



Stroubles Creek

WATER QUALITY IMPROVEMENT PROJECT

You are driving through Blacksburg during a terrible summer thunderstorm. You can picture it. It's dark, the windshield wipers are on high and you still can't see. Suddenly, your steering wheel pulls to the side and the roar of a wave hitting the bottom of your car is heard. Have you ever wondered where all of that water will end up? And what types of pollution are running off of streets, roofs and parking lots?

Most residents don't realize that Stroubles Creek runs through downtown Blacksburg! It runs through many neighborhoods, behind stores, and underneath downtown and the Drillfield on Virginia Tech's campus! Blacksburg residents are more connected to Stroubles Creek than many realize. Every piece of trash and grease spot left on Main Street may be swept up by runoff and carried down a storm drain directly into Stroubles Creek. Excess fertilizer, grass clippings, and pesticides from people's yards may run into Stroubles Creek. Storm drains and gutters offer the pathway for our pollution to reach Stroubles Creek.

How do we gauge the impacts to Stroubles Creek from stormwater runoff? The Virginia Department of Environmental Quality (DEQ) regularly monitors water quality in streams throughout Virginia to ensure that the streams can support healthy aquatic communities. Specifically, DEQ looks at benthic macroinvertebrates, or bugs for short. Examples are crayfish, aquatic insects and worms. Key bug families, or groups, in these communities are sensitive to pollution and will typically be present where there is good water quality, appropriate habitat conditions, and little or no pollution. Families that are sensitive to pollution include mayflies, stoneflies, and caddisflies. Other pollution sensitive families include certain beetles, dragonflies, and snails.

Bugs require particular water quality conditions. **Temperature** is important because it influences the activities of aquatic organisms along with the **oxygen** levels in water. Just like humans, bugs require oxygen to survive.

BACKGROUND

BENTHIC MACROINVERTEBRATES: "Benthic" means bottom-dwelling, "Macro" indicates that these insects are large enough to be seen with the naked eye, and "Invertebrates" tells us these organisms have no backbones.

If temperatures rise then oxygen levels fall. In addition, the **pH** must be within a certain range (between 6 and 9) to support a healthy community. pH measures the acidity or basic (alkaline) properties in the water. **Nutrients** in forms of Nitrogen and Phosphorus, like fertilizers, are present in nearly all streams. However, increased levels of nutrients can cause too much algae growth leading to a shortage of oxygen. As you can see, changes in just one of these components can lead to a change in a stream's water quality. This change can negatively affect the aquatic community.

The second component required by a healthy aquatic community is good habitat or surroundings. Healthy bug communities prefer streams that have a variety of rock sizes. They also require that these rocks be relatively free of fine materials like silt and sand (**sediment**). Many bugs live on the sides and undersides of the rocks and lose their living spaces if fine materials fill these areas. The amount of vegetation on the stream banks also influences the aquatic community. Some groups of bugs eat leaves that fall into the stream from the banks. In addition to providing food, bank vegetation shades the stream and keeps water temperatures low and oxygen levels higher than those without vegetation.

If the bug community is dominated by one family or if it contains only a few families that are sensitive to pollution, the bugs are telling us that water quality is less than desirable. DEQ designates these streams as **Impaired**. Impaired streams are scheduled to have a **Total Maximum Daily Load, or TMDL**, study conducted on them. The TMDL identifies causes of stream impairment and determines how pollution entering the stream can be reduced. The information from the TMDL study is presented at a series of public meetings where input is gathered from local **stakeholders**. Stakeholders are interested parties such as citizens, industries and local government.

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The TMDL study on Stroubles Creek was completed in 2004. It identified nutrients and sediment as the cause of the problem. The planning for TMDL Implementation kicked off shortly thereafter. During this phase, water quality improvement projects were identified by the stakeholders. Called **Best Management Practices, or BMPs**, these projects are designed to meet the pollution



Net-spinning Caddisfly Larvae



reductions needed to help the stream recover. The Stroubles Implementation planning phase brought together local landowners, town residents, DEQ, Department of Conservation and Recreation, the Town of Blacksburg, and Virginia Tech. The main goal was to reduce the amount of sediment and nutrients entering Stroubles Creek.

Sediment and nutrients in Stroubles Creek come from a variety of sources. Paved surfaces like roads and parking lots cause water to run off quickly during storms. As a result, pollution associated with automobiles, industry and human activities run off into Stroubles Creek. Unvegetated areas where construction activities occur and stream banks with cattle access also contribute to soil erosion during storms.

With the Town of Blacksburg and Virginia Tech on board to improve water quality in Stroubles Creek, several Implementation Plan projects are in the works. The projects range from fencing cattle out of Stroubles to improv-

TOTAL MAXIMUM DAILY LOAD

is the maximum amount of pollution a stream or river can handle and still maintain a healthy aquatic community.

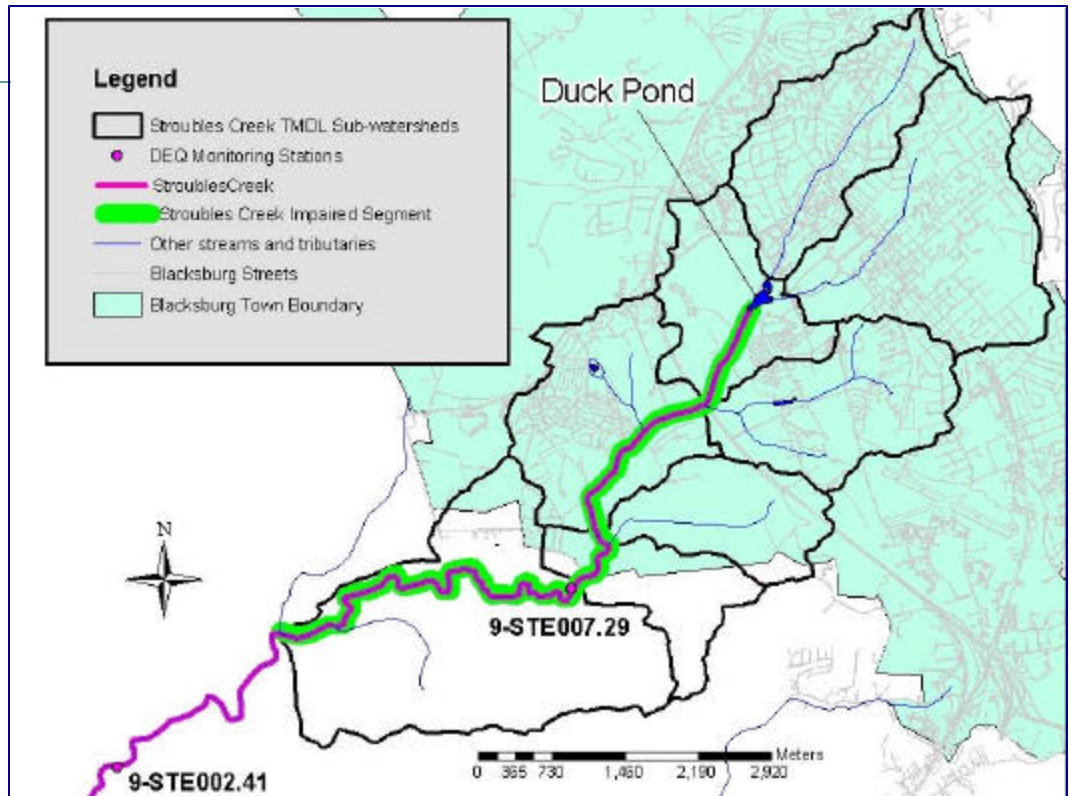
ing the stormwater holding pond at the Skelton Center. Other projects include street sweeping, rain garden installation, infiltration strips and porous pavers. Street sweeping helps reduce the amount of fine materials that run off into the stream during storms. **Rain gardens** are landscaped areas that collect and treat stormwater before it soaks into the ground. Infiltration strips are installed around the perimeter of parking lots. **Infiltration strips** are trenches filled with different sized rocks. Infiltration areas slow stormwater and allow the ground to absorb it. The design keeps stormwater from rushing off paved surfaces and immediately entering the storm sewer system. **Porous pavers** installed in parking areas spread out the water and allow the ground to absorb storm water through the spaces between the pavers.

Installing BMPs is not the final step. In order to prevent future problems, stakeholders must be educated about the importance of stream side vegetation, proper fertilization, responsible land disturbing activities and stormwater

TMDLs
In a nutshell...

- **Unhealthy Bug Community observed by DEQ**
- **TMDL study**
- **Implementation Planning Begins**
- **Best Management Practices, or BMPs, are identified**
- **BMPs installed in the watershed**
- **Bug Community monitored**
- **Bug Community recovers**
- **Water Quality Improvement goal is Achieved!**

management. The recovery effort is continuing via a partnership between the Implementation Plan support team and the New River Watershed Roundtable. DEQ and volunteers continue to sample the bugs in Stroubles Creek. A return of key families to the stream will ultimately show whether water quality improvement projects have helped Stroubles Creek. And the



next time you drive through town in that torrential downpour you will know where the water ends up!



STROUBLES CREEK BELOW MERRIMAC ROAD BRIDGE

STROUBLES CREEK ON VIRGINIA TECH CAMPUS



How can YOU help Stroubles Creek? Treat Stroubles like a STREAM not a STORM DRAIN!

- ◆ Stroubles Creek Implementation Plan: www.deq.virginia.gov/tmdl/implans/stroubip.pdf and for information about water quality monitoring contact Mary Dail at mrdail@deq.virginia.gov
- ◆ For general information on ongoing water quality improvement efforts in Stroubles Creek, contact Llyn Sharp at llyn@vt.edu
- ◆ To learn about what the Town of Blacksburg is doing to manage the watershed, contact Matt Stolte at mstolte@blacksburg.gov
- ◆ For more information about what Virginia Tech is doing to improve water quality, contact David Dent at ddent@vt.edu

