Lower Mad River Watershed Protection Project

Watershed Action Plan

A Community-Based Watershed Management Approach

Prepared and written by:
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Sinking Creek

Beaver Creek

Moore Run

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Mill Creek

Mad River below Buck Creek to above Donnels Creek

Rock Run

East Fork Donnels Creek

Chapman Creek

Donnels Creek

Jackson Creek

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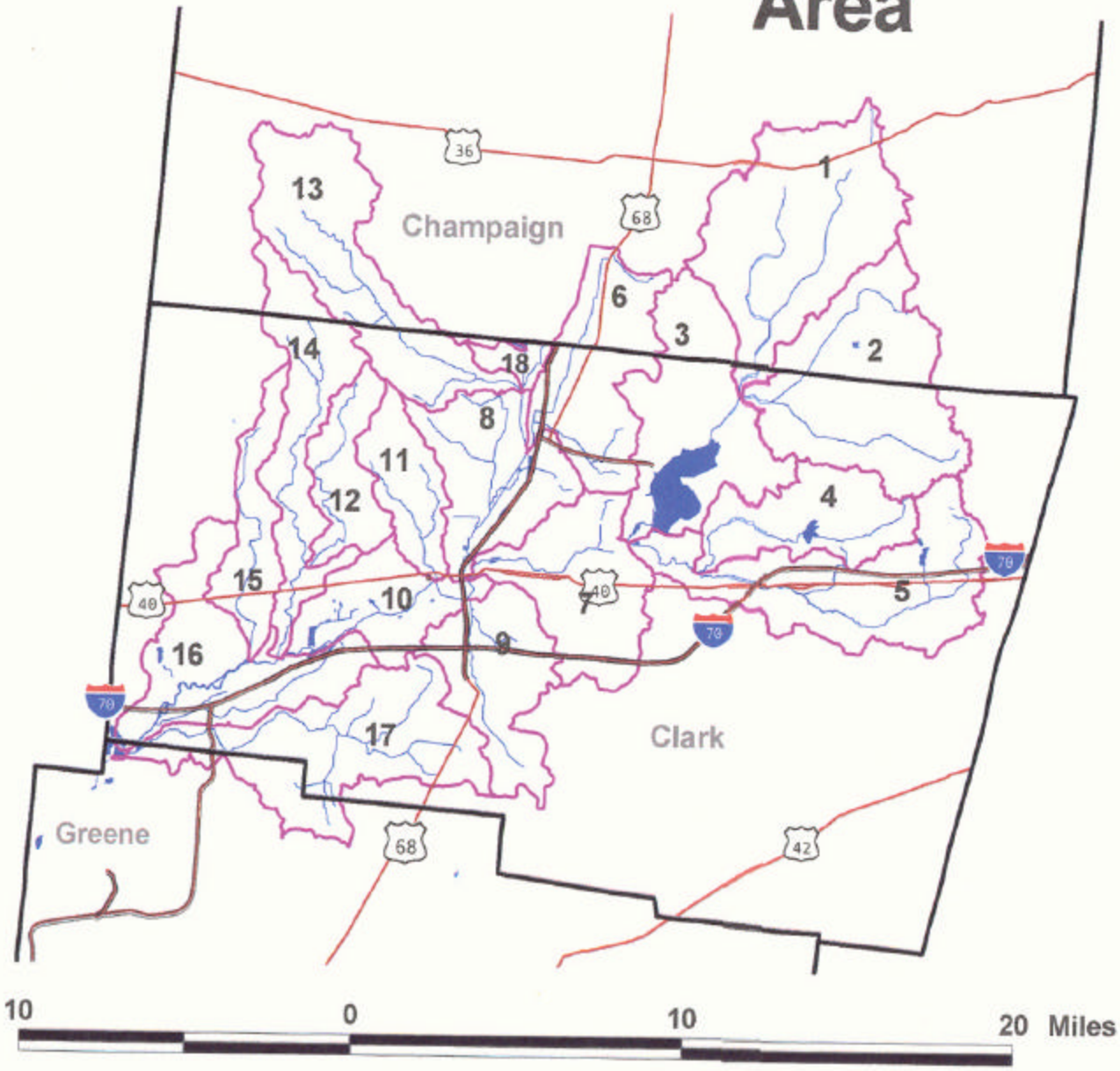
Champaign Soil and Water Conservation District
Natural Resource Conservation Service
Clark County Combined Health District
Ohio Environmental Protection Agency
Ohio Department of Natural Resources
Ohio State University Extension

Plan Endorsement

We, the supporters of the Lower Mad River Watershed Protection Project, do hereby approve and agree to pursue implementation of this Watershed Action Plan prepared and written by the Lower Mad River Watershed Protection Project.

_____	_____	_____
Ohio EPA	Ohio DNR	Clark SWCD
_____	_____	_____
Champaign SWCD	NRCS	OSU Extension
_____	_____	_____
Clark Co. Combined Health District	Champaign Co. Health Dept.	Top of Ohio RC & D
_____	_____	_____
Mayor of Springfield	State Senator	State Representative
_____	_____	_____
Clark Co. Commissioner	Champaign Co. Commissioner	B-W Greenway
_____	_____	_____
Tecumseh Land Trust	Bethel Twp. Trustee	German Twp. Trustee
_____	_____	_____
Harmony Twp. Trustee	Mad River Twp. Trustee	Moorefield Twp. Trustee
_____	_____	_____
Pike Twp. Trustee	Pleasant Twp. Trustee	Farm Bureau

Lower Mad River Watershed Protection Project Area



Sub-Watershed Identification Numbers
1=Buck Ck. above E. Fk. Buck Ck.
2=East Fork Buck Ck.
3=Buck Ck. below E. Fk. above Beaver Ck.
4=Sinking Ck.
5=Beaver Ck.
6=Moore Run
7=Buck Ck. below Beaver Ck. to Mad River
8=Mad River below Chapman Ck. to above Buck Ck.
9=Mill Ck.
10=Mad River below Buck Ck. to above Donnels Ck.
11=Rock Run
12=East Fork Donnels Ck.
13=Chapman Ck.
14=Donnels Ck.
15=Jackson Ck.
16=Mad River below Donnels Ck. to above Mud Run
17=Mud Run
18=Mad River below Nettle Ck. to above Chapman Ck.

Watershed Numbers
County Boundary
Roads
Primary road with limited access
Primary road without limited access
14 Digit Hydrologic Unit Boundaries
Rivers and Streams
Lakes and Ponds

N
W E
S

Lower Mad River Watershed Action Plan
A Community-Based Watershed Management Approach

A. Introduction & History of the Lower Mad River Watershed

Watershed & Project Background

The Lower Mad River Watershed encompasses 217,166.5 acres throughout the southeastern portion of Champaign County and the majority of Clark County. Twenty-one percent (21%) of the Lower Mad River Watershed is located in Champaign County and seventy-nine percent (79%) is located in Clark County. The Mad River is the primary stream and the main drainage system, entering Clark County west of Bowlusville and flowing southwest through the county. The larger tributaries have cut through glacial drift to the lower courses of bedrock. Steep limestone walls line the Mad River valley beginning in the Springfield area.

The City of Springfield is centered in the heart of the Lower Mad River Watershed. The City of Springfield's well field consists of 12 wells, which are located in the immediate flood plain of the Mad River. This well field provides an average of 12,000,000 gallons of potable drinking water per day and has the ability of producing 36,000,000 gallons per day if demanded. Springfield has a population of 65,358 people (according to the 2000 U.S. census). This population is nearly half of the total population for Clark County (48%). The Mad River provides the western boundary for the City of Springfield and Buck Creek flows through the very center of the city. Urban issues such as combined sewer over flows, stormwater run-off, urban construction, sedimentation, and poorly managed septic systems challenge the quality of the water in this area. The Villages of Enon, Tremont City, and Donnelsville are condensed, unsewered communities with existing on-site systems and contribute greatly to the degradation of the Mad River and its tributaries. According to figures developed by the Clark and Champaign County Health Departments, the Lower Mad River Watershed has approximately 15,000 on-site septic systems with 366 of these being aeration/aerobic systems. These types of systems release discharge directly into the Lower Mad River.

The Lower Mad River Watershed is listed as a TMDL priority watershed scheduled for development in 2005. Certain portions of the Lower Mad River Watershed and specifically the headwater tributaries of the Buck Creek sub-watershed are unique in the fact that they have the ability to maintain coldwater habitats. The Mad River sub-watershed (below Chapman Creek to above Mud Creek, 05008001 180) is designated as UWA Category 1 watershed. The Buck Creek sub watershed (05008001 170) is designated as a UWA Category 2 watershed and is unique in the fact that both agricultural and urban pressures cause water quality degradation. According to the 1996 Ohio Water Resource Inventory, the causes of impairments listed include habitat alterations, nutrient enrichment, siltation, flow alterations, ammonia, and causes unknown. In addition, this report indicates that out of the 202.3 stream miles that were assessed, 80.1 stream miles or 39.6% of those streams were in *not attaining* or *partially attaining* status.

Ohio EPA's State of Ohio Nonpoint Source Assessment has designated Jackson Creek and Donnels Creek as exceptional warmwater habitats. Medway Creek, Buck Creek (headwaters to East Fork Buck Creek, East Fork Buck Creek to Beaver Creek), Beaver Creek, East Fork Buck Creek, and the Mad River (prior to confluence with Buck Creek) are designated as coldwater habitats. Mad River (after confluence of Buck Creek), Smith Ditch, East Fork Donnels Creek, Rock Run, Miller Run, Buck Creek (Beaver to Mad), Sinking Creek, Mud Creek, Mud Run and Dugan Ditch are considered as warm water habitats. Only 17 miles are considered exceptional warmwater habitats.

Clark County History

Prior to European settlement, the most recent inhabitants of the watershed were Miami and Shawnee Indians. Other tribes, such as Wyandot, Delaware, Ottawa, and Mingo, also inhabited the area. The Mad River Valley, with its herb gardens and mineral springs, was a favorite hunting ground and medicinal retreat.

Early French and English hunters and trappers and other European explorers and soldiers told stories of the great natural wealth and beauty of the area. The endless fresh clear water of the Mad River fed by numerous springs, the rich fertile lands in the valleys of the Mad River, and the abundant forests of the smooth, hilly countryside attracted a continuous stream of settlers to the area.

Early settlements were primitive, but after the Treaty of Greenville was signed in 1795, settlement of the area increased. The first major settlement was established at Cribb's Station, at the forks of the Mad River, in the spring of 1796.

The City of Springfield was laid out in 1803, the same year that Ohio became a state. Clark County was created from parts of Champaign, Greene, and Madison Counties by an act of the Ohio Legislature on March 1, 1818. The county was named in honor of General George Rogers Clark of the Revolutionary War. Progress became more rapid after the creation of Clark County. The first census of Clark County, taken in 1820, showed a population of 610. Growth and progress stopped for a while with the failure of the Second Bank of the United States and the Panic of 1819. Springfield, the county seat, was incorporated in 1827.

Source: Clark County Soil Survey

Early Settlement Conditions

In the early years of settlement by the pioneers, marshes and bogs were scattered throughout the watershed, which included savannah areas that were wet in the early part of the year, but were subject to summer droughts. These areas were natural filters that ensured high water quality.

A striking feature of the Mad River is the lack of sinuosity in Champaign and Clark counties upstream of the Buck Creek confluence in Springfield. This is due to the channelization of the river that occurred around 1915 to reduce flooding and provide for agricultural drainage. The river has not recovered appreciably from this modification because of high levels that were

created as the channelization occurred. Local folklore holds that the name “Mad” was given to the river because it took an erratic path through the valley. A report on Champaign County published by the Ohio Geological Survey in 1878 mentioned “the multitude of small, crooked streams shows the swampy nature of the country” especially on the west side of the Mad River. The same report also mentions the influence of the abundant groundwater to the flow of the river. This groundwater influence makes the Mad River unique in this part of Ohio as a coldwater stream, which only rarely exceeds 70 degrees Fahrenheit during the summer. The Mad River is the largest coldwater stream in the State of Ohio. The modification of the Mad River created a straight, artificial ditch without pools or riffles. Downstream of the confluence with Buck Creek, the river has been less modified than the upper reaches, but has been impacted by channelization and sand and gravel mining in the past.

Source: Clark County Soil Survey

Section B. Watershed Inventory

Physiography, Relief, & Drainage

The land surfaces of Clark County can be described in five general divisions: (1) nearly level flood plains and low alluvial terraces of the stream valleys; (2) slightly higher, nearly level to gently slopping benches or outwash deposits of the glacial valleys; (3) rolling to steep valley walls, produced either by stream dissection or constructive morainal deposits; (4) predominantly undulating divides of the general upland level (mainly on the till plains); and (5) recessional or end moraines and kames that protrude above the general upland level.

In general, the slope pattern is complex in the uplands and uniform and simple along the larger drainageways. Relief ranges from nearly level to steep, but the land surface is predominantly undulating. Nearly level areas occur principally on stream flood plains, outwash plains, valley trains, and stream terraces and in the uplands in depressions and on flats, particularly on the till plains. Hilly to steep or very steep areas occur most extensively along the valley walls of the major drainageways and on the moraines. These hilly to steep or very steep areas are in Pleasant and Moorefield Townships, in the northern and eastern parts of Springfield Township, and in the southeastern part of Mad River Township. Along the west wall of the Mad River Valley, between the Champaign County line and U.S. Highway 40 and for some distance westward, the topography is rough and steep and has apparently formed in part by erosion that has taken place since the last glaciation. Otherwise, the topography of the county is essentially the same as when the Late Wisonsinan ice sheet retreated.

The upland is about 1,000 to 1,100 feet above sea level. It slopes gently to the southwest. The highest elevation in the county, approximately 1,250 feet, is about 2 miles northeast of Catawba near the Champaign County line. The lowest elevation, 820 feet, is in the southwest corner where the Mad River crosses the county line.

The major trunk streams include the Beaver Creek-Buck Creek-Mad River system in the northeast, central, and western parts of the county. This drainage is for the most part natural, except for some channelization in some parts of the Mad River and for the C.J. Brown Reservoir on Buck Creek northeast of the City of Springfield.

Source: Clark County Soil Survey

Bedrock Geology

Clark County is covered by various kinds and variable thinknesses of glacial drift left behind by continental glaciers during the most recent part of geologic history. Although the drift is more than 300 feet thick in the eastern part of the county, it is quite thin in the southwestern portion where both glacial meltwater streams and modern streams have eroded through the drift and exposed bedrock beneath. Two of these places of exposure are noteworthy. The first of these is the natural Buck Creek Gorge at Cliff Park in the City of Springfield. At this site, the Silurian (Niagaran) Cedarville and Springfield Dolomite (Lockport Dolomite) is exposed. The second is the north-south “manmade gorge” exposing the same types of rock, formed by the construction of the four-lane U.S. Highway 68 between U.S. Highway 40 and the Interstate 70 bypass around the south side of Springfield.

Source: Clark County Soil Survey

Surficial Geology

Clark County was glaciated more than once. The deposits of an older Illinoian and possibly a pre-Illinoian ice advance, recognized farther south in Ohio, were reworked and covered by a younger Wisconsinan glaciation. These glacial drift deposits covered the bedrock and filled old preglacial stream valleys. The largest and deepest of these buried valleys is known as the Teays drainage system. This system enters the county from the southeast near Plattsburg and trends northwestward on a line through Harmony and the C. J. Brown Reservoir and then leaves the county north and east of Tremont City. The depth to bedrock is more than 400 feet along this section of the buried Teays Valley.

There are two dominant types of glacial deposits that were left in the watershed. The first type is glacial till, which consists largely of clay mixed with boulders, gravel, sand, and silt. This unsorted material is deposited directly by glacial ice. Low, rolling or hummocky topography is characteristic of deposition by melting and retreating ice, which resulted in what is called ground moraine. Till deposited by ice, the terminus of which remains stationary for a time, results in a thicker and higher accumulation. Such topography, which is more contiguous and ridge-like than that resulting from deposition by melting and retreating ice, is referred to as end moraine. The second type of glacial deposits consists of stratified sand and gravel, sorted and deposited by running meltwater from the glacial ice. The most common type of stratified drift is the low, flat outwash plain deposited along meltwater streams.

Source: Clark County Soil Survey

Glacial History

When the Wisconsinan ice advanced to the south from northern Ohio, a topographic high in the bedrock of Logan County to the north split the ice into two lobes. The western lobe trended down the valley of a preglacial Miami River, and the eastern one trended down the valley of a preglacial Scioto River. Therefore, as the glaciers expanded, ice entered the county from both the northwest and the northeast, apparently abutted, and advanced southward toward the Ohio River. When the glacial ice retreated from the county, it melted away to the west and east as it had entered. Thus the major end moraines resulting from this retreat are oriented in a north-south direction in this interlobate area. The Springfield moraine north of the city and the Farmersville moraine along the western border of the county were deposited by the ice of the Miami lobe. East of Springfield, six end moraines (Pitchin, Thorp, Dolly Varden, South Charleston, Plattsburg, and Esboro) were deposited by ice of the Scioto lobe. These six individual end moraines become less distinct in the northern half of the county and comprise the wide Cable morainal belt.

Two major outwash systems trending north to south also occur in the county. The Kennard outwash system is an older and topographically higher one that begins north of the county and ends at Clifton Gorge. The meltwater of this system came from the Scioto lobe, and the outwash is associated with the six end moraines deposited by ice of this lobe. In addition to providing the sands and gravels of the outwash, the meltwater also contributed significantly to the erosion of the gorge. The second major outwash system is that of the Mad River and its major tributaries, Buck Creek and Beaver Creek. This entire system is younger and lower than the Kennard system to the east and developed only after the westward recession of the Miami lobe of ice uncovered a topographically lower drainageway to the southwest. The meltwater of this system was probably responsible for forming most of the Cliff Park Gorge in the city of Springfield. These extensive deposits of morainal material and outwash in Clark County constitute the parent material in which the soils of the county formed.

Source: Clark County Soil Survey

Topography & Land Use

The topography of the area is nearly level to gently sloping, although some sub-watersheds experience rolling topography. Nearly 79% of the land falls into the category of prime farmland. Most of the prime farmland is located on the till plains and valleys of the Mad River and along the secondary streams. Some soils rated as prime farmland soils do have limitations or hazards, such as a seasonably high water table and frequent flooding. Extensive flood plains are found along the Mad River and many of the related tributaries, such as Buck Creek. Flood plains are particularly extensive along the Mad River southwest of Springfield along I-70 and south to the Clark County line. In order to qualify as prime farmland, these areas have overcome the above limitations by implementing measures such as drainage and/or flood control. In recent years, a considerable amount of prime farmland has been lost to industrial and urban uses. According to the Clark and Champaign County Farm Service Agencies, an average of 285 acres of rural land is converted for urban use each year in the Lower Mad River Watershed. The loss of prime farmland to other uses places agricultural

pressures on marginal lands, which generally are more erodible, drought-stricken, less productive, and cannot be easily cultivated.

The watershed has 85% of the Highly Erodible Land (HEL) acres for Clark County. A total of 29,550 acres of HEL ground can be found in the Lower Mad River Watershed. The average slope for HEL ground in the Lower Mad River Watershed is 8%. Agricultural production for corn, soybeans, and beef cattle ranks in the upper twenties among Ohio's eighty-eight counties. However, small grain and hay production rank falls to the middle forties among Ohio's counties, showing a need for a cover crop program and extended crop rotations. NRI data from NRCS indicates that average soil loss is approximately 3 tons per acre per year. Tillage transects conducted by NRCS personnel in 2002 show that 85% of the tillage method used is minimum tillage.

Most of the land in Clark County is used for farming practices. The main enterprises are cash-grain farming, livestock production, and dairying. Urban or built-up land makes up 12% of the county and is expanding at a moderate rate. Throughout most of the farmland in the county, a drainage system has been installed in areas consisting of inundated soils to improve crop production. Most soils are well suited for field crops, pastures, and trees. Clark County has 30 different soil types, the majority of which are poorly-drained clays and well-drained loams. In 1992, ODNR identified approximately 750 acres of wetlands within the watershed.

Most of Clark County is nearly level and gently sloping land that is dissected in some areas by small rivers and streams. Wetness is a major limitation affecting the use of many of the soils. The hazard of erosion is generally severe on sloping to steep soils on terminal moraines and along stream valleys.

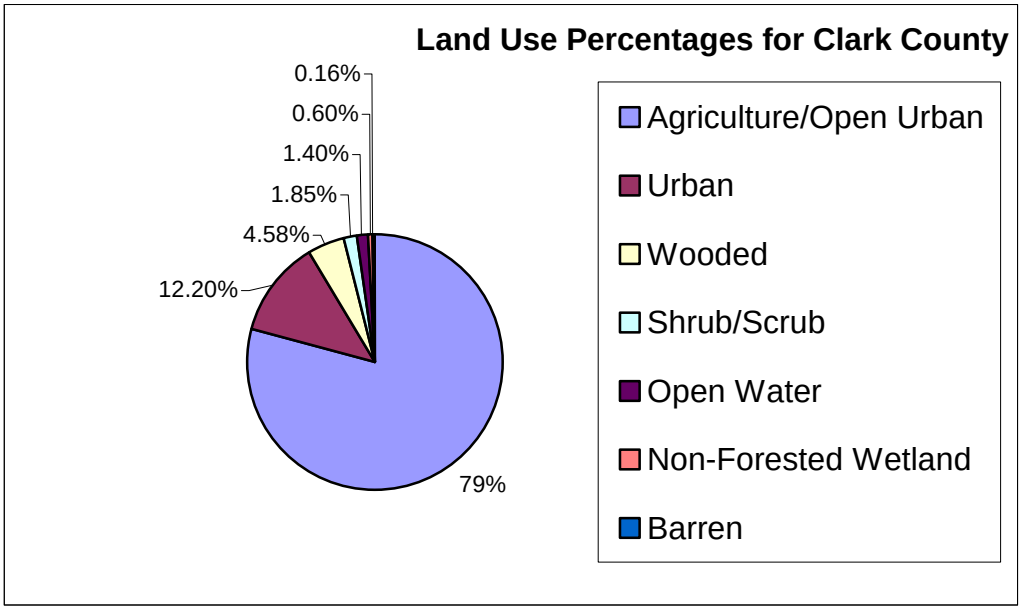
The watershed has a total of 8,539 acres of open space, recreation, and open space links according to the 1993 Miami Valley Open Space Inventory. The major recreation facility is Buck Creek State Park, which totals 4,425 acres. The second largest recreation acreage is the City of Dayton well fields (985 acres) located in Bethel and Mad River Townships. New Reid Memorial Park in the City of Springfield and Clark Lake Wildlife Area are the third and fourth largest open spaces in the watershed. These are highly visible areas in the watershed that provide recreational opportunities such as hiking, boating, fishing, swimming, and camping for western and central Ohio residents.

Source: Clark County Soil Survey

Land Use-Land Cover in the Lower Mad River Watershed

Land Use	Percent
Agriculture/Open Urban	79%
Urban	12.2%
Wooded	4.58%
Shrub/Scrub	1.85%
Open Water	1.4%
Non-Forested Wetland	.6%
Barren	.16%

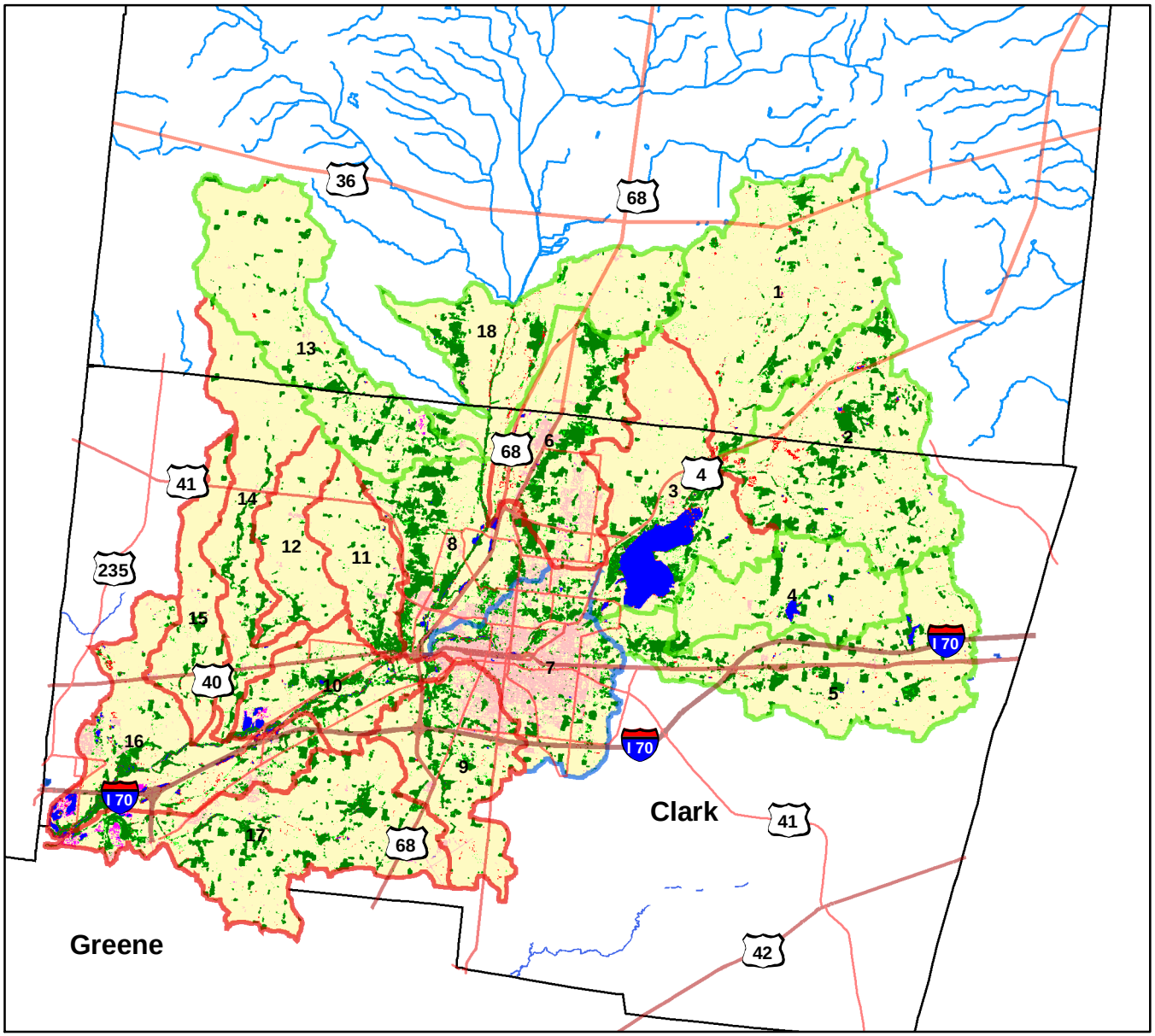
Sources – Customer Service Toolkit (NRCS)
14 Digit Hydrologic Units (NRCS)



Physical Attributes of the Lower Mad River Watershed

Attribute	Sub-Watershed Location
Ditches	Buck Creek above E. Fk. Buck Ck., Donnels Ck., Mad River below Donnels Ck. to above Mud Run
Levees	East Fork Buck Creek, Buck Creek below Beaver Ck. to Mad River, Jackson Creek, Mad River below Nettle Ck. to above Chapman Ck
Stream bank erosion	Sinking Creek, Beaver Creek, Mad River below Buck Ck. to above Donnels Ck., Mad River below Donnels Ck. to above Mud Run
Stream channel classification	The Lower Mad River can be classified as B and C stream type
Miles permanently protected	19 acres (2 miles) on the Mad River next to the Wenrick Wetlands protected by B-W Greenway (Mad River below Donnels Ck. to above Mud Run)
Acres permanently protected	96 acres along Beaver Ck. 601 acres along Mud Run
Natural channel	Begins at State Route 41 and extends southward
Modified channel	Begins at State Route 41 and extends northward to the county line
Dams	Buck Creek below Beaver Ck. to Mad River
Streams with unrestricted livestock	Buck Creek above E. Fk. Buck Ck., East Fork Buck Creek, Sinking Creek, Beaver Creek, Moore Run
Floodplain connectivity	Extensive flood plains are found along the Mad River and many of the related tributaries, such as Buck Creek. Flood plains are particularly extensive along the Mad River southwest of Springfield along I-70 and south to the Clark County line
Expected residential/commercial development	East Fork Buck Creek, Sinking Creek, Beaver Creek, Jackson Creek, Mud Run

Lower Mad River Watershed : Land Use-Land Cover



Legend

Lower Mad River Watershed Boundary

- 1, Buck Creek above E. Fk. Buck Cr.
- 2, East Fork Buck Creek
- 3, Buck Creek below E. Fk. to above Beaver Cr.
- 4, Sinking Creek
- 5, Beaver Creek
- 6, Moore Run
- 7, Buck Creek below Beaver Cr. to Mad River
- 8, Mad River below Chapman Cr. to above Buck Cr.
- 9, Mill Creek
- 10, Mad River below Buck Cr. to above Donnels Cr.
- 11, Rock Run
- 12, East Fork Donnels Creek
- 13, Chapman Creek
- 14, Donnels Creek [except E. Fk. Donnels Cr.]
- 15, Jackson Creek
- 16, Mad River below Donnels Cr. to above Mud Cr.
- 17, Mud Run
- 18, Mad River below Nettle Cr. to above Chapman Cr.
- Urban
- Agriculture/Open Urban
- Shrub/Scrub
- Wooded
- Open Water
- Non-Forested Wetlands
- Barren
- County Boundary
- Rivers and Streams
- Lakes and Ponds
- High Priority
- Medium Priority
- Low Priority

3 0 3 6 9 12 Miles

N W E S

Rolling topography characterizes the rural areas of the Lower Mad River Watershed

Industry and urban development in the Lower Mad River Watershed

Climate

During the winter, the average temperature is 27.8 degrees Fahrenheit (F) and the average daily minimum temperature is 19.0 degrees F. The lowest temperature on record, which occurred in Springfield on January 19, 1974, is –26.0 degrees F. During the summer, the average temperature is 71.0 degrees F and the average daily maximum temperature is 81.0 degrees F. The highest temperature, which occurred on August 21, 1983, is 100 degrees F.

Source: Clark County Soil Survey

Precipitation

An average of approximately 39.0 inches of precipitation falls on Clark County each year. Based on a 30-year record of rainfall data, the average precipitation is about 3.2 inches per month, with February (2.1 inches) typically being the driest month, and June (4.2 inches) being the wettest. There can be, however, extreme variations in some years and in certain months within a year. Such seasonal and yearly extremes, which may have serious consequences, are not apparent from the long-term precipitation information.

The average seasonal snowfall is 9.5 inches. The greatest snow depth at any one time during the period of record was 22.0 inches on February 2, 1978. On average, 9 days per year have at least one inch of snow on the ground. The heaviest 1-day snowfall on record was 8.0 inches on February 16, 1993.

Source: Clark County Soil Survey

Natural Resources

The natural resources in Clark County include ground water, bedrock, and sand and gravel deposits. Clark County has adequate water supplies to meet the needs of small municipal or industrial entities or for farm or home use. Water supplies are available generally in Clark County, either from glacial deposits or Silurian rock formations. Yields from consolidated rocks of Silurian age do not exceed more than 200 gallons per minute and commonly are lower than 50 gallons per minute. Yields from glacial sand and gravel commonly range from about 25 gallons per minute to about 250 gallons per minute. Yields of 500 to more than 1,000 gallons per minute may be developed in permeable sand and gravel deposits adjacent to the Mad River. These deposits are primarily associated with areas of Ross, Tremont, and Warsaw soils. Ground-water conditions are poor in areas of eastern Clark County, where fine sands in the buried Teays Valley deposits may yield as little as 3 to 10 gallons per minute. Small areas in the southwestern part of Clark County, where thin, unconsolidated glacial deposits overlie the interbedded, nonwaterbearing shale and limestone bedrock of Ordovician age, have poor yields.

Limestone and dolomite interbedded with shale are the major components of bedrock in Clark County. These sedimentary rocks from the Silurian and Ordovician systems consist mostly of calcium carbonate or calcium and magnesium carbonate. The rocks of the Niagara group and of Clinton age are the most extensive of the formations that occur near the surface. The Cedarville Dolomite and Springfield Limestone (Lockport Dolomite) of the Niagara group have

been the principal formations quarried at Limestone City, Durbin, and Cold Springs. In 1947, nearly 40,000 tons of limestone was quarried in the county. Today, only the Springfield quarry (west of Springfield) remains open. In 1990, this quarry produced about 121,142 tons of crushed stone for road construction or resurfacing.

Sand and gravel resources of Clark County are part of a larger resource of glacially derived sands and gravels that were deposited within the Great Miami River drainage area. The major portion of these deposits is within the outwash terraces confined to the valleys and tributaries of the Mad River. The total original sand and gravel resource of Clark County is estimated at approximately 5.7 billion tons. Analyses of samples collected from widely spaced deposits throughout the county indicate that most of the remaining undeveloped sand and gravel resources will provide good-quality materials for construction aggregate, base, and fill. The undeveloped resource of sand and gravel in Clark County appears adequate to meet the demands of the region for many years. The remaining extractable resource is mostly in rural areas, where intense land-use competition is not expected to be encountered.

Source: Clark County Soil Survey

Farming

In 1987, there were 812 farms in Clark County. More than 76% of the land in the county was made up of farms. The average farm size was about 239 acres. Most farms ranged from about 10 to 49 acres, but some were smaller than 10 acres and a few were more than 2,000 acres in size. In 1987, the principal crops grown were soybeans, on 60,285 acres; corn, on 58,918 acres; wheat, on 6,863 acres; and hay, on 7,490 acres. Other small grain, pasture, and specialty crops were grown on about 10,700 acres. The area used as woodland, including pastured woodland, was about 11,600 acres in 1987. The acreage of woodland and pasture has decreased in recent years as more areas are converted to cultivated land. The major livestock in the county in 1987 consisted of cattle and calves, hogs and pigs, and chickens.

Source: Clark County Soil Survey

Farm Numbers and Acreages in the Lower Mad River Watershed

Farm Data for Clark County	2002	2001	1999	1998	1997	1995
Number of Farms	800	790	**810**	780	750	760
Average Farm Size (Acres)	231	237	228	233	**252**	251
Total Land in Farms (Acres)	185,00	187,000	185,000	182,000	189,000	**191,000**

From the table above, it can be seen that farm data for Clark County has fluctuated a great deal between 1995 and 2001. The highest statistic for each category has been placed in bold font.

2002 Crop Summary

Crop	Acres Harvested	Yield	Production
Corn for Grain, Bu.	55,500	117.4	6,515,600
Soybeans, Bu.	71,600	34.1	2,438,800
Wheat, Bu.	5,900	55.9	329,800
Oats, Bu.	-	-	-
All Hay, Ton	10,100	2.48	25,000
Tobacco, lb.	-	-	-
Proc. Tomatoes, Ton	-	-	-

Source: Ohio Department of Agriculture, Ohio Agricultural Statistics Annual Report, 2002

2002 Livestock Inventory

Livestock	Number
All Cattle & Calves	10,500
Milk Cows	-
All Hogs & Pigs	14,200
All Sheep & Lambs	-

Source: Ohio Department of Agriculture, Ohio Agricultural Statistics Annual Report, 2002

Transect Data

2002 – 2003 Crop Years

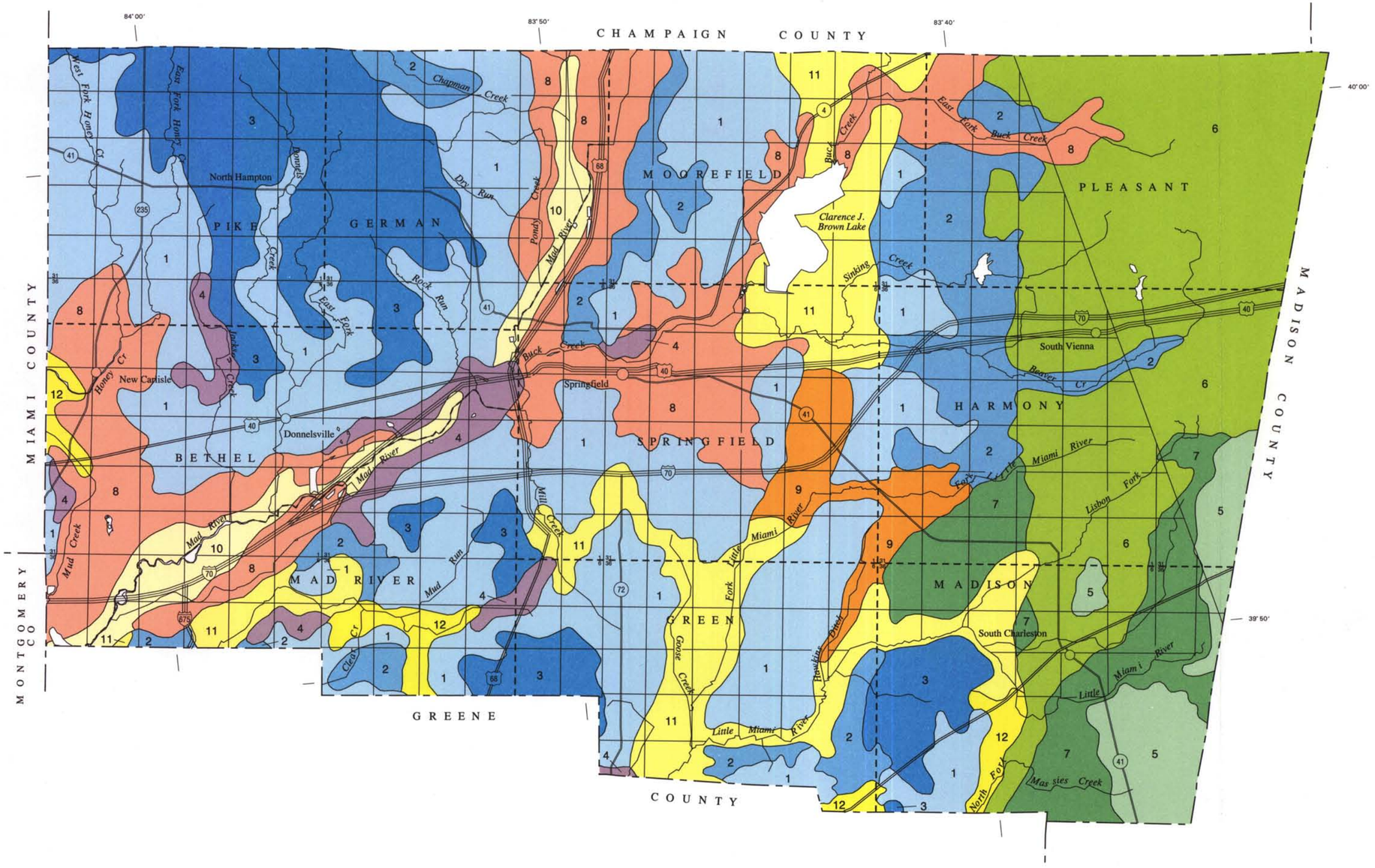
Crop Name	Total Acres Planted	% No-Till	% Conservation Tillage	% Reduced Tillage	% Conventional Tillage
Corn	62,600	31%	7%	16%	46%
Soybeans (full season)	109,494	**53%**	8%	16%	**23%**
Winter Wheat	6,900	99%	0%	0%	1%

Source – NRCS Transect Data

2004 Crop Year

Crop Name	Total Acres Planted	% No-Till	% Conservation Tillage	% Reduced Tillage	% Conventional Tillage
Corn	55,000	30%	17%	6%	47%
Soybeans (full season)	121,000	**83%**	8%	2%	**7%**
Winter Wheat	6,150	98%	0%	0%	2%

Source – NRCS Transect Data



SOIL LEGEND*

VERY DEEP AND MODERATELY DEEP SOILS ON TILL PLAINS AND END MORAINES

- 1 Miamian-Kokomo-Celina Association
- 2 Miamian-Eldean-Kokomo Association
- 3 Crosby-Kokomo-Celina Association
- 4 Miamian-Milton-Millsdale Association
- 5 Kokomo-Strawn-Celina Association
- 6 Strawn-Kokomo Association
- 7 Kokomo-Strawn-Crosby Association

VERY DEEP SOILS ON OUTWASH PLAINS, STREAM TERRACES, VALLEY TRAINS, LAKE PLAINS, AND FLOOD PLAINS

- 8 Eldean-Lippincott Association
- 9 Drummer-Ockley-Eldean Association
- 10 Tremont-Ross-Sloan Association
- 11 Eldean-Ockley-Westland Association
- 12 Westland-Milford-Ockley Association

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1997

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF SOIL AND WATER CONSERVATION
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
OHIO STATE UNIVERSITY EXTENSION

GENERAL SOIL MAP

CLARK COUNTY, OHIO

Scale 1:126720

1 0 1 2 3
MILES

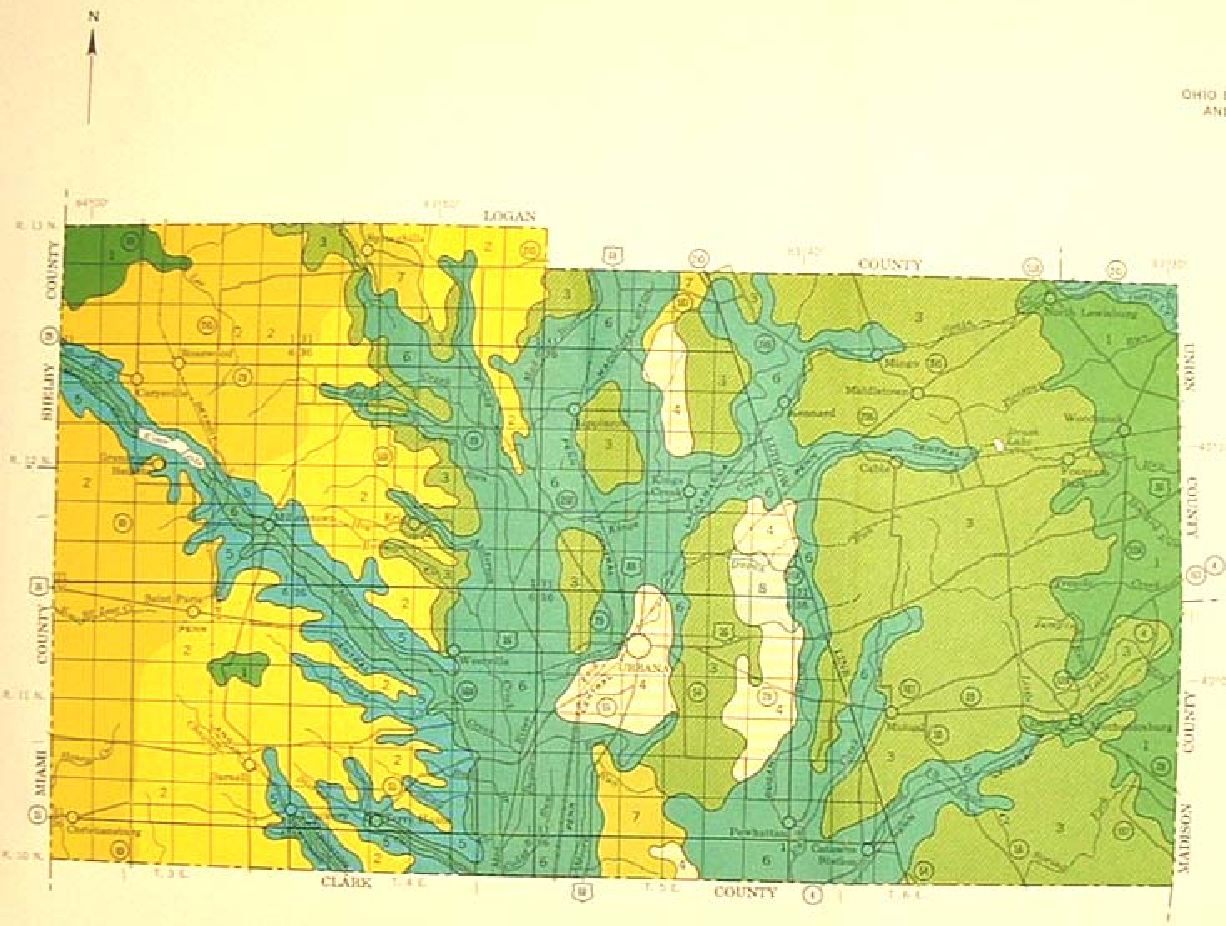
1 0 1 2 3 4 5 6
KILOMETERS

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
OHIO DEPARTMENT OF NATURAL RESOURCES, DIVISION OF LANDS AND SOIL,
AND THE OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

GENERAL SOIL MAP

CHAMPAIGN COUNTY, OHIO



SOIL ASSOCIATIONS

1	Brookston-Crosby association: Nearly level and undulating, very poorly drained and somewhat poorly drained, moderately fine-textured and medium-textured soils on uplands
2	Crosby-Brookston-Celina association: Nearly level and undulating, moderately well drained to very poorly drained, medium-textured and moderately fine-textured soils on uplands
3	Miami-Celina-Brookston association: Undulating to steep, well-drained and moderately well drained, medium-textured soils on uplands; and nearly level or depressed, very poorly drained, moderately fine-textured soils on uplands
4	Miami association: Nearly level to undulating, well-drained, medium-textured soils on uplands
5	Miami (steep) association: Sloping to steep, well-drained, medium-textured soils on uplands
6	Fox-Lippincott association: Nearly level to sloping, well-drained, medium-textured soils on stream terraces, and nearly level or depressed, moderately fine-textured soils on stream terraces
7	Miami-Fox-Casco association: Gently sloping to steep, well-drained, medium-textured soils on moraines and kames
8	Patton association: Level or depressed, very poorly drained, moderately fine-textured soils on old glacial lakebeds
	Glacial boulder belt

July 1969

Agronomy and Soils

More than 180,000 acres, or about 72% of the cropland in the county, was used as cropland and pastureland in 1982, according to the Clark SWCD Resources Inventory. Of this total, nearly 17,400 acres, or about 6.9%, was used as pastureland.

The soils in Clark County vary widely in their suitability for specific crops, and they require widely different management. Certain basic management practices, however, such as maintaining an adequate level of soil fertility, improving existing drainage, controlling erosion, and maintaining or improving soil tilth, are needed on nearly all of the soils in the county. Many of the soils in the county are suited to the crops commonly grown in the area and to some crops that are not commonly grown, such as barley, grain sorghum, popcorn, and sunflowers.

Deep and very deep soils that are characterized by good natural drainage and that warm early in the spring are especially well suited to many vegetables, small fruits, nursery plants, and orchards. These soils include the Eldean, Ockley, Rush, Warsaw, and Waupecan soils that have slopes of less than 6% and that are on terraces and outwash plains. These soils may also occur in low areas where air drainage is poor and frost is earlier and more frequent. These areas generally are poorly suited to some early vegetables, small fruits, and orchard crops. The potential for increased crop production in Clark County is good. The acreage farmed and the yields per acre could both be increased.

Some of the cropland and pastureland in Clark County has been used for urban development. About 12% of the county is urban land. The acreage used for crops and pasture has been affected by the use of land for urban development and other uses. According to the Soil Surveys of Clark and Champaign Counties, on-site septic systems in the watershed are limited by all soil types except, Ockley, Ross, Rush & Waupecan. All other soils are listed have severe sight limitation such as, slow percolation, flooding, shallow bedrock and poor filtration.

Soil drainage is a major management concern on more than 104,000 acres of land in Clark County. This acreage does not include miscellaneous areas or urban land. Also, erosion is a hazard where slopes are more than 2%. Celina and Crosby soils that have slopes of more than 2% are subject to wetness and erosion.

Soil erosion is damaging for two reasons. First, the productivity of the soil is reduced. Second, the water in streams and lakes can become polluted. Erosion of the surface layer is especially damaging on soils that have a clayey subsoil. Celina, Crosby, Eldean, Miamian, and Milton soils are examples. As the surface layer is removed, part of the clayey subsoil is incorporated into the plow layer. The higher clay content in the surface layer reduces soil tilth, resulting in a poorer seedbed. More energy is then required to till the soils, and more fertilizer is needed to replace lost plant nutrients. Soil erosion is also damaging to soils that are moderately deep, such as Milton soils, because it further reduces the root zone. Erosion reduces productivity on soils that tend to be droughty, such as Eldean, Milton, and Rodman soils. The surface layer stores the largest amount of water. Erosion reduces the available water capacity in the surface layer.

Erosion degrades water quality by increasing the amount of sediment in streams. By volume, sediment is the largest pollutant of streams in Clark County. Sediment indirectly degrades water quality because of the organic matter, plant nutrients, herbicides, and insecticides it carries from eroding fields. Controlling erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal and recreational uses and for fish and other wildlife.

Practices that control erosion provide a protective cover of vegetation, reduce the runoff rate, and increase the rate of water infiltration. A cropping system that keeps plant cover on the soil for extended periods reduces the hazard of erosion. Including forage crops of legumes and grasses in the rotation reduces the hazard of erosion, provides nitrogen, and improves tilth. Because the gently sloping Eldean, Miamian, and Strawn soils have short, irregular slopes, erosion is a severe hazard if these soils are farmed using conventional methods. A system of conservation tillage leaves crop residue on the surface, increases the rate of water infiltration, and helps to control runoff and erosion. Contour farming and terraces generally are not practical on these soils because of the short, irregular slopes. Celina, Eldean, Miamian, Milton, Ockley, Rush, Thackery, Warsaw, and Waupecan soils and some alluvial soils are well suited to no-till planting. Eroded phases of Casco, Eldean, Miamian, and Strawn soils are suited for no-till. Crosby, Randolph, Savona, and Waynetown soils are suited for no-till planting if they are adequately drained.

Soil wetness is a major management concern in Clark County. Subsurface and surface drains are used to remove excess water and thus allow tilling and planting early in the spring. Subsurface drains lower the seasonal high water table and thus increase the depth to which plant roots can penetrate. Some of the soils commonly have a seasonal high water table near or above the surface. Natural drainage outlets are generally not available because of the position of the soils on the landscape. If a drainage system has not been provided, these soils are usually too wet for the production of most of the commonly grown crops. The very poorly drained Adrian, Carlisle, Drummer, Kokomo, Linwood, Lippincott, Milford, Millsdale, Patton, Sloan, Wallkill, and Westland soils have a seasonal high water table near or above the surface during part of the year.

Somewhat poorly drained soils, such as Crosby, Randolph, Savona, and Waynetown soils, have a water table in the upper part of the subsoil in winter and spring. Subsurface drainage is needed for most crops. Even if they are drained, these soils generally stay wet longer than the associated very poorly drained soils. Crop growth and yields are generally limited if the soils are not drained.

Celina, Thackery, and Tremont soils are moderately well drained. These soils commonly include areas of wetter soils in seeps and swales and along drainageways. Surface and subsurface drains are effective in these wetter areas.

The design of both surface and subsurface drainage systems varies, depending on the type of soil and the availability of adequate outlets. A combination of surface drainage and subsurface drainage is needed in most areas of very poorly drained and somewhat poorly drained soils that are intensively row cropped. The drains in soils that have slow or very slow permeability should be spaced more closely than those in soils that are more permeable.

Subsurface drainage is slow or very slow in Crosby and Milford soils. Open ditches commonly are used to remove surface water and serve as outlets for subsurface drains.

Organic soils oxidize and subside when the pore space is filled with air. Special drainage systems are needed in areas of these soils to control the depth and period of drainage. Lowering the water table during the cropping season to a level that permits good aeration of the root zone but still supplies the water needed by the plants and raising it to the surface during other times of the year can minimize the oxidation and subsidence of these wet soils.

Soil fertility is naturally relatively low in some of the sandy soils and in the eroded, more sloping soils. In addition, sandy soils retain only a small amount of plant nutrients; therefore, more frequent additions of fertilizers are needed. Soils that commonly are naturally more acid are Celina, Crosby, Ockley, Rush, Savona, Warsaw, Waupecan, and Waynetown soils. The more acid subsoil limits the availability of some plant nutrients. The content of organic matter is moderately low or low in Casco, Strawn, and Rodman soils and in nearly all of the eroded soils. The soils on flood plains, such as Genesee, Ross, Sloan, and Tremont soils, naturally have a higher content of plant nutrients than most of the upland soils. The content of organic matter is moderate or high in the soils on flood plains. The surface layer of many very poorly drained soils is very dark grayish brown or black. The content of organic matter is high or very high in these soils. Special fertilizer may be needed on some soils because of micronutrient deficiencies. Deficiencies may occur in soils that are sandy, have a low content of organic matter, or have a pH of less than 5.5 or more than 7.3. They may also occur in soils that have a surface layer of muck.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soils. Soils that have good tilth are friable and porous. They can be worked easily, provide good seed contact, and allow for quick seedling emergence and strong root growth. Many of the soils on uplands that are used as cropland have a surface layer of silt loam that has a moderate or moderately low content of organic matter. The surface of these soils generally crusts when it dries after a heavy rainfall. The crust is hard, is slow to absorb water, and fractures very little. It reduces the infiltration rate, retards seedling emergence, and increases the runoff rate.

Some dark soils have a surface layer that contains more clay than that of most other soils in the county. Poor tilth is a problem because these soils tend to stay wet until late in spring. These soils can be tilled within only a narrow range in moisture content. If they are tilled when wet, the soils tend to be very cloddy and hard when dry. These clayey soils generally crack when they dry. The cracks increase the rate of water infiltration.

Surface compaction occurs if the soils are tilled or harvested when wet or if they are subject to heavy traffic or heavy loads. Compaction can be prevented by tilling the soils at the proper soil moisture conditions, using minimum tillage, and planting deep-rooted legumes and grasses. Surface compaction limits root growth, reduces water movement, and creates plowpans.

Irrigation is not used to a great extent in Clark County. Generally, rainfall is ample for crop moisture requirements. However, rainfall is commonly not timely or well distributed.

During dry periods, supplemental irrigation could increase yields. Some of the soils in the county are suited to irrigation and can be irrigated if water is available. Eldean, Milton, Ockley, and Rush soils are especially well suited to irrigation.

Field crops suited to the soils and climate of the watershed include many that are not now commonly grown. Corn and soybeans are the main row crops. Grain sorghum, sugar beets, sunflowers, navy beans, and similar crops can be grown. Economic conditions generally determine whether these crops are grown.

Wheat, rye, and oats are the most common close-growing crops. Alfalfa and grass-legume hay are also grown. The soils and climate are suited to barley, buckwheat, and flax and grass seed produced from bromegrass, fescue, timothy, and bluegrass.

Specialty crops grown commercially in Clark County are mainly apples, popcorn, potatoes, carrots, strawberries, and sweet corn. The acreage of such crops could be increased if economic conditions were favorable.

Eldean, Ockley, and Rush soils, and soils that have slopes of less than 6%, have adequate natural drainage, and warm early in spring are especially well suited to vegetables and fruits. Crops can generally be planted and harvested earlier on these soils than on the other soils in the county.

Pasture and hayland make up about 7% of the acreage in Clark County. Most of the soils used as pasture and hayland are on hillsides adjacent to cultivated areas in the less sloping areas. Some of the pasture and hayland is in irregularly shaped areas of occasionally flooded soils. A few woodlots are also pastured, but woodlots generally provide grazing of poor quality because forage plants are sparse.

Most of the soils in the county are suited to the production of high-quality permanent pasture, although yields vary widely. The pasture and hayland generally support bluegrass and tall grasses, such as tall fescue, orchardgrass, and timothy.

The Genesee, Sloan, Tremont, and Ross soils on flood plains are potentially well suited to use as permanent pasture. Occasional flooding during the growing season is less damaging to pasture than to grain crops. These alluvial soils are fertile and have a high available water capacity, and potential pasture yields are high. Soils in sloping to moderately steep areas are commonly eroded, are low in fertility, and have insufficient water available for plants because runoff is rapid. Forage production on these soils is low. Growth is good in the gently sloping areas of the same soils.

Source: Clark County Soil Survey

Woodland

Nearly all of Clark County was forested at the time of the earliest land surveys. The climax forest communities were dominantly beech, oak-sugar maple, and mixed oak on uplands and elm-ash forests in the very poorly drained areas, such as areas of Lippincott and Sloan soils.

In 1982, about 13,700 acres, or 5.5 % of the county, was woodland. Most of this acreage is in small, scattered woodlots on slopes along stream valleys, on flood plains, and in undrained areas on uplands. Most of the woodland has been cut over, and much of it has been grazed.

The potential for increased production of timber is high. If managed well, woodlots are capable of producing high-quality, rapidly growing native hardwoods. In addition, many woodlots could provide firewood, edible nuts, wildlife habitat, aesthetic value, and protection from strong winds.

Some kind of conservation treatment is needed on about 70% of the woodland in the county. The major management concerns are grazing of the woodland by livestock and inadequately stocked timber stands. Timber stand improvement practices, including culling diseased and less desirable trees and cutting and spraying vines, improve the growth rate of favored species. Harvesting mature trees benefits desirable trees by reducing competition and the potential of disease.

Source: Clark County Soil Survey

Wildlife

Wildlife habitat is directly related to soil and land use. Quality, type, and abundance of habitat limit the species and populations in an area. Many species of wildlife exist in Clark County, and most have varied in numbers over the years because of changes in land use. Cottontail rabbits, bobwhite quail, ring-necked pheasants, eastern meadowlarks, and bobolinks were once among the most abundant upland wildlife species. Populations of these species have declined recently, however, because of changes in land use, mainly farming practices. The conversion of pasture and hayland to row crop production, the removal of fencerows, and intensified cropping systems have contributed to the loss of upland wildlife habitat. White-tailed deer populations have increased in recent years, resulting partly from the availability of old pastures and woodlots that are no longer being grazed by livestock. Furbearers, such as red fox, gray fox, raccoon, skunks, opossum, and muskrat, are also relatively abundant. Many species of resident and migratory birds nest in the county. In addition, a few rare wildlife species, such as the spotted turtle and massasauga rattlesnake, also are in the watershed.

Many areas in the valleys of the Mad River and its tributaries provide excellent habitat for all types of wildlife commonly found in the area. These areas also provide habitat and staging areas during waterfowl migration. If proper management is applied, all of the soils in Clark County can be used to provide food and cover for wildlife. Habitat for openland, wetland, and woodland wildlife can be incorporated into a single area to attract the widest variety of wildlife species.

Habitat for wetland wildlife can be further developed in undrained depressions and in old stream meanders on flood plains. Ponds and marshes provide habitat for songbirds, waterfowl, shore birds, and wetland furbearers. Special plantings help to attract waterfowl. Water level management can be incorporated in some of these areas to further enhance the value to wildlife.

Most of the upland soils in the county are well suited to plants that are valuable as wildlife food and cover. Grassland nesting areas are especially critical. Planting grasses and legumes helps to create these areas. Cropland can also be valuable as wildlife habitat if managed properly.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. Soils also affect the construction of water impoundments. If food, cover, or water is missing, inadequate, or inaccessible, wildlife will be scarce or will not inhabit the area.

Source: Clark County Soil Survey

Water Quality

The geology of the Lower Mad River Watershed causes surface and ground water to closely interact. According to studies conducted by the Ohio EPA, the southwestern portion of the Lower Mad River Watershed contains areas where bedrock aquifers are located near the surface and are vulnerable to surface water contamination. In these areas of the watershed, residents experience cloudy drinking water following heavy rainfall. Water quality studies conducted by the Clark County Combined Health District have indicated that residential drinking wells become infiltrated with surface water causing bacterial contamination and elevated nitrate levels. The City of Springfield's well field is listed as a *Source Water Protection Area* and is another area where ground and surface water interact due to large amounts of sand and gravel deposits. The City of Springfield has become involved with the Lower Mad River Watershed Protection Project to advocate proper land use and management to reduce potential surface contaminants from reaching groundwater resources. Ohio EPA studies have indicated that several volatile organic compounds have been detected in the City of Urbana's well field, thus prompting City of Springfield officials to increase and expand groundwater-monitoring programs.

In other areas of the watershed, and specifically in the City of Springfield's Wellhead Protection/Source Water Protection Area, ground and surface water have close interactions due to large amounts of sand and gravel deposits. Recharge to the well field is largely induced by infiltration from the Mad River and Moore Run. Other studies conducted by Ohio EPA have indicated that several volatile organic compounds have been detected in the City of Urbana's well field. The City of Springfield's Water Treatment Plant has great concern with this plume of pollution reaching the city's drinking water supply. To keep watch on this condition, the Lower Mad River Watershed Protection Project, the City of Springfield, and the Miami Conservancy District have established a partnership to create groundwater-monitoring stations in the upper reaches of the watershed to test and evaluate ground water resources for traces of contamination. Through this partnership, groundwater data and trends will be shared between entities to further enhance groundwater protection planning efforts.

Significant Industrial Contributors to the Combined Sewer Systems

Industry Name	Interceptor Drainage	2001 Avg. Flow (GPD)
A & E Powercoating	Buck Creek East	273
Cascade Corporation	Mill Creek	5,132
Community Hospital	Buck Creek East	85,221
Cooper Energy Services	Mill Creek	18,197
Dole	Discharges into interceptor system	324,800
Mercy Medical Center	Buck Creek Northeast	101,441
Metaltek	Buck Creek East	11,728
Rawac Plating Company	Buck Creek Central	69,222
Reiter Dairy	Discharges into interceptor system	121,740
Rittal Corporation	Discharges into interceptor system	32,562
Fuel Systems LLC	Mill Creek	27,477
Springfield Uniform Laundry	Buck Creek East	69,616
Springfield Metal Finishing	Mill Creek	1,122
Teikuro Corporation	Discharges into interceptor system	5,943
2001 Total Industrial Flow (GPD)	1,046,931	
2001 WWTP Avg. Flow (GPD)	15,440,000	

Source – City of Springfield, Ohio CSO Long-Term Control Plan

Ground Water Resources

The largest ground water source in Clark County is the Mad River buried valley aquifer. This aquifer contains outwash sediments deposited by water rushing from the melting glacial ice. Well-sorted sand and gravel deposits help make buried valley aquifers the most productive aquifers of the basin and some of the most productive in the world. Municipal water supplies are withdrawn from this aquifer for the cities of Springfield and New Carlisle, the village of Enon, and the Clark County Water and Sewer District, which serves Northridge, Medway, and Park Layne.

The majority of ground water in Clark County comes from unconsolidated aquifers of sand and gravel. As water moves through the fractured limestone underlying the county, it dissolves and transports minerals contained in the bedrock. The water tends to have high concentrations of calcium carbonate and iron. Many households and municipalities, such as the City of Springfield, treat the water before use or distribution.

Due to the geology of the southwestern portion of the Lower Mad River Watershed, surface and ground water are closely connected. According to information distributed by Bob Moore and Rich Bendula of the Ohio EPA, the Lower Mad River Watershed contains areas where

bedrock aquifers are located near the surface and are vulnerable to surface water contamination. The Ohio EPA and the Clark County Combined Health District have conducted water quality studies to determine inorganic and bacteriological quality of the upland bedrock aquifers. In these areas of the watershed, residents experience water quality problems following heavy rain events. Drinking wells become turbid and some become contaminated with bacteria and nitrates.

Impairments & Critical Areas

Another aspect of water quality in Clark County is sediment loading in streams and rivers. Soil erosion is a continuously occurring, natural process that loosens and transports soil particles. About 830,000 tons of topsoil erode from the county's agricultural land annually. More than 95% of the erosion is on cropland. Runoff and sediment from residential development, construction sites, and agricultural lands, which may enter streams and rivers, carry other pollutants, such as lawn and agricultural chemicals (pesticides and fertilizers), septage, oil and gas from spills, and industrial wastes. Clark County citizens have a major challenge to reduce soil erosion and to protect water resources from pollutants that could affect the quality of the water supply.

The Lower Mad River Watershed is strongly influenced by both agricultural and rural pressures. It is the intent of this project to establish Best Management Practices through incentive programs and demonstration projects to ensure that this beautiful and productive area of Ohio becomes a better place to live, work, and play.

Targeted critical areas for this project include all cropland operations and urban development within 1000 feet of all streams, creeks, and tributaries within the watershed boundaries of the Lower Mad River. Highly Erodible Land (HEL) will be designated as a critical target for the cover crop program. The villages of Enon and Donnelsville will also be targeted for the septic pumping program.

The Non-point Assessment also indicates that the known causes of impairment include habitat alterations, nutrient enrichment, organic enrichment, dissolved oxygen, sedimentation, and flow alterations. It is suspected that crop production practices, urban and surface runoff, and lawn care services are the primary sources that contribute to the degradation of the stream and its tributaries. In this watershed, both agricultural and urban issues need to be addressed.

The Ohio Water Resource Inventory lists organic enrichment/dissolved oxygen, flow alterations, habitat alterations, unionized ammonia, metals, and siltation as causes of impairment in the Mad River Watershed. Major sources of impairment include municipal point source dischargers, channelization, and agriculture. The Lower Mad River Watershed Protection Project is promoting agricultural land use practices that can reduce or eliminate some of these causes of impairment. Coupled with the emphasis on land use practices is the need for timely surface and ground water quality data that can be used to assess the effectiveness of various agricultural best management practices in reducing organic enrichment and siltation.

According to *Water Quality Surveys* conducted by the Lower Mad River Watershed Protection Project during the spring of 2002, watershed residents indicated that point sources of

pollution, such as industrial discharges, mobile home parks, and municipal wastewater treatment plants, were a concern. It is important to note that this watershed is influenced by several point sources discharging into its tributaries. Throughout the watershed there are a total of 9 mobile home parks, 10 industrial facilities, and 8 wastewater treatment plants that are registered to operate under National Pollutant Discharge Elimination System permits. Due to the multiple and diverse influences causing water quality impairments this makes watershed protection and planning efforts a more difficult task.

Causes of Impairment in the Lower Mad River Watershed (OEPA)

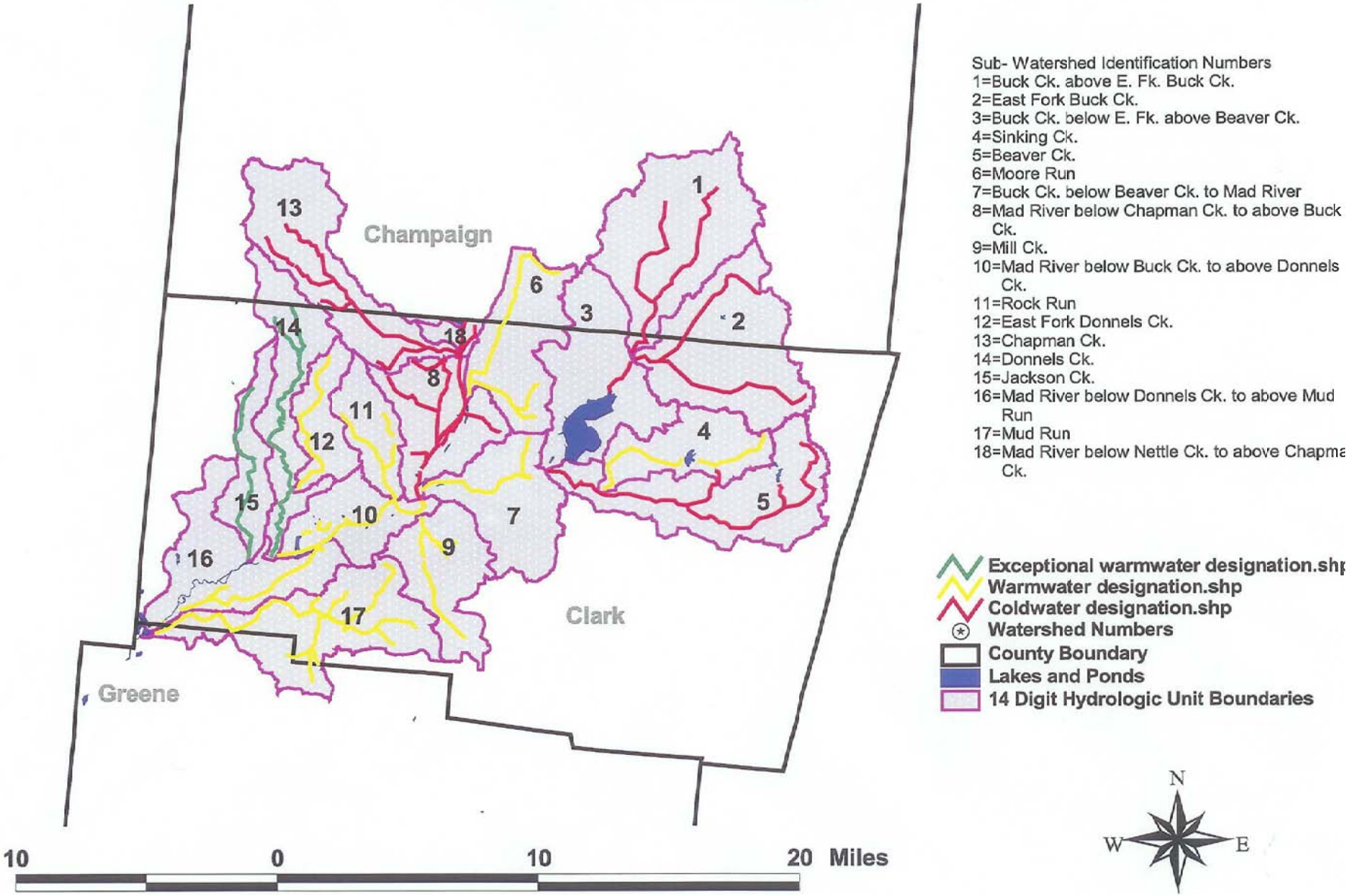
Habitat alteration
Nutrient enrichment
Siltation/sedimentation
Flow alteration
Ammonia
Organic enrichment
Dissolved oxygen
Municipal point source discharges
Channelization
Agricultural production

Contributors to Stream Degradation in the Lower Mad River Watershed (OEPA)

Crop production
Urban and surface runoff
Lawn care services

Lower Mad River Watershed Protection Project

Stream Use Designations



Sub- Watershed Identification Numbers
1=Buck Ck. above E. Fk. Buck Ck.
2=East Fork Buck Ck.
3=Buck Ck. below E. Fk. above Beaver Ck.
4=Sinking Ck.
5=Beaver Ck.
6=Moore Run
7=Buck Ck. below Beaver Ck. to Mad River
8=Mad River below Chapman Ck. to above Buck Ck.
9=Mill Ck.
10=Mad River below Buck Ck. to above Donnels Ck.
11=Rock Run
12=East Fork Donnels Ck.
13=Chapman Ck.
14=Donnels Ck.
15=Jackson Ck.
16=Mad River below Donnels Ck. to above Mud Run
17=Mud Run
18=Mad River below Nettle Ck. to above Chapma Ck.

Exceptional warmwater designation.shp
Warmwater designation.shp
Coldwater designation.shp
Watershed Numbers
County Boundary
Lakes and Ponds
14 Digit Hydrologic Unit Boundaries

OEPA Classifications of Tributaries for the Lower Mad River Watershed Protection Project Area

COLDWATER- Waters that can support coldwater organisms that are known for high water quality. Species are known to be intolerant of pollution, rare, or threatened. Coldwater habitats are unique in Ohio.

- Medway Creek
- Mad River below Chapman Creek to above Buck Creek
- Mad River below Nettle Creek to above Chapman Creek
- Buck Creek (Headwaters to East Fork of Buck Creek)
- Buck Creek (East Fork of Buck Creek to Beaver Creek)
- Beaver Creek
- East Fork of Buck Creek
- Dry Run
- Pondy Creek
- Chapman Creek

EXCEPTIONAL WARMWATER - Waters that are known to support unusual and exceptional aquatic species known for high water quality. Characteristics for this class are known for high species diversity, intolerant to pollution, rare, threatened, or endangered.

- Jackson Creek
- Donnels Creek

WARMWATER- Waters show characteristics of typical warm water aquatic organisms. Species diversity is not as great and organisms are known to be more tolerant of pollution.

- Buck Creek (Beaver Creek to Mad River)
- Mad River below Donnels Creek to above Mud Run
- Mad River below Buck Creek to above Donnels Creek
- Smith Ditch
- Mud Run
- East Fork Donnels Creek
- Rock Run
- Miller Creek
- Sinking Creek
- Dugan Ditch
- Kenton Creek
- Moore Run
- Mill Creek

Lower Mad River Watershed Stream Data

Stream Code	Stream Name	Flows Into	County (at mouth)	Length (miles)	Elevation (sources)	Elevation (mouth)	Avg. Fall (ft./mile)	Drains (sq. miles)
301.2901	Mud Run	Mad River	Greene	12.1	976	804	14.2	27.4
301.2904	Jackson Ck.	Mad River	Clark	4.8	990	847	29.8	9.56
301.2905	Donnels Ck.	Mad River	Clark	11.6	1146	852	25.4	26.4
301.290501	E. Fk. Donnels Ck.	Donnels Ck.	Clark	3	1005	930	25	9.1
301.2906	Rock Run	Mad River	Clark	3.7	1062	883	48.4	9.1
301.2907	Mill Ck.	Mad River	Clark	3.6	997	887	30.6	15.5
301.2908	Buck Ck.	Mad River	Clark	15.5	1080	890	12.2	141
301.290801	Beaver Ck.	Buck Ck.	Clark	14.5	1210	951	17.8	39.7
301.29080101	Sinking Ck.	Beaver Ck.	Clark	6.4	1160	1005	24.2	13.9
301.290802	E. Fk. Buck Ck.	Buck Ck.	Clark	6.4	1100	1025	11.7	28.8
301.2910	Moore Run	Mad River	Clark	8.1	1050	925	15.4	18.3
301.2911	Chapman Ck.	Mad River	Clark	10	1166	938	22.8	24.4

Source: Gazetteer of Ohio Streams (2001)

Total Use Attainments for the Lower Mad River Watershed

Number of miles in full attainment	49
Number of miles in partial attainment	14
Number of miles in non-attainment	17.6
Number of miles not assessed	50.9

Source: OEPA 305(b) Data

Prioritization of Tributaries & Watersheds by LMRWPP Joint Board of Supervisors

The 1999 section 319 grant received by the Lower Mad River Joint Board of Supervisors had several water quality improvement components. Many of these components funded best management practices to be established on lands of the watershed. The Joint Board expressed a need to fairly and systematically rate applications to implement these programs. The system was developed by utilizing aquatic life use designations from the Ohio EPA combined with land use activities and location in the watershed. Technical representatives from Clark & Champaign SWCD/NRCS assigned a point rating system for location and type of practice and amount of pollution reduced.

High Priority Area:

- Medway Creek
- Buck Creek (All headwaters above C.J. Brown Reservoir)
- Beaver Creek
- Mad River
- Donnels Creek
- Jackson Creek
- Dry Run
- Pondy Creek

Medium Priority Area:

- Dugan Ditch
- Sinking Creek
- East Fork Donnels Creek
- Miller Creek
- Smith Ditch
- Moore Run

Low Priority Area:

- Mill Creek
- Rock Run
- Kenton Creek
- Minnich Ditch
- Buck Creek (Beaver Creek to Mad River)

Proposed Future Stream Uses/Proposed Buck Creek Development

A project has been proposed that will release more water from the C.J. Brown Reservoir into Buck Creek, which will increase the water level to allow white water canoeing through the City of Springfield. This project may entail the demolition of 3 dams in Buck Creek within the City of Springfield. The increased flow and creek depth may also encourage more swimming in Buck Creek.

Another proposed project involves riverfront development along Buck Creek in the area adjacent to the Springfield Art Museum, located near the Fountain Avenue overpass. This project would require demolition of the dam in Buck Creek near the art museum property. This proposed development would not necessarily affect current stream uses of Buck Creek because it would involve mainly construction of restaurants and scenic walkways around the museum. Under this proposal, Buck Creek would only be used for its aesthetic value.

Source: City of Springfield, Ohio CSO Long-Term Control Plan

Expected Road/Highway/Bridge Construction & Development in the Lower Mad River Watershed

Source - Clark County Transportation Plan (2004)

Project	Project Description	Type	Sub-Watershed
IR675	Greene Co. line to IR70	Reconstruction/Lane addition	Mud Run
SR4	Belmont Ave. to north corporation limit	Reconstruction	Buck Ck. below Beaver Ck. to Mad River
SR4/SR369 Interchange	Interchange upgrade	Upgrade	Mad River below Buck Ck. to above Donnels Ck.
SR334	Extend west to Upper Valley Pk.	New roadway	Mad River below Chapman Ck. to above Buck Ck.
SR369	SR4 to US40	Operational improvements	Mad River below Buck Ck. to above Donnels Ck.
Burnett Rd. Extension	Columbus Ave. to SR4 (Belmont Ave.)	New roadway	Mill Ck.
Derr Rd.	Villa Rd. to Moorefield Rd.	Widening	Moore Run
Derr Rd. Extension	Extend north to Willow Rd.	New roadway	Moore Run
Leffel Lane Extension	Springfield-Xenia Rd. to Dayton Rd.	New roadway	Mill Ck.
Old Columbus/ Vernon Asbury	Intersection improvement	Operational improvement	Sinking Ck.
Possum Rd. Extension	W. Possum Rd. to Springfield-Xenia Rd.	New roadway	Mill Ck.
Possum Rd. Extension	SR72 to Springfield-Xenia Rd.	New roadway	Mill Ck.
Tremont City Rd.	Extend east to Derr Rd. extension	New roadway	Moore Run
Urbanization of City Streets	Springfield	Curb, gutter, sidewalk	Buck Ck. below Beaver Ck. to Mad River &Mad River below Chapman Ck. to above Buck Ck.

Commercial & Residential Development in the Lower Mad River Watershed

Building Permits Granted in 2004

	January	February	March	April
Commercial	9	9	15	13
Residential	22	24	72	69

Source: Clark County Division of Building Regulations, Permit Statistics

Total Numbers of Permits Granted (1999-2003)

	1999	2000	2001	2002	2003
Commercial	126	152	102	120	118
Residential	743	671	712	750	592

Source: Clark County Division of Building Regulations, Permit Statistics

Demographic Data for Clark & Champaign Counties

Population

Area	2000 Population	1990 Population
Clark County	144,742	147,548
Bethel Township	18,962	19,580
German Township	7,663	7,467
Harmony Township	3,548	3,395
Mad River Township	11,828	11,189
Moorefield Township	11,402	9,621
Pike Township	3,891	3,784
Pleasant Township	3,134	2,700
Springfield Township	13,424	13,352
City of Springfield	65,358	70,487
Champaign County	38,890	N/A

From the Population Table above, it can be seen that the total population of Clark County has experienced a –1.9 % decrease since 1990. The City of Springfield has seen serious decline in population while Bethel Township has experienced a slight incline.

Age (Clark Co.)

Age	Number	Percent
Under 5 years	9,480	6.5
5 to 9 years	10,091	7.0
10 to 14 years	10,403	7.2
15 to 19 years	20,553	14.2
20 to 24 years	10,699	7.4
25 to 34 years	8,824	6.1
35 to 44 years	17,681	12.2
45 to 54 years	21,115	14.6
55 to 59 years	7,960	5.5

60 to 64 years	6,599	4.6
65 to 74 years	10,873	7.5
75 to 84 years	7,796	5.4
85 years and over	2,593	1.8

Source: Clark Co. Planning Commission, U.S. Census Bureau 2000 Census Data

Age (Champaign Co.)

Age	Number	Percent
Under 5 years	2,544	6.5
5 to 9 years	2,875	7.4
10 to 14 years	2,931	7.5
15 to 19 years	2,862	7.4
20 to 24 years	2,026	5.2
25 to 34 years	5,049	13.0
35 to 44 years	6,130	15.8
45 to 54 years	5,505	14.2
55 to 59 years	2,316	6.0
60 to 64 years	1,745	4.5
65 to 74 years	2,526	6.5
75 to 84 years	1,768	4.5
85 years and over	612	1.6

Source: U.S. Census Bureau 2000 Census Data

Education Levels (Clark Co.)

Education Attainment	Percent
No high school diploma	19
H.S. graduate	40
Some college, no degree	21
Associate degree	6
Bachelor's degree	9
Graduate or professional degree	5

Source: Clark Co. Planning Commission, U.S. Census Bureau 2000 Census Data

Education Levels (Champaign Co.)

Education Attainment	Percent
High school graduate	82.3
Bachelor's degree or higher	10.6

Source: U.S. Census Bureau 2000 Census Data

Income Levels (Clark Co.)

Income in 1999 Households	Number	Percent
Less than $10,000	4,855	8.6
$10,000 to $14,999	3,584	6.3
$15,000 to $24,999	8,065	14.2
$25,000 to $34,999	7,834	13.8
$35,000 to $49,999	10,451	18.4
$50,000 to $75,000	11,843	20.9
$75,000 to $99,999	5,622	9.9

$100,000 to $149,999	3,339	5.9
$150,000 to $199,999	575	1.0
$200,000 or more	552	1.0
Median Household Income ($)	**$40,340**	

Source: Clark Co. Planning Commission, U.S. Census Bureau 2000 Census Data

Income Levels (Champaign Co.)

Income in 1999 Households	Number	Percent
Less than $10,000	989	6.6
$10,000 to $14,999	1,111	7.4
$15,000 to $24,999	1,709	11.4
$25,000 to $34,999	2,080	13.9
$35,000 to $49,999	2,764	18.4
$50,000 to $75,000	3,702	24.7
$75,000 to $99,999	1,636	10.9
$100,000 to $149,999	766	5.1
$150,000 to $199,999	154	1.0
$200,000 or more	99	0.7
Median Household Income ($)	**$43,139**	

Source: U.S. Census Bureau 2000 Census Data

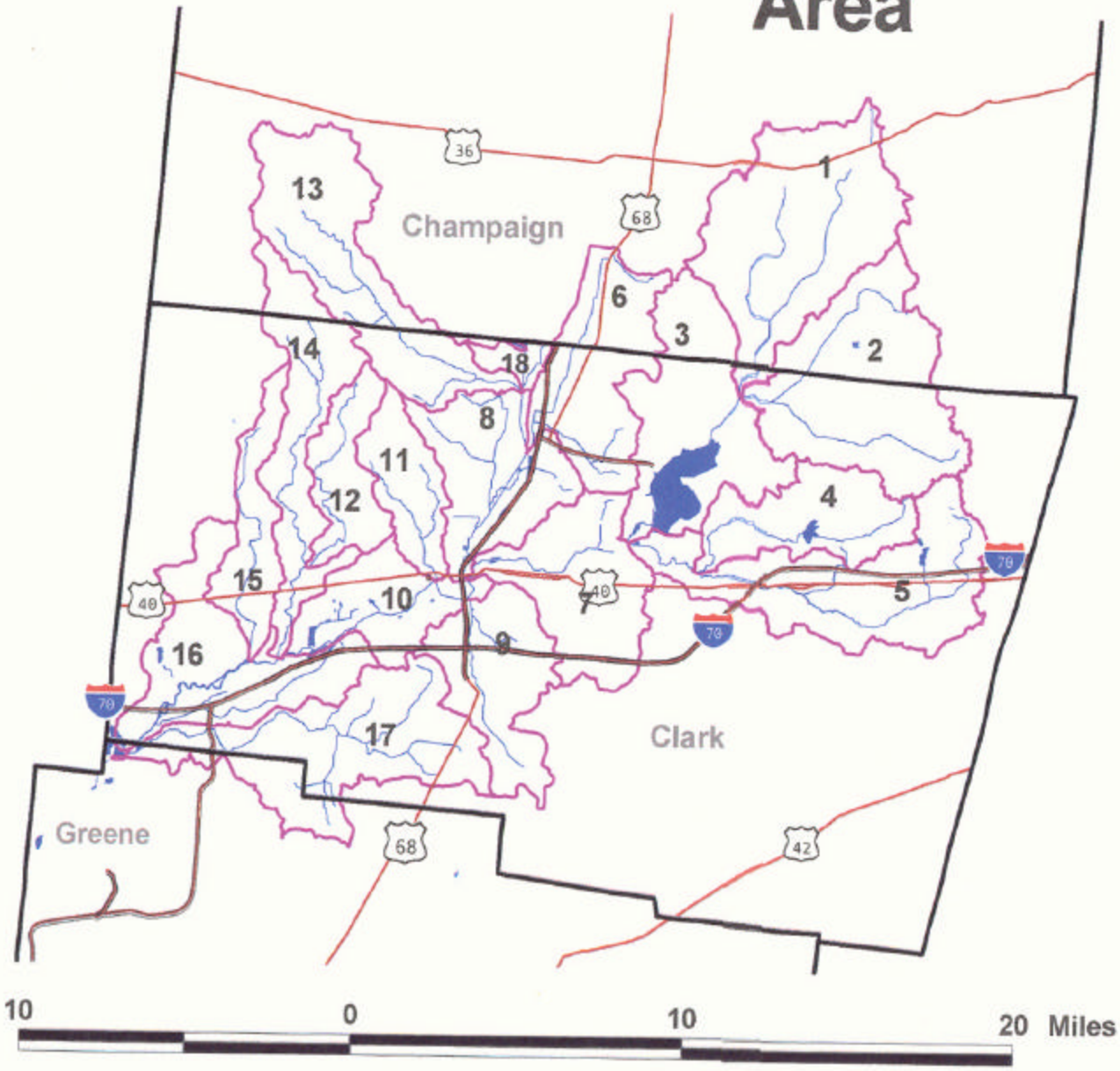
Recreation

The soils in Clark County are generally well suited for recreational development. The soils dominantly are very deep, are nearly level to gently sloping, and do not have many large stones or a high content of small stones. Most are not subject to flooding and do not have a clayey or sandy surface layer. Many wooded and hilly areas along stream valleys can provide scenic areas for camping, hiking, picnicking, and many other forms of outdoor activities. Well drained soils on flood plains have good potential for use as nature study areas, picnic areas, and paths and trails. Below is a list of recreational areas located in the Lower Mad River Watershed:

Recreational Areas in the Lower Mad River Watershed

City of Dayton Well Fields
C.J. Brown Reservoir
Clark Lake Wildlife Area
Crystal Lakes
Forest Hills Par 3 Golf Course
Mitchell Hills Golf Club
National Links Golf Course
New Reid Memorial Park
Northwood Hills County Club
Reid Golf Course
Rocky Lakes Golf Course
Snyder Park Golf Course
Springfield County Club
Windy Knoll Golf Course

Lower Mad River Watershed Protection Project Area



Sub-Watershed Identification Numbers
1=Buck Ck. above E. Fk. Buck Ck.
2=East Fork Buck Ck.
3=Buck Ck. below E. Fk. above Beaver Ck.
4=Sinking Ck.
5=Beaver Ck.
6=Moore Run
7=Buck Ck. below Beaver Ck. to Mad River
8=Mad River below Chapman Ck. to above Buck Ck.
9=Mill Ck.
10=Mad River below Buck Ck. to above Donnels Ck.
11=Rock Run
12=East Fork Donnels Ck.
13=Chapman Ck.
14=Donnels Ck.
15=Jackson Ck.
16=Mad River below Donnels Ck. to above Mud Run
17=Mud Run
18=Mad River below Nettle Ck. to above Chapman Ck.

Watershed Numbers
County Boundary
Roads
Primary road with limited access
Primary road without limited access
14 Digit Hydrologic Unit Boundaries
Rivers and Streams
Lakes and Ponds

N
W E
S

Section C. Project Structure, Organization, & Administration

Administrative Borders

Clark County – 171,561.54 acres (79%)
Champaign County – 45,604.96 acres (21%)
Total Watershed Acreage - 217,166.5

Villages
Catawba (Clark Co.)
Donnelsville (Clark Co.)
Enon (Clark Co.)
Lawrenceville (Clark Co.)
North Hampton (Clark Co.)
South Vienna (Clark Co.)
Tremont City (Clark Co.)
Mechanicsburg (Champaign Co.)
Mutual (Champaign Co.)

Townships
Bethel (Clark Co.)
German (Clark Co.)
Harmony (Clark Co.)
Mad River (Clark Co.)
Moorefield (Clark Co.)
Pike (Clark Co.)
Pleasant (Clark Co.)
Springfield (Clark Co.)
Goshen (Champaign Co.)
Salem (Champaign Co.)
Wayne (Champaign Co.)
Union (Champaign Co.)
Urbana (Champaign Co.)

Districts
Clark Soil and Water Conservation District
Champaign Soil and Water Conservation District
National Trails Parks and Recreation District (Clark Co.)
Clark County Park District
Clark County Combined Health District
Clark County Waste Management District

School Districts:

Clark-Shawnee Local School District (Clark Co.)
Greenon Local School District (Clark Co.)
Northeastern Local School District (Clark Co.)
Northwestern Local School District (Clark Co.)
Springfield City Schools (Clark Co.)
Mechanicsburg Schools (Champaign Co.)
Urbana City Schools (Champaign Co.)

Mission Statement

The mission of the Lower Mad River Watershed Protection Project is to improve the quality of life for residents by promoting the wise stewardship of the natural resources within the Lower Mad River Watershed. This goal will be achieved by implementing conservation practices and services, such as cover crops, filter strips, septic tank pumping, education, and public awareness. The primary effort of the LMRWPP consists of the completion, implementation, and demonstration of the Watershed Action Plan.

Cover crops have an important role in successful sustainable farming systems. Cover crops greatly benefit the soil and other crops, but are not intended to be harvested for feed or sale. Soil quality and fertility improvements can be seen after the use of a cover crop. Water and wind erosion is reduced, decreasing the amount of soil lost during the winter, fall, and early spring. Cover crops also have the ability to suppress weeds and control insects. Annually, 750 acres of cover crops will be incorporated into crop rotation. Soil erosion will be reduced by 7,900 tons per year.

The installation of filter strips is another conservation practice offered by the watershed protection project. Filter strips are land areas that consist of either planted or indigenous vegetation. Filter strips are situated between a surface-water body that receives runoff and a potential pollutant-source. Sediment, plant nutrients, and pesticides are carried into surface-water bodies by runoff. Filter strips provide water quality protection by reducing the amount of sediment, plant nutrients, and pesticides contained in the runoff and prevents the runoff from entering the water body. Vegetation covering the land area also protects the soil from erosion. One hundred and twenty (120) acres of grass and/or tree filter strips will be established.

Homeowners residing in the Lower Mad River Watershed have the opportunity to participate in the septic tank pumping program. Financial assistance is available to assist in pumping home septic systems and also to install risers. The watershed project also has a goal of helping residents pump 300 septic tanks. The project reimburses the homeowner for 75% of the total cost of pumping and 50% of the cost of installing risers. An additional goal is to protect 600 feet of streambank with bioengineering practices, such as willow staking.

Process for Defining Goals & Objectives

Inventory information used for defining goals and objectives was taken from windshield surveys and field observations made by the LMRWPP coordinator and Clark SWCD and NRCS personnel. Since the inception of the Lower Mad River Watershed Protection Project, stakeholders and landowners have been given numerous opportunities to provide input about critical areas within the watershed needing addressed. Clark SWCD and NRCS personnel as well as the LMRWPP Joint Board of Supervisors also provide input concerning areas facing water quality issues. All comments and suggestions from stakeholders and landowners are considered when making final decisions. The Joint Board of Supervisors meets monthly to discuss financial issues and review project activities. The Joint Board makes all final decisions concerning the watershed project's activities and objectives and also makes all final decisions concerning project approvals and spending of project funds.

Objectives

The work plan of the Lower Mad River Watershed Protection Project targets all of the known non-point source causes of water quality impairment. The Joint Board of Supervisors and Advisory Board are concerned about siltation from both urban and agricultural runoff and are addressing them through the cover crop program, urban construction site best management practice demonstrations/workshops, the urban wetland demonstration site, the storm drain marking project, bioengineering streambank erosion control demonstration sites/workshops, and the filter strip program.

The Lower Mad River Watershed Protection Project is jointly organized by the Clark & Champaign Soil & Water Conservation Districts. Since its inception in October 2000, The Lower Mad River Watershed Protection Project has taken great strides in implementing several conservation practices aimed at improving water quality through a 1999 319 - Ohio EPA grant. To date, 861.70 acres of stream side agricultural lands have been enrolled in the Winter Cover Crop Program, 91 acres of CRP grassed waterways, 62.36 acres of 319 grass filter strip and 342 acres of CRP filter strip have been established, 182 homeowners have had their on-site septic systems pumped & evaluated, a 1-acre demonstrational urban stormwater wetland has been established to reduce the amount of NPS pollution entering the Mad River, and 1 bioengineering erosion control project has been completed.

Mismanagement of septic tanks is another concern of project representatives. Improperly managed septic systems have the potential to pollute and contaminate water resources. A mismanaged septic system can also be a threat to public health. The Advisory Board will address this issue by providing a cost share program for the pumping of septic tanks. A questionnaire will be completed by participants to measure before and after attitudes of septic system management.

The educational component of this watershed project will include the publication of a semi-annual newsletter, one video, three field days, and six workshops. These educational efforts provide instruction, build interest and enthusiasm, and create adoption of best management practices. In addition to the educational program, volunteers will complete weekly

water testing samples on designated sections and compile data as an in-kind contribution to the LMRWPP.

LMRWPP Goals of 1999 Section 319 Grant

Establish 95 acres of grass filter strips and 25 acres of tree filter strips to reduce soil erosion.

Establish 750 acres of cover crops each year to reduce soil erosion. Priority will be given to HEL acres located 500 feet from tributaries.

Pump 300 septic tanks and educate homeowners on proper on-site septic system management to prevent contamination of water resources.

Design and install one urban storm water wetland to Improve stormwater runoff by trapping sediments and slowing and treating runoff before it is discharged into the Mad River. Educate residents on the utilization of wetlands

Assist landowners with the establishment of grass cover on exposed land surfaces to reduce soil erosion on rural and urban lands.

Design and install 600 feet of streambank protection to reduce soil erosion. Demonstrate the benefits of bioengineering to rural and urban landowners.

Reduce soil erosion by 7,900 tons per year. (current loss is 3 tons per acre per year)

Watershed Restoration Action Strategies

Public Outreach

An Advisory Board will be assembled to meet quarterly with the Joint Board of Supervisors. The Advisory Board will be comprised of landowners, residents, agricultural leaders, government agencies, college faculty, and fish and wildlife enthusiasts. Sub-committees will be appointed to address education, public outreach, demonstration projects, and additional funding. Elected county and township officials will be encouraged to actively participate with the project.

Monitoring & Evaluation

Sites will be selected throughout the watershed to monitor changes in water quality. Area high schools will be selected to participate with stream monitoring. Chemical analysis and macroinvertebrate sampling methods will be the primary source of monitoring. Windshield surveys will be taken throughout the watershed to assess any changes in water quality. The watershed coordinator will work closely with the OEPA, NRCS, Clark and Champaign County Health Departments, and Clark and Champaign County SWCDs to keep informed of any water quality issues pertaining to the watershed. Data will be collected and analyzed throughout the

duration of the project to note any changes in water quality and to identify possible sources of pollution.

Water Quality & Natural Resource Goal Problems

The problems that need to be addressed within the Lower Mad River Watershed are habitat alterations, nutrients, organic enrichment, and flow alteration. These areas of concern will be addressed by promoting and applying BMPs on agricultural lands and working closely with municipalities and urban residents to promote wise use of soil and water conservation. The watershed coordinator will coordinate activities with government agencies and watershed residents and landowners. Critical areas within the watershed will be targeted to install buffer strips and streambank stabilization practices. Educational efforts will be made in urban areas to promote the wise use of fertilizer and herbicides applied to lawns, parks, and golf courses.

Actions to be Taken

Siltation, nutrients, and habitat alteration causes will be addressed by installing grass filter strips, tree filter strips, and cover crops utilizing 319 funds. Additional buffer strips will be installed under NRCS buffer initiative programs. Streambanks will be stabilized utilizing approved bioengineering practices. An urban wetland will be installed as a demonstration site. Civil organizations will be enlisted to conduct storm drain stenciling in the City of Springfield. Educational programs and incentives will be initiated for homeowners with private septic systems.

Schedule for Implementation

The installation of buffer strips will be an ongoing project. NRCS and Clark SWCD will work in cooperation to install 500 acres of buffer strips per year for 3 years. Funding will be provided through 319 funds and CRP. Seven hundred and fifty (750) acres of cover crops will be established yearly and funded with 319 grant funds. An urban stormwater wetland will also be constructed with 319 grant funds. Storm drain stenciling will be funded through the 319 grant, local contributions, and in-kind support.

Funding Needs

Funding for these projects will be provided through Section 319 Grant Funds, USDA Conservation Reserve Program (CRP), and local in-kind contributions. Solicitations will be made to local businesses to supplement wetland, septic, and demonstration projects. Applications for state and local grants will be submitted to secure additional funds for water quality restoration projects in the Lower Mad River Watershed.

Partnerships

A Joint Board of Supervisors and the Advisory Board were established to address water quality issues within the Lower Mad River Watershed. Many local partners also worked with the watershed project to address areas and issues of concern. A list of Joint Board and Advisory Board members and local partners can be found below.

Lower Mad River Watershed Protection Project Joint Board of Supervisors

Name	Organization	Address	Phone
Paul Snyder	Clark SWCD Board Member	2489 Liberty Rd. New Carlisle, OH 45344	(937) 845-9233
Alan Donaldson	Clark SWCD Board Member	9206 Haddix Rd. Fairborn, OH 45324	(937) 878-5590
David Stickney	Clark SWCD Board Member	5490 Neer Rd. South Vienna, OH 45369	(937) 828-1035
John Ritter	Clark SWCD Board Member	525 Moorefield Rd. Springfield, OH 45503	(937) 327-7332
Mike Phelps	Champaign SWCD Board Member	1590 W. St. Rt. 36 Urbana, OH 43078	(937) 652-3095

Lower Mad River Watershed Protection Project
Joint Advisory Board

Name	Organization	Address	Phone
Tom Allen	Trout Unlimited/Fly Fishing Representative	3413 Foxcroft Dr., Lewis Center, OH 43035	N/A
Larry Berner	Clark & Champaign Co. Farmer/Landowner	911 Tremont City Rd. Springfield, OH 45502	(937) 399-1079
Matt Berner	Clark & Champaign Co. Farmer/Landowner	4820 River Rd. Springfield, OH 45502	(937) 399-5835
Jim Campbell	National Trails Parks & Recreation District	76 East High St. Springfield, OH 45502	(937) 328-7275
Ed Everman	ODNR, DSWC	10025 Amity Rd. Brookville, OH 45309	(937) 854-1772
Kim Farr	NRCS	4400 Gateway Blvd. Springfield, OH 45502	(937) 328-4600
Ann Gayek	National Trails Parks & Recreation District	76 E. High St. Springfield, OH 45502	(937) 328-7275
Andrea Zacharias	Champaign SWCD	1512 S. US Highway 68 Ste. E100	(937) 484-1507
Steve Hall	NRCS	1363 Burnett Dr. Xenia, OH 45385	(937) 373-4478
Phyllis Hill	Clark SWCD	4400 Gateway Blvd. Springfield, OH 45502	(937) 328-4600
Sarah Hippensteel	Miami Conservancy District	38 E. Monument Ave. Dayton, OH 45402	(937) 223-1278
Randy Hoover	ODNR, Division of Wildlife	N/A	N/A
Dana Hurst	Champaign Co. Farmer	7295 State Rt. 4 Mechanicsburg, OH 43044	(937) 834-2216
Bob Ingoldsby	Clark Co. Combined Health District	529 E. Home Rd. Springfield, Ohio 45503	(937) 390-5600
George McConkey	Clark SWCD	4400 Gateway Blvd. Springfield, OH 45502	(937) 328-4600
Bart Neer	Clark & Champaign Co. Farmer/Landowner	9087 Jones Rd. South Vienna, OH 45369	(937) 568-4212
Chris Rapenchuck	Army Corps of Engineers	2630 Croft Rd. Springfield, Ohio 45503	(937) 325-2411
Mike Ross	Land Developer	3590 Mechanicsburg Rd	(937) 215-0111
Joe Sargeant	Champaign Co. Health Department	1512 S. U.S. Highway 68 Urbana, OH 43078	(937) 484-1605
Doug Schafer	Champaign Co. Farmer/Landowner	4911 Pisgah Rd. Urbana, OH 43078	(937) 484-3574
Chris Simpson	Clark SWCD	4400 Gateway Blvd. Springfield, OH 45502	(937) 328-4600
Hugh Trimble	OEPA Southwest District	401 East Fifth St. Dayton, OH 45402	(937) 285-6444
Tim Weaver	City of Springfield	2100 Lagonda Ave. Springfield, OH 45503	(937) 525-5800

Local Partners

Name	
Art Halterman	Champaign Co. Farmer/Landowner
Bart Neer	Clark Co. Farmer/Landowner
Bill Runyan	Clark Co. Farmer/Landowner
Blair McConkey	Clark Co. Farmer/Landowner
Bob Clark	Clark Co. Farmer/Landowner
Bob Rinker	Clark Co. Farmer/Landowner
Brett Davis	Clark Co. Farmer/Landowner
Dale Hardacre	Clark Co. Farmer/Landowner
Dale Stewart	Clark Co. Farmer/Landowner
Dana Hurst	Champaign Co. Farmer/Landowner
Dave Stickney	Clark Co. Farmer/Landowner
David Bussert	Clark Co. Farmer/Landowner
Doug Funderburg	Champaign Co. Farmer/Landowner
Doug Schafer	Champaign Co. Farmer/Landowner
Greg Powell	Clark Co. Farmer/Landowner
Jeff Channell	Clark Co. Farmer/Landowner
Jim Clem	Clark Co. Farmer/Landowner
Jim Duvall	Clark Co. Farmer/Landowner
Jim Timmons	Clark Co. Farmer/Landowner
John Shuman	Clark Co. Farmer/Landowner
Ken Lokai	Clark Co. Farmer/Landowner
Larry Berner	Clark Co. Farmer/Landowner
Matt Berner	Clark Co. Farmer/Landowner
Larry Mullins	Clark Co. Farmer/Landowner
Mick Russell	Champaign Co. Farmer/Landowner
Mike Terry	Champaign Co. Farmer/Landowner
Phil Steele	Clark Co. Farmer/Landowner
Ray Steele	Clark Co. Farmer/Landowner
Sam Shuey	Clark Co. Farmer/Landowner
Todd Bumgarder	Clark Co. Farmer/Landowner
Tom Roberts	Clark Co. Farmer/Landowner
Tom Troxell	Clark Co. Farmer/Landowner

B-W Greenway

The mission of the B-W Greenway Community is to educate the public about the value of wetlands and the importance of connecting the Beavercreek and Wenrick Wetlands with a greenway; to promote sustainable use of land within the B-W Greenway Community while balancing human and wildlife needs; and to protect, preserve, and steward open space for farming, recreation, habitat, and watershed management.

B-W Greenway Goals

Connecting wetlands
Protecting surface and ground water
Preserving farmland
Developing a "sense of place"

Tecumseh Land Trust

The Tecumseh Land Trust of Greene and Clark Counties is a private, not-for-profit conservation organization. Its purpose is to preserve agricultural land, open space, and historic structures in voluntary cooperation with landowners and their heirs, and to educate the public about methods of private land conservation. It was founded in 1990 to promote thoughtful community planning to preserve rural land. The Tecumseh Land Trust is directed by a 15-member volunteer board that meets monthly. The Tecumseh Land Trust is supported by annual donations from its 158 members.

The Tecumseh Land Trust has sponsored or co-sponsored more than a dozen educational forums, tours, and conferences. These programs have focused on land-use planning, conservation, estate planning, and land protection techniques. The Tecumseh Land Trust regularly keeps these landowners (and others in Clark County) informed of relevant state and federal legislation and how other states are preserving agricultural lands.

Farmland Preservation Easements protected by the Tecumseh Land Trust (Clark Co.)

Acreage	Township	Sub-Watershed Location
96	Harmony	Beaver Creek
136	Mad River	Mud Run
150	Mad River	Mud Run
160	Mad River	Mud Run
155	Mad River	Clear Creek (tributary to Mud Run)
Total Easements = 697		

Section D. Public Involvement & Support

During initial public meetings, attendees expressed concerns and visions about their watershed and the water resources present. The watershed project coordinator attended and participated in several public forums to expose the watershed project to local governing officials and also to discover the public's thoughts and feelings about the quality of their watershed.

Meetings Attended for Public Input & Involvement

1. Danis Landfill Proposal 12/18/00 100+ people in attendance
   Meeting held in the Chapman Creek sub-watershed
   - Groundwater contamination issues
   - Chapman Creek biological integrity
   - Problems with current landfill

2. Ohio EPA NPDES Permit Hearing for Danis Landfill 01/26/01
   Meeting held in the Chapman Creek sub-watershed
   - Flooding from landfill runoff
   - Groundwater contamination
   - Chapman Creek and Mad River degradation

3. Pleasant Twp. 02/06/01 12 people in attendance
   Meeting held in the East Fork Buck Creek sub-watershed
   - Concern with landfill proposal/ Darby Wildlife Refuge
   - Farmland preservation
   - Flooding concerns and stream bank erosion & beaver dams on Buck Creek
   - Poor planning for housing & subdivisions

4. Harmony Twp. 02/08/01 6 people in attendance
   Meeting held in the Beaver Creek sub-watershed
   - Septic systems and pumping program information
   - Landowners to contact/Newsletter for promotion
   - Harmony is known for failed on-site system & straight pipe to Beaver Creek

5. Springfield Twp. 02/13/01 30 people in attendance
   Meeting held in the Mill Creek sub-watershed
   - Rapid urbanization/ Construction site runoff
   - Septic systems in Possum Woods, Forest Hills, Holiday Valley, Alberfelda, Deber Estates
   - Houses flooding
   - Stream erosion

6. Bethel Twp. 02/14/01 35 people in attendance
   Meeting held in the Donnels Creek sub-watershed
   - High nitrates in drinking water
   - Logjams and litter in many creeks
   - Urbanization along Donnels Creek/ Sanitary sewer needed for Donnelsville
   - Mosquitoes in stagnant ditches
   - Extensive flooding, especially along Cooper Ditch & Mud Creek in Park Layne

7. Lions Club of North Hampton 02/26/01 29 people in attendance
   Meeting held in the East Fork Donnels Creek sub-watershed
   - Livestock/agricultural runoff
   - Urbanization of North Hampton
   - Improper discharge of gray water from homes

8. Pike Twp. 03/06/01 7 people in attendance
   Meeting held in the Donnels Creek sub-watershed
   - Urbanization/construction site runoff/poor planning of sites
   - North Hampton on sanitary sewer (worked with City of New Carlisle)
   - Monies needed for cattle-exclusion fencing
   - Like their rural nature and open space/farm land preservation

9. German Twp. 03/24/01 12 people in attendance
   Meeting held in the Moore Run sub-watershed
   - Agricultural land flooding
   - Forest Hills subdivision septic systems
   - Annexation of Township land *"We don't want nothin' to do with Springfield"*
   - Danis Landfill in Tremont City
   - Poor on-site septic systems in Forest Hills & Tremont City

10. 1st Annual Lower Mad River Watershed Canoe Float 06/15/01 37 people in attendance
    Meeting held in the Mad River below Donnels Ck. to above Mud Run sub-watershed
    - Canoe float was held to bring local officials, landowners, and other stake holders together to see the importance of the Mad River to our community
    - ODNR Div. of Wildlife gave the group a presentation about the fish species that inhabit the Mad River ecosystem
    - Newspaper article was published for the event in the Springfield News-Sun (6/16/01)
    - Excellent feedback was given to continue with this activity

11. Clark County Fair 07/22/01 – 07/28/01
    Meeting held in the Beaver Creek sub-watershed
    - "Watershed Awareness" theme for fair booth display
    - Visitors had the opportunity to locate which watershed they lived in
    - After they located their watershed, we explained the watershed project that was being implemented there
    - Many septic pumping applications were given out and processed due to this exposure

12. Meeting with Clark Co. Engineers & Roberta Ober 10/23/01 7 people in attendance
    - Meeting held in the Beaver Creek sub-watershed
    - Stream bank erosion occurring on feeder stream to Beaver Creek
    - Landowner (Mrs. Ober) concerned with stormwater runoff from Holiday Hills subdivision
    - Engineering plans did not call for any stormwater control practices

13. Union Twp. Trustees 04/04/02 8 people in attendance
    Meeting held in the Buck Creek above E. Fk. Buck Creek sub- watershed
    - Poor planning for development/urbanization
    - Septic systems in Village of Mutual & Highland Hills
    - Loss of open space and farmland- notified watershed project of landowners who farm in Buck Creek Watershed
    - Promoted septic pumping program

14. In efforts to begin creating a Watershed Action Plan, surveys were distributed to Mad River watershed residents to collect input on their perceptions and activities leading to water quality impairments. The results are listed below:
    - Residents felt that the overall quality of streams, creeks, and water resources in the Lower Mad River Watershed was good (compared to excellent and poor)
    - Residents believed that urbanization/residential development and industrial discharge were the land use activities that impair the waters of the Lower Mad River Watershed
    - Residents identified financial assistance, pollution prevention education, and stream bank erosion as activities/programs that should be addressed for watershed protection
    - Residents indicated that they would like to receive further information relating to the watershed project

15. Donnels Creek Sub-Watershed/On-site Septic Planning Meeting 04/10/02 35 people in attendance
    - Meeting was held at the Donnelsville Post Office
    - Meeting was held to discuss the septic system problems in Donnelsville
    - A Waste Water Treatment Plant (WWTP) Advisory Board was assembled by the Village Council to seek further information regarding the installation of a WWTP
    - County & State Agencies gave presentations on the water quality of Donnels Creek and the current conditions of on-site systems
    - Residents expressed a definite need for sanitary septic system due to soil conditions, close proximity of homes, poor drainage, and failed systems
    - Residents also concerned with stream bank erosion and effluent discharge going into creek. Many children play along and in creek.
    - Residents were uninformed of the current water quality in the Village of Donnelsville
    - Village is located in a targeted area for the LMRWPP
    - Village Council is still in progress with WWTP

16. Northridge 29 Subdivision Meeting 04/11/02 15 people in attendance
Meeting held in the Buck Creek below E. Fk. above Beaver Creek sub-watershed
- Meeting was held with homeowners who were concerned with this new development in the Northridge subdivision
- Homeowners were concerned with flooding and stream erosion with this development on site and down stream on Kenton Creek
- Developer Terry Hoppes explained the engineering and the practices that would be installed
- County Planning has a plan to develop bike paths in the entire development and connect them with the current system. This development is needed to facilitate this plan.

17. Stream Monitoring Workshop 04/16/02 12 people in attendance
Workshop conducted in the Buck Creek below E. Fk. Buck Creek and Buck Creek below Beaver Ck. to Mad River sub-watersheds
- City of Springfield 4th grade teachers and curriculum director attended this training to learn about the Lower Mad River Watershed and ecological issues
- Springfield City Schools began a crayfish curriculum to teach children about macroinvertebrates and water quality
- LMRWPP Coordinator gave a presentation about the Lower Mad River Watershed Project and the aquatic species that thrive in the Mad River
- Discussions were held concerning the current concerns and issues that threaten the integrity of the Lower Mad River Watershed
- Most teachers were unaware that the Mad River had been channelized in its upper reach and left in its natural channel here. Discussion was held concerning flooding and streambank erosion along feeder creeks and main channel

18. Natural Heritage Social for Medway/New Carlisle Area 05/16/02 42 people in attendance
Meeting held in the Mad River below Donnels Ck. to above Mud Run sub-watershed
- Local agencies and greenway groups planned the meeting to meet with residents of the Crystal Lakes/Medway & New Carlisle area
- Residents participated in an interactive exercise that encouraged them to think about the enjoyable attributes their local area possessed. They then had to give feed back regarding the problems present in their area
- Crystal Lakes residents wanted assurance that the water in the “glacial lakes” would be protected. The lakes draw many people to the area for recreation
- Crystal Lakes residents had a sense of pride concerning the rare “glacial/kettle lakes”
- They felt ordinances and enforcement need to be initiated to improve their area
- A study by Wright State University was done in 1996-1998

19. City of Springfield Combined Sewer Over Flow Bi-Monthly Meetings
    Discussed issues in the Beaver Creek, Mad River below Chapman Ck. to above Buck Ck., and Buck Creek below Beaver Ck. to Mad River Sub-Watersheds
    - Meetings are currently being held to develop a long term CSO control plan for the City of Springfield
    - CDM has begun a study of the CSO affects on Buck Creek and Mill Run
    - Site visits have been made to locate the CSO discharge sites
    - Documentation has been made to observe the use of Buck Creek and the degree of human impact

20. RUDAT/Buck Creek Improvement group meetings
    Meeting held in the Buck Creek below Beaver Ck. to Mad River sub- watershed
    - The purpose of this group is to beautify the portion of Buck Creek flowing through the City of Springfield

21. 2nd Annual Lower Mad River Watershed Canoe Float 07/12/02 44 people in attendance
    Held in the Mad River below Donnels Ck. to above Mud Run sub-watershed
    - Participants were asked what they considered to be Critical Natural Resource Issues in the Lower Mad River Watershed:
        Point Source Pollution
        Waste Water Outflow from Sewage Treatment Plant
        Dump Sites
        Impact of Landfills on Water Resources
        Gravel Pits
        Dense Development in Rural Area
        Approval of Septic Systems in non-adequate sites
        Stormwater & Farm Runoff
        Modification & Loss of Habitats
        Stream Bank Erosion
        Channelization
        Non-Point Source Pollution
        Nutrient Loading of Water Resources
        Siltation
        Quality of Groundwater & Surface Water
        Wetland Quality & Quantity
        Aquifers

    - Areas & Points of Pride in the Lower Mad River Watershed:
        C.J. Brown Reservoir
        Coldwater Habitats
        Recreational Opportunities
        Stormwater Wetland
        Wenrick Wetland
        George Rogers Clark Park
        Clark Lake
        Educational Opportunities for Local Students
        Conservation Practices (Buffers and Conservation Tillage)

22. Stakeholder Meeting 04/17/03 7 people in attendance
Meeting held in the Beaver Creek sub-watershed

- Clark SWCD distributed surveys to local landowners, residents, and educators prior to this meeting. The purpose of the survey was to identify and address the public's opinion on natural resource issues and areas of the community that would benefit from natural resource conservation assistance. 41 surveys were completed and returned. Survey results are listed below:

- Participants were asked what they considered to be Critical Natural Resource Issues:
  - Stormwater Management
  - Animal Waste Management
  - Land Use Changes
  - Water Quality
  - Re-urbanization
  - Brownfields
  - Septic Systems

- Areas of Concern in the Lower Mad River Watershed:
  - East Fork Buck Creek
  - Little Miami
  - Mud Run
  - Chapman Creek
  - Donnels Creek
  - Mad River @ Eagle City Road
  - Mad River between Lower Valley Pike and Snyder Road

23. Earth Day Awareness Presentation 04/22/03 20 people in attendance
Meeting held in the Buck Creek below Beaver Creek to Mad River sub-watershed

- Presented to the Conservation Club at Wittenberg University in Springfield, OH.
- LMR Watershed Coordinator and Clark SWCD staff gave presentation to the students about storm drains and their importance
- Students were unaware that storm drain water empties into local creeks and streams
- Students then labeled storm drains throughout the campus to prevent dumping of chemicals, trash, etc. into the storm drains

24. Stakeholder Meeting for Pleasant and Moorefield Township and Champaign Co. landowners
Meeting held in the Sinking Creek sub-watershed 07/13/04 7 people in attendance

- Stakeholders were mailed a copy of the watershed plan prior to this meeting
- They were asked to comment on the information presented in the plan and to make suggestions as to issues needing further addressing
- They were asked to give their opinions of the water quality in their sub-watershed:
  - Water quality has improved over the last 25 years due to improved farming practices, such as no-till, and more restricted livestock access

- Critical natural resource issues:
  - Lack of maintenance of creek and adjacent areas
  - Bank stabilization
  - Some trees need to be removed – causing logjams
  - Lots of sediment in creek
  - Water flows wildly – need of water retention structures to slow water down
  - High velocity causing bank erosion
  - Remove sand bars
  - Drainage problems
  - Beaver dams along McConkey Rd. and State Route 54
  - "Everyone should do their part to protect the creek"
  - Water pollutants – lawn chemicals, highly concentrated livestock
  - "Not at sediment pollution can be contributed to farmers"
  - Stormwater management on Upper Valley Pike – loss of pervious surfaces
  - Catawba WWTP – discharging into creek
  - Mechanicsburg Sand & Gravel operation – residents are concerned
  - "Farmers do own most of the land in Clark Co., but we shouldn't be blamed for water quality impairments, we are trying to improve it"

- Proposed remedies:
  - Provide a cost-share program to watershed residents for creek bank stabilization using riprap, not willow staking
  - Allow watershed residents to make water quality standards – they are more aware of the impairments, causes, and sources
  - Champaign & Clark Co. should work together to improve Buck Creek
  - Install water retention structures

25. Stakeholder Meeting for German, Moorefield, Pike, & Springfield Township landowners
    Meeting held in the Rock Run sub-watershed 07/15/2004 8 people in attendance
    - Stakeholders were mailed a copy of the watershed plan prior to this meeting
    - They were asked to comment on the information presented in the plan and to make suggestions as to issues needing further addressing
    - They were asked to give their opinions of the water quality in their sub-watershed
    - Areas of concern:
      - Chapman Creek meanders and erodes into crop fields
      - Sediment buildup in Moore Run is making the creek shallower
      - Along State Route 68, Springfield's WWTP is discharging into the Mad River

    - Critical natural resource issues:
      - Drainage issues
      - Water moving too rapidly downstream
      - Loss of pervious surfaces
      - 80% of farmers allow their cattle to access the creek
      - Channelization of Mad River
      - Stakeholders would like to see more water quality tests completed
      - No recent OEPA water quality data
      - Lawn chemical and industry runoff into creeks

Litter present in creeks
Logjams and sediment building up in creeks
Clark Co. officials should work more closely with Clark SWCD & LMRWPP
"We all live downstream from somewhere"
Clark County Commissioners are promoting and supporting the development of residential housing instead of agriculture

- Proposed remedies:
  - The LMRWPP should provide programs that cost-share for tiling systems, cattle-exclusion fencing, flood retention structures to allow the gradual release of water downstream, and rock structures
  - Clark County Engineers Office should work more closely with Clark SWCD to ensure proper design of projects and maintenance of roadside ditches
  - The LMRWPP should host workshops to educate landowners who do not have agricultural backgrounds
  - Continue to promote on-site septic system maintenance
  - Continue to promote grass and tree filter strips

26. Stakeholder Meeting for Bethel & Mad River Township landowners
    Meeting held in the Mud Run sub-watershed 07/21/04 7 people in attendance

- Stakeholders were mailed a copy of the watershed plan prior to this meeting
- They were asked to comment on the information presented in the plan and to make suggestions as to issues needing further addressing
- They were asked to give their opinions of the water quality in their sub-watershed
  - Residential applications of lawn chemicals have caused minnow and crayfish kills in Jackson Creek

- Critical natural resource issues:
  - Storm water management/runoff in subdivisions
  - Village of Donnelsville sewer system
  - Application of lawn chemicals
  - Residential development
  - Mud Run is in need of dredging, water gets backed and floods over banks
  - Logjams
  - Eroded banks
  - Water softener salt contaminating septic systems and wells
  - Salt used for road de-icing is entering Mad River
  - High nitrate levels in the water from lawn chemical application, not agricultural applications
  - Residents changing their motor oil in the street

- Proposed Remedies
  - Continuation of the establishment of filter strips
  - Construction of retention basins to slow water down
  - Oversight of residential lawn chemical applications
  - Educate homeowners about lawn chemical applications
  - Promote the use of no-till farming practices to reduce soil erosion

Apply for grants to help with storm water management
Bethel Township is working with the Clark Co. Engineer's Office to dredge silt out of the Mad River from Interstate 70 to State Route 40 and cleaning out storm drains and catch basins
Purchase easements along the Mad River and place them under County maintenance

LMRWPP Funding Sources

Source	Services Provided
Section 319(h) Nonpoint Source Program Grant	Grant monies
Ohio Department of Natural Resources	Grant monies for watershed coordinator grant
National Trails Parks & Recreation	Provide in-kind cooperation and support of educational activities and field days.
Miami Conservancy District	Provide in-kind cooperation and support of educational activities and field days.
Clark Soil & Water Conservation District	Provide in-kind technical support and educational activities
Champaign Soil & Water Conservation District	Provide in-kind technical support and educational activities
Clark & Champaign Co. Landowners/Farmers	Provide in-kind cooperation and support for conservation projects

Phase II Storm Water Communities (Clark Co.)

City of Springfield
Village of Enon
Village of Lawrenceville
Bethel Township
German Township
Mad River Township
Moorefield Township
Springfield Township

Phase II Storm Water Activities in 2003 (Clark Co.)

Objective	Activity	Lead Party
NPS pollution education to middle & high school students	Enviroscape Model Presentations	Clark SWCD
Educate school audiences ages 9-12 on water quality	Nature Camp Program	Clark SWCD
Provide training to teachers for NPS pollution prevention	Earth Day Teacher Workshop	Clark SWCD
Sponsor multi-county event addressing water quality, NPS pollution prevention, environmental issues	Multi-county High School Envirothon	Clark SWCD
Earth Day activities	"Gearing Up for Earth Day" Workshop	Clark SWCD
Produce outreach materials to include NPS pollution prevention, focusing countywide	7 newsletters and newspaper articles distributed	Clark SWCD
Storm Drain Stenciling Program	Stenciled 100 storm drains throughout Clark Co.	LMRWPP
Septic Tank Pumping Program	Provided cost-share to 150 residents to pump septic tanks and included an informational packet	LMRWPP

Education & Outreach

Clark and Champaign SWCDs offer many educational opportunities for area students and residents. The Education Coordinator for each District is responsible for giving presentations to local schools concerning the importance of conservation. Adult education programs are offered as well, including an annual pond management clinic. Clark and Champaign SWCDs also publish a quarterly newsletter to inform area residents about conservation issues and projects taking place in Clark County. In addition, Clark SWCD holds an annual planning meeting and invites Clark County resides to share their views and opinions about conservation priorities and issues. Below is an overview of educational programs presented to students and teachers in the Lower Mad River Watershed (Clark County) through the duration of the 319 Grant.

	2001-2002 School Year	2002-2003 School Year
Number of students served	6,210	4,000
Number of teacher workshops	9	3
Number of individual classrooms served	210	180

Source – Clark SWCD data

The Watershed Action Plan was presented to various stakeholders whom attended meetings held throughout the watershed. The published Watershed Action Plan will be available to watershed residents at the Clark County Public Library and Clark SWCD office. Any updates made to the Watershed Action Plan after publication will be supplied to entities on the distribution list.

Outreach

Students from Kenton Ridge High School helped improve water quality of the Mad River by marking storm drains in Northridge. These storm drain markers inform Northridge residents that debris and chemicals dumped into the storm drains directly enter the Mad River and Buck Creek

Canoe Float participants gather around the LMRWPP Storm Water Wetland to learn about the importance of wetlands

Sample storm drain markers used to label storm drains throughout the Lower Mad River Watershed

Canoe Float participants enjoy a scenic ride down the Mad River

Past and Present Conservation Efforts

The following entities provided technical information and support to the LMRWPP to aid in conservation efforts:

Clark SWCD personnel have been actively involved in creating the **NPDES Phase II Storm Water Management Plan** for Clark County. The purpose of this plan is to stimulate a reduction in stormwater amounts.

Chemistry students from **Clark State Community College** conducted extensive studies on two sub-watersheds located in the Lower Mad River Watershed. These students contributed water quality information pertaining to Buck Creek above East Fork Buck Creek and Mad River below Nettle Creek to above Chapman Creek.

NRCS provides financial incentives and cost-share programs for Clark County residents including CRP (grassed waterways, filter strips, riparian buffers, and shallow water wetlands) EQIP, WRP, and FIP.

Clark SWCD provides technical support for NRCS cost-share programs and also provided environmental education programs and workshops to local schools and educators.

The LMRWPP coordinator created questionnaires and distributed them to **local landowners and stakeholders**. As a result of this survey, landowners and stakeholders designated the following as natural resource concerns in the Lower Mad River Watershed: Danis Landfill, pipes discharging into Buck Creek and Mad River throughout the City of Springfield, stormwater management issues, CSOs, and an increase in the amount of impervious surfaces, such as parking lots.

LMRWPP Programs for Watershed Residents

Grass Filter Strip Program

Tree Filter Strip Program

Cover Crop Program

Septic Pumping Program

Bioengineering Erosion Control Program

1999 section 319 Grant Progress Report

Completed and demonstrated Watershed Action Plan

Designed and installed 1 urban storm water wetland

Marked 800 storm drains with help from area high school and college students

Established 66.76 acres of grass filter strip

Established 10.2 acres of tree filter strip

Established 1,360 acres of cover crops

Purchased 1 straw mulcher to promote construction site stabilization

Purchased 1 tree planter to reduce soil erosion

Provided cost-share funding to pump 181 septic tanks

Conducted 2 watershed field days to educate watershed residents

Distributed 2,500 informational newsletter to watershed residents

Successful Activities

Best management practices implemented through the LMRWPP received an overwhelming response from watershed residents. Numerous landowners enrolled in the septic pumping program, the cover crop program, and the grass/tree filter strip program. These programs have not only educated landowners about the importance of conservation practices, but have also contributed significantly to the improvement of water quality in the Lower Mad River Watershed. In addition, Canoe Floats held annually by the LMRWPP also received a tremendous amount of support from local government officials and personnel.

In the summer of 2002, Clark SWCD received the *Buffer Ohio Award* for its outstanding achievements in establishing filter strips and buffers. The Lower Mad River Watershed Protection Project was instrumental in receiving this award by promoting streamside programs to targeted landowners.

Local stakeholder and landowner involvement has been successful in guiding the watershed project towards creating and developing a Community- Based Watershed Action Plan. Educational programs and teacher workshops have and will continue to be conducted to train educators on the effects of NPS pollution and its relationship to water quality.

Winter Cover Crop Program

Winter Cover Crops established along Buck Creek (Champaign County)

Winter Cover Crops established along Buck Creek (Champaign County)

Winter Cover Crops established along Beaver Creek

Grass Filter Strip Program

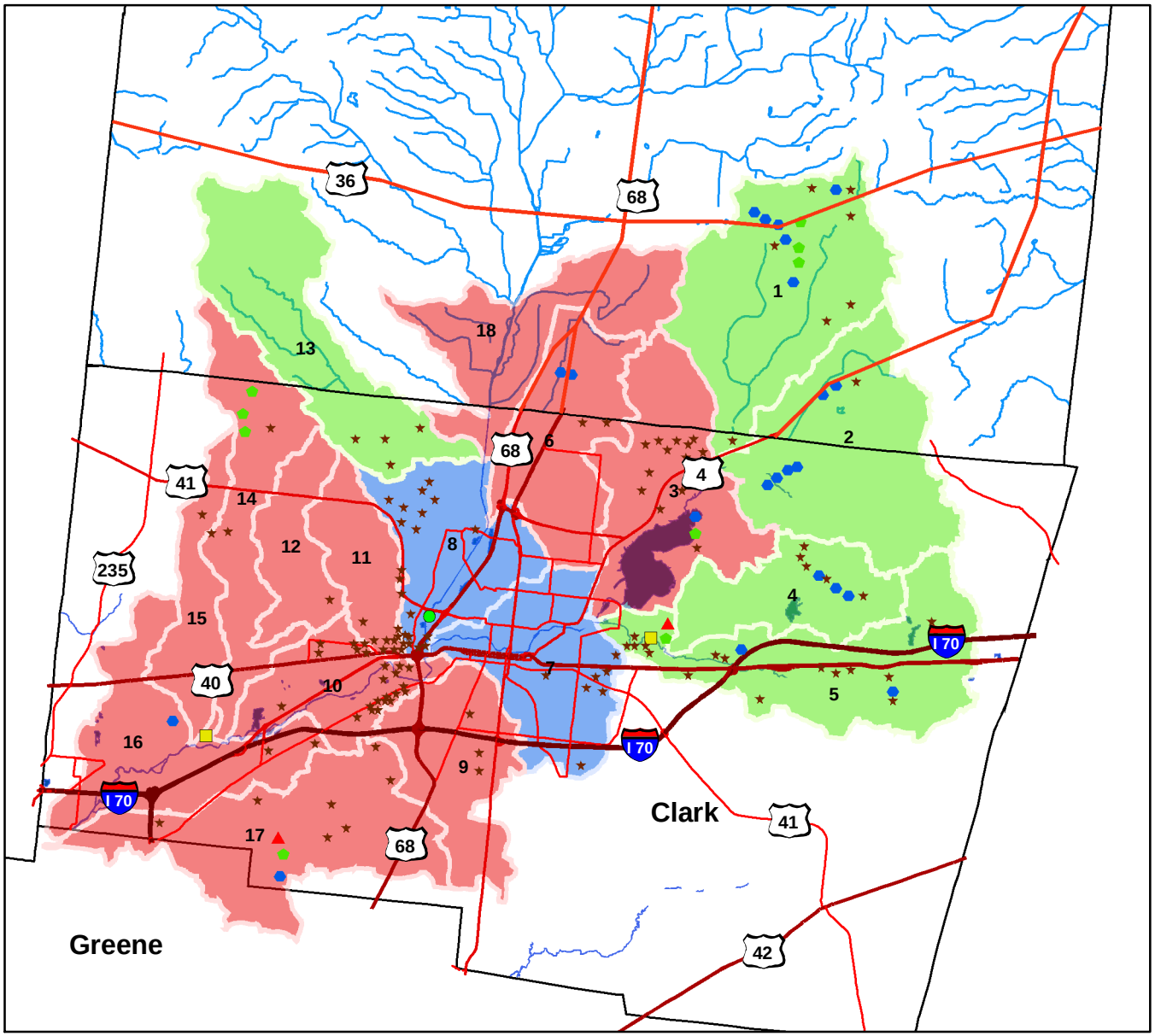
Grass filter strip established along Buck Creek (Champaign County)

Grass filter strip established along Donnels Creek (Clark County)

Bioenginnering Erosion Control Project

Stream Bank Stabilization Project established on Beaver Creek

Lower Mad River Watershed : Best Management Practices



Legend

- Septic Pumping Sites
- Cover Crop
- Grass Filerstrips
- Riparian Filter Strips
- Bioengeneering Erosion Control Sites
- Urban Storm Water Wetland

Lower Mad River Watershed Boundary

- 1, Buck Creek above E. Fk. Buck Cr.
- 2, East Fork Buck Creek
- 3, Buck Creek below E. Fk. to above Beaver Cr.
- 4, Sinking Creek
- 5, Beaver Creek
- 6, Moore Run
- 7, Buck Creek below Beaver Cr. to Mad River
- 8, Mad River below Chapman Cr. to above Buck Cr.
- 9, Mill Creek
- 10, Mad River below Buck Cr. to above Donnels Cr.
- 11, Rock Run
- 12, East Fork Donnels Creek
- 13, Chapman Creek
- 14, Donnels Creek [except E. Fk. Donnels Cr.]
- 15, Jackson Creek
- 16, Mad River below Donnels Cr. to above Mud Cr.
- 17, Mud Run
- 18, Mad River below Nettle Cr. to above Chapman Cr.
- County Boundary
- Rivers and Streams
- Lakes and Ponds
- High Priority
- Medium Priority
- Low Priority

3 0 3 6 9 12 Miles

N W E S

Urban Stormwater Wetland

The Lower Mad River Watershed Protection Project has teamed up with the Clark County Engineers, Clark SWCD, German Township Trustees, and the Clark County Commissioners to fund and implement a new Best Management Practice for treating and controlling urban stormwater runoff. An Urban Stormwater Wetland has been constructed in conjunction with drainage improvements that are being made along Upper Valley Pike and State Route 41. The Stormwater Wetland has been designed to trap sediments and also to slow and treat the runoff before it is discharged into the Mad River. The wetland is used as an educational and demonstration site to show the importance of wetlands for a healthier Lower Mad River Watershed.

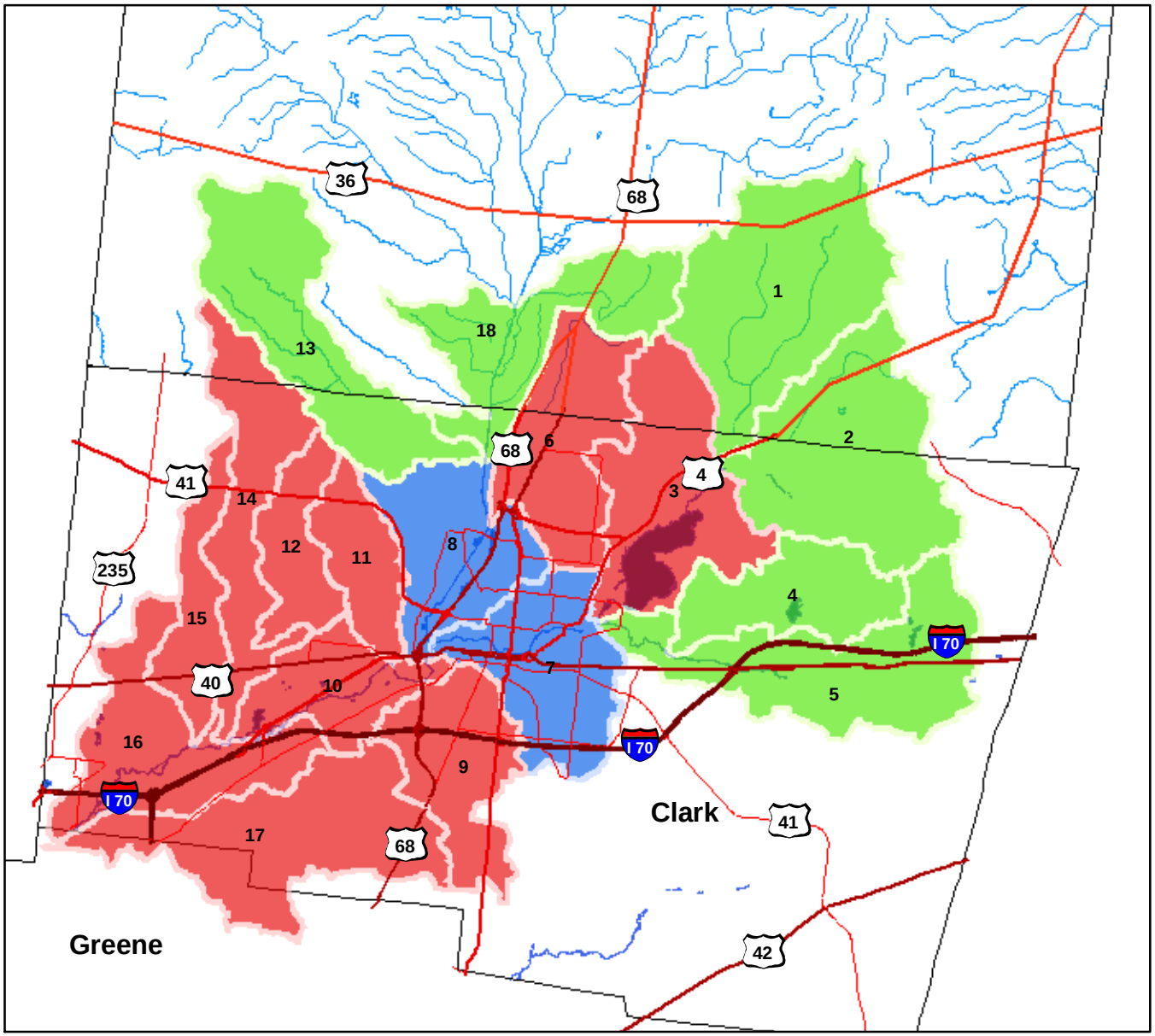
Section E. Sub-Watershed Assessment

The Lower Mad River Watershed was broken down into 18 separate 14 digit hydrologic units for planning and implementation purposes to inventory physical, biological, and habitat and use characteristics of the watershed on a sub-watershed basis. To maximize water quality restoration and protection, these 14-digit watersheds have been prioritized into three categories known as ***Water Quality Restoration Potential*** with levels of High, Medium and Low. To establish these criteria, the Lower Mad River Watershed Protection Project Coordinator held several meetings with local landowners, operators and stakeholders to gain their input of water quality restoration strategies. These sub-watersheds and their water quality restoration potential is listed below:

1. Buck Creek above East Fork Buck Creek = ***HIGH***
2. East Fork Buck Creek = ***HIGH***
3. Buck Creek below East Fork Buck Creek to above Beaver Creek = ***MEDIUM***
4. Sinking Creek = ***HIGH***
5. Beaver Creek = ***HIGH***
6. Moore Run = ***MEDIUM***
7. Buck Creek below Beaver Creek to Mad River = ***LOW***
8. Mad River below Chapman Creek to above Buck Creek = ***LOW***
9. Mill Creek = ***MEDIUM***
10. Mad River below Buck Creek to above Donnels Creek = ***MEDIUM***
11. Rock Run = ***MEDIUM***
12. East Fork Donnels Creek = ***MEDIUM***
13. Chapman Creek = ***HIGH***
14. Donnels Creek = ***MEDIUM***
15. Jackson Creek = ***MEDIUM***
16. Mad River below Donnels Creek to above Mud Run = ***MEDIUM***
17. Mud Run = ***MEDIUM***
18. Mad River below Nettle Creek to above Chapman Creek = ***HIGH***

Since the development of categorizing and prioritizing the sub-watersheds, the Ohio EPA has conducted a study of the Mad River Watershed basin. This study was done in conjunction as party of the Total Maximum Daily Load (TMDL) process that is required by the Clean Water Act. This process quantitatively assesses the quality of a water body and environmental factors contributing to degradation. It identifies the amount of pollution reduction required to meet water quality standards set by Ohio EPA. Restoration strategies are created utilizing Ohio EPA data and input from local stakeholders.

Lower Mad River Watershed Protection Project Area



Legend

Lower Mad River Watershed Boundary

- 1, Buck Creek above E. Fk. Buck Cr.
- 2, East Fork Buck Creek
- 3, Buck Creek below E. Fk. to above Beaver Cr.
- 4, Sinking Creek
- 5, Beaver Creek
- 6, Moore Run
- 7, Buck Creek below Beaver Cr. to Mad River
- 8, Mad River below Chapman Cr. to above Buck Cr.
- 9, Mill Creek
- 10, Mad River below Buck Cr. to above Donnels Cr.
- 11, Rock Run
- 12, East Fork Donnels Creek
- 13, Chapman Creek
- 14, Donnels Creek [except E. Fk. Donnels Cr.]
- 15, Jackson Creek
- 16, Mad River below Donnels Cr. to above Mud Cr.
- 17, Mud Run
- 18, Mad River below Nettle Cr. to above Chapman Cr.
- County Boundary
- Rivers and Streams
- Lakes and Ponds
- High Priority
- Medium Priority
- Low Priority

3 0 3 6 9 12 Miles

N W E S

Buck Creek above East Fork Buck Creek

Water Quality Restoration Potential = HIGH

Water Quality
The Ohio EPA conducted water quality studies in this sub-watershed.
Their results are listed in the table below:

Sub-Watershed	Buck Creek above E. Fk. Buck Ck.
14 Digit HUC #	05080001170010
State 305(b) ID #	OH58 20
Acres	19,546.8
Stream Classification	Coldwater
Segment Length	12 miles
Drainage Area	30.6 square miles
Year Sampled by OEPA	1984 & 2003
Attainment	.5 miles full attainment, 11 miles not assessed

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Features
This area can be characterized by its rural nature, rolling topography and rugged terrain. This sub-watershed consists mainly of agricultural land with dense patches of wooded area and minimal non-forested wetlands Consequently, several tributaries have been affected by leveeing/ditching to control flood flow or by unrestricted livestock grazing in riparian areas. Sandy, gravely soils are characteristic of this sub-watershed.

Land Use & Social Feature
Agriculture is the dominant land use in this sub-watershed. Presently, this area is very rural, but is experiencing urban development pressures. Due to the rolling topography, row cropped fields are typically designated as Highly Erodible Land (H.E.L) by USDA-NRCS. Agricultural areas not being row cropped are utilized for livestock and hay production. Several gravel-mining operations are located in this sub-watershed.

Water Resources
Due to the rural character of this watershed, residential homes do not have access to municipal water and waste water system. This includes the Village of Mutual. Residences will have to rely on domestic on conventional septic systems and wells for years to come.

Riparian & Stream Habitat
Diverse areas exist in the stream corridor depending on adjacent land use. Tributaries and East Fork Buck Creek have been levied and wooded riparian zones denuded in some agriculture areas to control storm flow and prevent land damaged from flooding caused by log-jams. Other streamside areas maybe fully wooded with an existing natural channel and functional flood plain.

Past & Present Conservation Efforts
Fourteen acres of grass filter strip and 110 acres of cover crops have been established in this sub-watershed. Seven septic tanks have been pumped to help improve the water quality of

Buck Creek. All of these practices have been implemented through the 319 Grant. No-till farming practices are also benefiting water quality.

Background & Problem Statement

OEPA Water quality reports indicate that agricultural land use has the most potential to affect water quality. Crop production, increasing number of livestock, and pasture/feedlots posses the ability to raise nutrient and bacterial levels in Buck Creek. Large numbers of cattle having access to tributaries along with crop production in highly erodible land (H.E.L.) areas are compromising water quality. Field observations made by Clark SWCD and NRCS personnel identify excessive sedimentation/siltation, pathogens, pesticides, and organic enrichment as causes of impairment.

The Village of Mutual contains dense housing, all with on-site septic systems and private water wells. This may pose a threat to public health and water quality due to the age and close proximity of these water/waste-water systems. The subdivision of Highland Hills, east of the Village of Mutual, is encountering issues with failing septic systems.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Target and inform streamside landowners about the importance of riparian protection and natural stream channels.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Champaign SWCD/NRCS to promote farm streamside buffers through USDA and MCD programs. Submit newspaper and newsletter article advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce sedimentation, organic enrichment, and bacterial/pathogen	**USDA-**Farm Bill (EQIP) **Miami Conservancy**	Work w/ Champaign SWCD/NRCS to identify livestock producers who have livestock operations.	On going	Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets.

levels from unrestricted livestock and feedlots.	**District**-water quality credit trading program **ODNR**-Pollution Abatement Funds **Ohio Livestock Coalition-** targeted mailing list	Establish one demonstration site along Buck Creek utilizing livestock exclusion fencing and pasture management. Submit newspaper and newsletter articles to promote proper spreading and storage of animal waste from feedlots.	Feb. 2007 – Feb. 1010 Feb. 2007 – Feb. 1010	Lineal feet and number of cattle excluded from stream. Newsletters produced and number of articles appearing in local newspapers. Document number of animal waste complaints received.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Champaign Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Champaign Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Champaign Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.

Cattle in Buck Creek at Neer Road

Cattle in Buck Creek at Neer Road

Downstream Buck Creek at East County Line Road and Buck Creek Lane (Champaign County)

Upstream Buck Creek at East County Line Road and Buck Creek Lane (Champaign County)

East Fork Buck Creek

Water Quality Restoration Potential = HIGH

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	East Fork Buck Creek
14 Digit HUC #	05080001170020
State 305(b) #	OH58 19
Acres	18,464.1
Stream Classification	Coldwater
Segment Length	6 miles
Drainage Area	29.3 square miles
Year Sampled by OEPA	1984
Attainment	.5 miles full attainment, 5.9 miles not assessed

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

This area can be characterized by its rural nature, rolling topography and rugged terrain. This sub-watershed consists mainly of agricultural land with dense patches of wooded area and minimal non-forested wetlands Consequently, several tributaries have been affected by channelization to control flood flow or by unrestricted livestock grazing in riparian areas.

Land Use & Social Features

Agriculture is the dominant land use where cattle and hay production are the typical farming practices. Agricultural fields being row cropped are typically classified as highly erodible land (H.E.L) by the USDA-NRC. A gravel mining operation can be found. This is a predominately rural area, but is currently experiencing rapid residential development.

Water Resources

Water is being used by truck crop operations for irrigation purposes. Flood control structures were built with the creation of the Buck Creek Conservancy District in the late 1960's in efforts to improve farmland and protect against flooding. A flood control structure is present at the intersection of State Route 4 and State Route 54. The Village of Catawba has its own municipal water system that serves 360 residents. Ground water is the primary water source for the village and water usage is approximately 23,000 gallons per day. The WWTP has a capacity of 64,00 gallons per day if demanded.

Riparian & Stream Habitat

Diverse areas exist in the stream corridor depending on adjacent land use. Tributaries and East Fork Buck Creek have been leveed and wooded riparian zones denuded in some agriculture areas to control storm flow and prevent land damaged from flooding caused by log-jams. Other streamside areas maybe fully wooded with an existing natural channel and functional flood plain. An example of these inconsistencies can be seen at County Line Road to Buck Creek Lane.

Past & Present Conservation Efforts
Two hundred and twelve acres of cover crops and 8 acres of filter strips were established through a 1999 section 319 grant. Additionally, 11 septic tanks were pumped and educational materials disseminated to help improve water quality. A variety of CRP projects have been implemented, such as the establishment of native grasses on Brigner Road. No-till farming practices are also benefiting water quality.

Background & Problem Statement
Ohio EPA Water quality reports indicate that agricultural land use has the most potential to affect water quality. Crop production, increasing number of livestock, and pasture/feedlots posses the ability to raise nutrient and bacterial levels in East Fork Buck Creek. Large numbers of cattle having access to tributaries along with crop production in highly erodible land (H.E.L.) areas are compromising water quality. Field observations made by Clark SWCD and NRCS personnel identify excessive sedimentation/siltation, pathogens, pesticides, and organic enrichment as causes of impairments. Specifically noted were several areas where stream channel and flood plain modifications have been made.

The Village of Catawba is on a sanitary sewer system and the WWTP outlets into East Fork Buck Creek. Homes with older on site septic systems that are in need of upgrading are also jeopardizing water quality.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Target and inform streamside landowners about the importance of riparian protection and natural stream channels.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Champaign SWCD/NRCS to promote farm streamside buffers through USDA and MCD programs. Submit newspaper and newsletter article advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.

Reduce sedimentation, organic enrichment, and bacterial/pathogen levels from unrestricted livestock and feedlots.	**USDA-**Farm Bill (EQIP) **Miami Conservancy District**-water quality credit trading program **ODNR**-Pollution Abatement Funds **Ohio Livestock Coalition-**targeted mailing list	Work w/ Champaign SWCD/NRCS to identify livestock producers who have livestock operations. Establish one demonstration site along Buck Creek utilizing livestock exclusion fencing and pasture management. Submit newspaper and newsletter articles to promote proper spreading and storage of animal waste from feedlots.	On going Feb. 2007 – Feb. 1010 Feb. 2007 – Feb. 1010	Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Lineal feet and number of cattle excluded from stream. Newsletters produced and number of articles appearing in local newspapers. Document number of animal waste complaints received.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Champaign Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Champaign/Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Champaign/Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.

East Fork Buck Creek at Everett Road

East Fork Buck Creek at Everett Road

East Fork Buck Creek at Mutual-Union Road

Runyan Road extending through East Fork Buck Creek

Runyan Road extending through East Fork Buck Creek

Buck Creek below East Fork above Beaver Creek

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Buck Creek below E. Fk. above Beaver Ck.
14 Digit HUC #	05080001170030
State 305(b) #	OH58 18
Acres	15,103.2
Stream Classification	Coldwater
Segment Length	7 miles
Drainage Area	82.9 square miles
Year Sampled by OEPA	2003
Attainment	6.8 miles full attainment

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

Varying topography can be seen throughout this sub-watershed. Rolling land is the dominating characteristic, but gentle sloping to large flat flood plain areas do exist. This sub-watershed consists of agricultural land with dense patches of forested land in the headwater reaches.

Many tributaries in agricultural areas have been modified to protect farmland and improve crop production. Below C.J. Brown Reservoir, Buck Creek has been channelized and lined with rock to carry high velocity flow exiting the dam spillway.

Land Use & Social Features

Diverse land use activities range from varied agriculture operations to urbanization, all having different affects on water quality. Row and truck crop operations exists, along with pasture and hay production.

As this watershed moves southerly toward the City of Springfield, more urban pressure can be seen. Many acres of farmland have been converted to build subdivisions and apartment/condominium complexes. Stormwater management and drainage issues have recently come to the forefront as a threat to water quality.

The C.J. Brown Reservoir, Buck Creek State Park and Old Reid Park are located in this sub-watershed. Several bike trails have been constructed for recreational purposes.

Water Resources

Water is used predominantly for agricultural/irrigation purposes at specialized companies like Michaels' Farm and Berryhill Nursery. Residential homes rely totally on private wells as a source of water. The community of New Moorefield doesn't have any type of public water or sewer infrastructure. Due to homes being in close proximity, on site septic systems pose a threat to water quality.

Construction of the C.J. Brown Reservoir began in the late 1960's and was opened in 1974. The damn and reservoir were constructed as flood protection for the City of Springfield. The reservoir is also utilized as a source of recreation.

Old Reid Park, located just downstream of C.J. Brown reservoir was the original site of Springfield's well field. Opened in 1882 as a source of water for fire protection, the well field remained active until the Eagle City Water Treatment Plant opened in 1958.

Riparian & Stream Habitat

Many tributaries in the upper reaches have been leveed/channelized to control flood flows and improve sub-surface drainage for agriculture. Wooded riparian corridors do not exist in several stretches. As Buck Creek flows toward the C.J. Brown reservoir, the stream channel exists in a natural state with an active flood plain and healthy riparian corridor. Downstream of C.J. Brown Reservoir, Buck Creek has been extensively channelized and modified with low head dams as flow enters the City of Springfield, compromising in stream habitat.

Past & Present Conservation Efforts

In the early 1980's, the federal government provided cost share assistance to the watersheds upstream of C.J. Brown Reservoir. Retention basins and grass waterways were constructed to reduce the amount of sediment and nutrients entering the C.J. Brown Reservoir. Shuman farms on Grant Rd. constructed two retention basins that are still effective today.

During implementation of the 1999 319 grant, nine acres of grass filter strip and 32 acres of cover crops were established in this sub-watershed to help improve water quality. Fourteen septic tanks were pumped, with several being located in the targeted community of New Moorefield. Conservation tillage practices have been implemented on a majority of row crop operations.

Background & Problem Statement

Ohio EPA reports indicate that crop production and low head dams are known sources causing water quality degradation. Due to the rolling topography in agricultural areas, row crop production does occur in land designated as highly erodible land (H.E.L) by the USDA-NRCS. Stream modifications have been made to some tributaries to control flooding and streambank erosion from storm water run off of this rugged landscape. These man made alterations can be seen in the form of channelization in agricultural areas and a combination of channelization and low head dams in urban settings. In-stream habitat has been drastically degraded with the loss an active flood plane and sterile stream morphology.

Field observations made by Clark SWCD and NRCS personnel confirm that excessive sedimentation/siltation, organic enrichment/DO and flow regulation/modification flow as impairments having a negative impact on water quality.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Target and inform streamside landowners about the importance of riparian protection and natural stream channels.
- ✓ Removal of low head dams to improve stream morphology, in-stream habitat and improve flow regime.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Champaign & Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Champaign & Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Champaign/Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Champaign/Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.
Low head dam removal, stream channel	**Miami Conservancy District**-water	Create stakeholder group to explore the feasibility of low	June 2007-June	Establishment of stakeholder group, list of participants,

modifications and flow regime improvements	quality credit trading program **Springfield Conservancy District** - maintain Buck Creek Cooridor & streamside parks downstream of C.J. Brown	head dam removal. Establish a demonstration projects along the Buck Creek Cooridor. Remove/alter low head dam(s) and channel modification utilizing natural stream channel design along Buck Creek	2009 July 2009	minute of meetings. Number of low head dams removed.
Reduce sedimentation from riparian land areas by promoting protection of riparian corridors and proper streambank restoration methods improving in stream habitat.	**Miami Conservancy District**-water quality credit trading program **OEPA**- 401 mitigation list	Work w/ Clark & Champaign SWCD/NRCS to identify riparian landowners with eroded streambank issues. Establish one demonstration site along Buck Creek utilizing bioengineering erosion control methods and natural stream channel design	On going Feb. 2007 – Feb. 1010	Create mailing list targeting streamside landowners to receive educational materials. Document soil saved/not delivered from eroding streambanks using R.U.S.L.E. Lineal feet of streambank protected or restored.

Aerial photo of the C.J. Brown Reservoir

Aerial photo of Buck Creek

Aerial photo of Buck Creek

Sinking Creek

Water Quality Restoration Potential = HIGH

Water Quality

The Ohio EPA conducted water quality studies for this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Sinking Creek
14 Digit HUC #	05080001170050
State 305(b) #	OH58 17
Acres	8,863.9
Stream Classification	Warmwater
Segment Length	6 miles
Drainage Area	12.3 square miles
Year Sampled by OEPA	2003
Attainment	N/A

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

This sub-watershed consists mainly agricultural lands with dense patches of forest, but development does exist. The landscape topography is very rolling to gently sloping. Soils characterics are dominated by deep-heavy clay with a seasonal high water table to loamy-clay.

Land Use & Social Features

Agricultural land use dominants this sub-watershed. Row crop, small grains and hay production are most common, but a few animal operations do exist. Due to the rugged terrain, some row cropped areas may be designated as highly erodible land (H.E.L) by the USDA-NRCS. Typically hay production occurs in these steep areas.

Sinking Creek has experienced urbanization and linear roadside development on Jones Road, Shorey Road, and Old Columbus Road.

Water Resources

Due to its rural character, residents of this watershed utilize conventional wells and on-site septic systems. Brookside Mobile Home Park, located on Mahar Road, and Northeastern High School have their own wells and wastewater treatment systems. Sinking Creek receives wastewater discharges that are under the control of Ohio EPA.

Clark Lake Wildlife Area is located in this sub-watershed and was created in the mid-1950's. Clark Lake was established to provide recreational and fishing activities for local residents and to provide wildlife habitat.

Riparian & Stream Habitat

The riparian corridor of Sinking Creek is marginal and averages less than 25 feet wide in some areas. Certain portions of the creek have a stream channel that changes from natural and

sinuous with an active flood plain to channelized. Some reaches that were cleared and straightened in the past are beginning to recover.

Past & Present Conservation Efforts

In the mid-1970's, the Sinking Creek watershed received special funding from the State of Ohio to reduce erosion and sedimentation entering Clark Lake. Cost share monies were provided to implement best management practices like, cover crops, grass waterways and incentives for no-till farming practices.

During the 1999 section 319 grant, one hundred and six acres of cover crops were established in HEL designated fields over the winter months to reduce erosion and improve soil conditions. Additionally, 9 septic tanks were pumped and educational materials disseminated to inform residents of the importance of proper septic system maintenance.

An experimental septic system was established on Jones Road in 2001. This project was a joint effort between the Clark County Combined Health District and Clark County Waste Management District. This innovative system utilizes shredded tires as a leaching medium.

Grassed waterways, sub-surface drainage and no-till farming practices have been implemented on many acres of farmland. Several landowners have taken advantage of Farm Bill Programs to establish filter strips, cattle-exclusion fencing and agricultural containment facilities to protect water quality.

Background & Problem Statement

Ohio EPA reports list crop production as the major source of water quality degradation in the Sinking Creek watershed. Due to the rolling ground some row crop production does occur in ground designated as H.E.L. Although some cattle some cattle operations due exist, they are not a posing an immediate threat to water resources.

Aging on-site septic systems do have the potential to impair water quality. For example, Rebecca Drive is lined with older homes on small lots and unsuitable soils. Areas like this are in need of septic system upgrading.

Point source discharges, like Brookside Village and Northeastern High School, do outfall into Sinking Creek, but are under Ohio EPA jurisdiction. However, these discharges do have a negative impact on water quality.

Field observations made by Clark SWCD and NRCS personnel identify excessive sedimentation/siltation, pathogen/bacterial contamination, high nutrient loadings and organic enrichment as causes of impairment.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Target and inform streamside landowners about the importance of riparian protection and natural stream channels.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Champaign & Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Reduce sedimentation from riparian land areas by promoting protection of riparian corridors and proper streambank restoration methods improving in stream habitat.	**Miami Conservancy District**-water quality credit trading program **OEPA**- 401 mitigation list	Work w/ Clark SWCD/NRCS to identify riparian landowners with eroded streambank issues. Establish one demonstration site along Sinking Creek utilizing bioengineering erosion control methods and natural stream channel design.	On going Feb. 2007 – Feb. 1010	Create mailing list targeting streamside landowners to receive educational materials. Document soil saved/not delivered from eroding streambanks using R.U.S.L.E. Lineal feet of streambank

				protected or restored.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.

Sinking Creek at Jones Road

Upstream Sinking Creek

Sinking Creek at Old Columbus Road

Clark Lake

Beaver Creek

Water Quality Restoration Potential = HIGH

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Beaver Creek
14 Digit HUC #	05080001170040
State 305(b) #	OH58 16
Acres	16,443.5
Stream Classification	Coldwater/*Warmwater**
Segment Length	15 miles
Drainage Area	37.6 square miles
Year Sampled by OEPA	1994 & 2003
Attainment	14.5 miles full attainment

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report
**Recommendation to change aquatic use life use following 2003 sampling data.*

Physical & Biological Factors

Varying topography can be seen throughout this sub-watershed. Rolling land is a common characteristic, but gentle sloping to large flat flood plain areas do exist. This sub-watershed consists mainly of agricultural land with patches of forested land in the headwater reaches. Lower reaches are highly urbanized and populated with residential development as Beaver Creek flows into areas of Springfield Township and the City of Springfield.

Land Use & Social Features

Beaver Creek is considered to be the most diverse sub-watershed of the Lower Mad River Watershed due to a variety of land uses. Agricultural land use dominants this sub-watershed in the headwater areas. Row crop, small grains and hay production are common, and several animal operations do exist. Due to the rugged terrain, some row cropped areas may be designated as highly erodible land (H.E.L) by the USDA-NRCS. Typically, hay production occurs in these steep areas. Beaver Creek has the highest concentration of cattle production than any other sub-watershed. Two tree farms and the National Links Golf Course are also located here.

Urbanization is a dominating factor affecting water quality in the lower portions of Beaver Creek, but roadside and lineal development can be seen in the headwater regions. Many landowners have applied for agriculture easements to combat this issue.

The Village of South Vienna and the community of Sylvan Shores are the most populated areas in the upper portion of the watershed. Several subdivisions, mobile home and recreational parks are common throughout the entire watershed.

Water Resources

Sylvan Lake is located in this sub-watershed and water quality is being affected by on-site septic systems leaching into the lake. Additionally, the community of Harmony has condensed residential homes with aging conventional septic systems. Poorly drained soils are compounding

this issue along with the fact that the area lays near/in the Beaver Creek flood plain. Harmony and Sylvan Shore have no public water system and rely on private wells as a source of drinking water.

South Vienna has a population of 665 residents. The Village has their own sanitary sewer and public water system. Water usage is approximately 65,000 gallons per day and the wastewater treatment plant (WWTP) has the capacity to produce 100,000 gallons per day if demanded. The discharge from the WWTP outlets into Beaver Creek and is under the jurisdiction of Ohio EPA.

Several smaller wastewater treatment plants exist in the watershed. Beaver Valley Resort & Campground, Tomorrow's Stars R.V. Park, Harmony Estates Mobile Home Park (MHP), and Bridgewood MHP. Although EPA monitors effluent from these point sources of pollution, they are still contributing to water quality degradation.

Riparian & Stream Habitat

Beaver Creek has a healthy, natural riparian corridor in a majority of stretches. These areas demonstrate characteristics of proper stream morphology and have actives flood plains, but other areas do exist in a modified state.

In areas utilized for row cropping, a wooded corridor and sinuous channel can been seen. Areas that have cattle grazing typically have access to the creek. Here, stream channels and vegetation have been cleared, resulting in unstable/eroding banks.

Past & Present Conservation Efforts

The watershed of Beaver Creek has seen a wide variety of conservation practices implemented. During the 1999 section 319 grant, six acres of grass filter strips, 2 acres of riparian filter strips, and 255 acres of cover crops were established. In addition, 19 septic tanks were pumped and a bioengineering erosion control project has been implemented.

Many landowners have enrolled streamside acres into the Conservation Reserve Program (CRP) by establishing grass filter strips. Grass Waterways have also been installed through CRP to control gully erosion. Another popular program in this sub-watershed is the Environmental Quality Incentives Program (EQIP). Utilizing these funds, several cattle operators have installed livestock exclusion fence to keep cattle from accessing the stream as a water source. Trees were then planted to re-establish a wooded riparian corridor putting more space between the creek and livestock. Spring developments were also created in conjunction with the fencing to provide a watering source.

An additional aspect of the Beaver Creek watershed is the large number of landowners that have applied to place their farm and woodland into easement programs. The Tecumseh Land Trust has preserved 96 acres of farmland along Beaver Creek near U.S. Route 40.

Background & Problem Statement

Ohio EPA reports indicate that crop production and livestock operations are sources of water quality degradation. Urbanization and lack of stormwater management are also having a negative impact, but is seen more in the lower watershed portions.

With the headwater reaches having a more rolling topography and being a predominantly agricultural area, some of the row cropped fields may be in land designated as highly erodible land (HEL) by the USDA-NRCS. Cattle production is another popular agricultural activity in this watershed. Several feedlots and pastureland that allow cattle to have unrestricted access to Beaver Creek are also sources of water quality impairments.

The lower portions of the watershed are being affected by urban land uses. Several subdivisions exist that have a stormwater system and were built prior to the implementation of stormwater regulations. This has led to higher velocity and erosive flows impacting stream morphology and function.

Throughout the entire Beaver Creek watershed, aging and failing on-site septic are an issue. Areas like Sylvan Shores and the community of Harmony are notorious for having septic system problems.

Additional stresses on water quality can be seen with the many point source discharges entering Beaver Creek. Although Ohio EPA has regulatory jurisdiction over point source effluent, negative impacts are seen affecting water quality.

Field observations made by Clark SWCD and NRCS personnel identify excessive sedimentation/siltation, high nutrient loads, pathogens, pesticides, toxic substances, organic enrichment and habitat modifications as causes of impairment.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Educate watershed residents about stormwater management and how it affects water quality.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce sedimentation, organic enrichment, and bacterial/pathogen levels from unrestricted livestock and feedlots.	**USDA-**Farm Bill (EQIP) **Miami Conservancy District**-water quality credit trading program **ODNR**-Pollution Abatement Funds **Ohio Livestock Coalition-** targeted mailing list	Work w/ Clark SWCD/NRCS to identify livestock producers who have livestock operations. Establish one demonstration site along Beaver Creek utilizing livestock exclusion fencing and pasture management. Submit newspaper and newsletter articles to promote proper spreading and storage of animal waste from feedlots.	On going Feb. 2007 – Feb. 1010 Feb. 2007 – Feb. 1010	Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Lineal feet and number of cattle excluded from stream. Newsletters produced and number of articles appearing in local newspapers. Document number of animal waste complaints received.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance.	April 2007	Number of workshop attendants.

maintenance		Create handouts promoting septic pumping and system management.	April 2007	Number of handouts distributed.
Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program **Clark County and Springfield Twp.-** Work with entities involved in Phase II areas.	Retrofit a bio-retention or stormwater wetland area to the existing stormwater system of Holiday Hills. Storm drain labeling in areas with curb and gutter stormwater systems. Create and submit articles to Springfield News-Sun on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter. Water quality activities reported to Ohio EPA for Phase II as required.

Village of South Vienna WWTP

Aerial photo of Beaver Creek

Beaver Creek

Beaver Creek

Beaver Creek

Moore Run

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Moore Run
14 Digit HUC #	05080001180020
State 305(b) #	OH58 24
Acres	11,741
Stream Classification	Warmwater
Segment Length	8 miles
Drainage Area	18.2 square miles
Year Sampled by OEPA	1994 & 2003
Attainment	8.1 miles not attaining

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

The topography of the Moore Run watershed consists of a steep landscape in the headwater areas in both Clark and Champaign Counties. The areas in Champaign County are located in an agricultural area, where Clark County areas are highly urbanized. The lower reaches of Moore Run are characterized by having very large tracks of land with a flat flood plain area. The channel of Moore Run has been drastically modified from a natural state.

Land Use & Social Features

The Moore Run watershed has a diversity of land uses, all having different impacts on water quality. The watershed area Southeast of Urbana is an agricultural area with dense patches of woods, but clusters of residential development do exist. Cattle and hay production are the most common farming activities in the rolling-high ground due to the potential for erosion. Cattle are raised in feedlots and pasture, some being located in close proximity to tributaries with unrestricted access. Row crop and small grain production takes place in the low ground in both Clark and Champaign Counties. These large tracts of ground have highly productive soils that are ideal for agriculture.

Headwater areas in Clark County have been highly urbanized as seen with the developing community of Northridge. The potential of future development is very high in this area with farmland and open space rapidly declining. The headwater tributary, Kenton Creek, has been impacted by accelerated stormwater run off from these developed areas. A majority of Northridge was developed prior to stormwater regulations being implemented. New developments, like Willow Chase and Simon Kenton farms, have implemented stormwater best management practices. Retention basins and dedicated green space care designed into developments to improve the quality of run off. Springfield Country Club, Northwood Hills Country Club, and Mitchell Hills golf courses are all located in this sub-watershed.

The Moore Run watershed also has several industries, such as International Harvester Truck and Engine and the KTK Industrial park, that are present along Old State Route 68/Urbana Pike. These areas are known to have many acres of impervious cover with a lack of stormwater retention/detention degrading water quality. Additionally, several point sources discharge into Moore Run from wastewater treatment plants and cooling water from industrial processes.

Water Resources

The urbanized and industrial areas of the watershed are serviced with public water and sewer by the City of Springfield. This is a major factor driving the rapid development of the area. Homes located on the outskirts utilize conventional on site septic and well systems. Due to their rural location two mobile home parks, Harvest Square and Rolling Hills, discharge waster water from their treatment plants directly into Moore Run.

Riparian & Stream Habitat

Moore Run has been drastically altered from its original state. The stream has been channelized and deepened to protect farm ground, improve crop production and convey stormwater. This has led to major habitat and flow degradation.

The riparian habitat can be described as semi-wooded with grass ground cover. Several reaches can be seen recovering where a sinuous flow pattern exists within the main channel. Areas where cattle are raised next to streams have no wooded vegetation with minimal ground cover.

Past & Present Conservation Efforts

During a 1999 section 319 grant, seventy-three acres of cover crops were established and two septic tanks pumped to help improve water quality. Special monies from the Ohio Department of Natural Resources (O.D.N.R.) were used to promote alternative stormwater practices. In 2002, the Clark SWCD joined up with the Springfield Emmanuel Christian Academy to install a bio-retention project. This site treats stormwater draining off of the parking lot and treats it using specialized plants and filtering media prior to be discharged. Storm drain marking was completed in Northridge with the help of Kenton Ridge High School students. Educational materials, in the form of door hangers, were distributed to educate residents about the relationship of storm drains and water quality.

Background & Problem Statement

Ohio EPA reports indicate that Moore Run is being affected by diverse land use activities. Sources of impairments range from point sources to crop production to improper stormwater run off management. Independent of land use, channelization of Moore Run can be seen as the main issue affecting water quality.

Cattle production tends to take place in the more rolling landscapes, but a few operations do have animals that can access the Moore Run tributaries. A vast majority of row cropping is done in the flat, flood plain areas of the watershed. The potential of accelerated erosion from these areas is minimal.

Lack of stormwater management from the developed and industrial areas is having a definite affect on water quality. According to the 2003 Mad River Basin TSD report: “EPA personnel noted a petroleum odor and oily sheen on the water surface”. The report indicates that EPA

would review permit adequacy and compliance to limit water quality impacts. The community of Northridge has several conventional stormwater systems that flow directly into the tributary, Kenton Creek. Due to the age and design of this infrastructure, stormwater has no means of being treated or improved prior to being discharged.

Not only does stormwater run off have potential to carry pollutants off the landscape, but also has accelerated flow. Due to the native riparian areas being cleared when stream modifications were made, only marginal vegetated areas exist next to streams. Severely eroded and unstable bank exist from this more erosive flow of stormwater.

Field observations made by Clark SWCD and NRCS personnel identify high nutrient loadings, pathogens, pesticides, toxic substances, organic enrichment, and flow alterations as causes of impairments. Additionally, discharges from wastewater treatments plants are also impacting water quality and are under regulatory jurisdiction of Ohio EPA.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Educate watershed residents about stormwater management and how it affects water quality.
- ✓ Enhance stream channel morphology to improve in-stream habitat and flow regime.

Task Description	Resources	How	**Time Frame**	**Performance Indicators**
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark & Champaign SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce sedimentation, organic enrichment, and bacterial/pathogen	**USDA-**Farm Bill (EQIP) **Miami Conservancy**	Work w/ Clark & Champaign SWCD/NRCS to identify livestock producers who have	On going	Document soil saved/not delivered using RUSLE or nutrient loading

levels from unrestricted livestock and feedlots.	**District**-water quality credit trading program **ODNR**-Pollution Abatement Funds **Ohio Livestock Coalition-** targeted mailing list	livestock operations. Establish one demonstration site along Moore Run utilizing livestock exclusion fencing and pasture management. Submit newspaper and newsletter articles to promote proper spreading and storage of animal waste from feedlots.	Feb. 2007 – Feb. 1010 Feb. 2007 – Feb. 1010	spreadsheets. Lineal feet and number of cattle excluded from stream. Newsletters produced and number of articles appearing in local newspapers. Document number of animal waste complaints received.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark & Champaign Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.
Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program **Clark County and Moorefield Twp.-** Work with entities involved in Phase II areas.	Retrofit a bio-retention or stormwater wetland area to the existing stormwater system of Northridge or industrial company. Storm drain labeling in areas with curb and gutter stormwater systems. Create and submit articles to Springfield News-Sun on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter. Water quality activities reported to Ohio EPA for Phase II as required.
Reduce sedimentation from riparian land	**Miami Conservancy District**-water	Work w/ Clark & Champaign SWCD/NRCS to	On going	Create mailing list targeting streamside

areas by promoting protection of riparian corridors and proper streambank restoration methods improving in stream habitat.	quality credit trading program **OEPA**- 401 mitigation list	identify riparian landowners with eroded streambank issues. Establish one demonstration site along Moore Run utilizing bioengineering erosion control and natural channel design methods and natural stream channel design	Feb. 2007 – Feb. 1010	landowners to receive educational materials. Document soil saved/not delivered from eroding streambanks using R.U.S.L.E. Lineal feet of streambank protected or restored.

Moore Run at Tremont City Road

Cattle in Moore Run

Buck Creek below Beaver Creek to Mad River

Water Quality Restoration Potential = LOW

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Buck Creek below Beaver Ck. to Mad River
14 Digit HUC #	05080001170060
State 305(b) #	OH58 15
Acres	11,593.2
Stream Classification	Warmwater
Segment Length	15 miles
Drainage Area	14.1 square miles
Year Sampled by OEPA	1994 & 2003
Attainment	4.8 miles full attainment, 1.2 miles partial attainment

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

A vast majority of this sub-watershed of Buck Creek lies in the political boundaries of the City of Springfield. This area has a very urbanized landscape with patches of woodland and open space.

Land Use & Social Features

Municipal and industrial land uses dominant this sub-watershed. In the past, Buck Creek was the heart of Springfield's industry. Companies like International Harvester and Crowell-Collier publishing were located here to utilize Buck Creek as a source of water and discharge for industrial processes. Many of these industrial sites have set empty or been demolished, with impervious ground surface still in existence.

In this area, the City of Springfield's sewer and stormwater system are combined. The result of this infrastructure leads to stormwater that is polluted with raw sewage and urban run-off entering Buck Creek. Springfield has 57 active combined sewer outfalls (CSO's) that can enter Buck Creek following a 0.25-inch rainfall event. Springfield has conducted studies to identify these CSO points and come up with a long-range plan to rectify the situation.

The corridor of Buck Creek is also home to several parks, bike and nature trails. The National Trails Parks and Recreation District and Springfield Conservancy District operate these recreational and open space areas. Studies have been done to further beautify and utilize this stretch of Buck Creek.

Water Resources

The City of Springfield has a population of 65,358 and depends on ground water as their primary water source. Water usage is approximately 16,000,000 gallons per day and the waster water treatment plant (WTTP) has a capacity of 36,000,000 gallons per day. As

previously noted, water quality of Buck Creek is drastically degraded due to the CSO issue in this portion of the watershed.

A few areas outside of the City of Springfield use conventional on site septic and water well systems. These areas, located in the southeast corner of Springfield Township, will be forced to hook up to public sewer and water when the current systems poses a threat to public health.

Riparian & Stream Habitat

This stretch of Buck Creek has been drastically channelized and modified with low head dams and levees. These man made alterations were installed to control flooding and allow for stream channel maintenance. A majority of the riparian corridor has a maintained grass cover but some wooded areas exist. As Buck Creek flows through Snyder Park near the confluence of Mad River, a large stand of Sycamore trees exist providing shade to the stream.

Although Buck Creek is extensively channelized, Ohio EPA's *2003 Mad River Basin TSD Report* indicates that aquatic species collected indicated good water quality. This is not typical of streams that have had extensive in stream habitat degradation and located in a highly urbanized landscape.

Past & Present Conservation Efforts

The Springfield Conservancy District was created in 1929 to establish a funding source to control flooding of Buck Creek. Prior to the construction of C.J. Brown Reservoir, these monies were used to levee and channelize the creek and maintain the stream channel and flood control structures. Currently, the Springfield Conservancy District maintains the stream channel and corridor by removing obstructions and mowing. In conjunction with the National Trails Parks and Recreation District, they have established the *Buck Creek Trail* that includes a biking/walking trail for recreational purposes. Studies have also been done to see if the low head dams of Buck Creek could be altered and or removed to promote canoeing and kayaking through the City. Many efforts are being made to revitalize downtown Springfield, and planners are incorporating Buck Creek as a main focal point.

During the implementation of the 1999 section 319 grant seven, storm drain marking was a popular program with the City of Springfield Schools, City of Springfield Utilities Department and the Conservation Club of Wittenberg University. The City of Springfield Schools used the storm drain labels as part of their 4th grade science curriculum. The Utilities Department utilized the storm drain markers as part of their illegal dumping procedures to educate residents about the effects of dumping waste into storm drains. The students of Wittenberg University labeled all the storm drains on campus during earth day activities to gain community service hours necessary for graduation.

Background & Problem Statement

According to Ohio EPA reports, sources of water quality degradation are from urban stormwater runoff, low head dam construction and combined sewer overflow(s). Due to the landscape being urbanized, many man made alterations can be seen to control storm and flood water.

Run off from impervious covers like parking lots, roads and rooftops, carry higher pollutant loads with increased flow velocity. The stormwater infrastructure of Springfield was built prior to

any water quality regulations and stormwater runoff has no means of being treated prior to entering Buck Creek. Compounding this issue is that storm water and sewer water systems are combined resulting in highly polluted run off entering Buck Creek during rain events. Ohio EPA has regulatory jurisdiction on the CSO issue and steps have been made to improve the situation, but this issue is having negative impacts on water quality.

Several low head dams can be seen in the channel of Buck Creek. Many of these structures were used to impound water for industrial processes and flood control in years past. Consequently, the City of Springfield based many of their stormwater outfalls and other utility locations on these impounded water levels. Removal of some dams is not practical due to this issue. The Springfield Conservancy District has conducted studies to see if other dams can be altered and or lowered to improve stream flow to draw recreation. This will also improve flow regime enhancing water quality.

The channelization of Buck Creek was done for flood control to protect the City of Springfield. This has led to a degradation of in-stream habitat and lack of a healthy wooded riparian corridor. Several green space and recreational areas are located in the flood plain, but are managed for easier stream channel maintenance. Due to constructed levees and flood control structures, there is not much opportunity for riparian corridor enhancements.

Additional stresses on water quality can be seen with point source discharges entering Buck Creek from industrial companies in Springfield. Although Ohio EPA has regulatory jurisdiction over point source effluent, negative impacts are seen affecting water quality.

Water Quality Restoration Goals:

- ✓ Educate watershed residents about stormwater pollution and how it affects water quality.
- ✓ Removal of low head dams to improve stream morphology, in-stream habitat and improve flow regime.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program **City of Springfield** Work with entities involved in Phase II areas.	Retrofit a bio-retention or stormwater wetland area to an existing stormwater system. Storm drain labeling in areas with curb and gutter stormwater systems. Create and submit articles to Springfield News-Sun on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter. Water quality activities reported to Ohio EPA for Phase II as required.
Low head dam removal, stream	**Miami Conservancy**	Create stakeholder group to explore the	June 2007-	Establishment of stakeholder group,

channel modifications and flow regime improvements	**District**-water quality credit trading program **Springfield Conservancy District** - maintain Buck Creek Corridor & streamside parks downstream of C.J. Brown	feasibility of low head dam removal. Establish a demonstration projects along the Buck Creek Corridor. Remove/alter low head dam(s) and channel modification utilizing natural stream channel design along Buck Creek	June 2009 July 2009	list of participants, minute of meetings. Number of low head dams removed.

Buck Creek at North Fountain Boulevard

Buck Creek at North Fountain Boulevard

Buck Creek at Snyder Park

Buck Creek at Snyder Park

Low Head Dam at Pumphouse Road

Buck Creek at Pumphouse Road

Buck Creek at North Plum Street

Mad River below Chapman Creek to above Buck Creek

Water Quality Restoration Potential = LOW

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Mad River below Chapman Ck. to above Buck Ck.
14 Digit HUC #	05080001180010
State 305(b) #	OH58 21
Acres	10,797.3
Stream Classification	Coldwater
Segment Length	6 miles
Drainage Area	323 square miles
Year Sampled by OEPA	1994 & 2003
Attainment	2.5 miles partial attainment, 3.9 miles not attaining

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

The landscape of this watershed can best be described as a valley setting, with the Mad River flowing through the center. Headwater reaches of the watershed have a very rolling topography that change to a flat and broad flood plain area. The Mad River has been drastically channelized and moved from its original location for flood control.

Land Use & Social Features

This sub-watershed has diverse land uses, all having different impacts on water quality. The northern areas are in an agricultural setting with dense patches of woods, but some roadside residential housing does exist. Cattle are typically pasture raised in the rolling-high ground. Many of these pastures are permanent due to the potential for erosion. Row crop and small grain production takes place in flood plain areas. These large tracts of ground have highly productive soils that are ideal for grain production.

Southern portions of the watershed are highly urbanized with areas like the Forest Hills Sub-division, Upper Valley Pike Shopping Center and the Bechtle Avenue Extension. Industrial companies, like Rittal and SPECO can be seen as well. These areas are known to have many acres of impervious cover with a lack of stormwater retention/detention degrading water quality. The Bechtle Avenue Extension was the only site that was required to implement stormwater best management practices. All others were built prior to stormwater regulations. Two golf courses, Windy Hill and Par 3 Golf Courses, are located in this sub watershed. Three mobile home parks exist and are serviced by public sewer and water systems.

Water Resources

The sub-watershed has very valuable and unique water resources that are vital to the local community. The City of Springfield's well field and water treatment plant were built in the Mad River flood plain in 1958. The well field has 12 wells, each capable of pumping 4,000,000 gallons of raw ground water per day. Water usage is approximately 16,000,000 gallons per day

among the city's 65,358 residents, businesses and industries. Not only does this well field provide water for Springfield, but for outlying communities. Several arrangements have been made between the City of Springfield and County/Township jurisdictions to provide drinking water to adjacent areas.

Watershed residents that do not have public water or sanitary sewer utilize conventional on site wastewater and water well systems. According to the Clark County Health Department, the Forest Hills subdivision is notorious for failing septic systems and contaminated wells. Compounding this issue is that many conventional septic systems were replaced with aeration septic systems that discharge effluent to local drainage ways rather than utilizing soils as a treatment media. This has led to a high concentration of treated aeration discharge entering drainage ways. Many of these tributaries can go dry leaving the effluent to lay stagnant.

Riparian & Stream Habitat

The Mad River was drastically channelized in the early 1900's. This was done to protect fertile farmland and improve drainage for crop production. The result was a straight ditch with no in-stream habitat or natural stream function. Levees were created from dredged spoil to keep the Mad River contained with in its new artificial channel. When the new channel was constructed, water bearing outwash deposits were exposed. This produced cool groundwater flowing into the new Mad River, keeping stream temperatures cooler with a steady flow.

Currently, the levees that were created are wooded leaving a wide riparian corridor providing shade to the stream channel. Large sycamore trees can be seen reaching over the stream channel in this stretch. Signs of the original Mad River channel can be seen as meandering woodlands in crop fields. It also serves as a political boundary between German and Moorefield Townships.

Channelization of the Mad River stopped at the confluence of Buck Creek due to shallow bedrock soils making this work next to impossible. This created storm flow in the Mad River to be faster and more erosive since it can't dissipate energy into a flood plain, allowing floodwater to slow down. The downstream Mad River channel has seen tremendous amounts of back erosion due to these modifications.

Past & Present Conservation Efforts

During the 1999 section 319 grant, an urban storm water wetland was constructed in conjunction with drainage improvements made along Upper Valley Pike and State Route 41. The storm water wetland was been designed to trap sediments and to slow and treat runoff before it is discharged into the Mad River. The wetland collects run off and drainage from the parking lot of the Upper Valley Mall and Forest Hills Subdivision. It serves as a demonstration site to promote alternative and natural ways to combat stormwater issues.

Additionally, twenty-one septic tanks were pumped and educational materials disseminated to promote proper on site septic system management. This area was targeted for this program due to the issues of failing on site septic systems and high concentration of aeration systems.

In 2002,the Tecumseh Land Trust enrolled a forty-acre woods, owned by Laura Schmidt, into a conservation easement. This woodland habitat will now be preserved in perpetuity from potential development.

The City of Springfield has purchased, through eminent domain, several acres of farm ground that lie adjacent to their well field. This was done to protect this water source from land use activities that could threaten the quality of water. These areas are row cropped, but

Background & Problem Statement

Ohio EPA reports indicate that this portion of the Mad River is being affected by diverse land use activities. Sources of impairments include crop production and improper stormwater run off management. Independent of land use, channelization of the Mad River has degraded in stream habitat and natural stream function.

Cattle and hay production tends to take place in the more rolling landscapes. A vast majority of row cropping is done in the flat, flood plain areas of the watershed. The potential of accelerated erosion from these areas is minimal.

The City of Springfield's Well Field is located in the flood plain of the Mad River. Due to the nature of alluvial flood plain soils, ground and surface water have the ability to become interconnected. These types of soils are known for their high fertility and yields for grain production, as well as the ability to produce high quantities of quality groundwater. Land surrounding the well field, a majority that is highly productive farmland, has been designated as a wellhead protection area. Concerns of agricultural activities threatening the quality of ground water resources have led to restrictions on many of these acres. With advances in global positioning system (GPS) technologies, grid soil sampling combined with precision application of fertilizers and pesticides can reduce concern with this issue.

Lack of stormwater management from urbanized and industrial areas is having a definite affect on water quality. The retail areas on Upper valley Pike have conventional stormwater systems that flow directly into the tributaries of/or the Mad River. Due to the age and design of this infrastructure, stormwater has no means of being treated or improved prior to being discharged. Not only does stormwater run off have potential to carry pollutants off the landscape, but also has accelerated flow and temperature.

Portions of this sub watershed have areas that are serviced by sanitary sewers, but aging and failing on-site septic are an issue. Areas like Forest Hills are notorious for having septic system problems.

The channelization of Mad River has led to degradation of in-stream habitat and natural stream function and flow. A river that was once sinuous and meandering has been contained in a man mad channel to protect adjacent land. Although the water within the channel is cool and high quality, it flows through a simplistic habitat with no structure or diversity. Efforts have been made by members of the Mad Men Chapter of Trout Unlimited to implement structures to improve habitat. This has concerned many streamside landowners about property rights with those who use the river as recreation.

Field observations made by Clark SWCD and NRCS personnel identify pathogens, pesticides, toxic substances, organic enrichment, and flow alterations as causes of impairments.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Educate watershed residents about stormwater management and how it affects water quality.
- ✓ Enhance stream channel morphology to improve in-stream habitat.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers Promote grid soil sampling and precision application of fertilizers, pesticides and herbicides.	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program **USDA**- Farm Bill (EQIP)	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark & Champaign Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.

Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program **Clark County and Moorefield Twp.-** Work with entities involved in Phase II areas.	Retrofit a bio-retention or stormwater wetland area to the existing stormwater systems on Upper Valley Pike. Storm drain labeling in areas with curb and gutter stormwater systems. Create and submit articles to Springfield News-Sun on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter. Water quality activities reported to Ohio EPA for Phase II as required.
Reduce sedimentation from riparian land areas by promoting protection of riparian corridors. Work with willing landowners to install structures to improve in-stream habitat.	**Miami Conservancy District**-water quality credit trading program **OEPA**- 401 mitigation list **Trout Unlimited-**Mad Men Chapter	Work w/ Clark & Champaign SWCD/NRCS to identify riparian landowners with eroded streambank issues. Establish one demonstration site along the Mad River installing structures to improve aquatic habitats.	On going Feb. 2007 – Feb. 1010	Create mailing list targeting streamside landowners to receive educational materials. Lineal feet of streambank protected or habitat restored.

Mad River at Forest Lake

Mad River at State Route 41

Storm water wetland located on State Route 41

Storm water wetland located on State Route 41

Mill Creek

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA conducted water quality studies for this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Mill Creek
14 Digit HUC #	05080001180040
State 305(b) #	OH58 14
Acres	9,883.7
Stream Classification	Warmwater
Segment Length	4 miles
Drainage Area	15.4 square miles
Year Sampled by OEPA	2003
Attainment	N/A

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

The topography of the Mill Creek watershed is gently slopping, with soils ranging from deep-heavy clay to shallow bedrock. The southern headwater areas are located in an agricultural setting. Mill Creek flows from South to North and becomes more urbanized as it approaches the City of Springfield and Mad River. Approximately one quarter of the watershed lie in the political jurisdiction of the City of Springfield where the rest is located in portions of Springfield and Green Townships.

Land Use & Social Features

The Mill Creek has a wide diversity of land uses all having different impacts on water quality. Agricultural land use dominants this sub-watershed in the southern most areas. Row crop, small grains and hay production are common along with a few livestock operations. A majority of these row cropped areas are typically designated as non-erodible by the USDA-NRCS, but some highly erodible land (H.E.L) do exist.

Land use transforms from agriculture to a mix of urbanization, commercial and industrial all with in a short distance. The Springfield Beckley Airport and Ohio Air National Guard (178th Fighter Wing) have several permits issued by Ohio EPA to discharge stormwater run off and wastewater effluent into tributaries of the Mill Creek. This area is known to have several acres of impervious cover with no means of treatment prior to entering tributaries. This has led to stormwater quality issues.

Interstate 70 cuts through the Mill Creek watershed and has two exits to state highways. Due to the ideal location and easy access, this has led to several industrial and commercial companies to locate here. A majority of these businesses are located along State Route 72 or State Route 68, but quite a few new companies are moving to land that has become available on Leffels lane.

Urbanization is a dominating factor affecting water quality in the Northern reaches of the watershed. Roadside housing and lineal development can be seen throughout the entire watershed, but becomes more concentrated in areas located in Springfield Township. Subdivisions like Sunnyland, RaMar Estates and Possum Woods were located in areas with poorly drained soils. This has led to several issues with on-site septic management systems. These subdivisions also have curb and gutter with no means of stormwater treatment due to the era when they were built. The area of Limecrest, also located in Springfield Township, also has a high concentration of housing and is provided with sanitary sewer utilities.

The Southern portion of the City of Springfield that lies in the watershed boundaries has the highest population of residents and percentage of impervious cover. This is an older part of the City and has very little green and open space. All stormwater leaving this area is directly piped into tributaries of Mill Creek.

Water Resources

Watershed areas located in the City of Springfield are serviced with public water and sewer utilities. During the mid-1980's, the Limecrest area was hooked onto the City of Springfield's wastewater sewer system because of the high amount of failed septic systems and active out-houses/privies. An agreement was reached between leaders of the City of Springfield and Springfield Township.

Homes located in Springfield and Green Townships utilize conventional on site septic and well systems. As previously noted, many of these areas are located in poorly drained soils. According to the Clark County Health Department, the Possum Woods subdivision and parts of Sunnyland known to have many septic systems issues. Many homes do not have enough acreage to install a new wastewater treatment system.

The Southern Interceptor Project was established with agreements between City, County and Township officials. This project consisted of a nine-mile sanitary sewer line that was installed in many of the outlying areas of this watershed. The idea of the pipeline project was to help reduce stress on current sanitary sewer infrastructure, facilitate development and provide sanitary sewer to areas in need. Many residents will be forced to hook up to this system if their current septic system poses a threat to public health.

Riparian & Stream Habitat

A majority of the Mill Creek channel exists in a natural state. The stream has a sinuous pattern with a wooded corridor in both urban and agricultural areas. Conversely, headwater areas around the Springfield-Beckley Airport have been channelized and altered to convey stormwater produced by the many acres of impervious cover. A few tributaries that were modified as a ditches, like Blee Ditch, can be seen as recovering.

Past & Present Conservation Efforts

Grassed waterways, sub-surface drainage and no-till farming practices have been implemented on many acres of farmland in the Mill Creek Watershed. Several landowners have taken advantage of Farm Bill Programs to establish filter strips and agricultural containment facilities to protect water quality.

During the implementation of the 1999 319 grant, three septic tanks were pumped and educational materials distributed to help improve water quality. In October 0f 2000, Clark SWCD worked with the Clark County Health Department to investigate stream bank erosion that exposed the face of the City's closed dump located at noon optimist baseball fields on Dayton Avenue. Over many years, the Mill Creek channel shifted directing flow toward the dump. Leachate and layers of fill could be seen. Landowners were ordered to contact Ohio EPA and Army Corps of engineers to get permits to relocate the stream channel away from the dumpsite.

Storm drain marking is a popular program with the City of Springfield Utilities Department. The Utilities Department utilizes the storm drain markers as part of their illegal dumping procedures to educate residents about the effects of dumping waste into storm drains.

At the request of landowners needing drainage assistance, a Public Works of Improvement Project was implemented through Senate Bill 160. The sub-division of Possum Woods is located in soils that are poorly drained and septic systems failed regularly. This project provided a sub-surface drainage outlet for homeowners to utilize for a curtain drain outlet. The Clark SWCD and Clark County Engineers Office designed and implemented this project that will be on maintenance in perpetuity.

Background & Problem Statement

Prior to the 2003 Mad River Basin TSD study, Ohio EPA did not have much biological water quality data on Mill Creek. The Ohio EPA's 305b report does not list any known sources of impairments. Field observations made by Clark SWCD and NRCS personnel identify impairments like sedimentation/siltation, pathogens, pesticides, toxic substances, and organic enrichment. Due to the diverse land uses, impairments originate from different sources and have different impacts on water quality. In the headwater regions of the south, agriculture is the dominant land use. Typical row crop and grain production takes place in fields that are gently slopping, but some highly erodible land does exist. Cattle grazing and hay production occurs in these rolling areas.

In the rural parts of this sub-watershed, aging on-site septic systems can be seen degrading water quality. Several sub-divisions have been located in areas with poorly drained soils. This has led to an overabundance of septic systems failures in condensed locations. The Southern Interceptor project, installed by the City of Springfield, was built as an improvement to their existing system and to take in several of these problem areas. Some areas of the watershed will not be able to hook into this sewer system do to their outlying locations and on-site systems will have to be used.

Interstate 70 crosses through this sub-watershed and provides ideal locations for industrial and commercial development. With this comes impervious cover that generates more and accelerated stormwater run off. This run off also carries pollutants that wash off the ground surface. Due to the era when these facilities were built, none have any means of treating stormwater prior to discharge into tributaries. Areas like the Springfield Beckley Airport and BP Oil of North America have permits issued from Ohio EPA to discharge stormwater into Mill Creek tributaries.

Contributing to the stormwater issue is that the southern portion of the City of Springfield is located in this sub-watershed. This is an older part of the city that has little green space and many acres of impervious covers. Stormwater is handled through traditional curb and gutter stormwater systems. Again, stormwater is discharged into local waterways at a higher velocity carrying pollutants from the local landscape.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Educate watershed residents about stormwater management and how it affects water quality.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.

Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program **Clark County and Springfield Twp.-** Work with entities involved in Phase II areas.	Retrofit a bio-retention or stormwater wetland area to the existing stormwater system. Storm drain labeling in areas with curb and gutter stormwater systems. Create and submit articles to Springfield News-Sun on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter. Water quality activities reported to Ohio EPA for Phase II as required.

Homes in Sunnyland built in close proximity to Mill Creek

Downstream Mill Creek at Sunnyland

Mill Creek at Sunnyland sub-division

Mill Creek at West Possum Road

Industrial development near Mill Creek

Upstream Mill Creek at Leffels Lane

Downstream Mill Creek at Leffels Lane

Mad River below Buck Creek to above Donnels Creek

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Mad River below Buck Ck. to above Donnels Ck.
14 Digit HUC #	05080001180030
State 30(b) #	OH58 11
Acres	7,604.6
Stream Classification	Warmwater
Segment Length	8 miles
Drainage Area	500 square miles
Year Sampled by OEPA	1994 & 2003
Attainment	7.8 miles partial attainment

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

The landscape of this watershed can best be described as a valley setting, with the Mad River meandering through the center. Headwater/highland reaches of the watershed have a gently rolling topography that go through a steep transitional landform heading toward a flat and broad flood plain area. The Mad River has been drastically channelized upstream of the confluence of Buck Creek. This stretch exists in a natural state but is lined by levees in some locations to control floodwater. Varying soil types can be seen in this portion of the Mad River Watershed. Soil characteristics range from shallow bedrock to alluvial sandy /gravelly to heavy clay.

Land Use & Social Features

This sub-watershed consists mainly of agricultural land with patches of forest, but residential housing does exist. A majority of row crop and small grain production takes place in flood plain areas. These large tracts of ground have highly productive soils that are ideal for grain production. Headwater areas that are row cropped tend to have soils that are poorly drained and sub-surface drainage improvements have been made. Many of these areas are under urban pressures for housing. This watershed has low numbers of cattle production, but several horse and small animal operations can be seen along Lower Valley Pike.

Not only are the soil types in the flood plain of the Mad River excellent for crop/grain production, they are also ideal for gravel mining operations. Several high production gravel pits can be seen along streamside land.

Many of the roads in this watershed are lined with residential homes, but some subdivisions due exist. Development has boomed along New Carlisle Pike with roadside housing that is located in the headwater reaches. The upland area also has several mobile home parks that utilize on site septic and well water systems.

George Rogers Clark Park and the Davison Interpretive Center are owned and operated by the National Trails Parks and Recreation District. Many historic landmarks can be seen recognizing the Battle of Piqua that took place in these preserved areas. This portion of Mad River is also highly used for recreation, especially canoeing.

Water Resources

Many residents of this sub-watershed utilize on-site septic and well water systems. Due to location, many areas are too far from the City of Springfield or Clark County utilities. Future plans are being made to extend water utilities into these areas.

Soil types in some populated areas are typically poorly drained. Coupling this issue is that many homes were built on small lots making on-site septic replacement difficult. According to the Clark County Health Department, the sub-division of Parkridge Acres, is notorious for having high numbers of septic system failures. Other examples can be seen with older/condensed roadside development along West National Road and New Carlisle Pike.

This sub-watershed is also has several mobile home parks that utilize both private well water and waste water treatment systems. Stressors on water quality can be seen from the many point source discharges of these facilities that outlet into small tributaries that drain to the Mad River. Ohio EPA has regulatory authority of these systems. The Clearview mobile home park was ordered to up grade their waster water treatment system by the Ohio Attorney Generals Office in June 2000.

Compounding water quality degradation from point sources is the City of Springfield's combined sewer overflow issue. The City's wastewater treatment system outfall is located in this sub-watershed and is known as the largest combined sewer over flow point. The wastewater treatment plant was built in 1935 and any upgrades have been made to rectify this situation. Currently, Springfield's wastewater infrastructure is 70% separate sanitary and 30% combined sewer. The City of Springfield working with several local stakeholders are developing a long-range plan to combat the problems of combined sewer overflow.

Riparian & Stream Habitat

This stretch of the Mad River was not channelized due to unfavorable soil characteristic. Areas around the confluence with Buck Creek are known to have shallow bedrock, making digging difficult. Further down stream, sandy/ gravelly soils have weak structure and would have led to an unstable constructed channel. Many landowners constructed high water levees along the river to control floodwater. Overtime, many man made structures and stream banks have eroded due to the shifting of the Mad and affects from up stream channelization. In many areas, the Mad River channel is lined with broken concrete and fill to combat stream bank erosion issues.

The riparian corridor can be seen as wooded to heavily wooded as it follows the sinuous Mad River. Many of the existing levees are covered with trees helping to provide shade to the stream and structure to adjacent land. Being in its native state, the Mad River has eroded/cut banks along with natural stream functions providing in stream habitat. Log jams exist in high numbers, which is another concern to landowners.

Along Lower Valley Pike, many residential homes have been built in the flood plain of the Mad River. Areas like these have less tree cover next to the river and have higher rates of stream bank erosion. This stretch of river has the highest rates of fill and discarded concrete along the bank. The Clark SWCD investigates several complaints a year regarding stream bank erosion.

Past & Present Conservation Efforts

Along Lower Valley Pike there are a few small animal operations. To improve feedlot and grazing conditions, several landowners installed best management practices through the USDA-Environmental Quality Incentives Program (EQIP). Heavy-use pads and rotational grazing management systems were implemented to improve water quality.

The Clark SWCD and NRCS staff has conducted many investigations into to streambank erosion and logjams. Due to the size of the drainage area and instability of the shifting stream channel, no practical solutions have been implemented. Construction costs to control eroded banks are very high and require vegetative removal that degrades stream quality.

During the implementation of the 1999 319 grant, twenty-one septic tanks were pumped and educational materials distributed. This area was targeted for this water quality improvement program due to the high number of septic system failures.

Background & Problem Statement

Ohio EPA reports indicate that this stretch of the Mad River is being affected by diverse land use activities. Sources of impairments range from waste water treatment discharges to crop production. Independent of land use, the up stream channelization of the Mad River has caused accelerated flow rates and flooding prompting many man made alterations.

Many down stream landowners feel that channelization of the Mad River has caused excessive erosion and damage to fertile farm ground. Over the years, many of them have created levees and lined stream banks with broken concrete. Levees that exist are typically wooded, creating a shaded canopy over the river, and limit the Mad River to have access the flood plain. This compounds downstream flooding issues. In several areas, floodwaters breach these levees and the out of bank flow cannot reenter the river.

Sporadic placed concrete along the stream channel has been a common method to slow down stream bank erosion that plagues this stretch of the river. These types of modifications have a negative impact on water quality and are not aesthetic to the landscape. Unfortunately, no cost effective remedy exists that will reduce these issues and allow for improved stream health.

Agriculture and gravel mining can be seen as the dominating land use in flood plain areas. The soil types in this area are known for their high productivity of row crops and gravel. Many of these streamside lands are highly sought after and have a high property value.

The flat topography and high fertility of the flood plain makes a good location for row cropping. Accelerated erosion from farming is minimal. Due to the nature of alluvial flood plain soils, ground and surface water have the ability to become interconnected. Concerns of agricultural activities threatening the quality of ground and surface water can be reduced with advances in global positioning system (GPS) technologies, grid soil sampling combined with precision

application of fertilizers and pesticides. Row cropping in the upland area is not as prolific due to poorly drained soils and farmland selling for residential housing.

Additionally, the wet soil conditions in the upland areas combined with densely populated housing has caused on site septic system failures to be high. Many of these homes are on small lots with inadequate space for system replacement and located away from access to sanitary sewer utilities. Future consideration should be taken to hook up many of these homes to a sanitary sewer system.

Point sources of pollution can also be seen as threatening water quality. The City of Springfield's wastewater treatment plant is known to be the largest combined sewer outfall. Untreated waste is discharged from this location when the watershed receives high levels precipitation that combines with sewage. The City of Springfield has taken many steps to upgrade their treatment plant to capture over flow events to protect water quality. The City has developed a long-range plan to combat the combined sewer overflow issue that plagues the City's storm and waste water systems.

Point sources of discharge can also be seen coming from mobile home parks.
Many of these locations have an on site waster water treatment plant that discharges into tributaries of the Mad River. Although these systems are under the jurisdiction of Ohio EPA, they are degrading water quality.

Field observations made by Clark SWCD and NRCS personnel identify high nutrient loadings, pathogens, pesticides, organic enrichment, and flow alterations as causes of impairments.

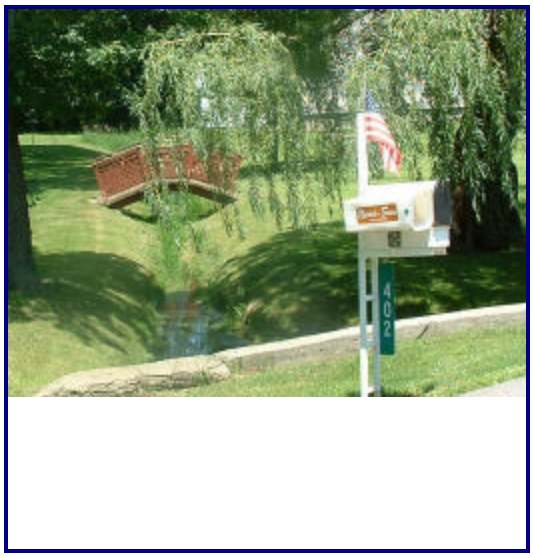
Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Enhance stream channel morphology to improve in-stream habitat and flow regime.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers Promote grid soil sampling and precision	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program **USDA**- Farm Bill (EQIP)	Work in conjunction with Clark & Champaign SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and

application of fertilizers, pesticides and herbicides.		Target operators and landowners who farm HEL land.		number of articles appearing in local newspapers.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark & Champaign Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.
Reduce sedimentation from riparian land areas by promoting protection of riparian corridors and proper streambank restoration methods improving instream habitat.	**Miami Conservancy District**-water quality credit trading program **OEPA**- 401 mitigation list	Work w/ Clark SWCD/NRCS to identify riparian landowners with eroded streambank issues. Establish one demonstration site along the Mad River utilizing bioengineering erosion control and natural channel design methods and natural stream channel design	On going Feb. 2007 – Feb. 1010	Create mailing list targeting streamside landowners to receive educational materials. Document soil saved/not delivered from eroding streambanks using R.U.S.L.E. Lineal feet of streambank protected or restored.

Mad River tributary at Ravenwood Drive



Mad River tributary at Ravenwood Drive

Mad River at Old Mill Road

Mad River at Old Mill Road

Rock Run

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Rock Run
14 Digit HUC #	05080001180050
State 305(b) #	OH58 12
Acres	5,780.9
Stream Classification	Warmwater
Segment Length	4 miles
Drainage Area	7.7 square miles
Year Sampled by OEPA	2003
Attainment	Full

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

The topography of the Rock Run watershed is gently slopping, with soils ranging from deep-heavy clay to shallow bedrock. The Northern headwater areas are located in an agricultural setting. As Rock Run flows toward the Mad River, higher rates of residential housing can be seen. Approximately 3 quarters of the watershed lies in German Township and the rest in Springfield Township.

Land Use & Social Features

Rock run has a diversity of land uses all having different impacts on water quality. Agricultural land use dominants this sub-watershed in the northern areas. Row crop, small grains and hay production are common along with a few livestock operations. A majority of the row cropped areas are typically designated as non-erodible by the USDA-NRCS.

Headwater areas typically have soils that are poorly drained and sub-surface drainage improvements have been made. Many of these areas are under urban pressures for housing due to location. This watershed has some livestock production with some animals having access to streams, as seen on Shrine Rd.

Many of the roads in this watershed are lined with residential homes, but some subdivisions and apartment complexes due exist. In the upland part of the watershed, roadside development is typical. The upland area also has several mobile home parks that utilize on site septic and well water systems. Southern areas have sub-divisions like Cedar Hills, Alberfelda, Deber Estates and parts of Forest Hills in addition to the developed roadsides.

Water Resources

Many residents of this sub-watershed utilize on-site septic and well water systems. Due to location, a majority of these areas are too far from public utilities. Rockway School, Alberfelda Heights and Cherry Lane do have public water that is supplied through an agreement between the City of Springfield and Springfield Township.

Soil types in populated areas are typically poorly drained. In the northern areas, soils have seasonal high water tables, where southern areas have restrictive bedrock layers. This situation has led to many conventional septic systems to fail early. Adding to this concern is that many homes were built on small lots making on-site septic replacement difficult. Compounding this issue is that many conventional septic systems were replaced with aeration septic systems that discharge effluent to local drainage ways rather than utilizing soil as a treatment media. This has led to a high concentration of treated aeration discharge entering drainage ways. Many of these tributaries can go dry leaving the effluent to lay stagnant.

In addition to numerous residential on site septic systems, small waster water treatment plants are in use. Rockway School, Greenlawn Village Condominiums, Westwind Properties and the Rolling Terrace mobile home park all discharge treated wastewater into tributaries of Rock Run. Although these facilities are permitted through Ohio EPA, they are having negative impacts on water quality.

Riparian & Stream Habitat

A majority of the Rock Run channel exists in a natural state having good stream morphology and function. The stream has a sinuous pattern with a wooded corridor in urban and some agricultural areas. A few tributaries that were modified as a ditches, like portions of Miller Creek, can be seen as recovering. Areas where cattle are raised next to streams have no wooded vegetation with minimal ground cover.

Past & Present Conservation Efforts

Several landowners have taken advantage of Farm Bill Programs to establish best management practices on farmland. In this sub-watershed, several acres of grassed waterways and sub-surface drainage systems have been installed to control erosion. Many of these projects were established along Shrine Rd. Additionally, no-till farming practices along with grass filter strips have been implemented on many acres of farmland.

During implementation of the 1999 319 water quality grant, eight septic tanks were pumped and educational materials disseminated to promote proper on site septic system management. This area was targeted for this program due to the issues of failing on site septic systems and high concentration of aeration systems.

Background & Problem Statement

Prior to the 2003 Mad River Basin TSD study, Ohio EPA did not have much biological water quality data on Rock Run. The Ohio EPA's 305b report lists crop production as known sources of impairments. Field observations made by Clark SWCD and NRCS personnel identify impairments like sedimentation/siltation, pathogens, pesticides, and organic enrichment.

Due to the diverse land uses, impairments originate from different sources and have different impacts on water quality. In the headwater regions of the North, agriculture is the dominant land use. Typical row crop and grain production takes place in fields that are gently slopping, but erosion issues are present. Cattle operations, specifically along portions of Shrine Road, have access to the Rock Run channel. A wooded riparian zone and ground cover is non-existent.

In developed portions of this sub-watershed, aging on-site septic systems can be seen degrading water quality. Several sub-divisions have been located in areas with poorly drained soils. This has led to an overabundance of septic systems failures. Future consideration should be taken to tie these areas on sanitary sewers. Some areas of the watershed will not be able to hook into a sewer system do to their outlying locations and on-site systems will have to be used.

Point sources of pollution can also be seen as threatening water quality. With several mobile home parks and apartment complexes being located in this area, discharge of treated effluent from these areas is under regulatory jurisdiction of Ohio EPA.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Target and inform streamside landowners about the importance of riparian protection and natural stream channels.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.

Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.
Reduce sedimentation, organic enrichment, and bacterial/pathogen levels from unrestricted livestock and feedlots.	**USDA-**Farm Bill (EQIP) **Miami Conservancy District**-water quality credit trading program **ODNR**-Pollution Abatement Funds **Ohio Livestock Coalition-** targeted mailing list	Work w/ Champaign SWCD/NRCS to identify livestock producers who have livestock operations. Establish one demonstration site along Rock Run utilizing livestock exclusion fencing and pasture management. Submit newspaper and newsletter articles to promote proper spreading and storage of animal waste from feedlots.	On going Feb. 2007 – Feb. 1010 Feb. 2007 – Feb. 1010	Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Lineal feet and number of cattle excluded from stream. Newsletters produced and number of articles appearing in local newspapers. Document number of animal waste complaints received.

Stormwater outlet into Rock Run

Septic system in the Rock Run sub-watershed located in a densely populated sub-division

Pipe discharging into Rock Run

Rock Run at Sintz Road

Rock Run at Shrine Road

Miller Creek (tributary to Rock Run) at Ballentine Pike

East Fork Donnels Creek

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	East Fork Donnels Creek
14 Digit HUC #	05080001180070
State 305(b) #	OH58 10
Acres	5,805.3
Stream Classification	Warmwater
Segment Length	3 miles
Drainage Area	10.7 square miles
Year Sampled by OEPA	2003
Attainment	Full

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

The topography of the East Fork Donnels Creek watershed is flat to gently slopping in the northern areas. This area is located in a rural/agricultural setting with scattered tracts of woodland. The topography of this watershed drastically changes to steep and rolling towards the south.

Land Use & Social Features

Agricultural land use dominants this sub-watershed in the northern areas. Row crops, small grains and hay production are common along with a few livestock operations. A majority of the row cropped areas are typically designated as non-erodible by the USDA-NRCS in this location.

Agricultural lands in the south have a more rugged terrain. Row cropped areas here may be designated as highly erodible land (H.E.L) by the USDA-NRCS. Typically, hay production and pasture-raised livestock exist in these steep areas.

Residential housing in the northern areas has grown, as seen with developments along Penny Pike and North Tecumseh Rd. These headwater areas typically have soils that are poorly drained and sub-surface drainage improvements were made for agricultural production, not housing. More dense urbanization is seen more in the southern parts of the watershed. Roadside development, along with subdivisions like Winding Tree and Bending Tree Estates on Folk Ream Road, are more common in this landscape.

Additionally, a few mobile home parks exist in the East Fork Donnels Creek Watershed. The largest of these, Chateau Estates, has had several issues with their on site waster water treatment plant.

Water Resources

Due to its rural character, residents of this watershed utilize domestic wells and on-site septic systems. Chateau Estates mobile home park and Northwestern High School have their own

wells and wastewater treatment systems. Ohio EPA has received permits that would extend a sewer line to these two locations from the Village of North Hampton. This system would connect to the City of New Carlisle. Effluent from this system would outfall in the Honey Creek Watershed.

Riparian & Stream Habitat

A majority of the East Fork Donnels Creek exists in a natural state with good stream function. The stream has a sinuous pattern with a wooded corridor and an active flood plain.

Past & Present Conservation Efforts

Several landowners have taken advantage of Farm Bill Programs to establish best management practices on farmland. In this sub-watershed, several acres of grassed waterways and sub-surface drainage systems have been installed to control erosion. Additionally, no-till farming practices along with grass filter strips have been implemented on many acres of farmland.

During implementation of the 1999 319 water quality grant, one septic tank was pumped and educational materials disseminated to promote proper on site septic system management. This area was targeted for this program due to the issues of high concentration of aeration systems in Winding Tree and Bending Tree Estates.

Background & Problem Statement

Prior to the 2003 Mad River Basin TSD study, Ohio EPA did not have much biological water quality data on East Fork Donnels Creek. The Ohio EPA's 305b report lists crop production as known sources of impairments. Field observations made by Clark SWCD and NRCS personnel identify impairments like sedimentation/siltation, pathogens, pesticides, and organic enrichment.

A majority of this landscape is utilized for agricultural production. Typical row crop and grain production takes place in fields that are gently slopping, but erosion issues are present. Headwater areas are known to have soils with seasonal high water tables. Many acres of this land have been drained systematically with sub surface tile. These soil types are highly productive when properly drained.
Due to the rolling topography in the southern areas, erosion can be an issue. Cattle production numbers are low in this area and occur on ground that is permanent pasture. Areas where houses are present, along New Carlisle Pike, have yards consisting of grass cover and some woods.

Residents of this sub-watershed utilize on site septic and wells. Being in a rural location will force these homes to use this type of system for many years. Areas where newer housing exist, along Penny Pike and Folk Ream Road, were built under county regulations to have ample room for septic system replacement. In the near future, Northwestern High School and Chateau Estates mobile home park will be on line with a sewer line extended from the Village of North Hampton.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Target and inform streamside landowners about the importance of riparian protection and natural stream channels.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.

Urbanization near East Fork
Donnels Creek

Tributary of East Fork Donnels Creek -
Existing stream is blocked

Junction of East Fork Donnels Creek and a
tributary to East Fork Donnels Creek

Tributary of East Fork Upstream

Existing tributary of East Fork Donnels Creek
and a new channel

Chapman Creek

Water Quality Restoration Potential = HIGH

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Chapman Creek
14 Digit HUC #	05080001160080
State 305(b) #	OH58 25
Acres	15,626.1
Stream Classification	Coldwater
Segment Length	10 miles
Drainage Area	24.9 square miles
Year Sampled by OEPA	1994 & 2003
Attainment	7.6 miles full attainment, 2.5 miles partial attainment

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

Varying topography can be seen throughout this rural sub-watershed. Rolling land is a common characteristic, but gentle sloping to large flat flood plain areas do exist. This sub-watershed consists mainly of agricultural land but many acres of forested land can be seen. Tremont City located near the confluence of Chapman Creek and the Mad River and is the only incorporated area of the watershed.

Land Use & Social Features

Agricultural land uses dominate this watershed, but some residential housing does exist. Row crop, small grains and hay production are common, along with a few truck crop operations. Due to the rugged terrain in the headwater areas, row cropped fields may be designated as highly erodible land (H.E.L) by the USDA-NRCS. Additionally, there are a few cattle operations located in the high ground. Many of these operations take place in fields that are permanent pasture due to the potential for erosion. A majority of row cropping in this sub watershed occurs in the flat low-ground next to Chapman Creek. These tracts of ground have highly productive soils with low erosion potential. These areas have ideal conditions for grain production.

Residential housing can be seen along roadsides of this landscape. Areas of Willowdale Road and Knollwood Road have the most existing and potential for future housing. The Village of Tremont City has the highest concentrated population in the watershed.

The Tremont City Landfill is also located in the Chapman Creek Watershed. This 200 plus acre facility is located 300 feet North of Chapman Creek along Snyder-Domer Road. The landfill has been closed for several years and signs of contamination have been found in groundwater and soils in the area.

Water Resources

Due to the rural character of the Chapman Creek watershed, residents utilize domestic on site septic and water wells. Homes located in Tremont City are older and spaced very close together. According to the Clark County Health Department, residents of Tremont City have a difficult time to replace existing on site septic systems and wells. Typically, homeowners have to apply for variances for distance setbacks between wells and existing septic systems. Tremont City will need to have public sewer and water infrastructure in the future.

The major threat to water resources is the Tremont City Landfill site that lies next to Chapman Creek west of Tremont City. The 80-acre site is divided into the former Waste Transfer Facility (14 acres), the closed Sanitary Landfill (58 acres), and the Barrel fill, also known as the Industrial Waste Disposal (IWD) Chemical Waste Landfill (8.5 acres). The former Waste Transfer Facility, permitted in 1977 as a hazardous waste treatment facility, subsequently underwent clean closure
Pursuant to Ohio EPA's hazardous waste rule requirements in 1985 when operations ceased. The Sanitary Landfill, permitted as a solid waste disposal facility in 1969, closed under Ohio EPA's solid waste rules in 1995, and is currently engaged in post-closure monitoring and undertaking corrective actions pursuant to those rules.

The U.S. EPA and Ohio EPA's Division of Emergency and Remedial Response (DERR) launched an investigation of the closed Tremont City Landfill site in 1999 and concluded that contamination exists which has migrated from the disposal areas and affected groundwater, soils, and sediments. The agencies are currently focusing their attention on the Barrel fill area, operated from 1976 to 1979 by IWD, a subsidiary of Danis, as a drum and barrel disposal area.

Historical records indicate that 47,000 drums of industrial wastes were placed in a series of cells or trenches excavated to a depth of 15 to 25 feet within the glacial till and covered with soil. Potentially hazardous waste streams include paint sludges, glues, resins, asbestos, and ink sludges. In October 2003, U.S. EPA and the parties responsible for contamination related to the Barrel fill signed a legal order to conduct a Remedial Investigation/Feasibility Study (RI/FS). The first phase of the Remedial Investigation (RI), including the installation and sampling of groundwater wells, collection of soil and soil gas samples, and excavating five test pits has been completed. Based on the data collected, a second phase has begun which includes the installation of additional groundwater monitoring wells and an aquifer test. Analysis of stream water samples collected at RM 0.77 in Chapman Creek during the 2003 survey, however, did not reveal any elevated concentrations downstream from the Tremont City Landfill.

Riparian & Stream Habitat

The channel of Chapman Creek remains in a natural state with good stream functions. The creek bed is primarily composed of gravel and sand, with small amounts of boulders, slabs, and cobbles. Natural channel conditions are evident, with a moderate to narrow wooded riparian corridor. The in-stream channel appears to be of high quality with a mixture of pool, riffle, and run habitats. The Clark SWCD/NRCS investigates several complaints a year in regard to streambank erosion. Due to the sandy/gravelly soils characteristics of riparian areas, along with high stream gradient and flow, unstable banks exist along much of the stream.

Past & Present Conservation Efforts

Several landowners have taken advantage of Farm Bill Programs to establish best management practices on farmland. In the headwater areas, many acres of grassed waterways and sub-surface drainage systems have been installed to control erosion. Additionally, no-till farming practices along with grass filter strips have been implemented on many acres of farmland. The Environmental Quality Incentives Program (EQIP) has been popular with landowners having cattle operations. Several feet of cattle exclusion fencing and alternative watering systems have been installed to improve water quality

During implementation of the 1999 319 water quality grant, four septic tanks were pumped and educational materials disseminated to promote proper on site septic system management. This sub-watershed was targeted for this program due to septic system issues of Tremont City.

Background & Problem Statement

Ohio EPA reports indicate that crop production and livestock operations are sources of water quality degradation. Leachate from the Tremont City Landfill is listed as well. Additionally, lack of stormwater management in Tremont City has the potential to convey pollution to Chapman Creek.

With the headwater reaches having a more rolling topography and being in an agricultural area, row cropped fields may be designated as highly erodible land (HEL) by the USDA-NRCS. Many landowners have installed grass waterways that have become silted in and becoming unusable to control gully erosion. Cattle production is another agricultural activity seen in headwater areas, but in low numbers. Many of these operations are done in permanent pastures rather than a feedlot setting.

Row cropped areas in the lower portions of the watershed take place in large flat tracts of flood plain ground. These types of soils are known for their high fertility and yields for grain production. Due to the nature of flood plain soils, ground and surface water have the ability to become interconnected. With advances in global positioning system (GPS) technologies, grid soil sampling combined with precision application of fertilizers and pesticides can reduce agricultural effects on our water resources.

Throughout the entire Chapman Creek watershed, aging and failing on-site septic are an issue. Tremont City is notorious for having septic system problems and lack of useable space for replacement. These conditions could pose a threat to the residents of Tremont City and future considerations should be made for water and sewer systems.

Tremont City also has issues with a lack of stormwater management. The stormwater system in Tremont City was designed and built prior to the implementation of stormwater regulations. Stormwater rolling of this land has the potential to carry pollutants and has higher velocity and erosive flows impacting stream morphology and function.

The major threat of water quality in this sub watershed comes from concerns with the Tremont City Landfill. As previously noted, several investigations have been made by Ohio and United States Environmental Protection Agency. Several local organizations, such as CF water, have

been making strides to promote cleaning up the landfill and protect the groundwater aquifer that the community utilizes.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Educate watershed residents about stormwater management and how it affects water quality.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers Promote grid soil sampling and precision application of fertilizers, pesticides and herbicides.	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce sedimentation, organic enrichment, and bacterial/pathogen levels from unrestricted livestock and feedlots.	**USDA-**Farm Bill (EQIP) **Miami Conservancy District**-water quality credit trading program **ODNR**-Pollution Abatement Funds **Ohio Livestock Coalition-** targeted mailing list	Work w/ Clark SWCD/NRCS to identify livestock producers who have livestock operations. Establish one demonstration site along Beaver Creek utilizing livestock exclusion fencing and pasture management. Submit newspaper and newsletter articles to promote proper spreading and storage of animal waste from feedlots.	On going Feb. 2007 – Feb. 1010 Feb. 2007 – Feb. 1010	Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Lineal feet and number of cattle excluded from stream. Newsletters produced and number of articles appearing in local newspapers. Document number of animal waste complaints received.

Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.
Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program **Clark County and Springfield Twp.-** Work with entities involved in Phase II areas.	Retrofit a bio-retention or stormwater wetland area to the existing stormwater system of Tremont City. Storm drain labeling in areas with curb and gutter stormwater systems. Create and submit articles to Springfield News-Sun on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter. Water quality activities reported to Ohio EPA for Phase II as required.

Donnels Creek

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Donnels Creek
14 Digit HUC #	05080001180060
State 305(b) #	OH58 9
Acres	11,138.7
Stream Classification	Exceptional Warmwater/ *Warmwater**
Segment Length	12 miles
Drainage Area	27.8 square miles
Year Sampled by OEPA	1994 & 2003
Attainment	6 miles full attainment, 5.6 miles not attaining

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report
**Recommendation to change aquatic use life use following 2003 sampling data.*

Physical & Biological Factors

The landscape of this watershed can best be described as a narrow valley agricultural setting, with the Donnels Creek meandering through the center. Patches of dense woodland can also be seen. Headwater/highland reaches of the watershed have a gently rolling topography that go through a steep transitional landform heading toward the creek. Flat and broad flood plain areas can be seen near the confluence with the Mad River. Soils characteristics range from deep-heavy clay to shallow bedrock to sandy/gravelly.

As Donnels Creek flows toward the South, higher rates of roadside residential housing can be seen. The Villages of North Hampton and Donnelsville are located in this sub watershed.

Land Use & Social Features

Agricultural land use dominants this sub-watershed. Row crops, small grains and hay production are common along with a few livestock operations. A majority of the row cropped headwater areas are typically designated as non-erodible by the USDA-NRCS in this location. Due to the slopping terrain of the central portion, row cropped areas may be designated as highly erodible land (H.E.L) by the USDA-NRCS.

Residential housing can be seen along roadside through out the watershed, but some sub divisions do exist. Heistand Estates, located just East of Donnelsville, is approximately six years old. Donnels Creek farm, west of North Hampton, began construction in 2005. Both of these areas were required to implement stormwater best management practices to protect water quality.

Water Resources

Due to its rural character, residents of this watershed utilize domestic wells and on-site septic systems. The Village of North Hampton has it own drinking water well and waste water

treatment systems. The well is located in North Hampton and provides water to 500 residents that use approximately 50,000 gallons per day. The sanitary sewer system is an extension from the City of New Carlisle. Due to the age and close proximity of homes in this location, these public utilities were crucial to the Village. Recently, talks have been conducted to extend this sewer line to Northwestern High School and Chateau Estates mobile home park. Effluent from this system would outfall in the Honey Creek Watershed.

The Village of Donnelsville has recently installed a sanitary sewer line to provide to their residents. Many of the aging homes were in close proximity and had on site septic management issues. Combined with the shallow bedrock soils of the area, this was a public health hazard. The Village and Clark County Utilities worked to extend a sewer from the Southwest Waste Water Treatment Plan. In addition to bringing this area on-line, Tecumseh High School would also be added. The Community of Dialton should also be considered to be placed on a sanitary sewer system due lack of space to upgrade septic systems.

Stormwater issues also exist in these two urbanized areas. Acres of impervious cover create more amounts of stormwater runoff. When these Villages were established, no legislation existed to mandate stormwater run off controls. This has led to water quality degradation.

Riparian & Stream Habitat

Headwater areas typically have soils that are poorly drained and sub-surface drainage improvements have been made. The headwater tributary, Thackery Ditch, was constructed to provide an adequate outlet for subsurface drainage systems. This stream can be seen as maintained in some locations and recovering in others. This has led to in stream habitat degradation.

A majority of the Donnels Creek channel exists in a natural state having good stream morphology and function. The stream has a sinuous pattern with a wooded corridor and an active flood plain.

Past & Present Conservation Efforts

Several landowners have taken advantage of Farm Bill Programs to establish best management practices on farmland. In this sub-watershed, several acres of grassed waterways and sub-surface drainage systems have been installed to control erosion. Additionally, no-till farming practices along with grass filter strips have been implemented on many acres of farmland.

During implementation of the 1999 319 water quality grant, fourteen acres of grass filter strip were established. Additionally, two septic tank was pumped and educational materials disseminated to promote proper on site septic system management. This sub-watershed was targeted for this program due to septic system issues of Donnelsville.

Background & Problem Statement

Prior to the 2003 Mad River Basin TSD study, Ohio EPA did not have much biological water quality data on Donnels Creek. The Ohio EPA's 305b report lists crop production as known sources of impairments. Field observations made by Clark SWCD and NRCS personnel identify impairments like sedimentation/siltation, pathogens, pesticides, and organic enrichment.

A majority of this landscape is utilized for agricultural production. Typical row crop and grain production takes place in fields that are gently slopping, but erosion issues are present. Headwater areas are known to have soils with seasonal high water tables. Many acres of this land have been drained systematically with sub surface tile. These soil types are highly productive when properly drained.

Due to the rolling topography in the central areas, erosion issue can be an issue with row crop production. These lands may be designated as highly erodible land (H.E.L) by the USDA-NRCS. Cattle production numbers are low in this area and occur on ground that is permanent pasture. Confined cattle production does occur in low numbers here. Many old feedlots can be seen vacated.

Near the confluence of the Mad River, large tracts of flood plain land can be seen. This farmland is known to have highly productive soils that are ideal for agriculture, but flooding does occur.

Residents of this sub-watershed utilize on site septic and wells. Being in a rural location will force these homes to use this type of system for many years. Watershed residents of Donnelsville and North Hampton utilize a sanitary sewer system that will improve water quality. In the near future, Northwestern High School and Chateau Estates mobile home park will be on line with a sewer line extended from the Village of North Hampton. Considerations should be made to add the Community of Dialton to a sanitary system.

Impervious surfaces of Donnelsville and North Hampton are sources of non-point pollutants. Due to a traditional stormwater management practices pollutants such as pathogens, pesticides, toxic substances, organic enrichment, and thermal stress exist as water quality concerns. No stormwater controls exist that would improve stormwater run off quality.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Target and inform streamside landowners about the importance of riparian protection and natural stream channels.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.
Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program	Retrofit a bio-retention or stormwater wetland area to the existing stormwater system in Donnelsville or North Hampton. Storm drain labeling in Donnelsville or North Hampton. Create and submit articles for New Carlsile paper and Township newsletter on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter.

Upstream Donnels Creek at Route 40

Downstream Donnels Creek at Route 40

Donnels Creek

Log jam on Donnels Creek

Log jam on Donnels Creek

Jackson Creek

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA has conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Jackson Creek
14 Digit HUC #	05080001180090
State 305(b) #	OH58 8
Acres	6,805.5
Stream Classification	Exceptional Warmwater*/Warmwater**
Segment Length	5 miles
Drainage Area	10.2 square miles
Year Sampled by OEPA	2003
Attainment	Full

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report
**Recommendation to change aquatic use life use following 2003 sampling data.*

Physical & Biological Factors

The landscape of this watershed can best be described as a narrow valley in an agricultural setting, with the Jackson Creek through the center. Patches of dense woodland can also be seen. Headwater/highland reaches of the watershed have a gently rolling topography that go through a steep transitional landform heading toward the creek. Flat and broad flood plain areas can be seen near the confluence with the Mad River. Soils characteristics range from deep-heavy clay to shallow bedrock to sandy/gravelly.

Land Use & Social Features

Agricultural land use dominants this sub-watershed. Row crops, small grains and hay production are common along with a few livestock operations. A majority of the row cropped headwater areas are typically designated as non-erodible by the USDA-NRCS. Due to the slopping terrain of the central portion, row cropped areas may be designated as highly erodible land (H.E.L) by the USDA-NRCS.

Residential housing can be seen along roadsides through out the watershed. Recent development has occurred on areas of Myers and Bishoff Roads. A large cluster of homes can be seen built in the Jackson Creek flood plain along Tille Lane.

Water Resources

Due to its rural character, residents of this watershed utilize domestic wells and on-site septic systems. Tecumseh High School has recently been connected to a sewer from the Southwest Waste Water Treatment Plant. This line was extended to provide sewer utilities to the Village of Donnelsville as well.

Riparian & Stream Habitat

Headwater areas typically have soils that are poorly drained and sub-surface drainage improvements have been made. Headwater reaches of Jackson Creek were channelized to provide an adequate outlet for subsurface drainage systems. This stream can be seen as maintained in some locations and recovering in others. This has led to in stream habitat degradation.

In the central portion of the watershed, the Jackson Creek channel exists in a natural state having good stream morphology and function. The stream has a sinuous pattern with a wooded corridor and an active flood plain. Several houses exist in this stretch along Tille lane. These homes are located in the flood plain and a levee was created along Jackson Creek to control flooding. Compounding this issue is that the development sits at the bottom of a hill and has soils with seasonal high water tables. The Clark SWCD and Clark County Engineers have worked with residents and Bethel Township to propose drainage improvements, but no involved parties will pay toward the project costs.

South of Lower Valley Pike, the topography changes from rolling and steep to flat and broad. Jackson Creek becomes a straightened channelized ditch as it flows through the flood plain to the Mad River. The stream channel has no wooded vegetation, but grass ground cover is present.

Past & Present Conservation Efforts

Several landowners have taken advantage of Farm Bill Programs to establish best management practices on farmland. In this sub-watershed, several acres of grassed waterways and sub-surface drainage systems have been installed to control erosion. Additionally, no-till farming practices along with grass filter strips have been implemented on many acres of farmland. Several acres of warm season grass filter strips were established on Bishoff Road.

During implementation of the 1999 319 water quality grant three septic tank were pumped and educational materials disseminated to promote proper on site septic system management.

Background & Problem Statement

Prior to the 2003 Mad River Basin TSD study, Ohio EPA did not have much biological water quality data on Jackson Creek. The Ohio EPA's 305b report lists crop production as known sources of impairments. Field observations made by Clark SWCD and NRCS personnel identify impairments like sedimentation/siltation, pathogens, pesticides, and organic enrichment.
A majority of this landscape is utilized for agricultural production. Typical row crop and grain production takes place in fields that can be gently slopping, but erosion issues are present. Headwater areas are known to have soils with seasonal high water tables. Many acres of this land have been drained systematically with sub surface tile. These soil types are highly productive when properly drained.

Due to the rolling topography in the central areas, erosion issue can be an issue with row crop production. These lands may be designated as highly erodible land (H.E.L) by the USDA-NRCS. Cattle production numbers are low in this area and occur on ground that is permanent pasture. Confined cattle production does occur in low numbers here. Many old feedlots can be seen vacated.

Near the confluence of the Mad River, large tracts of flood plain land can be seen. This farmland is known to have highly productive soils that are ideal for agriculture, but flooding does occur.

Residents of this sub-watershed utilize on site septic and wells. Being in a rural location will force these homes to use this type of system for many years. The Village of Donnelsville and Tecumseh High School are the only two areas of this watershed that are connected to a sanitary sewer system.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Target and inform streamside landowners about the importance of riparian protection and natural stream channels.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts	April 2007 April	Number of workshop attendants.

		promoting septic pumping and system management.	2007	Number of handouts distributed.
Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program	Retrofit a bio-retention or stormwater wetland area to the existing stormwater system Donnelsville or North Hampton. Storm drain labeling in Donnelsville or North Hampton. Create and submit articles for New Carlisle newspaper or Township newsletter on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter.

Jackson Creek

Mad River below Donnels Creek to above Mud Run

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA has conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Mad River below Donnels Ck. to above Mud Run
14 Digit HUC #	05080001180080
State 305(b) #	OH58 4
Acres	13,210.9
Stream Classification	Warmwater
Segment Length	8 miles
Drainage Area	585 square miles
Year Sampled by OEPA	1994 & 2003
Attainment	8.3 miles full attainment

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

The landscape of this watershed can best be described as a valley setting, with the Mad River meandering through the center. Headwater/highland reaches of the watershed have a gently rolling topography that go through a steep transitional landform heading toward a flat and broad flood plain area. The Mad River has been drastically channelized upstream of the confluence of Buck Creek. This stretch exists in a natural state but is lined by levees in some locations to control floodwater. Varying soil types can be seen in this portion of the Mad River Watershed. Soil characteristics range from shallow bedrock to alluvial sandy /gravelly to organic muck.

Land Use & Social Features

This sub-watershed consists of agricultural land with patches of forest, along with urbanized areas like Park Layne, Medway and Enon. A majority of row crop and small grain production takes place in flood plain areas. These large tracts of ground have highly productive soils that are ideal for grain production.

Not only are the soil types in the flood plain of the Mad River excellent for crop/grain production, they are also ideal for gravel mining operations. Several high production gravel pits can be seen along streamside land. The Green Velvet sod farm is also located here.

Headwater areas of the north contain soils that are underlain with sand and gravel. These soils provide great growing conditions for nursery crop production. Companies like Studebaker Nursery and Scarff's own and operate several hundred acres here. Also in this area there are a few operations that raise some livestock.

Other than watershed areas of the City of Springfield, this is the most populated area of Clark County. Communities like Enon, Park Layne, Crystal Lake and Medway have condensed housing.

This location also has several mobile home parks. Additionally, many roads in this watershed are lined with residential homes and a few small businesses.

The Estel Wenrick wetland, located along Spangler Road, is owned and operated by the National Trails Parks and Recreation District. This 167-acre wooded-wetland habitat is home to many sensitive biological communities. Many special interest groups have enhanced the integrity of the area by removing invasive species of vegetation.

Water Resources

The sub-watershed has very valuable and unique water resources that are vital to the local community. The Village of Enons well field and water treatment plant were built to supply water to approximately 1,300 village residents.

Not only does this well field provide water for Enon, but for outlying communities. Several arrangements have been made between Enon Village/County/Township jurisdictions to provide drinking water to adjacent areas. This water source has been a catalyst for development of the western parts of Enon.

Outlying areas of the watershed and Crystal Lakes utilize domestic wells as a source of drinking water. The aquifer of this area is unique due to extensive and shallow sand and gravel deposits. These glacial deposits are capable of yielding up to several hundred gallons per minute to large diameter screened wells. Domestic wells yield from 5 to 20 gallons per minute. Well depths range from 25 to 65 feet with the majority between 30 and 40 feet. Water levels range from one to two feet in the low-lying areas near the lake to 17 to 20 feet on higher ground. The aquifer of this watershed is recharged from rainfall and melted snow soaking into the ground and re-supplying the aquifer.

Tecumseh High School and mobile home parks in this watershed have their own well water and waste water treatment systems. Several of these wastewater treatment systems have received violations from the Ohio EPA. In 2003, the Clark County utilities Department filed paperwork to install a sanitary sewer extension from the Southwest Waste Water Treatment plant. The goal of this project was to serve the mobile home parks, Tecumseh High School and surrounding areas in need.

Riparian & Stream Habitat

This stretch of the Mad River was not channelized due to unfavorable soil characteristic. Areas around the confluence with Buck Creek are known to have shallow bedrock, making digging difficult. Further down stream, sandy/ gravelly soils have weak structure and would have led to an unstable constructed channel. Many landowners constructed high water levees along the river to control floodwater. Overtime, many man made structures and stream banks have eroded due to the shifting of the Mad and affects from up stream channelization. In many areas, the Mad River channel is lined with broken concrete and fill to combat stream bank erosion issues.

The riparian corridor can be seen as wooded to heavily wooded as it follows the sinuous Mad River. Many of the existing levees are covered with trees helping to provide shade to the stream and structure to adjacent land. Being in its native state, the Mad River has eroded/cut banks

along with natural stream functions providing in stream habitat. Logjams exist in high numbers, which is another concern to landowners.

Past & Present Conservation Efforts

The Clark SWCD and NRCS staff has conducted many investigations into to streambank erosion and log-jams along this stretch of Mad River. Due to the size of the drainage area and instability of the shifting stream channel, no practical solutions have been implemented. Construction costs to control eroded banks are very high and require vegetative removal that degrades stream quality.

During implementation of the 1999 water quality fifteen acres of cover crops were established and 2 septic tanks pumped help improve water quality.

The Spring Run Fishing Club has established several acres of warm season grass filter strips along Smith Ditch. These vegetative buffers trap nutrients and sediment from entering the steam that provides water to the fishing club.

Flood control structures were installed near the community of Medway during the mid 1950's. Following a sever flood that nearly decimated the town, a high water channel was constructed to divert floodwater around Medway. The outlet of this structure can be seen just east of Medway on Lower Valley Pike.

Additionally, special interest organizations have been promoting wetland and green space preservation. These grass roots organizations have enhanced and protected many acres of sensitive habitats.

Background & Problem Statement

Ohio EPA reports indicate that this stretch of the Mad River is being affected by diverse land use activities. Sources of impairments range from waste water treatment discharges to improper storm water management to crop production. Independent of land use, the up stream channelization of the Mad River has caused accelerated flow rates and flooding prompting many man made alterations.

Many down stream landowners feel that channelization of the Mad River has caused excessive erosion and damage to fertile farm ground. Over the years, many of them have created levees and lined stream banks with broken concrete. Levees that exist are typically wooded, creating a shaded canopy over the river, and limit the Mad River to access the flood plain. This compounds downstream flooding issues. In several areas, floodwaters breach these levees and the out of bank flow cannot reenter the river.

Agriculture and gravel mining can be seen as the dominating land use in flood plain areas. The soil types in this area are known for their high productivity of row crops and gravel. Many of these streamside lands are highly sought after and have a high property value.

The flat topography and high fertility of the flood plain makes a good location for row cropping. Accelerated erosion from farming is minimal. Due to the nature of alluvial flood plain soils, ground and surface water have the ability to become interconnected. Concerns of agricultural

activities threatening the quality of ground and surface water can be reduced with advances in global positioning system (GPS) technologies, grid soil sampling combined with precision application of fertilizers and pesticides.

Point sources of pollution can also be seen as threatening water quality. The Clark County Southwest Waste Water Treatment Plant collects and treats waste from Park Layne, Crystal Lakes and Enon. Due to the close proximity of homes and soil types that have high percolation rates, a sanitary sewer system was essential for the area. Many other problematic areas will eventually be brought on to this system via sewer line extension projects. Many of the mobile home parks operating an on site treatment system will be required to utilize this new infrastructure.

Lack of stormwater management from the developed areas is having an affect on water quality. The Village of Enon and community of Park Layne are urbanized areas with large amounts of impervious cover. These conventional stormwater systems flow directly into Mud Creek in Park Layne and Smith Ditch in Enon. Due to the age and design of this infrastructure, stormwater has no means of being treated or improved prior to being discharged. Not only does stormwater run off have potential to carry pollutants off the landscape, but also has accelerated flow leading to higher rates of erosion and downstream flooding.

Field observations made by Clark SWCD and NRCS personnel identify high nutrient loadings, pathogens, pesticides, organic enrichment, and flow alterations as causes of impairments.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Educate watershed residents about stormwater management and how it affects water quality.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers Promote grid soil sampling and precision application of fertilizers, pesticides and herbicides.	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program **USDA**- Farm Bill (EQIP)	Work in conjunction with Clark & Champaign SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance. Create handouts promoting septic pumping and system management.	April 2007 April 2007	Number of workshop attendants. Number of handouts distributed.
Reduce sedimentation from riparian land areas by promoting protection of riparian corridors and proper streambank restoration methods improving instream habitat.	**Miami Conservancy District**-water quality credit trading program **OEPA**- 401 mitigation list	Work w/ Clark SWCD/NRCS to identify riparian landowners with eroded streambank issues. Establish one demonstration site along the Mad River utilizing bioengineering erosion control and natural channel design methods and natural stream	On going Feb. 2007 – Feb. 1010	Create mailing list targeting streamside landowners to receive educational materials. Document soil saved/not delivered from eroding streambanks using R.U.S.L.E. Lineal feet of streambank

		natural stream channel design		protected or restored.
Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program **Clark County, Mad River Twp. and the Village of Enon-** Work with entities involved in Phase II areas.	Retrofit a bio-retention or stormwater wetland area to the existing stormwater system of Northridge or industrial company. Storm drain labeling in areas with curb and gutter stormwater systems. Create and submit articles to Springfield News-Sun on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter. Water quality activities reported to Ohio EPA for Phase II as required.

Homes in Crystal Lake built in close
Proximity to the Mad River

Recreational use of Crystal Lake and
Mad River

Hidden Lake located in Crystal Lake

Hidden Lake located in Crystal Lake

Mad River at Spangler Road

Hidden Lake located in Crystal Lake

Mad River Coridor

Mud Run

Water Quality Restoration Potential = MEDIUM

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Mud Run
14 Digit HUC #	05080001190030
State 305(b) #	OH58 2
Acres	17,200.9
Stream Classification	Warmwater
Segment Length	12 miles
Drainage Area	27.5 square miles
Year Sampled by OEPA	2003
Attainment	Full

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

Varying topography can be seen throughout portions of this sub-watershed located in Clark County. Rolling land is a common characteristic, but gentle sloping to large flat flood plain areas do exist. This sub-watershed consists of agricultural land with patches of forested land along with heavily urbanized areas. Many locations of the Mud Run watershed are under pressures from development. Soil characteristics range from deep-heavy clay to shallow bedrock to sandy/gravelly.

Land Use & Social Features

The Mud Run watershed has a diversity of land uses, all having different impacts on water quality. Agricultural land use dominants this sub-watershed and the distribution of urban development is relatively even throughout. Concentrated areas exist in and around Enon.

Row crop, small grains and hay production are common, and a few animal operations exist. Due to the rolling terrain, some row cropped areas may be designated as highly erodible land (H.E.L) by the USDA-NRCS. Typically, hay production occurs in these steep areas.

The Springfield Beckley Airport and Ohio Air National Guard (178th Fighter Wing) have several permits issued by Ohio EPA to discharge stormwater run off and wastewater effluent into tributaries of the Mud Run. The Village of Enon also is contributing to stormwater issues. These areas are known to have several acres of impervious cover with no means of treatment prior to entering tributaries. This has led to stormwater quality issues.

Water Resources

The sub-watershed has very valuable and unique water resources that are vital to the local community. The Village of Enons well field and water treatment plant were built to supply water to approximately 1,300 village residents.

Not only does this well field provide water for Enon, but for outlying communities. Several arrangements have been made between Enon Village/County/Township jurisdictions to provide drinking water to adjacent areas. This water source has been a catalyst for development of the western parts of Enon.

Homes located in the Village of Enon utilize a sanitary sewer system provided by Clark County. Areas located outside of Enon boundaries utilize conventional on site septic and well systems. West Enon Estates was recently forced to tie onto a sanitary sewer line that extends from the Southwest Waste water Treatment Plant. Many storm sewers and ditches contained high levels of untreated sewage from on site septic systems making for unsanitary conditions.

Greenon High School and Hustead Elementary both have on-site wastewater treatment systems. Until 2004, both of these locations had issues with these systems working properly. Both schools have installed new wastewater treatment systems that use newer technologies to improve quality of waster water effluent.

Riparian & Stream Habitat

A majority of the Mill Creek channel exists in a natural state. The stream has a sinuous pattern with a wooded corridor in both urban and agricultural areas. Conversely, headwater areas around the Springfield-Beckley Airport have been channelized and altered to convey stormwater produced by the many acres of impervious cover.

Specifically, studies conducted by Wittenberg University state that the Mud Run Watershed has 7.51 miles of forested natural riparian buffer. The stream channel has been modified in many places to make it more accessible to agricultural farms or to control the river through certain heavy-populated areas. There are 7.34 miles of channelized stream, 13.05 miles of unchannelized streams, and 6.55 miles of naturally returning stream.

Past & Present Conservation Efforts

Several landowners have taken advantage of Farm Bill Programs to establish best management practices on farmland. In this sub-watershed, several acres of grassed waterways and sub-surface drainage systems have been installed to control erosion. Additionally, no-till farming practices along with grass filter strips have been implemented on many acres of farmland.

During implementation of the 1999 319 water quality grant, Four acres of native grass filter strip, five acres of forested riparian filter strip, and seventy-five acres of cover crops were established to help improve water quality. In addition, eight septic tanks have been pumped and educational materials distributed to improve on site septic system management.

Due to pressures from urbanization, many local landowners have taken steps to protect and preserve farmland in perpetuity. The Tecumseh Land Trust has acquired four conservation easements in this watershed, all consisting of farmlands. Unfortunately, there are no protected parks or forests in this watershed.

Farmland Preservation Easements Protected by the Tecumseh Land Trust

Acreage	Location
136	Fowler Road
150	Collier Road
160	Rebert Pike
155	East Enon and Fowler Road

Background & Problem Statement

Ohio EPA reports indicate that crop production and livestock operations are sources of water quality degradation. Urbanization and lack of stormwater management are also having a negative impact. This can be seen around the Springfield-Beckley Airport and Village of Enon.

Due to the diverse land uses, impairments originate from different sources and have different impacts on water quality. A vast majority of this watershed is dominated by agriculture land uses. Typical row crop and grain production takes place in fields that are gently slopping, but some highly erodible land does exist. Cattle grazing and hay production occurs in these rolling areas. Many pastures are permanent and some have access to Mud Run Tributaries.

With the Village of Enon having public water and sewer utilities, new developments like Hunters Glenn and White Oak have sprung up. Older developments, like Hauke Meadows and Happy Valley, do not have access to public sewer and water. These areas utilize domestic water wells and on site wastewater treatment. Unfortunately, these developments have been built in the Mud Run Flood Plain. Landowners and developers have modified the position of the stream and removed streamside vegetation. The Clark SWCD receives several complaints annually regarding flooding and stream bank erosion along these stretches.

Compounding the flooding and streambank erosion issues is the lack of stormwater management leaving the Village of Enon and surrounding urbanized areas. The stormwater infrastructure for these areas was built prior to stormwater quality regulations. This leads to stormwater that has accelerated and erosive flow. This run off also has the potential to carry pollutants off the landscape.

Field observations made by Clark SWCD and NRCS personnel identify excessive sedimentation/siltation, high nutrient loadings, pathogens, organic enrichment, flow alterations, and habitat modifications as causes of impairment.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Promote education of proper on site septic system management to improve water quality.
- ✓ Educate watershed residents about stormwater management and how it affects water quality.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce sedimentation, organic enrichment, and bacterial/pathogen levels from unrestricted livestock and feedlots.	**USDA-**Farm Bill (EQIP) **Miami Conservancy District**-water quality credit trading program **ODNR**-Pollution Abatement Funds **Ohio Livestock Coalition-** targeted mailing list	Work w/ Clark SWCD/NRCS to identify livestock producers who have livestock operations. Establish one demonstration site along Beaver Creek utilizing livestock exclusion fencing and pasture management. Submit newspaper and newsletter articles to promote proper spreading and storage of animal waste from feedlots.	On going Feb. 2007 – Feb. 1010 Feb. 2007 – Feb. 1010	Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Lineal feet and number of cattle excluded from stream. Newsletters produced and number of articles appearing in local newspapers. Document number of animal waste complaints received.
Reduce organic enrichment and pathogen/bacterial sources of pollution from on site septic systems	**OEPA**-DEFA Program **Clark Co. Health Department-** Funds to inventory and write plan.	Work with local Health Dept. to complete HSTS inventory identifying failing systems and establishing guidelines for septic system corrections/upgrades.	Jan. 2007-Jan 2009	Approved County-wide HSTS plan by OEPA & Clark Co. Health Board Number of on site septic systems upgraded/replaced.
Educate watershed residents on proper on site septic system maintenance	**Clark Co. Health Department**	Host workshop for watershed residents on proper on site septic system maintenance.	April 2007	Number of workshop attendants.

		Create handouts promoting septic pumping and system management.	April 2007	Number of handouts distributed.
Reduce NPS pollutants associated with stormwater by implementing BMP's and education of watershed residents on stormwater management.	**OEPA**-DEFA Program **Miami Conservancy District**-water quality credit trading program **Clark County and Springfield Twp.-** Work with entities involved in Phase II areas.	Retrofit a bio-retention or stormwater wetland area to the existing stormwater system of Holiday Hills. Storm drain labeling in areas with curb and gutter stormwater systems. Create and submit articles to Springfield News-Sun on stormwater and stream health.	Jan. 2007-Jan. 2010 May 2007	Number of stormwater system upgrades Number of storm drains labeled. Number of articles appearing in newsletter. Water quality activities reported to Ohio EPA for Phase II as required.

Mud Run at East Enon Road and Fowler Road

Mud Run at East Enon Road and Fowler Road

Damage to Mud Run caused by cattle

Mud Run at East Enon Road and Fowler Road

Damage to Mud Run caused by cattle

Mad River below Nettle Creek to above Chapman Creek

Water Quality Restoration Potential = HIGH

Water Quality

The Ohio EPA conducted water quality studies in this sub-watershed. Their results are listed in the table below:

Sub-Watershed	Mad River below Nettle Ck. to above Chapman Ck.
14 Digit HUC number	30001160060
State 305(b) #	OH58 29
Acres	12,307.7
Stream Classification	Coldwater
Segment Length	4 miles
Drainage Area	264 square miles
Year Sampled by OEPA	1994 & 2003
Attainment	4.6 miles partial attainment

Source: Mad River Stream Segment Data (Ohio 305b Report) & 2003 Mad River Basin TSD Report

Physical & Biological Factors

The landscape of this watershed can best be described as a valley setting, with the Mad River flowing through the center. Headwater reaches of the watershed have a very rolling topography that change to a flat and broad flood plain area. The Mad River has been drastically channelized and moved from its original location for flood control. This portion of the Mad River is a coldwater habitat and supports a flourishing trout habitat.

Land Use & Social Features

This sub-watershed can be characterized by its rural nature. The northern areas are in an agricultural setting with dense patches of woods, but some roadside residential housing does exist. Cattle are typically pasture raised in the rolling-high ground. Many of these pastures are permanent due to the potential for erosion. Row crop and small grain production takes place in flood plain areas. These large tracts of ground have highly productive soils that are ideal for grain production.

A few residential houses can be seen more along roadsides in the Clark County portion this watershed. These homes, along with the Mad River Airport, are located on Upper Valley Pike.

Water Resources

The sub-watershed has very valuable and unique water resources that are vital to the local community. Due to the rural character of this watershed, residents utilize domestic on site septic and water wells and will have to rely on them for years to come.

Riparian & Stream Habitat

The Mad River was drastically channelized in the early 1900's. This was done to protect fertile farmland and improve drainage for crop production. The result was a straight ditch with no in-stream habitat or natural stream function. Levees were created from dredged spoil to keep the Mad River contained with in its new artificial channel. When the new channel was constructed,

water bearing outwash deposits were exposed. This produced cool groundwater inflowing into the new Mad River, keeping stream temperatures cooler with a steady flow.

Currently, the levees that were created are wooded leaving a wide riparian corridor providing shade to the stream channel. Large sycamore trees can be seen reaching over the stream channel in this stretch. Signs of the original Mad River channel can be seen as meandering woodlands in crop fields.

Past & Present Conservation Efforts

Ohio EPA reports indicate that this portion of the Mad River is being affected by diverse land use activities. Sources of impairments include crop production and improper stormwater run off management. Independent of land use, channelization of the Mad River has degraded in stream habitat and natural stream function.

Due to the topography and nature of this watershed, very few Farm Bill Programs have been implemented in the past. The cropped headwater regions have a gently slopping grade that goes through a very steep transitional area. This rolling and rugged transitional area is either wooded or in a permanent grass cover, greatly reducing erosion and sedimentation issues. A vast majority of flood plain areas are utilized for grain production.

Due to the nature of alluvial flood plain soils, ground and surface water have the ability to become interconnected. These types of soils are known for their high fertility and yields for grain production, as well as the ability to produce high quantities of quality groundwater. Just downstream of this sub watershed is the City of Springfield's well field. A majority of land surrounding the well field has been designated as a wellhead protection area. Concerns of agricultural activities threatening the quality of ground water resources have led to restrictions on many of these acres. With advances in global positioning system (GPS) technologies, grid soil sampling combined with precision application of fertilizers and pesticides can reduce concern with this issue.

Water Quality Restoration Goals:

- ✓ Reduce sedimentation, pesticides, nutrients and other non-point source pollutants from agricultural & urban land areas.
- ✓ Enhance stream channel morphology to improve in-stream habitat.

Task Description	Resources	How	Time Frame	Performance Indicators
Reduce sedimentation and nutrient run off from agricultural fields through promoting conservation tillage, crop rotation and establishment of filterstrips & riparian buffers Promote grid soil sampling and precision application of fertilizers, pesticides and herbicides.	**USDA**- Farm Bill (CRP) **Miami Conservancy District**-water quality credit trading program **USDA**- Farm Bill (EQIP)	Work in conjunction with Clark SWCD/NRCS to promote streamside buffers through USDA and MCD programs on agricultural lands. Submit newspaper and newsletter articles advertising the benefits of riparian buffers. Target operators and landowners who farm HEL land.	On going	Acres of agricultural lands enrolled in conservation programs. Document soil saved/not delivered using RUSLE or nutrient loading spreadsheets. Newsletters produced and number of articles appearing in local newspapers.
Reduce sedimentation from riparian land areas by promoting protection of riparian corridors. Work with willing landowners to install structures to improve in-stream habitat.	**Miami Conservancy District**-water quality credit trading program **OEPA**- 401 mitigation list **Trout Unlimited-**Mad Men Chapter	Work w/ Clark & Champaign SWCD/NRCS to identify riparian landowners with eroded streambank issues. Establish one demonstration site along the Mad River installing structures to improve aquatic habitats.	On going Feb. 2007 – Feb. 1010	Create mailing list targeting streamside landowners to receive educational materials. Lineal feet of streambank protected or habitat restored.

Mad River below Nettle Creek

Mad River below Nettle Creek

Mad River below Nettle Creek

Section F. Load Reductions

Estimated Load Reductions for Agricultural Field Practices (Cover Crops)

Landowner	Acres Established	Sediment (tons/yr)	Phosphorus (lbs/yr)	Nitrogen (lbs/yr)	Sub-Watershed
Whitehall Farms	120	33	44	88	E. Fk. Buck Ck.
Whitehall Farms	20	47	52	103	E. Fk. Buck Ck.
Hillcrest Farm	31.2	13	17	34	E. Fk. Buck Ck.
Spring Run Farm	15.6	64	75	150	Mud Run
Shuman Farms	32	101	109	219	Buck Ck. below E. Fk. above Beaver Ck.
Miller Farm	17.3	84	89	202	Beaver Ck.
Oder Farm	17.5	73	78	194	Moore Run
Beaverdale Farms	94.5	41	44	88	Beaver Ck.
Bill & Bob Agle	84.1	39	41	83	Beaver Ck.
Barbara Rion	59.2	61	68	136	Mud Run
Ardell Price	55	31	39	91	Moore Run
Neer Farms	59	65	93	186	Beaver Ck.
Neer Farms	73	101	109	219	Sinking Ck.
Shawnee Farm	40.8	13	17	34	East Fk. Buck Ck.
Lon Peters	11.5	57	62	124	Buck Ck. above E. Fk.
Jeff Channell	98	61	66	132	Buck Ck. above E. Fk.
Blair McConkey	33	30	42	85	Sinking Ck.
Total	**861.70**	**914**	**1,045**	**2,167**	

Estimated Load Reductions through Grass & Tree Filter Strips

Landowner	Acres Established	Sediment (tons/yr)	Phosphorus (lbs/yr)	Nitrogen (lbs/yr)	Sub-Watershed
Deselem	2.8	31	52	97	Buck Ck. above E. Fk.
Shuman	9.3	52	90	168	Buck Ck. below E. Fk.
Knight	8	47	82	153	Beaver Creek
Rion	9.3	33	58	108	Mud Run
Singer	10.37	24	39	73	E. Fk. Buck Ck.
Halterman	2.8	24	40	75	E. Fk. Buck Ck.
Peters	5.4	65	168	202	E. Fk. Buck Ck.
P. Steele	7.75	80	138	258	Donnels Ck.
R. Steele	6.64	84	145	270	Donnels Ck.
Total	**62.36**	**440**	**812**	**1,404**	

Clark County Septic System Estimated Load Reductions

County	Landowner Initials	Date of Final Inspection	Sub-Watershed	Gallons Per Day
Clark	CS	05/12/2004	Rock Run	1,000
Clark	KP	08/09/2003	Mad River below Buck Ck. to above Donnels Ck.	1,000
Clark	BA	09/18/2003	Beaver Ck.	1,500
Clark	DF	08/26/2003	Rock Run	1,000
Clark	HT	08/19/2003	Chapman Ck.	850
Clark	SS	08/26/2003	Beaver Ck.	1,000
Clark	LB	08/26/2003	Beaver Ck.	1,000
Clark	MM	08/26/2003	Sinking Ck.	1,500
Clark	JN	08/26/2003	Mud Run	1,500
Clark	RN	08/19/2003	Beaver Ck.	750
Clark	RW	07/31/2003	Rock Run	1,200
Clark	NB	08/15/2003	Mad River below Chapman Ck. to above Buck Ck.	1,100
Clark	RV	08/12/2003	Sinking Ck.	1,500
Clark	FC	08/12/2003	Chapman Ck.	1,000
Clark	JF	08/18/2003	Rock Run	2,000
Clark	MJ	08/11/2003	Sinking Ck.	1,000
Clark	DS	08/12/2003	Donnels Ck.	1,000
Clark	JE	08/11/2003	Beaver Ck.	1,200
Clark	ML	08/12/2003	Chapman Ck.	850
Clark	DK	08/12/2003	Sinking Ck.	1,200
Clark	DW	08/12/2003	Sinking Ck.	1,500
Clark	TS	07/07/2003	Chapman Ck.	1,000
Clark	WT	06/03/2003	Beaver Ck.	1,200
Clark	RE	06/05/2003	Mud Run	1,000
Clark	LB	06/09/2003	Mud Run	1,250
Clark	VWA	04/11/2003	Mad River below Nettle Ck. to above Chapman Ck.	1,200
Clark	GW	05/29/2003	Mill Ck.	1,000
Clark	CB	05/21/2003	Sinking Ck.	2,000
Clark	RD	03/27/2003	Mud Run	750
Clark	JS	05/20/2003	Moore Run	1,500
Clark	JH	05/24/2003	Buck Creek below E. Fk. above Beaver Ck.	1,250
Clark	EP	05/16/2003	Mud Run	1,000
Clark	GD	05/16/2003	East Fork Buck Creek	600
Clark	JC	04/23/2003	Mad River below Chapman Ck. to above Buck Ck.	2,000
Clark	SB	04/15/2003	Mad River below Buck Ck. to above Donnels Ck.	1,500
Estimated Load Reduction:	Gallons per day adequately treated: 41,900			
			*Reductions were only calculated for a	
TSS	9,176.1 lbs/yr		sample of landowners enrolled in the	
BOD	17,893.4 lbs/yr		septic pumping program	
Phosphorous	1,911.7 lbs/yr			
Nitrogen	5,046.9 lbs/yr			
Ammonia	3,823.4 lbs/yr			

Champaign County Septic System Estimated Load Reductions

County	Landowner Initials	Date of Final Inspection	Sub-Watershed	Gallons Per Day
Champaign	BD	05/13/2003	East Fork Buck Creek	1,500
Champaign	BC	11/10/2002	Buck. above E. Fk. Buck Ck. Ck	1,000
Champaign	JC	11/10/2002	Buck. above E. Fk. Buck Ck. Ck	1,000
Estimated Load Reduction:	Gallons per day adequately treated: 3,500			
TSS	766.5 lbs/yr			
BOD	1,494.7 lbs/yr			
Phosphorous	159.7 lbs/yr			
Nitrogen	421.6 lbs/yr		*All systems were enrolled in LMRWPP	
Ammonia	319.4 lbs/yr		septic pumping program	

Load Reduction Goals and BMPs

Pollutant	BMP/Goal
Sediment	Establish cover crops and filter strips
Nitrogen	Establish filter strips, collaborate with OSU Extension to host educational workshop for farmers concerning nitrogen and phosphorus application methods, meet with local lawn care services to discuss their practices, and septic pumping assistance and education
Phosphorus	Establish filter strips, collaborate with OSU Extension to hold educational workshop for farmers concerning nitrogen and phosphorus application methods, meet with local lawn care service provides to discuss application methods and amounts, and septic pumping assistance and education
TSS	Septic pumping assistance and education
BOD	Septic pumping assistance and education
Ammonia	Septic pumping assistance and education

Section G. Future Conservation Efforts

To continue the improvement of water quality in the Lower Mad River Watershed, numerous practices have been identified and will be carried out in the future. Because the LMRWPP will end in September 2004, implementation of future conservation projects will be carried out by Clark SWCD, Champaign SWCD, and NRCS if funding is available from USDA.

For sub-watersheds facing rural pressures including agriculture and livestock production, cattle-exclusion fencing through EQIP and CRP, feedlot improvements, cover crops, and filter strips will be applied. For sub-watersheds that are facing urban pressures, septic tank pumping, along with storm drain marking and education will be applied. Major emphasis will be placed on septic system maintenance education due to the fact that at least 60 systems can be classified as failing in Clark County to date. Urban settings that are experiencing a decline in pervious surfaces will also need to maintain these surfaces by keeping them free of chemicals, such as motor oil, and debris.

Several agencies located in Clark and Champaign Counties have the capability to implement these practices. Clark SWCD will aid practices needed for the sub-watersheds falling in Clark County while Champaign SWCD will aid practices needed for sub-watersheds falling in Champaign County. Clark and Champaign SWCD will continue to provide educational programs and teacher workshops to train educators on the effects of NPS pollution and its relationship to water quality. NRCS, the Clark County Health Department, and the Clark County Engineer's Office will also supply technical assistance to remedy watershed impairments.

Each township within Clark County is responsible for establishing the BMPs listed below as part of the NPDES Phase II Storm Water Management Program for Clark County:

- Catch Basin Cleaning Program
- Street Cleaning Program
- Develop training program for County employees to address prevention/reduction of pollutant runoff from facilities
- Enclosed salt storage and utilizing salt treated with M-50 to reduce rate and occurrences for de-icing
- Maintenance program for herbicidal applications
- Perform routine maintenance for County owned vehicles
- Disposal of waste collected through community operations (provide waste disposal at County facilities)
- Maintenance program for permanent storm water treatment facilities including ditches and pipes

Implementation – Future Practices to Address Water Quality Issues (Prioritized by Local Stakeholders)

Sub-Watershed	Priority	Future Practices
Buck Ck. above E. Fk. Buck Ck.	2	Cattle exclusion fencing through EQIP, feedlot improvements, cover crops, filter strips, and septic pumping assistance and education
East Fork Buck Ck.	1	Cattle exclusion fencing through EQIP, feedlot improvements, cover crops, and filter strips
Buck Ck. below E. Fk. above Beaver Ck.	2	Septic pumping assistance and education, cover crops, and filter strips
Sinking Ck.	1	Cattle exclusion fencing through EQIP, cover crops, filter strips, grassed waterways, and septic pumping assistance and education
Beaver Ck.	1	Cattle exclusion fencing through EQIP, cover crops, filter strips, and septic pumping assistance and education
Moore Run	2	Cattle exclusion fencing through EQIP, septic pumping assistance and education, storm drain marking and education to prevent dumping
Buck Ck. below Beaver Ck. to Mad River	3	Septic pumping assistance and education, storm drain marking and education to prevent dumping
Mad River below Chapman Ck. to above Buck Ck.	3	Septic pumping assistance and education, storm drain marking and education to prevent dumping, and keeping impervious surfaces free of debris and chemicals
Mill Ck.	2	Septic pumping assistance and education
Mad River below Buck Ck. to above Donnels Ck.	2	Septic pumping assistance and education, storm drain marking and education to prevent dumping, and keeping impervious surfaces free of debris and chemicals
Rock Run	2	Septic pumping assistance and education, storm drain marking and education to prevent dumping, and keeping impervious surfaces free of debris and chemicals
East Fork Donnels Ck.	2	Septic pumping assistance and education
Chapman Ck.	1	Septic pumping assistance and education
Donnels Ck.	2	Septic pumping assistance and education
Jackson Ck.	2	Septic pumping assistance and education
Mad River below Donnels Ck. to above Mud Run	1	Septic pumping assistance and education
Mud Run	1	Septic pumping assistance and education, storm drain marking and education to prevent dumping, and keeping impervious surfaces free of debris and chemicals
Mad River below Nettle Ck. to above Chapman Ck.	1	Septic pumping assistance and education, storm drain marking and education to prevent dumping

1 = high priority sub-watershed 2= medium priority sub-watershed 3=low priority sub-watershed

Best Management Practices Implemented per Sub-Watershed Through the LMRWPP 319 Grant

Sub-Watershed	BMP(s) Implemented
Buck Creek above E. Fk. Buck Ck.	Grass Filter Strips – 13.17 acres Cover Crops – 109.5 acres Septic Pumpings – 7 tanks
East Fork Buck Creek	Grass Filter Strips – 8.2 acres Cover Crops – 212 acres Septic Pumpings – 11 tanks
Buck Creek below E. Fk. above Beaver Ck.	Grass Filter Strips – 9.3 acres Cover Crops – 32 acres Septic Pumpings – 14 tanks
Sinking Creek	Cover Crops – 106 acres Septic Pumpings – 9 tanks
Beaver Creek	Grass Filter Strips – 6.4 acres Riparian Filter Strips – 1.6 acres Cover Crops – 254.9 acres Septic Pumpings – 19 tanks Bioengineering Erosion Control Project
Moore Run	Cover Crop – 72.5 acres Bio-Retention Project Septic Pumpings – 2 tanks
Buck Creek below Beaver Ck. to Mad River	Septic Pumpings – 7 tanks
Mad River below Chapman Ck. to above Buck Ck.	Septic Pumpings – 21 tanks Urban Storm Water Wetland
Mill Creek	Septic Pumpings – 3 tanks
Mad River below Buck Ck. to above Donnels Ck.	Septic Pumpings – 21 tanks
Rock Run	Septic Pumpings – 9 tanks
East Fork Donnels Ck.	Septic Pumpings – 1 tank
Chapman Creek	Septic Pumpings – 4 tanks
Donnels Creek	Grass Filter Strips – 14.39 acres Septic Pumpings – 2 tanks
Jackson Creek	Septic Pumpings – 3 tanks
Mad River below Donnels Ck. to above Mud Run	Septic Pumpings – 2 tanks Bioengineering Erosion Control Project
Mud Run	Native Grass Filter Strips – 4.2 acres Forested Riparian Filter Strips – 5.1 acres Cover Crops – 74.8 acres Septic Pumpings – 8 tanks
Total for Lower Mad River Watershed *Note: Figures represent projects completed from April 2000 through June 2003. Additional septic pumpings occurred from July 2003 through May 2004, for a grand total of 182 tanks.	**Filter Strips – 62.36 acres** **Cover Crops – 861.70 acres** **Septic Pumpings – 143 tanks**

Best Management Practices Implemented by NRCS & Clark SWCD

Practice	2001	2002	2003	Total
CRP Filter Strips	77 acres	242 acres	23 acres	342 acres
CRP Grassed Waterways	15 acres	40 acres	36 acres	91 acres
Riparian Forest Buffer	N/A	40 acres	17 acres	57 acres
Total Soil Saved by Erosion Control Methods	1,884 tons/year	24,638 tons/year	31,729 tons/year	58,251 tons/year

Source – NRCS data

Sub-Watershed Acreage

Name	HUC	Acreage
Buck Ck. above E. Fk. Buck Ck.	05080001170010	19,546.0
E. Fk. Buck Ck.	05080001170020	18,464.1
Buck Ck. below E. Fk. above Beaver Ck.	05080001170030	15,103.2
Sinking Ck.	05080001170050	8,863.9
Beaver Ck.	05080001170040	16,443.5
Moore Run	05080001180020	11,741.0
Buck Ck. below Beaver Ck. to Mad River	05080001170060	11,593.2
Mad R. below Chapman Ck. above Buck Ck.	05080001180010	10,767.3
Mill Creek	05080001180040	9,883.7
Mad River below Buck Ck. above Donnels Ck.	05080001180030	7,604.6
Rock Run	05080001180050	5,780.9
E. Fk. Donnels Ck.	05080001180070	5,805.3
Chapman Ck.	05080001160080	15,626.1
Donnels Ck.	05080001180060	11,138.7
Jackson Ck.	05080001180090	6,085.5
Mad River below Donnels Ck. above Mud Run	05080001180080	13,210.9
Mud Run	05080001190030	17,200.9
Mad River below Nettle Ck. above Chapman Ck.	05080001160060	12,307.7
Total Acreage in Lower Mad River Watershed		**217,166.5**

Section H. Practical Matters

Contact Agency:

Clark Soil & Water Conservation District
4400 Gateway Blvd., Suite 103
Springfield, OH 45502
(937) 328-4600

List of Acronyms

CCA	Center City Association
CDM	Camp Dresser & McKee
CRP	Conservation Reserve Program
CSO	Combined Sewer Overflow
DNR	Department of Natural Resources
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
HEL	Highly Erodible Land
HW	Head Waters
LMRWPP	Lower Mad River Watershed Protection Project
NPDES	National Pollutant Discharge Elimination System
NPS	Non-Point Source
NRCS	Natural Resources Conservation Service
NRI	National Resources Inventory
OARDC	Ohio Agricultural Research and Development Center
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
OSU	Ohio State University
PS	Point Source
SWCD	Soil & Water Conservation District
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
UWA	Unified Watershed Assessment
WRP	Wetland Reserve Program
WWTP	Waste Water Treatment Plant

Action Plan Distribution List:

- LMRWPP Joint Board
- LMRWPP Advisory Board
- Clark SWCD
- Clark County Commissioner's Office
- Clark County Engineer's Office
- Clark County Health Department
- Clark County Auditor's Office
- Clark County Building Regulations
- Clark County OSU Extension Office
- Clark County Development Office
- Clark County Parks & Recreation
- Clark County Planning Commission
- Clark County Prosecutor's Office
- Clark County Public Library
- Clark County Recorder's Office
- Clark County Transportation Coordinating Committee
- Clark County Treasurer's Office
- Clark County Utilities Department
- Clark County Waste Management District
- State Elected Officials
- State Representatives
- Buck Creek State Park
- Ohio EPA
- State Highway Garage
- State Watercraft
- City of Springfield
- City of New Carlisle
- Village of Catawba
- Village of Donnelsville
- Village of Enon
- Village of Lawrenceville
- Village of North Hampton
- Village of South Vienna
- Village of Tremont City
- Township Trustees
- Farm Credit Services
- Area banks
- Corps of Engineers / C.J. Brown Reservoir
- Farm Service Agency
- Tecumseh Land Trust
- Division of Soil and Water
- NRCS State Office
- Clark County Fair Office
- Clark County Historical Society

- Champaign County Historical Society
- Township Zoning Inspectors
- Clark County School Board Office
- Springfield City School Board Office
- Clark County School Agriculture Vocational Departments
- Champaign County Health Department
- Village of Mutual

All records and documents pertaining to this plan will be kept in the
Clark Soil and Water Conservation District
4400 Gateway Blvd., Suite 103
Springfield, OH 45503
(937) 328-4600

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- Clark SWCD
- NRCS
- LMRWPP Joint & Advisory Board
- Champaign SWCD
- Clark County Health Department
- OEPA
- ODNR Division of Surface Water
- Ohio State University Extension (Clark County)