What is a watershed report card?

The Firelands Coastal Tributaries Watershed Program is a partnership of local, state, and federal agencies, local businesses and volunteer groups working together to improve the small streams within the Firelands area.

The report card is one product of that partnership to communicate findings of stream, wetland and beach health sampling to our residents.

The aim of this report card is to provide a transparent, timely, and geographically detailed assessment of water quality for Mills Creek in 2014.

Grades are determined by comparing three indicators (nitrate, soluble reactive phosphorus, and turbidity) to scientifically derived ecological thresholds or goals. These three indicators are combined into one overarching Water Quality Index, which is combined with the average macroinvertebrate score for the watershed to create an overall watershed grade.

Vital Signs Indicators (dissolved oxygen, water temperature, pH, and ammonia) are considered basic diagnostic indicators that are not included in the Water Quality Index. If one or more of the vital signs do not score well, it is an indication of a serious problem in the creek.

Firelands Coastal Tributaries Watersheds

Many coastal communities, such as the northern areas of the Firelands, are unique because the drainage of the coast is divided into a collection of small streams that empty directly into the Sandusky Bay and Lake Erie.

As you travel across the county, you will cross small drainage areas called "watersheds" that define where rainfall and snow melt will flow to a stream or tributary. Many of us don't think about where our water came from or where it is going as it passes under a road bridge, but understanding watershed systems helps us make decisions that keep water clean and Lake Erie healthy.

The Firelands Area coastal tributaries are made up primarily of small creek systems: Cold Creek, Mills Creek, Pipe Creek, Sawmill Creek, Old Woman Creek, and Chappel Creek. These creeks differ greatly in geology, soil type, water sources, natural habitats, and land use, which makes our Firelands watersheds an area of great diversity for our residents, tourists, as well as native and migratory wildlife.

Although these tributaries are small, they play a very important role in the overall health of Lake Erie. They serve as nursery habitat for fish, vital "stop-over" sites for migrating birds, drinking water, recreation opportunities, and more. Even though most of Lake Erie's water comes from the upper Great Lakes, most of the pollutants come from the watersheds that drain into it. Monitoring helps identify which streams need the most attention to improve water quality.
A system driven by groundwater & storms

When it rains, it drains; and these storm events move pollutants through the watershed. Pollutants, like sediment and nutrients, increase in Mills Creek when it rains similar to other local watersheds. Mills Creek differs from our other local streams because it is also highly influenced by groundwater. The groundwater in Mills Creek helps to keep a more stable base flow (low water flow) in the channel but can potentially show higher concentrations of pollutants in the stream in the absence of rain if the groundwater entering the stream has been contaminated.

What makes up Mills Creek?
Mills Creek is a 42.4-square-mile watershed made up of many small tributary and drainage ditches. Mills Creek begins in Sandusky and Huron Counties encompassing the City of Bellevue and empties into Sandusky Bay on the west side of Sandusky. The watershed consists of approximately 26% developed land, 67% agricultural land, and 7% natural areas. There is one EPA permitted sewer outflow in the City of Bellevue that discharges into the headwaters of Mills Creek. This watershed is also home to several industrial areas with permitted discharges to the Creek.

Mills Creek is located on the easternmost portion of the Great Black Swamp, a once large wetland system created after Ancient Lake Erie’s shoreline receded to its present day location. The soil consists mainly of lake basin clay with a high seasonal water table. As a result, this area is commonly saturated in the spring months and drains slowly where drainage improvements have not been implemented. Mills Creek is also part of a Karst geological region, which is characterized by a series of sinkholes and underground rivers flowing through cracks and cavities in the limestone bedrock. Surface water and groundwater are more connected in Karst regions increasing the potential for flooding and groundwater pollution. Nearly the entire watershed is highly sensitive to groundwater contamination.

Key features
- Urban centers
- Storm-driven system
- Flooding
- Quarries
- Rail yard/industry
- Possible Karst area
- Golf courses

Indicators of health
- Soluble reactive phosphorus
- Nitrate
- Turbidity
- Bacteria
- Benthic community

Pollution Sources
- Urban stormwater and combined sewer overflows
- Manure/sludge fertilizer application
- Broken and/or leaking septic systems
- Municipal wastewater treatment plant
- Row-crop agriculture
- Animal agriculture

Types of inputs
- Nutrients
- Sediments
- Bacteria

Bare ground in winter and little to no natural buffers between field and stream contributes to the degraded water quality in Mills Creek.

Key drivers
Mills Creek’s water quality is affected by many types of land uses, such as urban development, agricultural row-crop and livestock farms, commercial and industrial areas, and limestone quarries. The drainage of this watershed has been heavily modified including the use of tile, open ditch and sinkholes to carry excess stormwater from development and farm fields. This combined with Karst geology increases the transportability of pollutants through the watershed. Only 30% of the stream maintains a buffer of natural vegetation; reducing the stream’s ability to effectively handle the excessive flush of pollutants from rain events. This watershed also has the lowest adoption of conservation tillage in the county.

Municipal waste water from the City of Bellevue and several home sewage treatment systems also contribute to sediment, nutrient, and bacterial pollutants in the watershed.
Mixed Year of Wet and Dry Months

The amount of rainfall observed in 2014 during the sampling period from April to November, did not always follow the average climate pattern for the area. The season started off with fairly normal rainfall in the spring, and experienced below average rainfall amounts in the summer months. The beginning of fall was very wet but ended drier than average.

The total number of storms near or greater than 1” recorded during the sampling period was 15; however, only one of those storms occurred close to a sampling event influencing the results. Of the storms recorded, 1/2 occurred during spring. The average number of “wet days” for daily records was 16 during the sampling period.

Mills Creek is influenced by both groundwater and storm water discharges. The lack of storm events sampled resulted in some improvements in turbidity and phosphorus scores but not nitrogen suggesting not all pollutants are storm driven in this creek.

Monitoring in Mills Creek

Monthly water samples are analyzed by volunteer stream monitors and Old Woman Creek Reserve Staff from April through November. Annual benthic macroinvertebrate (aquatic worms and insect larvae) sampling and identification is performed in the summer by staff, volunteers, with the assistance of a summer research intern.

Nitrogen, monitored as nitrate, is a type of nutrient pollution which is found in fertilizer and untreated waste. In excess this chemical can lead to algal blooms.

Phosphorus, monitored as soluble reactive phosphorus, is another type of nutrient pollution which is found in fertilizer and untreated waste. In excess this chemical can lead to algal blooms.

Turbidity is a measure of cloudiness of the water typically caused by sediment-laden runoff. Excessive sediment in the water can clog fish gills, and cover macroinvertebrate habitat and fish eggs.

Vital Sign Indicators are a collection of pH, temperature, dissolved oxygen, and ammonia. Like our blood pressure, these parameters can identify if a serious problem is present.

Benthic macroinvertebrates are aquatic organisms with no backbone and are visible to the naked eye. Some are very intolerant to pollution, therefore make great indicators of water health.

Bacteria, measured as E. coli, are microorganisms commonly found in untreated waste. Many bacteria are harmful to human health and can restrict our drinking and recreational water uses.

Bacteria, an indicator of human safety

Determining if recreational areas are safe for swimming is accomplished by measuring certain bacteria as an indicator. These bacteria serve as a surrogate for the presence of pathogens which may cause illness in humans. Bacteria in the water come from a variety of sources, including untreated municipal waste, failing septic systems, pet waste, and livestock, often after heavy rainfall.

In Mills Creek, indicator bacteria are measured by the Erie County Health Department at Lions Park (see map) three to four times weekly. In 2014, Lions Park, received a 78% score meaning the risk of getting sick while swimming occurred less than a quarter of the recreational season. Although this site is not directly located at the mouth of Mills Creek, this small stream does contribute to the overall condition of the Bay.
Mills Creek 2014 Report Card

Overall the Mills Creek grade increased to a D from an F in 2013. The increase is most likely attributed to the addition of 2 sites which had better water quality and macroinvertebrate sampling.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrients</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>P SR Phosphorus</td>
<td>D-</td>
<td>C-</td>
</tr>
<tr>
<td>Turbidity</td>
<td>ND</td>
<td>B-</td>
</tr>
<tr>
<td>Benthic Macroinvertebrate</td>
<td></td>
<td></td>
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</tbody>
</table>

Nutrients are a continued Concern for Stream Health. Nutrients received poor grades again in 2014. Sites on the mainstem received lowered grades than adjacent tributaries suggesting increased nutrient inputs are entering from the Bellevue area.

What do these grades mean?

- **A (80–100%)**: All water quality indicators meet desired levels. Quality of water in these locations tends to be very good, most often leading to preferred habitat conditions for aquatic life.
- **B (60–80%)**: Most water quality indicators meet desired levels. Quality of water in these locations tends to be good, often leading to acceptable habitat conditions for aquatic life.
- **C (40–60%)**: There is a mix of good and poor levels of water quality indicators. Quality of water in these locations tends to be fair, leading to sufficient habitat conditions for aquatic life.
- **D (20–40%)**: Some or few water quality indicators meet desired levels. Quality of water in these locations tends to be poor, often leading to degraded habitat conditions for aquatic life.
- **F (0–20%)**: Very few or no water quality indicators meet desired levels. Quality of water in these locations tends to be very poor, most often leading to unacceptable habitat conditions for aquatic life.
- **ND**: No Data (ND) is a designation used for areas where there is either insufficient or no data to give a grade on desired health levels.

2014 Site Grades
Sites are listed from north to south.

- **F**: Mills Creek Golf Course
- **D-**: Strub Rd
- **D-**: Miller Rd West
- **C-**: Miller Rd East
- **F**: Strecker Rd West
- **D-**: Strecker Rd East

Note: See more information on previous page.
Clean Water Starts With You

To reduce our greatest creek stressors (nutrient and sediment pollution, and habitat loss), we all need to do our part. Whether you live in the city or on a farm of tens to thousands of acres, each of us has a role to play in reducing the impacts that come from our respective lifestyles. We thank many of our Firelands Area residents and landowners who are already working to improve our soil and water and encourage others to restore and protect Lake Erie. To find out more about how you can help, see the back page of this report card.

Build a rain barrel for your home! Workshops offered every year April, May and June. Call the Erie SWCD for dates.

Drainage control structures placed on farm tile can reduce nutrient pollution by 50% and hold back water during the dry months.

Conservation education at Perkins and Sandusky Schools

A project called iEvolve (Inquiry and Engagement to Invigorate and Optimize Learning for Everyone) with STEM (Science Technology Engineering and Math) began at Perkins and Sandusky Schools in 2012 with the opportunity to combine citizen research with classroom learning. Students in various grades embarked on exploration into the world of pollinators, frog communities, water quality, and sustainable gardening.

Our local city schools and Bowling Green have partnered with Erie Soil and Water Conservation District, Toledo Zoo, Sea Grant Stone Laboratory, and the Toledo MetroParks to foster a love of science and discovery at an early age while providing valuable real world research than can be used locally and shared globally.

In 2014, two rain gardens were installed at Meadowlawn and Venice Heights School and a perimeter pollinator garden addition to the vegetable community garden at Osborne School. Students are currently studying how soils differ in these gardens compared to high trafficked turf lawns and what role they play in reducing runoff and improving the environment.

Students practice taking measurements of soil temperature, compaction, moisture, and infiltration in the rain garden installed at Meadowlawn in Perkins Township.

Osborne students help tend their garden, removing weeds and planting native flowers for pollinators.

Rain garden installed at Venice Heights school in Sandusky. This garden holds and stores runoff from the parking lot until it soaks into the soil.
You can help!

<table>
<thead>
<tr>
<th>WHAT YOU CAN DO</th>
<th>WHO BENEFITS</th>
<th>WHAT’S REDUCED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leave a natural area along a stream or ditch</td>
<td>Grass or wooded buffers help filter pollutants and reduce flood damage</td>
<td>N  P  🍀  🎧</td>
</tr>
<tr>
<td>Remember to inspect and pump out your septic system every 3–5 years</td>
<td>A properly maintained septic system prevents costly repairs and untreated sewage discharge into our streams</td>
<td>N  P  🎧  🍀</td>
</tr>
<tr>
<td>Help your community develop a plan that supports low impact development</td>
<td>Smart development fosters growth and protects the local resources and character of a community</td>
<td>N  P  🎧  🍀</td>
</tr>
<tr>
<td>Follow the “4Rs” of fertilizer use: Right source, Right amount, Right place, Right time</td>
<td>The “4Rs” approach promotes the wise use of fertilizer by farmers, residents, and landscapers to reduce costly nutrient loss that pollutes our streams</td>
<td>N  P  🎧  🍀</td>
</tr>
<tr>
<td>Plant cover crops</td>
<td>Cover crops build healthy soils that help hold back nutrients and water and increase crop yields</td>
<td>N  P  🍀  🎧</td>
</tr>
<tr>
<td>Plant a rain garden or install a rain barrel</td>
<td>Rain gardens and rain barrels help reduce stormwater runoff and can cut down on landscaping costs</td>
<td>N  P  🎧  🍀</td>
</tr>
<tr>
<td>Install a drainage management system</td>
<td>Managing field drainage reduces nutrient loss while saving water for when your crops need it the most</td>
<td>N  P  🎧  🍀</td>
</tr>
<tr>
<td>Properly manage livestock &amp; pet waste</td>
<td>Storing and disposing of animal waste properly reduces nutrients and prevents harmful bacteria from fouling beaches</td>
<td>N  P  🎧  🍀</td>
</tr>
</tbody>
</table>

Learn more

If you would like to learn more about the development of this report card or watersheds in the Firelands Area visit the following websites:
eriecleanwater.org  oldwomancreek.org  ian.umces.edu  eriecohealthohio.org

Get involved

We could use your help to improve our watershed. If you are interested in being a volunteer, contact Breann Hohman, Watershed Coordinator for the Erie Soil and Water Conservation District at 419-626-5211 or bhohman@eriecounty.oh.gov.

Available Opportunities:
• Stream monitoring
• Invasive plant removal
• Habitat restoration
• Litter clean-ups

Students learning how watersheds work and how we can reduce pollution.

Volunteers help collect water samples for Mills Creek.

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Erie Soil and Water Conservation District
2900 Columbus Ave, Rm 131
Sandusky Ohio 44870

Mills Creek
Report Card

Join Us!
Saturday, April 11th
10:00 am
Mr. Smiths Coffee House
140 Columbus Ave
Sandusky, Ohio

Ask questions, get answers about what's in our water!