Monterey Bay Aquarium

Observing System Conservation Use …and Potential

Margaret Spring | Chief Conservation & Science Officer

IOOS Advisory Committee Meeting

June 27, 2023

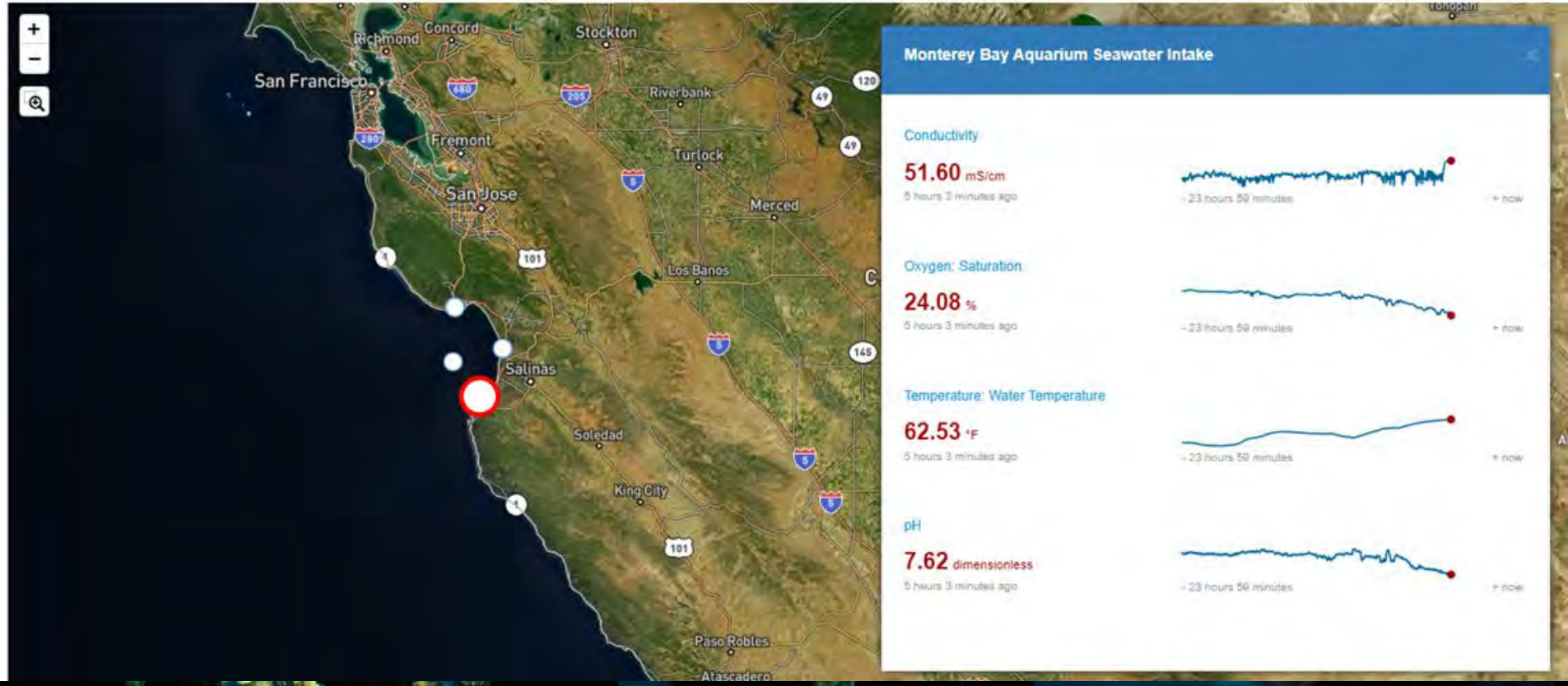

Monterey Bay
Aquarium
MontereyBayAquarium.org

Monterey Bay Real-Time Sensors Dashboard

Parameters | **Stations** | Grid | Resources

Click on the list below, or a point on the map to see latest data.

- Santa Cruz
- Santa Cruz Wharf Weather Station
- Moss Landing Marine Laboratories Seawater Intake Monitoring Station (MLSC1)
- Moss Landing Marine Laboratories Weather Station
- M1 Mooring Real-Time Data, Monterey Bay, CA
- **Monterey Bay Aquarium Seawater Intake**
- Monterey Wharf II



The Aquarium's ocean conservation priorities

Improving the sustainability of global fisheries and aquaculture

Protecting California ocean wildlife and ecosystems

Reducing the sources of ocean plastic pollution

Addressing the ocean impacts of climate change

Animal Telemetry

Data Descriptor | Open Access | Published: 01 April 2022

A biologging database of juvenile white sharks from the northeast Pacific

John O'Sullivan, Christopher G. Lowe, Oscar Sosa-Nishizaki, Salvador J. Jorgensen, James M. Anderson, Thomas J. Farrugia, Emiliano García-Rodríguez, Kady Lyons, Megan K. McKinzie, Erick C. Oñate-González, Kevin Weng, Connor F. White, Chuck Winkler & Kyle S. Van Houtan

Scientific Data **9**, Article number: 142 (2022) | Cite this article

3500 Accesses | **1** Citations | **155** Altmetric | Metrics

- From 2001–2020, the Monterey Bay Aquarium led an international research collaboration to understand the life cycle, ecology, and behavior of white sharks (*Carcharodon carcharias*) in the southern California Current.
- full data records from 59 pop-up archival (PAT) and 20 smart position and temperature transmitting (SPOT) tags that variously
- recorded pressure, temperature, and light-level data, and computed depth and geolocations for 63 individuals.

"This effort really speaks to the Aquarium's mission to inspire conservation of the ocean to promote public education and awareness," said Megan McKinzie, the data coordinator at the U.S. Animal Telemetry Network, whose data center organizes and maintains data about marine animals.

NEWS › ENVIRONMENT

Monterey Bay Aquarium shares a treasure trove of data about young white sharks

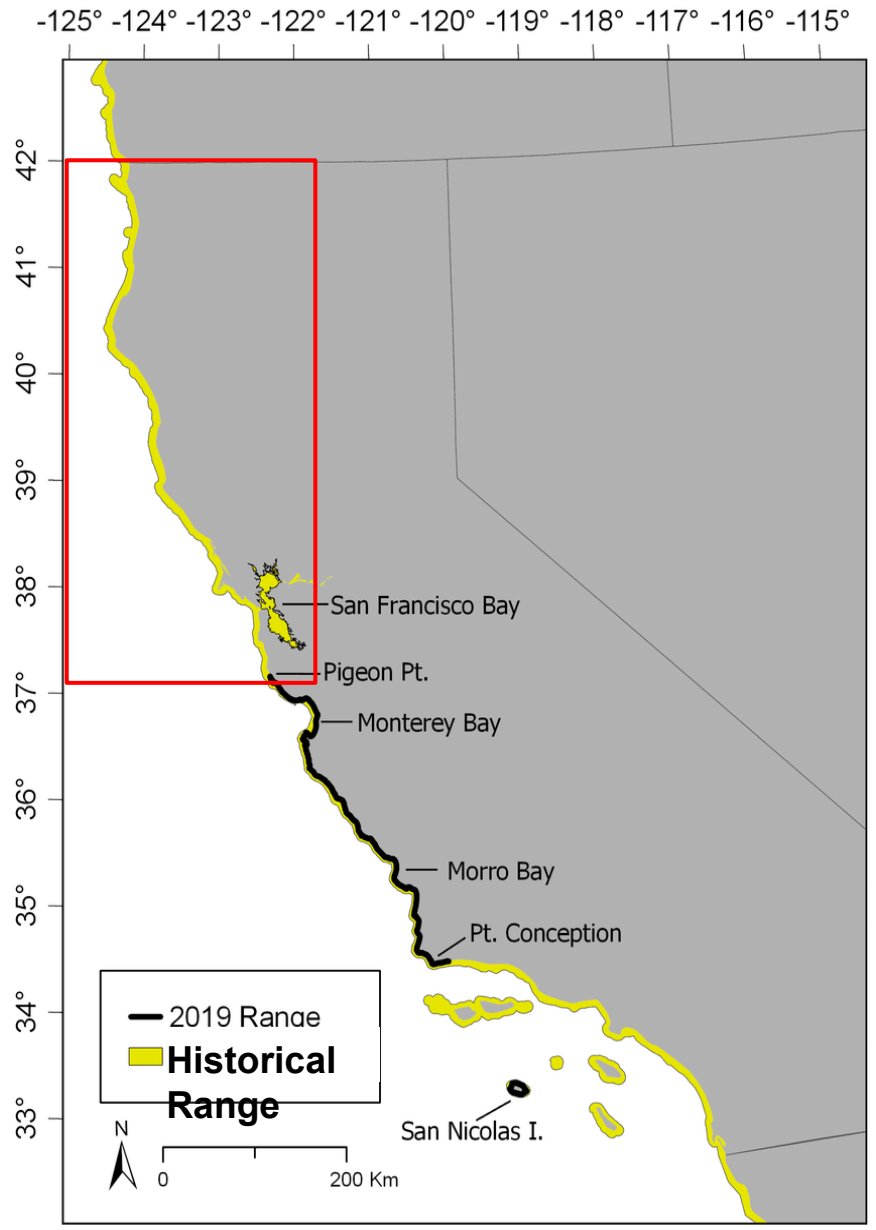
In 2001, the Monterey Bay Aquarium wanted to better understand young white sharks so they could help them feel at home at the aquarium. Researchers had studied adult white sharks in the ocean, but they knew very little about what younger sharks were up to in their natural habitat. (Monterey Herald file)

By GRAYCEN WHEELER | newsroom@montereyherald.com |

PUBLISHED: April 25, 2022 at 2:16 p.m. | UPDATED: April 25, 2022 at 3:46 p.m.

Southern Sea Otter Recovery:

Data to Evaluate Site Suitability for Potential Reintroduction



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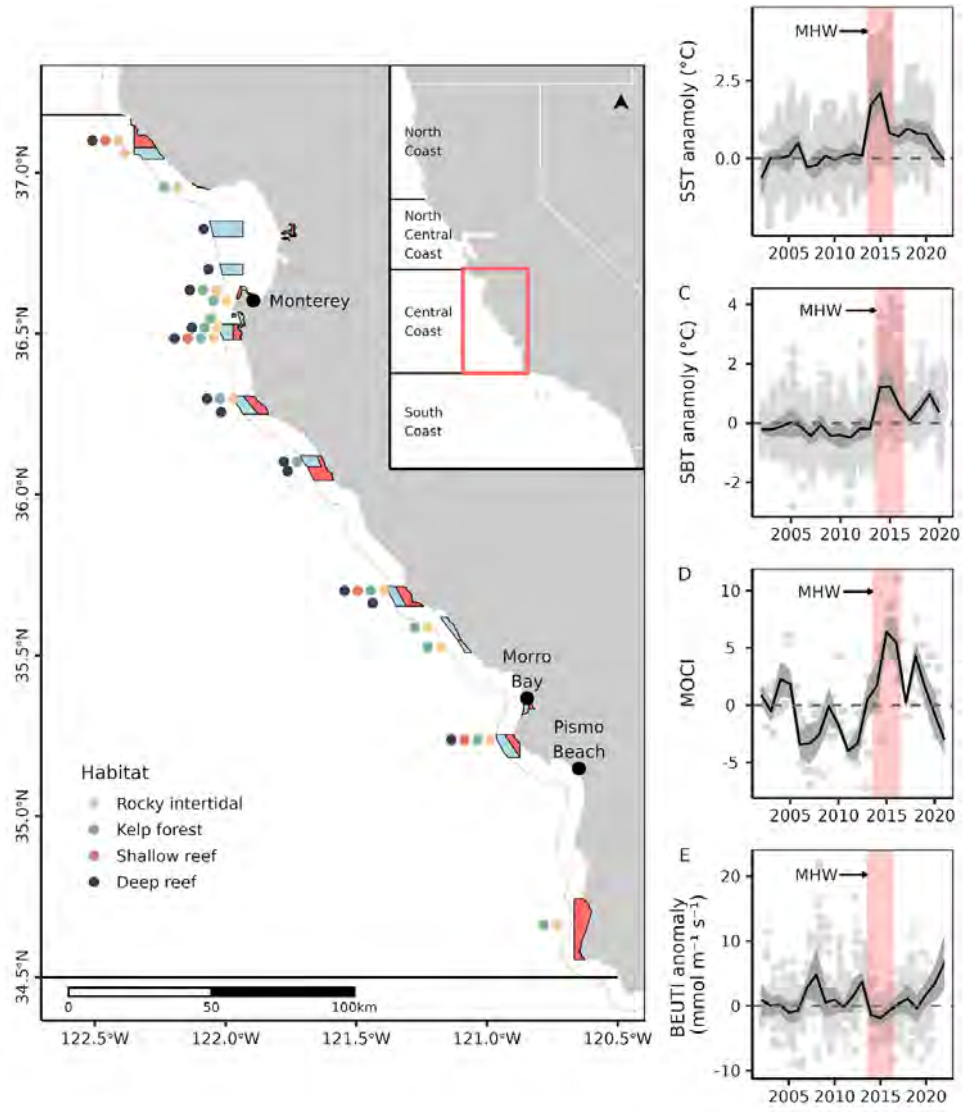
Long--term ecosystem monitoring and environmental change



Sea surface temperate

Sea bottom temperate

Multivariate Ocean Climate Indicator

Biologically Effective Upwelling Index

IOOS Integrated Ocean Observing System

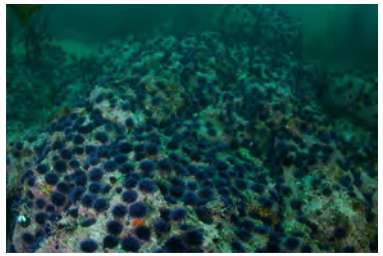
CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

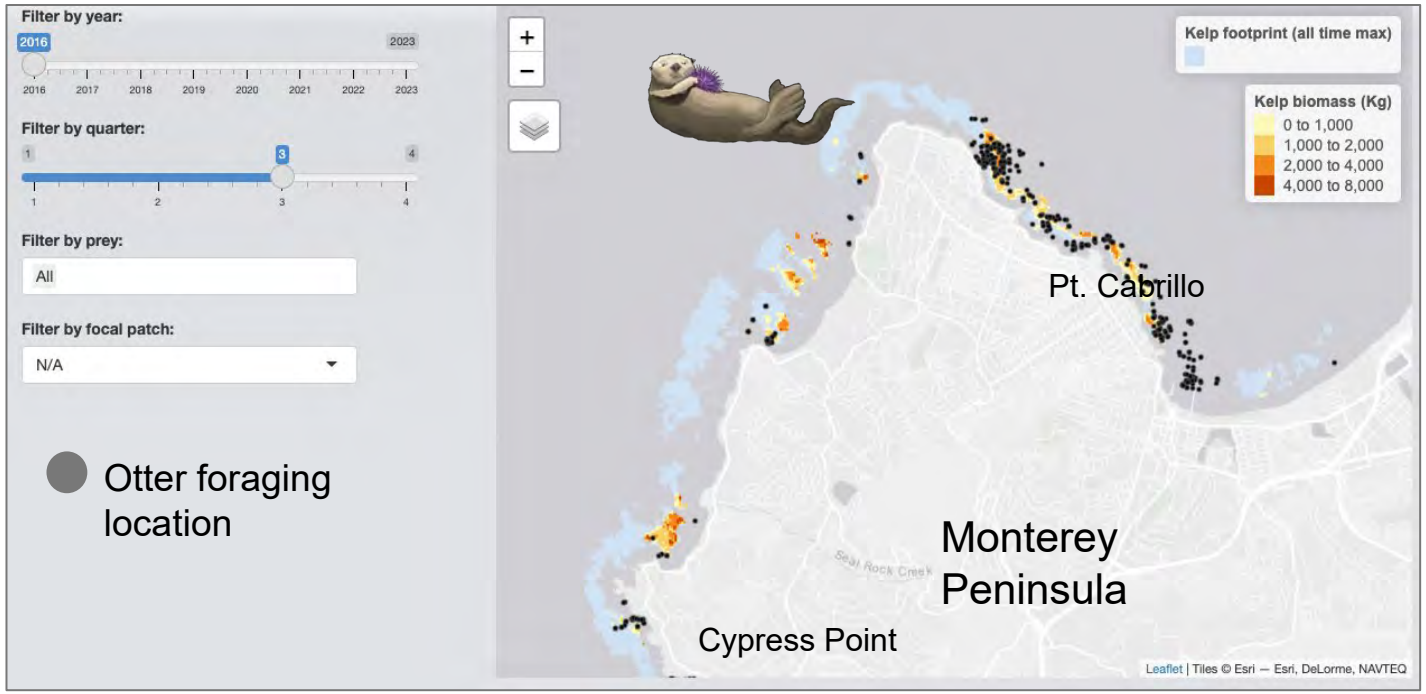
MERCATOR OCEAN INTERNATIONAL

Monterey Bay Aquarium

Smith et al. 2023, *In revision*

Sea otter foraging behavior and kelp forest recovery





Kelp landsat data: Santa Barbara Coastal LTER, T. Bell, K. Cavanaugh, and D. Siegel. 2023. SBC LTER: Time series of quarterly NetCDF files of kelp biomass in the canopy from Landsat 5, 7 and 8, since 1984 (ongoing) ver 20. Environmental Data Initiative. https://doi.org/10.6073/pasta/41f330ccf66fa8c05fc851862e69b1da (Accessed 2023-06-02).

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CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

Decision-relevant OA information

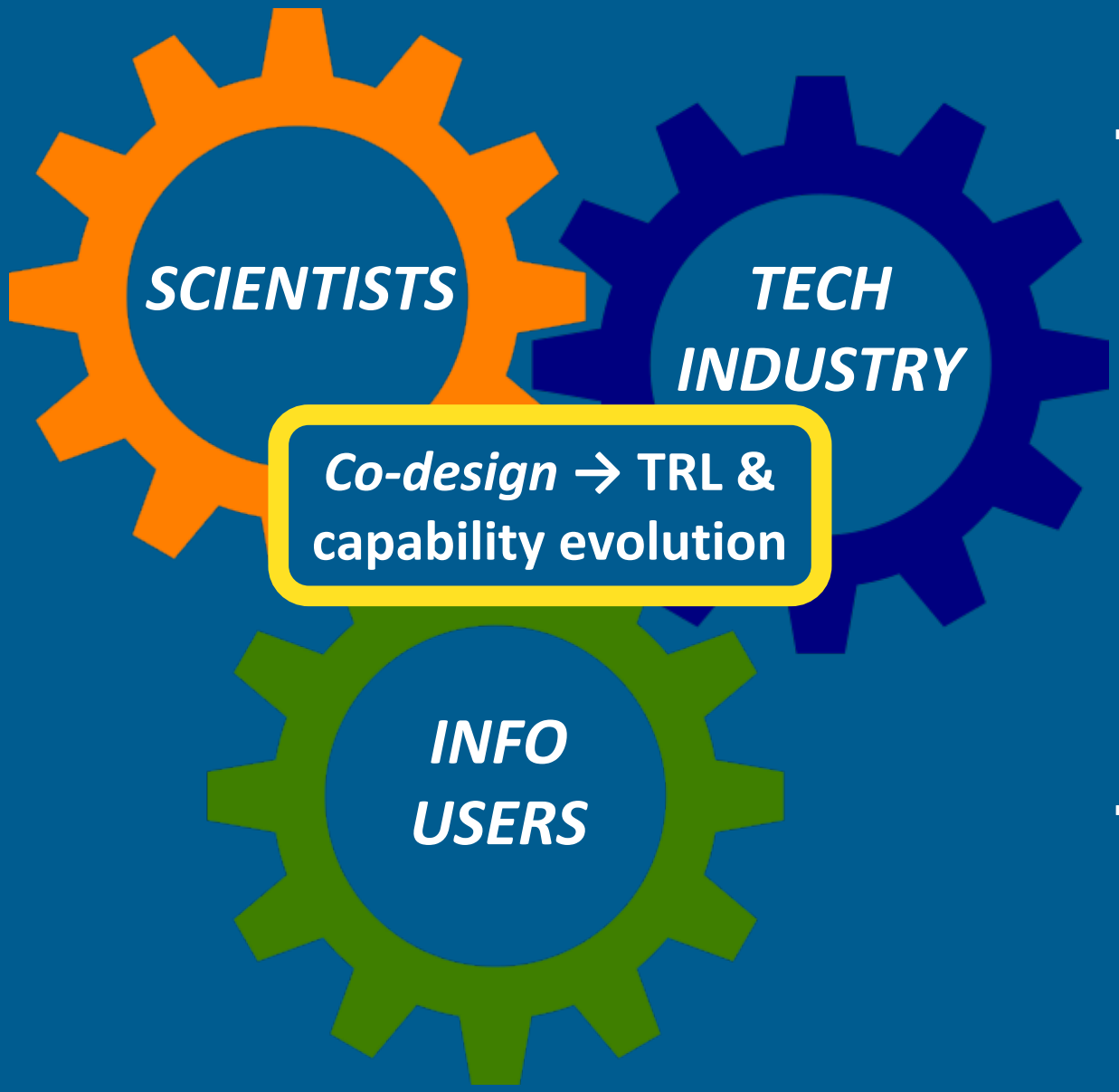
CeNCOOS responds to state and federal OA priories by:

- Standardizing data collection across monitoring programs
- Improving data quality, accessibility, and interoperability
- Investing in subsurface, offshore, and joint bio-chem observations
- Filing geographic gaps to address ecosystem and human vulnerabilities
- Creating centralized information hub (California OA Portal) to streamline access to data, forecasts, and indicators

STATE OF CALIFORNIA
COAST AND OCEAN ANNUAL REPORT
2022
Ocean Protection Council

IOOS Integrated Ocean Observing System
OAP NOAA OCEAN ACIDIFICATION PROGRAM
OCEAN PROTECTION COUNCIL
Sea Grant California

Synchro – Three Pillars of Evaluation



- Three Pillars
  I. Testing/evaluation access for emerging technologies
  I. Low-cost tech procurement & evaluation
  I. Case study for monitoring offshore wind impacts
- Aims to bridge the gap between R&D innovation and widespread adoption of ocean technology

Future Conservation Opportunities (US and Global)

- Health and Pollution
- Solutions Focused
- Environmental Justice

PHOTO COURTESY OF TYLER NIX VIA UNSPLASH

Seabed Mining

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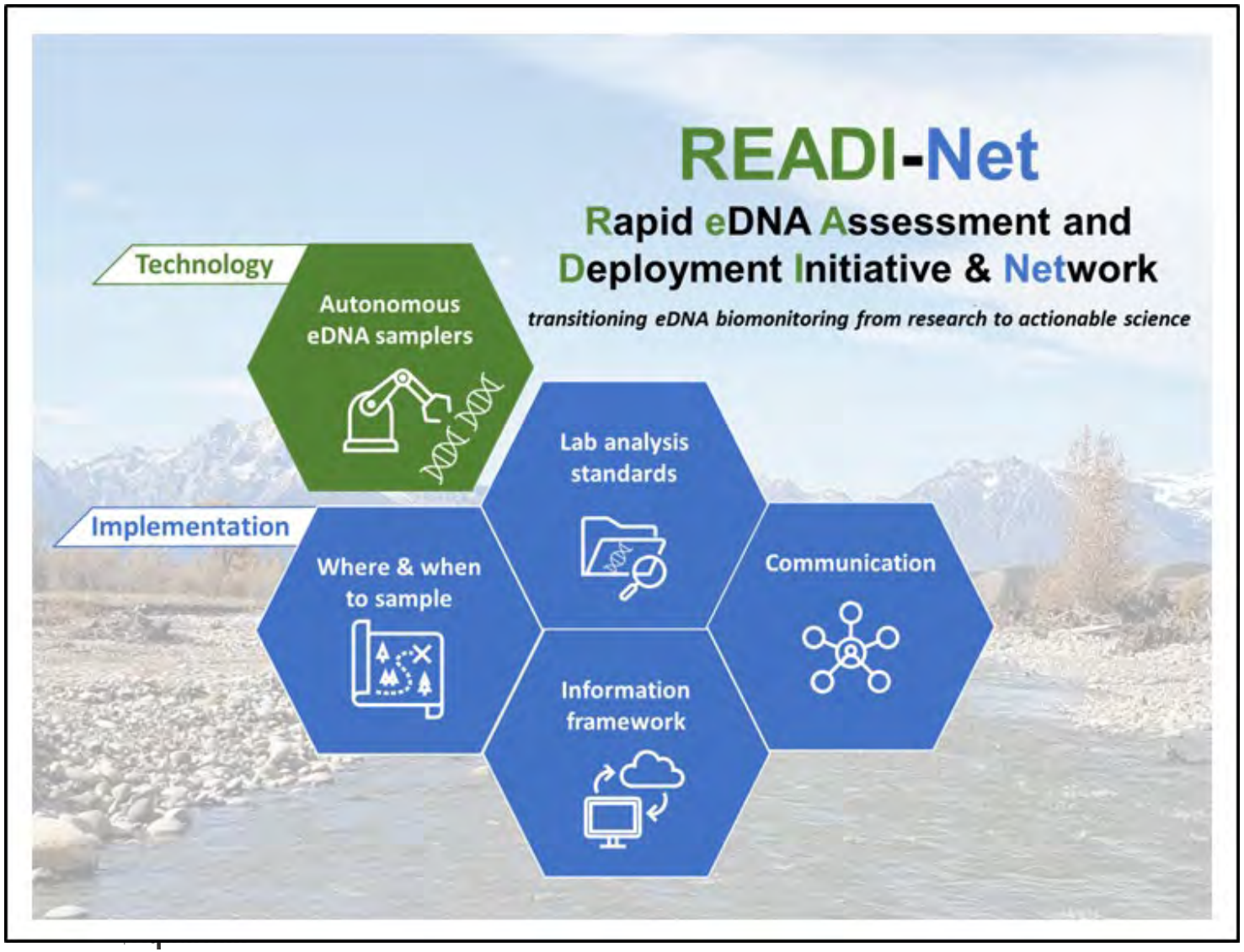
MBARI Monterey Bay Aquarium Research Institute

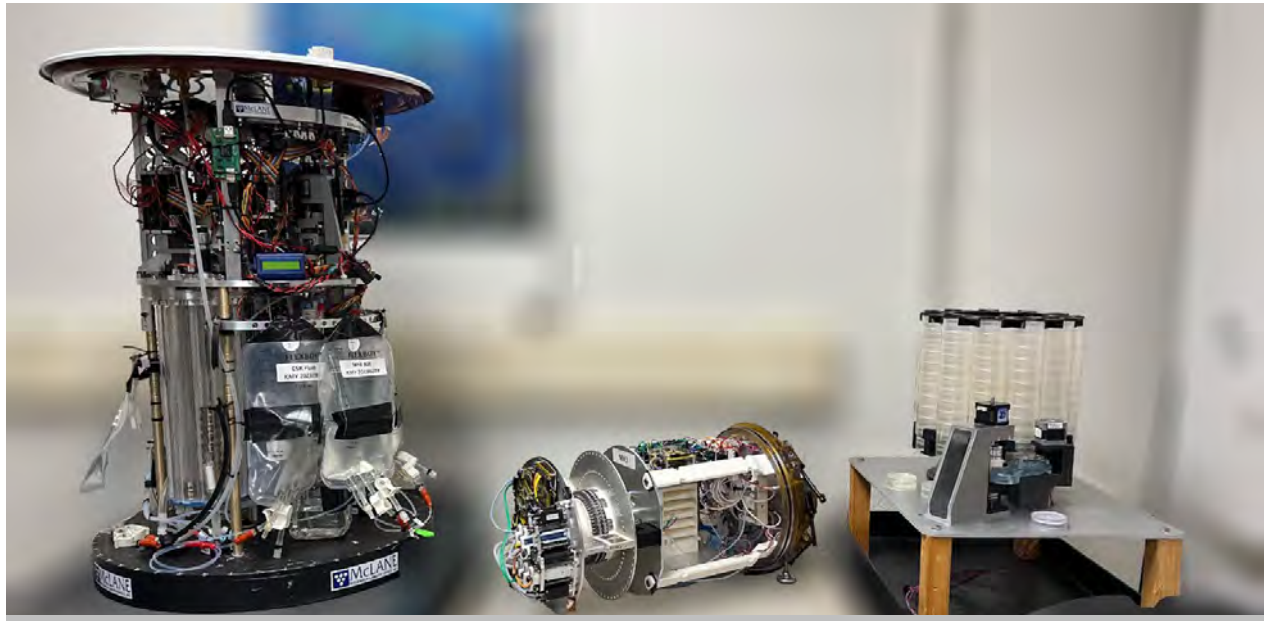
Invasive Species: USGS × MBARI Collaboration: READI-Net



- Improve eDNA detection technology
- Improve trust in eDNA methods and results
- Reduce impacts and costs of invasive species

Autonomous eDNA samplers

Design a fit-for-purpose eDNA sampler



2nd Generation | 3rd Generation | Sampler

- 3 ESP 'models'
  - Different purposes & use cases
- Monitoring requires using appropriate:
  - Tools & methods
  - Sampling frequency
  - Sampling locations
- ESP sampler designed to meet a broader eDNA audience

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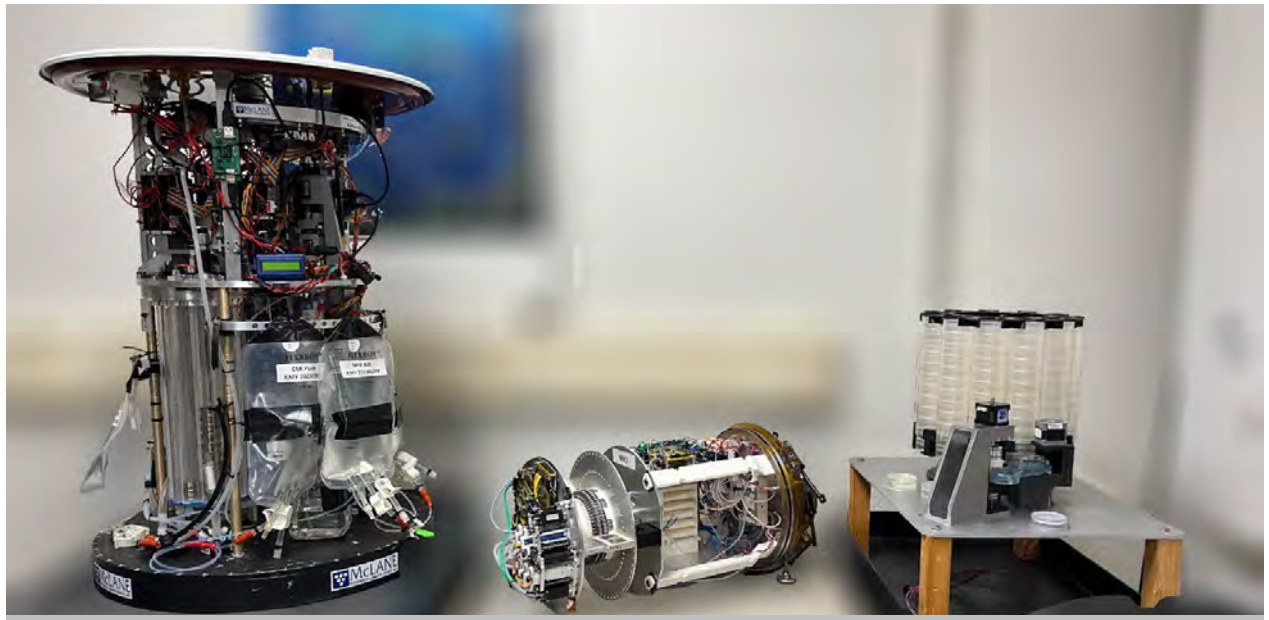
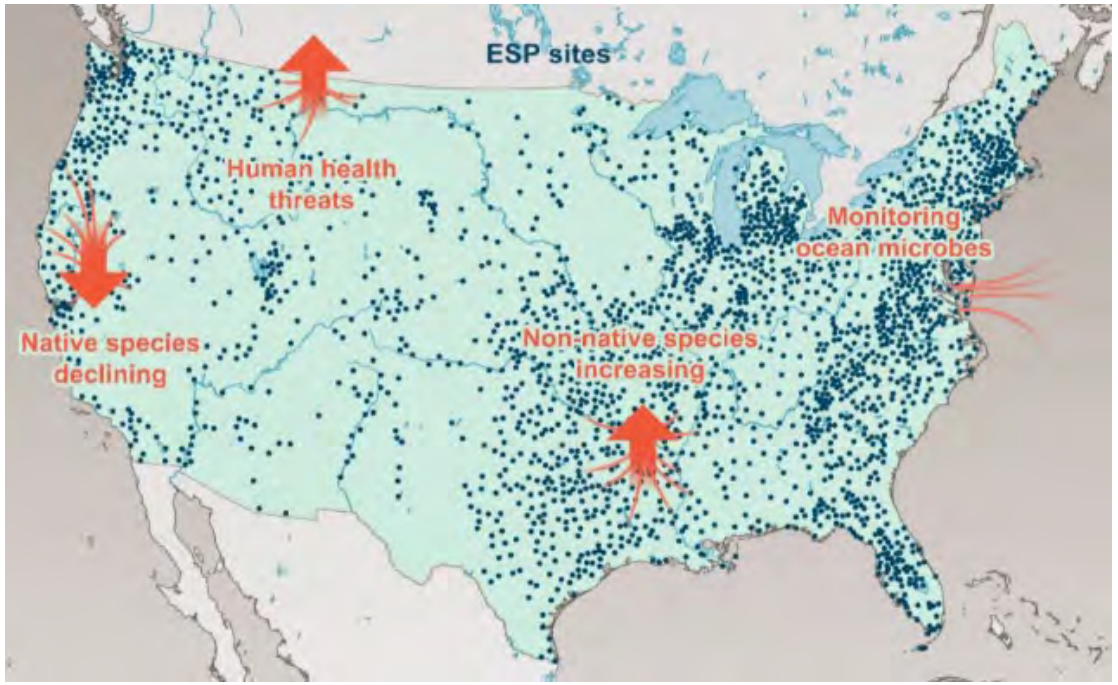
Autonomous eDNA samplers

Future eDNA Monitoring Network



2nd Generation | 3rd Generation | Sampler



Existing stream gage infrastructure is ideal for creating a network of eDNA observation for monitoring the environment and ecosystems

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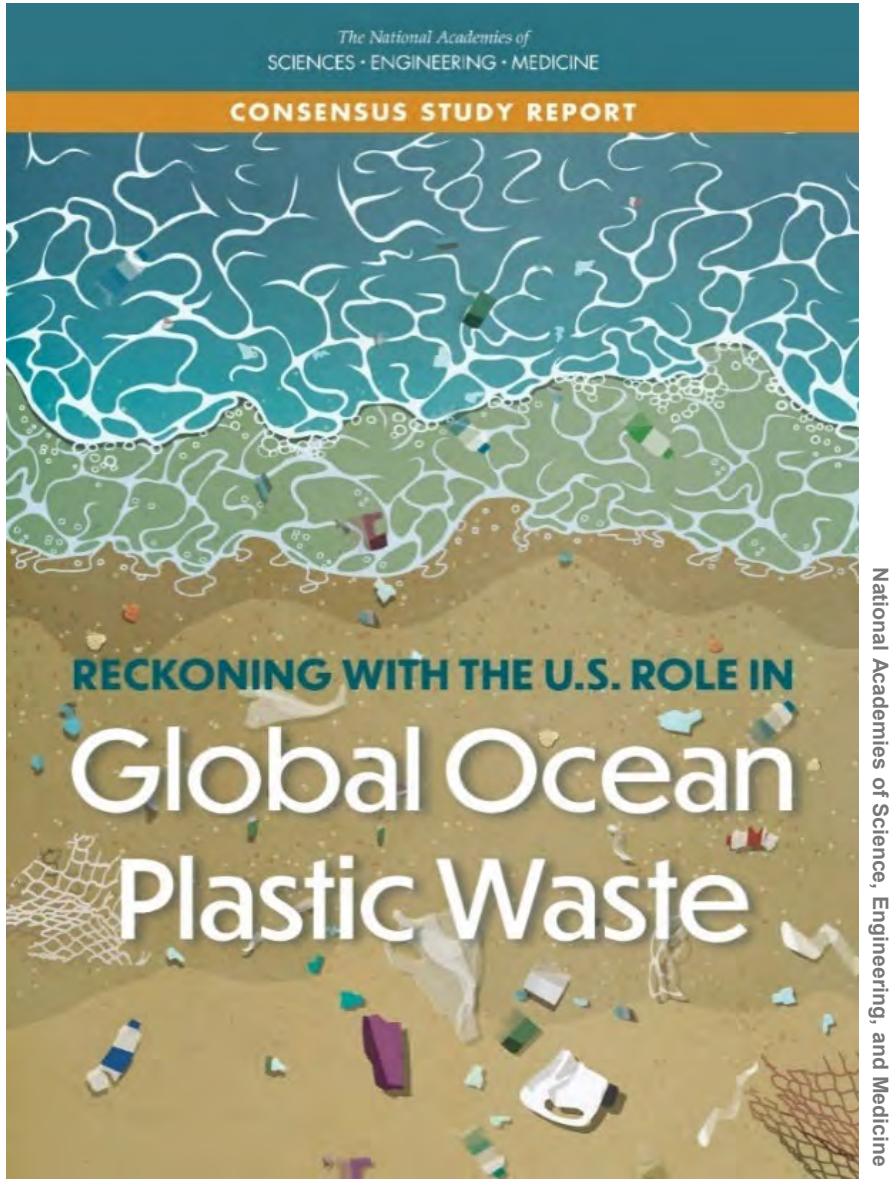
Plastic Pollution: First science-based report on the U.S. contribution

- U.S. production, imports, exports
- U.S. waste generation and leakage
- Pathways for transport to ocean
- Distribution and fates once in ocean
- Vision for tracking and monitoring
- Potential interventions for addressing the problem



U.S. municipal solid waste generation is 2–8 times per person greater than many other countries.

The United States should substantially reduce solid waste generation (absolute and per person) to reduce plastic waste in the environment and the environmental, economic, aesthetic, and health costs of managing waste and litter.

Credit: Tom Fisk

Leaked plastic waste has societal impacts

- Economic impacts
- Societal equity issues
- Watershed and food web contamination
- Human health concerns

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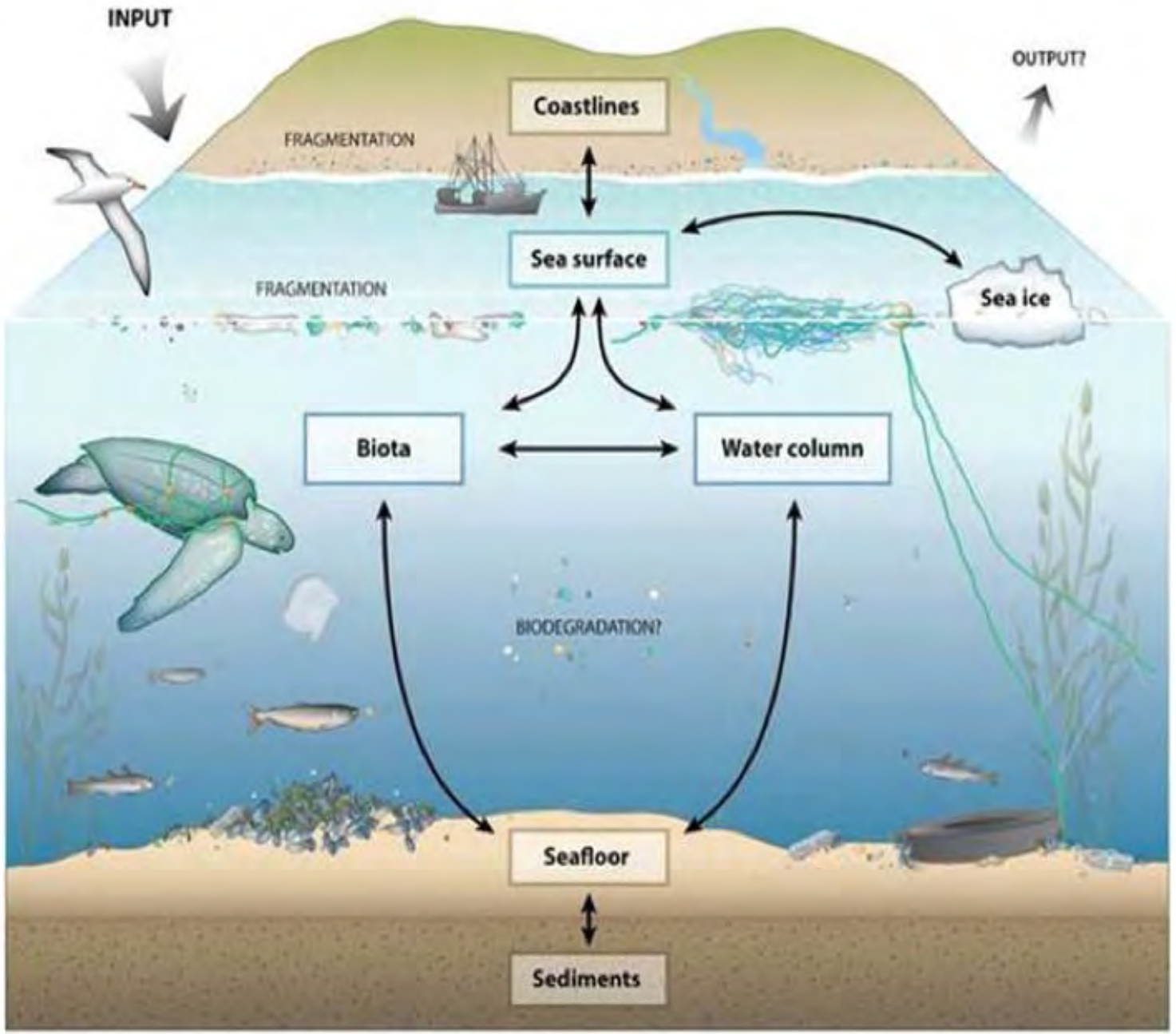
Action is needed *at each stage of the plastic life cycle* to reduce plastic waste entering the environment and ocean.

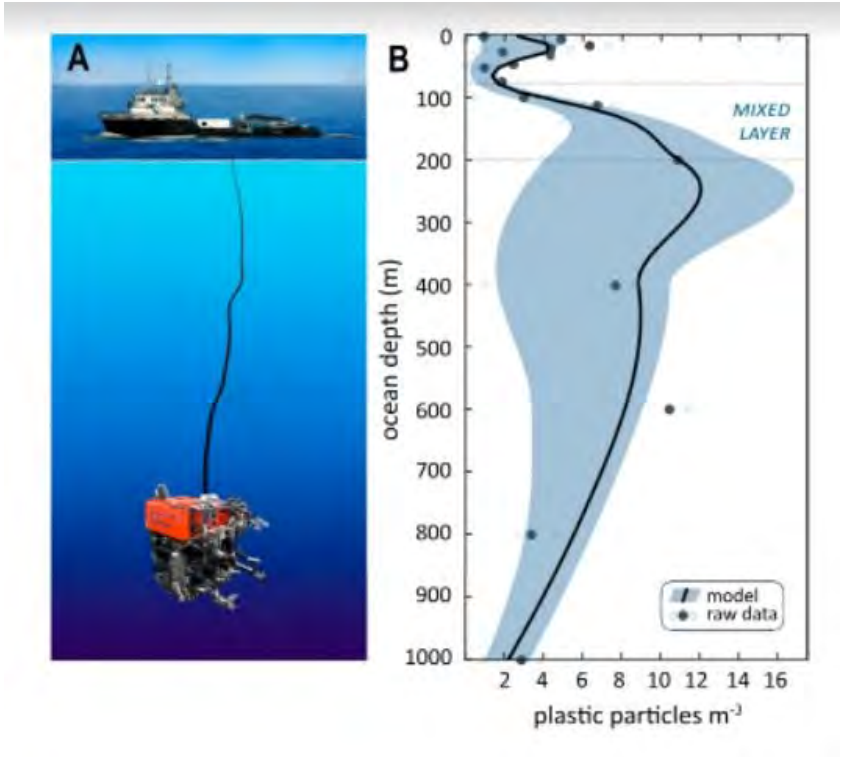
Source: NASEM

The distribution of plastic waste in the marine environment is complex and dynamic.



National Academies of Science, Engineering, and Medicine

Plastic Pollution in Monterey Bay



Pervasive at all depths sampled

Found in the bodies of pelagic red crabs and larvacean houses

Can be traced to consumer plastics

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Open-source tool to trace origins of microplastic

Emily Miller /

Monterey Bay Aquarium

Regular, standardized, and **systematic data collection** is needed to understand **extent of plastic waste** in the environment, **develop effective interventions**, and **evaluate progress** in reducing U.S. plastic waste.

Credit: Leonid Danilov

National marine debris tracking and monitoring framework

Research-based

NOAA · U.S. Department of Commerce · National Oceanic and Atmospheric Administration

United States Environmental Protection Agency

NASA

Department of Energy · United States of America

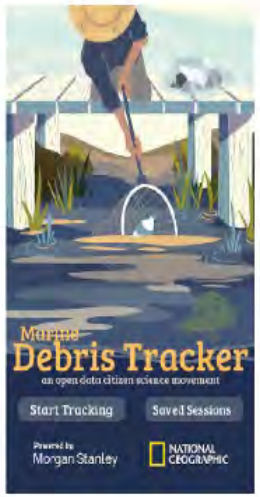
SFEI

Adopt A Beach · California Coastal Commission

USGS
science for a changing world

+

Community-based



International COASTAL Cleanup

SURFRIDER FOUNDATION

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Heal the Bay

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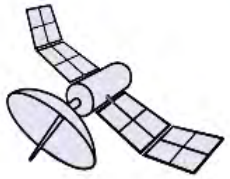
Emerging Technologies



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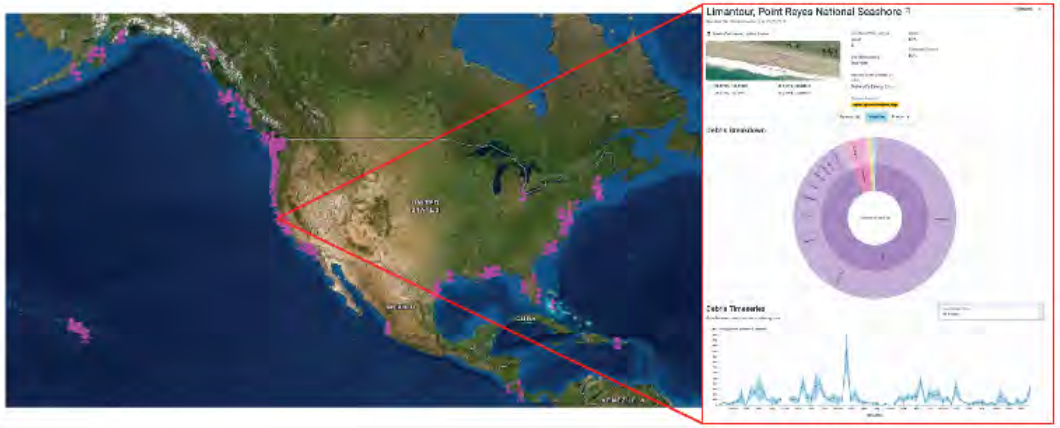
Integrated Data and Visualizations



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Informed Decision Making & Policy

The National Academies of

Azul's 2022 U.S. Latinos and the Ocean Poll

Latinos Want Action on Ocean Justice & Climate Policy

- **89%** of U.S. Latinos believe in protecting the **environment** as a means of protecting their communities **86%** of U.S. Latinos believe the government has a **responsibility to preserve** the ocean and public lands for the **enjoyment of future generations**
- **87%** say that Congress should create new **national parks, national monuments, national wildlife refuges and tribal protected areas** to protect historic sites or areas for outdoor recreation

Latinos Seek Bold Legislative Actions

- **92%** of respondents supported doing more to prevent plastic pollution with **80%** of respondents supporting the ban of **single use plastics**
- **74%** of respondents supported **stricter regulation** of illegal, unreported and unregulated (IUU) fishing activities, even if it meant paying more for fewer fish
- **66%** of respondents supported a **ban on offshore drilling**, even if it meant paying more for gas

Latinos Want 30x30 & Spanish-Speakers Shatter Stereotypes

- **80%** of Latinos supported increasing the share of both **protected lands and waters** in the United States to 30% of each. Of these, **84%** would still support it if it cost the U.S. government more **96%** cited environmental issues like **pollution & global warming** as personally important to them.
- **72%** of respondents from Spanish-speaking households cited environmental issues as being **very important** to them compared to only **51%** of respondents from English-speaking households
- More than 62 million people living in the U.S. are Latino or about one in every five. Latinos make up the second largest demographic, yet Latinos are not a monolithic voting bloc. While the Latino community varies in political party affiliation, a new poll has found that the **overwhelmingly majority support strong policies to protect the ocean and prevent plastic pollution.**
- According to **Azul's 2022 U.S. Latinos and the Ocean Poll**, Latino voters want the nation to invest more, and are willing to pay more themselves, to advance ocean justice. Below are some of the poll's key findings. *To learn more about the poll, and the ocean protection and environmental justice policies the Latino community supports, please visit:* **bit.ly/azulpoll**

https://azul.org/wp-content/uploads/2022/07/2022-Azul-U.S.-Latino-and-the-Ocean-Poll-Full-S
urvey-Report.pdf.

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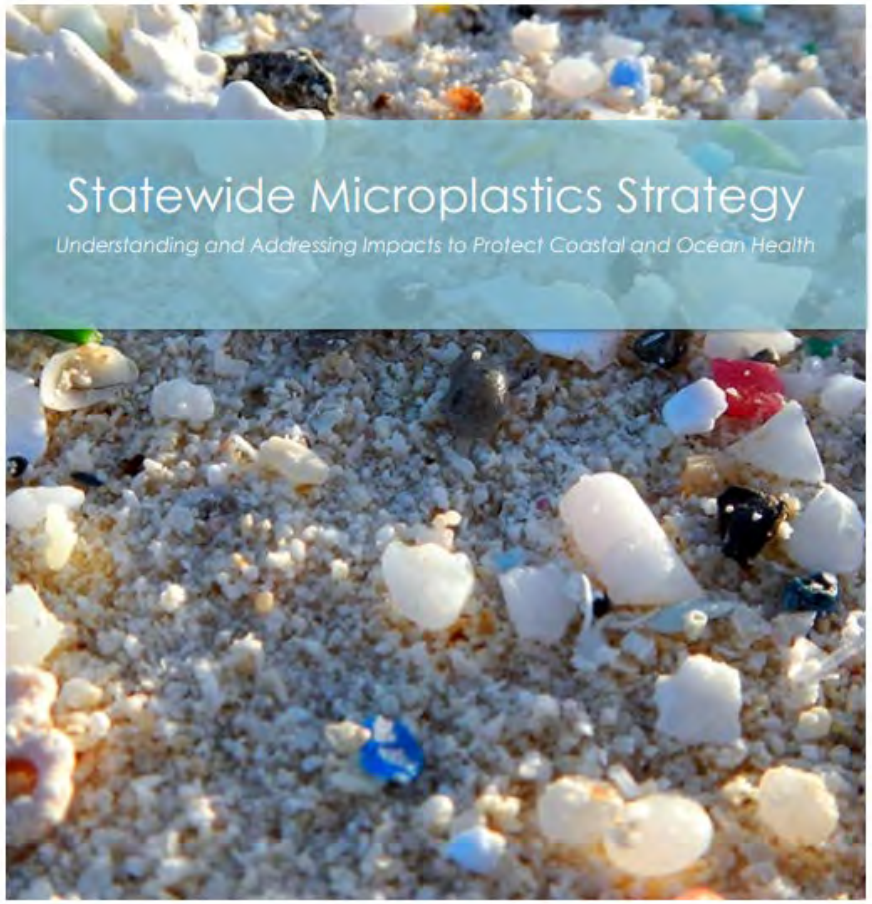
California is ahead of U.S. on plastic solutions

- OPC: microplastics strategy, marine litter plan, research
- Water Board: microplastic standards and trash TMDLs
- Laws: Microbeads, single-use item reduction, labeling, SB 54 source reduction and producer responsibility, EJ funds
- AG: consumer rights, greenwashing, investigations



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CALIFORNIA OCEAN SCIENCE TRUST

Opportunities for deeper partnership in bringing observing research, data and technology to state & regional decision-makers

THANK YOU!

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mbayaq.co/oceanaction