Magothy River Index

for 2012

Presented at "State of the Magothy," Wed. 2/20/13, by the Magothy River Association

Magothy Health Was 17% in 2012 (Grade: F)

The Magothy River Association's annual "Magothy River Index," first presented in 2003, assesses the ecosystem health of the tidal river. Status is expressed as a percent (%) of a desirable goal (more is better), and also as a letter grade (0-20% is F, 80-100% is A).

MRA assessed ecosystem health based on three factors: water clarity (April-October Secchi depth ≥1 meter) and dissolved oxygen (DO, June-September water column DO ≥5 milligrams/liter or mg/l), both from MRA volunteers' data, and submerged aquatic vegetation (SAV) area from the Virginia Institute of Marine Science (VIMS). SAV need adequate water clarity to grow, and fish and shellfish need adequate DO to survive.

The 2012 mean score, 17% or F, was the **lowest MRA has measured**, down from 45% (C) in 2006 (Fig. 1, magenta line). Clarity and SAV status stayed very low, with **no SAV mapped in 2012** (for the first time since 1992), and DO status fell sharply in 2012, mainly in the creeks.

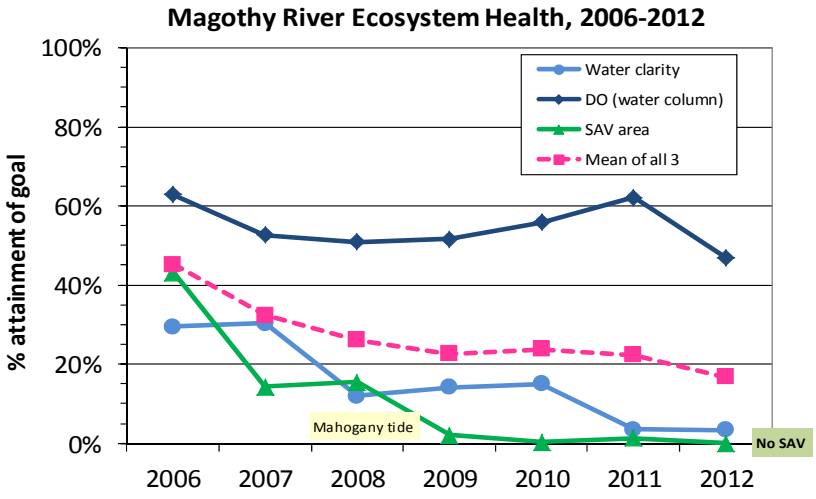


Fig. 1. Magothy ecosystem health status by year, 2006-2012.

Only a Few More Dark False Mussels in 2012

A drop in salinity in 2003 due to high rainfall probably triggered the millions of **dark false mussels (DFM)** in the Magothy in 2004 (Fig. 2, left). The mussels helped clear the water and increase SAV in 2004-2005 (see link to video in caption). However, a drop in salinity in 2011 did **not** yield many more mussels in 2012, except a few new clumps on oyster shells (Fig. 2, right). Perhaps a drop in salinity large enough to trigger spawning has to be followed by a **storm surge**, such as the one from Isabel in September 2003. That surge probably moved larvae into habitats that have hard surfaces to which they can attach, such as pilings and bulkheads.

Fig. 2. Thousands of dark false mussels on a piling in Old Man Creek in 2004 (left), and a few on an oyster shell in Dividing Creek in 2012 (right). See: http://youtu.be/-BHOtAd5KhU

Where have all the [underwater] grasses gone?

The loss of all SAV in the Magothy in 2012 raises a key question: why did SAV go from over 300 acres to 0 in only 7 years? The simple answer (Fig. 1): the water clarity (Secchi depth, blue line) got worse, especially in 2007-2008. But **why did the water clarity get worse**?

Water clarity gets worse when algae and/or sediment in the water increase. State staff measure both parameters at one deep mid-river site once a month. Fig. 3, a-b show that **both started to rise in 2010,** after having some spikes due to high flow in 2003-2004.

Thus, it appears that **both algae and sediment** may be to blame for the loss of the grasses. **Algae is the more likely cause**, since its levels were higher relative to what SAV can tolerate (marked with arrows on graph). But why did algae and sediment get worse **after** the grasses started to go away in 2006?

SAV only grow in the shallows, and increases in algae and sediment levels may have started sooner there. However, there are no data from shallow sites to test this.

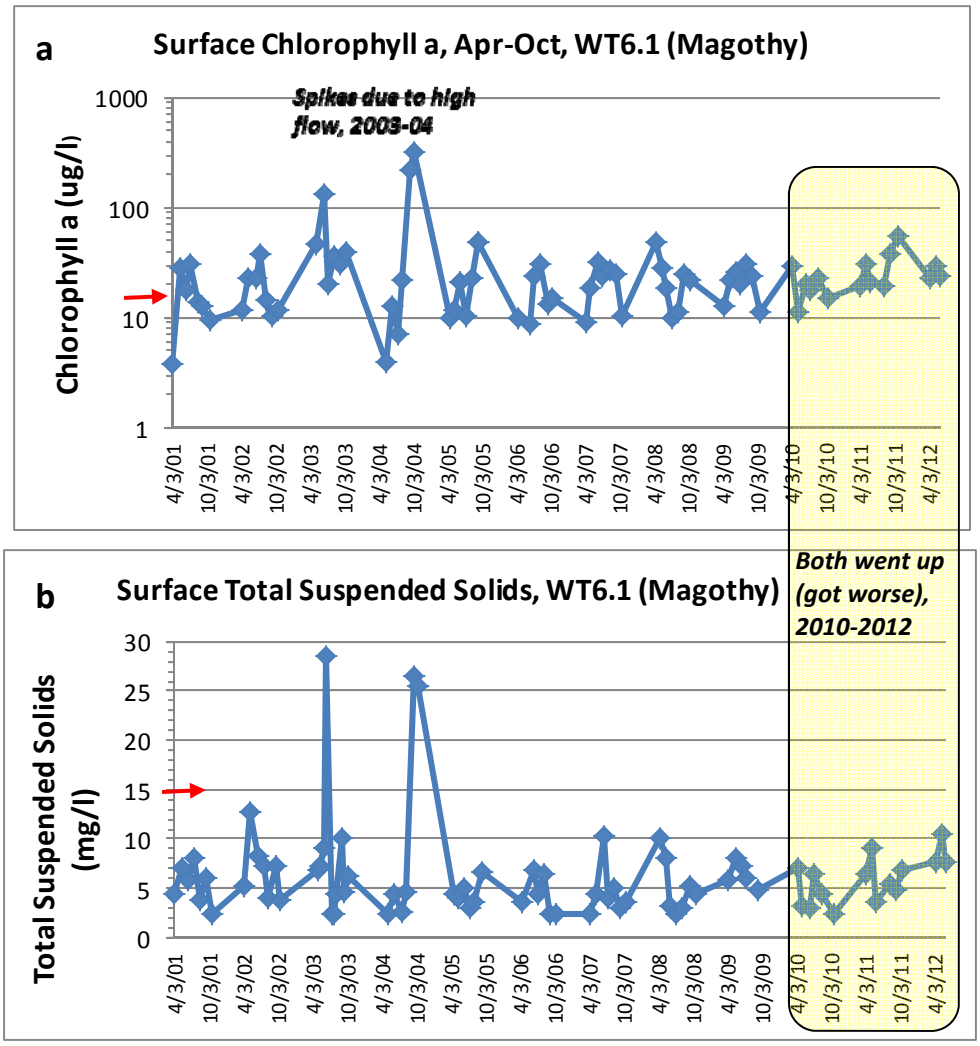


Fig. 3, a-b. Graphs of Magothy Chlorophyll a or algae (a) and Total suspended solids (b), 2001-2012. Both went up (got worse) in 2010-2012 (yellow box). Red arrows mark the maximum sustained levels that SAV can tolerate.

Wild Celery Planted, June 2012

Local students grew wild celery which was planted by two NOAA interns in upper Mill Creek in June 2012 (Fig. 4). Unfortunately, all of the plants were gone by October, when the wild celery planted in 2011 was also gone; low water clarity probably killed the wild celery. A few small clumps of another species of SAV (redhead grass) that staff from Anne Arundel Community College planted nearby survived, so they will plant it again in 2013. Staff from the Maryland Department of Natural Resources also helped with the planting; expenses were paid by Anne Arundel County.

Fig. 4. NOAA interns planting SAV in Mill Creek, June 2012.

Upper Creeks Had More Sulfur Bacteria Blooms

Several upriver creeks, and the upper mainstem river near Magothy Bridge, had more sulfur bacteria blooms in 2012; they were first noted in Cattail Creek in 2005. They look like algae blooms but are pale green or reddish (Fig. 5) and often have a musky, rotten egg, or sulfur smell. They are found where DO levels are very low as a result of algae blooms. Amazingly, there were no major fish kills reported during these blooms, although DO levels were low enough to kill fish. Perhaps the fish have learned to avoid the low DO.

Fig. 5. Green sulfur bacteria blooms (pale green) in two areas in Old Man Creek, Aug. 2012.

Growing Wetland Plants in Floats

Fig. 6. Prototype wetland plant float in Cattail Creek, July 2012. The newer design uses foam "noodles."

MRA volunteers have grown and planted oysters and SAV for over 10 years, and some of those oysters are still helping to clean the river. However, none of the SAV survived more than few years (see story on page 2), due to low water clarity. There is another group of beneficial aquatic plants that does not require clear water, the **emergent wetland plants** that used to line many of our shores, and MRA is starting a new program to have waterfront residents grow them in floats. MRA President Paul Spadaro is working with Dr. Stephen Ailstock at Anne Arundel Community College to design and test a float to grow wetland plants next to a pier (Fig. 6). The MRA is looking for 10-20 waterfront residents who would like to test one of these in 2013; volunteers can sign up at the "State of the Magothy" meeting on February 20, or contact Carl Treff at

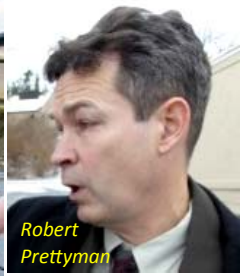
magothyriversavers@yahoo.com

"We can all agree that once the Magothy River was cleaner and healthier. We can no longer accept the status quo and delay implementing solutions. I ask you to work with me, and together we will find solutions to make the Magothy River better for tomorrow." — MRA President Paul Spadaro

The MRA is proud to honor two students' commitment to our watershed by awarding them MRA's two scholarships in 2012:
E. Gordon Riley Scholarship: **Matthew Coveyou**

Brent Kurrle Scholarship: **Robert Prettyman**

Both support studies in Environmental Science at Anne Arundel Community College. Contact the AACC Science office (Dragun 238, 410-777-2260) to apply for MRA's 2013 scholarships.



Get Involved!

Action	Result (or details)
Join the Magothy River Association: see *www.magothyriver.org* and click "Join Us."	Contact President Paul Spadaro at 410-647-8772 or *president@magothyriver.org*
Volunteer to help with oyster gardening, the new wetland plant floats (page 3), and with monitoring of water quality and oysters.	Contact Carl Treff to sign up for oyster gardening and the wetland floats *magothyriversavers@yahoo.com*; Dick Carey to help with oyster or water quality monitoring *magothyriverdiver@gmail.com*; or Paul Spadaro to help with water quality monitoring *president@magothyriver.org*
Plant more native trees. Cut trees down *only* when they pose an imminent threat to people or property.	Trees absorb nitrogen, reduce air pollution, provide food and habitat to animals, shade houses, and help hold soil
Install rain gardens and stormwater retrofits in your yard and neighborhood.	Reduces the quantity of stormwater runoff, and improve its quality, as was done in Manhattan Beach.
Replace some of your lawn with native flowers and shrubs; fertilize it only in the fall (if needed). See *http://www.dnr.state.md.us/criticalarea/guidance.asp*	Reduces your use of fertilizer, lawn chemicals, water, and gas for mowing; increase habitat and food for animals, reduce harmful effects of runoff.
If you have a septic system, maintain it on schedule. Consider upgrading to a nitrogen removing system (priority is failing septic systems in the Critical Area).	Reduces nitrogen runoff into ground water and nearby streams. To learn how to apply for upgrades see: *http://www.aahealth.org/programs/env-hlth/well-septic-systems/brf*
Reduce energy use and air pollution. Buy energy efficient cars and appliances and electric-powered yard tools, and use them in ways that minimize energy use.	Reduces greenhouse gas and nitrogen emissions; slows global climate change; saves you money.

*MRA's work to enhance **Beachwood Park** continued in 2012. MRA worked with county park staff to plan repairs to the steps leading to the main fishing area, organized a cleanup in April 2012, and planned the route of a new nature trail, which will be established by volunteers in 2013. Contact Kelly Kalinowski to help with this project at kellyjkalinowski@gmail.com*


Photo: Peter Bergstrom

Mark your calendars for Magothy River Day 2013 on Sunday, June 9, Lake Waterford Park, Pasadena.

This event will be held on land for the first time, at this lovely park near the headwaters of the Magothy. It will include a "Concert in the Woods" by the Nautical Wheelers, displays and exhibits, and other activities. See *http://www.magothyriver.org* for more details!

Thanks to:

- The MRA volunteers who helped with outreach events, did water monitoring, grew and planted oysters and SAV, and monitored oysters and SAV.
- Dr. Peter Bergstrom, NOAA Chesapeake Bay Office & MRA (writing, layout, data analysis, and graphs).
- Chesapeake Bay Trust and MD DNR for support for MRA projects.
- Dr. Bob Orth and Dave Wilcox at VIMS for SAV data.
- Everyone who gave comments.

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