Magothy River Index

for 2010

Presented at "State of the Magothy," Wed. 2/16/11, by the Magothy River Association

Magothy health was 22% in 2010 (Grade: D-)

The Magothy River Association's "Magothy River Index" assesses the ecosystem health of the tidal river, produced annually by the MRA since 2003. It reports the status of vital habitats and water quality in the Magothy in the previous year. Status is expressed as a percent (%) of a desirable goal (more is better), and also as a letter grade (see Fig. 4 for scale).

We assessed ecosystem health based on three factors: water clarity (Apr-Oct Secchi depth > =1 m) and dissolved oxygen (DO, Jun-Sep water column > 5 mg/l), both from MRA volunteers, 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 2010 grade, 22% or D-, was the same as last year, but down from 44% (C-) in 2006 (Fig. 1). SAV status fell in 2007, and clarity status fell in 2008, and both have stayed low since then.

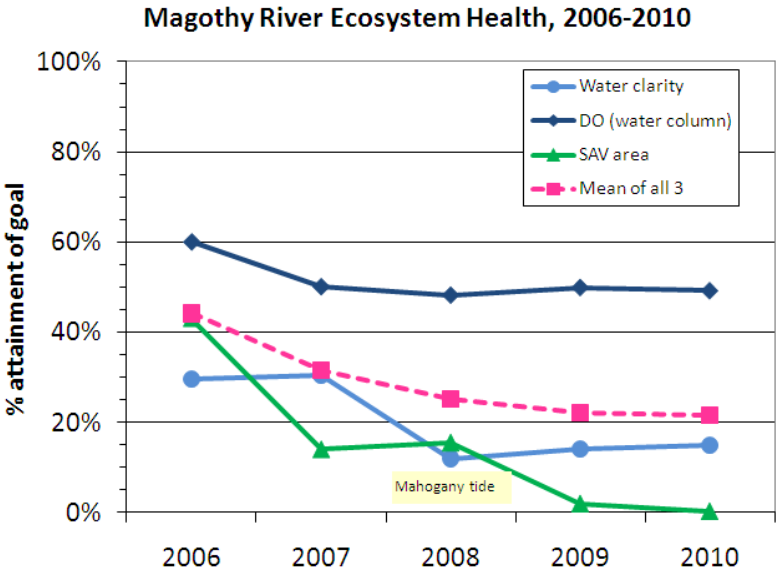

Fig. 1. Magothy ecosystem health status by year, 2006-2010.

Data from Mill & Dividing creeks used for the first time

The 2010 health status (22%) included data from 6 sites in Mill & Dividing creeks for the first time, raising the number of sites included to 16. Volunteers who live in those two watersheds started sampling in 2006 after a large sewage spill in Mill Creek late in 2005. Status from past years was recalculated with the new data, so the DO and clarity status values in Fig. 1 differ from those in past reports. Fig. 2 shows the mean DO and clarity status by groups of sites for 2010; they varied widely. Mainstem sites had the best status. Mill Creek sites had the worst DO status, and were tied with Dividing Creek sites for the worst clarity status.

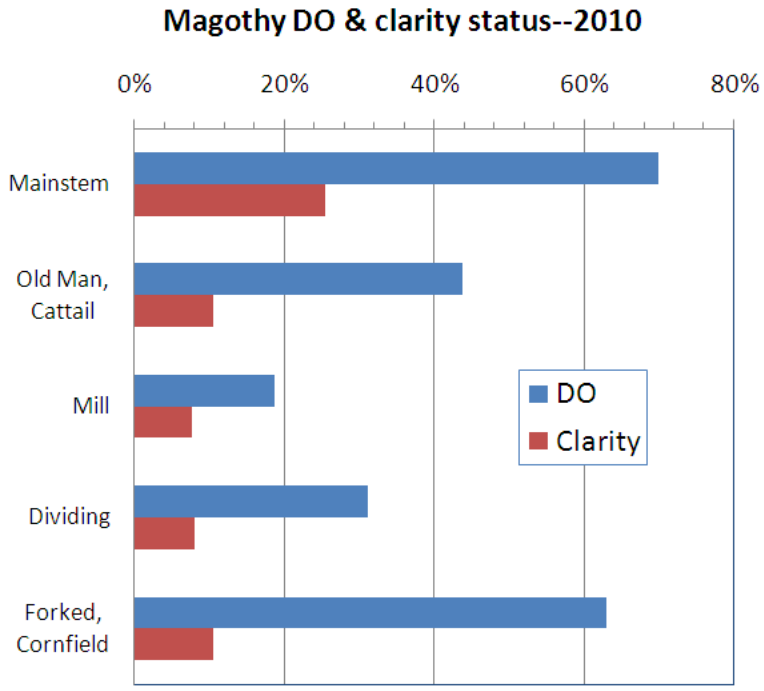

Fig. 2. Graph of DO and clarity status by group of sites for 2010.

Problems with low surface DO in some creeks

Our past reports on dissolved oxygen (DO) status (and Figs. 1 & 2) used data from all depths from surface to bottom. However, low surface DO values (less than 5 mg/l) seemed to be more common in recent years, so we examined surface DO separately. A graph of surface DO status by year for three groups of sites, and the mean over all sites (Fig. 3), shows that the biggest problems were in Mill & Dividing creeks, with surface DO status as low as 30% in 2007. Mean surface DO status over all sites was 67-77%.

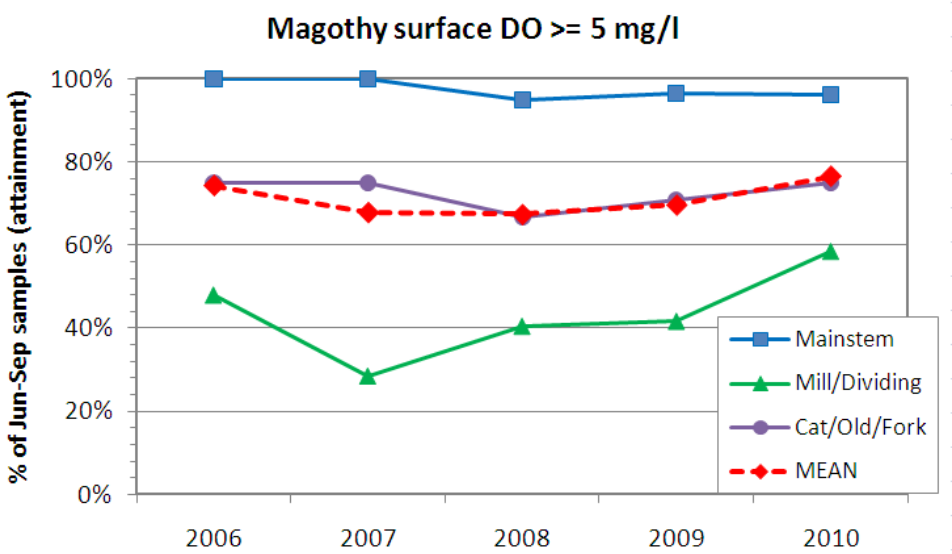

Fig. 3. Graph of Magothy surface DO by year and group, 2006-2010.

Fig. 4 shows the 2006-2010 mean surface DO status by monitoring site, using 5 status categories (with the same ranges as the letter grades). The map shows the best status (green) at mainstem sites and in Old Man and Forked creeks, with the worst status (red and purple symbols) in upper Mill & Dividing creeks. Those 3 sites each had 1-2 years with no surface DO > 5 mg/l. This suggests that the usual causes of poor DO status, reduced flushing and more organic matter that decomposes, are worse in those creeks, even though Cattail and Old Man creeks are farther upriver. The large sewage spill in Mill Creek in Dec. 2005, and more recent smaller spills in both creeks, are probably a factor in the poor surface DO status there.

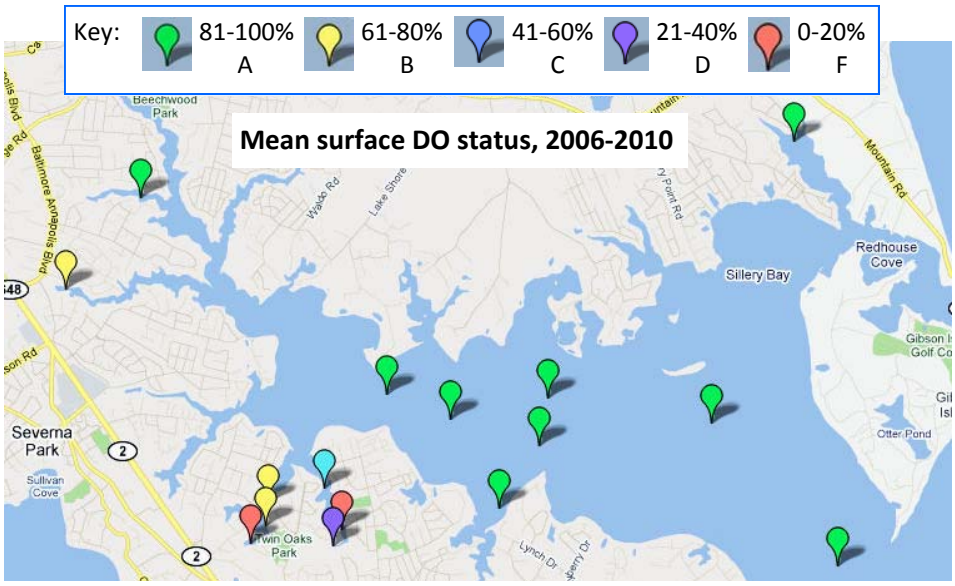

Fig. 4. Map of 2006-2010 mean surface DO status by monitoring site

Magothy River Day celebrated, June 12, 2010

Magothy River Day was celebrated again in 2010 with a raft-up near Dobbins Island with over 500 boats. The weather was perfect, the music by the Nautical Wheelers was relaxing, and at least 138 people took part in the annual Wade-In to measure water clarity (Fig. 5). Unfortunately, the wade-in results (how deep we could see our feet) were the worst since we started doing these (only 8", and 39" is the goal). **The 2011 event is also on June 12.**

Fig. 5. We tried again to set a Guinness record for the largest wade-in. Unfortunately, the water was very murky.

Can bivalves other than oysters help the Magothy?

We wrote in last year's Index about the MRA's ongoing efforts, working with partners, to restore native oysters to the Magothy. In our efforts to improve the ecosystem health of the Magothy, we are also exploring other species of native bivalves that citizens could grow and plant in the fresher parts of the river, since oysters can only grow in the saltier lower portions of the river.

The "natural experiment" that demonstrated how bivalves could improve ecosystem health occurred in 2004, when the normally rare dark false mussels were suddenly very abundant. Data collected by MRA volunteers showed the dramatic improvements in water clarity and SAV area that resulted, in Cornfield Creek in this example (Fig. 6). Unfortunately these mussels did not last (most were gone by 2005), so we need to find another native bivalve that can provide similar amounts of filtration sustainably.

We are looking for a suitable native bivalve to test in pilot projects, grown in cages floating at piers until they are large enough to put on the bottom or on hard surfaces (Fig. 7). One of the candidate species, brackish water clams (*Rangia cuneata*), were introduced here from the Gulf of Mexico, so they might become invasive if we planted them. Another candidate, hooked mussels (*Ischadium recurvum*), may or may not be native, and they require hard surfaces on which to grow. Dark false mussels (*Mytilopsis leucophaeata*) are native, but they are small, so millions are needed to get much filtration, and we think most of them were eaten by ducks, crabs, etc. in 2004. Another possibility is the Baltic macoma clam (*Macoma balthica*) which is native and can grow to about 1.5" long, about as large as hooked mussels. A team of MRA scientists is investigating all of these bivalves, and will publicize the new bivalve growing program once we have it in place.

In 2010, the MRA had another award-winning float in the Severna Park 4th of July Parade. The theme was "Making the river better for tomorrow" and it won the "Best Theme" award. Thanks to all of the MRA volunteers who made the float possible.
(photo by Tom Hampton)

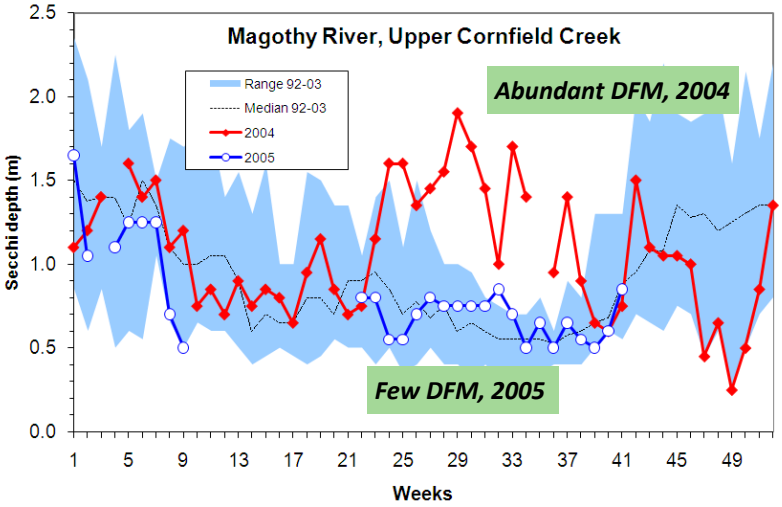

Fig. 6. How dark false mussels (DFM) improved water clarity (Secchi depth) in upper Cornfield Creek in 2005. SAV increased nearby as a result. Weekly data by Bill & Barbara Kobett.

Fig. 7. (Left) Dark false mussels and one hooked mussel on branch; (Right) brackish water clam shells dropped by birds on a pier.

Our homework

Action	Result
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 MRA oyster restoration projects, and with monitoring of both oyster and SAV habitats (via diving and in canoes/kayaks respectively), and growing SAV to plant in upper Mill Creek.	We can improve our vital habitats and track them over time. Contact Dick Carey to help with oysters and/or diving at *magothyriverdiver@gmail.com*, or Peter Bergstrom for SAV surveys or planting at *pwbergstrom@gmail.com.*
Plant more native trees. Cut trees down *only* when dead and/or dangerous.	Trees absorb nitrogen, reduce air pollution, provide food and habitat to animals, shade houses, etc.
Install rain gardens and stormwater retrofits in your yard and neighborhood.	Reduce 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/pdfs/BackyardMakeover.pdf*	Reduce 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).	Reduce nitrogen runoff into ground water and nearby streams. To learn how to apply for upgrades see: *http://www.aahealth.org/a2z.asp?id=208*
Reduce energy use and air pollution. Buy energy efficient cars and appliances and electric-powered yard tools, and use them to minimize energy use.	Reduces greenhouse gas and nitrogen emissions; slows global climate change; saves you money.

"The enjoyment of the Magothy for us today and for future generations depends on us reversing the river's failing grades. We can and will become better stewards. I invite you to participate in the MRA time capsule project and tell us and future generations what you are doing to help restore the Magothy for generations to enjoy! We cannot sit back and assume that someone else will heal the river. Working together, we can restore our river." **— MRA President Paul Spadaro**

Magothy SAV transects, August, 2010

Printed on 100% post-consumer recycled paper.

Thanks to:

- The MRA volunteers who helped with MRA 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, graphs, and most of the photos); Tom Hampton for the parade photo, and Karen Gallagher for the wade-in count.
- Chesapeake Bay Trust for support for MRA projects.
- Dr. Bob Orth and Dave Wilcox at VIMS for SAV maps and data.
- Several people for comments.