

**‘Upper Maumee Watershed Volunteer Water Monitoring’  
Lake Erie Protection Fund Award- SG 481-2014 Award: \$14,980**

**TECHNICAL REPORT**

**Activities & Timelines:**

The project and activities described in the grant application were successfully implemented as scheduled. Equipment was purchased and nine volunteer monitors were trained initially. Along the way, four more volunteer monitors joined the effort along with a local high school Chemistry class. Eight stream sites were monitored on a monthly basis from May 2014 to May 2015, except February 2015 due to ice and frigid conditions. All procedures were followed as outlined in the study plan and volunteer manual. In addition to the eight water samples, a ninth duplicate sample was sent to Heidelberg Laboratory for quality control which added to the cost of water analysis from the original application. This cost was balanced by a slightly lower equipment cost and the elimination of printing. The watershed report card will be printed with other funding and will also be available online in an expanded format. See attached for a one page summary of the report card.

**Work Products and Outcome:**

The products of this volunteer monitoring effort are multifaceted. Streams that had no known water quality data were measured for the first time and now have one full year of data on 8 sites. Thirteen volunteer monitors and a high school Chemistry class were trained and became active participants in the watershed action process. A watershed report card was produced and will be used to educate the public. Because the streams did receive poor grades, the report card can be used as a tool to convince stakeholders that remedies are warranted. A list of simple actions to improve water quality along with a website link containing more detailed information is included on the report card. In addition, the report card can be used as a tool to leverage funding for best management practices. With the installation of BMPs, the report card scores should improve over time. The results of the report card were shared in a presentation at the Land to Lake Conference on June 11, 2015 at Defiance College where volunteers were also recognized. The results of this monitoring effort will be shared at local and statewide meetings such as the WMAO Conference and will be submitted for review as an academic paper.

Although this data only shows the streams condition during a 32 hour time period, all 8 sites can be compared relative to each other. Collaboration with Bruce Cleland, TetraTech, Doug Kane, Defiance College, Laura Johnson, Heidelberg University and Chris Riddle, Ohio EPA was sought to review the data collected. Overall, the results show that work is needed to reduce nutrients, specifically phosphorus, from entering local waterways. For the report card, each site received a score based on the percentage of times the result was within the water quality standard set by the Upper Maumee Watershed Action Plan, 2014.

Figure 1:

## Upper Maumee Watershed Tributaries

### Data collected monthly by volunteers May 2014- April 2015

### Percentage of monthly samples that met water quality standards\*

<b>Stream</b>	<b>Total Suspended Solids</b> <small>[ Clarity of Water ]</small>	<b>Nitrate</b> <small>[ Excess causes algal blooms and other water quality problems. Sources are fertilizer, faulty septic systems, and wastewater treatment plants. ]</small>	<b>Soluble Reactive Phosphorus</b>	<b>Total Phosphorus</b>	<b>Overall Grade**</b>
Marie DeLarme	64%	55%	91%	82%	B
Gordon Creek 1	55%	55%	82%	55%	C
Gordon Creek 2	64%	55%	82%	55%	C
Platter Creek 1	45%	55%	73%	64%	C
Platter Creek 2	64%	36%	55%	0%	D
Snooks Run	64%	73%	27%	18%	D
Sulphur Creek	27%	36%	0%	0%	F
Zuber Ditch	36%	27%	0%	0%	F

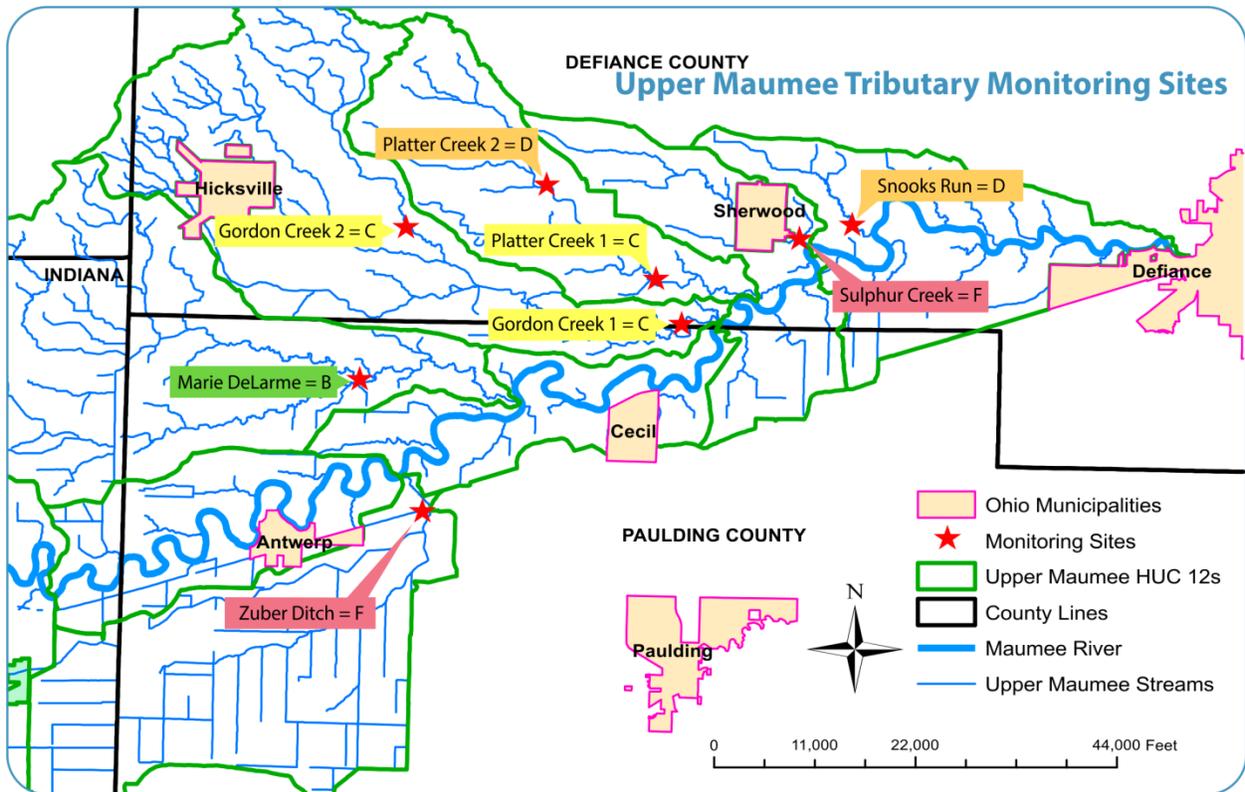
\*Water Quality Standards set by the Upper Maumee Watershed Action Plan, 2014. Total suspended solids measured streamside with the Ohio Sediment stick. Also measured stream side: pH, dissolved oxygen, temperature. Nitrate, Soluble Reactive Phosphorus, and Total Phosphorus along with other soluble nutrients measured at Heidelberg National Center for Water Quality Research. The Upper Maumee Watershed Action Plan and more details on data collected can be found at [landtolake.com](http://landtolake.com)

\*\* Grade scale A= 87-100%, B= 69-88%, C=59-68%, D=39-58%, F=0-38%

This format was chosen as a public education tool because people can relate to the percentage and letter grade. The overall grade was curved upwards and reflects a better grade than the typical school grading scale.

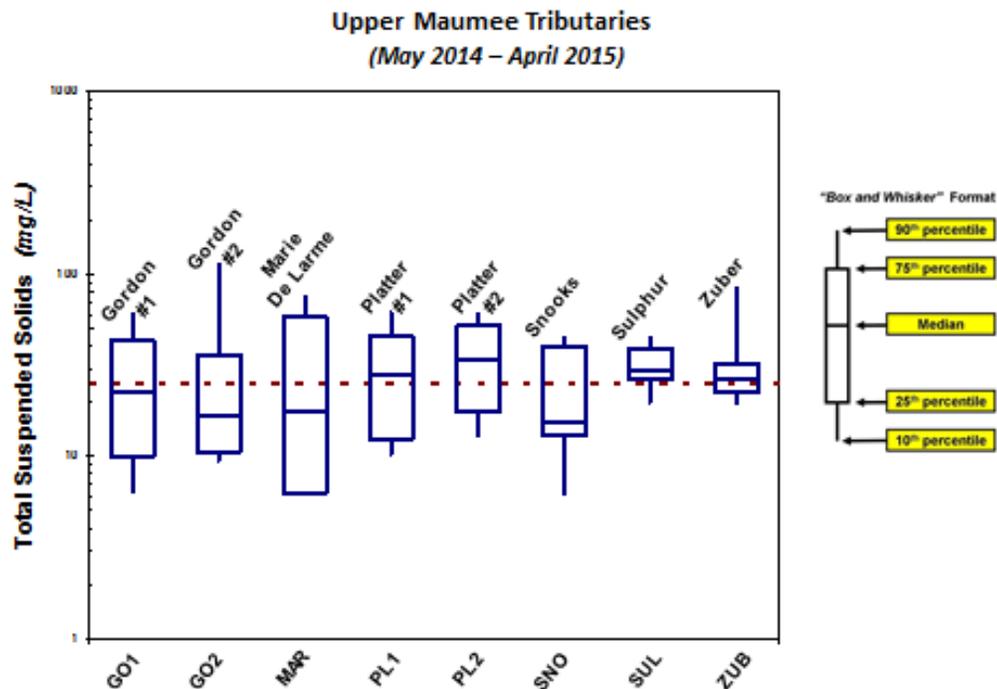
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The monitoring sites were chosen at a location close to the Maumee River to capture a measurement of the overall health of the subwatershed. For Platter Creek and Gordon Creek, an additional monitoring site was established to possibly differentiate between branches. Because Platter Creek and Gordon Creek lay mainly in Defiance County these watersheds were of particular interest because it is also the area served by Defiance Soil & Water Conservation District. Defiance SWCD was recently awarded a 319 grant for agriculture best management practices within Platter Creek watershed. The data collected as part of this monitoring effort will be important in understanding baseline conditions and be used to measure predicted improvements.

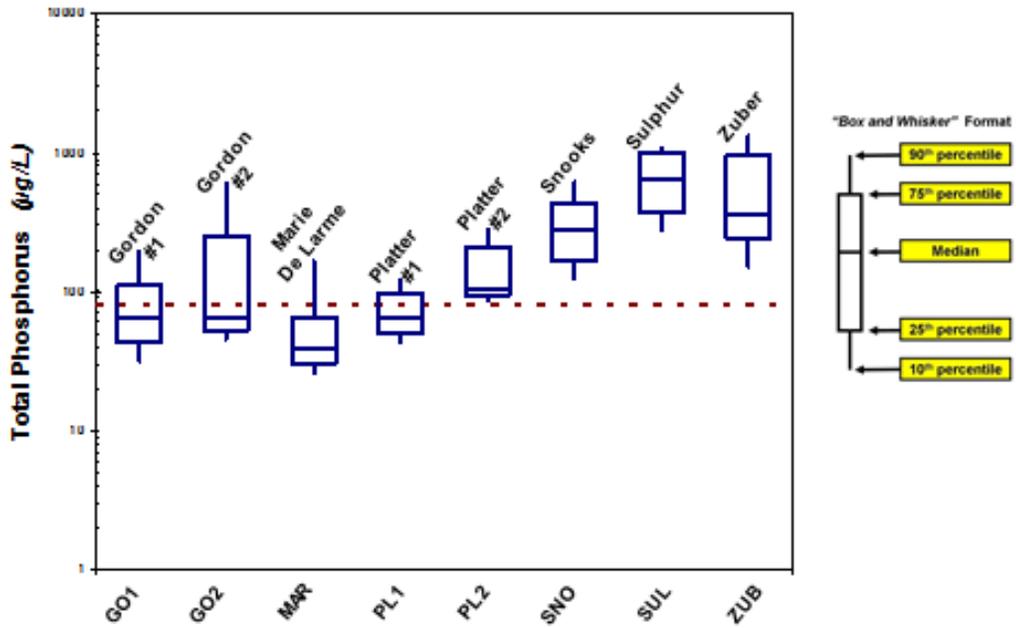


The following box and whisker plots further illustrate the condition of the Upper Maumee tributaries for the year sampled. The box and whisker plots show the median samples but they also show the range of samples and outliers. The larger the box shows a wider range of samples collected indicating that the stream fluctuated more widely during the year or at least during the days sampled. The whiskers show the outlying samples and a longer whisker indicates a larger difference compared to the others collected for that year.

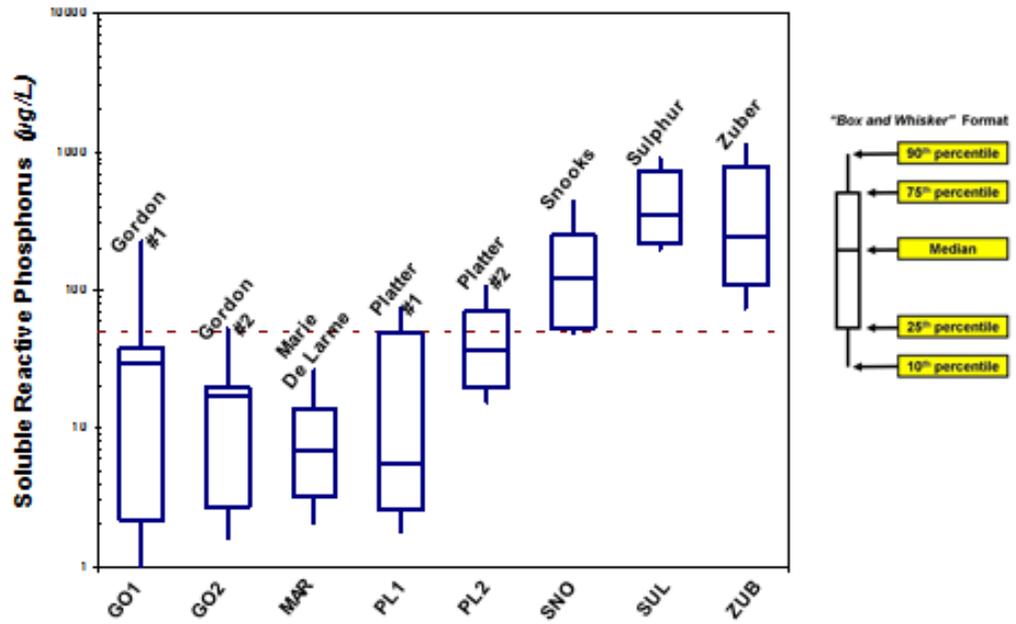
The horizontal red dashed line represents the target for the particular variable. Ideally the entire box and whisker plot would be below the dashed red line. With increased BMPs and other factors remaining the same, future years of sampling will hopefully show these plots largely below the red line. Currently, the samples indicate that most watersheds in the Upper Maumee watershed need significant improvements to reduce nitrates, phosphates, and total suspended solids. Certain watersheds such as Platter, Snooks, Sulphur, and Zuber are showing trends that they are consistently over the limit. This is largely due to a lack of riparian buffers, failing septic tanks, agriculture fields lacking best management practices, and in the case of Sulphur Creek, possible municipal sewage.



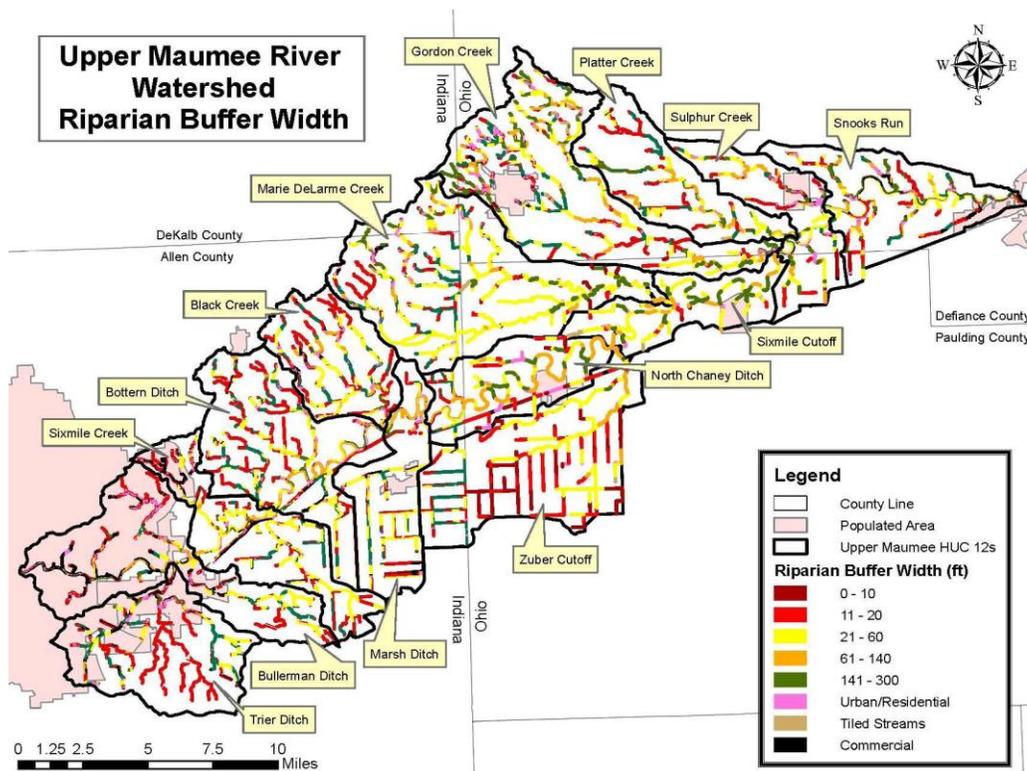
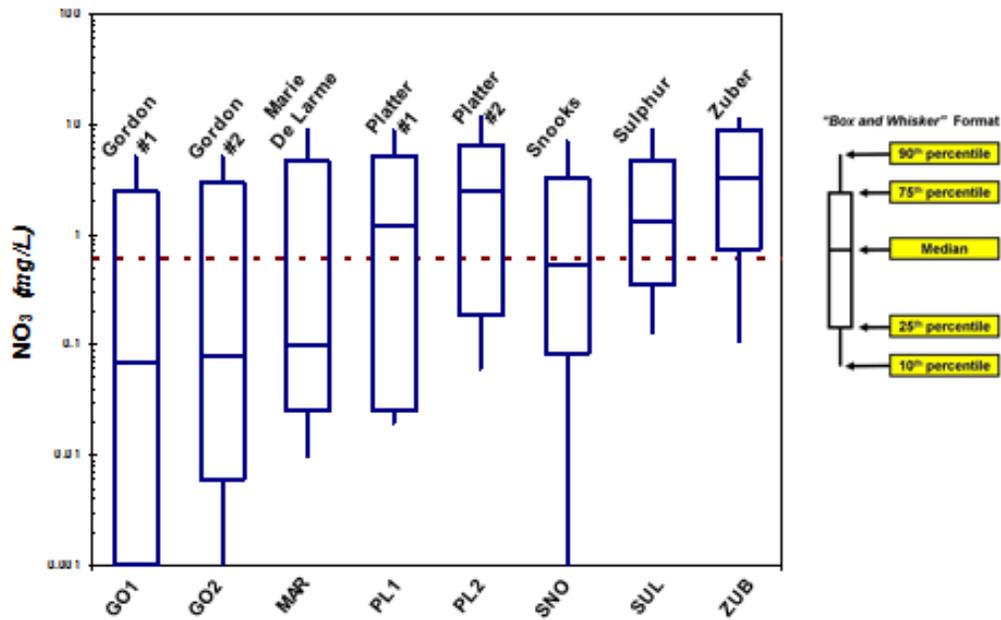
Upper Maumee Tributaries  
(May 2014 – April 2015)



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(May 2014 – April 2015)

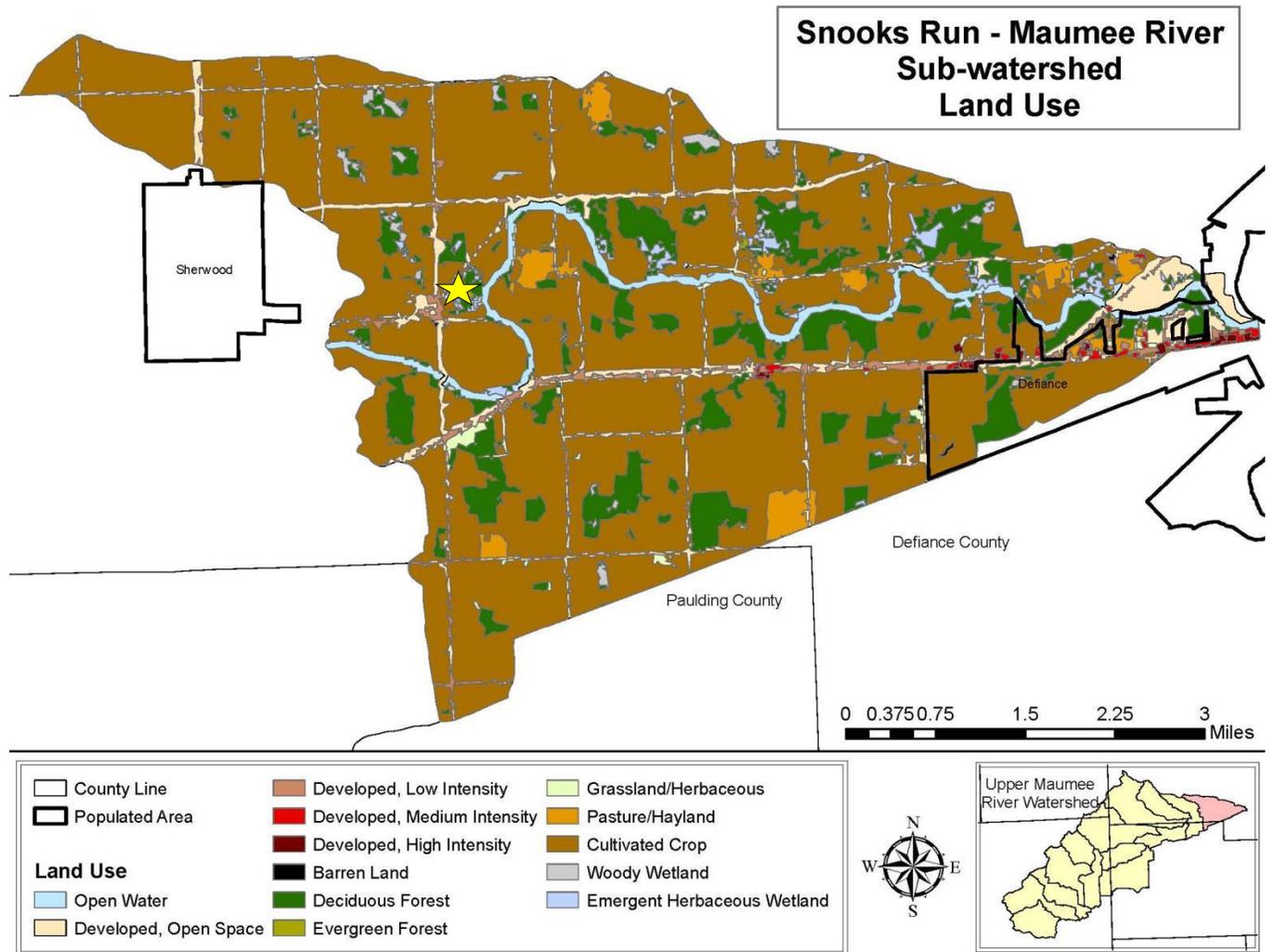


**Upper Maumee Tributaries  
(May 2014 – April 2015)**



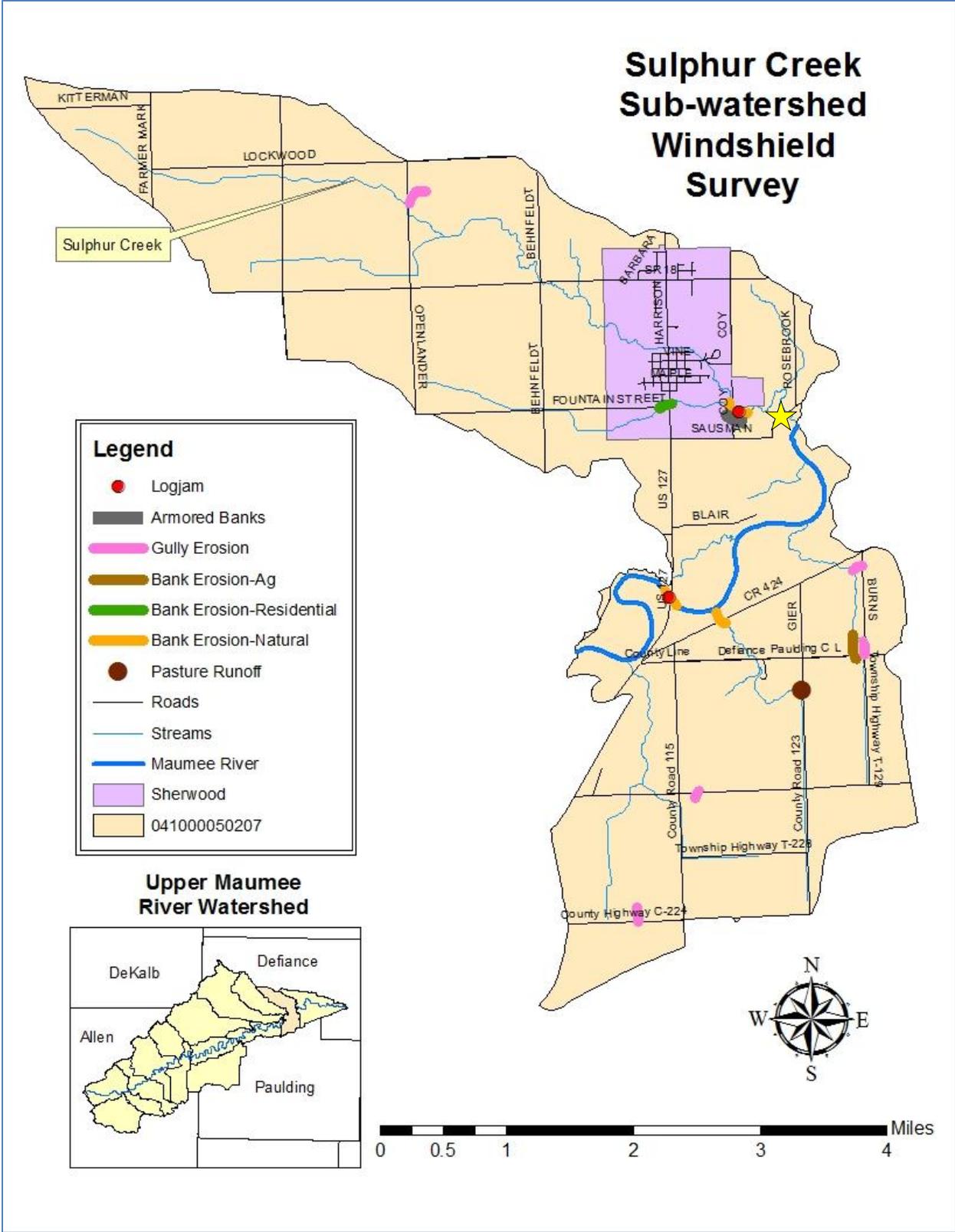
The map above shows the riparian buffer width for the Upper Maumee River watersheds. The large amount of red and maroon areas gives a visual of streams lacking adequate buffers between land use and waterways. Interestingly, the area of yellow in the middle on Marie DeLarme Creek corresponds to the best water quality measured during the study period.

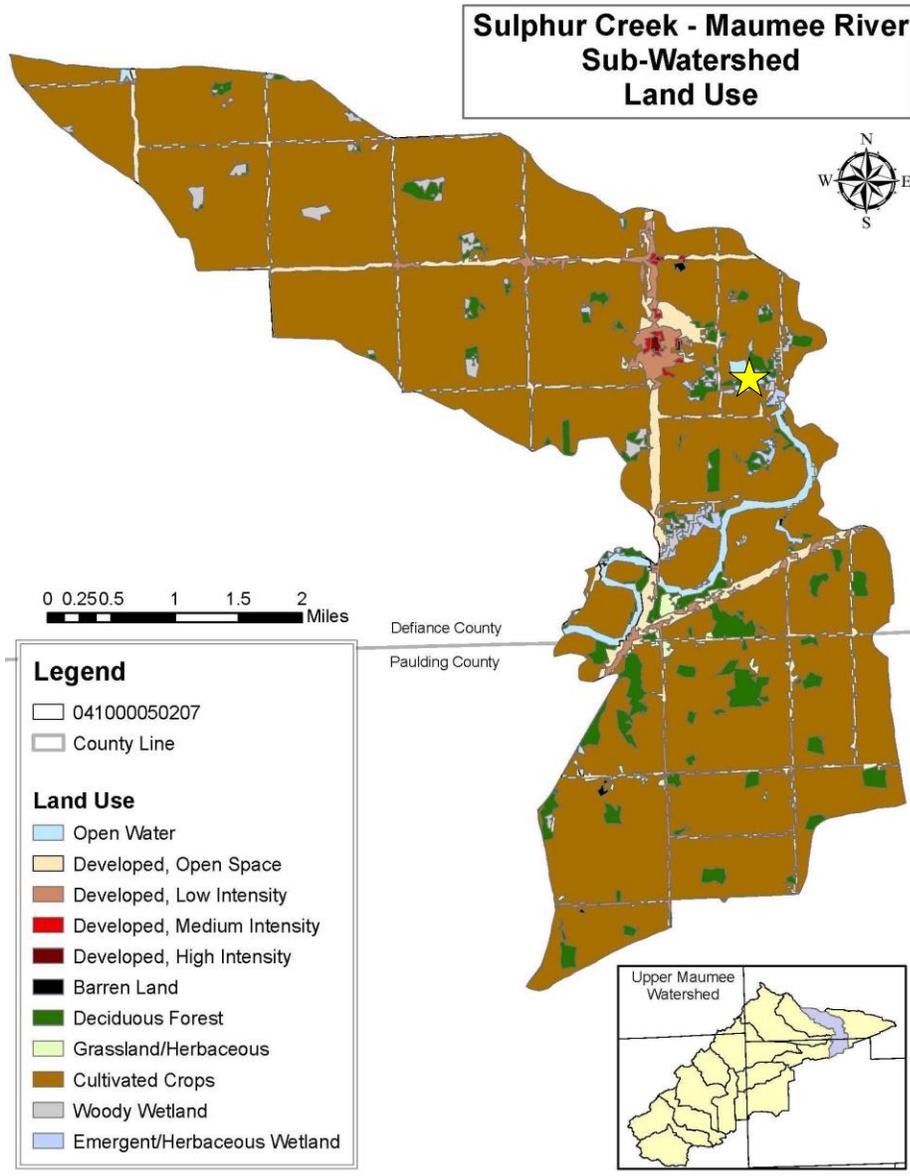




Snooks Run is a difficult watershed to monitor because it includes many small tributaries. The monitoring location was selected because it captured a larger tributary. The tests for Snooks Run were above average for TSS and nitrates but very poor for phosphorus and dissolved phosphorus. The land use is largely cultivated crops for the area measured. The macroinvertebrate tests showed a fair/good on the pollution tolerance index. The Citizen's Qualitative Habitat Evaluation Index score was 45.5 which indicates moderate to excessive man made modifications to the stream.

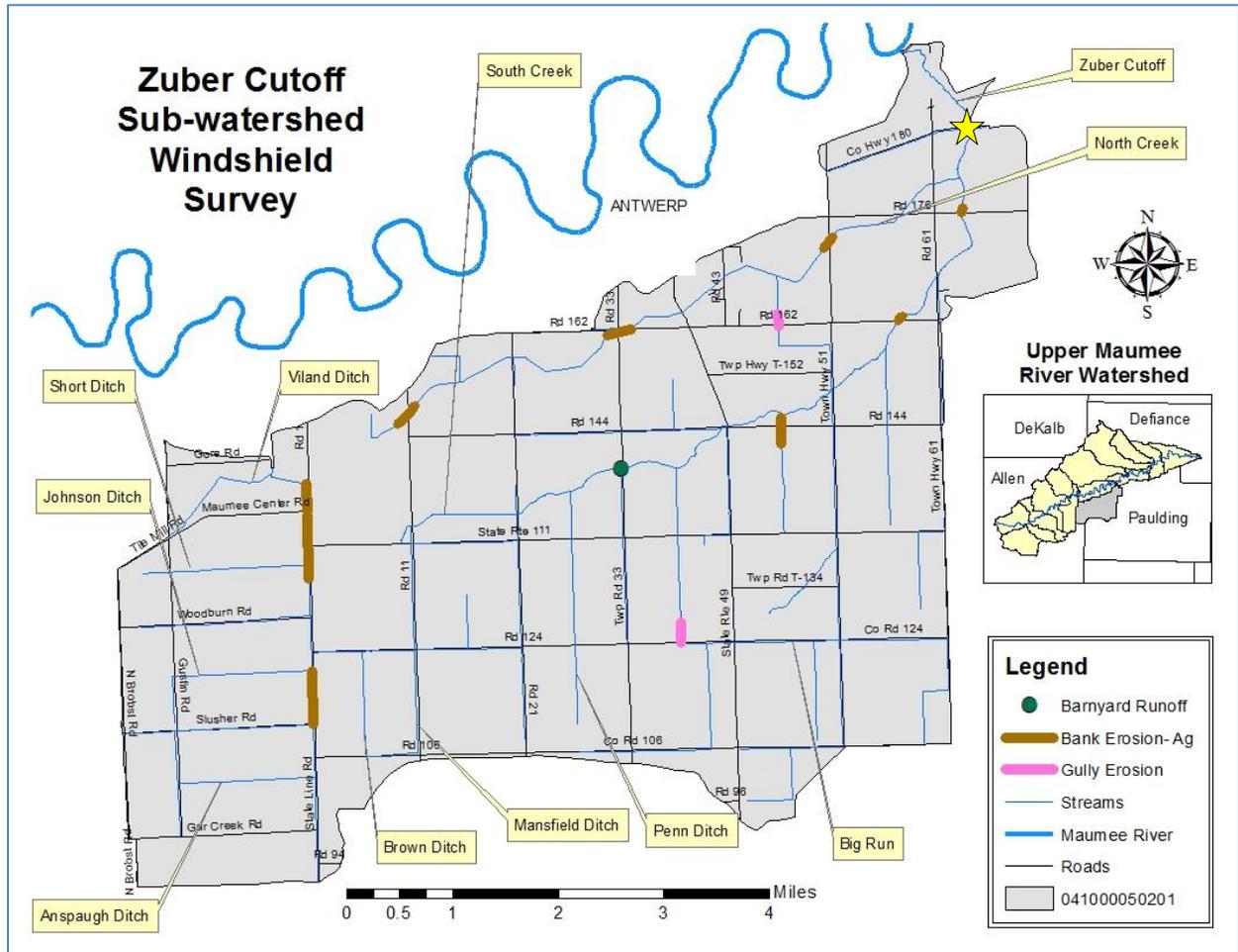
# Sulphur Run- F

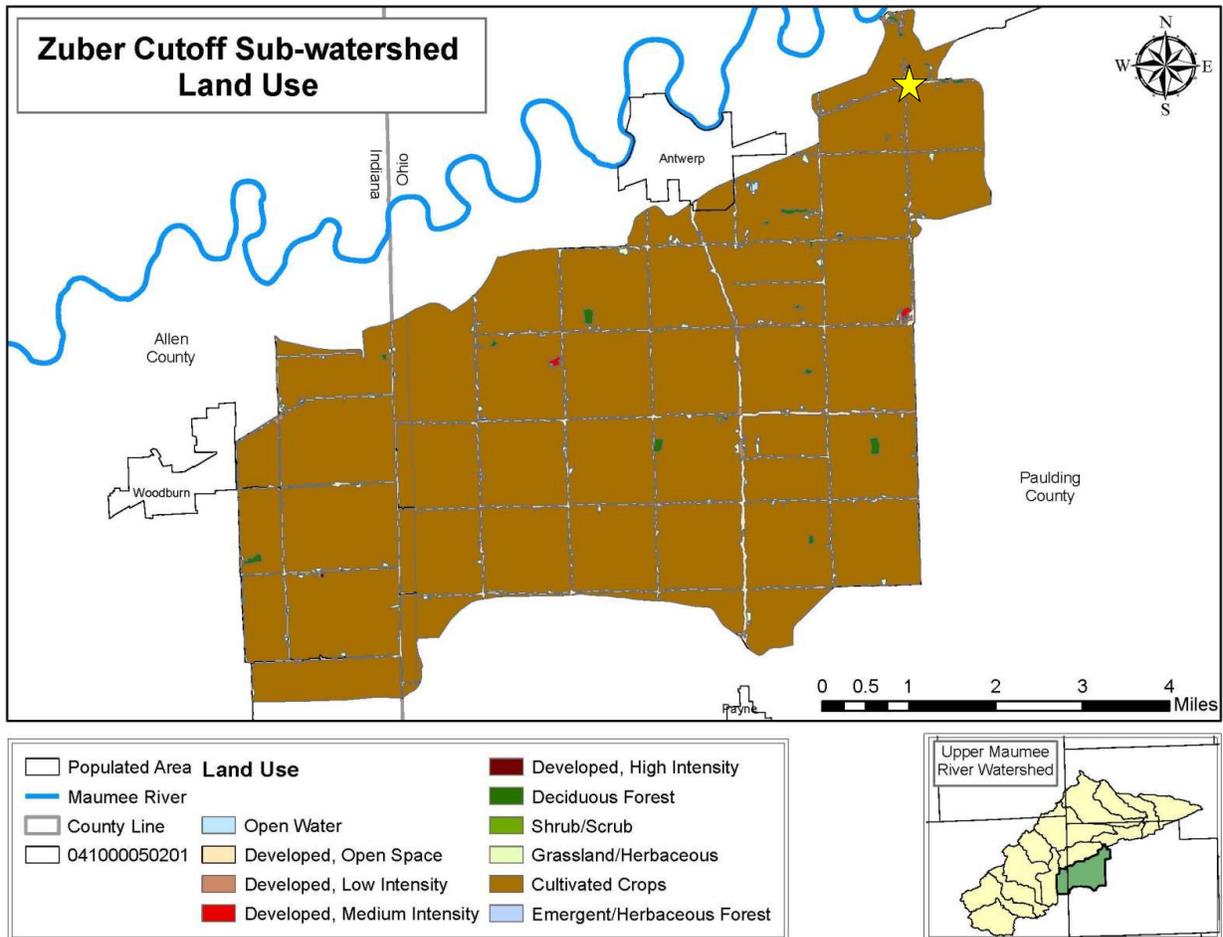




Sulphur Creek is a unique watershed because it includes land both north and south of the Maumee River. The monitoring spot was selected to capture a larger area within Defiance County. The land contributing to this watershed is mostly cultivated fields but also includes the Village of Sherwood. Sherwood currently uses a lagoon system to treat sewage which outlets to Sulphur Creek. Records show that the discharge from Sherwood lagoons can be contributing to the very low numbers for TSS and nitrate and this monitoring spot was never above the standard for phosphorus or dissolved reactive phosphorus. Further testing for bacteria is warranted to determine the source. In spite of the very low water quality results, the monitoring location scored a 69 on the Citizen's Qualitative Habitat Evaluation Index which indicates positive features for warm water habitat and the macroinvertebrate tests showed a good/excellent on the pollution tolerance index.

# Zuber Ditch- F

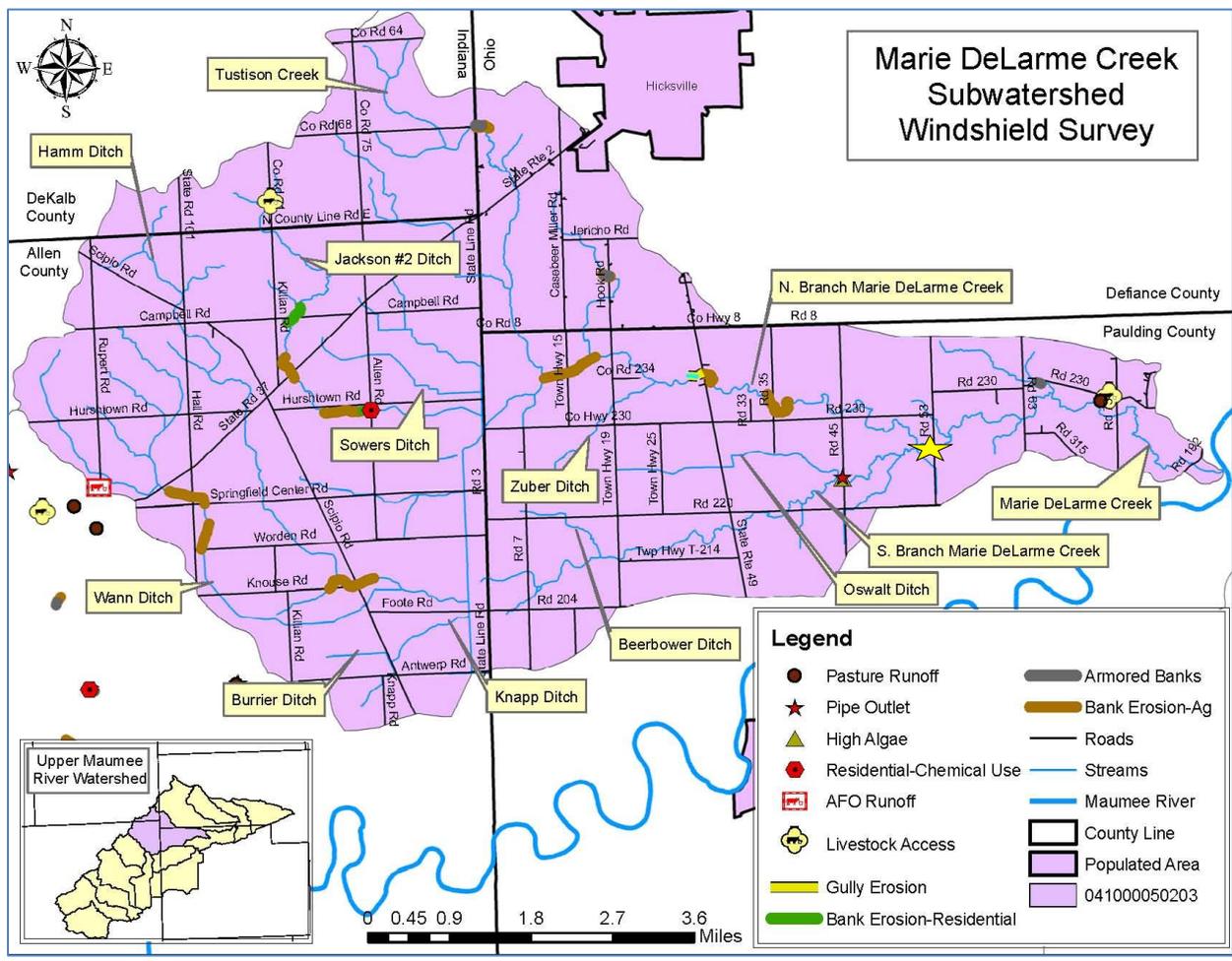


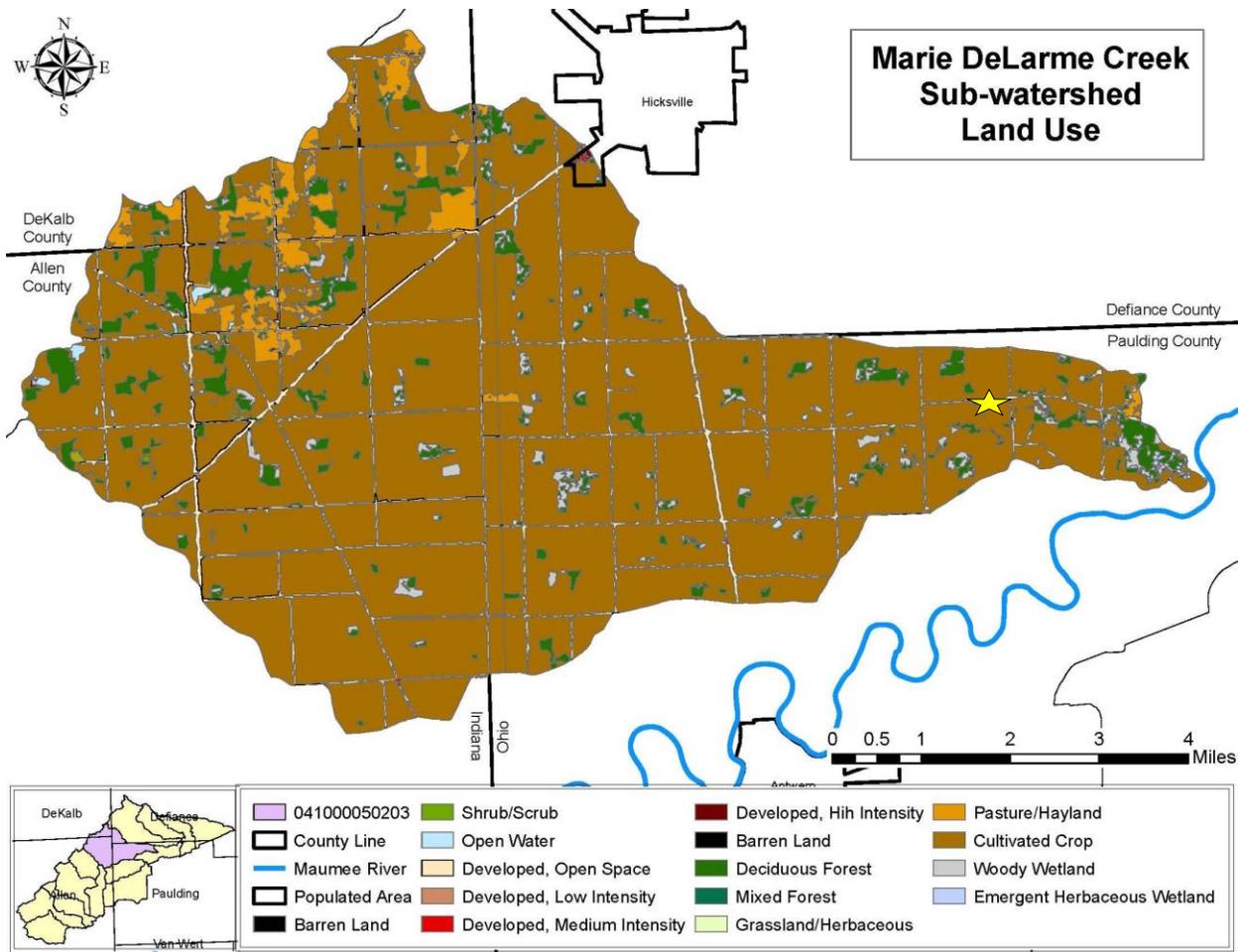


Zuber Ditch land use is mainly cultivated fields and most streams have been straightened to follow the road ditches. There are also animal operations within Zuber Ditch that may account for the very few number of times that the water quality standards were met for TSS and nitrate. During this sample year, the water quality standard was never met for phosphorus or soluble reactive phosphorus.

Despite the very poor water quality and lack of adequate stream structure throughout the watershed, the monitoring location was at a very nice location that scored 80 on the Citizen's Qualitative Habitat Evaluation Index which indicates that it is capable of supporting exceptional water warm habitat biological communities and good/excellent on the macroinvertebrate test.

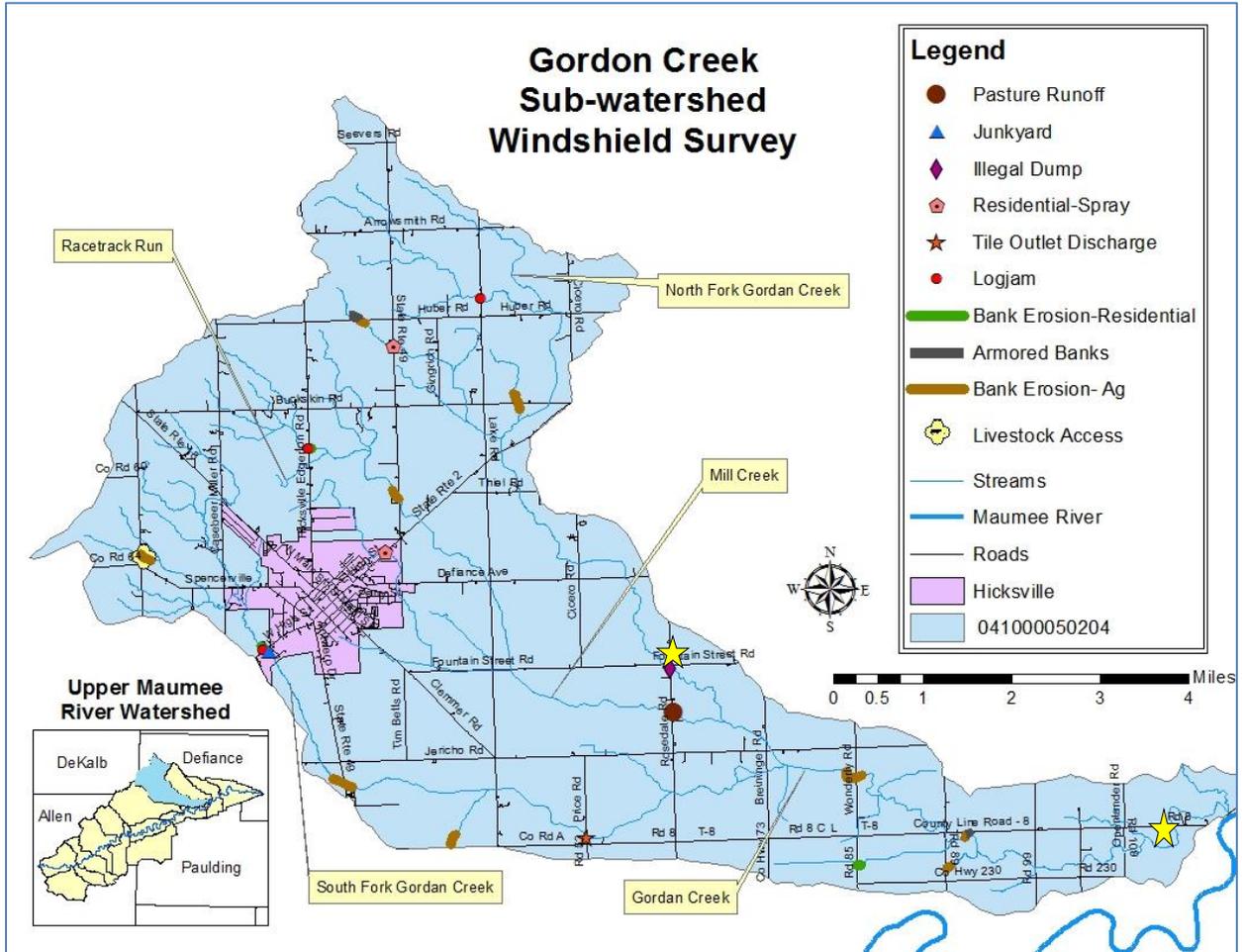
# Marie DeLarme- B

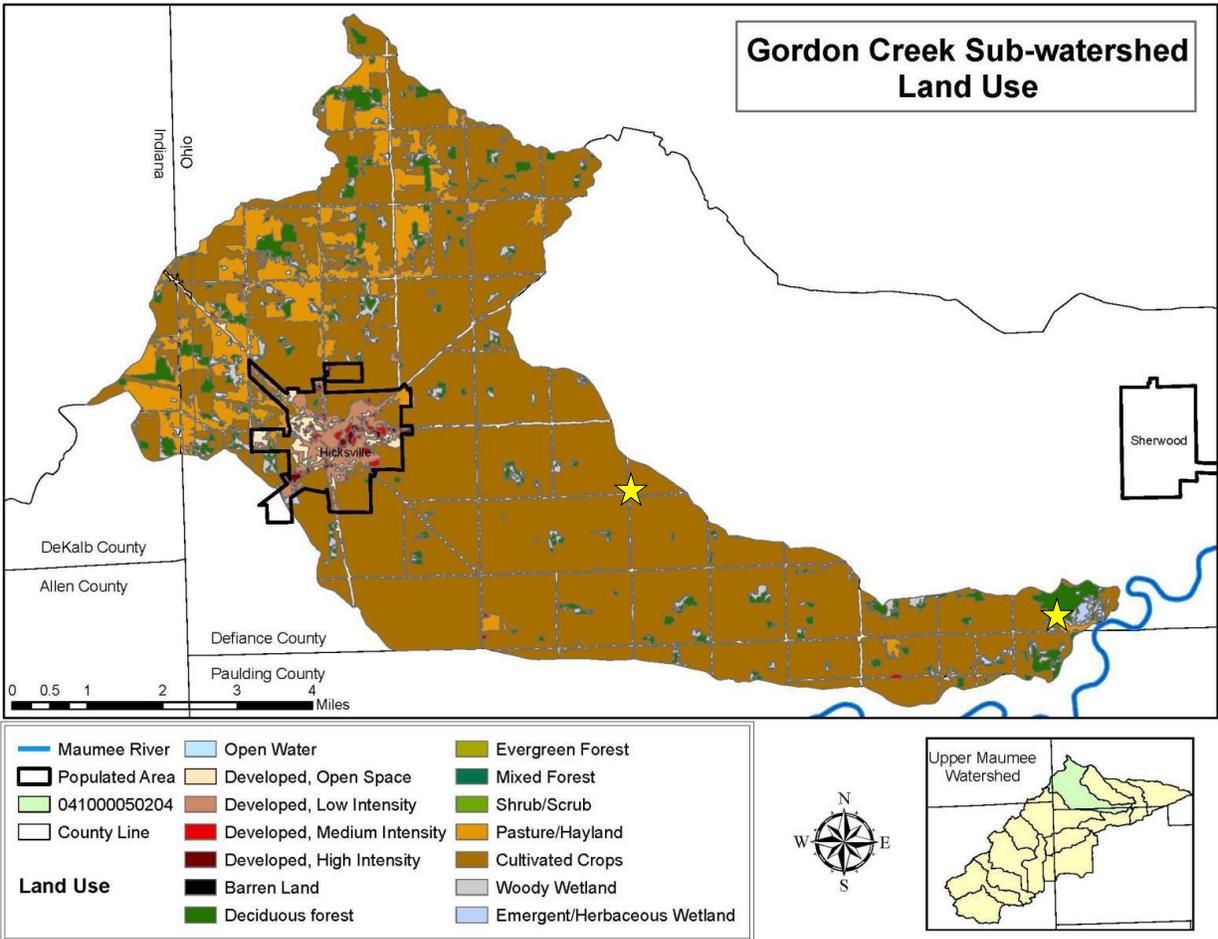




Marie DeLarme Creek received the highest score for the watersheds tested this year. About half the time the water quality standards were met for TSS and nitrates and the standards for phosphorus were met the majority of the time. Interestingly, the land use map shows that headwater streams are surrounded by some forests and pasture/hayland and the riparian buffer inventory indicates that there is a large section in the center of the watershed with adequate riparian buffer. These factors probably contribute to better water quality. Forrest Woods, a large nature preserve located downstream on the sampling location, most likely further improves the water quality before Marie DeLarme outlets to the Maumee River. Ironically, the sample location scored a very low 20 on the Citizens' Qualitative Habitat Evaluation Index, but scored good for macroinvertebrate testing.

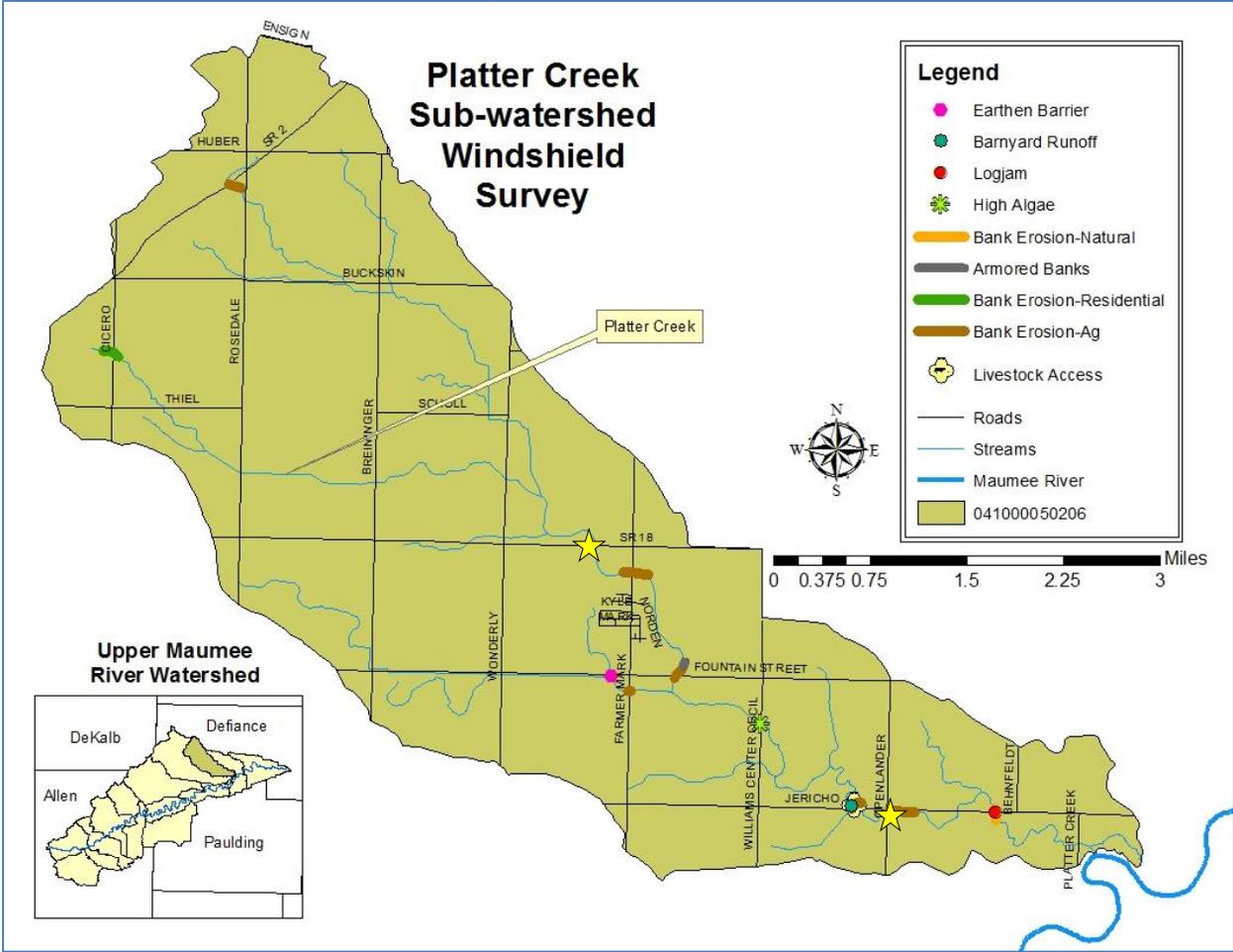
# Gordon Creek- C

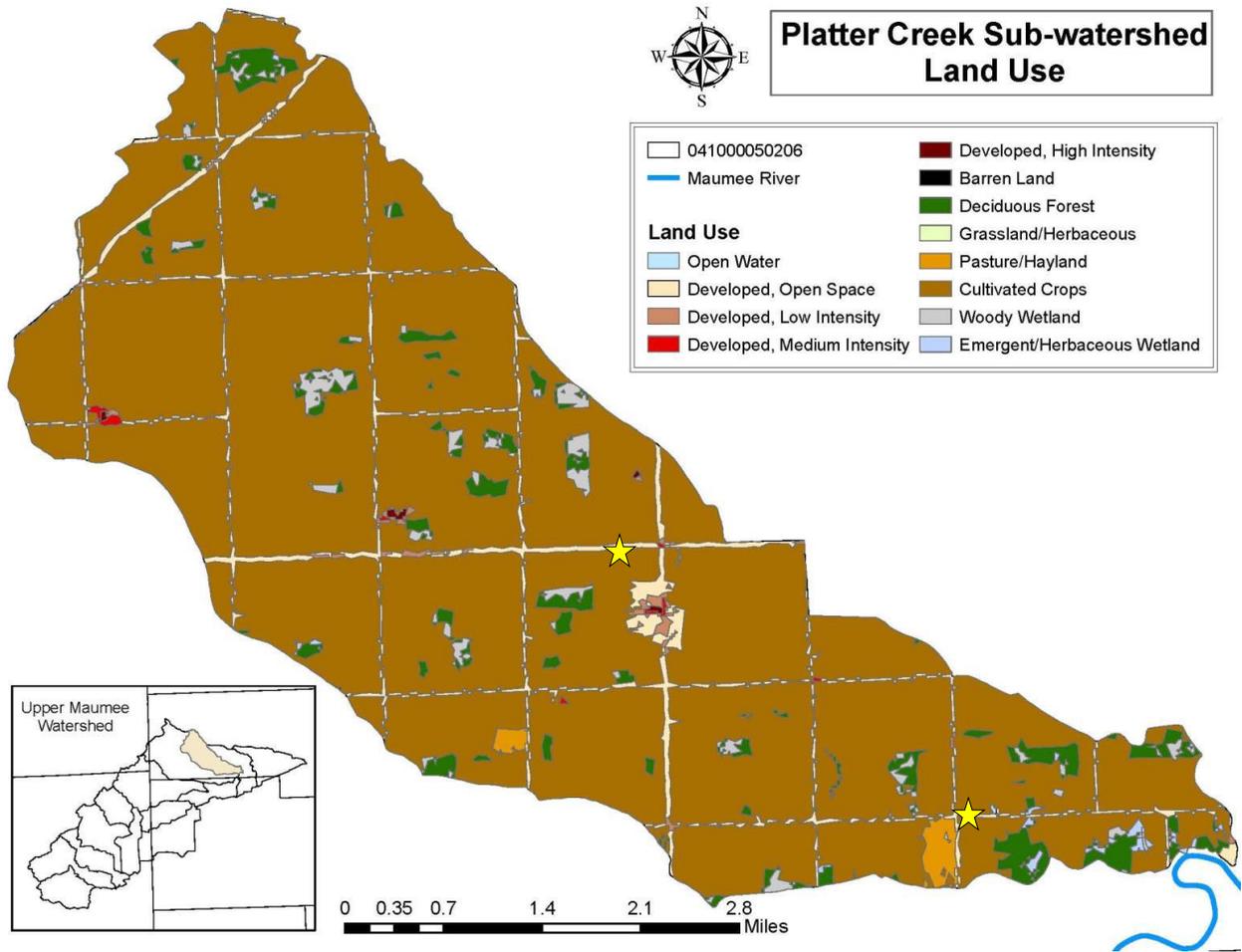




Gordon Creek received average ratings with about half of all samples taken at the two sites meeting water quality standards. Gordon Creek is a varied watershed with a lot of pasture/hayland and some forests in the headwaters, mostly cultivated crops throughout, and the Village of Hicksville on the lower branch. Hicksville is a larger village with a few combined sewage overflows from their sewage treatment plants. The Gordon Creek sites received a fair rating for macroinvertebrates and a 47 on the Citizen's Qualitative Habitat Evaluation Index indicative of modified warm water habitat.

# Platter Creek- C & D





Platter Creek received both a C and D grade with the D being located on the upstream site in the watershed. Platter Creek is largely cultivated crops with a small collection of houses in Mark Center.

The Citizen's Qualitative Habitat Evaluation Index score were the among the lowest recorded in this study with 21 for Platter Creek 2 (upstream site) and 35 for Platter Creek 1 (closer to the Maumee River) which indicates moderate to excessive man made modifications to the stream. The macroinvertebrate tests received a bad rating on the pollution tolerance index. The opportunities for improvement within this watershed are great with a recently awarded 319 grant for agriculture best management practices such as cover crops, gypsum, variable rate fertilizer application and saturated buffers.

**Abstract:**

The ‘Upper Maumee Watershed Volunteer Water Monitoring’ project measured stream quality of tributaries on a monthly basis from May 2014- May 2015. Data was collected stream side for dissolved oxygen, pH, temperature, and total suspended solids along with general observations. Water samples were analyzed by Heidelberg Laboratory for soluble nutrients (including N & P) and total phosphorus. This first year of data along with visual assessments and macroinvertebrate collections has allowed observation of general trends. Each tributary watershed received a ‘grade’ based on the percentage of monthly samples that met the water quality standard for TSS, nitrate, SRP and total P. One watershed received a B, three received a C, two received a D, and two received a F. These grades were used to create a visual report card to educate the public on current conditions and suggestions for improvements. This data is essential to understand the difference between the pollutant load on the Maumee River coming from Ft. Wayne and the large watershed upstream and the pollutant load coming from the local watersheds. Quantifying the nutrient levels on these small streams makes it possible to inform stakeholders, focus on projects in designated areas, and measure improvements. The data and leverage it provides is critical to improving water quality locally and in Lake Erie.

“This project was funded through the Lake Erie Protection Fund, administered by the Ohio Lake Erie Commission. The LEPF is supported by the voluntary contributions of Ohioans through donation or purchase of a Lake Erie license plate displaying the Marblehead Lighthouse or the Lake Erie life preserver.”