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

East Fork Little Miami River—Salt Run HUC-12 (050902021305)

Clermont S.W.C.D. Soil & Water Conservation District

May 2019

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Acknowledgements

Many agencies and organizations were involved with the development of this NPS-IS plan. Specifically, Clermont Soil and Water Conservation District (SWCD) would like to acknowledge the Ohio, Kentucky, Indiana Regional Council of Governments, the Clermont County Water Resources Department for providing GIS data. Additionally, the Clermont SWCD would like to thank the Clermont County Office of Environmental Quality and all project partners involved through the East Fork Watershed Collaborative, as this group of water quality professionals continues to provide valuable insights to the entire East Fork Little Miami River Watershed.

CHAPTER 1

Salt Run Watershed Introduction

East Fork Little Miami River- Salt Run
Nine-Element NPS-IS Plan

Prepared by
Clermont Soil and Water Conservation District
May 2019

Chapter 1: Introduction

Salt Run HUC-12 Watershed includes a 9 mile segment of the East Fork Little Miami River and 7 major tributaries.

The Salt Run-EFLMR Watershed (HUC-12: 050902021305) is the most downstream watershed in the larger East Fork Little Miami River (EFLMR) basin, and encompasses the land area that drains to the East Fork from a point downstream of Stonelick Creek to the confluence with the Little Miami River, a State and National Scenic River. This HUC-12 watershed is 42.6 square miles in total area; however, the drainage area of the East Fork at its confluence with the Little Miami River is approximately 500 square miles. The Salt Run watershed includes a 9.1-mile segment of the EFLMR main stem which is designated as Exceptional Warmwater Habitat (EWH) by the Ohio Environmental Protection Agency (OEPA). Significant tributaries in the Salt Run HUC-12 watershed include Hall Run, Salt Run and Shayler Run that flow into the East Fork from the south, and Happy Hollow Creek, Wolfpen Run, Sugarcamp Run and Dry Run that enter from the north. Salt Run is the most urbanized and densely populated subwatershed of the East Fork, although a significant portion is still wooded/forested.

The East Fork Watershed Collaborative (EFWC), an informal agency-citizen based watershed group formed in 2001, has taken on the responsibility of watershed planning and implementation in the EFLMR watershed. Due to the size of the EFLMR watershed (>500 square miles and 18 HUC-12s), five separate planning units were created. Each planning unit has a state-endorsed watershed action plan to address causes and sources of impairment. The EFWC is now updating the watershed action plans according to USEPA's Nine-Element Nonpoint Source Implementation Strategic Plan (NPS-IS plan) for each individual HUC-12. The Salt Run plan is the second watershed planning unit to be updated.

1.1 Report Background

In response to Ohio re-focusing watershed planning and implementation on HUC-12 planning units, the EFWC is revising the five existing state-endorsed WAPs with Salt Run being the second. This NPS-IS plan is an update to the existing Lower East Fork Watershed Action Plan (WAP) which was endorsed by the Ohio Department of Natural Resources (ODNR) and the OEPA in 2003. The original Lower East Fork planning unit coincides with the HUC-12 Salt Run-EFLMR watershed addressed here.

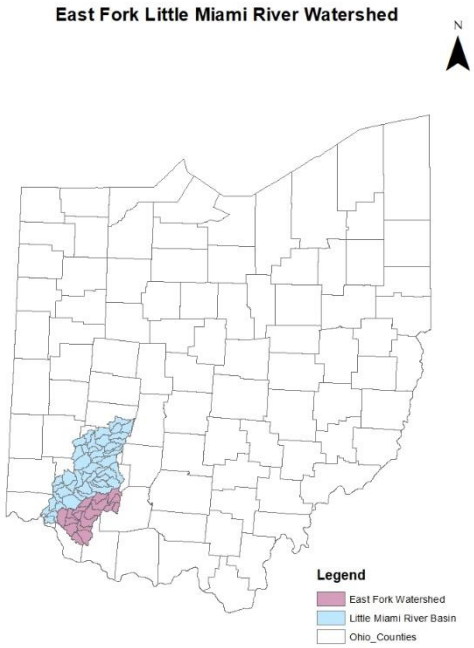


Figure 1-1: East Fork Lake River watershed located in the lower Little Miami River Basin.

1.2 Watershed Profile & History

The EFLMR is a subwatershed of the Little Miami River Basin located in southwest Ohio (Figure 1-1). The Little Miami River Basin drains an area of 1,756 square miles and the main stem flows 105 miles southwest to its confluence with the Ohio River in Hamilton County. The EFLMR watershed is approximately 500 square miles in total area and encompasses areas of Highland, Clinton, Brown, Warren, and Clermont counties. The EFLMR flows over 80 miles from its origin in Clinton and Highland counties southwest to its confluence with the Little Miami in Clermont County. Clermont County occupies the largest area in the watershed, covering approximately 390 square miles (49%).

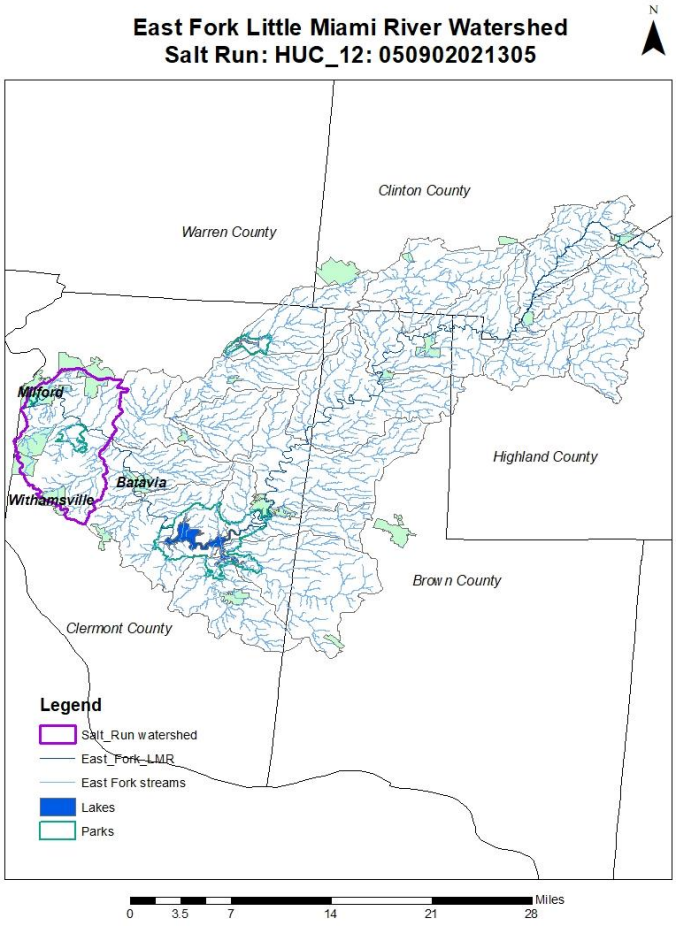


Figure 1-2: Salt Run watershed location

The EFLMR is designated as Exceptional Warmwater Habitat (EWH) from the mouth to river mile 75 in Clinton County. The only other stream in the watershed with a EWH designation is Dodson Creek in Highland County. The remaining streams in the watershed have an aquatic life use designation of Warmwater Habitat (WWH). The EFLMR is also designated as a Public Water Supply (PWS) at rive mile 22.6 due to the Clermont County Water intake in the William H. Harsha Reservoir. With a few exceptions, the streams in the watershed are also designated for Agricultural and Industrial Water Supply (AWS, IWS) and Primary Contact Recreation (PCR) (OEPA, 2014).

The EFLMR watershed includes eighteen 12-digit Watershed Assessment Units (WAUs). The Salt Run HUC-12 includes seven major tributaries: Dry Run, Hall Run, Happy Hollow Creek, Salt Run, Shayler Run,

Sugarcamp Run and Wolfpen Run. Approximately 9.1 miles of the EFLMR flow through the Salt Run HUC-12 watershed, beginning at the EFLMR's confluence with Stonelick Creek and flowing downstream to the confluence with the Little Miami River just downstream from Milford, OH. Most of the Salt Run HUC-12 is located in the City of Milford and Miami and Union Townships, with smaller portions located in Batavia and Pierce Townships (Figure 1-2). The mainstem of the EFLMR drops 30 feet from its the confluence with Stonelick Creek to the point it flows into the Little Miami River 9.1 miles downstream, for an average slope (or drop) of 3.3 feet per mile.

Land use is primarily residential and commercial, with a significant amount of forested land.

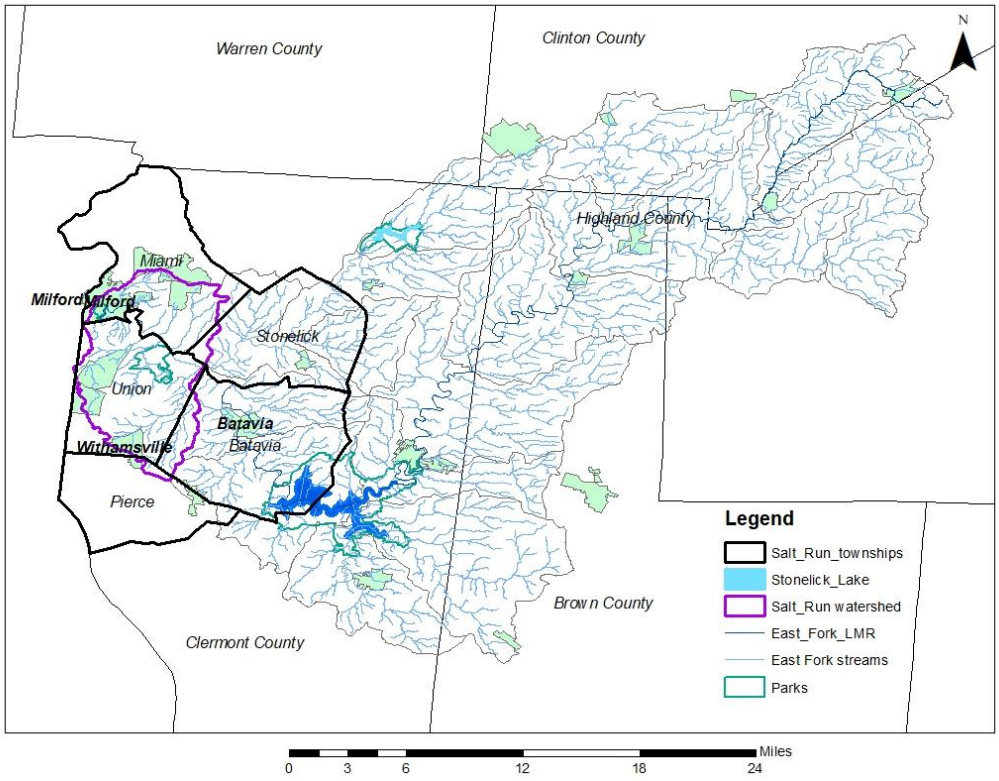


Figure 1-3: Salt Run HUC-12

In regards to threatened and endangered species, several species have been found in the watershed, including two species of fish on the state endangered list – mountain madtom (*Noturus eleuthenus*) and northern madtom (*Noturus stigmosus*) – and several mussel species, including the rayed bean (*Villosa fabalis*), the sheepnose (*Plethobasus cyphyus*), the fanshell (*Cyprogenia stegaria*) and the elephant ear (*Elliptio crassidens*), among others. Diverse mussel populations historically thrived in the EFLMR, and while some stream reaches have retained mussel diversity, the EFLMR mussel population as a whole is determined to be aging and less diverse (Hoggarth and Goodman, 2007). In-stream habitat degradation is contributing to the decline of mussel species. Therefore, restoration of degraded habitat is an important goal of the EFWC and included in chapters 3 and 4 of this NPS-IS plan.

Land use in the watershed is a mix between residential/commercial, mostly in the upper reaches of the watershed, and forested land along the lower tributary valleys. Forested land represents 48.2% of the land use in the watershed, while residential and commercial accounts for 20.1 % and 4.0%, respectively. There is some agricultural land use in the watershed, including 13.7% pasture/hay and 11.1% row crops; however, agricultural activities in this area are declining rapidly.

1.3 Public Participation and Involvement

Public participation and involvement is critical to the success of any NPS-IS plan. The EFWC was formed in 2001 to provide local agencies, groups and individuals the opportunity to collaboratively plan and implement water quality improvement projects throughout the EFLMR watershed. The EFWC's mission is "to enhance the biological, chemical and physical integrity of the EFLMR and its tributaries." The EFWC is an informal agency-citizen based organization (i.e., no application has been made for legal non-profit status) established to provide a cohesive approach to watershed management amongst the 32 townships and 21 villages in the EFLMR watershed. Although Clermont Soil and Water Conservation District (SWCD) is the lead agency for the EFWC, there are several participants, including SWCDs, NRCS district personnel and landowners in Brown, Clinton and Highland Counties. All EFWC members contribute knowledge about agriculture, industry, and other community resources and activities in the region. The EFWC has accepted the responsibility for developing and implementing the watershed protection plans for each of the 18 12-digit HUCs in the EFLMR watershed. These planning efforts provide a forum for the jurisdictions to discuss watershed issues across political boundaries.

The EFWC provides a cohesive approach to watershed management amongst 32 townships and 21 villages in the EFLMR watershed.

Specific to the development of this NPS-IS plan, the EFWC issued a press release notifying the public that the existing Lower East Fork Watershed Action Plan, published in December 2003, was being updated, and public comments would be accepted through May 31, 2019. Clermont SWCD will continue to incorporate valuable input from communities and county partners on a regular basis.

The EFWC works closely with community interest groups as well as environmental organizations and agencies.

Figure 1-4: Clermont SWCD hosts a field day with local producers

Furthermore, the EFWC has worked closely with multiple environmental organizations and agencies, including the USEPA Office of Research and Development (USEPA – ORD), the U.S. Army Corps of Engineers, USDA natural Resources Conservation Service (NRCS), Ohio EPA, OSU Extension, Clermont County's Office of Environmental Quality (OEQ) and others to understand the existing conditions of this watershed and develop strategic solutions to bring ecological lift to these streams. Furthermore, the local interest in water quality in this region is

unmatched, as groups such as the Water Quality Monitoring and Modeling Cooperative meet regularly to discuss issues impacting water quality, coordinate sampling efforts, review important findings from the previous month, and plan future work.

Lastly, Clermont SWCD is dedicated to public involvement through education and outreach activities. From publishing newsletters and regularly updating social media outlets such as Facebook and Twitter to participating in regional conservation/stormwater organizations and hosting annual workshops/field days (Figure 1-4), the Clermont SWCD already works to engage the local community, as its mission is "promoting the wise use of our natural resources through service and education."

CHAPTER 2

Salt Run Watershed Characterization & Assessment Summary

East Fork Little Miami River - Salt Run
Nine-Element NPS-IS Plan

Prepared by
Clermont Soil and Water Conservation District
May 2019

Chapter 2: Salt Run Watershed Characterization and Assessment Summary

OEPA has classified 3 of the 5 monitoring sites on the East Fork and 5 of 6 tributaries in the Salt Run HUC-12 as being in full attainment.

The Salt Run HUC-12 watershed includes seven named tributaries, and a 9.0-mile reach of the EFLMR main stem from the confluence of Stonelick Creek to the mouth at the Little Miami River. In 2012, Ohio EPA conducted an intensive biological and water quality survey of the EFLMR watershed to determine use attainment status and to determine if any changes in key indicators have taken place over time. Ohio EPA's technical report summarizing the results of this study - *Biological and Water Quality Study of the East Fork Little Miami River and Select Tributaries, 2012* – was published in May 2014. The report states that three of five locations on the East Fork main stem met the Exceptional Warmwater Habitat (EWH) aquatic life use. The two non-supporting sites included the most downstream location at river mile 0.8 which partially supported the EWH use due to habitat degradation and natural conditions, and the most upstream location (river mile 9.1), where the causes and sources for partial support were unknown. Only one of the six tributaries surveyed did not support the Warmwater Habitat (WWH) use designation. Ohio EPA determined that Hall Run was in non-support at both river miles 0.2 and 2.3 due to low dissolved oxygen (DO), exacerbated by low flow. The cause listed was urban storm water runoff. Poor habitat was also listed as a cause at Hall Run 0.2. The other tributaries surveyed by Ohio EPA, including Salt Run, Sugarcamp Run, Shayler Run, a tributary to Shayler Run, and an unnamed tributary to the East Fork at river mile 2.4, fully supported the WWH use. Additionally, a study conducted by Clermont County OEQ in 2005 showed high fecal coliform levels in the effluent of home sewage treatment systems in a subdivision located in the Wolfpen Run subdivision.

2.1 Summary of Watershed Characterization for Salt Run HUC-12

2.1.1 Physical and Natural Features

The underlying geology of the Salt Run HUC-12 watershed is primarily interbedded shale and limestone of Ordovician age (450 million years ago). This bedrock is overlain by glacial cover and a relatively shallow layer of loess from a few to as much as 40 inches depth. The glacial cover is a clayey till of Illinoian Age. This clay layer is situated above the bedrock but below the soil, often creating an impermeable layer preventing infiltration into the bedrock below. Furthermore, clay is more erodible and less stable than limestone, and areas where the clay to limestone ratio is high will experience greater streambank erosion.

Soil plays an extremely important role in watershed management. For example, in many watersheds soils act as natural water filters. Certain soil types are prone to flooding or erosion, affecting runoff rates and sedimentation. An understanding of soil types, with their benefits and limitations, leads to more effective land use management. Much of the Salt Run HUC-12 watershed includes Rossmoyne and Cincinnati soils, together comprising nearly half the soils in

in the watershed. Both soil types formed in as much as 40 inches of windblown silty material (loess) that overlies limy clay loam glacial till. Rossmoyne soils are moderately well drained, and Cincinnati soils are well drained. Both soils have a compact, brittle layer (fragipan) in the subsoil that impedes root penetration and percolation of water. Because Rossmoyne and Cincinnati soils are silty, these soils are particularly susceptible to erosion where disturbed or cultivated. The following figure (Figure 2-1) and table (Table 2-1) provide a summary of the most common soils found in Salt Run HUC-12 watershed.

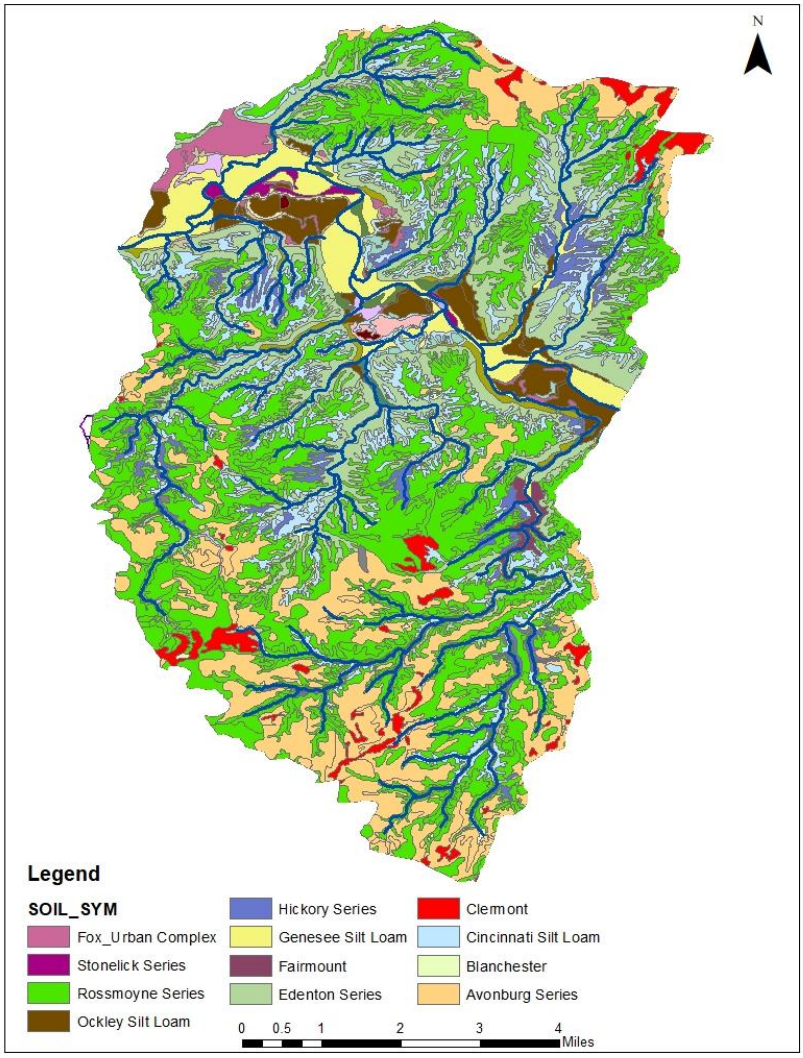


Figure 2-1: Salt Run HUC-12 watershed soil types (Lerch *et al.*, 1975; Lerch, 1992)

Table 2-1: Common soil types in the Salt Run HUC-12 watershed

Soil Series	% Soil Type in Watershed	Topography	Permeability	Drainage	Seasonal High Water Table	Runoff Potential
Rossmoyne	28%	0-6% slope (ridgetops)	Slow-moderately slow	Moderately well drained	1.5-2.5 ft.	Medium
Clermont	23%	Nearly level	Very slow	Poorly drained	0-.5 ft or ponded	Very Slow
Hickory Series	17%	Sloping-very steep (hillsides)	Moderately slow-moderate	Well drained	>6 ft.	Medium
Avonburg	13%	0-6% slope	Very slow	Somewhat poorly drained	.5-1.5ft.	Medium
Edenton	11%	Sloping to very steep	Moderately slow	Well drained	>6 ft.	High
Cincinnati Silt Loam	2.2%	2-12%	Moderately slow	Well drained	>6 ft.	Medium
Genesee	3%	Floodplain	Moderate-moderately slow	Well drained	>6 ft.	Negligible

2.1.2 Land Use and Protection

The Salt Run HUC-12 watershed is 42.6 mi^2 in total area. Forested land is the most prominent land use, accounting for approximately 48.2% (20.5 mi^2) of the land use in the watershed, including Cincinnati Nature Center's 1000+ acre Rowe Woods. Residential land accounts for 20.1% of the watershed (8.4 mi^2), followed by commercial land use at 4.0% (1.7 mi^2). Much of the development in the western portion of the watershed occurred before Clermont County adopted its first set of storm water management regulations in 1990. There is some agricultural land use remaining in the watershed, including pasture/hay (13.7%) and row crops (11.1%), but this is rapidly declining as development continues to spread east from the Cincinnati-Hamilton County metro area. A map depicting land use in the Salt Run-East Fork watershed is shown in Figure 2-2.

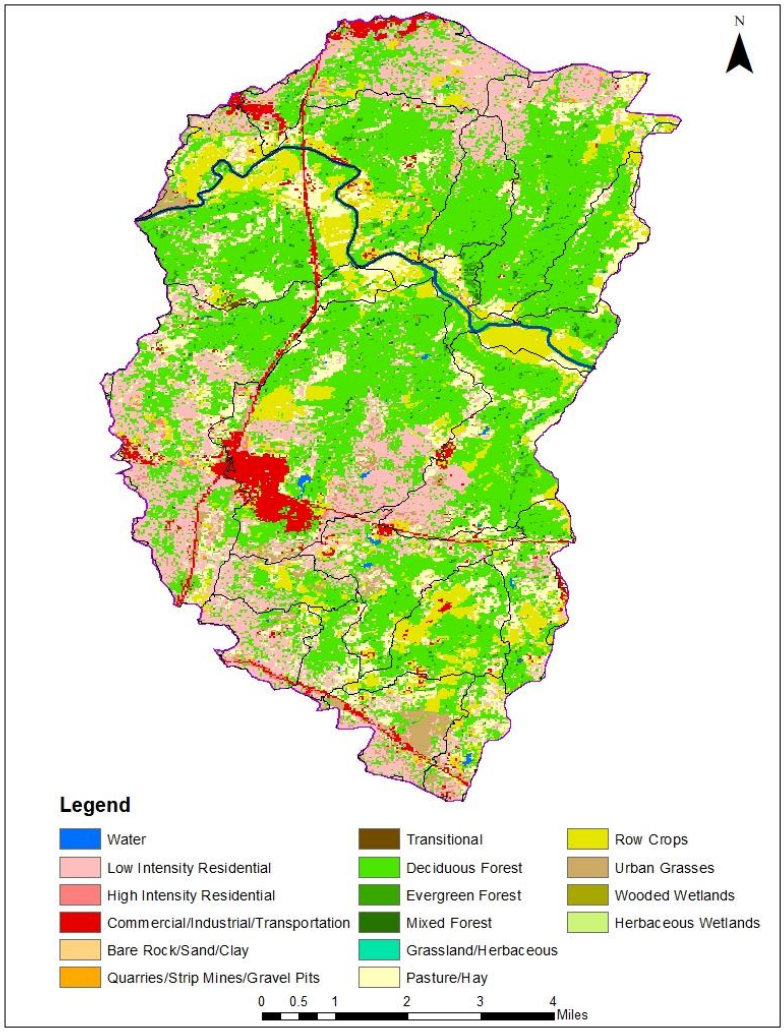


Figure 2-2: Salt Run HUC-12 watershed landuse

Residential and commercial development has occurred in much of the watershed, primarily in the upper reaches of the EFLMR tributaries and along the major transportation corridors (US 50 and State Routes 28, 32, 125 and 131). The County has had storm water management

regulations in place since 1990, but problems were created prior to the adoption of the regulations. Developed areas with more impervious surfaces increase the rate and volume of runoff. The lower reaches of streams show the effects of excess runoff shown by down-cutting and channel widening. As the County continues to develop, protection of the river and stream corridors remains a priority for watershed protection and restoration.

The native vegetation of the Salt Run HUC-12 watershed is deciduous hardwood forest, though species composition varies based on soil moisture. The flatter areas of the watershed are characterized by seasonal wetness. The dominant species in these areas are pin oak, soft maples, ash, elm, and swamp oak with beech and sweetgum also present. In the better drained areas, white and red oak, beech, sugar maple and hickory are dominant, with elm, black walnut, honey locust, and blackgum also present. Sycamore, boxelder, hackberry, willow and cottonwood are common in bottom-land forests.

The main stem of the EFLMR generally has sufficient forested riparian buffer except in locations where it parallels major transportation corridors such as US Route 50. Riparian buffers along the tributaries tend to be of good quality in the lower reaches where the valleys are steeper,and lacking in the upper reaches where much of the development in the watershed has occurred. Riparian protection along the EFLMR main stem and tributaries is a priority for watershed restoration and protection.

2.1.3 Biological Features

The Ohio Department of Natural Resources, Division of Natural Areas and Preserves maintains a list of rare, threatened and endangered species in the State of Ohio, including endangered species of fish and macroinvertebrates. Species found in the Salt Run HUC-12 watershed considered to be endangered, threatened or of special concern are summarized in Table 2-2. This includes endangered freshwater mussels (Figure 2-3). It is important to note that these are confirmed occurrences of these species, and other rare plant and animal species are likely present in the watershed, but haven't been identified. There are no federally listed species found in the Salt Run HUC-12.

Figure 2-3: Rayed bean; endangered freshwater mussel found in the EFLMR (EFWC, 2006)

Table 2-2: Rare, threatened, and endangered species in the Salt Run HUC-12 watershed

Common Name	Scientific Name	Federal Status	State Status	Location
Rare Plant List				
Running Buffalo Clover	*Baptisia australis*	Endangered	Endangered	Shayler Run

Common Name	Scientific Name	Federal Status	State Status	Location
Rare Animal List				
Fawnsfoot	*Truncilla donaciformis*	Not listed	Threatened	East Fork Little Miami River
Deertoe	*Truncilla truncata*	Not listed	Special Interest	East Fork Little Miami River
Elephant Ear	*Elliptio crassidens*	Not listed	Endangered	East Fork Little Miami River
Rayed Bean	*Villosa fabalis*	Proposed for Listing	Endangered	East Fork Little Miami River
River Redhorse	*Moxostoma carinatum*	Not listed	Special Interest	East Fork Little Miami River
Mountain Madtom	*Noturus eleuthenus*	Not listed	Endangered	East Fork Little Miami River
Northern Madtom	*Noturus stigmosus*	Not listed	Endangered	East Fork Little Miami River
Northern Harrier	*Circus cyaneus*	Not listed	Endangered	Cincinnati Nature Center
Common Tern	*Sterra hirundo*	Not listed	Endangered	Cincinnati Nature Center
Black Tern	*Chlidonias niger*	Not listed	Endangered	Cincinnati Nature Center
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Not listed	Endangered	Cincinnati Nature Center
Golden-winged Warbler	*Vermivora chrysoptera*	Not listed	Endangered	Cincinnati Nature Center
Sandhill Crane	*Grus canadensis*	Not listed	Endangered	Cincinnati Nature Center

Numerous invasive plant species occur throughout the EFLMR watershed. Common invasives include bush honeysuckle (*Lonicera species*), Japanese honeysuckle (*Lonicera japonica*), multi-flora rose (*Rosa multiflora*), and garlic mustard (*Alliaria petiolata*). Other known invasives include the Autumn and Russian Olive (*Elaeagnus spp.*) and the Tree of Heaven (*Ailanthus altissima*). There are other invasive species, such as the Purple Loosestrife (*Lythrum salicaria*),

which are not yet prevalent in the watershed; however still pose a threat of proliferating and dominating the landscape.

Invasive plants have negative impacts on native vegetation and animals within the watershed. Bush and Japanese honeysuckle out-compete and displace native plants and alter natural habitats by decreasing light availability and depleting soil moisture and nutrient content. Exotic bush honeysuckle competes with native plants for pollinators, resulting in a reduced seed set for native species. Unlike native shrubs, the fruits of exotic bush honeysuckle are carbohydrate-rich and do not provide migrating birds with the high-fat content needed for long flights. Multiflora rose forms dense thickets, excluding most native shrubs and herbs from establishing, and may be detrimental to nesting of native birds. This species was once suggested by Soil and Water Conservation Districts for living fences and wildlife habitat, however it is no longer encouraged. Garlic mustard invades areas disturbed by human activities and appears to be aided by white-tailed deer that prefer to eat native wildflowers and leave garlic mustard untouched. Garlic mustard displaces many native spring wildflowers such as spring beauty, wild ginger, bloodroot, Dutchman's breeches, toothworts and trilliums that occur in the same habitat. It is also credited with the decline of the West Virginia white butterfly because chemicals in garlic mustard appear to be toxic to the butterfly's eggs.

Invasive plant species are not the only threat to the EFLMR watershed. The Emerald Ash Borer (*Agrilus planipennis,* EAB) is an invasive wood-boring insect that threatens native North American ash trees throughout Ohio and elsewhere across the Midwest by infesting saplings and fully mature ash trees (*Fraxinus spp.*). While not in the Salt Run HUC-12 watershed, the Asian Longhorned Beetle (ALB, *Anoplophora glabripennis*) (Figure 2-4) was discovered nearby in Tate Township in Clermont County in 2011. This invasive beetle has no known natural predators and poses a threat to Ohio's hardwood forests. Restricted areas are now in effect for the Village of Bethel and Tate Township, as well as for East Fork State Park.

Figure 2-4: Asian Longhorned Beetle (ODA, 2011)

Zebra mussels *(Dreissena polymorpha*) are another invasive species rapidly spreading throughout the Midwest. Zebra mussels and a related species, the quagga mussel (*Dreissena bugensis*), are small, fingernail-sized mussels native to the Caspian Sea region of Asia. They are tolerant of a wide range of environmental conditions and have now spread to parts of all the Great Lakes, the Mississippi River, and the Ohio River. Zebra mussels clog water-intake systems of power plants and water treatment facilities, as well as irrigation systems, and the cooling systems of boat engines. They have severely reduced, and may eliminate, native mussel species.

No zebra or quagga mussels have been found in the EFLMR watershed. It is important, however, to continue to monitor the watershed for the presence of these aquatic invasives.

In addition to the threat of invasive species, research has shown that poor water quality and habitat loss are contributing to the decline of the EFLMR mussel population (Hoggarth and Goodman, 2007). Research done between 1990-91 and 2006-07 on 10 sites in the EFLMR yielded a decline in the Mussel-Index of Biological Integrity (M-IBI) scores). While some reaches retained their mussel diversity, the EFLMR population as a whole was determined to be aging and less diverse. It appears that the former mussel community is being replaced by a few opportunistic mussel species that use the freshwater drum as a host (*L. fragilis, P. alatus, T. truncate).*

2.2 Summary of Biological Trends for Salt Run HUC-12

Ohio EPA's 2014 Technical Report, *Biological and Water Quality Study of the East Fork Little Miami River and Select Tributaries*, which summarizes the results of its 2012 interdisciplinary monitoring program, served as the foundation for understanding existing conditions throughout the Salt Run HUC-12 watershed. Ohio EPA's program provides the basis for evaluating whether streams throughout the state are meeting existing use designations and if any changes to biological, chemical, or physical indicators are evident. Ohio's 2018 Integrated Water Quality Monitoring and Assessment Report also used data from this technical document to report upon the aquatic life use, monitoring results, and attainment status of each monitoring site. This information ultimately determines if regulatory actions need to be taken, as the findings and conclusions inform NPDES permits, Ohio Water Quality Standards, biennial Integrated Water Quality Monitoring and Assessment Reports, TMDLs, etc.

The main stem of the East Fork Little Miami River is designated as Exceptional Warmwater Habitat and the tributaries are designated as Warmwater Aquatic Habitat

With the exception of the main stem of the EFLMR, which has an aquatic use designation of EWH, the streams throughout the Salt Run HUC-12 have an aquatic use designation of WWH. Therefore, the primary metrics by which these streams are characterized as supporting/not supporting their designated use is through biological indices associated with fish sampling, macroinvertebrate sampling, and habitat assessments. The monitoring and assessment results are compared to thresholds associated with supporting typical warmwater assemblages of aquatic organisms for Ohio rivers and streams, and classified as fully supporting, partially supporting, or not supporting the typical aquatic assemblages.

In regards to non-aquatic life uses, streams in the Salt Run HUC-12 are designated for Primary Contact Recreation (PCR), Agricultural Water Supply (AWS), and Industrial Water Supply (IWS). These streams have not been assessed for their agricultural or industrial uses; however, Ohio EPA did contact PCR assessments at three locations on the EFLMR main stem (RM 9.1, 5.6 and 0.7) and one on Shayler Creek (RM 1.7). None of these sites were found to be supporting the PCR use; however, no definitive links to direct sources of human origin were apparent.

Ohio EPA conducted biological surveys at 13 locations throughout the Salt Run HUC-12, including five on the East Fork main stem and eight sites on six tributaries (Figure 2-5). Of the five mainstem sites, biological assemblages at two sites (RM 9.1 and RM 0.8) did not have acceptable condition status for EWH due to local habitat quality at RM 0.8, and for an unknown reason at RM 9.1. Tributaries sampled included Shayler Run, Sugarcamp Run, Hall Run and an unnamed tributary (confluence with the mainstem at RM 1.62). Three sites sampled in the Shayler Run subcatchment had biological assemblages rated in acceptable condition, as did the site sampled on Sugarcamp Run. Hall Run is an urbanized stream, and biological assemblages failed applicable biocriteria for WWH at the two sampling locations. The unnamed tributary to the East Fork (RM 1.62) is also an urban stream; however, despite being highly urbanized and experiencing low DO levels and high conductivity readings (principally driven by chloride), the condition of the fish and macroinvertebrate assemblages were consistent with local habitat quality and WWH status, albeit marginally.

Table 2-3 presents a summary of the biological index scores for all the sites within the Salt Run HUC-12 based on fish samples, macroinvertebrate samples, and habitat assessments (described in detail in the sections below). Red text in this table denotes scores that do not meet the criterion for EWH and WWH streams, and the green text in this table denotes scores that exceed the criterion for EWH and WWH streams.

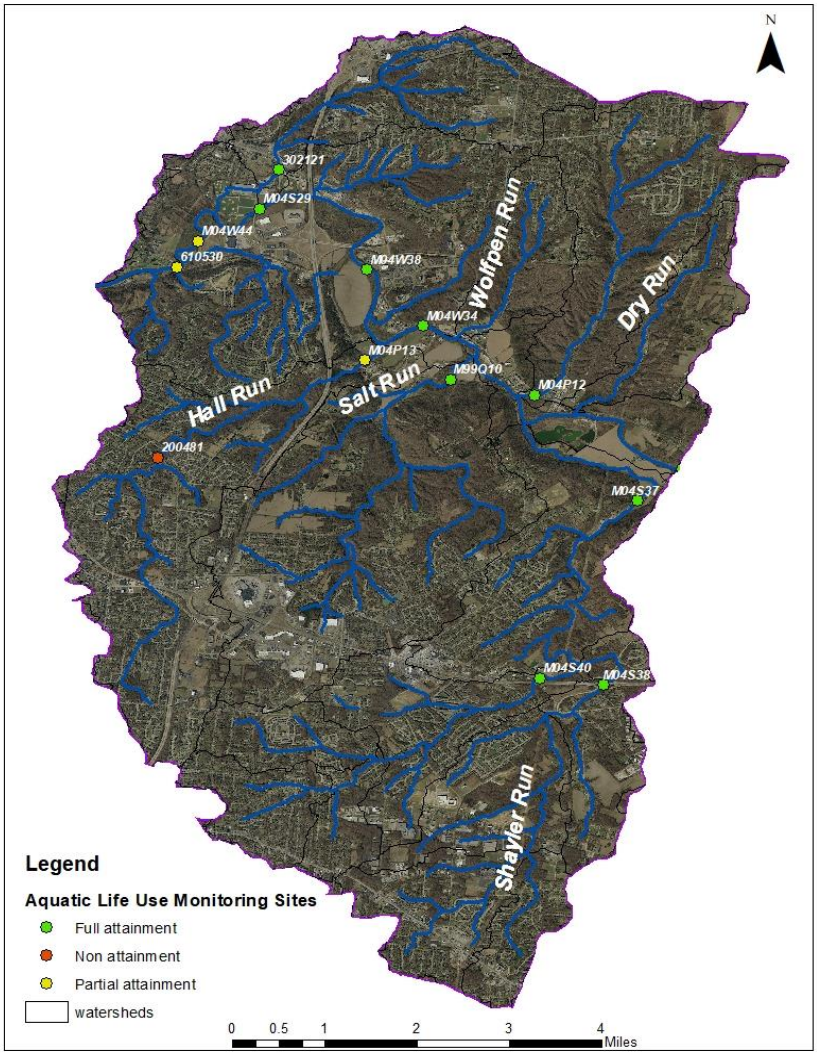


Figure 2-5: Attainment Status of Aquatic Life Use Monitoring Sites (OEPA, 2016)

Table 2-3: Biological index scores for sites in the Salt Run HUC-12 Watershed (OEPA 2018) based on fish samples (IBI and MIwb), macroinvertebrate samples (ICI), and habitat (QHEI)

Exceptional Warmwater Habitat Sites

Station ID	Station Name	RM (DA[a])	IBI[b]	MIwb[c]	ICI[d]	Status	QHEI[e]
East Fork Little Miami River (EWH)							
610530	Near Terrace Park Country Club @ S Milford Rd	0.8 (498)	42 Good	9.4 Very Good	50 Exceptional	Partial	72.3
M04W44 *	In S-Curve 0.4 mi. downstream Milford WWTP	1.2 (497)	43 Good	9.6 Exceptional	50 Exceptional	Partial	66.0
M04S29	Upstream Milford Parkway	2.2 (494)	45 Very Good	10.2 Exceptional	52 Exceptional	Full	82.5
M04W38	Adjacent W TechneCenter Drive	4.3 (491)	49 Very Good	9.3 Very Good	52 Exceptional	Full	83.0
M04W34	Perintown	5.6 (484)	47 Very Good	9.0 Very Good	52 Exceptional	Full	83.0

M04W34	Upstream of confluence with Stonelick Creek	9.1 (380)	45	Good	8.6	Good	48	Exceptional	Partial	87.0

Warmwater Habitat Sites

Station ID	Station Name	RM (DA[a])	IBI[b]		MIwb[c]	Invertebrates Assessed	Status	QHEI[e]
200481	Hall Run d/s Summerside Rd	2.3 (3.1)	26	Poor	N/A	Fair	Non	58.0
M04P13	Hall Run Roundbottom Rd	0.2 (5.5)	30	Fair	N/A	Fair	Non	47.8
M99Q10	Salt Run @ Roundbottom Rd	0.4 (6.4)	48	Very Good	N/A	Mod. Good	Full	65.8
M04P12	Sugarcamp Run @ U.S. 50	0.2 (3.6)	44	Good	N/A	Good	Full	59.3
M04S38	Shayler Run @ Olive Branch u/s SR 32	5.2 (4.9)	48	Very Good	N/A	Mod. Good	Full	71.5
M04S37	Shayler Run @ Binning Rd	1.7 (12.1)	44	Good	N/A	Good	Full	67.5
M04S40	Trib. To Shayler Run d/s/ SR 32	0.4 (4.4)	40	Good	N/A	Mod. Good	Full	63.8
302121	Unnamed trib to EFLMR RM 2.4	0.4 (2.6)	38	Marginal	N/A	Mod. Good	Full	56.0

* Not part of 2012 survey. Fish survey conducted in 2007; macroinvertebrate survey conducted in 2008

[a] Drainage areas are reported in square miles.

[b] IBI criterion is 50 for EWH streams, 40 for WWH headwater/wadable streams.

[c] MIwb criterion is 9.4 for EWH wadable streams and 9.6 for EWH boatable streams. The criterion is 8.1 for WWH wadeable streams and 8.7 for WWH boatable. MIwb criterion is NA for headwater streams.

[d] ICI criterion is 46 for EWH streams.

[e] QHEI scores from streams across the state indicate that values greater than 75 represent habitat conditions which could have the ability to support exceptional warmwater faunas, and values > 64 are generally conducive of supporting warmwater faunas (OEPA, 2014).

***Fish**: Modified Index of Well-Being (MIwb) & Index of Biotic Integrity (IBI)*

The Index of Biotic Integrity indicates good to very good conditions at all locations except two stations on Hall Run

The MIwb and IBI scores quantify the integrity of the fish community at each monitoring location. The field and laboratory procedures utilized by OEPA for the fish sampling, which involved pulsed DC electrofishing methods, are outlined in the document titled *Biological Criteria for the Protection of Aquatic Life: Volume III, Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities* (OEPA, 1989) and the more recent updated document (OEPA, 2008). On the main stem of the EFLMR these scores ranged from good to exceptional. Comparing the electrofishing sampling results from the 2012 monitoring program to previous years (1982 and 1998), there was no significant difference longitudinal trends or in overall mean IBI scores on the East Fork main stem. MIwb scores were nearly similar between years, but the MIwb was higher in 2012 compared to 1998. The apparent decrease in the IBI and MIwb downstream from the Milford

wastewater treatment plant relative to the scores obtained immediately upstream was an artifact of local habitat, not plant performance. The riffle included in the sampling zone downstream from the plant was anemic compared to the strong riffle-run complex in the zone upstream from the plant.

Macroinvertebrates: *Invertebrate Community Index (ICI)*

The ICI is a measure of the macroinvertebrate community integrity at each monitoring location. Similar to the fish sampling, the field and laboratory procedures utilized by OEPA for the macroinvertebrate sampling is outlined in the document titled *Biological Criteria for the Protection of Aquatic Life: Volume III, Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities* (OEPA, 1989) and the more recent updated document (OEPA, 2008). All sites surveyed on the East Fork main stem scored in the exceptional range. Consistent with broader statewide trends, the quality of macroinvertebrate assemblages measured in 2012 was similar to that measured in 1998, and better than that measured in 1982, likely owing to improved wastewater infrastructure and treatment. Macroinvertebrate scores on the tributaries coincided with their respective use attainment status, with only fair assemblages recorded on Hall Run, and moderately good to good assemblages seen on all other tributaries.

Habitat: *Qualitative Habitat Evaluation Index (QHEI)*

OEPA assessed the habitat characteristics through the Qualitative Habitat Evaluation Index (QHEI), which provides an understanding of existing habitat features important to fish communities and is based upon methodologies established by Rankin's habitat assessments (Rankin 1989, Rankin 1995, OEPA 2006). During this evaluation, several habitat characteristics are assessed on the stream reach, such as type/quality of substrate, amount/quality of in-stream vegetative cover, channel morphology, extent/quality of riparian vegetation, pool/run/riffle quality, etc. Review of hundreds of QHEI scores from streams across the state indicate that values greater than 64 are generally conducive of supporting warmwater faunas and scores greater than 75 represent habitat conditions which could have the ability to support exceptional warmwater faunas (OEPA, 2014). With that, the quality of the physical stream habitat throughout much of the main stem EFLMR and appear to be of sufficient quality to support exceptional warmwater aquatic assemblages, with excellent QHEI scores ranging from 82.5 to 87, with the exception of the RM 0.8 site which scored 72.3. In fact, poor habitat was listed as a cause of partial attainment at this site, along with natural conditions. The QHEI scores for the eight tributary sites ranged from 47.8 at Hall Run RM 0.2 to 71.5 at Shayler Run RM 5.2. Both of the non-supporting sites on Hall Run had QHEI scores less than 64, which is considered sufficient for supporting WWH aquatic life use. Three of the six sites classified as fully supporting also had QHEI scores lower than 64. These three sites also had marginally good macroinvertebrate communities, suggesting that full use support is borderline and could be threatened with only small changes in the physical or chemical makeup of the sites. Table 2-4 illustrates the QHEI scores as well as the warmwater habitat and modified warmwater habitat attribute results.

Table 2-4a: Qualitative Habitat Evaluation Index (QHEI) Matrix with Warmwater Habitat (WWH) and Modified Warmwater Habitat (MWH) Attribute Totals for East Fork Main Stem Sites in the Salt Run HUC-12 (OEPA, 2014)

		East Fork Little Miami River				
Key QHEI Elements	Station ID	610530	M04S29	M04W38	M04W34	M04S03
	River Mile	0.8	2.2	4.3	5.6	9.1
	QHEI Score	72.3	82.5	83.0	83.3	87.0
	Gradient (ft/mi)	3.23	3.23	4.55	4.55	5.76
WWH Attributes	Not Channelized or Recovered	•	•	•	•	•
	Boulder/Cobble/Gravel Substrates	•	•	•	•	•
	Silt Free Substrates					•
	Good/Excellent Development	•	•	•	•	•
	Moderate/High Sinuosity	•	•	•	•	•
	Extensive/Moderate Cover	•	•	•	•	•
	Fast Current/Eddies		•	•	•	•
	Low/Normal Embeddedness	•	•	•	•	•
	Max Depth >40 cm	•	•	•	•	•
	Low/Normal Riffle Embeddedness			•	•	•
	WWH Attributes	7	8	9	9	10
MWH Attributes / Hi Influence	Channelized/No Recovery					
	Silt/Muck Substrates					
	No Sinuosity					
	Sparse/No Cover					
	Max Depth <40 cm					
	Hi-Influence Modified Attributes	0	0	0	0	0
MWH Attributes / Moderate Influence	Recovering Channel					
	Heavy/Moderate Silt Cover					
	Sand Substrate (Boat)					
	Hardpan Substrate Origin					
	Fair/Poor Development	•				
	Low Sinuosity					
	Only 1 or 2 Cover types					
	Intermediate/Poor Pools					
	No Fast Current	•				
	High/Moderate Embeddedness					
	High/Moderate riffle Embeddedness		•		•	
	No Riffle	•				
	M.I. MWM Attributes	3	1	0	1	0
MWH H.I.+1/WWH+1 Ratio		0.13	0.11	0.1	0.1	0.09
MWH M.I.+1/WWH+1 Ratio		0.5	0.22	0.1	0.2	0.09

Table 2-4b: Qualitative Habitat Evaluation Index (QHEI) Matrix with Warmwater Habitat (WWH) and Modified Warmwater Habitat (MWH) Attribute Totals for Tributaries in the Salt Run HUC-12 (OEPA, 2014)

		Salt Run - East Fork HUC 12 Tributaries							
		Hall Run		Salt Run	Sugarcamp Run	Shayler Run		UNT to Shayler Run	UNT to EFLMR
Key QHEI Elements	Station ID								
	River Mile	2.3	0.2	0.4	0.2	5.2	1.7	0.4	0.4
	QHEI Score	58.0	47.8	65.8	59.3	71.5	67.5	63.8	56.0
	Gradient (ft/mi)	40.0	90.9	9.43	66.7	17.5	29.9	37.0	20.6
WWH Attributes	Not Channelized or Recovered	•		•	•	•	•	•	•
	Boulder/Cobble/Gravel Substrates	•	•	•	•		•		•
	Silt Free Substrates								
	Good/Excellent Development			•	•	•	•	•	
	Moderate/High Sinuosity					•	•	•	
	Extensive/Moderate Cover	•		•	•	•	•	•	•
	Fast Current/Eddies								
	Low/Normal Embeddedness	•	•	•	•	•	•	•	•
	Max Depth >40 cm	•	•	•	•	•	•	•	•
	Low/Normal Riffle Embeddedness			•	•	•		•	
	WWH Attributes	5	3	7	7	7	7	7	5
MWH Attributes	Channelized/No Recovery								
Hi Influence	Silt/Muck Substrates		•						
	No Sinuosity								
	Sparse/No Cover				•			•	•
	Max Depth <40 cm	•	•						
	Hi-Influence Modified Attributes	1	2	0	1	0	0	1	1
Moderate Influence	Recovering Channel		•						•
	Heavy/Moderate Silt Cover								
	Sand Substrate (Boat)								
	Hardpan Substrate Origin								
	Fair/Poor Development	•	•	•	•				•
	Low Sinuosity	•	•	•	•			•	•
	Only 1 or 2 Cover types		•						
	Intermediate/Poor Pools		•		•			•	
	No Fast Current	•	•	•	•	•	•	•	•
	High/Moderate Embeddedness			•					•
	High/Moderate riffle Embeddedness			•					
	No Riffle	•	•				•		•
	M.I. MWM Attributes	4	7	5	4	1	2	3	6
MWH H.I.+1/WWH+1 Ratio		0.33	0.75	0.13	0.25	0.13	0.13	0.25	0.33
MWH M.I.+1/WWH+1 Ratio		0.83	2.0	0.75	0.63	0.25	0.38	0.50	1.17

Water Quality

In addition to the biological and physical monitoring discussed above, OEPA employs chemical monitoring to understand existing conditions throughout the EFLMR watershed. Within the Salt Run HUC-12, the OEPA (2014) report documented that organic enrichment/low DO was a particular concern in the East Fork at RM 0.8, in Hall Run, and an unnamed tributary to the East Fork at RM 1.6. No other water quality parameters were found to exceed instream criteria in the Salt Run HUC-12 watershed. Table 2-5 presents the locations at which DO concentrations failed to meet the minimum criteria, and the range of concentrations for each violation.

Table 2-5: Sampling Locations with Dissolved Oxygen Concentrations Below Established Criteria (OEPA, 2014)

Station ID	Station Name	RM	Number of Exceedances	Concentration below criteria (mg/L)
East Fork Little Miami River				
M04S29	Upstream Milford Parkway	2.2	1	5.92‡
610530	Near Terrace Park Country Club @ S Milford Rd	0.8	5	5.99‡, 5.55‡, 5.36‡, 5.18‡, 5.64‡
Hall Run				
200481	d/s Summerside Road	2.3	2	2.58‡‡, 3.29‡‡
M04P13	@ Roundbottom Road	0.2	1	2.90‡‡
Tributary to East Fork Little Miami River (RM 1.62)				
Unknown	Unknown, not specified in TSD report	0.1	5	4.07‡, 3.04‡‡, 1.43‡‡, 4.58‡, 4.91‡

‡ value is below the EWH minimum 24-hour average D.O criterion (6.0 mg/l) or value is below the WWH minimum 24-hour average D.O criterion (5.0 mg/l) or value is below the MWH minimum 24-hour average D.O criterion (4.0 mg/l) as applicable.

‡‡ value is below the EWH minimum at any time D.O. criterion (5.0 mg/l) or value is below the WWH minimum at any time D.O. criterion (4.0 mg/l) or value is below the MWH minimum at any time D.O. criterion (3.0 mg/l) as applicable.

2.3 Summary of Potential Pollution Causes and Associated Sources for Salt Run HUC-12

OEPA used the results of its multidisciplinary monitoring program to not only determine the attainment status of the streams within the Salt Run HUC-12 watershed, but also to assign probable causes and sources of impairment. As previously mentioned, the Ohio 2018 Integrated Report lists two sites on the EFLMR main stem as partial attainment status, and two sites on Hall Run as non-attainment status. All other locations assessed during the 2012 survey are listed as full attainment. Table 2-6 presents the causes and sources reported by OEPA.

Table 2-6: Causes and Sources of Impairment for Salt Run HUC-12 Sampling Locations with Partial Attainment Status (OEPA, 2014)

Station ID	RM (DA)	Primary Cause	Primary Source	Location
East Fork Little Miami River				
M04S03	9.1 (380)	Unknown	Unknown	Upstream of confluence with Stonelick Creek
610530	0.8 (498)	Natural Conditions / Habitat	N/A	Near Terrace Park Country Club @ S Milford Rd
Hall Run				
200481	2.3 (3.1)	Low DO exacerbated by low flow	Urban storm water runoff	Downstream Summerside Road
M04P13	0.2 (5.5)	Low DO exacerbated by low flow	Urban storm water runoff	At Roundbottom Road

2.4 Additional Information for Determining Critical Areas and Developing Implementation Strategies

2.4.1 Lower East Fork Watershed Management Plan

The EFWC is fortunate to have supportive partners in the region to assist with watershed planning and project implementation. The Ohio, Kentucky and Indiana (OKI) Regional Council of Governments completed a GIS analysis to assess tree canopy cover and riparian corridors in the Salt Run, Solomon Run and Glady Creek HUC-12 watersheds (Figure 2-6) to help identify potential areas for restoration. The analysis includes varying buffer widths along the streams for potential restoration opportunities and a watershed canopy assessment, given the level of urbanization in the lower watershed.

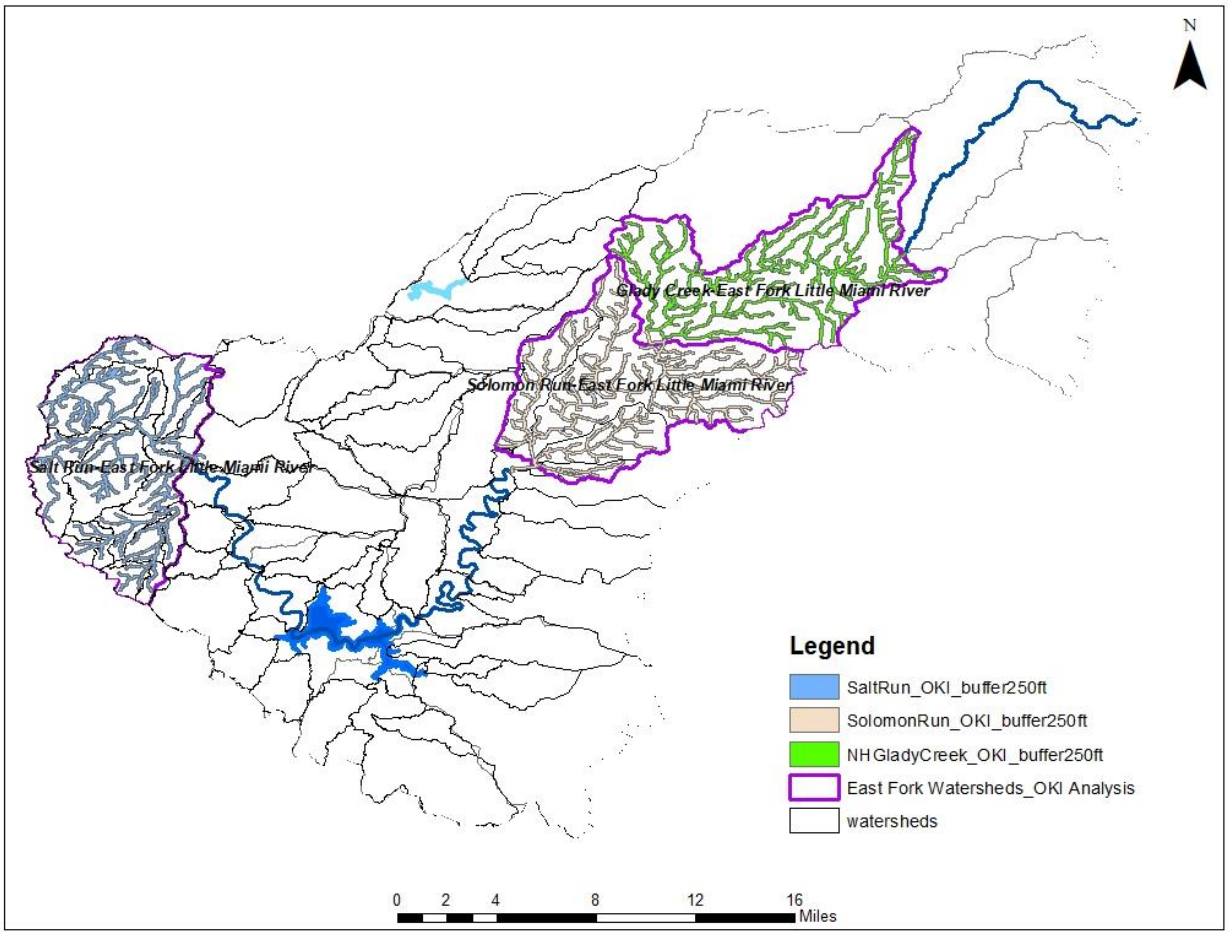


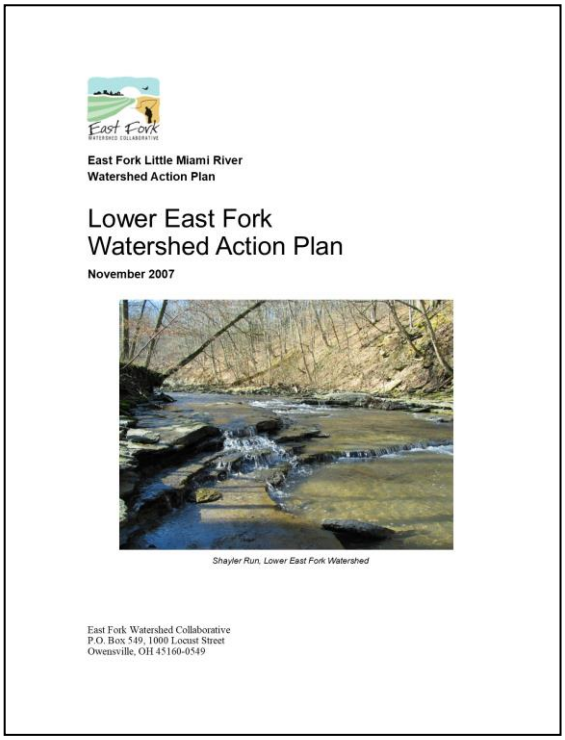
Figure 2-6: OKI buffer analysis for Salt Run, Solomon Run and Glady Creek (OEPA, 2016)

2.4.2 Wolfpen Run Home Sewage Treatment Systems

In 2005, Clermont County OEQ collected fecal coliform samples from 90 home sewage treatment system (HSTS) outlets in the Eagle Rudge subdivision that either served individual homes or multiple homes via a collector line. The study showed high fecal coliform concentrations at the majority of the outlets, with 40 having concentrations greater than 6,000 cfu/100 mL. While improvements have been made since this time, this area remains a concern.

2.4.3 Lower East Fork Watershed Management Plan

In March 2003, the East Fork Watershed Collaborative published the Lower East Fork Watershed Management Plan (Figure 2-10). This document includes a watershed action plan for the 42.6 square mile drainage area downstream of Stonelick Creek to the confluence with the Little Miami River. The Salt Run HUC-12 Watershed exactly coincides with this area. The 2003 Watershed Management Plan provides a watershed inventory focusing on geology, soil, biological features, water resources, land use, point sources and non-point sources of pollution, and alterations to natural habitat; a summary of water resource quality in the EFLMR and its tributaries; a summary of community water management goals and interests; a discussion of watershed impairments, including an identification and quantification of potential pollutant sources and recommended watershed restoration and protection goals. This document uses several data resources to report on existing stream conditions, including Ohio EPA's 2000 Ohio Water Resource Inventory 305(b) Report and the 1998 assessment. The more focused Nine Element NPS-IS Plan for the Salt Run HUC-12 presented herein builds on the successes of this previous plan and is consistent with its findings and recommendations.


East Fork Little Miami River
Watershed Action Plan

Lower East Fork
Watershed Action Plan

November 2007

Shayler Run, Lower East Fork Watershed

East Fork Watershed Collaborative
P.O. Box 549, 1000 Locust Street
Owensville, OH 45160-0549

Figure 2-10: Lower East Fork Plan, 2003

CHAPTER 3

Conditions & Restoration Strategies for Salt Run HUC-12 Critical Areas

East Fork Little Miami River - Salt Run
Nine-Element NPS-IS Plan

Prepared by
Clermont Soil and Water Conservation District
May 2019

Chapter 3: Conditions & Restoration Strategies for Salt Run HUC-12 Critical Areas

3.1 Overview of Critical Areas

Several critical areas have been identified throughout the Salt Run watershed: HUC-12 050902021305. Specifically, the Hall Run and the upper- and lower-most reaches of the East Fork subwatersheds are impaired, with only partial attainment status at their monitoring locations (OEPA, 2014), making these areas important target regions.

Hall Run and portions of the East Fork main stem are impaired and have been prioritized as critical areas with several BMP strategies.

Wolfpen Run, which was not assessed during Ohio EPA's 2012 survey, has also been identified as a critical area due to a heavy concentration of discharging home sewage treatment systems and a mobile home package plant. Sampling conducted by Clermont County OEQ has shown exceptionally high fecal coliform concentrations in Wolfpen Run.

While Ohio EPA determined that Shayler Run is in full attainment of its aquatic life use, the section of the creek north of State Route 32 has been identified as a critical area due to habitat degradation that resulted in part from the installation of an old sanitary trunk sewer in the creek valley. This section of sewer has since been abandoned and is no longer in use.

Finally, the Avey's Run watershed has been identified as a critical area due to its exceptional quality. Avey's Run is protected through most of its length, as it runs through Clermont County's Shor Park and the Cincinnati Nature Center before joining Salt Run. There is also an opportunity to protect additional stream corridor upstream of these two areas (Figure 3-1).

Land use in the watershed is a mix of urban/industrial, suburban residential, forested and agricultural. Different BMP strategies for each subwatershed are proposed based on known impairments and watershed conditions.

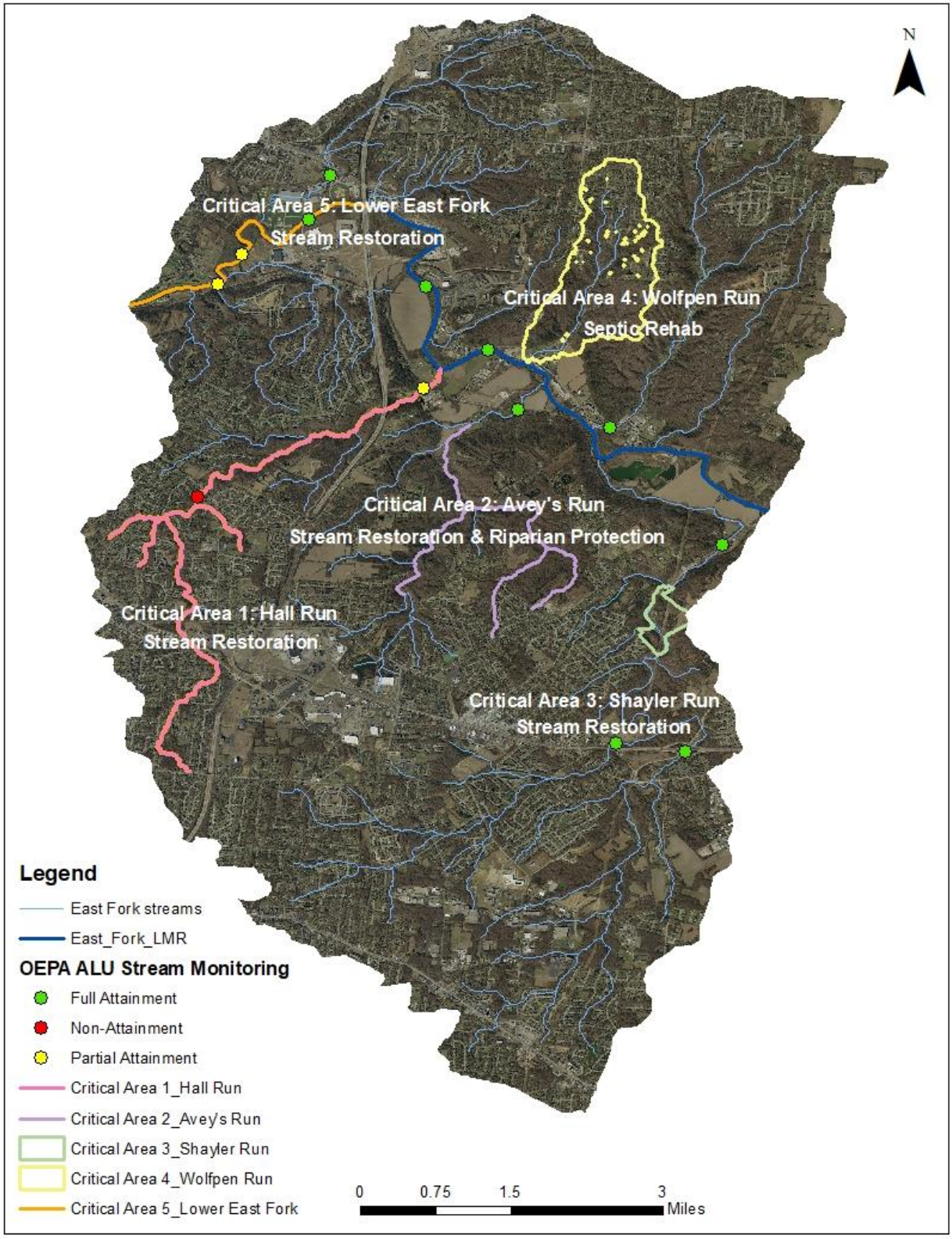


Figure 3-1: Salt Run HUC-12 critical areas and BMP strategies

3.2 Critical Area 1: Conditions, Goals, & Objectives for the Hall Run subwatershed of the Salt Run HUC-12.

3.2.1 Detailed Characterization

Critical Area 1 includes the streams and tributaries within the Hall Run subwatershed of the Salt Run HUC-12. The OEPA 2016 Integrated Report indicates that the sites within this 5.5 square mile subwatershed are impaired and only meet partial attainment status with fish samples, macroinvertebrate assessments, and habitat assessments not meeting acceptable values for streams with warmwater aquatic habitat (WWH) designation (Figure 3-2). The sampling location at RM 2.3 (200481) is in non-attainment due to low dissolved oxygen (DO) from urban runoff. The downstream sampling site near Roundbottom Road (RM 0.23, M04P13) is impaired by anthropogenic habitat modifications, a legacy of sewer line construction, and urban storm water runoff.

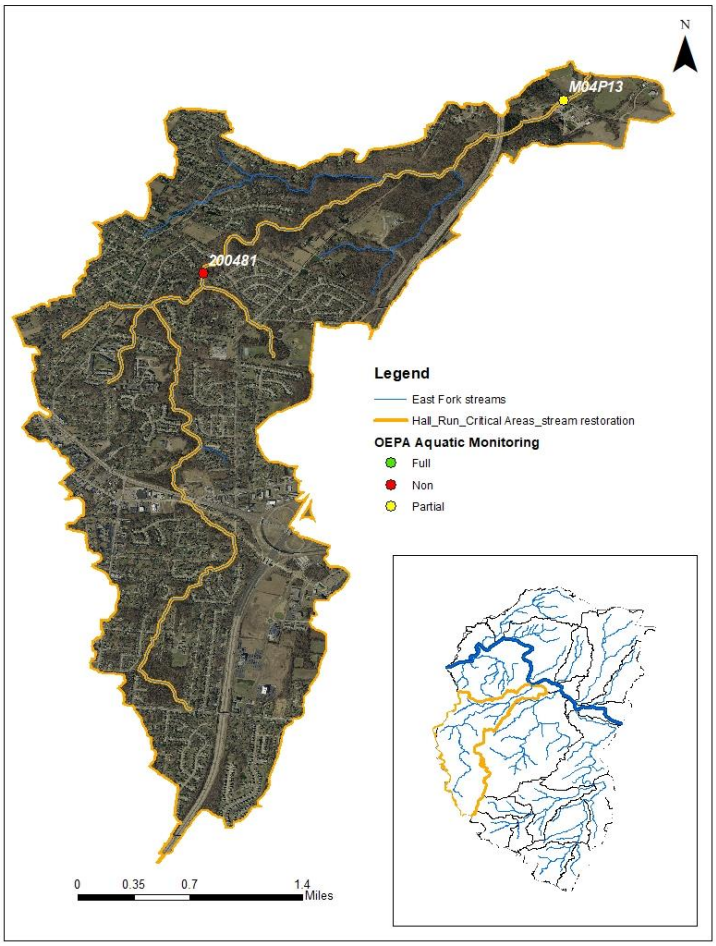


Figure 3-2: Aquatic life use monitoring sites in Hall Run

Review of the 2011 National Land Cover Database (NLCD) indicates that the majority of the watershed is a mix of commercial and residential land use, along with forested areas and a few large farm fields (Figure 3-3). Approximately 35% of the land use is classified as residential and commercial, with 40% forested area and 15% agricultural.

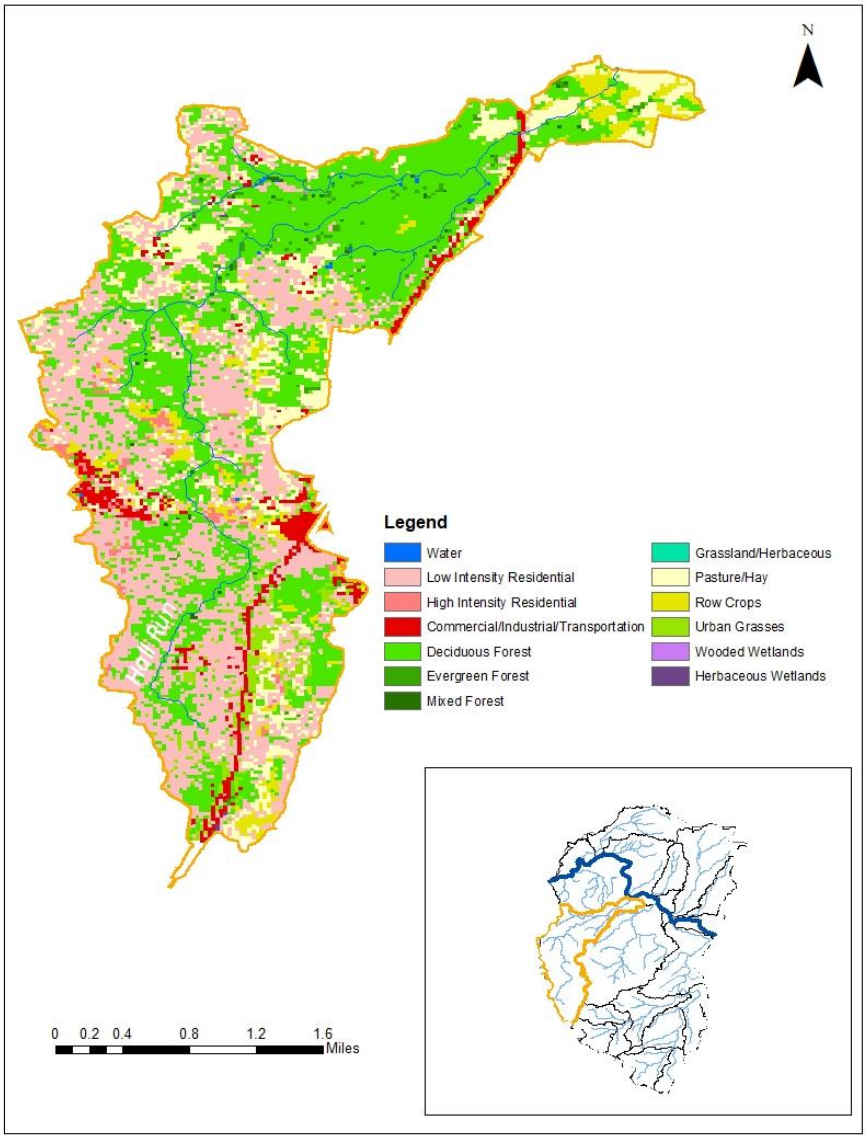


Figure 3-3: Hall Run land use (NLCD, 2011)

Protection of existing forested areas plays an important role in improving and maintaining watershed health. Trees and forests protect water resources by reducing storm water runoff and flooding, preventing erosion by stabilizing soil with root systems, providing habitat for wildlife, providing shade for streams and other habitats, and improving regional air quality. Incorporating the management of urban and community forestry into local watershed planning is an essential component of water resource protection.

OKI provided an analysis of tree canopy cover in the Salt Run Watershed. Hall Run and other areas in the Salt Run watershed are highly urbanized and many parts of the landscape are transitioning from agriculture or open space to residential and commercial development. The monitoring of forest cover over time will help communities understand how development is impacting the watershed and help identify areas that can be protected, enhanced or reforested in the future.

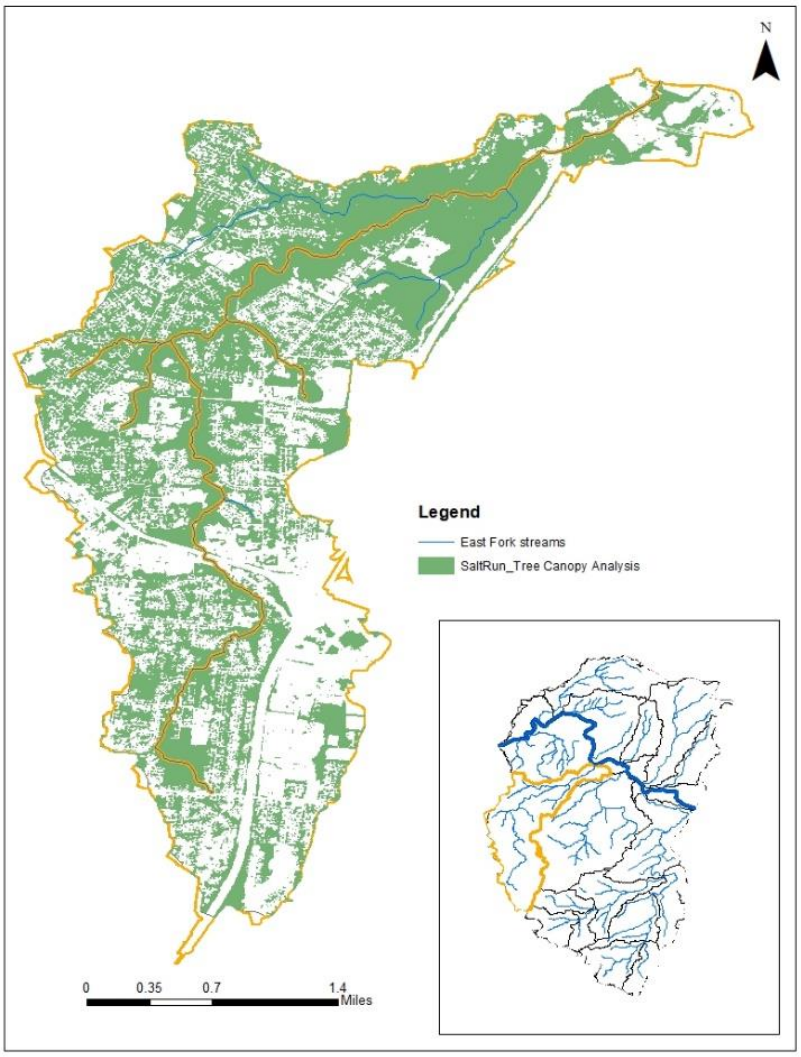


Figure 3-4: Hall Run Tree Canopy Cover

In addition, OKI provided an analysis of the riparian corridors in the Salt Run watershed to assess existing conditions and identify areas in need of restoration. The protection of forested riparian corridors is one of the most critical measures a community can implement to protect water resources. Riparian corridors along the East Fork Little Miami River and the major tributaries in Salt Run are good overall, with some segments in need of restoration. The headwater streams, where riparian buffer widths tend to decrease, are in need of better protection to mitigate the influx of urban storm water runoff.

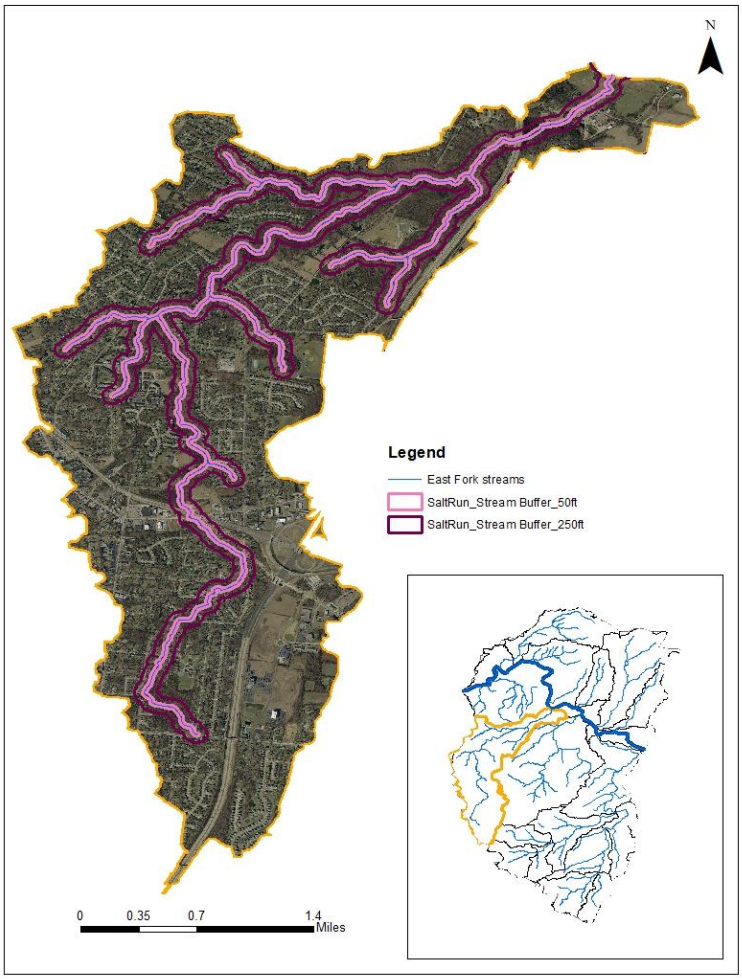


Figure 3-5: Hall Run Stream Buffer Analysis

3.2.2 Detailed Biological Conditions

The 2012 sampling conducted by OEPA in this subwatershed indicates that conditions are not suitable for supporting warmwater aquatic habitat. Table 3-1 illustrates the attributes of the fish sampled in 2012 at each monitoring location, resulting in IBI scores of 26 at the upstream site (200481) and 30 at the downstream site (M04P13). The IBI criterion is 40 for WWH headwater/wadeable streams. Table 3-1 also includes the habitat assessment scores,

represented by QHEI values. OEPA reports that QHEI scores from streams across the state indicate that values greater than 55 are generally conducive of supporting warmwater faunas (OEPA, 2014). The habitat assessment at the upstream site (200481) scored 58. It was lacking fast current/eddies, instream cover, and appropriate riffle-pool habitat. The habitat assessment at the downstream site (M04P13) scored 47.8 with issues such as sparse/no instream cover, low sinuosity, poor riffle-pool development, and moderate to heavy silt.

Next, Table 3-2 presents the 2012 macroinvertebrate community data at each site in the Hall Run subwatershed. The dominant taxa at the upstream site (200481) include *Hydropsychids,* baetids, isopods, *Stenelmis* (F), and *Psephenus* (MI). The dominant taxa at the downstream site (M04P13) include *Hydropsychidsc*, *Stenelmis* (F), baetids, isopods (F), and midges (F, T). The ICI assessment at these sites reports good to marginally good conditions.

Table 3-1: Attributes of fish samples and QHEI assessments collected from the Hall Run monitoring locations. Fish attribute values are averages except in cases where sampling method different between passes (OEPA, 2014).

Station ID	RM	QHEI	Drainage Area (mi^2)	Mean # of Species	Rel. # Minus Tol.	Relative Number (all)	IBI	Narratives
M04P13	2.3	47.8	5.3	4.0	229.0	1,101.8	30	Fair
200481	0.2	58.0	3.1	9.0	50.0	212.0	26	Poor

Table 3-2: Macroinvertebrate community attributes for the Hall Run monitoring locations (OEPA, 2014).

Station ID	RM	Total Taxa	Qual Taxa	Total EPT	Qual EPT	Total Sens.	Qual Sens.	Qual Tolerant	Density	ICI[a]	Flow
M04P13	2.3	30	30	8	8	4	4	5	Low	G	Normal
200481	0.2	29	29	7	7	3	3	9	Low	MG	Normal

[a]ICI assessment of G indicates good conditions and an ICI assessment of MG indicates marginally good conditions.

Furthermore, OEPA also conducted water quality sampling as part of its 2012 monitoring of the watershed. This sampling concluded that dissolved oxygen (DO) levels were low and the total suspended solids (TSS) were elevated. Low DO and high TSS, coupled with the poor habitat conditions, are factors likely contributing to impairments.

3.2.3 Detailed Causes and Associated Sources

Results of the 2012 monitoring effort indicate several probably causes of impairment in the Hall Run subwatershed, including poor habitat and low dissolved oxygen levels – exacerbated by urban runoff (OEPA, 2014). In regards to habitat conditions, the following attributes from the habitat assessment have an influence on the partial attainment status at these monitoring sites:

Poor instream habitat conditions and urban runoff are primary sources of impairment to Hall Run.

- Channelization
- Sparse/no cover
- Max pool depth less than 40 cm
- Low sinuosity
- Intermediate/pool pools
- No fast current
- No riffle

In addition to poor habitat conditions, urban runoff is suspected to be a primary source of pollution in this subwatershed. Stormwater runoff carries nutrients and sediments to nearby streams; and therefore, some of the primary objectives listed in the next section focus on habitat restoration and BMPs to provide pollutant filtration.

3.2.4 Outline Goals and Objectives for the Critical Area

As previously explained, Hall Run is primarily impaired due to poor habitat and low dissolved oxygen. These conditions are exacerbated by low flow conditions.

Goals

Improving the biological and habitat conditions through an increase in the IBI, MIwb, ICI, and QHEI scores is the overall nonpoint source restoration goal of all NPS-IS plans, with the ultimate goal of bringing the watercourses into full attainment with its designated aquatic life use. In order to bring the Hall Run subwatershed into full attainment, the following goals have been set:

Hall Run @ RM 0.2 (M04P13) – near Milford @ Roundbottom Rd.:

- Goal 1 – Achieve IBI score of 40 → NOT ACHIEVED: Site currently has a score of 30 (Fair).
- Goal 2 – Achieve ICI value of Good → ACHIEVED: Site currently assessed as Good.
- Goal 3 – Achieve QHEI >55 → NOT ACHIEVED: Site currently has a score of 47.8.

Hall Run @ RM 2.3 (200481) - @Summerside Estates, Dst. Summerside Rd.

- Goal 1 – Achieve IBI score of 40 → NOT ACHIEVED: Site currently has a score of 26 (Poor).
- Goal 2 – Achieve ICI value of Good → NOT ACHIEVED: Site currently assessed as Marginally Good.
- Goal 3 – Achieve QHEI ≥ 55 → ACHIEVED: Site currently has a score of 58.

Objectives

The following objectives have been set to improve the conditions in Critical Area 1 - Hall Run subwatershed.

Objective 1: Mitigate the influx of sediment and/or nutrients from urban storm water runoff.

- Identify 3 detention basins in the Hall Run watershed for retrofit. The retrofit designs will modify the basins to provide more water quality benefits, including Water Quality Volume storage to increase removal of suspended solids. Retrofit changes may include modifications to the basin inlets with the installation of with energy dissipating stone

and sediment forebays, modifications to the outlet structure, and planting native species. Any concrete low flow channels will be removed

Objective 2: Stream Restoration: Restore approximately 1,500 LF of Hall Run downstream of I-275. This stream segment is impaired by habitat modification from urban storm water runoff and encroachment on the stream corridor by a landscaping company.

- Implement Natural Channel Design elements to restore instream habitat.
- Install grade control structures to moderate flow.
- Establish a 25-foot buffer on either side of the stream.

Objective 3: Riparian Enhancements: The forest cover along the stream corridors in Hall Run is good overall. However, there are significant segments along Hall Run and the headwater tributaries lacking adequate riparian protection.

- Restore approximately 500 LF of riparian vegetation/protection along Hall Run upstream of I-275
- Restore approximately 1,500 LF of riparian vegetation along a headwater tributary near Beechwood Rd.
- Restore approximately 700 LF of riparian vegetation along a headwater tributary north of Branter Rd.

This NPS-IS plan presents an adaptive watershed planning approach and is anticipated to be dynamic as these objectives are implemented, other objectives identified, and both project-related and regularly scheduled monitoring is completed. The monitoring efforts will verify progress towards meeting the goals of the plan (i.e., water quality standards). The objectives, projects and implementation strategies presented herein will be reevaluated and modified if determined necessary, as several versions of this NPS-IS plan are expected – ultimately working towards full attainment of the aquatic health designation.

Details regarding the adaptive management approach for watershed planning is also included in the beginning of chapter 4 of this NPS-IS plan. As objectives and implementation projects are reevaluated, the OEPA Nonpoint Source Management Plan Update (OEPA, 2013), which includes a full list of non-point source management strategies, will be utilized. Strategies, as presented in the overview tables of chapter 4, are classified into the following descriptions:

- Urban Sediment and Nutrient Strategies;
- Altered Stream and Habitat Restoration Strategies;
- Agricultural Nonpoint Source Reduction Strategies; and
- High Quality Waters Protection Strategies

3.3 Critical Area 2: Conditions, Goals, & Objectives for Avey's Run of the Salt Run HUC-12.

3.3.1 Detailed Characterization

Avey's Run has a 6.6 mi^2 drainage area within the Salt Run watershed and is identified as Critical Area 2 of this NPS-IS plan. The OEPA 2016 Integrated Report indicates that the monitoring site within this subwatershed is meeting attainment status with biological and habitat meeting acceptable limits for streams with warmwater aquatic designation (Figure 3-6). Avey's Run is a high quality stream located in an urbanizing watershed; however, segments of the headwater streams are in need of restoration. Restoration and protection of the Salt Run tributaries and protection of the forested riparian corridor is a priority.

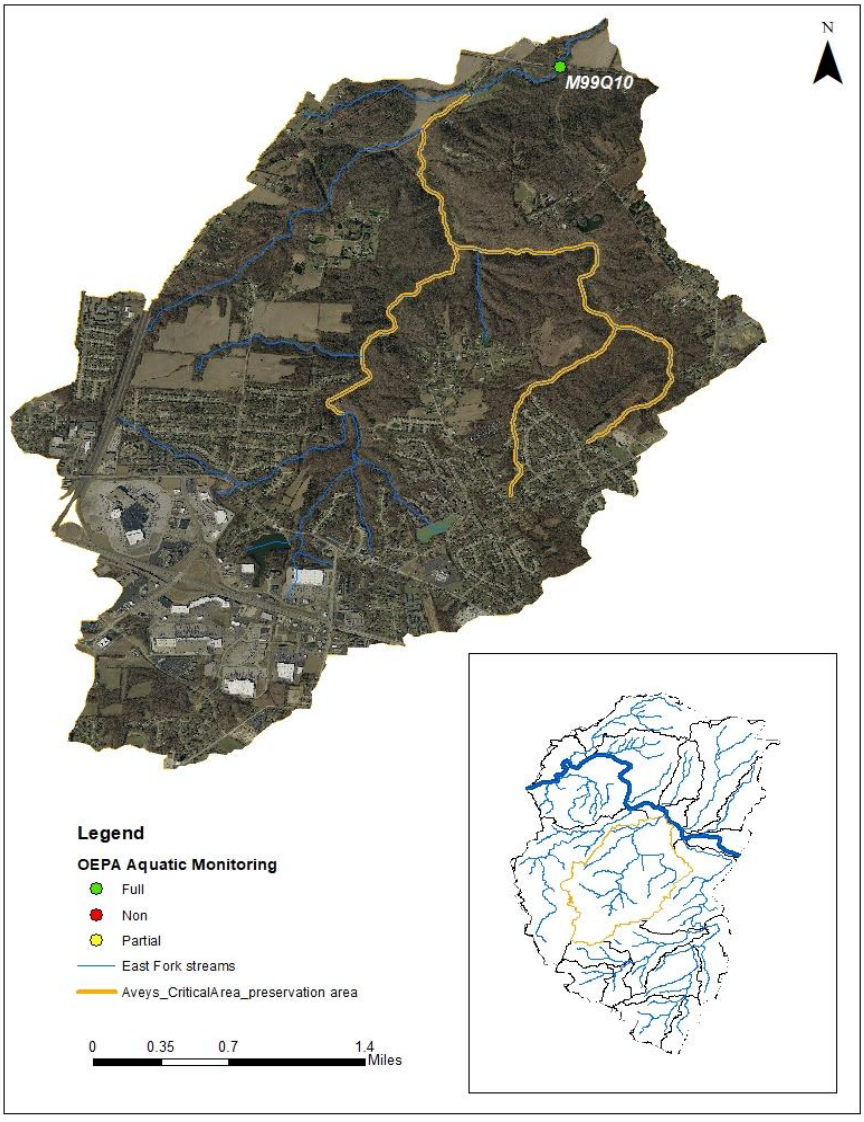


Figure 3-6: Aquatic life use monitoring sites in the Avey's Run subwatershed.

Review of the 2011 NLCD indicates that the majority of the watershed is comprised of nearly 50% forested area, followed by 30% residential and commercial, and approximately 10% agricultural. The Cincinnati Nature Center owns approximately 1,000 acres in the watershed and the Clermont County Park District owns approximately 60 acres at Shor Park. Protection of these open spaces aids long-term protection for the stream corridor (Figures 3-7 and 3-8).

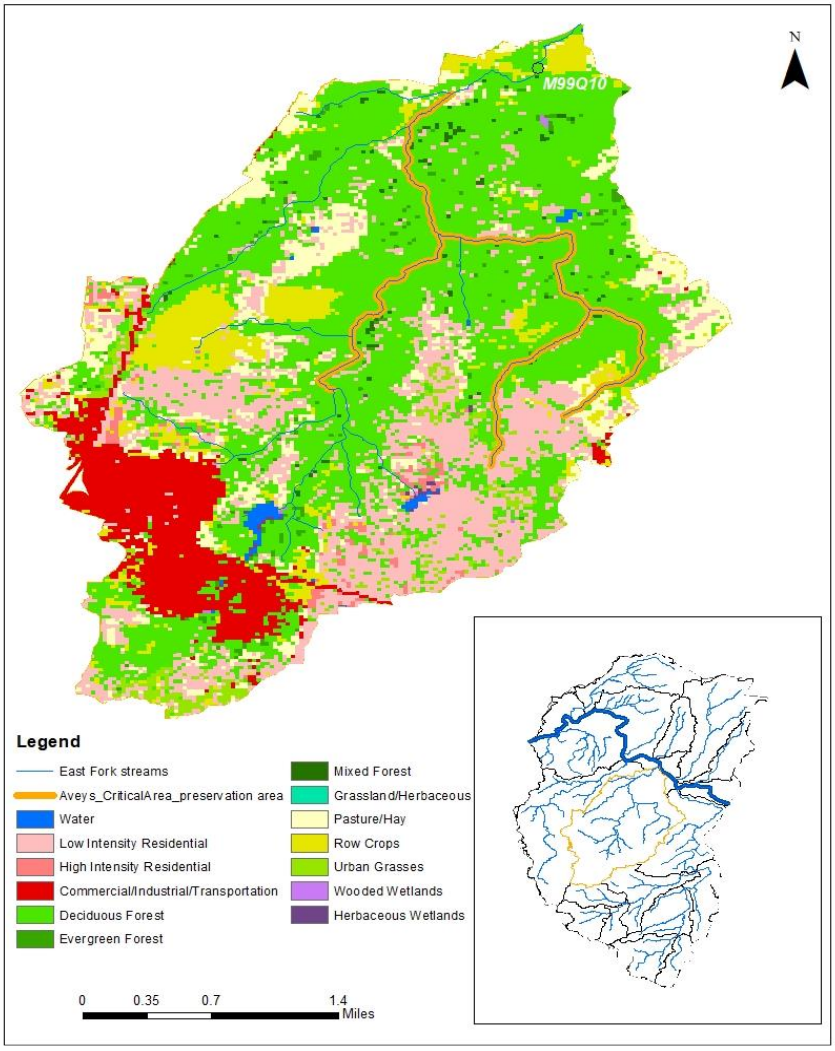


Figure 3-7: Avey's Run Land Use

Figure 3-8: Avey's Run Protected Areas

OKI provided an analysis of tree canopy cover in the Salt Run Watershed. The towns of Summerside and Mt. Carmel are located in this subwatershed and canopy cover is lacking in these developed areas. Canopy cover could be improved in these areas and along the corridors of headwater streams (Figure 3-9).

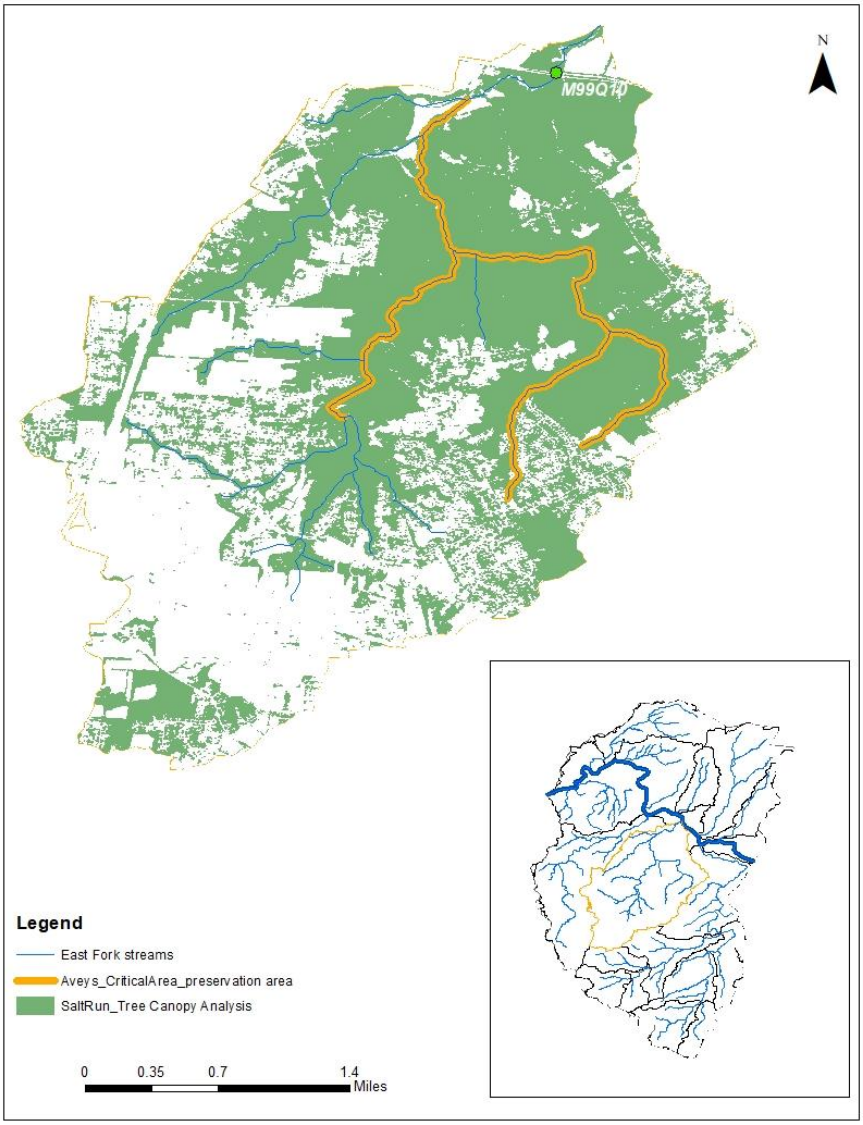


Figure 3-9: Avey's Run Tree Canopy Cover

In addition, OKI provided an analysis of the riparian corridors in the Salt Run watershed to assess existing conditions and identify areas in need of restoration. Riparian corridors along the East Fork Little Miami River and the major Salt Run tributaries are good overall, with some segments in need of restoration. The headwater streams, where riparian buffer widths tend to decrease, are in need of better protection to mitigate the influx of urban storm water runoff (Figure 3-9).

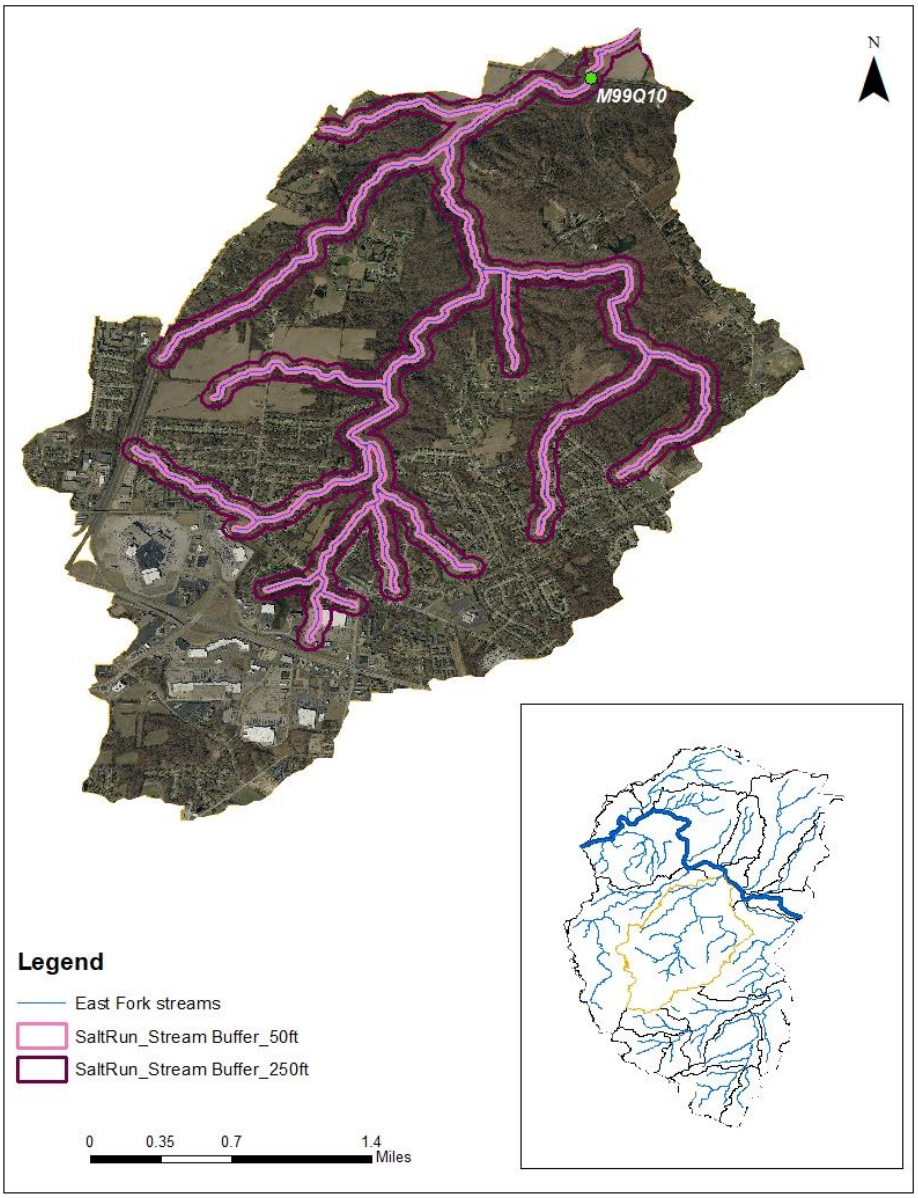


Figure 3-10: Avey's Run Stream Buffer Analysis

3.3.2 Detailed Biological Conditions

The 2012 sampling conducted by OEPA in this subwatershed indicates that conditions are suitable for supporting warmwater aquatic habitat. Table 3-3 illustrates the attributes of the fish sampled in 2012 at each monitoring location, resulting in IBI scores of 48 at the downstream site (M99Q10). The IBI criterion is 40 for WWH headwater/wadeable streams. Table 3-1 also includes the habitat assessment scores, represented by QHEI values. OEPA reports that QHEI scores from streams across the state indicate that values greater than 55 are generally conducive of supporting warmwater faunas (OEPA, 2014). The habitat assessment at the monitoring site

scored 65.8. It was lacking fast current/eddies, had low sinuosity and high-moderate embeddedness. Table 3-3 shows the IBI scores were very good in this subwatershed.

Next, Table 3-4 presents the 2012 macroinvertebrate community data in the Salt Run subwatershed. The dominant taxa at the site include *Chimarra* (MI), hydropsychids, baetids, midges (F) and water pennies. The ICI assessment at these sites reports good conditions.

Table 3-3: Attributes of fish samples and QHEI assessments collected from the Avey's Run monitoring location. Fish attribute values are averages except in cases where sampling method different between passes (OEPA, 2014).

Station ID	RM	QHEI	Drainage Area (mi^2)	Mean # of Species	Rel. # Minus Tol.	Relative Number (all)	IBI	Narratives
M99Q10	0.4	65.8	6.4	15	498	740	48	Very Good

Table 3-4: Macroinvertebrate community attributes for the Avey's Run monitoring locations (OEPA, 2014).

Station ID	RM	Total Taxa	Qual Taxa	Total EPT	Qual EPT	Total Sens.	Qual Sens.	Qual Tolerant	Density[b]	ICI[c]	Flow
M99Q10	0.4	37	37	9	9	5	5	9	M-L	G	Normal

[a] Clermont County Office of Environmental Quality maintains a permanent monitoring station at RM 2.7.

[b] M-Low = Moderate-Low.

[c] ICI assessment of P indicates poor conditions, LF indicates low-fair conditions, and F indicates fair conditions.

3.3.3 Detailed Causes and Associated Sources

Local assessments of headwater streams in Salt Run documented segments of habitat impairment, particularly along the Avey's Run tributary at the Shor Park site. Approximately 200 LF of the headwater stream is currently funneled underground within a 48-inch pipe that is in disrepair. Significant bank erosion and headcutting is occurring downstream of this segment. There is also a signficant headcut at the outfall of the existing bioretention basin, slightly south of the piped stream. Bank erosion continues along a 500+ segment of the headwater stream and the right descending bank is migrating toward an existing trail path. These conditions have adversely impacted habitat quality in this headwater stream. In addition, large portions of the property remain in fallow conditions where invasives species (e.g., honeysuckle, autumn oak) have taken over. These areas have soil types and topography better suited for wetlands.

3.3.4 Outline Goals and Objectives for the Critical Area

As previously stated, the monitoring site within Avey's Run is meeting attainment status with biological and habitat conditions meeting acceptable limits for streams with warmwater aquatic designation; however, segments of the headwater streams are in need of restoration. The stream and its tributaries are threatened by land development as urbanization continues throughout the watershed. Restoration and protection of the Salt Run tributaries and protection of the forested riparian corridor is a priority in this urbanizing watershed.

Goals

Improving the biological and habitat conditions through an increase in the IBI, MIwb, ICI, and QHEI scores is the overall nonpoint source restoration goal of all NPS-IS plans, with the ultimate goal of bringing the watercourses into full attainment with its designated aquatic life use and implementing management measures to maintain a healthy watershed. In order to bring the Avey's Run subwatershed into full attainment, the following goals have been set:

Avey's Run within the Salt Run subwatershed

- Goal 1 – Achieve IBI score of 40 → ACHIEVED
- Goal 2 – Achieve ICI value of Good → ACHIEVED
- Goal 3 – Achieve QHEI score ≥ 55 → ACHIEVED

Objectives

The following objectives have been set to improve and maintain the conditions in Critical Area 2 – Avey's Run subwatershed.

Objective 1: Improve stream and habitat conditions along a headwater stream located at Shor Park.

- Daylight 200 LF of headwater stream and restore approximately 500+ LF with instream restoration and bank stabilization
    - Daylight 200 LF of stream
    - Restore 500+ LF of stream with Install three (3) riffles, two (2)grade control structures and one (1) energy dissipation pool.
    - Construct 0.3 acres of pocket wetlands to manage storm water runoff on site.
    - Stabilize 500+ LF of stream bank with hand-placed log structures, along with invasive species removal and native live stake plantings.

Objective 2: Protect the riparian corridor along the mainstem of Avey's Run and headwater tributaries

- Establish conservation easements or fee simple purchase of riparian corridor in the upper watershed.
    - Protect approximately 45 acres of riparian corridor along tributaries in Avey's Run upstream of protected park areas.

3.4 Critical Area 3: Conditions, Goals, & Objectives for Shayler Run of the Salt Run HUC-12.

3.4.1 Detailed Characterization

Shayler Run subwatershed has 6.5 mi^2 drainage area within the Salt Run watershed and is identified as Critical Area 3 of this NPS-IS plan. The OEPA 2016 Integrated Report indicates that the monitoring sites within this subwatershed are meeting attainment status with biological and habitat meeting acceptable limits for streams with warmwater aquatic designation. Shayler Run is a high quality stream located in an urbanizing watershed; however, segments of Shayler Run are in need of restoration. Ohio EPA has documented stream habitat modifications caused by a legacy sewer line that was previously located in the middle of the stream and exacerbated by urban storm water runoff. Clermont County has acquired the property in the vicinity of this site and habitat restoration is a priority for maintaining attainment status.

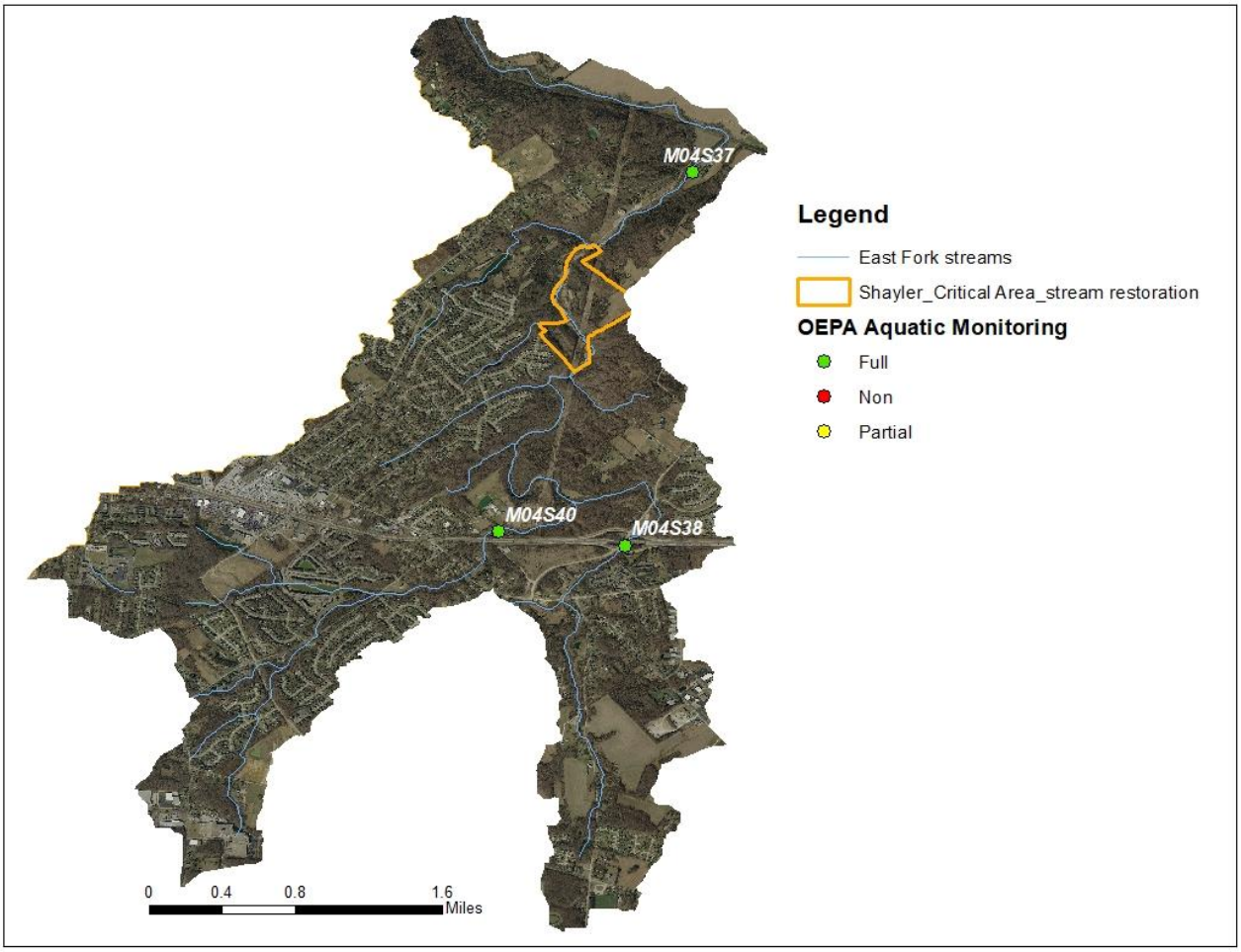


Figure 3-12: Shayler Run critical area

Review of the 2011 NLCD indicates that the majority of the watershed is comprised of forested area, which is approximately 50% of the land use in the subwatershed. Agriculture and residential development occupy approximately 30% and 15% of the landscape.

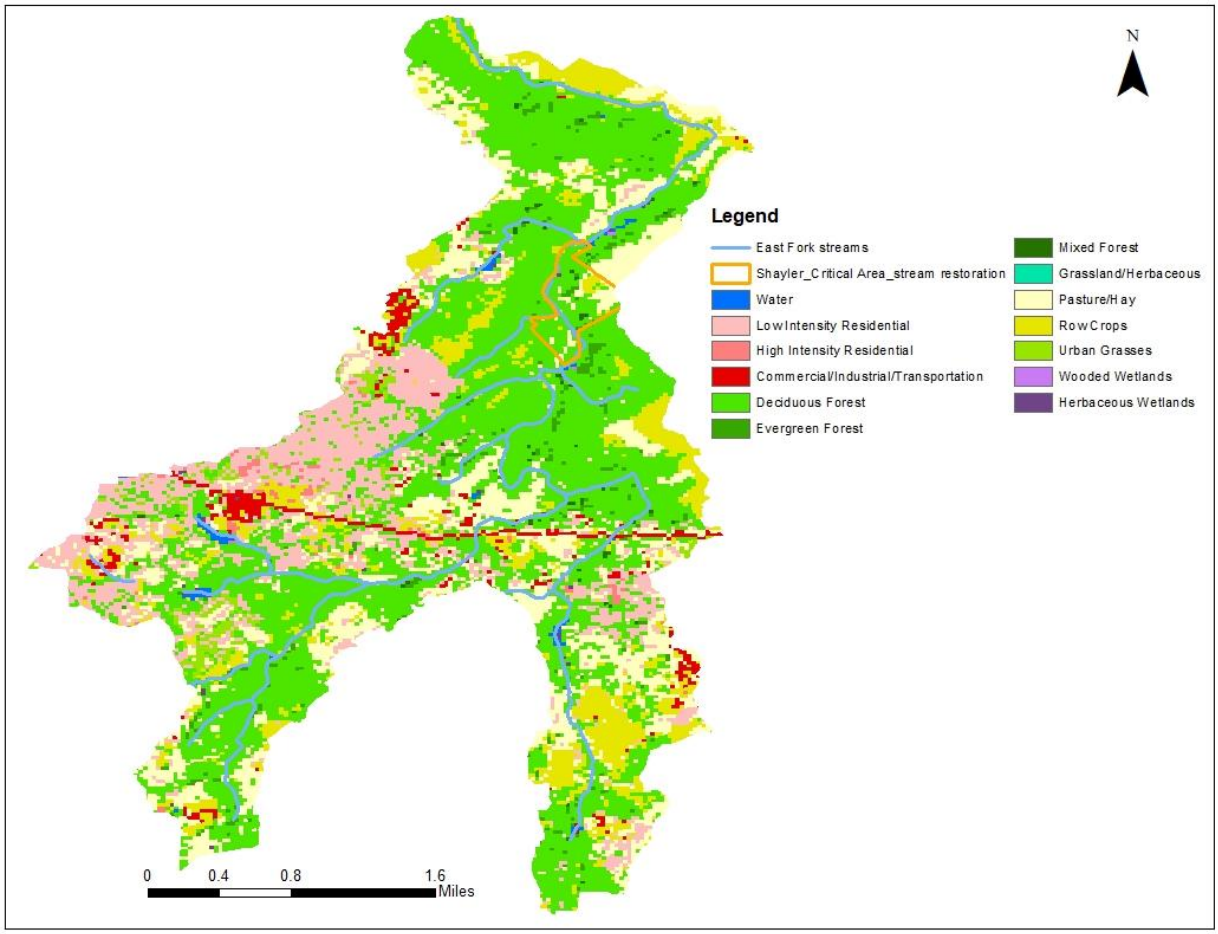


Figure 3-13: Shayler Run Land Use

OKI provided an analysis of tree canopy cover in the Shayler Run subwatershed. Tree canopy cover is greater in the areas north of State Route 32; however cover diminishes along this transportation corridor near areas of commercial development. Canopy cover also diminishes in pockets of residential development.

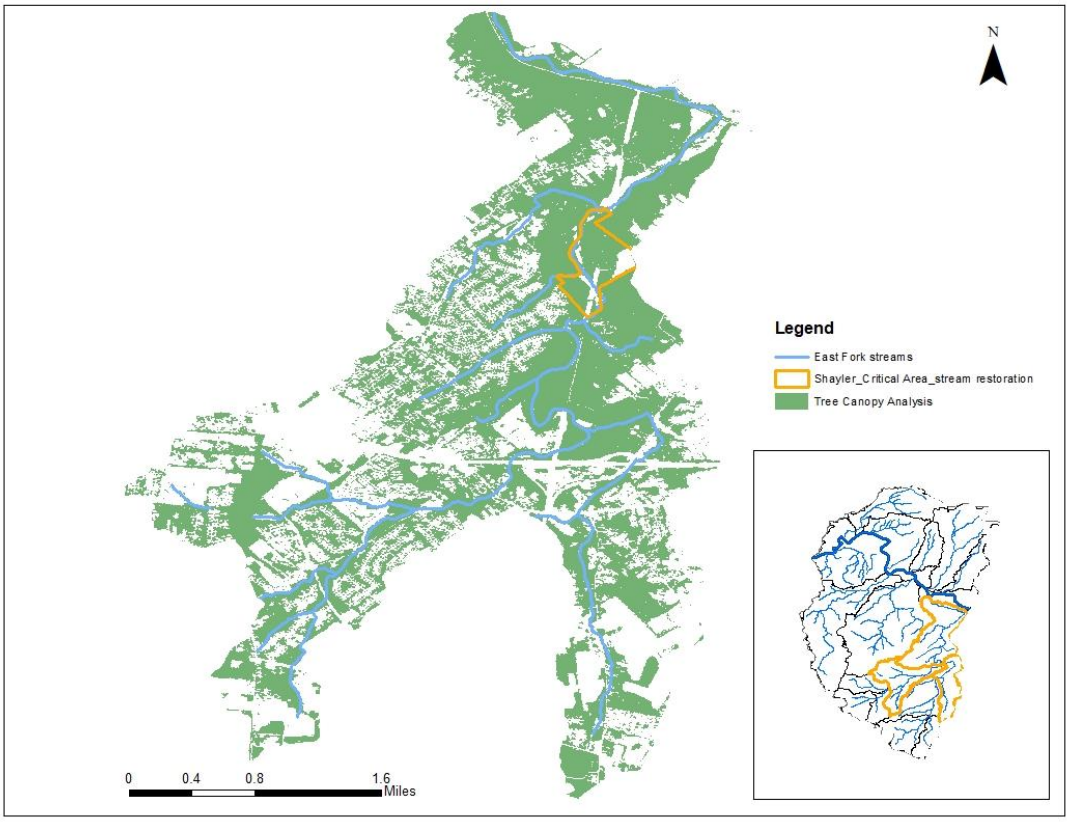


Figure 3-14: Shayler Run Tree Canopy Analysis

In addition, OKI provided an analysis of the riparian corridors in the Salt Run watershed to assess existing conditions and identify areas in need of restoration. The riparian corridor has sufficient forested cover along the majority of the mainstem of Shayler Run. There are segments along the headwater streams where there may be opportunities to improve the corridor, particularly in the upper watershed near existing agricultural fields.

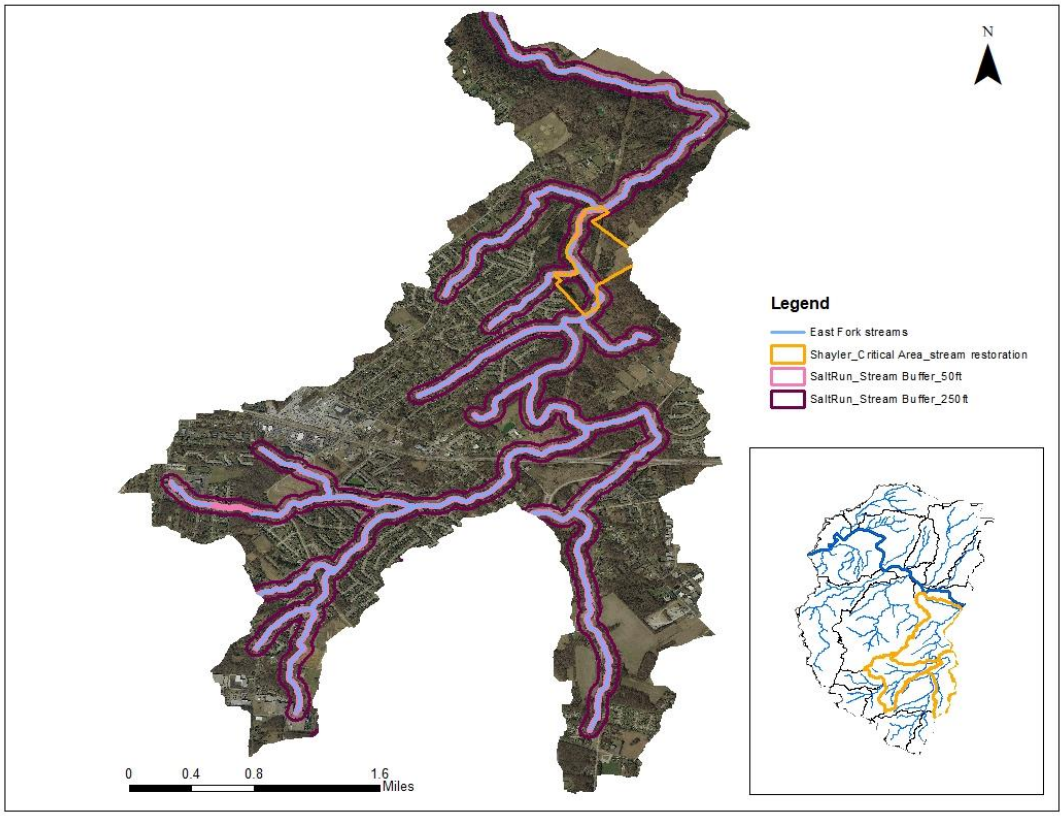


Figure 3-15: Shayler Run Stream Buffer Analysis

3.4.2 Detailed Biological Conditions

The 2012 sampling conducted by OEPA included three (3) sites in the Shayler Run subwatershed. These sites had biological assemblages rated in acceptable condition. Table 3-5 illustrates the attributes of the fish sampled in 2012 at each monitoring location, resulting in IBI scores of ≥ 44 in the main stem of Shayler Run and ≥ 40 in a tributary. Table 3-5 also includes the habitat assessment scores, represented by QHEI values. OEPA reports that QHEI scores from streams across the state indicate that values greater than 64 are generally conducive of supporting warmwater faunas (OEPA, 2014). The habitat assessments along Shayler Run resulted in scores above ≥ 67 and 64 for the Shayler tributary. Habitat attributes in the Shayler Run sub-watershed included at the monitoring sites indicated some impacts from high/moderate riffle embeddedness, intermittent or poor pools and lack of fast currents.

Next, Table 3-6 presents the 2012 macroinvertebrate community data at each site in the Shayler Run subwatershed. The dominant taxa at the site include Caddisflies (MI, F), flatworms, baetids, *Elimia* (MI), hydropsychids, and *Chimarra*. The ICI assessment at these sites reports good conditions.

Table 3-5: Attributes of fish samples and QHEI assessments collected from the Shayler Run monitoring location. Fish attribute values are averages except in cases where sampling method different between passes (OEPA, 2014).

Station ID	RM	QHEI	Drainage Area (mi^2)	Mean # of Species	Rel. # Minus Tol.	Relative Number (all)	IBI	Narratives
M04537	1.7	67.5	12.1	12.0	526.0	752.0	44	Good
M04538	5.2	71.5	5.2	12.0	1,244.0	1,634.0	48	Moderately Good
M04S40	.4	64	4.4	10.0	380.0	706.0	40	Moderately Good

Table 3-6: Macroinvertebrate community attributes for the Shayler Run monitoring locations (OEPA, 2014).

Station ID	RM	Total Taxa	Qual Taxa	Total EPT	Qual EPT	Total Sens.	Qual Sens.	Qual Tolerant	Density[b]	ICI[c]	Flow
M04537	1.7	38	38	9	9	5	5	11	Low	G	Normal
M04538	5.2	35	35	7	7	5	5	8	Mod-Low	MG	Normal
M04S40	.4	38	38	7	7	5	5	10	Mod-Low	MG	Normal

[a] Clermont County Office of Environmental Quality maintains a permanent monitoring station at RM 2.7.

[b] M-Low = Moderate-Low.

[c] ICI assessment of P indicates poor conditions, LF indicates low-fair conditions, and F indicates fair conditions.

3.4.3 Detailed Causes and Associated Sources

Restoration priorities in the Shayler Run watershed include habitat restoration along a segment of the stream that was impacted by a sewer trunk line and exacerbated over the years by urban storm water runoff. Several streams in Clermont County have been impacted by legacy sewer lines that were once built underneath and adjacent to stream pathways. The sewer line along Shayler has been relocated, but the stream habitat has not recovered. Ohio EPA assessments indicate the Shayler Run subwatershed is currently meeting aquatic life use attainment; implementation of the restoration project along this segment would help preserve stream health with permanent protection of the corridor on county owned land.

3.4.4 Outline Goals and Objectives for the Critical Area

As previously stated, the monitoring sites within Shayler Run are meeting attainment status with biological and habitat is meeting acceptable limits for streams with warmwater aquatic designation; however, segments of the Shayler Run are in need of restoration. . The stream and its tributaries are threatened by land development as urbanization continues throughout the watershed. Restoration and protection of the Shayler Run tributaries and protection of the forested riparian corridor is a priority in this urbanizing watershed.

Goals

Improving the biological and habitat conditions through an increase in the IBI, MIwb, ICI, and QHEI scores is the overall nonpoint source restoration goal of all NPS-IS plans, with the ultimate goal of bringing the watercourses into full attainment with its designated aquatic life use and implementing management measures to maintain a healthy watershed. In order to maintain full aquatic life use attainment in the Shayler Run subwatershed, the following goals have been set:

Shayler Run

- Goal 1 – Achieve IBI score of 40 → ACHIEVED
- Goal 2 – Achieve ICI value of Good → ACHIEVED
- Goal 3 – Achieve QHEI score of 64 → ACHIEVED

Objectives

The following objectives have been set to improve and maintain the conditions in Critical Area 3 – Shayler Run subwatershed.

<u>Objective 1: Improve stream and habitat conditions Shayler Run Park.</u>

- Restore approximately 2,500 LF with instream restoration and bank stabilization
  - Restore 2,500 LF of Shayer Run
  - Install Natural Channel Design features, including constructed riffles and grade control structures
  - Stabilize 2,000 LF of stream bank
  - Permanently protect approximately 3 acres of riparian corridor (50 ft. buffer) along county property.

3.5 Critical Area 4: Conditions, Goals, & Objectives for Wolfpen Run of the Salt Run HUC-12.

3.5.1 Detailed Characterization

Wolfpen subwatershed has a 1.2 mi^2 drainage area within the Salt Run watershed and is identified as Critical Area 4 of this NPS-IS plan. The OEPA 2016 Integrated Report indicates that the monitoring site downstream of this subwatershed is meeting attainment status with biological and habitat meeting acceptable limits for streams with warmwater aquatic designation; however, Ohio EPA bacteriological sampling results from the East Fork main stem downstream of Wolfpen indicate exceedances which are likely attributable to failing home septic systems (HSTS).

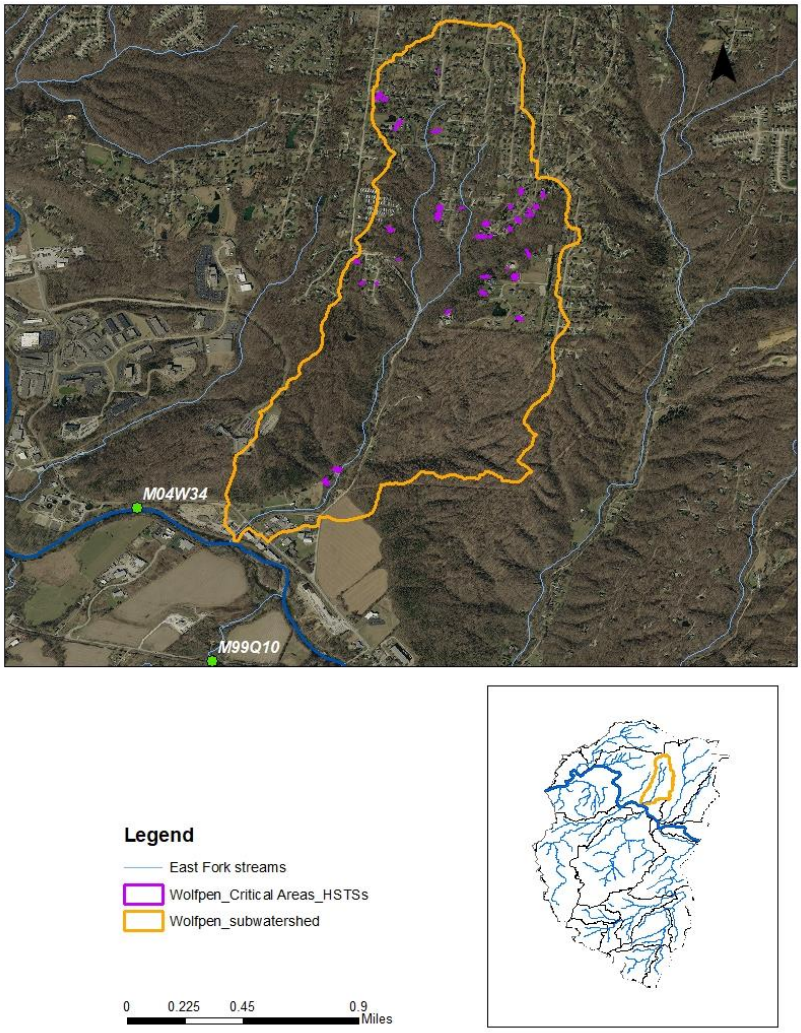


Figure 3-16: Wolfpen Run subwatershed and critical areas

Review of the 2011 NLCD indicates that the majority of the watershed is comprised of deciduous forest (71%), residential development (20%) and cropland (6%)(Figure 3-17). Opportunities for riparian restoration have been identified in the watershed; Wolfpen Run has one of the largest concentrations of discharging HSTSs in the lower East Fork.

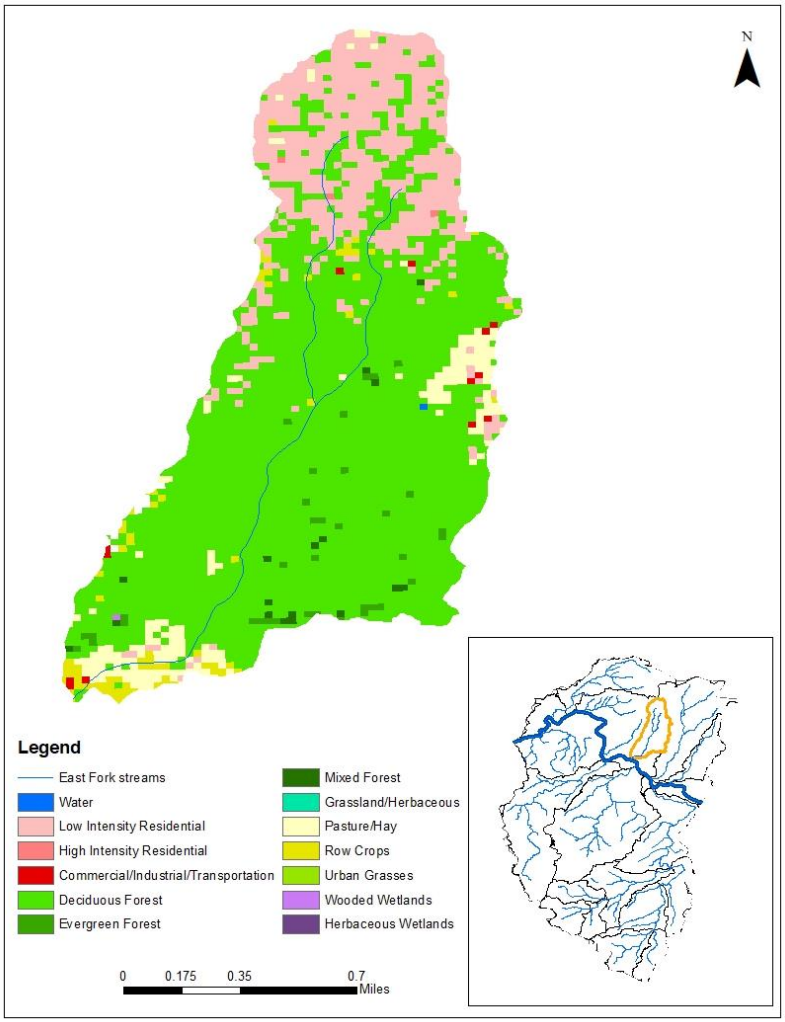


Figure 3-17: Wolfpen Run land use

OKI provided an analysis of tree canopy cover in the Wolfpen Run subwatershed (Figure 3-18). Over 70% of the land use categorized as forested land. There is an opportunity to preserve the forested areas and the ecosystems services it provides. In addition, the riparian analysis demonstrates Wolfpen Run has adequate riparian protection mostly throughout the length of the stream; however, there are opportunities to improve riparian protection in the upper (near the Eagle Ridge subdivision) and lower reaches (near State Route 50) of the stream (Figure 3-19).

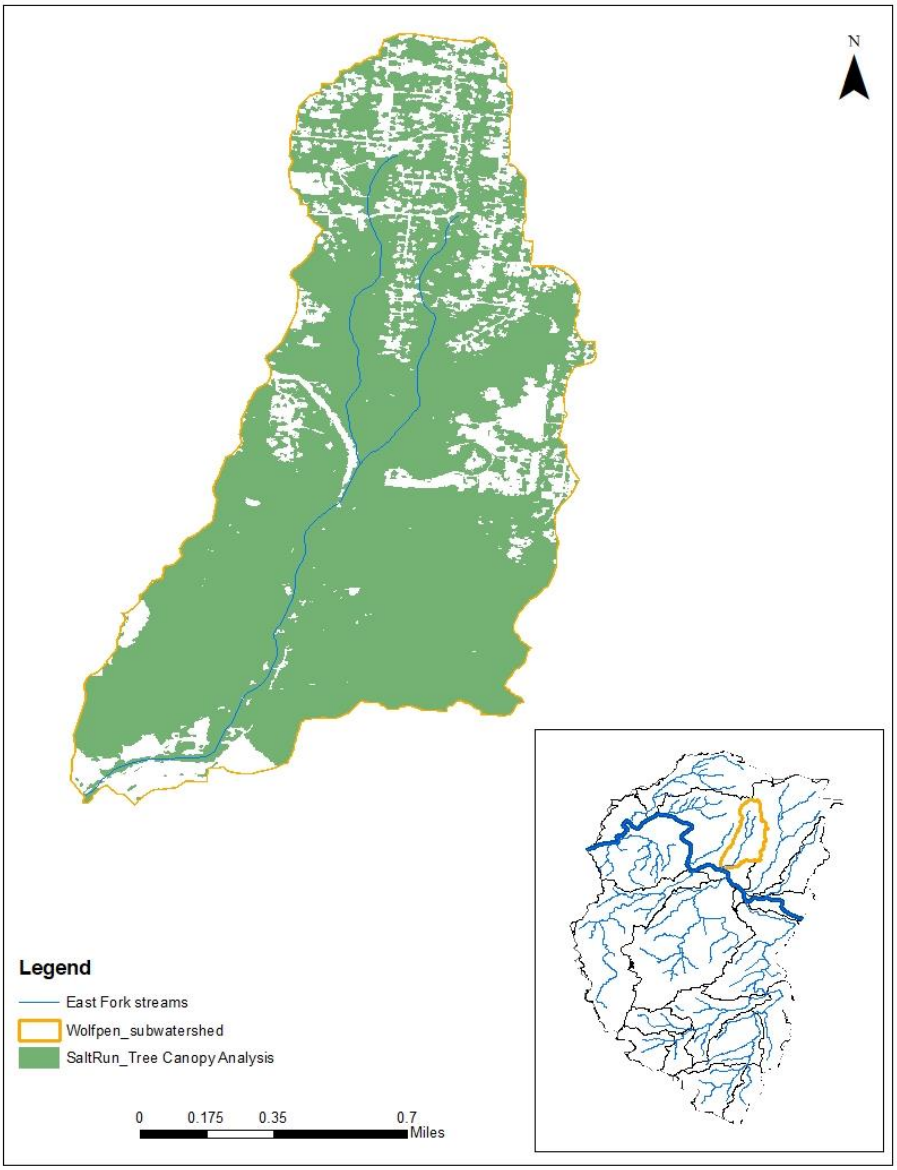


Figure 3-18: Wolfpen Run tree canopy analysis

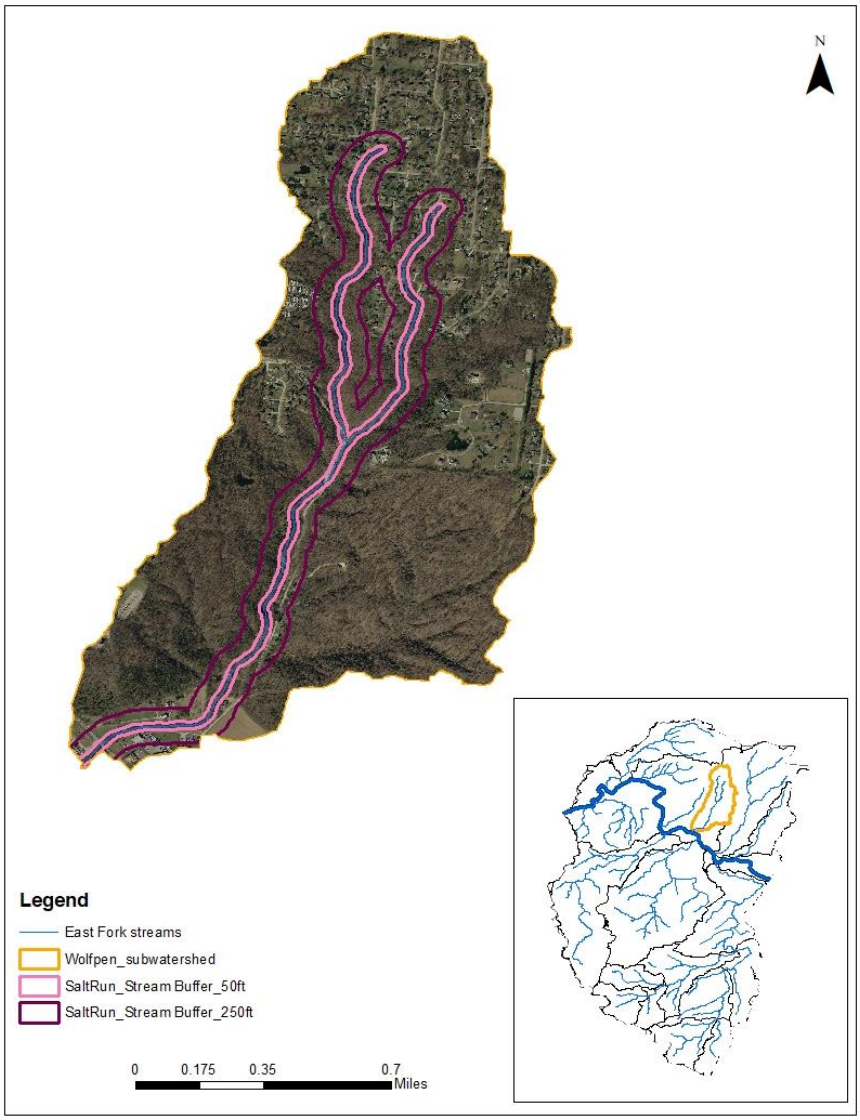


Figure 3-19: Wolfpen Run riparian buffer analysis

3.5.2- Detailed Biological Conditions

The OEPA 2016 Integrated Report indicates that the monitoring site downstream of this subwatershed is meeting attainment status with biological and habitat meeting acceptable limits for streams with warmwater aquatic designation; however, Ohio EPA bacteriological sampling results from the East Fork main stem downstream of Wolfpen indicate exceedances which are likely attributable to failing home septic systems (HSTS).

Previous assessments conducted by Ohio EPA (1997) included a sampling site (one mile along Wolfpen-Pleasant Hill Road)) within the Wolfpen subwatershed. The stream was listed as only partially attaining with fair biological communities. This assessment concluded stream habitat was fair (QHEI = 52) with excellent substrate, but poor instream cover and riparian zone

protection, and below average pool and riffle quality. The 1997 assessment listed organic enrichment, low dissolved oxygen, pathogens and habitat alterations as causes of impairment. In addition, Clermont County's Office of Environmental Quality (OEQ) conducted monitoring upstream and downstream of a mobile home park located at RM 1.55. Similar to Ohio EPA's data, Clermont OEQ sampling demonstrated exceedances in bacteria and nutrient levels, organic enrichment and low DO levels. Of the 47 identified HSTSs in Wolfpen Run, it is estimated that approximately 25% of these older systems are failing.

Next, Table 3-7 presents the 2012 macroinvertebrate community data at each site in the Wolfpen Run subwatershed. The dominant taxa at the site include Caddisflies (MI, F), flatworms, baetids, *Elimia* (MI), hydropsychids, and *Chimarra*. The ICI assessment at these sites reports good conditions.

Table 3-7: Attributes of fish samples and QHEI assessments collected from the monitoring location near Wolfpen Run. (OEPA, 2014).

Station ID	RM	QHEI	Drainage Area (mi^2)	Mean # of Species	Rel. # Minus Tol.	Relative Number (all)	IBI	Narratives
M04W34	5.6	83.3	484	25.0	437.3-	461.3	47	Very Good

Table 3-8: Macroinvertebrate community attributes for the Wolfpen Run monitoring locations (OEPA, 2014).

Station ID	RM	Total Taxa	Qual Taxa	Total EPT	Qual EPT	Total Sens.	Qual Sens.	Qual Tolerant	Density[b]	ICI[c]	Flow
M04W34	5.6	70	60	24	20	27	24	7	1181/sqft	52	Low

[a] Clermont County Office of Environmental Quality maintains a permanent monitoring station at RM 2.7.

[b] M-Low = Moderate-Low.

[c] ICI assessment of P indicates poor conditions, LF indicates low-fair conditions, and F indicates fair conditions.

Table 3-9: Ohio EPA bacteriological *(E. coli)* sampling results near Wolfpen Run. All values expressed as colony forming units (cfu) or most probable number (MPN) per 100 ml of water (OEPA, 2014).

Station ID	Stream RM	AU	Location	Samples	*E. coli* Geometric Mean	*E. coli* Max Value	Condition Status
M04W34	5.6	13-05	Adjacent to US 50, Dst of Wolfpen Run	8	346	4000	Not Supported

3.4.3 Detailed Causes and Associated Sources

Restoration priorities in the Wolfpen Run watershed include riparian restoration and protection, and the replacement or rehab of failing HSTSs. The repair and replacement of the failing HSTSs is a priority for this subwatershed. The location of two subdivisions in the upper watershed may provide future opportunities for expanding sewer service.

3.4.4 Outline Goals and Objectives for the Critical Area

As previously stated, the elimination of failing HSTSs is a priority for Wolfpen Run subwatershed. Ohio EPA's data from 1997 attributed pathogen exceedances in Wolfpen Run to failing HSTSs and the most recent assessment from 2012 revealed continued exceedances in the mainstem of the East Fork at RM 5.6.

Goals

Improving the biological and habitat conditions through an increase in the IBI, MIwb, ICI, and QHEI scores is the overall nonpoint source restoration goal of all NPS-IS plans, with the ultimate goal of bringing the watercourses into full attainment with its designated aquatic life use and implementing management measures to maintain a healthy watershed. The following goals have been set for the East Fork Little Miami River downstream of Wolfpen Run:

Wolfpen Run subwatershed @ RM 5.6 (M04W34)

- Goal 1 – Achieve IBI score of 40 → ACHIEVED
- Goal 2 – Achieve ICI value of Good → ACHIEVED
- Goal 3 – Achieve QHEI score of 64 → ACHIEVED
- Goal 4 – Achieve attainment of Primary Contact Recreation Use → NOT ACHIEVED

Objectives

The following objectives have been set to improve and maintain the conditions in Critical Area 4 – Wolfpen Run subwatershed.

Objective 1: Eliminate pathogens in the Wolfpen Run watershed and restore Primary Contact Recreation

- Replace or rehab 12 failing HSTSs in the Wolfpen Run watershed
- Identify potential areas for sewer line expansion
    - Complete a study for sewer expansion to be included in county capital improvement plans

3.6 Critical Area 5: Conditions, Goals, & Objectives for the Lower East Fork of the Salt Run HUC-12.

3.6.1 Detailed Characterization

The Lower East Fork s has a 1.2 mi^2 drainage area within the Salt Run watershed and is identified as Critical Area 5 of this NPS-IS plan. The OEPA 2016 Integrated Report includes three monitoring sites (RM 2.2, 1.2 and .77) along the main stem of the EFLMR. The site at RM 2.2 is in full attainment of the river's exceptional warmwater habitat designation, while the sites at RM 1.2 and.77 are in partial attainment. Ohio EPA bacteriological samples showed exceedances in *E. coli* at RM .77. Data for the site at RM 1.2 is included in the Lower Little Miami River TMDL report.

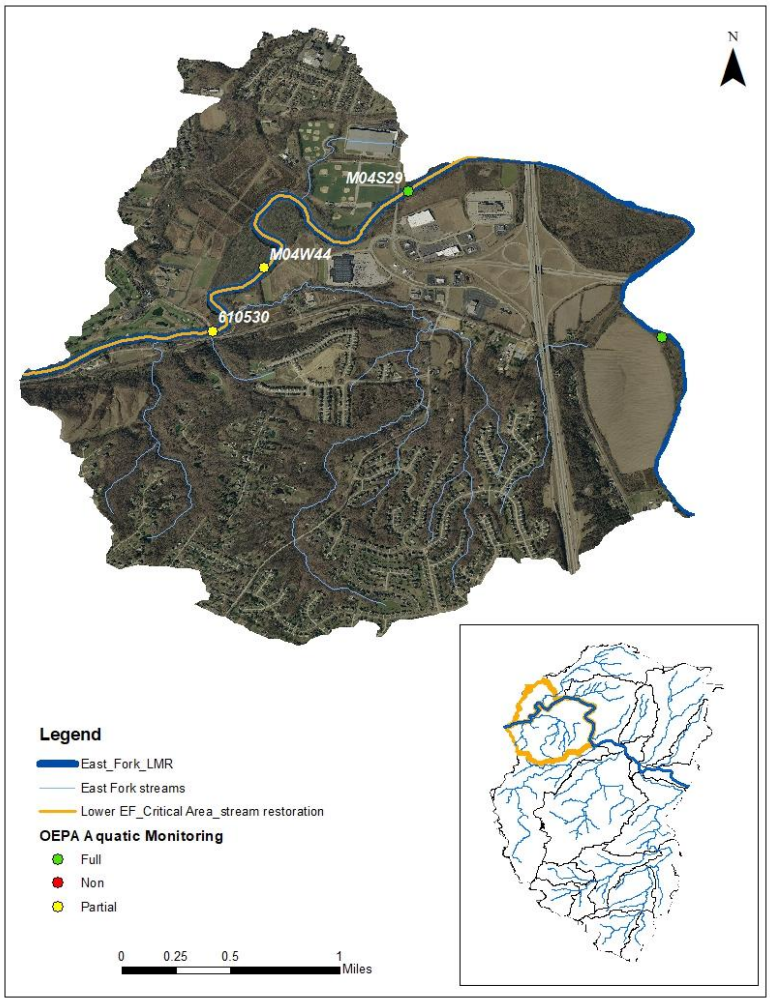


Figure 3-20: Lower East Fork OEPA monitoring sites

Review of the 2011 NLCD indicates that the majority of the watershed is comprised of deciduous forest (46%), followed by agriculture (40%) and residential and commercial (9%) (Figure 3-21). The City of Milford and the I-275 interchange is located in the Lower East Fork. Approximately 3 miles of the EFLMR main stem flows through this subwatershed. The Valley View Foundation (VVF), a local nonprofit/land trust and conservation partner, owns 190 acres in the Lower East Fork subwatershed (Figure 3-21). Greenspace preservation, similar to the high-quality open space owned by VVF, is important for this suburban and urbanizing watershed.

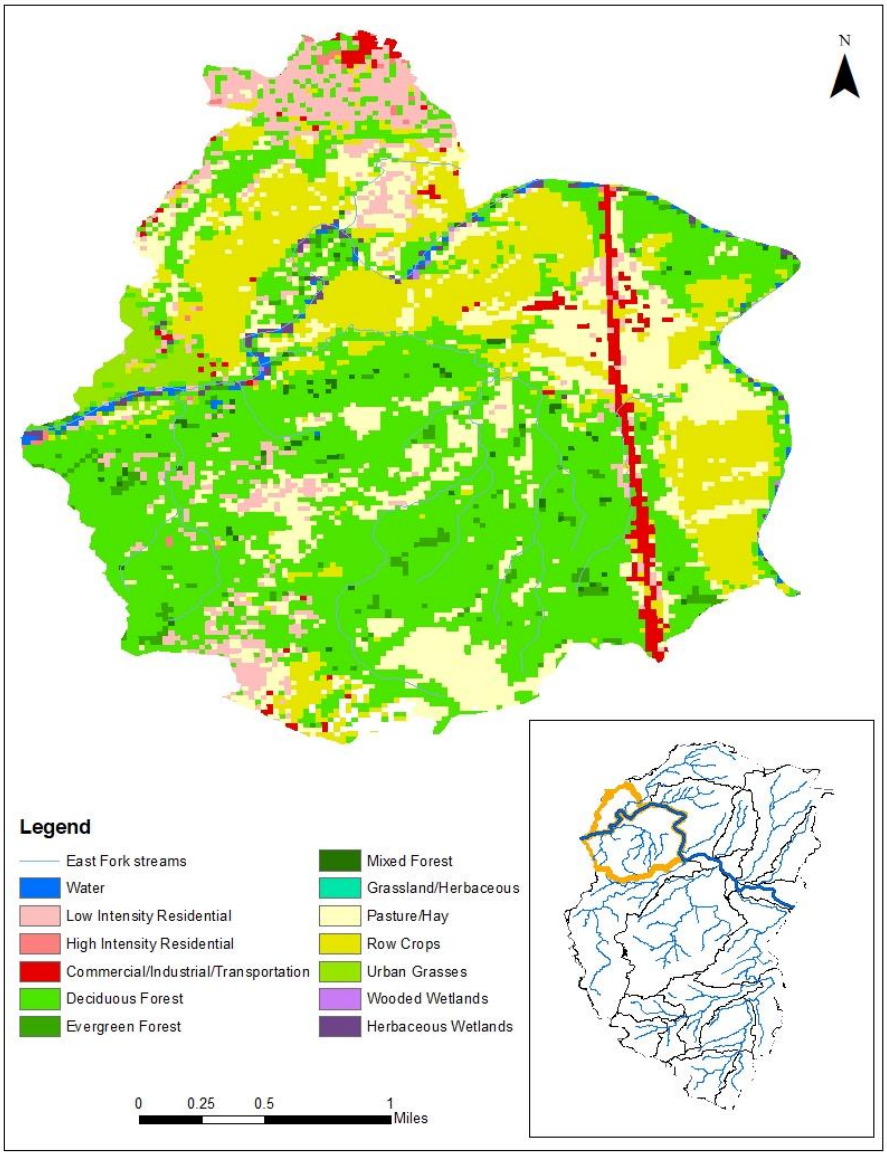


Figure 3-21: Lower East Fork land use

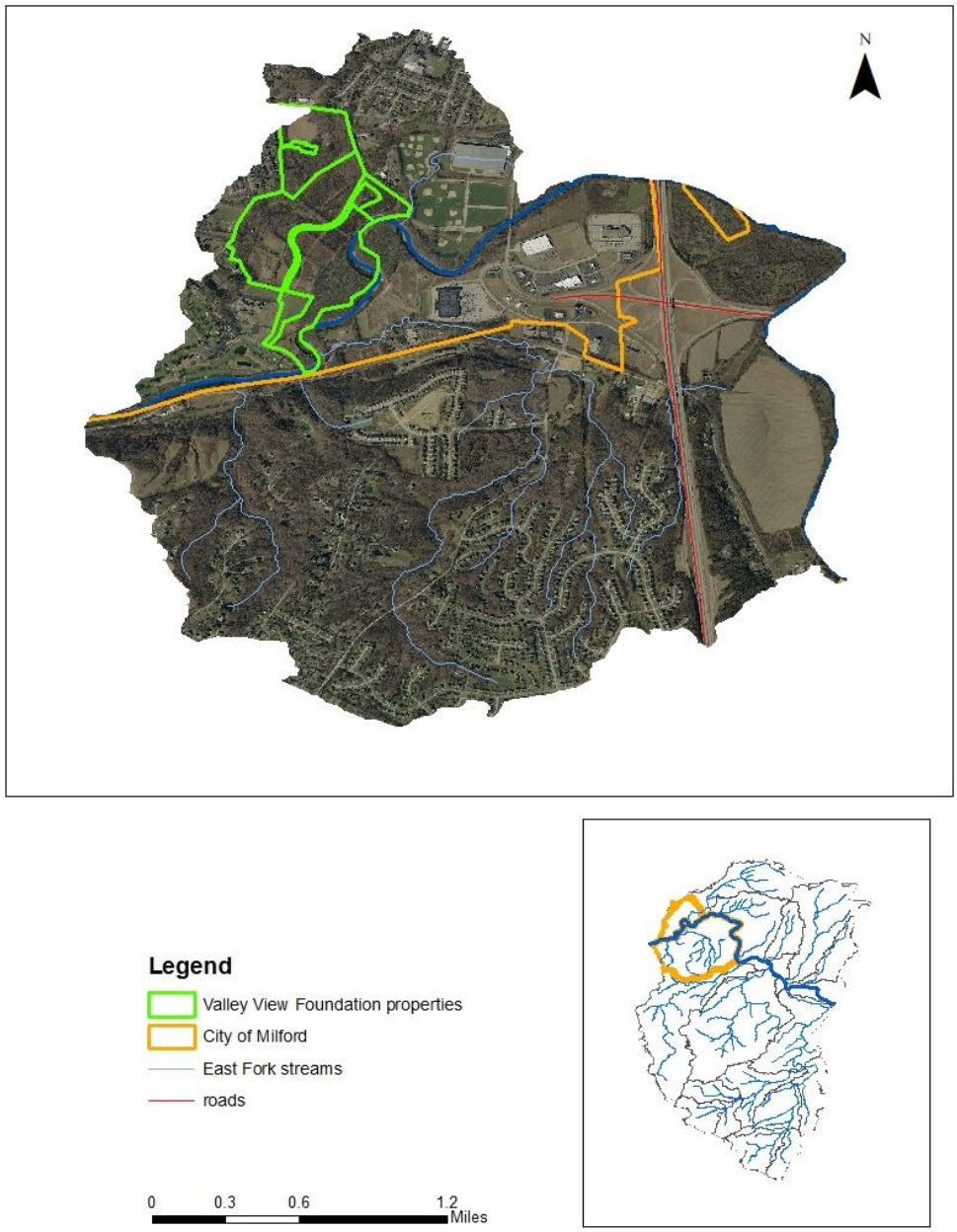


Figure 3-22: Protected areas in the lower watershed

OKI provided an analysis of tree canopy cover in the Lower East Fork Watershed (Figure 3-23). Canopy cover diminishes along the major transportation corridor and commercial areas, and throughout pockets of Milford. There is significant opportunity to improve canopy cover in these areas.

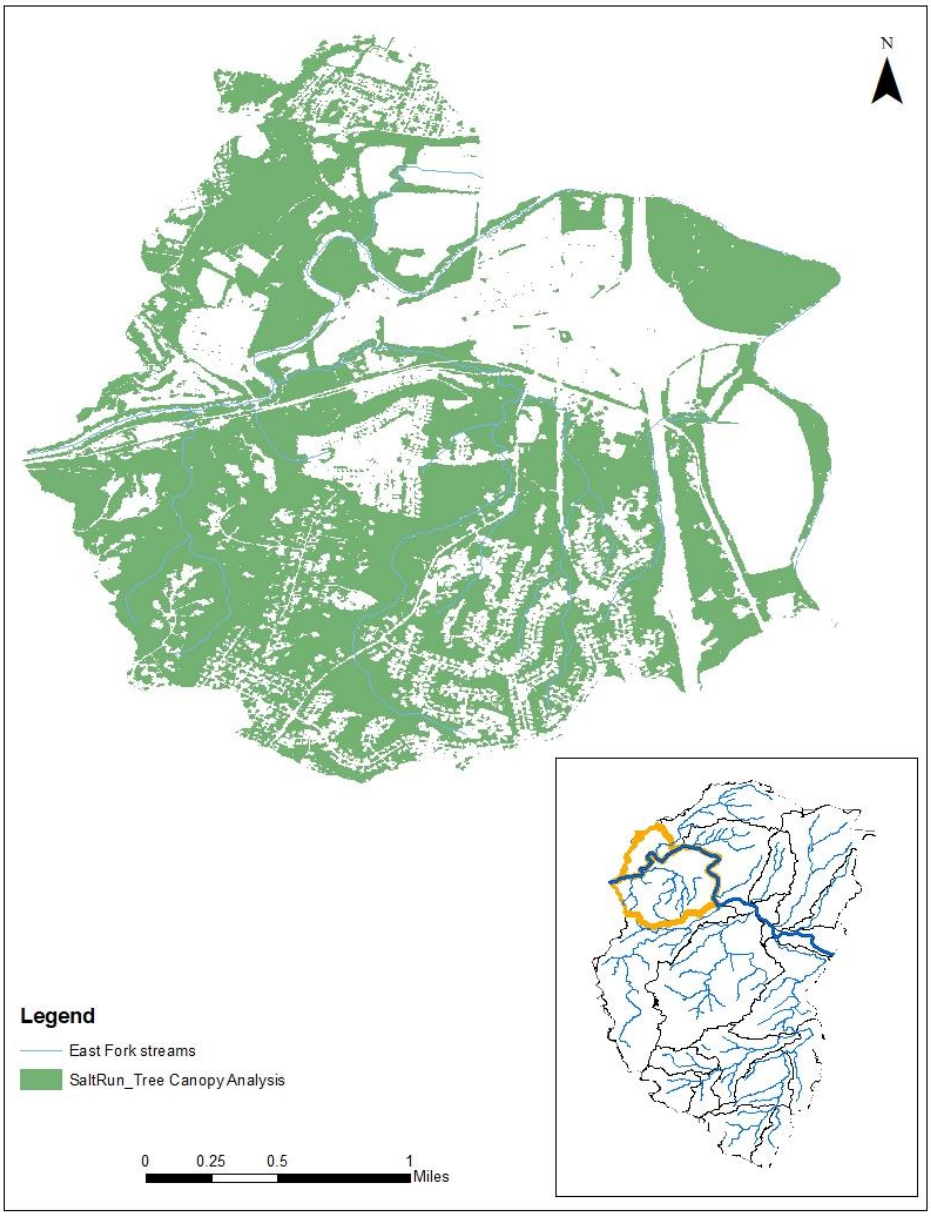


Figure 3-23: OKI Canopy Cover Analysis

In addition, OKI provided an analysis of the riparian corridors in the Lower East Fork subwatershed (Figure 3-24) to assess existing conditions and identify areas in need of restoration. Riparian corridors along the East Fork Little Miami River diminish in areas near the transportation corridor and along segments of the mainstem, particularly downstream of RM 2.2. These areas are in need of better forested riparian protection to mitigate the influx of urban storm water runoff.

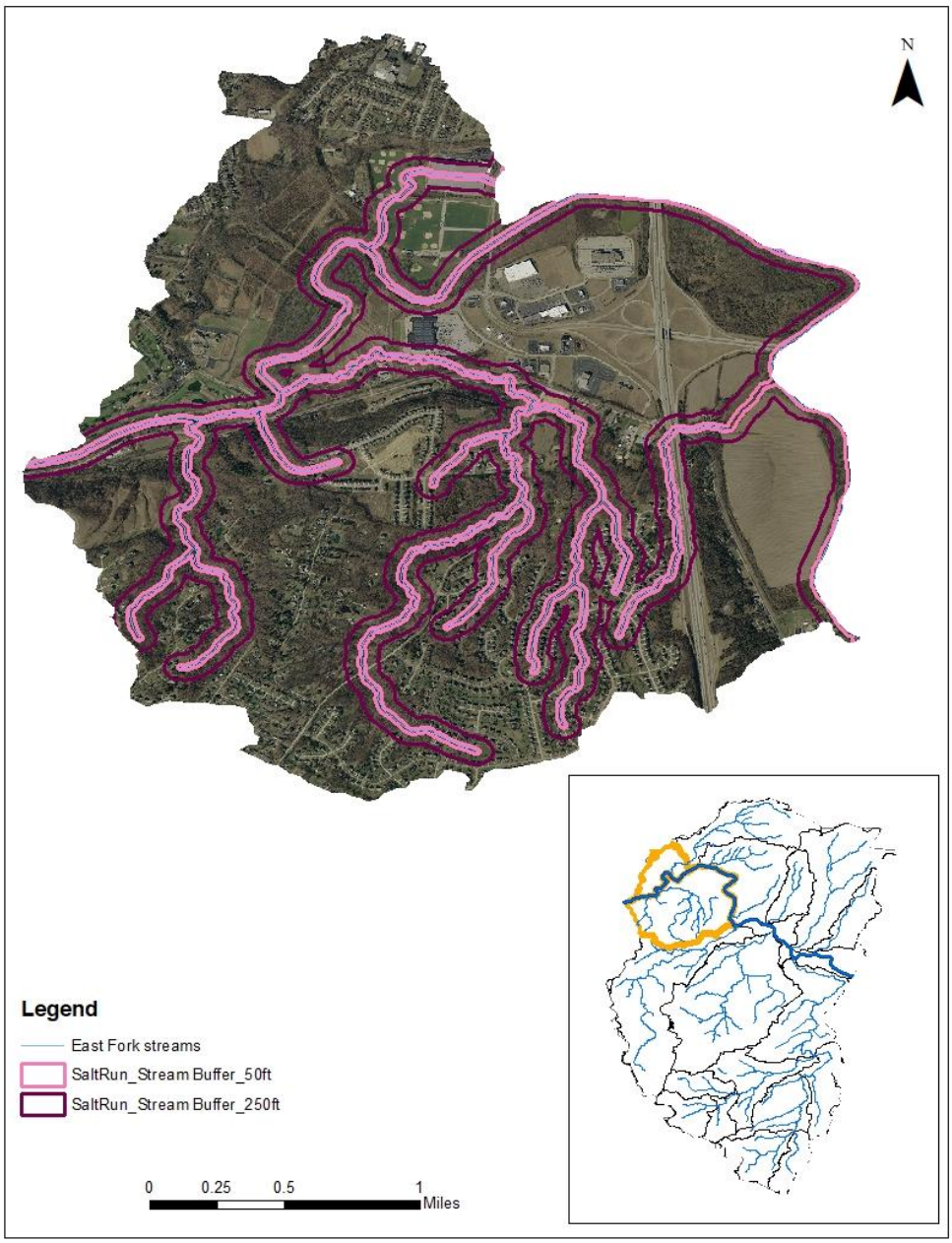


Figure 3-23: OKI Riparian Corridor Analysis

3.6.2- Detailed Biological Conditions

The OEPA 2016 Integrated Report indicates that the monitoring sites at RM 1.2 and .77 are not meeting acceptable limits for streams with exceptional warmwater (EWH) aquatic designation. The sites at RM .77 showed impairment of the fish community with a low IBI score of 42 and 43. The IBI criterion is 50 for Exceptional Warmwater Habitat streams.

Table 3-10: Attributes of fish samples and QHEI assessments collected from the monitoring location in the Lower East Fork subwatershed (OEPA 2012 and 2010).

Station ID	RM	QHEI	Drainage Area (mi^2)	Mean # of Species	Rel. # Minus Tol.	Relative Number (all)	IBI	Narratives
M04529	2.2	82.5	494	27	335	340	45	Very Good
M04W44	1.2	66	497	-	-	-	43	Good
610530	.7	72.3	498	24.5	279	305	42	Very Good

Table 3-11: Macroinvertebrate community attributes for the Lower East Fork monitoring locations (OEPA, 2012).

Station ID	RM	Total Taxa	Qual Taxa	Total EPT	Qual EPT	Total Sens.	Qual Sens.	Qual Tolerant	Density[b]	ICI[c]	Flow
M04529	2.2	78	56	26	19	29	19	11	$878/ft^2$	50	Low
610530	.77	73	55	32	24	32	21	9	$1514/ ft^2$	50	Low

[a] Clermont County Office of Environmental Quality maintains a permanent monitoring station at RM 2.7.

[b] M-Low = Moderate-Low.

[c] ICI assessment of P indicates poor conditions, LF indicates low-fair conditions, and F indicates fair conditions.

The ICI scores for the lower East Fork meet the minimum threshold of 46 for the EWH designation. Dominate species at the upstream site at RM 2.2 included Protoptila,hydropsychids, midges, Elimia (F,MI). The downstream site at RM .77 included Hydropsychids, baetids, midges, Petrophila sp. (F,MI).

Table 3-12: Ohio EPA bacteriological *(E. coli*) sampling results for the Lower East Fork. All values expressed as colony forming units (cfu) or most probable number (MPN) per 100 ml of water (OEPA, 2012).

Station ID	Stream RM	AU	Location	Samples	*E. coli* Geometric Mean	*E. coli* Max Value	Condition Status
610530	.77	13-05	S. Milford Rd Nr Terrace Pk Country Club	10	640	6800	Not Supported

Water quality criteria for determining attainment of recreation use are based upon quantities of bacteria indicators (*Escherichia coli*). The downstream site at RM .77 exceeded thresholds for *E. coli* and this segment of river is in non-attainment of its Primary Contact Recreation (PCR) designation. The monitoring site at RM 1.61 just downstream of the Milford WWTP did not exceed thresholds for *E. coli*.

3.6.3 Detailed Causes and Associated Sources

The low IBI scores in the Lower East Fork were attributed to sedimentation and siltation caused by streambank erosion. In this segment of river there is approximately 1,500+ LF of severe erosion occurring on the right and left descending banks. The right descending bank includes segments of erosion with steep banks approximately 10-12 feet high. The stabilization of these areas and instream habitat enhancements is a priority to bring the river bank into full attainment of its EWH designation. In addition, identifying the source of *E. coli* contamination is also a priority for this subwatershed.

3.6.4 Outline Goals and Objectives for the Critical Area

As previously stated, bringing the East Fork into attainment with its EWH designated use is is a priority in this urbanizing watershed. This will be done through stream restoration projects that improve habitat and stabilize eroding streambanks, by increasing the quality of vegetated riparian corridors and by improving canopy cover through the watershed.

Goals

Improving the biological and habitat conditions through an increase in the IBI, MIwb, ICI, and QHEI scores is the overall nonpoint source restoration goal of all NPS-IS plans, with the ultimate goal of bringing the watercourses into full attainment with its designated aquatic life use and implementing management measures to maintain a healthy watershed. In order to bring the lower East Fork Little Miami River into full attainment, the following goals have been set:

Lower East Fork@ RM 2.2 (M04529)

- Goal 1 – Achieve IBI score ≥ 50 → ACHIEVED : Score of 45 (non-significant departure)
- Goal 2 – Achieve ICI value ≥ 46→ ACHIEVED: Site currently has a score of 50
- Goal 3 – Achieve QHEI ≥ 64 → ACHIEVED: Site currently has a score of 82.5

Lower East Fork @ RM 1.2 (M04W44)

- Goal 1 – Achieve IBI score ≥ 50 → NOT ACHIEVED: Site currently has a score of 43
- Goal 2 – Achieve ICI value ≥ 46→ ACHIEVED: Site currently has a score of 50
- Goal 3 – Achieve QHEI ≥ 64 → ACHIEVED: Site currently has a score of 66

Lower East Fork @ RM 0.77 (610530)

- Goal 1 – Achieve IBI score ≥ 50 → NOT ACHIEVED: Site currently has a score of 42
- Goal 2 – Achieve ICI value ≥ 46→ ACHIEVED: Site currently has a score of 50
- Goal 3 – Achieve QHEI ≥ 64 → ACHIEVED: Site currently has a score of 72.3
- Goal 4 – Achieve attainment of PCR → NOT ACHIEVED: Site currently has *E. coli* exceedances

Objectives

The following objectives have been set to improve and maintain the conditions in Critical Area 5 – the Lower East Fork subwatershed.

Objective 1: Improve IBI scores and improve habitat conditions downstream of RM 2.2

- Stabilize approximately 1,500+ LF of stream bank along the East Fork LMR
    - Permanently protect restores stream banks with conservation easement or fee simple purchase
- Install Natural Channel Design features, including constructed riffles (2) to improve fish IBI scores >42.

Objective 2: Restore PCR status to the lower East Fork LMR

- Complete site assessments to identify potential sources of bacterial contamination near RM 0.77
    - Complete 1 study along with local health district

Again, this NPS-IS plan presents an adaptive watershed planning approach and is anticipated to be dynamic as these objectives are implemented, other objectives identified, and both project-related and regularly scheduled monitoring is completed. The monitoring efforts will verify progress towards meeting the goals of the plan (i.e., water quality standards). The objectives, projects and implementation strategies presented herein will be reevaluated and modified if determined necessary, as several versions of this NPS-IS plan are expected – ultimately working towards full attainment of the aquatic health designation. Details regarding the adaptive management approach for watershed planning is also included in the beginning of chapter 4 of this NPS-IS plan.

As objectives and implementation projects are reevaluated, the OEPA Nonpoint Source Management Plan Update (OEPA, 2013), which includes a full list of non-point source management strategies, will be utilized. Strategies, as presented in the overview tables of chapter 4, are classified into the following descriptions:

- Urban Sediment and Nutrient Strategies;
- Altered Stream and Habitat Restoration Strategies;
- Agricultural Nonpoint Source Reduction Strategies; and
- High Quality Waters Protection Strategies

Furthermore, it is important to note that the objectives and practices listed in this NPS-IS plan will likely be cross-referenced to address impairments throughout the watershed. Implementation strategies included herein should have a positive impact on mitigating nutrient runoff and Harmful Algal Blooms (HABs), and therefore, this NPS-IS plan will be referenced in the future.

CHAPTER 4

Projects and Implementation Strategy

East Fork Little Miami River - Salt Run
Nine-Element NPS-IS Plan

Prepared by
Clermont Soil and Water Conservation District
May 2019

Chapter 4: Projects and Implementation Strategy

This chapter of the Salt Run HUC-12 NPS-IS Plan includes an action plan to mitigate the impairments discussed in detail throughout Chapter 3. It brings together the goals, objectives, and anticipated projects by summarizing the "who, what, when, and where" of several implementation opportunities throughout the critical areas. This plan includes projects that incorporate numerous strategies outlined in Ohio's Nonpoint Source Management Plan (Update) (OEPA, 2013) and is intentionally dynamic (Figure 4-1) as more information is garnered, projects are implemented, and new projects are developed. Once projects are implemented and as funding allows, monitoring will be conducted in coordination with the OEPA-DSW Ecological Assessment Unit and Clermont County Office of Environmental Quality, to understand improvements and guide future watershed planning efforts, including consideration for additional critical areas.

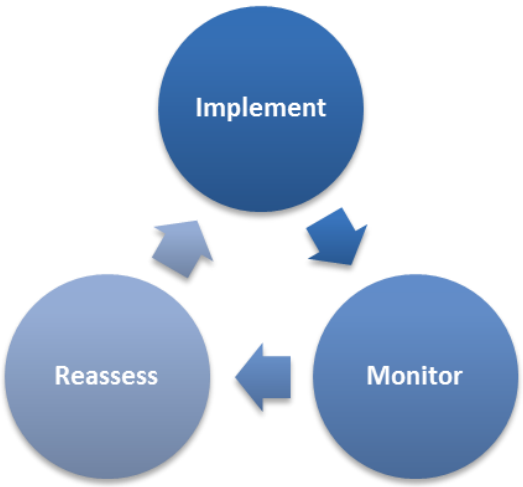


Figure 4-1: Dynamic Watershed Planning Approach

4.1 Overview Tables and Project Sheets for Critical Areas

Five overview tables and associated project summary sheets for each of the critical areas (Hall Run, East Fork Main Stem, Lower Shayler Creek, Wolfpen Run and Avey's Run) are included within this chapter of the NPS-IS plan. Project opportunity figures (included in Appendix B) have also been included to provide supplemental information regarding each proposed project. The opportunities presented throughout this chapter provide concept level opportunities to be further vetted as land owners provide additional feedback on the projects and each project is adequately funded. With that, the estimated project costs and the time frame (short to medium), are both heavily dependent upon funding opportunities and coordination with property owners and project partners.

Project summary sheets and opportunity figures present an action plan for the Salt Run and critical areas.

In addition to the detail provided in previous chapters, the project summary sheets outline how the nine minimum elements of watershed planning are being met by each opportunity, as shown in the first column of each table. Furthermore, as mentioned above, this is a dynamic NPS-IS plan that is inherently flexible to respond to additional monitoring/stakeholder/project opportunity feedback (Figure 4-1) such that funds can continue to be invested in the Salt Run HUC-12 to provide the greatest chances for improvements in aquatic communities and habitat for the least cost. Additionally, if a future critical area(s) is identified within the Salt Run HUC-12, supplemental information will be provided as funding allows.

4.1.1 Education and Outreach Strategies

One important element of NPS-IS nine element plans is the education and outreach activities that will be conducted while implementing the plan. Clermont SWCD is dedicated to engaging the public and informing them of important events and projects, but also educating them about the existing condition of the streams, how to improve impairments, and conserve the high quality areas. Four times a year, Clermont SWCD sends out both electronic and paper copies of a newsletter titled *Clermont Environmental Quarterly*. This newsletter includes important project updates and information regarding environmental conditions. The SWCD's website, www.clermontswcd.org, has dedicated pages regarding the East Fork Watershed Programs and will include detailed information relating to this NPS-IS plan. Clermont SWCD also uses several social media outlets to inform and engage the local community, such as Facebook (https://www.facebook.com/ClermontSWCD), Twitter (https://twitter.com/ClermontSWCD), and YouTube (https://www.youtube.com/channel/UCr-xLSlP-iejIVvbA2NoxiA).

The East Fork Watershed Collaborative, which includes several local agencies, works to educate the community to better understand water quality and stormwater management issues.

Furthermore, as an active member of groups such as the East Fork Watershed Collaborative and the Greater Cincinnati Regional Stormwater Collaborative, the SWCD works to educate the local community to better understand water quality and stormwater management issues. The East Fork Watershed Collaborative, which was formed in 2001, allows local agencies, groups, and individuals within the East Fork Little Miami River watershed to work together to plan and implement water quality improvement projects, organize work groups to accomplish specific tasks, and ultimately work to "enhance the biological, chemical, and physical integrity of the East Fork Little Miami River and its tributaries" (EFWC, 2006). The Greater Cincinnati Regional Stormwater Collaborative, which includes organizations such as local storm water districts, municipalities, townships, and soil and water conservation districts in Southwest Ohio and Northern Kentucky, works to raise awareness about water quality issues in the Ohio River Valley. More information about the Greater Cincinnati Regional Stormwater Collaborative is available on its website at www.savelocalwaters.org.

A full-time educational specialist is employed at the SWCD, who presents at local schools and special interest groups, completing over 300 presentations each year. In regards to agricultural education and outreach, the SWCD hosts annual workshops and field days where local producers come together to discuss relevant topics. In the past these workshops have focused on cover crops. Lastly, the SWCD conducts one-on-one meetings with landowners. As the opportunities included in this NPS-IS plan are further vetted and implemented in the watershed, the Clermont SWCD will utilize these avenues to engage the public and educate the community about pollutants of concern, potential sources of pollutants, and solutions to improve the condition of the streams within the Salt Run HUC-12.

4.2 Critical Area 1: Overview Table and Project Sheet(s) for the Hall Run subwatershed of the Salt Run HUC-12.

4.2.1 Critical Area 1: Project and Implementation Strategy Overview Table

The Project Overview Table on the next page presents a summary of each strategy identified for Critical Area 1: Hall Run subwatershed. These BMP strategies are divided into several categories, including urban storm water runoff management, altered stream and habitat restoration strategies, and other nonpoint source causes and associated sources of impairment (OEPA, 2013). As discussed in chapters 2 and 3, the monitoring stations in the Hall run subwatershed are in non- attainment of the warmwater aquatic life use designation in these locations. These projects will help to mitigate the pollutant loads coming from the land, and when coupled with the other recommended BMP strategies, will improve conditions in Hall Run.

These projects will help mitigate pollutant loads and begin to improve the conditions in Salt Run, ultimately working towards full attainment.

Critical Area 1 (Hall Run Subwatershed): Project Overview Table for Salt Run HUC-12 (050902021305))							
Goals	**Obj. No.**	**Proj. No.**	**Project Title (criteria g)**	**Lead Organization (criteria d)**	**Time Frame[b] (criteria f)**	**Estimated Cost[c] (criteria d)**	**Potential/Actual Funding Source (criteria d)**
Urban Sediment and Nutrient Reduction Strategies[a]							
1, 2	1	1	Stormwater Detention Basin Retrofits – Phase I	Clermont SWCD	Short	$100,000	OEPA 319, Private Foundations, Public-Private Partnerships, County MS4 Funds
1, 2, 3	3	2	Urban Reforestation	Clermont SWCD	Medium	$200,000	OEPA 319, Private Foundations
Altered Stream and Habitat Restoration Strategies[a]							
1, 2, 3	2	3	Hall Run Stream Restoration Near RM 0.2	Clermont SWCD	Medium	$250,000	OEPA 319, WRRSP
1, 2, 3	3	4	Hall Run Riparian Corridor Enhancements	Clermont SWCD	Medium	$100,000	OEPA 319, Private Foundations
Agricultural Nonpoint Source Reduction Strategies[a]							
			Not Applicable for this Critical Area at this time.				
High Quality Waters Protection Strategies[a]							
			Not Applicable for this Critical Area at this time.				
Other NPS Causes and Associated Sources of Impairment[a]							
			Not Applicable for this Critical Area at this time.				

[a] OEPA, 2013

[b] All time frames are subject to project funding availability and property owner coordination, with short being 1-3 years and medium being 3-7 years.

[c] Estimated cost presents rough planning-level implementation costs.

4.2.2 Critical Area 1: Project Summary Sheet(s)

These project summary sheets present the next step toward implementation and improving the conditions of Hall Run. Reference Appendix B – *Critical Area 1: Hall Run subwatershed BMP Strategy Maps* for additional information regarding each BMP opportunity.

Critical Area 1: Project 1		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	Stormwater Detention Basin Retrofits – Phase I
criteria d	**Project Lead Organization & Partners**	LEAD: Clermont SWCD PARTNERS: Union Twp, Private Property Owners
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 1: Hall Run subwatershed
criteria c	**Location of Project**	A 2018 analysis conducted by Sustainable Streams LLC prioritized six storm water management basins for retrofits in various locations through the watershed.
n/a	**Which strategy is being addressed by this project?**	Urban Sediment and Nutrient Reduction Strategies
criteria f	**Time Frame**	Short (1-3 years) *Depends on interest (through promotion and buy-in) by land owners and adequate funding opportunities.*
criteria g	**Short Description**	Retrofit of flood control storm water basins in the Hall Run watershed
criteria g	**Project Narrative**	A study conducted by Sustainable Streams, LLC in 2018 identified and analyzed 37 storm water basins in the Hall Run watershed for retrofit opportunities. Many of these basins were built primarily for flood control and provide little water quality benefit. The basins were assessed by several criteria, including storage volume, drainage area and public ownership. Six of the 41 basins were identified as top priorities for retrofitting.
criteria d	**Estimated Total Cost**	$100,000 +
criteria d	**Possible Funding Source**	Ohio 319, Private Foundations, Public Private Partnerships, Clermont MS4 funds
criteria a	**Identified Causes and Sources**	Cause: Impaired habitat, low DO exacerbated by low flow Source: Urban storm water runoff

criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To modify six storm water management basins to improve their ability to provide water quality treatment for a wider range of storms. The project will seek to meet the WQv requirements of the Ohio Construction General Permit where feasible. Volume-based stormwater controls provide better control of the urban flow regime which reduces the erosivity of flows during storm events. Detention basin retrofits present one of the most cost-effective methods of mitigating erosive flows in urban/suburban watersheds. Combined with stream corridor and habitat improvements, detention basin retrofits will improve conditions in Hall Run.
	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	The 37 basins in the hall Run watershed provide a total of 46.7 ac-ft of storage throughout the watershed. The six prioritized basins have a storage capacity of 22.65%, 49% of the total storage capacity of all basins.
	Part 3: Load Reduced[a]:	Estimated: 2,716 TN/year and 953 lbs TP/year
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	Use of the East Fork Soil & Water Assessment Tool (SWAT) model developed and calibrated by US EPA's Office of Research & Development, can be used to predict volume and load reductions. If the project is funded through OEPA 319 program, staff from the OEPA-DSW Ecological Assessment Unit can perform both pre and post project monitoring to determine progress (through IBI, ICI, and QHEI). The next OEPA-DSW comprehensive watershed-scale ecological and chemical assessment in this watershed is scheduled for 2022.
criteria e	**Information and Education**	This project will be promoted through newsletters, the SWCD website, social media, and other educational outreach opportunities. Reference section 4.1.1 for additional information regarding these initiatives.

[a] Pollutant load reduction estimates were estimated using the STEPL and Region 5 Models.

Critical Area 1: Project 2		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	Reforestation of riparian corridor and urban areas
criteria d	**Project Lead Organization & Partners**	LEAD: Clermont SWCD PARTNERS: Union Twp, Private Property Owners
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 1: Hall Run subwatershed
criteria c	**Location of Project**	Throughout the Hall Run watershed.
n/a	**Which strategy is being addressed by this project?**	Urban Sediment and Nutrient Reduction Strategies
criteria f	**Time Frame**	Medium (3-7 years) *Depends on interest (through promotion and buy-in) by land owners and adequate funding opportunities.*
criteria g	**Short Description**	Reforest sections of the Hall Run watershed to help manage urban storm water management
criteria g	**Project Narrative**	Trees and forests play an important role in reducing the volume and rate of storm water runoff in several ways. Tree canopies intercept and capture rainfall. They consume water through evapotranspiration, improve infiltration, and filter pollutants. The first step of this project involves the completion of an urban tree canopy assessment. Upon completion of this, SWCD will work with Union Township and its residents to develop and implement a forestry master plan.
criteria d	**Estimated Total Cost**	$200,000
criteria d	**Possible Funding Source**	Ohio 319, Private Foundations, Public Private Partnerships, Clermont MS4 funds
criteria a	**Identified Causes and Sources**	Cause: Impaired habitat, low DO exacerbated by low flow Source: Urban storm water runoff
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To be developed in conjunction with Union Township following the completion of the Urban Tree canopy Assessment.

	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	To be determined following the completion of the Urban Tree canopy Assessment.
	Part 3: Load Reduced[a]:	To be calculated following the completion of the Urban Tree Canopy Assessment using the East Fork Soil & Water Assessment Tool (SWAT) model
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	Use of the East Fork Soil & Water Assessment Tool (SWAT) model developed and calibrated by US EPA's Office of Research & Development, can be used to predict reductions in runoff volume and stream flow rates. If the project is funded through OEPA 319 program, staff from the OEPA-DSW Ecological Assessment Unit can perform both pre and post project monitoring to determine progress (through IBI, ICI, and QHEI). The next OEPA-DSW comprehensive watershed-scale ecological and chemical assessment in this watershed is scheduled for 2022.
criteria e	**Information and Education**	This project will be promoted through newsletters, the SWCD website, social media, and other educational outreach opportunities. Reference section 4.1.1 for additional information regarding these initiatives.

Critical Area 1: Project 3		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	Hall Run Stream Restoration Near RM 0.2
criteria d	**Project Lead Organization & Partners**	LEAD: Clermont SWCD PARTNERS: Clermont OEQ, Private property owners
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 1: Hall Run subwatershed
criteria c	**Location of Project**	OEPA monitoring station ID M04P13: Hall Run @ Roundbottom Road, RM 0.2
n/a	**Which strategy is being addressed by this project?**	Altered Stream and Habitat Restoration Strategies
criteria f	**Time Frame**	Medium (3-7 years) *Depends on interest (through promotion and buy-in) by land owners and adequate funding opportunities.*
criteria g	**Short Description**	Restore ~1,500 linear feet of degraded stream (USDA NRCS Practice 395)
criteria g	**Project Narrative**	Restore the instream habitat and improve the riparian buffer zone along ~1,500 linear feet of impaired stream at RM 0.2, from Roundbottom Road upstream to the I-275 culvert. Hall Run has impaired habitat at OEPA's monitoring location ID M04P13. With a 2012 QHEI of 47.8, some of the issues lack of defined pool-riffle habitat and lack of sinuosity. This habitat restoration project includes constructed riffles, potential creation of meanders, invasive species removal, and riparian plantings.
criteria d	**Estimated Total Cost**	$250,000
criteria d	**Possible Funding Source**	OEPA 319, WRRSP
criteria a	**Identified Causes and Sources**	Cause: Impaired habitat, low DO exacerbated by low flow Source: Urban storm water runoff
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To increase IBI score above 40 (currently 30), to raise the ICI score (from marginally good), and to raise QHEI score (from 47.8 to 64) at Roundbottom Road Sampling Site on Hall Run (RM 0.2). One reasonable objective includes habitat restoration at the monitoring location using bioengineering methods and materials. This, coupled with the other recommended BMP strategies, will improve conditions in Hall Run.

	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	The entire stream restoration objective will be accomplished through implementation of this project.
	Part 3: Load Reduced[a]:	Estimated: 225 tons sediment/year, 300 lbs TN/year, and 102 lbs TP/year
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	If the project is funded through OEPA's 319 program, staff from the OEPA-DSW Ecological Assessment Unit can perform both pre and post project monitoring to determine progress (through IBI, ICI, and QHEI). The next OEPA-DSW comprehensive watershed-scale ecological and chemical assessment in this watershed is scheduled for 2022.
criteria e	**Information and Education**	This project will be promoted through newsletters, the SWCD website, social media, and other educational outreach opportunities. Reference section 4.1.1 for additional information regarding these initiatives.

[a] Pollutant load reduction estimates were calculated using an implementation goal of 1,500 linear feet of stream restoration and pollutant load removal rates reported by the Chesapeake Bay Stormwater Network and Center for Watershed Protection. Stream restoration pollutant load removal rates include a TN removal rate of 0.2 lb/ft/yr, a TP removal rate of 0.068 lb/ft/yr, and a TSS removal rate of 310 lb/ft/yr (Schueler & Stack, 2012).

Critical Area 1: Project 4		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	Hall Run Riparian Corridor Enhancements
criteria d	**Project Lead Organization & Partners**	LEAD: Clermont SWCD PARTNERS: OKI, Private property owners
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 1: Hall Run subwatershed
criteria c	**Location of Project**	OEPA monitoring station ID M04P13: Hall Run @ Roundbottom Road, RM 0.2
n/a	**Which strategy is being addressed by this project?**	Altered Stream and Habitat Restoration Strategies
criteria f	**Time Frame**	Medium (3-7 years) *Depends on interest (through promotion and buy-in) by land owners and adequate funding opportunities.*
criteria g	**Short Description**	Create 50-foot riparian buffer along 75% of the Hall Run stream corridor (~5 miles)
criteria g	**Project Narrative**	Using the results from the riparian corridor study completed by the OKI Regional Council of Governments (2019), identify priority areas for riparian enhancements, with a goal of creating a minimum 50-foot riparian corridor along 75% of Hall Run. Once priority areas are identified, Clermont SWCD will identify funding sources and with property owners to obtain project buy-in.
criteria d	**Estimated Total Cost**	$100,000
criteria d	**Possible Funding Source**	OEPA 319, OEPA 319, Private Foundations
criteria a	**Identified Causes and Sources**	Cause: Impaired habitat, low DO exacerbated by low flow Source: Urban storm water runoff
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To create a minimum 25-foot riparian buffer along 75% of the Hall Run stream corridor. This, coupled with stream restoration and urban storm water runoff BMP strategies, will improve conditions in Hall Run.
	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	A minimum 25-foot riparian corridor would be created over 75% of the Hall Run corridor
	Part 3: Load Reduced[a]:	Estimated: 105 tons sediment/year, 294 lbs TN/year, and 147 lbs TP/year

criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	Clermont SWCD and OKI will map improvements to the riparian corridor over time using Clermont County aerial photography, usually updated every two years (sometimes annually). If the project is funded through OEPA's 319 program, staff from the OEPA-DSW Ecological Assessment Unit can perform both pre and post project monitoring to determine progress (through IBI, ICI, and QHEI). The next OEPA-DSW comprehensive watershed-scale ecological and chemical assessment in this watershed is scheduled for 2022.
criteria e	**Information and Education**	This project will be promoted through newsletters, the SWCD website, social media, and other educational outreach opportunities. Reference section 4.1.1 for additional information regarding these initiatives.

[a] Pollutant load reduction estimates were estimated using the STEPL and Region 5 Models.

4.3 Critical Area 2: Overview Table and Project Sheet(s) for the Upper Salt and Avey's Run subwatershed of the Salt Run HUC-12.

4.3.1 Critical Area 2: Project and Implementation Strategy Overview Table

The Project Overview Table on the next page presents a summary of each strategy identified for Critical Area 2: Upper Salt and Avey's Run subwatershed. Currently, two BMP strategies have been identified for this watershed, as shown in the Project Overview Table for Critical Area 2. As discussed in Chapter 3, this watershed has been selected as a critical area more due to the exceptional quality of the watershed, though there are some impaired stream segments. The strategies identified below will help expand and preserve greenspace in the watershed, as well as restore impaired stream segments.

Critical Area 2 (Upper Salt and Avey's Run subwatershed): Project Overview Table for Salt Run HUC-12 (050902021305)							
Goals	**Obj. No.**	**Proj. No.**	**Project Title (criteria g)**	**Lead Organization (criteria d)**	**Time Frame[b] (criteria f)**	**Estimated Cost[c] (criteria d)**	**Potential/Actual Funding Source (criteria d)**
Urban Sediment and Nutrient Reduction Strategies[a]							
			Not Applicable for this Critical Area at this time.				
Altered Stream and Habitat Restoration Strategies[a]							
1, 2, 3	1	1	Restoration of Avey's Run @ Shor Park	Clermont Park District	Short	$225,316	Section 319
Agricultural Nonpoint Source Reduction Strategies[a]							
			Not Applicable for this Critical Area at this time.				
High Quality Waters Protection Strategies[a]							
1, 2, 3	2	2	Upper Salt Run - Preservation of Dickerson Property	Cardinal Land Conservancy	Medium	$200,000	Clean Ohio
Other NPS Causes and Associated Sources of Impairment[a]							
			Not Applicable for this Critical Area at this time.				

[a] OEPA, 2013

[b] All time frames are subject to project funding availability and property owner coordination, with short being 1-3 years and medium being 3-7 years.

[c] Estimated cost presents rough planning-level implementation costs.

Critical Area 2: Project 1		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	Restoration of Avey's Run at Shor Park
criteria d	**Project Lead Organization & Partners**	LEAD: Clermont County Park District PARTNERS: Clermont Soil & Water Conservation District
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 5: Upper Salt/Avey's Run subwatershed
criteria c	**Location of Project**	Avey's Run @ Shor Park
n/a	**Which strategy is being addressed by this project?**	Altered Stream and Habitat Restoration Strategies
criteria f	**Time Frame**	Short (1-3 years)
criteria g	**Short Description**	Restore / stabilize sections of Avey's Run through Shor Park with creation of pocket wetlands
criteria g	**Project Narrative**	The project will involve daylighting 200 linear feet of Avey's Run, riffle construction over 200 linear feet of stream, bank stabilization along 550 feet, the creation of three pocket wetlands, and 11.5 acres of invasive species removal.
criteria d	**Estimated Total Cost**	$225,316
criteria d	**Possible Funding Source**	OEPA 319, local resources
criteria a	**Identified Causes and Sources**	Cause: Channel modification, habitat alterations, sediment Source: Urban storm water runoff
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To restore approximately 750 linear feet of Avey's Run.
	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	The length of stream to be restored/stabilized represents approximately 25% of the total of all streams in Shor Park (2,960 linear feet total).
	Part 3: Load Reduced:	Estimated: 2,820 lbs TN/year, 777 lbs TP/year, 328 tons of sediment/year

criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	Habitat surveys will be conducted by a Level 3 Quality data Collector following completion of the project.
criteria e	**Information and Education**	Project Partners will develop project fact sheets, issue a project press release, publish newsletter articles, develop a project web page and a project video, install educational signage and conduct project tours.

[a] Pollutant load reduction estimates were calculated using the US EPA Region 5 model

Critical Area 2: Project 2		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	Upper Salt Run - Preservation Dickerson Property
criteria d	**Project Lead Organization & Partners**	LEAD: Cardinal Land Conservancy PARTNERS: Clermont Soil & Water Conservation District
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 5: Upper Salt/Avey's Run subwatershed
criteria c	**Location of Project**	Dickerson Property, 900 Old State Route 74
n/a	**Which strategy is being addressed by this project?**	High Quality Waters Protection Strategies
criteria f	**Time Frame**	Medium (3-7 years)
criteria g	**Short Description**	Preserve 41 acres of green space along 2,100 linear feet of upper Salt Run through either permanent conservation easement or fee simple purchase by Cardinal Land Conservancy.
criteria g	**Project Narrative**	The Dickerson property consists of 41.2 acres of mostly greenspace along a 2,100 foot stretch Salt Run, just upstream of the Cincinnati Nature Center.
criteria d	**Estimated Total Cost**	$200,000
criteria d	**Possible Funding Source**	Clean Ohio Fund, WRRSP
criteria a	**Identified Causes and Sources**	Cause: N/A Source: N/A
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To permanently preserve and protect a wooded riparian corridor along 2,100 linear feet of upper Salt Run.
	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	The length of stream to be preserved represents 100% of the stream corridor on the property.
	Part 3: Load Reduced:	N/A

criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	Cardinal Land Conservancy would either hold a conservation easement or purchase the property, and would be responsible for ensuring the natural condition of the stream corridor in perpetuity.
criteria e	**Information and Education**	Project Partners would issue a project press release and install educational signage.

4.4 Critical Area 3: Overview Table and Project Sheet(s) for the Lower Shayler Run subwatershed of the Salt Run HUC-12.

4.4.1 Critical Area 3: Project and Implementation Strategy Overview Table

The Project Overview Table on the next page presents a summary of each strategy identified for Critical Area 3: Lower Shayler Run subwatershed. Currently, only one BMP strategy has been identified for this watershed, as shown in the Project Overview Table for Critical Area 3. As discussed in Chapter 3, the instream habitat has been impaired due to a combination of increased urban stormwater runoff due to development and the construction of a sanitary trunk sewer in and along lower Shayler Run Creek. The project listed will improve instream habitat, which will help macroinvertebrate and fish communities to improve.

Critical Area 3 (Lower Shayler Creek subwatershed): Project Overview Table for Salt Run HUC-12 (050902021305)							
Goals	**Obj. No.**	**Proj. No.**	**Project Title (criteria g)**	**Lead Organization (criteria d)**	**Time Frame[b] (criteria f)**	**Estimated Cost[c] (criteria d)**	**Potential/Actual Funding Source (criteria d)**
Urban Sediment and Nutrient Reduction Strategies[a]							
			Not Applicable for this Critical Area at this time.				
Altered Stream and Habitat Restoration Strategies[a]							
1, 2, 3	1	1	Lower Shayler Run Stream Restoration	Clermont SWCD	Medium	$1,000,000	WRRSP
Agricultural Nonpoint Source Reduction Strategies[a]							
			Not Applicable for this Critical Area at this time.				
High Quality Waters Protection Strategies[a]							
			Not Applicable for this Critical Area at this time.				
Other NPS Causes and Associated Sources of Impairment[a]							
			Not Applicable for this Critical Area at this time.				

[a] OEPA, 2013

[b] All time frames are subject to project funding availability and property owner coordination, with short being 1-3 years and medium being 3-7 years.

[c] Estimated cost presents rough planning-level implementation costs.

4.4.2 Critical Area 3: Project Summary Sheet(s)

These project summary sheets present the next steps toward implementation and improving the conditions of Salt Run HUC-12. Reference Appendix D –*Critical Area 3: Lower Shayler Run Subwatershed BMP Strategy Maps* for additional information regarding each BMP opportunity.

Critical Area 3: Project 1		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	Lower Shayler Run Stream Restoration
criteria d	**Project Lead Organization & Partners**	LEAD: Clermont SWCD PARTNERS: Clermont County Water Resoures Dept, Office of Environmental Quality
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 3: Lower east Fork Subwatershed
criteria c	**Location of Project**	Shayler Run river mile 2.9 to 1.6
n/a	**Which strategy is being addressed by this project?**	Altered Stream and Habitat Restoration Strategies
criteria f	**Time Frame**	Medium (3-7 years) *Depending upon funding through WRRSP*
criteria g	**Short Description**	Restore approximately 6,800 linear feet of stream using natural channel design techniques
criteria g	**Project Narrative**	In the 1970s, a sanitary trunk sewer was installed in the valley along Shayler Run. Over time, because of increased urbanization and flows in the watershed, the stream channel downcut and moved laterally, exposing several sections of the trunk sewer. This sewer has since been replaced by a deep tunnel and has been abandoned in place; however, the habitat impacts remain.
criteria d	**Estimated Total Cost**	$1,000,000
criteria d	**Possible Funding Source**	WRRSP
criteria a	**Identified Causes and Sources**	Cause: Impaired habitat Source: Urban storm water runoff, channel modification

criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To ensure that QHEI scores are greater than 64 along the proposed project reach, and to reconnect Shayler Run with its floodplain.
	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	This project represents 100% of the aquatic habitat restoration projects in this Critical Area.
	Part 3: Load Reduced[a]:	Estimated: 1,054 tons sediment/year, 1,360 lbs TN/year, and 462 lbs TP/year
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	If the project is funded through OEPA 319 program, staff from the OEPA-DSW Ecological Assessment Unit can perform both pre and post project monitoring to determine progress (through IBI, ICI, and QHEI). The next OEPA-DSW comprehensive watershed-scale ecological and chemical assessment in this watershed is scheduled for 2022.
criteria e	**Information and Education**	This project will be promoted through newsletters, the SWCD website, social media, and other educational outreach opportunities. Reference section 4.1.1 for additional information regarding these initiatives.

[a] Pollutant load reduction estimates were calculated using an implementation goal of 500 linear feet of stream restoration and pollutant load removal rates reported by the Chesapeake Bay Stormwater Network and Center for Watershed Protection. Stream restoration pollutant load removal rates include a TN removal rate of 0.2 lb/ft/yr, a TP removal rate of 0.068 lb/ft/yr, and a TSS removal rate of 310 lb/ft/yr (Schueler & Stack, 2012).

4.5 Critical Area 4: Overview Table and Project Sheet(s) for the Wolfpen Run subwatershed of the Salt Run HUC-12.

4.5.1 Critical Area 4: Project and Implementation Strategy Overview Table

The Project Overview Table on the next page presents a summary of each strategy identified for Critical Area 4: Wolfpen Run subwatershed. Currently, only one BMP strategy has been identified for this watershed, as shown in the Project Overview Table for Critical Area 4. As discussed in Chapter 3, many of the septic systems serving the Eagle Ridge subdivision are underperforming or failing, thus contributing a significant amount of pathogens and nutrients to Wolfpen Run. The project listed would connect all lots in the subdivision to public sewers or repair / replace failing systems.

Critical Area 4 (Wolfpen Run subwatershed): Project Overview Table for Salt Run HUC-12 (050902021305)							
Goals	**Obj. No.**	**Proj. No.**	**Project Title (criteria g)**	**Lead Organization (criteria d)**	**Time Frame[b] (criteria f)**	**Estimated Cost[c] (criteria d)**	**Potential/Actual Funding Source (criteria d)**
Urban Sediment and Nutrient Reduction Strategies[a]							
4	1	1	Repair / Replacement of Failing Septic Systems	Clermont Water Resources Dept	Medium	$525,000	WPCLF, CDBG
Altered Stream and Habitat Restoration Strategies[a]							
			Not Applicable for this Critical Area at this time.				
Agricultural Nonpoint Source Reduction Strategies[a]							
			Not Applicable for this Critical Area at this time.				
High Quality Waters Protection Strategies[a]							
			Not Applicable for this Critical Area at this time.				
Other NPS Causes and Associated Sources of Impairment[a]							
			Not Applicable for this Critical Area at this time.				

[a] OEPA, 2013

[b] All time frames are subject to project funding availability and property owner coordination, with short being 1-3 years and medium being 3-7 years.

[c] Estimated cost presents rough planning-level implementation costs.

Critical Area 4: Project 1		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	Repair / Replacement of Home Sewage Treatment Systems
criteria d	**Project Lead Organization & Partners**	LEAD: Clermont County Public Health PARTNERS: Clermont Water Resources Dept., Office of Environmental Quality and Clermont Soil & Water Conservation District
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 4: Wolfpen Run subwatershed
criteria c	**Location of Project**	Eagle Ridge Subdivision
n/a	**Which strategy is being addressed by this project?**	Other NPS Causes and Associated Sources of Impairment
criteria f	**Time Frame**	Medium (3-7 years) *Depends on interest (through promotion and buy-in) by land owners and adequate funding opportunities.*
criteria g	**Short Description**	Repair or replace 25% of the home sewage treatment systems in the Eagle Ridge subdivision, explore opportunities for extending public sewer
criteria g	**Project Narrative**	Many septic systems in this subdivision are not providing adequate treatment due to a variety of reasons. Storm water runoff from failing systems can carry untreated sewage with high concentrations of bacteria and nutrients into streams causing elevated pathogen levels, organic enrichment, excessive algal growth, and loss of dissolved oxygen. This project would repair or replace 25% of home sewage treatment systems in the Eagle Ridge subdivision, and explore opportunities for extending public sewer, ultimately providing financial subsidies to homeowners who cannot to connect.
criteria d	**Estimated Total Cost**	$525,000 +
criteria d	**Possible Funding Source**	WPCLF, Community Development Block Grants
criteria a	**Identified Causes and Sources**	Cause: Elevated nutrient loads, pathogens Source: Failing septic systems

criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To connect lots in the Eagle Ridge subdivision to public sewer, or repair/replace HSTSs, thereby eliminating pathogen and nutrient loads to Wolfpen Run from failing systems.
	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	Approximately 25% of the septic systems exist in the Eagle Ridge subdivision. The proposed project would eliminate the failing systems by connecting each lot to public sewers.
	Part 3: Load Reduced:	Estimated: 60 lbs TN/year and 22.8 lbs TP/year per system
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	Considerable data exists for Wolfpen Creek, documenting the existing problems. Following elimination of the septic system, samples will be collected for nutrients, suspended solids and pathogens to document improvements in the stream.
criteria e	**Information and Education**	Project Partners will work with property owners in the subdivision through public meetings, open houses, newsletters and direct communication.

Pollutant load reduction estimates were estimated using the STEPL and Region 5 Models.

4.6 Critical Area 5: Overview Table and Project Sheet(s) for the East Fork Little Miami River main stem.

4.6.1 Critical Area 5: Project and Implementation Strategy Overview Table

The Project Overview Table on the next page presents a summary of each strategy identified for Critical Area 5: East Fork Little Miami River main stem – specifically, the uppermost and lowermost reaches of the Salt Run watershed. Similar to the Project Overview Table for other Critical Areas, these BMP strategies are divided into several categories, including altered stream and habitat restoration strategies, agricultural nonpoint source reduction strategies, and other nonpoint source causes and associated sources of impairment (OEPA, 2013). As discussed in chapters 2 and 3, the upper and lower monitoring stations on the East Fork are in partial attainment of the exceptional warmwater aquatic life use designation in these locations. These projects will improve instream habitat, which, when coupled with other recommended BMP strategies in the Salt Run HUC-12 watershed, will help macroinvertebrate and fish communities to improve.

These projects will improve instream habitat, which will help macroinvertebrate and fish communities to improve.

Critical Area 5 (East Fork Little Miami River Main Stem): Project Overview Table for Salt Run HUC-12 (050902021305)							
Goals	**Obj. No.**	**Proj. No.**	**Project Title (criteria g)**	**Lead Organization (criteria d)**	**Time Frame[b] (criteria f)**	**Estimated Cost[c] (criteria d)**	**Potential/Actual Funding Source (criteria d)**
Urban Sediment and Nutrient Reduction Strategies[a]							
			Not Applicable for this Critical Area at this time.				
Altered Stream and Habitat Restoration Strategies[a]							
1, 2, 3	1	1	EFLMR Stream Bank Restoration Near RM 1.2	Clermont SWCD	Short	$750,000	WRRSP
1, 2, 3	1	2	EFLMR Habitat Restoration Near RM 0.2	Clermont SWCD	Medium	$300,000	OEPA 319, WRRSP
Agricultural Nonpoint Source Reduction Strategies[a]							
			Not Applicable for this Critical Area at this time.				
High Quality Waters Protection Strategies[a]							
			Not Applicable for this Critical Area at this time.				
Other NPS Causes and Associated Sources of Impairment[a]							
			Not Applicable for this Critical Area at this time.				

[a] OEPA, 2013

[b] All time frames are subject to project funding availability and property owner coordination, with short being 1-3 years and medium being 3-7 years.

[c] Estimated cost presents rough planning-level implementation costs.

4.6.2 Critical Area 5: Project Summary Sheet(s)

These project summary sheets present the next steps toward implementation and improving the conditions of Salt Run HUC-12. Reference Appendix C –*Critical Area 5: East Fork Little Miami River (EFLMR) Main Stem BMP Strategy Maps* for additional information regarding each BMP opportunity.

Critical Area 5: Project 1		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	EFLMR Stream Bank Restoration Near RM 1.2
criteria d	**Project Lead Organization & Partners**	LEAD: Clermont SWCD PARTNERS: Valley View Foundation, Madison Tree Service, City of Milford
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 2: EFLMR Main Stem
criteria c	**Location of Project**	OEPA monitoring station ID M04W44: EFLMR 0.4 miles downstream of Milford WWTP (monitored in 2007-08)
n/a	**Which strategy is being addressed by this project?**	Altered Stream and Habitat Restoration Strategies
criteria f	**Time Frame**	Short (1-3 years) *Depending upon funding through WRRSP*
criteria g	**Short Description**	Stabilize 1,500 linear feet of eroding streambank; improve habitat in 1,500 feet of river
criteria g	**Project Narrative**	Banks on both sides of the river in this river reach are high, unstable and have been rapidly eroding in recent years. Clermont SWCD has been working with the riparian land owners (Valley View and Madison Tree) to develop a restoration strategy to minimize bank erosion and improve stream habitat. A conceptual plan for the project was in development as this watershed plan was being prepared.
criteria d	**Estimated Total Cost**	$750,000
criteria d	**Possible Funding Source**	WRRSP
criteria a	**Identified Causes and Sources**	Cause: Impaired habitat Source: Urban storm water runoff
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To stabilize 1,500 feet of highly eroding banks and to increase the IBI score to 50 (score of 43 in 2012). Stream restoration will be completed using natural channel design techniques.

	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	This project represents 50% of the aquatic habitat restoration projects in this Critical Area.
	Part 3: Load Reduced[a]:	Estimated: 192 tons sediment/year, 382 lbs TN/year, and 192 lbs TP/year
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	If the project is funded through OEPA 319 program, staff from the OEPA-DSW Ecological Assessment Unit can perform both pre and post project monitoring to determine progress (through IBI, ICI, and QHEI). The next OEPA-DSW comprehensive watershed-scale ecological and chemical assessment in this watershed is scheduled for 2022.
criteria e	**Information and Education**	This project will be promoted through newsletters, the SWCD website, social media, and other educational outreach opportunities. Reference section 4.1.1 for additional information regarding these initiatives.

[a] Pollutant load reduction estimates were estimated using the STEPL and Region 5 Models.

Critical Area 2: Project 2		
Nine Element Criteria	**Information Needed**	**Explanation**
criteria g	**Project Title**	EFLMR Habitat Restoration Near RM 0.8
criteria d	**Project Lead Organization & Partners**	LEAD: Clermont SWCD PARTNERS: Private property owners
criteria c	**HUC-12 & Critical Area**	Salt Run HUC-12 HUC (050902021305) Critical Area 2: EFLMR Main Stem
criteria c	**Location of Project**	OEPA monitoring station ID 610530: EFLMR near Terrace Park Country Club @ S Milford Rd
n/a	**Which strategy is being addressed by this project?**	Altered Stream and Habitat Restoration Strategies
criteria f	**Time Frame**	Medium (3-7 years) *Depends on interest (through promotion and buy-in) by land owners and adequate funding opportunities.*
criteria g	**Short Description**	Improve habitat in ~500 linear feet of impaired stream
criteria g	**Project Narrative**	The East Fork has a QHEI of 66 in this reach, which is considered good, but lower than needed to meet its Exceptional Warmwater Habitat use, primarily due to poor riffle-pool development. The project will seek to raise the QHEI score from 66 to 75 by creating improved riffle-pool habitat over 500 linear feet of stream.
criteria d	**Estimated Total Cost**	$300,000
criteria d	**Possible Funding Source**	OEPA 319, WRRSP
criteria a	**Identified Causes and Sources**	Cause: Impaired habitat Source: Urban Storm water runoff, natural conditions
criteria b & h	**Part 1: How much improvement is needed to remove the NPS impairment associated with this Critical Area?**	Goals: To increase IBI score to 50 or greater (currently 43), and to raise QHEI score (from 66 to 75) at EFLMR @ South Milford Road Bridge (RM 0.8). One objective includes habitat restoration at the monitoring location using bioengineering methods and materials. This, coupled with the other recommended BMP strategies in the Salt Run HUC-12 watershed, will improve conditions in the East Fork Little Miami River.

	Part 2: How much of the needed improvement for the whole Critical Area is estimated to be accomplished by this project?	This project represents 50% of the aquatic habitat restoration projects identified in this Critical Area.
	Part 3: Load Reduced[a]:	Estimated: 4.3 tons sediment/year, 4.3 lbs TN/year, and 8.5 lbs TP/year
criteria i	**How will the effectiveness of this project in addressing the NPS impairment be measured?**	If the project is funded through OEPA 319 program, staff from the OEPA-DSW Ecological Assessment Unit can perform both pre and post project monitoring to determine progress (through IBI, ICI, and QHEI). The next OEPA-DSW comprehensive watershed-scale ecological and chemical assessment in this watershed is scheduled for 2022.
criteria e	**Information and Education**	This project will be promoted through newsletters, the SWCD website, social media, and other educational outreach opportunities. Reference section 4.1.1 for additional information regarding these initiatives.

[a] Pollutant load reduction estimates were estimated using the STEPL and Region 5 Models.

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