, Program Manager, exwc_lmr_program@navy.mil, 805-982-4853.

IN THE NEXT ISSUE OF *LMR NEWS*

Our next issue will include highlights from the program's review of ongoing projects conducted during its most recent IPR.

Until then, look online for LMR-related information. Fact sheets that summarize LMR projects currently underway will soon be posted at the LMR web site (www.lmr.navy.mil). Articles about the LMR program are also available in issues of *Currents* magazine at http://greenfleet.dodlive.mil/currents-magazine.