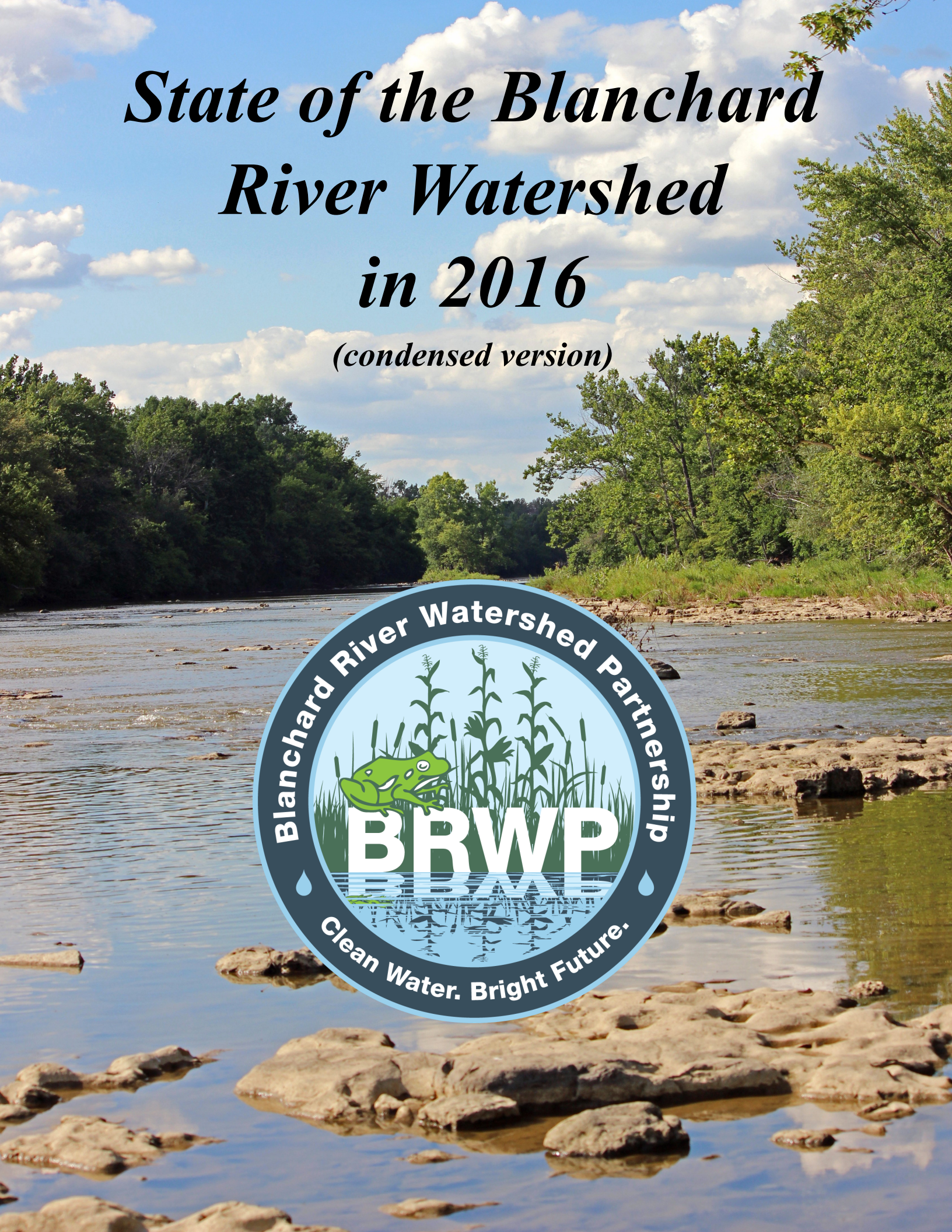
State of the Blanchard River Watershed in 2016

(condensed version)



State of Watershed 2016 Report

Introduction - The Total Maximum Daily Load (TMDL) Report for the Blanchard River watershed was adopted in 2009 by the Ohio EPA. The report was a comprehensive report of the over-all condition of the Blanchard River watershed from all standpoints. The goal of this ***2016 State of the Blanchard River Watershed Report*** is to provide an overview of conditions within the watershed in 2016 and what efforts have been used to address the impairments listed in the 2009 TMDL Report.

Impairments - The *2010 Ohio Integrated Assessment Report for the Blanchard River* list the impairments found in the Blanchard River watershed during the *2009 Biological and Water Quality Study Report*. The BRWP, with input from the Ohio EPA, assigned each impairment a point value of either 1, 2, or 3 based on their importance to be harmful to the water quality and whether they can be restored.

The impairments are listed below with their assigned point values.

3-points (highest priority)	***2-points***	***1-point (least priority)***
-sedimentation/siltation	-nitrate/nitrite	-direct habitat alterations
-total phosphorus	-nutrient eutrophication	-low flow alterations
-organic enrichment (sewage)		-dissolved oxygen
		-water temperature

The highest priority impairments are those that are causing direct harm in the form of the algal blooms in the waterways and Lake Erie, pathogens in the waterways, and filling in of the waterways that lead to increased flooding and blockage of the streams and rivers, especially the Maumee River's entrance into Lake Erie. All of these 3-point impairments can be reduced or eliminated by using Best Management Practices (BMPs). The 2- point impairments are not as high of a priority as the 3-point impairments. Each of them can be reduced or eliminated by using Best Management Practices (BMPs). Finally, the 1-point impairments are caused mostly by the channelization of the waterways and the high percentage of agricultural land use in the watershed. Because agriculture is the largest land use industry in the watershed, the Ohio EPA has lowered the Use Designation for most of the waterways in the Blanchard River Watershed from warm-water habitat to modified warm-water habitat. This lower designation makes it easier to achieve full attainment designation of the waterway. There are some BMPs that will help to reduce each of these 1-point impairments.

Water Usage in the Watershed (See page A - 2 in the appendix for more data.)

The **top ten water** users getting their water from the City of Findlay and from the Village of Ottawa are:

Table 1: Top Ten Water Users - Findlay

1. Whirlpool
2. Cooper Tire
3. Ball Metal
4. Blanchard Valley Hospital
5. Createc
6. Sanoh America, Inc
7. University of Findlay
8. City Laundry/Kramer Enterprises
9. Nissin Brake
10. Riverview Terrace

Table 2: Top Ten Water Users - Village of Ottawa

1. Bluffton, OH
2. Glandorf , OH
3. Whirlpool
4. Silgan Plastics
5. Hirzel Ottawa Processing
6. Steel Technologies
7. North Ottawa (an un-incorporated area)
8. The Meadows of Ottawa
9. Miller City, OH
10. Palpac

Land Use - Land Use in a watershed is probably the largest contributor to the water quality in a watershed. The runoff of water during heavy precipitation events carry nutrients, chemicals and other pollutants directly into the waterways which affects the water quality.

Table 3 - Land Use in acres at the 10-digit Watershed Level

Over-all Total - Headwaters	2006	2010	2015
Total Agriculture Use	72,939.5	72,353.3	71,281.9
Total Other Use	9,698.2	7,364.0	7,475.3
Total Development Use	2,714.7	6,408.3	6,728.9
Unclassified Use	773.2	0.0	639.5
Total	**86,125.6**	**86,125.6**	**86,125.6**

Over-all Total - The Outlet/Lye Creek	2006	2010	2015
Total Agriculture Use	64,361.8	68,729.9	68,507.2
Total Other Use	8,871.3	7,011.0	7,123.3
Total Development Use	11,974.1	9,478.7	9,669.3
Unclassified Use	92.6	80.2	0.0
Total	**85,299.8**	**85,299.8**	**85,299.8**

Over-all Total - Eagle Creek	2006	2010	2015
Total Agriculture Use	49,278.0	53,124.7	51,949.8
Total Other Use	9,057.3	7,325.5	7,493.6
Total Development Use	15,215.6	13,638.9	13,592.5
Unclassified Use	776.0	237.8	1.291.00
Total	**74,326.9**	**74,326.9**	**74,326.9**

Over-all Total - Ottawa Creek	2006	2010	2015
Total Agriculture Use	78,429.0	82,929.7	89,543.5
Total Other Use	7,460.9	5,700.6	6,013.4
Total Development Use	9,209.9	6,423.9	5,819.1
Unclassified Use	6,267.2	6,321.8	0.0
Total	**101,367.0**	**101,376.0**	**101,376.0**

Over-all Total - Riley Creek	2006	2010	2015
Total Agriculture Use	42,844.3	44,874.2	46,777.5
Total Other Use	6,301.7	5,122.6	5,130.1
Total Development Use	7,629.9	6,285.7	5,899.6
Unclassified Use	1,031.3	1,524.7	0.0
Total	**57,807.2**	**57,807.2**	**57,807.2**

Over-all Total - Cranberry Creek	2006	2010	2015
Total Agriculture Use	74,734.4	79,206.1	79,279.1
Total Other Use	7,192.1	5,258.8	5,597.1
Total Development Use	12,010.9	9,103.8	7,621.7
Unclassified Use	0.0	368.7	1,439.5
Total	**93,937.4**	**93,937.4**	**93,937.4**

Table 3 provides a comparison of the change in land use in each of the 10 digit watershed from 2009 to 2015. According to data compiled from USDA National Agricultural Statistics Service Cropland Data Layer for 2006, 2010, 2015 which is available at https://nassgeodata.gmu.edu/CropScape/(1), 77.5% (382,465 acres) of the land was used for agriculture in 2006, 81.8% (403,462 acres) in 2010 and 82.1% (405,217 acres) in 2015. Corn, soybeans, winter wheat and grass/pasture comprised most of the acreage in all three years. The other two large areas of land use were forest 8.2% (40,498 acres) in 2006, 6.6% (32,381 acres) in 2010 and 5.9% (33,548) in 2015, developed areas (11.9% in 2006, 10.4% in 2010 and 10.0% in 2015). The entire summary of Land Use can be found on pages A - 3 through A - 8 of the appendix.

All land use has an effect on water quality either for the good or the bad. Eliminating forest and areas that are consistently covered by vegetation will increase the amount of run off during a storm event. This will increase the amount of sediment and nutrient loading, which will decrease the water quality. Increasing the amount of impervious surface as the result of development will lead to more runoff and lower the water quality. Increasing the amount of cropland will also increase the amount of runoff which would lower the water quality of the watershed.

To prevent negative effects of land use on water quality, strategies that will minimize the negative effects on water quality must be used.

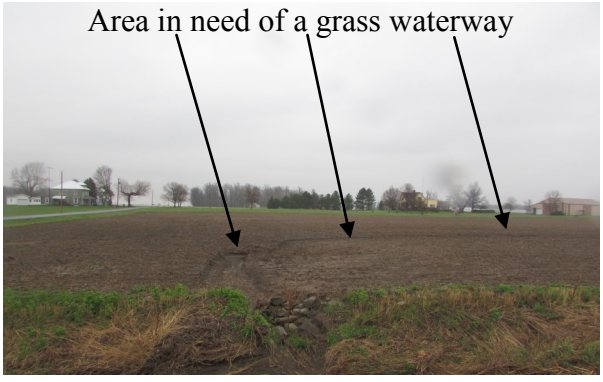
What is Being Done in the Watershed to Improve Water Quality?

As a result of the Blanchard River Watershed Partnership writing and receiving full endorsement of The Outlet/Lye Creek Watershed Action Plan in 2012, the Blanchard River Watershed was designated a focal watershed for Great Lakes Restoration Initiative (GLRI) funding. This designation, along with the algal bloom problem in Lake Erie, has caused many agencies, such as National Resource Conservation Services (NRCS), Environmental Protection Agency (EPA), The Nature Conservancy, local Soil and Water Conservation Districts (SWCD), The Ohio State University and others to focus more on the Western Lake Erie Basin and the Blanchard River Watershed, in an effort to improve the water quality. Most of the work has been implemented in the agriculture community.

SUMMARY OF THE BEST MANAGEMENT PRACTICES INSTALLED FROM 2008 - 2015							
		The Outlet /	**Eagle**	**Riley**	**Ottawa**	**Cranberry**	**Total WS**
BEST MANAGEMENT PRACTICE	**Headwater**	**Lye Creek**	**Creek**	**Creek**	**Creek**	**Creek**	**BMP**
Grassed Waterway	65,217 lf	22,181 lf	35,753 lf	37,176 lf	19,825 lf	20,507 lf	**200,659 lf**
Wetland Creation or Restoration	5 acres	52 acres	62 acres	36 acres	ndr	ndr	**155 acres**
Drainage - Subsurface	11,932 lf	ndr	4,750 acres	300 lf	110,352 lf	883,262 lf	**1,010,596 lf**
Controlled Drainage Structure	ndr	ndr	2,040 acres	72 acres	98 acres	210 acres	**2,420 acres**
Drainage - Tile Main	ndr	4,900 lf	900 lf	4,325 lf	ndr	ndr	**10,125 lf**
Comprehensive Nutrient Management Program	1,385 acres	647 acres	280 acres	825 acres	35 acres	570 acres	**3,742 acres**
Conservation Plan	ndr	ndr	1 acre	192 acres	331 acres	1,524 acres	**2,048 acres**
Filter Strips	ndr	ndr	ndr	8 acres	7 acres	10 acres	**25 acres**
Conservation Tillage No Till and Strip Till	ndr	ndr	ndr	4,884 acres	737 acres	2,154 acres	**7,775 acres**
Conservation Crop Rotation	ndr	ndr	ndr	ndr	ndr	592 acres	**592 acres**
Cover and Green Manure Crop	588 acres	119 acres	248 acres	3,093 acres	424 acres	1,340 acres	**5,782 acres**
Nutrient Appl, VRT - w/Tri-State Dert. Rec.	2,026 acres	ndr	ndr	ndr	729 acres	1,581 acres	**4,336 acres**
Blind Inlet	ndr	ndr	58 acres	ndr	ndr	ndr	**58 acres**

ndr - no data reported, ***NO NRCS*** **Data included in the information above.**

The Blanchard River Watershed Partnership has written several grants allowing local Soil and Water Conservation Districts and the BRWP to install BMPs in the Blanchard River Watershed. The total money awarded in these grants have totaled over $1.14 million. In addition, the NRCS have committed nearly $5 million since 2012. There have been other sources of money in the Western Lakes Erie Basin that have been available to farmers for BMPs. There are many factors that go into determining the load reductions from the BMPs. Such factors would include soil types, size of watershed affected, practice being used, distance from nearest waterway and topography. For the purpose of this report, it is important to realize that there are a lot of Best Management Practices being used by farmers, and several agencies involved providing guidance.



Controlled Drainage Structure

Water Quality and Macroinvertebrates

The Blanchard River Watershed Partnership has been monitoring water quality using macroinvertebrate identification since 2008. The BRWP monitors several sites on the Blanchard River, Lye Creek, Riley Creek and Little Riley Creek in the spring and fall during the year. Macroinvertebrates are organisms without backbones that live in rivers and streams, in areas that have riffles. Examples of macroinvertebrates are mayflies, crayfish, snails, leeches and others. The use of macroinvertebrates in determining water quality is based on their tolerance for pollution. Macroinvertebrates are divided into three groups based on their tolerance levels. The sources of the pollutants that affect the macroinvertebrates are sewage, pesticides, industrial effluent, low pH, low dissolved oxygen (DO) and heavy metals.

Table 5 - Summary of Macroinvertebrate Water Quality Monitoring 2009 - 2015

Blanchard River Sites															
	2009		**2010**		**2011**		**2012**		**2013**		**2014**		**2015***		**Over-all**
Pollution Sensitive	**F****	**S****	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**Avg. %**
Water Penny Larvae	13	16	13	18	12	15	8	18	9	18	7	18	4	8	**59.5**
Mayfly Nymph	15	16	17	18	13	15	17	18	18	18	17	18	8	8	**94.6**
Caddisfly Nymph	15	16	18	18	15	15	18	18	18	18	18	18	8	8	**99.1**
Riffle Beetle Adult	9	16	11	18	8	15	13	18	16	18	12	18	5	8	**66.7**
Gilled Snail	14	16	16	18	13	15	17	18	16	18	18	18	6	8	**90.1**

*Due to heavy rains and flooding in June, no monitoring was done in the spring
**F represents the number of sites where that organism was present; S refers to the number of sites monitored

Lye Creek Sites															
	2009		**2010**		**2011**		**2012**		**2013**		**2014**		**2015***		**Over-all**
Pollution Sensitive	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**Avg. %**
Water Penny Larvae	1	8	3	7	4	7	2	7	1	8	0	5	0	4	**23.9**
Mayfly Nymph	5	8	5	7	6	7	4	7	8	8	4	5	4	4	**78.3**
Caddisfly Nymph	8	8	7	7	7	7	7	7	7	8	4	5	3	4	**93.5**
Riffle Beetle Adult	4	8	4	7	7	7	6	7	6	8	4	5	1	4	**69.6**
Gilled Snail	8	8	3	7	3	7	4	7	5	8	1	5	3	4	**58.7**

*Due to heavy rains and flooding in June, no monitoring was done in the spring
**F represents the number of sites where that organism was present; S refers to the number of sites monitored

Riley Creek & Little Riley Creek Sites															
	2009		**2010**		**2011**		**2012**		**2013**		**2014**		**2015***		**Over-all**
Pollution Sensitive	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**Avg. %**
Water Penny Larvae	1	8	3	15	6	18	8	17	6	18	1	8	4	9	**31.2**
Mayfly Nymph	6	8	15	15	17	18	13	17	15	18	8	8	8	9	**88.2**
Caddisfly Nymph	6	8	12	15	13	18	7	17	13	18	4	8	8	9	**67.7**
Riffle Beetle Adult	3	8	4	15	8	18	7	17	9	18	4	8	4	9	**41.9**
Gilled Snail	4	8	4	15	14	18	12	17	9	18	4	8	2	9	**52.7**

*Due to heavy rains and flooding in June, no monitoring was done in the spring
**F represents the number of sites where that organism was present; S refers to the number of sites monitored

Table 5 shows the results of our macroinvertebrate studies from 2009 to 2016. The table only shows the data for the organisms that are the most sensitive for pollution. ***The fact that at least one species of the pollution sensitive organisms were present at each site during the monitoring period indicates that the level of pollutants were so low that there was no effect from the pollutants on the presence of these sensitive organisms. This would indicate that the water quality was high.*** The probable cause of any organisms not being present would be that lack of the necessary habitat due to low water, adverse water temperature, or the time of the monitoring.

Gaps in the Data

In order to do a completely updated Watershed Report Card, more data is needed to compare with the data in the 2009 TMDL Study that was completed by the Ohio EPA and the ODNR. The major data gaps that exist in the Blanchard River Watershed are:

- ***Credible chemical data at each of the TMDL sites used in the TMDL Report -*** The BRWP is partnered with the Sierra Club to do chemical testing at most of the TMDL sites. The chemical testing uses test strips that can only be used to identify hot spots. The data is not precise enough to be considered credible. Credible chemical data is needed to verify that the Best Management Practices that have been implemented are achieving the expected results in the watershed. The National Water Quality Research Center at Heidelberg University has added three additional water quality monitoring stations in the Blanchard River Watershed. These three new sites went on line in the fall of 2015.
- ***Home Septic Treatment Systems (HSTS)*** - The 2009 TMDL Report noted that failing HSTS were a source of pathogens and nutrients that are helping to cause some of the water quality impairments. The BRWP has partnered with the Hancock County Commissioners and the Hancock Public Health Department to repair / restore failing HSTS based on economic need. Since 2012, there have been 22 systems repaired or restored under the grants. There has not been any other data collected on failing HSTS in the watershed.
- ***Index of Biological Integrity (IBI) -*** Index of Biological Integrity is used to identify and classify water pollution problems. The IBI of a watershed is a scientific study that can only be done by trained personnel. This study is done by the Ohio EPA and the ODNR.
- ***Aquatic Use Attainment -*** Aquatic Use Attainment measures whether the waterbody provides suitable habitat for survival and reproduction of desirable fish, shellfish, and other aquatic organisms. There have not been any Aquatic Use Attainment studies done by the Ohio EPA and the Ohio Department of Natural Resources since the TMDL study. As a result, no data can be present as to any improvement or decline of the Aquatic Use in the watershed.

Final Thoughts

In addition to the work done in the Blanchard River Watershed, there has been a lot of work done in the Western Lake Erie Basin by the NRCS to fight the algal bloom problem in Lake Erie. Between 2009 and 2014, NRCS has helped producers install conservation BMPs, amounting to nearly $57 million in grants. These practices affect more than 435,000 acres and help to improve the water quality. The estimated load reductions from these practices is approximately 7 million pounds of nitrogen, 1.2 million pounds of phosphorus and 488,000 tons of sediment.(2)

As one can see, there is much work being done to improve water quality in the Blanchard River Watershed and the Western Lake Erie Basin, but there is still more work to be done. Improving water quality is everyone's responsibility.

References

1. USDA National Agricultural Statistics Service Cropland Data Layer for 2006, 2010, 2015 which is available at https://nassgeodata.gmu.edu/CropScape/
2. August 2015 - National Conservation Resources Service, *www.**nrcs**.usda.gov/wps/PA_**NRCS**Consumption/download?cid=**nrcs**eprd402611*

Appendix

Water Source and Usage in the Blanchard River Watershed

Where do People get Their Water?				
		Water Usage		
Cities and Villages by County		CCF	MG	MGD
Allen County	**Source of Water**			
Beaverdam	Private Wells by way of Groundwater			
Bluffton	Ottawa Upground Reservoir by way of the Blanchard River	224,576	168.0	0.460
Hancock County				
Arlington	Private Wells by way of Groundwater			
Benton Ridge	Private Wells by way of Groundwater			
Findlay	Findlay Upground Reservoir by way of the Blanchard River	2,840,027	2,124.3	5.820
Houcktown	Private Wells by way of Groundwater			
Jenera	Private Wells by way of Groundwater			
Mt. Blanchard	Private Wells by way of Groundwater			
Mt. Cory	Private Wells by way of Groundwater			
Rawson	Private Wells by way of Groundwater			
Stark	Private Wells by way of Groundwater			
Vanlue	Private Wells by way of Groundwater			
Hardin County	Private Wells by way of Groundwater			
Dunkirk	Private Wells by way of Groundwater			
Forest	Private Wells by way of Groundwater			
Kenton	Private Wells by way of Groundwater			
Patterson	Private Wells by way of Groundwater			
Putnam County				
DuPont	Groundwater - Private Wells			
Gilboa	Groundwater - Private Wells			
Glandorf	Ottawa Upground Reservoir by way of the Blanchard River	34,882	26.1	0.072
Miller City	Ottawa Upground Reservoir by way of the Blanchard River	4,008	3.0	0.008
Ottawa	Ottawa Upground Reservoir by way of the Blanchard River			
Seneca County				
No villages in the watershed				
Wyandot County				
No villages in the watershed				

CCF - hundred cubic feet

MG - million gallons

MGD - million gallons per day

HEADWATERS WATERSHED LAND USE			
LAND USE - Headwaters	**Acres**		
Agriculture	**2006**	**2010**	**2015**
Corn	19,254.9	22,982.0	22,605.0
Soybeans	39,592.3	39,805.4	39,370.2
Winter Wheat	8,083.2	4,836.4	4,428.9
Grass / Pasture	5,637.6	4,216.3	4,135.3
Alfalfa	234.0	437.5	578.5
Other Crops / Produce	3.9	3.5	2.4
Oats	23.4	1.3	0.4
Total	**72,829.2**	**72,282.4**	**71,120.7**
Other Land Use	**2006**	**2010**	**2015**
Barren	239.5	228.2	179.5
Forest	8,297.9	6,741.3	6,714.8
Woody Wetlands	62.0	10.4	9.1
Herbaceous Wetlands	35.7	36.0	126.5
Open Water	200.7	324.5	344.7
Fallow / Idle Cropland	862.5	23.6	100.7
Total	**9,698.2**	**7,364.0**	**7,475.3**
Developed	**2006**	**2010**	**2015**
Developed/Open Space	2,309.4	4,969.3	4,787.1
Developed/Low Intensity	359.0	1,221.0	1,460.5
Developed/Med Intensity	33.4	162.6	397.0
Developed/High Intensity	12.9	55.4	84.3
Total	**2,714.7**	**6,408.3**	**6,728.9**
Over-all Total Headwaters			
Total Agriculture Use	72,939.5	72,353.3	71,281.9
Total Other Use	9,698.2	7,364.0	7,475.3
Total Development Use	2,714.7	6,408.3	6,728.9
Unclassified Use	773.2	0.0	639.5
Total	**86,125.6**	**86,125.6**	**86,125.6**

THE OUTLET/LYE CREEK WATERSHED LAND USE			
	Acres		
LAND USE	**2006**	**2010**	**2015**
Agriculture			
Corn	15,135.8	18,119.7	19,430.1
Soybeans	33,783.5	36,507.5	36,547.1
Winter Wheat	8,712.4	8,729.4	7,410.3
Grass / Pasture	5,983.9	4,520.5	3,044.9
Alfalfa	697.4	717.5	1,662.2
Other Crops / Produce	11.5	22.5	90.1
Oats	37.2	0.9	14.9
Total	**64,361.8**	**68,618.0**	**68,199.6**
Other Land Use			
Barren	216.2	122.3	170.4
Forest	6,671.3	5,721.4	5,640.7
Woody Wetlands	75.2	4.8	4.7
Herbaceous Wetlands	96.1	87.8	176.8
Open Water	1,172.5	1,025.3	983.9
Fallow / Idle Cropland	640.1	49.4	146.8
Total	**8,871.3**	**7,011.0**	**7,123.3**
Developed			
Developed/Open Space	8,372.3	5,885.1	5,391.6
Developed/Low Intensity	2,741.7	2,536.7	2,788.2
Developed/Med Intensity	540.1	721.5	1,049.1
Developed/High Intensity	320.0	335.4	440.4
Total	**11,974.1**	**9,478.7**	**9,669.3**
Over-all Total The Outlet/Lye Creek			
Total Agriculture Use	64,361.8	68,729.9	68,507.2
Total Other Use	8,871.3	7,011.0	7,123.3
Total Development Use	11,974.1	9,478.7	9,669.3
Unclassified Use	92.6	80.2	0.0
Total	**85,299.8**	**85,299.8**	**85,299.8**

EAGLE CREEK WATERSHED LAND USE			
	Acres		
LAND USE	**2006**	**2010**	**2015**
Agriculture			
Corn	12,952.8	15,670.5	18,909.3
Soybeans	24,426.3	26,066.3	26,264.2
Winter Wheat	6,102.5	5,247.9	2,716.6
Grass / Pasture	5,273.3	5,320.0	3,530.6
Alfalfa	502.9	717.5	502.9
Other Crops / Produce	12.4	25.3	23.8
Oats	7.8	4.7	2.4
Total	**49,278.0**	**53,052.2**	**51,949.8**
Other Land Use			
Barren	292.9	99.2	278.0
Forest	7,433.9	6,566.8	6,552.7
Woody Wetlands	43.4	8.0	4.2
Herbaceous Wetlands	121.7	190.4	199.9
Open Water	393.7	444.4	382.3
Fallow / Idle Cropland	771.8	16.7	76.5
Total	**9,057.3**	**7,325.5**	**7,493.6**
Developed			
Developed/Open Space	8,207.2	6,835.7	5,834.2
Developed/Low Intensity	4,916.1	4,515.6	4,825.8
Developed/Med Intensity	1,384.8	1,571.7	2,012.0
Developed/High Intensity	707.5	715.9	920.5
Total	**15,215.6**	**13,638.9**	**13,592.5**
Over-all Total Eagle Creek	**2006**	**2010**	**2015**
Total Agriculture Use	49,278.0	53,124.7	51,949.8
Total Other Use	9,057.3	7,325.5	7,493.6
Total Development Use	15,215.6	13,638.9	13,592.5
Unclassified Use	776.0	237.8	1.291.00
Total	**74,326.9**	**74,326.9**	**74,326.9**

OTTAWA CREEK WATERSHED LAND USE			
	Acres		
LAND USE	**2006**	**2010**	**2015**
Agriculture			
Corn	25,448.4	27,797.5	34,152.3
Soybeans	37,193.1	40,170.0	41,233.2
Winter Wheat	9,685.0	10,019.1	6,361.5
Grass / Pasture	5,019.9	3,995.1	5,587.3
Alfalfa	802.8	765.3	1,403.1
Other Crops / Produce	254.2	176.7	7.8
Oats	23.3	6.0	4.4
Total	**78,426.7**	**82,929.7**	**88,749.6**
Other Land Use			
Barren	58.1	12.7	31.4
Forest	6,710.1	5,213.4	5,588.8
Woody Wetlands	59.7	1.1	3.0
Herbaceous Wetlands	75.2	149.9	108.8
Open Water	131.0	224.4	259.5
Fallow / Idle Cropland	427.0	99.2	128.8
Total	**7,461.0**	**5,700.6**	**6,013.4**
Developed			
Developed/Open Space	8,293.2	5,472.9	4,758.2
Developed/Low Intensity	841.6	849.3	880.7
Developed/Med Intensity	69.0	87.2	149.7
Developed/High Intensity	6.2	14.5	30.5
Total	**9,209.9**	**6,423.9**	**5,819.1**
Over-all Total Ottawa Creek			
Total Agriculture Use	78,429.0	82,929.7	89,543.5
Total Other Use	7,460.9	5,700.6	6,013.4
Total Development Use	9,209.9	6,423.9	5,819.1
Unclassified Use	6,267.2	6,321.8	0.0
Total	**101,367.0**	**101,376.0**	**101,376.0**

RILEY CREEK WATERSHED LAND USE			
	Acres		
LAND USE	**2006**	**2010**	**2015**
Agriculture			
Corn	11,152.7	12,232.2	15,485.9
Soybeans	20,511.4	21,773.5	21,800.0
Winter Wheat	5,843.7	5,330.9	3,179.9
Grass / Pasture	4,750.3	4,925.3	5,587.3
Alfalfa	415.4	398.3	537.5
Other Crops / Produce	167.5	109.7	45.4
Oats	2.7	4.2	1.8
Total	**42,843.6**	**44,774.1**	**46,777.5**
Other Land Use			
Barren	135.6	53.2	148.8
Forest	5,384.2	4,695.8	4,518.5
Woody Wetlands	28.7	3.3	3.3
Herbaceous Wetlands	35.7	79.8	102.5
Open Water	217.0	290.5	269.8
Fallow / Idle Cropland	500.6	0.0	87.2
Total	**6,301.7**	**5,122.6**	**5,130.1**
Developed			
Developed/Open Space	5,703.4	4,443.5	3,871.3
Developed/Low Intensity	1,463.1	1,307.5	1,364.0
Developed/Med Intensity	339.4	398.8	528.4
Developed/High Intensity	124.0	135.9	135.9
Total	**7,629.9**	**6,285.7**	**5,899.6**
Over-all Total Riley Creek			
Total Agriculture Use	42,844.3	44,874.2	46,777.5
Total Other Use	6,301.7	5,122.6	5,130.1
Total Development Use	7,629.9	6,285.7	5,899.6
Unclassified Use	1,031.3	1,524.7	0.0
Total	**57,807.2**	**57,807.2**	**57,807.2**

CRANBERRY CREEK WATERSHED LAND USE			
	Acres		
LAND USE	**2006**	**2010**	**2015**
Agriculture			
Corn	15,868.8	19,714.1	22,410.5
Soybeans	35,499.9	37,332.8	40,838.9
Winter Wheat	14,498.8	14,646.3	9,191.1
Grass / Pasture	7,135.5	5,405.9	3,251.7
Alfalfa	1,609.5	1,953.3	2,853.6
Other Crops / Produce	115.5	27.8	12.9
Oats	6.4	5.3	0.7
Total	**74,734.4**	**79,206.1**	**79,279.1**
Other Land Use			
Barren	235.6	54.7	104.3
Forest	6,001.0	4,602.8	4,532.1
Woody Wetlands	34.1	7.6	1.6
Herbaceous Wetlands	95.3	177.9	212.2
Open Water	253.4	314.2	440.4
Fallow / Idle Cropland	572.7	100.3	306.5
Total	**7,192.1**	**5,258.8**	**5,597.1**
Developed			
Developed/Open Space	9,712.9	6,633.7	4,715.3
Developed/Low Intensity	1,875.3	1,913.7	2,023.6
Developed/Med Intensity	310.0	350.7	616.5
Developed/High Intensity	203.8	205.7	266.4
Total	**12,101.9**	**9,103.8**	**7,621.8**
Over-all Total Cranberry Creek			
Total Agriculture Use	74,734.4	79,206.1	79,279.1
Total Other Use	7,192.1	5,258.8	5,597.1
Total Development Use	12,010.9	9,103.8	7,621.7
Unclassified Use	0.0	368.7	1,439.5
Total	**93,937.4**	**93,937.4**	**93,937.4**