

**An Overview of Dissolved Oxygen and Water Clarity Conditions,
Enterococci, Submerged Aquatic Vegetation, and Oysters in the
West and Rhode Rivers During 2007**
(to be presented April 10, 2008)



Compiled by Stacie Bender with contributions from Steve Gauss (Project Oyster – West River), Richard Crenshaw (Lead SAV Surveyor), and Dr. Peter Bergstrom (NOAA Chesapeake Bay Office).

Introduction:

This report serves as a guide to aquatic health conditions in the West and Rhode Rivers, tributaries of the Chesapeake Bay, in 2007. It is based on weekly data collected by the West/Rhode Riverkeeper’s water quality monitoring team, along with annual surveys (aerial and field) of Submerged Aquatic Vegetation (SAV). It is intended to provide the reader with a general perspective of aquatic health in the West and Rhode Rivers.

Variables Chosen for West/Rhode Riverkeeper Water Quality Data Examination:

The water quality indicators chosen for this report include top and bottom dissolved oxygen, Secchi Depth (water clarity), SAV, and bacteria (specifically, enterococci).

The Chesapeake Bay Program (CBP) has set 5 mg/L as the dissolved oxygen target and 0.97 m as a goal for Secchi Depth, which should be sufficient for growth of SAV. The CBP has set SAV area goals of 60 acres (24.3 ha) in the Rhode and 238 acres (96.4 ha) in the West River, which are based on SAV mapped from historical aerial photographs from 1938-1964. The SAV status reported here is the 2007 mapped area as a percentage of that goal, using aerial SAV survey data from the Virginia Institute of Marine Science (VIMS). The EPA criterion for repeated bacteria samples is a geometric mean of 35 MPN/100 ml or less, using at least 5 samples per site, and no samples collected within 48 hours of rain. The bacteria status reported here is the percentage of sampling sites within each river that passed this criterion.

The percentage of observations that meet these goals is listed in Table 1.

Table 1: Percentage of 2007 West and Rhode River Data Meeting Specified Targets

| River | Dissolved Oxygen | Water Clarity (Secchi Depth) | SAV | Bacteria |
|-------|------------------|------------------------------|-----|----------|
| West | 62 % | 1 % | 0 % | 100 % |
| Rhode | 54 % | 0 % | 0 % | 75 % |

Time Periods Chosen for Examination:

The time period of July 11, 2007 to September 26, 2007 was chosen for the analysis of the dissolved oxygen in the West and Rhode Rivers, since measurements collected both near the rivers’ bottoms and near the water’s surface were available during this time. Additionally, measurements collected in the summer/early fall are used because these months commonly exhibit decreased oxygen levels.

The time period of May 23, 2007 to October 24, 2007 was chosen for the analysis of the water clarity measurements. This time period comprises the duration of the West/Rhode Riverkeeper’s 2007 water quality monitoring program, with Secchi Depth being the chosen measure of water clarity.

The time period of May 23, 2007 to August 22, 2007 was chosen for the analysis of bacteria (specifically enterococci). The time period represents the duration of the enterococci monitoring in 2007 conducted by the West/Rhode Riverkeeper in conjunction with Anne Arundel Community College (AACC).

Summary of 2007 Dissolved Oxygen Observations:

In the West River, 62% of the dissolved oxygen measurements collected during the time period in question met or exceeded the target of 5 mg/L, and 54% did so in the Rhode. Generally, fewer dissolved oxygen observations collected at upstream sites in 2007 met the target of 5 mg/L compared to the number of dissolved oxygen observations meeting this target at sites located downstream. Additionally, dissolved oxygen levels were usually lower at sites located in deeper waters, unless the waters were open and more exposed to mixing. Many sites hovered around the 50% attainment mark, meaning 50% of their dissolved oxygen observations collected in 2007 met the target of 5 mg/L. Sites located in the West River fared better than those in the Rhode, where most sites had below 60% attainment of the 5 mg/L target.

For more details about dissolved oxygen levels at water quality monitoring sites in the West and Rhode Rivers, visit the Riverkeeper's Water Quality web page at http://www.westrhoderiverkeeper.org/water_quality.php.

Summary of 2007 Secchi Depth Observations:

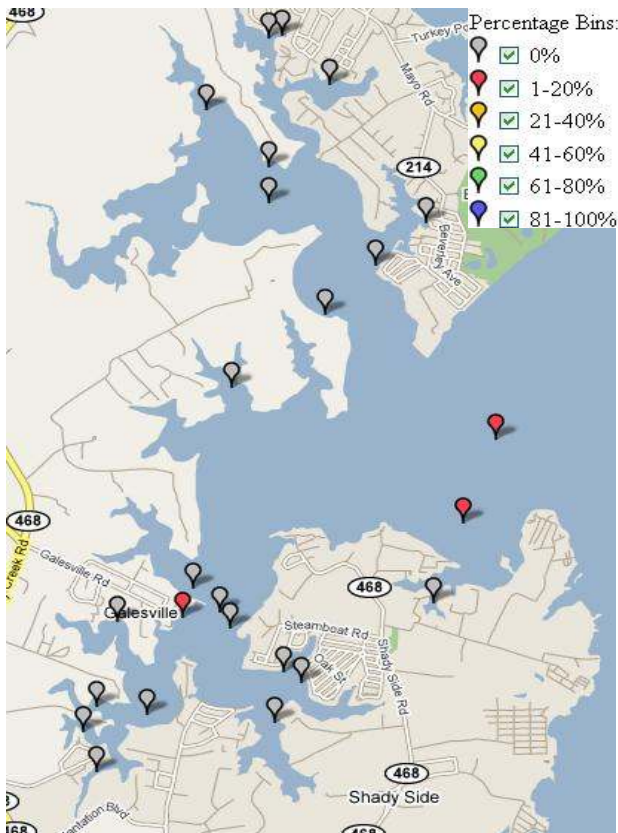


Figure 2: Percentage of 2007 Secchi Disk Measurements \geq 0.97 m
(Based on Spring/Summer/Fall 2007 West/Rhode Riverkeeper data, collected between May 23, 2007 and Oct. 24, 2007)

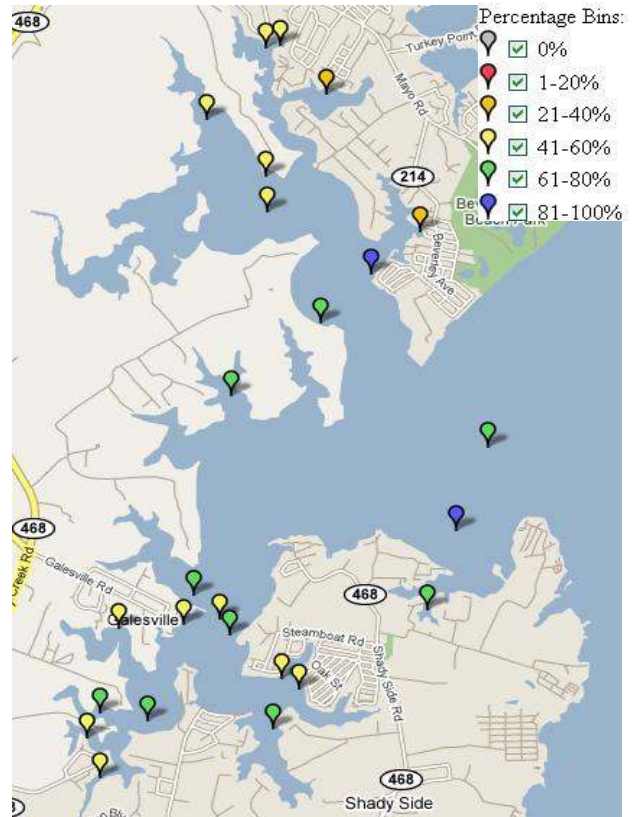


Figure 1: Percentage of Dissolved Oxygen Observations \geq 5 mg/L
(Based on Summer/Fall 2007 West/Rhode Riverkeeper data, collected between July 11, 2007 and Sept. 26, 2007)

In the West River, 1% of the Secchi Depth measurements collected met or exceeded the target of 0.97 m during the time period in question, and 0% did so in the Rhode. The water clarity conditions in the West and Rhode Rivers, as indicated by Secchi Depth measurements, fail, in most instances, to reach the goal of 0.97 m set by the Chesapeake Bay Program. The only sites with measurements exceeding this criterion were W6, W15, and W17. W6 and W17 are located in the more open parts of the West River, while W15 is at the end of the Galesville Pier. For the period of May 23, 2007 to October 24, 2007, no site in the Rhode River had a Secchi Depth greater than 0.97 m (see Figure 2). For more details about water clarity at water quality monitoring sites in the West and Rhode Rivers, visit the Riverkeeper's Water Quality web page at http://www.westrhoderiverkeeper.org/water_quality.php.

Bacteria:

During the 2007 bacteria monitoring season, two sites in the Rhode River (R6 – upper Bear Neck Creek and R7 – mid Cadle Creek) exceeded the Environmental Protection Agency’s criteria of 35 MPN/100 mL (the threshold used to analyze data representing multiple samples collected repeatedly at the same sites over a certain time period). Figure 3 shows the geometric means of each water quality monitoring site that was regularly monitored for bacteria. No bacteria counts from samples collected in close proximity, time-wise, to rainfall are included in this graph, so that bacteria

Rhode & West River Bacteria, 2007
(each site sampled 8-10 times; without rain data)

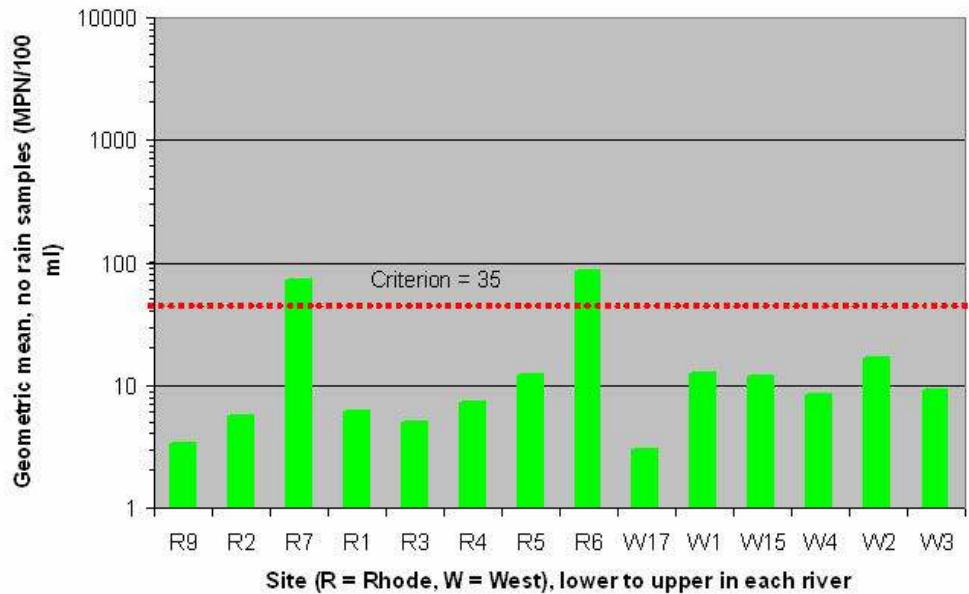


Figure 3: Geometric Means of 2007 Enterococci Counts in the West and Rhode Rivers
(Graph courtesy of Dr. Peter Bergstrom, NOAA Chesapeake Bay Office)

patterns in the absence of rainfall can be seen. Sites R6 and R7 have resident flocks of ducks and geese, which contribute to the high bacteria levels at these two sites. Whether or not there are other factors besides the waterfowl that contribute to the high bacteria counts at sites R6 and R7 remains to be seen.

Rhode River Enterococci by date, 2007
(shows elevated levels on 2 of 3 rain dates)

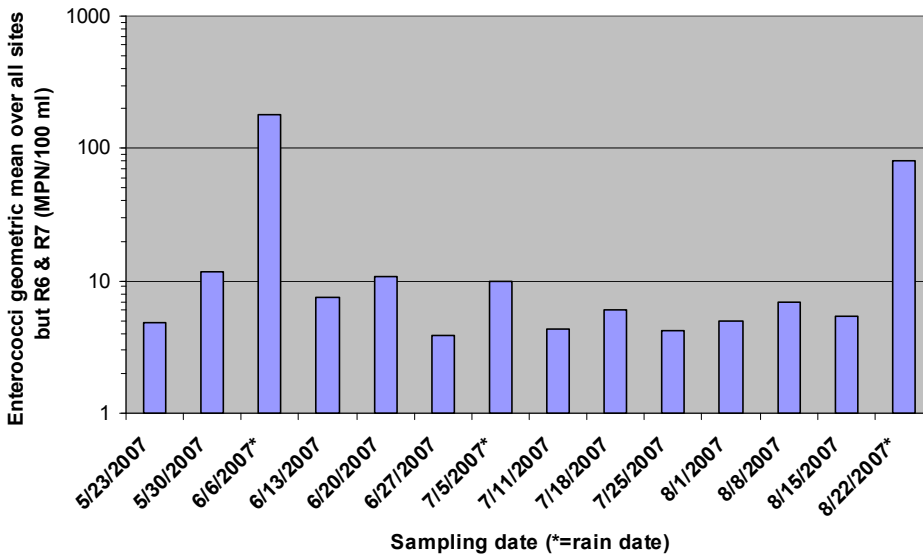


Figure 4: Geometric Mean of 2007 Enterococci Counts in the Rhode River (EXCLUDING sites R6 and R7)
(Graph courtesy of Dr. Peter Bergstrom, NOAA Chesapeake Bay Office)

The effects of rainfall on bacteria counts can also be seen upon examination of the Rhode River bacteria data in conjunction with rainfall reports collected by volunteer observers for the Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS). Rainfall observations from CoCoRaHS sites MD-AA-20, MD-AA-19, and MD-AA-9 were used to indicate the presence of rainfall within the watershed. Figure 4 shows an elevated mean enterococci count for Rhode River sites on the rain dates of June 6 and August 22, 2007.

Submerged Aquatic Vegetation (SAV):

The Virginia Institute of Marine Science (VIMS) conducts aerial SAV surveys, and data obtained from these surveys are used to evaluate the SAV status of the West and Rhode Rivers. In addition, volunteers have surveyed both rivers for SAV in the spring and fall. The Chesapeake Bay Program has set SAV goals of 60 acres (24.3 ha) in the Rhode and 238 acres (96.4 ha) in the West River.

The 2007 VIMS aerial survey detected zero acres of SAV in the West and Rhode Rivers. The graph below, courtesy of Dr. Bergstrom, shows the percentage of the SAV goals met in each river over more than twenty years (see figure 5). The West and Rhode River SAV values for 2007 are 0 %.

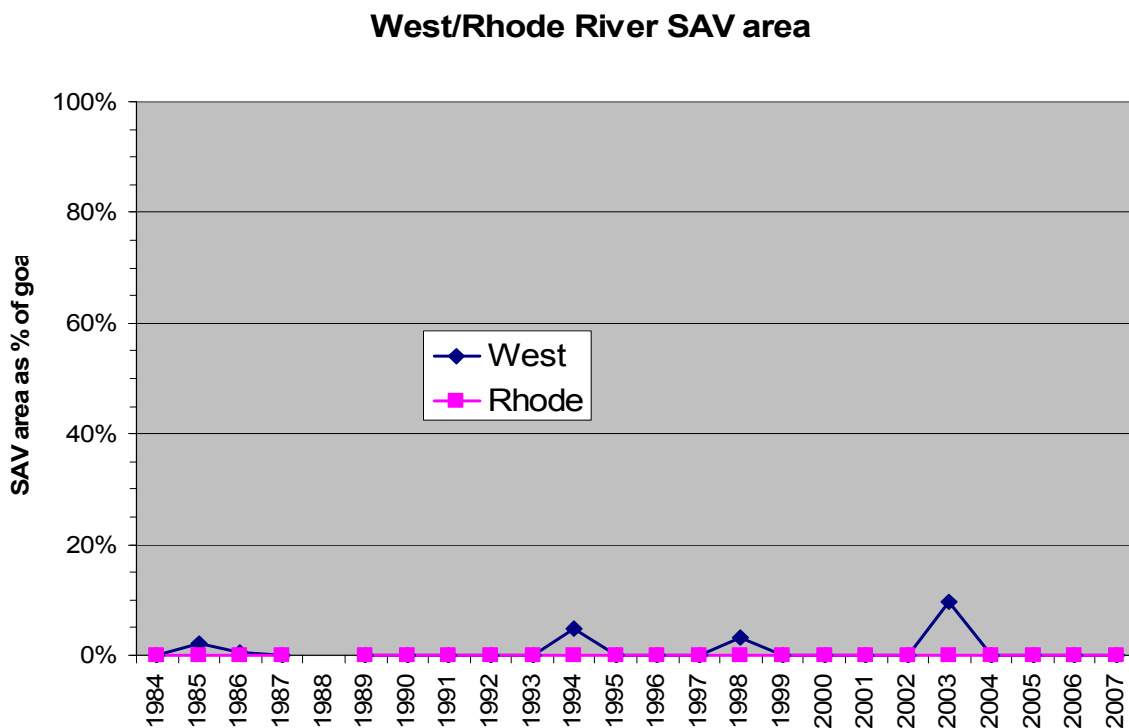


Figure 5: Percentage of SAV Goal Met in the West and Rhode Rivers Using VIMS Aerial SAV Survey Data
(Graph courtesy of Dr. Peter Bergstrom, NOAA Chesapeake Bay Office)

Despite the absence of SAV in the West and Rhode Rivers, as implied by data from the 2007 VIMS survey, SAV (Horned Pondweed), in limited quantities, was found in several of the creeks during field surveys in 2007. There may be other small SAV beds in both rivers that the VIMS aerial survey could not detect due to the murky water. Also, the VIMS survey also does not include beds of Horned Pondweed, an annual species, because it grows in the spring and the VIMS surveys are normally conducted later in the year, after the Horned Pondweed dies off.

For more information on SAV and the VIMS aerial surveys, visit <http://www.vims.edu/bio/sav/>.

Oysters:

According to Steve Gauss, the salinity in the West and Rhode Rivers increased and remained high due to the lack of rain throughout 2007. This is, in many ways, good news for the oysters. Project Oyster – West River (POWeR) has planted 50,000 adult oysters on two oyster reefs in the West River over the past four years from 26 oyster gardeners. In June 2007, the oyster gardeners returned their oysters that had been growing since the previous fall. Despite a good crop of spat that was distributed, the returns were meager by previous standards. It is suspected that several below freezing days with extremely low tides in the winter of 2006-2007 caused a high mortality. During the summer of 2007 the salinity increased to levels commensurate with spat set and good growth. While the oysters had poor spat set in spite of the higher salinity, those that were set by the Chesapeake Bay Foundation (CBF) in the tanks in Shady Side grew quite well and when they were distributed to the

gardeners in the fall, most were as large as 20-30 mm. During the past winter, there was only one sub-freezing day with low tides and inspection of a number of cages shows promise that they have come through well. Higher salinity does bring with it an increase in dermo and MSX and an increase in *Stylochus ellipticus*, the flatworm that feeds on oysters. Dermo is still very low in the West and Rhode Rivers, but an increase in *Stylochus* has been observed. The final outcome of the 2007 year will be determined in June when the gardeners return their oysters.

For more information about oysters in the West River, visit the POWeR project's web site at <http://www.westriveroyster.org/>.

How You Can Help:

- Join the West/Rhode Riverkeeper water quality monitoring efforts. If interested, contact Zach Thomas, Volunteer Coordinator, at zach@westrholderiverkeeper.org, or Stacie Bender, at water_quality@westrholderiverkeeper.org.
- Join the Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS) and monitor rainfall (which can easily affect water quality via stormwater runoff) in the West and Rhode watersheds. Check out <http://www.cocorahs.org/state.aspx?state=md>, or contact Stacie Bender at the email address listed above.
- Reduce stormwater runoff in the West and Rhode watersheds by planting a rain garden. For more information, visit http://www.dnr.state.md.us/mydnr/askanexpert/rain_garden.asp or join the Creekwatchers meeting on April 18th, 2008 (see <http://www.westrholderiverkeeper.org/calendar.shtml> for place and time).
- Make use of the Honeydipper pump-out boat. To find out how to schedule service, visit <http://www.westrholderiverkeeper.org/calendar.shtml>. The Honeydipper's season starts on May 23rd, 2008.
- Help reduce nutrients that reach the Rivers by keeping your septic system pumped and in good repair and by reducing the amount of fertilizer used on your lawn.
- Become an oyster gardener or volunteer to help with the oyster projects in the West and Rhode Rivers. To do so, contact the POWeR project via their web site (<http://www.westriveroyster.org/>) or power@westriveroyster.org.
- Become a member of the West/Rhode Riverkeeper! Find out how to join at <http://www.westrholderiverkeeper.org/what.shtml> or call 410-533-9002.

Last But Certainly Not Least:

The West/Rhode Riverkeeper organization owes a HUGE thank you to the energetic and dedicated volunteers who collected water quality measurements during the course of the 2007 monitoring season. Not only did they collect samples and measurements, they also chauffeured sampling crews around the Rivers, they shuttled water samples to AACC for laboratory analysis, they shuttled shared equipment among various crews, they helped with making the water quality data available online, and the list goes on. They completed these tasks when the summer sun was beating down, when the sun was barely rising, when the rains finally returned last fall. Hats off to all of you!

