

# Cleanup Review

Winter Issue 2010 Vol. 19, No. 2

## Durable Plastic Lasts and Lasts

By Eva M. Johnson, Water Recreation Specialist (Conservation Corps Minnesota)

As winter approaches, some of us fly south or at least imagine doing so, perhaps while standing in the cold waiting for the bus. We dream of warmer days walking along an ocean beach. But in those daydreams, do you see millions of pieces of small plastic debris floating in the water around your feet? Probably not, and you may be surprised to find out that such things commonly occur in oceans.

**How do little pieces of plastic get into the ocean?** The process is similar to how trash from our streets is washed into the storm sewer system and flows into Minnesota's lakes and rivers. The rivers and streams carry that same trash into the oceans. In fact, when rain falls on Minnesota, there are three directions it can flow (see *Hill of Three Waters* below). This means that floatable trash from Minnesota enters the ocean from three directions. Once trash makes it to the ocean, there is no else for it to go, so it stays and stays...some of it sinks but most of it floats around with the currents. And the majority of this trash is – what? Plastic!

**Why so much plastic?** It is not surprising that our connection with plastic is a daily occurrence. Plastic is in everything! When plastic is discarded, it may eventually breakdown by photo-degradation. Unlike bio-degradation (breakdown occurring through biochemical reactions), the polymers in most plastics breakdown only when exposed to sunlight. According to the researchers at the Ocean Conservancy, “most plastics degrade more slowly in water than on land due to reduced exposure to the sun's UV rays and cooler temperatures” (1). It takes a long time for this process to occur. When it does, the plastic breaks into smaller and smaller micro-pieces. What you see floating in the ocean starts to look like a snow globe, according to ocean researcher Miriam Goldstein.



Image Credit: Ocean Conservancy

**These colorful plastic pieces (including a cigarette lighter and a toothbrush) were all part of the contents found in a dead laysan albatross's stomach in Hawaii (1).**

### Hill of Three Waters

Minnesota is home to an unusual water feature known as a triple divide. Three major watersheds diverge at a location near Hibbing in northeastern Minnesota. As a result, water runs in three directions toward the Gulf of Mexico, the Gulf of St. Lawrence, and Hudson Bay. Ojibwe Indians are said to have called the site “Hill of Three Waters” and used it for council meetings. The site is now part of the Hull Rust Mahoning Mine—one of the largest operating open-pit iron mines in the world.



Source: *Water Ways: A Minnesota Water Primer and Project WET Companion*, Ch 2, pg.27, Minnesota Department of Natural Resources, 2010.

Miriam studied the Great Pacific Garbage Patch (GPGP) or gyre on a Seaplex research trip supported by University of California-Davis and the non-profit, Project Kaisei (3). The GPGP is a large swarm of trash (including millions of these micro-plastic pieces) swirling with the ocean's currents between the United States and Japan, located north of Hawaii.

Although some media sources have stated it is an island the size of Texas – it is actually not **one** congruent floating piece but areas of water where millions of particles of trash continuously float with the currents – as opposed to an island you could walk upon. Researchers are studying the trash and its affect on wildlife and fish as well as developing a plan to clean up this debris. Unfortunately, this large amount of tiny pieces cannot be scooped up with a net without creating great disturbances to all kinds of sea life.

## TOP TEN MARINE DEBRIS ITEMS 2009

RANK	DEBRIS ITEM	NUMBER OF DEBRIS ITEMS	PERCENTAGE OF TOTAL DEBRIS ITEMS
1	CIGARETTES/CIGARETTE FILTERS	2,189,252	21%
2	BAGS (PLASTIC)	1,126,774	11%
3	FOOD WRAPPERS/CONTAINERS	943,233	9%
4	CAPS, LIDS	912,246	9%
5	BEVERAGE BOTTLES (PLASTIC)	883,737	9%
6	CUPS, PLATES, FORKS, KNIVES, SPOONS	512,517	5%
7	BEVERAGE BOTTLES (GLASS)	459,531	4%
8	BEVERAGE CANS	457,631	4%
9	STRAWS, STIRRERS	412,940	4%
10	BAGS (PAPER)	331,476	3%
TOP TEN TOTAL DEBRIS ITEMS		<b>8,229,337</b>	<b>80%</b>
TOTAL DEBRIS ITEMS WORLDWIDE		<b>10,239,538</b>	<b>100%</b>

SOURCE: OCEAN CONSERVANCY/INTERNATIONAL COASTAL CLEANUP 2009

***So what can be done to prevent this?*** Stop littering, change the way we use plastic, and pick up the trash at its source! In 45 states including Minnesota, and 180 countries, a worldwide cleanup effort has been occurring each fall by the Ocean Conservancy. Only three years before Adopt-a-River began, the International Coastal Cleanup (ICC) started cleaning the world's oceans in 1986. Annually, hundreds of thousands of global volunteers cleanup trash and debris along the world's beaches and waterways. This effort is organized by countries, states and volunteer organizations in partnership with Ocean Conservancy, an organization that promotes healthy and diverse ecosystem research, education, and science-based advocacy. But this effort doesn't just focus on oceans, it includes many rivers, lakes and streams. As water flows across the land, down hills and mountains and through valleys and ditches – it flows, ultimately into the ocean.

The Minnesota ICC effort is spearheaded by Great Lakes Aquarium in Duluth. They participate in the worldwide effort by organizing a Beach Sweep along Lake Superior. For the last 14 years, at locations along the North Shore, volunteers have helped clean the shorelines along the major tributary to the Atlantic Ocean. This year's cleanup took place on Saturday, Sept. 25th and included seven locations involving 82 people who removed 310 pounds of trash. Other Adopt-a-River groups, such as the Underwater Adventures Aquarium in the Twin Cities, have also joined with the Ocean Conservancy to clean up waterways.

During these cleanups, volunteers are required to record each item they find on a data sheet (yes, even each individual cigarette butt). After the worldwide data gathering is complete, the data sheets are tallied and a data report is constructed. The International Coastal Cleanup does this in order to track the type of items found and their frequency. Eventually they hope to change behaviors that allow trash to reach the ocean in the first place (1).

***What's so concerning about small plastic pieces in water?*** The plastic directly affects wildlife in two ways: ingestion and entanglement. Sea mammals, birds, fish and other animals (totalling 180 species) have been documented to eat plastics (3). These animals eat the plastic pieces (or other trash), their stomachs feel full, and as a result, the animals don't get the nutrients they need and eventually starve to death.

Secondly, wildlife can be entangled in debris, often a fatal outcome. A number of items can entangle wildlife, including: plastic bags, balloons, six-pack rings, fishing line, straws and more. The ICC records all observances of wildlife entangled in marine debris. During the 2009 cleanup, 138 birds, 89 fish, 23 mammals and more were found caught in some piece of human-made debris (see *Marine Wildlife Found Entangled*). Of the 336 wildlife, 216 were found dead; others were released from their entanglement and set free. In 2006, Minnesota Beach Sweep volunteers found a dead seagull entangled in purple wrapping ribbon.

A third and more environmentally dangerous effect can occur when the chemicals in plastics leach into the water as toxins and endocrine disrupting compounds. And as we've seen with mercury, small concentrations of these chemicals increase (or bio-magnify) up the food chain. Endocrine disruption in fish and other aquatic organisms can occur at very low levels of these contaminants, and cause reproductive impairment. There is an extensive body of research on endocrine disruption in aquatic systems.

Even back in 1997, we said that the undisputed, number one item picked up in Minnesota and across the globe is the cigarette butt. Cigarette filters are plastic which takes a long time to break down into dispersed fibers. It will never completely disintegrate (4). A thought to consider is that, unfortunately, it is still true today. Will it be true 10 years from now?

*Editor's Note: Although the Adopt-a-River database does not track entanglements, it does give hints as to the problems of plastics in Minnesota waters. For example, just over 75% of all cleanups where items were described found plastics.*

## World Cleanup Stats

- **60% of debris is from single-use disposable items**
- **#1 piece of trash is the discarded cigarette butt**
- **500,000 documented ICC volunteers worldwide in 2009**
- **60-80% of trash occurred from land-use activities (the rest are water-based activities)**

## MARINE WILDLIFE FOUND ENTANGLED IN MARINE DEBRIS

WILDLIFE	BEVERAGE BOTTLES	BEVERAGE CANS	CRAB, LOBSTER, & FISH TRAPS	FISHING HOOKS	FISHING LINE	FISHING NETS	PLASTIC BAGS	RIBBON/STRINGS	ROPE	6-PACK HOLDERS	WIRES	TOTAL
AMPHIBIANS	1	0	0	0	3	1	6	0	0	1	0	12
BIRDS	2	0	0	5	45	53	19	5	5	1	3	138
FISH	5	1	2	1	48	11	11	2	5	1	2	89
INVERTEBRATES	6	2	1	1	14	12	6	7	6	0	0	55
MAMMALS	0	0	0	3	6	1	6	1	5	1	0	23
REPTILES	0	0	0	0	10	4	1	1	2	0	1	19
<b>TOTAL DEBRIS ITEMS</b>	<b>14</b>	<b>3</b>	<b>3</b>	<b>10</b>	<b>126</b>	<b>82</b>	<b>49</b>	<b>16</b>	<b>23</b>	<b>4</b>	<b>6</b>	<b>336</b>



Graphic Credit: Ocean Conservancy 2009

### Sources:

1. *Trash Travels: From Our Hands to the Sea, Around the Globe, and Through Time*, Ocean Conservancy, 2009 report accessed [www.oceanconservancy.org](http://www.oceanconservancy.org), accessed October 2010. 2. University of California - San Diego, *Seaplex (Scripps Environmental Accumulation of Plastic Expedition)* <http://sio.ucsd.edu/Expeditions/Seaplex/>, accessed October 2010. 3. *The Great Pacific Garbage Patch* video, University of California TV, <http://uctv.tv>, accessed October 2010, Miriam Goldstein. 4. *Cleanup Review*, Winter Issue, Vol 6, No. 1, MN DNR, January 1997.

# Celebrating the Significance of Water

## **HISTORICAL MOMENT:** The falls are going out! the Eastman Tunnel Collapse of October 5, 1869

Paul E. Nordell, Coordinator, DNR Adopt-a-River Program

After more than a year of digging, and with only 500 feet to go, the tunnel beneath Saint Anthony Falls developed a serious leak on Oct. 4, and it completely collapsed the next day. The spectacle brought out hundreds of people from Saint Anthony (east of the falls) and Minneapolis (west of the falls). Crowds gathered at the southern end of Nicollet Island to watch the river disappear into a swirling chasm. The falls began to erode rapidly upstream. It was the result of increased mill development. In order to capture water power, mill operators had driven shafts through the limestone cap of the falls, into the soft sandstone beneath. From there, they dug tunnels through the sandstone to reach the mills on the river bank. By 1868 this tunneling process had caused water to collapse the hard rock cap of the falls to within 1,100 feet of its edge within the river bed. If the limestone collapsed beyond its edge, it would have left only rapids in place of the waterfalls.

Before waterpower was developed, the falls had retreated for thousands of years at the rate of four feet per year. With development, however, the retreat increased to 26 feet per year between 1857 and 1868. The bore holes in the limestone and the weight of log jams crashing over the lip of the falls had taken its toll. In 1868, the problem was aggravated by the new owners of Nicollet Island, William Eastman and John Merriam, who tried to capture their own share of waterpower. They envisioned the development of a new milling district on the island. To accomplish this they planned to dig a 2,500-foot tunnel under Nicollet Island. The upstream end of the tunnel would draw water from a new shaft through the rock.

Even before the tunnel collapse, Minnesota Congressman Ignatius Donnelly pleaded unsuccessfully in Washington for the U.S. Army Corps to help to save the water power of the falls in 1868. The argument for the preservation of the falls was shifting. For the Corps to become involved, the problem had to be defined as a navigation issue rather than an interest of private mill operators, despite the fact that nearly the entire regional economy was dependent upon those mills. The preservation of navigation above the falls became the new focus for obtaining federal help. Since the 1850's, steamboats



**Break in the tunnel, St. Anthony Falls, 1869**

*Minnesota Historical Society Photograph Collection Location no. MH5.9 MP4.32 p11 Negative no. 9123*

had traveled upstream as far as Sauk Rapids, a distance of 80 miles. Thus a renewed and successful federal appeal to bring in the Corps resulted in construction beginning in July 1874. An underground wall was constructed to prevent further leaks from the river as it under-cut the limestone and dissolved the sandstone below. By 1885, the Army Corps had completed the preservation effort, including an effective apron in front of the falls. This assured that Saint Anthony Falls would be stopped from its own destruction after thousands of years of erosion.

It wasn't until 1963 that the Minneapolis Upper Harbor Project was completed. A nine-foot navigation channel of the Mississippi River was extended another 4.6 miles. As for the water power site, it was fully converted to hydroelectricity by 1908. The current Lower Saint Anthony Dam, completed in 1956, will generate 10 megawatts of power when repaired and placed back in production in 2011. The Upper Saint Anthony Dam, completed in 1963, generates 12.4 megawatts of power.

*Sources: www.brockfieldpower.com (accessed 10-19-2010); www.mvp.usace.army.mil/navigation (accessed 10-19-2010); www.mvp.usace.army.mil/history/engineering (accessed 10-19-2010); Kane, Lucile M., *The Waterfall That Built a City: The Falls of St. Anthony in Minneapolis*. Minnesota Historical Society, Saint Paul, 1966.*

# Plant Page

## Red-osier Dogwood *Cornus sericea* (*C. stolonifera* Michx.)

### Family

Cornaceae (Dogwood Family)

### Common Name

Osier is a french word meaning “willow-like”. Other common names include: red willow, American dogwood and redstem dogwood.

### Habitat

This Minnesota native shrub is commonly found along shorelines and in wetlands (similar to the habitat of willows). It also survives well in upland dry communities. This shrub (and its varieties) is a popular landscape plant and is hardy to zone 3.

### Identification

The red-osier dogwood is one of the easiest plants to identify in the winter months. This shrub is multi-stemmed and can grow up to 10 feet tall in the wild. The showy stems turn bright red in fall and lasts through the winter. In the summer, the shrub can be identified by its opposite leaves with smooth margins and unique “parallel” veins. It also has a purple-red color to its leaves in the fall.

### Historical Uses

American Indians, specifically the Potawatomi, made dreamcatchers with red-osier stems. Other tribes were known to eat the sour berries. Some used the stems to make arrows, stakes and tools.



**Winter Interest** *Cornus sericea* ‘baileyi’ is showy during winter months with its red stems against the white snow.



### Bloom

From May to August, small white flowers - in clusters - can be found on the dogwood.

### Streambank Stabilization

Along with willow stems, red-osier dogwood can be used as live stakes to stabilize streambanks. This is because the dogwood is a fast-growing species that secures and holds the steep slopes with deep roots.

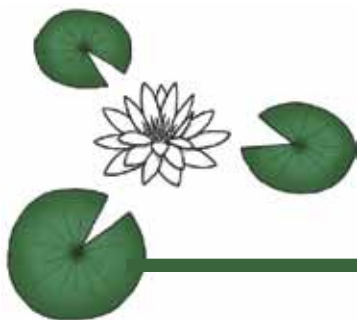


### Fruit

From August to September, small white berries attract birds to the dogwood.

### Sources

USDA plant data sheet; Smith, Welby. *Trees and Shrubs of Minnesota* (2008). *Landscape Plants of the Upper Midwest*, University of Wisconsin-Extension website, accessed October 2010.



# On the Water

Featuring: Hastings Environmental Protectors, Crow River Cleanup and Lamplighters 4H club.

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Vermillion River cleanup in Hastings



Crow River cleanup in Middleville Township



Coon Creek cleanup by Lamplighters 4-H Club

## Hastings Environmental Protectors (HEP)

HEP has been active for 10 years and they joined Adopt-a-River for the first time this summer. A major cleanup for Spring Lake was conducted on Aug. 28 with partners such as National Park Service, CF Industries, Flint Hills Refinery, 3M, Walmart, Dakota County SWCD, Vermillion River Joint Powers Board, Waste Management and DNR, among others. Spring Lake is four river miles above the Hastings dam on the Mississippi River pool above. When completed, five miles of island and mainland shoreline were cleansed of 6,000 pounds of trash. A total of 70 people contributed 350 hours of volunteer effort to this project. A number of the volunteers were duck hunters who highly prize this area for their sport.

## Crow River Clean Up Day

Volunteers across the Crow River watershed held their 7th Annual Clean Up on Sept. 18th. The effort included volunteers in 14 locations throughout the watershed. A group of volunteers in Middleville township cleaned up an old dump site and removed 18,800 pounds of debris, mainly tires. They removed 571 passenger tires, 17 semi-tires, 15 tractor tires and more. The total clean up consisted of 246 volunteers who removed 25,760 lbs (or 12.9 tons) of trash!

## The Lamplighters 4-H Club

Volunteers cleaned up Coon Creek near Coon Rapids in Anoka County this August and collected a total of 365 pounds (including 10 pounds that they were able to recycle). They took canoes down Coon Creek and found trash at bridge crossings. Some items they found this year included: sleds, golf ball, bike inner tubes and a large cable spool.

## Got Photos?

If your adopt group would like to be featured in the Cleanup Review 'On the Water', send an email request with photos and a description of your cleanup to:

[adoptariver.dnr@state.mn.us](mailto:adoptariver.dnr@state.mn.us). Thanks for volunteering!

# Adopt-a-River BULLETIN

## *The Beaver - Nature's Engineer*

Our instinctiveness as humans to manipulate our environment is not so dissimilar from the beavers. Virtually every piece of this sculpture, except for a few scraps of wire and welding rods, came from river cleanup sites on the Mississippi and Minnesota rivers. The beaver sculpture was on display for 12 days at the Minnesota State Fair.

This year's sculpture was a team effort by two artists. Sculptor Chip Addington (right), a Minnesota native, will be a 2011 graduate in sculpture and environmental studies at Bethel University in Arden Hills. He won the International Sculpture Center's Outstanding Student Achievement in Contemporary Sculpture Award for 2010. Sculptor Caylon Hackwith (left) is from Glasgow, Montana. He is a 2010 graduate in sculpture from Bethel University and has won various awards locally and by the International Sculpture Center.



Thank you to all volunteers who helped promote the Adopt-a-River program at the fair this year! Annually since 1994, the MN DNR Adopt-a-River program has commissioned a found-objects sculpture to highlight the volunteer efforts in cleaning Minnesota's waterways. To view photos of past 17 years of sculptures, go to: [www.mndnr.gov/adoptriver/sculptures/index.html](http://www.mndnr.gov/adoptriver/sculptures/index.html).



## *Paul Nordell wins Eco Award*

Adopt-a-River program coordinator, Paul Nordell, was named an Eco Award winner by Boating Magazine. He is among a group of 10 to be selected for the first-ever awards by the magazine. Paul has been coordinating the program since 1991. <http://www.boatingmag.com/skills/boatings-eco-awards?page=0.4>

Cleanup Review is published by the Minnesota Department of Natural Resources for the Adopt-a-River Program in the Parks and Trails Division.

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Please direct your comments, questions, and suggestions about the Cleanup Review Newsletter to:  
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[www.mndnr.gov/adoptariver](http://www.mndnr.gov/adoptariver)

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Minnesota Department of Natural Resources  
Adopt-a-River Program

Cleanup Date(s): \_\_\_\_\_ Month/Day/Year \_\_\_\_\_

PLEASE REPORT TO US AT LEAST ONCE A YEAR. YOUR REPORTS ARE IMPORTANT TO ALL. YOUR CLEAN REPORTS HELP US MONITOR, MAINTAIN, PROTECT, RESTORE, AND ENHANCE. REPORTS FORBIDDER OR ILLEGAL MATERIAL SHOULD BE MARKED FOR HEALTHY HANDLES.

Your best estimates are okay. If you're unsure, ask for our "Rubber Rubber" Tutorial. If you were unable to do a cleanup this year, write not available, "N/A" under "Date(s)". Thank you!

Name of Organization: \_\_\_\_\_  
Name of Contact Person: \_\_\_\_\_  
Street: \_\_\_\_\_ City: \_\_\_\_\_  
Phone: (\_\_\_\_\_) \_\_\_\_\_-\_\_\_\_\_  
Area of Stream Cleaned: \_\_\_\_\_ Watershed: \_\_\_\_\_  
Mile(s) of Stream Cleaned: \_\_\_\_\_ (If of unknown length, list mile(s) cleaned) (Mile(s) cleaned)  
Points of Trash Collected: \_\_\_\_\_ Date of Next Cleanup (if known): \_\_\_\_\_

Plastic  Glass  Dryclean  Aluminum  Paper  Ink  Cigarette Filters  Food  Other

Comments: \_\_\_\_\_

*Don't forget to send in your purple reporting cards (postage paid) for the 2010 cleanup season!*



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# Adopt-a-River

## Cleanup Review Newsletter

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Thank you  
State Fair  
Volunteers!



Trees have grown through  
tires at the Minnesota River  
Cleanup in Belle Plaine

#### CLEANUP STATISTICS: DECEMBER 2010

3,003 cleanups - 82,367 volunteers - 5,932,164 lbs collected - 9,938 miles cleaned  
(since program began in 1989)