THE MAGOTHY RIVER INDEX FOR 2005
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EXECUTIVE SUMMARY

- The Magothy River Association's "Magothy River Index" is an assessment of the health of the tidal river for communication to the residents of the watershed, produced annually since 2002. It summarizes what we know about the status of vital habitats and water quality in the Magothy in the previous year, based mainly on monitoring done by MRA volunteers. We also summarize the ongoing and planned habitat restoration and protection actions in the watershed, and conclude with a section on what you can do to help the Magothy.
- The biggest Magothy environmental story of 2005 was increases in **Submerged Aquatic Vegetation (SAV).** The SAV area in the Magothy increased in 2004 (the latest year for which surveys are available), from **31% to 55%** of the Chesapeake Bay Program restoration goal, **the highest area mapped since 1979.** We also saw a **large expansion upriver of redhead grass in 2005**, up to the site of the old Riverdale restaurant.
- The biggest story of 2004 was the dramatic increase in **dark false mussels** (*Mytilopsis leucophaeata*), a small bivalve that was first noticed in higher than normal numbers the Magothy late in 2003. They **died back some in 2005**, except in Old Man Creek where mussel numbers appeared to be similar in both years.
- The last four years have varied in the **amount of rainfall** in the Chesapeake watershed. The drought of 1999-2002 was followed by two "wet" years in 2003 and 2004, and an average rainfall year in 2005. (http://md.water.usgs.gov/monthly/bay.html) Changes in rainfall usually affect some aspects of Magothy water quality, especially dissolved nitrogen.
- **In 2005, dissolved nitrogen levels at the mainstem site were better than in 2003-2004**. Dissolved nitrogen levels improved only slightly in 2005 at the two creek sites, however. The worse levels of nitrogen we observed at all three sites in 2003-2004 corresponded to the two "wet" years during 2002-2005. Dissolved nitrogen levels are often worse in "wet" years.
- **2005 saw continued good levels of water clarity in Old Man Creek**. Both Cattail and Old Man creeks had better than usual water clarity in 2004, when the mussels were more abundant, but the mussels declined in Cattail Creek in 2005, and the water clarity got worse there.
- **Chlorophyll *a* and total suspended solids levels got worse in 2005** at both creek and mainstem sites. For chlorophyll *a*, 2005 was the worst year during 2002-2005, while for total suspended solids, 2002 was the worst year in this period and 2005 was the second worst, at both creek and mainstem sites. It is not clear why these both got worse in 2005.
- In 2005, **bottom dissolved oxygen conditions** at oyster restoration sites got slightly worse compared to 2004, but remained adequate for oyster growth. As in past years, these conditions were much better at oyster restoration sites (83% of the 2005 samples were > 2 mg/l, the level needed by oysters) than at the deeper mid-river site where the state collects water quality data, which lacks oysters (only 13% of the 2005 samples there were > 2 mg/l).
- 2005 ended with a **large sewage spill in Mill Creek** that started on December 17. We do not know yet what effects it will have on that creek or the river in 2006. MRA is working with Anne Arundel County DPW and Bayland Consultants to develop and implement a water quality monitoring plan to assess the effects of the spill and help the County decide whether

additional remediation is needed. We need volunteers to conduct monitoring twice a month from 6 piers (3 in Mill Creek and 3 in Dividing Creek); contact Peter Bergstrom at sav2@magothyriver.org if you can help with this.

INTRODUCTION AND METHODS

The Magothy River Association (MRA) is dedicated to the preservation and improvement of the water quality, plants, and wildlife of the Magothy River and its watershed. Founded in 1946, it is an all-volunteer group representing about 46 communities within the Magothy River Watershed. We devote our efforts to projects that protect the welfare of the river and its inhabitants. We plan to issue this report each year in late winter, and hope to add more data to it each year as they become available. This document will be available soon on our web site, www.magothyriver.org. Suggestions on how to improve the report are welcome, and can be sent to Peter Bergstrom at sav2@magothyriver.org.

Professionals collected all the data on Vital Habitats that we report below, but MRA volunteers, in two groups, collected all of the water quality data we report:

- MRA volunteers led by Peter Bergstrom collected most of the water quality data used for this index in shallow water (where SAV can grow) at three sites in two groups, all sampled monthly on the same day:
    - **Upper creeks**: Data collected from piers on Old Man and Cattail creeks were averaged to represent conditions in the smaller, upriver tidal creeks.
    - **Mainstem**: Data from the end of the Ulmstead pier in the mouth of Forked Creek represents conditions near shore in the wider part of the river and the mouths of the larger creeks.
- MRA volunteers led by Dick Carey collected the bottom dissolved oxygen data used for this index near the bottom (where oysters live) at four or five sites in two groups, all sampled by boat about three times a month on the same day:
    - **Midriver** is the same site (WT6.1) that is also sampled monthly by Maryland Department of Natural Resources, located between North and South Ferry Points, which has no oysters nearby. It is about 5.5 meters (18 feet) deep. Our monitoring at this site has shown that it has some of the worst dissolved oxygen found in the river, so it is not representative of the river as a whole, even though it is near the middle of the river.
    - **Oyster restoration sites** (Four or five shallower sites, each 3-4 meters or 10-12 feet deep) had bottom dissolved oxygen values similar to each other, so their results were averaged and reported as a single value.

The factors used in the Index are divided into two categories: **Vital Habitats and Water Quality**. For both Vital Habitat and Water Quality, we compared the monitoring results to an established goal whenever possible. For those factors that have goals, the attainment of that goal was expressed as a percentage, with 100% meaning the goal was met, and higher values meaning it was exceeded. This also enabled us to scale the results so that **more attainment of a goal always means improvement**, including the water quality factors for which less is better based on their raw data (nitrogen, phosphorus, chlorophyll *a*, and total suspended solids).
Habitats are good places to live for fish, crabs, turtles, and birds, and other fish and wildlife of the Magothy to live. Water quality is another way to measure the quality of the Magothy as a habitat for aquatic life. Unfortunately, some factors for which we have data have no goal, and for some

important measures (such as numbers of fish and wildlife in the Magothy) we have no data, so we cannot use them in the Index. Several important factors for which we cannot calculate an index value are discussed after the Water Quality section. We only calculated an overall average index value for the 4 components of water quality for SAV growth, since they were all measured at the same sites on the same days.

MAGOTHY RIVER INDEX FOR 2005: VITAL HABITATS

Tidal and non-tidal wetlands: These are important habitats for fish and wildlife, although they are not monitored regularly. Wetlands once made up about 7.5% of the area of the watershed, which we used as our interim goal. They now cover 2% of the watershed, based on National Wetlands Inventory (NWI) data from 1989, so **currently wetlands are 27% of this goal.**

Forested nontidal stream buffers: These buffers improve water quality and provide wildlife habitats. In 1997 (the latest year with data), **23% of Magothy streams** had at least a 100 foot wide forested buffer, also called a riparian forested buffer. Our goal is for 100% of streams to have forested buffers, and you can help us reach this goal by planting trees along streams that lack them (see Conclusions section).

Submerged Aquatic Vegetation (SAV): These underwater bay grasses provide crucial habitat for fish, crabs and numerous other aquatic creatures. The Chesapeake Bay Program goal for SAV restoration in the Magothy is 545 acres. In 2004, the last year for which data are available, there were 299 acres of SAV mapped by aerial surveys in the Magothy, or **55% of the CBP goal.** This was the highest area mapped since 1979. Figure 1 shows that Magothy SAV area dropped sharply between 1979 and 1984 and increased through 1998-1999, before something (probably a "mahogany tide" algae bloom in Spring 2000) caused murky water and thus an SAV dieback in 2000. There are no data for 2001 due to airspace restrictions following the terrorist attacks. In 2002, a drought year, the SAV area rose again, to slightly more than was mapped in 1999. SAV area declined again in 2003, probably because photos were taken after Tropical Storm Isabel passed, which made the water cloudier, and then rose dramatically in 2004, probably as a result of clearer water caused by filtration by dark false mussels. The 2005 SAV survey results are not available yet, but based on ground surveys by MRA volunteers (see below), we expect an increase over the 2004 Magothy SAV area.

MRA volunteers continued mapping and identifying species in natural SAV beds to supplement the aerial surveys in 2005. We found that redhead grass coverage expanded greatly in 2005, with new, dense beds of mixed redhead grass and widgeongrass lining most of Swan Cove, on the north shore from North Ferry Point upriver to Steedmans Point (for an online Magothy map, see http://www.magothyriver.org/MagothyRiverMap.htm). This was the farthest upriver that dense redhead grass beds had been found since 1979. Sparser patches of redhead grass in shallower water were found in July on both shores from Steedmans and Henderson points upriver to the site of the old Riverdale restaurant. Although most of these new plants died back by late August, they suggest that water quality may be improving in this area. Some of these patches may have spread from the redhead grass we planted near the mouth of Cockey Creek in 2002-2003; in 2004, those restored beds were the farthest upriver we had found redhead grass in the Magothy.

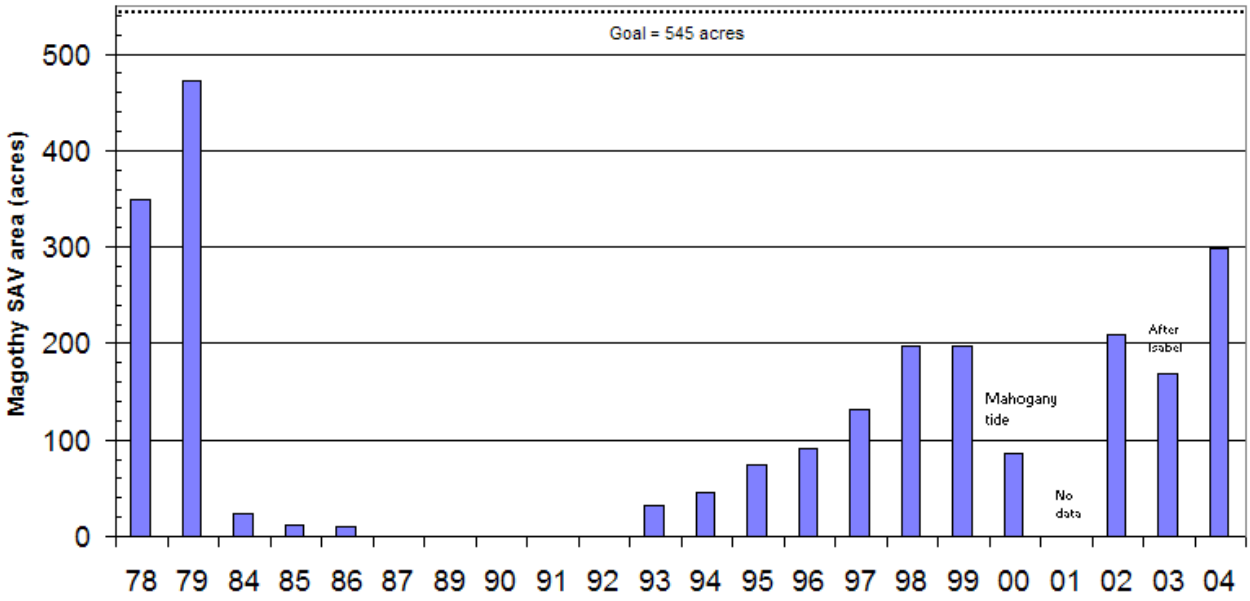

Figure 1. Submerged Aquatic Vegetation (SAV) area in the Magothy River, 1978-2004.
(Data are from http://www.vims.edu/bio/sav/segtots.html converted to acres)

Forested tidal shoreline buffers: This is a new measure of shoreline habitat that came from the watershed survey done by MD DNR in 2004. Our goal is 100%. They estimated that **69%** or 52 miles of the tidal shoreline they surveyed had a forested buffer at least 50 feet wide.

Unaltered tidal shoreline (not bulkhead or riprap): This is another new measure of shoreline habitat that came from the watershed survey done by MD DNR in 2004. Our goal is 100%. They estimated that **44%** of all tidal shorelines were unaltered, or about 33 miles of the 76 miles surveyed. The altered sections included 94 sections over 500 feet in length.

The goal attainment for all of the Vital Habitats is summarized below in Table 1 and Figure 2. In Figure 2 the data used were the latest year with data available.

Table 1. MAGOTHY RIVER INDEX, VITAL HABITATS, 2002-2005

Indicator	What	Where	2002	2003	2004	2005
Wetlands (tidal and non-tidal)	% of historical amount (estimated)	Whole watershed	**27%** *(1989)*	*SAME*	*SAME*	*SAME*
Forested nontidal stream buffers	% of stream miles with 100 foot or wider buffers	All nontidal streams	**23%** *(1997)*	*SAME*	*SAME*	*SAME*
Submerged Aquatic Vegetation (SAV)	% of historical amount based on aerial survey	All tidal waters	**38%**	**31%**	**55%**	N/A
Forested tidal shoreline buffers	% of shoreline with forested buffer at least 50 feet wide	All tidal shorelines	N/A	N/A	**69%**	N/A
Unaltered tidal shoreline	% of shoreline with no bulkhead or riprap	All tidal shorelines	N/A	N/A	**44%**	N/A

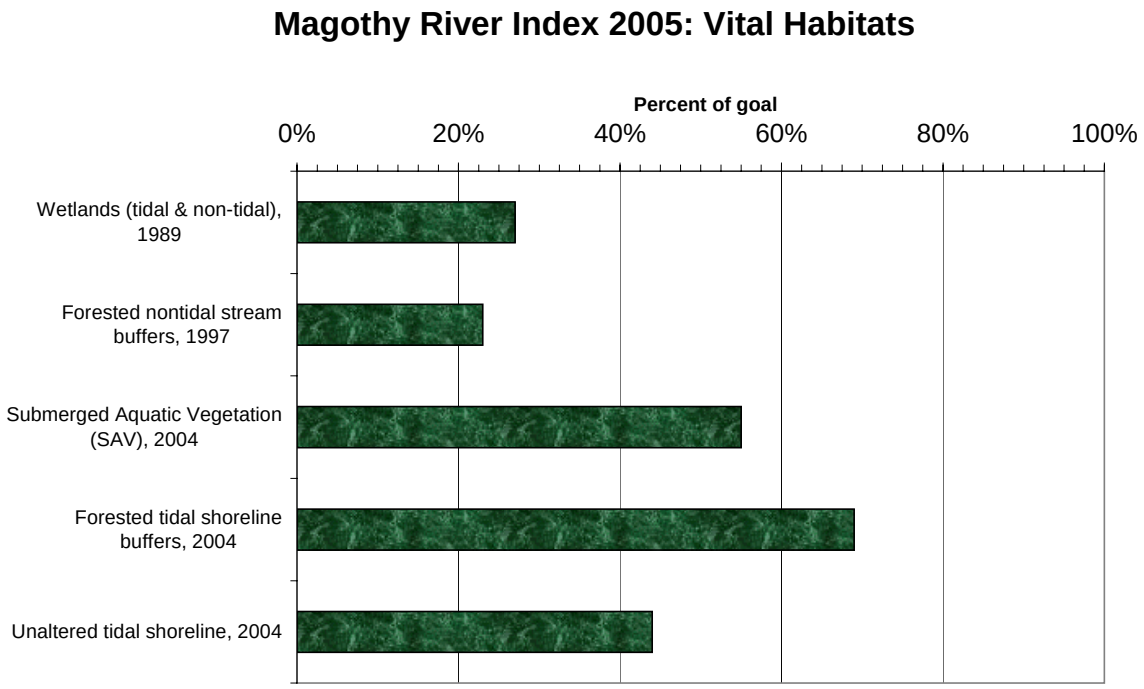

Figure 2. Graph of Magothy River Index vital habitat values for 2005. The year for which data were reported is noted.

MAGOTHY RIVER INDEX FOR 2005: WATER QUALITY

Table 2 and Figure 3 summarize the attainment of water quality goals. Attainment of the goals other than dissolved oxygen based on medians of monthly data, April-October (7 months), which is the SAV growing season. Dissolved oxygen (DO) status was based on frequencies of low DO in June-November (6 months), which is when most low DO occurs in the Magothy. DO sampling was done about 3 times a month.

Water Clarity: To allow the return of submerged aquatic vegetation (SAV) the Chesapeake Bay Program (CBP) has adopted the goal of improving water clarity (in rivers with higher salinity such as the Magothy) so that at least 22% of surface light reaches the bottom. This is calculated for the restoration depth for SAV in that river (which is 1 meter at Mean Low Water in the Magothy). Some other rivers have different restoration depths, based on historical depths at which SAV was mapped.

We found that the water clarity at the Upper creek sites in 2005 achieved **93% of the goal**, while the Mainstem site achieved **91% of the water clarity goal**. This was a decline for the creek sites over their 2004 values (Table 2 and Figure 3), due mainly to a decline in water clarity in Cattail Creek in 2005. This pattern (better clarity in Old Man Creek) suggests that the filtration by dark false mussels may have been the cause, since Old Man Creek had more mussels in 2005 than Cattail Creek or the mainstem of the river. MRA volunteer divers led by Dick Carey estimated that there were about 68 million mussels in Cattail Creek in 2005, down from about 380 million mussels in fall 2004. Unfortunately, similar mussel surveys were not done in Old Man Creek, but the numbers of mussels appeared to be about the same in that creek in both years.

Bottom Dissolved oxygen: Aquatic animals require adequate dissolved oxygen to survive. State water quality standards require a minimum of 5.0 milligram per liter (mg/l) of dissolved oxygen, the level needed by many fish. Oysters can survive with less dissolved oxygen, as little as 2.0 mg/l, so we used this to set our goal. Attainment was expressed as the % of bottom samples that were above 2 mg/l, with a goal of 100%.

We found that bottom dissolved oxygen in 2002-2005 was much higher (better for oyster growth and survival) at the Oyster restoration sites, meeting the 2 mg/l goal in 83-100% of samples, than at the Midriver site, where it met that goal in only 8-50% of samples (Table 2 and Figure 3). This difference shows that we picked oyster restoration sites where there is usually enough dissolved oxygen for oyster survival. DO conditions at the Midriver site got worse in 2003, improved in 2004, and got worse again in 2005 (Table 2 and Figure 3). The worsening in 2003 was probably due to increased rainfall, which usually leads to worse bottom DO conditions, but the causes of the changes in 2004-2005 are not clear, since total rainfall in 2004 was still above average, and it was near normal in 2005.

Total suspended solids, chlorophyll *a*, and dissolved inorganic nitrogen:
These three water quality parameters all have habitat requirements for SAV growth, and chlorophyll *a* has a Chesapeake Bay Program water quality goal (Table 2). Some of these factors showed some likely effects of changes in rainfall and/or changes in mussel abundance.

- **Total suspended solids** goal attainment may have improved in 2003-2004 due to filtration by dark false mussels, even though both were high rainfall years, which tend to have more runoff

and thus worse total suspended solids levels. Attainment of the goal got worse at both sites in 2005, when there were both fewer mussels (and thus less filtration) but also less rainfall (and thus less runoff) compared to 2003-2004.

- **Chlorophyll *a*** goal attainment in the Magothy was good (over 100%) in 2002-2004 in the creeks and in 2003 at the mainstem site and got slightly worse in 2005 at both sites (Table 2). Since these chlorophyll *a* improvements started in 2002 before the increase in dark false mussels in 2003-2004, and because 2004 (when mussels were at their peak) did not have the best chlorophyll *a* levels, the increased filtration by the mussels was probably not a major cause of those improvements.
- **Dissolved inorganic nitrogen (DIN)** goal attainment in 2003 and 2004 was much worse than in 2002 (Table 2). Goal attainment improved at the mainstem site in 2005, presumably because there was less rainfall, but it stayed low at both creek sites in 2005, for reasons that are not clear. DIN is generally more affected by changes in rainfall than any of the other water quality parameters, partly because one of its components, nitrate, can be abundant in both runoff and ground water. High rainfall flushes more ground water into the river, and also reduces the residence time of water in areas such as wetlands where dentrification (natural nitrogen removal) occurs. Worse DIN levels can fuel algae blooms, but it is apparently not their only cause. As noted above, chlorophyll *a* got worse in 2005, both in the creeks (where DIN got worse) and at the mainstem site (where DIN got better).

Mean status for water clarity, dissolved inorganic nitrogen, chlorophyll *a*, and total suspended solids: The last two rows of Table 2 show the unweighted mean by year of these four components of habitat requirements for SAV growth. They show that while in the creeks this mean got worse in 2005, in the mainstem it improved. It appears that these changes had different causes. In the creeks, the downturn in 2005 was probably caused by the decline in dark false mussels in Cattail Creek, which led to worse water clarity, total suspended solids, and chlorophyll *a* conditions in the creeks. The improvement in the mean status at the mainstem site in 2005 was probably due to lower rainfall in 2005, which dramatically improved dissolved inorganic nitrogen levels (Table 2).

MAGOTHY ENVIRONMENTAL FACTORS NOT USED IN THE INDEX

These environmental factors were not included in the index because the available data have no goal and thus could not be expressed as a percentage, or because data are missing.

Data available, but no numerical goal:

Fish Consumption Advisories: The Maryland Department of the Environment (MDE) issues these advisories based on toxic contaminant levels found in fish caught in each river, using models to estimate your risk of getting sick from eating various amounts of fish. See:
http://www.mde.state.md.us/citizensinfocenter/health/fish_advisories/index.asp
In 2003, the Magothy was listed for two fish species, channel catfish and white perch. In 2004, channel catfish were dropped because none were caught in the latest surveys, but the Magothy still has a consumption advisory for white perch. Several nearby rivers also had consumption advisories for white perch (Patapsco, Chester, Severn, and South rivers).

Table 2. MAGOTHY RIVER INDEX, WATER QUALITY, 2002-2005

Indicator	What	Where	2002	2003	2004	2005
Water Clarity > 1 m, Upper Creeks*	% of SAV water clarity goal achieved	Upper creeks (2)	62%	78%	129%	93%
Water Clarity > 1 m, Mainstem	Same	Mainstem	83%	83%	95%	91%
Total Suspended Solids < 15 mg/l, Upper Creeks	% of SAV habitat requirement achieved	Upper creeks (2)	101%	202%%	316%	154%
Total Suspended Solids < 15 mg/l, Mainstem	Same	Mainstem	131%	180%	214%	182%
Chlorophyll *a* < 8 µg/l, Upper Creeks	% of CBP goal to ensure adequate clarity achieved	Upper creeks (2)	139%	192%	183%	94%
Chlorophyll *a* < 8 µg/l, Mainstem	Same	Mainstem	75%	111%	90%	65%
Dissolved Inorganic Nitrogen < 0.15 mg/l, Upper Creeks	% of SAV habitat requirement achieved	Upper creeks (2)	207%	35%	34%	42%
Dissolved Inorganic Nitrogen < 0.15 mg/l, Mainstem	Same	Mainstem	222%	82%	52%	238%
Bottom DO, Midriver > 2 mg/l	% of data that met level needed by oysters (> 2.0 mg/l)	Mid-river (WT6.1)	31%	8%	50%	13%
Bottom DO, Oyster sites > 2 mg/l	Same	Oyster restoration sites (4-5)	94%	100%	96%	83%
Bottom DO, Midriver > 5 mg/l	% of data that met state standard (> 5.0 mg/l)	Mid-river (WT6.1)	25%	0%	13%	7%
Bottom DO, Oyster sites > 5 mg/l	Same	Oyster restoration sites (4-5)	59%	68%	65%	17%
MEAN SAV WQ—Upper creeks	***Unweighted mean of first 4 water quality values***	***Upper creeks (2)***	***127%***	***127%***	***166%***	***96%***
MEAN SAV WQ--Mainstem	***Same***	***Mainstem***	***128%***	***114%***	***113%***	***144%***

*Shaded rows are graphed in Figure 3 below.

Magothy River Index 2002-2005: Water Quality

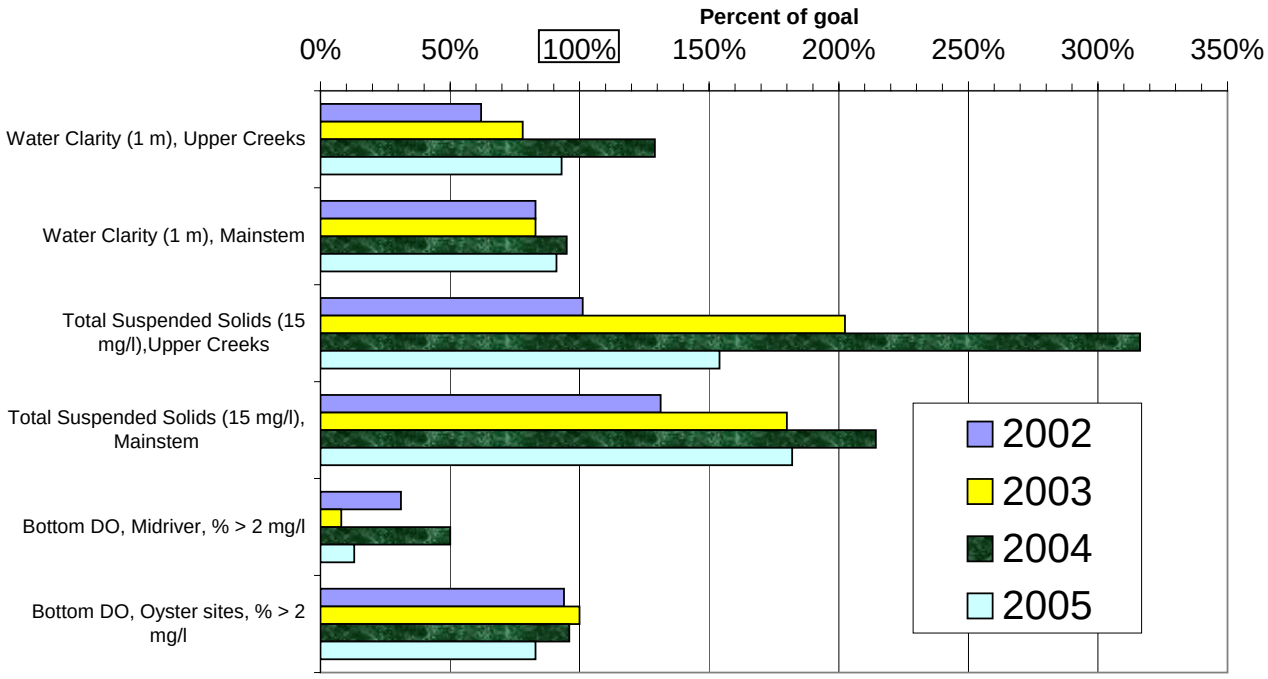

Figure 3. Graph of selected Magothy River Index water quality values for 2002-2005.

MAGOTHY ENVIRONMENTAL FACTORS NOT USED IN THE INDEX (continued)

Non-tidal Tributary Health: In spring 2002 and 2003, Magothy River Association (MRA) volunteers sampled 20 points on Magothy non-tidal tributary streams for benthic invertebrate animals (insects and other animals living on the bottom of streams). Maryland DNR staff analyzed the samples and rated their health by comparison to reference streams that had few human impacts and a diverse community of benthic animals living in them,. Nineteen of the 20 Magothy sites had "Poor" quality based on these samples. The one site rated "Fair" was on Magothy Branch (the non-tidal Magothy) above Lake Waterford. To see the data, go to http://mddnr.chesapeakebay.net/mbss/streamwaders.cfm and type "Magothy" in the box for "8 digit watershed name." Statewide, half of the small streams sampled by DNR were rated Poor, about a third were rated Fair, and the rest (11%) were rated Good. Thus, with 95% of our sites sampled rated Poor, the Magothy was much worse than the state average.

Maryland DNR also supervised a Stream Corridor Assessment (SCA) of all nontidal Magothy streams in 2004. Rather than studying benthic invertebrates, the SCA located, photographed, and ranked any "problem areas" (such as serious erosion) on all of the walkable Magothy nontidal streams (49 stream miles total). It also included a tidal shoreline survey. Janis Markusic reported on both studies at the State of the Magothy meeting in February 2005; DNR's report is available as large PDF files by writing to sav2@magothyriver.org. The SCA ranked all of the

subwatersheds as "Good," "Fair," or "Poor" by comparing them to relatively undisturbed reference watersheds. Fourteen of 22 (64%) of the subwatersheds were ranked in Poor condition. The rest (36%) were rated Fair; none were rated Good. Of these "fair" subwatersheds, **Blackhole Creek, Kinder Branch, Grays Creek and Muddy Run** were in the best condition. **Cypress Creek,** which includes **North Cypress Branch**, was identified as one of the highest priority subwatersheds for restoration, and a major effort is underway to restore North Cypress Branch.

No data available:

Oysters: There is no easy way to locate or count the total number of oysters in a river. Even if we knew our current oyster population size, we don't know the historical abundance of oysters in the Magothy, sop we would have no goal for comparison.

Fish, Crabs and Turtles: These are also hard to count, but for different reasons: they move around and are hard to catch. Maryland DNR did summer fish surveys in the Magothy in the past (1989-1991) using a seine net in the shallows and trawls at various depths, and documented a total of 37 finfish species. There are no known surveys of Magothy crabs or turtles. Turtles seen in our tidal waters include snapping turtles (mainly in tidal ponds and upper creeks) and diamondback terrapins. Terrapins need natural shorelines with beaches to nest, and these are becoming rare on the Magothy.

Birds: One of our more visible waterbirds is the **osprey**, which spends the warmer months here and winters in South America. Local resident George Kerchner counted 25 active osprey nests on the Magothy in 1996. Ospreys have increased so much that their nest sites may be limited in the Magothy. If you are a waterfront property owner and are interested in erecting a nest platform, contact sav2@magothyriver.org for more information. The MRA web site has information about common birds seen around the Magothy at http://www.magothyriver.org/Critters.html

There are no confirmed **bald eagle** nests in the watershed, but eagles are sometimes seen flying over the river, sometimes in pairs. They prefer to nest in undisturbed wooded waterfront tracts, of which there are few on the Magothy. They nest on the Severn and South rivers most years.

Recent efforts to map **mute swans** and their nests by MD Department of Natural Resources and other agencies noted a few mute swan nests on the Magothy, but not as many as on the Severn and South rivers. The nests are being mapped as part of an effort to control this exotic and invasive species in Maryland, which competes with native waterfowl and damages SAV beds. For more details see:
http://www.dnr.state.md.us/wildlife/muteswans.html

ONGOING and NEW ACTIONS TO HELP THE MAGOTHY

Oyster restoration (including reef balls): The MRA has done oyster restoration with our partners on five bars in the Magothy, with a sixth bar (Black Bar, BLKB in Figure 4 below) planned for future restoration. The statewide Oyster Recovery Partnership (http://www.oysterrecovery.org/projects/location/magothy.html) planted 1.3 million spat on shell on 0.5 acres adjacent to the Chest Neck Point (CNP) site in 2001, and later disease monitoring by University of MD staff found no diseased oysters. MRA has a 5-year oyster restoration plan with a goal of restoring 30 acres of oyster reef in the river. Since the Magothy is closed to oyster

harvest, any oysters restored here will provide valuable water quality and habitat benefits. Reef balls have also been placed next to some of the oyster restoration sites, which provide fish habitat as well as oyster habitat. For more on MRA restoration projects see: http://www.magothyriver.org/Current_Projects.html

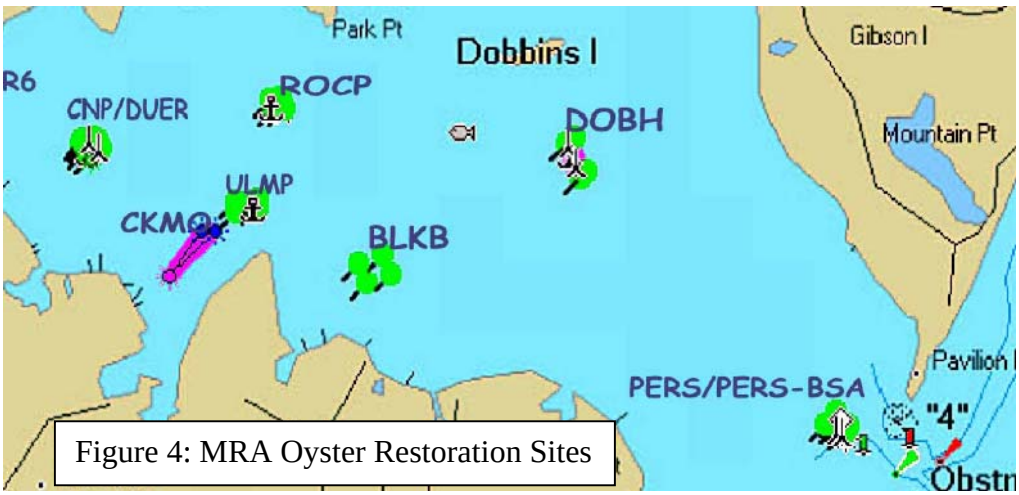

Figure 4: MRA Oyster Restoration Sites

SAV restoration: The MRA started doing SAV restoration in the Magothy in 1998, and we have planted redhead grass every year since 2002, first at the Grachur Club near Cockey Creek (2002-2003) and then off the Sylvan View beach near Grays Creek and Little Island (2004-2005). All four of these projects had good survival and had some plants spreading outside of the planted area. In 2006 we plan to plant at the Grachur Club again but try wild celery this time, because redhead grass was doing so well in the upper Magothy in 2005.

Wetland and stream restoration, stormwater retrofits: Nontidal wetland restoration was done recently in North Grays Creek. New wetland projects are planned on Cattail Creek in Berrywood, and along North Cypress Branch. Stream restoration and stormwater retrofits are planned for North Cypress Branch along McKinsey Road. See: http://www.mdot.state.md.us/News/2005/October%202005/SHA_Cypress_branch.htm

Land protection: Our partner organization, the Magothy River Land Trust, has protected 413 acres in the Magothy watershed via permanent easements through 2005. Many of these include sensitive wetland habitats such as bogs. For a map of protected properties through 2004, see http://www.magothyriver.org/Land_Trust.html. The MRA is working to protect sensitive habitats on Dobbins Island from development, and reverse some of the damage done to habitats on Little Island through unpermitted development.

WHAT YOU CAN DO TO HELP THE MAGOTHY

- **Plant trees along streams and shorelines that lack them** or have a narrow forested buffer, to increase the number of stream and shoreline miles that have forested buffers.
- **Increase oyster reefs** to increase filtration capacity and fish habitat. You can do oyster gardening and help with oyster nurseries (oysterinfo@magothyriver.org), and do diving to support oyster restoration (diver@magothyriver.org).
- **Increase Submerged Aquatic Vegetation** (SAV) through planting to improve water quality and increase fish and shellfish habitat, contact Carl Treff at magothyriversavers@yahoo.com. If you can help with **surveys of current SAV locations**, please contact Peter Bergstrom at sav2@magothyriver.org.
- **Volunteer to help with water quality and dark false mussel monitoring**. To help with water quality monitoring, contact Peter Bergstrom (sav2@magothyriver.org) or Dick Carey (diver@magothyriver.org). Volunteers who live near Mill and Dividing creeks are especially needed this year. If you have a pier, get a ceramic tile from MRA to hang off your pier, and check it monthly to see if **new dark false mussels** have attached to it.
- Reduce your lawn area and your use of lawn fertilizer, and use native plants. **Fertilize your lawn (if necessary) only in the fall**, which is the best time for grass growth, and **avoid fertilizing in the spring**, when fertilizer runoff is more likely to cause algae blooms.
- **Reduce your use of vehicles and other internal combustion engines**. These add nitrogen to the air, much of which reaches the water. Car pool, combine trips, buy more fuel-efficient vehicles and four-cycle boat motors, and use electric yard tools instead of gas tools.
- **Encourage nutrient best management practices,** including nutrient management by lawn care companies, and at horse farms and other farms in the watershed.
- **If you have a septic system, keep it pumped out and in good repair.**
- **Minimize and when possible reduce the amount of pavement and other impervious surfaces in your yard,** since they increase runoff to the river. This can be done by using gravel or porous pavers for driveways and parking lots. Support stormwater retrofits in the watershed.
- **Install rain barrels, rain gardens, and other structures** to retain and improve the quality of runoff before it leaves your yard. See: http://www.arlingtonecho.org/rainbarrel.htm
- **Join the Magothy River Association: see** http://www.magothyriver.org/Who_We_Are.html or contact President Paul Spadaro at 410-647-8772 or president@magothyriver.org.
- Visit our web page (link above) and sign up for "News and Announcements" via email.

ACKNOWLEDGMENTS

We thank the **Chesapeake Bay Trust** for their generous support of the monitoring laboratory analysis costs for this project from 1992-1996 and 2001-2005, and support for most of our restoration projects. We also thank the many volunteers who helped do the monitoring and restoration over the years.