2007 CHESTER RIVER REPORT CARD

This newsletter introduces the first Chester River ecosystem health report card. This report card summarizes the 2007 water quality of two major parts of the Chester River ecosystem: the estuary (tidal regions) and the creeks (non-tidal) flowing into the estuary. Creek water quality is based on data collected by the Chester River Association and their Chester Tester volunteers. Health of the estuarine regions is based on data collected by the Chesapeake Bay Program partners. This report card helps clarify how healthy the region's waterways are, and what you can do to help improve the ecological condition of the Chester River.

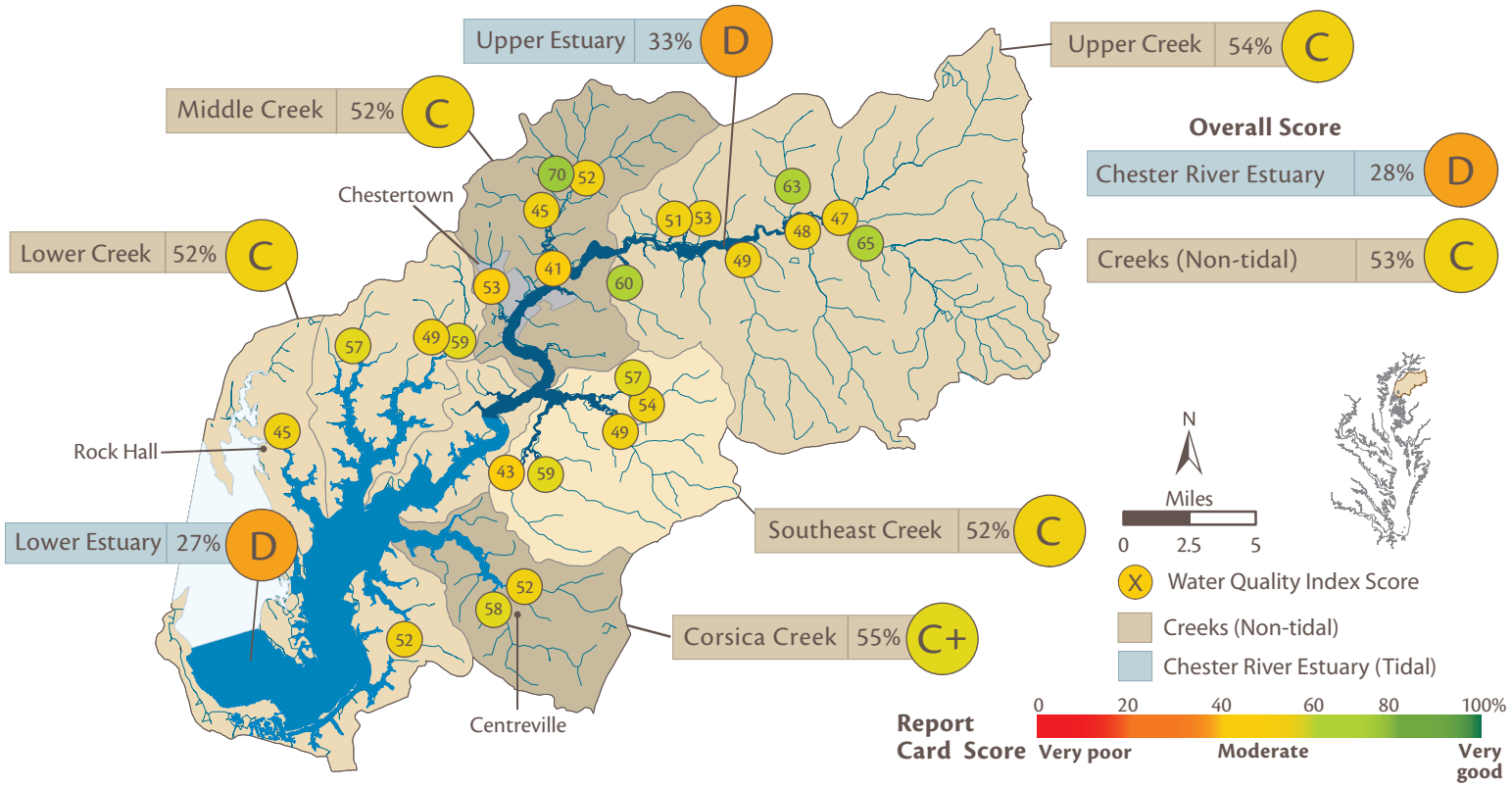


Figure 1: Report card grades and scores for the Chester River estuary and its creeks in 2007. See back page and www.eco-check.org for further information on the methods. Note: Overall score for the Chester River estuary accounts for the different area of the two sub-regions (i.e., a weighted score).

Overall, the quality of water in the Chester River creeks in 2007 was moderate, scoring 53 out of a possible 100 points (Figure 1). A comparison of the five smaller sub-regions showed that there was very little difference among regions of the Chester River watershed, with scores only ranging from 52 to 55. However, a closer analysis of the individual monitoring station water quality scores paints a different picture, with index scores ranging from 41 (poor) to 70 (moderate-good). This creek to creek variability illustrates the need for small-scale, targeted management actions that consider the sources of pollution within individual creek watersheds.

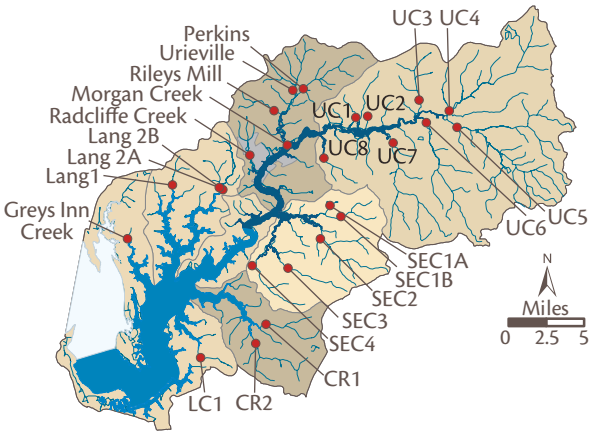
Overall health of the Chester River estuary (tidal regions) was poor in 2007, with a weighted score of 28 out of 100. While the two estuarine regions had similar overall scores, the Upper Estuary was in slightly better condition (33%) than the Lower Estuary (27%); however, the Upper Estuary score is based on slightly fewer indicators (see back page). While most indicators used to calculate the indices scored poorly, water clarity and aquatic grasses cover were consistently very poor throughout the estuary.

Photo credits: Chester River Association & J. Thomas (UMCES)

WATER QUALITY VARIED AMONG CREEKS

Water quality varied among different creeks within the Chester River watershed. Water Quality Index scores at the Chester Tester creek sampling stations ranged from 41 (poor condition) to 70 (moderate-good; Figure 2). The best water quality was measured at Urieville Station, in the mid-reaches of Morgan Creek. Interestingly, the worst score was at the mouth of that same creek, close to where the creek flows into the Chester River. This difference between stations on the same creek highlights how water quality can change over a relatively small section of the watershed.

There was a gradual trend in water quality between the two extremes, with no particular area of the watershed displaying better or worse water quality. In addition to the difference in overall water quality, there were substantial differences in the condition of the individual indicators (e.g., dissolved oxygen, turbidity) between stations. For example, one station may score poorly for levels of dissolved oxygen and well for nitrate (e.g., SEC 4), while another station may score well for dissolved oxygen and poorly for nitrate (e.g., Radcliffe Creek). These results highlight the need for targeted management action.



Location and names of the Chester Tester creek water quality monitoring stations in 2007.

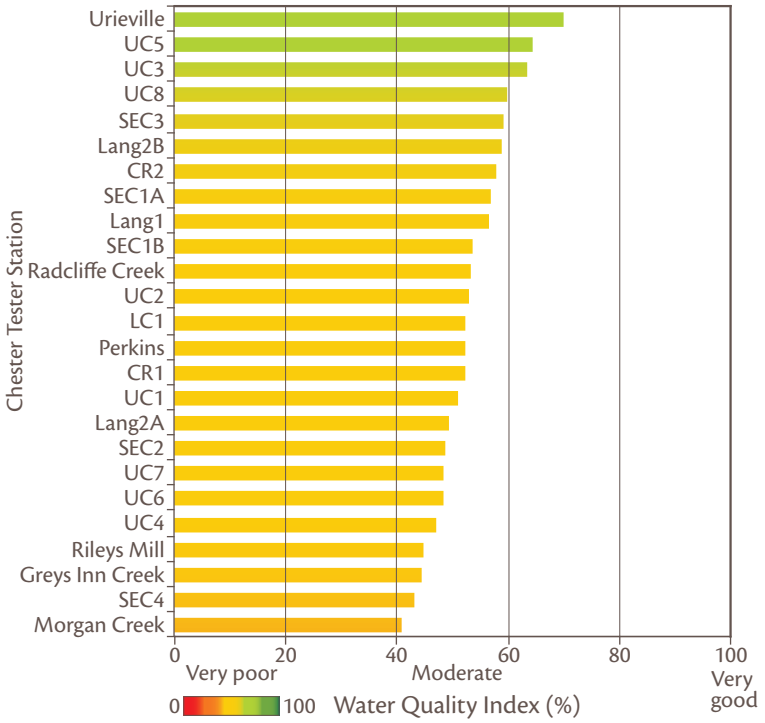


Figure 2: Ranked assessment of the Chester Tester creek monitoring stations. Creeks ranked from best to worst Water Quality Index scores.

FLUCTUATING WATER QUALITY IN TIDAL REGIONS

A retrospective analysis of the estuarine Water Quality Index shows a number of notable features over the past 20 years of monitoring (Figure 3). It seems that apart from some high values in the late 1980s, there are no long-term trends of improvement or deterioration, but rather inter-annual fluctuations that may in part be driven by changes in annual weather conditions (i.e., wet vs. dry years). A second notable feature is that water quality in the upper freshwater reaches of the river tended to be of better quality (relative to the target) compared to the station near the river mouth (see back page for targets). Better water quality in the upper reaches is largely due to dissolved oxygen levels that more frequently meet the target level. Finally, the long-term analysis shows that water quality near the mouth of the river improved substantially this year compared to the past few years and was largely due to improved dissolved oxygen conditions.

J. Thomas, UMCES

Aerial view of Chestertown.

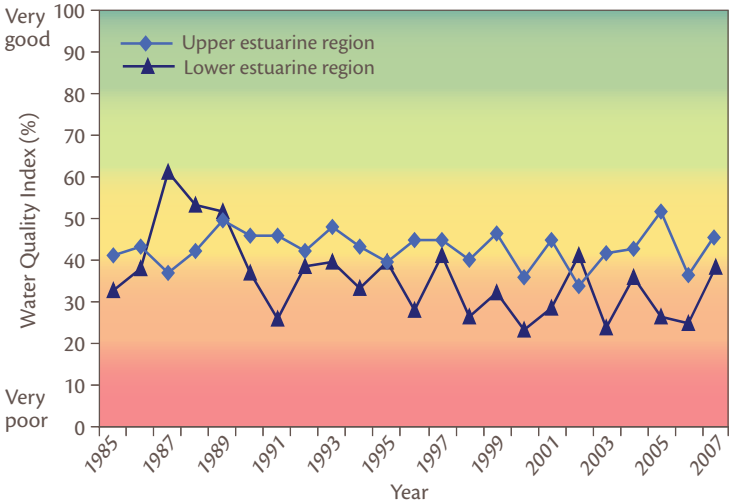
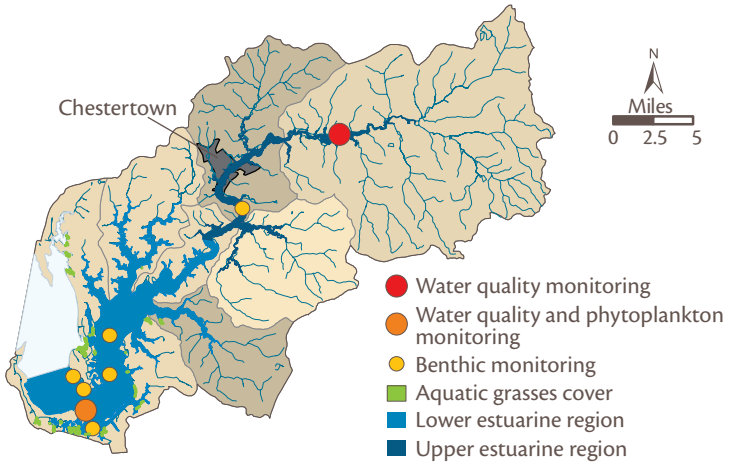


Figure 3: Water quality in the estuarine regions of the Chester River between 1985 and 2006.



Location of the monitoring stations within the tidal reaches of the Chester River.

MORGAN CREEK, LARGEST SOURCE OF NUTRIENTS

Morgan Creek is a unique watershed because it has the largest number of point source pollution discharge permits in the Chester River basin. Within the watershed, there are two wastewater treatment facilities and two industrial dischargers permitted to release a total of 620,000 gallons of wastewater every month. Agriculture also dominates the landscape, ranging from dairy farms to row crops. Including the nonpoint sources that typically come from agricultural practices, Morgan Creek is estimated to be the largest overall source of nutrients to the Chester River estuary. These nutrient load estimates also account for the large differences in water quality observed between the monitoring stations at the mouth of the creek (poor water quality) and the station in the mid-reaches (moderate-good water quality; see previous page).

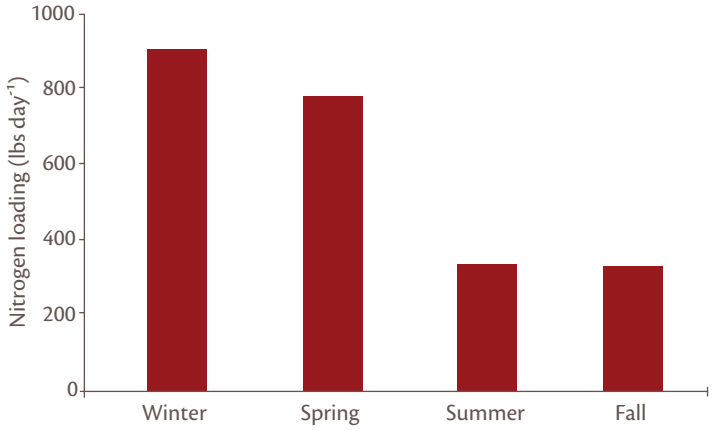


Figure 4: Estimated 2007 Morgan Creek seasonal nitrogen loads. Assessment conducted by the Chester River Association.

CRA

Aerial photograph of Morgan Creek.

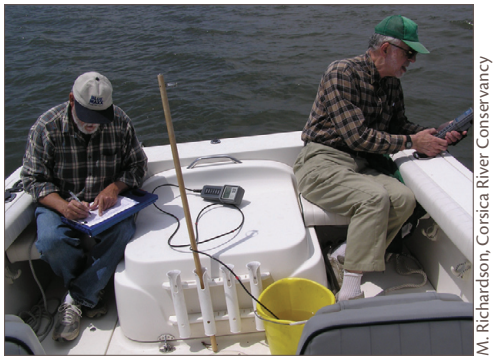
Morgan Creek has a Total Maximum Daily Load (TMDL) for nutrients. The State of Maryland estimates all the sources of pollutants and how much of those pollutants a water body can process. Maryland uses a computer model with inputs of water quality samples and discharge permit allowances, but there are also assumptions made since many of the point source discharge locations are not monitored for nutrients.

The Chester River Association (CRA) recently completed an independent assessment of nutrient loads based on data collected from the Chester Tester creek monitoring program. This assessment showed how nitrogen loads can differ between seasons (Figure 4). Phosphorus loads calculated by the CRA's methods were significantly higher than those based on the model, prompting further investigation to determine the discrepancy between the results.

While the CRA works with the State to incorporate their testing results, changes are already occurring in Morgan Creek. Chestertown Foods, a food processing plant, has ceased operations, the two wastewater facilities are upgrading to enhanced nutrient reduction systems, and CRA is working to reduce phosphorus output from Velsicol Chemical. All of these changes will significantly reduce the nutrient load to Morgan Creek and the Chester River. Continued monitoring will be needed to determine what effect this will have on the overall health of our watershed.

NO FISH KILLS IN THE CORSICA RIVER DURING 2007

The Corsica River Conservancy has been conducting weekly water quality monitoring during the May–October period for the past three years. This is in conjunction with the Corsica River Restoration Project initiated by the State of Maryland in 2005. In September 2005 and again in September 2006 there were massive fish kills in the Corsica River, with an estimated 30,000–50,000 fish lost in the 2005 event. The fish kills were caused by toxins released by harmful algal blooms (HABs) and/or very low dissolved oxygen levels that occurred during decomposition of the decaying blooms. In 2007, dissolved oxygen levels were consistently better than 2006 (Figure 5), with levels dropping just below the threshold level for a very short period. In contrast, dissolved oxygen levels in 2006 were below the threshold for most of June and July, and for a short period in September. While many regions of the Bay experienced fish kills in 2007, there were no fish kills in the Corsica River, and this can be attributed to a lack of harmful algal blooms. It is too early to know if this past year's conditions are a true long-term improvement, but continued efforts to reduce nutrient loads through programs such as cover crops should bring positive benefits. For more information, please visit www.corsicariverconservancy.org.



M. Richardson, Corsica River Conservancy

Volunteers monitoring the health of the Corsica River.

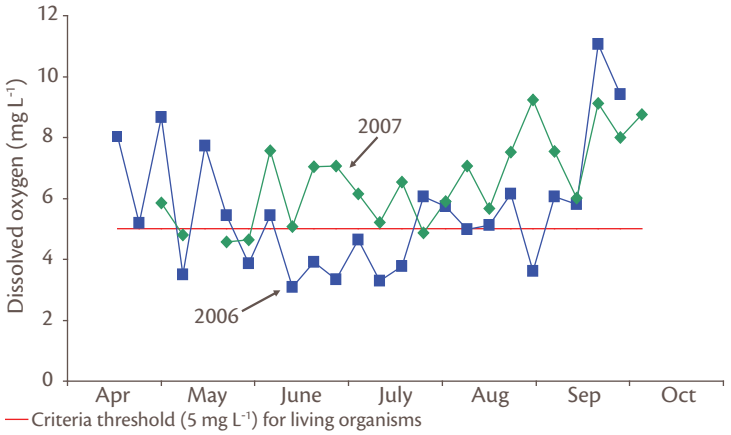


Figure 5: Dissolved oxygen levels in the Corsica River during 2006 and 2007. Dissolved oxygen in 2007 was above the threshold level during the majority of sampling times.

HOW GRADES ARE CALCULATED

The creek Water Quality Index is based on five parameters (nitrate (NO_3^-), ammonium (NH_4^+), phosphate (PO_4^{-3}), dissolved oxygen, and turbidity) that were measured at approximately monthly intervals during 2007. The frequency that each parameter exceeded its target level was calculated to provide a score between zero and 100. For example, a score of 75% means that the indicator passed the target three-quarters of the time. The Water Quality Index score for each station is then calculated by averaging the individual indicator scores (Figure 6).

Scores for the estuarine region of the Chester River are based on three water quality (water clarity, dissolved oxygen, and chlorophyll *a*) and three biotic (aquatic grasses, Phytoplankton and Benthic Indices of Biotic Integrity) indicators. Grades for the estuarine regions of the river were calculated in a similar manner, that is, the frequency that they pass established targets. Aquatic grasses were assessed by measuring progress towards an area (hectare) goal. Further information available at: www.eco-check.org.

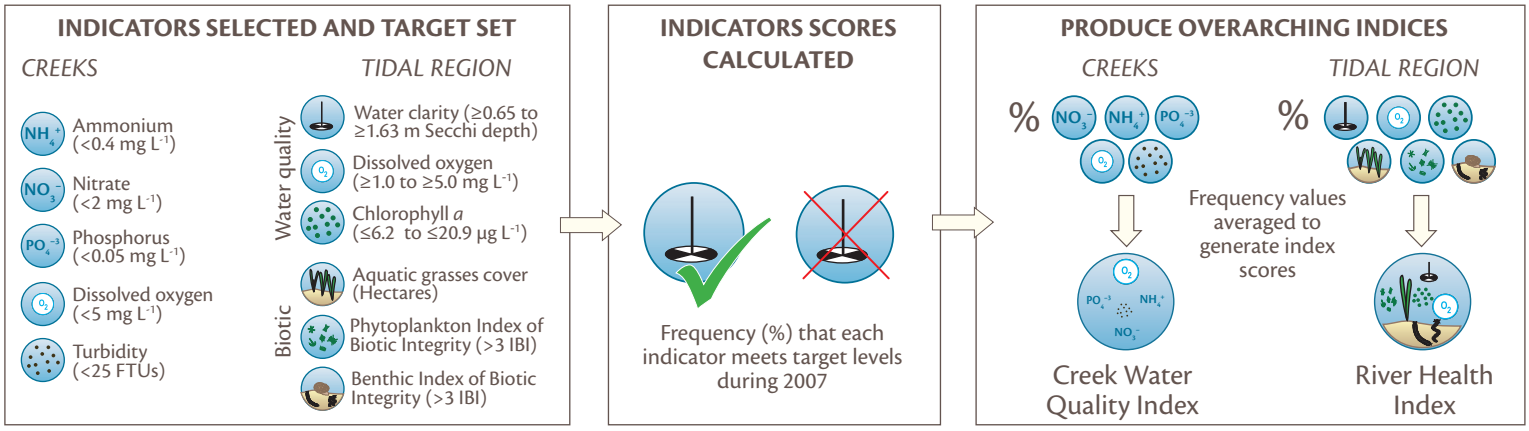


Figure 6: Summary of the methods used to generate the report card scores.

WHAT YOU CAN DO

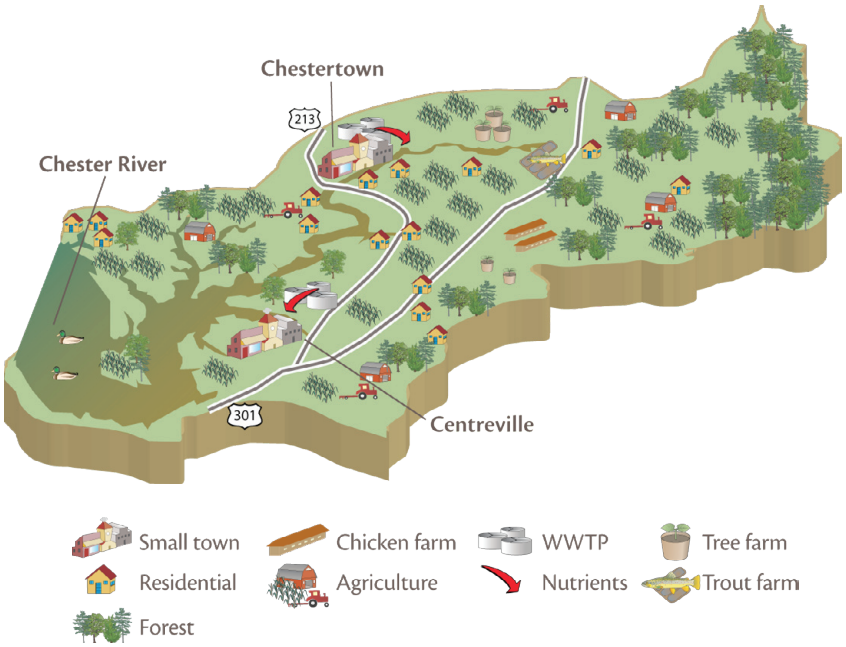
A few ways you can reduce your nutrient footprint:

- Reduce lawn and garden fertilizer use.
- Maintain your septic system and if possible, replace with a more advanced system that has nitrogen removal capabilities.
- Reduce runoff and exposed soil. Plant trees; conserve water; direct drains and gutters into vegetated areas.
- Reduce your use of electricity. Power generated by the burning of fossil fuels leads to increased atmospheric nutrient and toxicant deposition.
- More ways to reduce your impacts can be found at: http://www.chesapeakebay.net (Get Involved)

Support the Chester River Association (CRA):

- Donate or become a member of the CRA.
- Become a volunteer Chester Tester or a committee member.
- If you discover a problem, immediately contact the CRA so that they can follow up with the appropriate department.

To contact the CRA:
Email: info@chesterriverassociation.org
Phone: 410-810-7556
Website: www.chesterriverassociation.org



Chester River watershed highlighting major land uses and other factors impacting the River and creeks.

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Further information at:
www.chesterriverassociation.org
www.eco-check.org
www.ian.umces.edu

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