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Notes from the field – Spring & Summer 2010: Water Quality
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Spring – Summer 2010: Water Quality Assessments

The farm is certainly looking greener but have we actually made improvements that will help the nearby stream?



Point source polluters are carefully regulated.

The type of pollution we are trying to prevent through our project is known as “non point source” pollution also commonly referred to as [NPS](#). Often when we think of water pollution we think of pollution that comes from a sewage treatment plant or factory pipe outlet. These types of pollution are called “point sources.” Point sources are carefully regulated to make sure they don’t contribute to water pollution.

We all, directly or indirectly, contribute to what is called non point source pollution. Basically NPS pollution occurs when rainwater washes pollutants across the land, downhill and into our waterways.



Storm drains take raw rainwater directly to the nearest stream to keep our roadways from flooding



Volunteer to label the drains in your community



Rainwater is a source of non point source pollution that we all impact

In urban and suburban areas, the rainwater often first washes off our lawns, streets, roofs, and parking lots into storm drains a.k.a. sewers. Did you realize that these storm drains that keep our roads from flooding drain directly into the nearest waterway? They don't travel to a sewage treatment plant first to be cleaned. If you've ever thrown litter, pet waste or poured oil into a storm drain, you unfortunately sent it directly to a local stream. Many people don't realize the connection. There are opportunities to label storm drains in your community. For more information contact the [Prince William Clean Community Council](#).

The rainwater that falls on our horse farms travels over our pastures, manure piles, and paddocks. What does the rainwater encounter on your farm?



A muddy area at Oakwood Farm (before) might a source of non point source pollution

In the "before" conditions on Oakwood Farm for example, the rainwater from the roof fell to the ground in front of the barn into the high-traffic area of bare soil, and potentially manure. The rainwater could wash through this area in further out into the pasture. The pasture grasses were short with



Smooth surfaces like overgrazed, compacted, pastures speed up the flow of rainwater and lead to erosion of vital topsoil and nutrients

bare spots of exposed soil between the plants. Here rainwater could pick up loose soil or sediment, manure, and if it had recently been applied, fertilizer or herbicides. The polluted rainwater would continue to move downhill toward the stream.

The smoother the surface (short grass vs. tall grass) the faster the water will flow. Water also increases in speed and force as the slope toward to stream increases in angle. By the time the

contaminated rainwater reaches the stream it is moving with enough velocity to cause additional erosion in the stream channel itself. The fast moving water pulls at the sides of the banks of the stream, loosening more soil, and adding to its polluted load. This in how over time stream channels become deeper, wider, and more upright.

Ever notice the muddy or even chocolate milk-like appearance of local streams during or shortly after a rain storm? This is most likely from non point source pollution.

So, our goal with the project was to change the landscape through horse- and bay-friendly management practices so that less polluted water would runoff the pasture. We wanted to slow down the flow of rainwater and allow more rainwater

to soak into the soil rather than run off. We also wanted to reduce some of the sources of pollution.



Rainwater can carry sediment downhill

We began at the barn by installing gutters and downspouts. The roof water runoff is now collected in an underground pipe that outlets into a well-vegetated area in the adjacent hay field. The tall grasses help to slow the water down and the vegetation helps to soak up the rainwater so less runs off.



Gutters and downspouts can control and direct rainwater from our roofs



It's hard to keep vegetation on high-traffic areas like paddock and around the water troughs



Muddy stream water can be from sediment entering the stream or from erosion of the stream banks themselves

The area adjacent to the barn, on both sides of the barn, was a typically high-traffic area, denude of vegetation. It's not realistic to think that you can keep vegetation in any area that receives a lot of hoof traffic. Common high traffic areas on horse farms include areas near the barn, gates, water troughs, and travel lanes. We resurfaced the dirt areas with bluestone and added fencing to create mud-free sacrifice area paddocks. Manure is collected off the paddocks daily. The areas around the water troughs and gate areas adjacent to the sacrifice areas were also treated with bluestone dust gravel.

The manure is now stored in a composting facility and protected from rainwater. This protects both the nearby stream and also prevents



Manure storage piles can be a significant source of pollution for surface and groundwater

manure-contaminated rainwater from leaching into groundwater beneath the composters.

Probably the most significant progress we made to protect water quality is the improvements to the pastures. The thick, tall grasses can now slow the flow of rainwater and allow more infiltration of water than runoff. Think of it this way, how quickly does a marble roll across a glass table? What about through shag carpet?



Our O2 manure composting system protects water quality

Our safety net, so to speak, for any remaining runoff

water is our streamside buffer. This 25 foot wide area directly adjacent to the stream is fenced to keep the horses

away. The grasses, trees, and other vegetation are allowed to grow as dense as possible. The buffer area is the final speed bump and filter to slow and clean

rainwater before allowing it to gently enter the stream.

Data was collected on the farm in both the "before" and "after" conditions. Soil loss before the project was estimated at 0.95 tons per acre per year. After the installation of BMPs and improved pasture management, soil loss was reduced to 0.10 tons/acre. The Clean Water Project conducted a stream assessment of the "before" and "after" conditions of the stream channel and buffer that could be used for additional comparisons over a longer period of time. Rainfall runoff was measured by Virginia Tech's Biological Systems Engineering. The volume of runoff in the "after" conditions decreased by 76% with an 80-92% decrease in nutrient and sediment levels in the runoff.



Gather rainfall simulation data at Oakwood in the "after" conditions

To read the project-specific scientific reports related to the rainwater runoff and the stream, visit the links below:

[Water Quality Evaluation of Equine Farm Management Practices](#)

Prepared by Virginia Tech, Biological Systems Engineering

[Chesapeake Bay-Friendly Horse Farm Project Water Quality Monitoring](#)

Prepared by Virginia Waters and Wetlands, Inc.

Each of us can impact non point source pollution. Maintain or establish healthy vegetation to slow, filter, or absorb rainwater. Work to keep pollutants out of our waterways and away from storm drains. Only apply fertilizers or manure to your farm (or lawn) at rates based on soil tests to keep excesses from washing away. Minimize the use of impervious surfaces like concrete, and asphalt because not only do they prevent rainwater infiltration, they warm and speed up the flow of rainwater, and can



This water trough does not have to be dumped to clean and we've placed gravel around the trough to prevent erosion from high-traffic

increase erosion and harm water quality. If you do use a semi-impervious surface on your farm, like bluestone, make sure rainwater flowing across the bluestone then flows into an area of dense vegetation so it can slow down, cool, and allow pollutants time to settle out. You have the opportunity to improve water quality in our streams and the Chesapeake Bay by beginning with simple, but effective, practices at your home <http://www.pwcgov.org/default.aspx?topic=010008000750005939> or farm.