# LMR news

SUMMER 2021

SCIENCE • STEWARDSHIP • NAVY READINESS

## Welcome!

Welcome to the latest issue of *LMR News*—the 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 species—their occurrence in training areas and potential exposure, response and consequences.

NAVFAC Naval Facilities Engineering Command
ENGINEERING AND EXPEDITIONARY WARFARE CENTER

### INSIDE THIS ISSUE

## WHO WE ARE

The LMR program is one of the U.S. Navy's applied research (6.4) programs, sponsored by the Chief of Naval Operations Installations (OPNAV N4I) and managed by the Naval Facilities Command Engineering and Expeditionary Warfare Center (NAVFAC EXWC) in Port Hueneme, CA. The LMR program's fundamental mission is to support the Navy's ability to conduct uninterrupted training and testing, which preserve core Navy readiness capabilities. Our efforts to achieve that mission include working to improve the best available science regarding the potential impacts to marine species from Navy activities, demonstrating and validating projects ready for applied research, and broadening and improving the technology and methods available to the U.S. Navy Marine Species Monitoring Program.

## PROGRAM OFFICE INSIGHTS

It has been another busy quarter in the LMR program with personnel changes at our resource sponsor, wrapping up proposal reviews, project updates and other activities.

First, we want to share the news about changing representation from our resource sponsor at OPNAV N4I. Our previous sponsor representative, Danielle Kitchen, has assumed a new position with the Office of the Deputy Assistant Secretary of the Navy, Environment and Mission Readiness (DASN(E&MR)), as their new Director of Environmental Policy. We will miss Danielle's support as LMR's sponsor representative for the past eight years. We are grateful for all of Danielle's guidance on identifying priority research needs, her support in developing inter-agency collaborations and her contributions to building the LMR program. Danielle's experience with sea turtles and other marine species helped to move LMR to expand the program's investment portfolio beyond marine mammals to fund studies on other marine species including birds, fishes and turtles. With her new role at DASN(E&MR), we look forward to the broader perspectives that she will continue offer to LMR as a representative on the LMR Advisory Committee (LMRAC).

Danielle's former role at OPNAV N4I (previously N45) will be filled by Benjamin Colbert. Benjamin worked at Naval Sea Systems Command (NAVSEA) headquarters in Environmental Planning & Acquisition Policy and supported the Navy's environmental compliance documentation related to at-sea testing activities. Additionally, he represented NAVSEA on the LMRAC for past three years. Benjamin served in the Coast Guard, has a background in marine science and

Anu Kumar
Program Manager

Mandy Shoemaker
Deputy Program Manager

has a broad interest in acoustic impacts to marine species. We are excited about the insights that Benjamin brings to LMR and look forward to working with him as the new sponsor representative.

We have two additional FY21 projects to announce. Note that we will announce other projects as plans and contracts are finalized.

| Investment Area | Project Title | Principal Investigator | Need |
|---|---|---|---|
| Criteria | Standardizing Auditory Evoked Potential Hearing Thresholds with Behavioral Hearing Thresholds | Dorian Houser, National Marine Mammal Foundation (NMMF) | N-0237-21 Standardizing Auditory Evoked Potential Hearing Thresholds with Behavioral Hearing Thresholds |
| Data Tools | Combining Global OBS and CTBTO Recordings to Estimate Abundance and Density of Fin and Blue Whales | Danielle Harris, University of St Andrews | N-0206-19 Demonstration and Validation of Passive Acoustic Monitoring Sparse Arrays to Estimate the Density of Low-frequency Whales Over Large Spatial Areas |

LMR was happy to contribute to an outreach video being produced by NAVFAC EXWC STEM (science, technology, engineering and mathematics) program. The video will focus on STEM careers that are relevant to the LMR program. LMR program director, Anu Kumar and deputy director, Mandy Shoemaker were interviewed about their backgrounds and how LMR projects employ aspects of STEM education. When the video is available for viewing online, we will share a link to its location.

Anu and Mandy joined a team from the Naval Postgraduate School (NPS) on a data collection effort in August. This project, Evaluating Performance of Directional Sensors in Support of Detecting and Tracking Targets of Interest in Real Ocean Environments, is assessing how directional sensors can work for detecting and tracking sounds produced by marine mammals. This project arose from a 2020 research topic submission by LMR through the NPS Naval Research Program, which resulted in a project award to an NPS team. The results will provide guidance on sensor configuration for future monitoring technologies.

Blue whale.
*Cascadia Research Collective*

The LMRAC and LMR staff have reviewed and selected the Navy research needs for FY22. The FY22 pre-proposal solicitation to address the selected needs was published on the LMR website on September 20, 2021. Pre-proposals are due on December 2, 2021.

This issue's Project Spotlight is on an Investment Area 2 (Data Processing and Analysis Tools) project, Demonstration and Validation of Passive Acoustic Density Estimation for Right Whales. After a COVID delay, a team in Brazil was able to get into the field this field season and collect data on southern right whales. See the Project Spotlight section for details.

And just in case you missed our distribution email earlier in the summer, the 2020 LMR Annual Report is now available. You can find it at the annual reports tab on our website: www.navfac.navy.mil/lmr. Our annual reports provide an overview of the LMR program's mission, history and process, updates on all the projects we oversee and a list of the publications that became available during the year. We are particularly proud of how principal investigators (PI) and program staff persevered in the face of the COVID pandemic, making notable progress on almost all of the 27 projects underway in 2020.

For the latest LMR publications, go to the Recent Publications section of this issue and for a spreadsheet listing all LMR-related publications, checkout the publications tab at our website, www.navfac.navy.mil/lmr.

## RECENT PUBLICATIONS

This section includes recent publications and reports resulting from projects that are or have been 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 National Environmental Policy Act, Marine Mammal Protection Act and Endangered Species Act compliance documentation.

And as a reminder, the full and updated Summer-21 publication spreadsheet, which includes this entry, is available on our website.

California sea lions.
*Josh Kaye-Carr, NOAA*

Kastelein, R.A., Helder-Hoek, L., Defillet, L.N., Huijser, L. A. E., Terhune, J. M. and Gransier, R. (2021) Temporary hearing threshold shift in California sea lions (*Zalophus californianus*) due to one-sixth-octave noise bands centered at 2 and 4 kHz: effect of duty cycle and testing the equal-energy hypothesis. *Aquatic Mammals*, 47(4), 394-418. DOI 10.1578/AM.47.4.2021.394.

## LMR PROJECT SPOTLIGHT

Wondering about some of the LMR-supported projects? This section provides a brief overview of one or more projects underway in the LMR program.

For this issue we present an overview of a project under Investment Area 2: Data Processing and Analysis Tools.

### Demonstration and Validation of Passive Acoustic Density Estimation for Right Whales

A team led by Susan Parks from Syracuse University and Len Thomas from University of St Andrews is working to demonstrate new approaches to collecting marine mammal density estimates. The project couples shore-based observations with acoustic cues (i.e., vocalizations) obtained via a continuous passive acoustic recording array to estimate density in a Brazilian population of southern right whales (*Eubalaena australis*). The data will be a basis for evaluating fixed-PAM based density estimation methods. The field data collection effort is led by Julia Dombroski (Ph.D. candidate—Syracuse University) with support from Instituto Australis in Brazil.

Southern right whale.
*Israel Maciel, Brazilian SISBIO permit 60324-7*

The marine mammal density estimates needed for the Navy's acoustic effects models are typically collected through ship and aerial visual surveys. While these are standard methodologies for obtaining density estimates, they are very expensive to conduct, are limited in their spatial and temporal coverage and are not effective at documenting cryptic species (species that are difficult to see). Passive acoustic monitoring (PAM) for density estimation has the potential to increase the amount of density data that can be used in the Navy's acoustic effects modeling.

The Brazilian right whale population offers a useful study opportunity because the population can be found close to shore in a coastal area where PAM devices can be easily deployed and where there are elevated hillsides suitable for visual observation of individuals. This combination allows for concurrent acoustic and visual monitoring. In addition,

previous studies with southern right whales from multiple habitats have demonstrated that the acoustic repertoires of all right whale species are similar, with the same call types described for each species. The southern right whale can thus serve as a proxy for the highly endangered North Atlantic right whale (*Eubalaena glacialis*).

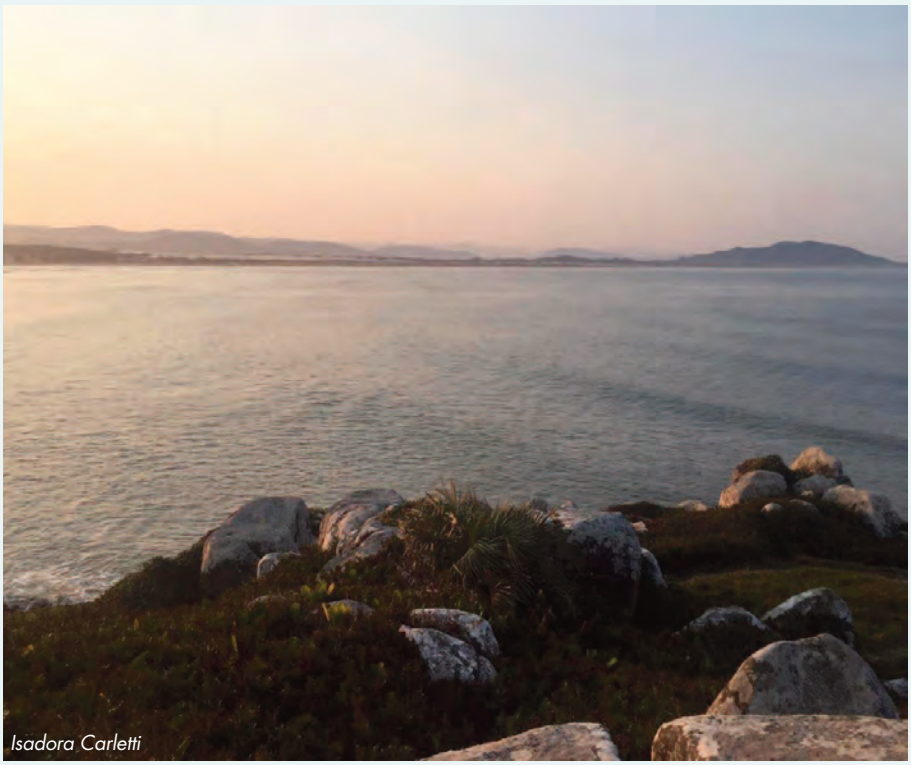
The resulting visually verified acoustic data set will be used to assess and validate a range of PAM density estimation methods for right whales. This approach could also improve the understanding of the sensitivity to variation in biological (age, sex, behavior), environmental (time of day, weather) and anthropogenic (ship noise) parameters.

Visual observation team.
*Israel Maciel*

The survey plan includes collecting visual survey data concurrently with acoustic recordings of vocally active right whales using a time-synchronized fixed PAM-array. Visual data are being recorded from a land-based survey platform using a theodolite operated by a visual observation team.
Whale presence can reliably be detected out to 8-kilometers (km), but the survey is focused within a 3 km radius area from the survey platform. The visual observation team will detect, localize and track all right whale groups within that observation area. Acoustic data are being collected through multiple underwater sound recorder units (Ocean Instruments recorders) arrayed over the 3km radius observation area. Additional recorder units are located to the north, south and east of the visual observation area to determine if sounds are coming from outside or inside the visual detection area. For example, whales calling offshore will be detected first on the offshore unit, before detection on any of the recordings within the central array. To increase involvement and engagement of local communities in the project, the acoustic array was installed and recovered with help of a team of local fishermen.

The acoustic data will be analyzed and PAM density estimates generated through three statistical methods: spatial capture recapture (SCR), extended SCR and acoustic model-based assessment of effective detection area (EDA). The visually obtained density of right whales in the bay will be compared to the output of PAM density estimates to validate the approaches applied for estimation of right whale density using passive acoustic methods.

The first field season collecting data with the array and the visual land base team occurred in August and September of 2021, with 70 hours of visual tracking of more than 80 right whales and over 1400 hours of acoustic data collected. Analysis is ongoing, with preliminary visual and acoustic density estimate comparisons planned by early next year. In the next field season in 2022, suction cup acoustic tag data will be collected in conjunction with the visual and acoustic array data to provide more insight into variation in the acoustic cue rates of individual whales.


*Isadora Carletti*

The project will provide the raw acoustic and visual data, analyses of these data sets, peer-reviewed scientific publications and oral presentations at scientific meetings. At the completion of this study, visual survey data collected under the project will be contributed to the OBIS-SEAMAP online database and tag data to the Movebank data repository.

This project is being conducted under Brazilian SISBIO (Sistema de Autorização e Informação em Biodiversidade) permit 60324-7 and has been approved by the Syracuse University IACUC (Institutional Animal Care and Use Committee).

## IN-PROGRESS REVIEW

As a reminder to PIs and LMRAC members, our 2021 IPR is scheduled for November 15 to 18, 2021. We are proceeding with plans to hold this as a hybrid meeting with both in-person and virtual options for those who will not be able to travel. More details will follow.

## PROGRAM PARTICIPANT UPDATES

Colleen Reichmuth and Jillian Sills at Long Marine Laboratory at the University of California Santa Cruz have bid farewell to KE18—a male Hawaiian monk seal who was the subject of LMR project 32: Behavioral Assessment of Auditory Sensitivity in Hawaiian Monk Seals—and have welcomed a returning monk seal, KP2. Partnership arrangements with Sea Life Park Hawaii, the University of Hawaii's Waikiki Aquarium, and the Marine Mammal Physiology Project at the University of California Santa Cruz, along with guidance from National Oceanic and Atmospheric Administration staff, enabled the safe transfer of these non-releasable monk seals. Both seals are settled in at their respective facilities—KE18 is back at Sea Life Park and KP2 is at Long Marine Laboratory. The seals are key partners in important acoustic studies of this endangered species. Results from studies with KE18 provided new data on monk seal hearing and sound production. KP2 will offer the opportunity to collect additional data from a second individual under LMR project 32, expanding our understanding of the species' auditory sensitivity and range of hearing.

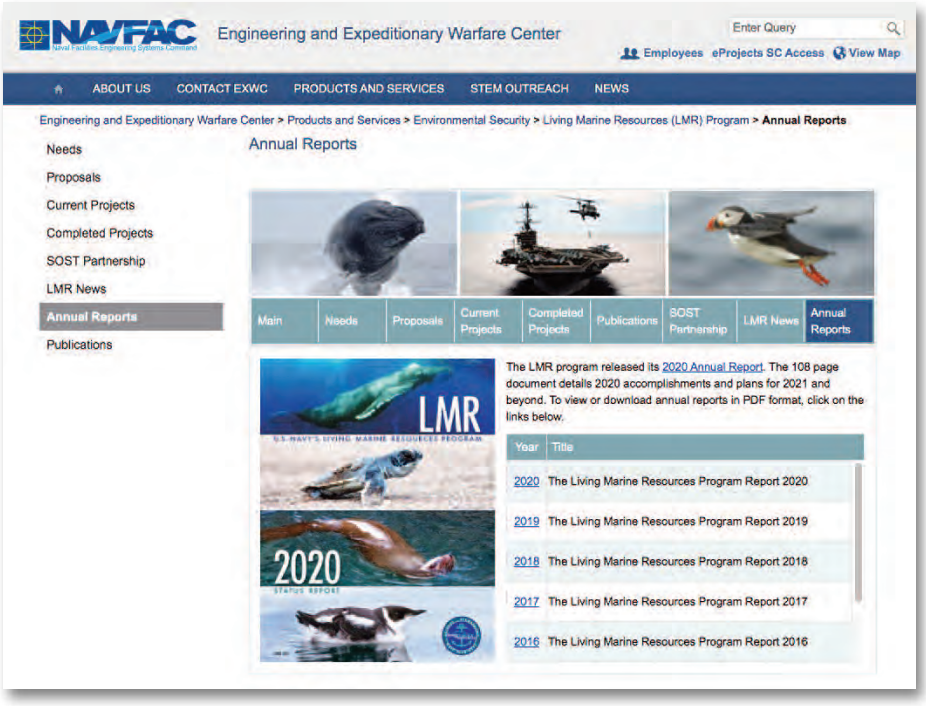
Monk seal KP2 at Long Marine Laboratory.
*Colleen Reichmuth, NMFS permit 19590*

The two male seals have been deemed non-releasable by the National Marine Fisheries Service and are housed in human care for zoological display, public education and conservation research.

The team for project 48, Collection of *in situ* Acoustic Data for Validation of U.S. Navy Propagation Models of Ship Shock Trial Sound Sources, has successfully retrieved the recording devices that were deployed for the Navy's ship shock trials. Three explosive detonations were completed by mid-August.

## OUR WEBSITE

You can find links to all of our informational materials, including fact sheets, an updated publication spreadsheet and our most recent annual report, at our website—www.navfac.navy.mil/lmr.




## PROGRAM SCHEDULE

| No. | What | When |
|---|---|---|
| 1. | Proposal Solicitation & Review | |
| a. | FY22 Needs Approved | August 2021 |
| b. | FY22 Pre-proposal Solicitation Announcement | September 20, 2021 |
| 2. | Quarterly Status Reports (QSR) | |
| a. | Submit fall QSR | October 29, 2021 (effort from July–September) |
| b. | Submit winter QSR | January 31, 2022 (effort from October–December) |
| c. | Submit spring QSR | April 29, 2022 (effort from January–March) |
| d. | Submit summer QSR | July 30, 2022 (effort from April–June) |
| 3. | In-progress Review | November 15–18, 2021 |

## LMR INVESTMENT AREAS

The LMR program focuses its research funding in five investment areas:

### 1. Data to support risk threshold criteria

Collect data to improve the Navy's acoustic and explosive impact assessments and validate mitigation requirements, information critical to the Navy's environmental compliance and permitting process. This includes data on how well animals can hear, how and when animals may be exposed to acoustic and explosive sources, and how animals respond or are affected when exposed. Projects in this area can include hearing studies, sound exposure and behavioral response studies.

### 2. Data analysis and processing tools

Make required monitoring program data processing and analysis more efficient and cost-effective. This includes developing tools to automate the processing of large amounts of data to reduce costs, increase efficiency and provide consistency. These tools support the Navy's environmental compliance process and permitting process. Projects in this area can include new detection and classification algorithms, improvements to software programs, or development of novel analytical methods.

### 3. Monitoring technology demonstrations

Continue to develop and demonstrate technologies that can improve field data collection methods. The technologies enable efficient and cost-effective implementation of the Navy's Marine Species Monitoring program. Examples include new monitoring technologies and platforms, including sensors, tags, moored devices, buoys, gliders and REMUS 600s.

### 4. Standards and metrics

Work to establish interagency and scientific community standards and metrics for data collection, management and analysis. This promotes data comparability and enables data aggregation from different data sets. It ensures consistent, agreed-upon standards and metrics in order to provide cost-effective improvements to data and results that can be incorporated into the environmental compliance process. Projects in this area can include standards for data collection methods, standardized data management tools, and new metrics for reporting performance of data analysis methods.

### 5. Emergent topics

This investment area is reserved for other priority topics needed by the Navy that may come up and do not fall within the preceding topics.

## LMR-RELATED PHOTOS—KEEP THEM COMING

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 *LMR News* and give you credit—right there with your photo.

False killer whale.
*Robert K. Uyeyama*

Surely among all of those photos from field work you have a few that you're particularly proud of. Please send them along, accompanied by a caption, photo credit and permit number (as applicable) and be sure that the photos are in high resolution format. 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.

## HELP WITH OUR MAILING LIST

If you want to subscribe to, or unsubscribe from, *LMR News*, please send your email address to Eric Rasmussen at eric.rasmussen@navy.mil.

## CONTACT THE LMR PROGRAM

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

## IN THE NEXT ISSUE OF *LMR NEWS*

Our next issue will provide available information on additional FY21 projects, ongoing project updates and other program news.

# www.navfac.navy.mil/lmr