

2013 WATERSHED EDUCATION MINI-GRANT APPLICATION FINAL REPORT

PROJECT TITLE: HEALTHY SOIL CLEAN WATER CAMPAIGN DATE: 2/5/2015

SWCD: ERIE SOIL AND WATER CONSERVATION DISTRICT PHONE: 419-626-5211

ADDRESS: 2900 COLUMBUS AVE, RM 131, SANDUSKY OHIO 44870

GRANT ADMINISTRATOR: BREANN HOHMAN E-MAIL: BHOHMAN@ERICOUNTY.OH.GOV

COLLABORATORS: OLD WOMAN CREEK NERR, FRIENDS OF PIPE CREEK WATERSHED, FRIENDS OF OLD WOMAN CREEK, ERIE HURON NRCS, BGSU FIRELANDS (DR. LINDA CORNELL)

PROJECT STARTING DATE: FEBRUARY 2014 ENDING DATE: DECEMBER 2014

GRANT REQUEST: \$ 1,000 (MAXIMUM \$1,000)

LOCAL MATCH: \$ 2,900 (INDICATE ESTIMATED CASH OR IN-KIND MATCH ON BACK OF FORM)

TOTAL PROJECT BUDGET: \$ 3,900 (INCLUDE ESTIMATED LIST OF EXPENDITURES ON BACK OF THIS FORM)

PROJECT SUMMARY (INCLUDE DESCRIPTION AND BRIEF STATEMENT ON HOW INTENDED AUDIENCE WILL BENEFIT FROM THE PROJECT):

THE HEALTHY SOIL CLEAN WATER CAMPAIGN PROPOSED TO ENHANCE THE EFFORTS OF THE FCT MONITORING PROGRAM, ESWCD EDUCATION AND OUTREACH, OLD WOMAN CREEK NERR, AND NRCS "UNLOCKING SECRETS OF SOIL" INITIATIVES TO INFORM AND MOTIVATE STEWARDSHIP CHANGES IN THE FIRELANDS WATERSHEDS USING CITIZEN SCIENCE. AS PART OF THIS PROJECT, THE ESWCD EXPANDING THE MAILING LIST OF THE REPORT CARDS TO THE STREAM ADJACENT LANDOWNERS IN MILLS CREEK (200 DIRECT MAILED PLUS 150 EXTRA) AND PREFACING THE REPORT CARD MAILING WITH A INFORMATIONAL POSTCARD. A SPECIAL INFORMATIONAL SESSION WAS HELD IN EACH WATERSHED, CONTACTING A TOTAL 48 LOCAL RESIDENTS. ADDITIONAL OUTREACH INCLUDED 7 ARTICLES THAT APPEARED IN THE AGRO-BUSINESS SECTION OF THE SANDUSKY REGISTER FOCUSING ON WATER QUALITY DATA AND SOIL HEALTH. ALSO, SMALL SIGNAGE DEPICTING VARIOUS SOIL HEALTH AND WATER QUALITY MESSAGES "HEALTHY SOIL CLEAN LAKE PLANT COVER CROPS", "SAVE NUTRIENTS PLANT COVER CROPS", "BARE GROUND SOIL LOST PLANT COVER CROPS" AND "DO YOU SOIL TEST?" ALONG THE ROAD NEAR FIELDS IN HIGH TRAFFIC AREAS OF THE MONITORED WATERSHEDS.



THE PROJECT FOCUSED ON REPETITION AND REINFORCING OF STEWARDSHIP MESSAGES, AN APPROACH OF COMMUNITY BASED SOCIAL MARKETING TO MOTIVATE BEHAVIOR CHANGES. THE PROJECT HAS BEGUN TO INCREASE THE “BUZZ” ABOUT SOIL CONSERVATION FROM OUR AGRICULTURAL AND NON-AGRICULTURAL LANDOWNERS. FOR EXAMPLE WE HAVE HAD 3 NEW CLIENTS (1 AGRICULTURAL PRODUCER AND 2 NON-OPERATORS) THAT HAVE INQUIRED ABOUT IMPROVING THEIR LAND AND PROTECTING LAKE ERIE. WE ARE CURRENTLY WORKING WITH THEM ON INSTALLING BUFFERS AND ADOPTING COVER CROPS AND REDUCED TILLAGE PRACTICES. THE PROJECT ALSO HELPED TO SET THE STAGE FOR CREATING A FARMER GROUP IN THE OLD WOMAN CREEK WATERSHEDS TO DEVELOP A WATERSHED BASED AGRICULTURAL POLLUTION REDUCTION PROJECT THAT WE MIGHT LINK TO THE VOLUNTEER AND OLD WOMAN CREEK ESTUARINE RESEARCH RESERVE MONITORING PROGRAMS. THIS GROUP OF FARMERS HAVE BEEN PRESENTED IDEAS OF SOIL IMPROVEMENT PRACTICES AND COVER CROP TECHNIQUES AS WELL AS PROVIDED THE PLATFORM FOR PEER TO PEER DISCUSSIONS.

AS WE MOVE FORWARD WE HAVE FOUND THAT THE SMALL SIGNAGE IS HELPFUL (AND COST EFFECTIVE COMPARED TO BILLBOARDS) BUT DOES NOT LAST MORE THAN ONE SEASON LIKE HOPED. A MORE STURDY MATERIAL WOULD BE HELPFUL. THE FARMERS THAT HAD THE SIGNS IN THEIR FIELDS APPRECIATED NOT ONLY HELPING TO SPREAD THE MESSAGE BUT LIKED HOW IT SHOWED THE GENERAL PUBLIC THAT AGRICULTURE IS STEPPING UP TO HELP CLEAN LAKE ERIE. IT WAS ALSO BEST TO KEEP MESSAGES SHORT. ALTHOUGH NOT ALL MESSAGES WERE UNDERSTOOD, IT DID INVOKE OTHERS TO ASKED QUESTIONS THAT OPENED THE DOOR FOR MORE CONVERSATIONS ON IMPROVING OUR LAND AND WATER!

SIGNATURE, SWCD BOARD CHAIR DATE _____

Water Quality Report

2014



Old Woman Creek Report Card



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.

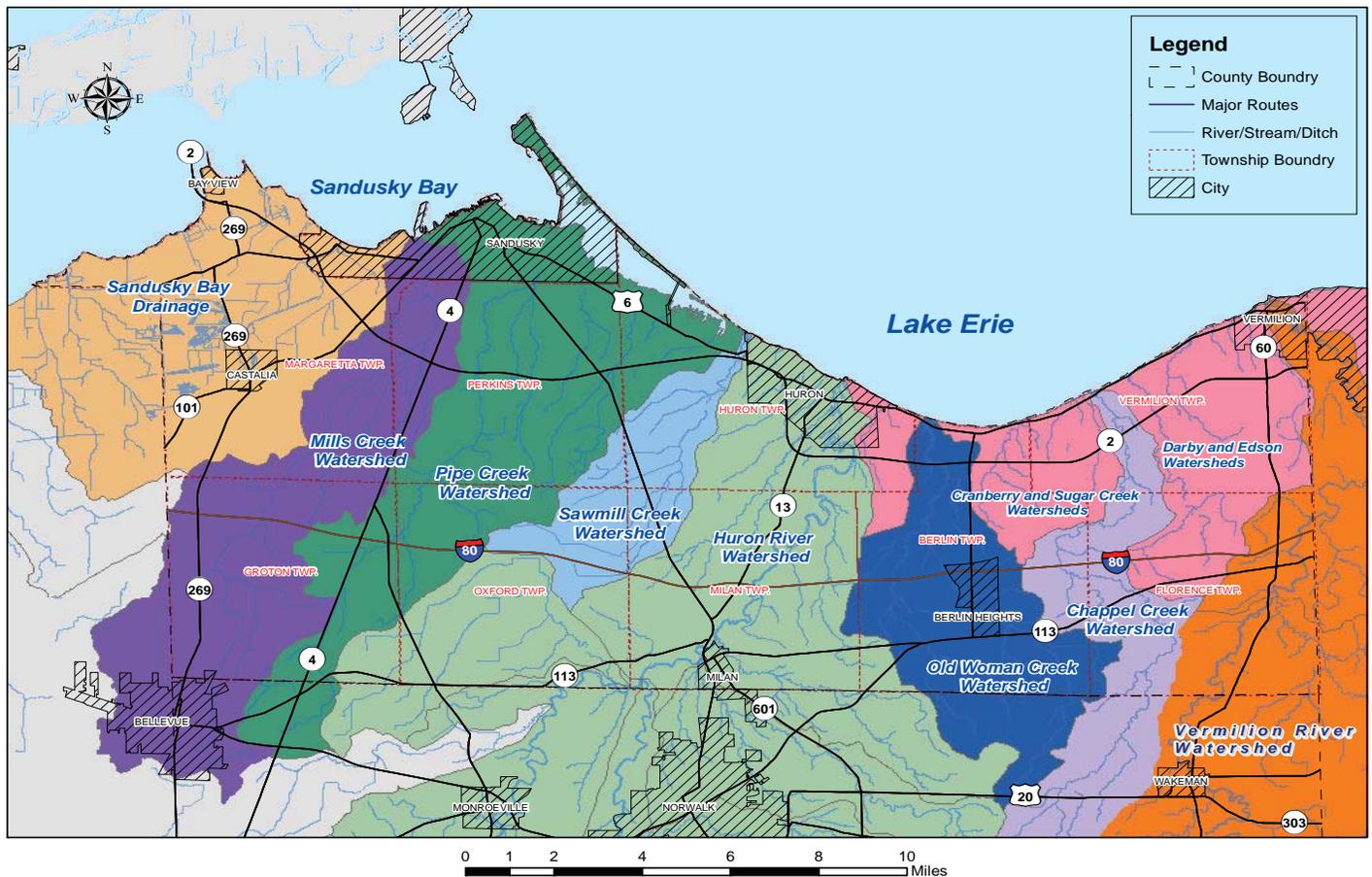
The report card is one product of that partnership to communicate findings of stream, wetland and beach health sampling to our residents.

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 storm-driven system

When it rains, it drains, and storm events move pollutants through the watershed. When Old Woman Creek's flow is low to normal, we often find little nutrient and sediment pollution. However, during and after a storm, the creek will turn light brown from being laden with sediment and often carries excess nutrients that contribute to algal blooms in Lake Erie. Storms are more intense and frequent in the spring and fall, leading to higher pollutant concentrations than in the summer.

What makes up Old Woman Creek?

Old Woman Creek is a 27-square-mile watershed consisting of east and west branches. These branches meet upstream of a natural estuary that flows into Lake Erie just east of the City of Huron. Located on the southernmost shore of the Great Lakes, a unique microclimate in this watershed supports diverse agriculture including row-crops, orchards, and vineyards. The watershed is made up of over 66% agricultural land, predominantly in the upper (southern) reaches followed by 20% natural areas in the lower (northern) reaches. At the center of the watershed is a small community, the Village of Berlin Heights.



Great Lakes freshwater estuaries are partially enclosed coastal wetlands found where creeks or rivers meet and mix with the lakes. A unique feature of Old Woman Creek is the estuary mouth, which can be open or closed.



Key drivers

Old Woman Creek estuary is isolated from the lake by a barrier beach that opens and closes according to stream flow and lake wave action. When the mouth is closed, water accumulates in the estuary, allowing wetland processes to filter out pollutants. The Old Woman Creek estuary is one of the best examples of an intact coastal wetland in the Lake Erie watershed. However, like the lake, the estuary is impacted by natural

and human factors. Storms in the upper reaches of the watershed during spring planting and fall harvest cause sediment to move downstream. Nutrients from field runoff, animal waste, and failing septic systems also enter the Creek during storms. Habitat quality influences water quality and the Creek's response to storms. Intact natural habitats are more resilient, filtering out pollutants and supporting improved water quality, than those that are degraded.

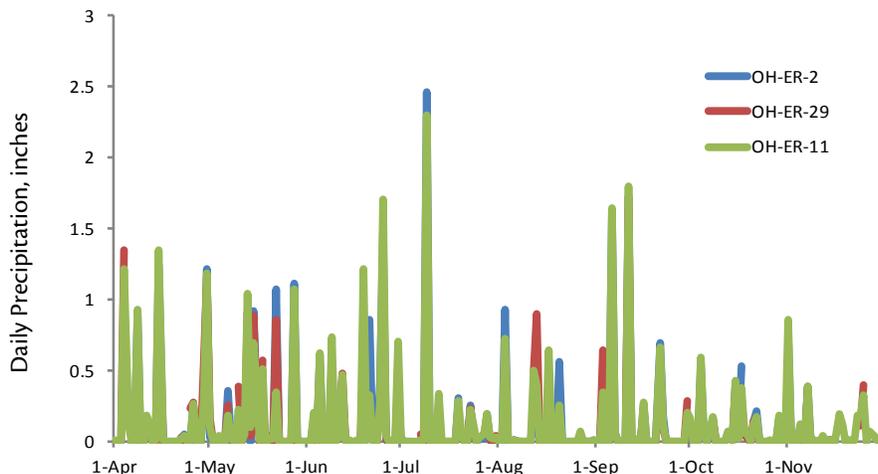
Very Stormy Spring in 2014

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. Above average rainfall was recorded in spring and early fall while summer months experienced below average rainfall totals.

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 sampling results. Of the storms recorded, 2/3 occurred during spring. The number of "wet days" for daily rain events was 10 days or greater for all of the sampling months. The driest months being October and November.

Old Woman Creek is a storm-driven system, water quality responds to storm activity for the year. Although, most sampling events were not influenced by storm activity, most grades did not show improvement in 2014.

OWC Daily Precipitation Data 2014



Daily rainfall totals from the COCORAHs stations within the Old Woman Creek Watershed.

Monitoring in Old Woman 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.

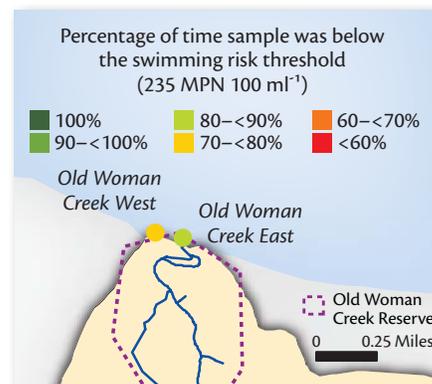


Bacteria, measured as *E. coli*, are microorganisms commonly found in untreated waste. Many bacteria are harmful to human health and can restrict our drinking and recreational water uses.

Bacteria, an indicator of human safety

The water quality indicators measured in Old Woman Creek provide an overview of the ecological health of the watershed. 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 failing septic systems, pet waste, and livestock, often after heavy rainfall.

In Old Woman Creek, there are two lake sites located on the public and private barrier beach (see map) where bacteria are measured by the Erie County Health Department. In 2014, west beach scored 71% and east beach 90% meaning most of swimming season presented less risk of illness from contact with water. Note that the bacteria scoring scale is more stringent than water quality indicators because of the high variability and importance to human health and safety.



Old Woman Creek 2014 Report Card



B- Estuary

The estuary received a B- grade overall, a slight decline from 2013, but a great improvement compared to the creek. Turbidity is not scored in the estuary due to lack of threshold.

Indicator	2012	2013	2014
N Nitrate	C+	C	C-
P SR Phosphorus	A-	B	A-

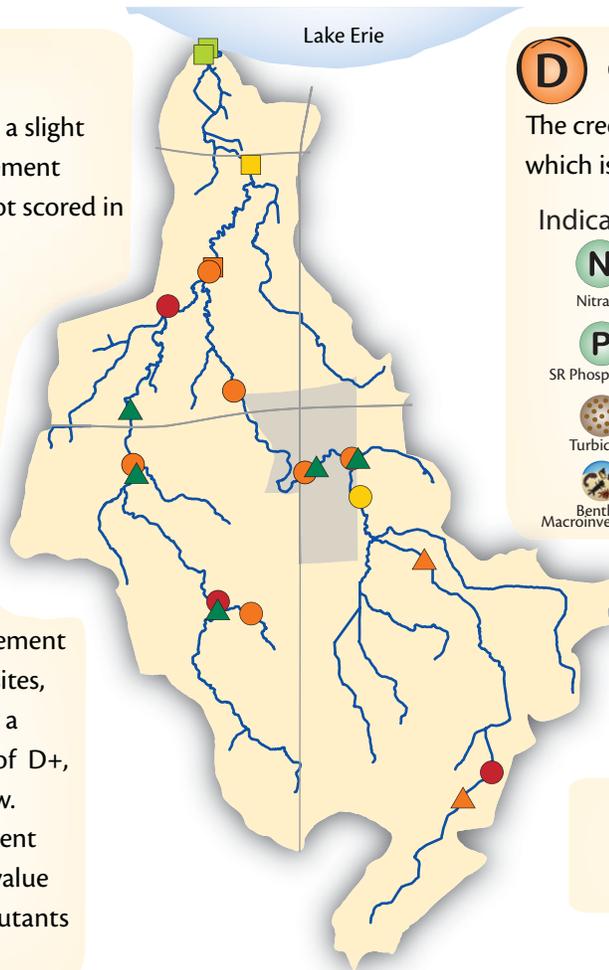
Nutrients and Turbidity a Concern for Stream Health

Although P showed a slight improvement with a grade of C in 2014 for the creek sites, N failed overall for a second year in a row. Turbidity also received a lower grade of D+, marking a decline the third year in a row. The estuary showed better overall nutrient grades than the creek highlighting the value coastal wetlands serve filtering out pollutants before they reach Lake Erie.

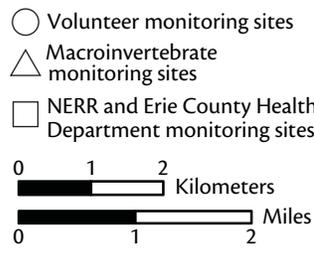
D Creek

The creek received a D grade overall, which is a slight decline from 2013.

Indicator	2012	2013	2014
N Nitrate	C+	F	F
P SR Phosphorus	C-	D	C
Turbidity	C	C-	D+
Benthic Macroinvertebrate	ND	ND	B



Vital Signs Indicators



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.

People working together for clean water

We all need clean water. As a coastal community, the health of our water greatly affects our quality of life and our economy. Sediment and nutrients carried by runoff from urban and agricultural areas pollute our waterways, causing murky water conditions and algal blooms which can be harmful to animals and humans.

When our water is polluted, we lose recreational opportunities like swimming, sport fishing, and birding and may incur increased costs for drinking water treatment and dredging to keep boating channels open. To reduce the greatest stressors on Old Woman Creek (nutrient and sediment pollution, and habitat loss), we as a community need to work together. Whether you live in the city or on a farm of tens to thousands of acres, we all can help reduce polluted runoff. 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 how you can help, see the back page of this report card.



Old Woman Creek NERR offers many opportunities to help improve our waterways such as annual rain barrel building workshops.

Digging deeper in soil will benefit agriculture and Lake Erie



A bare soil is susceptible to wind and rain erosion as well as becoming biologically dead due to lack of plant roots to complete the cycle of nutrients. When soil is not properly managed more tilling, fertilizer, and pesticide use if often need to continue to maintain crop yields.

Focusing on the health of our soil is our greatest opportunity to improve water quality, reduce our carbon footprint, and establish food security by creating resilient productive farms. Because soil is the second largest “carbon sink” (greatest place to store carbon aside from the ocean), improving its health helps mitigate the impacts of climate change by reducing carbon in our atmosphere.

Over the last hundred years, our soils have been heavily worked and have lost organic matter and structure, which has increased compaction and erosion, while reducing the ability to hold water and nutrients. A healthy soil is more alive and has better structure to filter our water, buffer extremes in weather, and reduce fertilizer and pesticide inputs to grow a crop.

A group of Old Woman Creek farmers have begun meeting to investigate their own soil health to improve their farms and the health of the creek. Among the conservation needs discussed, these farmers are looking at reducing compaction, soil & nutrient loss, and building organic matter. Get involved by contacting the Erie SWCD office.

National research in our own backyard

Where the creek enters Lake Erie you will find the Old Woman Creek Estuary. This important wetland system was designated in 1980 as one of the 28 nationally protected areas in the National Estuarine Research Reserve (NERR) System, which is part of the National Oceanic and Atmospheric Administration.

As a research reserve, this site is the center for freshwater estuary monitoring in the lower Great Lakes through the System Wide Monitoring Program. (SWMP). This program monitors water chemistry, weather, invasive species, and vegetation to help understand the effects of changes in lake levels and climate on coastal wetland plant and animal communities, the effectiveness of invasive species control efforts, and the value of the estuary as a pollution filter.

Each year the Old Woman Creek NERR hosts research projects conducted by scientists from universities throughout the nation. Since its designation, over 200 peer-reviewed scientific papers have presented results from research conducted at Old Woman Creek.



The Old Woman Creek National Estuarine Research Reserve is a facility to support wetland and ecology research and monitoring both in the lab and at several locations within 583 acres of coastal wetland and upland forest.

You can help!

N = nitrogen
P = phosphorus
● = sediment

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

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



Farm Bureau staff learns about watersheds at the Berlin Township Conservation Club.

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



Stream monitor training at Hoffman Forest Preserve in Old Woman Creek.



Initial Report card analysis and design in collaboration with the University of Maryland Center for Environmental Science's Integration & Application



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Water Quality Report

2014

Old Woman Creek Report Card



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

Join Us!

Friday, April 3rd

12:00 pm

BROWN BAG LUNCH

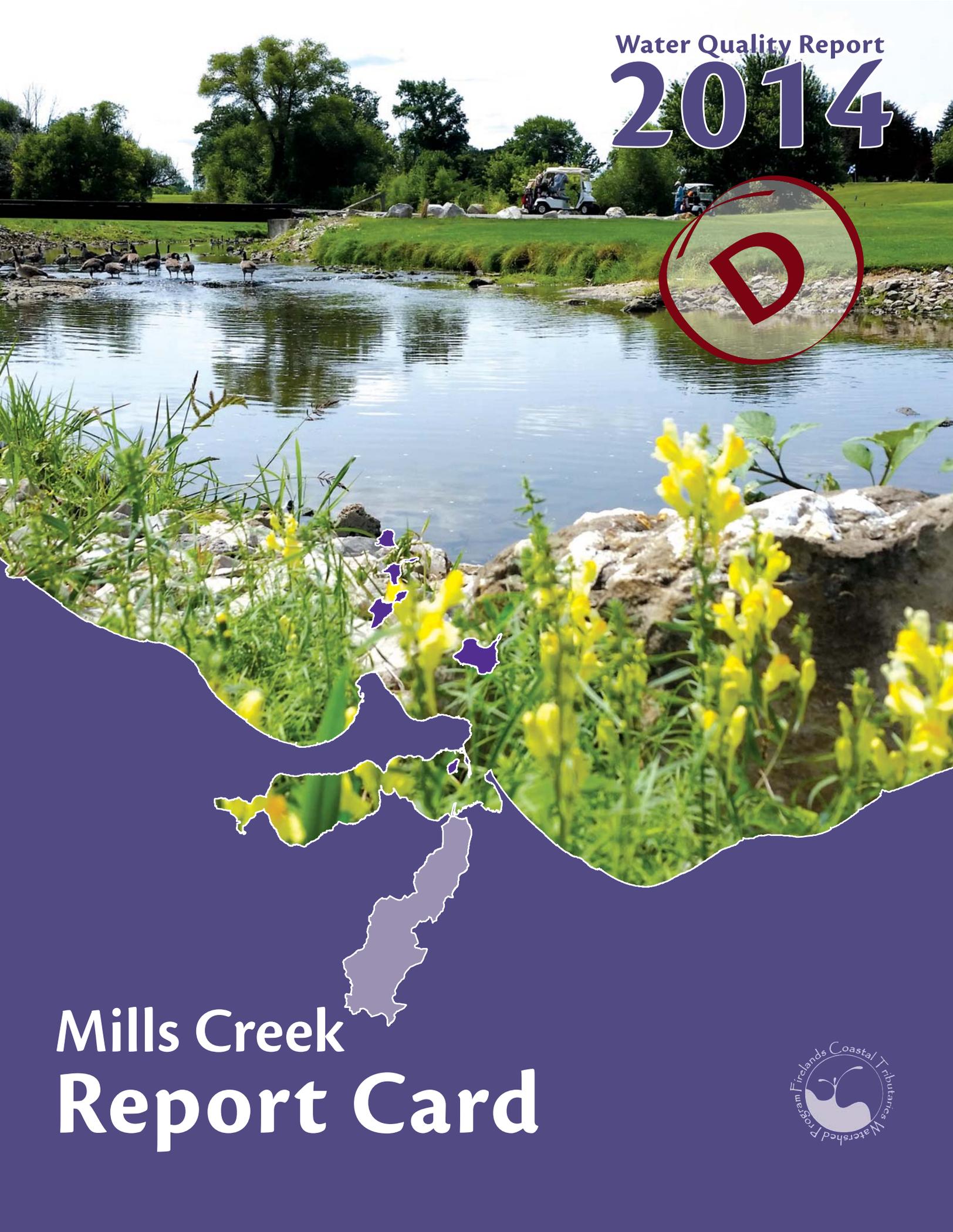
Old Woman Creek Reserve

2514 Cleveland Rd East

Ask questions, get answers
about whats in our water!

Water Quality Report

2014



Mills Creek Report Card



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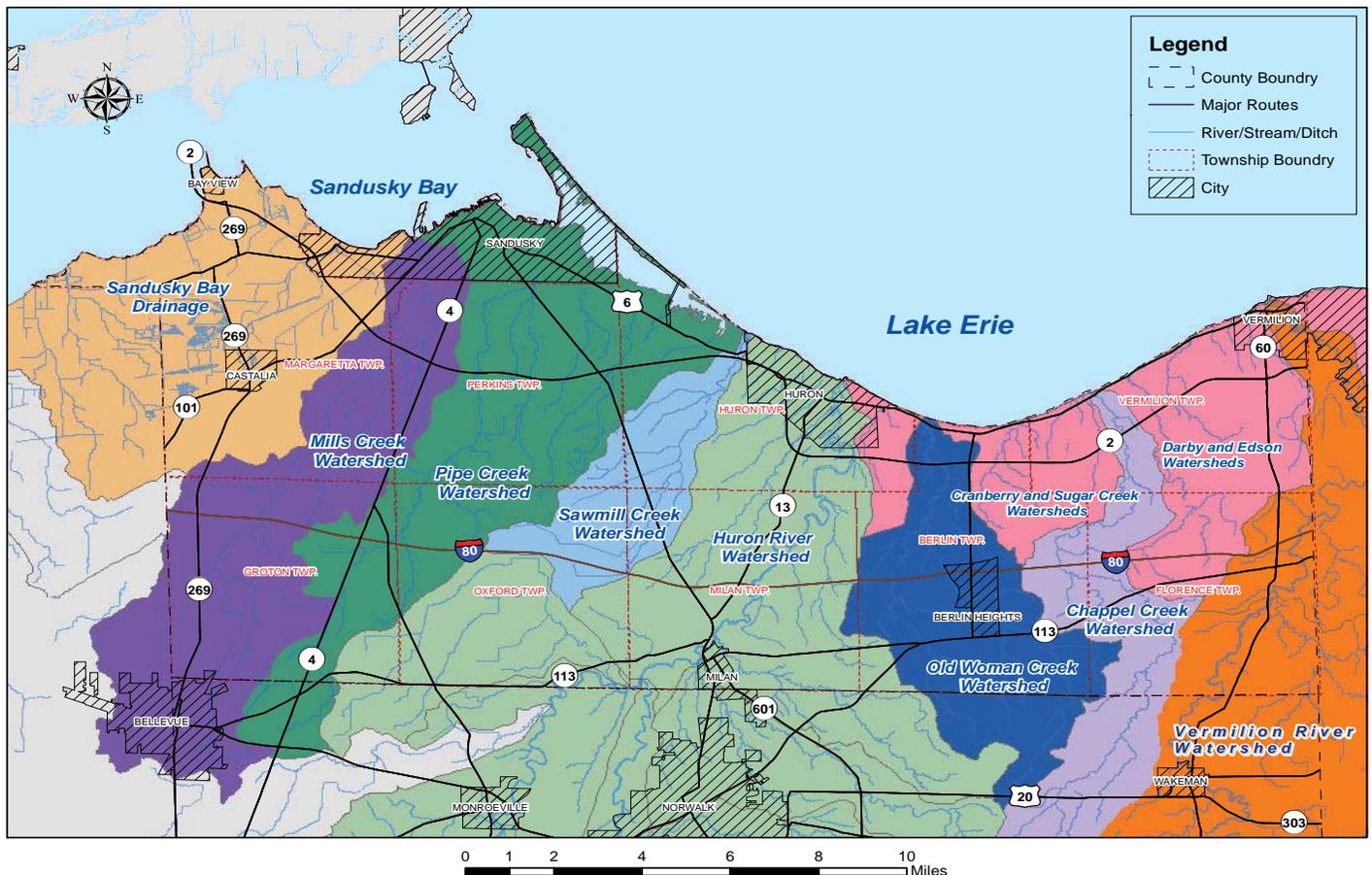
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A system driven by groundwater & storms

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 MillsCreek?

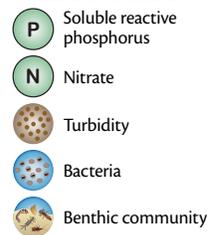
Mills Creek is a 42.4-square-mile watershed made up of many small tributary and drainage ditches. Mills Creek begins in Sandusky and Huron Counties encompassing the City of Bellevue and empties into Sandusky Bay on the west side of Sandusky. The watershed consists of approximately 26% developed land, 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



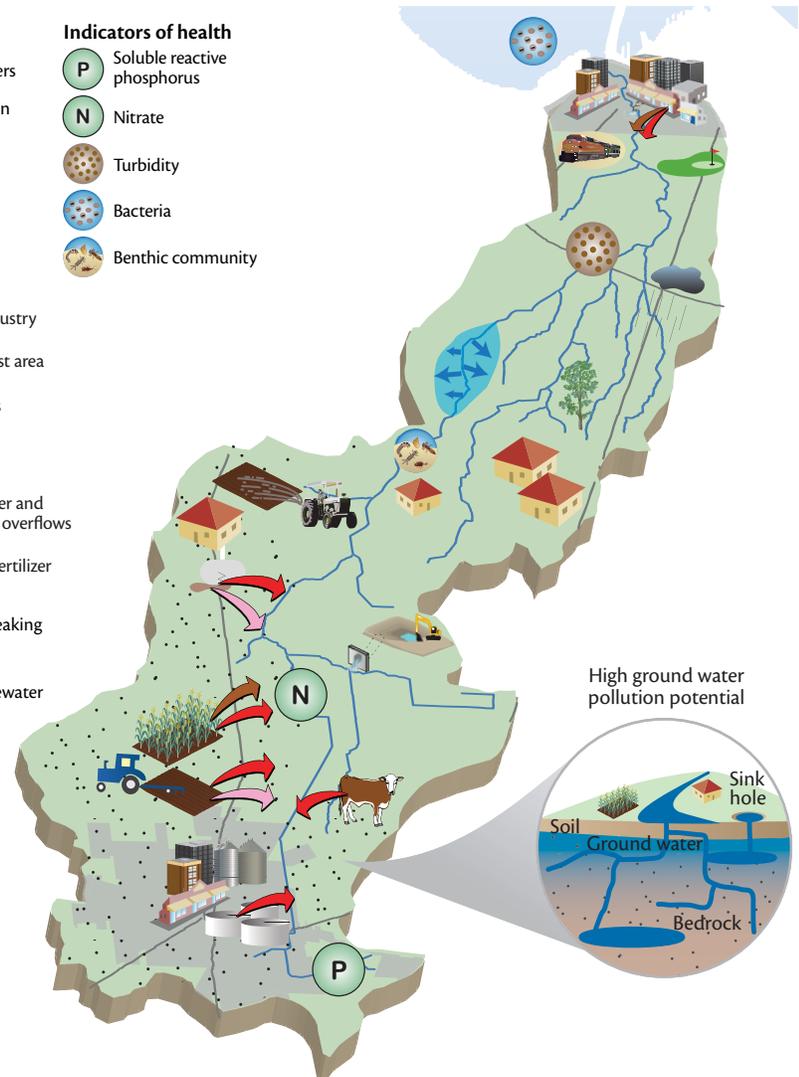
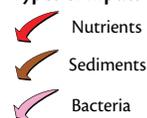
Indicators of health



Pollution Sources



Types of inputs



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.

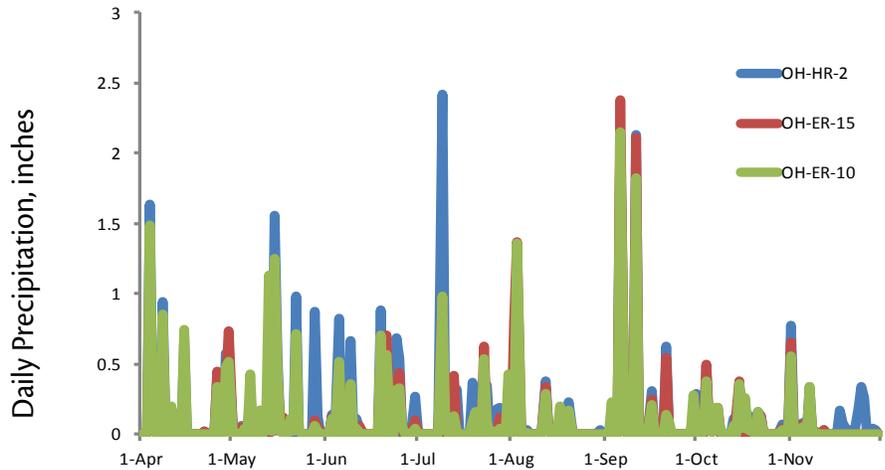
Mixed Year of Wet and Dry Months

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.

Mills Creek Daily Precipitation Data 2014



Daily rainfall totals from the COCORAHs stations within the Mills Creek watershed.

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.



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.



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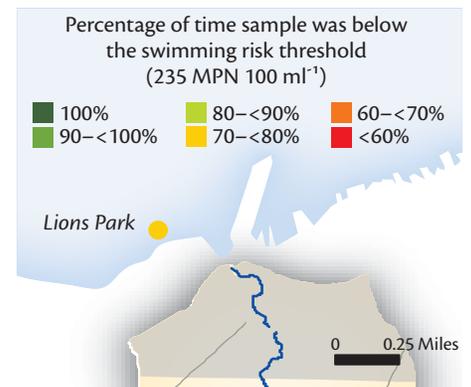


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Bacteria, an indicator of human safety

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



Sandusky Bay

Mills Creek

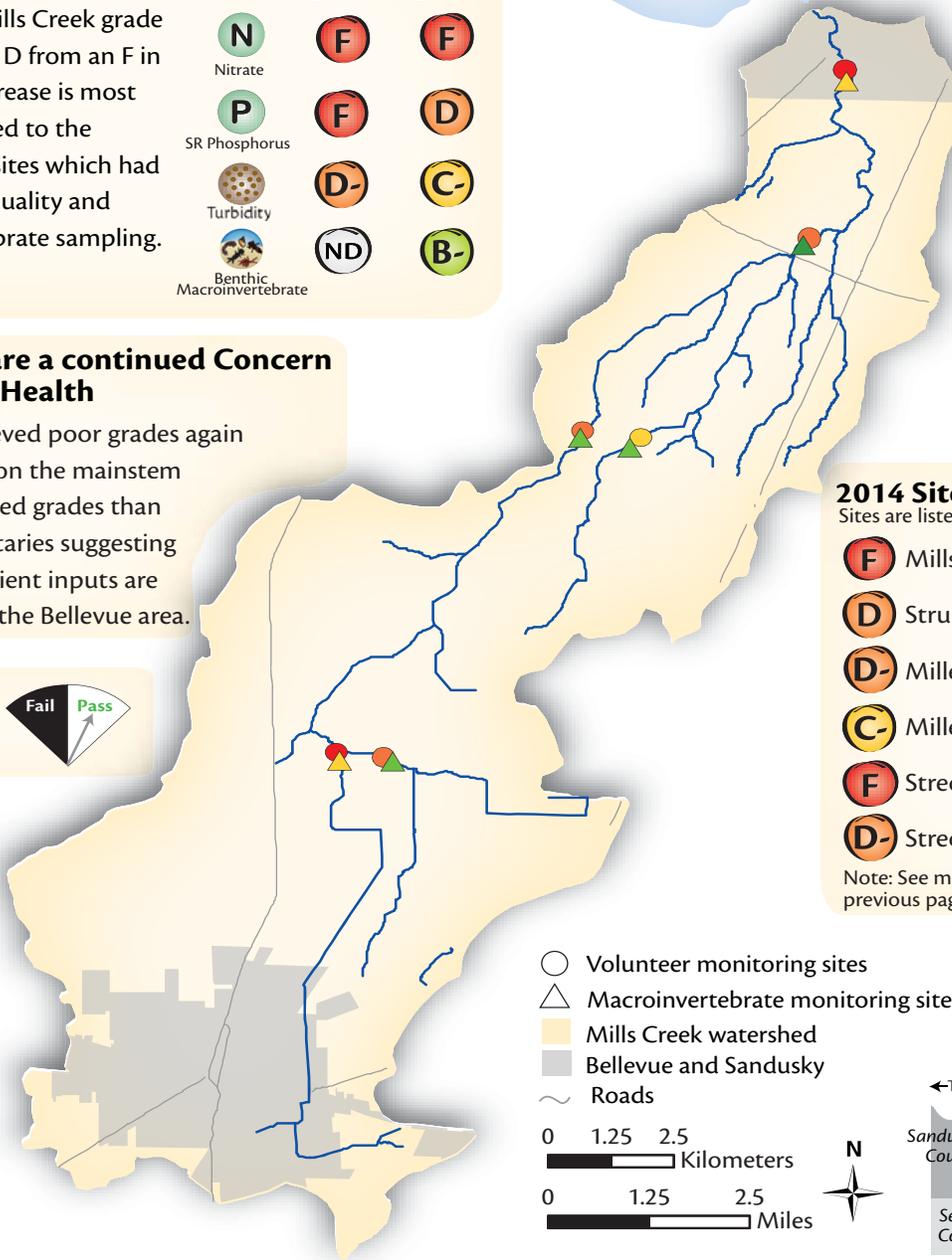
Overall the Mills Creek grade increased to a D from an F in 2013. The increase is most likely attributed to the addition of 2 sites which had better water quality and macroinvertebrate sampling.

Indicator	2013	2014
N Nitrate	F	F
P SR Phosphorus	F	D
Turbidity	D-	C-
Benthic Macroinvertebrate	ND	B-

Nutrients are a continued Concern for Stream Health

N P 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.

Vital Signs Indicators



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.

- Volunteer monitoring sites
- △ Macroinvertebrate monitoring sites
- Mills Creek watershed
- Bellevue and Sandusky
- ~ Roads

0 1.25 2.5 Kilometers

0 1.25 2.5 Miles



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.
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- 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.

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



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

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 that can be used locally and shared globally.

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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!

N = nitrogen
P = phosphorus
 = sediment

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

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



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

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



Volunteers help collect water samples for Mills Creek.



Initial report card analysis and design in collaboration with the University of Maryland Center for Environmental Science's Integration & Application Network



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Published: March 2015

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Water Quality Report

2014

Mills Creek Report Card



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

Join Us!

Saturday, April 11th

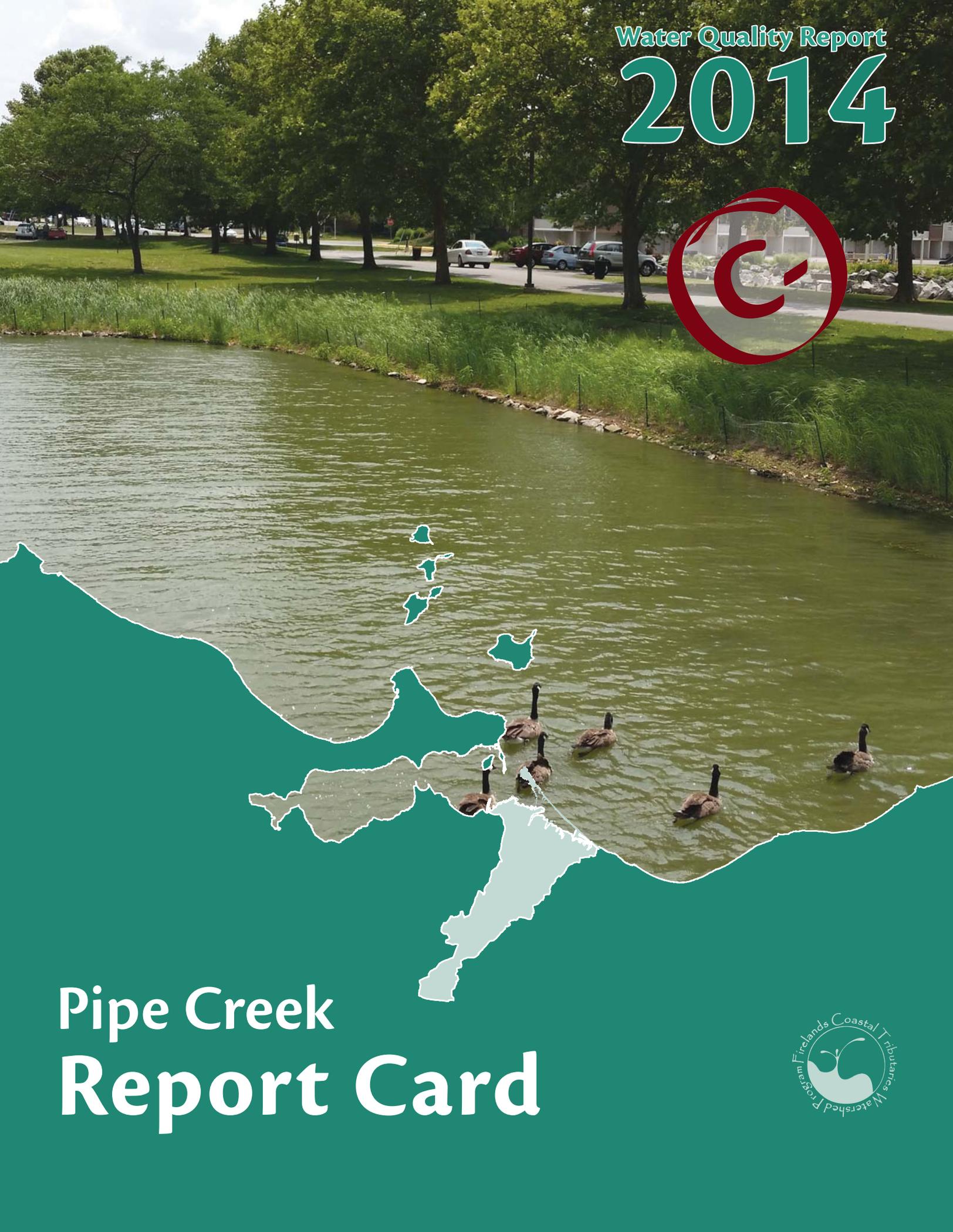
10:00 am

Mr. Smiths Coffee House

140 Columbus Ave

Sandusky, Ohio

**Ask questions, get answers
about whats in our water!**



Pipe Creek Report Card



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.

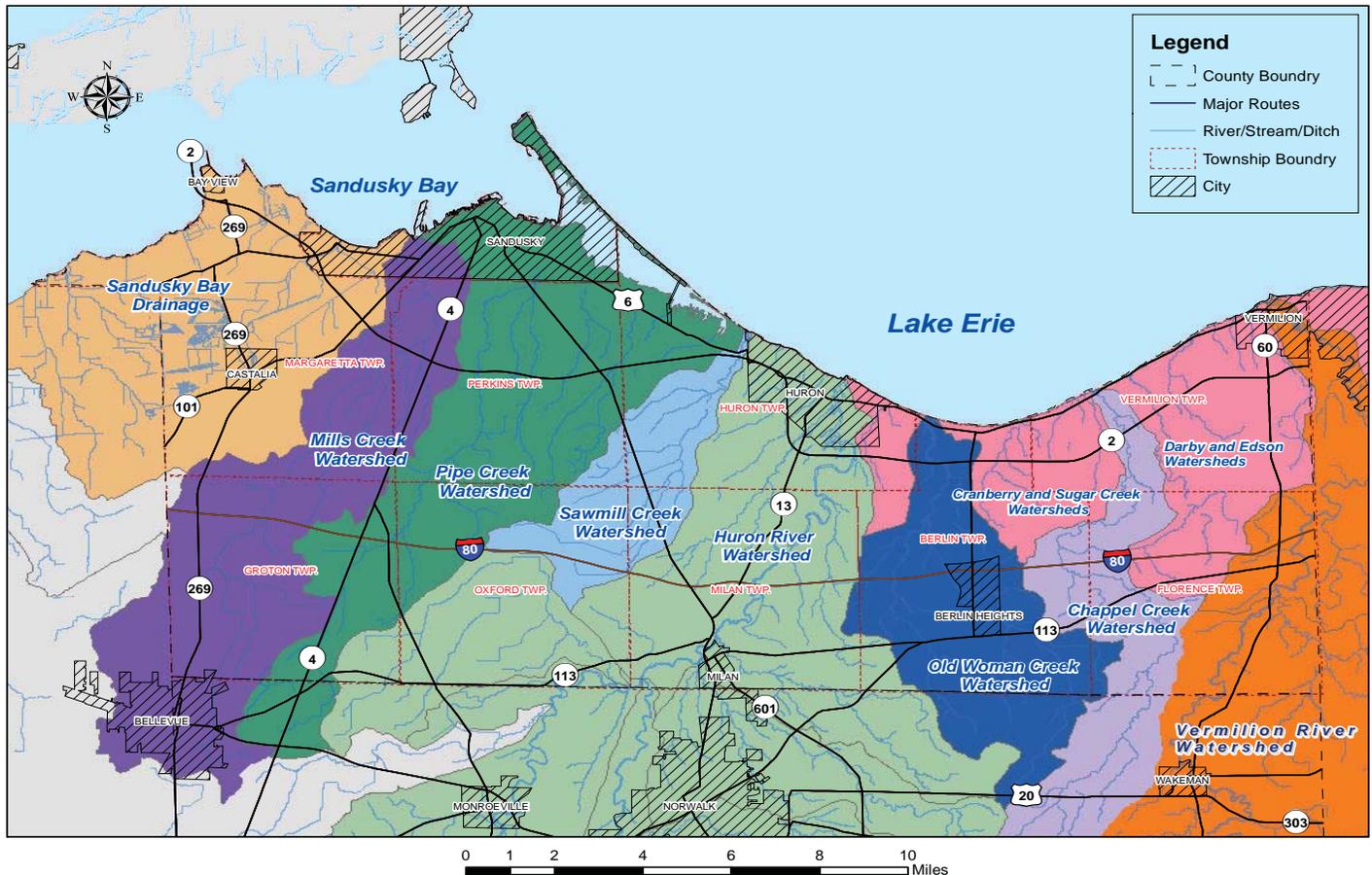
The report card is one product of that partnership to communicate findings of stream, wetland and beach health sampling to our residents.

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 storm-driven system

When it rains, it drains; and these storm events move pollutants through the watershed. When Pipe Creek's flow is low to normal, we often find little nutrient and sediment pollution. However, during and after a storm, the creek will turn light brown from being laden with sediment and often carries excess nutrients that contribute to algal blooms in Lake Erie. Storms are more intense and frequent in the spring and fall, leading to higher pollutant concentrations than in the summer.

What makes up Pipe Creek?

Pipe Creek is a 48.5-square-mile watershed made up of three main streams: Pipe Creek, Hemminger Ditch, and Plum Brook. Pipe Creek begins in Huron County east of Bellevue and empties into East Sandusky Bay near the Cedar Point Causeway. The lake shoreline is a mix of coastal marsh and heavily altered land use for shipping, boating, and erosion control. The watershed consists of approximately 41% developed land, 39% agricultural land, and 20% natural areas. Land use has changed drastically in the past 15 years with the conversion of 9,250 acres of agricultural land to residential and commercial purposes.



A key feature of Pipe Creek is the wetlands in both the creek and East Sandusky Bay

Pipe Creek is 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. The unique geology of Pipe Creek makes it ideal for limestone quarry operations, but at a higher risk for potential groundwater pollution.



Loss of habitat from filling the floodplain has negatively impacted Pipe Creek



Key drivers

Pipe 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. Large amounts of polluted run-off enter the stream in the upper rural portion of the watershed. However, aging infrastructure in older developments with combined sanitary and storm sewer systems adds

sediment, nutrient, and bacterial pollution in the urbanized areas of the watershed. Heavier storms and loss of natural stream and wetland habitat have also reduced the stream's ability to effectively handle the excessive flush of pollutants from rain events.

Increasing landowner stewardship to hold back, slow down, or soak in stormwater and reduce polluted run-off would greatly improve the condition of Pipe Creek.

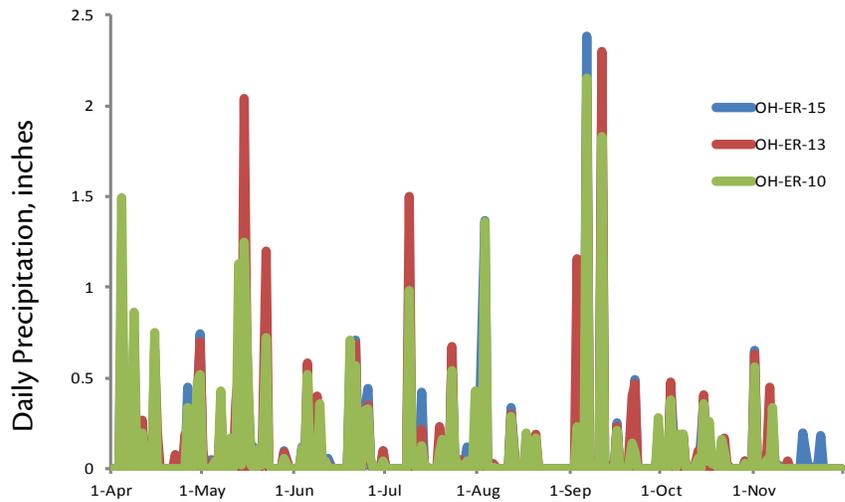
Mixed Year of Wet and Dry Months

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 14; 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.

Pipe Creek, like many watersheds, is a storm-driven system, water quality responds to storm activity in the year. The lack of storm events sampled did not result in improvements in water quality suggesting not all pollutants are storm driven in this creek.

Pipe Creek Daily Precipitation Data 2014



Daily rainfall totals from the COCORAHs stations within the Pipe Creek Watershed.

Monitoring in Pipe 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 failing septic systems, pet waste, and livestock, often after heavy rainfall.

In Pipe Creek, there are two Bay sites (see map) where indicator bacteria are measured



by the Erie County Health Department three to four times weekly. In 2014, Battery Park, received a 100% score meaning there was no risk of getting sick while swimming. The Pipe Creek Canoe Launch site, on the other hand, received a 76% score meaning a health

risk was present during 1/4th the swimming season. This site is located at the mouth of Pipe Creek and was most likely lower because of a higher potential of influence of pollutants that come directly from the watershed.

Pipe Creek 2014 Report Card



Pipe Creek

Pipe Creek received an overall C- grade, which is a slight improvement from the D+ received in 2013. The increase was likely due to the addition of macroinvertebrate data.

Indicator	2012	2013	2014
N Nitrate	D	F	F
P SR Phosphorus	C-	C+	C+
 Turbidity	C	D+	D-
 Benthic Macroinvertebrate	ND	ND	B

Nitrogen and Turbidity a Concern for Stream Health

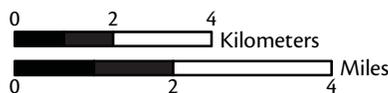
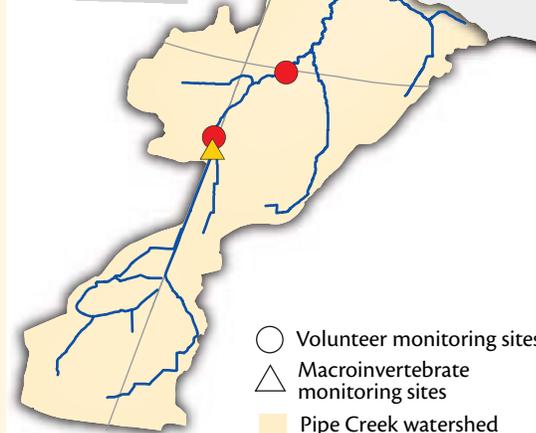
The creek received another overall failing grade for **N** with all sites failing individually except Oakland Cemetery which received a B. This suggests nitrogen inputs are occurring throughout the mainstem with the creek unable to filter it out. The Oakland site is the only non-mainstem site.

also continues to be an issue throughout the watershed with grades ranging from C to F. Strecker and Harris Roads were the lowest scoring sites, where adequate stream buffers are lacking adjacent to agricultural fields.

Vital Signs Indicators



pH too high at Bogart Rd site



(ND) Hemminger Ditch Plum Brook Sub-basin

Creek Sites

Sites are listed from north to south.

- (D+)** Perkins Ave
- (B+)** Oakland Cemetery
- (C)** Columbus Ave
- (D+)** Bogart Rd
- (C-)** Patten Tract Rd
- (F)** Harris Rd
- (F)** Strecker Rd

Note: See more information on previous page.

What do these grades mean?

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People working together for clean water

To reduce our greatest creek stressors (nutrient and sediment pollution, and habitat loss), we as a community need to work together. 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.

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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.

Trees reduce stormwater in the urban community

We often think of trees simply as shade and a place for the birds and squirrels to inhabit. In fact, urban forests play a vital role in more than just habitat and a cool escape from the summer sun. Trees act as mini-reservoirs, controlling runoff at the source. The leaves, branches and bark intercept rainfall reducing run-off and erosion because the water never impacts the ground. Roots increase water storage and enhance rainfall to soak into the surrounding soil.

In 2014, the City of Sandusky Tree Commission and the Erie Soil and Water Conservation District worked together to help record the street trees in the community to establish their value and help manage their important resource. Discovered in the survey, Sandusky's 6,000+ street trees prevent over 10.5 million gallons of rainfall from reaching the ground annually. This diverts the amount of stormwater entering their combined sewer system and helps reduce the amount of untreated sewage discharging into Sandusky Bay. As Sandusky works to better stormwater management, trees will continue to serve the community in more ways than one.



Shade trees like these found at the Sandusky Bay Pavilion can reduce stormwater, energy costs, crime, and improve the health of residents in a community.

You can help!

N = nitrogen
P = phosphorus
 = sediment

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Remember to inspect and pump out your septic system every 3–5 years	A properly maintained septic system prevents costly repairs and untreated sewage discharge into our streams	N P 
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Follow the “4Rs” of fertilizer use: R ight source, R ight amount, R ight place, R ight time	The “4Rs” approach promotes the wise use of fertilizer by farmers, residents, and landscapers to reduce costly nutrient loss that pollutes our streams	P P
Plant cover crops	Cover crops build healthy soils that help hold back nutrients and water and increase crop yields	N P 
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Learn more

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Join our volunteers to get involved in many opportunities at Pipe Creek.

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Water Quality Report 2013

Pipe Creek Report Card



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Sandusky Ohio 44870

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