LMR news

SPRING 2020

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 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 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

Proposal reviews and pandemic planning kept program staff busy in the past quarter.

Program staff and the LMR Advisory Committee (LMRAC) recently completed proposal reviews for Fiscal Year 2020 (FY20). The full proposals address the three FY20 Need Topics:

1. **N-0228-20**: Marine Mammal Acoustic Software Application Enhancements
2. **N-0225-20**: Marine Mammal Conditioned Attenuation of Hearing Sensitivity
3. **N-0224-20**: Frequency-dependent, Underwater, Temporary Threshold Shift in California Sea Lions

Decisions on proposal selections were made in mid-June. Project announcements will be made in the next newsletter. Available funding will influence which projects could start within the fiscal year.

The LMR program also submitted a research topic under the Small Business Innovation Research (SBIR) program, which was selected for the September SBIR Broad Agency Announcement (BAA) Solicitation. The BAA solicitation period for Phase I projects closed on October 23, 2019. Phase I projects seek to determine the scientific or technical merit of an idea or technology. The following three Phase I performers were selected and have now begun work:

1. Triton Systems
2. OASIS
3. EOM Offshore.

Anu Kumar
Program Manager

Mandy Shoemaker
Deputy Program Manager

As with so many other activities around the country and the world, the COVID-19 pandemic has affected how the LMR program is working. While most of us are working from home, we have been keeping up with our principal investigators (PIs) on their projects. Field work that had been planned to start during late winter through early summer has been postponed, which for some projects means a delay until 2021. Many of the PIs have taken this time to focus on data analyses and manuscript preparation when possible. See the LMR Project Spotlight section for more information. We appreciate all the efforts being made to keep projects productively moving forward.

California sea lions. *Claire Fackler, NOAA*

IN-PROGRESS REVIEW 2020

We will continue to evaluate how the 2020 IPR will be conducted in a safe and productive way. We ask that PIs and LMRAC members keep the week of December 1, 2020 open on your calendars for the IPR. We will provide updates on how we plan to proceed.

LMR PROGRAM PARTICIPANT UPDATES

The Effects of Sound in the Ocean on Marine Mammals (ESOMM) conference brings together scientists that study the effects of sonar, to share their research results with operational users and regulators and show how to improve management and regulation of sonar systems based on science. Many participants in ESOMM meetings are now or have previously worked on LMR projects.

The ESOMM 2020 meeting currently is scheduled for the first week of November in Beaufort, North Carolina. The meeting co-chairs—Brandon Southall, Doug Nowacek and Andy Read—are continuing to monitor if it will be prudent to hold an in-person meeting. They expect to make the decision by July 1, 2020. The meeting is by invitation only and invitees are being contacted by email with updates.

LMR PROJECT SPOTLIGHT

While this section typically presents information on one or two of our projects, for this issue we are providing brief updates on the effects the COVID-19 pandemic is having on all our projects.

Major delays

With travel disruptions, limits on working in close quarters and short seasons for conducting work, the 2020 field work planned for several projects has been postponed. For others, data collection has been delayed because facilities have been closed. Projects affected are listed below.

No.	Project Title	Notes
22	Hearing and Estimated Noise Impacts in Three Species of Auk: Implications for for the Marbled Murrelet	Field work postponed until Spring/Summer 2021. During 2020, the team is focusing on lab work, analysis of existing data and manuscript preparation. Schedule will be delayed by one year.
23	Cuvier's Beaked Whale and Fin Whale Behavior During Military Sonar Operations: Using Medium-term Tag Technology to Develop Empirical Risk Functions	Field work postponed until Fall 2020. Currently, the team is focused on analyzing existing data and preparing manuscripts. Schedule will be delayed by one year.
24	Frequency-dependent Growth and Recovery of TTS in Bottlenose Dolphins	Data collection postponed until lab facilities are reopened. Currently, the team is focused on analyzing existing data and preparing manuscripts. Impacts to schedule are still pending.
27	High Fidelity Acoustic and Fine-scale Movement Tags	Facility closures and cancelled field work prevented development and testing of tags. Cancelled field work also stopped leasing income needed to support new tag production. Impacts to schedule are still pending.
30	Measuring the Effect of Range on the Behavioral Response of Marine Mammals Through the Use of Navy Sonar	Field work postponed until Fall 2020. Currently, the team is focused on analyzing existing data and preparing manuscripts. Schedule will be delayed by one year.
35	Multi-spaced Measurement of Underwater Sound Fields from Explosive Sources	Field work postponed until Fall 2020. Schedule will be delayed by one year.
39	Use of "chirp" Stimuli for Non-invasive, Low-frequency Measurement of Marine Mammal Auditory Evoked Potentials	Data collection postponed until lab facilities are reopened. Impacts to schedule are still pending.
40	Temporary Threshold Shifts in Underwater Hearing Sensitivity in Freshwater and Marine Turtles	Data collection postponed until lab facilities are reopened. Project team plans to recover from the delays within the next year to minimize delays to the overall project end date.
41	Improved Tag Attachment System for Remotely-deployed Medium-term Cetacean Tags	Data collection postponed until lab facilities are reopened. Impacts to schedule are still pending.
44	Demonstration and Validation of Passive Acoustic Density Estimation for Right Whales	Field work postponed until Summer 2021. Project team plans to recover from the delays within the next year to minimize delays to the overall project end date.

Minor Delays

Selected projects have seen minor delays due to disrupted work schedules. Project end dates have been extended to account for the delays where necessary.

No.	Project Title
18	Acoustic Metadata Management for Navy Fleet Operations
21	Extended Duration Acoustic Tagging of Right Whales
29	3S3: Behavioral Responses of Cetaceans to Naval Sonar
32	Behavioral Assessment of Auditory Sensitivity in Hawaiian Monk Seals

On Track

Several projects have been able to continue work as planned with minimal disruption and anticipate meeting existing timelines. However, these projects will continue to be monitored for any potential schedule changes.

No.	Project Title
17	Blue and Fin Whale Density Estimation in the Southern California Offshore Range Using PAM Data
26	The Effects of Underwater Explosions on Fish
31	DenMod: Working Group for the Advancement of Marine Species Density Surface Modeling
33	TTS in Harbor Seals Due to Fatiguing Noise of Several Frequencies
34	Standardizing Methods and Nomenclature for Automated Detection of Navy Sonar
36	Analytical Methods to Support Development of Noise Exposure Criteria for Behavioral Response
42	ACCURATE: ACoustic CUe RATEs for Passive Acoustics Density Estimation
43	MSM4PCoD: Marine Species Monitoring for the Population Consequences of Disturbance
45	Frequency-dependent, Underwater, Temporary Threshold Shift in California Sea Lions

We are very grateful to all of our project teams for working with us to come up with the best solutions we can to continue pushing forward during this time. We will provide updates in future issues if timelines change.

Blue whales.
Dan Shapiro, NOAA/NMFS

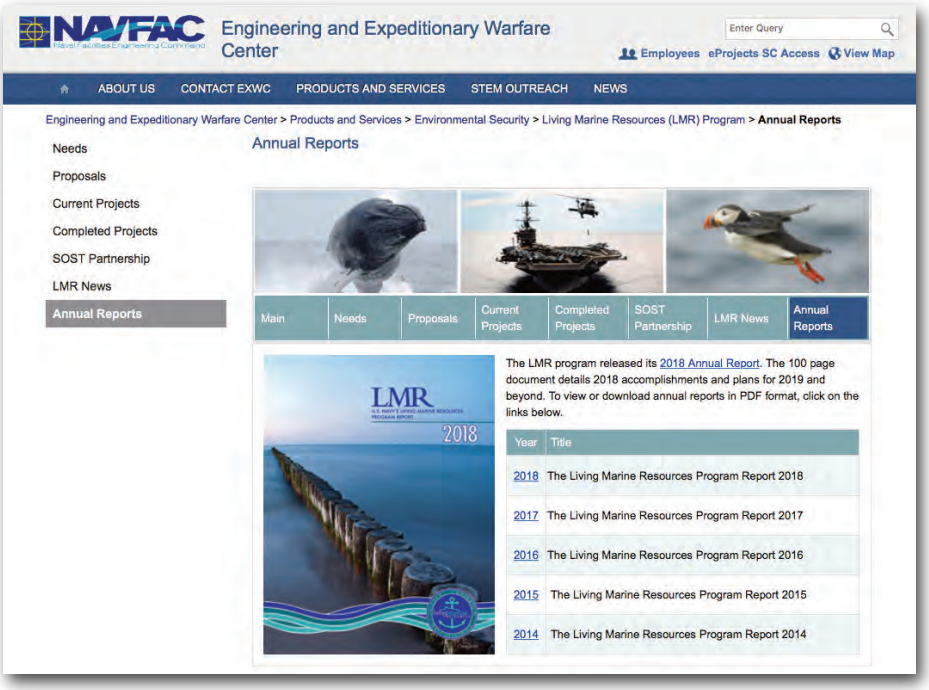
LMR PARTNERSHIP UPDATES

As noted in the Project Spotlight section, work on several projects has been delayed due to the COVID-19 pandemic. This includes projects funded by the Subcommittee on Ocean Science and Technology Interagency Task Force on Ocean Noise and Marine Life (SOST ITF-ONML). The status of each of the three projects is summarized below.

Project Title	Notes
Collection of Auditory Evoked Potential Hearing Thresholds in Minke Whales	Field work planned for summer 2020 is delayed until 2021.
Towards a Mysticete Audiogram using Humpback Whales' Behavioral Response Thresholds	Field work planned for late summer 2020 is delayed until 2021.
Investigating Bone-conduction as a Pathway for Mysticete Hearing	Currently little delay with initial work being conducted remotely. On-site experiments planned for fall 2020 will depend on facilities' schedules and access to specialized equipment.

OUR WEBSITE

You can find links to all of our informational materials, including our 2018 annual report, at our website—www.navfac.navy.mil/lmr.



www.navfac.navy.mil/lmr

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.

RECENT PUBLICATIONS

This section includes recent publications and reports resulting 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 National Environmental Policy Act, Marine Mammal Protection Act and Endangered Species Act compliance documentation.


Harbor seal.

Baumgartner, M.F., Bonnell, J., Van Parijs, S.M., Corkeron, P.J., Hotchkin, C., Ball, K., Pelletier, L-P., Partan, J., Peters, D., Kemp, J., Pietro, J., Newhall, K., Stokes, A., Cole, T.V.N., Quintana, E., Kraus, S.D. (2019). Persistent near real−time passive acoustic monitoring for baleen whales from a moored buoy: System description and evaluation. *Methods in Ecology and Evolution*, 10(9), 1476-1489. DOI: 10.1111/2041-210X.13244.

Dahl, P.H., Jenkins,A. K., Casper, B., Kotecki, S.E., Bowman, V., Boerger, C., Dall'Osto, D.R., Babina, M.A. and Popper, A.N. (2020). Physical effects of sound exposure from underwater explosions on Pacific sardines (*Sardinops sagax*). The *Journal of the Acoustical Society of America* 147, 2383. DOI: 10.1121/10.0001064.

Kastelein, R.A., Parlog, C., Helder-Hoek, L., Cornelisse, S. A., Huijser, L.A.E., Terhune, J.M. (2020) Temporary hearing threshold shift in harbor seals (*Phoca vitulina*) due to a one-sixth-octave noise band centered at 40 kHz. *The Journal of the Acoustical Society of America*, 147 (3), 1966-1976. DOI: 10.1121/10.0000908.

Kastelein, R.A., Parlog, C., Helder-Hoek, L., Cornelisse, S. A., Huijser, L.A.E., Terhune, J.M. (2020) Temporary hearing threshold shift in harbor seals (*Phoca vitulina*) due to a one-sixth-octave noise band centered at 32 kHz. *The Journal of the Acoustical Society of America*, 147 (3), 1885-1896. DOI: 10.1121/10.0000889.

For lists of other publications, please see our annual program reports and recent issues of *LMR News*.

PROGRAM SCHEDULE

No.	What	When
1.	**Proposal Solicitation & Review**	
a.	FY20 proposal review	March/April, 2020
b.	FY20 proposal decisions	June, 2020
2.	**Quarterly Status Reports (QSR)**	
a.	Submit summer QSR	July 31, 2020
b.	Submit fall QSR	October 30, 2020
c.	Submit winter QSR	January 29, 2021
d.	Submit spring QSR	April 30, 2021

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 the LMR newsletter and give you credit—right there with your photo.

Minke whale.
Mark Deakos, permit 14451

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 *LMR News*. 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 Lorraine Wass at ljwass@outlook.com.

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 information on proposal selections, an update on our 2019 LMR program report, new publications, updates on the pandemic's effects and other information as available.