LMR news

SPRING 2016

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Welcome!

Welcome to the spring 2016 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.

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Humpback whale.
NOAA/NMFS

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NAVFAC Naval Facilities Engineering Command
ENGINEERING AND EXPEDITIONARY WARFARE CENTER

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

Projects, proposal reviews, meetings and more kept us busy during the last quarter.

Sonobuoys and our partnership with the Sonobuoy Liaison Working Group (SLWG) are highlights this quarter. The Partnership section includes a list of projects receiving sonobuoys from the recent allocation. In addition, Shannon Rankin, a Principal Investigator (PI) on the LMR-funded project—Passive Acoustic Density Estimation of Baleen Whales: Using Sonobuoys to Estimate Call-Rate Correction Factors—spoke at the SLWG May meeting. As the group responsible for determining how many sonobuoys are available for non-defense uses, the SLWG members welcome insights on sonobuoy applications in marine mammal research and monitoring. Shannon's project is summarized in our Project Spotlight section.

Anu Kumar, Program Manager

Please look at our new 'Recent Publications' section, debuting in this issue of the newsletter. As many of the LMR-funded projects move forward, more of the PIs are reporting results in scientific journals and technical reports and presenting at conferences. We will list publications as they are available.

Looking ahead, two projects have upcoming field tests. Haru Matsumoto, PI on the project "Demonstration of High-Performance PAM Glider and Profiler Float," will be conducting a field trial of the two autonomous passive acoustic monitoring (PAM) platforms off the coast of Southern California. In addition, the Southern California Behavioral Response Study is planning another Controlled Exposure Experiment (CEE) with Navy ships in July/August. Highlights from these efforts will be shared when available.

The opportunity to submit needs to be considered for FY17 ended May 31. We received 26 need submissions, which will now be reviewed and ranked by the LMRAC. Thank you to all who participated in the needs process.

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).

Blue whales.
Dan Shapiro, NOAA/NMFS

LMR PROJECT SPOTLIGHT

Wondering about some of the new LMR projects? This section provides a brief overview of one or more projects in each issue of *LMR News*.

Passive Acoustic Density Estimation of Baleen Whales: Using Sonobuoys to Estimate Call-Rate Correction Factors

This quarter we introduce a recently funded project for FY15, *Passive Acoustic Density Estimation of Baleen Whales: Using Sonobuoys to Estimate Call-Rate Correction Factors*, Principal Investigator Shannon Rankin, NOAA's Southwest Fisheries Science Center (SWFSC).


Shannon Rankin.

Passive acoustic monitoring (PAM) is a proven means of detecting and classifying vocally active marine mammals, as well as a number of fish species. While the Navy uses PAM data for many environmental monitoring purposes, the ability to derive improved density estimates for species of concern is perhaps the most powerful and beneficial application of PAM. Currently there are many Navy sites where density estimates are either not available, or are derived from large area visual surveys with limited data (fewer sightings due to inclement weather).

This project team is using sonobuoys to conduct PAM monitoring during a large-scale cetacean survey being conducted by National Oceanic and Atmospheric Administration (NOAA). The California Current Cetacean and Ecosystem Assessment Survey (CalCurCEAS) is a survey designed specifically to estimate cetacean density and abundance.

Efforts to use PAM for density estimation of cetaceans can be complicated by the wide variation in hydrophone platforms as well as the long lead times needed to implement studies. The sonobuoys, however, offer a number of benefits. Sonobuoy deployment requires relatively minimal experience and can be conducted from a variety of platforms (airplanes, helicopters, ships), which allows for opportunistic monitoring. In addition, data collection can be conducted in real-time, allowing for a short turnaround between identifying a need and obtaining data and density estimates for baleen whales in a given area.

The team members are estimating the density of calls (number of calls per unit area per unit time) for several baleen whale species. They are using sonobuoys equipped with localization capabilities that work in conjunction

with PAMGuard, a widely used marine mammal passive acoustic processing program. This call density will be applied to the estimated density of baleen whales from visual sighting surveys, which under appropriate conditions are considered the 'gold standard' for cetacean population estimation. This will enable them to estimate the correction factor that would convert this call rate density into whale density. The density of whales will be compared over the entire study area using visual line-transect survey methods during daylight hours and acoustic point-transect survey methods during night hours.

Gray whale.
Dr. Steven Swartz, NOAA/NMFS/OPR

The survey portion of phase one is now complete. A total of 215 sonobuoys were deployed systematically and opportunistically during sightings of baleen whales. Two sonobuoys were deployed each evening, approximately one nautical mile apart. Experienced acoustic technicians detected and localized specific stereotyped baleen whale calls.

Most of the costs of phase one were covered by NOAA, the Bureau of Ocean Energy Management, and Navy. The data analysis portion of this phase, now underway, is being funded by LMR. The second phase will focus on refining methods and characterizing the error associated with localizing individual marine mammal detections.

LMR PARTNERSHIPS

In December 2015, the LMR program submitted to the SLWG a list of projects requesting sonobuoys. All 480 sonobuoys requested were allocated for 2016. Projects receiving sonobuoys during 2016 are identified in the following table.

Project	Organization
California Cooperative Oceanic Fisheries Investigations (CalCOFI) Surveys	University of California at San Diego/ Scripps Institution of Oceanography
North Pacific Right Whale Surveys	National Marine Mammal Laboratory/ Alaska Fisheries Science Center
Southern Resident Killer Whale Surveys	Northwest Fisheries Science Center
Atlantic Marine Assessment Program for Protected Species (AMAPPS) cruise	Southeast Fisheries Science Center
Mysticetes in the Northeast/ AMAPPS cruise	Northeast Fisheries Science Center
Main Hawaiian Islands Survey	Pacific Islands Fisheries Science Center

IN-PROGRESS REVIEW 2016

A reminder that the 2016 IPR, which includes only those involved in LMR-funded projects, will be held the week of 14 November 2016 back at NAVFAC EXWC in Port Hueneme, California.

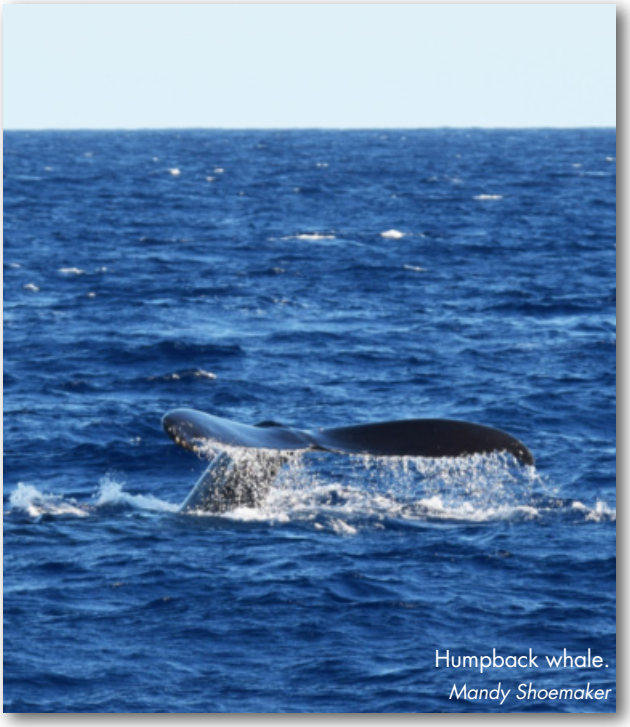
LMR PROGRAM PARTICIPANT UPDATES

Technology Test Drive Highlights

REMUS being deployed during the technology test.
Mandy Shoemaker

Principal investigators (PIs) Phil Abbot and Vince Premus from Ocean Acoustical Services and Instrumentation Systems, Inc. (OASIS) completed another test run of the Integrated Real-time Autonomous Passive Acoustic Monitoring System (IRAP). This latest sea trial was conducted in February with the coordination of Commander Pacific Fleet (CPF) at the Pacific Missile Range Facility (PMRF) in Kauai during a Submarine Commanders Course (SCC). The primary objective of this field test was to demonstrate the capabilities of the integrated autonomous PAM system using an Unmanned Underwater Vehicle (UUV) equipped with acoustic sensors for the passive acoustic monitoring of baleen whales (humpbacks) and odontocetes (beaked whales) while mid-frequency active sonar(s) are operating in the range.

The abundant presence of vocalizing humpback whales and the extensive listening capabilities of the range hydrophone (underwater microphone) array, made PMRF the ideal site for the demonstration and validation of the UUV's capabilities and performance. While further development is needed to provide a fully autonomous device, this test allowed for the demonstration of this capability and will lead to the enhancement of detecting marine mammals in offshore areas where the Navy conducts training and testing activities. This project leveraged technologies developed and funded by the Office of Naval Research (ONR).


Humpback whale.
Mandy Shoemaker

RECENT PUBLICATIONS

This new section will include recent publications (as available) from projects that are partially or fully funded by the LMR program. The information provided in the publications is of significant value to the Navy's at-sea environmental compliance process and directly feeds into the NEPA, MMPA, and ESA compliance documentation.

The following list includes publications since January 2016.

Allen, A., J. Goldbogen, A. Friedlaender, J. Calambokidis. In press. An automated lunge detector for surface and deep feeding fin whales. Methods in Ecology and Evolution.

Friedlaender, A. S., Hazen, E.L., Goldbogen, J.A., Stimpert, A.K., Calambokidis, J. and Southall, B.L. (2016), Prey-mediated behavioral responses of feeding blue whales in controlled sound exposure experiments. Ecological Applications. doi:10.1002/15-0783.

Roch, M. A., Batchelor, H., Baumann-Pickering, S., Berchock, C. L., Cholewiak, D., Fujioka, E., Garland , E. C., Herbert, S., Hildebrand, J. A., Oleson, E. M. et al. (2016). Management of acoustic metadata for bioacoustics. Ecological Informatics 31, 122-136, doi.org/10.1016/j.ecoinf.2015.12.002.

Southall, B., J. Calambokidis, , D. Moretti, A. Stimpert, A. Douglas, J. Barlow, J. Keating, S. Rankin, K. Southall, A. Friedlaender, E. Hazen, J. Goldbogen, G. Gailey, A. Allen. (2016). Project report: Biological and Behavioral Response Studies of Marine Mammals in Southern California, 2015 (SOCAL-15).

Wiggins, S. M. and Hildebrand, J. A. (2016). Final Report Living Marine Resources: ID—33 Technology Demonstration for Fleet Passive Acoustic Monitoring. MPL Technical Memorandum 608.

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. A factsheet on the Marine Mammal Monitoring on Ranges (M3R) project was recently posted on the web site. See the "Project Highlights" tab to find a downloadable PDF of the factsheet.

Our Fiscal Year 2015 (FY15) program report soon will be available online. The annual report provides an overview of the LMR program and the program's project portfolio. It includes summaries of ongoing, new, completed and partnership projects.

PROGRAM SCHEDULE

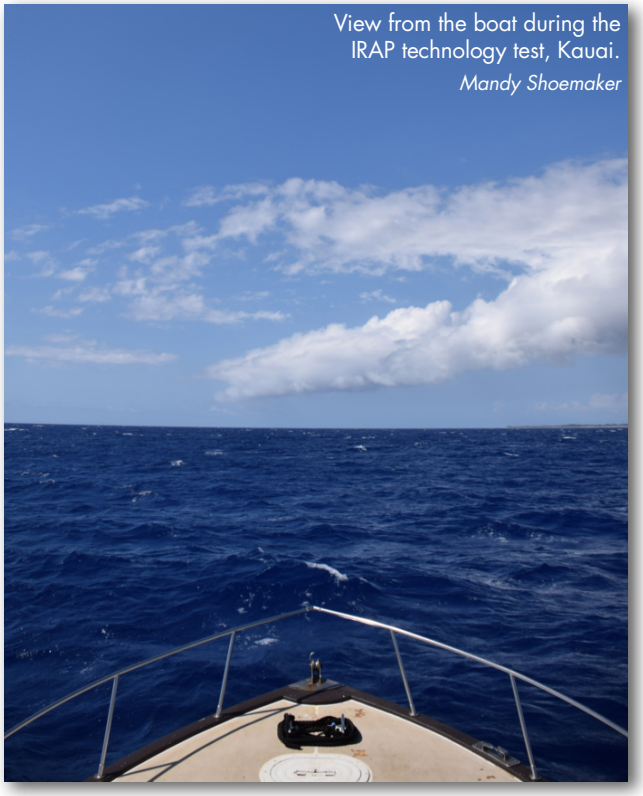
No.	What	When
1.	**Proposal Solicitation & Review**	
a.	Announce project new starts	Summer 2016
2.	**Project & Contracts Management**	
a.	Award FY16 projects	Fall 2016
3.	**Quarterly Status Reports (QSR)**	
a.	Submit summer QSR	July 5, 2016
b.	Submit fall QSR	October 3, 2016
c.	Submit winter QSR	January 3, 2017
c.	Submit spring QSR	April 3, 2017
4.	**In-progress Review**	
a.	Port Hueneme, CA	Week of November 14, 2016

Check out our website (www.lmr.navy.mil) for a possible changes and new dates.

LMR-RELATED PHOTOS—KEEP THEM COMING

Thanks go to our Deputy Program Manager Mandy Shoemaker for some of the images used in this issue. We continue to welcome the wonderful high resolution photographs of marine mammals taken during survey and demonstration 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.



View from the boat during the IRAP technology test, Kauai.
Mandy Shoemaker

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.

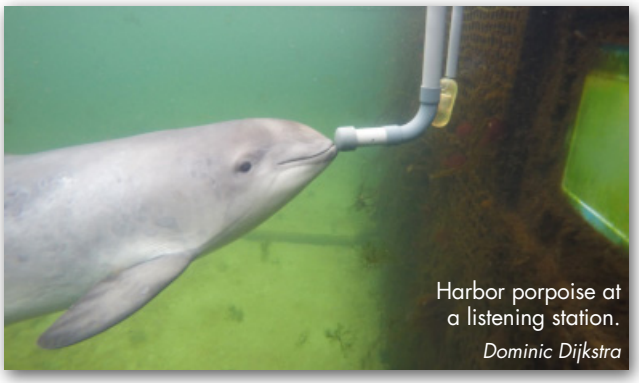
CONTACT THE LMR PROGRAM

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 provide updates on the proposal review process and notes on project field tests, as available.

You also can find articles about the LMR program in issues of *Currents* magazine at http://greenfleet.dodlive.mil/currents-magazine.



Harbor porpoise at a listening station.
Dominic Dijkstra