ISSUE 37

LMR news

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 support the at-sea compliance process and enable the Navy to conduct essential training and testing activities.

INSIDE THIS ISSUE

NAVFAC Naval Facilities Engineering Systems Command
EXWC Engineering & Expeditionary Warfare Center

WHO WE ARE

The LMR program's fundamental mission is to support the Navy's ability to conduct uninterrupted training and testing, which preserves core Navy readiness capabilities. LMR is an applied research program, sponsored by Chief of Naval Operations for Fleet Readiness and Logistics (N4) and managed by the Naval Facilities Engineering and Expeditionary Warfare Center (NAVFAC EXWC) in Port Hueneme, CA. LMR funds Navy-driven research needs to support at-sea compliance and permitting.

PROGRAM OFFICE INSIGHTS

Since our last issue, we have selected new projects (see below), had project field efforts, held our annual In-progress Review and worked with the LMR Advisory Committee on future needs and priorities.

Our Project Updates section summarizes the 2024 field work conducted by the 3S4 (Project 64) team, which is collecting data to help compare the respective behavioral responses of marine mammals to Pulsed Active and Continuous Active sonars.

This issue's Project Spotlight provides an overview of two recently completed projects funded in cooperation with the Subcommittee on Ocean Science and Technology Interagency Task Force on Ocean Noise and Marine Life (SOST ITF-ONML).

Check out the Program Participants section for some staff updates and see the Recent Publications list for citations of multiple peer-reviewed publications that have gone to press.

We have six new projects to announce.

Investment Area	Project Number & Title	Principal Investigator(s)
Data to Support Risk Threshold Criteria	Project 76—Evaluating Behavioral Responses of Pinnipeds to Mid-Frequency Sonar to Support Navy Compliance Permits	Dan Costa
Data Processing and Analysis Tools	Project 73—Study of Marbled Murrelet Diet and Forage Species Availability Within the Inland Puget Sound Waters	Scott Pearson Monique Lance
Data Processing and Analysis Tools	Project 75—Evaluating Population Consequences of Disturbance (PCOD) to Support Navy Compliance Permits	Lars Bejder
Data Processing and Analysis Tools	Project 77—Passive Acoustic Analysis Using the Navy's M3 System	Regina Guazzo
Monitoring Technology Demonstrations	Project 72—Unmanned Underwater Vehicle (UUV) Technology to Enable Readiness of Navy Ranges	Jeff Gilbert
Standards and Metrics	Project 74—Navy Received Level Propagation Modeling Alignment Working Group	Elizabeth Henderson

IN-PROGRESS REVIEW

The 2024 In-progress Review (IPR) was held the week of December 9, 2024.

This year's meeting included 27 project presentations, nine of which were final project presentations. These projects have provided new data to support at-sea compliance as well as new insights on managing and applying the data for monitoring and assessing risk criteria. Results of these projects are now available to Navy commands.

This IPR also was an opportunity to reflect on the progress and accomplishments over the ten years that Anu Kumar and Mandy Shoemaker have managed the LMR program. Accomplishments since 2014 include

- Publishing the first risk function for Blainville's beaked whales based on operational Navy sources
- Significantly expanding knowledge of hearing in multiple marine species
- Continually working to improve monitoring technology
- Investigating the effects of Navy explosive activities on marine mammal behavior
- Exceeding 180 peer-reviewed publications.

Program Manager Anu Kumar and Deputy Program Manager Mandy Shoemaker.

See these and many more LMR accomplishments in the graphic included on pages 4 and 5.

Throughout the week, members of the LMR advisory committee (LMRAC) dedicated themselves to discussion and important questions around applying results of final projects and their perspectives on current and potential future projects. The conversations and discussions among LMRAC members and between LMRAC members and project principal investigators throughout the meetings make for better project outcomes and ensure strong information flow among the many Navy organizations and commands that LMR works to support.

Thanks to all for a great and productive meeting.

The 2025 IPR is scheduled for the week of November 17, 2025. All PIs and LMRAC members will receive an email from Anu Kumar and Mandy Shoemaker with additional details.

LIVING MARINE RESOURCES
MAJOR TECHNICAL ACCOMPLISHMENTS

2013
- Conducted first marine mammal exposure experiment with a U.S. Navy DDG using operational mid-frequency sonar (53C)
- Transitioned marine mammal hearing topic from ONR to LMR

2014
- Published deepest dive ever recorded (goose-beaked whale)
- Published first risk function based on operational Navy sources at AUTEC (Blainville's beaked whale)

2015
- Initiated first external collaboration (non-Navy) and leveraged funding project, updating Marine Mammals and Noise book
- Started investigating effect of relevant U.S. Navy operational signal duty cycles on marine mammal hearing
- Co-funded the Behavioral Response Research and Evaluation Workshop (BRREW) to reprioritize BRS investments

2016
- Awarded first LMR bird and fish studies
- Transitioned the digital acoustic recording tag (DTAG) to enable commercial availability
- Conducted first marine mammal exposure experiment with a U.S. Navy helicopter using operational dipping sonar (AN/AQS-22)

2017
- Transitioned exposure experiments using operational mid-frequency sonar (53C) to the U.S. Navy Marine Species Monitoring program
- Invested in the Density Modelling (DenMod) workgroup to advance methods and encourage collaboration among interagency stakeholders

2018
- Published first American National Standards Institute (ANSI) standard focused on auditory evoked potentials data collection in cetaceans
- Conducted explosive exposure experiment on fish, in coordination with U.S. Navy explosive ordnance disposal team EODMU3 DET SW

LIVING MARINE RESOURCES
MAJOR TECHNICAL ACCOMPLISHMENTS

2019

- Collaborated in first inter-agency investment in large whale hearing, via the Subcommittee on Ocean Science and Technology (SOST)
- Started investigating effect of animal cue rates on passive acoustic based density estimates
- Started investigating population consequences of disturbance (PCOD) analysis methods
- Awarded first LMR turtle hearing study

2020

- Leveraged Small Business Innovative Research (SBIR) program to advance passive acoustic monitoring of marine mammals using underwater gliders
- Maintained progress toward research goals during COVID-19 pandemic by focusing on data analysis and publications when field work was delayed

2021

- Conducted far field measurements of under-water propagation from a U.S. Navy full ship shock trial, USS *Gerald R. Ford* (CVN 78)
- Improved animal tag attachment duration by modifying the material and micro-texture of the suction cups

2022

- Started investigating effect of U.S. Navy operational sonar signal durations on perceived loudness of marine mammals
- Started investigating effect of U.S. Navy Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) sonar on marine mammals
- Developed an unclassified sonar detector and standard-ized sonar nomenclature report for use by researchers analyzing passive acoustic data

2023

- Conducted field measurements of underwater propagation from surface detonations, in coordination with U.S. Navy explosive ordnance disposal team EODMU3 DET SW
- Conducted first direct measurement of hearing in a large whale (minke whale)
- Co-funded the Sound Cooperative at the National Centers for Environmental Information (NCEI) to support a national cyberinfrastructure capability for passive acoustic monitoring (PAM) data

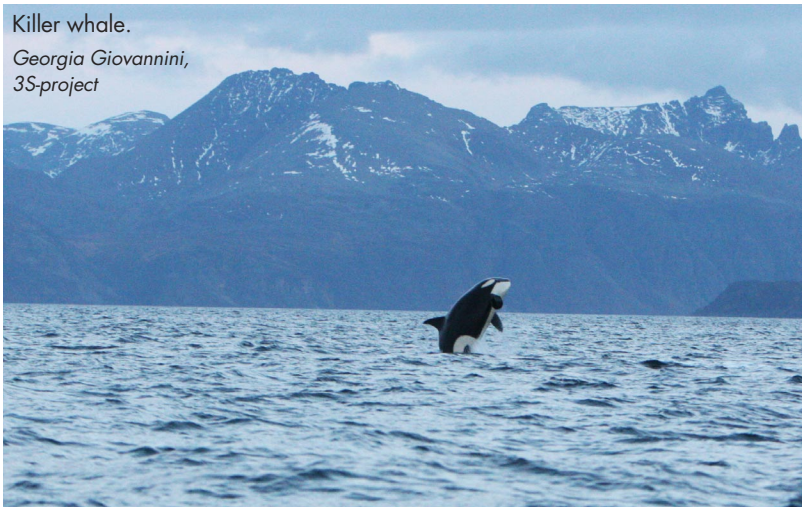
2024

- Started investigating effect of U.S. Navy activities involving explosives on the behavior of marine mammals
- Surpassed 180 peer-reviewed scientific publications available for use in the Navy's at-sea compliance process
- Published first direct measurement of hearing in a large whale (minke whale) in the prestigious peer-reviewed journal *Science*

PROJECT STATUS UPDATES

3S4: Effect of Continuous Active Sonar and Longer Duration Sonar Exposures in Killer Whales, Humpback Whales and Northern Bottlenose Whales

The recently completed 2024 field trial was a great success. In total, the team deployed 31 tags, including three Splash tags and 20 Mixed-DTAG++ to killer whales and eight Mixed-DTAG++ to humpback whales. The team conducted six long duration, controlled exposure experiments (CEEs) to 14 animals (ten focal and four non-focal), three with the continuously active sonar (CAS) signal and three with the pulsed active sonar (PAS) signal. All six CEEs were on killer whales, during the nighttime feeding context, and using the high-powered source. Thus, the team collected a well-balanced dataset to address the CAS-vs-PAS question and the effect of longer duration exposures. However, this topic needs more data to be conclusive and another trial is planned in 2025 to complement the dataset.



Killer whale.
Georgia Giovannini, 3S-project

PROGRAM PARTICIPANT UPDATES

The LMR program is saying goodbye to one of our pioneering team members—Eric Rasmussen, a computer programmer and website developer from the Naval Air Warfare Center in Lakehurst, NJ. Eric started his Navy career immediately after graduating from Rutgers University in 1985 with a degree in Chemical Engineering.

Before joining the LMR team in 2012, Eric was the primary designer and developer of software that helped acquisition program managers identify and ultimately reduce hazardous materials and obsolete specifications in aviation maintenance manuals. He was also instrumental in building the Information Technology (IT) infrastructure (including business processes, databases and a website) for a predecessor to the LMR program—the Navy Environmental Sustainability Development to Integration (NESDI) program. The LMR program recognized the value of NESDI's management application and tasked Eric to build a similar system to manage their

own business processes. The success of these applications was further recognized when two additional RDT&E programs followed suit—the Facilities Shore Readiness (FSR) program and Naval Shore Energy Technology Transition and Integration (NSETTI) programs. Together with other program managers, Eric developed the IT foundation and web presence that manage all operational aspects of LMR as well as promote program public awareness. This has enabled the LMR program to efficiently solicit, review and prioritize needs and proposals, and select the best projects that support the mission.

In retirement, Eric will be riding into the sunset on his Harley Davidson Softail with his wife Renee right behind him. We'll miss Eric's hard work and great sense of humor. We wish him fair winds and followings seas and thank him for his outstanding work on the LMR program.

With Eric's retirement, the LMR program is happy to welcome Ellen Cronkrite, our new webmaster, to the management team. She brings over three decades of IT experience with varied positions within the NAVFAC Information Technology Center (NITC). Ellen has worked in database management, Job Control Language (JCL), SharePoint and website management, service and resource contract management, hardware support, application account support, and cybersecurity vulnerabilities. She has a Security+ certification, which enables her to support IT security. In her leisure time, Ellen pursues multiple creative outlets including writing books, sewing, cooking, baking and playing with her Bichon Bolognese, Ace. Welcome to the team Ellen!

Mandy Shoemaker, LMR's Deputy Program Manager, attended the Effects of Sound on Marine Mammals (ESOMM) meeting in The Haag, Netherlands. The ESOMM meeting brings together scientists, action agencies, regulators and policy experts from all over the world to share ideas. The meeting was well attended and provided an excellent avenue to foster collaboration. In addition, the Bureau of Ocean Energy Management (BOEM) held a one-day workshop prior to the meeting focused on marine mammal noise impact research and funding priorities. This workshop allowed scientists to give an overview of current research and the funding agencies to discuss priorities and potential partnerships.

Mandy Shoemaker also attended the 25th Biennial Conference on the Biology of Marine Mammals in Perth, Australia. The conference was attended by more than 1,500 scientists, managers, policy makers and students from over 75 countries. This international forum provided valuable opportunities for publicizing Navy-funded research and monitoring efforts and identifying new research results that could contribute to Navy projects.

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 two projects from Investment Area 1: Data to Support Risk Threshold Criteria.

The projects highlighted here, managed by LMR, are two of three projects jointly selected and funded by The Subcommittee on Ocean Science and Technology (SOST) Interagency Task Force on Ocean Noise and Marine Life (ITF-ONML) partnership. The SOST ITF-ONML was organized to increase coordination and communication across federal agencies in addressing issues related to the potential impacts of anthropogenic noise on marine life. The projects were selected to increase knowledge about mysticete hearing and to help develop of audiograms for these large whales. For more on the partnership, see the SOST Partnership tab on the LMR website.

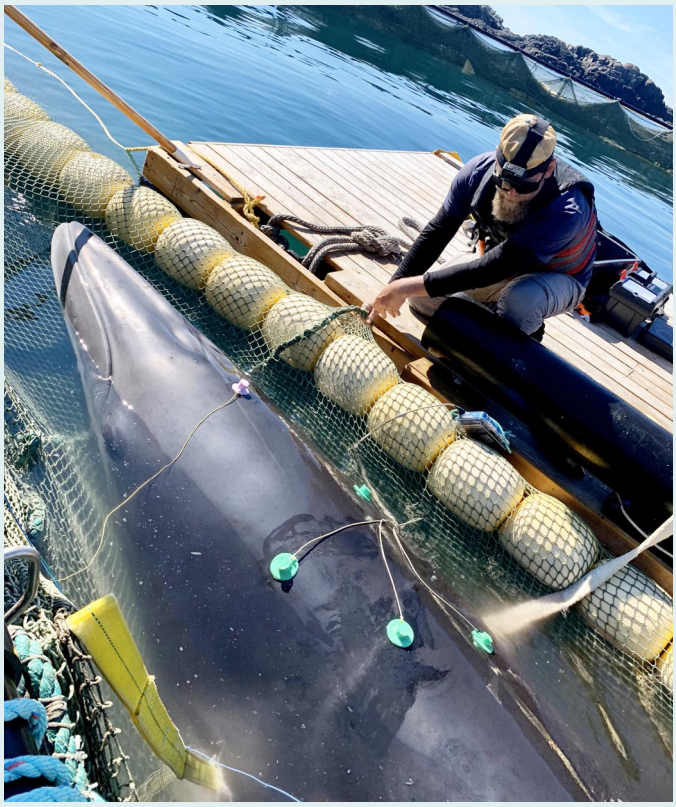
Because of their size, mysticetes pose special challenges to collecting hearing data. These two projects focused on two different mysticete species and tested different approaches to collecting hearing data. Project 37 obtained *in situ* auditory evoked potential (AEP) measurements of hearing sensitivity in the minke whale (*Balaenoptera acuotorstrata*) while Project 38 measured the behavioral response of migrating humpback whales (*Megaptera novaeangliae*) to tones of various frequencies to infer their hearing sensitivity at each frequency.

These projects are an example of how the LMR program directly supports Navy warfighters by reducing risk and enabling military readiness. The Navy is required to assess the impacts of military readiness activities on protected marine species. A lack of data results in increased risk to the Navy and requires regulators to take a precautionary approach in dictating mitigation or other permit conditions, which can reduce the realism and effectiveness of training and testing.

Project 37—Collection of Auditory Evoked Potential Hearing Thresholds in Minke Whales

This project was led by Dorian Houser of the National Marine Mammal Foundation and included an international team of marine mammal specialists. The team measured the hearing of minke whales by temporarily confining animals in a fjord off the Norwegian coast and conducting AEP testing. The AEP data collected during this project are the first direct measurements of hearing in a mysticete. Using AEPs to determine hearing sensitivity has been common practice in human and terrestrial animal research for decades. Over the last two decades, the technology also has been used routinely to test hearing in odontocetes (toothed whales), both small (e.g., dolphins and porpoises) and large (e.g., beluga, pilot and killer whales).

The project team conducted four field efforts from 2021 through 2024. Each field season improved using lessons learned in the preceding season. The first measurements were taken in 2023 and 2024. The general project approach was implemented in a migration corridor for juvenile minke whales in Norway. The area included a basin between small islands that could be sealed off with temporary barrier nets once whales were within the basin. Each whale was evaluated for test suitability and then corralled into a modified fish farm. An individual was then raised up in a net hammock for AEP testing. The team focused on small (3–5 meters long) juvenile minke whales because they were most suitable for handling and were expected to have good hearing capabilities, which increased the chance of success with the AEP methods. Juvenile minke whales are similar in size to wild beluga whales that have been temporarily caught and released for AEP testing.



First minke whale test of 2024.
Erica Staaterman

During the 2023 season, a total of 88 whales were observed near the catch system. Eight whales entered the catch basin, and two whales were successfully corralled and placed into the hammock for testing. Procedures for performing the AEP hearing test were established with the first whale and the team successfully recorded the whale's auditory brainstem response (ABR), which was the first step toward obtaining the audiogram. With the second whale, the team assessed the frequency range of hearing. Although the types of sounds used for testing were too broadband to precisely determine the upper-frequency limit of hearing in the whale, the results indicated that the whale's upper-frequency limit was between 45 and 90 kHz, which is higher than had been predicted for this species through anatomical modeling, sounds they produce and behavioral responses to sounds heard. Both whales were satellite tagged during the hearing test and showed species-typical dive and migratory behavior upon release, suggesting no long-term negative effects of the hearing test.

During the 2024 season, only 21 whales were observed in the area over the season (four times fewer than observed in the prior year) but five whales were caught within the catch basin. Of the five whales caught in the basin, two were corralled into the net hammock for testing. These whales provided

the first thresholds of hearing for any mysticete whale. Thresholds were obtained at frequencies ranging from 5 to 64 kHz. As in the prior year, satellite tag data demonstrated that the whales continued their migration to foraging grounds north of Norway following the hearing tests. One tag persisted long enough to allow observation of the minke whale's southern migration as far south as the Azores.

The frequency-specific information obtained, particularly the upper-frequency limit of hearing and the region of best sensitivity, provides data needed to validate models of hearing in mysticete whales. Techniques developed during the minke whale hearing tests will facilitate future audiometric measurements on other mysticete species. Publications on the methods and on the results have been released in the journals *Aquatic Mammals* and *Science*, respectively. (See the Recent Publications section for citations.)

Project 38—Towards a Mysticete Audiogram Using Humpback Whales' Behavioral Response Thresholds

The project team was led by Rebecca Dunlop and Michael Noad from the University of Queensland, Australia. The team measured behavioral response of migrating humpback whales (*Megaptera novaeangliae*) to tones of various frequencies to infer their hearing sensitivity at each frequency. These behavioral response experiments serve as a proxy for audiometric measurements to estimate hearing sensitivity in baleen whales.

Approaching a whale to attach a motion and sound recording tag.
The Cetacean Ecology Group, University of Queensland, permit Queensland DES # WA0009021

A series of field experiments were conducted between 2021 and 2024 in a unique site near Queensland, Australia. The study site provided several benefits: lower noise levels than many ocean sites; an extensively measured and characterized acoustic environment; and a wealth of background data on whale movements, normal whale behaviors and abundance based on 11 previous field seasons. These benefits supported tagging efforts and facilitated detecting responses to the sound source. The experiments included both a team of land-based visual observers, who recorded the movement and dive behaviors of focal groups of whales during the experiments, and on-water teams.

One on-water team attached motion and sound recording tags to some of the whales to record fine-scale changes in movement and dive behavior as

well as their acoustic environment. Another on-water team deployed a sound source from a vessel, playing upsweep tones at various frequencies to approaching whales. The trials for each experiment followed a 'before/during' protocol, where the target whale group behavior was continually recorded 'before' and 'during' the tone playback. The playback began when the whales were too far from the source to hear it (based on assumptions about their hearing in noise). The source level of the tone remained constant throughout each trial. As the whales approached the sound source, the received level of the tones at the focal group increased until the tones became audible to the whales. At this point, the focal group usually changed behavior by temporarily stopping, changing direction to avoid the vessel and/or changing dive behavior. The received level was measured at the point at which they changed behavior, giving an indication of detection-and-response threshold of the signal in noise. This was repeated multiple times for each frequency, using different groups of whales. Trials in which the vessel was present, but no tones were transmitted, were also conducted to provide a control sample. This was to ensure that the response was to the tone stimulus and not the presence of the vessel.

In 2021, the team completed 15 experiments, including one control (no signal), at 1 kHz, 4 kHz and 16 kHz. Frequencies tested in 2022 included 250 Hz (sweeping up to 315 Hz), 1 kHz (sweeping up to 1.25 kHz), 4 kHz (to 5 kHz) and 16 kHz (to 20 kHz). In 2023, a total of 32 sound trials and eight control trials were completed, with seven Acousounde tags successfully deployed and retrieved. Frequencies tested were 80 Hz, 250 Hz, 1 kHz, 4 kHz, 16 kHz and 22 kHz sweeps. The 2024 field effort completed the 80 Hz and 22 kHz dataset.

Over the four field seasons, the team completed 106 trials, with tagged animals in 12 of those trials. This total also included 12 control trials. Results showed that the study design was effective at eliciting a response, indicating that the whales heard the sounds. Data analysis showed that whales were consistently responding to all tested frequencies (80 Hz to 22 kHz). For each frequency, the lowest received level, and lowest received signal-to-noise ratio (SNR) measured at the behavioral change-point, were used to infer the hearing sensitivity of humpback whales in natural noise.

These results provide the first empirical data on large whale hearing in noise. The data on how well humpback whales can hear under ocean noise conditions will inform hearing models already developed for mysticetes, help to validate and integrate the modeling approach with real data, and provide a robust measure of humpback whale responses to tones under realistic conditions. Hearing data can also be incorporated into models used to assess the effects of various sound sources on mysticete behavior and physiology.

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 compliance process and directly feeds into the National Environmental Policy Act, Marine Mammal Protection Act and Endangered Species Act compliance documentation.

Coates, S.N., Sweeney, D.A., Falcone, E.A., Watwood, S.L., Rone, B.K., DeRuiter, S.L., Barlow, J., Dolan, K.A., Morrissey, R.P., DiMarzio, N.A., Jarvis, S.M., Andrews, R.D. and Schorr, G.S. (2024). Insights into foraging behavior from multi-day sound recording tags on goose-beaked whales (*Ziphius cavirostris*) in the Southern California Bight. *Frontiers in Marine Science*, 11:1415602. DOI 10.3389/fmars.2024.1415602.

Giovannini, G., Miller, P.J.O., Wensveen, P. and Samarra, F. I. P. 2025. Sound production during feeding in Icelandic herring-eating killer whales (*Orcinus orca*). *Ethology Ecology & Evolution*. DOI 10.1080/03949370.2024.2437373.

Houser, D.S., Kvadsheim, P.H., Kleivane, L., Mulsow, J., Ølberg, R.A., Harms, C.A., Teilmann, J. and Finneran, J.J. (2024). Direct hearing measurements in a baleen whale suggest ultrasonic sensitivity. *Science*, 386(6724):902-906. DOI 10.1126/science.ado7580.

Kastelein, R.A., Helder-Hoek, L., Van Acoleyen, L., Defillet, L.N., Terhune, J.M. and Jennings, N. (2025). Temporary hearing threshold shift in California sea lions (*Zalophus californianus*) due to a noise band centered at 40 kHz and comparison with shifts due to lower-frequency sounds. *Aquatic Mammals*, 51(1):13-30. DOI 10.1578/AM.51.1.2025.13.

Kastelein, R.A., Van Acoleyen, L., Tuytens, K., Jansen, E., Terhune, J.M. and Jennings, N. (2024). Quantifying sound exposure in a pool: comparing hydrophones on a grid with a sound recording tag on a California sea lion (*Zalophus californianus*). *Aquatic Mammals*, 50(6):592-610. DOI 10.1578/AM.50.6.2024.592.

Madhusudhana, S., Seger, K. D. and Klinck, H. (2024). Descriptor: U.S. Navy's Full Ship Shock Trial of 2021 (FSST2021). *IEEE Data Descriptions*, 1:66-70. DOI 10.1109/IEEEDATA.2024.3456710.

Ruscher, B., Sills, J.M., Packard, N., Kendall, T.L., Williams, T.M. and Reichmuth, C. (2025). Psychoacoustic data confirm reduced hearing sensitivity in Hawaiian monk seals relative to Phocinae seals. *Endangered Species Research*, 56:19-26. DOI 10.3354/esr01377.

Schick, R.S., Cioffi, W.R., Foley, H.J., Joseph, J., Kany, N.A., Margolina, T., Swaim, Z.T., Zeng, L. and Southall, B.L. (2024). Estimating received level in behavioral response studies through the use of ancillary data. *The Journal of the Acoustical Society of America*, 156(6):4169-4180. DOI 10.1121/10.0034617.

Two recently accepted manuscripts by the 3S4 team will soon be available:

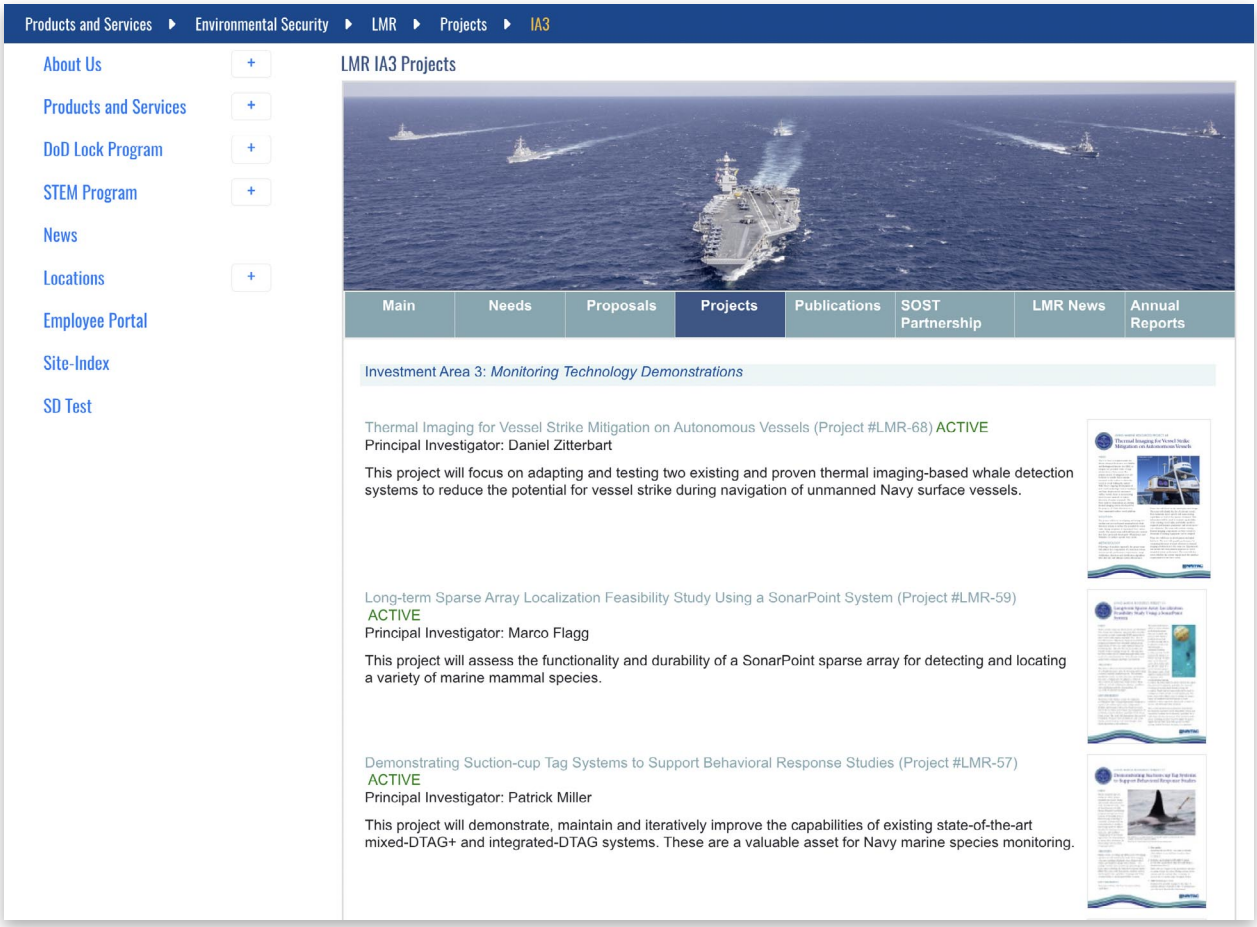
Curé, C., Isojunno, S., Wensveen, P.J., Siemensma, M.L., von Benda-Beckmann, A.M., Kvadsheim, P.H., Burslem, A., Benti, B., Roland, R., Lam, F.P.A. and Miller, P.J.O. (2025). Severity scoring of sperm whale (*Physeter macrocephalus*) behavioral responses to an operational sonar source reveals importance of received level and source-receiver distance. *Aquatic Mammals Journal* (in press).

Wensveen, P.J., Isojunno, S., Kvadsheim, P.H., Lam, F.P.A., Curé, C., von Benda-Beckmann, A.M. and Miller, P.J.O. (2025). Distance matters to sperm whales: Behavioural disturbance in response to both sonar received level and source distance. *Marine Pollution Bulletin* (in press).

As a reminder, the full and updated publication spreadsheet, which includes these entries, is available on our website.

OUR WEBSITE

At our website—exwc.navfac.navy.mil/lmr—you can find links to all our informational materials, including fact sheets, an updated publication spreadsheet and our annual reports.

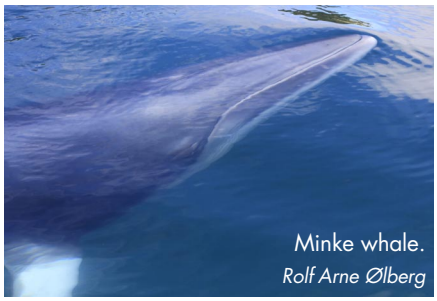


PROGRAM SCHEDULE

No.	What	When
1.	**Proposal Solicitation & Review**	
a.	FY26 Needs Evaluation	August 2025
b.	FY26 Proposal Solicitation	October 2025
2.	**Quarterly Status Reports (QSR)**	
a.	Submit spring QSR	April 30, 2025 (effort from January–March)
b.	Submit summer QSR	July 31, 2025 (effort from April–June)
c.	Submit fall QSR	October 31, 2025 (effort from July–September)
d.	Submit winter QSR	January 31, 2026 (effort from October–December)
3.	**In-progress Review**	**Week of November 17, 2025**

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 future issues of *LMR News* and give you credit—right there with your photo. Please email your high-resolution photos, accompanied by captions, photo credits and permit numbers (as applicable), to EXWC_LMR_program@us.navy.mil.



Minke whale.
Rolf Arne Ølberg

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CONTACT THE LMR PROGRAM

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

IN THE NEXT ISSUE OF *LMR NEWS*

Our next issue will provide available information on new projects, project updates and publications.

exwc.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 required data to support the Navy's acoustic and explosive impact assessments and validate mitigation requirements, information critical to Navy at-sea compliance and permitting.

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 Navy at-sea compliance and permitting.

3. MONITORING TECHNOLOGY DEMONSTRATIONS

Continue to develop and demonstrate technologies that provide critical field data collection capabilities and methods. The technologies enable efficient and cost-effective implementation of the Navy's Marine Species Monitoring program.

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. This increases the utility of limited data and provides a cost-effective means of incorporating results into Navy at-sea compliance and permitting.

5. EMERGENT TOPICS

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