NOAA Marine Plastic Activity Overview:

1. Marine Debris Program Lessons Learned
2. NCEI Global Marine Microplastics Database and Map Portal

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Photo: Hawaii Wildlife Fund

NOAA Marine Debris Program

Established in 2006 by Congress as federal lead for marine debris.

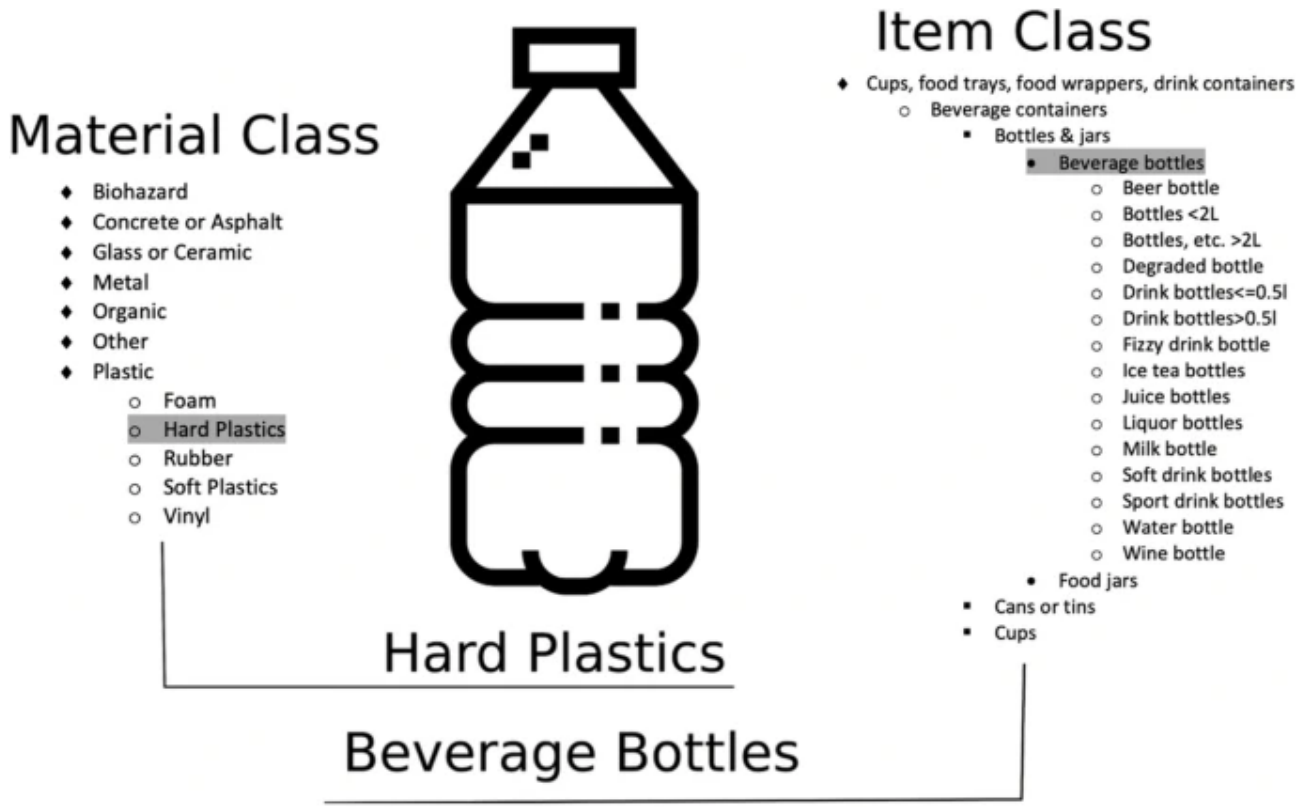
Mission: to investigate and prevent the adverse impacts of marine debris.

Photo: NOAA

NOAA MARINE DEBRIS PROGRAM PILLARS

- Prevention
- Removal
- Research
- Emergency Response
- Regional Coordination
- Monitoring & Detection

Classification matters.
Limited consensus.
Crosswalks exist.

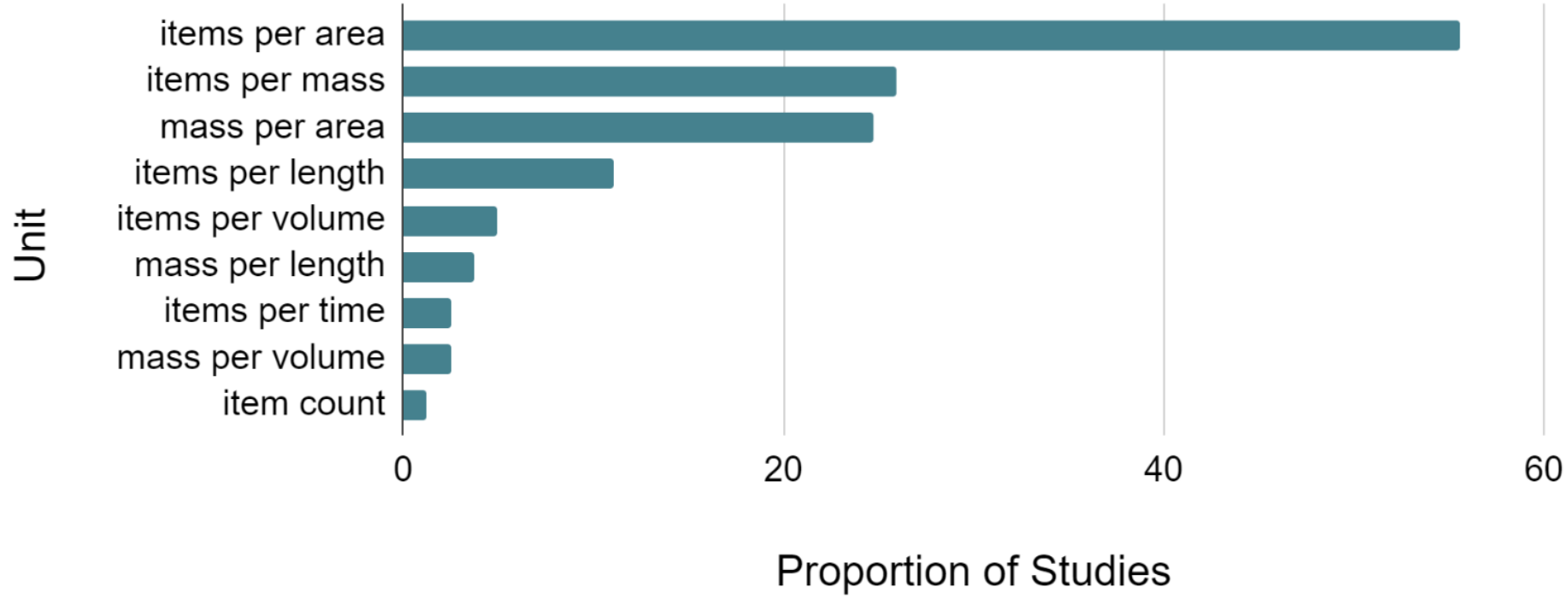


At least 68 unique "Trash lists"

Hapich, H., Cowger, W., Gray, A. *et al.* Trash Taxonomy Tool: harmonizing classification systems used to describe trash in environments. *Micropl.& Nanopl.* 2, 15 (2022)

Reporting units matter! Limited consensus.

81 micro and macro shoreline studies



Uhrin, A.V., Hong, S, Burgess, H.K., Lim, S., and Dettloff, K. Towards a North Pacific long-term monitoring program for ocean plastic pollution: A systematic review and recommendations for shorelines. *Environmental Pollution*, Volume 310, (2022).

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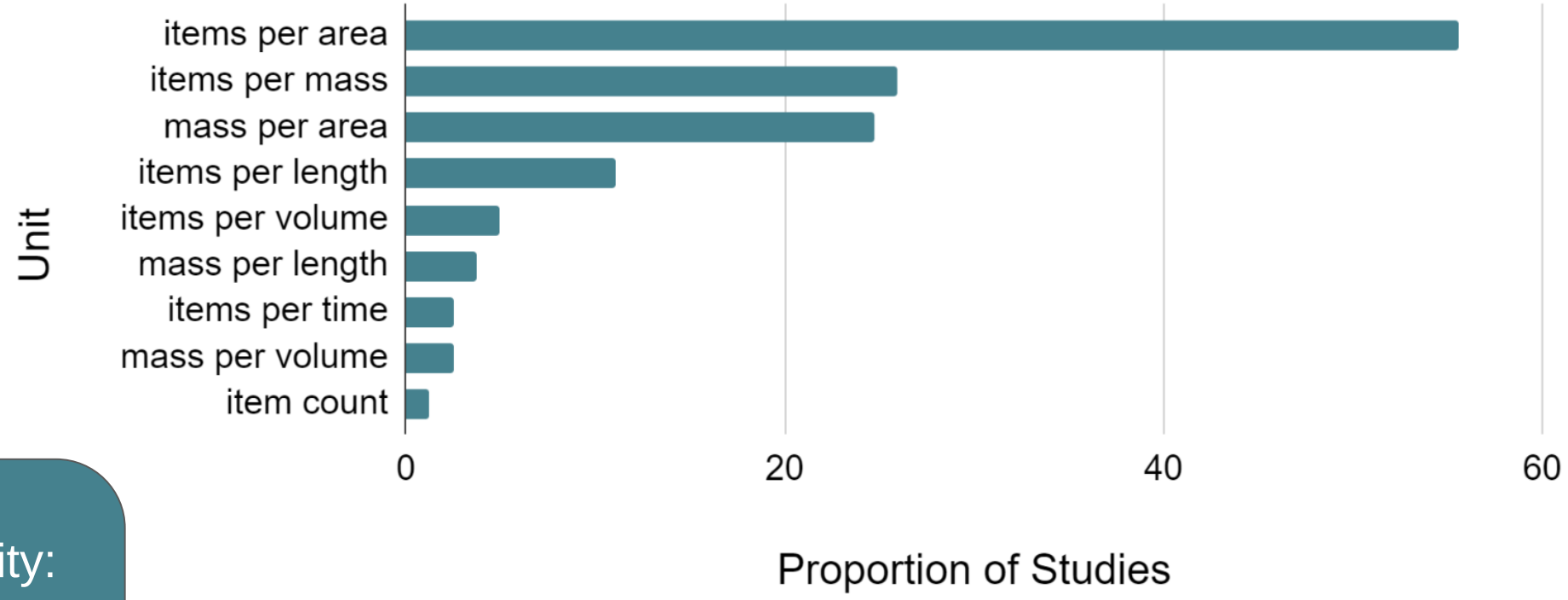


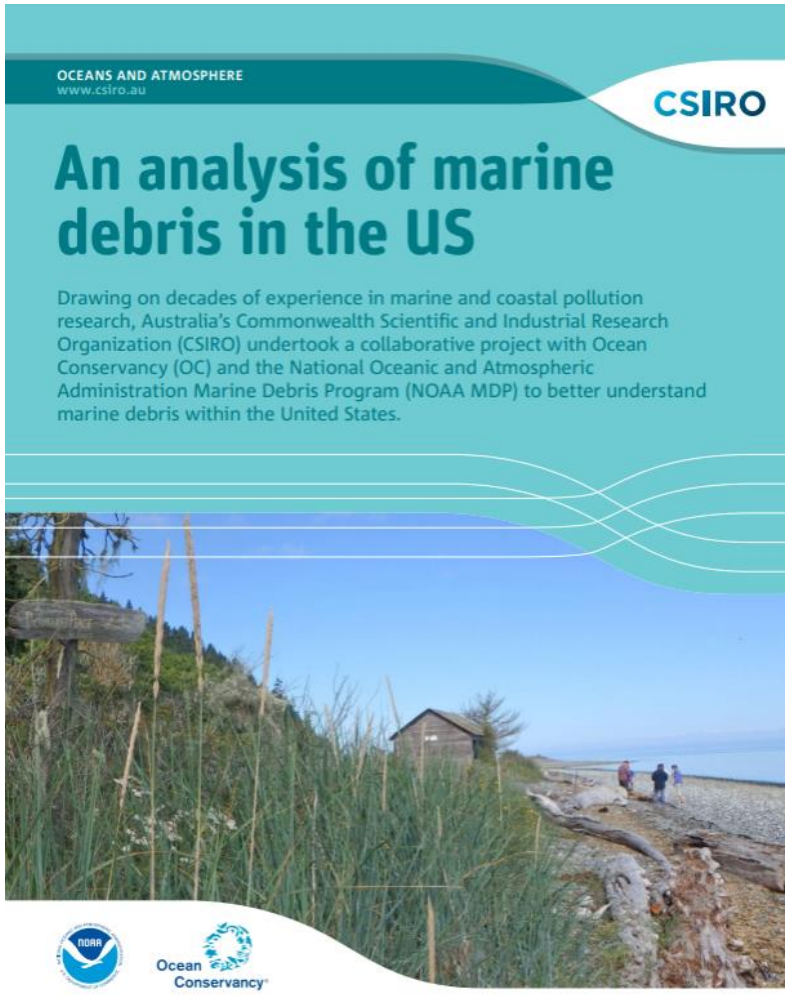
Key to interoperability: Clear reporting of sampling dimensions, location, effort controls, overall methods

Uhrin, A.V., Hong, S, Burgess, H.K., Lim, S., and Dettloff, K. Towards a North Pacific long-term monitoring program for ocean plastic pollution: A systematic review and recommendations for shorelines. *Environmental Pollution*, Volume 310, (2022).

Data collection methods matter!

Common units $\neq$ comparability

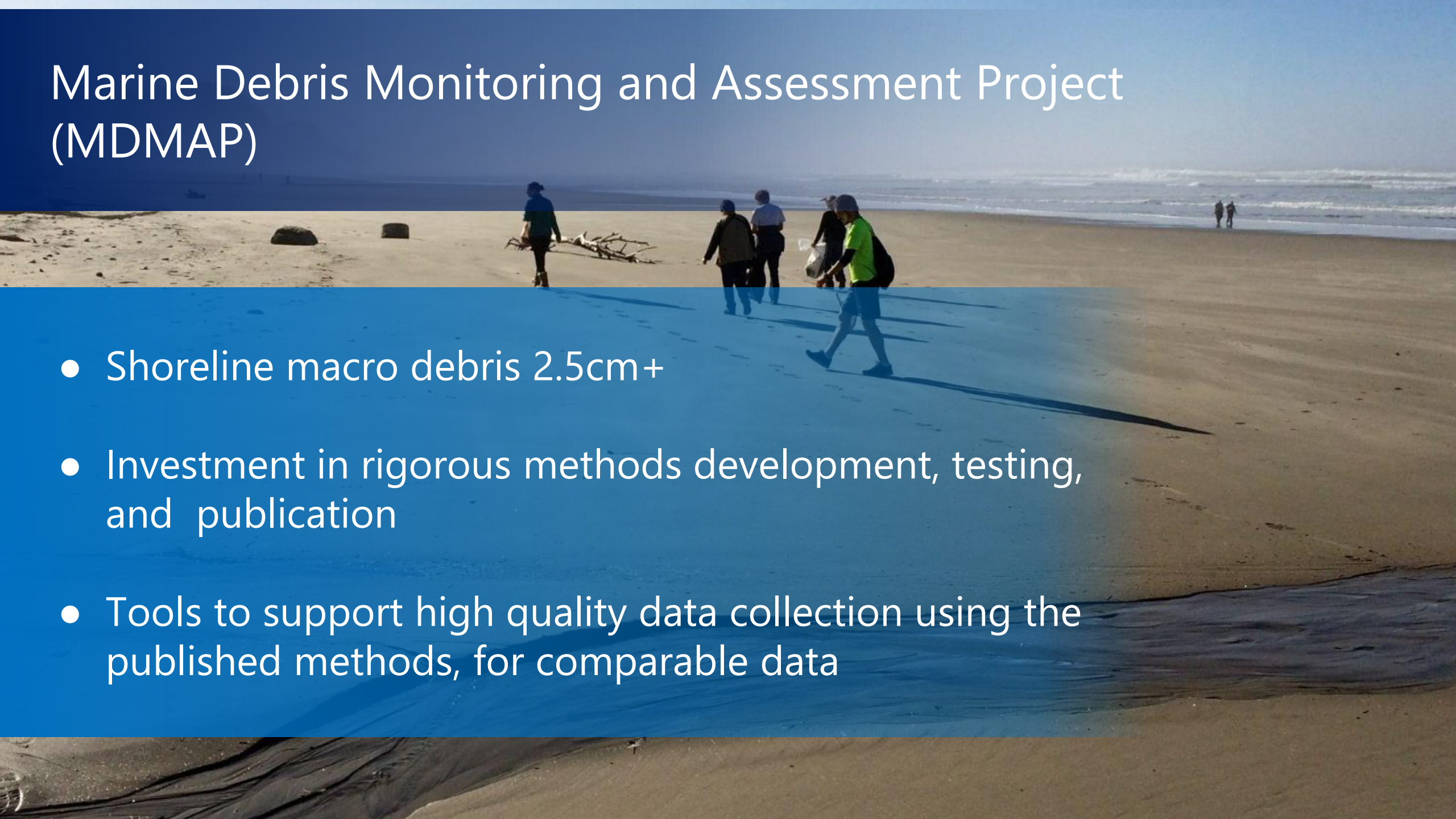
Shoreline Macro Methods comparison:



- Partnership with Ocean Conservancy & Australia Commonwealth Scientific and Industrial Research Organization (CSIRO)
- Compared results from the Marine Debris Monitoring and Assessment Project, International Coastal Cleanup, CSIRO method

- All tested methods can generate items per length of shoreline
- Different field protocols yield different results, sometimes by orders of magnitude

Marine Debris Monitoring and Assessment Project (MDMAP)

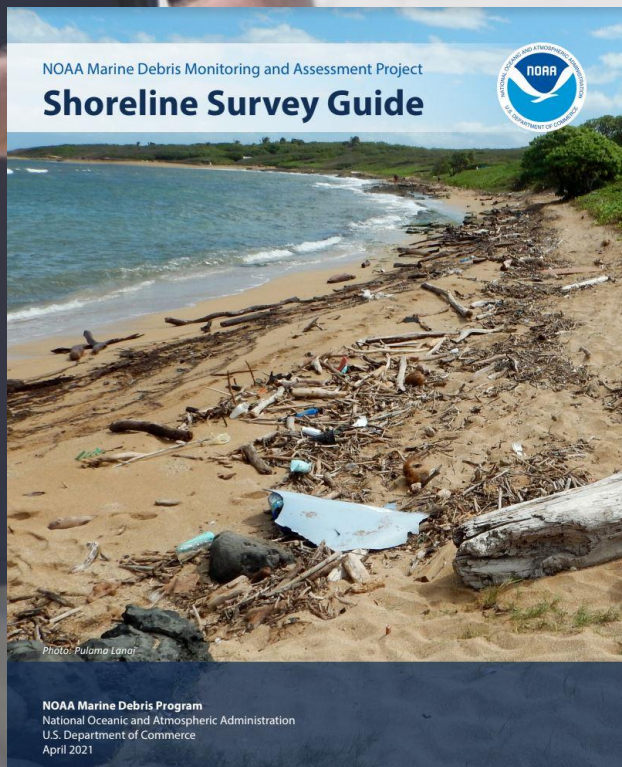


- Shoreline macro debris 2.5cm+
- Investment in rigorous methods development, testing, and publication
- Tools to support high quality data collection using the published methods, for comparable data

Monitoring Toolbox

https://marinedebris.noaa.gov/monitoring-toolbox

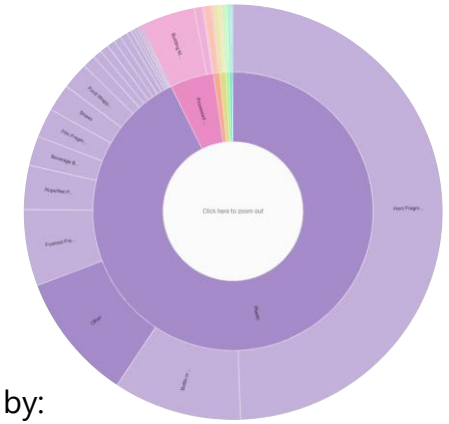
- Data collection protocols
- Training videos
- Open database
  - Data from **standard NOAA data collection methods only**
- API
- Data Visualizations



Data Visualizations

Composition

Proportion of items by material and item type



Viewable by:

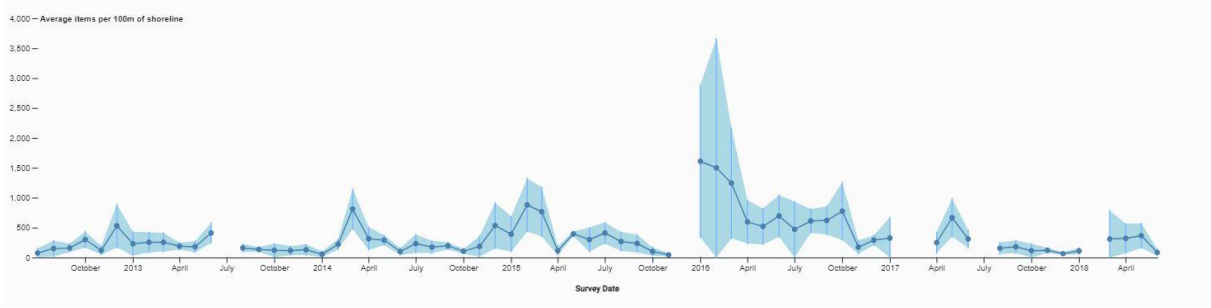
survey

single site

selection of sites

Time series

Average items per month per 100m length of shoreline



Viewable by:

all debris or by type

single site

selection of sites

The NOAA NCEI Global Marine Microplastics Database and Map Portal

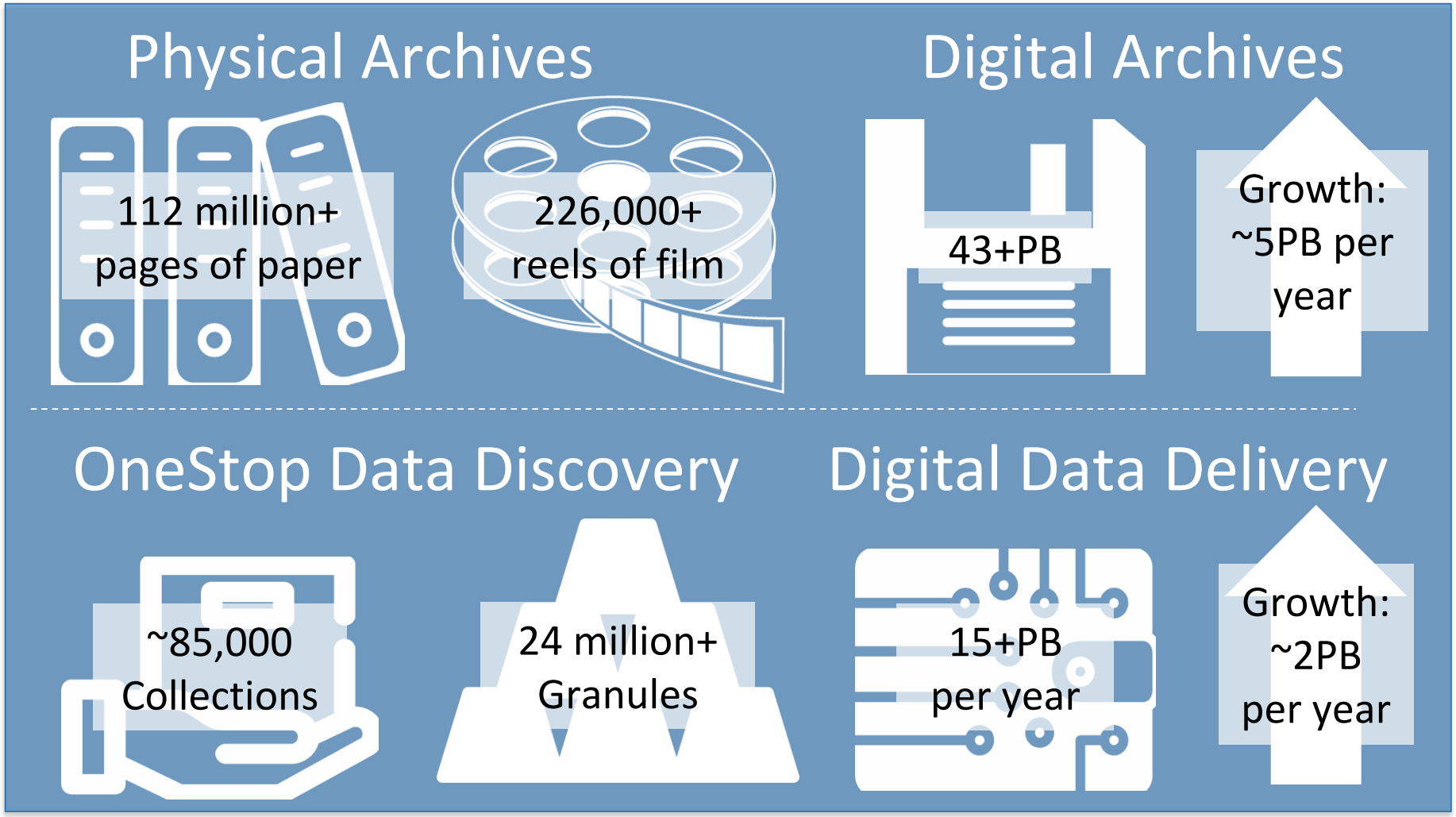
Jennifer B. Webster[1], Ebenezer Nyadjro[1,2], Gunnar Kaltenberger[1,4], Leonard Collazo[1,4], Tiffany Toft[1,4], Zhankun Wang[3], Yee Lau[1,2], Just Cebrian[1,2], Tim Boyer[3], Kirsten Larsen[1]

1. NOAA/ National Centers for Environmental Information, Stennis Space Center, MS
2. Northern Gulf Institute, Mississippi State University, Stennis Space Center, MS
3. NOAA/ National Centers for Environmental Information, Silver Spring, MD
4. General Dynamics Information Technology, Inc, Stennis Space Center, MS

National Centers for Environmental Information (NCEI)

Date: January 25, 2023

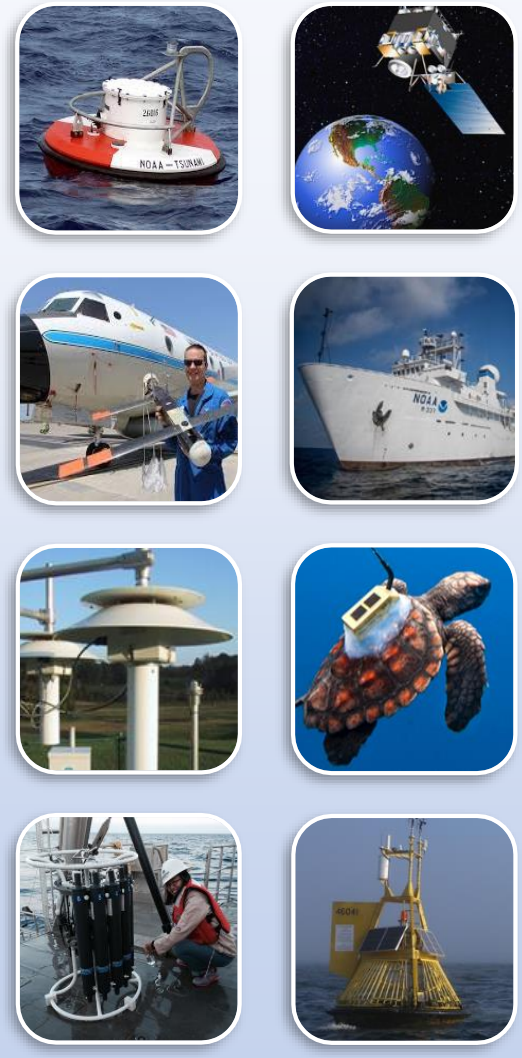
NCEI Core Stewardship Services



as of November 2021

NOAA Data: High Impact, Global Reach

NOAA Observing Systems



NCEI

Scientific Data Stewardship

Research-quality products for decision making

Climate & Weather

- Climate Assessments
- Climate Normals
- Billion $ Disasters
- Drought Monitoring

Oceans & Coasts

- Tsunami Warning
- Coastal Digital Elevation Models
- Extended Continental Shelf
- World Ocean Database

Geophysics

- Space Weather
- World Magnetic Model

NCEI Efforts in Marine Microplastic Monitoring

- **Need**: A **large-scale, long-term, comprehensive database and archive** for marine microplastics

- **Vision**: Establish a global, microplastic database that will **serve a diverse international customer base**, who will use it, together with other NCEI archived data (e.g., Global Ocean Current Database, World Ocean Database, etc.), to attain a holistic understanding of the global microplastic problem.

- **Goals:**
  - Provide a **robust, open access repository for archived information** needed for marine microplastic debris monitoring

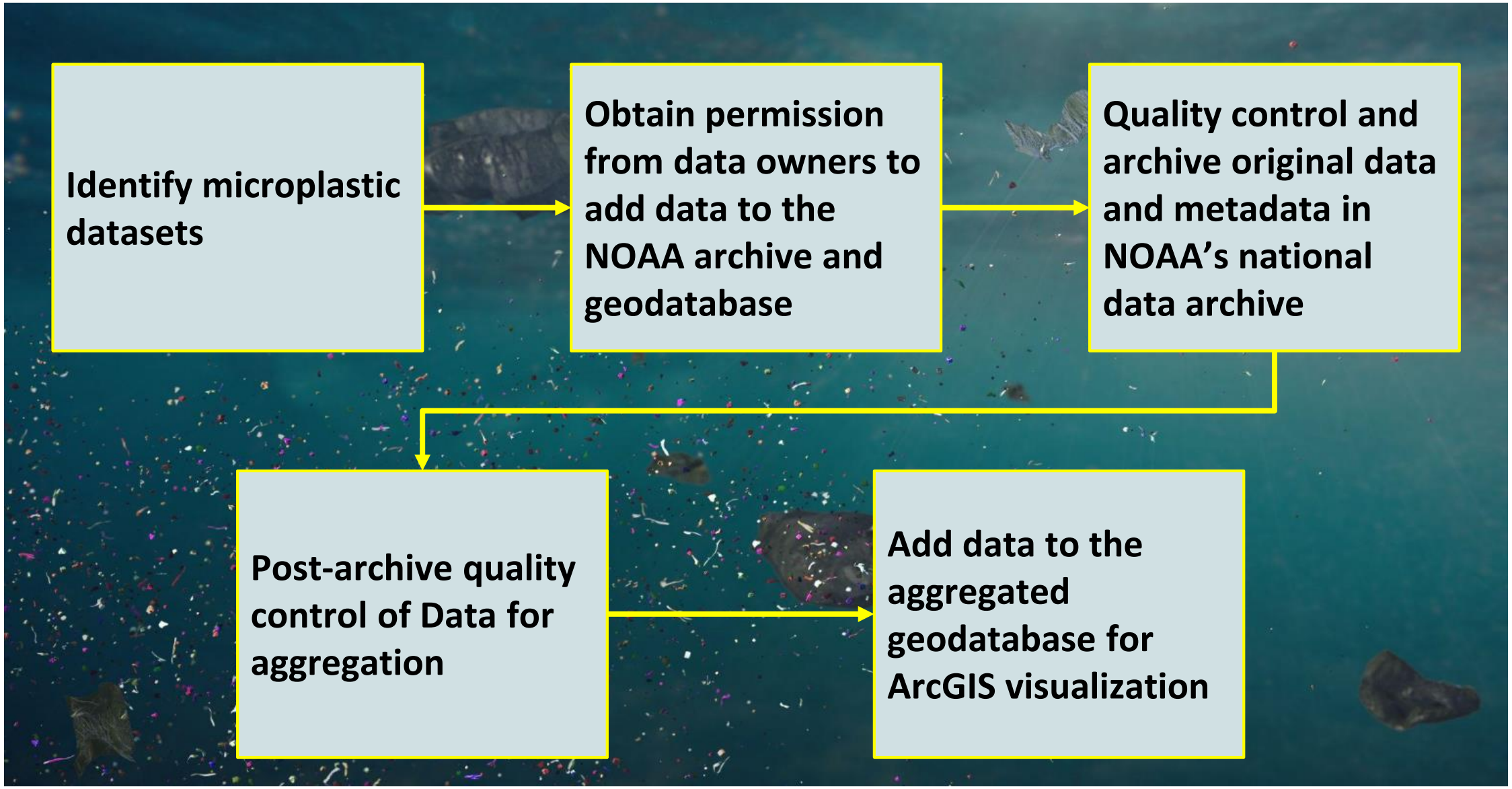
  - Advance a **database** and **GIS web portal** in concert with other microplastic observing efforts (e.g., GPML, MOEJ, EMODnet, EUROqCHARM, etc)

Marine Plastic Monitoring Challenges

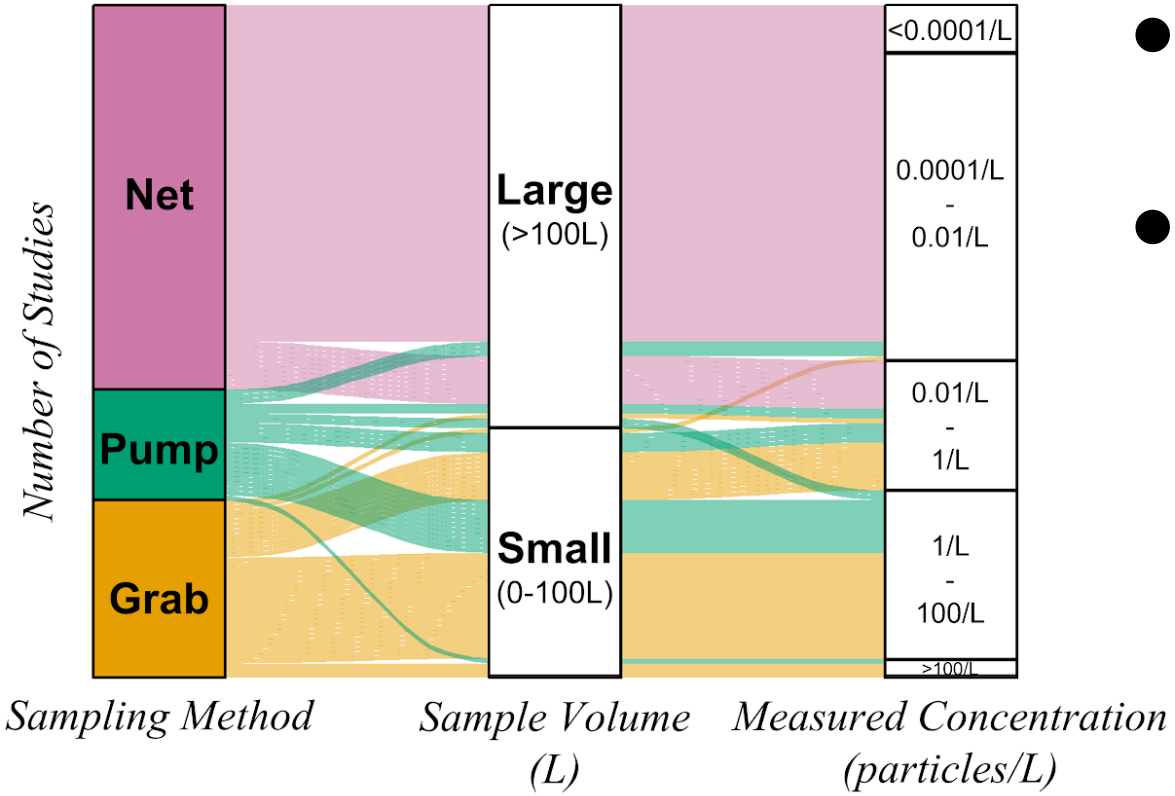
Issues:

- Currently lack of community standard
- NOAA participating on international working groups to establish standards for collecting & reporting

Steps in Microplastic Database Development



Microplastics water methods comparison



- Most variance in concentrations explained by sampling method
- Sampling the same place at the same time using different common methods yielded different concentrations by **orders of magnitude**

Watkins L, Sullivan PJ, Walter MT. What you net depends on if you grab: A meta-analysis of sampling method's impact on measured aquatic microplastic concentration. Environmental Science & Technology, 55 (19): 12930–12942 (*2021*).

Data Quality Control for Microplastic

Data Archive

- All data submitted to NCEI is checked for consistency and data transfer correctness. Errors or questionable data are resolved with the data provider.
  - Preferred data format is .CSV or NetCDF but will work with other formats
  - Data are archived and accessible in original form through each datasets accession link

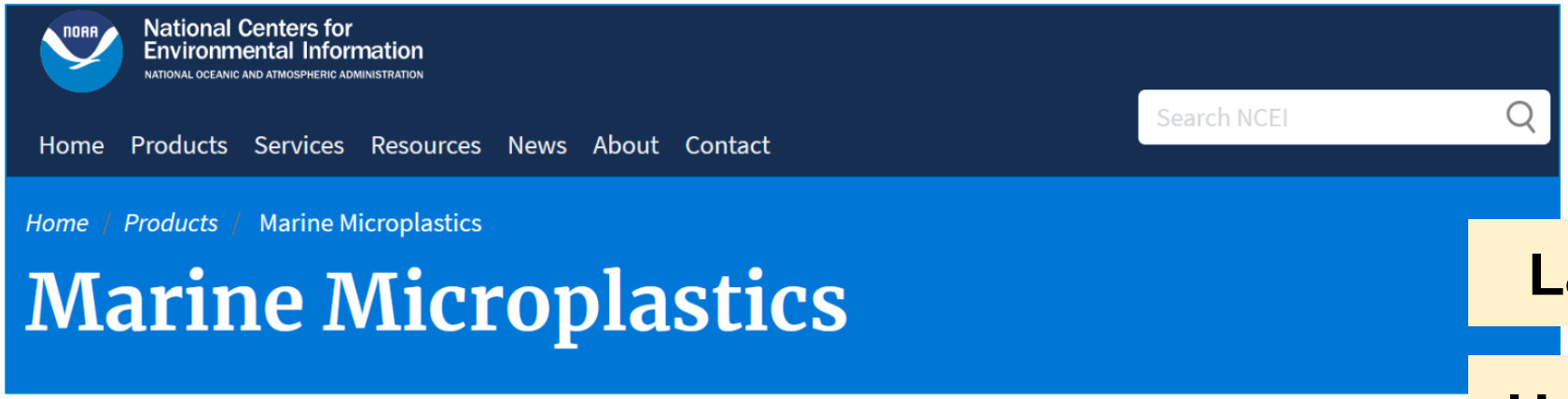
Database and Map Portal

- Limited fields are accessed in the map portal
- Data fields are harmonized for unified display

Current Database & Map Portal Units

Sample Parameter	Data Units
Date	Numeric Day.Month.Year (e.g. 25.01.2023 for January 25, 2023)
Location	Latitude & Longitude in decimal degrees
Equipment	e.g. grab bottle, neuston net, manta net, bongo net, or plankton net
Microplastic Concentration Value	Pieces of plastics / m^3

NCEI Marine Microplastics Website Overview



Launched July 2021

Updated August 2022

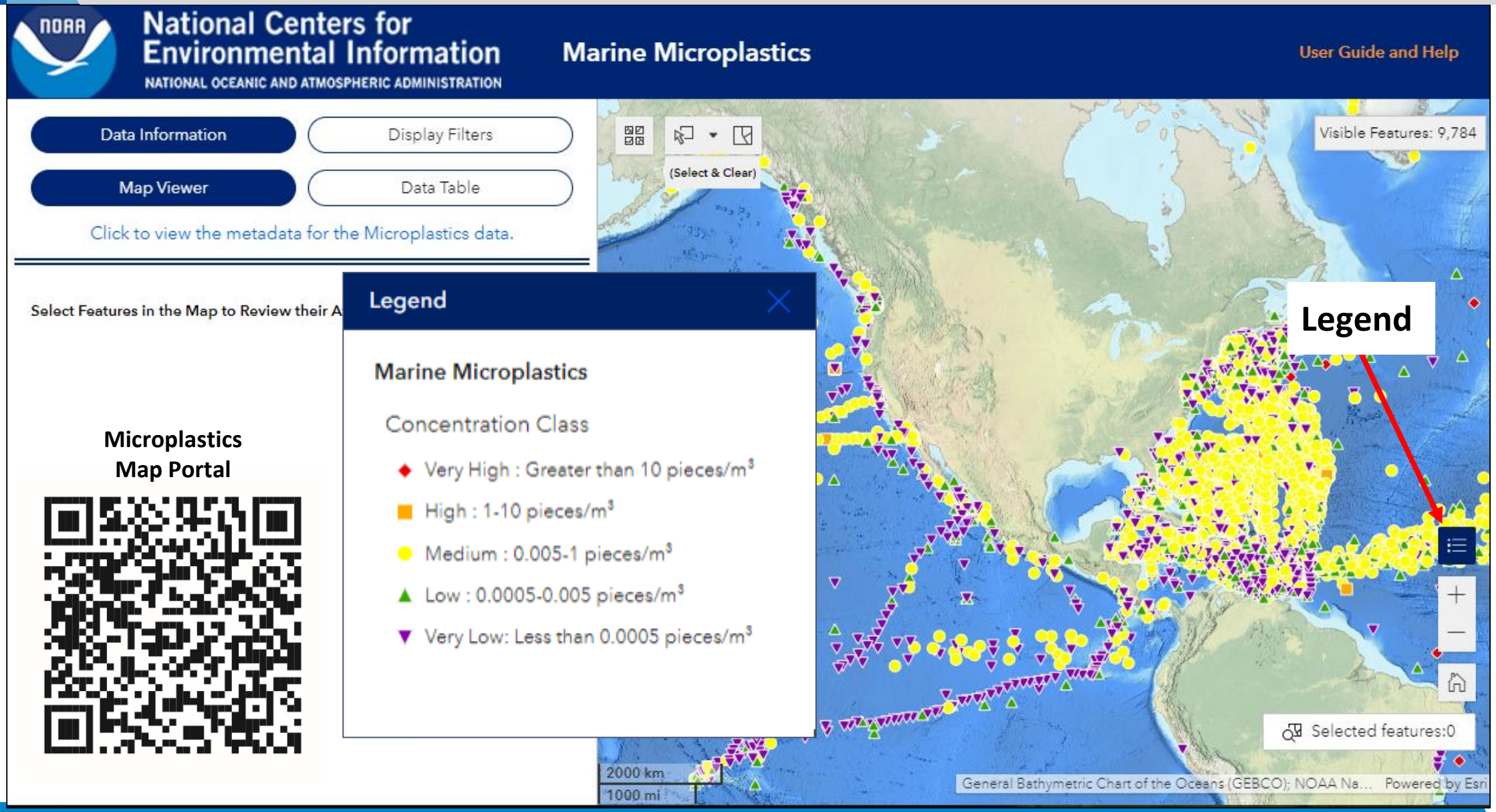
https://www.ncei.noaa.gov/products/microplastics

Homepage:

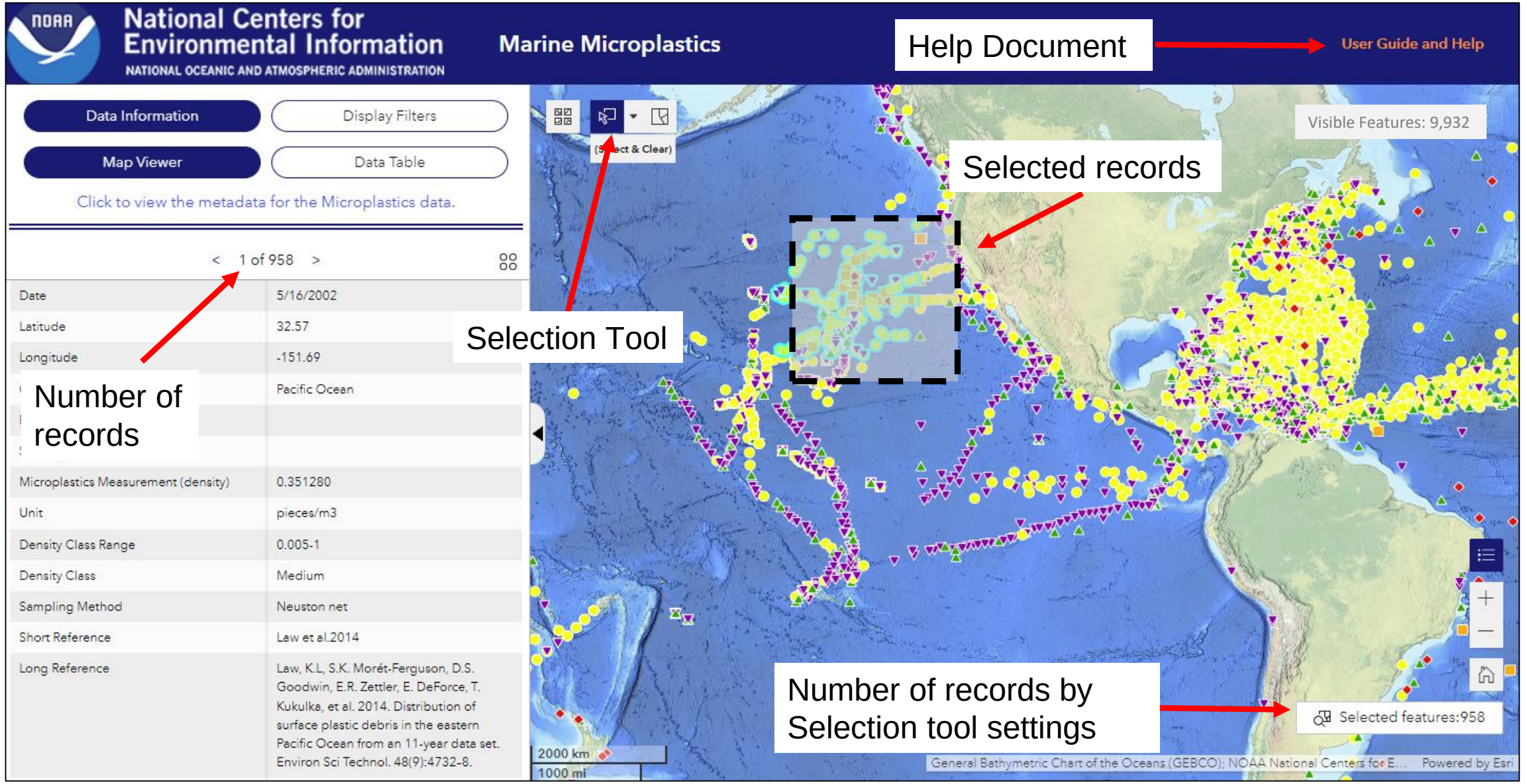
- Background information
- NOAA Policy & Approach
- Access to
  - Data submission information
  - Microplastic Data Archive
  - ArcGIS Map Viewer

Microplastics Homepage

NCEI Marine Microplastics Data Map Portal Overview



Map Portal Overview: *Selecting a Group of Records*



Current Use of Database & Future Target Audience

★ **Research Scientists**
- Example: AI Moonshot Challenge proposal - AI & MP sensing International collaboration - data for development of remote sensing capabilities

★ **U.S. and International Students**
- Example: Data requests to support Ph.D. dissertation and Undergraduate thesis projects

★ **U.S. State Environmental managers and Policy makers**
- Example: Texas Commission on Environmental Quality - data to support state microplastic water quality policy

Plans to engage **future target audiences**:

Fisheries managers, Tourism organizations, Media, General public

Thank You!

Microplastics Homepage

Questions?

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MDMAP Homepage