Nine-Element Nonpoint Source Implementation Strategic Plan (NPS-IS plan)

Blanchard River:
The Outlet-Blanchard River Watershed
(04100008 01 03)

Version 1.0

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Acknowledgments

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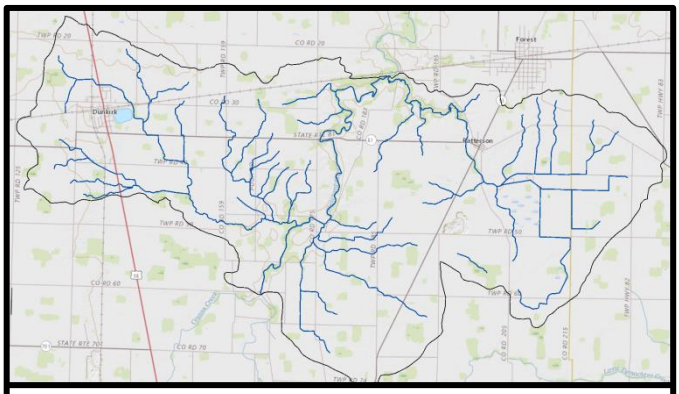
Chapter 1 Introduction

The Outlet-Blanchard River HUC-12 (04100008 01 03) watershed covers 21,748 acres or 33.98 square miles (Map 1.1). Like most of the HUC-12 in the Blanchard River watershed, agriculture use is the largest land-use (83.4% or 18,142 acres).



Map 1.1: The Outlet-Blanchard River Watershed

The watershed starts at the moraine between the Sandusky River watershed and the Blanchard River watershed to the east its widest point. At its widest point in a south to north direction, the watershed is approximately 5.5 miles wide. The Blanchard River flows through the middle area in a south to north direction. The Blanchard River enters the watershed at RM 98.23 where the Cessna Creek HUC-12 and Headwaters-Blanchard River HUC-12 watersheds meet. The river flows in a north direction to RM 89.51 where it enters the Ripley Run-Blanchard River HUC-12 watershed. There are two main tributaries that flow into the Blanchard River in the watershed. The Outlet (upper) starts southeast of the Village of Patterson and flows in a northwest direction entering the Blanchard River at RM 90.94. Shallow Run starts northwest of the Village of Dunkirk and flows in a southeast direction entering the Blanchard River at RM 96.69. The entire watershed lies in the Eastern Corn Belt Plains (ECBP) region.

The federal and state nonpoint source funding opportunities require strategic watershed plans be written at the HUC-12 watershed level using the nine key elements in the *Guide to Developing Nonpoint Source Implementation Strategic Plans in Ohio* developed by the OEPA. The Blanchard River Watershed Partnership (BRWP), with collaboration from local agencies, has started to develop Nine-Element Nonpoint Source Implementation Strategic Plans (NPS-IS plan) for the Blanchard River Watershed based on the 2012 Report Card. The 2012 Report Card was developed using data from the 2009 TMDL study, 2010 Ohio Integrated Assessment Report for the Blanchard River and ODNR's Earth Resources Information Network (ERIN). Each HUC-12 watershed was assigned a letter grade based on the data. The Outlet-Blanchard River HUC-12 received a letter grade of "D" in the report card.

1.1 Report Background

The Blanchard River Watershed Partnership is a community-based volunteer 501(c) (3) organization that seeks to address problems and concerns that affect the health of the Blanchard River Watershed and educate all citizens about the dynamics of the Blanchard River and its tributaries. The BRWP members and Board of Directors include interested citizens, local government agencies, educators, representatives of industry and other stakeholders who have come together with one goal in mind: to improve and maintain water quality within the watershed. One of the main ways to achieve improved water quality was through the development of watershed action plans (WAP). In June 2011, the BRWP received full endorsement of The Outlet/Lye Creek (HUC 04100008 02) WAP. In November 2012, the BRWP received full endorsement of another WAP for the Riley Creek Watershed (HUC 04100008 04). These two action plans were written at the HUC-10 level. Implementation activities in these two watersheds have been occurring since their endorsement. After the endorsement of these two WAPs, designed to outline the process for restoration activities, the BRWP was able to write or assist with grant writing that resulted in the award of over $8,000,000 in funding.

With the new requirement from the U.S. EPA to develop plans that align with the nine-element plans, focus is now on developing NPS-IS plans for individual HUC-12 based on their grade in the 2012 Report Card. This NPS-IS plan is being written for **The Outlet-Blanchard River HUC-12 (04100008 01 03)** watershed to address nonpoint source causes and sources of impairments that have been specifically identified in the watershed.

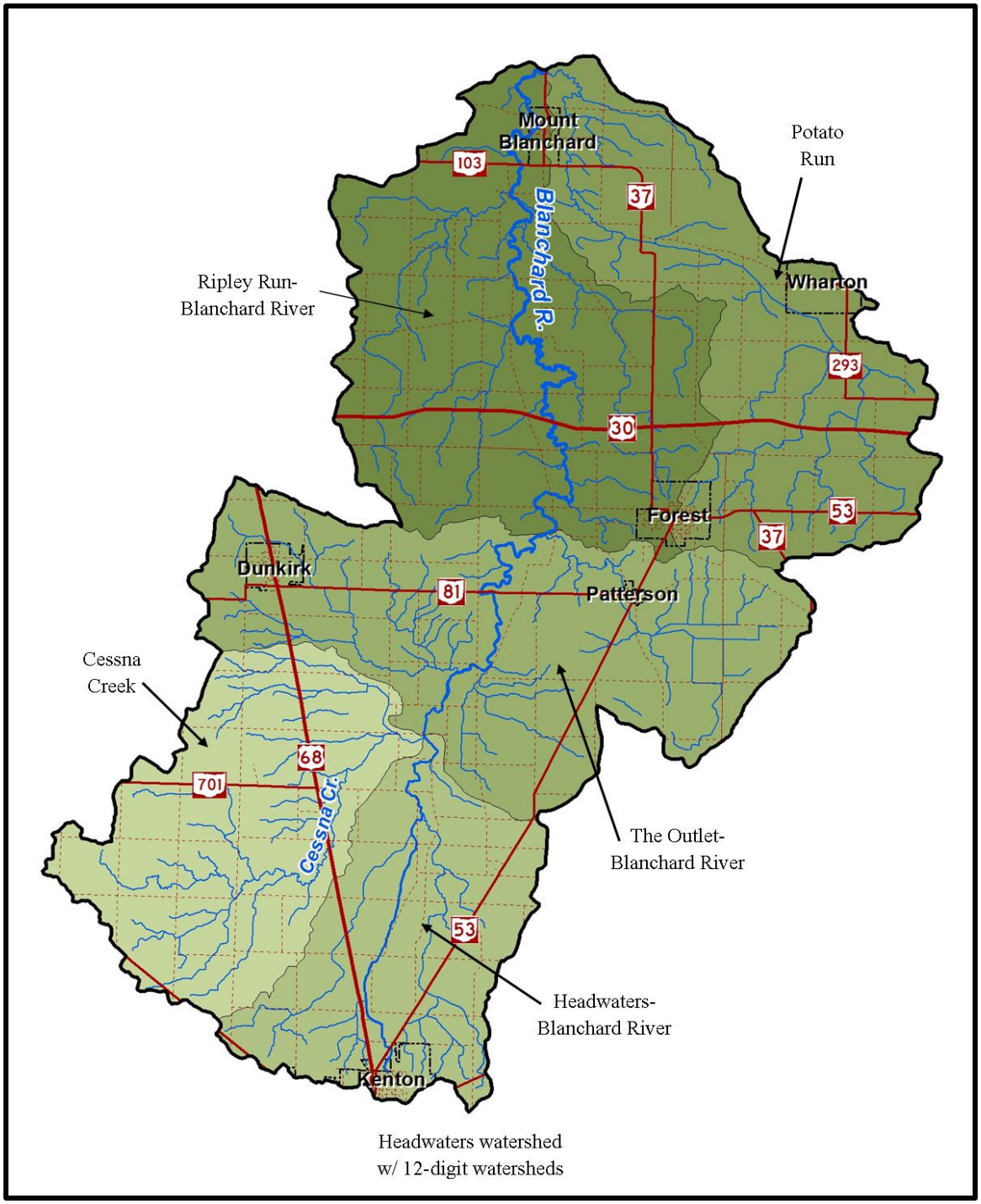
Removal of nonpoint source impairments in **The Outlet-Blanchard River HUC-12** will address nonpoint source impairment and allow for step-wise improvement toward achieving attainment of water quality standards. In addition, nutrient load reductions achieved through implementation of projects in this watershed will address Western Lake Erie Basin load reduction goals as described in the Ohio Domestic Action Plan for Ohio in accordance with the Annex 4 agreement.

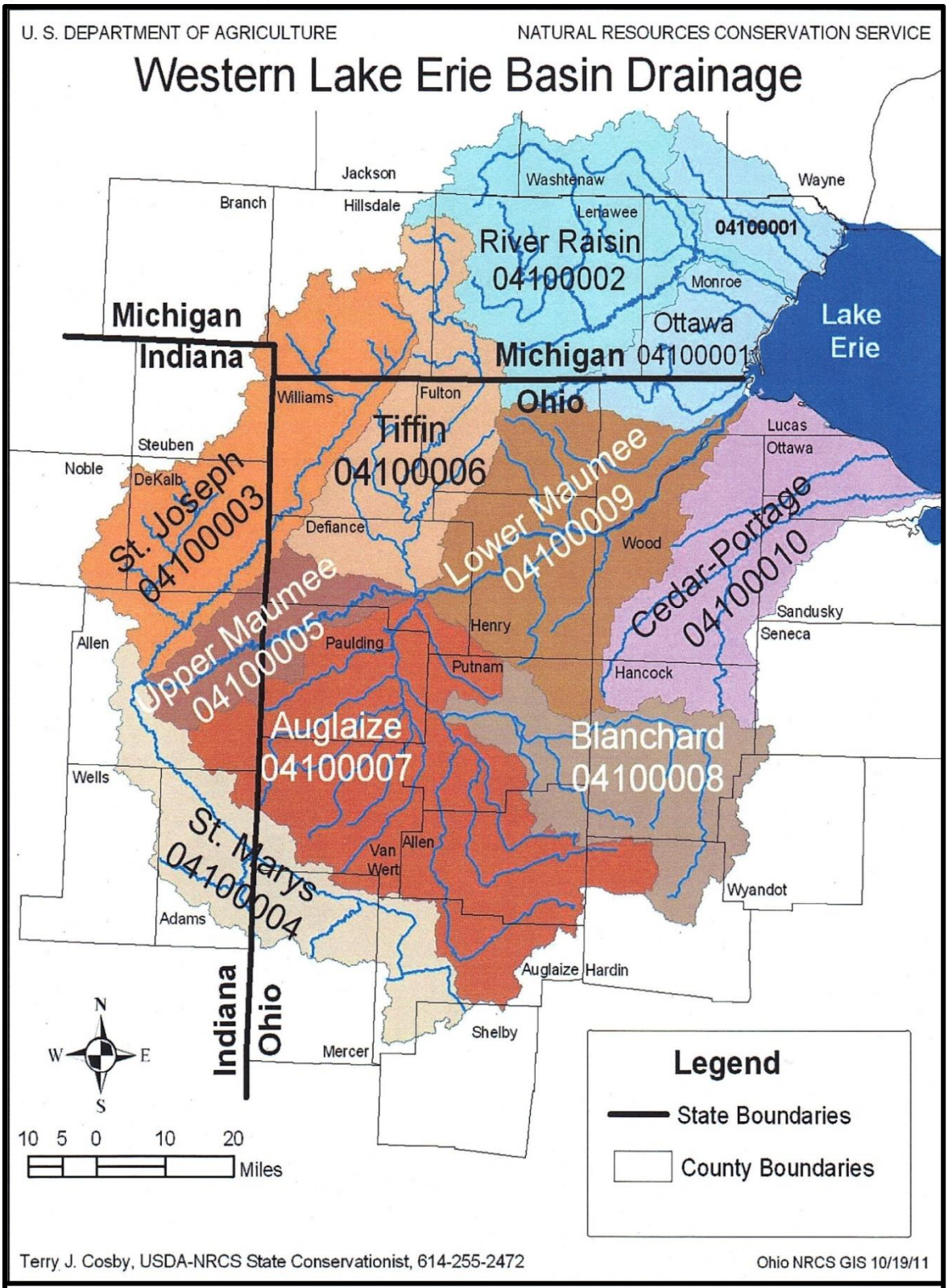
1.2 Watershed Profile & History

The Blanchard River Watershed is identified using an 8-digit Hydrological Unit Code (HUC), 04100008. There are six subwatersheds within the Blanchard River Watershed. Each of these subwatersheds is identified using an HUC-10. The Headwaters watershed HUC-10 is 04100008 01. There are five smaller HUC-12 watersheds located in the Headwaters watershed. Map 1.2, on page 1-3, shows the HUC-10 subwatersheds in the Headwaters. The Blanchard River Watershed covers 493,434-acres (771 square miles) and drains into the Auglaize River west of the Village of Dupont in Putnam County. From here, the water flows into the Maumee River at Defiance and

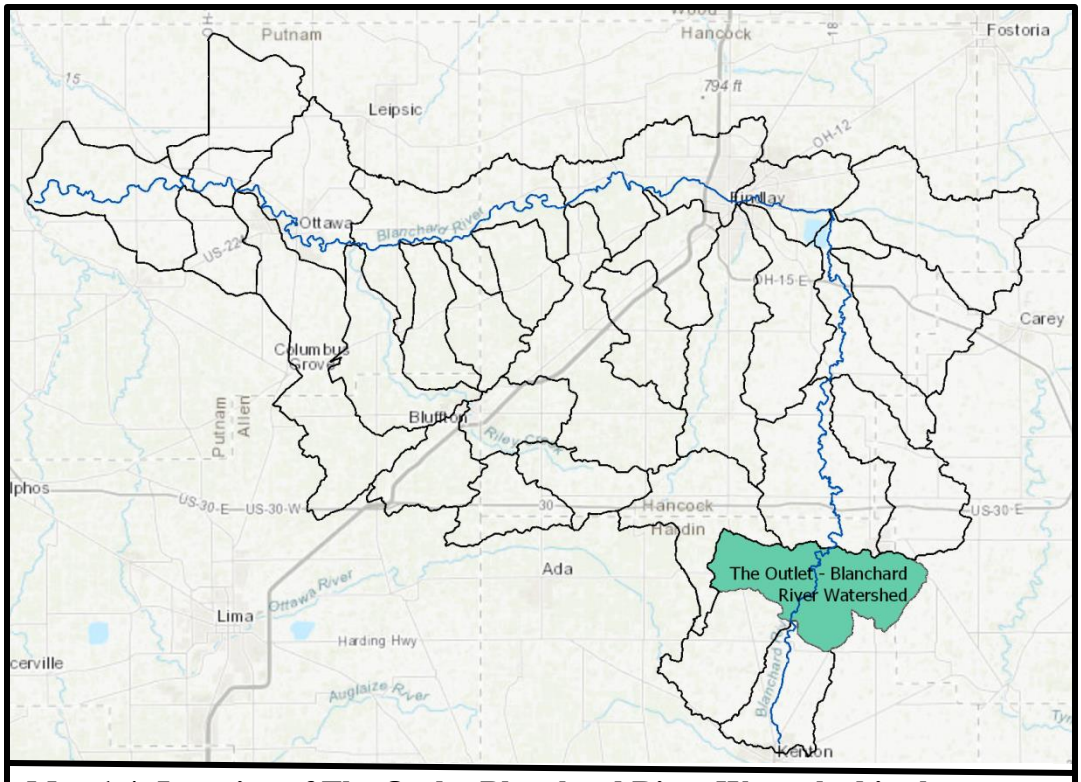
eventually into Lake Erie at Toledo. Map 1.3 on page 1-4 shows the location of the Blanchard River Watershed in the Western Lake Erie Basin. Map 1.4 on page 1-5 shows the location of The Outlet-Blanchard River Watershed in the Blanchard River Watershed. Over 77% percent of the watershed is used to grow row crops. Map 1.5 on page 1-5 shows the elevation changes in the watershed.

Map 1.2: Headwater Watershed (HUC 04100008 01) with the HUC-12 subwatersheds

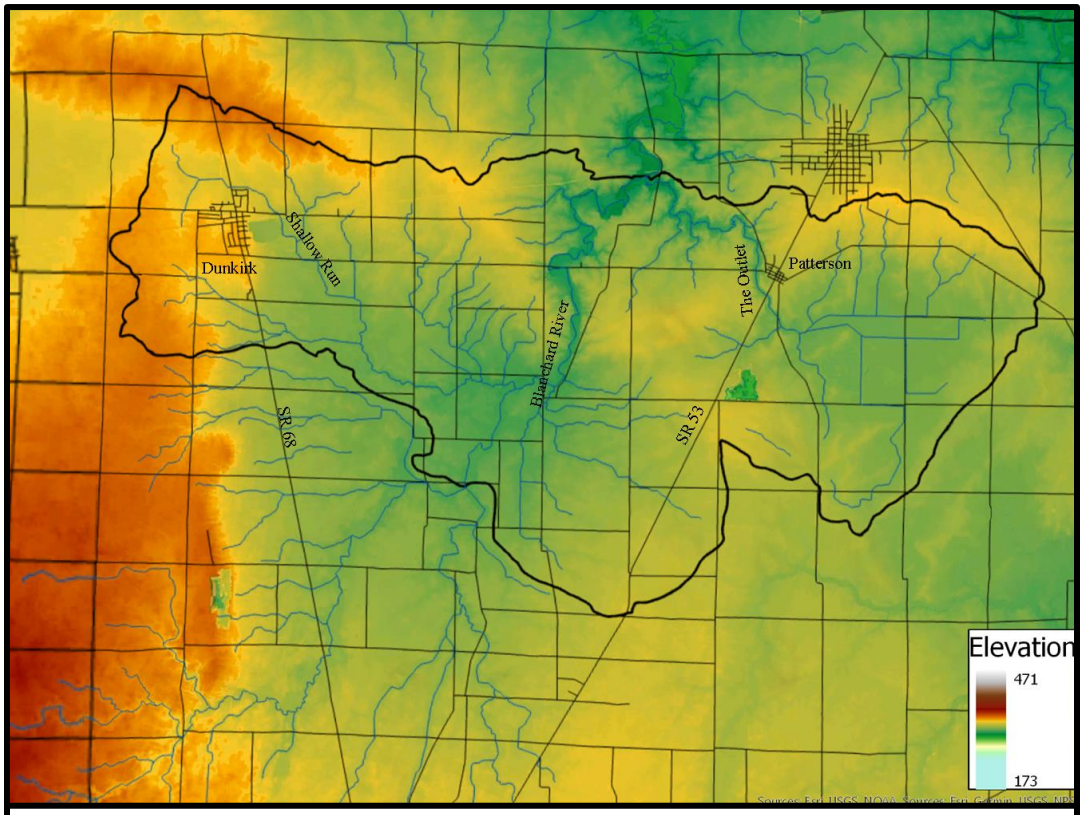




Map 1.3: Location of the Blanchard River Watershed in the Western Lake Erie Basin



Map 1.4: Location of The Outlet-Blanchard River Watershed in the Blanchard River Watershed.



Map 1.5: Elevations of The Outlet-Blanchard River Watershed

Prior to European immigrant settlement in the 1800's, wetlands were common and, based on soil survey information, made up about 42 percent of the watershed. Due to the clearing of swamp forest and the subsequent drainage of the land, most of the wetlands have been artificially drained. Wetlands, occurring in cropland, currently constitute less than 1 percent of the watershed and wooded wetlands constitute about 3.2 percent of the watershed.

In addition to addressing the impairments in **The Outlet-Blanchard River HUC-12,** this NPS-IS plan will have a cross benefit to meet phosphorus load reduction goals in the Western Lake Erie Basin described in the Ohio Domestic Action Plan for Ohio in accordance with the Annex 4 agreement.

1.3 Public Participation and Involvement

The initial planning process for developing a Nine-Element Nonpoint Source Implementation Strategic Plan (NPS-IS) was conducted by the Blanchard River Watershed Partnership (BRWP). Partners were contacted to inform them of the plan. These partners included the Hardin County Soil & Water Conservation District (HSWCD), Hardin Public Health Department, Ohio Department of Agriculture and Natural Resources Conservation Service (NRCS). The BRWP formed a Headwaters Community Advisory Committee in 2017. This group will provide input for the plan. The watershed was scouted by doing a road-by-road observation and inspection of the conditions of the waterways, agricultural fields, and other features that would be useful in developing **The Outlet-Blanchard River HUC-12 NPS-IS** plan. A picture upstream and downstream from each bridge was taken.

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Chapter 2: The Outlet-Blanchard River Watershed

Characterization and Assessment Summary

2.1 Summary of Watershed Characterization for The Outlet-Blanchard River HUC-12

2.1.1 Physical and Natural Features

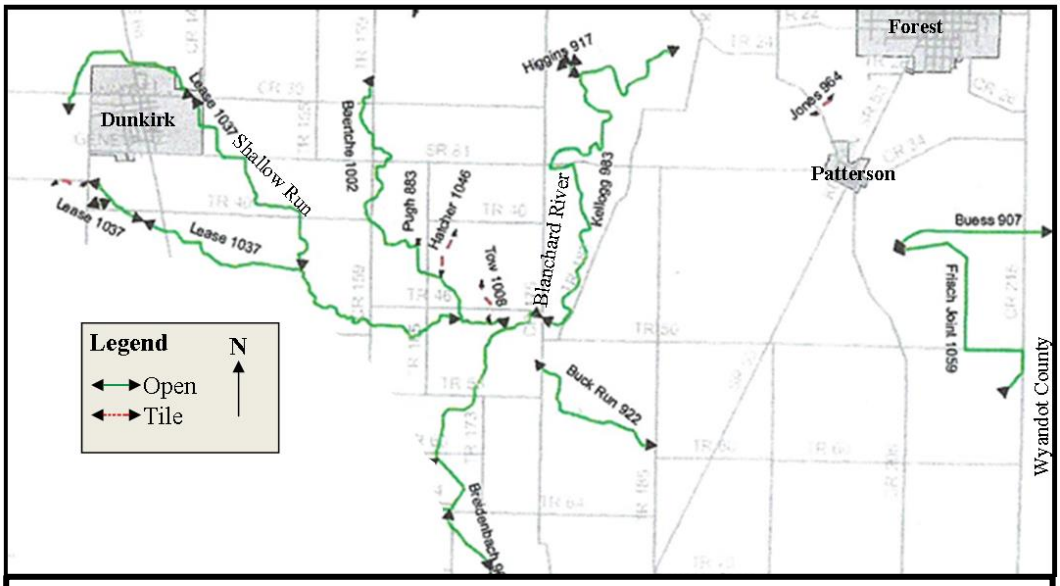
The Blanchard River enters The Outlet-Blanchard River watershed at RM 98.23. The river flows in a north direction to RM 89.51 where it enters the Ripley Run-Blanchard River HUC-12 watershed. There are two main tributaries that flow into the Blanchard River in the watershed. The Outlet (upper) starts southeast of the Village of Patterson (elevation 922') and flows in a northwest direction entering the Blanchard River at RM 90.94. Shallow Run starts northwest of the Village of Dunkirk (elevation 945') and flows in a southeast direction entering the Blanchard River at RM 96.69. The entire watershed covers about 31.4 square miles and drains 21,822 acres Land use within the watershed is primarily for agricultural purposes (84.1%). Table 2-1 summarizes the land use in the watershed.

The Outlet-Blanchard River Watershed (04100008 01 03)			
Land Use Classification	**Area (ac.)**	**Area (mi^2)**	**% Watershed Area**
Crop Land	16,799.90	26.25	77.25
Hay/Pasture	1,342.37	2.10	6.17
Deciduous Forest	1,713.99	2.68	7.88
Barren	119.20	0.19	0.55
Herbaceous/Woody Wetlands	46.04	0.07	0.21
Shrub land	0.89	0.00	0.00
Developed, High Intensity	12.23	0.02	0.06
Developed, Medium Intensity	60.49	0.09	0.28
Developed, Low Intensity	339.37	0.53	1.56
Developed, Open Space	1,128.21	1.76	5.19
Water	185.25	0.29	0.85
Total	**21,747.94**	**33.98**	**100.0**

Table 2.1: Land Use Classification for The Outlet-Blanchard River Watershed (Reynolds)

The entire watershed lies within the Eastern Corn Belt Plains (ECBP) ecoregion. In an ECBP a clay-enriched B horizon and the predominant land use is cropland. In addition, the predominant forest type is beech/maple forest and the primary land use is agriculture. (Knowlton, OSU)

there are several waterways in **The Outlet-Blanchard River HUC-12** under maintenance by the Hardin County SWCD according to as described in ORC 940.17-30. Map 2.1 below shows the areas of The Outlet-Blanchard River HUC-12 Watershed that are under maintenance.



Map 2.1: Waterways under Maintenance by Hardin SWCD
(Martin/Hardin SWCD)

Soil analysis shows that 11,580 of the 12,370 acres (64.3%) are of the Blount-Pewamo series with a slope of less than 5%. These two soil series are both silty clay loam that drain slowly. The parent material for both varieties is glacial till. The over-all Base Sediment Delivery for the soils in the watershed is 81751.7 tons. /yr. or 0.4832 tons/ac./yr. The Nitrogen Associated with sediment is 22,306.6 lbs. /yr. or 1.237 lbs./ac./yr. The Phosphorus Associated with sediment is 9,528.1 lbs. /yr. or 0.5261 lbs./ac./yr.

2.1.2 Land Use and Protection

As shown in Table 2-1 on page 2-1, 84.1% of **The Outlet-Blanchard River HUC-12** is used for agricultural purposes. As with most of the agricultural area in the Blanchard River Watershed, corn and soybeans are the two dominant crops being grown. (USDA 2015)
There is no school buildings located in the watershed. The Village of Patterson is the only unsewered area in the watershed.

protection program. The largest of these is located southeast of the Village of Patterson and covers 525 acres. This area is enrolled in the Wetland Reserve Protection program. **(**See picture 2.1)

Picture 2.1: Conservation land enrolled in the Wetland Reserve Program (WRP) (Martin)

The EPA's National Pollutant Discharge Elimination System (*NPDES*) requires a permit for all facilities discharging pollutants from a point source to a water of the state. There are two NPDES-permits located in **The Outlet-Blanchard River HUC-12** watershed: 1. Dunkirk Waste Water Treatment Plant (WWTP) (Permit #2PB00061) discharges into Shallow Run and 2. Shelly Materials, Inc - Forest Quarry (Permit # 2IJ00022) discharges into The Outlet. Table 2.2 below summarizes each permit.

Table 2.2: NPDES Permits in The Outlet-Blanchard River Watershed

NPDES Permits - The Outlet-Blanchard River Watershed					
		Permit	Issue	Average	Compliance
Applicant Name	Facility Name	Number	Date	Design Flow	History
Village of Dunkirk	WWTP	2PB00061	*	137,000 gpd	no problems reported
Shelley Materials, Inc.	Forest Quarry	2IJ00022	2/15/2018	3,310,000 gpd**	no problems reported

*Old permit expired on February 28, 2018. A new permit has been applied for but not approved as of April 13, 2018.
**The discharge varies since it consists of mostly stormwater and ground water.

The Dunkirk Cemetery is located just south of the Village of Dunkirk on the west side of SR 68. (See picture 2.2) The Patterson Cemetery is located along TR 195 about one half mile northwest of the Village of Patterson.

Picture 2.2: Dunkirk Cemetery

The main transportation corridor in the watershed includes SR 68 that runs through the watershed between the Village of Dunkirk and Kenton and SR 53 that runs between the Village of Patterson and Kenton. There is a CSX railroad track that runs between the Village of Dunkirk and Kenton. Another railroad track runs between the Village of Patterson and Kenton. These transportation corridors present areas of potential stormwater pollution from normal spills and droppings.

2.2 Summary of Biological Trends for Tiderishi Creek HUC-12

The Outlet-Blanchard River HUC-12 was sampled starting in 2005 and reported in 2007 and 2009 as a part of the Ohio EPA's *2007 Technical Support Data Report* and the *Total Maximum Daily Load Report (2009)* respectively. These two documents were used extensively in preparation of The Outlet-Blanchard River HUC-12. The habitat and biological data presented in this plan is from these two reports.

According to the 2009 TMDL Report, on page 44, the biological communities in the Blanchard River Headwaters watershed assessment unit (WAU) were impacted by a combination of factors related to:

- agriculture practices,
- inadequate water treatment from several of the small communities,
- hydromodification due to channelization which altered instream habitat and natural flow,
- riparian vegetation limited to grasses and low growing bushes,
- elevated nutrient levels,
- low dissolved oxygen and
- high temperature.

According to the 303(d) list in the OEPA 2014 Integrated Report, overall, **The Outlet-Blanchard River HUC-12** is impaired due to total phosphorus, direct habitat alterations, water temperature water, organic enrichment (sewage), nutrient/eutrophication biological indicators, and low flow alterations. The sources are: crop production with subsurface drainage, channelization, streambank modification/destabilization and combined sewer overflows.

2.2.1 Sediment and stream habitat

The 2005 TMDL Study did not find impaired sites with sedimentation and siltation. As a result, a quantification of sediment induced and habitat induced causes of impairment was not included in the TMDL Report.

Table 2-2 on the next page shows the characterization of the habitat TMDL using QHEI metrics for the three sites having causes of either habitat alteration or flow alteration (or both) from Table 7.7 of the 2009 TMDL. The first two sites were on the Blanchard River, RM 97.5 and RM 96, have both been designated as WWH. The third site was on The Outlet at RM 3.6 has also been designated as a WWH. None of the sites achieved the Total Habitat Score of 3 needed to

Table 2.3: Characterization of the Habitat TMDL using QHEI metrics. (Ohio EPA 2009

Stream/River	River Mile	Stream Designation	QHEI Score	# of High Influence Attributes	Total # of Modified Attributes	Subscore[1]			Total Habitat Score
						QHEI	High Influence	Modified	
Blanchard River	97.5	WWH	46	1	8	0	1	0	1
Blanchard River	96	WWH	46	2	8	0	0	0	0
The Outlet (Blanchard R. RM90.94)	3.6	WWH	52	1	8	0	1	0	1

[1]Habitat TMDL points are assigned to WWH streams based on achieving the following minimum targets: QHEI = 60 points; total number of modified attributes < 5; number of high influence modified attributes < 2. One point is assigned if these targets are met.

meet the goal, the number of high influence attributes need to be lowered to at least 1 and the total number of modified attributes needs to be lowered to at least 4.

2.2.2 Macroinvertebrates (Invertebrate Community Index [ICI])

According to the 2009 TMDL report, the macroinvertebrate community in the **The Outlet-Blanchard River HUC-12** reflects an impaired aquatic resource. Table 2-3 summarizes the data collected during the 2005 TMDL study. These sites were studied during July 2005.

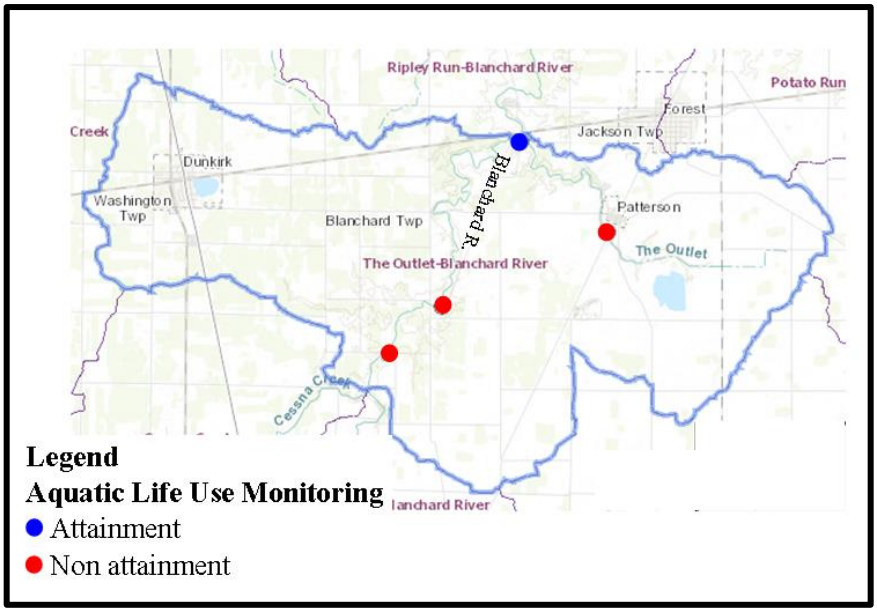
Table 2.4: Macroinvertebrates Results from TMDL Study

Macroinvertebrates in The Outlet-Blanchard River HUC- 12 (04100008 01 03) 2009 TMDL Study				
RM (Drain. Area mi^2)	No. Qualitative Taxa	Total Taxa	ICI[b]	Quality EPT
Blanchard River RM 96.0 (95.6)	31	55	16	5
Blanchard River RM 97.5 (97.5)	37	52	20	7
The Outlet RM 0.30 Blanchard R. RM 90.94 (3.6)	24	21	nr	6
Shallow Run RM 0.90	28	28	nr	1
Shallow Run RM 3.0	20	20	nr	0

b - A narrative evaluation of the qualitative sample based on attributes such as community composition, EPT taxa richness, and number of sensitive taxa was used when quantitative data were not available or considered unreliable due to current velocities less than 0.3 fps flowing over artificial substrates.
nr - no record provided in the TMDL

Map 2.2 shows the attainment status for aquatic life use at each site studied during the 2005 TMDL study. The site at RM 88.2 was in full attainment, while the other two sites on the Blanchard River at RM 96.0 and RM 97.5 where in non-attainment. The only site on The Outlet at RM 3.0 was in non-attainment.

Map 2.2: Map of the Attainment Status for Aquatic Life Use



2.2.3 Habitat (via Qualitative Habitat Evaluation Index [QHEI])

The Ohio EPA sampling teams collected data related to water quality and habitat characteristics during the 2005 study. As shown in Tables 2.3 and 2.4 on page 2-5, the total habitat score at the Blanchard River RM 96.0 was 0 and the site at RM 97.5 had a score of 1. The only other site studied was on The Outlet at RM 3.6. The site had a score of 0. The total habitat score is equal to the sum of the QHEI, high influence attributes and modified high influence attributes. A total habitat score of 3 is needed to meet the goal of the EPA. The QHEI score was only determined at the two sites on the Blanchard River and the one site on The Outlet. None of the sites met the established metric threshold of 60 for QHEI. The Blanchard River site at RM 97.5 met the established metric threshold for number of high influence attributes but not for the total number of modified attributes. The Blanchard River site at RM 96.0 failed to meet the established metric threshold for number of high influence attributes and for the total number of modified attributes. The site on The Outlet at RM 3.6 met the established metric threshold for number of high influence attributes but not for the total number of modified attributes.

The site on the Blanchard River at RM 96.0 had a Quality EPT score of 5 that exceeds the threshold metric. The site at RM 97.5 also had a Quality EPT score of 7 that exceeds the

threshold metric. The site at RM 0.30 on The Outlet had a Quality EPT score of 6 that exceeds the threshold metric. The two sites on Shallow Run at RM 0.90 and 3.0 had a Quality EPT score of 1 and 0 respectively. Neither of these scores met the threshold metric set by the EPA.

2.2.4 Fishes (modified Index of Well-Being [Mlwb] & Index of Biotic Integrity [IBI]

The fish population study was conducted at two sites on the Blanchard River on September 15, 2005 as a part of the TMDL Study. Table 2.5 below summarizes the results of the study based on their tolerance to pollution. The sampling at RM 95.60 showed 21 species present. Thirteen or 61.9% of the species were either tolerant or moderately tolerant to pollution. There were no species that were intolerant to pollution and only two species were moderately tolerant. The sampling at RM 97.50 showed 22 species present. Pollution tolerant or moderately tolerant species comprised 59% of the total collected. There were no species that were intolerant to pollution and only four species were moderately tolerant.

An additional two sites were study on The Outlet on the same date. The sampling at RM 0.30 showed 18 species present. Eight or 44.4% of the species were either tolerant or moderately tolerant to pollution. There were no species that were intolerant to pollution and only three species were moderately tolerant. The sampling at RM 3.60 showed 20 species present. Sixteen or 80% of the species were either tolerant or moderately tolerant to pollution There was one species that was intolerant to pollution and only three species were moderately tolerant.

The TMDL noted that hydromodification, as a result of the streams being maintained primarily to remove excess water from the surrounding landscape, was reflective of an excess of nutrients and a dissolved oxygen deficit.

Table 2.5: Summary of the Fish Study from the TMDL Study

Summary of Fish Population							
River/Stream	River Mile	Number Species	Tolerance to Pollution by Species				
			T	MT	M	MI	I
Blanchard River	95.60	21	7	6	6	2	0
Blanchard River	97.50	22	7	6	5	4	0
The Outlet	0.30	18	5	3	7	3	0
The Outlet	3.60	20	8	8	0	3	1

T - tolerant MT - moderately tolerant M - intermediate MI moderately intolerant I - intolerant

2.3 Summary of NPS Pollution Causes and Associate Sources for The Outlet-Blanchard River HUC-12

Table 2.6 below provides a summary of the IBI, ICI, Mlwb, status of each site, QHEI, causes and sources of Impairments at each site during the 2005 TMDL study.

Table 2.6: Summary of Aquatic Assessment Score for The Outlet-Blanchard River HUC - 12 (04100008 01 03)

RM (Drain. Area mi^2)	IBI	Mlwb[a]	ICI[b]	Status[c]	QHEI	Causes	Sources
Blanchard River 97.5/97.5 (43)	34*	9	20*	Non	46.0	Direct habitat alteration, nutrients, ammonia, flow alteration	Ag related channelization, crop production, streambank modification/ destabilization
Blanchard River 96.0/ 95.6 (61)	30*	7.3*	16*	Non	46.0	Direct habitat alteration, organic enrichment/DO	Ag related channelization, crop production, combined sewer overflow, (via Shallow Run/Dunkirk)
Shallow Run 3.0 (6.4)		a	VP*			Direct habitat alteration, organic enrichment/DO, flow alteration, nutrients	Ag related channelization, crop production, combined sewer overflow
Shallow Run 0.9 (10.8)		a	P*			Direct habitat alteration, organic enrichment/DO, flow alteration, nutrients, temperature	Ag related channelization, crop production, combined sewer overflow (Dunkirk)
The Outlet 3.6 (9.5)	34*	a		Non	52.5	Direct habitat alteration, flow alteration, nutrients	Ag related channelization, crop production
The Outlet 0.3/0.3 (12.4)	38[ns]	a	MG[ns]	Full	55.5		

a - Mlwb is applicable to headwater streams with drainage areas $\leq$ 20 mi^2
b - A narrative evaluation of the qualitative sample based on attributes such as community composition, EPT taxa richness, and number of sensitive taxa was used when quantitative data were not available or considered unreliable due to current velocities less than 0.3 fps flowing over artificial substrates.
c - Attainment status based on a single organism group is parenthetically expressed.
ns - Nonsignificant departure from biocriteria ($\leq$4 IBI or ICI units, or $\leq$0.5 Mlwb units)
* - Indicates significant departure from applicable biocriteria (>4IBI or ICI units, or >0.5 Mlwb units. Underlined scores are in the Poor or Very Poor range.

The 2016 Integrated Water Quality Monitoring and Assessment Report published by the Ohio EPA reported that the aquatic life use impairments in **The Outlet-Blanchard River HUC-12** were total phosphorus, low flow alteration, direct habitat alterations, organic enrichment (sewage) biological indicators, temperature (water) and nutrient/eutrophication biological indicators. The listed sources for the impairments were channelization, crop production with subsurface drainage, streambank modifications/destabilization and combined sewer overflows. All the sites were designated as WWH. Only the site at RM 0.3 on The Outlet was in full attainment. All the other sites were in nonattainment.

The TMDL report indicates that Recreational Use Attainment in the watershed is impaired due to bacteria. There is no water currently being used in the watershed for a public drinking supply. Any drinking water is from water wells in the Village of Dunkirk and the rural area.

Chapter 3: Conditions & Restoration Strategies for The Outlet-Blanchard River HUC-12 Critical Areas

3.1 Overview of Critical Areas

According to the EPA's TMDL Report, the issues in **The Outlet-Blanchard River HUC-12, "**are related to agricultural practices in the watershed along with inadequate waste treatment." The stream modifications in the watershed are related to agricultural use have removed a majority of the riparian buffer vegetation. These modifications have removed a majority of the riparian buffer vegetation. Farmers are establishing their row crops close to the edge of the stream resulting in potential stream bank destabilization and the removal of any buffer between the field and the stream.

The 2009 Ohio EPA TMDL Study reported on four sampling sites in **The Outlet-Blanchard River HUC-12**. The sampling at these sites was done in 2005. The site at RM 88.2 was in full attainment, while the other two sites on the Blanchard River at RM 96.0 and RM 97.5 where in non-attainment. The only site on The Outlet at RM 3.0 was in non-attainment.

Specific restoration strategies and projects will focus on the reduction of the nutrients, especially phosphorus, and sediment loading along the entire Tiderishi Creek. Section 10.3.4 of the U.S EPA' s 2008, *Handbook for Developing Watershed Plans to Restore and Protect Our Water,* states that, "In general, management practices are implemented immediately adjacent to the waterbody or upland to address the source of pollutant loads." Using this rationale, Critical Area 1 will include cropland acreage within the HUC-12 according to a hierarchy of priorities. Map 3.1 on page 3-2 shows the location of the critical area 1 with the priority areas.

Critical Area 2 will address the inadequate waste treatment problem in the watershed. The TMDL noted that the combined sewer overflows (CSOs) in the Village of Dunkirk and the unsewered Village of Paterson were the source of the pathogens and bacteria from the inadequate treatment of waste. Since the TMDL study was completed in 2009, the Village of Dunkirk has completed the separation of all CSOs. Therefore, Critical Area two will include only the Village of Patterson.

The 2009 TMDL Report does not specifically list any goal for reduction of the amount of sediment and nitrogen reduction needed in **The Outlet-Blanchard River HUC-12.** Therefore the specific restoration strategies and projects will focus on the reduction of the phosphorus loading in the Blanchard River. The Best Management Practices (BMPs) suggested will focus on the reduction of the total phosphorus. However, these BMP's result in a reduction of the sediment and nitrogen loadings. Additional critical areas may be identified and will be addressed in future revisions of this NPS-IS

In addressing the needed phosphorus load reduction in **The Outlet-Blanchard River HUC-12,** there must be a baseline to start with in developing the reduction plan. Table 3.1 shows an Annualized Summary of seasonal phosphorus loadings into **The Outlet-Blanchard River HUC-12** based on data from the 2005 TMDL Study. The table also includes the suggested seasonal and annual reduction needed to meet the reduction goal for the entire watershed. Table 3.1 also shows the 40% reduction goal established in the Domestic Action Plan created the International Joint Commission.

Table 3.1 Annualized Summary of 2005 TMDL Seasonal Phosphorus Loading Table

Existing (2005) P Load -Annual (TMDL)	8,568.4 kg P/year
TMDL Target - Annual	3,272.8 kg P/year
Difference (Annual P Load -Target P Load) to meet watershed TMDL P-target	5,295.6 kg P/year (reduction of 38.2%)
Domestic Action Plan (reduce 40% of existing P load) to Western Lake Erie Basin	3,427.4 kg P/year (reduction of 40%)

3.2 Critical Area 1: Conditions, goals and objectives for Marsh Run-Little Riley Creek HUC - 12

3.2.1 Detailed Characterization

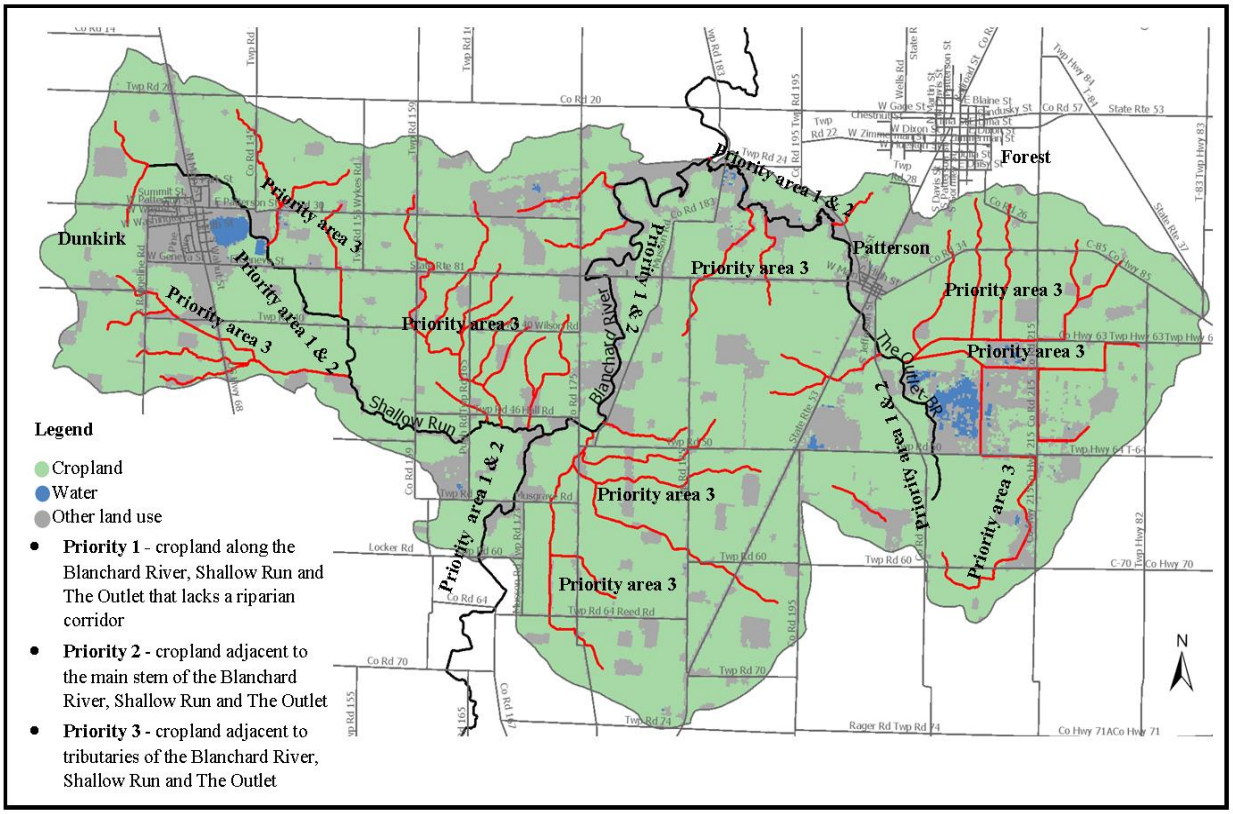
The area defined in **The Outlet-Blanchard River HUC-12** as Critical Area 1 will include all the tile-drained crop land (16,800 acres). (See Map 3.1 on the next page.) According to the 2009 TMDL report, the cropland acres of The Outlet-Blanchard River Watershed are contributing the most significant load of phosphorus and sediment and are causing most of the document water quality impairment in the watershed. Picture 3.1 and 3.2 show a fields in Critical Area 1.

Picture 3.2: A field along a waterway in Critical Area 1 (Martin)

Since the phosphorus loading will not be equal throughout the watershed, critical area 1 will be will be prioritized as follows: (See Map 3.1 below)

- **Priority 1**: Crop parcels (fields) along the Blanchard River, Shallow Run, The Outlet and their tributaries that lack a riparian corridor and edge-of-field conservation practice(s). (approximately 3,000 acres).
- **Priority 2:** Crop parcels (fields) adjacent to the main stem of the Blanchard River, Shallow Run, The Outlet (approximately 4,000 acres).
- **Priority 3:** Crop parcels (fields) adjacent to tributaries of the Blanchard River, Shallow Run and The Outlet (as shown in Map 3.1) — (approximately 9,800 acres).
- **Priority 4:** Fields with documented high Soil Test Phosphorus levels (e.g., above 150 ppm. Mehlich-3).

Map 3.1: Critical Area 1 in The Outlet-Blanchard River HUC-12



Both The Ohio State University and National Center for Water Quality Research (NCWQR) at Heidelberg University have conducted studies that show incorporation of nutrients can reduce phosphorus runoff by 90%. Based on these results a performance based incentive for incorporation of nutrients should be offered to farmers to help meet the phosphorus reduction needed to meet the TMDL goal. This approach will allow the Hardin SWCD, Wyandot SWCD and other agencies working in the watershed to help the farmers conduct a more thorough

analysis of how nutrients are being applied to and lost from their fields.

In addition to the performance based incentive for incorporation of nutrients, other NPS pollution leaving the cropland from surface run-off and/or subsurface drainage will also be addressed using appropriate Best Management Practices (BMPs).

These BMPs will focus on:

- Reducing the rate and amount of surface runoff,
- Reducing phosphorus loading from tile drainage, via treatment, volume reduction, and discharge controls,
- Drainage management systems, and
- Soil test for phosphorus reduction.

3.2.2 Detailed Causes and Associated Sources

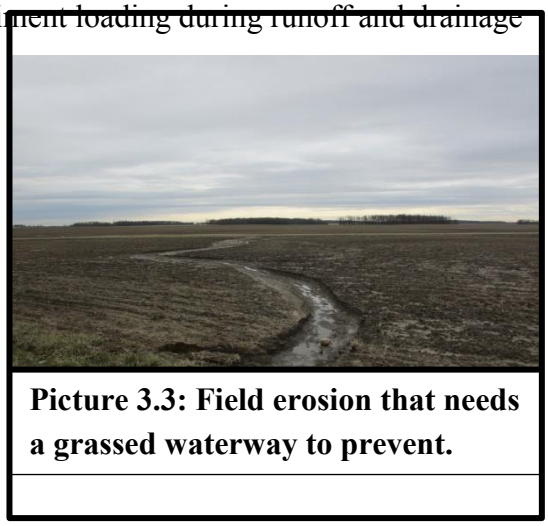
The 2009 TMDL Report reports that impairments in **The Outlet-Blanchard River HUC-12** watershed are related to agricultural uses. The contributing causes and sources associated with crop production in Critical Area 1 are shown in Table 3.2.

Table 3.2: Causes and Sources of Impairments in Critical Area 1

RM (Drain. Area mi^2)	Causes	Sources
Blanchard River 97.5/97.5 (43)	Direct habitat alteration, nutrients, ammonia, flow alteration	Ag related channelization, crop production, streambank modification/ destabilization
Blanchard River 96.0/ 95.6 (61)	Direct habitat alteration, organic enrichment/DO	Ag related channelization, crop production, combined sewer overflow, (via Shallow Run/Dunkirk)
Shallow Run 3.0 (6.4)	Direct habitat alteration, organic enrichment/DO, flow alteration, nutrients	Ag related channelization, crop production, combined sewer overflow
Shallow Run 0.9 (10.8)	Direct habitat alteration, organic enrichment/DO, flow alteration, nutrients, temperature	Ag related channelization, crop production, combined sewer overflow (Dunkirk)
The Outlet 3.6 (9.5)	Direct habitat alteration, flow alteration, nutrients	Ag related channelization, crop production
The Outlet 0.3/0.3 (12.4)	None listed in TMDL	None listed in TMDL

As noted in Table 3.2, Critical Area 1 is mainly impaired by nutrients, flow alteration, ammonia and direct habitat alteration due to agriculture uses. Therefore, the focus in addressing these impairments in Critical Area 1 will be to:

1. Soil test fields that have not been tested within the last two years and are directly adjacent to a waterway.
2. Once the results of the soil tests are known, those fields with the highest phosphorus levels will be addressed first using acceptable Best Management Practices (BMPs).
3. The remaining fields in Critical Area 1 will be soil tested and acceptable BMPs will be used to reduce phosphorus loads.
   NOTE: Soil testing is not eligible for funding under the EPA 319 program. Funding will be sought from other sources.
4. Edge of field conservation practices, such as cover crops, conservation tillage, filter strips and buffers, will be used to reduce sediment loading during runoff and drainage events.
5. Grassed waterways will be used in fields that have erosion problems such as shown in picture 3.3.
6. Soluble phosphorus loading that occurs through drainage tile will be addressed using phosphorus filters.



Picture 3.3: Field erosion that needs a grassed waterway to prevent.

Goals for Critical Area 1 - Phosphorus Load reduction from cropland

- Goal 1: To reduce phosphorus loading from cropland in the watershed from 8,568.4 kg annually to 3,272.8 kg annually (a reduction of 5,295.6 kg per year). ***These numbers are based on the data and recommendation in the 2009 TMDL Report***

- Goal 1a: To reduce total phosphorus loading from cropland in the watershed from 8,568.4 kg annually to 5,141.0 kg annually, a reduction of 3,427.4 kg per year, to achieve a 40% reduction goal consistent with Ohio's Domestic Action Plan.

In order to achieve the goals listed above for nonpoint source load reduction for phosphorus in **The Outlet-Blanchard River HUC-12**, the following objectives that address nutrient loading need to be achieved in Critical Area 1. These objectives are prioritized to achieve the greatest results in Critical Area 1.

- Objective 1: To implement Controlled drainage water management systems to manage water draining 400 acres. (20 structures averaging 20 acres drainage per structure. (NRCS 554)

- Objective 2: To install a phosphorus filter on four main drain outlets tile leading from fields that are more than 1000 feet from the main stem or a tributary to capture dissolved reactive phosphorus (DRP). (NRCS 782)

- Objective 3: Enroll 5,000 acres of cropland in a precision nutrient management plan that includes cover crops, conservation tillage, soil test for phosphorus and SOM and proper placement of fertilizer. (NRCS 590)

- Objective 4: To install 3,000 linear feet of grassed waterways that treat 1,000 acres of cropland.(NRCS 412)

- Objective 5: Soil test 90% of the acres or 12,120 acres in Critical Area 1.

- Objective 6: Enroll 8,000 acres of cropland in cover crops. (NRCS 340)

- Objective 7: Enroll 8,000 acres of cropland in conservation tillage. (NRCS 329)

Note: Cover crops and Conservation tillage have a one-year life span. Trying to get the farmer to use the practices without a yearly cost-share incentive is a goal.

Narrative of Objectives

Objective 1 will involve controlling water from surface and tile runoff by establishing control drainage management systems to manage 400 acres of drainage area. An estimated 20 structures will be installed average 20 acres per structure. By controlling base flow conditions and water management the BMPs will result in a load reduction of 250 lbs./year of phosphorus and 175 lbs./year of nitrogen.

leading from fields that are more than 1000 feet from the main stem of the Blanchard River, The

Outlet or Shallow Run to capture dissolved reactive phosphorus (DRP). Dr. Chad Penn, from USDA-ARS, reports in an article titled, "Evaluation of a universal flow-through model for predicting and designing phosphorus removal structures" the estimated load reduction of DRP has been projected to be between 30 - 50% based on available information. Assuming that each filter is draining a 30 acre field, the estimated reduction of phosphorus will be 800 pounds per year.

Objective 3 will focus on getting the 5,000 acres closest to a waterway enrolled in a Precision Nutrient Management Plan (PNMP). The Natural Resource Conservation Service (NRCS) offers an incentive under their Environmental Quality Incentives Program (EQIP) program, This ***Nutrient Management (590)*** plan allows a "producer to be able to improve efficiency and effectiveness of nutrients by utilizing precision techniques and tools, maintain or increase yields, and minimize nutrient losses from fields, thus helping protect surface and ground water supplies. Precision nutrient management techniques ensure that the 4 R's (Right rate, Right source, Right application method, and Right application timing) provide proper amount of nutrients to the crop where it is needed." (NRCS 2014) By developing precision nutrient management plan on 5,000 acres of cropland in Critical Area 1, there will be a loading reduction an estimated 2,500 lbs./year of phosphorus, 2,500 tons/year of sediment and 2,900 lbs./year of nitrogen.

Objective 4 will involve installing 3,000 linear feet of grassed waterways that will treat 1,000 acres of cropland. There will be an estimated load reduction of 900 lbs. of phosphorus, 385 tons of sediment and 1,237 lbs. of nitrogen.

Objective 5 will involve soil testing 90% or 15,120 acres in Critical Area 1. Only by soil testing can we know the level of phosphorus and soil organic matter present in the soil. The results of each soil will allow the farmer to meet the "Right Rate" of the 4 R's program.

Objectives 6 will involve establishing cover crops on 8,000 acres per year on cropland that is not enrolled in a Precision Nutrient Management Plan. By establishing cover crops on 8,000 acres per year, there will be an estimated loading reduction of 4,210 lbs. of phosphorus, 3,865 tons of sediment and 9,900 lbs. of nitrogen.

Objective 7 will involve establishing 8,000 acres per year on cropland in conservation tillage that is not enrolled in a Precision Nutrient Management Plan. By establishing conservation tillage, there will be an estimated loading reduction of 1,150 lbs. of phosphorus, 950 tons of sediment and 2,800 lbs. of nitrogen.

conservation tillage are easy BMPs to get farmers to use when there is a cost share payment involved, there is a concern in whether the farmers will do these practices without the payment. Additional Outreach to the farmers will be needed to be made to education the farmer on the importance of these practices.

As these objectives are implemented, chemical testing will be conducted near the mouth of the Blanchard River, The Outlet and Shallow Run during rain events and/or at least once a month to measure the phosphorus and nitrogen levels. The data will provide an idea of the progress towards meeting the listed goals. All objectives will be reevaluated yearly to see if any modifications are needed.

When reevaluating the restoration efforts, the participating agencies and individuals will look at the BMPs being used, the interest of the farmers, and the data that has been collected to see if there should be a modification to the goals and/or objectives. The group will use the Ohio EPA Nonpoint Source Management Plan Update (Ohio EPA 2014) as a reference for possible modifications.

3.3 Critical Area 2: Conditions, goals and objectives for The Outlet-Blanchard River HUC - 12

3.3.1 Detailed Characterization

The 2009 TMDL Report noted that the Village of Dunkirk had several CSOs that were impacting Shallow Run causing low dissolved oxygen, high ammonia concentrations, phosphorus loading and high fecal coliform count. ***Note: the CSOs in Dunkirk have been separated and are no longer impacting Shallow Run.***

The TMDL also noted that the unsewered Village of Patterson was impacting The Outlet with organic and nutrient loading from failing Home Sewage Treatment Systems (HSTS). The pathogens/bacteria being released from failing HSTS prevents The Outlet from reaching attainment for Recreation Use. In addition, failing HSTS will also contribute phosphorus loading to the creek.

Critical Area 2 will include the homes and businesses in the Village of Patterson that are using HSTS to handle human waste. According to Wilkipedia, the 2010 Census reported that the Village of Patterson had 56 housing units and a population of 139 people. The Outlet runs just on the west side of the village and receives any of the runoff from the failing systems in the village. According to the Ohio EPA, The Outlet from its mouth to RM 4.0, which is after Patterson, is a perennial stream. The Outlet above RM 4.0 is an intermittent stream. The 2009 TMDL Report lists organic enrichment (sewage) biological indicators as a cause of impairment in The Outlet-Blanchard River watershed. The pathogens/bacteria being released from failing HSTS in Patterson prevents the The Outlet from reaching attainment for Recreation Use. According to the 2010 Ohio Lake Erie Phosphorus Task Force Final Report failing HSTS will also contribute phosphorus loading to waterways.

3.3.3 Outline Goals and Objectives for Critical Area 3

Goal for Critical Area 2

- Goal 1: Reduce pathogen/bacteria loading to meet the water quality standard metric.
- Goal 2: Reduce phosphorus from failing HSTS by 100 pounds per year for 3 years.

Objectives for Critical Area 2

- Objective 1: A feasibility study will be done to determine the best way to handle the human sewage problem in the Village of Patterson.
- Objective 2: Once the feasibility study is completed, the Jackson Township Trustees, Hardin County Health Department and Hardin County Commissioners will decide which option for handling the human sewage would work best for the village.
- Objective 3: Replacement of all HSTS systems in the Village of Patterson will occur based on the findings of the feasibility study.

Objective 1 will focus on hiring a company to do a feasibility study of possible options to handling the human sewage.

Objective 2 will focus on selecting the option from the feasibility study that would work the best for the Village of Patterson.

Objective 3 will involve the replacing of the HSTS in the village of Patterson with a sewered system. Funding for the project will be sought from sources.

4.1 Overview Tables and Project Sheets for Critical Areas

As noted in Chapter 2, **The Outlet-Blanchard River HUC-12** impairments are mainly due to the agriculture activities in the watershed. This chapter will discuss the projects and evaluations needed to be done to restore the watershed as much as possible.

On the following pages are the projects and guidelines believed to be needed to improve the conditions in **The Outlet-Blanchard River HUC-12** watershed to meet the goals of the TMDL Study for nutrient reduction and for removing the impairment status for the watershed. It will be necessary to periodically reevaluate the status of the critical areas to determine if the projects are sufficient to reach the goals outlined by the TMDL Report. There may be a need to use other Best Management Practices (BMPs) than those listed in the projects when the need for a specific BMP is found.

For **The Outlet-Blanchard River HUC-12** watershed, there are two Critical Areas identified. Project and Implementation Strategy Overview Tables have been created for each area (subsections 4.2 and 4.3).

Project Summary Sheets (PSS) provide the nine elements adopted by the OEPA for the projects that have been developed and in need of funding. If during implementation additional problems are identified, additional tables/projects will be developed. Any new PSS will be submitted to the OEPA for verification and funding eligibility.

4.2 Critical Area 1: Overview Table and Project Sheets for The Outlet-Blanchard River HUC-12

Table 4.1 on the next page summarizes the Project and Implementation Strategy Overview Table for Critical Area 1. The table summarizes the projects needed for restoration of the nonpoint source impairments identified in the TMDL Report for **The Outlet-Blanchard River HUC-12** watershed. Only the projects listed in the Project Summary Sheets will be eligible for state and federal funding.

Table 4.1: Critical Area 1: Project Overview Table for The Outlet-Blanchard River HUC - 12 (04100008 01 03)							
Goal	**Objective**	**Project #**	**Project Title** (EPA Criteria g)	**Lead Organization** (Criteria d)	**Time Frame** (EPA Criteria f)	**Estimated Cost** (EPA Criteria d)	**Potential/Actual Funding Source** (EPA Criteria d)
Urban Sediment and Nutrient Reduction Strategies							
Altered Stream and Habitat Restoration Strategies							
Agricultural Nonpoint Source Reduction Strategies							
1, 1a	1	1	Implementing Controlled drainage management systems to reduce DRP and N	Hardin SWCD	Short Term (1-3 yr.)	$94,000	EQIP, USDA, EPA 319, GLB
1, 1a	2	2	Installing phosphorus filters on the main tile leading to the creek from upland fields	Hardin SWCD	Short Term (1-3 yr.)	$50,000 - 80,000	EQIP, USDA, EPA 319, GLB
1, 1a	3	3	Precision Nutrient Management Plan	Hardin SWCD	Short Term (1-3 yr.)	$1,250,000	EQIP, USDA, EPA 319, GLB
1, 1a	4	4	Grassed Waterways	Hardin SWCD	Short Term (1-3 yr.)	$25,000	EQIP, USDA, EPA 319, GLB
1, 1a	5	5	Soil Testing for Phosphorus, Nitrogen and SOM	Hardin SWCD	Short Term (1-3 yr.)	$211,680	EQIP, USDA, GLB
1, 1a	6	6	Establishing Cover Crops to reduce P, N and sediment loading	Hardin SWCD	Short Term (1-3 yr.)	$200,000	EQIP, USDA, EPA 319, GLB
1, 1a	7	7	Establishing Conservation Tillage to reduce P, N and sediment loading	Hardin SWCD	Short Term (1-3 yr.)	$120,000	EQIP, USDA, EPA 319, GLB
High Quality Waters Production Strategies							
Other NPS Causes and Associated Sources of Impairment							

4.2.1 Critical Area 1 Project Summary Sheets

The section presents the Project Summary Sheets that were developed based on the actions needed to minimize the nutrient and sediment loadings from cropland in **The Outlet-Blanchard River HUC-12** watershed. These projects are the logical next steps or priority/short term projects needed to be accomplished in order to begin the restoration activities needed to address the impairments and to prevent the transport of the sediment and nutrients further down the watershed and eventually to Lake Erie. Medium and longer term projects will not have a project summary sheet, as these projects are not ready for implementation. As a project comes to an end, an evaluation of the progress will be done to see if the project needs to be continued.

Table 4.2 Project Summary Sheet Critical Area 1 Project 1: Controlled Drainage Management

Nine Element Criteria	Information needed	Explanation
n/a	Title	Controlled Drainage Water Management
criteria d	Project Lead Organization & Partners	Hardin SWCD, Wyandot SWCD, NRCS, USDA, BRWP
criteria c	HUC-12 and Critical Area	The Outlet-Blanchard River HUC-12 (04100008 01 03) Cropland areas
criteria c	Location of Project	The Outlet-Blanchard River HUC-12, South of Forest and Dunkirk, OH - Cropland areas
n/a	Which strategy is being addressed by this project?	Agricultural Nonpoint Source Reduction Strategy
criteria f	Time Frame	Short Term (1-3years)
criteria g	Short Description	Controlled drainage water management is the practice of using a water control structure on the tiles in a field to raise the depth of the drainage outlet, holding water in the field.
criteria g	Project Narrative	The TMDL Report for the Blanchard River watershed states that the The Outlet-Blanchard River HUC-12 impairments are related to the agricultural uses in growing crops. Controlled drainage water management uses a water control structure on the tiles in a field to raise the depth of the drainage outlet, holding water in the field which prevents the nutrients from entering the waterways. The goal is to install 20 water control structures to control 400 acres of cropland.
criteria d	Estimated Total Cost	$94,000
criteria d	Possible Funding Source	Ohio EPA 319, Great Lakes Sediment and Nutrient Reduction Program, NRCS EQIP, USDA-CIG

Table 4.2 Project Summary Sheet Critical Area 1 Project 1: Controlled Drainage Management cont.

criteria a	Identified Causes & Sources	Cause(s): Nutrient & Sediment loading Sources(s): Channelization, Removal of riparian vegetation & non irrigated crop production
criteria b & h	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	The phosphorus loading needs to be reduced 5,295.6 kilograms annually from the watershed.
criteria b & h	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	Controlled drainage water management will be established on 400 acres. The estimated reduction of dissolved reactive phosphorus (DRP) will be 92.5 kg. or 210 lbs./yr., or 1.7% of the goal. In addition, there will be an estimated 150 lbs./yr. of nitrogen.
criteria b & h	Part 3: Load Reduced?	Estimated: 92.5 kg. or 221 lbs. P/year and 150 lbs./year nitrogen
criteria i	How will the effectiveness of this project in addressing the NPS impairment be measured?	OEPA watershed-wide monitoring is expected to be conducted again In the summer of 2020 with the TMDL being scheduled for 2023.
criteria e	Information and Education	This project will be promoted to the producers and other stakeholders with public meetings, news releases articles, social media and personal contacts from the Allen SWCD, NRCS and the BRWP to eligible producers. The overall reduction and improvements will be shared with the public as well.

Table 4.3 Project Summary Sheet Critical Area 1 Project 2: Phosphorus Filter

Nine Element Criteria	Information needed	Explanation
n/a	Title	Phosphorus Filter
criteria d	Project Lead Organization & Partners	Hardin SWCD, Wyandot SWCD, NRCS, USDA, BRWP
criteria c	HUC-12 and Critical Area	The Outlet-Blanchard River HUC-12 (04100008 01 03) Cropland areas
criteria c	Location of Project	The Outlet-Blanchard River HUC-12, South of Forest and Dunkirk OH - Cropland areas
n/a	Which strategy is being addressed by this project?	Agricultural Nonpoint Source Reduction Strategy

Table 4.3 Project Summary Sheet Critical Area 1 Project 2: Phosphorus Filter cont.

criteria f	Time Frame	Short Term (1-3 years)
criteriag	Short Description	Dissolved Reactive Phosphorus (DRP) from Critical Area 1 fields that are more than 1000 feet from the main stem will be the greatest source of P loading to the waterways.
criteria g	Project Narrative	The TMDL Report for the Blanchard River watershed states that The Outlet-Blanchard River HUC-12 impairments are related to Agricultural uses in growing crops. DRP has been identified as the main source of P flowing into Lake Erie. The cropland fields in Critical Area 1 that are more than 1000 feet from the main stem will have their greatest loss of P from field tile in the form of DRP. The goal is to install two Phosphorus Filters in the drainage system of two fields. The filters will control 80 acres of cropland
criteria d	Estimated Total Cost	$25-40,000
criteria d	Possible Funding Source	Ohio EPA 319, Great Lakes Sediment and Nutrient Reduction Program, NRCS EQIP, USDA-CIG
criteria a	Identified Causes & Sources	Cause(s): Nutrient & Sediment loading Sources(s): Channelization, Removal of riparian vegetation & non irrigated crop production
criteria b & h	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	The goal is to reduce the phosphorus loading by 5,295.6 kilograms annually.
criteria b & h	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	The use of two Phosphorus Filters will reduce the DRP by an estimated 181 kg. or 400 pounds per year. This would be 3.4% of the goal.
criteria b & h	Part 3: Load Reduced?	Estimated: 181 kg or 400 lbs. of P/year
criteria i	How will the effectiveness of this project in addressing the NPS impairment be measured?	OEPA watershed-wide monitoring is expected to be conducted again In the summer of 2020 with the TMDL being scheduled for 2023.
criteria e	Information and Education	This project will be promoted to the producers and other stakeholders with public meetings, news releases articles, social media and personal contacts from the Allen SWCD, NRCS and the BRWP to eligible producers. The overall reduction and improvements will be shared with the public as well.

Table 4.3 Project Summary Sheet Critical Area 1 Project 3: Precision Nutrient Management

Nine Element Criteria	Information needed	Explanation
n/a	Title	Precision Nutrient Management Plan
criteria d	Project Lead Organization & Partners	Hardin SWCD, Wyandot SWCD, NRCS, USDA, BRWP
criteria c	HUC-12 and Critical Area	The Outlet-Blanchard River HUC-12 (04100008 01 03) Cropland areas
criteria c	Location of Project	The Outlet-Blanchard River HUC-12 (04100008 01 03), South of Forest and Dunkirk, Ohio - Cropland areas
n/a	Which strategy is being addressed by this project?	Agricultural Nonpoint Source Reduction Strategy
criteria f	Time Frame	Short Term (1-3 years)
criteria g	Short Description	By using Precision Nutrient Management Plans, a farmer will be able to better fertilize, grow the crop, and be most cost efficient.
criteria g	Project Narrative	The TMDL Report for the Blanchard River watershed states that the The Outlet-Blanchard River HUC-12 impairments are related to the agricultural uses in growing crops. Precision Nutrient Management Plans (PNMP) (NRCS 590) for each field in the watershed would be the ultimate goal. During the first three years of this NPS-IS plan, the objective is to get approximately 5,000 acres enrolled in the plan. According to the NRCS, "by implementing a precision nutrient management plan, producers will be able to improve efficiency and effectiveness of nutrients by utilizing precision techniques and tools, maintain or increase yields, and minimize nutrient losses from fields, thus helping protect surface and ground water supplies. Precision nutrient management techniques ensure that the 4 R's (Right rate, Right source, Right application method, and Right application timing) provide proper amount of nutrients to the crop where it is needed."
criteria d	Estimated Total Cost	**$1,250,000** The Precision Nutrient Management Plan includes soil testing ($10/ac., year 1 & 3), Precision Fertilizer Application $20.00/ac., Cover Crops $30/ac. and Conservation Tillage $15/ac.). This totals $215/acre over the three years. With a goal have enrolling 5,000 acres that would equal $1,075,000. The remaining $175,000 is an estimated cost of $35/acre to have the plan written by a qualified person.
criteria d	Possible Funding Source	Ohio EPA 319, Great Lakes Sediment and Nutrient Reduction Program, NRCS EQIP, USDA-CIG
criteria a	Identified Causes & Sources	Cause(s): Nutrient & Sediment loading Sources(s): Channelization, Removal of riparian vegetation & non irrigated crop production

Table 4.3 Project Summary Sheet Critical Area 1 Project 3: Precision Nutrient Management cont.

criteria b & h	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	The goal is to reduce the phosphorus loading by 5,296 kg. per year from the watershed.
criteria b & h	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	The Nutrient Management Plan will include cover crops and conservation tillage on the 5,000 acres for a three year period. The estimated reduction of phosphorus will be 1,134 kg./yr. or 2,500 lbs./yr., or 21.4% of the goal. In addition, there will be an estimated sediment reduction of 2,500 tons/year and a reduction of 2,900 lbs./yr. of Nitrogen.
criteria b & h	Part 3: Load Reduced?	Estimated: Phosphorus - 1,134 kg./yr. or 2,500 lbs./yr.; 2,500 tons/ year of sediment and Nitrogen - 2,900 lbs./yr.
criteria i	How will the effectiveness of this project in addressing the NPS impairment to be measured?	OEPA watershed-wide monitoring is expected to be conducted again in the summer of 2020 with the TMDL being scheduled for 2023.
criteria e	Information and Education	This project will be promoted to the producers and other stakeholders with public meetings, news releases articles, social media and personal contacts from the Hardin SWCD, Wyandot SWCD, NRCS and the BRWP to eligible producers. The overall reduction and improvements with be shared with the public as well.

Nine Element Criteria	Information needed	Explanation
n/a	Title	Grassed Waterway
criteria d	Project Lead Organization & Partners	Hardin SWCD, Wyandot SWCD, NRCS, USDA, BRWP
criteria c	HUC-12 and Critical Area	The Outlet-Blanchard River HUC-12 (04100008 01 03) Cropland areas
criteria c	Location of Project	The Outlet-Blanchard River HUC-12 (04100008 01 03), South of Forest and Dunkirk, Ohio - Cropland areas
n/a	Which strategy is being addressed by this project?	Agricultural Nonpoint Source Reduction Strategy
criteria f	Time Frame	Short Term (1-3 years)
criteria g	Short Description	By using a grassed waterway, a farmer will be able to control or eliminate the nutrient and sediment loading from water conveyance across the surface during a rain event.

Table 4.4 Project Summary Sheet Critical Area 1 Project 4: Grassed Waterways cont.

criteria g	Project Narrative	The TMDL Report for the Blanchard River watershed states that the The Outlet-Blanchard River HUC-12 impairments are related to the agricultural uses in growing crops. Grassed waterways (NRCS 412) are useful in controlling nutrient and sediment loading from concentrated surface run-off during a rain event. During the first three years of this NPS-IS plan, the objective is to install 3,000 linear feet that are 40 feet wide and treat 1,000 acres of cropland. According to the NRCS, "This practice is applied in areas where added water conveyance capacity and vegetative protection are needed to prevent erosion and improve runoff water quality resulting from concentrated surface flow ."
criteria d	Estimated Total Cost	$25,000
criteria d	Possible Funding Source	Ohio EPA 319, Great Lakes Sediment and Nutrient Reduction Program, NRCS EQIP, USDA-CRP
criteria a	Identified Causes & Sources	Cause(s): Nutrient & Sediment loading Sources(s): Channelization, Removal of riparian vegetation & non irrigated crop production
criteria b & h	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	The goal is to reduce the phosphorus loading by 5,296 kg. per year from the watershed.
criteria b & h	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	Grassed waterways will be installed to treat an estimated 1000 acres. The estimated reduction of phosphorus will be 408.2 kg. or 900 lbs./yr., or 7.7% of the goal. In addition, there will be an estimated load reduction of 1,237 lbs./yr. of nitrogen and 385 tons/yr of sediment.
criteria b & h	Part 3: Load Reduced?	Estimated: 408.2 kg. or 900 lbs. P/year; 1,237 lbs./year nitrogen and 385 tons/yr. sediment.
criteria i	How will the effectiveness of this project in addressing the NPS impairment be measured?	OEPA watershed-wide monitoring is expected to be conducted again In the summer of 2020 with the TMDL being scheduled for 2023.
criteria e	Information and Education	This project will be promoted to the producers and other stakeholders with public meetings, news releases articles, social media and personal contacts from the Hardin SWCD, Wyandot SWCD, NRCS and the BRWP to eligible producers. The overall reduction and improvements will be shared with the public as well.

Table 4.6 Project Summary Sheet Critical Area 1 Project 5: Soil Testing

Nine Element Criteria	Information needed	Explanation
n/a	Title	Soil Testing for Phosphorus, Nitrogen & Solid Organic Material (SOM)
criteria d	Project Lead Organization & Partners	Hardin SWCD, Wyandot SWCD, NRCS, USDA, BRWP
criteria c	HUC-12 and Critical Area	The Outlet-Blanchard River HUC-12 (04100008 01 03) - Cropland areas
criteria c	Location of Project	The Outlet-Blanchard River HUC-12, south of Forest and Dunkirk OH - Cropland areas
n/a	Which strategy is being addressed by this project?	Agricultural Nonpoint Source Reduction Strategy
criteria f	Time Frame	Short Term (1-3 years)
criteria g	Short Description	By soil testing the fields, the producer will be able to apply nutrients at the right rate and create a baseline for the SOM.
criteria g	Project Narrative	Soil testing at least 90% or 15,120 acres of the cropland, the producer will know exactly where and how much of each nutrient needs to be applied to achieve his yield goal for each field. In addition, by testing for the SOM in each field, baseline data will be gathered to measure the amount of increase in SOM from use of BMPs. The soil testing will be conducted using a 2.5 acre grid method. The sampling data will be collected and shared with the producer and the agencies involved.
criteria d	Estimated Total Cost	$211,680
criteria d	Possible Funding Source	Great Lakes Sediment and Nutrient Reduction Program, NRCS EQIP, USDA-CIG
criteria a	Identified Causes & Sources	Cause(s): Nutrient & Sediment loading Sources(s): Channelization, Removal of riparian vegetation & non irrigated crop production
criteria b & h	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	The goal is to reduce the phosphorus loading by 5,295.6 kilograms annually.

Table 4.6 Project Summary Sheet Critical Area 1 Project 5: Soil Testing cont.

criteria b & h	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	The phosphorus associated with sediment in the watershed based on RUSLE II is 0.5261 lbs./acre/year. If the SOM is raised by 1%, there would be 16,500 more gallons of water held by the soil, instead of running off. This would result in a estimated load reduction of 3,977 kg. or 8,768 lbs. phosphorus/year or 75% of the goal. In addition, there will be an estimated sediment reduction of 3,694 tons/year and a reduction of 9,629 lbs./yr. of Nitrogen.
criteria b & h	Part 3: Load Reduced?	Estimated: 3,977 kg or 8,768 lbs. of P/year, 3,694 tons of sediment/ year and 9,629 lbs. of nitrogen/year.
criteria i	How will the effectiveness of this project in addressing the NPS impairment be measured?	OEPA watershed-wide monitoring is expected to be conducted again In the summer of 2020 with the TMDL being scheduled for 2023.
criteria e	Information and Education	This project will be promoted to the producers and other stakeholders with public meetings, news releases articles, social media and personal contacts from the Hardin SWCD, Wyandot SWCD, NRCS and the BRWP to eligible producers. The overall reduction and improvements will be shared with the public as well.

Table 4.7 Project Summary Sheet Critical Area 1 Project 6: Cover Crops

Nine Element Criteria	Information needed	Explanation
n/a	Title	Cover Crops
criteria d	Project Lead Organization & Partners	Hardin SWCD, Wyandot SWCD, NRCS, USDA, BRWP
criteria c	HUC-12 and Critical Area	The Outlet-Blanchard River HUC-12 (04100008 01 03) Cropland areas
criteria c	Location of Project	The Outlet-Blanchard River HUC-12, south of Forest and Dunkirk, OH - Cropland areas
n/a	Which strategy is being addressed by this project?	Agricultural Nonpoint Source Reduction Strategy
criteria f	Time Frame	Short Term (1-3years)
criteria g	Short Description	Cover crops keep the soil in place and help to prevent nutrients from being lost from the field by tying the nutrients up in the plant

Table 4.7 Project Summary Sheet Critical Area 1 Project 6: Cover Crops cont.

criteria g	Project Narrative	The TMDL Report for the Blanchard River watershed states that the The Outlet-Blanchard River HUC-12 watershed impairments are related to the agricultural uses in growing crops. Cover crops provide a Best Management Practice that keeps growing vegetation on the cropland during the non-growing season. Cover crops also help to prevent erosion and increase nutrient assimilation. Cover Crops also help to increase the SOM in the soil which will further prevent water runoff. The goal is to establish 2,667 acres per year for a total of 8,000 during the three years in addition to the acres of cover crops in Nutrient Management Plans.
criteria d	Estimated Total Cost	$200,000
criteria d	Possible Funding Source	Ohio EPA 319, Great Lakes Sediment and Nutrient Reduction Program, NRCS EQIP, USDA-CIG
criteria a	Identified Causes & Sources	Cause(s): Nutrient & Sediment loading Sources(s): Channelization, Removal of riparian vegetation & non irrigated crop production
criteria b & h	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	The goal is to reduce the phosphorus loading by 5,295.6 kg. per year from the watershed
criteria b & h	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	The estimated reduction of phosphorus will be 710 lbs./yr., or 26.8 % of the goal. In addition, there will be an estimated sediment reduction of 375 tons/year and a reduction of 1,100 lbs./yr. of nitrogen.
criteria b & h	Part 3: Load Reduced?	Estimated: 710 lbs. P/year, 375 tons/year sediment and 1,100 lbs./ year nitrogen
criteria i	How will the effectiveness of this project in addressing the NPS impairment be measured?	OEPA watershed-wide monitoring is expected to be conducted again In the summer of 2020 with the TMDL being scheduled for 2023.
criteria e	Information and Education	This project will be promoted to the producers and other stakeholders with public meetings, news releases articles, social media and personal contacts from the Hardin SWCD, Wyandot SWCD, NRCS and the BRWP to eligible producers. The overall reduction and improvements will be shared with the public as well.

Table 4.8 Project Summary Sheet Critical Area 1 Project 7: Conservation Tillage

Nine Element Criteria	Information needed	Explanation
n/a	Title	Conservation Tillage
criteria d	Project Lead Organization & Partners	Hardin SWCD, Wyandot SWCD,NRCS, USDA, BRWP
criteria c	HUC-12 and Critical Area	The Outlet-Blanchard River HUC-12 (04100008 05 03) Cropland areas
criteria c	Location of Project	The Outlet-Blanchard River HUC-12, south of Forest and Dunkirk, OH - Cropland areas
n/a	Which strategy is being addressed by this project?	Agricultural Nonpoint Source Reduction Strategy
criteria f	Time Frame	Short Term (1-3years)
criteria g	Short Description	Conservation Tillage is a BMP that a producer can use to reduce nutrient and sediment loadings by minimizing tillage.
criteria g	Project Narrative	The TMDL Report for the Blanchard River watershed states that the The Outlet-Blanchard River HUC-12 watershed impairments are related to the agricultural uses in growing crops. Conservation tillage leaves the crop residue on the field before and after planting the next crop thus keeping the soil in place and helping to prevent nutrients from being lost from the field. The Hardin SWCD, Wyandot SWCD, NRCS and the BRWP will work with the watershed landowners and farmers to enroll cropland in conservation tillage. The goal is to establish 8,000 acres over the three years, besides the acres in conservation tillage.
criteria d	Estimated Total Cost	$120,000
criteria d	Possible Funding Source	Ohio EPA 319, Great Lakes Sediment and Nutrient Reduction Program, NRCS EQIP, USDA-CIG
criteria a	Identified Causes & Sources	Cause(s): Nutrient & Sediment loading Sources(s): Channelization, Removal of riparian vegetation & non irrigated crop production
criteria b & h	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	The goal is to reduce the phosphorus loading by 5,296 kg./year from the watershed.

Table 4.8 Project Summary Sheet Critical Area 1 Project 7: Conservation Tillage cont.

criteria b & h	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	Conservation tillage will be established on the 2,667 acres for a three year period. The estimated reduction of phosphorus will be 631 kg. or 1,391 lbs./ yr., or 11.9 % of the goal. In addition, there will be an estimated sediment reduction of 967 tons/year and 3,299 lbs./yr. of nitrogen.
criteria b & h	Part 3: Load Reduced?	Estimated: 631 kg. or 1,391 lbs. P/year, 967 tons/year sediment and 3,299 lbs./year nitrogen
criteria i	How will the effectiveness of this project in addressing the NPS impairment to be	OEPA watershed-wide monitoring is expected to be conducted again in the summer of 2020 with the TMDL being scheduled for 2023.
criteria e	Information and Education	This project will be promoted to the producers and other stakeholders with public meetings, news releases articles, social media and personal contacts from the Hardin SWCD, Wyandot SWCD, NRCS and the BRWP to eligible producers. The overall reduction and improvements with be shared with the public as well.

4.3 Critical Area 2: Overview Table and Project Sheets for The Outlet-Blanchard River HUC-12

Table 4.9 on page 4-15 summarizes the Project and Implementation Strategy Overview Table for Critical Area 2. The table summarizes the project(s) needed for restoration of the nonpoint source impairments identified in the TMDL Report for **The Outlet-Blanchard River HUC-12** watershed. Only the project(s) listed in the Project Summary Sheets will be eligible for state and federal funding.

4.3.1 Detailed Characteristics

The 2009 TMDL Report noted that the unsewered Village of Patterson was impacting The Outlet with organic and nutrient loading from failing Home Sewage Treatment Systems (HSTS). The pathogens/bacteria being released from failing HSTS prevents The Outlet from reaching attainment for Recreation Use. In addition, failing HSTS will also contribute phosphorus loading to the creek. There are 56 identified HSTS units in the Village of Patterson

4.3.2 Critical Area 2 Project Summary Sheet(s)

This section presents the Project Summary Sheet(s) that were developed based on the actions needed to address the impairment of organic enrichment (sewage) biological indicators noted in the TMDL Report for the Village of Patterson. The source of the bacteria and pathogens are the failing home septic treatment systems (HSTS) found in the village to handle human waste. The only project in Critical Area 2 is a short term project and is ready for funding. There is no medium term or long term projects for Critical Area 2. As projects come to an end, an evaluation of the progress will be done to see if the project needs to be continued or adjusted.

Table 4.9: Critical Area 2: Project Overview Table for The Outlet-Blanchard River HUC - 12 (04100008 01 03)							
Goal	**Objective**	**Project #**	**Project Title** (EPA Criteria g)	**Lead Organization** (Criteria d)	**Time Frame** (EPA Criteria f)	**Estimated Cost** (EPA Criteria d)	**Potential/Actual Funding Source** (EPA Criteria d)
Urban Sediment and Nutrient Reduction Strategies							
Altered Stream and Habitat Restoration Strategies							
Agricultural Nonpoint Source Reduction Strategies							
High Quality Waters Production Strategies							
Other NPS Causes and Associated Sources of Impairment							
1, 2	1	1	Feasibility Study of Patterson	Hardin County Board of Health	Short Term (1-3 yr.)	$25,000	WPCLF, RCAP

Table 4.10 Project Summary Sheet Critical Area 2 Project 1: Feasibility Study Patterson

Nine Element Criteria	Information needed	Explanation
n/a	Title	Feasibility Study for Handling Failing HSTS in Patterson
criteria d	Project Lead Organization & Partners	Hardin County Board of Health Department
criteria c	HUC-12 and Critical Area	The Outlet-Blanchard River HUC-12 (04100008 01 03)
criteria c	Location of Project	The Outlet-Blanchard River HUC-12, south of Patterson, OH
n/a	Which strategy is being addressed by this project?	Other NPS Causes and Associated Sources of Impairment
criteria f	Time Frame	Short Term (1-3 years)
criteria g	Short Description	The failing HSTS in Patterson are contributing bacteria, pathogens and phosphorus to The Outlet
criteria g	Project Narrative	The TMDL Report for the Blanchard River watershed states that one of impairments in The Outlet-Blanchard River HUC-12 was organic enrichment (sewage) biological indicators HSTS in the Village of Patterson. The first step is have a Feasibility Study done to determine what are the options for dealing with the failing HSTS in Patterson
criteria d	Estimated Total Cost	$25,000
criteria d	Possible Funding Source	Grant, RCAP
criteria a	Identified Causes & Sources	Cause(s): organic enrichment (sewage) biological indicators Sources(s): failing HSTS
criteria b & h	Part 1: How much improvement is needed to remove the NPS impairment for the whole Critical Area?	Fecal Coliform needs to be lowered at the 75th percentile from the 2,200 CFU/100 ml. to 1,000 CFU/100ml. The level at the 90th percentile needs to be lowered from 7,600 CFU/100 ml. to 2,000 CFU/100 ml. In addition, the phosphorus reduction needed is 2,649 kg/year.
criteria b & h	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	This project will only determine the options for handling the failing HSTS in the village. Improvements will occur once an option is selected.

Table 4.10 Project Summary Sheet Critical Area 2 Project 1: Feasibility Study Patterson cont.

criteria b & h	Part 3: Load Reduced?	None
criteria i	How will the effectiveness of this project in addressing the NPS impairment to be measured?	OEPA watershed-wide monitoring is expected to be conducted again In the summer of 2020 with the TMDL being scheduled for 2023.
criteria e	Information and Education	This project will be promoted to the homeowners and other stakeholders with news releases articles, social media and personal contacts from the Hardin County Board of Health and the BRWP to homeowners. The overall reduction and improvements with be shared with the public as well.

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Appendices

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Appendix A: Acronyms and Abbreviations

The following acronyms and abbreviations were used in this NPS-IS Plan and are commonly used by agencies working to restore Ohio's watersheds.

A

ALU	Aquatic Life Uses

B

BMP	Best Management Practice
BRWP	Blanchard River Watershed Partnership

C

CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act

D

DRP	Dissolved Reactive Phosphorus

E

ECBP	Eastern Corn Belt Plains
EPT Index	Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies)
EQIP	Environmental Quality Incentives Program
ERIN	Earth Resources Information Network

G

GIS	Geographic Information System
GLB	Great Lakes Basin (Commission)
GLRI	Great Lakes Restoration Initiative

H

HRPC	Hancock Regional Planning Commission
HSWCD	Hancock County Soil & Water Conservation District
HSTS	Home Septic Treatment System
HUC	Hydrological Unit Code

I

IBI	Index of Biological Integrity
ICI	Invertebrate Community Index

M

MGD	Million Gallons per Day
Mlwb	Modified Index of Well Being
MWH	Modified Warmwater Habitat

N

NCWQR	National Center for Water Quality Research (located at Heidelberg University)
NPS-IS	Nonpoint Source Implementation Strategy
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service

O

ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency

Q

QHEI	Qualitative Habitat Evaluation Index

R

RM	River Mile

T

TMDL	Total Maximum Daily Load
TSD	Technical Support Document (from OEPA)

U

USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

W

WAP	Watershed Action Plan
WWH	Warmwater Habitat

Appendix B

LIST OF MAPS

LIST OF PICTURES

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