

Global Library of Underwater Biological Sound (GLUBS)

SCOR WG #169

2024-2025 annual updates



What is GLUBS?

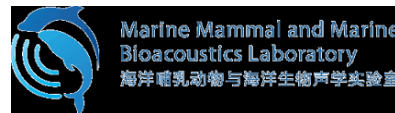
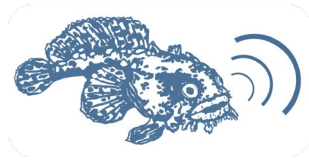


- GLUBS is the Global Library of Underwater Biological Sounds, an initiative proposed by the International Quiet Ocean Experiment ([IQOE](#)).
- Our mission is to connect and utilize existing sound tools and repositories and build datasets of known and unknown sounds to create automatic call detectors for fish, mammals, and invertebrates that will be open access and user-friendly.
- GLUBS is committed to advancing the field of bioacoustics research and providing researchers with the tools they need to study the underwater world.

What is GLUBS?



GLUBS is a collaborative effort, involving bioacousticians and data scientists from 28 different institutions globally.



Meetings



- Core group (Jarriel (USA), Mooney (USA), Di Iorio (FRA), Parsons (AUS), Rice (USA), Davidson (US/UK)) continued to meet monthly throughout the year
 - Occasional additions
- AI working group met intermittently to advance an AI perspectives paper
- In-person meeting in Denmark Sept 2025
 - 8 in-person members, plus several interested conference attendees

GLUBS Terms of Reference - Deliverables



ToR	Deliverable	Timing
1)	Up-to-date species list available on WoRMS	On-going
	Publication on new species identified as soniferous between 2023 and 2026	2026
2 a) and b)	*Publication of categorized underwater sounds of aquatic mammals	2025
2c)	*Open-access library of underwater sounds of aquatic mammals	2026
3)	Peer-reviewed article on a standard method to characterize sounds.	2025
4a)	Research Topic compilation of papers on unidentified sounds in Frontiers in Remote Sensing, including an editorial synopsis	2024
4b)	Editorial article on unidentified sounds in general science magazines	2025
4d)	*Open-access library of underwater unidentified sounds	2026
5b)	Open access dataset and publication on the use of AI detection algorithms in a fish community	2025
5c)	Collection of annotated open access datasets for the machine learning community	2025
5d)	Papers outlining a variety of AI detection algorithms	2026
6)	A synopsis of media materials produced to promote awareness of aquatic sound	Annual
	A suite of produced reference materials	2026
7a)	Publication/webpage outlining existing applications relevant to underwater bioacoustics and GLUBS	2025
7b and c)	Report on the required infrastructure to implement GLUBS libraries	2025
7)	*Implemented open access, web-based platform (includes deliverables 2c and 4d)	2026

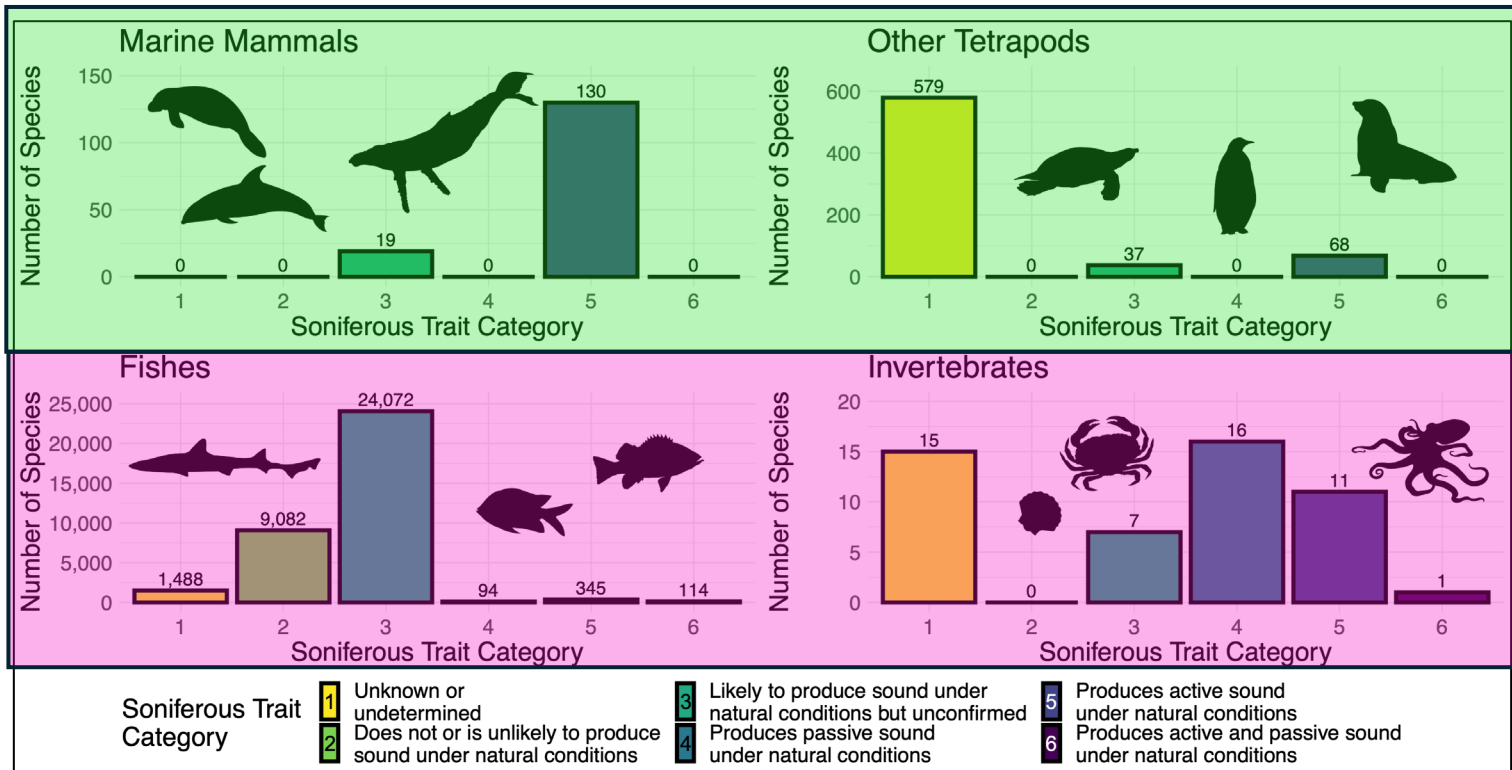
GLUBS Terms of Reference - Deliverables



ToR #1: Soniferous species list: Produce and continually update an open-access inventory of species that are known and anticipated to produce sound underwater.

ToR	Deliverable	Timing
1)	Up-to-date species list available on WoRMS	On-going
	Publication on new species identified as soniferous between 2023 and 2026	2026

Inventory Soniferous Animals – Marine mammals and other tetrapods



**Updated inventory –
Looby et al. 2026 (in prep)**

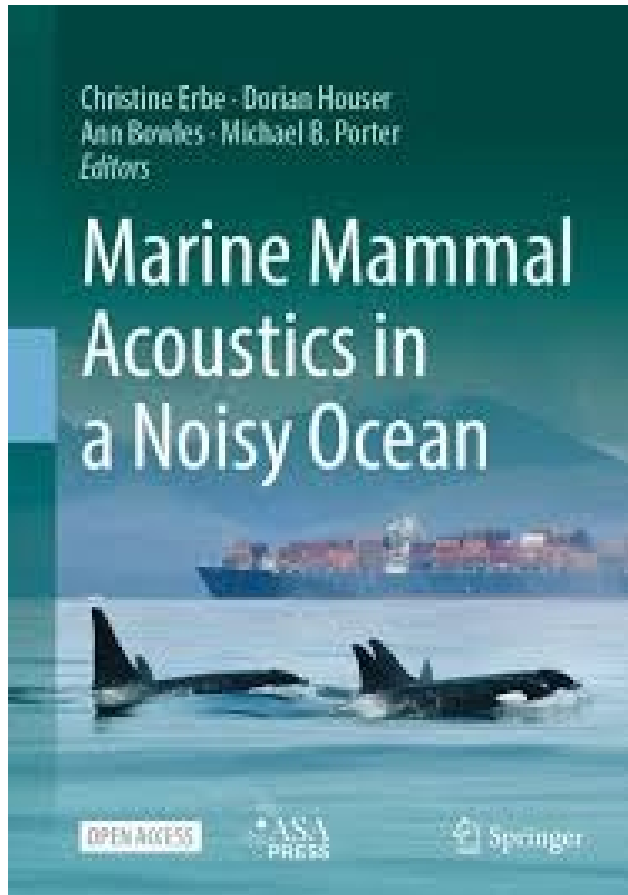
GLUBS Terms of Reference - Deliverables



ToR #2: Library of mammal sounds: Collate an inventory of marine mammal sounds, commencing with those collected by the GLUBS partners.

ToR	Deliverable	Timing
1)	Up-to-date species list available on WoRMS	On-going
	Publication on new species identified as soniferous between 2023 and 2026	2026
2 a) and b)	*Publication of categorized underwater sounds of aquatic mammals	2025
2c)	*Open-access library of underwater sounds of aquatic mammals	2026

Marine mammal sounds



Erbe et al. 2025 – taxonomic sections from each chapter

Mysticete sounds (3.13) Erbe et al.

Odontocete sounds (4.5) Erbe and Wei

Pinniped sounds (5.5) Parsons et al.

Otter sounds (6.4) Sousa-Lima et al.

Sirenia sounds (7.4) Sousa-Lima et al.

GLUBS Terms of Reference - Deliverables



ToR #3: Categorizing sound types: Develop a structured practice for the standard categorization of sounds when reporting new sounds and collating previously reported sounds into meaningful groups

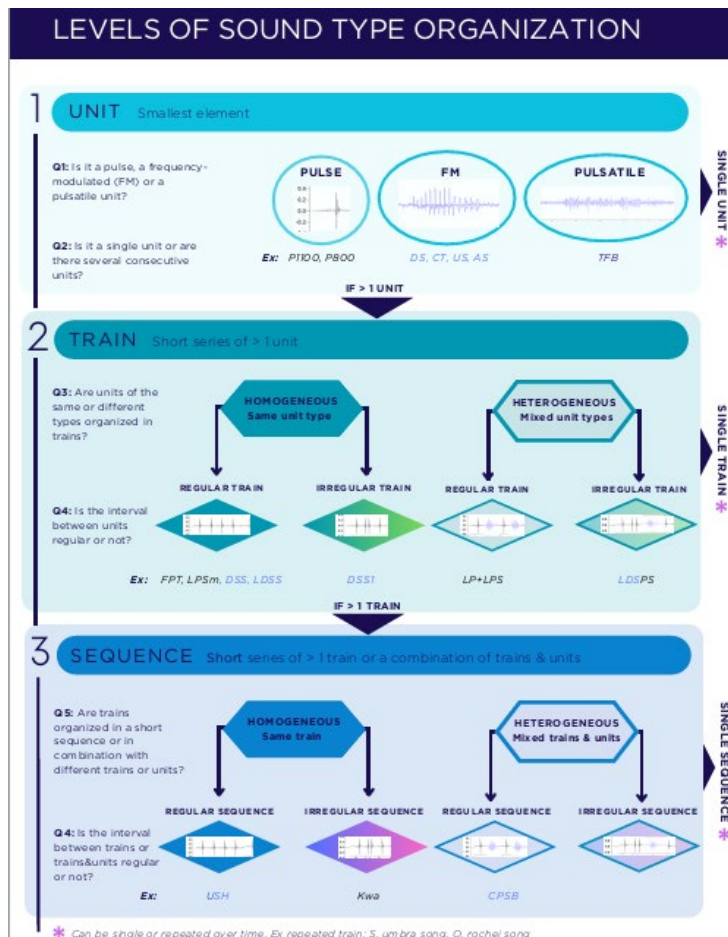
ToR	Deliverable	Timing
1)	Up-to-date species list available on WoRMS	On-going
	Publication on new species identified as soniferous between 2023 and 2026	2026
2 a) and b)	*Publication of categorized underwater sounds of aquatic mammals	2025
2c)	*Open-access library of underwater sounds of aquatic mammals	2026
3)	Peer-reviewed article on a standard method to characterize sounds.	2025

Sound characterization

Sound annotation

- Di Iorio (in prep)

- Kemp et al. (in prep) Sound annotation standardization and case study applications



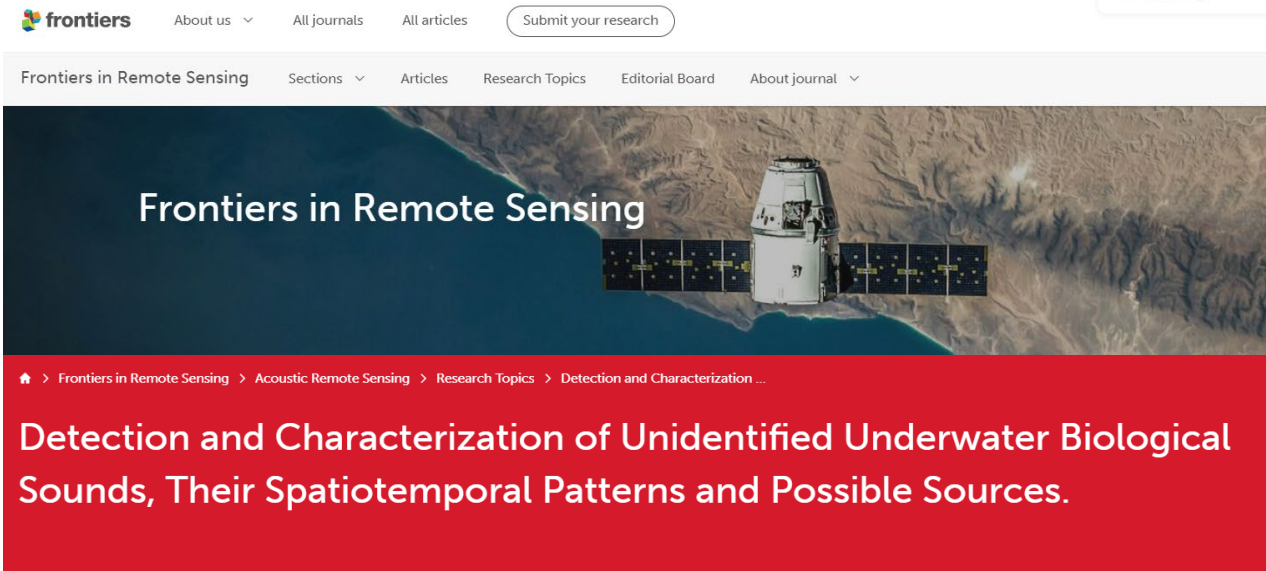
GLUBS Terms of Reference - Deliverables



ToR #4: Library of unknown sounds: Develop an open-access searchable tool that provides reference sounds for categorized unknown sound types together with temporal and spatial variations

ToR	Deliverable	Timing
1)	Up-to-date species list available on WoRMS	On-going
	Publication on new species identified as soniferous between 2023 and 2026	2026
2 a) and b)	*Publication of categorized underwater sounds of aquatic mammals	2025
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3)	Peer-reviewed article on a standard method to characterize sounds.	2025
4a)	Research Topic compilation of papers on unidentified sounds in Frontiers in Remote Sensing, including an editorial synopsis	2024
4b)	Editorial article on unidentified sounds in general science magazines	2025
4d)	*Open-access library of underwater unidentified sounds	2026

Unknown sounds



- Co-editors (13): Parsons, Mooney, Di Iorio, Looby, Rountree, Juanes, Lammers, Lin, Linke, Stanley, Sayigh, Rice, Song
- 10 papers published
- 2 rejected (1 to be resubmitted)
- 1 in interactive review
- eBook to be detailed
- Editorial to be finished

- Non-stereotypy (to species) in mysticete downsweeps (Nguyen Hong Duc et al.)
- Nocturnal fish chorusing activity in the Central Red Sea mesophotic reef zone and adjacent shallow sites (Havlik et al.)
- The Australian Fish Chorus Catalogue (2005-2023) (Hawkins et al.)
- Automatic detection of unidentified fish sounds: A comparison of traditional machine learning with deep learning (Mouy et al.)
- Unsupervised clustering reveals acoustic diversity and niche differentiation in pulsed calls from a coral reef ecosystem (Noble et al.)
- Machine learning for efficient segregation and labeling of potential biological sounds in long-term underwater recordings (Parcerisas et al.)
- Observation and Modeling of an Unusual Spatiotemporal Pattern in Bioacoustic Chorusing (D'Spain et al.)
- Revised clusters of annotated unknown sounds in the Belgian part of the North Sea (Calonge et al.)
- Cross-referencing unidentified fish sound data sets to unravel sound sources: a case study from the Temperate Northern Atlantic (Viera et al.)
- Unidentified fish sounds as indicators of coral reef health and comparison to other acoustic methods (Jarriel et al.)

Unknown sounds



Darras, K. F., Rountree, R. A., Van Wilgenburg, S. L., Cord, A. F., Pitz, F., Chen, Y., ... & Mammides, C. (2025). Worldwide Soundscapes: a synthesis of passive acoustic monitoring across realms. *Global Ecology and Biogeography*, 34(5), e70021.

Urban et al. IOQE Hydrophone metadatabase and draft manuscript

FishEye Collaborative

Individual Libraries

Australian Fish Chorus Catalogue

Lucia Di Iorio

WHOI (Mooney et al.)

JAMSTEC – Underwater sounds of Japan (T. Akamatsu – 2023-2028)

GLUBS Terms of Reference - Deliverables



ToR #4: Artificial intelligence tools: Develop new, standardized methods for detecting, identifying and characterizing underwater sounds

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2c)	*Open-access library of underwater sounds of aquatic mammals	2026
3)	Peer-reviewed article on a standard method to characterize sounds.	2025
	Implementation of ToR 3 in deliverables for ToRs 2 and 4.	2026
4a)	Research Topic compilation of papers on unidentified sounds in Frontiers in Remote Sensing, including an editorial synopsis	2024
4b)	Editorial article on unidentified sounds in general science magazines	2025
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Artificial Intelligence WG



Lin & van Zeeland. Moving toward a universal AI for underwater biological sounds (in prep).

GLUBS Terms of Reference - Deliverables



ToR #4: Promote awareness of underwater sound: Develop and implement ways to engage managers, artists, citizen scientists and the general public to promote knowledge of the importance of underwater sound to marine fauna.

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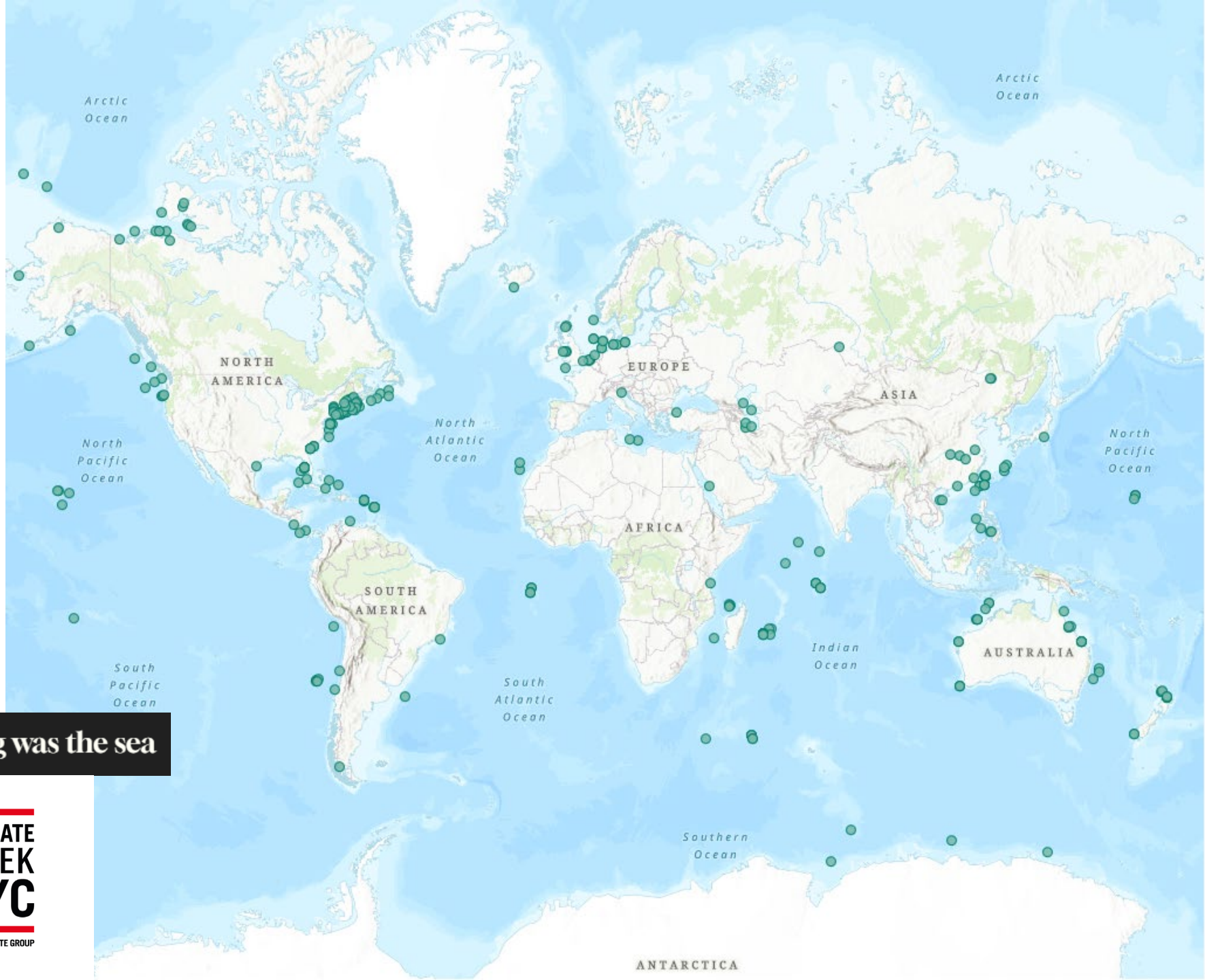
WOPAM 2024 & 2025

2024:

- 180 collaborators
- recording at over 400 global locations

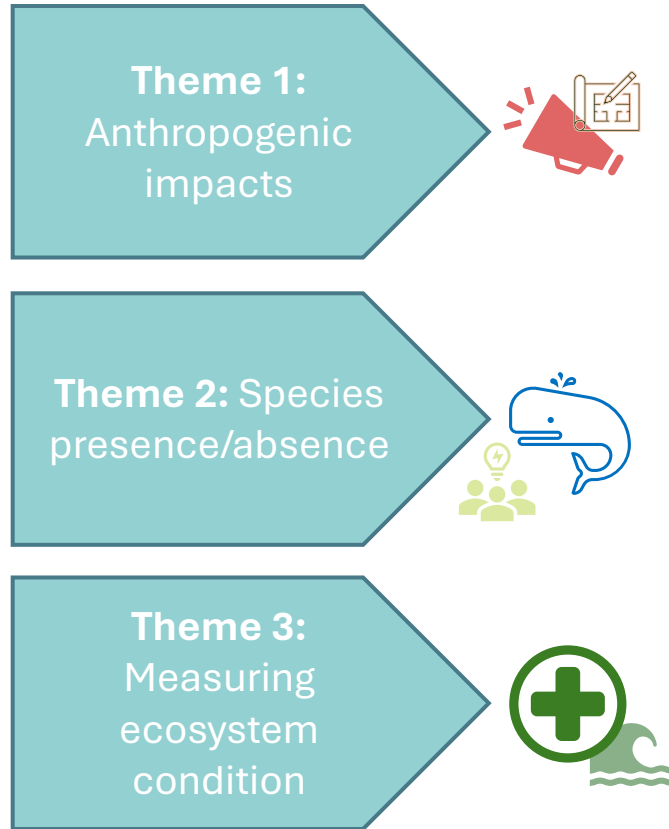


Primero estaba el mar - In the beginning was the sea



Two workshops hosted for WOPAM collaborators

Collaborator areas of particular interest



MANTA Workshop organized
December 11th with **Dr Jennifer Miksis-Olds**
40 people attended



Aquariums and “Ocean Voices” Exhibition


- Bridging the “knowledge-action gap” takes more than awareness-raising (Van Leuvan et al 2022).
- We incorporated measures of learning before/during exhibition as well as voluntary questionnaire to see what values such exhibitions may impact

Reflective → how we can be better through listening.

How did ‘listening’ to the oceans make you feel?

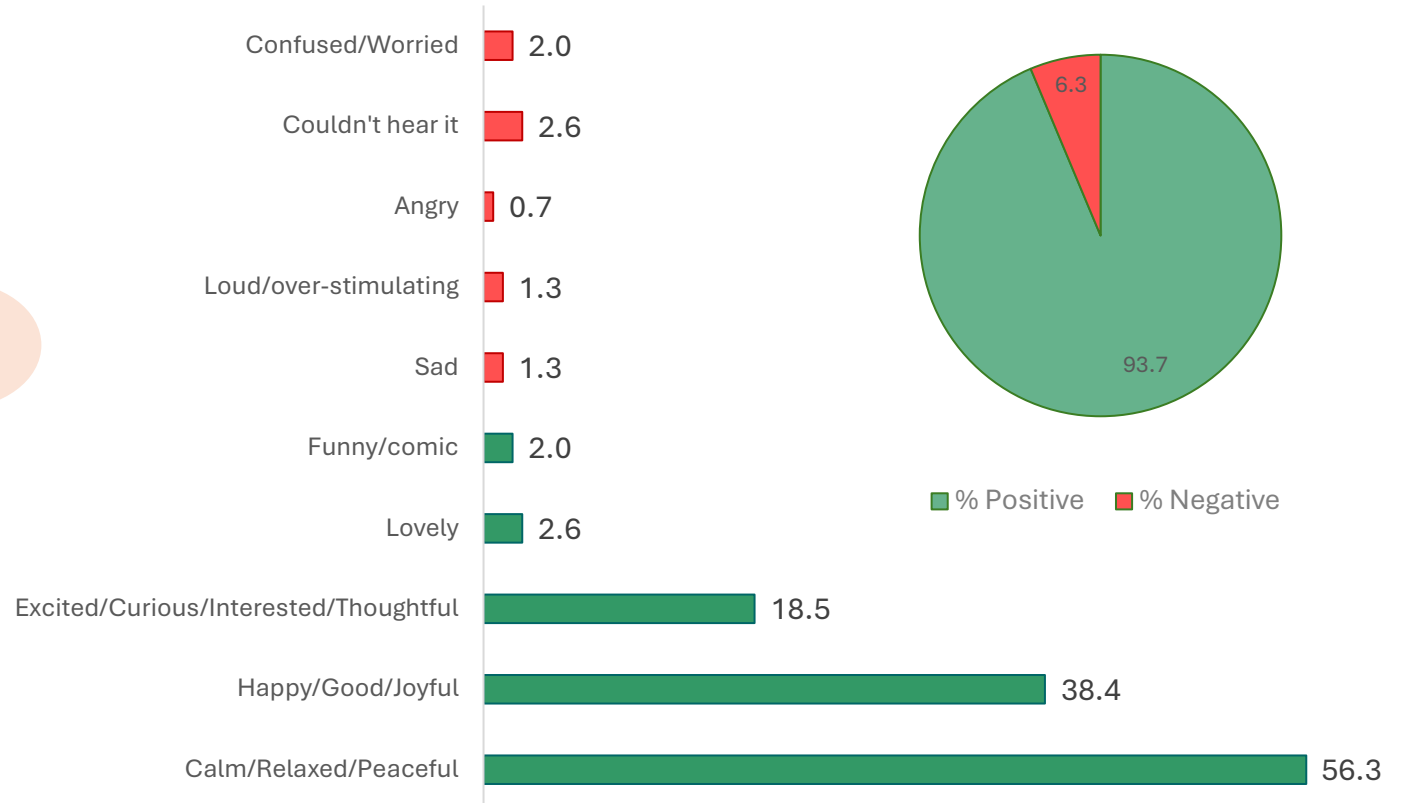
Listening to the oceans gives me a sense of peace, knowing that ~~all~~ animals of all shape, colour and ability live in its waters

Annie
12yo

 HAPPY

Olivia
4yo

Participant Responses (%) to how biological ocean sounds make them feel?



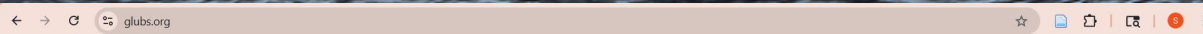
GLUBS Terms of Reference - Deliverables



ToR #7: GLUBS cyberinfrastructure: Develop the flow process to integrate these systems into a practical platform that would implement GLUBS as a global application.

ToR	Deliverable	Timing
7a)	Publication/webpage outlining existing applications relevant to underwater bioacoustics and GLUBS	2025
7b and c)	Report on the required infrastructure to implement GLUBS libraries	2025
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Cyberinfrastructure



 **Global Library of Underwater Biological Sounds**

[Home](#) [About](#) [Resources](#) [Sounds](#)

Welcome to GLUBS

Connecting the World of Underwater Sound

[Who We Are](#)



Searchable lists for underwater sound repositories, tools for analysis, and sound libraries

Updating in the coming months

Underwater Sound Repositories

In its raw form, acoustic recordings can require lots of space and memory, making it difficult to maintain. As technology to process these vast stores of data continue to develop, it's vital that the original files are maintained and accessible. You can look through existing repositories of underwater sound to test your own detection algorithms, mine sounds, or simply explore.

Filter by Features

- Data available upon request
- On-going
- Open source data
- Real-time
- User data storage

Filter by Region(s)

- Antarctic
- Arctic
- Atlantic

Number of applications found: 30

ARBIMON

Global
On-going, User data storage
mostly terrestrial



Aloha Cabled Observatory

Pacific
Real-time, On-going



Funding applications - Previous



ARDC – Research orientated platforms

Australian Fish sounds catalogue (pre FishSounds.net)

Partners: AIMS, Curtin, Auckland Uni, Waikato Uni, JASCO, Griffiths, Sydney University

Department of Climate Change Energy, Environment and Water

**Innovative Biodiversity Monitoring grants
Nature Repair Market**

Partners: Curtin University



Australian Research Data Commons



Australian Government

**Department of Climate Change, Energy,
the Environment and Water**

Funding applications - Previous



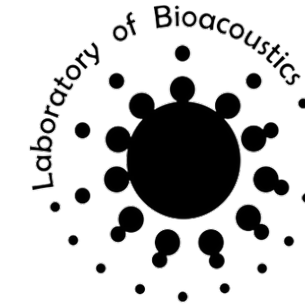
Identification and characterization of events in the marine acoustic landscape between the mouth of the Amazon River and the surrounding areas of the state of Maranhão

Sentinels of the Blue Amazon

Focus: Building the ARC catalogue - Archive for Research and Conservation of Images and Sounds from Nature - EcoAcoustic Research Hub

Universidade Federal do Rio Grande do Norte, Brazil

Partner and funding: CLS Brasil, CNPq, Brazilian Navy



Sound Science for Nature



SENTINELAS DA
AMAZÔNIA AZUL



Funding applications - Future



CetaceaCloud (PI Renata Sousa-Lima)

And

Sonoteca Amazonia (Co-PI Renata Sousa-Lima)

Funding – ANP/PETROBRAS

Focus:

Database for

Marine mammals on the Equatorial Coast of Brazil

And

Amazonian biodiversity

Partners: UFRN, UFPA, CLS Brasil, Instituto Mamirauá



Funding applications - Future



Advanced Strategic Capabilities Accelerator (ASCA)

Funding – Australian Defence Science and Technology Group

Focus:

Theme 2 – Acoustic Data Collection and Processing seeks innovative solutions on sensors, edge processing and high-performance computing for data processing.

Submission – RFI on Sept 15th, Pitch Day Nov 2ⁿ

Collaboration: AIMS, Cetaware, FishEye Collaborative



Pitch Day 2025 Scope cont.

Theme 2: Acoustic Data Collection and Processing, CDRE Michael Turner

- Challenge Statement 2A. Sensors
How might we collect and continuously monitor acoustic intelligence data for barrier operations using a low cost, two-person deployed systems for 120 days?
- Challenge Statement 2B. Edge processing
How might we continuously monitor acoustic sensors, automatically detect and classify signals of interest at the edge, and transmit classifications with confidence for barrier operations using a low cost, two-person deployed system for 120 days?
- Challenge Statement 2C. High-performance computing for data processing
How might we process large volumes of complex acoustic intelligence data ashore to automatically generate data libraries and actionable intelligence?

In response to this RFI, you are permitted to propose one solution per theme, for a maximum of two solutions. A solution may address multiple Challenge Statements within the same theme.

Funding applications - Future



Indo-Pacific Ocean Initiative

Funding – Dept. Foreign Affairs and Trade

Focus:

Indian Ocean
Microplastics (India)
Deep sea centre (Indonesia)

Presentations in May (India), August (Indonesia)

Slow burn - 2026



RESEARCH CENTER FOR DEEP SEA
IPOI SEMINAR SERIES

Opening: Dr. Marina C.G. Frederik - Acting Head of Research Center for Deep Sea

Understanding and Addressing Marine Plastic Pollution across Australian Ecosystems
Dr. Marina Santana
Postdoctoral Research Fellow - Microplastics



A Regional Hub for a Global Library of Underwater Biological Sounds (GLUBS)
Dr. Miles Parsons
Research Scientist - Marine Acoustics



Moderator:
Dr. Angga Dwinovantyo



Thursday, 21 August 2025
KST B.J. Habibie Serpong - 13:00-14.30 WIB
KKB Atjep Suwartana Ambon - 15:00-16.30 WIT

RESEARCH CENTER FOR DEEP SEA & AUSTRALIAN INSTITUTE OF MARINE SCIENCE