

FOCUS on Water Quality

Friends citizen water quality monitors test these parameters

By Beth Hansen

The Friends of Chesterfield's Riverfront citizen water quality monitors test the water at 6 sites. These volunteer monitors perform a series of tests on a weekly basis. Their commitment at this level enables Chesterfield County to have a data at these sites related to water clarity, temperature, dissolved oxygen and pH. Below is a description of why we monitor for these parameters and how the monitors perform the tests.

Water clarity (turbidity) Water clarity measures how clear the water is. Material suspended in water will reduce water clarity making it more turbid. Two primary reasons water clarity is reduced are (1) soil runoff from land after a rainstorm; and (2) growth of algae in warm, nutrient-rich water. Nutrients running off the land (such as fertilizer and animal waste) and entering from point sources such as sewage treatment plants can trigger algae blooms (large growths of algae).

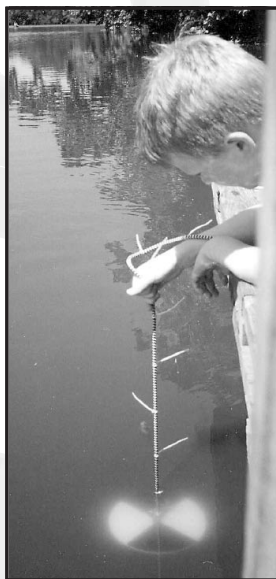
Why is turbidity or cloudy water a problem? (1) Turbidity affects rooted aquatic plants (such as underwater grasses) by reducing the amount of sunlight they receive. Without adequate sunlight for photosynthesis, they cannot survive. These plants provide habitat including food, shelter and oxygen for fish and other aquatic animals. Underwater grasses along shorelines also help to trap soil and nutrients washing into waterways.

(2) Too much sediment can clog the gills of fish and shellfish and cover up eggs

and bottom-dwelling animals when it settles out. It also fills in river channels.

A secchi disk and a transparency tube are two pieces of equipment that can be used to measure water clarity. A secchi disk is a black and white disk attached to a rope. The disk is lowered into the water until it cannot be seen. The secchi depth is the depth just before the disk disappears from view.

For shallow water, a transparency tube can be used. The tube is a cylinder that is filled with sample water. There is a drain at the bottom. Water is slowly released until the black and white pattern in the transparency tube just becomes visible by



Nathan Hanson - Friends volunteer

viewing from above. The level of water remaining in the tube is recorded as the transparency tube reading.

Temperature Water temperature is

CONTINUED ON PAGE 4

Announcing the 2003 Citizens for Water Quality Outstanding Citizen Activist Award

Congratulations to Peggy Sleevi, one of Friend of Chesterfield's Riverfront's citizen water quality monitors. Peggy received an outstanding citizen activist award from Izaak Walton League's Save Our Streams at the Citizens for Water Quality Annual Summit held in Charlottesville on Saturday, July 26.



Peggy Sleevi has been a water quality monitor for the Friends of Chesterfield's Riverfront since the program was initiated in the fall of 2000. Peggy and her students at Trinity Episcopal School perform QA/QC on all the weekly data collections for the six sites sponsored by Friends. She also enters the data from monitors who don't have access to the Alliance for the Chesapeake Bay's database. This past year, in addition to monitoring at Robious Landing Park on the James River, Peggy agreed to take over the administration portion of Friends monitoring program by directly receiving data from all our volunteers and tracking the data sheet.

Chesterfield Office of Water Quality volunteer opportunities

By Heather Barrar, Chesterfield Office of Water Quality

The Chesterfield County Office of Water Quality has adopted the mission to "preserve, protect and restore the ecological integrity of the county's watersheds, streams and other water resources." We cannot complete this mission unless we have your help.

By volunteering as a citizen monitor,

you will collect valuable data to help manage our water resources. You also will gain a greater understanding of our natural environment by interacting with nature. Whether you are looking for a one-time weekend project, or long-term involvement, we have a program to fit your needs.

We will be offering training for both of our monitoring programs on Oct. 25 at Pocahontas State Park. Contact Heather Barrar, at 748-1920, if you are interested in

attending. Currently, we offer three volunteer opportunities:

Stream Watcher: Are you interested in learning more about your favorite creek or looking for a family project? Become a stream watcher. This project takes a few hours and we ask that you visit your stream every season, or at least twice a year. While visiting your stream, take pictures and record observations such as the

CONTINUED ON PAGE 7

Focus on Water Quality

Friends citizen water quality monitors test these parameters

CONTINUED FROM PAGE 3

be affected by shading from trees along streambanks, stormwater runoff, depth of the water and cooling water discharges from industries. Temperature impacts many parts of the aquatic ecosystem. Temperature affects the rates of chemical reactions and the solubility of many substances. Water temperature affects how much oxygen water can hold. Colder water can hold more oxygen than warm water. Temperature also affects feeding and reproduction of aquatic animals. Some aquatic organisms are more sensitive to temperature than others.

Water temperature is easily measured using a scientific thermometer. The thermometer should be left in the water sample about 3-5 minutes. The sample needs to be kept out of the sun.



Dissolved oxygen Dissolved oxygen (DO) levels are affected by water temperature (warm water hold less oxygen than cold), water turbulence, production by plants during photosynthesis, and consumption by aquatic animals, plants and bacteria. This is one of the most important indicators of water quality. All aquatic plants and animals need DO to survive. Fish and other aquatic organisms become stressed and cannot survive when DO levels are low. When DO levels drop close to 5 mg of oxygen per liter of water or below, many species of fish and other aquatic animals are stressed and may not survive.

During Virginia's hot summer months, a combination of factors contribute to low oxygen levels in streams and rivers. Warm water can't hold as much oxygen as cold water—at 30 C (86 F) water can only hold 7.7 mg/l of oxygen, whereas at 5C (41F) water can hold 12.8 mg/l oxygen (Alliance for Chesapeake Bay Citizen Monitoring Manual). Summer rainstorms can carry fertilizer and animal waste from yards and farms to waterways, adding excess nutrients. The warm temperatures and the abundance of nutrients provide ideal conditions for algae to grow, leading to algae blooms.

Algae blooms can reduce DO levels dramatically. As the algae die, there is a population explosion of decomposers (primarily bacteria) that consume oxygen. DO levels can drop very low (even to 0) particularly

near the bottom of water bodies where much of the decomposition occurs. This can kill bottom-dwelling organisms and fish eggs. A major algae bloom can result in low oxygen levels spreading throughout the water body, stressing many aquatic organisms.

Dissolved oxygen is measured by volunteers using a chemical test kit. If problems are detected, the Office of Water Quality is notified and will test with a calibrated meter.



Joe Roussos - Friends volunteer

pH pH indicates how acidic or alkaline (basic) a substance is. It is the measure of hydrogen ions (H⁺) in a solution. The pH scale ranges from 0-14. A pH of 7.0 is neutral. Numbers below 7 are acidic, numbers above 7 are alkaline. The scale is logarithmic, so a change from one number to the next represents a ten-fold change in the acidity or alkalinity. The pH of distilled water is 7, bleach is 12-13 (very alkaline or basic), baking soda is about 8.0, vinegar is about 3.5 and lemon juice is about 2 (very acidic). Natural rainfall has a pH of about 5.6 (slightly acidic).

Survival and reproduction of fish and other aquatic organisms is impacted at high or low pHs. In general, a pH reading higher than 9 or lower than 6 can impact aquatic life. Photosynthesis tends to increase the pH of waters, so high pH readings can occur during algae blooms. Chemicals in runoff and rainfall can impact pH. Sulfur dioxides and nitrogen oxides are air pollutants produced by car exhaust, coal-burning power plants and other emissions. These chemicals react with water in the air to form sulfuric acid and nitric acids. These are commonly called acid rain (or acid precipitation). Acid precipitation can cause the pH of water bodies to drop. Water bodies surrounded by areas with thin, acidic soils are most at risk. Some soils (such as those containing limestone) can buffer the rainfall before it reaches the streams and rivers.

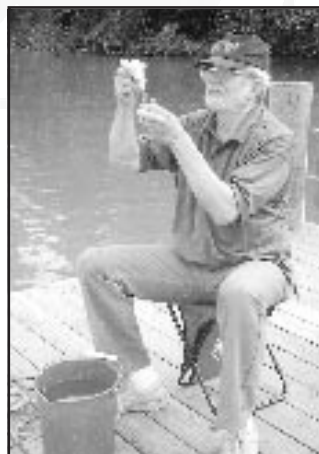


meter, testabs or pH paper.

Salinity Salinity is only measured at one of the Chesterfield monitor sites. Jim Turner monitors salinity from his dock on the James River in Enon. Because this area is tidal and during the summer 2002 drought, more aquatic life resulting from additional salinity were noticed, salinity is being measured. Typically the reading for salinity at the Enon site is around 1.41 parts per thousand (ppt). Jim says, "Considering all the rain we have had, I suppose the readings are lower than they would have been last year. I always do my testing now at about 4 - 6 PM. It has worked out that most of my readings have been at high or outgoing tide, but even at low or incoming tide, I have a salinity reading." Freshwater usually has a salinity of less than 0.5 ppt. Saltwater (ocean water) may be about 35 ppt. According to the Alliance for the Chesapeake Bay, the salinity near the mouth of the James River varies from about 8 - 19 ppt, while the salinity in the tidal freshwater James is 0.3 ppt or less. The term brackish water refers to water with an intermediate salinity (1-10 ppt. is one measure of brackish water, with 10-30 ppt. considered moderately salty).

The Appomattox and James Rivers and in the Chesapeake Bay, salinity can vary with rainfall. When there has been lots of rainfall, the freshwater runoff typically lowers the salinity. During dry periods, tides bring salty ocean water further up into the rivers. Because saltwater is more dense than fresh, the water tends to have higher salinity near the bottom that at the surface in tidal rivers.

Salinity is measured using a hydrometer which calculates specific gravity and correcting for temperature.

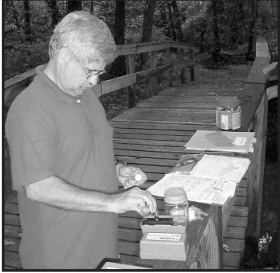


Jim Turner - Friends volunteer

REFERENCE: ALLIANCE FOR THE CHESAPEAKE BAY CITIZEN MONITORING PROGRAM MANUAL.

Focus on Water Quality

Thanks to all our Citizen Monitors



Doug Camp - Friends volunteer

The Friends of Chesterfield's Riverfront have been sponsoring a successful weekly citizen water quality monitoring program in partnership with the Alliance for the Chesapeake Bay and the Chesterfield County Office of Water Quality Section since September 2001. Without the dedication of many of the volunteers listed, this work would not be possible.

Robious Landing at James River

Current monitors - Marilyn Haskell, Peggy Sleevei & Deb Kinder
Past monitors - Sara Miller, Norma Pohle & Julie Mentzer

Rockwood Park at Falling Creek

Current Monitors - Doug Camp and Linda Luck & family
Past monitor - Steve Church & Cheryl Richardson

Enon at Mount Blanco on the James River

Current Monitor - Jim Turner
Past monitors - Robert Dern, Tommy & Chris Buisset

Dutch Gap at Henricus on the James River

Current Monitors - Jason Walters, Darcey Davies & family and Jimmy Jones
Past Monitors - Ed Thompson, Jim Speckhart, Jonathan Williams, Lindsey Minter

White Bank Park at Swift Creek

Current Monitors - Beth & Nathan Hansen & Dan Hobbs

Bailey Bridge at Swift Creek

Joe & Nicholas Roussos & Norman Pohligh

Pocahontas State Park

Paula Labieniec

Also, a great deal of appreciation and thanks to Peggy Sleevei and her students at Trinity Episcopal for entering the data needed and for preparing QA/QC on all of the Friends of Chesterfield's Riverfront data. This year Peggy has begun to receive the citizen's data sheets directly and is responsible for all the administrative work related to the Friends' monitoring program.

Most recently, we have had some dedicated monitors leave for work and other reasons. We wish Steve Church the best. He monitored Rockwood Park for the past 2 years. Thanks Steve. Also, thanks to Jim Speckhart who helped at Dutch Gap while he attended VCU. Good luck to both of you guys in your new work!

Welcome to our new monitors trained by Jessica Blackburn & Stacey Moulds in August at Henricus Historical Park. Thanks to the Henricus Foundation for the use of the education facility for this training. *Welcome new monitors!* The Davies and Luck families, Deb Kinder, Paula Labieniec and Jimmy Jones.



Nicholas Roussos - Friends volunteer

Top 10 reasons to become a Citizen Water Quality Monitor

10. Gives you a greater understanding of the environment
9. You can get your kids involved
8. It's a chance for real people to do real science
7. Explore new areas of your community
6. Makes you feel great
5. Gives you the realization where your drinking water comes from
4. Meet new people and make new friends
3. Lets you "do something" about the environment
2. Helps the community protect natural resources

And the number one reason to monitor:

1. It's fun to get your feet wet!

Chesterfield Office of Water Quality
Heather Barrar, 748-1920 or barrar@chesterfield.gov

What Does a Friends' Citizen Water Quality Monitor Do?

By Janit Potter

The monitors work in teams for each monitoring site. Each team sets a schedule to share the responsibility of weekly monitoring. It is preferred that the teams arrange at time so that each week the data is collected around the same day of the week and the same time of the day. As the data is being collected, the monitors record the information on a data sheet. Many monitors take this sheet home with them and enter it directly onto the Alliance for the Chesapeake Bay database. After entering data, the monitors mail their data to Peggy Sleevei the volunteer data manager who does a quality assurance check and retains the original data sheet.

To become a water quality monitor, citizens usually contact Janit Potter, executive director for the Friends of Chesterfield's Riverfront. Interested persons are encouraged to accompany an existing volunteer monitor prior to registering for training. After learning more about what is involved, citizens interested in becoming a water quality monitor are scheduled to take a two-hour training class to learn how to conduct the tests. The Alliance for the Chesapeake Bay staff conducts these training sessions and provides equipment support to all Friends volunteers. Once trained, citizen monitors may begin to work on the team for their selected site. Within a six month period and once a year thereafter all monitors must pass a Quality Assurance test on their monitoring technique. This test usually involved a Saturday morning session combined with additional training.

Other ways monitors become active in the larger community is to attend statewide Citizen Water Quality meetings held quarterly. The Friends volunteers attend these meetings and bring back information to share with the organization.