

Conservation Currents

Northern Virginia Soil & Water Conservation District
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How Healthy Is Your Stream? Find Out As A Volunteer Stream Monitor

by Matthew Monteverde, NVSWCD Summer Intern

Every year hundreds of streams in the United States are contaminated by pollutants that degrade their overall health. What most people do not realize is that a large portion of this stream degradation is attributed to us. After a rainfall event, paved areas and rooftops create large volumes of surface runoff that pick up contaminants on our roads and lawns (such as oil and fertilizer) before flowing into storm drains which channel the polluted runoff directly to our streams. Fairfax County has 30 major stream watersheds, all of which feed into the Potomac River and Chesapeake Bay. Both the increased runoff volume as well as the contaminants can have very adverse effects on our aquatic ecosystems, and in particular, on our populations of benthic macroinvertebrates.

What are macroinvertebrates and why are they so important to the health of our streams? Benthic macroinvertebrates are small but visible aquatic animals without a backbone that live at the bottom of streams for at least some portion of their lives. They can be found under logs, sediment, rocks and aquatic vegetation.

Some common examples of these animals are: crayfish, clams, snails, aquatic worms, and a variety of aquatic insect larvae, such as stoneflies, caddisflies, mayflies, dragonflies and damselflies. In addition to being an integral



Stream monitor group leader Chandra holds up an observation container with Hellgrammites.
Credit: Matthew Monteverde

part of the aquatic food chain, they are also used to draw conclusions about the overall health of our streams.

How are macroinvertebrates used to measure stream health? Macroinvertebrates, unlike fish and other aquatic vertebrates, are less mobile and therefore less able to escape the effects of habitat degradation. Their abundance and species diversity can be used to measure stream health. They live year-round in the stream which helps in continual water quality studies. Each species

Monitor continued on page 2

Monitor continued from page 1

responds to contaminants and stress differently. This allows for better determination of problems that are plaguing our streams. In addition, certain macroinvertebrates such as stoneflies, caddisflies and mayflies can also act as early warning indicators of changes to the stream, in particular, through contamination from point and nonpoint sources. These specific macroinvertebrates are very sensitive to stream impairment and need good water quality, cool temperatures, and a high concentration of dis-



Volunteer stream monitors loosen rocks and sediment while collecting macroinvertebrates. Credit: Matthew Monteverde



Picking out and classifying different macroinvertebrates found on the net. Credit: Matthew Monteverde

solved oxygen to survive.

Often, when we think about determining water quality, we imagine chemical tests such as pH, dissolved oxygen or nitrate testing. Although these give us a numerical value as to the quality of our water, the numbers are subject to high variability within the stream. A less expensive, more efficient method involves using biological monitoring to evaluate the abundance and diversity of benthic macroinvertebrates found in the stream to assess habitat quality.

Macroinvertebrates are collected using a net positioned on the stream bed as rocks and

Monitor continued on page 8

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Fertilize in the Fall, If At All

And Other Tips for a Healthy Lawn

Fall is a good time to evaluate your lawn care program and make adjustments for the coming year, whether you do it yourself or contract it out. Here are our favorite tips:

- **Fertilize in the Fall.** Timing is everything when you apply fertilizer. Autumn is when your lawn's roots - what sustains your lawn through the summer - are actively growing.
- **Not in the Spring!** Spring fertilizing encourages leaf growth at the expense of root development. It feeds weeds and can lead to disease and insect problems. In addition, you will have to mow the lawn more frequently. If you must fertilize in the spring, limit it to a light feeding (half-pound of 10-10-10 per 1000 sq. ft.) after the initial flush of growth has subsided in May.
- **Never Fertilize in the Summer.** Most lawn grasses in our area are cool season species, which die back during the heat of the summer.
- **When in the Fall?** The ideal periods for application are the first two weeks in September and between the last mowing and Thanksgiving. After Thanksgiving, fertilizer will most likely wash into local streams, degrading aquatic environments.
- **Choosing a Lawn Care Company.** If you decide to contract lawn care professionals, carefully research the operation. Are a variety of pest management approaches offered? Is your lawn treated as a single entity, or does every lawn get the same treatment of pesticides, herbicides, and fertilizer?
- **Soil Matters.** Before you fertilize, test your soil to learn what, if anything, it needs. For \$10, the Virginia Cooperative Extension (VCE) will analyze a soil sample for you. Soil test kits are available at any Fairfax County Public Library or at the VCE office.
- **Just Lime?** If your lawn needs anything, it is likely lime. Most soils in Northern Virginia are acidic; lime helps to neutralize the acidity. A balanced pH will improve the availability of nutrients, encourage thatch decomposition, and benefit soil microorganisms, all of which are essential to the soil's health and fertility.
- **Lime Tips.** Lime can be applied to your lawn any time of the year. It is best to apply it in the fall, because it takes several months to be fully incorporated into the soil. For turf, pelletized limestone is preferable to pulverized limestone. The pellets spread more evenly with less dust.
- **Keep It Sharp.** Sharp mower blades produce a cleaner cut that slices through grass rather than pulling it by the roots. Sharp blades give your lawn a more uniform appearance and extend the life of your mower.
- **Cut It High...** Set your blades for a mowing height that will remove only the top one-third of the grass blade. Higher settings allow the grass to compete effectively with lower growing weed species. Higher growth also shades the ground from the sun, reducing moisture requirements.
- **...Let It Lie.** Turf clippings are mostly composed of the grass' leaf tissue and thus decompose rapidly. Clippings left on the lawn will contribute nitrogen and other nutrients to the soil, reducing fertilizer needs.
- **Integrated Pest Management.** By using healthy lawn care practices, you will cut down the need for pest control. If you use pesticides, apply only to the area that is affected by the pest.

For more tips, view NVSWCD information at www.fairfaxcounty.gov/nvswcd or VCE Lawn & Garden publications at www.pubs.ext.vt.edu

What Is That Stuff In The Stream?

by Danielle Wynne and Heather Ambrose, Ecologists

Stormwater Planning Division, Dept. of Public Works and Environmental Services, Fairfax County

What Is That Orange Slime?

Streams in Fairfax County support many different types of life. Fish, insects and salamanders live in many streams. Sometimes we may see things in streams that we do not recognize. The fuzzy, bright orange substance seen in the picture to the right is often a type of bacteria! This bacteria takes iron dissolved in groundwater and oxidizes it (a chemical reaction similar to forming rust), drawing energy from the process of turning it into gelatinous gunk. When iron is oxidized, it cannot dissolve in the water. Instead, it produces either an orange colored slime, like the picture to the right, or an oily sheen, like the picture below. This indicates that the stream is partially fed by groundwater.

Bacteria or Petroleum:

How to Tell the Difference?

To distinguish between iron oxidizing bacteria and petroleum, break up the oily sheen on the water with a stick. If the sheen stays broken up in pieces, then it is most likely iron



Attack of the Orange Slime! Is this an orange monster emerging from the stream?
No! It's iron oxidizing bacteria.
 Credit: Friends of Accotink Creek

oxidizing bacteria; the same as the orange slime above – just in a different form. Iron oxidizing bacteria is not harmful and may accumulate for several months until it is dislodged by high water flows.

If the sheen goes back together, then it may be a petroleum spill. If you believe it is a petroleum spill, please call the Fairfax County Fire and Rescue Department Hazardous Materials Investigative Service at 703-246-4386, TTY 711.

Sudsy Water: Natural or Man-Made?

Foam, suds or bubbles in a stream may be the result of a natural process or human pollution. Foam develops in streams when certain substances interact with the water, reducing the surface tension. This makes air bubbles on the water. When air is mixed with moving water, foam, suds or bubbles are created. Nature contributes to the creation of foam, suds or bubbles when plants and animals decompose and release a substance that can break down



An oily sheen produced by iron oxidation, a natural process.
 Credit: Fairfax County

How to Tell the Difference Between Natural and Man-Made Foam

Natural sources from decomposition of leaves, twigs or other organic substances:

- Natural foam appears as light tan or brown, but may be white and has an “earthy,” “fishy” or “fresh cut grass” odor.
- Natural foam occurs at many locations along a stream, accumulating on or near the bank, or on other material in the stream.
- Natural foam can be seen in eddies or floating downstream.
- Natural foam increases after rain storms as rainfall transports the decomposed plants to the stream.
- Natural foam can cover large areas and can accumulate in large amounts.

Man-made sources include yard fertilizing, car washing, washing machine discharge, sanitary sewer or septic field failures:

- Foam from man-made sources is usually white and fragrant or perfumed.
- Foam from man-made sources will accumulate near the source of the discharge.
- Foam from most detergents is biodegradable and will disappear quickly.
- Foam from leaking sanitary sewer lines or septic fields will have a foul odor.
- Foam from man-made sources is likely not related to rain storms.

the surface tension of the water. A drier than usual winter and early spring can contribute to a buildup of natural factors that cause foam, suds or bubbles in the water.

Over-fertilizing your lawn can cause excess plant and algae growth to occur in local streams. The decomposition of this excess growth will lead to an increase in foam, suds and bubbles.

Car washing on hard surfaces, washing machine discharge, sanitary sewer or septic field failure and certain types of industrial discharge from paint and pesticide production can be a source of man-made foam, suds or bubbles.

If you see foam, suds or bubbles in a Fairfax County stream that you suspect is a result of a sanitary sewer line break, or if you detect the odor of sewer gas, call the Fairfax County Wastewater Collection Division at 703-323-1211, TTY 711. For additional information please contact the Stormwater Planning Division at watersheds@fairfaxcounty.gov or 703-324-5500, TTY 711 ♠



Soapy suds enter a stream, likely from car washing on a residential driveway.

Credit: Fairfax County

Here Comes the Electric Car

by Jackie Falatko, NVSWCD Summer Intern

Each year, we see a new set of cars. While this normal cycle is familiar to us, this year we have seen some truly new vehicles on our roads. In December 2010, the Chevrolet Volt began arriving at homes in the Washington, DC metro area. Nissan rolled out their electric car, the Leaf, in the DC area in July 2011. Other car companies are closing in on producing electric models within the next couple of years as well. With the Volt earning Motor Trend's Car of the Year award, the car world – and environmental world – is abuzz.

The benefits of using electric cars are widely heralded. The United States' dependence on oil is linked to national security and it is also tied to climate change. Electric cars reduce carbon dioxide emissions, particularly if more of the nation's electricity comes from renewable energy sources.

What Makes These Cars New?

This new wave of car technology is, of course, not entirely unprecedented. The Toyota Prius and Honda Civic gas-electric hybrids have been on the market in the United States for about ten years. The Chevrolet Volt and the Nissan Leaf, on the other hand, run purely on electricity. Well, sort of. The Volt has the capacity to drive about 40 miles using only electricity and then runs on gasoline (premium only) for an additional 375 miles, at 37 mpg. In comparison, the Leaf has an electricity-only range of 100 miles, but then must be recharged. In current models, air conditioning and heating use, as well as "heavy foot" accelerating, will diminish those ranges, in some cases significantly.

Other auto companies are jumping on the electric bandwagon. The 2011 Tesla Roadster can travel 200 miles on pure electric power, but costs about \$110,000 compared to about \$40,000 for the 2011 Volt or the \$35,000 2012 Leaf. A \$7,500 federal tax credit helps make the cars more affordable. By comparison, the



Credit: Adventures of Pam and Frank

2011 model of the hybrid Toyota Prius is priced at just over \$22,000. (Hybrid cars purchased after December 31, 2010 are no longer eligible for tax credits.) Other auto manufacturers including Ford, Toyota, and Mitsubishi are expected to introduce their own electric vehicles to U.S. markets within the next couple of years.

The Infrastructure: Charging Stations

What happens when the battery runs out? Where will owners of the new electric vehicles charge their fancy high-yield batteries? Most will use at-home charging stations in their garages, essentially plugging into an electrical outlet, for Level I or II charging. Level I charging charges a car in about 12 hours using a regular 120 volt outlet, the equivalent of plugging it into the wall for the cost of about \$1.50 day. However, older homes sometimes require new wiring dedicated to car-charging, or risk overloading existing circuits.

Another option is for owners to buy a 240V charging kit for Level II charging. These kits cost around \$500, with installation fees ranging from \$1,000 to \$1,500. These kits could charge the Volt, for example, in as few as four hours. Fairfax County and other localities require a permit to install a charging station. For more information, contact the Dept. of Planning and Zoning at 703-222-0801, TTY 711.

Level II charging stations are also becoming

available at gas stations, airports, and car dealerships. There may be charging stations installed at some rest stops in Virginia in coming years. The Nissan Leaf's navigation system includes the locations of nearby charging stations.

Level III charging utilizes DC (direct current) unlike the alternating current (AC) in our homes. This technology is still being designed, but once on the market, most electric vehicles will charge in under an hour. They are able to partially charge 50-80% in 10-15 minutes. However, constant charging at Level III will lower the range of the car.

How Green Are Electric Cars?

Electric cars do not burn gasoline, so they do not generate harmful emissions at the tailpipe. However, the electricity must still be generated to charge electric vehicles. Currently, the United States obtains about 50% of its electricity from coal and around 20% each from nuclear and natural gas.

A new feature on the U.S. Dept. of Energy website* allows users to enter a zip code and see detailed information about their electricity sources, as well as what that means for electric vehicle carbon emissions.

In Northern Virginia, 50.47% of our electricity comes from coal, 38.74% from nuclear and 4.95% from natural gas. The remaining 5.84% comes from hydroelectric, biomass, oil, and other electricity sources.

An electric vehicle recharging in the Northern Virginia area would contribute annual CO₂ emissions of 7167 pounds. In contrast, a conventional gasoline vehicle emits 13043 pounds of CO₂ per year, a considerable increase. The figures are based on "well-to-wheel" greenhouse gas emissions, taking into account the production and distribution of both fuel and electricity in the calculations.

Proponents of electric cars also advocate for greater reliance on solar, wind, and other renewable sources of energy. Even though the electricity grid has a long way to go to be considered truly green, electric cars already make

a significant improvement in total emissions.

There are other criticisms of electric cars. The process of mining lithium for the batteries can cause serious environmental damage. Rare earth minerals are used in the battery systems, which have an environmental impact as well. Price fluctuations in either commodity could also be harmful to the nascent industry.

Is It Worth the Money?

If you are thinking about buying a new electric car instead of a gasoline car, you will also want to consider the economic factors.

Say you drive a gasoline car 15,000 miles a year and get 25 miles per gallon of gasoline. With gasoline at the price of \$3.75 per gallon, the annual cost of gas would be \$2,250.

If your new electric car utilizes only electricity, at around \$1.50 a night, the annual price tag for the electricity would be \$547.50.

The cost of a new gasoline car is around \$20,000 and an electric car is around \$30,000 (after the \$7,500 tax break). The cost of the installation of the charging station could be an added \$1,500.

While the electric car has a higher price tag up front, all told, after about 6 years the electric car would break even and the gasoline car's cost would begin to exceed the cost of the electric car. Of course, these numbers are estimates based on average usage.

An electric car is certainly something to be considered. Total carbon emissions are significantly reduced. There are zero emissions from the vehicle itself, which could improve local air quality. The cost over the lifetime of the vehicle is roughly equivalent to a new gasoline car, thanks in part to federal tax credits. As infrastructure develops, more electric models come out, and their popularity increases, perhaps some day we will say, "Do you remember when we used to pump gasoline into our cars?" ♦

* U.S. DOE, "Emissions and Electric Vehicles": http://www.afdc.energy.gov/afdc/vehicles/electric_emissions.php

Monitor continued from page 2

sediment are overturned. After each catch, the macroinvertebrates are identified, sorted by species and recorded on a data sheet. At the end of the stream monitoring session, some simple calculations are made and an ecological score is determined. A typical stream monitoring site should be sampled four times a year during each season to get an accurate assessment of the changing quality of the stream.

Currently only 36% of the rivers in the US are monitored by the government. We know very little about the condition of many of the streams and rivers, even in our own backyards, and it is up to volunteers to do additional monitoring to protect the health of our streams.

Stream monitoring is important for the Chesapeake Bay watershed, home to thousands of different species of plants and animals that all depend on clean water. The macroinvertebrates serve as the first indicators in determining human impairment of our streams.



Stream monitoring is fun for all at Holmes Run!
Credit: Matthew Monteverde

Stream monitoring is a fun, easy way to determine if your local stream has been impacted by pollution sources. To get involved and find out about upcoming events, contact Dan at Daniel.Schwartz@FairfaxCounty.gov or 703-324-1423, TTY 711. ♣



Hellgrammite found in a local stream.
Credit: Matthew Monteverde

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Don't Miss These Articles!
How Healthy Is Your Stream? 1
Fertilize in the Fall, If At All, 3
What Is That Stuff In the Stream? 4
Here Comes the Electric Car, 6