

Marine Debris

NOAA Marine Debris Program | Office of Response and Restoration | NOAA National Ocean Service



Japan Tsunami Marine Debris: *Information, actions, and opportunities for engagement*

Local Environmental Observer Network
April 16, 2012

Peter Murphy
Alaska Coordinator
NOAA Marine Debris Program

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Outline

- Background
 - Marine Debris
 - Marine Debris in AK
 - Japan Tsunami
- What we know
- What we are doing
- What you can do
- Questions?



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NOAA Marine Debris Program

- Established in 2005
- Mandated by the Marine Debris Research, Prevention, and Reduction Act, Dec. 2006
- Dedicated to leading and promoting research, prevention, and reduction activities nationwide
- Regional Structure
- Website:

<http://marinedebris.noaa.gov/>



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What **is** marine debris?

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Marine Debris is “any persistent **solid material** that is manufactured or processed and directly or indirectly, intentionally or unintentionally, **disposed of or abandoned into the marine environment** or the Great Lakes.”

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Marine Debris: Where does it come from?

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Marine Debris - Impacts



Photos: Gulf of Alaska Keeper



Photos: NOAA



Photos: NWSI



Photos: NOAA



Photos: NOAA

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What we know about... The “garbage patches”



NOAA PIFSC CRED

News and information sources

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garbage patch - Google Search

Web Images Videos Maps News Shopping Gmail more

Google

garbage patch

About 1,190,000 results (0.13 seconds)

Advanced search

Everything
Images
Videos
News
Shopping
More

Silver Spring, MD
Change location

All results
Sites with images
Wonder wheel
Timeline
More search tools

Images for garbage patch Report images

Garbage Patch

The largest of these garbage swills is known as the Pacific Gyre, or The Great Garbage Patch. It is roughly the size of Texas, containing approximately 3.5 ...

Multimedia - News - Take Action - Resources

www.greatgarbagepatch.org/ - Cached - Similar

Great Pacific Garbage Patch - Wikipedia, the free encyclopedia

The Great Pacific Garbage Patch, also described as the Pacific Trash Vortex, is a gyre of marine litter in the central North Pacific Ocean located roughly ...

Discovery - Formation - Effect on wildlife - Research and cleanup

en.wikipedia.org/wiki/Great_Pacific_Garbage_Patch - Cached - Similar

HowStuffWorks "The Great Pacific Garbage Patch"

The Great Pacific Garbage Patch, the world's largest landfill, is located in the middle of the Pacific. Read about the Great Pacific Garbage Patch.

science.howstuffworks.com > ... > Earth Science > Oceanography - Cached - Similar

YouTube - The Garbage Patch

3 min - Dec 23, 2007 - Uploaded by hethma
over 7 million tons of plastic spanning an area twice the size of texas destroying our oceans and harming our food chains.

www.youtube.com/watch?v=tnUjTHB1lVM

YouTube - The Great Pacific Garbage Patch - Good Morning America

5 min - Aug 6, 2008 - Uploaded by rexsherman
umm now *seriously* lets say if you believe in god he'll save and forgive! now you may continue to throw your garbage,,,,, ah yes and this ...

www.youtube.com/watch?v=uLrVCi4N67M

More videos for garbage patch

Ads

Great Garbage Patch

Project Kaisei is working to remove plastic from our oceans. Learn more

www.projectkaisei.org

Also try

north pacific gyre

See your ad here

- North Pacific Gyre
- Size of TX
- Pacific Trash Vortex
- World's largest landfill
- 7 million tons of plastic

What do we REALLY know about the "garbage patches?"

www.mnn.com/.../what-is-the-great-pacific-ocean-garbage-patch - Similar

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Here's what you need to know...

Term “garbage patch” is a misnomer.

Marine debris concentrates in various areas of our oceans – not just the “garbage patches.”

Gyres (very large scale)

Eddies

Windrows



3 things to remember:

1. NOT a blanket of trash visible with satellite or aerial photography.
2. Exact size and mass are unknown.
3. Mainly small bits of floatable marine debris.

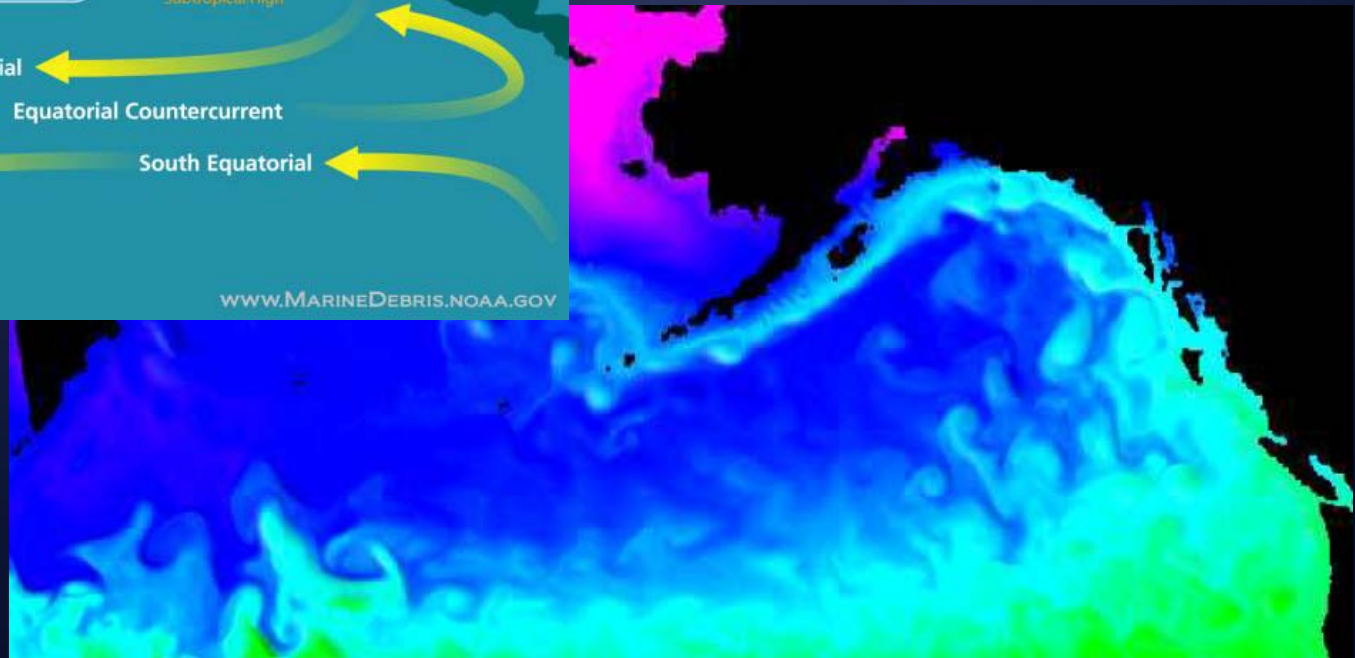
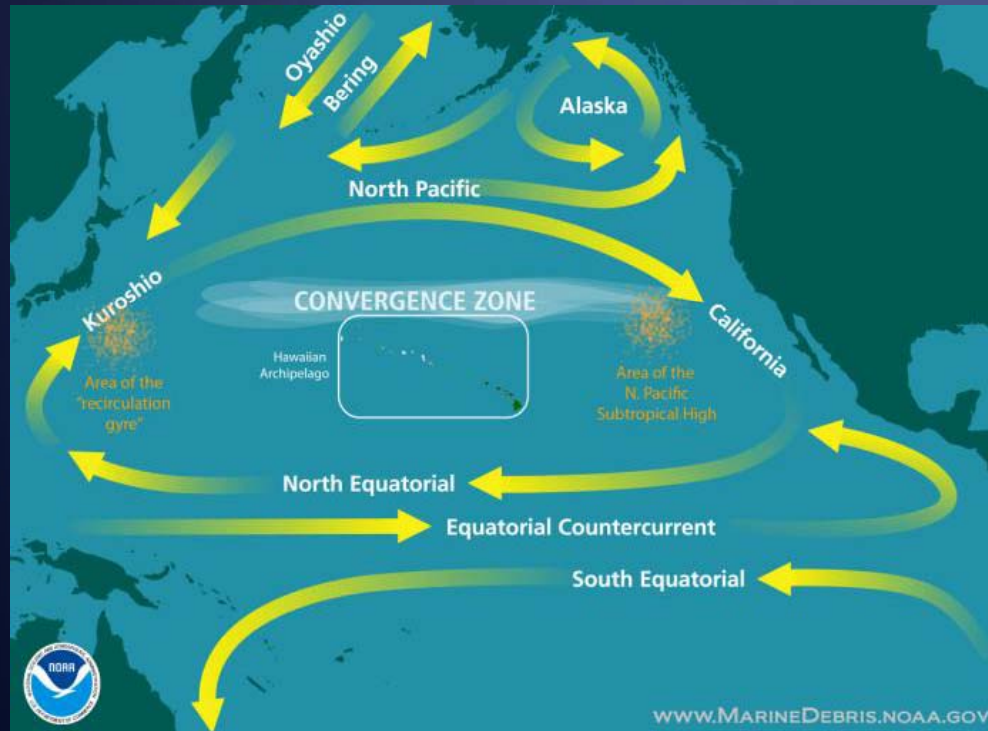
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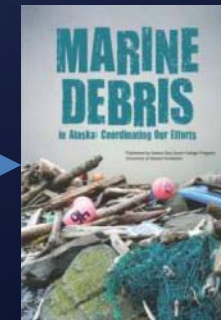


Marine Debris: In Alaska



Marine Debris in Alaska

- More coastline than rest of US combined
- High density of marine debris
- Actions
 - Removal
 - Research
 - Disposal
 - Data standardization
 - Outreach
 - From AK to lower 48



Marine Debris

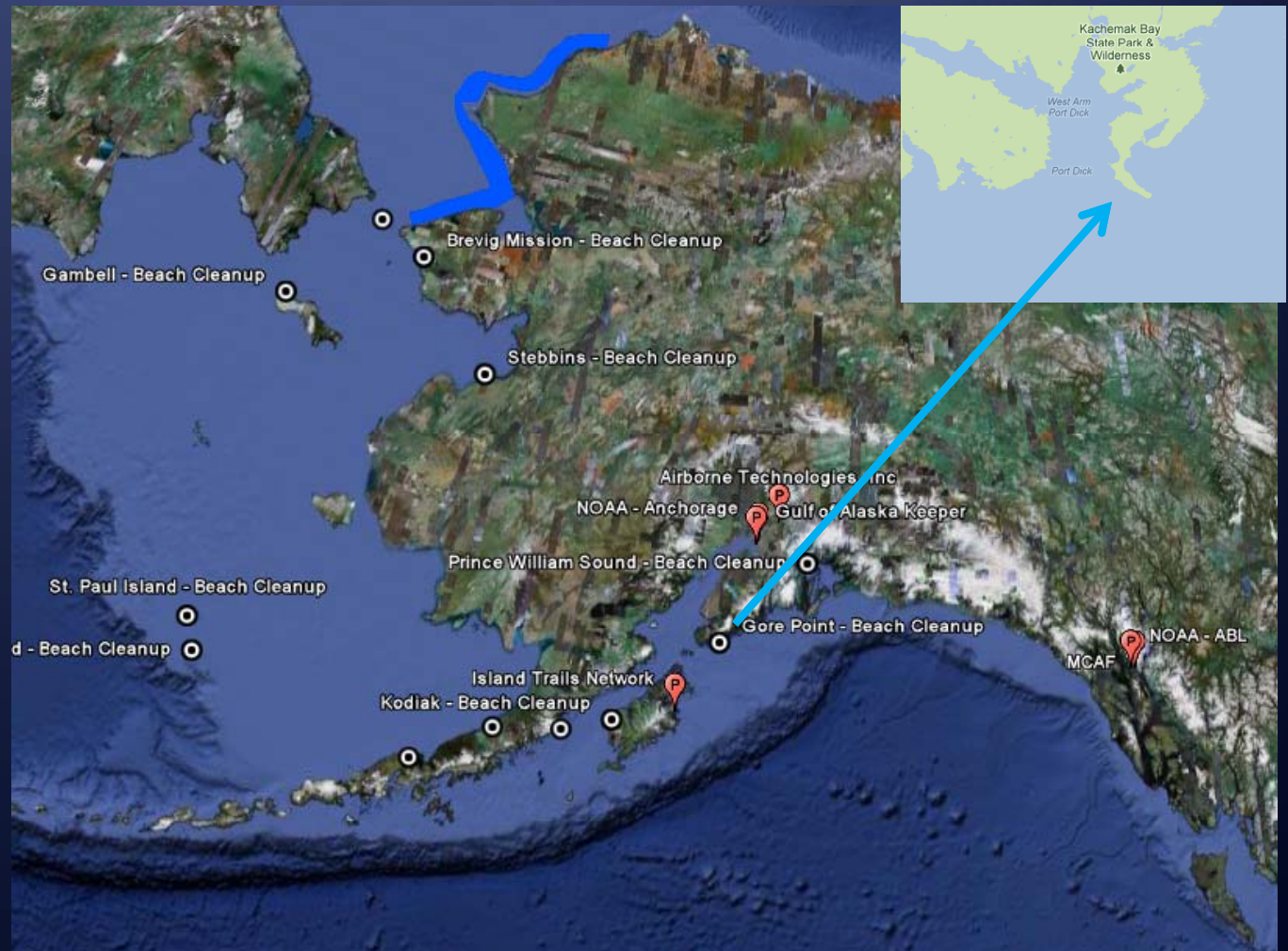
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Marine Debris – Already in Alaska

- MD in AK
 - 23 projects
 - Research
 - Outreach
 - Removal



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Marine Debris in AK – Example



*Photos:
Gulf of
Alaska
Keeper*

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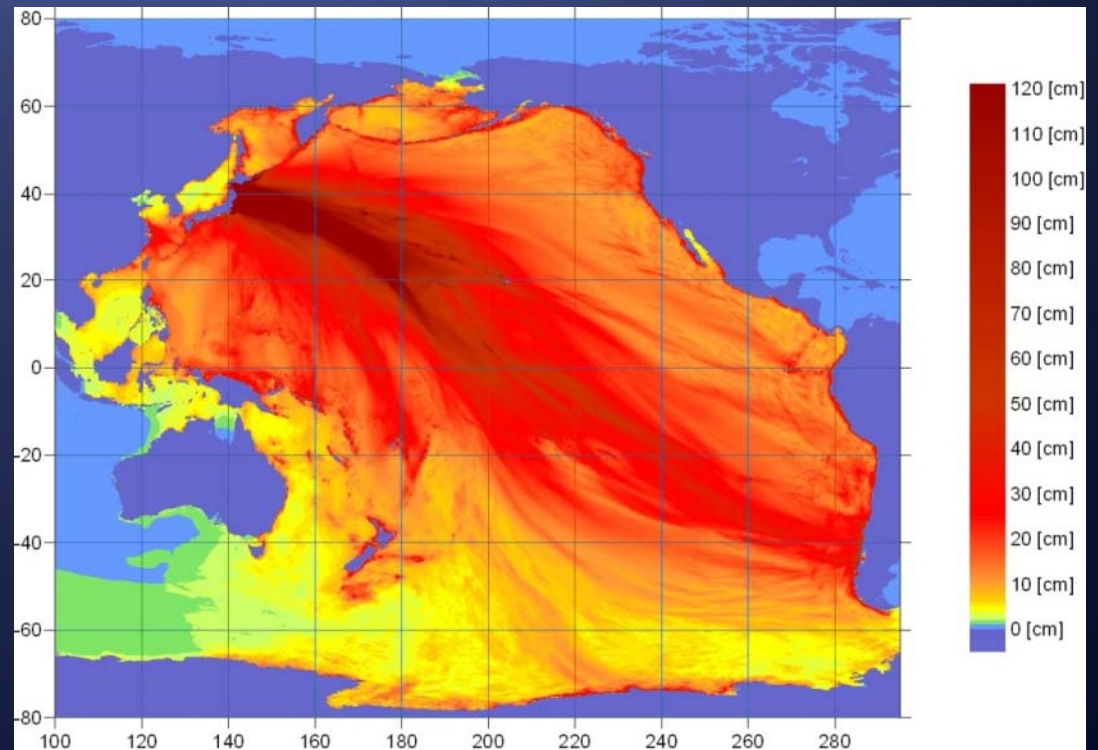


Marine Debris: Japan Tsunami



Tsunami Event

- 9.0 magnitude earthquake
- 120 ft max wave height
- 217 square miles inundation
- 15,844 people confirmed dead, 3,451 missing



NOAA's ocean energy distribution forecast map of the 2011 Japan tsunami



The Damage

- Total debris on land: ~22 million tons
- Quantity and composition of floating debris: unknown at this time



Photo: US Navy

Ofunato, March 15

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Tsunami Marine Debris – What is it?



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At-sea Sightings: Japan, Oct., Nov. 2011



Fishing boat



Capsized boat



Gas cylinder



Fishing gear

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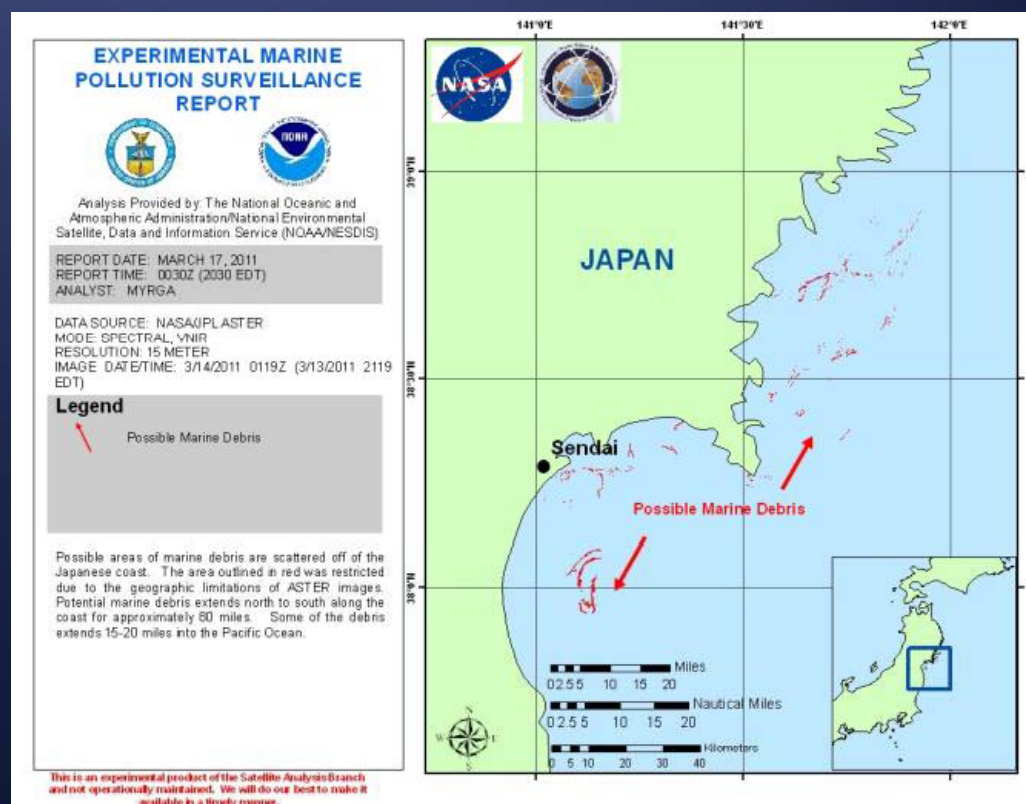
Marine Debris – Early Sightings



Photos: US Navy Pacific Fleet

Aerial Imagery – March 13

- Patches and fields
- Wood, construction materials abundant



Satellite Imagery – March

- Patches and fields – By April 14, debris no longer visible

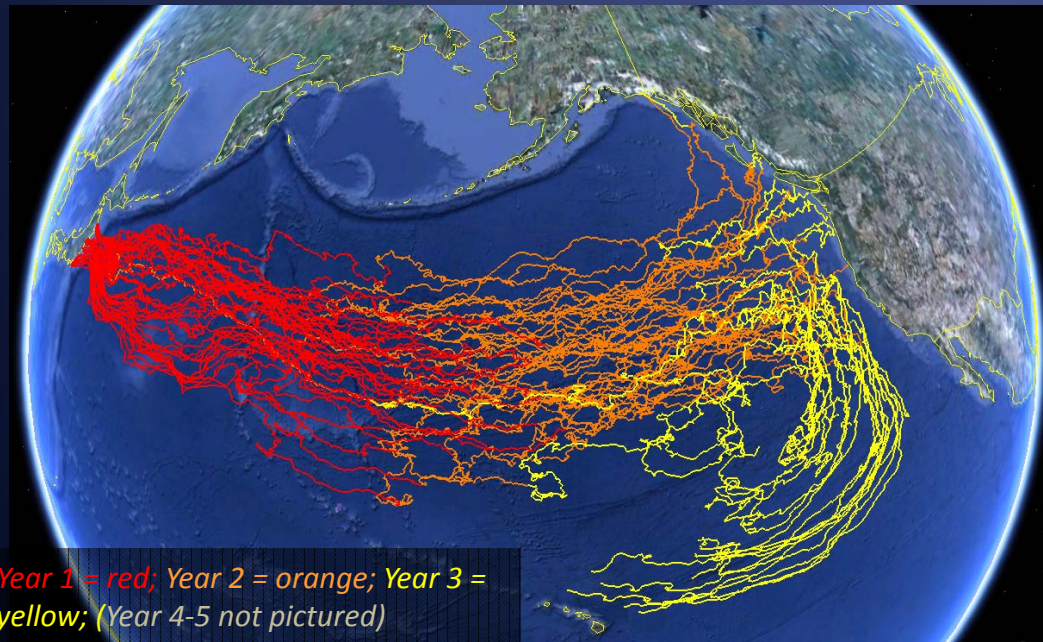
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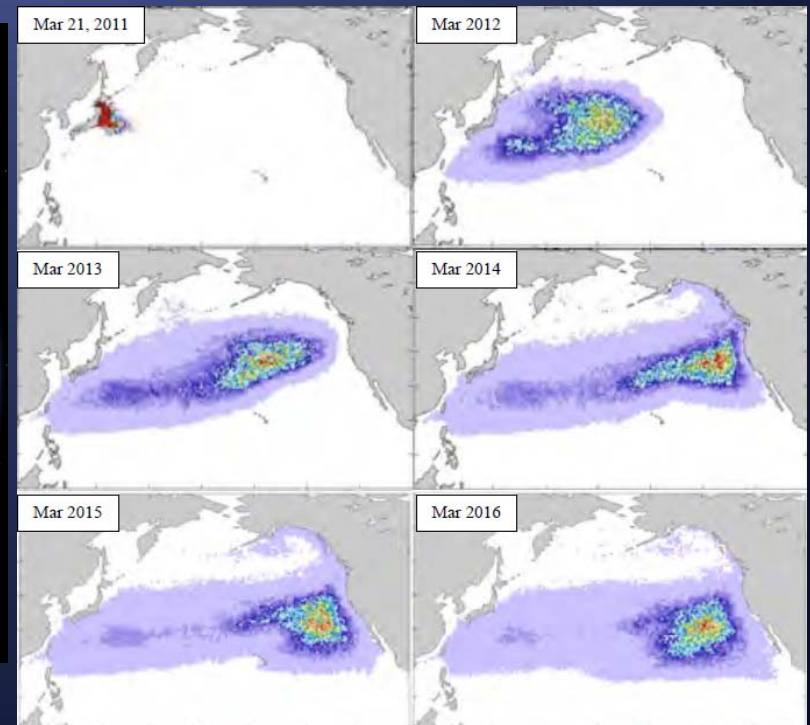
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Modeling – Initial Efforts



NOAA OSCURS Model outputs



UH SCUD model outputs

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Windage



Windage is combination of sail area and drag.



Lower windage



Higher windage

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Modeling – Updated Efforts

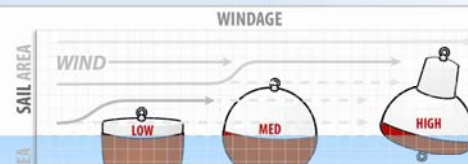
Modeled Movement of the Marine Debris Generated by the March 2011 Japan Tsunami



On March 11, 2011, an estimated 5 million tons of debris washed out by the tsunami

Estimated 30% floated away and dispersed

Estimated 70% sank near Japan

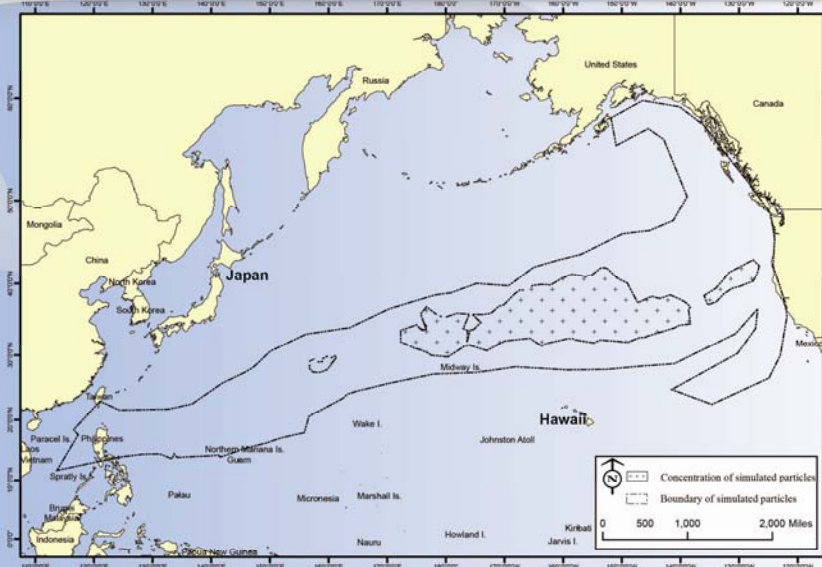


What is Windage?

Winds have a greater effect on the movement of debris with a larger sail area

Expected Distribution of Computer Simulated Particles Through Saturday, 4/07/12

- Japan Ministry of the Environment estimates that 5 million tons of debris washed into the ocean.
- They further estimated that 70% of that debris sank near the coast of Japan soon after the event.
- Model Results: High windage items may have reached the Pacific Northwest coast as early as winter 2011-2012.
- Majority of modeled particles are still dispersed north and east of the Hawaiian Archipelago.
- NOAA expects widely scattered debris may show up intermittently along shorelines for a long period of time, over the next year, or longer.



NOAA used a computer model to simulate the movement of tsunami debris from March 11, 2011, to the present day. This GNOME model (General NOAA Operational Modeling Environment) simulation is based on ocean surface currents from the US Navy (the Hybrid Coordinate Ocean Model) and winds from NOAA (the NOAA blended wind product). The computer model simulated the release of 1,000 particles from each of 8 locations on the Japan coastline where tsunami wave heights were 3.5 meters or greater. Particles were randomly assigned windage values from 1-5%, meaning that they were moved not only by ocean currents, but were also moved by 1-5% of wind speed in the downwind direction. The dotted black line is drawn to contain 95% of all simulated particles. The shaded area indicates the region of the highest concentration of simulated debris with 1% windage at the end of the simulation. For more details on this model, please visit marinedebris.noaa.gov

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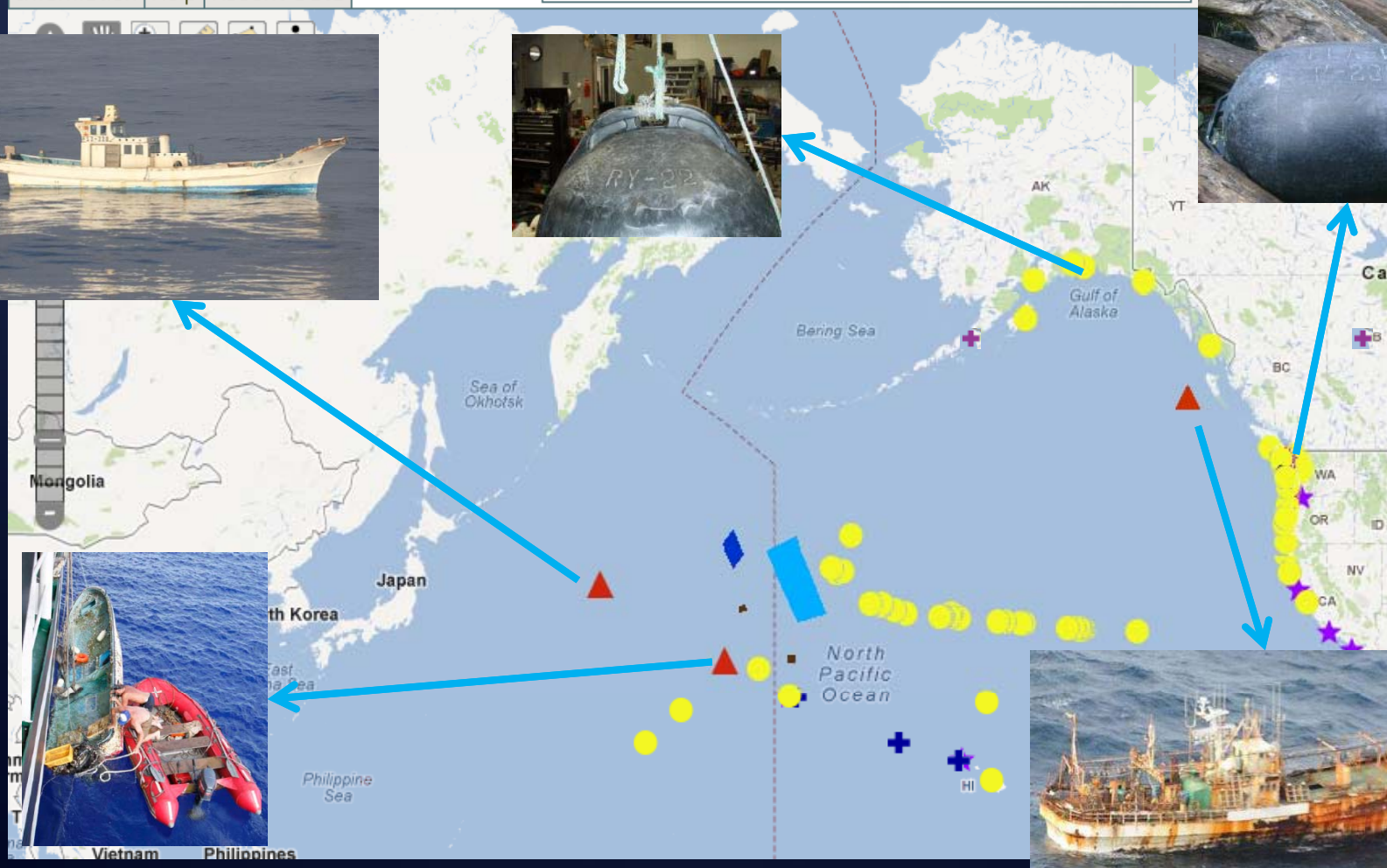


Tsunami Marine Debris - Sightings

ERMA | Environmental Response Management Application
Pacific Islands

Information Help Recent Data

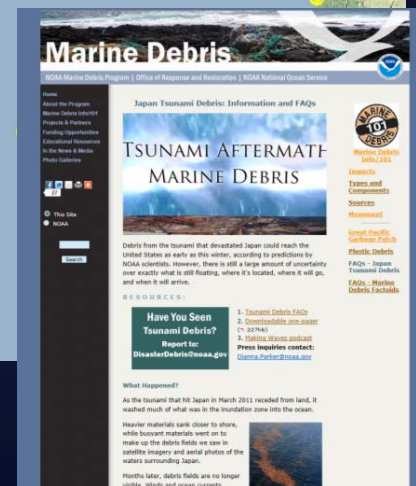
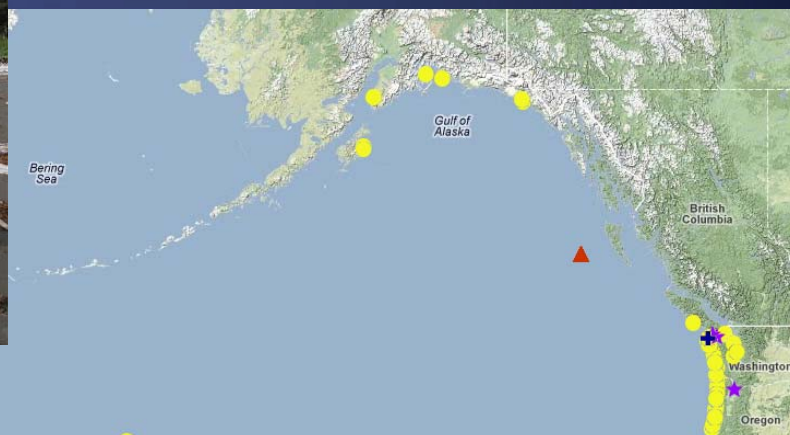
Find





Tsunami Marine Debris – Actions

1. Detection
 - *Satellite, Aerial, Vessel*
2. Modeling
3. Monitoring
 - *Baseline data*
4. Planning / Preparedness
 - *Regional*
5. Communication





Tsunami Marine Debris – What we know

- Tsunami debris **added to an existing problem**
- Likely much of the **debris sank near shore off Japan coast.**
- **Debris is dispersed** and not in large concentrations or fields.
- **Radioactive debris?**
 - Consensus that contamination of debris is highly unlikely
- **Sightings**
 - **Three** sightings of confirmed JTMD (as of 04/10/12), many more unconfirmed



Marine Debris Reporting

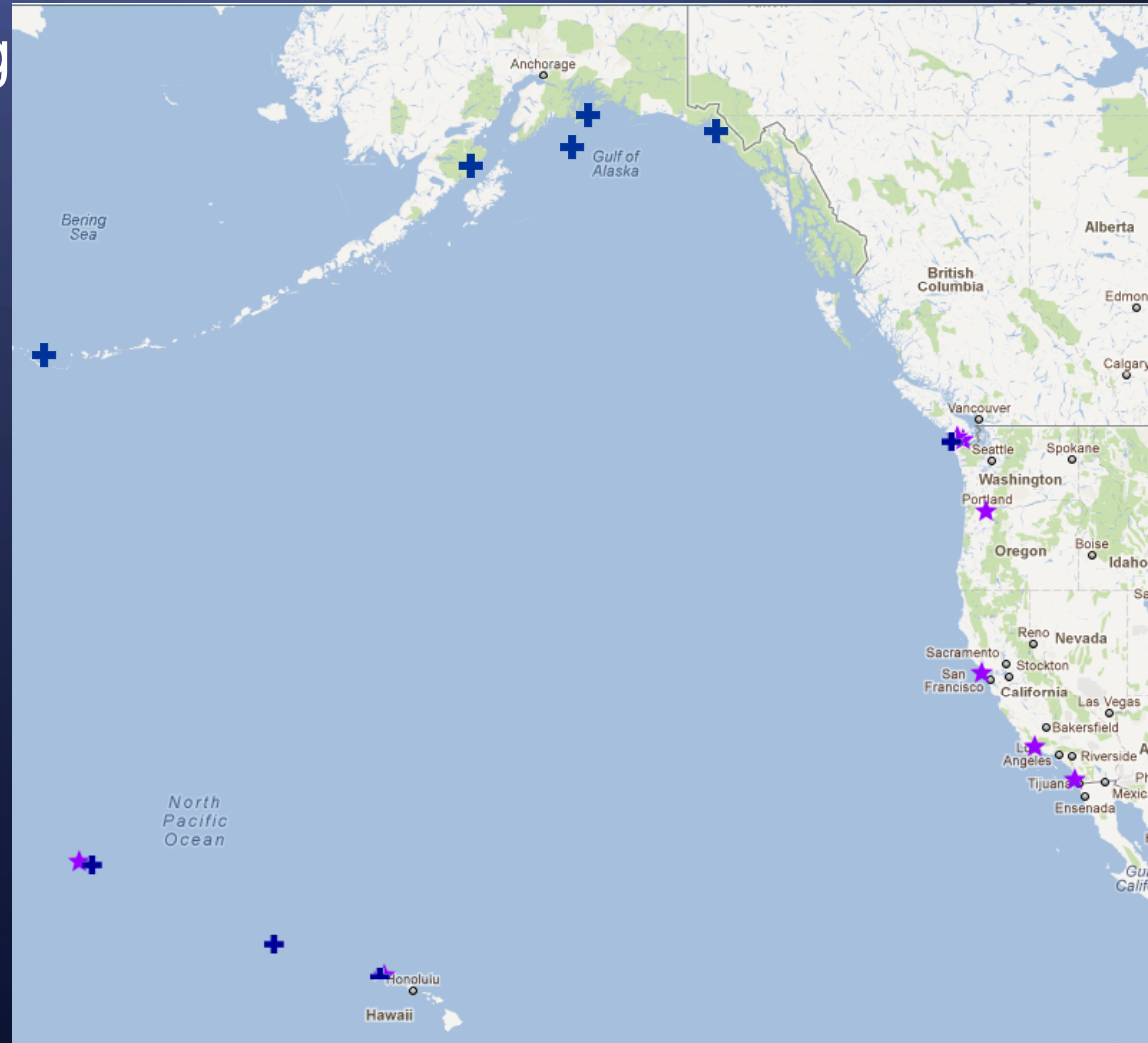
- 3 Tiers / Levels
 1. Voluntary Reporting
 - Occasional
 - Local knowledge
 2. Presence/Absence
 - Regular
 - Local knowledge + Recording
 3. Structured Monitoring





Marine Debris Monitoring

- Structured Monitoring
 - MDP Protocol
 1. Select site
 2. Characterize site
 3. Select transects
 4. Collect marine debris data
 5. Repeat monthly



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Marine Debris Monitoring

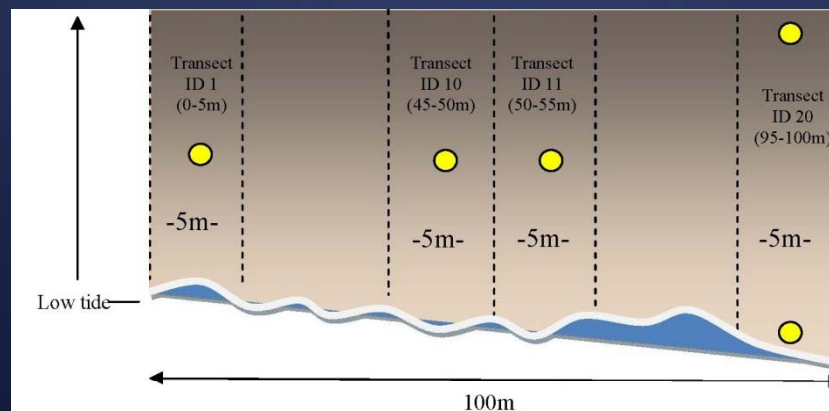
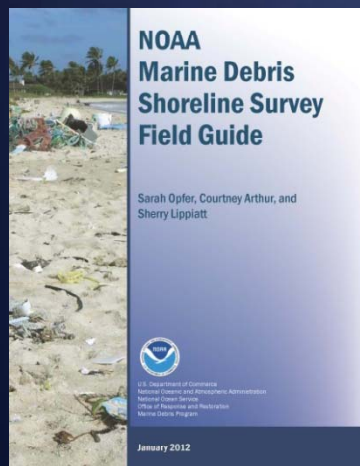
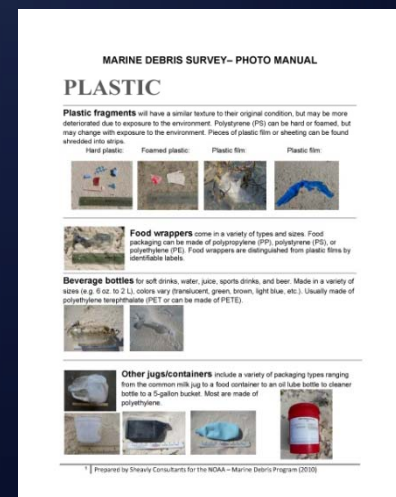


Figure 3. Example of a shoreline section (100m) with yellow circles indicating marked GPS coordinates. Width determines location of GPS coordinates.



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Marine Debris What YOU can do!

- Report JTMD sightings
 - disasterdebris@noaa.gov
- Volunteer
 - Cleanup
 - [Monitoring Programs](#)
- Stay Informed
 - <http://marinedebris.noaa.gov>



Photo: Gulf of Alaska Keeper



Thank You

Peter Murphy

peter.murphy@noaa.gov

marinedebris.noaa.gov

Report JTMD Sightings to:

disasterdebris@noaa.gov