



# *Proceedings of the* **Great Lakes Marine Debris Workshop**

December 1-2, 2011

Ann Arbor, MI, USA

**Sarah Opfer (ed.)**



US Department of Commerce  
National Oceanic and Atmospheric Administration  
National Ocean Service  
Office of Response and Restoration  
Marine Debris Division  
Silver Spring, MD 20910

National Oceanic and Atmospheric Administration  
Technical Memorandum NOS-OR&R-40  
March 2012

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# **PROCEEDINGS OF THE GREAT LAKES MARINE DEBRIS WORKSHOP**

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**Sarah Opfer<sup>1,2</sup> (ed.)**

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## Background

Marine debris is defined as 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. While perhaps more commonly thought of as an oceanic problem, the Great Lakes, with its complex system of habitats, wetlands, rivers, and tributaries, is an area that is also affected by debris. In the Great Lakes, marine debris affects the beauty of our environment, is a health and safety hazard, threatens our wildlife and natural resources, and comes at an economic cost. From a beach covered in trash to an animal entangled in fishing line, marine debris is a problem we cannot ignore.



Figure 1. Map of the Great Lakes Basin. Credit: EPA.gov

Debris in the Great Lakes ranges from trash and litter items which are small in size to large abandoned and derelict vessels. Marine debris is generally classified into two broad categories of sources: ocean or lake-based and land-based. Ocean or lake-based debris are those materials that may be dumped, swept, or blown off both commercial and fishing vessels, as well as any stationary platforms at sea. Land-based debris is generated on land and may be blown, swept, or washed out to sea. This includes littering, dumping in rivers and streams, storm water discharges, poor waste management practices, and industrial losses during production, transportation, and processing. Beach and shoreline cleanups like those conducted by the Adopt-a-Beach™ Program typically target this type of debris.

Besides being an eyesore and degrading the aesthetics of coastal environments, land-based debris typically impacts humans and the environment in several ways. Wildlife entanglement, perhaps one of the most notable types of impacts, can lead to injury, illness,

suffocation, starvation, and even death. Land-based debris can also be ingested by wildlife, whether through the item being mistaken for food or the animal's accidental ingestion with natural food items. Ingestion of debris may lead to loss of nutrition, internal injury, intestinal blockage, starvation, and death. Humans are also impacted by land-based debris. Human health and safety becomes a concern with unsanitary forms of marine debris, such as medical waste, as well as encounters with unsafe types, such as broken glass. Economic impacts are increasingly a concern. These impacts are felt by those whose livelihoods are linked to the water, yet in many cases, the costs remain unknown. Less commonly thought of are the impacts to navigation through the blockage of intake valves on boats and the ability of debris to transport alien or invasive species.

One debris type of particular focus for the National Oceanic and Atmospheric Administration's (NOAA) Marine Debris Program is derelict fishing gear (DFG). DFG refers to nets, lines, and other recreational or commercial fishing equipment that has been lost, abandoned, or discarded in the environment. DFG not only impacts wildlife through entanglement, but it also can scour, break, smother, and otherwise damage valuable habitat. DFG also impacts navigation safety by propeller entanglements and the fishing community economy through its ability to continue to fish (ghostfishing). An example of DFG currently found in the Great Lakes region is monofilament fishing line.

Another emerging debris issue in the Great Lakes is historic milling debris. Given the past abundance of forested areas, the region was home to numerous sawmilling operations in the 1800's and early 1900's. By necessity, these sawmills were built on the coasts and contributing rivers of the Great Lakes. Byproducts of the milling operation (slabs and sawdust) were commonly discarded directly into the aquatic environment, and much of the woody material is still located at these sites. While the exact impacts to the environment are yet unknown, it is believed that this material smothers the bottom-environment, limiting environmental productivity and habitat while contributing to the degradation of fish and wildlife populations.

The marine debris community in the Great Lakes was first brought together at a one-day convening hosted by the John G. Shedd Aquarium in Chicago, IL on July 22, 2011. Through a NOAA Office of Education grant, the Shedd Aquarium worked with the NOAA Marine Debris Program and the Alliance for the Great Lakes to bring together a diverse group to discuss the issues related to marine debris in the region. Participants identified a number of issues associated with Great Lakes debris, then grouped them into nine broad categories and prioritized them for next action steps. One of the top-tier issues identified was the need to further refine the scope of the problem and to better define what is currently known on debris issues. In an effort to move forward with the results from the workshop in July 2011, the NOAA Marine Debris Program coordinated a follow-up two-day workshop which is discussed in this document.

## *Workshop Structure*

A meeting of NOAA, other federal and state agencies, and non-governmental organizations was held to develop a collective vision statement for a regional action plan and further define the state of knowledge on land-based debris, derelict fishing gear, and sawmill debris, which also included the identification of knowledge gaps.

Workshop Objectives:

- Establish a shared vision that each organization will work towards in addressing the marine debris problem in the Great Lakes.
- Establish the current state of knowledge on land-based debris, derelict fishing gear, and historic sawmill and fill debris, including critical information gaps.
- Connect federal agencies, states, tribal nations and non-governmental organizations in the Great Lakes region to identify potential opportunities for collaboration related to marine debris.

The two day workshop was held December 1-2, 2011 in Ann Arbor, MI at NOAA's Great Lakes Environmental Research Laboratory (GLERL) and hosted by the NOAA Marine Debris Program and the NOAA Restoration Center- Great Lakes Region (see Appendix I agenda, and Appendix II participants). The workshop was facilitated by Stephanie Kavanaugh from NOAA's Special Projects Office.

The beginning of the first day included a welcome address from GLERL assistant director, John Bratton, who provided an overview of the facility and current research, as well as a brief background on the numerous environmental issues facing the Great Lakes region, including marine debris. The remainder of the first day reviewed the current state of knowledge in three debris categories: land-based debris, historic sawmill debris, and derelict fishing gear. Brief presentations on the topics were given by knowledge experts in the field (Appendix III). These presentations included information gathered from volunteer efforts, debris removal projects, and general experience or communications. An opportunity was made available for other attendees to contribute additional information during a question and answer session at the end of each presentation.

Following each presentation, a series of discussion questions were used to generate feedback from participants to identify information gaps:

1. What is missing from our knowledge of this type of debris?
2. What else is necessary for us to know in order to further our understanding of this debris type in the Great Lakes?

A complete bulleted list of knowledge gaps identified by participants is included in Appendix IV. Gaps were placed in one of four bins according to what debris type they were specifically related to, or if they were knowledge gaps that were relevant to all debris types.

The second day focused on building the Great Lakes community around a crafted vision statement that will be used in a Great Lakes regional marine debris action plan. In preparation for discussion at the meeting, the Hawaii Marine Debris Action Plan was distributed to invitees in advance with the request to pay particular attention to sections 1 (Intro), 2 (Plan Development), and Figure 8 in section 6 for this meeting (NOAA 2010). Invitees were also asked to consider the following questions during their review of the document:

1. Does my organization have an interest and a role to play in the development and implementation of a regional action plan to address marine debris?
2. Will this action plan be a useful tool for my organization and the region?
3. What are some elements of the process that we are currently missing?

During the second day of the meeting, the Hawaii Marine Debris Action Plan was presented and the process for its development was reviewed. This included discussing the development of conceptual models and results chains while also reviewing the adaptive management process (Figure 2; Appendix III). Additionally, in preparation for small group breakouts, vision statements were reviewed. Background was provided on what they are, why groups have them, and some examples (Appendix III).

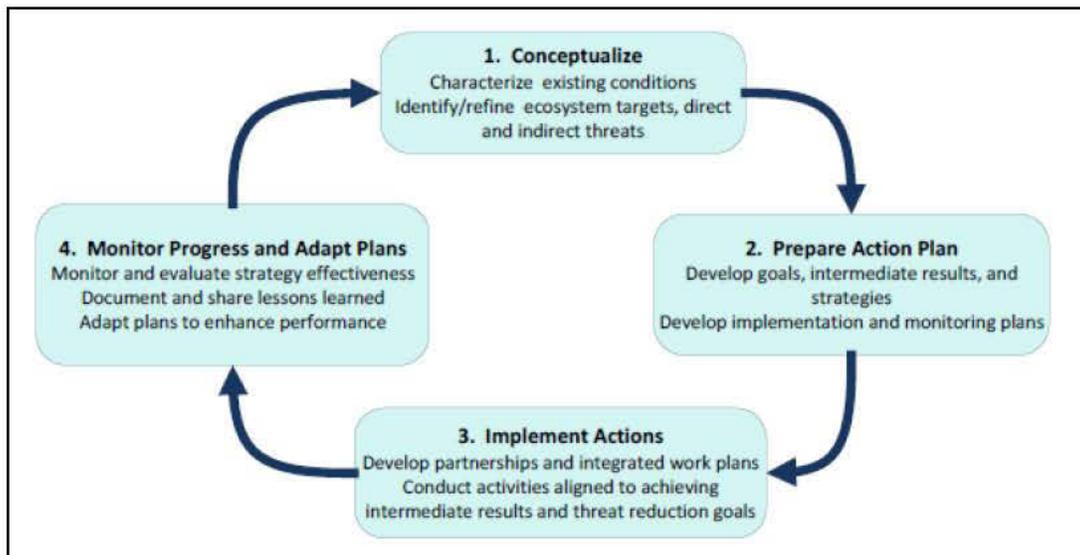


Figure 2. Adaptive Management Process (NOAA 2010).

Participants were divided into two breakout groups. Each group was first tasked with developing key elements they wished to see in a vision statement for the Great Lakes. This was accomplished by agreeing to a time frame of five years. Therefore, each group was given the following scenario: *Imagine it is the year 2016 and working together, all of your organizations have accomplished everything they set out to do regarding marine debris in the Great Lakes Region. Then answer the questions: What does that future look like? What have you accomplished?* Groups were then brought back together to analyze similarities and differences between the elements developed by the two breakout groups.

The second task of the breakout groups was to synthesize key vision elements into draft vision statements. This was accomplished by developing mock newspaper headlines. Groups were asked to develop a cover story headline and then several supporting headlines. Following this second task, the groups again came together to identify common themes and ideas between groups as well as identify what they liked and what they disagreed with from both lists. This critique was done in an effort to narrow down draft vision statements and their associated elements. These elements and draft vision statements will be further refined following the workshop with a small core team.

After analyzing the draft vision statements, it became evident to participants that follow-up actions would need to take place. Therefore, the group discussed and recorded all follow-up actions that would need to be addressed after this workshop. Included in this discussion was the identification of individuals or groups who were currently missing and should be included in future marine debris discussions. This brainstorm of future contacts and groups can be found in Appendix V.

The workshop finished with an evaluation. Participants were given the opportunity to identify what they liked about the workshop and also make suggestions for the improvement of future workshops. This complete list can be found in Appendix VI.

## ***Results***

### **Current State of Knowledge**

#### ***Land-based debris***

Land-based debris in the Great Lakes is largely monitored by volunteers in the Adopt-a-Beach™ Program organized by The Alliance for the Great Lakes. This cleanup effort began in 1991 and now operates year-round. Data gathered on the type and amount of debris that is collected is entered into an online database. This data can be exported to the public and other agencies for use in monitoring marine debris. Along with marine debris monitoring, volunteers collect information on beach health.

In 2011, 595 litter monitoring forms were collected and entered into the database. Initial results indicate that 48% of the land-based debris collected by volunteers is food-related items. These are things such as food wrappers/containers, beverage containers, bags, eating utensils, etc. The second highest category of items collected during these cleanups in 2011 was smoking-related (41%). These debris types include cigarette filters, lighters, cigar tips, and tobacco product packaging.

Other items of interest included the significant collection of balloons and balloon strings, as well as firework debris. Balloon strings are significant because one of the most notable types of impacts from marine debris is wildlife entanglement. Entanglement can lead to injury, illness, suffocation, starvation, and even death. Adopt-a-Beach™ volunteers in the

Great Lakes record wildlife entanglements and have found several instances of wildlife entangled in balloon strings as well as monofilament line and rope.

Also presented were two large debris wash-up/distribution events in the region: Trash wash-up in Michigan in 2008 and 2010 which was likely from a sewage overflow in Milwaukee, WI and also an Oak Creek Bluff collapse in 2011. Alliance for the Great Lakes was involved in the cleanups or other response related to these events.

A subtype of debris that was presented during the land-based debris discussion was plastic pellets, commonly referred to as nurdles. These plastic pellets are considered a type of microplastic and are typically used in the plastic industry. Microplastics are those debris particles that are composed of primarily synthetic particles and are less than five millimeters in size (Arthur et al. 2009). Plastic pellets typically enter the environment through accidental losses such as spillage of plastic resin pellets during production, transportation, and processing.

The University of Western Ontario has done some research into the distribution of plastic, including these pellets, along the shorelines of Lakes Huron, Erie, and St. Clair. Data was obtained from sampling beaches, wetland, and/or boat landings. Initial results from this study indicate that most plastics in the Great Lakes are composed of polyethylene, polypropylene, and polyethylene terephthalate. Plastic pellets were found primarily on the southern Canadian beaches of Lake Huron, with the Sarnia Beach area having the highest amount of plastic pellets. Researchers speculate that this is likely due to current patterns in Lake Huron. Downstream of these areas however in Lake St. Clair and Lake Erie, shorelines sampled contained considerably less plastic than Lake Huron. Further investigation is needed to determine the extent and distribution of these plastic pellets on the shorelines of the other Great Lakes as well as their potential impacts to the region.

### ***Sawmill Debris***

An emerging debris issue in the Great Lakes is historic milling debris. Given the past abundance of forested areas, the region was home to numerous sawmilling operations in the 1800's and early 1900's. By necessity, these sawmills were built on the coasts and contributing rivers of the Great Lakes. Byproducts of this historic milling operation (slab, chips, and sawdust) were commonly discarded directly into the aquatic environment, and much of the woody material is still located at these sites. With the development of more efficient technology, modern sawmills produce less waste. Additionally, the small amount of waste that they do produce is marketed for reuse. This reuse could be in the form of mulch, fuel, compost, particle board, and chips for paper products.

Currently known areas of this debris occurrence include: the St. Louis River in Minnesota, Muskegon Lake, Michigan, and the Manistique River in Michigan. All three of these areas are in Great Lakes Areas of Concern (AOCs). Given the geographical distribution of these historic mills (Figure 3), there are likely other areas where this debris occurs but which have not yet been documented.

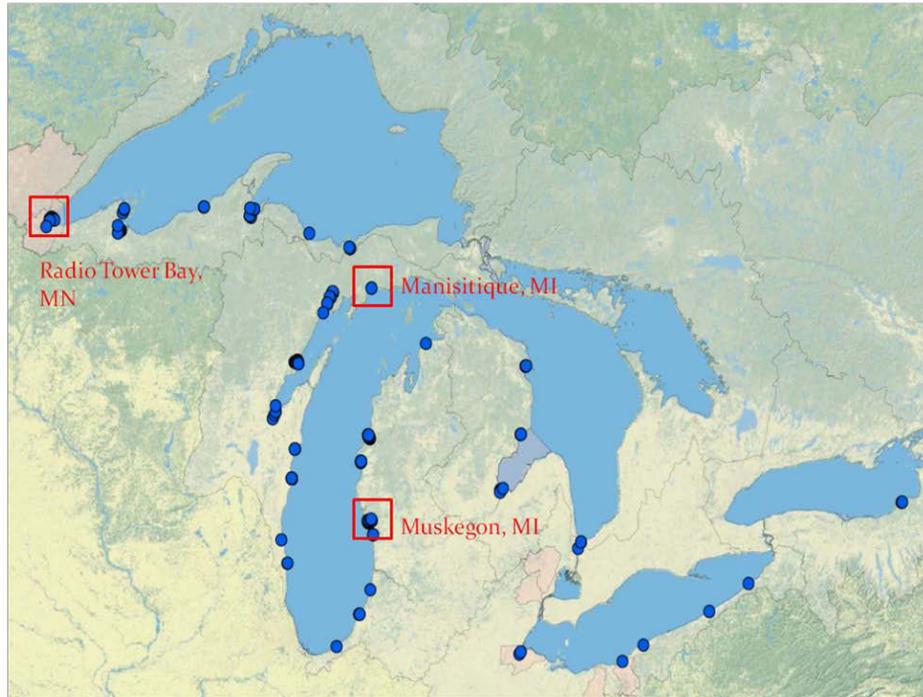


Figure 3. Map of historic sawmilling locations. Credit: NOAA Restoration Center

Radio Tower Bay is located in the St. Louis River outside of Duluth, Minnesota. The bay (also known as Cedar Yard Bay) was the site of a sawmilling operation from the late 1800's through the early 1900's. The mill was constructed over the water, on pilings driven into the bottom of the estuary. The mill was burned in 1918, during a massive forest fire in northeast Minnesota, but discarded debris remains (figure 4). The Minnesota Department of Natural Resources, in partnership with Minnesota Land Trust, has received a Great Lakes Restoration Initiative (GLRI) grant through NOAA's Restoration Center – Great Lakes Region to remove derelict pilings. This removal will be phase I of a larger plan to remove the benthic woody debris.



Figure 4. Pilings planned for removal in Radio Tower Bay (left) and woody lumber debris (right). Credit: Minnesota Land Trust and NOAA respectively.

The Manistique River is located on the upper peninsula of Michigan and drains into Lake Michigan. This sites' sawmill debris, primarily in the form of chips and sawdust, is compounded by the Polychlorinated Biphenyls (PCBs) associated with it. The source of the PCB contamination was an upstream carbonless copy-paper deinking lagoon. Due to contamination, the site has had several dredging operations through the Environmental Protection Agency (EPA) Superfund Program as well as navigational dredging by the Army Corps of Engineers. However, sawmill debris still remains a concern for the area (figure 5).



Figure 5. Sawdust debris on the shoreline of Manistique, MI and in sediment cores. Credit: EPA.

Muskegon Lake is a 4,200-acre lake in west Michigan, connected to Lake Michigan. A history of developmental impacts has greatly impacted the ecological functions and overall quality of the lake, beginning in the late 1800s during the lumber era. This area is also impacted by sawmill slabs and chips (figure 6). The West Michigan Shoreline Redevelopment Commission (WMSRDC) has received an engineering and design GLRI grant from NOAA to investigate the impacts of this debris and determine extent for future removal efforts.



Figure 6. Sawmill debris (slab wood) in Muskegon Lake, MI. Credit: WMSRDC

While the exact impacts to the environment are yet unknown, it is believed that the historic milling material smothers the bottom-environment, limiting environmental productivity and habitat while contributing to the degradation of fish and wildlife populations (figure 7).



Figure 7. Reference site on St. Louis River with biologic productivity (left), and Radio Tower Bay productivity (right) impacted by sawmill debris. Credit: Minnesota Land Trust

### ***Derelict Fishing Gear***

The commercial fishing industry in the Great Lakes provides a large economic benefit to the region. In 2000, the lake whitefish was the most harvested fish in both U.S. and Canadian waters of the Great Lakes, accounting for over 21 million pounds worth over \$18

million in dockside value. Yellow perch and walleye each were worth over \$10 million in dockside value, with yellow perch having the most value per pound (just over \$2/lb) (Kinnunen 2003).

Commercial fishing effort and gear varies by lake, state, and fishery. Gill nets are one of the most widely used types of gear for catching lake herring, chubs/ciscoes, whitefish, lake trout, yellow perch, salmon, walleye, and white perch (Kinnunen 2003). Gill nets are generally set perpendicular to the shore and strung end-to-end in "gangs" that are frequently over a mile long and sometimes stretch for five miles or more (figure 8). These nets are currently used in Lakes Michigan, Superior, Huron, and the Canadian side of Erie (their use is illegal in Ohio). Another type of commonly used gear in the Great Lakes are trap and pound nets (figure 9). These nets are used in Lakes Superior, Michigan, Huron, Erie, and the Canadian side of Ontario for smelt, lake whitefish, carp, catfish, freshwater drum, white bass, white perch, yellow perch, and eel. Other gear types used less frequently in the Great Lakes include hoop nets, seines, and trawl nets.

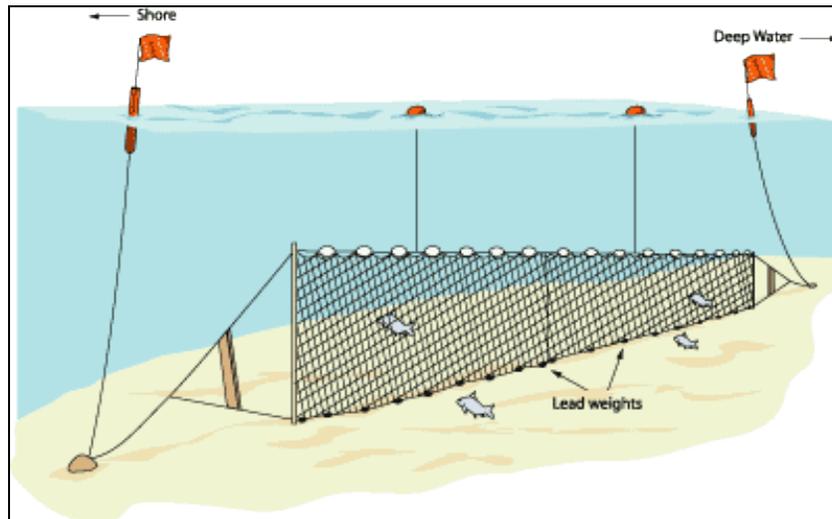


Figure 8. Diagram of a set gill net. Credit: MI Sea Grant

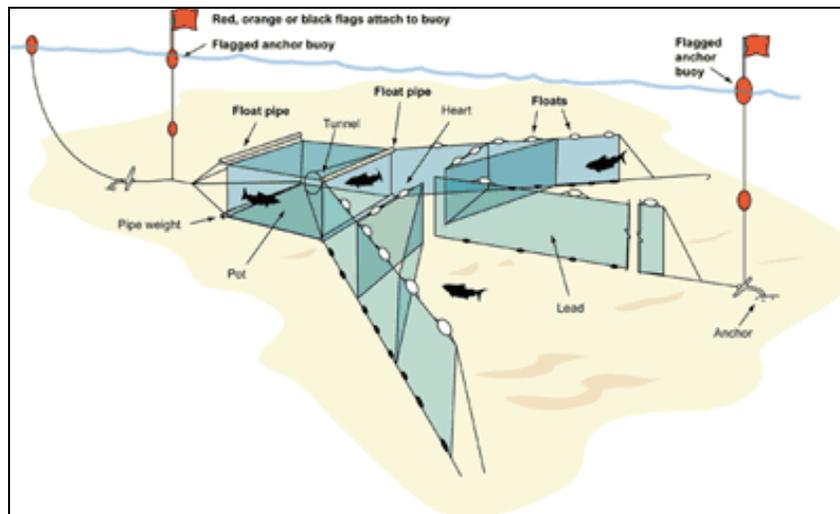


Figure 9. Diagram of a set trap net. Credit: MI Sea Grant

The United States fisheries value is primarily the result of recreational fishing. As a popular sport fishing destination, this ~\$4 billion industry brings tourist revenue to the region (Talhelm 1988). In 2010 in Lake Erie alone, sport anglers made over 750,000 trips and the private sport fishing effort topped 3.6 million hours (ODW 2011). Sport fishing in the region is primarily done through hook and line efforts.

While much is known about these fishing practices, it remains unclear how much of the gear (nets & associated line, monofilament, etc.) is lost and currently in the environment as derelict fishing gear. Due to the advent of GPS positioning, it is speculated that less modern gear is being lost (Brian Locke, personal communication, November 14, 2011) There have been several anecdotal accounts of lost gear in Lakes Michigan, Huron, and Erie, but no formal study or survey of loss rates has been conducted. For example, derelict fishing gear has been documented on several Great Lakes shipwrecks. On one wreck in the Wisconsin waters of Lake Michigan, the majority of the fishing gear appears to be cotton-based and older, unlike the more modernly used synthetic variety, but further investigation is needed (figure 10). Additional gear found on wrecks includes diving mooring lines.



Figure 10. Fishing nets on a wreck in Wisconsin waters of Lake Michigan. Credit: NOAA Sanctuaries.

Because much remains unknown about the extent of the problem in the Great Lakes, impacts are also currently hard to quantify. Some documentation of entanglements has occurred by The Alliance for the Great Lakes through their Adopt-a-Beach™ program. These entanglements are primarily of birds caught in monofilament fishing line or balloon ribbons. However, less is known about other potential impacts, including benthic smothering, hazards to navigation, and impacts to the economy through loss and downtime.

### **Knowledge Gaps**

As participants identified knowledge gaps for each of the debris types above, it became evident that there were several gaps that were consistently identified. These include:

- Identification of the greatest debris impacts. These include impacts to human health, fish & wildlife populations and habitat, the coastal environment, and socioeconomic impacts.
- Identification of all types of debris found in the Great Lakes. Because the Great Lakes have not yet been thoroughly investigated for marine debris, it is unclear if they have all of the same debris types as is known in the oceans.
- Discovery of all sources of debris, which includes source tracking.
- Determination of the spatial distribution or extent of all debris types.
- Comprehensive understanding of all regulations affecting marine debris in the Great Lakes.
- Comprehensive understanding of all existing research that has been done and the data that has been collected so far. This includes freshwater specific data on marine debris.

- The use of standard collection methods of marine debris data. While these methods and scale will vary depending on the research question, it is important to have comparable data where possible.
- A clear understanding of what the public cares about and their perceptions related to marine debris.
- Understanding what research all managers need to address marine debris in the Great Lakes.
- Looking at social science research from a marine debris perspective.
- Open water and underwater data collection. Currently, much focus is on what we see on the beaches and in the environment, but it is unclear what is floating out in the lakes, in the water column, or resting on the bottom.

A complete list of information gaps identified by participants on specific debris types can be found in Appendix IV.

### **Vision Statement**

After the first breakout group session on day two, each group identified a list of key elements they wished to see in a vision statement for the Great Lakes in a five year timeframe. Common elements from both groups included:

- A clear picture of the extent of the marine debris problem in the Great Lakes.
- A more involved and better educated public with some form of public action towards marine debris.
- A measurable reduction in marine debris and improvements to the environment. One group developed a slogan for a reduction goal of 'Debris free by 2033.'
- Improved stakeholder coordination and better coordination among states, federal agencies, tribes, and non-profits.
- Sustained funding for marine debris efforts.
- Coordination with Lakewide Management Plans (LaMPs) and the Great Lakes Collaborative.
- Better source control of marine debris or increased prevention of marine debris.
- Established standard ways to collect data and measure impacts of debris through a science-based approach. This could include the development of some guiding principles.

Groups took these elements and crafted draft vision statements in the form of newspaper headlines. Group One created a draft vision statement/cover story which read, "*Marine debris greatly reduced through cooperative stakeholder group.*" A series of four headlines to support this statement were also created and were as follows:

- 1) Coordinated research program established to understand the extent & impact of marine debris in the Great Lakes.
- 2) Nurdles & Nets: Industries sign on to reduce marine debris in the Great Lakes.
- 3) Historic marine debris removed from three Great Lakes harbors.
- 4) Volunteers expand efforts to increase marine debris legislation and funding.

The second breakout group had a similar draft vision statement/cover story which read, *“Collaborative plan identifies Great Lakes marine debris hot spots and study shows that harmful impacts have been reduced.”* This group developed supportive headlines which included:

- 1) Local community sets up foundation to fund Great Lakes marine debris removal and prevention efforts.
- 2) Re-use of historic sawmill debris boosts local economy.
- 3) Animal entanglements no longer a problem due to increased stewardship by anglers and volunteers.

These two draft vision statements and supporting headlines had several common elements or themes. The first common element is the idea of collaboration. This includes collaboration amongst all groups including federal, state, tribal, and non-profit groups, and also the public. Related to this, both groups identified the idea of having an ongoing stakeholder group. This stakeholder group would be comprised of a diverse number and type of organizations that work towards, or are in some way related to, the topic of marine debris. Additionally, some form of action or result is described in the draft vision statements. For example, these include the acts of debris removal, improved wildlife habitat, development of a funding source, and stewardship by the public, industry, and governments. Finally, both draft vision statements included increased knowledge and understanding of the debris as well as the reduction of debris and its associated impacts.

### *Next Steps*

Because this workshop was the start of the development of a regional action plan to address marine debris in the Great Lakes, follow-up work is required. The first action that will be taken is the refinement of the vision statement. This will be completed by a few volunteers (Sarah Opfer-NOAA Marine Debris Program, Jamie Cross- Alliance for the Great Lakes, Kathy Evans- WMSRDC) and then sent to all the participants for additional feedback. Once approved, this vision statement will be used to frame the development of a regional action plan.

Through the course of the two day workshop, many participants pointed out other groups or individuals that should be included in future discussions. As a way to coordinate this list, participants were asked to send a list of names and contact information to Sarah Opfer (NOAA) who would keep the master list for future reference and workshop invitations. This will also help steer the development of a more formally established working group which was also identified as a desired next step following this workshop. This working group will need to be refined in scope, structure, and possibly geographically.

Once a working group is established, further regional action plan development can proceed. This includes the development of a rough timeline for the development process as well as the first steps of creating a conceptual model.

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*Appendix I – Workshop Agenda*

**Great Lakes Region Marine Debris Workshop**

December 1-2, 2011

Great Lakes Environmental Research Laboratory

Ann Arbor, MI

**Objectives:**

- Establish a shared vision that each organization will work towards in addressing the marine debris problem in the Great Lakes.
- Establish the current state of knowledge on land-based debris, derelict fishing gear, and historic sawmill and fill debris, including critical information gaps.
- Connect federal agencies, states, tribal nations and non-governmental organizations in the Great Lakes region to identify potential opportunities for collaboration related to marine debris.

**Product:**

- This workshop will generate information that will be used as a basis of a future action plan for the region, and for reference in grant proposals

**Day 1 – Thursday, December 1<sup>st</sup>**

8:30am	<b>Registration &amp; Coffee</b>
9:00am	<b>Welcome – GLERL Assistant Director John Bratton; Congressman Chip Cravaak (invited)</b>
9:15am	<b>Workshop Objectives – Sarah Opfer, NOAA</b>
9:20am	<b>Agenda Review &amp; Participant Introductions – Stephanie Kavanaugh, NOAA</b>
9:40am (15 minute break @ 10:30)	<b>Presentation &amp; Discussion: Land-Based Debris – Jamie Cross, Alliance for the Great Lakes</b>
11:40am	<b>Presentation: Historic Sawmill &amp; Fill Debris – Julie Sims, NOAA; Kathy Evans, WMSRDC; Daryl Peterson, MLT; Amy Mucha or Scott Cieniawski, US EPA</b>
12:30pm	<b>BOX LUNCH (Jimmy John’s)</b>
1:45pm	<b>Discussion: Historic Sawmill &amp; Fill Debris</b>
2:45pm	<b>BREAK</b>

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<b>3:00pm</b>	<b>Presentation &amp; Discussion: Derelict Fishing Gear – Presenters Sarah Opfer, NOAA; Ellen Brody, NOAA</b>
<b>4:45pm</b>	<b>Wrap-Up Day 1 – Sarah Opfer, NOAA</b>
<b>5:00pm</b>	<b>ADJOURN</b>
<b>6:30pm</b>	<b>Dinner Together – Location TBD</b>

**Day 2 – Friday, December 2<sup>nd</sup>**

<b>8:30am</b>	<b>Coffee</b>
<b>9:00am</b>	<b>Welcome &amp; Agenda Review –Stephanie</b>
<b>9:10am</b>	<b>Action Plan Presentation – Sarah &amp; Stephanie</b>
<b>9:40am</b>	<b>Visioning Breakout Groups Round 1</b>
<b>10:30am</b>	<b>BREAK</b>
<b>10:45am</b>	<b>Visioning Session Report Outs Round 1</b>
<b>11:30am</b>	<b>Visioning Breakout Groups Round 2</b>
<b>12:15pm</b>	<b>BOX LUNCH (Produce Station)</b>
<b>1:30pm</b>	<b>Visioning Session Report Outs Round 2</b>
<b>2:45pm</b>	<b>BREAK</b>
<b>3:00pm</b>	<b>Input on future workshop direction – what are the next steps?</b>
<b>4:00pm</b>	<b>ADJOURN</b>

## *Appendix II - Participant List*

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*Appendix III - Presentations*

## The Alliance for the Great Lakes

Land-based Marine Debris:  
NOAA Great Lakes Debris Meeting

Jamie Cross  
Adopt-a-Beach™ Manager  
[jcross@greatlakes.org](mailto:jcross@greatlakes.org)



## What's Ahead

- Alliance for the Great Lakes background information
- What is land-based marine debris
- Cleanup programs in the Great Lakes
- Adopt-a-Beach™ results
- Marine Debris Events



## A Community that Cares for the Great Lakes

Formed in 1970, the Alliance for the Great Lakes is the oldest independent Great Lakes citizens' organization in North America. Our mission is to...

Conserve and restore the world's largest freshwater resource using:

- Policy
- Education
- Local Efforts



Ensuring a living resource for future generations of people and wildlife.



## Adopt-a-Beach™ Program Overview

Today the program is a **year-round opportunity** for families, schools, businesses and community-based groups to **conduct litter monitoring and monitor beach health** along Great Lakes shorelines.

- 1991 – ICC Coordinator in Illinois and Michigan
- 2003 – Launched year-round Adopt-a-Beach™ program
- 2008 – ICC Coordinator in Indiana
- 2008 – Forms aligned with US EPA's Sanitary Survey
- 2010 – Six Great Lakes States and nearly 11,000 volunteers
- 2010 – ICC Coordinator in Wisconsin
- 2011 – New online system with results available to the public
- 2011 – 595 Litter Monitoring Forms collected from IL, IN, MI NY, OH and WI removing 32,465 pounds of debris



## Land-based Marine Debris: NOAA

Debris generated on land can be blown, swept, or washed out to sea.

- Littering, dumping, and poor waste management practices
- Storm water discharges
- Extreme natural events



## Volunteer Cleanup and Monitoring Programs, Great Lakes

International Coastal Cleanup, coordinated by the Ocean Conservancy in Washington D.C. carried out by various state coordinators

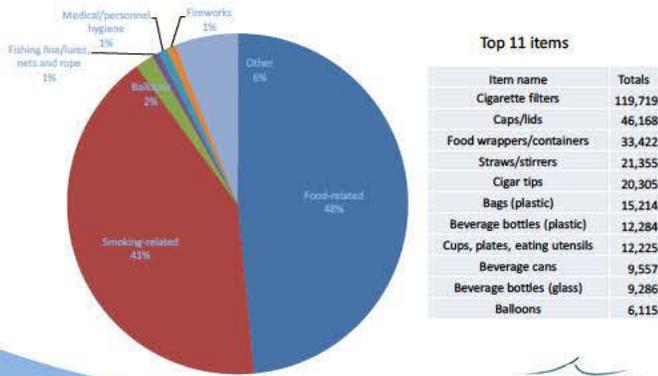
- Ohio (OH Lake Erie Commission)
- Minnesota (Great Lakes Aquarium)
- Pennsylvania (PA Coastal Resources Management Program)
- New York (American Littoral Society)
- Illinois, Indiana, Michigan and Wisconsin (Alliance for the Great Lakes)

Alliance for the Great Lakes year-round Adopt-a-Beach™ program

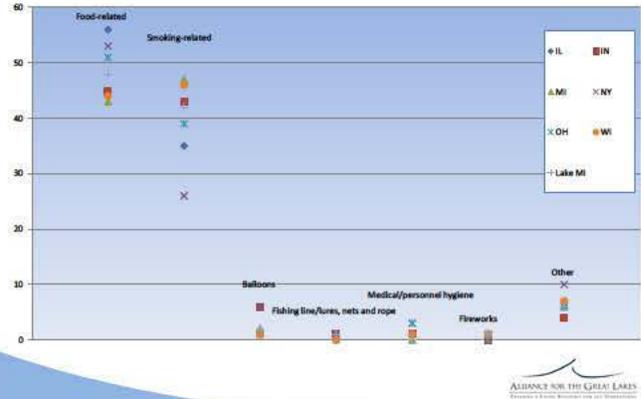
Other volunteer cleanups that do not catalog results (e.g. Lake St. Clair Nautical Mile Cleanup, Detroit River Spring Cleanups, Buffalo River Spring Cleanup)



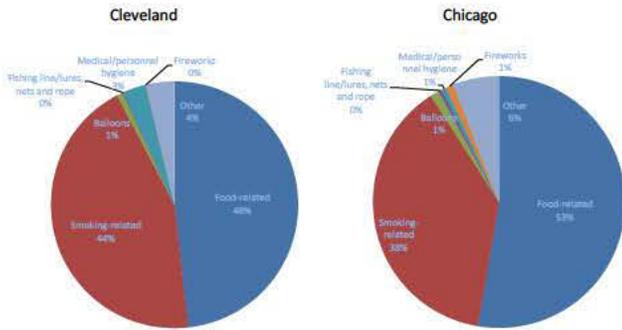
The Adopt-a-Beach™ Program: 2011 Results



Adopt-a-Beach™ Program: Items by Percentage 2011



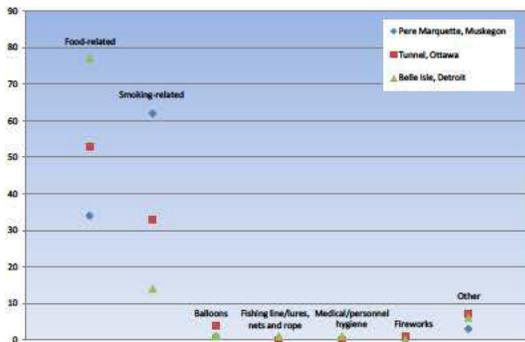
Percentage of Items: Two Great Lake Cities



Top Ten Items: Two Great Lake Cities

Item name	Cleveland	Item name	Chicago
Cigar tips	5,275	Cigarette filters	33,027
Caps/lids	3,546	Caps/ lids	14,282
Cigarettes filters	2,206	Food wrappers/containers	7,825
Straws/stirrers	906	Straws/stirrers	6,767
Food wrappers/containers	893	Bags (plastic)	5,474
Bags (plastic)	831	Beverage bottles (glass)	4,092
Beverage bottles (plastic)	825	cups/plates/eating utensils	3,482
Cups/plates/eating utensils	658	Beverage bottles (plastic)	3,280
Tampons/tampon applicators	397	Cigar tips	2,935
Beverage cans	362	Beverage cans	2,864

Percentage of items: Three Michigan Beaches



Top Ten Items: Three Michigan Beaches

Item name	Pere Marquette Park, Muskegon	Item name	Tunnel, Ottawa	Item name	Belle Isle, Detroit
Cigarette filters	5,806	Cigarette filters	333	Caps/lids	893
Food wrappers/containers	1,412	Food wrappers/containers	246	Food wrappers/containers	370
Caps/lids	661	Caps/lids	109	Beverage bottles (glass)	309
Straws/stirrers	538	Straws/stirrers	100	Bags (plastic)	289
Bags (plastic)	230	Toys	46	Cigarette filters	254
Cigar tips	219	Bags (plastic)	42	Cups/plates/eating utensils	214
Cups/plates/eating utensils	216	Balloons	42	Straws/stirrers	172
Tobacco packaging	114	Cigar tips	35	Cigar tips	164
Beverage bottles (plastic)	93	Cups/plates/eating utensils	19	Beverage bottles (plastic)	126
Bags (paper)	91	Bags (paper)	16	Bags (paper)	120

Adopt-a-Beach™: Animal entanglements 2011

Animal	Debris Item		State	County
Seagull	ribbon	Alive	Illinois	Lake
Seagull	6 pack plastic ring	Alive	Illinois	Cook
Seagull	fishing line	Alive	Illinois	Lake
Opossum	string/twine	Alive	Michigan	Berrien
Mallard Duck	fishing line, hook	Alive	Michigan	Ottawa
Fish	rope	Dead	Michigan	Ottawa
Crow	fishing line	Dead	Michigan	Charlevoix
Goose	fishing line	Alive	Ohio	Cuyahoga
Seagull	netting/rocks	Alive	Wisconsin	Milwaukee
Seagull	fishing line	Dead	Wisconsin	Ozaukee



Mystery Trash Wash-up, Mich.

- Lake Michigan Coast
- 2008 and 2010
- Agency involvement
- Alliance involvement
- Coast Guard investigation
- Case closed 2011



Oak Creek Bluff Collapse We Energy, Wis.

- October 31, 2011 bluff collapses
- Coal ash, construction equipment, storage containers
- Boom placed in Lake Michigan to prevent debris and fuel from moving into the lake
- Incident under investigation



Next steps/questions

- Other debris land-based debris
- Underwater debris
- What are the impacts
- Analysis to determine source
- Target areas with little to no information
- Work with existing cleanups to collect information



Jamie Cross, Adopt-a-Beach™ Manager

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Adopt-a-Beach™ online system

[www.greatlakesadopt.org](http://www.greatlakesadopt.org)



## Distribution of Plastic Particles along the shorelines of Lakes Huron, Erie and St. Clair

Sources: Matt Zbyszewski (M.Sc. Thesis)  
Alexandra Hockin (B.Sc. Thesis)  
Zbyszewski and Corcoran, 2011 (Water, Air and Soil Pollution)

## Categories of Plastic Debris

**Pellets (nurdles):** raw plastic resin materials that are molded into plastic products; 1 to 5 mm diameter, various colours and types

**Fragments:** particles of broken plastic products; 2 mm to 10 cm in size; various colours, shapes and types

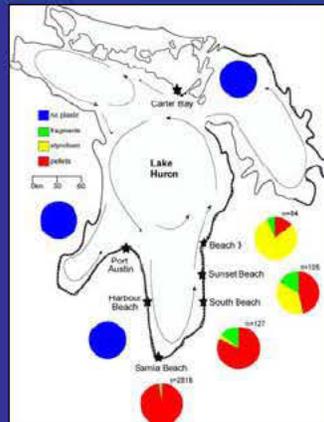
**Styrofoam:** polystyrene; usually broken down into < 5 cm pieces

**Intact Products:** e.g. water bottles, styrofoam cups, syringes

## Methods



## Distribution Results: Lake Huron

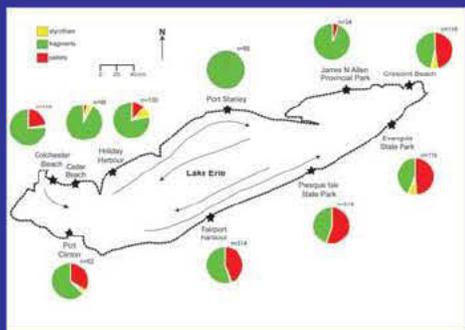


\*4/7 beaches yielded 3,209 plastic fragments over 85m<sup>2</sup>

\*2,984 pellets (93%), 108 fragments (3%), 117 Styrofoam (4%)

\*Sarnia Beach, 94% pellets; Beach 3, 14% pellets

## Distribution Results: Lake Erie

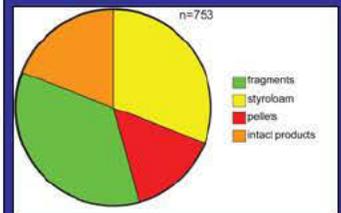


\*10 beaches yielded 1,576 plastic pieces

\*603 pellets (39%), 934 fragments (59%), 39 Styrofoam (2%)

\*Presque Isle, 55% pellets; James N Allen, 6% pellets

## Distribution Results: Lake St. Clair

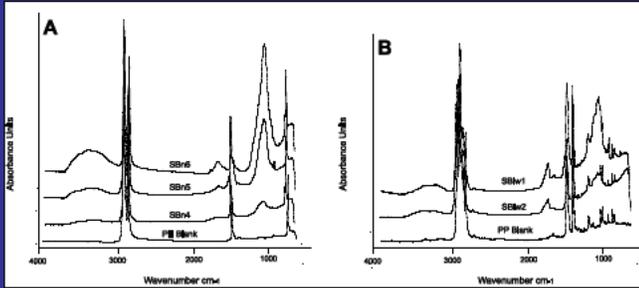


\*9 beaches yielded 753 plastic pieces

\*110 pellets (15%), 267 fragments (35%), 234 Styrofoam (31%), 142 intact products (19%)

\*Metro Beach, 46% pellets; Harsens Island, 0% pellets

## Distribution Results



\*49 polyethylene, 22 polypropylene, 1 polyethylene terephthalate

\*Oxidation indicated by peaks in the 1,715 – 1,735  $\text{cm}^{-1}$  range

## Conclusions of Study

1) Distribution appears to follow the predominant water current pattern in Lakes Huron and Erie

2) Greater relative percentage of pellets on Lake Huron compared with Lakes Erie and St. Clair (source of pollution most likely spillage during transport)

3) Polyethylene pellets are more resistant to weathering than polypropylene (confirmed by chamber study)

\*Persistent Organic Pollutants (POPs: PCBs, DDTs) can be adsorbed to pellets (e.g. Endo et al., 2005; Rios et al., 2007) \*Gas chromatography mass spectrometry at UWO

# Sawmill & Mill Debris in the Great Lakes

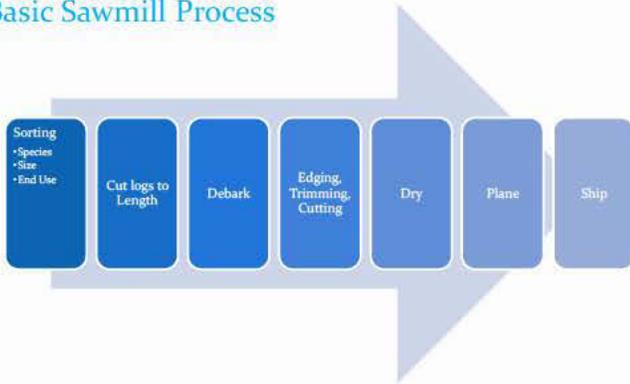
Julie Sims, NOAA  
 Terry Heatlie, NOAA  
 Kathy Evans, WMSRDC  
 Daryl Peterson, Minnesota Land Trust  
 Amy Mucha & Scott Cieniawski, EPA

## Outline

- Sawmill Process & Waste
- Sawmill Debris Projects
  - Detection - GLERL/Muskegon
  - Muskegon
  - Radio Tower
  - Manistique



## Basic Sawmill Process



3

## Waste



## Modern Waste

- More efficient = less waste
- Market for waste:
  - Slabwood/scrap – fuel, chipped for paper
  - Sawdust – compost, animal bedding, particle board
  - Bark Chips – mulch, fuel
  - Wood Chips – particle board



5

## Historic Waste

- Less efficient = more waste
- No market/demand
  - Disposed of near mills
  - Abandoned

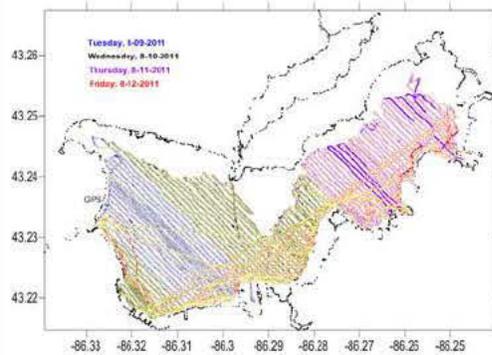




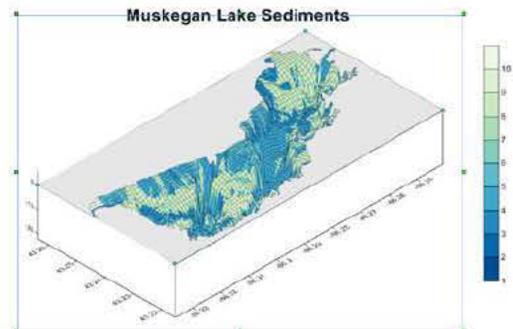
## Detection of Sawmill Debris



## Locating the Sawmill Debris in Muskegon Lake



## Muskegon Lake Sediment Types



- Depth contour map overlay
- 10 eco types
- Collect mud!

### Lower St. Louis River



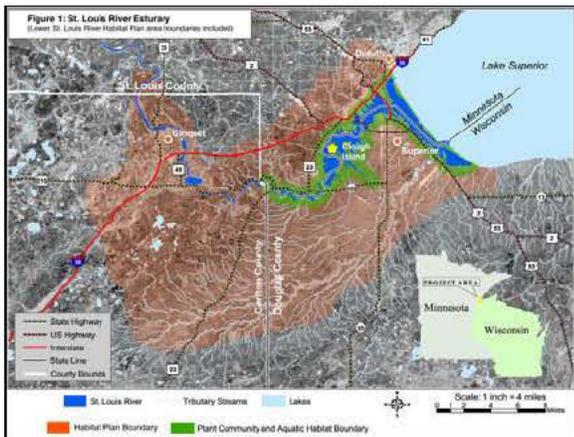
- \* 12,000 acre freshwater estuary.
- \* Wetlands are largest such complex in Lake Superior.
- \* Diverse habitats supporting high diversity of plant and animals.

### State & National Significance of St. Louis River Estuary

- Largest fish “nursery” on U.S. side of Lake Superior
- Major stopover for migratory birds & waterfowl
- Key source of nutrients for Lake Superior’s primary productivity
- #1 volume port on Great Lakes, and second largest dry bulk port in U.S.
- Over 50,000 summer angler hours annually
- 3.5 million people visit Duluth & Superior each year



### The Lower St. Louis River AOC



From St. Louis River Citizens Action Committee's 2002 Habitat Plan [www.stlouisriver.org](http://www.stlouisriver.org)

Major declines in fish and wildlife populations as well as overall environmental quality.

**Health Officials Join Probe**  
**Fish Death Study Widens**

BY BARBARA BOLLER  
 Some public health officials are expected to take part today in the investigation of the deaths of thousands of fish in the Lake Superior.

State officials in St. Paul yesterday were informed of the deaths of more than 100,000 fish in the St. Louis River estuary, according to a report by the Minnesota Department of Natural Resources.

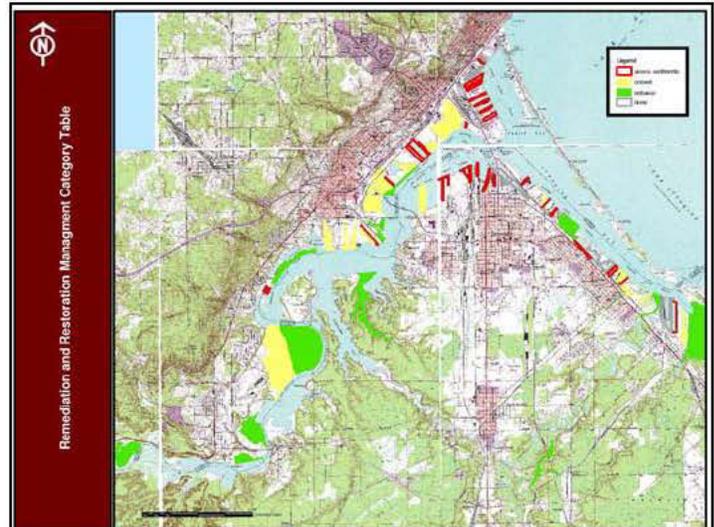
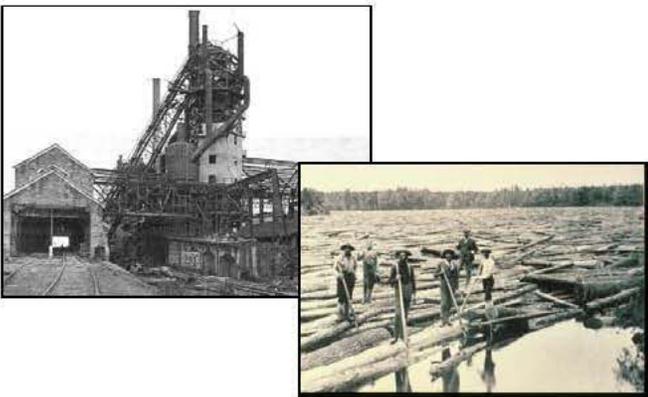
The report, which was part of a larger investigation into the cause of the fish deaths, was released today. It is the first time that health officials have been involved in the investigation of the fish deaths.

The report also noted that the fish deaths were not limited to the St. Louis River estuary, but were also found in other parts of the Lake Superior basin.

The report was released today as part of a larger investigation into the cause of the fish deaths. It is the first time that health officials have been involved in the investigation of the fish deaths.



### Industrial Waste Dumping



### Radio Tower Bay Habitat Restoration Project



### Radio Tower Bay Project Area Detail



### Phase I Project Components:

1. Quality Assurance
2. Historic Evaluation
3. Outreach
4. Construction

### Quality Assurance Program Plan (QAPP)



### Historic & Cultural Evaluation (SHPO)



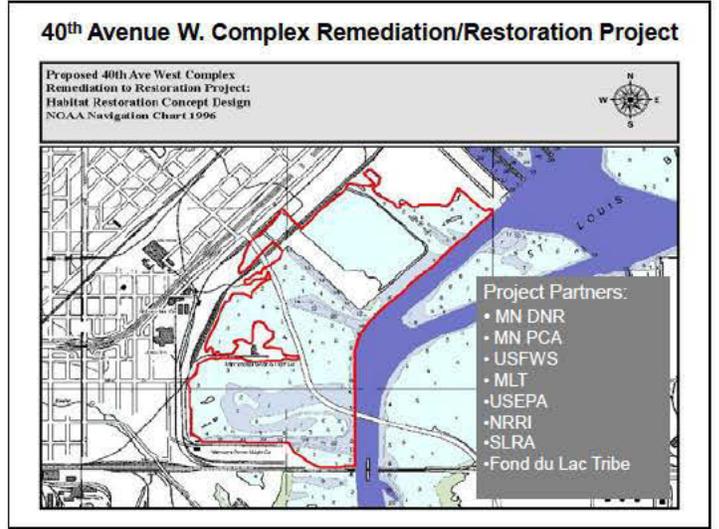
### Construction



### Phase II









## Manistique River & Harbor Area of Concern

A Site Impacted by Sawmill and Wood Debris



## - Sawmill/Wood Debris - Impacts in Manistique

- Much of the site is actually made from debris from major historical sawmill operations just upstream
- There was also a source of PCB contamination from carbonless copy paper – de-inking lagoon
- Therefore as the PCBs migrated downstream, it became associated with the woodchips and sawdust and now much of the debris is contaminated



## Site Background

- About 10 years since Superfund dredged
- Great Lakes Legacy Act (GLLA) did site characterization sampling in September 2010
- USACE dredged (most) of the federal navigation channel in 2010



**Current Status of the Manistique Area of Concern**

- After dam gate is opened, large amount of essentially clean material has come in
- Areas of low and high energy

**Sediment Changes from 2001 to 2009**

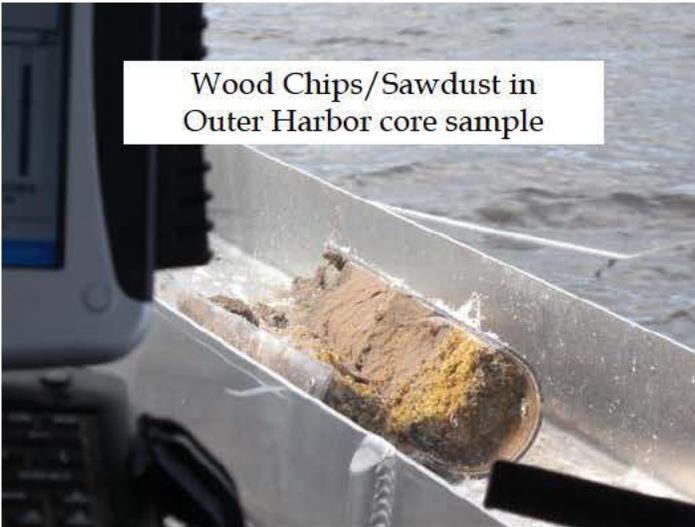


**West Beach**

- The west beach area and harbor sediments contain a large amount of woodchips/sawdust
- This area is outside of the AOC
- Three (3) Samples analyzed for PCBs
  - Maximum: 6.3 ppm
  - Average: 3.8 ppm
- Area is highly accessible for human contact.



**Wood Chips/Sawdust in Outer Harbor core sample**



**Sediment Chemistry Summary**

Area	Min Detected Result	Max Detected Results	Average	SD of Detected Results
Outer Harbor	0.19	25.82	2.49000	5.98470
Outer Harbor Hotspot	0.196	2.63	0.63889	0.81016
River Edge	0.428	0.428	0.42800	0.00000
River Slips	0.183	51.44	3.01357	11.10297
West Beach	2.24	6.356	3.76267	2.25723
Overall	0.19	51.44	1.78679	6.43594

Area	Min Detected Result	Max Detected Results	Average	SD of Detected Results
Outer Harbor	0.166	36.715	1.27800	5.61939
Outer Harbor Hotspot	0.167	0.167	0.85472	0.77632
River Edge	0.3535	0.84	0.69675	0.20249
River Slips	0.234	497.7	20.61509	99.40335
Overall	0.166	497.7	6.72874	55.00056

Area	Min Detected Result	Max Detected Results	Average	SD of Detected Results
Outer Harbor	0.166	36.715	1.37568	5.12544
Outer Harbor Hotspot	0.167	2.63	0.84606	0.79171
River Edge	0.428	0.84	0.36325	0.23662
River Slips	0.183	497.7	10.94977	68.50468
West Beach	2.24	6.356	3.76267	2.25723
Overall	0.166	497.7	4.10170	37.56847

**Fish Contamination**

- MDEQ data (2009) indicate
  - There are still elevated PCB concentrations in fish
  - Generally, carp tissue concentrations have gone down over time
  - Redhorse suckers have not
  - Most species are not at levels needed for delisting

Table 4. Results of Analysis of Variance comparing PCB concentrations in fish collected from the Manistique River AOC across years.

Species	Indication	D	R <sup>2</sup> (adjusted)
Carp	2004 ~ 2009	0.02	0.48
Blackchin Outlier	No detectable difference	0.07	0.49
Rock Bass	No detectable difference	0.00	0.19
Smallmouth Bass	No detectable difference	0.17	0.40

**Delisting Approach at Manistique**

- The key to both remaining BUIs is bioaccumulation of PCBs from sediment into biota
- A significant effort in 2011 has been to understand the bioaccumulation potential of the sediments
  - How it varies across the site
  - Do the woodchips retard or influence uptake
  - Which sediments offer the best bioaccumulation bang for our bucks?

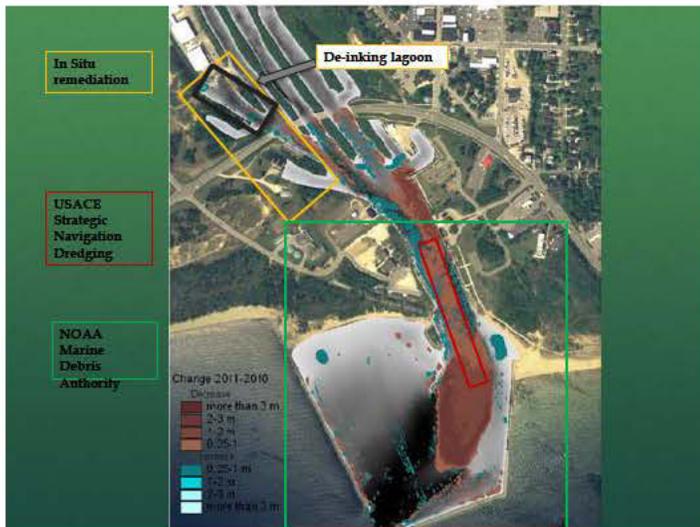


## Bioaccumulation & other analyses

- In situ amendment research candidate site
- Swallow boxes up with data expected in roughly 9 months
- NOAA added as mussel watch site this year
- USACE ERDC - multiple bioaccumulation analyses this year (POM, site specific Koc, black carbon, and lumbriculus)
- USGS also did a spider/riparian foodchain study

## Non-Bioaccumulation Analyses

- Delineate volume and extent of contamination
  - Slips
  - Outer Harbor
- Contaminant Levels in Wood Chips
  - Grain size fractionation
- Confirm and delineate extent of putative wood chip 'mat' in nearshore Lake Michigan
- Evaluate variations in bioaccumulation potential (slips versus harbor)
- Field and coordination support to on-going ERDC, USGS, and ORD bioaccumulation studies



### Muskegon Lake Area of Concern Fish and Wildlife Habitat Restoration

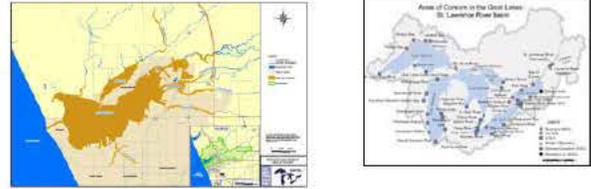
Great Lakes Marine Debris Workshop  
December 1-2, 2011  
NOAA GLERL, Ann Arbor, Michigan



Kathy Evans  
Program Manager  
West Michigan Shoreline Regional Development Commission

### Great Lakes Areas of Concern (AOCs)

Muskegon Lake is a 4,232-acre drowned river-mouth lake, connected to Lake Michigan by a navigational channel. It was designated an AOC in 1985, and is one of 14 AOCs in Michigan.

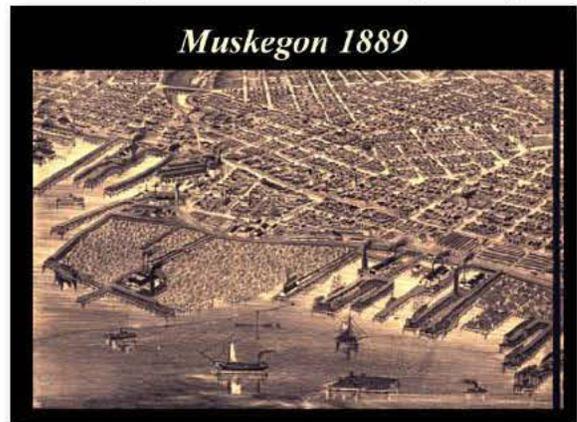


SOURCE: AOCs: USGS. Data modified from the Michigan Department of Natural Resources. GIS: the Michigan Center for Geographic Information, Department of Information Technology, 2004 and 2005, 2008.

### Muskegon Lake and Lake Michigan



### Muskegon Lake - a History of Impacts



Muskegon Lake Shoreline during the Lumber Era

### Muskegon Lake - a History of Impacts

Muskegon 1940s



Post World War II Industrial Era



How do you make this.....turn into this?

## Fish and Wildlife Restoration Plan Guides Local Planning for On-the-Ground Restoration Projects



## Loss of Fish and Wildlife Habitat

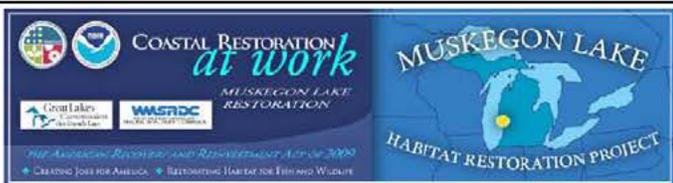


## AOC Restoration Targets



## Beneficial Use Impairments

- 27% of open water and coastal wetland area lost to filling and land development
- 74% of the shoreline hardened with broken concrete, foundry slag, seawalls
- Fish and wildlife habitat was lost, isolated, fragmented
- Fish and wildlife populations were degraded



### Project Goals:

- Ecological benefits for fish and wildlife
- Progress toward removal of Beneficial Use Impairments through restoration and scientific monitoring
- Job creation and retention
- Improvement of short and long-term economic conditions
- Public involvement and community outreach

### Grant Partners:

- Monitoring
- Oversight and Guidance
- Public Involvement and Awareness



## Marine Debris

Historic Sawmill Slab Wood, Foundry Waste, Broken Concrete, Metal Debris



### Impacts of Mill Debris

Smothering Benthic Habitat

Degrading Shoreline Habitat



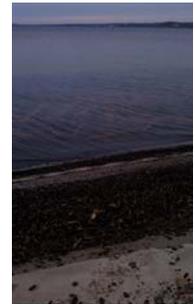
### Various Forms of Marine Debris



### Navigation Concerns



### Altered Habitats



### Contaminated Mill Debris



### Removal Methods





### Bad Wood...

Education



### Good Wood

Education



### The Evolving Role of Volunteers

1993

2010



**Marine Debris**  
OFFICE OF RESPONSE AND RESTORATION • NOAA NATIONAL OCEAN SERVICE

## Derelict Fishing Gear in the Great Lakes – A Story of Knowns & Unknowns

Marine Debris Workshop  
1 December, 2011  
Ann Arbor, MI

Sarah Opfer, NOAA  
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## Known – Fishing Practices

- Commercial Industry Value
  - Lake Whitefish: \$18M
  - Yellow Perch: >\$10M
  - Walleye: >\$10M



**Lake Whitefish Commercial Harvest**  
Percent by each Great Lake in 2002

**Yellow Perch Commercial Harvest**  
Percent by each Great Lake in 2002

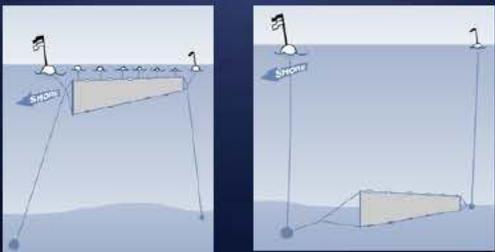
**Walleye Commercial Harvest**  
Percent by each Great Lake in 2002

Data courtesy of MI Sea Grant

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## Known – Fishing Practices

- Commercial Gear Types:
  - Gill Nets

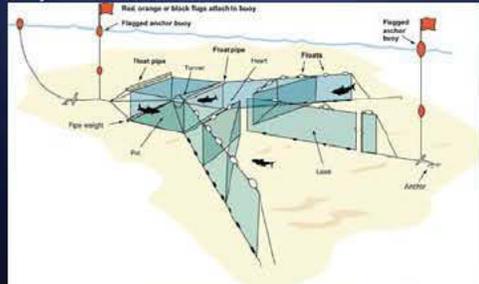


Photos courtesy of MN Sea Grant

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## Known – Fishing Practices

- Commercial Gear Types:
  - Trap/Pound Nets



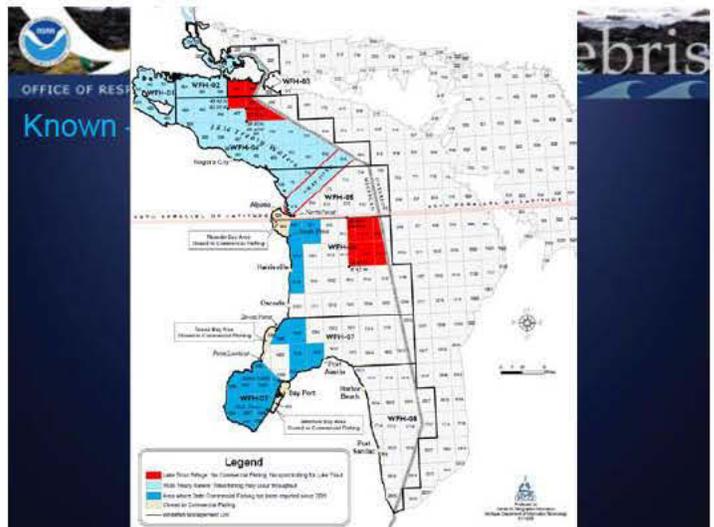
Photos courtesy of MI Sea Grant

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## Known – Fishing Practices

- Commercial Gear Types:
  - Trawl/Seine Nets



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### Known – Fishing Practices

- Recreational Industry Value
  - \$4 Billion
  - Primarily Hook & Line



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### Known – Debris



**Reel In And Recycle!**  
Monofilament Recycling Program

- 55 monofilament recycling bins
  - Through partnership with BoatUS "Reel in and Recycle" program
- 2009 ICC Net/line results:
  - **~2.5X** more than WA, MD, & VA combined!
- Anecdotes:
  - GLIFWC: Nets causing issues in tribal fishing areas of Lake Michigan
  - State Enforcement: Cutting lines during illegal fishing
  - Researchers: Potential monofilament and lead debris on reefs
  - Issues in Thunder Bay National Marine Sanctuary

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IL	Lake	Waukegan North/Municipal Beach	bird	fishing wire
IL	Cook	Oak Street Beach	bird	orange fencing
IL	Cook	63rd Street Beach/Jackson Park Beach	herring gull	fencing
IL	Lake	North Point Marina Beach	seagull	nylon rope
IN	Lake	Marquette Park Beach	fish	debris
IN	Lake	Marquette Park Beach	goose	fishing line
MI	Ottawa	Tunnel Park	fish	string
MI	Oceana	Driftwood Association - Private	sea gull	balloon string
MI	Charlevoix	Ferry Beach	seagull	fishing line
OH	Cuyahoga	Euclid Beach - Cleveland Lakefront State Park	bird	net
WI	Racine	Racine Zoo Beach - North of Goold Street	seagull	fishing line

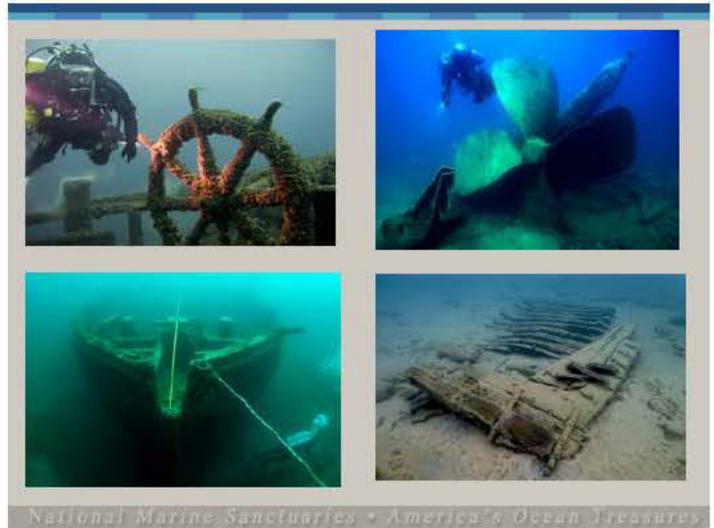
Data courtesy of Alliance for the Great Lakes

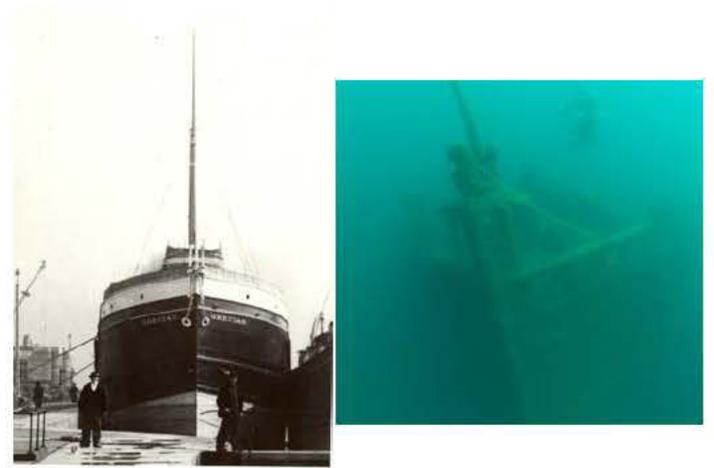
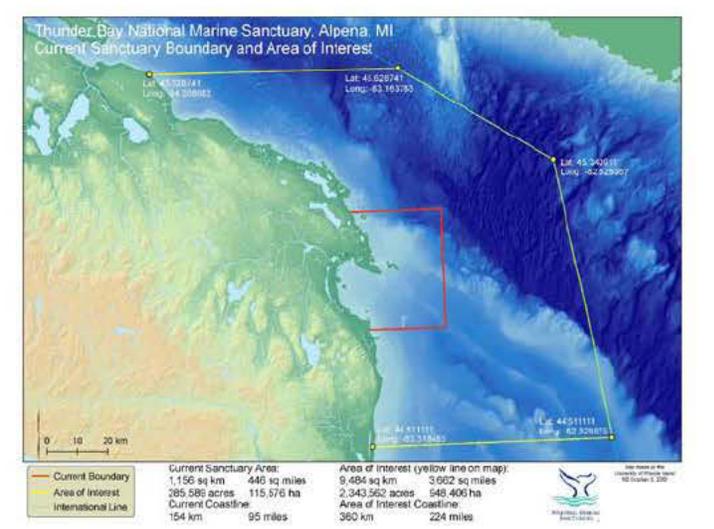
## Marine Debris

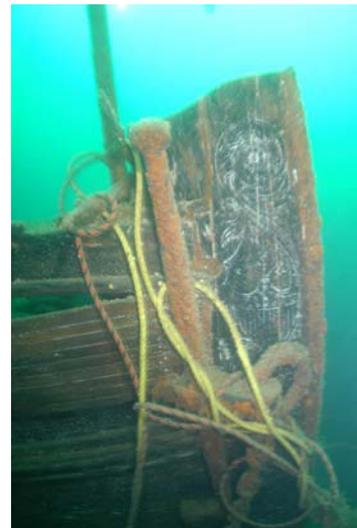
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### Unknowns

- How much is lost?
- Impacts?
- Hot spots?
  - Does it move?
  - Concentrated on the reefs?







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## Marine Debris Regional Action Plans

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## Purpose & Goal

- Promote coordinated action to address significant threats
- Establish a framework for strategic action
- Vary in length
  - 2 years
  - 5 years
  - 10 years

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## Steps

1. Establish a shared vision
2. Conceptual model development
3. Results Chains or action refinement

Conceptual Model

```

    graph LR
    A[Strategy] --> B[Indirect Threats]
    B --> C[Direct threat]
    C --> D[Stressors]
    D --> E[Ecosystem Target]
    
```

Example Results Chain

```

    graph LR
    A[Develop capacity & coord. for MD removal] --> B[Cost/capacity for debris removal]
    B --> C[Lack of removal]
    C --> D[Navigational Hazard]
    D --> E[Human Health & Safety]
    
```

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## Steps

Conceptual Model

```

    graph LR
    A[Strategy] --> B[Indirect Threats]
    B --> C[Direct threat]
    C --> D[Stressors]
    D --> E[Ecosystem Target]
    
```

Results Chain

```

    graph LR
    A[Strategy] --> B[Intermediate Result]
    B --> C[Threat Reduction Goal]
    C --> D[Ecosystem Target]
    
```

Example Threat Reduction Goal and Strategy

```

    graph LR
    A[1.1 Develop effective methods to locate marine debris accumulations] --> B[Backlog of marine debris reduced by 2020]
    
```

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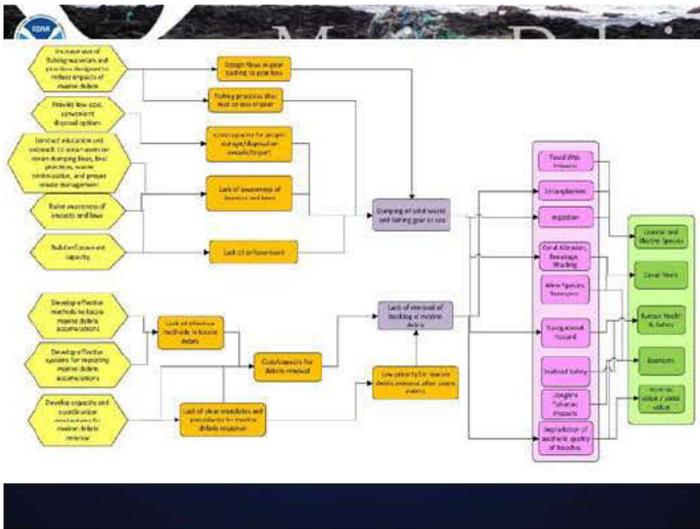
## Steps

1. Conceptualize  
Characterize existing conditions  
Identify/refine ecosystem targets, direct and indirect threats
2. Prepare Action Plan  
Develop goals, intermediate results, and strategies  
Develop implementation and monitoring plans
3. Implement Actions  
Develop partnerships and integrated work plans  
Conduct activities aligned to achieving intermediate results and threat reduction goals
4. Monitor Progress and Adapt Plans  
Monitor and evaluate strategy effectiveness  
Document and share lessons learned  
Adapt plans to enhance performance

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## Hawaii Marine Debris Action Plan

- Six workshops to develop strategic actions to address marine debris.
- ID actions in five focus areas:
  - Research & Assessment
  - Outreach
  - Land-based Debris Prevention
  - Beach Cleanup
  - Reef (In-water) Debris Removal
- Plan rolled out January 12, 2010 with over 75 partners and elected officials in attendance.
- Vision Statement: The overall goal of the HI-MDAP is to reduce ecological, health and safety, and economic impacts of marine debris in Hawai'i by 2020.



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**Goal 1 – Backlog of Marine Debris at Sea Reduced**

*Strategy 1.1: Develop effective methods to locate marine debris accumulations*

**Action RA2: Standardize survey methodology, data collection, and design for in-water sampling or sonar surveys**

**Description:** Develop or adapt, test, and disseminate marine debris survey methodologies and design across the state and in line with the rest of the nation so that data are comparable. Offer recommendations on data parameters to facilitate data sharing and comparison. Potential methods may vary with type of debris (nets vs. metal debris)

Debris Type: Ocean-based	Location: MHI initially
Duration: 2 years	Funding Status: unfunded
Estimated Cost: \$350,000, exclusive of vessel costs	Funding Sources: NOAA MDP
Lead Organization: NOAA	Partner Organizations: Universities, AMRF, USCG, fishermen

**Significance of Expected Outcomes:** Assessing and monitoring amounts of marine debris in various environments will allow prioritization of removal and prevention activities. Using standardized protocols will allow comparison with other regions and a robust time series.

## CREATING A MARINE DEBRIS VISION FOR THE GREAT LAKES REGION

Stephanie Kavanaugh, NOS Special Projects Division

## WHAT IS A VISION?

- A picture of the preferred future
- A statement that describes how the future will look if the organization achieves its ultimate aims and has been tremendously successful

## WHY HAVE ONE?

- To guide your organization or coalition from where you are today to where you want to be in the future
- To provide guidance in making resource management, staffing and other decisions
- To motivate staff (and yourself!)
- To ensure all parties involved are in agreement on what they are working towards together

## SOME EXAMPLES

- Disney – To become the leading entertainment company in the world
- Microsoft – A PC in every home
- NOAA's Office of Coast Survey – The nation's economy and coasts are healthier as a result of OCS navigation products and services
- NOAA's Office of Response & Restoration – Impacts of coastal environmental hazards are sharply reduced through the development and application of world-class science

## VISIONING EXERCISE

Great Lakes Environment Report:  
Special Marine Debris Edition  
January 1, 2016

COVER STORY \_\_\_\_\_

HEADLINE 1 \_\_\_\_\_

HEADLINE 2 \_\_\_\_\_

HEADLINE 3 \_\_\_\_\_

HEADLINE 4 \_\_\_\_\_

Imagine it is 2016 and your organizations, working together, have accomplished everything you set out to do regarding marine debris in the Great Lakes.

- What does that future look like?
- What have you accomplished?

## QUESTIONS?

## ***Appendix IV – Knowledge Gaps***

### ***Knowledge Gaps that apply to all Great Lakes debris:***

- What are the greatest impacts?
  - IMPACTS: Human Health
  - IMPACTS: Fish and Wildlife Populations and Habitat
  - IMPACTS: Coastal Health/Environment
  - IMPACTS: Socioeconomic
- Identification of all types of debris
- Identification of all sources of debris
- Source tracking
- Spatial distribution
- Understanding of all marine debris regulations
- Comprehensive understanding of all existing research done/data collected so far
- Freshwater specific data on marine debris
- Standard collection methods (how fine to break out; depends on the question)
- What does the public care about?
- What research do managers need?
- Look at social science research from a marine debris perspective
- Open and under water data collection

### ***Land-Based Debris Knowledge Gaps:***

- Core samples needed
- Sediment column samples
- Water column samples
- Fish stomach contents
- Microplastics in the Great Lakes (affects on fish & wildlife and humans)
- Data from inland/attached water bodies
- Beach health overlap with marine debris

### ***Historic Sawmill & Fill Debris Knowledge Gaps:***

- Need to know the extent
- Identification of good (providing habitat) vs. bad wood (smothering)
- Hard to sample (need technique & source)
- Determine appropriate re-use (cost of testing vs. landfill)
- Post-processing techniques for re-use
- Cost-effective remediation techniques
- What types of fill are there and do we remediate? (including shoreline stabilization materials)
- Effects on water chemistry and wildlife (for example effects of methane on invertebrates)
- Natural degradation rate (can we enhance it somehow?)
- Methane production – climate change connection
- Movement of finer debris (where to look)

- Loading estimates
- Benthos affected? (Dig and recreate shallow habitat?)

***Derelict Fishing Gear Knowledge Gaps***

- Fish and bird mortality
- Where and how much?
- When does debris become habitat? (depends on what it is)
- Fishing net loss rate & abandonment rate
- Why do fishermen get rid of nets?
- Is there education going on? They don't WANT to lose their nets – could be a win-win situation
- Lead sinkers = lead poisoning for birds?
- Marinas: what's under them?
- Recreational dive groups – connect with them and get data from them
- Ask state & Federal agencies, provincial government and tribes to report sightings of derelict gear (and other marine debris sightings)
- Recreational fishery groups and charter boats – get information from them
- Is there derelict gear on artificial reefs?
- 10 years ago you couldn't see the gear – it's safer to identify and remove now

***Other***

- What actions can we take without knowing everything?

## *Appendix V – Future Contacts*

### ***Who's Missing?***

- Beach Monitoring Consortium; Great Lakes Beach Association (Health Departments/EPA)
- Coastal Zone Management folks (through lake basin meetings)
- Great Lakes Fish Commission + Canadian Province representative; Council of Lake Committees
- Tribes
- Environmental Protection Agency (EPA) Marine Debris program
- Great Lakes Cities Initiative (Mayors)
- Areas of Concern Coordinators
- Lakewide Management Plan Coordinators
- Industry and green chemical organizations
- Green Building Council (LEED folks)
- Recreational & charter fishing groups
- Fish America Foundation
- Sewage industry
- Fish & Wildlife Service Great Lakes Habitat Program
- Clean marine programs
- Wood “re-users”

*Appendix VI – Workshop Evaluation*

<b><i>What I Liked</i></b>	<b><i>Suggestions for Improvement</i></b>
<ul style="list-style-type: none"> <li>• Workshop goal wasn't HUGE – good start</li> <li>• Better than last workshop; more focused; broad but manageable</li> <li>• Having an engaged facilitator from NOAA</li> <li>• Visual and tangible products</li> <li>• Was well facilitated</li> <li>• Presentations were informative</li> <li>• Collegial Discussions</li> <li>• No pressure to come up with a specific policy</li> <li>• Openness of discussion</li> <li>• Format for meeting was “what the answer looks like,” not “what the answer is”</li> <li>• Knowledge of marine debris issues</li> <li>• Participants checked egos at the door</li> </ul>	<ul style="list-style-type: none"> <li>• More people at group dinner</li> <li>• More participants (ask participants for their contacts beforehand)</li> <li>• Wide representation of stakeholders</li> <li>• Send invite list before + information on what's been done so far</li> <li>• Send participant bios and organizational descriptions</li> <li>• One night stay only (afternoon day 1 + morning day 2)</li> <li>• Need more folks to help plan</li> <li>• Web or phone participation option (have satellite groups together w/in states)</li> <li>• Meeting room with windows</li> <li>• Day 1 focus was on unknowns, would like to have some focus on what we know now and therefore what actions can be taken now</li> </ul>

**United States Department of Commerce**

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