

LMRnews

FALL 2015

Welcome!

Welcome to the fall 2015 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 improve our understanding of how Navy at-sea training and testing activities could affect marine mammals—their occurrence in training areas and potential exposure, response, and consequences.

Right whales.
NOAA NMFS



SCIENCE • STEWARDSHIP • NAVY READINESS

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 (OPNAV 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 improve the best available science regarding the potential impacts to marine species from Navy activities, and improve the technology and methods available to the U.S. Navy marine species monitoring program, while preserving core Navy readiness capabilities.

PROGRAM OFFICE INSIGHTS

The pace and progress continues to increase in the LMR program, and we have a lot to report this quarter. One indication of the increasing pace is that the program exceeded end-of-year obligation and expenditure benchmarks. Additionally, we had a strong response to the Broad Agency Announcement (BAA) for 2016 projects with 55 pre-proposals submitted. The FY16 BAA solicited pre-proposals in two topic areas:

1. Behavioral Response Research to Study the Effects of Sound on Marine Mammals
2. Marine Species Hearing Research Related to the Acoustic Effects Criteria.

The LMR Advisory Committee (LMRAC) will be reviewing these and recommending which should be considered for the full proposal round.

Other topics that are covered in greater detail below include the fiscal year 2015 new start projects and the 2015 In-Progress Review (IPR), held 19–23 October 2015. The IPR once again provided a productive forum for program staff, LMRAC members and Principal Investigators to discuss project progress.

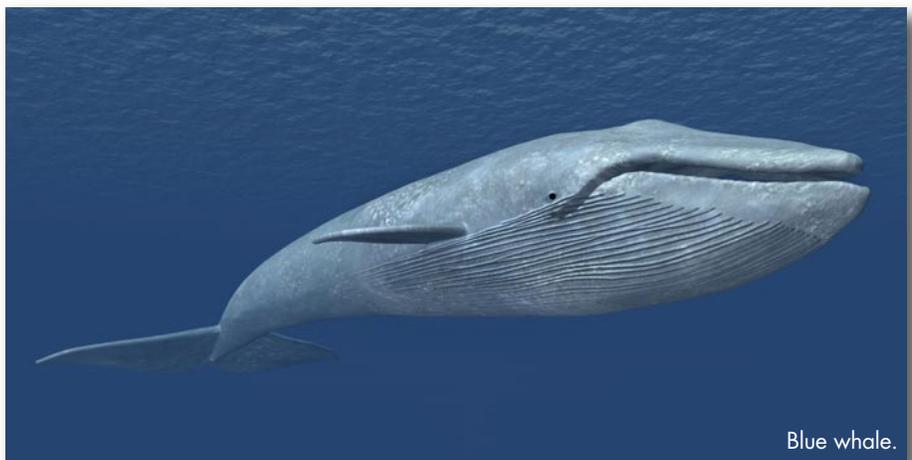
Two items in the the LMR Partnerships section provide information on a recently published research article of interest to the LMR program and a brief report on Mandy Shoemaker's presentation to the Sonobuoy Liaison Working Group.



Anu Kumar, Program Manager

LMR PARTNERSHIPS

Results of a project funded by the Office of Naval Research (ONR) on aspects of whale foraging efficiency and prey density were recently published in “Science Advances.” The research on which the article, “Blue whales (*Balaenoptera musculus*) optimize foraging efficiency by balancing oxygen use and energy gain as a function of prey density” (Hazen, Friedlaender, Goldbogen Sci. Adv. 2015;1:e1500469, 2 October 2015), is based also received ship time and tagging support via LMR program funding. For a full pdf version, available online, go to: <http://advances.sciencemag.org/content/advances/1/9/e1500469.full.pdf>.



Blue whale.

Mandy Shoemaker attended the 28–29 October Sonobuoy Liaison Working Group (SLWG) meeting at the Stennis Space Center. She gave a presentation to the group highlighting some of the projects that employ sonobuoys during field research and how the research and sonobuoys benefit the Navy. The information was well received and the SLWG appreciated the update on how the Navy allocation of sonobuoys set aside for marine species research is being used. The LMR program will be compiling a list detailing the Principal Investigators and projects that need sonobuoys in 2016 and will submit it to Applied Logistics Services (ALS), Inc. by the end of December.

LMR PROJECTS—NEW FOR 2015

The BAA for FY15 project funding resulted in 51 pre-proposals of which 19 were developed into full proposals. Of those 19, nine new start projects were selected for the FY15 funding cycle.



The following table provides a brief summary of the projects by need category.

Hearing Measurements in a Broad Range of Marine Mammal Species

29 pre-proposals • 5 new starts

Project No.	Title	Principal Investigator & Organization	Objective
11	Audiograms of Hearing in Baleen Whales	Darlene Ketten <i>Woods Hole Oceanographic Institution</i>	Generate a model audiogram for baleen whales. The audiograms will aid in species-specific risk assessments for hearing impacts and will provide ear and head anatomical guides that support effective electrode and sound source placements for proposed auditory brainstem response (ABR) measures.
14	Behavioral Audiometry in Multiple Killer Whales	Brian Branstetter <i>National Marine Mammal Foundation</i>	Collect the first demographic hearing data from killer whales to understand how potential acoustic impacts might vary within a mixed population of animals (across age and gender). Data from the study will help to determine mid-frequency cetacean composite audiograms and weighting functions for Navy at-sea environmental compliance.
13	Standardization of Auditory Evokes Potential (AEP) Audiometry Methods to Ensure Comparable Data Inclusion in a National Marine Mammal AEP Database	Dorian Houser <i>National Marine Mammal Foundation</i>	Standardize hearing threshold measurement methods used in odontocetes and increase species representation and sample sizes in hearing threshold estimates to reduce uncertainty in hearing range analyses used by Navy planners.

Project No.	Title	Principal Investigator & Organization	Objective
15	Jawphone Simulations to Maximize the Utility of Psychoacoustic and Auditory Evoked Potential Experiments	Ted Cranford <i>San Diego State University</i>	Use a computational approach to identify the mechanism(s) by which jawphones stimulate hearing when they are used to gather data on toothed whale auditory capabilities and formulate sensitivity maps as guidance for optimal placement of the jawphones to maximize their utility in gathering hearing data for a variety of animals.
20	Temporary Threshold Shift in Harbor Porpoises Due to 3 kHz Naval Sonar Sounds and Recovery of Hearing	Ron Kastelein <i>SEAMARCO</i>	Establish a dose-behavior response relationship around 3 kHz sound exposures and determine sound exposure levels associated with temporary threshold shifts (TTS) and hearing recovery.

Population Density Estimation from Passive Acoustic Monitoring

22 pre-proposals • 3 new starts

Project No.	Title	Principal Investigator & Organization	Objective
16	Passive Acoustic Density Estimation of Baleen Whales: Using Sonobuoys to Estimate Call-Rate Correction Factors	Shannon Rankin <i>Southwest Fisheries Science Center</i>	Estimate baleen whale density in the California Current and Navy's SCORE range by combining sonobuoy data with visual sightings to estimate the correction factor needed to convert call density data to whale density data.
17	Blue and Fin Whale Density Estimation in the U.S. Pacific Fleet Southern California Offshore Range Using Passive Acoustic Monitoring Data	Ana Širović <i>Scripps Institution of Oceanography</i>	Develop spatially and temporally explicit density estimates for blue and fin whales in Southern California (SOCAL) range to provide the Navy with a realistic, quantitative assessment of levels of impact. Results will ensure better estimates of potential disturbance and harassment for mitigation planning for future naval training and Environmental Impact Statement (EIS) assessments.
19	DECAF-TEA: Density Estimation for Cetaceans from Acoustic Fixed sensors in Testing and Evaluation Areas	Len Thomas <i>University of St. Andrews</i>	Demonstrate and validate a method for passive acoustic density estimation that can be used across a range of species, environments and temporal scales. Density estimates will be added to the Navy Marine Species Density Database.

Marine Species Monitoring Data Collection Toolkit Development

8 pre-proposals • 1 new start

Project No.	Title	Principal Investigator & Organization	Objective
18	Acoustic Metadata Management for Navy Fleet Operations	Marie Roch <i>San Diego State University</i>	Expand development of Tethys, a passive acoustic monitoring metadata database, to improve its utility for long-term Navy monitoring data management and support Navy mitigation efforts.

IN-PROGRESS REVIEW 2015

Over 40 researchers and members of the program's management team packed the main conference facility at NAVFAC EXWC in Port Hueneme, California for the third annual LMR In-Progress Review (IPR). These IPRs provide the program's Principal Investigators (PIs) with a chance to share the results of their program-sponsored research projects. They also provide members of the program's management team (the LMRAC) with an opportunity to comment on the progress of those efforts and the work to be done in the out years. The LMRAC ensures that LMR program research is focused on Navy needs and provides its PIs with insights and assistance to migrate the results of their research into the operation of the Fleet and System Command testing and training ranges.

Before the start of the IPR, LMRAC members met to discuss the results of a workshop held in April 2015 to review the status and future of research into the behavioral responses of marine mammals to naval sonar exposure. This workshop was undertaken to evaluate the return on investment of current U.S. Navy funded programs, identify the data needs and the contributions of current research programs to meeting those data needs, and determine the ability to meet outstanding data needs given the current state of the technology. Len Thomas from the University of St. Andrews was on-hand to walk LMRAC members through the results of the report and receive feedback prior to its publication.

The 2015 LMR IPR started officially on Tuesday, 20 October with a morning of presentations by members of the LMRAC. After Anu Kumar welcomed the participants, managed introductions and provided highlights of the program's financial and execution successes for the past fiscal year, Mandy Shoemaker concentrated her presentation on the annual reporting requirements for the assembled PIs. Julie Rivers from the U.S. Pacific Fleet and Nora Gluch from the Naval Sea Systems Command were up next to provide an overview of the Navy's monitoring program underway at the Navy's Fleet and System Command testing and training ranges—a valuable context for all LMR projects. These presentations were followed by briefs about two of the LMR program's longest running investments—the Southern California Behavioral Response Study and the Marine Mammal Monitoring on Navy Ranges projects.

Wednesday was dedicated to checking in with the various PIs on the LMR projects that were initiated in FY14. This allowed for an opportunity to hear about the great progress being made on some projects and discuss mid-course corrections for others.

The report from the April workshop on research into marine mammal behavioral responses to naval sonar is now available at: <http://hdl.handle.net/10023/7741>. Report citation: Harris, C.M. and L. Thomas. 2015. Status and future of research on the behavioral responses of marine mammals to U.S. Navy sonar. CREEM Technical Report 2015-3, University of St. Andrews.

On Thursday morning, the spotlight was shifted to the program's FY15 "new start" projects and the PIs charged with managing them. Each of these PIs were given time to highlight the objectives of their "new starts" and receive some feedback from the LMRAC and others to ensure that their proposed approaches will fit the need. (For an annotated list of these projects, see the "LMR Projects—"New Starts" for 2015" section in this issue of LMR News. Highlights about all of these efforts are being compiled and will eventually be posted as project fact sheets to the LMR website at www.lmr.navy.mil/ProjectHighlights.aspx.) In the middle of the afternoon, IPR attendees toured the nearby Ocean Engineering Department and its resident remotely operated vehicle and pressure tanks that mimic ocean pressure levels and temperature to test equipment durability and survivability.

By all accounts, this was yet another successful IPR that allowed plenty of time and space for conversation and collaboration that will inevitably benefit the program's Principal Investigators and management team and ultimately, the end users of LMR-funded technologies, software and analytical methods.

The 2016 IPR, which includes only those involved in LMR-funded projects, will be held sometime in the fall of 2016 back at NAVFAC EXWC in Port Hueneme, California. Read the winter 2016 issue of LMR News for more details.

The following organizations were represented at the 2015 LMR IPR:

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|--|---|
| 1. Bio-Waves, Inc. | 14. Navy Marine Mammal Program |
| 2. Cascadia Research Collective | 15. OASN (EI&E) |
| 3. Chief of Naval Operations Energy and Environmental Readiness Division | 16. Ocean Acoustical Services and Instrumentation Systems, Inc. |
| 4. Commander Pacific Fleet | 17. Office of Naval Research |
| 5. Deputy Assistant Secretary of the Navy for Environment | 18. Oregon State University, Cooperative Institute for Marine Resources Studies |
| 6. Deputy Chief of Naval Operations for Information Dominance | 19. San Diego State University |
| 7. HDR, Inc. | 20. Scripps Institution of Oceanography |
| 8. National Marine Mammal Foundation | 21. Southall Environmental Associates |
| 9. Naval Air Warfare Center Weapons Division China Lake | 22. Space and Naval Warfare Systems Command, Systems Center Pacific |
| 10. Naval Facilities Engineering and Expeditionary Warfare Center | 23. U.S. Fleet Forces Command |
| 11. Naval Facilities Engineering Command Atlantic | 24. University of California San Diego |
| 12. Naval Sea Systems Command | 25. University of St. Andrews |
| 13. Naval Undersea Warfare Center—Newport | 26. Woods Hole Oceanographic Institution/Boston University |

PROGRAM INVESTMENT AREAS

The LMR program's five key investment areas are:

1. Data to Support Risk Threshold Criteria

Research regarding potential impacts to marine species from Navy training and testing activities, primarily focused on potential impacts from sound (e.g., hearing studies, sound exposure and behavioral response studies).

2. Improved Collection and Processing of Protected Species Data in Areas of Navy Interest

Develop methods to improve the ability to process large amounts of marine species data and provide cost effective solutions to enhance marine species monitoring capabilities (e.g., new detection and classification algorithms, automated processing tools for passive acoustic monitoring data).

3. Monitoring and Mitigation Technology Demonstrations

Demonstrate technologies that offer to enhance marine species monitoring capabilities (e.g., new passive acoustic monitoring technologies and platforms such as gliders).

4. Standards and Metrics

Establish interagency and scientific community standards and metrics to evaluate marine species data to provide comparable results (e.g., standards for hearing studies, detector and classifier performance analysis standards).

5. Education and Outreach, Emergent Opportunities

Support education and outreach on LMR-funded research investments and new scientific methods available to the broader scientific community. Emergent research topics of priority interest to the Navy (e.g., LMR website and program outreach on investments, Introduction to Density Estimation from Acoustics (IDEA) training, other study topics needed by the Navy).



Pilot whales.

LMR PROGRAM PARTICIPANT UPDATES

Sea Mammals and Sonar Symposium

Several LMR program participants—PIs, LMRAC members and staff—participated in the Sea Mammals and Sonar Symposium in St. Andrews, Scotland, which took place in October. The symposium addressed the progress in the field of understanding the impact of anthropogenic sound in the ocean and included presentation of the results of the Sea Mammals and Sonar Safety (3S) project and related research projects. In addition to the presentations, the symposium included ample time for discussion that focused on future research needs and opportunities. PDF copies of all presentations can be found at <https://www.tno.nl/smss/>.

OUR WEB SITE—WHAT'S AVAILABLE NOW

Our web site (www.lmr.navy.mil) is a ready source of up-to-date information about the LMR program.

The screenshot shows the homepage of the Living Marine Resources (LMR) Program website. At the top, there is a navigation menu with links for HOME, PROGRAM DETAILS, NEEDS, PRE-PROPOSALS, PROJECT HIGHLIGHTS, LMR NEWS, and LOGIN. The main heading reads "Living Marine Resources (LMR) Program" with the subtext "SCIENCE • STEWARDSHIP • NAVY READINESS". Below this, there is a "WELCOME TO THE NAVY'S LMR PROGRAM" section with a "READ MORE >>" button. To the right is a large image of a white whale. Below the welcome message is a "QUICK LINKS" section with links for NEEDS, PRE-PROPOSALS, PROGRAM SCHEDULE, ANNUAL REPORTS, CONTACT US, and DOWNLOAD OUR LOGO. To the right of the quick links is an "LMR NEWS" section with a "DOWNLOAD PDF >>" button and a "SIGN UP FOR LMR NEWS" link. Further right is a "PROGRAM HAPPENINGS" section with two bullet points: "Our pre-proposal solicitation closed Monday 26 October at 5:00 PM PDT." and "Our first Annual Report is now available." The footer contains the U.S. Navy logo, contact information for the Chief of Naval Operations, and links for Accessibility/Section 508, Privacy Policy, and Contact Us.

www.lmr.navy.mil

PROGRAM SCHEDULE

No.	What	When
1.	Proposal Solicitation & Review	
a.	Request full proposals	Winter 2015/16
b.	Full proposals due	Spring 2016
c.	Announce project new starts	Summer/Fall 2016
2.	Project & Contracts Management	
a.	Award FY16 projects	Summer 2016
3.	Quarterly Status Reports (QSR)	
a.	Submit winter QSR	January 4, 2016
b.	Submit spring QSR	April 4, 2016
c.	Submit summer QSR	July 5, 2016
d.	Submit fall QSR	October 3, 2016

Check out our website (www.lmr.navy.mil) for a summary of upcoming dates.

LMR-RELATED PHOTOS—KEEP THEM COMING

We continue to welcome the wonderful high resolution photographs of marine mammals taken during survey work. We encourage all LMR participants to share photos of marine mammals, survey efforts, personnel who were involved and the equipment 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



Cuvier's beaked whales.
©Gregory S. Schorr/Cascadia Research

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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 provide updates on some of the sampling and analysis efforts being done in Southern California by researchers from Cascadia Research.

The fall 2015 issue of *Currents* magazine, the Navy's energy and environmental magazine, includes a photo by Erin Falcone of Cascadia Research in the Best Shot department, taken during an LMR-funded field study. You also can find past articles about the LMR program in issues of *Currents* magazine at <http://greenfleet.dodlive.mil/currents-magazine>.



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