

## Status Update on Japan Tsunami Marine Debris

June 14, 2012

**Overview:** *On March 11, 2011, a 9.0 magnitude earthquake struck off the coast of Japan, creating a devastating tsunami that reached heights of up to 130 feet and inundated 217 square miles. The Government of Japan has estimated that the tsunami generated 5 million tons of marine debris and that 70 percent of that debris sank nearshore. They estimate that 30 percent, or roughly 1.5 million tons, remained afloat. Immediately after the tsunami, fields of debris could be seen off the coast of Japan in aerial photos and by satellite imagery. However, within approximately a month after the tsunami the marine debris dispersed and was no longer concentrated in large fields. Ocean models predict marine debris generated by the Japan tsunami that remains afloat will be carried eastward by ocean currents and winds toward the United States.*

### Activity Summaries and Updates

#### **Modeling**

##### *Background:*

NOAA's GNOME ("General NOAA Oil Modeling Environment") model hindcasts the movement of simulated tsunami debris (i.e., from the time of the tsunami to the present) using NOAA blended winds and currents from the Navy Hybrid Coordinate Ocean Model (HYCOM). The GNOME model runs are also incorporating USCG Search and Rescue research data on the windage (or "sail-effect") of different types of debris objects.

The GNOME model runs indicate that the fastest moving marine debris with high windage may have reached coastal waters off of Alaska, British Columbia, and the U.S. West Coast this past winter (2011/2012), but the bulk of the widely scattered debris likely remains out at sea north of the main Hawaiian Islands. The GNOME model runs will be updated every two weeks and published in a visualization of the model outputs. This visualization is attached and is also posted on the NOAA Marine Debris website: <http://marinedebris.noaa.gov/info/japanfaqs.html>.

##### *Updates:*

- The NOAA GNOME model hindcast run continues to be updated every two weeks. The most recent run was completed on June 13, 2012.
- The most recent NOAA GNOME model run indicates that the highest concentration of widely scattered simulated debris particles remains well off the West Coast and north of the main Hawaiian Islands. The fastest moving, highest-windage simulated debris particles continue to move down the West Coast. In Alaska, the "leading edge" of the fastest moving debris turning back westward has reached Kodiak Island and Shelikof Strait. To the south,

very high windage items may have turned back westward and be reaching the vicinity of the Main Hawaiian Islands.

- The next monthly meeting of the Modeling Subject Matter Expert group will be in late June, following on the last meeting held on May 24.
- There is ongoing interest from other agencies on potential modeling contributions and NOAA's Marine Debris Program staff are working to communicate current actions and request proposed additional steps/actions from interested groups, which will be fed into the Modeling Subject Matter Expert group for ongoing discussion.

## **Detection**

### *Background:*

NOAA is continuing to track sightings of potential Japan tsunami marine debris reported to the NOAA disasterdebris@noaa.gov account. For visualization, these sightings have been entered into the Emergency Response Management Application (ERMA) tool. (See "Media and Communications section below for additional information on ERMA). The latest ERMA screenshot is attached.

### ***Satellite Detection:***

#### *Background:*

Shortly after the tsunami, NASA provided RADARSAT images, which were analyzed by the NOAA National Environmental Satellite Data Information Service (NESDIS). More recently, the National Geospatial Intelligence Agency (NGA) has provided higher resolution satellite imagery for two requested target areas to NOAA. NOAA NESDIS is currently analyzing these images.

#### *Updates:*

- NOAA NESDIS continues the analysis of the areas of interest (AOIs) submitted by the NOAA Marine Debris Program. NESDIS is looking into using new software for analysis of the images that could make debris detection easier.
- NOAA is continuing to work with NGA on both existing areas of interest and expansion of overall detection strategy to a more broad-based sampling approach (gathering smaller areas in a sampling pattern rather than larger individual areas as NGA has previously requested areas be defined).
- Testing: NOAA is working to deploy simulated debris to test detection by multiple satellite sensors as part of an Unmanned Aircraft System (UAS) trial on the north shore of Oahu on 06/19 and 06/20. Debris items will include fishing nets, buoys, lumber, and

household plastics, along with the deployment vessels. Satellite resolutions to be tested are 1-3 m.

***Aerial and At-Sea Detection:***

*Background:*

NOAA has requests out for reporting of any observations and photographs of significant marine debris, as well as reports of “no debris observed,” to DisasterDebris@NOAA.gov.

Requests have been made for opportunistic observations from:

- World Ocean Council (WOC)
- NOAA’s Pacific fleet of vessels
- NOAA Fisheries Observers
- Hawaii Longline Fishery
- NOAA Weather Service, Voluntary Observing Ship (“VOS”) Program (nationally)
- UNOLS Vessels
- Recreational/commercial fishers in Hawaii
- Pacific Cup sailboat racers

MARAD advisory (issued by US Dept. of Transportation, 4/18/12) to all US mariners

- Similar advisory has been issued by: Republic of the Marshall Islands
- Similar advisory has been issued by: United Kingdom Hydrographic Office

*Updates:*

	New:	Total to Date:	Confirmed from Tsunami:
At-Sea Sightings*:	<u>6</u>	<u>27</u>	<u>3</u>

\*Sightings reported to DisasterDebris@noaa.gov

- USCG District 17 reported sightings of potential at-sea Japan tsunami marine debris from helicopter flights out of Cordova, AK. Sightings were of typical debris, including a previously reported container.
- The USCG is submitting maps to NOAA of sightings reported as part of routine training, enforcement and patrol missions in Alaska.

- NOAA's Marine Debris Program has received multiple requests/quotes from companies interested in contracting for marine debris detection. Though there are not resources available for contracting at present, NOAA is working with these companies on voluntary reporting and gathering information on their proposed actions to inform understanding of potential actions.
- Pacific Cup racers will be reporting significant marine debris items seen while in transit from California to Hawaii using (Federal Paperwork Reduction Act-approved) forms developed by NOAA Marine Debris Program.
- Please let a member of the Marine Debris Program know if you have any ideas for new groups to contact for reporting of at-sea sightings.

### ***Shoreline Detection:***

#### *Background:*

NOAA has a call out for reporting of any observation of significant debris on shorelines that may be from the Japan tsunami to [DisasterDebris@NOAA.gov](mailto:DisasterDebris@NOAA.gov).

#### *Updates:*

- U.S. Fish and Wildlife Service reported there have been no significant sightings of debris at Midway Atoll. The yearly debris removal sponsored by NOAA is currently underway in the Northwest Hawaiian Islands and teams have already removed 15 kilos worth of debris.
- A 165-ton floating dock, confirmed to have been lost during last year's Japan tsunami, washed ashore on Agate Beach in Oregon on June 5<sup>th</sup>. Oregon Parks Department, which has jurisdiction over all beaches in the state of Oregon, is in the process of removing the dock. Bids from different companies have been submitted for removal, ranging from \$80,000-\$200,000. The USCG had received two reports of the dock sighting off the coast of Oregon on Sunday and Monday, but the state of Oregon had not heard any report until a photograph of the dock was posted online on Tuesday. The reports to the USCG did not give a sense of the size or the exact location of the dock, and investigation of the reports were diverted by a search-and-rescue mission. The dock sat fairly high in the water (~2 ft.). There has been concern about the marine fouling organisms present on the dock due to the possible introduction of non-native, invasive species into the area. Local scientists from Oregon State University were able to respond, identify organisms, and remove and destroy 1.5 tons of marine organisms.
- *Post-call update:* A 21-foot vessel washed ashore on Friday, June 15<sup>th</sup> at Benson Beach on Cape Disappointment in Washington. The boat broke up in the surf; the hull was intact but the wheelhouse had been separated. Washington Department of Health monitored the boat for radiation and the readings were normal. On Saturday the boat was moved off the beach, and Washington Department of Fish and Wildlife cleaned it to remove possible

aquatic invasive species. The Japanese Consulate in Seattle was contacted to determine if the boat originated from Japan and is related to the tsunami event.

	New:	Total to Date:	Confirmed from Tsunami
Shoreline Sightings*:	<u>86</u>	<u>315</u>	<u>6</u>

\*Sightings reported to DisasterDebris@noaa.gov

These items have predominantly been fishing gear, consumer debris, and other miscellaneous debris.

## **Shoreline Monitoring**

### *Background:*

NOAA is supporting shoreline monitoring on the West Coast, Alaska, and Hawaii using NOAA shoreline monitoring protocols. Shoreline surveys will be conducted primarily by volunteer groups.

- California: Fourteen monitoring sites have been identified, five of which will be overseen by the Gulf of Farallones National Marine Sanctuary.
- Oregon: Working through the Cooperative Institute for Marine Resources Studies at Oregon State University in partnership with local non-governmental organizations (SOLV and Surfrider Oregon).
- Washington: Working with the Olympic Coast National Marine Sanctuary and other partners to expand existing marine debris monitoring efforts.
- Alaska: Working with Alaska Fisheries Science Center to continue long-term monitoring and with the National Park Service and the U.S. Fish and Wildlife Service, who will implement the protocols at summer field camp sights.
- Hawaii: Working with the U.S. Fish and Wildlife Service to monitor in the Northwestern Hawaiian Islands (Midway and Tern Islands), with NMFS and the State of Hawaii to monitor at Kure Atoll, with Sustainable Coastlines Hawaii to monitor a site on Oahu and with the US Navy to monitor a site on Kauai. Additionally, the NOAA NMFS monk seal camp team will be on the lookout for any significant or unusual marine debris at various locations in the Northwestern Hawaiian Islands.

For copies of NOAA's marine debris shoreline monitoring protocols, email: [MD.monitoring@noaa.gov](mailto:MD.monitoring@noaa.gov)

*Updates:*

- National Park Service reports that a large amount of debris items with Japanese characters were found in monitoring plots north of San Francisco.
- NOAA is working with National Invasive Species Council contacts from NMFS and USFWS to incorporate invasive species reporting into shoreline monitoring.

## **Invasive Species**

### *Background:*

The floating dock that washed ashore in Oregon on June 5th was fouled with a number of organisms native to Japan. This incident raised awareness of the potential introduction of non-native and possibly invasive species to the United States from Japan tsunami debris. A group of scientists from federal and state agencies and academia with expertise in invasive species have established a new subject matter expert group to help address this risk.

### *Updates:*

Peg Brady from NOAA National Marine Fisheries Service will be coordinating a group of invasive species experts from federal and state agencies and academia. The group is making plans to hold a workshop in July or August to explore the potential for the introduction of non-native species to the west coast, Alaska or Hawaii from Japan tsunami debris. Regarding the dock in Oregon, marine scientists from the Hatfield Marine Lab indicated that one-third of the species found on the dock are native to Oregon, but the remaining two-thirds are not native to the area. It is important to note that non-native does not necessarily mean that the organisms are invasive. The initial call for this group will be held next Wednesday, June 20<sup>th</sup>.

## **State/Agency Updates**

### *Hawaii:*

- The City and County of Honolulu is working with existing plans and protocols to develop operational guidelines for Japan tsunami marine debris. They are interested in what other counties and states are developing to help avoid reinventing the wheel.
- Annual debris removal efforts in the Northwestern Hawaiian Islands are underway. Debris removal teams are currently on Midway Atoll conducting removal efforts and preparing for the rest of the debris removal cruise.
- On Maui, NOAA's Marine Debris Program briefed the Mayor and County agency representatives on Japan tsunami marine debris, made three presentations to the public and one to the Maui County Hotel and Resort Security Association.
- NOAA will brief the Honolulu staff of all four Hawaii Congressional members on June 26.

### *Alaska:*

- There was a sighting of a pair of welded oil tanks reported by a charter boat captain. USCG helicopter overflights investigated but did not sight the object. Debris sightings continue to be reported primarily in the Eastern Gulf of Alaska region, generally of similar debris types previously reported (buoys, Styrofoam in various forms, etc.).
- The State of Alaska is continuing to coordinate on outreach questions with NOAA, including debris-handling guidelines. The state is working on an internal process to coordinate agency actions and responsibilities related to Japan tsunami marine debris.
- The National Park Service has conducted its first debris monitoring surveys using the NOAA Marine Debris Program protocols and is working to add monitoring sites in the Wrangell-St. Elias area. NOAA NMFS vessel-based survey of the outer coast of Southeast Alaska departs June 14 from Ketchikan and is targeting survey of 50+ sites on the outer coast, including sites with time-series dating back to 1980's, which will be very helpful in comparing the density of debris being sighted.

#### *California:*

- The contingency operations report was submitted last Monday for review. The state's protocols are mostly an informational planning document and not necessarily a response document, as California is using current state protocols to respond to debris arrival.

#### *Oregon:*

- The floating dock that washed ashore has been the top priority for the past week.
- Oregon is working to establish response protocols for the state and is working with non-profit organizations to prepare an action-ready volunteer network for the cleanup of beaches. This response plan is a collaborative effort between state, federal, and non-governmental organizations.

#### *Washington:*

- Washington is continuing to develop a Japan tsunami marine debris contingency plan, based on input from a workshop held on April 25. The Washington State Emergency Management Division is the lead agency for debris response.
- NOAA's Marine Debris Program is collaborating with NOAA's National Weather Service on a Beach Hazard Statement (BHS) in Washington State. The system was launched on May 16 on an experimental basis at six nation-wide locations. In Washington, NOAA will use the BHS to caution beach goers and enhance public safety in the event of uncommon hazardous or potentially hazardous marine debris items on or near shorelines, or other marine debris situations that could be a public hazard.
- There have been a number of reports of significant amounts of Styrofoam on the shorelines, as well as numerous floats sighted offshore.

## Media and Communications

### *Background:*

- NOAA is coordinating efforts to communicate current information to international, federal, state, and local stakeholders, the public, and the media. The NOAA Marine Debris Program website is a publicly accessible site that provides up-to-date information on current scientific knowledge on the tsunami debris. The address is: <http://marinedebris.noaa.gov>
- The Joint Information Center portal is an online platform for sharing communication materials on Japan tsunami marine debris. The website is a collaboration among a number of state and federal agencies and is accessible to collaborators, the media, and stakeholders. Access is password protected, so please let Kelly Huston from California Dept. of Emergency Management know if you would like to access the site ([Kelly.Huston@calema.ca.gov](mailto:Kelly.Huston@calema.ca.gov)). The portal address is: <http://disasterdebris.wordpress.com>.
- The Environmental Response Management Application (ERMA) is an online mapping application developed by NOAA Office of Response and Restoration (OR&R) Spatial Data Branch. NOAA's Marine Debris Program has worked with NOAA's Spatial Data Branch to create layers in ERMA to track and spatially display Japan tsunami marine debris sightings as well as satellite detection requests and monitoring sites. These layers are updated on a regular basis and output for use in modeling discussions, detection targeting, communication and presentations. The latest ERMA screenshot is attached. Please contact [Peter.Murphy@noaa.gov](mailto:Peter.Murphy@noaa.gov) or [Neal.Parry@noaa.gov](mailto:Neal.Parry@noaa.gov) with any questions.

### *Updates:*

- There is continued media interest on the tsunami debris, with the main focus on the Styrofoam in Washington and the dock in Oregon. If you receive any requests and feel uncomfortable responding, please feel free to direct questions to Dianna Parker ([Dianna.Parker@noaa.gov](mailto:Dianna.Parker@noaa.gov)) or Ben Sherman and Keely Belva ([Ben.Sherman@noaa.gov](mailto:Ben.Sherman@noaa.gov) or [Keely.Belva@noaa.gov](mailto:Keely.Belva@noaa.gov)) at NOAA NOS Public Affairs.
- NOAA's Marine Debris Program will be launching a new Japan tsunami marine debris page to highlight upcoming meetings, frequently asked questions, and other important information. If you would like to include any other information on the site, please send suggestions to [Dianna.Parker@noaa.gov](mailto:Dianna.Parker@noaa.gov).
- There will be a media event in Honolulu with NOAA about UAS on Monday June 18th.

## NOAA Reporting Addresses:

For reports of significant debris sightings.....[DisasterDebris@noaa.gov](mailto:DisasterDebris@noaa.gov)



For shoreline monitoring guides.....MD.monitoring@noaa.gov

Media inquiries.....Dianna.Parker@noaa.gov

**Information Web Sites:**

<http://marinedebris.noaa.gov/info/japanfaqs.html>

**Joint Information Center Portal:**

<http://disasterdebris.wordpress.com>

**Government of Japan website:**

The Government of Japan has released a report on tsunami marine debris trajectory modeling conducted by Kyoto University:

[http://www.kantei.go.jp/jp/singi/kaiyou/hyouryuu/souryou/simulation\\_eng.html](http://www.kantei.go.jp/jp/singi/kaiyou/hyouryuu/souryou/simulation_eng.html)

**Upcoming Public Meetings/Presentations/Events:**

- UAS Press event June 18<sup>th</sup>, Honolulu, HI
- NOAA presentation to Honolulu Local Emergency Planning Committee (LEPC), Honolulu, HI