



DOSITS WEBINAR · OCTOBER 2026

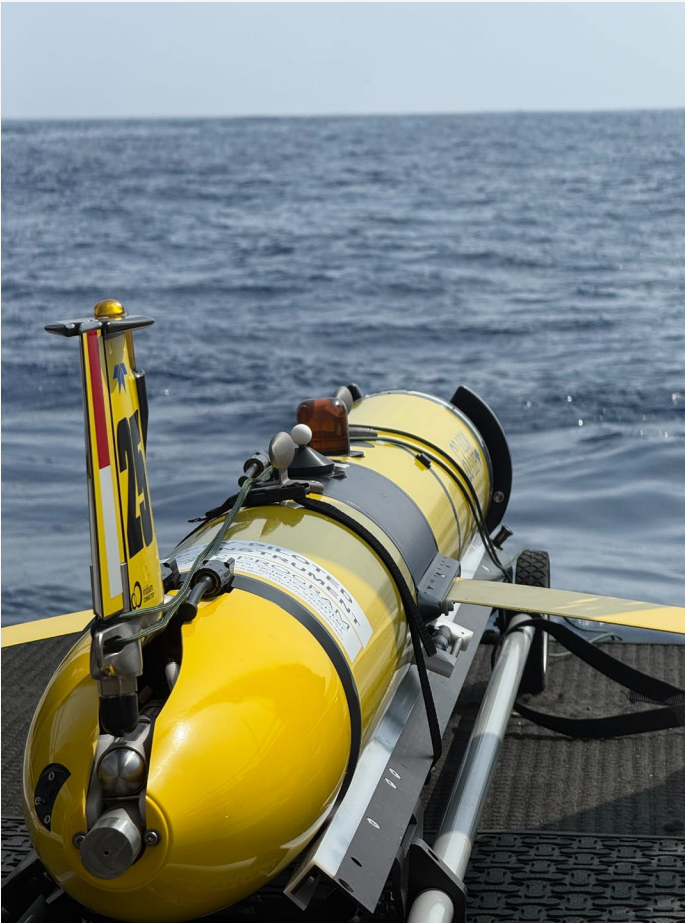
Passive acoustic gliders for management & conservation

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Gliders can support protected species management



A Slocum glider with a DMON ready for deployment — NOAA Fisheries

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Legal mandates

Marine Mammal Protection Act (MMPA, 1972) and Endangered Species Act (ESA, 1973) require abundance estimates and risk assessments to set take limits and designate critical habitat

In the US, marine mammals are managed by NOAA and USFWS

Scale of the problem

Cetaceans range across thousands of kilometers of ocean — traditional visual surveys are expensive, weather-dependent, and leave large gaps in coverage

Passive acoustic gliders to fill the gaps

Low-cost, all-weather, all-hours, months-long deployments cover new ground and provide data streams that can feed directly into management

Why gliders — a quick reminder



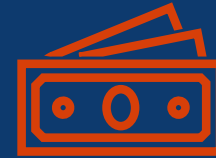
Vast coverage

Access remote and diverse offshore habitats difficult to access by ship



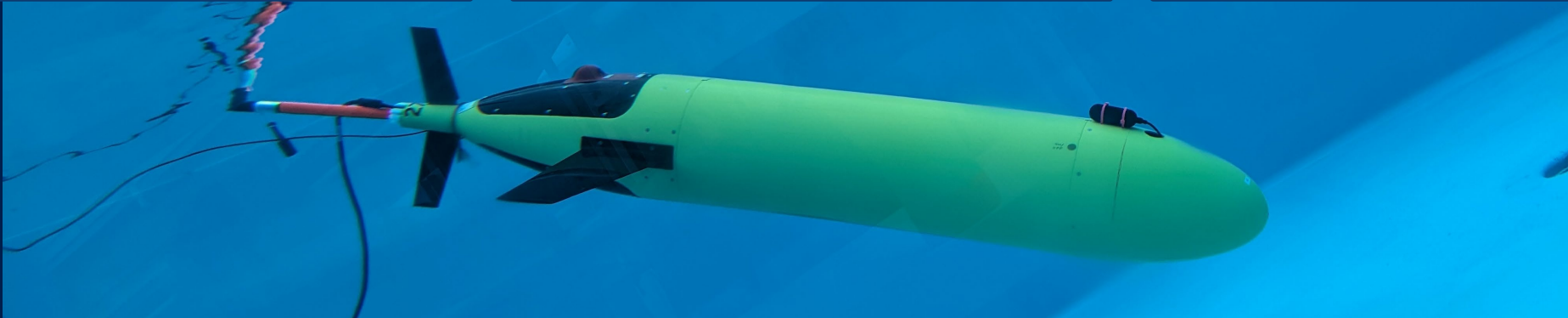
All-weather persistence

Months-long deployments, day and night, through conditions that ground ships and planes



Low cost

A fraction of ship-based survey cost — enables more surveys, more species, more regions



Case study: North Atlantic right whales

~380 individuals remaining

one of the world's most endangered large whales

Primary threats are vessel strike & fishing gear entanglement

Both could be reduced with real-time knowledge of whale locations
Ocean noise and climate change are secondary concerns

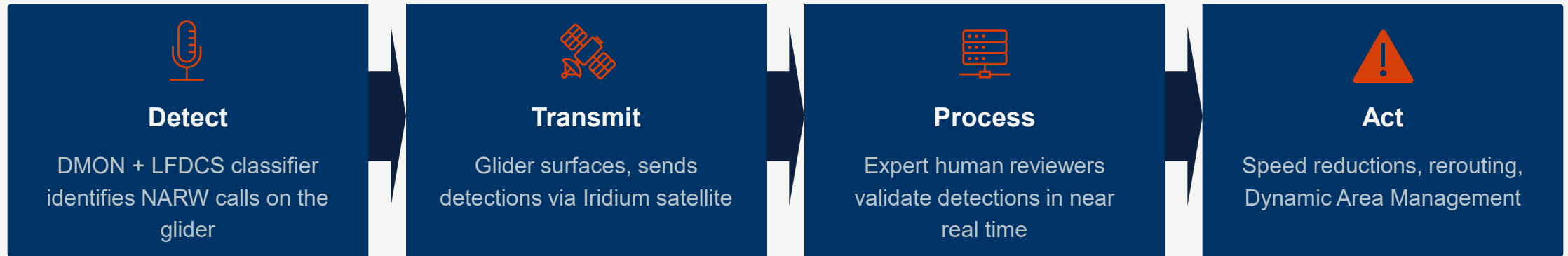
Species-specific calls detectable with passive acoustic monitoring

Real-time detection can inform adaptive management



North Atlantic right whale mother and calf — NOAA Fisheries

Real-time detection → Active management



US Northeast

Glider and buoy detections trigger Right Whale Slow Zones – voluntary speed reduction zones

Canadian East Coast

Gulf of St. Lawrence — glider detections trigger Dynamic Management Plans to reduce vessel collision risk

Recent Detections

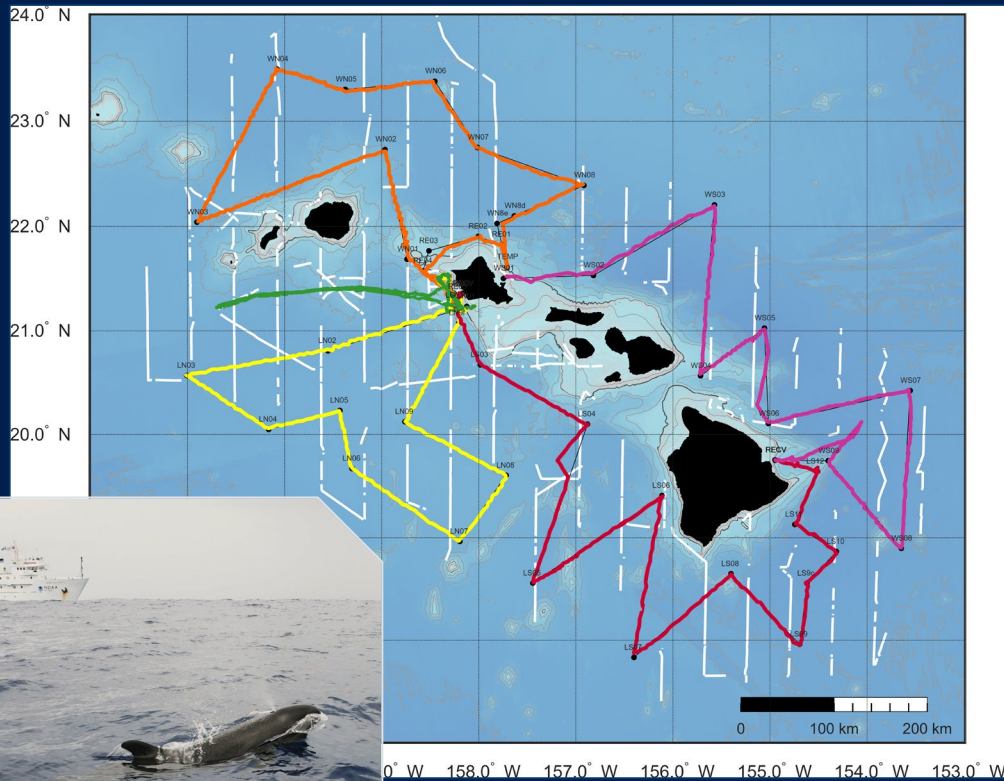
See where the robots have heard marine mammals in the past 3 days.



Robots4Whales.who.edu

Detection alerts made publicly available via email, text, or the Whale Alert app

Baumgartner et al. (2020), Indeck et al. (2025)



- ## Concurrent ship and glider surveys

More info: <https://nmfs-ost.github.io/PAM-Glider/>

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Density estimation from passive acoustics

We can't count every animal – but we can count some of them and correct for the ones we missed.

Key challenges

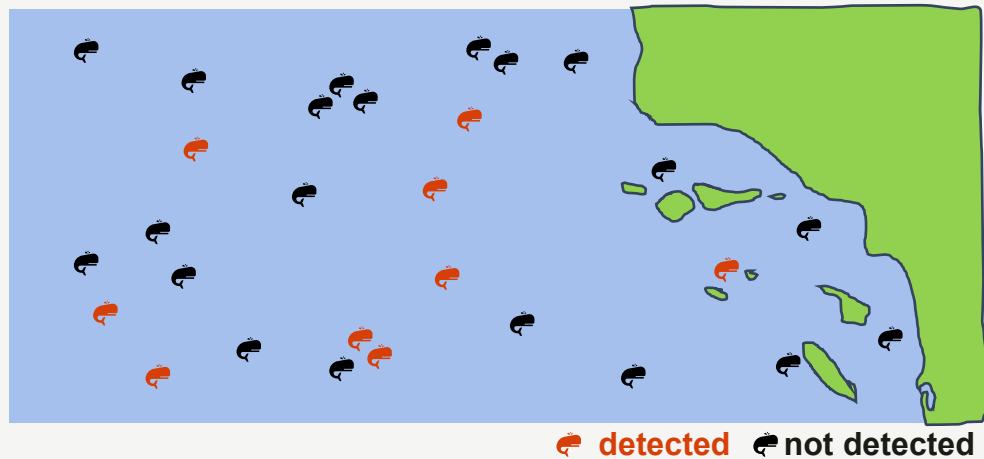
1. Figuring out how many animals we missed (detection probability)
2. We hear calls, not individual animals so we must account for behavioral variables (e.g., call rate, group size, depth)



Common dolphins in Southern California — SEA, Inc.

Density estimation from passive acoustics

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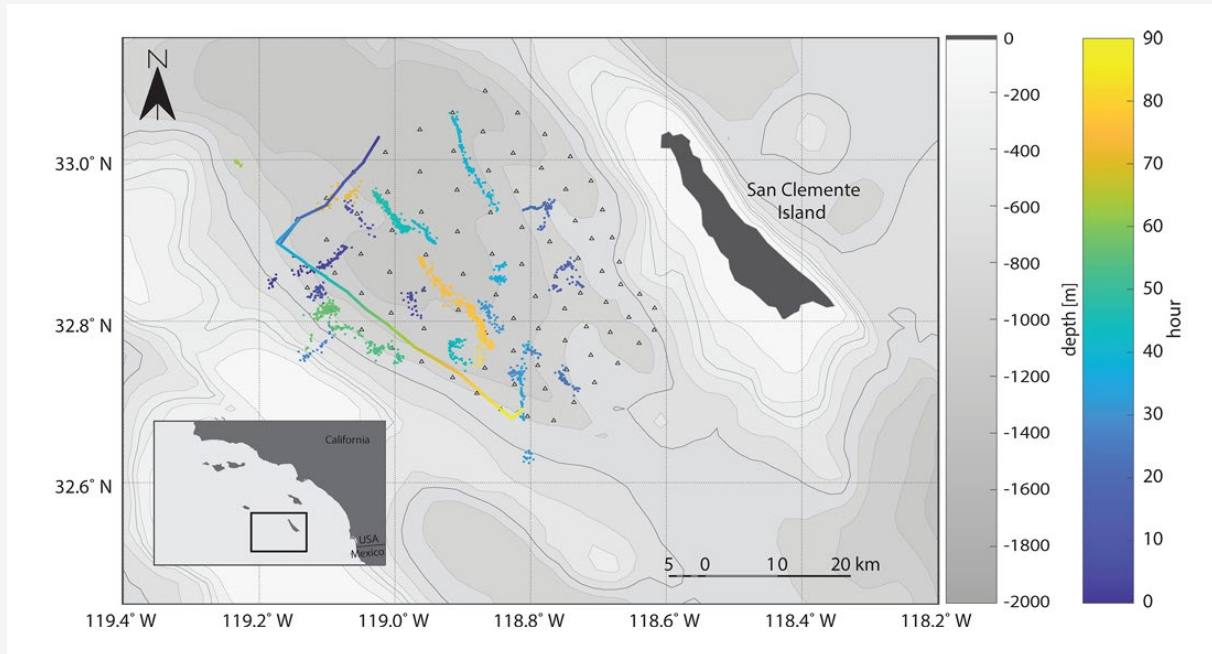
Key challenges

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Common dolphins in Southern California — SEA, Inc.

Case study: Fin whale density



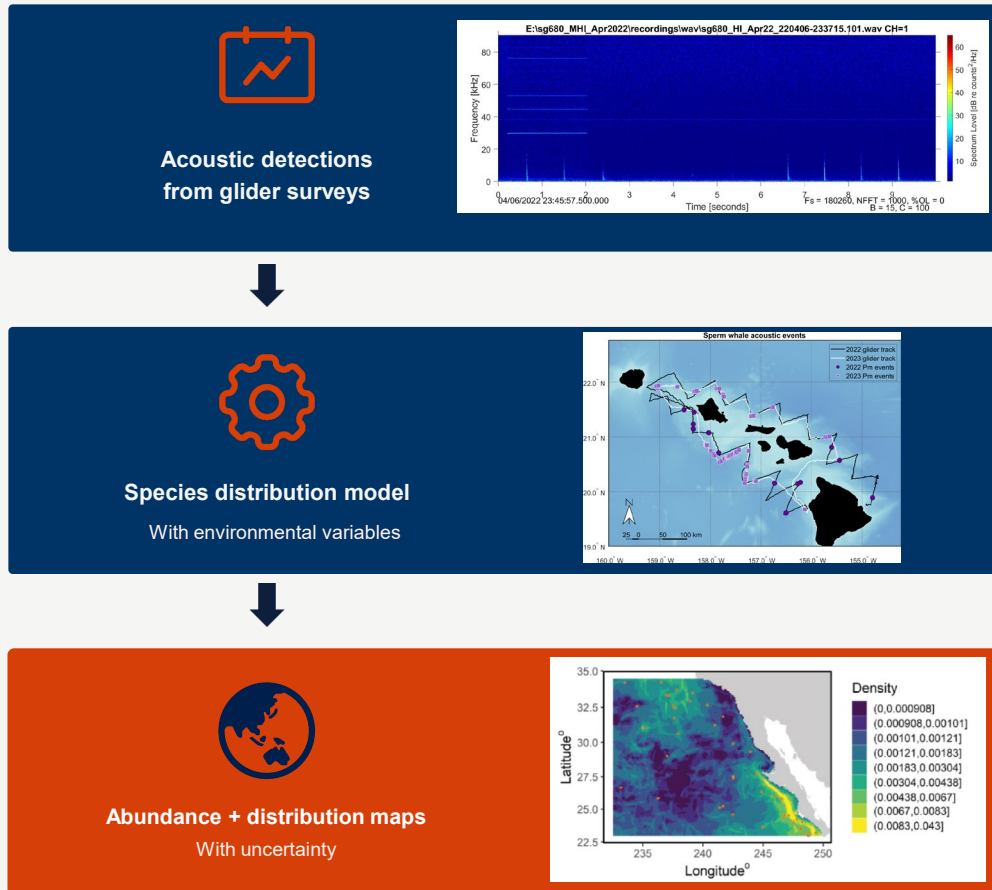
Fin whale localized tracks (dots) and glider track (line) – Fregosi et al. 2022

Demonstrated that an acoustic density estimation framework can be applied to glider data

- Leveraged stationary hydrophone array to get animal locations = detection probability
- Automated detection of thousands of fin whale 20 Hz calls
- Direct comparison with stationary array possible
- Highlighted that glider noise can be important for very low frequency species

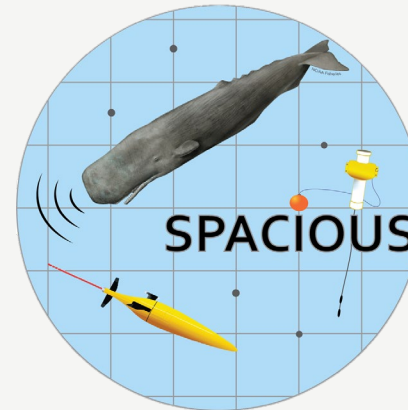
	Density	CV	95% CI
Glider	1.8 whales/km ²	0.55	0.67-5.0
Array	1.3 whales/km ²	0.49	0.52-3.2

Incorporating glider-based detections into spatial modeling



Example visual-survey derived SDM – Becker et al. 2022

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**Spatial Population Assessment of Cetaceans
Integrating acoustic Observations from
Uncrewed Systems**

GOALS:

- Combine acoustic glider detections with environmental covariates to predict species distributions across the full study area
- Generate abundance estimates and uncertainty maps in the format NOAA stock assessments require
- Develop framework to complement and eventually integrate with traditional visual survey data



PIFSC Protected Species Division Team: Yvonne Barkley, Janelle Gardner, Devin Johnson, Kaitlin Palmer, and Megan Wood

More info: <https://nmfs-ost.github.io/PAM-Stocks/>

Acoustic gliders are exciting new and effective tools for studying important living marine resources

Thank you



A Seaglider is assembled for deployment – NOAA Fisheries

REFERENCES

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- NOAA Fisheries marine mammal stock assessments: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments>