

# NOAA's Marine Debris Monitoring and Assessment Project

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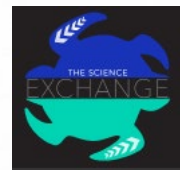
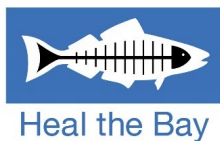


# NOAA Marine Debris Program

- Established in **2006** by Congress as the federal lead for marine debris.
- Mission:** to investigate and prevent the adverse impacts of marine debris.

# MDMAP Partners

MDMAP functions as a network of individuals and organizations volunteering with MDMAP, personnel at sister agencies, and scientists exploring specific research questions.



## Detect

spatial and temporal changes  
in shoreline debris loads by  
material and type

## Facilitate

a national network for  
research and science-based  
policies

# MDMAP Goals

## Foster

stewardship and marine  
debris awareness  
through engagement

## Provide

tools to partners to be  
able to ask and answer  
their own questions

## Guide

and evaluate prevention  
of marine debris

# Timeline

## Development & testing

Adapted prior US and European monitoring efforts

2009/12

2011

## Japan Tsunami

Generated interest and demonstrated need

2012

## Database & protocol launch

Recruited participants

2016

## Toolbox launch

Training, data analysis tools

2017

## Data assessment

Analysed data, identified limitations

2018

## Protocol evaluation

Tested sources of error and bias identified by the data assessment

2019

## Participant interviews

To understand their needs and pain points

2021

## Integrate & reboot

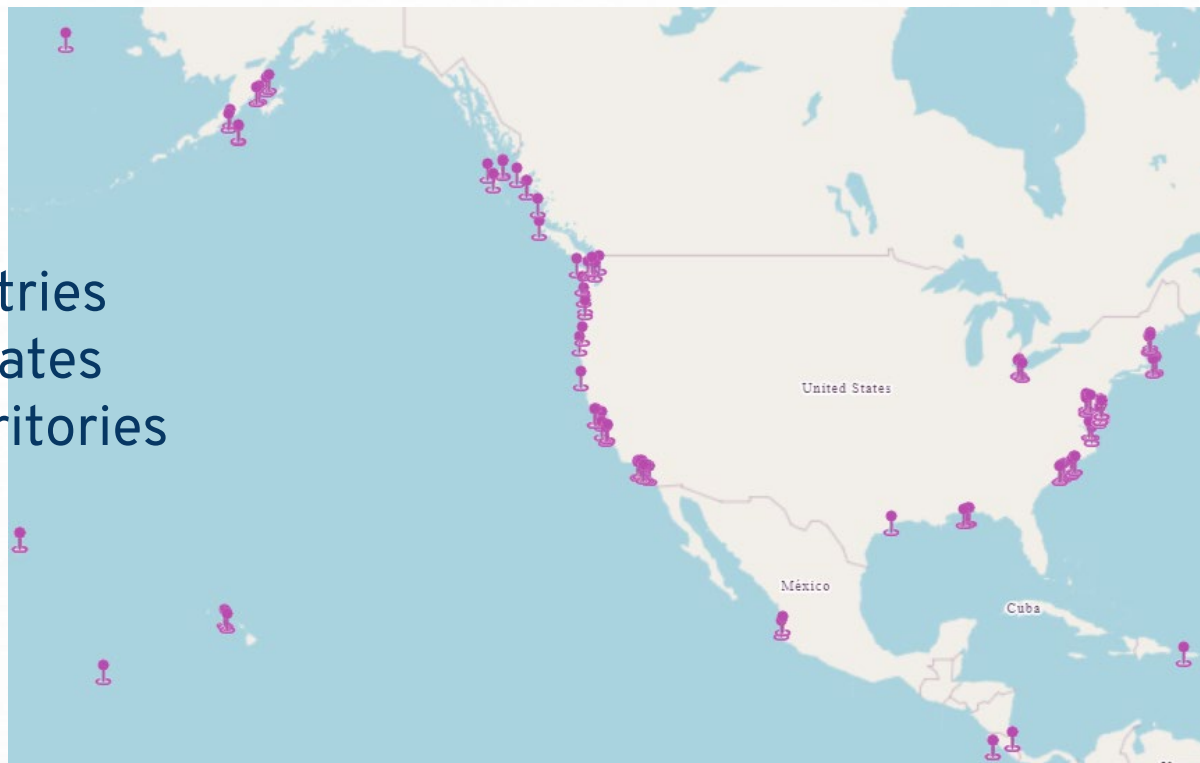
Implement feedback and lessons-learned

2021

# MDMAP Dataset

**443** Sites  
**9,055** Surveys

**9** Countries  
**23** US states  
& territories





# MDMAP in California



68

Sites



2,452

Transects



173,823

Items



# MDMAP in California

Top 10

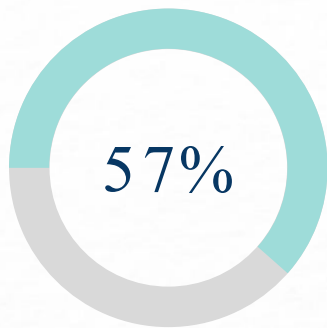
Bottom 10

Item	Count
Hard Plastic Fragments	40271
Foamed Plastic Fragments	19540
Metal Fragments	12960
Filmed Plastic Fragments	12350
Paper and Cardboard	8975
Bottle/Container Caps	8862
Cigarettes	8537
Glass Fragments	8221
Food Wrappers	8117
Metal Other	7907

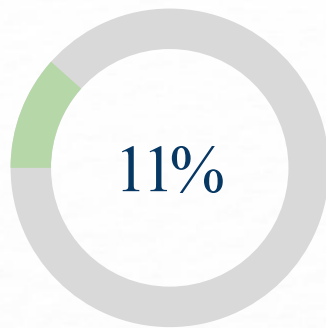
Item	Count
Gloves (non-rubber)	30
6-Pack Rings	44
Tires	51
Rubber Gloves	62
Glass Other	69
Aerosol Cans	90
Towels/Rags	191
Buoys & Floats	193
Paper Bags	231
Glass Jars	235



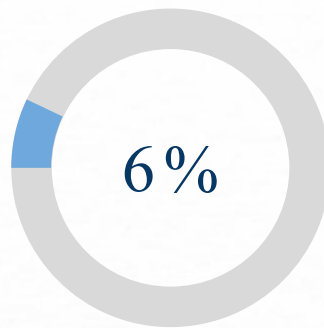
# MDMAP in California



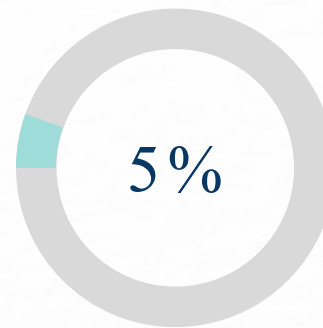
Plastic  
Fragments



Plastic  
Consumer  
Items



Plastic  
Smoking  
Items



Plastic  
Fishing  
Items

\* Does not include cigarette butts < 2.5 cm. Data as of Feb 29, 2016.

# MDMAP in Greater Farallones NMS

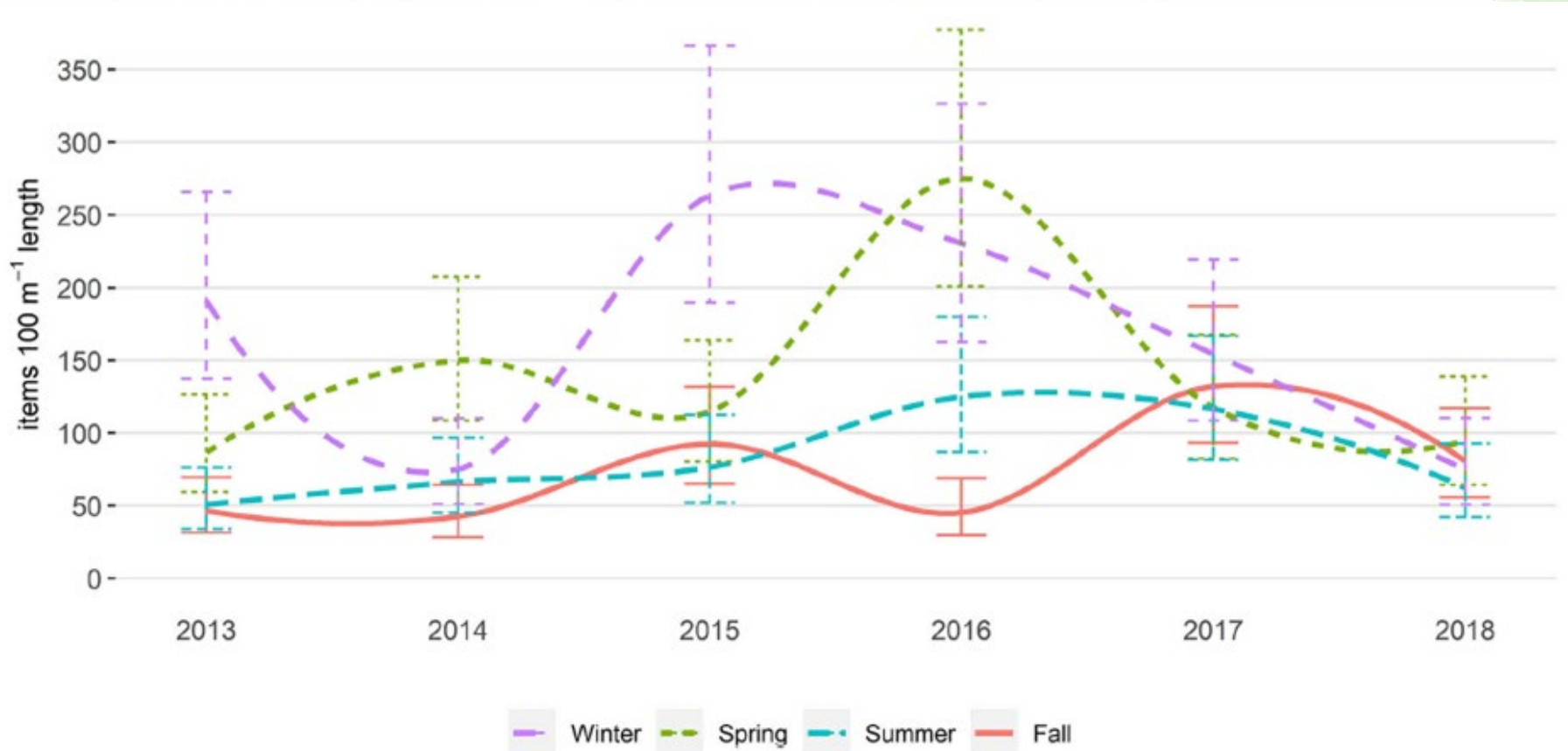


- 2012 - 2018
- 6 sites, 1,162 transects
- Average 203 items per 100 m site
- 91% of items plastic



Uhrin, A., Lippiatt, S., Herring, C., et al., Temporal trends and potential drivers of stranded marine debris on beaches within two US National Marine Sanctuaries using citizen science data, *Frontiers in Environmental Science*, 8:604927, 2020.

# Greater Farallones NMS: Seasonal Trend



# Greater Farallones NMS: Survey Team Size Effect

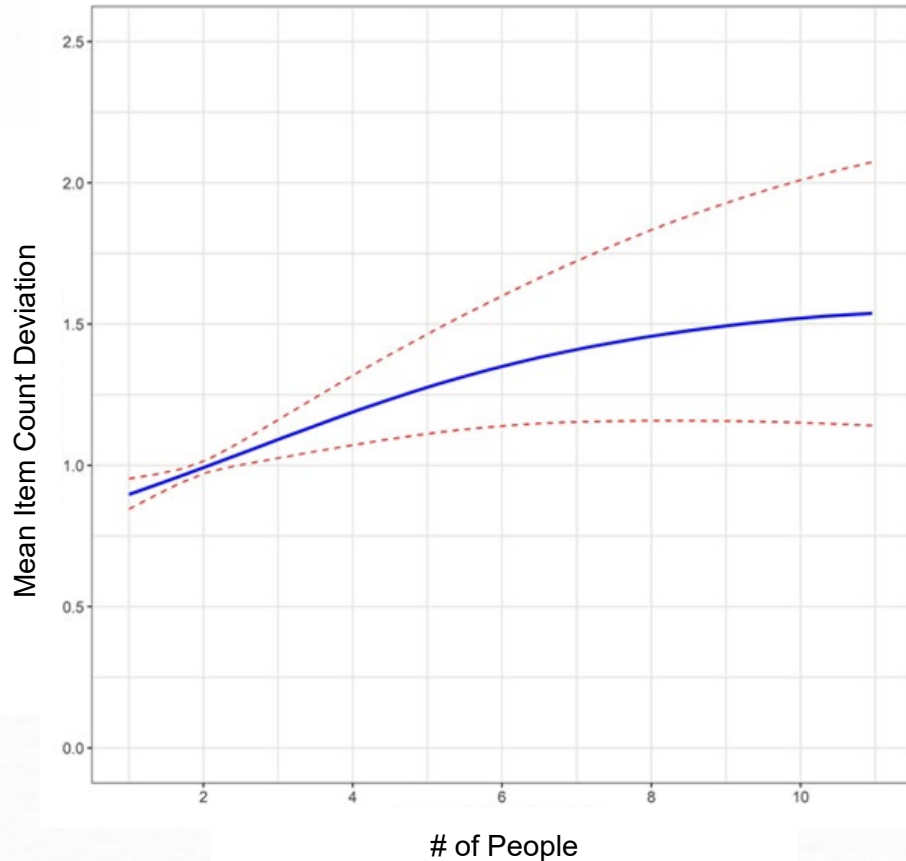
- More people = more debris
- Sampling areas overlap?
- Search area per person is smaller, closer?

See also:

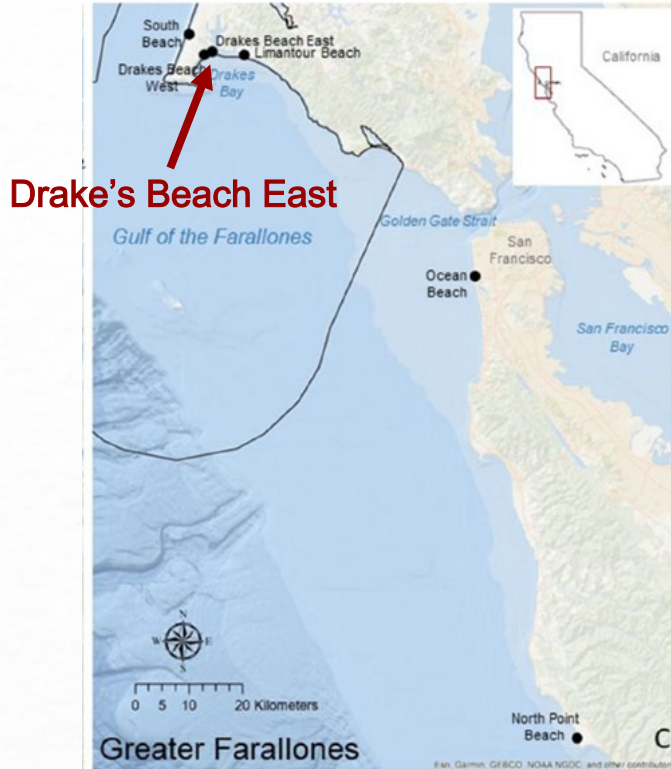
Hardesty, B. D., et al. 2017. Developing a Baseline Estimate Of Amounts, Types, Sources and Distribution of Coastal Litter - An Analysis of US Marine Debris Data  
[https://marinedebris.noaa.gov/sites/default/files/publications-files/An\\_analysis\\_of\\_marine\\_debris\\_in\\_the\\_US\\_FINAL\\_REP.pdf](https://marinedebris.noaa.gov/sites/default/files/publications-files/An_analysis_of_marine_debris_in_the_US_FINAL_REP.pdf)

Burgess, H. K., et al. 2020. Examining Influences on Observed Counts of Shoreline Surveys of Marine Debris.  
<https://clearinghouse.marinedebris.noaa.gov/project?mode=View&projectId=838>

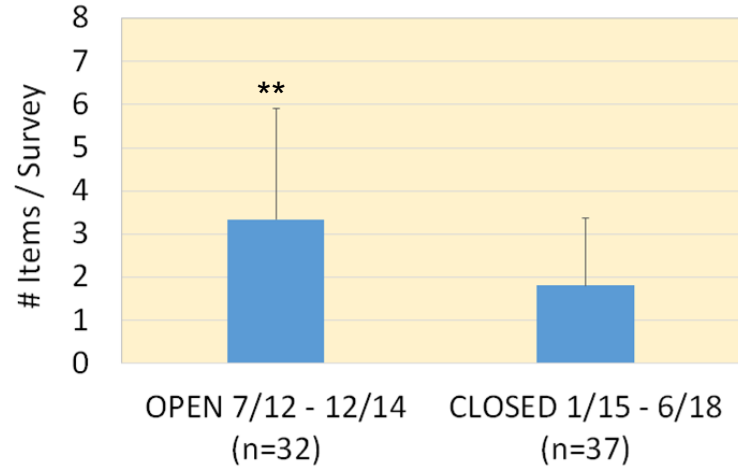
Plastic Items, GFNMS accumulation data



# Greater Farallones NMS: Oyster Farm Debris



## Drakes Beach East Oyster Farm Debris





# MDMAP Protocol Evaluation



## Question

What influences counts during surveys?

DETECTION AS A FUNCTION OF:

distance &  
team size  
things we can  
control

shoreline & debris  
characteristics  
things we can't  
control

LOWER DETECTION:

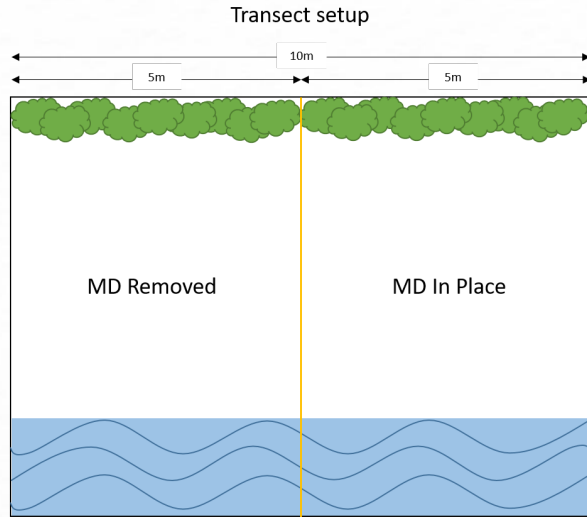
fewer eyes, farther than  
2.5 m from surveyor,  
looking in two directions

brown, grey, black, smaller  
items; searching cobble and  
vegetated areas





# MDMAP Protocol Evaluation



- Vegetation
- Water
- Center Line

## Question

Does debris removal impact future debris loads?



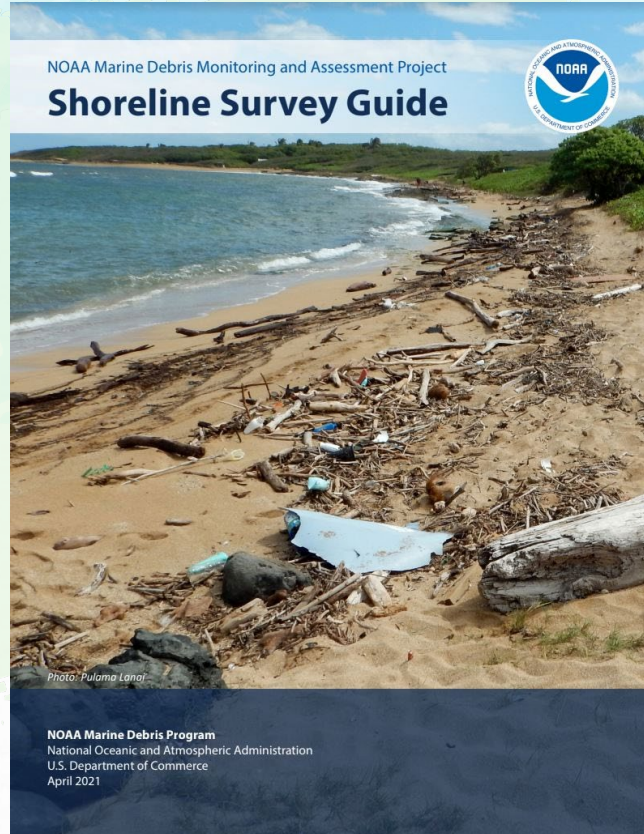
no statistical effect from removal a month later, even in vegetation

## CONSIDERATIONS:

- survey interval ~28 days  
tides, wind, other clean-ups
- shorter intervals, remote less dynamic sites, larger clean-up area might have different results

# Updated materials

<https://marinedebris.noaa.gov/research/monitoring-toolbox>



# How to

## MDMAP *at a glance*







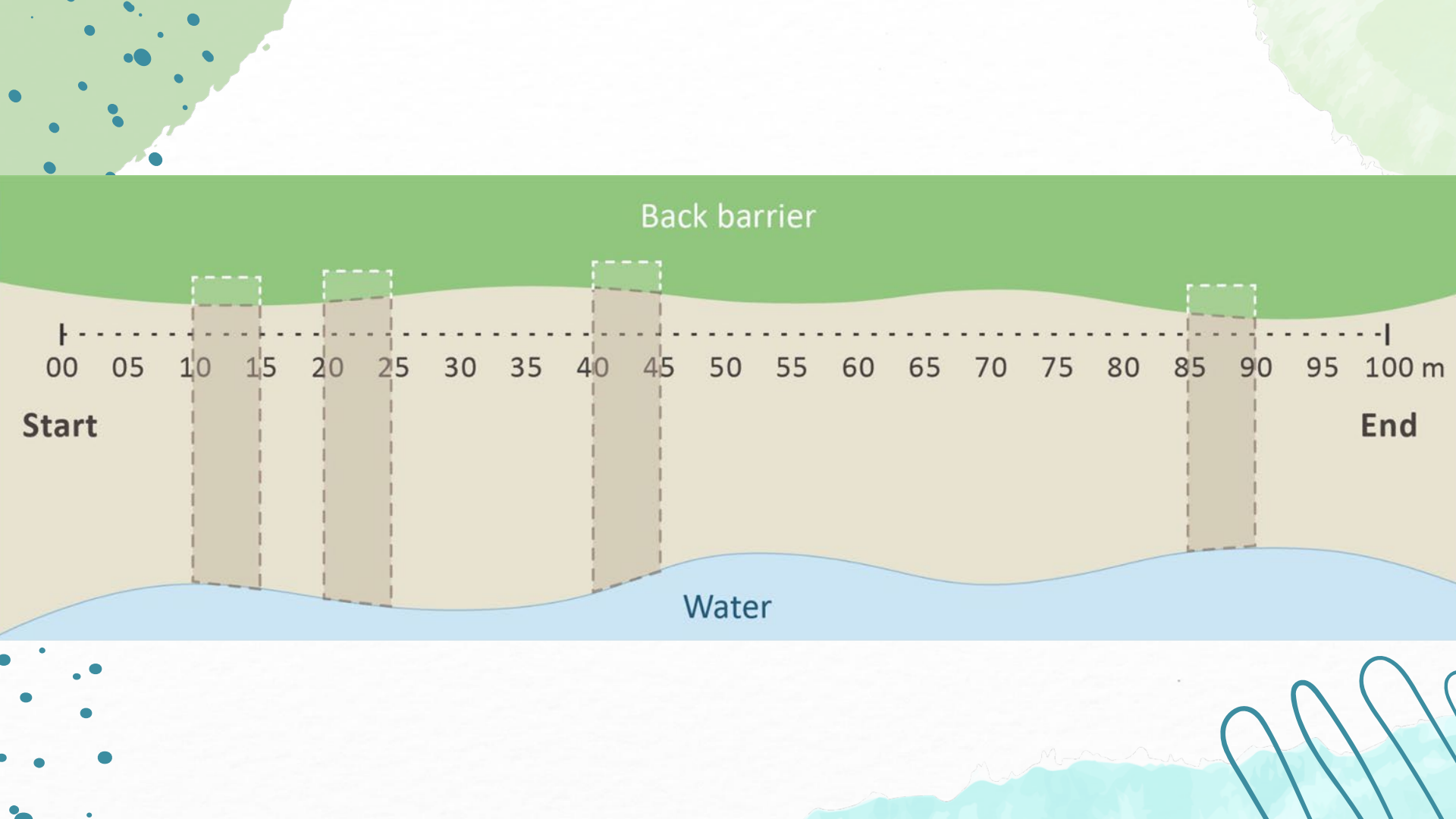
-  **Choose a site**  
Select a 100 meter shoreline survey site
-  **Select transects**  
Randomly select four 5 meter transects
-  **Record conditions**  
Record site condition information
-  **Survey for debris**  
Within each transect search for and document items 2.5 centimeters or larger
-  **Enter data**  
Enter data online in the MDMAP database
-  **Repeat!**  
Repeat, aiming for monthly surveys at each site



Photo: NOAA

monthly  
encouraged  
not  
required



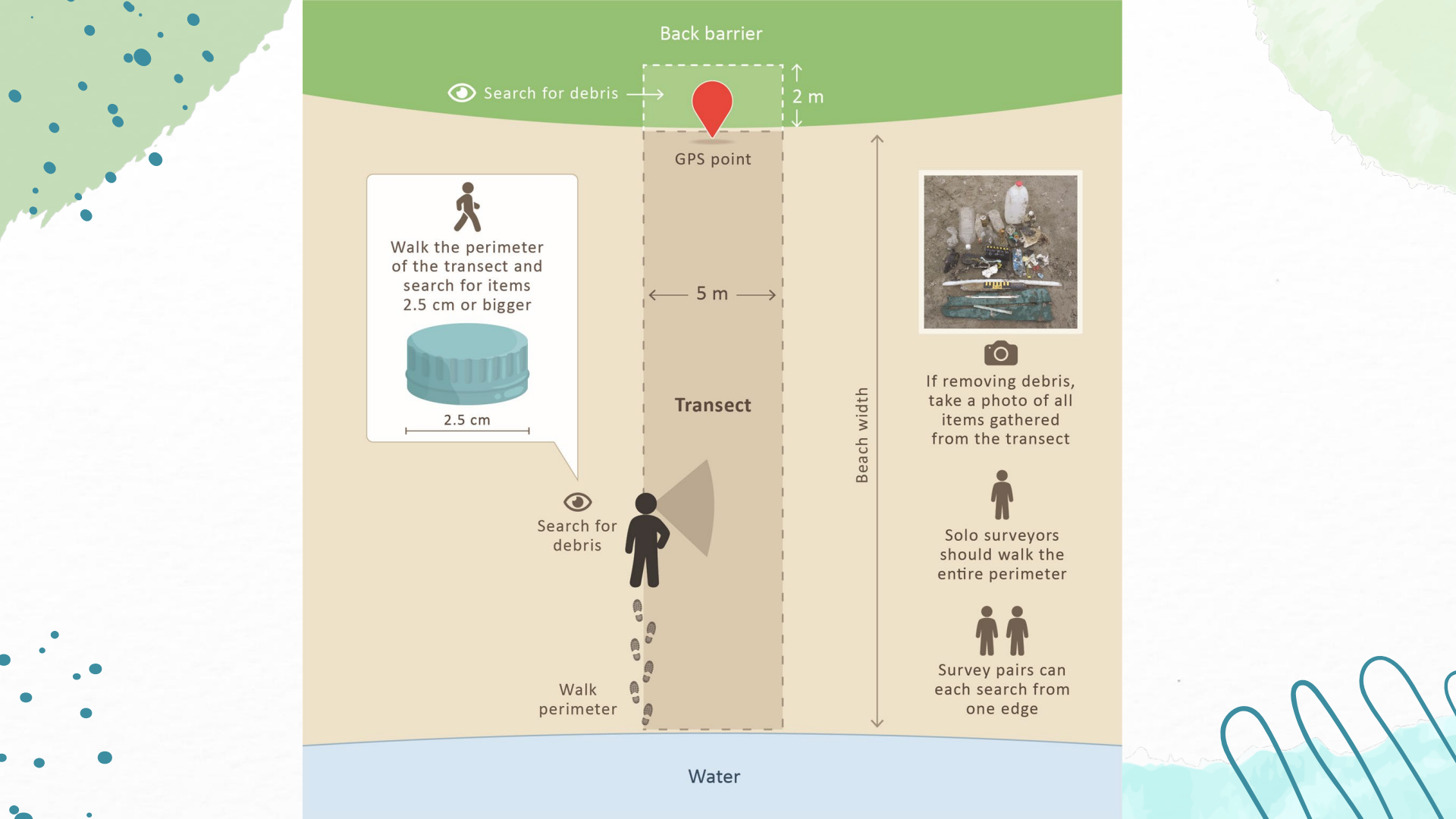
Back barrier

00 05 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 m

Start

End

Water



Back barrier

Search for debris

2 m

GPS point

5 m

Transect

Beach width

Walk the perimeter of the transect and search for items 2.5 cm or bigger



2.5 cm



If removing debris, take a photo of all items gathered from the transect



Solo surveyors should walk the entire perimeter



Survey pairs can each search from one edge

Search for debris



Walk perimeter



Water



Open

explorable without an account

Customizable

easier custom item tracking

Modernized

better account mgmt,  
r&r tracking

**Updated database  
(live May)**

Data Viz

interactive, filterable

API

securely add or pull data from  
other applications

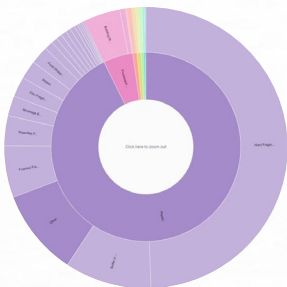
Responsive

phone, tablet and computer



# Data viz

## Composition

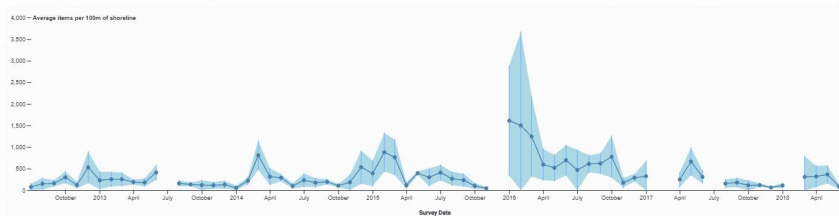


Survey

Site

Sites

## Time series



All debris or by type

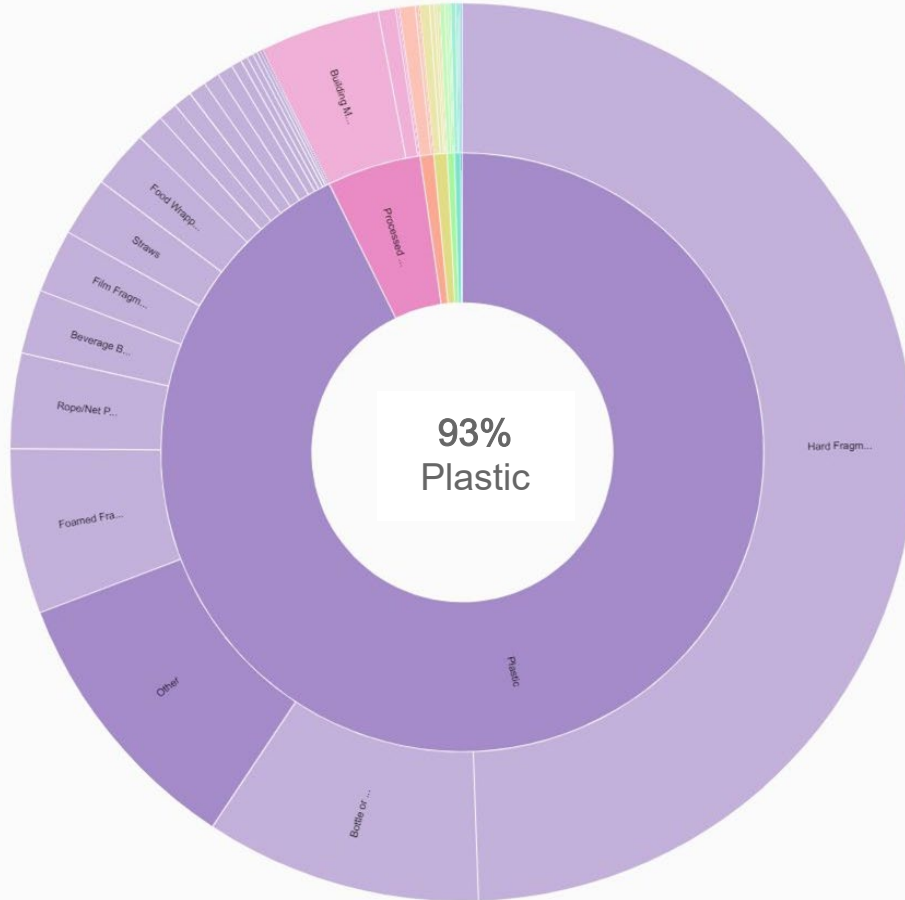
Site

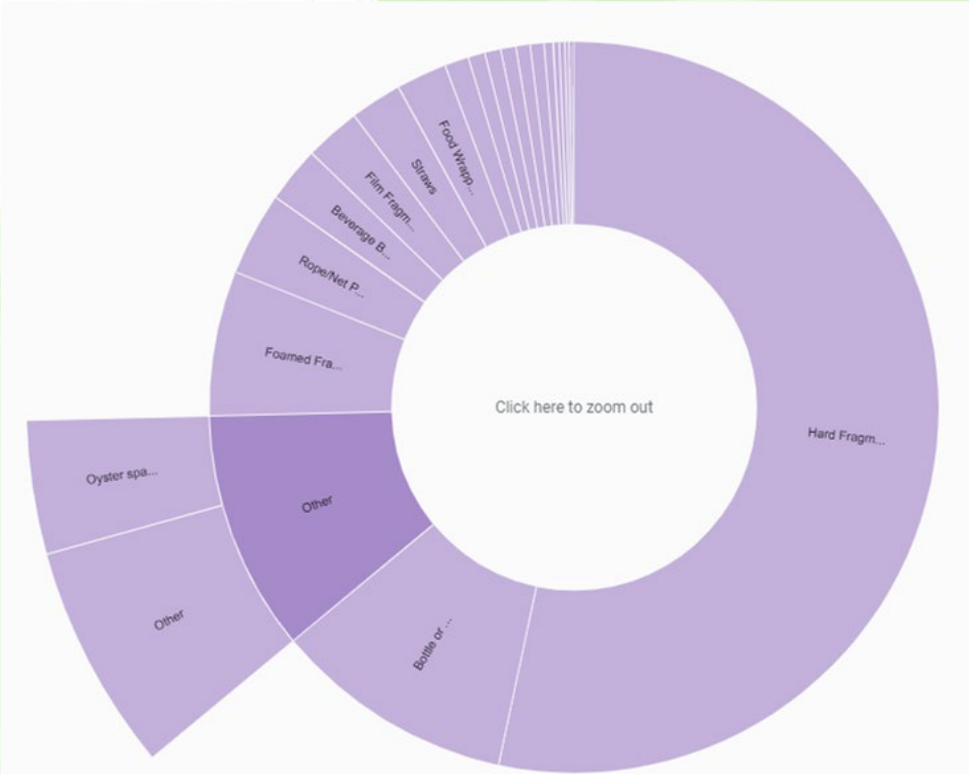
Sites

Surveys 69

Visualize

Photos 2



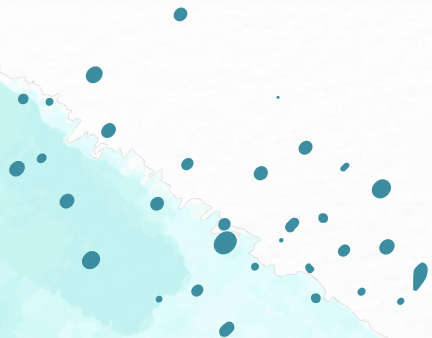
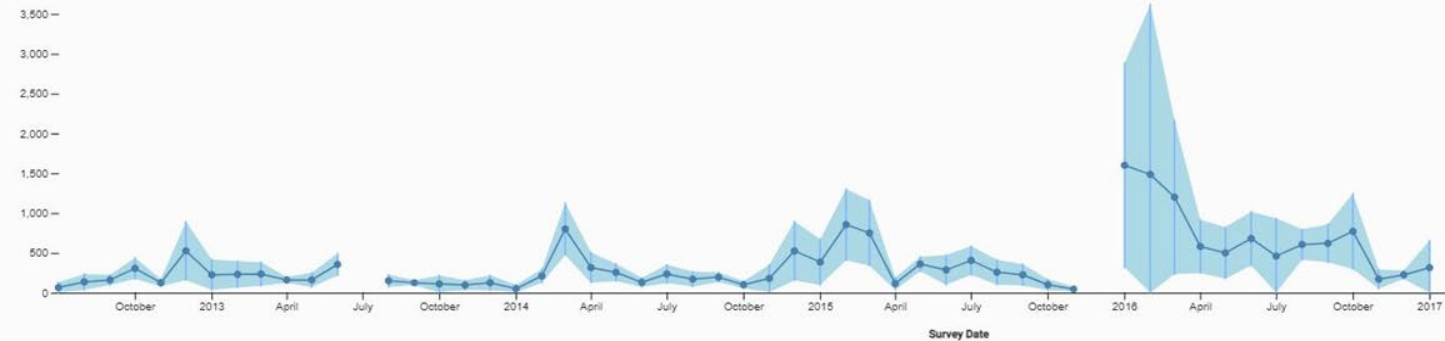




## Debris Timeseries

Filter Debris Type  
All Debris

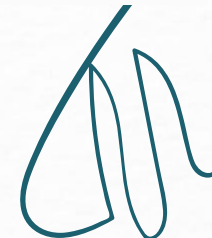
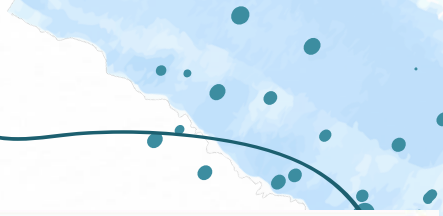
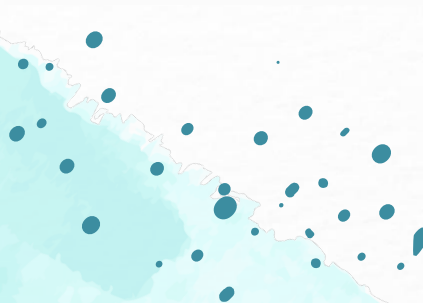
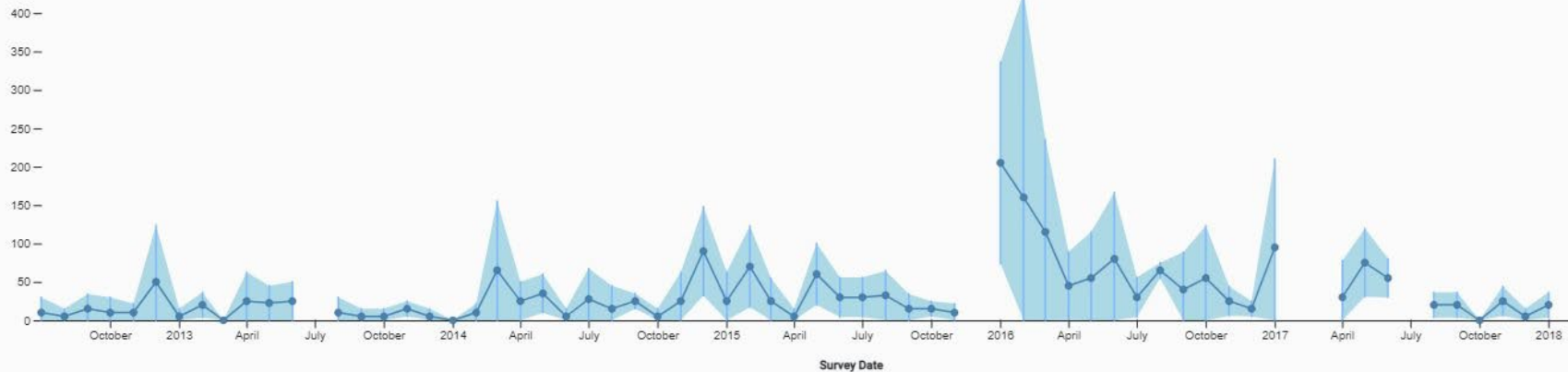
4,000 — Average items per 100m of shoreline



# Debris Timeseries

Filter Debris Type  
Bottle or Container Caps

450 — Average items per 100m of shoreline







# Thank you!

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