A Comprehensive Watershed Management Plan

for the Salt Creek Watershed

A Collaboration of
Muskingum Soil and Water Conservation District,
Salt Creek Community Focus Group, and the residents of
the Salt Creek Watershed
March 2005

The Muskingum Soil and Water Conservation District mission and vision of the project are as follows:

Mission Statement: Providing leadership and assistance for the conservation and enhancement of our natural resources and environment.

Vision: Recognized as a dynamic, innovative team reaching for a harmonious environment.

The Salt Creek Community Focus Group mission and vision of the project are as follows:

Mission Statement: The Salt Creek Community Focus Group strives to maintain or improve the quality of surface and ground water that is in the Salt Creek Watershed.

Vision: Providing input on identification or direction of priorities for studies and corrective or preventative action, and the education of citizens in the Salt Creek Watershed on later water quality issues.

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This publication was financed in part by a Muskingum County Commissioners and Muskingum Soil and Water Conservation District

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Acronym Reference List

NRCS-Natural Resources Conservation

ODNR-Ohio Department of Natural Resources

OEPA-Ohio Environmental Protection Agency

FSA-Farm Service Agency

BMPs-Best Management Practices

BOD-Biological Oxygen Demand

QHEI-Qualitative Habitat Evaluation Index

DO-Dissolved Oxygen

DBH-Diameter Breast Height

RM-River Mile

EWH-Exceptional Warm Water Habitat

SWCD-Soil & Water Conservation District

TSS-Total Suspended Solids

TMDL-Total Maximum Daily Load

GIS-Geographic Information Systems

IBI-Index of Biological Integrity

USDA-United States Department of Agriculture

ICI-Invertebrate Community Index

USFWS-United States Fish & Wildlife

WWH-Warm Water Habitat

LEAP-Livestock Environmental Assurance Program

NPDES-National Pollution Discharge Elimination System

CRP-Conservation Reserve Program

NPS-Non-point Source Pollution

EQIP-Environmental Quality Incentives Programs

Description of the Watershed

Location Statistics

The Salt Creek Watershed is located in the northeastern and southeastern parts of Muskingum County. The Salt Creek Watershed location is within the Allegheny Plateau Region. The Salt Creek Watershed is 93,000 square acres and is located in part or all of eleven townships within Muskingum County. The townships include: Meigs, Blue Rock, Wayne, Highland, Perry, Salem, Washington, Salt Creek, Adams, Union, and Rich Hill.

The northern most part starts at the southern edge of Adams Township. The eastern edge goes to the middle of Union and Rich Hill Townships. On the western edge of the Salt Creek Watershed it splits through Washington and Wayne Townships. The southern tip is in the middle of the Blue Rock State Forest in Blue Rock Township. The Salt Creek Watershed drains into the Muskingum River right before Cutler Lake Road and St. Rt. 60 meet. Seven fourteen-digit Hydrological Unit Codes (HUCs) represent the Salt Creek Watershed. Identification of the watershed location and 7-14 HUC is laid out in MAP 1.

Stream Statistics

The Salt Creek is the main branch with seven named tributaries flowing into it. The major tributaries are Mann's Fork, Boggs Creek, Buffalo Fork, White Eyes Creek, Little Salt Creek, Frog Run and Georges Run. The Salt Creek Watershed has 13 named streams by the *Gazetteer of Ohio Streams* flowing into the main stem of the Salt Creek. There are 96.6 known miles of streams within the watershed. Seven major tributaries converge into the Salt Creek as it falls 14.1 ft./mile discharging into the Muskingum River.

Land Use

General

The land within the Salt Creek Watershed is 48.25% agricultural. The farms are laid out on the rolling hills of eastern Muskingum County. The other main land use of the Salt Creek Watershed is the wooded areas. These wooded areas add great capacity and beauty to the Salt Creek Watershed area. The Salt Creek Watershed contains the Blue Rock State Forest. All of the forested area represents 49.86 % of the Watershed. The meandering streams in the Salt Creek Watershed flow through its natural land patterns. The urbanized land use is 0.29%. The other 1.60% of the watershed is made up of open water, barren, non-forested wetlands, and shrub/scrub.

Incorporated/ Unincorporated

There are two incorporates areas in the Salt Creek Watershed. Norwich is located on the east side of the watershed and Adamsville is located in the northern portion (Map18,19).

Phase 2 Stormwater Communities

These are no Phase 2 Stormwater Communities in the Salt Creek Watershed. (OEPA)

Geological Features
There is no designation of geological features in the Salt Creek Watershed. (USGS)

Special Designations
There are no special designations of national, state wild, or scenic rivers in the Salt Creek Watershed.

Recreation Uses
Recreational uses in the watershed include: boating, fishing, swimming, hiking, camping, golfing, and hunting. Blue Rock State Forest and Blue Rock State Park are located within the Salt Creek Watershed. The Blue Rock State Forest has 4,579 forested acres and 15 acres of open water. The Blue Rock State Park covers 322 acres. Four public golf courses can also be found within the Watershed. The Jaycee and Norwich Valley Public Golf Courses are located north of Interstate 70 and Creek Side and Fuller's Fairways Golf Courses are located south of Interstate 70.

Industrial Uses
The industrial uses of land in the Salt Creek Watershed are increasing along Interstate 70 and State Route 40. Major corporations have developed their companies along the Interstate for easy highway entrance and exit. With increasing industrial land uses more environmental problems are being contributed to the Salt Creek Watershed.

History
Muskingum County was named after a Delaware Indian word meaning "a town on the riverside" or the old Indian language word meaning "the eye of the elk". Muskingum County is divided by the Muskingum River flowing north to south through the county. Muskingum County was greatly settled in the earlier years. Muskingum County was booming with industry, retail, and entertainment. In 1948 the 74 industries employed 11,500 employees. Historically, many employment opportunities outside city limits were in the agricultural and mining industry. They used the railroad that crosses Muskingum County for industrial transportation (See Map 16).

Historical/ Present Township Background

Perry Township
Perry Township was organized in 1812 from the "Military District" and named in honor of Commodore Perry. Perry Township's north boundary is Salem, east by Union, south by Salt Creek and Wayne, and west by Washington Townships. The geological surface is undulating; the soil is limestone clay with sand and yields good crops. Salt Creek and Little Salt Creek, White Eyes run and numerous smaller streams, drain the township.

In Perry Township there is one town site. The original proprietor of the town site of Sonora was John Brown. It was platted by Isaac Stiers in 1812. Sonora contained a variety of business places, small manufacturing interests, possessed good telegraph, express and railway facilities, a railroad, and post offices to sustain its population of approximately 200 people. The post office was established in 1855 and Evan Crane was the first postmaster. Another post office was established in Perry Township at Bridgeville twenty-two years earlier with Andrew Hughes being the postmaster. As the population grew Perry and surrounding townships needed more

transportation needs this is when the railroad and road was built. Railroads were a major source of transportation. The Central Ohio division of the Baltimore & Ohio Railroad crosses the township with a station at Sonora. The National Pike or present day State Route 40 was completed through the township in 1820.

Information was obtained from USGenWeb Township Project located at OHGenWeb at www.rootsweb.com

Highland Township

Highland Township's boundaries include: Monroe to the north, Guernsey to the east, Union to the south, and Salem Township to the west. The landscape resembles the surrounding townships. The central and southern parts of this township are comparatively level and susceptible of easy cultivation. The northern area is elevated and broken. The original survey and the reduction to the present area were done in July 2, 1819. "A petition was presented by a number of the inhabitants of the northeastern division of Muskingum County, praying that the 5th add 6th ranges, thence east to the county line, thence north to the place of beginning, may be incorporated into a new township, by the name of Highland, and the election ordered to be held at the house of William Dennison on the first Monday in April, 1814, to elect the necessary township officers." (*www.rootsweb.com*) To understand the original boundaries of Highland Township before the survey we must consider the fact that Mr. Dennison lived a mile and a half southwest of Adamsville, in what is now Salem Township. During the election Joseph K. McCune and Joseph Williamson were the first justices of the peace**.**

Highland township started to be settled in 1808, when Mathias Trace, from Washington County, Penn., established a homestead on the northeast one-fourth of section 11. The settlement was advancing so rapidly, that in 1835 John Bradford, James Honnold and Andrew Geyer and their families were living in frame houses. For quicker transportation the first public road laid out in this township was that from Cambridge to Dresden, the second in 1806 was from Findley Milldam, south of New Concord, to the mouth of Wills Creek, about nine years later.

David Rankin originally owned Bloomfield, a small town site located in the northeastern part of the township. An inland post office, twenty miles northeast of Zanesville, and four miles north of New Concord, was the nearest shipping point. The population of Bloomfield was about 100.

Information was obtained from USGenWeb Township Project located at OHGenWeb at www.rootsweb.com

Blue Rock Township

Blue Rock Township was created from Salt Creek Township in June 1810. No election of officers was held until December 3rd of 1813. Salt Creek and Zanesville got together with county commissioners to agree on making a new township, with the name of Blue Rock coming from the Big Blue Rock on the creek and riverbanks that would divide the townships. The boundaries are north by Salt Creek, and Wayne Township, east by Meigs Township, and south by Morgan County and west by the Muskingum River.

The first election for the township was held at the house of Lawrence Allwine just above Gaysport on January 1814. By 1880 the elections were held at the township house on section fifteen in the center of the township on Buttermilk Road. It is still used by the township for

meetings and elections. The number of voters polled in the township in 1817 was only 30. But by 1880 the township had grown to 280 polled voters.

The small towns in the Blue Rock Township are Gaysport, Rural Dale, and Kiefer. Along with the towns many churches and schoolhouses were built. During the years of 1800-1865 nine churches were built of all different religions. Besides religion education was something of importance to the Blue Rock residents. Nine schoolhouses were built between the early 1800-1950.

Blue Rock Township contains Blue Rock State Park and Forest. Blue Rock State Park became an official park in 1949. Activities available at the park include canoeing, swimming, hiking, canoeing, fishing, hunting, and picnic areas. The Blue Rock State Forest is 4,579 acres.

Information was obtained from USGenWeb Township Project located at OHGenWeb at www.rootsweb.com

Salt Creek Township

In 1788 the Salt Creek Township was known as "Township thirteen of range twelve of lands of the United States within the territory northwest of the River Ohio, and subject to entry in the land office in Marietta, Ohio." (*Biographical and Historical Memoirs of Muskingum County, Ohio).* The Salt Creek Township was formed in 1815 and reorganized in 1826 and 1839. The first reorganization detached sections to form Wayne Township. In 1839 the Salt Creek Township reorganized again to form Harrison Township.

Back then horses were selling for forty dollars a piece and cattle at eight dollars each. There were many businesses and churches throughout Salt Creek Township. They had the Chandler's Grist Mill , Zachary's Tannery, William's Distillery, a tavern, salt mining, and a blacksmith. The churches included Methodist Episcopal, United Brethren Church, and Salt Creek Baptist. The residents of Salt Creek Township took education seriously and established the first brick school house with seven pupils and the first circulating Muskingum County library with 150 volumes.

Information was obtained from USGenWeb Township Project located at OHGenWeb at www.rootsweb.com

Washington Township

The announcement that Washington Township became an official formed township came on Wednesday June 5, 1822 in the *County Commissioners Journal*. Soon after, on June 27, 1822, the first election for township officers was held. The first settler in Washington Township was Isaac Prior in 1799. More settlers started to emerge into the area.

Businesses and transportation increased with the emerging settlers. The businesses include a sawmill, mining company, distillery, and tanney. The first sawmill was built in 1810 by William McConnell. The first mining of coal in Muskingum County was by John Bates in 1811. In 1819 the first distillery and tannery were opened. During this economic movement of businesses, Adamsville Road was surveyed and opened in 1813, making it the first county road.

Along with the businesses roads there were many churches in the area. Washington Township Baptist Church in Washington Township was formed in 1842 and stood until it was destroyed in 1932 by a fire. The other churches were Washington Township Methodist Church and St. John's Lutheran Church. The Washington Methodist Church was started by Roger Manlry in 1808. The church meetings were held in homes. The St. John's Lutheran Church was organized in the 1860s, and in 1876 the first permanent church structure was built.

Information was obtained from USGenWeb Township Project located at OHGenWeb at www.rootsweb.com

Adams Township

Adams Township is located with Wills Creek to the north. The landscape in the northern portion is broken and rough and to the south is more evenly broken and rough with similarity to Salem. Wills Creek drains the northern, and Symmes Creek the southern and western portions. Salt Creek drains a portion of the southern and eastern sides of the township.

The first settlers were James Wilcox, David Brellsford and Hugh Ballentine. They settled on Wills Creek in the northeast corner of Adams Township. The most important event that aided in the settlement of the township was a public road. The road cut through Adams Township, from the settlement on Symmes Creek to Otsego in Monroe Township.

For the formation of a the present day Adams Township a petition was presented by Caleb Jordan, and signed by a number of citizens of Madison and Monroe Townships to the County Commissioners. The petition asked that land be set forth from Madison and Monroe Townships to form a new township. This was done due to many difficulties and disadvantages in the distance they have to travel to elections. The County Commissioners believing that it was necessary for the convenience of the inhabitants and township officers to be able to vote granted the the formation of a new township. Adams Township was named after John Quincy Adams, the sixth President of the United States. The first schoolhouse was erected in 1820.

Information was obtained from the book Township Histories of Muskingum County, Ohio located at the Muskingum County Library, Zanesville, Ohio.

Wayne Township

On March 26, 1826 it was ordered by the commissioners that Wayne Township be formed. This new township would be struck off from part of Zanesville and Salt Creek Townships. Wayne Township has one of the more pleasing variations in appearance out of all the townships in Ohio. Wayne Township is varied and has excellent adaptation to agriculture, horticulture, and vegetable gardening. The geological surface is undulating, with a clay soil on the uplands and the extensive bottomlands. The streams are composed of rich sandy loam. The largest stream, traversing a considerable part of the township, is Salt Creek, which courses in a southeasterly direction and empties into the Muskingum River.

Wayne Township was named after the first settler, Anthony Wayne, perpetuating the memory of his life lessons and emulating his example of steadfastness and integrity. With the increase in settlers, a town and a road were established. Before the organization of Wayne Township the

first road was surveyed through this township and went from Zanesville to McConnellsville, along the river. Also prior to the organization, the first town of Duncan Falls was settled.

Information was obtained from the book Township Histories of Muskingum County, Ohio located at the Muskingum County Library, Zanesville, Ohio.

Union Township

Union Township is situated with the "United States Military District," and contains twenty-five square miles of territory. The township was surveyed in 1803 and the government reserved the southeast quarter for school purposes. The township was divided into sections then quarters, numbering them from one to twenty-five. They began numbering at the northeast corner tract.

The first settler was never determined because of the government lease of the land for ninety-nine years. Union Township was known as the school land. The early settlers were unable to purchase land elsewhere so they became permanent settlers. The government, receiving no revenue from these lands, found it necessary to pass a law exposing them to public sale. The occupants had the first offer in purchasing the land.

To increase the ease of transportation the first road through Union Township was the Old Wheeling Road and the second was National Road. The first village was Norwich, which is located near the center of section seven, and occupies a portion of three-quarters of that section. In 1806, David Findley laid out the town of New Concord along the line of the National Road.

Information was obtained from the book Township Histories of Muskingum County, Ohio located at the Muskingum County Library, Zanesville, Ohio.

Rich Hill Township

Rich Hill Township is located in the eastern part of Muskingum County. It is bounded on the north by Union Township, and the military base line; on the east by Guernsey County, Ohio; on the south by Meigs Township; and on the west by Salt Creek Township. It is a full Congressional township, and contains thirty-six sections, each a square mile. Rich Hill contains no towns of any importance. The only town is Rix Mills and is located in the center of the northern tier of the sections. Williams Reynolds designed Rix Mills in 1854.
John Reynolds named the township Rich Hill in 1815, because it was rich and had hilly geography. The forest is predominant in the township because of the rich soils. Some of the trees that inhabit the forest are oak, walnut, poplar, butternut, hickory, chestnut, maple, gum, elm, and beech. There is very little land that could not be cultivated, if cleared. Buffalo, and Williams Fork, of Salt Creek, drain the western portion, while McKee's and May's Forks, of Wills Creek, drain the eastern portion of the township. Water is abundant, and, although strongly impregnated with lime, it is good.

Information was obtained from the book Township Histories of Muskingum County, Ohio located at the Muskingum County Library, Zanesville, Ohio.

Meigs Township

Meigs Township consists of an entire Congressional township, consisting of thirty-six sections. It is bounded on the north by Rich Hill Township; on the east by Noble County, Ohio; on the south by Morgan County; and on the west by Blue Rock Township. The geography of Meigs Township is very hilly, the streams having cut deep ravines through the lime and sandstones of the lower coal measures. Meigs Creek drains the southwestern portion of the township; Dyes Fork of Meigs Creek, the southeastern; Collins Fork of Wills Creek, the northeastern; and Dents creek, the northwestern portion. The branches of these streams ramify throughout the township. It received its name from the principal stream in it – Meigs Creek – the creek, itself, having derived its name from Governor Return J. Meigs, of Marietta.

The township was formed in 1819. For the means of transportation the first road surveyed through the township was the Zanesville and Marietta Road. The villages of Meigs Township are small and unimportant. They are High Hill, Zeno, Coal Hill, Meigs, and Museville.

Meigs Township is the holder of the highest land in Muskingum County. The location of the land named High Hill is an elevated knob, situated on the southwest quarter of section four. The summit is 1,375 feet above sea level. A mound crowns the summit, from which twelve counties are visible. Tourists often visit High Hill-as the Zanesville and Marietta Road runs by its base-to enjoy the delightful prospect.

Information was obtained from the book Township Histories of Muskingum County, Ohio located at the Muskingum County Library, Zanesville, Ohio.

Salem Township

The township was originally a part of Highland Township. In 1819 the commissioners set off the township of Salem – five miles square. The name was derived from Salem, Massachusetts, as a number of the early settlers were from that region.

The northeast corner of the township was “school land”, and surveyed into one hundred acre lots, numbered from one to forty, beginning at the southeast corner of said quarter of the township, numbering north and south alternately and ending in the northwest corner.

In 1832 the town of Adamsville was laid out in the northeast corner of section seven by Mordecai Adams. President John Quincy Adams appointed Jonathan Starkey, who resided about a mile east of Adamsville, postmaster in 1827. In 1832 several houses were erected in Adamsville. Adamsville was incorporated in 1864 and the first mayor was David Richardson. The first schoolhouse was built on the northwest corner of lot 37 of the school land in 1817.

Information obtained from Histories of Muskingum County Ohio a reproduction by Unigraph, Inc. 1974; Originally published by J.F. Everhart & Co. 1882.

Demographics

Overview

Water resources are an essential need in a person's everyday life. The residents in the Salt Creek Watershed depend on their water resources to provide recreation, drainage, work, and a dependable drinking source. This water resource accommodates 5095 landowners and a total population census of 9484. The ages of the residents living in Muskingum County ranges between 25-44. The average median income of Muskingum County is $35,185, below the state average of $40,956. The largest age population group is 25-44, representing 27.7% of the population. The percentage of high school graduates is 44.2% and 12.6% have a bachelor degree or higher. Migration of this county can be recognized by the increase of population (Table 1) (Census 2000).

As the watershed continues to grow in size urbanization has strongly increased. Following recent events many family farming operations are being sold to land developers and broken into housing developments. Also, newer homes are replacing the old farmhouses throughout the watershed. Following trends you can recognize that with new housing developments, public sewage and water will soon follow the construction.

History

Native American tribes of Delaware, Wyandot, and a few Seneca and Shawanoese inhabited the rolling hills of Muskingum County, giving Muskingum County the name after a Delaware Indian word meaning "a town on the riverside" or the old Indian language word meaning "the eye of the elk". The Indians settled the area setting up towns in the south by present day Duncan Falls and north by present day Dresden. Old cabins and the graveyard of early settlers still remain to show there was a presence of Indians throughout Muskingum County.

Beginning in 1920 Muskingum County came to be known as the "Gateway to Southeastern Ohio". Zanesville, located inside Muskingum County, served the State of Ohio as the Capital before it was moved back to Chillicothe. Muskingum County was booming with industry, retail, and entertainment. In 1948 the 74 industries employed 11,500 employees. The agricultural industries produced corn, wheat, oats, potatoes, tobacco, wool, and pork. The mining companies were mining brine, which was boring into whitish sandstone this was known as "salt rock". The Salt Creek Watershed was a valuable water resource for these industries.

Salt Creek Township Mining History

The boundaries were set for Salt Creek Township in 1808 when they named the township. The name was given because of the Salt Creek stream that flows north and south then west to the Muskingum River. Also, the name was given for the mining of "salt rock" done in the area. Salt was found throughout the Chandlersville area. It was mined through two wells by Muskingum Mining Company as the years passed. The mining company found more natural resources as it mined the land.

Population Growth

The population accelerated through the 1800s, when the Muskingum County area was being settled (information based on the 2000 Census Report). The largest population growth increase was during 1920 to 1930 (Table 1). People were moving toward the city because of industries starting and mining increasing throughout Muskingum County. The biggest rural population decrease happened in 1926 due to people migrating toward the city.

Population Growth from 1800-2000											
Year	**1800**	**1810**	**1820**	**1830**	**1840**	**1850**	**1860**	**1870**	**1880**	**1890**	**1900**
#	n/a	10,036	17,824	29,334	38,749	45,049	44,416	44,886	49,774	51,210	53,185
year	**1910**	**1920**	**1930**	**1940**	**1950**	**1960**	**1970**	**1980**	**1990**	**2000**	
#	57,488	57,980	67,398	69,795	74,535	79,159	77,826	83,340	82,068	84,585	

Table 1-Muskingum County Population Growth 1800-2000

Salt Creek Watershed Population

Using the 2000 Census of townships the population was determined for the Salt Creek Watershed population. The 11 townships were analyzed by placing the fourteen digit HUC watershed boundaries and the population was therefore calculated (Table 2).

Subwatershed Population Census 2000		
050 40004 060 010		
Salt Creek above Little Salt Creek	***Total***	**2527**
050 40004 060 020		
Little Salt Creek	***Total***	**1557**
050 40004 060 030		
White Eyes Creek	***Total***	**1695**
050 40004 060 040		
Buffalo Fork	***Total***	**510**
050 40004 060 050		
Boggs Creek	***Total***	**2449**
050 40004 060 060		
Mann's Fork	***Total***	**543**
050 40004 060 070		
Salt Creek	***Total***	**319**
Total Watershed Population		**9600**

Table 2-Population Divided by Subwatershed

Population, Age, Income, and Education

Muskingum County's average age, income, and education is based on the 2000 Census (Table 3). The average income is right below the state average of $40,956. The percentage of those holding a high school degree is due to the Muskingum County's 40 public schools. To obtain a bachelors degree, there are two four-year public/private universities and one two-year public college. Throughout Muskingum County there are six public /branch libraries for the public to utilize.

Average, Age, Income, and Education				
County	Average Age	Income	Education	
			% High School Degree	% Bachelor Degree or Higher
Muskingum	25-44	35,185	44.20%	12.60%

Table 3-Average Age, Income, & Education

Employment, Poverty Levels

Muskingum County is ranked 25th in the state for unemployment according to the Ohio 2000 Census (Table 4). The unemployment rate is increasing due to the economy at this present time. The poverty rate mirrors the unemployment percentage. (Census 2000)

Unemployment	Poverty Levels	
	Below 50%	50%-99%
6.40%	5.00%	7.90%

Table 4-Unemployment/Poverty Levels (Muskingum County)

Economic Patterns

According to The Muskingum County profile for economic patterns Table 37 describes Muskingum County business structure.

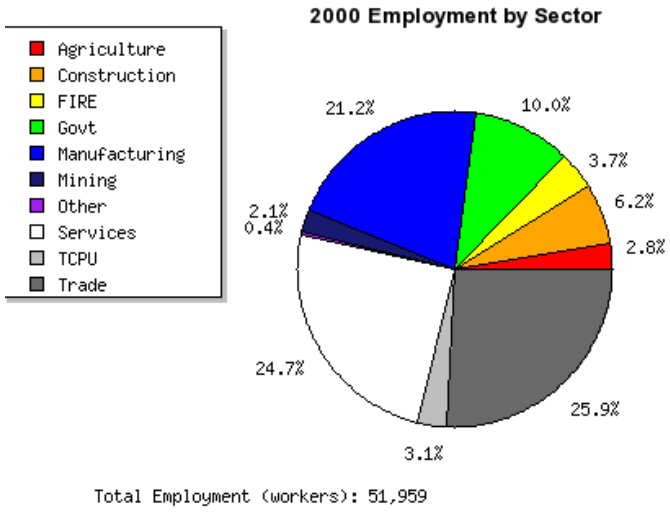

Table 37- Muskingum County Business Structure

Employment includes full-time and part-time workers and the self-employed in all sectors, including agriculture.

FIRE: Finance, Insurance, Real Estate TCPU: Transporation, Communications, Public Utilities Trade: includes wholesale and retail trade

Year	Agricultural Services, Forestry, And Fishing	Mining	Construction	Manufacturing	Transportation And Public Utilities	Wholesale Trade	Retail Trade	Finance, Insurance, And Real Estate	Services	Unclassified Establishments	Total
1988	64	945	826	7,383	1,031	1,956	6,051	918	7,034	101	26,309
1989	53	907	835	8,119	993	1,934	6,200	937	7,777	179	27,934
1990	72	933	949	7,920	952	1,906	6,394	1,027	7,715	62	27,930
1991	70	783	938	7,500	889	1,965	6,480	931	8,434	29	28,019
1992	89	487	821	8,379	1,003	1,779	6,274	969	8,984	2	28,787
1993	66	487	892	9,363	997	1,678	6,358	977	9,176	16	30,010
1994	62	481	830	9,109	1,094	1,662	6,776	1,006	9,627	18	30,665
1995	78	450	970	10,772	948	1,616	7,009	1,061	9,810	4	32,718
1996	127	319	938	8,591	1,096	1,479	7,589	1,106	10,278	5	31,528
1997	117	263	1,077	10,144	886	1,442	7,781	1,013	9,658	11	32,392

Table 38- Muskingum County Business Statistics from 1988-1997

http://www.osuedc.org/profiles/business_stats/business_stats.php?&fips=39119&

Agricultural Statistics

The agricultural statistics below are for Muskingum County (Table 5). These statistics are based on the 2000 Census. Agricultural acres are on the decline due to the construction of housing developments and industry throughout the county.

Acres		% Agricultural	# Farms	Acres/ Farms
Total	Agricultural			
430,179.60	190,911.80	44.38%	1018	187.54

Table 5-Agriculture Statistics (Muskingum County)

The Salt Creek Watershed encompasses 93,000 square acres of Muskingum County. The agricultural land use of the Salt Creek Watershed is 48.25 % (Table 6).

Acres			% Agricultural
Muskingum Co.	Salt Creek Watershed	Agricultural	
430,179.60	93,000.00	44,872.50	48.25%

Table 6-Agriculture Statistics (Salt Creek Watershed)

Watershed Plan Development
Partnership

Group Responsible

The Muskingum Soil and Water Conservation District (MSWCD) supervisors, as financial sponsors, are responsible for the completion of the Salt Creek Watershed Project. The Muskingum MSWCD supervisors represent their respective MSWCD. Each MSWCD is a non-profit organization, and a legal sub-division of the State of Ohio, as set forth in Section 1515 of the Ohio Revised Code. Every county has an MSWCD office that is governed by a board of five supervisors elected by the public within the county. Swedes were organized for the purpose of developing and carrying out programs for the conservation and development of the soil and water resources.

The major function of the MSWCD is to assist all landowners, and operators to land uses within their county, both rural and urban. Projects are developed as a team effort with the landowner, by offering technical advice and many times, cost sharing dollars.

Salt Creek Watershed Project Prelude

The first Salt Creek Watershed meeting was held May 2, 2002 at the Muskingum Soil and Water Conservation District (MSWCD). The meeting attendees were: elected officials, the public, the Division of Natural Resources Area 3 Assistance Team, and MSWCD Supervisors. The decision reached at this meeting was that further water quality and land use research was needed before a watershed plan could be developed for the Salt Creek Watershed. The Muskingum County Commissioners provided half of the funding along with MSWCD providing the other half of the funding through the state match of the county funds to hire a Watershed Monitoring Technician for this research.

Purpose of the Project

The Salt Creek Watershed Management Plan will distinguish the non-attainment and attainment stream segments in each fourteen digit HUC. The watershed management plan will describe the conservation measures the residents and businesses need to implement to improve the water quality within each seven- fourteen digit HUC. When completing the watershed management plan, we hope that the potential partners in the Salt Creek Watershed will fully endorse the plan.

The MSWCD watershed monitoring technician performed the research on the Salt Creek Watershed to determine the physical, chemical, and biological integrity. In 2003 twenty-six sampling locations were chosen and there were 31 sampling sites in 2004. The sites were chosen due to accessibility to road crossings, ease in performing habitat assessments, drainage area, representation of major land uses and land cover, and sampling within the seven- fourteen digit HUC. The data found would show if there are water quality was within attainment or non-attainment. After researching the data, non-attainment and attainment status was determined for each subwatershed. A watershed group was formed to develop community support, educate, and increase the awareness of the Salt Creek Watershed.

Providing Service in the Salt Creek Watershed

District

The following districts serve the people of the Salt Creek Watershed:

-Muskingum Soil and Water Conservation District (MSWCD)
-Ohio Division of Wildlife, District 4 Southeast District
-Ohio Environmental Protection Agency (OEPA) Southeast District Office
-Public Sewage
    Muskingum
-Public Water Districts
    East Muskingum
    Zanesville City
-School Districts
    Bishop Rosecrans
    Franklin Local
    John Glenn
    Tri-Valley
    Zanesville Christian Academy
    Zanesville Christian School
    Zanesville City

Agencies

-City of Zanesville
-Fire Departments
    Wayne Township
    Adamsville
    Norwich
    Perry Township
    Washington Township
-Muskingum County
    Health Department
    Job and Family Services
    Commissioners
    Engineer
    Recycling and Litter Prevention
    Sheriff
    Emergency Management
    Dog Warden
-Ohio State University Extension
-Ohio Department of Natural Resources, Division of Soil and Water
-USDA Farm Service Agency
-USDA Natural Resource Conservation Service
-Ohio Farm Bureau
-Muskingum Farm Bureau
-Ohio Department of Natural Resources, Division of Wildlife

Previous and Current Water Quality Efforts

Through different government agencies programs are offered to enhance the water, soil, land, and air that we use. Listed below are programs that were implemented by residents throughout the Salt Creek Watershed. These programs struck the Salt Creek Watershed residents interest in better water quality, which in return creates support for the Salt Creek Watershed Project.

Environmental Quality Incentive Program (EQIP)

Developed in the 1996 Farm Bill, EQIP was started. This USDA program has financial and technical support available for participants for the installation and implementation of structural and management practices on the eligible lands. The eligible land includes all private land in agriculture: grassland, cropland, pastureland, and non-industrial private forestland. Some structural and management practices that are implemented through this program are: animal waste management, grazing improvement, irrigation improvement, wind erosion reductions, and non-waste nutrients. There are EQIP participants in the Salt Creek Watershed. During the time frame of 2003-2004 ten applicants were approved and four applicants were deferred.

Muskingum County livestock producers have a high degree of environmental concern. Their high concern is shown by the high attendance (over 100) at three locally held Livestock Environmental Assurance Program (LEAP) meetings. (OSU Extension) These LEAP meetings serve to educate producers on the need and benefits of sound environmental practices on their farms. (SWCD, Livestock Coalition)

Conservation Reserve Program (CRP)

The Food Security Act of 1985 approved the CRP. This program was put in place to provide technical and financial assistance to eligible participants. CRP covers farmers' concerns dealing with soil, water, and other related natural resource concerns on their land in an environmentally beneficial and cost effective manner. Some of the farmers' concerns include reducing water runoff, sedimentation erosion, and improving lakes, river, ponds and streams.

Wildlife Habitat Incentive Program (WHIP)

The WHIP began in 1998 to assist participants with their wildlife management. The WHIP program assists the participants in developing a plan and provides the installation cost of the plan. The land eligible for this program is any privately owned land, unless the land is already enrolled in CRP or Grassland Reserve Program (GRP) or any other program: agricultural, woodlots, and stream banks.

Livestock Exclusion Fencing

The Ohio Department of Natural Resources, Dominion Energy, and US-Army COE brought $25,000 of mitigation money into Muskingum County for stream livestock exclusion fencing. The Muskingum Soil and Water Conservation District decided to focus this funding into the Salt Creek Watershed. The fencing will allow a buffer between the stream and fence. The minimum buffer is 15 ft. starting from the top of the stream bank back. The program will pay for fencing in full: the cooperator must enter into a ten-year commitment. This program is a first come first serve basis. All of the sites will be evaluated.

Personnel Responsible

Listed in Table 7 are the personnel responsible for advising fiscal needs, preparing and approving reports, and assisting with the technician's requests. The personnel responsible for completion of data collecting and finalizing plans are listed in Table 8. The staff in Table 8 consists of the following:

- Planning Partners- Muskingum SWCD
- Technical Advisory Committee- The Area Assistance Team
- Professional Assistance and Volunteers- numerous agencies and individuals sharing their expertise

Tracking Progress

The MSWCD Board of Supervisors will review and prioritize the watershed management plan. They will continue to seek funding for the watershed coordinator position, implementation of conservation practices (NRCS Standards), and education programs to improve the Salt Creek Watershed's water quality. The MSWCD Board of Supervisors will also track the progress through the watershed coordinators monthly written update and biannual oral board report. By reviewing the reports the MSWCD Board of Supervisors will have the capabilities to recommend revisions to the watershed management plan as needed.

The MSWCD Watershed Coordinator will implement and monitor the watershed management plan progress. The progress of the watershed management plan will be tracked through the number of activities, participants, installation of conservation practices, and the improvement of the water quality, which will be analyzed by the continuous water quality monitoring effort (pg.83). For tracking references the following will be developed and available for review: watershed management plan, spreadsheets, pictures, plans, MSWCD board reports, and other documentation. The MSWCD Agricultural Resource Specialist, Ag/Wildlife Specialist, Urban Resource Specialist, Educational Specialist, Intern, DPA, and Administrative Assistants will be involved in all aspects of the watershed management plan. The MSWCD technical staff will review BMP's and insured inspections is completed for tracking purposes. The watershed coordinator will complete any revisions that are recommended by the MSWCD Board of Supervisors.

The watershed management plan was reviewed and endorsed by the Salt Creek Community Focus Group members. Working as a capacity the focus and prioritization of watershed management plan will be determined. These members will also be involved in the watershed educational activities and publicizing the Salt Creek Community Focus Group to gain additional stakeholders. The members will be able to review the progress of the watershed management plan at the monthly meeting and make suggestions of revision if there is no progression. The suggestions will submitted before the next MSWCD Board of Supervisors meeting.

Along with the Salt Creek Community Focus Group the Salt Creek Watershed management plan will be open to public and elected officials through meetings held in a variety of places throughout the watershed. This will encourage public involvement and improved water quality. There will be a time for recommendation on modifications throughout the watershed management plan. The suggestions will be submitted to the MSWCD Board of Supervisors and the MSWCD watershed coordinator.

The watershed management plan will be posted on the MSWCD website. This will give the public a chance to review the plan if they can not attend one of the public meetings or at there own leisure.

Name	Title	Responsibilities
Dan Imhoff	OEPA-DSW	Technical Report Approval
Chad Amos	ODNR-DSWC-Program Specialist	Technical Report Approval
Dick Sorg	MSWCD-DPA	Advise Watershed Technician
Lisa Crock	MSWCD-Administrative Assistant	Fiscal Administrative Assistant
Randy Bridwell, Dean Young, Andy Rittberger, Rollin Hetrick, Brent Iden, and Tom Graham	MSWCD Board of Supervisors	Act in an Advisory Capacity
Dorothy Montgomery, Don Madden, and Brian Hill	County Commissioners	Financial Supporter

Table7-Salt Creek Watershed Personnel and Responsibilities

Name	Title	Responsibilities
Dean Young, Andy Rittberger, Rollin Hetrick, Tom Graham, and Brent Iden	MSWCD Board of Supervisors	Act in an Advisory Capacity
Richard Sorg	MSWCD-DPA	Data Gathering/ Technical support
Lisa Crock	MSWCD-Adm. Assistant	Fiscal Administrative Assistant
Ryan Fink	MSWCD-Ag/ Wildlife Technician	Data Gathering/ Technical support
Linda Atkinson	MSWCD-Education Specialist	Data Gathering/ Education
Kenny Rupe	MSCWD-Agricultural Resource Specialist	Data Gathering/ Technical support
Paul Holdsworth	MSWCD-Urban Resource Specialist	Data Gathering/ Technical support
Kylene Wilson	MSWCD-Watershed Coordinator	Data Gathering, Project Report Writing
Denise Dunlap	MSWCD- Info. / Adm. Assistant	Data Gathering
Susan Wolfe	MSWCD-Intern	Data Gathering
Heidi Suhoski	MSWCD-Intern	Data Gathering
Chad Amos, ODNR-DSWC Dan Imhoff, OEPA JP Lieser, OSU Extension Bob First, Buckeye Hills RC&D Mike Greenlee, ODNR-Div. of Wildlife Bob Mulligan, ODNR-DSWC	Technical Advisory Committee	Kept up to date on progress, provide technical and educational support.
Doug Joy	Zoology/ Ecology Teacher East Muskingum School District	Involve students in volunteer monitoring (education)
Patty Dyer	NRCS, District Conservationist	Data Gathering/ Technical support
Bryan Ford	NRCS, Soil Conservationist	Data Gathering/ Technical support
Randy Bridwell	Muskingum County Planning Commission, Past MSWCD Board of Supervisor	Providing Support

Table 8-Responsible for Data Collection and Plan Finalization

Public Involvement

On May 2, 2002 the first Salt Creek Watershed public meeting was held. At the conclusion of this meeting a decision was made that there was not enough data on the Salt Creek Watershed. The group of five SWCD supervisors, public officials, agencies, and general public decided to hire an employee to research the Salt Creek Watershed.

After the hiring of the Salt Creek Watershed monitoring technician in June 2003, three public meeting were held to create public awareness of the Salt Creek Watershed Project. Public awareness of this project drew public interest to the project. Salt Creek Watershed displays were held at the following locations: Muskingum County Fair, Muskingum County Farm City Day, and Friends of the Lower Muskingum public meeting. In between meetings, publicizing the Salt Creek Watershed Project, chemical, physical, and biological water quality data was collected. The data was collected and analyzed to determine the healthiness of the water quality.

Below are the educational activities the watershed monitoring technician has provided and will continue to provide to the general public:

Educational Activities:

- **Volunteer Monitoring Program**
  - Began June 1st with a three hour training; the last day to monitor was October 18, 2004. This gave the residents opportunity to be involved in the data collecting process.

- **Salt Creek Community Focus Group Meetings**
  - In February of 2004 the Salt Creek Community Focus Group was formed. There are fifteen members and growing. The SCCFG meets every other month to organize community events and discuss water quality issues. The group has no legal status. There is no legal structure in which the group operations by which there are no board, operational procedures, bylaws, decision-making process, responsibilities or roles have not been defined. They have created a survey to send out to the local residents to establish an over all opinion of the watershed. (Appendix

- **Public Awareness Meetings**
  - The public meetings are held in July. This is another way, other that the Salt Creek Community Focus Group meetings, to promote awareness of the Salt Creek Watershed.

- **Southeastern Ohio Water Quality Training**
  - Location: a stream in Blue Rock State Forest. The participants have the chance to learn about chemical water quality by Ohio Farm Bureau, fish electro-shocking by Ohio Environmental Protection Agency (OEPA), and macro-invertebrate, by MSWCD.

- **Conservation Air Tour, "Tour of the Salt Creek Watershed**"
    - The participants have the chance to fly over the Salt Creek Watershed. It allows them to see the bird's eye view of the watershed.

- **Roadside Pick Up**
    - Participants are able to clean up their community and be involved in helping out the environment. The roadside pick up occurs along one of the major state routes throughout the watershed, along with encouraging the residents to get out in their own neighborhood.

- **Salt Creek Watershed Displays**
    - Displays are available for the: Muskingum County Fair, Muskingum County Farm City Day, Sophomore Career Expo

Through the above events the attendees have made their concerns known about the water quality in the Salt Creek Watershed. Listed below are some of the concerns in random order:

- Failed or non existence Sewage/ Septic tanks
- Erosion
- Runoff from agricultural practices (manure, fertilizers)
- Loss of riparian zones
- Logging activities
- Bank and streams being cleaned of down trees and blockages
- Runoff from parking lots
- Need more commercial and agricultural areas monitored for pollutants
- Not enough Public Access
- Insufficient fish species in the creek
- Trash problem
- Lack of education and awareness
- Flooding
- Improper planting of crops (tillage practices, amount of riparian corridor)
- Improper storage of animal waste

Education

The educational specialist in the Muskingum Soil and Water Conservation District office works with youth that reside in the watershed, and youth that attend both within and outside the watershed boundaries. An educational camp for third through sixth graders is available for participants in June. Also an educational teachers workshop is held in August. A major percentage of Camp Adventure and Teachers Workshop activities focus on water quality. The school visits are for kindergarten age students through eighth grade. The programs performed are below on Table 9 and Table 10.

Future Education

The Salt Creek Community Focus Group and Muskingum SWCD believe that education and awareness is one of the major issues that the Salt Creek Watershed will face. The residents of the watershed due to the lack of education do not understand completely the importance of a healthy sustainable watershed. The lack of education or outreach to the residents is listed under the concerns for the watershed. Therefore when assembling the watershed management plan to provide more outreach and education to the Salt Creek Watershed residents. Our plan will implement this outreach by the following:

- **Implement a multi-faceted public information outreach to all residents of the watershed in order to increases their awareness of how their actions effect water quality, promote citizen action, encourage the adoption of BMP's, provide a mechanism for community involvement/ learning in water quality issues.**

    - **Increase the number of trainings/ educational programs.** These trainings/ educational programs will provide information addressing the concerns of the residents. Experts in the area of concern will be brought to the table to tell their expertise on the topic at hand. All of the trainings/ educational programs will highlight how they affect the water quality. Examples are:
        - The concern for failing or non-existent septic tanks, Muskingum County Health Department would come and share their expertise and how this problem can be solved. Starting with features, proper installment, common problems, maintenance, health concerns, and water quality issues of septic systems.
        - The concern for runoff from agricultural practices (manure, fertilizers), Muskingum SWCD, NRCS, ODNR Divisions, OSU Extension and FSA would come and share their expertise and how the concerns can be solved. Explaining cost share programs, conservation practices, proper manure storage and handling, and proper herbicides or pesticides application.

    - **Establish working partnerships with Zane State and Muskingum Colleges and high schools.** Develop a continuous voluntary monitoring program for the students to participate in. This will give students hands on experience and increase awareness of the watershed project. This partnership will allow us to reach older students and utilize the resources at the colleges and local high schools.

    - **Continue and increase the number of current educational watershed activities with additions**
        - Schedule two roadside trash pick up throughout the watershed
        - Schedule two-stream side clean up throughout the watershed.

- **Continue the number of school age programs and teacher workshops with additions**
    - Provide a Healthy Water Healthy People Teacher's Workshop provided by Linda Atkinson trained facilitator of Healthy Water Healthy People.

- **Establish working partnerships with Zane State and Muskingum Colleges and local high schools.** Develop a continuous voluntary monitoring program for the students to participate in. This will give students hands on experience and increase awareness of the watershed project. This partnership will allow us to reach older students and utilize the resources at the colleges and local high schools.

- **Create an informational booklet and cd-rom for high school/ adult and one for students 3-6 about the Salt Creek Watershed.** The booklets will follow the Ohio Academic Content Standards for example: Macro-Invertebrate Survey meets 11-12 grade benchmarks. The booklet will be age and grade appropriate and allow students and adults discover their own back yards with fun educational information. Activities in the booklet will enforce the educational information that the book provides. The booklets will be as a utensil in the learning process for watershed residents. The cd-rom will focus on the 3-6 grades with interactive activities. These activities will enhance the students learning and enforce the educational material in the booklet. The publishing of the booklets and cd-rom will be contracted out.

- **Creation of a newsletter for the Salt Creek Watershed.** The newsletter will be mailed to all the residents in the watershed four times a year. It will provide up coming events, current events, conservation practices, educational, and fun information about the watershed. The newsletter will be written and contracted out for publishing.

- **Development of a Salt Creek Watershed website**. The website will provide the following about the Salt Creek Watershed: overview of the Project, fun facts, interactive games, updates, and events for all ages. The website will be an easy access site that will publicize the Salt Creek Watershed. This website will be contracted out to a web design professional.

Activity	Grade Levels									Description
## Indicates outdoor program. ~ Indicates activity can be indoors or outdoors. * Adaptation for this grade	K	1st	2nd	3rd	4th	5th	6th	7th	8th	
~ Enviroscape	X	X	X	X	X	X	X	X	X	A land-use model of a watershed, including a housing development, an agriculture area, factory, lake, and forest. Students learn about non-point source pollution and the best methods to manage our land so as to protect our water resources. A GREAT environmental lesson!
Groundwater Flow Model					X	X	X	X	X	This sand tank model demonstrates the movement of groundwater, aquifers, and the effect pollution has on our drinking water. Students can also test samples of drinking water.
Streamulator		X*	X*	X	X	X	X	X	X	The stream table model demonstrates stream flow and movement, erosion and deposition, channel dynamics at high and low flow, and the effects of land use on the stream. Best outdoors or on a 1st floor.
"Till We or Won't We?"				X	X	X				Students learn the importance of soil resources, conduct experiments on soil erosion and create a data record. They learn how the topsoil and subsoil serve vital ecological functions, support agriculture, and eventually provide us with food.
Soils for Third Grade				X						This program has been developed for the New Science Content Standards' third grade soils requirement. Two sessions are required to cover the material. **This can be adapted to other grade levels if requested. Call for more details.**
"Dirt Made My Lunch"	X	X	X							Students investigate soil formation and most important – we can trace all our food back to the soil.
"Francis the Fish"	X	X	X							The story of Francis takes students on a journey downstream and demonstrates how humans affect the quality of the water in that stream.
"The Wonders of Wetlands"				X	X	X	X			Wetlands are wonderful places to visit and explore. Not only do wetlands provide important services for us by controlling floods, filtering pollutants, and trapping silt and other sediments; they also provide an interesting habitat for wildlife. Students will construct their own wetland model as they study this topic.
"The Great Flood"					X	X	X	X	X	A beginning lesson on reading topographic maps. Students will make a landform and a topo map of the landform. Following this students match their classmates' maps and land forms.
## Stream Monitoring	X	X	X	X	X	X	X	X	X	All ages enjoy and can learn more about the life in a stream. Beginners learn the importance of the habitat of a stream. Older students evaluate water quality according to the macro invertebrates found in the water.

Table 9- List 1 of School Programs

Activity	K	1st	2nd	3rd	4th	5th	6th	7th	8th	Description
~ "Creek Critter Caper"	X*	X	X	X	X	X				You don't have a stream? This program uses the same scientific procedures as stream monitoring by using a fabric stream.
~ "Benthic Bugs & Bioassessment"			X*	X*	X*	X	X	X	X	Students conduct a simulated bioassesment of aquatic macroinvertebrates in a stream. In the process they learn the role that aquatic macroinvertebrates play in determining water quality.
~ "Incredible Journey"			X	X	X	X	X			Students become water molecules and simulate the movement of water through the water cycle. They will record their journey and identify the states of water while on their journey. An adaptation of adding pollution to the water cycle is great for 5th and 6th graders.
Seeds			X	X						Learn about seed germination, Ohio agriculture and make a seed necklace.
## "Dewey Dew Drop and the Watershed Adventure"			X	X	X					This is an interactive skit/story that teaches the participants the importance of water quality. Dewey travels through the water cycle and meets many obstacles along the way. This is best presented outside.
Return of the Black Bear to Ohio or Mammals in Ohio	X*	X*	X*	X	X	X	X	X	X	We have a Wildlife Trunk that includes furs, skulls, tracks, ID books, and much more. Programs can focus on the black bear or how to identify skulls of mammals found in Ohio.
Turkeys in Ohio			X	X	X					Great Thanksgiving program about the return of the wild turkey in Ohio.
"Visit to a Christmas Tree Farm"			X	X	X	X				A tree farm visit via a **slide show** that teaches the process of growing, harvesting, and marketing trees for the holiday. Includes a classification activity whereby students key evergreen branches.
Literature Connections										
Click Clack Moo			X	X						An honorary Caldecott book in which students participate in a skit telling the story followed by information about agriculture in Ohio.
## A River Ran Wild			X	X	X	X	X			Lynne Cherry's book comes alive with an activity adapted from Project WET's "Common Water". To do this activity we need water and an outdoor setting.
Crawdad Creek			X	X	X					This story teaches about the life in and around the stream-a great accompaniment to stream monitoring.

Table 10- List 2 of School Programs

Public Involvement Continued

Stream Debris Removal

The Ohio Department of Labor has brought $400,000 into Muskingum County for stream debris removal for flood control. The Muskingum Soil and Water Conservation District decided to focus this money into the Salt Creek Watershed but not excluding the other Muskingum County watersheds. This project was designed to put displaced employees back to work and remove debris at the same time. Muskingum County SWCD helped with the identification of sites for the debris removal. To identify the sites for debris removal the Muskingum SWCD performed the following:

- Publicized in the Muskingum SWCD Newsletter Watershed Buzz Section.
- At the Salt Creek Community Focus Group meeting had the Project Manager, Mark Bradley come and speak about the project.
    - Invited
        - Township Trustees
        - Muskingum County Commissioners
        - Muskingum County Health Department
        - FEMA
        - General Public
        - SCCFG members
        - Muskingum SWCD Board of Supervisors

The Debris Removal Project began in February 2005 and will last until they run out of money or six months. The workers were trained and divided into four crews of six people. The workers tools are the following: one pair of chest waders, wheel barrel, shovels, pick, maul, chainsaws, rakes, four-wheel drive trucks, and chains. The workers were provided with proper clothing and shoes.

After the implementation of this project we hope that the debris removed will help with some of the flooding concerns. Amount of debris will be calculated and reported to track the progress.

Groups & Organizations

The following groups and organizations are work within the watershed

Multi-County

Muskingum Soil and Water Conservation District
225 Underwood Street, Suite 100, Zanesville, OH 43701, (740) 454-2027

Muskingum/Morgan Farm Bureau
PO Box 220, Zanesville, OH 43702-0220, (800) 964-8184; Tiffany Pattison

Girl Scouts of America
3230 Bowers Ln., Zanesville, OH 43701, (740) 4548563; Millie Gessel

ODNR-Division of Wildlife, District 4 Southeast District
360 E. State St., Athens, OH 45701, (740) 594-2211

Southern Ohio Covered Bridge Association
668 N. Main St., Marion, OH 43302; Brian McKee

Muskingum County

Muskingum Soil and Water Conservation District

Board of Supervisors

Andy Rittberger-Chair
1930 Lutz Lane
Zanesville, OH 43701
Phone- (740) 452-3439,Fax- (740) 452-6001, Email- andyritt@rrohio.com

M. Dean Young- Treasurer/ Fiscal Agent
1535 Jersey Ridge Rd.
Zanesville, OH 43701
Phone- (740) 454-2531, Fax-, Email- d.young@alrinis.com

Rollin Hetrick- Vice Chair Person
5299 Baughman Rd.
Zanesville, OH 43701
Phone- (740) 452-9170, Fax-, Email-

Brent Iden –Secretary
11755 Iden Rd.
Newark, Ohio 43055
Phone- (740) 787-1774, Fax-, Email- idenfarmsinc@alltel.net

Tom Graham-Member
13776 Hamby Hill Rd.
Frazeysburg, OH 43822
Phone- (740) 828-2112, Fax-, Email-graham@dragonbbs.com

Boy Scouts of America, Muskingum Valley Council
734 Moorehead, Zanesville, OH 43701, (740) 453-0571

Muskingum County Library System
225 N. Fifth St., Zanesville, OH 43701, (740) 453-0391

Muskingum County Health Department
205 North 7th St., Zanesville, OH 43701, (740) 454-9741

Muskingum County Job and Family Services
445 Woodlawn Avenue, Zanesville, OH 43701, (740) 454-0161
Muskingum County Recycling and Litter Prevention
200 Sunrise Center Rd., Zanesville, OH 43701, (740) 455-7901
Muskingum County Community Foundation
534 Putnam Avenue, Zanesville, OH 43701, (740) 453-5192
Muskingum County Port Authority
205 North 5th St., Zanesville, OH 43701, (740) 455-0742
Muskingum County Welcome Center
205 N. 5th St., Zanesville, OH 43701, (740) 453-5004
Muskingum County Emergency Management Agency, Gene Hanning
401 Main St., Zanesville, OH 43701, (740) 453-1655
Muskingum County Dog Warden
1500 Newark Rd., Zanesville, OH 43701, (740) 453-0273

Federal, State, Regional, & County Entities

Ohio Department of Natural Resources, Division of Soil and Water Conservation
225 Underwood St., Ste. 400, Zanesville, Ohio 43701, (740) 455-9178
Ohio State University Extension, Muskingum County
225 Underwood St., Ste. 600, Zanesville, Ohio 43701, (740) 454-0144
USDA Farm Service Agency
225 Underwood St., Ste. 200, Zanesville Ohio 43701, (740) 454-2824

USDA Natural Resource Conservation Service
225 Underwood St., Ste. 100, Zanesville, Ohio 43701 (740) 454-2767
Ohio Department of Natural Resources, Division of Wildlife
360 E. State Street, Athens, Ohio 45701, (740) 594-2211
Ohio Department of Natural Resources, Division of Forestry
360 E. State Street, Athens, Ohio 45701, (740) 593-3341
Ohio Farm Bureau
560 Rix Mills Road, New Concord, 43762
Muskingum Farm Bureau
1625A Sharon Avenue, PO Box 220, Zanesville, Ohio 43702-0220, (740) 452-2356

Political Resources

Federal

US Senator Michael DeWine
140 Russell Senate Office Building, Washington, DC 20510, (800) 205-OHIO
US Senator George Vionovich
B34 Dirksen Senate Office Building, Washington, DC 20510, (614) 469-6697
US Representative Robert W. Ney
2438 Rayburn, Washington, D.C. 20515, (202) 225-6265

State

Ohio State Senator Joy Padget
841 Walnut Street, Coshocton, OH 43812

Ohio State Representative Jim Aslanides
77 South High Street, 12th Floor, Columbus, OH 43215, (614) 644-6014

Ohio State Representative Jennifer Garrison
77 South High Street, Riffe Center, Columbus, OH 43215, (614) 466-4308

County

Muskingum County Commissioners:
Dorothy Montgomery, Brian Hill, Don Madden
401 Main St., Zanesville, OH 43701, (740) 455-7100

Muskingum County Engineer Doug Davis
155 Rehl Road, Zanesville, OH 43701, (740) 454-0155

Muskingum County Auditor Anita Adams
401 Main St., Zanesville, OH 43701, (740) 455-7109

Muskingum County Sheriff Robert Stephenson
28 N. 4th St., Zanesville, OH 43701, (740) 452-3637

City

City of Zanesville Mayor Jack Fenton
401 Market Street, Zanesville, Ohio, (740) 455-0603

Plan Endorsed Partners

Muskingum Soil and Water Conservation District

Andy Rittberger	Rollin Hetrick	Brent Iden	Dean Young	Tom Graham
Chair person	Vice Chair person	Secretary	Fiscal/Treasurer	Member

Muskingum County Commissioners

Dorothy Montgomery	Don Madden	Brian Hill

Salt Creek Community Focus Group

Member

Muskingum County Health Department

Michael Kirsch, BS, RS	Corey Hamilton, MS, RD, LD
Environmental Health Director	Health Commissioner

Ohio University Extension

Mark Mechling

Farm Service Agency

Bill Houston

Natural Resource Conservation Services

Patty Dyer	Bryan Ford
District Conservationist	Soil Conservationist

Plan Endorsed Stakeholders

Potential Stakeholders

Agencies

Ed Heil
Muskingum County Cattlemen's Association
7715 Norfield Rd.
Adamsville, OH43802

Doug Guinsler
Muskingum Agricultural Society
P.O. Box 2176
Zanesville, OH437022176

Jeff Lewis
Ohio Air National Guard
220 EIS 4995 Old Wheeling
Zanesville, OH43701

Joyce Gibbs
Muskingum County Recycling Litter Prevention
200 Sunrise Center
Zanesville, OH43701

Evan Blumer
The Wilds
14000 International Rd.
Cumberland Rd., OH43732

Bonne Dailey
Muskingum Valley Park District
P.O. Box 446
Zanesville, OH437020446

Businesses

Steve Garrett
ABI Phone Systems, INC.
1775 East Pike
Zanesville, OH43701

Jon Giacomin
Cardinal Health
3540 East Pike
Zanesville, OH43701

Al Wanzelak
Autozone Distribution Center
2110 Sonora Rd.
Zanesville, OH43701

Tim Tysinger
Chandlersville Mill
4050 Big Muskie Dr.
Chandlersville, OH43727

Kent Curry
Batteries Unlimited
2350 Adamsville Rd.
Zanesville, OH43701

David Frame
City Tire Service
1800 East Pike P.O. Box 245
Zanesville, OH437020245

Roger & Denise Brosie
B&B New Century Engraving
1530 Bald Hill Rd.
Zanesville, OH43701

Sharon Glaub
Creno's Pizza East
2005 Chandlersville Rd.
Zanesville, OH43701

Roger Baker

Robert Hittle

Baker's Pizza & Carryout
8115 East St. P.O. Box 341
Adamsville, Oh43802

Kent Curry
Batteries Unlimited
2350 Adamsville Rd.
Zanesville, OH43701

Kim Mudgett
Big Rock Flea Market
57058 East Pike
Zanesville, OH437018014

Charles Brock
Brock's Welding & repair Service
3985 East Pike
Zanesville, OH43701

Dusty Brown
Brown's Body Shop
2340 Adamsville Rd.
Zanesville, OH43701

James Cameron
Cameron Drilling Co., INC.
3636 Adamsville Rd.
Zanesville, OH437019542

Terry & Bob Wilson
Graphix Unlimited INC
1500 Sonora Rd.
Zanesville, OH43701

James McDonald
Hallowed Hills
3129 East Pike P.O. Box 3444
Zanesville, OH437023444

Judy Kimble
Hydro Supply Company
3112 East Pike
Zanesville, OH43701

Sean Reilly
Jaycees
P.O. Box 1283
Zanesville, Oh437021283

Paul Strzala
Kingston Oil Corporation
1800 Dietz Lane

Cumberland Trail Customs, LTD.
3484 Old Wheeling Rd.
Zanesville, OH43701

Dave Dailey
Dailey Fence & Supply
5385 Edgemoor Rd.
Adamsville, OH43802

Ron Dennis
Dollar General Distribution Center
2505 East Pointe Dr.
Zanesville, OH43701

Wendel Dreve
Dreve & Gilliland, INC
9665 Young America Rd. P.O. Box 36
Adamsville, OH438020367

Jack Downing
Downing Company
2880 East Pike P.O. Box 1300
Zanesville, oh437021300

Willadeen Kulick
The Glass House Antique
8825 East Pike
Norwich, OH43767

Mary Ellen Weingartner
Ohio Pottery At Norwich
8540 East Pike
Norwich, Oh43767

John Staker JR
Oxford Oil Company
4900 Boggs Rd. P.O. Box 910
Zanesville, OH437020910

Micheal Burkhart
Professional Plumbing Services INC
3570 Old Wheeling Rd,
Zanesville, OH43701

Larry Wade
Red Roof Inn of Zanesville
4929 East Pike
Zanesville, OH43701

Matt Grimm
Matt Grimm Services
1250 Jackson Rd.

Zanesville, OH43701

James Hildenbrand
Log Hollow Antiques/ Interior Design
2825 Chandlersville Rd.
Zanesville, OH43701

Clayton Page
Love's Travel Stop / Arby's
605 Sonora Rd.
Zanesville, OH43701

Pete Pappas
Lumi-Lite Candle INC
102 Sundale Rd. P.O. Box 2
Norwich, OH43767

Zanesville, OH43701

Patty McNutt
McNutt Farm II. Outdoorsman Lodge
6120 Cutler Lake Rd.
Blue Rock, OH43720

Tina Harper
Mickey's Restaurant
3015 East Pike
Zanesville, OH43701

Alan King
National Road-Zane Grey Museum
8850 East Pike
Norwich, OH43767

Construction

Dave Johnson
All American Homes of Ohio , INC.
4005 All American Way
Zanesville, OH 43701

Micheal & Mary Cannon
C & M Construction
140 Jackson Rd.
Zanesville, Oh 43701

Ken Ogg
Circle K Construction
4955 McDonald Rd.
Chandlersville Rd, Oh 43727

Scotty Staker
Staker Custom Landscaping
3022 Dietz Lane
Zanesville, OH 43701

Rick & Lesha Alexander
Alexander Construction & Renovation Services
1575 Rustic Ridge Rd.
Zanesville, OH 43701

Joe Israel
Israel, Joe Construction
575 SundALE Rd.
Norwich, Oh 43737

Otto Luburgh
Luburgh, INC.
4174 East Pike
Zanesville, Oh 437018840

Mike Paul
Paul Construction Company, INC.
1702 Chandlersville Rd.
Chandlersville, OH 43701

Shala Zemba
Zemba Bros. , INC.
3401 East Pike
Zanesville, OH 43701

Media

WHIZ-AM-FM
629 Downard Road
Zanesville, OH 43701
(740)452-5431
FAX: (740)452-6553

WCVZ-FM
2477 East Pike

WYBZ-FM
2895 Maysville Pike
P.O. Box 4310
Zanesville, OH 43701
(740)453-6004
FAX: (740)453-5865

WTNS-AM-FM
114 North 6th Street

Zanesville, OH 43701
(740)455-3181
FAX: (740)455-6195

WCLT-T-100
674 Jacksontown Road
Newark, OH 43055
FAX:(740)345-5775

WWJM FM 106
210 South Jackson Street
New Lexington, OH 43764
FAX:(740)342-1036

Don Stillion
2477 East Pike P.O. Box 3208
Zanesville, OH 437023208

Coshocton, OH 43812
(740)622-1560
FAX: (740)622-7940

WCMJ 96 FM
4988 Skyline Drive
Cambridge, OH 43725
FAX:(740)432-1991

Times Recorder
34 South Fourth Street
Zanesville, OH 43701
(740)452-4561
FAX:(740)450-6759

Arnett William
2477 East Pike P.O. Box 3208
Zanesville, OH 437023208

Schools

William Bussey
MID-EAST Career & Technology Center
400 Richards Rd.
Zanesville, OH 43701

East Muskingum Local Schools
13125 John Glenn Rd.
New Concord, OH 43762
(740) 826-7631

Franklin Local School District
360 Cedar St.
Duncan Falls, OH 43734
(740) 674-5203

Zanesville Christian School
2400 Chandlersville Rd.
Zanesville, OH 43701
(740) 454-2509

Susan Reese
Muskingum Christian Academy
1018 Marietta Street
Zanesville, OH 43701

Tri-Valley Local School District
36 E. Muskingum Ave.
Dresden, OH 43821
(740) 754-1442

Zanesville City Schools
160 N. 4th St.
Zanesville, OH 43701
(740) 454-9751

St. Nicholas Schools
1040 E. Main St.
Zanesville, OH 43701
(740) 452-7504

Churches

Lighthouse Baptist Church
136 Rix Mills Rd.
New Concord, OH 43762
(740) 452-4229

Westwood Baptist Church
2395 East Pike
Zanesville, OH 43701
(740) 452-4229

Maranatha Bible Church

Cornerstone Full Gospel Church
4509 Salt Creek Dr. P.O. Box 506
Duncan Falls, OH 43734
(740) 674-5062

Church of Christ in Christian Union
2375 East Pike
Zanesville, OH 43701
(740) 452-0919

Tree of Life Christian Fellowship

2400 Chandlersville Rd.
Chandlersville, OH 43727
(740) 454-7765

East 40 Church of Christ
7522 East Pike
Zanesville, OH 43701
(740) 872-3711

Church of Christ -Chandlersville
9075 Chandlersville Rd.
Chandlersville, OH 43727
(740) 674-6311

2220 Chandlersville Rd.
Zanesville, OH 43701
(740) 452-8807

Chandlersville United Methodist Church
9105 Chandlersville Rd.
Chandlersville, OH 43727
(740) 674-6209

Sonora United Methodist Church
4540 Old Country Lane
Zanesville, OH 43701
(740) 453-2532

Watershed Inventory
Description of the Watershed

Geology/Glacial History
Southeastern Ohio is an unglaciated area. The glacial era had little to no contribution in forming the streams and valleys. The buried valleys are shown in Map 11.The glacial melting assisted in the formation of drainage ways and patterns across Muskingum County. Some of the glacially derived soils were washed down stream to make the slopes a mixture of glacially derived soils and bedrock. The bedrock of Muskingum County was formed during the Pennsylvanian/ Permian Ages. During these ages the bedrock was exposed and weathered. Muskingum County's bedrock consists of sandstone, shale, clay, siltstone, and limestone. (USDA Soil Survey of Muskingum County)

Topography
The topography of the Salt Creek Watershed includes gently rolling hills. Within the Salt Creek Watershed the valleys are steep and the flood plains are very narrow, referencing USDA Soil Survey of Muskingum County. In further research of the topography of the Salt Creek Watershed, please reference these seven USGS Quadrangle Topography Maps (Table 11). Recognition of the steep slopes of the Salt Creek Watershed is shown by the average gradient of the Salt Creek from headwaters to the mouth falling 131 ft./mile (Gazetteer of Ohio Streams). The tributaries flowing into the Salt Creek have an average gradient of 16.00-48.0 ft./mile (Table 12).

*Ruraldale	*Norwich
*Zanesville East	*Adamsville
*Philo	*Otsego
*New Concord	

Table 11-List Topographical Maps

Stream Name	Flows Into	Avg. Gradient (ft./mile)
Salt Creek	**Muskingum River**	131.00
Frog Run	**Salt Creek**	27.40
Georges Run	**Salt Creek**	30.00
Prairie Fork	**Salt Creek**	39.10
Manns Fork	**Salt Creek**	37.90
Kent Run	**Manns Fork**	47.30
Boggs Creek	**Salt Creek**	34.05
Indian Run	**Boggs Creek**	32.1
White Eyes Creek	**Salt Creek**	37.05
Little Salt Creek	**Salt Creek**	16.10
Buffalo Fork	**Salt Creek**	31.73
Williams Fork	**Buffalo Fork**	38.50
Lapage Run	**Buffalo**	35.50

Fork

Table 12- Average Gradients

Soils

The Salt Creek Watershed Region is composed of five different soil types: Lowell-Guernsey-Gilpin association, Westmoreland-Berks-Guernsey association, Glenford-Newark-Fitchville association, Wellston-Zanesville-Alford association, and Westmoreland-Coshocton-Rigley association.

Glenford-Newark-Fitchville association **soils are aligned in the Salt Creek stream and several other streams north from the discharge into the Muskingum River until Little Salt Creek Branches off.**

GfA-Glenford silt loam, 0 to 2 percent slopes. This deep, nearly level, moderately well drained soil is on terraces in the valleys of former glacial lakes. Most areas of this soil are elongated strips or are irregular in shape and are 10 to 50 acres in size. The surface layer is brown, friable silt loam about 10 inches thick and the subsoil is approximately 40 inches thick. The soil color and characteristics vary as it proceeds down through the layers. Starting at the upper layer of the soil it is dark yellowish brown, friable silt loam; the next part is dark yellowish brown, mottled, firm silt loam; and the lower part is yellowish brown, mottled, firm silty clay loam. The underlying material to a depth of 60 inches or more is brown, firm silty clay loam

GfB-Glenford silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on terraces in the valleys of former glacial lakes. Most areas are on smooth and convex shoulder slopes or low knolls. They are round or long and narrow and range from 5 to 100 acres in size. Typically, the surface layer is dark grayish brown friable silt loam about 7 inches thick. The subsoil is about 33 inches thick. The upper part is brown, friable silt loam; the next part is yellowish brown, mottled, firm silty clay loam. The underlying material to a depth of 60 inches or more is brown, mottled, firm silty clay loam. Some areas on the higher knolls are well drained. Areas near the margin of uplands have loamy subsoil.

GfC2-Glenford silt loam, 6 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is on dissected terraces in the valleys of former glacial lakes. Most areas are on shoulder slopes at the margin of the dissected terraces, but some areas are on foot slopes of upland hillsides. Sheet and rill erosion has removed part of the original surface layer, and cultivation has mixed subsoil material into the present layer. Most areas are long strips that range from 5 to 100 acres in size. The surface layer is dark grayish brown and yellowish brown, friable silt loam about 6 inches thick. The subsoil is about 34 inches thick. The upper part is brown, friable silt loam; and the lower part is yellowish brown, mottled, firm silty clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm silty clay loam. In severely eroded areas the surface layer is silty clay loam. In areas where the underlying material is sandy loam, the soil is well drained.

The Glenford series characteristics are the following: moderately slow permeability rate, slow runoff (6 to 15 percent slope has medium or rapid runoff), high available water capacity, low organic matter, moderate shrink- well potential, and has a high water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is suited for timber production, hay and pasture, and cultivated crops. The soil is moderately suited for site buildings and septic tank absorption fields. The land capability classifications are in order the following order: 0 to 2 percent slope (I), 2 to 6 percent slopes (IIe), and 6 to 15 percent slopes (IIIe). The suitability group is A-6 for hayland and pastureland.

Ne-Newark silt loam, frequently flooded. This deep, nearly level, somewhat poorly drained soil is on flood plains. It makes up the entire flood plain along the small streams or is in long, narrow areas adjacent to sloping uplands or terraces on the wider flood plains. Old stream channels dissect some areas and small drainage ditches. Flooding is brief and usually occurs during the dormant season, but flash floods may occur during the growing season following intense local thunderstorms. Most areas range from 5 to 50 acres in size. Slopes range from 0 to 3 percent. Typically, the surface layer is dark grayish brown, very friable silt loam about 11 inches thick. The subsoil is brown and grayish brown, mottled, very friable silt loam about 21 inches thick. The underlying material to a depth of 60 inches or more is dark yellowish brown and light brownish gray, friable silt loam. In some areas the surface layer is loam or silty clay loam. In many places the content of clay is lower. Some areas on low terraces are subject to rare flooding.

The Newark series characteristics are the following: moderate permeability rate, slow runoff, high available water capacity, moderate organic matter, and has a high water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is suited for timber production, hay (if drained) and pasture, and cultivated crops. The soil is generally unsuited for site buildings and septic tank absorption fields. This unsuitability is due to the flooding potential. The land capability classifications are in order the following order: 0 to 3 percent slope (IIw). The suitability group is C-3 for hayland and pastureland.

FcA-Fitchville silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on terraces in the valleys of former glacial lakes. Most areas are irregular in shape and range from 10 to 150 acres in size. Typically, the surface layer is dark grayish brown, friable silt loam about10 inches thick. The subsoil is about 48 inches. It is mottled. The upper part is brown, friable silty clay loam, and the lower part is brown and pale brown, firm silty clay loam. The underlying material to a depth of 70 inches or more is yellowish brown, mottled, firm silty clay loam. Some areas are poorly drained. In some places the subsoil and underlying material have more clay. In a few areas the underlying material is sandy loam or loam.

FcB-Fitchville silt loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is on slightly dissected terraces in the valleys of former glacial lakes. Some areas at the margin of the filled valleys are on alluvial fans. Most areas are irregular in shape and range from 5 to 40 acres in size. Typically, the surface layer is dark grayish brown, friable silt loam about 14 inches thick. The subsoil is brown and pale brown, firm silt loam about 36 inches thick. The underlying material to a depth of 70 inches or more is yellowish brown, firm silty clay loam. Some areas where intermittent streams emerge from upland ravines are subject to rare flooding

and have a surface layer of silt loam or clay loam alluvium that is 6 to 24 inches thick. In a few areas the subsoil is sandy loam or loam. In a few places the underlying material is sandy loam, loam or silty clay.

The Fitchville series characteristics are the following: moderately slow permeability rate, slow runoff (2 to 6 percent slope has medium runoff), high available water capacity, moderate organic matter, and has a high water table in the lower part of the subsoil in the extended wet periods. The soil is suited for timber production, hay and pasture, and cultivated crops. The soil is poorly suited for site buildings and septic tank absorption fields. Slow permeability rates and seasonal wetness are the reason for the poorly suitable ratings. The land capability classifications are in order the following order: 0 to 2 percent slope (IIw), 2 to 6 percent slopes (IIe). The suitability group is C-1 for hayland and pastureland.

Westmoreland- Berks- Guernsey association and Lowell-Guernsey-Gilpin association soils are present in the southern part of the watershed. The soils are deep and moderately drained. These soils are found on steep hills and ridges throughout the watershed.

WtC2—Westmoreland silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, well drained soil is on knolls and shoulder slopes on ridgetops. Areas of this soil also occur as narrow bands around hillsides. Slopes are generally smooth, but some are dissected by small drainage ways. Erosion has removed part of the original surface layer. Most areas range from 2 to 20 acres in size. Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsoil is about 30 inches thick. Hard siltstone bedrock is at a depth of about 40 inches.

WtD2—Westmoreland silt loam, 15 to 25 percent slopes, eroded. This deep, moderately steep, well drained soil is on nose slopes, side slopes, and dissected upland hillsides. Slopes are broken by many small drainage ways. Erosion has removed part of the original surface layer. Gullies and scars are common. Most areas are long and narrow or oblong and range from 5 to 80 acres in size. Typically, the surface layer is dark grayish brown, friable silt loam about 3 inches thick. The upper part of the subsoil is yellowish brown and dark yellowish brown, firm channery silty clay loam about 21 inches thick. Hard siltstone bedrock is at a depth of about 50 inches.

WtE—Westmoreland silt loam, 25 to 40 percent slopes. This deep, steep, well drained soil is on dissected hillsides. Slopes are long and complex and have many intermittent drainage ways that from a dendritic pattern. Slopes are both convex and concave. They have spurs, ridges, and crests in convex areas, and they have coves, ravines, and hollows in concave areas. Outcrops of siltstone and sandstone are common along streams. Individual areas of this soil range from 10 to 500 acres in size. Typically the surface and subsurface layers are very dark grayish brown and brown, friable silt loam. They have a combined thickness of about 9 inches. The subsoil is about 36 inches thick.

WuC2—Westmoreland-Guernsey silt loam, 8 to 15 percent slopes, eroded. These deep, strongly sloping soils are on dissected ridgetops and hillsides and on benches. The Westmoreland soil is on moderately steep slopes, and the Guernsey soil is on narrow, gently sloping benches. The two soils occur as alternating bands associated with strata of different kinds of bedrock. In some places they are intermingled. Slopes are complex and have knolls,

shoulders, and coves. Erosion has removed most of the original surface layer, and gullies and scars are common along intermittent drainage ways. Seep spots are numerous. Most areas of these soils range from 3 to 50 acres in size. They are about 45 percent Westmoreland soil and 35 percent Guernsey soil. The Westmoreland soil is well drained. The Guernsey soil is moderately well drained.

WuD2—Westmoreland-Guernsey silt loams, 15 to 25 percent slopes, eroded. This deep, moderately steep soils are on dissected hillsides and benches. Slopes are irregular and have many gullies and landslide scars. Erosion has removed part of the original surface layer. Seeps are common. The two soils occur as alternating bands that are associated with different bedrock strata. Most areas are long and narrow or are oblong and range from 10 to 50 acres in size. They are about 45 percent Westmoreland soil and 35 percent Guernsey soil. The Westmoreland soil is well drained. The Guernsey soil is moderately well drained.

WvD—Westmoreland-Urban land complex, 15 to 35 percent slopes. This map unit consists of areas of urban land and Westmoreland soil that are intermingled in such an intricate pattern that they cannot be mapped separately. The deep, moderately steep and steep, well drained Westmoreland soil is on dissected hillsides. It is dominant in the open areas. The Urban land consists of areas that are covered by buildings or pavement. Because of the pattern of urban development, most areas of this map unit are rectangular and range in size from 10 to 100 acres. They are about 50 percent Westmoreland soil and 20 percent urban land. Typically, the surface layer of the Westmoreland soil is dark brown, friable silt loam about 9 inches thick. The subsoil is about 31 inches thick. In these areas of urban land, the surface is impermeable because of concrete or bituminous pavement and building rooftops.

The Westmoreland series characteristics are the following: moderate permeability rate, medium to rapid runoff, low to moderate available water capacity, moderate to low organic matter, and has a high water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is suited for timber production. The suitability for hay and pasture, and cultivated crops depends on the percentage of slope. The soil suitability for site buildings and septic tank absorption fields depends on the percentage of the slope and the permeability. The land capability classifications are in order the following IIIe, IVe, and VIe. The suitability group is A-1, A-2, and A-3 for hayland and pastureland.

BeB-Berks channery silt loam, 2 to 8 percent slopes. This moderately deep, gently sloping, well drained soil is on upland shoulder slopes and narrow ridgetops. Stones are common on the surface. Most areas are long and narrow and range from 5 to 15 acres in size. Typically, the surface layer is dark grayish brown, friable channery silt loam about 8 inches thick. The subsoil is yellowish brown, friable very channery and extremely channery silt loam about 21 inches thick. Weathered, fine grained sandstone or siltstone bedrock is at a depth of about 29 inches. Some areas are strongly sloping. In places the surface layer is sandy loam or loam or is very channery. Most areas are used as pasture. Only a few areas are used as cropland. Some areas are wooded.

BeD2-Berks channery silt loam, 15 to 25 percent slopes, eroded. This moderately deep, moderately steep, well drained soil is on bluffs, in ravines, or on dissected hillsides on uplands. Sandstone and siltstone stones and boulders are common on the surface. Erosion has removed

part of the original surface layer. Individual areas are long and narrow and range from 5 to 80 acres in size. Typically, the surface layer is brown, friable channery silt loam about 8 inches thick. The subsoil is yellowish brown, firm very channery silt loam about 27 inches thick. Fractured, soft siltstone bedrock is at a depth of about 35 inches. In severely eroded areas, the surface layer is very channery. In some areas the soil is deeper over bedrock.

BeE-Berks channery silt loam, 25 to 40 percent slopes. This moderately deep, steep, well drained soil is on bluffs, in ravines, or on the dissected parts of hillsides. In many areas the soil forms a bluff at the top of a long hillside. Stones and rock outcrops of sandstone and siltstone are common. Slopes are irregular, and benches and spurs are in some areas. Most areas occur as thin bands that range from 5 to 45 acres in size. Typically, the surface layer is very dark grayish brown, friable channery silt loam about 6 inches thick. The subsoil is about 21 inches thick. It is brown and yellowish brown, firm channery and very channery silt loam. Below this to a depth of 60 inches or more is grayish brown, very firm, weathered siltstone and hard siltstone bedrock. In some areas the subsoil contains more clay and fewer coarse fragments. In other areas the bedrock is at a depth of less than 20 inches. Rock outcrops are common along streams. Most areas are used as woodland. Some areas are used as pasture.

BkF-Berks-Westmoreland complex, 40 to 70 percent slopes. These moderately deep and deep, well drained soils are on dissected; very steep hillsides along the larger stream valleys. Areas of this unit have the most rugged terrain in the county. Some areas form the side slopes of narrow hollows or ravines along the smaller streams or tributaries. Some slopes are benched. Springs at the upper edge of some of the benches cause seepage downslope. Stones and massive outcrops of sandstone form bluffs or ledges in some areas. Most areas are long and narrow and range from 20 to 500 acres in size. They are about 40 percent Berks soil and 35 percent Westmoreland soil. The Berks soil is on the steeper, upper parts of hillsides, and the Westmoreland soil is on the less sloping, lower parts. The two soils are so closely intermingled that it is impractical to map them separately. Typically the surface layer and subsurface layer of the Berks soil are very dark gray and brown, friable channery silt loam about 10 inches thick. The subsoil is about 12 inches thick. It is yellowish brown, firm very channery silt loam. Fractured, fine grained sandstone bedrock is at a depth of about 22 inches. Typically, the surface layer of the Westmoreland soil is brown, friable silt loam about 4 inches thick. The subsoil is about 40 inches thick. It is yellowish brown channery silty clay loam. Fractured, weathered, fine grained sandstone and siltstone bedrock is a t a depth of about 44 inches. In some areas, stones and boulders are on the surface and the surface layer and subsoil are sandy loam. Most areas f these soils are wooded.

The Berks series characteristics are the following: moderate to moderately rapid permeability rate, medium to rapid runoff, low available water capacity, moderate to low organic matter, and has a moderate water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is suited for timber production. The poorly to moderate suitability for hay and pasture, and cultivated crops depends on the percentage of slope. The soil suitability for site buildings and septic tank absorption fields depends on the percentage of the slope and the permeability. The land capability classifications are in order the following IIe, IVe, and VIe. The suitability group is F-1 and F-2 for hayland and pastureland.

GtC2-Guernsey-Upshur silty clay loams, 6 to 15 percent slopes, eroded. These deep, strongly sloping soils are on benches below the steeper hillsides and on isolated knolls on the broader ridgetops. They formed in material weathered from alternating thin beds of brown, gray, and red clay shale. Most areas are dissected by drainage ways. Erosion has removed part of the surface layer, and tillage has incorporated part of the subsoil into the remaining surface layer. Many areas have an irregular or hummocky surface because of scars, gullies, and landslides. Most areas are long and narrow or are circular and are 5 to 75 acres in size. They are about 50 percent Guernsey soil and 30 percent Upshur soil. The two soils occur as areas so narrow and intermingled that it is impractical to map them separately. The Guernsey soil is moderately well drained. Typically the surface layer is brown, friable silty clay loam about 7 inches thick. The subsoil is about 32 inches thick. The upper part is light olive brown and brown, mottled, firm silty clay. The underlying material to a depth of about 62 inches is mixed light olive brown and light olive gray, very firm channery silty clay. Below this is soft clay shale bedrock. In severely eroded areas the surface layer is silty clay. In places the soil is well drained.

GtD2-Guernsey-Upshur silty clay loams, 15 to 25 percent slopes, eroded. These deep, moderately steep soils are in coves or on dissected benches on hillsides. Erosion has removed part of the surface layer, and tillage has incorporated part of the subsoil into the remaining surface layer. Most areas of these soils are long and narrow or are circular and range from 5 to 75 acres in size. They are crossed by many drainage ways. They are about 45 percent Guernsey soil and 30 percent Upshur soil. The two soils occur as areas so closely intermingled that it is impractical to map them separately. The Guernsey soil is moderately well drained. Typically, the surface layer is brown, friable silty clay loam about 7 inches thick. The subsoil is about 32 inches thick. The upper part is light olive brown and brown, mottled, firm silty clay and clay. The lower part is weak red and olive gray, firm clay. The underlying material is light olive brown and light olive gray, very firm silty clay about 32 inches thick. In places the surface layer is silty clay and is composed mostly of subsoil material. Some areas are somewhat poorly drained, and other areas are well drained. The Upshur soil is well drained. Typically, the surface layer is dark brown silty clay loam about 4 inches thick. The subsoil is firm clay about 36 inches thick. The upper part is yellowish red, and the lower part is dark reddish brown and dark red. The underlying material is yellowish brown and dark reddish brown, very firm, calcareous clay and silty clay loam about 34 inches thick.

The Guernsey series characteristics are the following: moderate to moderate slow permeability rate, rapid runoff, high available water capacity, moderate to low organic matter, and has a moderate water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is moderately suited for timber production. The well suited for hay and pasture, and poorly suited for cultivated crops depends on the percentage of slope. The soil suitability is poor for site buildings and septic tank absorption fields due to the percentage of the slope and the permeability. The land capability classifications are in order the following IVe and VIe. The suitability group is A-6 for hayland and pastureland.

***Lowell -Guernsey- Gilpin association and Wellston-Zanesville-Alford association* are north of the Salt Creek. These soils are well to moderately drained; also they are found on steep ridges and hills throughout the Salt Creek Watershed**.

LpC2—Lowell silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, well drained soil is on dissected uplands. Most areas are on rounded ridgetops or shoulder slopes, but some areas are on benches. Slopes are long and smooth and typically are convex. Erosion has removed part of the original surface layer. Most areas range from 3 to 100 acres in size. Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 41 inches thick. The upper part is yellowish brown, friable silty clay loam and silty clay. The lower part is light olive brown, grayish brown, and yellowish brown, firm silty clay and silty clay loam. The underlying material to a depth of 60 inches or more is olive, very firm, weathered clay shale and siltstone. In some areas, mottles are at a depth of more than 30 inches. In severely eroded areas the surface layer is silty clay loam. In some places the soil is moderately well drained. Some areas that occur as thin bands around low knolls on ridgetops have a redder subsoil. In areas on benches and foot slopes, the depth to bedrock is more than 5 feet. In many places the subsoil is calcareous and contains fragments of limestone.

LpD2—Lowell silt loam, 15 to 25 percent slopes, eroded. This deep, moderately steep, well drained soil is on the knolls and ridges of dissected hillsides. Areas on ridges are mainly long and narrow, and areas on knolls are rounded. Slopes are long, smooth and convex. Most areas range from 10 to 100 acres in size. Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 49 inches thick. In sequence downward, it is dark brown, friable silty clay loam; strong brown, very firm silty clay; strong brown, very firm clay; and yellowish brown, mottled, very firm clay. The underlying material is brown, firm channery silty clay loam about 13 inches thick. Brown, soft, clay shale bedrock is at a depth of about 70 inches. In some areas the soil is moderately well drained. In many places, the soil is redder and the subsoil contains more clay. In severely eroded areas the surface layer is silty clay loam. In many areas the subsoil is moderately alkaline and is limy.

LrE2—Lowell-Gilpin complex, 25 to 40 percent slopes, eroded. These steep, well drained soils are on dissected hillsides. The Lowell soil is on the less sloping parts of hillsides and benches. The Gilpin soil is on the steeper bluffs. Erosion has removed part of the original surface soil, and scars and gullies are common. The two soils occur as alternating strips across the hillside that are too small to map separately. Most areas range from 20 to 250 acres in size. They are about 45 percent Lowell soil and 35 percent Gilpin soil. The Lowell soil is deep. Typically, the surface layer is dark yellowish brown, friable silt loam about 7 inches thick. The subsoil is about 41 inches thick. The upper part is dark brown, friable silty clay loam. The lower part is dark brown, firm channery silty clay and light olive brown, firm silty clay. The underlying material to a depth of 60 inches or more is light olive brown, very firm channery silty clay loam. In some severely eroded areas, the surface layer is silty clay loam. Some areas on benches are moderately well drained. In places the subsoil is calcareous and has common fragments of limestone. In some areas the soil has reddish brown colors.

LrF-Lowell-Gilpin complex, 40 to 70 percent slopes. These very steep, well drained soils are on dissected hillsides. The Lowell soil is commonly on narrow benches and the less sloping parts of hillsides. The Gilpin soil is on the steeper bluffs. Landslides are common in some areas. The two soils occur as areas so intricately mixed that mapping them separately is not practical. Most areas are 30 to 30 acres in size. They are about 45 percent Lowell soil and 30 percent Gilpin soil.

The Lowell series characteristics are the following: moderate to moderate slow permeability rate, rapid runoff, moderate available water capacity, moderate to low organic matter, and has a moderate water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is well suited for timber production. The well suited for hay and pasture, and poorly suited for cultivated crops depends on the percentage of slope. The soil suitability is poor to unsuited for site buildings and septic tank absorption fields due to the percentage of the slope and the permeability. The land capability classifications are in order the following IIIe, IVe, VIIe and VIe. The suitability group is A-1, A-2, A-3, and H-1 for hayland and pastureland.

GdB-Gilpin silt loam, 2 to 8 percent slopes. This moderately deep, gently sloping, well drained soil is mainly on shoulder slopes and nose slopes of dissected upland ridgetops, which consists of resistant beds of sandstone, or upland ridgetops. Resistant beds of sandstone or siltstone shape the local relief. Slopes are smooth and slightly convex. Most areas range from 3 to 60 acres in size. Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is yellowish brown, friable silt loam, clay loam, and channery clay loam about 21 inches thick. Light olive brown, fractured siltstone, soft shale, and fine grained sandstone bedrock is at a depth of about 30 inches. In some areas the subsoil is less acid. In places the subsoil is sandy loam and channery sandy loam. Small areas of deep, well drained soils are on the wider ridgetops.

GdC2-Gilpin silt loam, 8 to 15 percent slopes, eroded. This moderately deep, strongly sloping, well drained soil is on shoulder slopes and nose slopes on narrow or dissected upland ridgetops. Erosion has removed part of the original surface layer and reduced the thickness of the subsoil. Slopes are smooth, but a few shallow drainage ways are near the edge of some areas. Individual areas of this soil are long and sinuous and range from 3 to 60 acres in size. Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is brown, firm silt loam and channery silt loam about 16 inches thick. Hard, fine grained siltstone bedrock is at a depth of about 22 inches. Many areas are less acid. Some areas that are severely eroded have a surface layer of channery silt loam. In places the soil is deeper over bedrock.

GeD2-Gilpin-Upshur complex, 15 to 25 percent slopes, eroded. These moderately steep, well drained soils are on dissected hillsides and benches. Erosion has removed part of the original surface layer, and the present surface layer is a mixture of material from the original surface and the subsoil. The Gilpin soil is on the steeper parts of hillsides, and the Upshur soil is on the steeper parts of hillsides, and the Upshur soil is in the less sloping areas and on benches. Landslips are common on the Upshur soil. Most areas of these soils are oblong and are 5 to 50 acres in size. They are about 40 percent Gilpin soil and 35 percent Upshur soil. The two soils occur as areas so closely intermingled that it is impractical to map them separately. The Gilpin soil is moderately deep. Typically, the surface layer is dark grayish brown and yellowish brown, friable silt loam about 4 inches thick. The subsoil is yellowish brown, friable silt loam about 26 inches thick. Olive, fractured siltstone bedrock is at a depth of about 30 inches. Many areas are severely eroded and have a surface layer of channery silt loam.

GeE2-Gilpin-Upshur complex, 25 to 40 percent slopes, eroded. These steep, well drained soils are on dissected hillsides and benches. The Gilpin soil is on the steeper parts of benches, and the Upshur soil is on the less sloping parts. Landslides and gullies are common. A few springs are in areas of these soils. Erosion has removed part of the original surface layer, and the present surface layer is a mixture of subsoil material and material from the original surface layer.

Most areas are oblong and range from about 20 to 150 acres in size. They are about 40 percent Gilpin soil and 35 percent Upshur soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical. The Gilpin soil is moderately deep. Typically, the surface layer is dark grayish brown, friable silt loam about 4 inches thick. The subsoil is brown, friable channery silt loam about 24 inches thick. Olive shale bedrock is at a depth of about 28 inches. Many areas are severely eroded and have a surface layer of channery silt loam.

The Gilpin series characteristics are the following: moderate permeability rate, rapid runoff, low available water capacity, low organic matter, and has a moderate water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is well suited for timber production. The well suited for hay and pasture, and moderate to well suited for cultivated crops depends on the percentage of slope. The soil suitability is well suited for site buildings and poorly suited for septic tank absorption fields due to the percentage of the slope, depth to bedrock and the permeability. The land capability classifications are in order the following IIIe, IIe, IVe, and VIe. The suitability group is F-1, F-5, and F-6 for hayland and pastureland.

WhB—Wellston silt loam, 2 to 8 percent slopes. This deep, gently sloping, well drained soil is on knolls and in saddles on ridgetops. Slopes are smooth and convex. Individual areas are 3 to 50 acres in size. Typically, the surface layer is brown, friable silt loam and firm silty clay loam, the lower part is yellowish brown, firm silty clay loam. Soft, weathered sandstone is at a depth of about 48 inches. In many places the silty material is more than 60 inches thick

WhC2-Wellston silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, well drained soil is on shoulder slopes and broad ridgetops. A few areas are on benches. Slopes are generally smooth but are mildly dissected by a few shallow drainage ways. Erosion has removed part of the original surface layer. Most areas are 4 to 20 acres in size. Typically, the surface layer is yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 39 inches thick. Soft, weathered sandstone is at a depth of more than 60 inches thick. A few areas are severely eroded.

The Wellston series characteristics are the following: moderate permeability rate, medium runoff, high available water capacity, moderate organic matter, and has a high water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is well suited for timber production. The well suited for hay and pasture, and cultivated crops depends on the percentage of slope. The soil suitability is well suited for site buildings and septic tank absorption fields depending on the percentage of the slope, depth to bedrock and the permeability. The land capability classifications are in order the following IIIe and IIe. The suitability group is A-6 for hayland and pastureland.

ZnB—Zanesville silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained and well drained soil is on knolls and in saddles on ridgetops. Slopes are generally smooth and convex. Most areas range from 5 to 40 acres in size. Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 60 inches thick.

ZnC2—Zanesville silt loam, 6 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained and well drained soil is on knolls and shoulder slopes on ridgetops. Slopes are long and smooth. Erosion has removed part of the original surface layer. Most areas

range from 3 to 60 acres in size. Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 41 inches thick.

The Zanesville series characteristics are the following: moderate permeability rate, rapid runoff, moderate available water capacity, low organic matter, and has a high water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is well suited for timber production. The well suited for hay and pasture, and cultivated crops depends on the percentage of slope. The soil suitability is well suited for site buildings and septic tank absorption fields depending on the percentage of the slope, depth to bedrock and the permeability. The land capability classifications are in order the following IIIe and IIe. The suitability group is F-3 for hayland and pastureland.

AfB-Alford silt loam, 2 to 8 percent slopes. This deep, gently sloping, well drained soil is on knolls and in saddles on ridgetops and terraces in areas of thick, silty windblown deposits. Most areas are long and narrow and range from 5 to 30 acres in size. Typically, the surface layer is brown, friable silt loam about 10 inches thick. It is yellowish brown, friable silt loam and is mottled in the lower part. The underlying material to a depth of 80 inches or more is yellowish brown, mottled, friable silt loam. In some areas the soil is moderately well drained. In a few areas the soil is eroded. In places the underlying material is loam or fine sandy loam. Most areas are used as cropland. Some areas are used as pasture or as sites for homes. A few areas are wooded.

AfC2-Alford silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, well drained soil is on the shoulder slopes of ridgetops or on dissected terraces along broad valleys. Erosion has removed part of the original surface layer, and the present surface layer contains some subsoil material. Most areas are oblong or are irregular in shape and range from 15 to 40 acres in size. Typically, the surface layer is yellowish brown, friable silt loam about 10 inches thick. The subsoil is about 38 inches thick. It is yellowish brown, friable silt loam. The underlying material to a depth of 60 inches or more is yellowish brown, firm silt loam. In some areas the soil is moderately well drained. In a few areas the surface is not eroded. Other areas have gullies. In places the underlying material is loam, fine sandy loam or silty clay loam at a depth of more than 40 inches. Most areas are used as cropland or pasture. Some areas are wooded.

The Alford series characteristics are the following: moderate permeability rate, medium-rapid runoff, high available water capacity, moderate-low organic matter, and has a high water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is well suited for timber production. The moderate to well suited for hay and pasture, and cultivated crops depending on the percentage of slope. The soil suitability is well suited for site buildings and septic tank absorption fields depending on the percentage of the slope, depth to bedrock and the permeability. The land capability classifications are in order the following IIIe and IIe. The suitability group is A-6 for hayland and pastureland.

***Westmoreland- Coshocton- Rigley association* is well to moderate-drained soils that are found at the northern area of the watershed.**

CsC2-Coshocton silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is in saddles on ridgetops. Slopes are mostly concave, and seeps or

springs are common. Erosion has removed part of the original surface layer and reduced the depth to the more clayey subsoil. Most areas are oblong or are irregular in shape and range from 5 to 30 acres in size.

CsD-Coshocton silt loam, 15 to 25 percent slopes. This deep, moderately steep, moderately well drained soil is on the lower parts of hillsides and in coves at the head of minor drainage ways on dissected hillsides. Gullies and soil-creep scars are common. Most areas are crescent shaped or long and narrow and range from 5 to 35 acres in size. Typically, the surface layer is very dark gray and dark grayish brown, friable silt loam about 8 inches thick. The subsoil is about 32 inches thick. The upper part, to a depth of about 20 inches, is yellowish brown, firm silt loam and clay loam. The lower part, to a depth of about 40 inches, is yellowish brown, mottled, firm silty clay loam. The underlying material is dark yellowish brown, mottled, very firm silty clay loam about 25 inches thick. Dark gray and very dark grayish brown, soft shale bedrock is at a depth of about 65 inches. In some of the less sloping areas, the upper part of the soil is very silty and does not contain pebbles. In places the subsoil has more clay. In some severely eroded areas, the surface layer has more rock fragments.

CtE-Coshocton-Westmorland silt loams, 25 to 40 percent slopes. These deep, steep soils are on bluffs or are in ravines or hollows on dissected hillsides. The moderately well drained Coshocton soil is in the concave, less sloping landscape positions. The well drained Westmoreland soil is on the middle and upper parts of convex shoulder slopes or on the nose slopes of hillsides. Areas of these soils occur as alternating bands, which are associated with different bedrock strata. They commonly are 150 to 500 feet wide and are 10 to 300 acres in size. Most areas are about 45 percent Coshocton soil and 35 percent Westmoreland soil. The two soils occur as areas so intricately mixed or so small that it is impractical to map them separately. Typically, the surface layer of the Westmoreland soil is dark grayish brown, very friable silt loam about 5 inches thick. The subsoil is 32 inches thick. The upper part is yellowish brown, friable silty clay loam, and the lower part is brown and yellowish brown, friable and firm shaly silty clay loam. The underlying material is brown, firm very shaly silty clay loam about 28 inches thick. Soft, weathered shale bedrock is at a depth of about 65 inches. In places the subsoil contains more sand and is moderately deep over bedrock.

The Coshocton series characteristics are the following: moderate to slow permeability rate, rapid runoff, high available water capacity, moderate-low organic matter, and has a high water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is moderate suited for timber production. The moderate suited for hay and pasture, and unsuited for cultivated crops depending on the percentage of slope. The soil suitability is unsuited for site buildings and septic tank absorption fields depending on the percentage of the slope, depth to bedrock and the permeability. The land capability classifications are in order the following IIIe, VIe, and IVe. The suitability group is A-6 and A-3 for hayland and pastureland.

RfC-Rigley loam, 8 to 15 percent slopes. This deep, strongly sloping, well drained soil is on knolls or shoulder slopes on ridgetops. Individual areas generally are long and narrow and range mainly from 3 to 80 acres in size. Typically, the surface layer is dark brown, friable loam about 10 inches thick. The subsoil is about 30 inches thick. The upper part is dark brown, friable loam, and the lower part is dark yellowish brown, friable sandy loam. The underlying material

to a depth of 80 inches or more is very pale brown, friable sandy loam and loamy sand. In some areas the surface layer and the subsoil have a higher content of sandstone fragments. In places the surface layer is sandy loam. In some areas the soil is moderately deep. In places, the underlying material is more clayey and the soil is moderately well drained. Some areas are gently sloping.

RgD-Rigley channery loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is on upland hillsides and nose slopes. Some areas have common stones on the surface. Outcrops of bedrock are at the upper edge of some areas. Most areas are long and narrow and range from 5 to 50 acres in size. Typically, the surface layer is dark grayish brown, friable channery loam about 6 inches thick. The upper part is dark yellowish brown, friable sandy loam. The underlying material to a depth of 60 inches or more is very pale brown is yellowish brown and pale brown, very friable channery loamy sand. In some areas the subsoil has a higher content of sandstone fragments. In other areas the soil is moderately deep over sandstone bedrock. In some places the surface layer is sandy loam. Areas where the underlying material is clayey are moderately well drained.

RhE—Rigley-Coshocton complex, 25 to 40 percent slopes. These deep, steep soils are on dissected hillsides. The well drained Rigley soil is on bluffs, and the moderately well drained Coshocton soil is on concave benches in areas that have seeps and a perched water table. Areas of the Coshocton soil commonly are less sloping than areas of the Rigley soil. The two soils occur as belts that are associated with different types of bedrock. These belts are around hillsides or are in ravines at the head of small streams. Each belt is at a consistent elevation. Most areas of these soils range from 10 to 250 acres in size. They are about 40 percent Rigley soil and 35 percent Coshocton soil. Throughout the watershed the bedrock consistently contained of shale, clay, limestone, sandstone, and siltstone. Additional information on the soil characteristics can be found in the Muskingum County Soil Survey.

The Rigley series characteristics are the following: moderate to rapid permeability rate, rapid runoff, moderate available water capacity, moderate-low organic matter, and has a high water table in the lower part of the subsoil in the winter, spring, and extended wet periods. The soil is well to moderate suited for timber production. The moderate to poorly suited for hay and pasture, and cultivated crops depending on the percentage of slope. The soil suitability is moderately suited for site buildings and septic tank absorption fields depending on the percentage of the slope, depth to bedrock and the permeability. The land capability classifications are in order the following IIIe, VIe, and IVe. The suitability group is A-1, A-1, and A-3 for hayland and pastureland.

Using the Natural Resource Conservation Service (NRCS), soils are classified into three categories: Highly Erodible Land (HEL), Potential Highly Erodible Land (PHEL), and Non Highly Erodible Land (NHEL). The soils aligning the banks of the streams in the Salt Creek Watershed are classified as HEL (NRCS). (Charles McCluskey, NRCS Muskingum County District Conservationist)

Biological Features

Rare, Threatened, and Endangered Species

U.S. Federal Species

Species considered U.S. species are fish, wildlife, and plants that have been depleted in numbers and are in danger of or threatened with extinction. These species have aesthetic, ecological, educational, historical, recreational, and scientific value to the nation (Endangered Species Act of 1973). Those species that meet these requirements are enlisted on the U.S. Federal List before they can be declared rare, threatened, and endangered species. The state of Ohio has 26 listed on the U.S. Federal List. The species from this list are then classified as threatened or endangered.

Threatened Species

Animal or plant species those are likely to be endangered in the future.

Endangered Species

Animal or plant species that are likely to be extinct in the species' known ranges.

Extinct

Animal or plant Species that no longer exist.

Species listed as follows:

Threatened Animals

Bald Eagle (***Haliaeetus leucocephalus***)

Endangered Animals

Indiana Bat (***Myotis sodalis***)

State Of Ohio

The Ohio Department of Nature Resources (ODNR) Division of Natural Areas and Preserves (DNAP) classify their species as rare plants and animals, high quality plant communities, and natural features. The data containing these records started in 1976 and now holds 13,000 records. The threatened species are classified by the following:

Threatened

-Species on the Federal Threatened list but not present on the Endangered Species list.
-Natural populations of the species in Ohio are limited to < 4 or >10 happenings.
-The distribution of the natural populations of the species in Ohio is limited to a geographic area delineated by no less than four or more than seven US Geological 7.5 minute quadrangle maps.

Potentially Threatened

-Does not qualify for endangered or threatened species, but is proposed endangered or threatened species in the Federal Register.

-The natural populations of the species could become a threatened species in Ohio in the future.

-The natural populations of the species, even though they are not threatened in Ohio at the time of designation, are declining in abundance or vitality at a significant rate throughout all or large portions of the state.

Reference: ODNR-ODNAP

Rare Species.

Species that is scarcely populated.

Invasive nonnative species and their potential impacts

Invasive Species

Plant or animal that is non-native to an area. Characteristics of invasive species include: fast growth, species, high fruit production, rapid vegetative spread, efficient seed dispersal, and lack of natural predators.

Potential Invasive Species Impacts

Aggressive

Take over existing plant communities

Spread quickly

Lack Natural Predators

Hard to control

Very few predators

Chemical control application

Plant Invasive Species

Multi Flora Rose **(*Rosa multiflora*)**

Purple Loosestrife (***Lythnum salicaria***)

Eurasian Water Milfoil **(*Myriophyllum spicatum*)**

Animal Invasive Species

Common Carp (***Cyprinus Carpio***)

Species Listed as the Following:

Threatened

Small White Snake Root **(*Eupatoriun Aromaticum*)**

Potentially Threatened

Tennessee Bladder Fern **(*Cystopteris Tennesseensis*)**

Hairy Pinweed **(*Lechea Villosa*)**

Commonly Found Trees in the Salt Creek Watershed

Red Oak *(Quercus rubra)*

- Height: 50-70ft.
- Diameter: 1-3ft.
- Growing Conditions: moist, deep, rich, well-drained soils of slightly acidic pH.
-

Black Oak *(Quercus velutina)*

- Height: 60-80ft.
- Diameter: 2-3ft.
- Growing Conditions: dry soils

White Oak *(Quercus alba)*

- Height: 60-100ft.
- Diameter: 2-3ft.
- Growing Conditions: ranging from dry forests and fields to mesic woodlands and downslopes

Sugar Maple *(Acer saccharum)*

- Height: 75-100ft.
- Diameter: 2-4ft.
- Growing Conditions: rich, moderately deep soils having even moisture coupled with good drainage

White Ash *(Fraxinus americana)*

- Height: 60-80ft.
- Diameter: 2-4ft.
- Growing Conditions: Rich, moist, well-drained soils of acidic to neutral pH

American Sycamore *(Platanus occidentalis)*

- Height: 80-100ft.
- Diameter: 3-8ft.
- Growing Conditions: deep, moist, rich soils of variable pH that are either well-drained or moderately drained

American Beech *(Fagus grandifolia***)**

- Height: 80-100ft.
- Diameter: 3-8ft.
- Growing Conditions: organic or clay soils, of alkaline to acidic pH, and of very moist to dry conditions

Black Walnut *(Juglans nigra)*

- Height: 70-100ft.
- Diameter: 2-4ft.
- Growing Conditions: deep, moist, rich, well-drained soils under sunny conditions

Black Cherry *(Prunus serotina)*

- Height: 50-60ft.
- Diameter: 1-3ft.
- Growing Conditions: deep, moist, rich, well-drained soils of variable pH under full sun to partial sun conditions

Hickory

- Height: 50-90ft. (depends on the species)
- Diameter: 1-3ft. (depends on the species)
- Growing Conditions: deep, moist to occasionally wet, rich soils under sunny conditions, such as are found in bottomlands, flatlands that do not drain quickly, and floodplains (depends on the species)

White Pine *(Pinus strobus)*

- Height: 75-100ft. (depends on the species)
- Diameter: 2-4ft. (depends on the species)
- Growing Conditions: intolerant of soils that are alkaline in pH and poorly drained; therefore, the heavy clay soils

Highly Valued Timber

- Red Oak
- Black Oak
- White Oak
- Sugar Maple
- Black Walnut
- Black Cherry

Water Resources

Climate

Muskingum County changes temperatures seasonally. Spring temperatures ranges from 50-70 degrees Fahrenheit and summer rises to the range of 68-80 degrees Fahrenheit. Fall and winter temperature decrease to an average of 30-60 degrees Fahrenheit. The average early temperature is 51 degrees Fahrenheit. Humidity is higher in mid-afternoon and slightly increases toward evening. Evening hours have the highest humidity. (www.worldclimate.com)

Precipitation

Thirty-eight inches of rain is the annual precipitation for Muskingum County. (www.worldclimate.com) Sixty percent of the precipitation comes between April-September. During the winter months the average in snowfalls are recorded in the range of 25 inches.

Since no mountain ranges exist between Ohio and the Polar Regions, no effective barrier prevents the southward spread of Arctic air from northern Canada. Similarly, warm tropical air masses move freely northward in the summer. Storm systems form along the boundary between major cold and warm air masses, and storm paths frequently cross the State of Ohio. (OSU Extension Agronomy Guide, Bulletin 472)

Surface Water

Wetlands

Land use that has been classified non-forested wetlands makes up 0.29% of the Salt Creek Watershed (ODNR, Realm 2003). The wetland areas are found in the northern portions of the watershed. Map 17 shows the wetland area throughout the watershed.

Streams

The Salt Creek Watershed has fourteen named streams (reference the *Gazetteer of Ohio Streams*) flowing into the main stem of the Salt Creek. There are 96.6 known miles of streams within the watershed, listed below are 83.1 miles of the main tributaries. There are five main tributaries that flow into the Salt Creek before it reaches the Muskingum River. Table 13 below explains the five tributaries' statistics.

Stream Name	Drainage (sq. mile)	Avg. Flow (cfs)	Length (Miles)	Avg. Gradient (ft./mile)
Salt Creek	136.62	14.25	27.1	131.00
Mann's Fork	29.19	1.65	13.4	37.90
Boggs Creek	22.44	9.17	11.4	34.05
White Eyes Creek	14.84	5.70	8.6	37.05
Little Salt Creek	14.7	7.32	7.5	16.10
Buffalo Fork	35.48	5.32	15.1	31.73

Table 13−Main Tributaries' Statistics

The five tributaries connect into the Salt Creek as it makes it way into the Muskingum River. The Salt Creek discharges into the Muskingum River right below Duncan Falls where Cutler Lake Rd. intersects State Route 60. To effectively manage the Salt Creek Watershed it is broken into fourteen digits Hydrological Unit Codes (HUC). (Map17)

Hydrological Unit Codes (HUC)
Adequate management practices of watersheds are based on the HUC of watersheds. Watersheds are broken down into 2, 4, 6, 8, and 14 digit HUC (USGS). The largest watershed area is the two digit HUC and decreases in area the larger the HUC digit. The two digits HUC is the water resource region, which the watershed is within and then becomes subdivided into a four digit HUC then six, eight, and finally fourteen digits. Also the larger HUC digit the lesser amounts of land acres are drained (USGS). The Salt Creek Watershed is one eight-digit watershed, which is subdivided into seven fourteen-digit sub watersheds. The watershed monitoring technician used the fourteen-digit HUC to conduct a watershed survey within the seven fourteen digit HUC.

Sub watershed: *flow, size*
Appendix-1 exhibits the seven fourteen digit HUC along with average flow and drainage area's square miles (USGS).

USGS Flow
03149500 SALT CREEK NEAR CHANDLERSVILLE, OH
LOCATION.-Lat 39°54'31", long 81°51'37", in SW 1/4 sec.10, T.13N., R.12W.,
Muskingum County, Hydrologic Unit 05040004,
on left bank downstream of State Highway 146,
11 miles southeast of Zanesville and 2 miles northwest of Chandlersville,
1 mile upstream from Buffalo Fork.
Drainage Area.-75.6 mi².

Year	Annual mean stream flow, in ft^3/s	Year	Annual mean stream flow, in ft^3/s	Year	Annual mean stream flow, in ft^3/s
1936	109	**1941**	51.9	**1945**	145
1937	114	**1942**	78.8	**1946**	80.9
1938	91.6	**1943**	69.0	**2001**	66.3
1939	79.4	**1944**	54.9	**2002**	72
1940	93.9				

Table 40- Annual Stream Flow Statistics

Tributary: *name, length*
Appendix-2 lists the tributaries' names and lengths within all seven fourteen-digit HUC. Map 20

Gazetteer of Ohio Streams lists the streams within each of the seven-fourteen digit sub watersheds. The Appendix-2 displays the length and the gradients of the named streams with

each of the seven fourteen-digit sub watersheds. The gradients and length measurements are taken from the ***Gazetteer of Ohio Streams.***

100-year Floodplain Area
The 100-year floodplain is represented in Map 21.

Entrenchment Indicators and Flood Plain Connectivity
Entrenchment indicators of a stream refer to the widening of the stream channel. Entrenched streams are down cut so the stream facilitates the volume of flow produced. Entrenched streams have little to no flooding due to the widening of the channel. Larger discharges of runoff can increase the stream flow and produce entrenching. Streams that have been entrenched have no place to deposit sediment loads due to little to no flooding when large discharges occur. When a stream floods the access to the streams floodplain, and the ability to deposit sediment is the flood plain connectivity. Urbanization can intensify the amount of runoff created by creating more impervious surfaces (roofs, parking lots, roads). (www.epa.state.oh.us) (www.dnr.state.oh.us)

The Salt Creek Watershed entrenchment is insufficient at this time. The Salt Creek Watershed is not experiencing heavy urban and industrial area at the present time. The trend of urbanization and industrializing continues to increase at the rate it is now entrenchment could take place in the future. Urbanization and industrialization will create more storm water runoff from the parking lots, roofs, and roads. The Salt Creek Watershed has been increasing its flooding events from year to year. Local landowners are noticing the flooding events happening more often every year and that the Salt Creek and tributaries can easily flow out of the banks. The tributaries in the Salt Creek Watershed deposit large amounts of sediments in the floodplain after a flooding event. (Kylene Wilson, MSWCD Watershed Coordinator)

Sinuosity Indicators
Sinuosity is the meandering of a stream. Sinuosity of a stream provides various habitats and velocities. Due to variants in velocities of meandering streams, they tend not to flood during storm happenings. Streams that are straight and have constant velocities tend to flood in a storm event (OEPA). Throughout the Salt Creek Watershed streams are natural. The main stem Salt Creek is prone to flooding in storm happenings. The Salt Creek does has a natural low sinuosity and straightens out for some distances. (www.epa.state.oh.us) (www.dnr.state.oh.us)

Water Quality Standards
The Federal Clean Water Act of 1972, amended in 1977, set the standards for water quality in streams. The two elements that Ohio's streams follow are 1) numeric standards and 2) beneficial use designations.

1.) ***Numeric Standards:*** The parameters are chemical and biological indicators. The chemical parameters are pH, nitrite, nitrate, dissolved oxygen, conductivity, etc. Depending on the water body's designation, the criteria are set. Criteria are based off past data collected in the Ohio's five ecoregions. Past data is how the expectations for future data are made. Listed below are the three biological tests that are collected to determine the numeric standards for the biological indicators.

IBI-Index of Biological Integrity is the measure of fish species diversity and species population. The IBI scale is 0 to 60 and the higher the number the healthier the water quality.

ICI- Invertebrate Community Index measures the macro invertebrates living within a stream. Macro invertebrates vary in taxa from pollutant intolerant to pollutant tolerant. The ICI scale range is from 0 to 60 with the higher the number representing healthier water quality.

Miwb- Modified Index of Well Being uses fish mass and rules out 13 fish species that are tolerant of pollution in the Miwb final analysis. High IBI shows diversity and low Miwb could indicate there is a problem within the stream.

Using these three criteria and the chemical analysis from the stream determines if it is meeting the designated use.

2.) Beneficial Use Designations: The Ohio EPA classifies beneficial use designations into four major uses: aquatic life, recreational use, water supply, and state resource water (Table 14). Beneficial use designation describes how the human population uses the streams and how the biological communities react to their actions.

Use Designations

Aquatic Life Use

Exceptional Warm Water Habitat: *This habitat has exceptional water quality containing a highly diverse amount of species with no tolerance to pollution. Most species have the status of rare, endangered, or federal threatened.*

Warmwater Habitat: *Able to support a biological community and is typical for Ohio's streams. The biological community differs in different ecoregions.*

Modified Warmwater Habitat: *Due to irreversible habitat changes the habitat is unable to support a diverse biological community.*

Cold Water Habitat: *Habitat that is able to support cold-water biological communities.*

Limited Resource Water: *< 3 sq. miles, unable to support biological communities, lack of water.*

Recreational Use

Primary Contact: Full body contact (swimming, boating).

***Secondary*:** Partial body contact recreation (swimming, wadding).

Bathing Waters: Full body contact, regular water testing and waste treatment facilities (swimming area, bath house).

Water Supply

Public: *Drinking water, meets Water Quality Standards, treated.*

Agricultural: *Without treatment, livestock watering, and irrigation.*

Industrial: *Industrial/commercial use, with/without treatment.*

State Resource Water

State Water: *Any water that flows through a state or parkland.*

Table 14 Beneficial Use Designations

Salt Creek Watershed Use Designation
The Salt Creek Watershed is located in the Western Allegheny Plateau (WAP) ecoregion. The streams within the Salt Creek Watershed carry an aquatic use designation of Warmwater Habitat. The Ohio EPA Biologist decided the use of designation after reviewing chemical, physical, and biological data from 2003 and IBI from 1996, 1997, and 2002.

Lakes and Reservoirs (Size, Uses, Watershed)

The only lake within the Salt Creek Watershed is Blue Rock State Park Lake. This lake is 15 acres and is used for recreation in the Blue Rock State Park. Within the Salt Creek Watershed five other lakes meet the standards to have permitted dams. The watershed contains many farm ponds of many different sizes and shapes. Many of these ponds and lakes can be seen on USGS topographical maps. The permitted dams are listed in Table 15. The water bodies are permitted with classification from ODNR Division of Water Dam Safety: Classification of Structures. The Dam Safety: Classification of Structures uses the following parameters: height of dam, storage volume, and potential downstream hazards.

Class	# Of Dams	Township	Sub watershed
I	1	Blue Rock	05040004 060 060
II	4	Washington	05040004 060 020
III	1	Wayne	05040004 060 050

Table 15- Permitted Dams in the Salt Creek Watershed

Ground Water

Aquifers (location, recharge rates, uses)

Geologic Formation
Throughout the Salt Creek Watershed it is composed of a bedrock aquifer. The bedrock in the aquifer is composed of sand, gravel, limestone, and sandstone, and other aquifers. This region is composed of shale, sandstone, and limestone. The extensive aquifers are composed of shale and fine grained sandstone aquifers. The aquifers are 0 to 50 feet deep. These bedrock aquifers have the ability to hold, store, and permeate water through their composition (OSU Ext 2000). Around the mouth of the Salt Creek and continuing up the creek there is a buried valley. The buried valley is made up of permeable materials, which the ground can easily filter water through.

Recharge Rates
Recharge rates for the ground water aquifer are 1-5 gallons per minute (gpm)(OSU Ext. 2000). In the upland area in the Salt Creek Watershed the ground water aquifer recharges slowly because of the low permeability rates.

Uses
In Muskingum County 31% of the households use private wells, 7% of the households use surface water, and 62% of the households use public water systems. Groundwater aquifers are

important in the Salt Creek Watershed because of resident's public water and wells are from ground water resources. (See Map 10, 12, &15)

Source Water Assessment Plan
There is no SWAP in the Salt Creek Watershed.

Protected Water System Wells
There are only five public water system wells within the Salt Creek Watershed. The residents have public use access to the protected water systems wells. The public water wells and protection areas are shown in Map 10, 12, &15. (Scott Kester OEPA, SEDO)

Drastic Maps
There are no known DRASTIC Maps in the Salt Creek Watershed.

Public Water

Locations
Public water is available in several areas of the watershed. Providers are: Muskingum Water and Zanesville City Water. The public water lines follow the corridor of major state routes and county roads throughout the watershed.

Salt Creek Watershed Public Water Systems	
#	Facility
1	New Hope Lutheran Church
2	Adamsville Methodist Church
3	Adamsville Elementary School
4	Jaycee Public Golf Course
5	Chandlersville Church of Christ

Table 32-Public Water Facilities

Land Use

Land Cover/Land Use

In 2003, The Real Estate and Land Management (REALM) Division provided the land cover/land use statistics for the entire Salt Creek Watershed. The statistics are broken into seven different cover types listed below in Table 16.

Salt Creek	
Land Use/ Land Cover	Percentage
Urban (Open Impervious Surfaces)	0.29%
% Agriculture/ Open Urban Areas (Non-Impervious)	48.25%
Shrub/ Scrub	1.21%
Wooded	49.86%
Open Water	0.08%
Non-Forested Wetlands	0.29%
Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.03%
Total of the Watershed	100.00%

Table 16-Salt Creek Watershed Land Use/ Land Cover

These land use/land cover statistics are based off of 1994 land use/ land cover data. Percentages of land use /land cover by sub watershed are described in Appendix 4.

Urban 0.29%

Urban areas include: residential, industrial, transportation, utilities, oil, and gas wells (Map 17 & 14). All open impervious surfaces are included in this percentage. Sub divisions and small villages are classified as residential areas.

Impervious surfaces

Impervious surfaces can be rooftops, roadways, or parking lots. The impervious surfaces will increase with the commercial development along I-70 and State Route 40. Also, impervious surface area will be increasing as a result of urbanizing. This urbanization will continue to increase throughout the Salt Creek Watershed as farms are divided into housing developments.

Public Sewage Systems

The Muskingum Water Department has sewage lines running along the I- 70 and State Route 40 corridor. The number of households on public sewage systems is unavailable. displays the routes of the public sewage lines in the watershed.

Sewage Septic Systems

The number of sewage septic systems within the Salt Creek Watershed boundaries was determined from Muskingum County Health Department records (Table 17). The table below explains the persons per household (2000 Census Data), and percentage of unreported home septic systems (Table 18). The population used in this table was from the 2000 Census (See Demographic Section).

Reported Sewage Septic Systems by Subwatershed		
050 40004 060 010	*Total*	525
050 40004 060 020	*Total*	514
050 40004 060 030	*Total*	342
050 40004 060 040	*Total*	114
050 40004 060 050	*Total*	934
050 40004 060 060	*Total*	190
050 40004 060 070	*Total*	79
Total Reported in the Watershed		2697

Table 17-2003 Sewage Septic Systems

Watershed Population	Buildings Salt Creek Watershed	Reported Septic Systems	% Buildings w/Unreported Septic Systems	Persons/ Buildings
9600	4485	2697	40%	2.53

Table 18 –Sewage Septic Systems

Oil and Gas Industry

Throughout the watershed the oil and gas industry is apparent. According to the Ohio Geological Survey there are over 10,000+ wells in Muskingum County. In the eleven townships that the watershed covers there are 4,000+ wells. Muskingum County is in the top ten counties in Ohio for amount of wells. Also Muskingum County ranks number one in the amount of active wells. (www.ooga.org) Map 14 exhibits the amount of oil and gas wells in the Salt Creek Watershed.

Agriculture/Open Areas 48.25%

Agriculture areas include: cropland, pastureland, golf courses and farmsteads (Map17). Further information is available for livestock inventory, chemical usage (restricted, unrestricted), tillage, and crop rotations and can be found by sub watershed in Appendix 9.

The main crop types throughout the watershed are soybeans and corn. Dick Sorg, MSWCD DPA and Kylene Wilson, MSWCD Watershed Coordinator made overall assessment of what percentage of crops were planted by conservation and conventional tillage. The planting of the crops is done 55-60% by conservation tillage and 40-45% by convention tillage. When using rotations here are examples of the rotations used:

- Plant corn then plant rye in the fall
- Plant two years of corn, one year of small grain, and then hay for four years
- Plant one year of corn then a year of soybeans

The commonly used herbicides for crop production are the following: Atrazine, Cyanazine, Roundup Ready, and Bromoxynil.

The livestock inventory is based on the Ohio Department of Agriculture (ODA) animal units. This designation of animal unit is calculated depending on the animal species. Determination of the amount of animal units is calculated by multiplying the factor in parentheses by the number of animals. The following are the number of animal units represented by the factor in parentheses to multiply the number of animals by: slaughter/ feeder cattle (1.0), mature dairy cattle (milked or dry)(1.4), swine (.4), horses (2), sheep or lambs (0.1), turkeys (0.018), laying hens or broilers (0.01), or ducks (0.2). (ODA)

By a drive by assessment done by Kenny Rupe, MSWCD Agricultural Technician and Kylene Wilson, MSWCD Watershed Coordinator of the livestock producers in the watershed, they determined fewer than 2% intensive graze their livestock. The two main water sources the producers use are ponds and springs. There is no known irrigation in the Salt Creek Watershed.

Shrub/Scrub 1.21%

Shrub/Scrub areas include young sparse woody vegetation and saplings (Map 17).

Wooded 49.86%
Wooded areas included deciduous and coniferous trees (Map 17). The wooded area is the most abundant land use/land cover within the Salt Creek Watershed. The Blue Rock State Forest, which includes 4,579 wooded acres is located in the southwestern area of the watershed.

Open Water 0.08%
Open water includes lakes, ponds, and streams (Map 17). Blue Rock State Park has a 15-acre lake located in the southwestern area of the watershed. Along with the Blue Rock State Park Lake other farm ponds contribute to the percentage of open water within the watershed.

Non-Forested Wetlands 0.29%
Non-forested wetlands include wetlands identified by the 1994 thematic mapper and the Ohio wetland inventory (ODNR) (Map 17).

Barren 0.03%
Barren areas include strip mines, quarries, sand, and gravel pits (Map 13 & 17).

Stream and Floodplain Attributes

Early Settlement Conditions

The Native Americans accomplished the early settlement of southeastern Ohio. There were Delaware, Wyandot, Seneca and Shawanoese Indian tribes that occupied the area. The Indian tribes set up settlements in Muskingum County by Duncan Falls and Dresden. The Native American tribes inhabited the rolling hills of Muskingum County, giving Muskingum County the name after a Delaware Indian word meaning “a town on the riverside” or the old Indian language word meaning “the eye of the elk”.

Channelization

There is no data found on channelization throughout the Salt Creek Watershed (Core of Engineers, Huntington District).

Riparian Levies

By observation and record there is no record of riparian levies in the watershed boundaries (ODNR metadata).

Entrenchment

By observation entrenchment throughout the Salt Creek Watershed is an insufficient amount to be recorded.

Channel and Floodplain Condition, Floodplain Connectivity

By observation throughout the watershed there is no channelization or riparian levies so the stream is allowed to flow naturally to the floodplain.

Eroding Banks-Potential Soil Loss

Twenty-three of the twenty-six sites were assessed for bank erosion during the water quality study of the Salt Creek Watershed. Completing a Qualitative Habitat Evaluation Index (QHEI) for each of the 23 sites accomplished the bank erosion assessment. The scale the bank erosion was measured on was little/none (<25% eroding), moderate (25-50% eroding), and heavy/severe (>50% eroding). The banks throughout the Salt Creek Watershed sites were mainly moderately eroding (see Table 19).

The soils characteristics and classifications are determined to be highly erodible by NRCS standards. (See pages 37-48) By observation of the erosion conditions they are becoming severely worse. Kylene Wilson, MSWCD Watershed Coordinator while driving through, visiting residents, and field testing in the watershed did these observations.

# of Locations	% Of Eroding Banks Present	Erosion of Banks
5	21.74%	None / Little
14	60.87%	Moderate
4	17.39%	Heavy / Severe
Total 23	100.00%	

Table 19-Erosion of Banks

Forested Riparian Corridor Assessment

The stream banks with a forested or non-forested riparian buffer were measured. With the use of the 1996 USGS maps and a map measurer the miles of riparian buffer were calculated. The Salt Creek Watershed contains more forested banks than non-forested banks (Table-20). Appendix 18 displays the amount of riparian buffer found throughout each 7-14 digit HUC. The map distance measurer on the Geographic Information System (GIS) calculated the entire streams riparian buffer.

Riparian Buffer	Miles	%
Forested	60.50	62.63%
Non Forested	36.10	37.37%
Total Stream Miles	96.6	100%

Table 20- Riparian Buffer

Streams Miles with Unrestricted Livestock Access

Unrestricted livestock access is the unlimited access to streams. The area of stream that has unrestricted livestock access is used for one of the following reasons: crossing area, watering, or seasonal/ rotational area. With no data found on stream miles with unrestricted livestock access an estimate of miles was made (Muskingum SWCD). With consideration of riparian corridor (Table-20) of the stream banks the stream miles with unrestricted livestock was calculated. The total number of non-confined livestock operations was multiplied by 500 feet (appox.) of unrestricted livestock access. This figure would provide an estimate of the amount of stream miles with unrestricted livestock access (Appendix 15).

Dams

Within the Salt Creek Watershed boundaries there are six permitted dams (Table 21). None of the dams are in the main tributaries of the Salt Creek Watershed. The dams are located with ponds and lake structures. The Ohio Department of Natural Resources Division of Water classifies all permitted dams into four classifications and three set criteria (Table-22)(ODNR, DSW).

Class	Height of Dam	Storage Volume	Potential Downstream Hazard
I	>60ft.	>5000 ac.-ft.	Probable loss of life, serious hazard to health, structural damage to high value property
II	>40ft.	>500 ac.-ft.	Flood water damage to homes, businesses, industrial structures (no loss of life envisioned), damage to state and interstate highways, railroads, only access to residential areas
III	>25ft.	>50 ac.-ft.	Damage to low value non-residential structures, local roads, agricultural crops, and livestock
IV	</=25ft.	</=50ac.-ft.	Losses restricted to the dam

Table-21- Permitted Dams Classifications

Class	# Of Dams	Township	Sub watershed
I	1	Blue Rock	05040004 060 060
II	4	Washington	05040004 060 020
III	1	Wayne	05040004 060 050

Table 22- Permitted Dams in the Salt Creek Watershed

Permanent Protection of Stream Miles

There are no protected stream miles throughout the Salt Creek Watershed.

Status and Trends

Trends will follow more commercial and industrial development along the interstate and major state routes. These trends will continue to increase in up coming years. Urbanization will also increase into the rural areas of the watershed due to the rural areas receiving public water and sewage lines.

Protected Lands

City, County, District, State, or National Public Forests and/or Parks

City

Zanesville Port Authority

The Zanesville Port Authority owns and protects 1,123.5 aces of land in Washington Township. In Perry Township the Zanesville Port Authority owns 717.8 acres. Also in Perry Township the City of Zanesville owns 1,000.00 acres off of Park Lane.

State

Blue Rock State Park

The Blue Rock State Park is located in the southern part of the Salt Creek Watershed. In 1949 Blue Rock State Park was formed after the Division of Parks and Recreation was created. The Blue Rock State Park recreational uses include: boating, fishing, swimming, hiking, camping, golfing, and hunting. Blue Rock State Park covers 322 acres of land. The park has 15 acres of open water to use for recreation.

Blue Rock State Forest

Blue Rock State Forest and Park are located within the southern portion of the Salt Creek Watershed. The forested land was purchased by the State of Ohio in 1936. The Blue Rock State Forest is 4,579 acres of forested land. Throughout the Blue Rock State Forest there are hunting, hiking, and horseback riding trails.

Ohio Historical Covered Bridge Association

The Ohio Historical Covered Bridge Association claimed 2/3 of an acre of land in 1960. On this land stands one of Ohio's historical bridges. The bridge overlies the Salt Creek stream.

Conservation Easements

There are no known permanent conservation easements currently in the Salt Creek Watershed. With the implementation of this grant we will be able to educate residents and encourage the establishment of conservation easements.

Land Protected by Private Foundations or Land Trust

There is no land contained within the Salt Creek Watershed boundaries that is held by land trust or private foundations.

Status and Trends

Currently the Salt Creek Watershed land area consists of mainly four uses: agricultural, wooded areas, and increasing urban land, and commercial. Historically the watershed consisted of agricultural and wooded areas. The topography of the area includes gently rolling hills and steep valleys. Agriculture in the area includes mainly beef cattle, sheep and hog operations. Beef cattle herds include an average of 50 head. The main crop is corn, which is conventionally planted.

The beautiful agricultural farms are increasingly being divided into housing developments. Urbanization is taking place along main highways and public water lines. Future trends include more urbanization and commercializing. This will reduce the amount of agricultural farmland.

Commercial development is increasing along the I-70 and State Route 40 corridor. This development has increased the number of NPDES permits in the watershed boundaries. Trends will continue to increase in the future.

Cultural Resources
Sites of Historical and Cultural Significance

Salt Creek Watershed

Historical Covered Bridge

The Salt Creek Historical Bridge is also known as the Johnson's Mill Bridge. The Salt Creek historical bridge is located within Perry Township over laying the Salt Creek stream. This Ohio historical marker was constructed in 1970-1975 with warren trusses. Jesse Romino and Thomas Fisher constructed this historical covered bridge. The local surrounding communities used this bridge for transportation.

Zane Trace Landmark

The Zane Trace Road, National Road or now commonly called Route 40 runs throughout the Salt Creek Watershed along Interstate 70. The National Road is a historical road that runs through Muskingum County. Ebenezer Zane and his brothers constructed Route 40 in 1796-1797. The pioneers used this travel route to transport their goods. The road was widened in the 1800's for larger transport.

National Road/ Zane Grey Museum

The National Road/ Zane Grey Museum is open year round during selected hours during the week. The museum displays Zane Grey books and other artifacts. The national road tour artifacts are displayed through the museum also. National Road/ Zane Grey Museum is a historical education experience.

Muskingum County

Muskingum County is located about 50 miles east of Columbus and 21 miles west of Cambridge. The name Muskingum comes from an old Delaware Indian word meaning "a town by the river" or old Indian language word meaning "the eye of the elk. In 1790 the town of Westbound was formed and later the named was changed to Zanesville. This town was formed on the creation of the original pioneer trail (Zane's Trace or National Road) through the Ohio Valley. The town of Zanesville is where the Licking and Muskingum River meets. The state capital was in Zanesville from 1810-1812. Also, the Y-Bridge, a historical landmark is established in Muskingum County overlying the conjunction of the Muskingum and Licking Rivers.

The development of the community was due to transportation throughout the county. National Road was developed straight through Muskingum County. The road was the first federally funded road in America. Presently the Interstate 70 runs side by side with the National Road. Muskingum County now benefits from both the National Road and Interstate 70. One the famous bridges in Muskingum County is the Y-Bridge. The Y-Bridge was built so it spans across the Muskingum and Licking River providing connection with businesses on the other side of Zanesville. Along with road travel the Muskingum River was another source of travel mechanism. The businesses were able to ship their goods all over Ohio and the United States. Muskingum County has great natural resources: sand, clay, and iron. Some of the goods that were shipped all over America were pottery, steel, and glass. Zanesville was once known as the

"Pottery Capital of the World" due to the rich clay soils found in Muskingum County. (www.muskingumcounty.com) In fact, the clay resources allowed Zanesville to become known as the "Pottery Capital of the World." Pottery symbolizes the heritage and culture of Muskingum County. The pottery and glassware are still sold in antique stores in downtown Zanesville. Also besides pottery and glassware, steel and baskets are manufactured. The steel manufacturing plant resides in Zanesville. The handmade baskets are made in a small Muskingum County village known as Dresden. Dresden still resides of the home of the Longaberger Basket Company in Dresden. It is the largest manufacturer of handmade baskets in the U.S.

Muskingum County landscape is made of rolling hills, residential areas, and small villages. Muskingum County is home of many outdoor recreational activities. The county contains three state parks and several city parks. It's a great county for hunting, fishing, boating, and athletics.

Information obtained from the Muskingum County Website, www.muskingumcounty.org, and the Zanesville-Muskingum County Chamber of Commerce 2004 publication of the Zanesville and Muskingum County Visitors Guide.

*Sites of Recreational Signific*ance

State Owned Recreational Facilities

Blue Rock State Park

The Blue Rock State Park is located in the southern part of the Salt Creek Watershed. In 1949 Blue Rock State Park was formed after the Division of Parks and Recreation was created. The Blue Rock State Park recreational uses include: boating, fishing, swimming, hiking, camping, golfing, and hunting. Blue Rock State Park covers 322 acres of land. The park has 15 acres of open water to use in these recreational uses.

Blue Rock State Forest

Blue Rock State Forest and Park are located within the southern portion of the Salt Creek Watershed. The forested land was purchased by the State of Ohio in 1936. The Blue Rock State Forest is 4,579 acres of forested land. Throughout the Blue Rock State Forest there are hunting, hiking, and horseback riding trails.

Privately Owned Recreational Facilities

Creek Side Golf Course

The Creek Side Golf Course is a nine-hole golf course in Chandlers Ville. . The golf course is opened March through November.

Fuller's Fairways

Fuller's Fairways is an eighteen-hole golf course located in Zanesville. The golf course is opened March through November.

Zanesville Jaycee Golf Course

Jaycee Golf Course is an eighteen-hole golf course located in Zanesville. The golf course is opened all year around for golfer convenience.

Norwich Valley Golf Course

Norwich Valley Golf Course is a nine-hole golf course located in Norwich. The golf course is opened all year around for golfer convenience

Water Resource Data Quality

Use Designation

OEPA Use Designation Status

The aquatic life use designation for the Salt Creek Watershed was Warmwater Habitat (WWH). Since there were OEPA 305(b) or 303(d) completed for the Salt Creek Watershed the designation of warmwater habitat the Salt Creek Watershed field data was reviewed by Dennis Mischne, OEPA. During the Salt Creek Watershed Project chemical, biological, and physical field data was collected in the process of determining the quality of water.

Attainment Status

OEPA Aquatic Life Use Attainment Status

OEPA determines the status of streams by using the 305(b) and 303(d) integrated water quality report. The reports display the data that was gathered by the OEPA. The in attainment or non-attainment status comes from the 305(b) and 303(d) reports. The Salt Creek Watershed however is not listed on either of the 305(b) and 303(d) integrated water quality reports. The attainment status was determined by the analysis of the chemical, biological, and physical field data collected during 2003 –2004 by the MSWCD watershed monitoring technician and past data collected by the OEPA.

Salt Creek Watershed Project

Establishing Attainment Status

In researching the status of water quality within the Salt Creek Watershed physical, biological and chemical data was collected from designated locations. The number of sites for each data collection method is located in Table 23. These three data collecting methods are listed below and the procedures that were used. The data collection was done between June and October 1, 2003 and June and September 2004. The sampling results were used to establish an attainment status for the Salt Creek Watershed. 2003 sampling was able to identify the streams that were in attainment and non attainment. In 2004 more sites were selected upstream and downstream of problem areas to identify the attainment areas. Further sampling is needed to establish a yearly water quality data on Salt Creek Watershed.

Data	2003 Sites	2004 Sites
Biological	23	n/a
Physical	23	n/a
Chemical	26	31

Table 23- Sites Evaluated

Site Selection

Throughout the Salt Creek Watershed 26 sampling sites in 2003 and 31 sampling sites in 2004 were chosen to collect data from. These sampling sites were chosen from the criteria listed in Table 24.

*Accessible bridge or road crossing
*Drainage area
*Represented the major land use/ land cover patterns
*Represented sampling within the 14 digit HUC
*Accessibility to perform habitat assessments

Table 24- Sampling Site Criteria

Physical Data

Physical data collecting assesses the habitat in the sampling site. During the 2003 data collection Kylene Wilson (MSWCD Watershed Monitoring Technician) and Susan Wolfe (MSCWD Intern) collected using the OEPA method of Qualitative Habitat Evaluation Index (QHEI) the physical data. Due to the insufficiency amount of time during 2004 data collection period no QHEI were down on the new sampling location.

QHEI

The QHEI procedures examined the bedrock, riparian land use, substrate quality, and riffle status. The habitat for organism is examined by completing a QHEI. The QHEI worksheet has values based on a 0-100 scale with numbers closer to 100 being high habitat water quality. The results of the QHEIs are presented in Appendix 7.

Biological Data

Biological data was sought by kick seining sites in collection of macro invertebrate for identification and then scoring them on the macro invertebrate survey score sheet. Past OEPA fish electro-shocking data was also used for biological data (Appendix-8&6)

Macro Invertebrate Survey

The macro invertebrate survey was completed using the EPA macro invertebrate score sheet. Kick seining was done and macro invertebrate identified to complete this survey. During the 2003 data collection Kylene Wilson (MSWCD Watershed Monitoring Technician) and Susan Wolfe (MSCWD Intern) accomplished the macro invertebrate survey. The results of these macro invertebrate surveys are represented in Appendix-6. The macro invertebrate survey was completed on 23 of the 26 sites in 2003. Due to the high water levels and inaccessibility the other three streams could not be surveyed. The macro-invertebrate survey was unable to be completed in 2004 due to the shortage of time and high water levels. Macro invertebrate survey score sheet used categorized results as good, fair, and poor. This survey is used as a general survey of the water quality.

Fish Electro Shocking Data

The Ohio EPA collected the Fish Electro Shocking data. The data was received to review for the biological data. The fish data included species weight, length, and IBI (Refer to Watershed Inventory Section, Water Quality) for the sampling area. Eleven sites were evaluated in the watershed between the years of 1983-2002. The results from these electro shocking sampling periods are presented in Appendix 8.

Chemical Data

Chemical data was collected by performing series of water samples on the selected sampling locations. The samples were in 2003 and 2004 at during high and low flows. The OEPA analyzed the samples for the following parameters: conductivity, pH, nitrites, nitrates, ammonia, fecal coliform, E.coli, total phosphorus, total suspended solids, temperature, and dissolved oxygen.

Water Sampling and Analysis

The chemical data was collected in three separate sampling runs. Each sampling consisted of three days of collecting samples. Each day 8-14 samples were collected to total the number the of sample sites. Samples were not all collected on one day so samples would not exceed holding times before the samples were analyzed. Standard methods were used to collect the water samples. A Wilco horizontal sampler was used to collect these samples. The samples were sent away to OEPA for chemical analysis. YSI 63 Temperature took other chemical sample readings, Conductivity, pH, and Total Dissolved meter and, YSI 550A Dissolved Oxygen and Temperature meter. The measurements were taken and recorded by the water sampler during that run. The results from the chemical analysis are shown in Appendix 13.

2003 Sampling Runs

The sampling sites were sampled three total times during July, August, September, and October 2003 see Table 25. Kylene Wilson (MSWCD Watershed Monitoring Technician), Susan Wolfe (MSWCD Intern), Dick Sorg (MSWCD DPA), and Ryan Fink (MSWCD Wildlife Specialist) completed the three water-sampling runs. The Ohio EPA using standard methods analyzed the water samples chemical integrity. The samples were tested for the following parameters: conductivity, pH, nitrites, nitrates, ammonia, fecal coliform, total phosphorus, total suspended solids, temperature, and dissolved oxygen.

2004 Sampling Runs

The sampling sites were sampled four total times during June, July, August, and September 2004 see Table 25. Kylene Wilson (MSWCD Watershed Monitoring Technician), Susan Wolfe (MSWCD Volunteer), Heidi Suhoski (MSWCD Intern), and Linda Atkinson (MSWCD Education Specialist) completed the four water-sampling runs. The Ohio EPA using standard methods analyzed the water samples chemical integrity. The samples were tested for the following parameters: conductivity, pH, nitrites, nitrates, ammonia, fecal coliform, E.coli, total phosphorus, total suspended solids, temperature, and dissolved oxygen.

2003 Water Sampling	
Event	**Date**
Sampling Run 1	July 21,22,&23
Sampling Run 2	August 35, 26, 27
Sampling Run 3	September 29, 30, and October 1
2004 Water Sampling	
Event	**Date**
Sampling Run 1	June 28,29,& 30
Sampling Run 2	July 26,27,&28
Sampling Run 3	August 30,31,& September 1
Sampling Run 4 (Fecal/Ecoli)	September 20 & 21

Table 25 – Water Sampling Schedule

Flows

USGS hydrological gage station measured the flow rate at site # 25. The other 22 sites out of 26 were measured by field equipment. Eighteen feet of stream was measured and marked off, the average of three cross sectional measurement and depth measurements were taken of the eighteen-foot section. Calculations were performed with these measurements to obtain the cubic feet per sec result. The streams flow rates are exhibited in Appendix 11.The gradients of the streams are represented in Appendix 12.

Salt Creek Watershed Numerical Water Quality Targets

The Salt Watershed numerical water quality targets are set from the Ohio EPA guidelines for Aquatic Use (fishable) and Primary Contact (swimable) Streams in Ohio (Reference Table 11). The water quality targets are based off of The Ohio State University studies and Ohio EPA regulations, which are listed below in Table 26.

Parameters and Targets of Water Quality Data

Temperature

The water temperature target for streams inhabiting aquatic species is 8.3-29.4 degrees Celsius. This temperature is dependent on the time of the year. The colder the water temperature the more dissolved oxygen the water contains. Temperatures above the target ranges has less dissolved oxygen and is unable to support aquatic species.

pH

The pH target for streams inhabiting aquatic species is 6.5-9.0 siu. The pH of water is the measure of hydrogen ions. The scale for pH ranges from 0 to 14. The numbers closer to 0 are more acidic and numbers closer to 14 are more basic or alkaline. Numbers ranging at 7 are neutral. All of the Salt Creek Watershed data meets the requirements for the pH target.

Dissolved Oxygen

For aquatic life to survive in the streams dissolved oxygen needs to be present. The dissolved oxygen target for aquatic streams is >5.0 mg/L. Dissolved oxygen is the amount of oxygen gas dissolved in water. Table 26 identifies the sample site that did not meet the dissolved oxygen target.

Total Phosphorus

The total phosphorus target for aquatic streams is <0.10 mg/L. The total phosphorus is the measure of the amount of phosphorus in solution and in particulate form. See Table 26 for the sample sites that did not meet the target for total phosphorus.

Fecal Coliform

The fecal coliform target limit for aquatic streams is 1000 cpu/100ml for primary contact and 5000 cpu/100ml for agricultural use. Fecal coliform is the amount of human or animal fecal that is in the water. Fecal coliforms are highly pathogenic and could harmfully affect humans or animals if consumed. Table 26 identifies the Salt Creek Watershed sample sites that were over the target amount of fecal coliform.

E. Coli

The E.coli target limit for aquatic streams is 576 per 100ml (animal use) and 126 per 100 ml or 298 per 100 ml. (human use). E. coli (Escherichia coli) is a type of fecal coliform bacteria commonly found in the intestines of animals and humans. The presence of E. coli in water is a strong indication of recent sewage or animal waste contamination. During rainfalls, snow melt, or other types of precipitation, E. coli may be washed into creeks, rivers, streams, lakes, or groundwater. Table 26 identifies the Salt Creek Watershed sample sites that were over the target amount. www.home-water-purifiers-and-filters.com

Total Nitrite-Nitrate

Nitrite-Nitrate target limit for aquatic streams is < 0.10 mg/L. Nitrates that later combine Total with phosphorus can promote algae growth within streams. Nitrogen compounds entering streams are the result of livestock manure or feeding area runoff, fertilizers on yards or agricultural fields, sewage, and legumes. Nitrates/ Nitrites being very water-soluble have high potential in contaminating ground water. Excessive amounts in streams could cause harmful health effects to humans or animals if ingested. The excessive amounts can cause algal and macrophyte production. See Table 26 for the Salt Creek Watershed sampling sites that did not meet the target for aquatic streams.

Total Suspended Solids

Total Suspended Solids (TSS) target limit for aquatic streams is <60 mg/L. The amount of sediment load a stream carries is the total suspended solids. Sunlight is absorbed by the sediment, which allows the water to heat up and then causes a decrease in the dissolved oxygen in the water. The building of sediment in the streambed destroys habitats for aquatic organisms by smothering eggs and new larvae. Point sources-industries or wastewater treatment plants, and non-point sources- erosion, agricultural and construction sites, can cause TSS. Listed in Table 26 are the sites that did not meet the target limit for aquatic streams.

Ammonia

Ammonia target limits for aquatic streams is 1.1-13.0 mg/L. Ammonia is the result of decaying vegetable and animal matter. The ammonia concentration is dependent on the pH and the temperature of the stream. Ammonia that is over the target limit can cause severe health effects to animal or humans if consumed. See ammonia target limit in Table-26

Qualitative Habitat Evaluation Index (QHEI)

QHEI is the evaluation of the habitat assessment. The *QHEI* target limit for aquatic streams is above 60 and the scale ranging from 0-100.Results are located in Appendix 5.

Index of Biological Integrity (IBI)

IBI is the 0-60 score given for the result of a fish assessment. This fish assessment measures the species diversity and population. The *IBI* target limit of aquatic streams is _>44 with a variance of 4. The closer the score is to 60 the healthier water quality the stream obtains. Results are located in Appendix 8.

Modified Index of Well Being

Miwb target limit for aquatic streams is > 8.4. *Miwb* uses fish mass and rules out 13 fish species that are tolerant of pollution in the *Miwb* final analysis. High IBI shows diversity and, low *Miwb* could indicate there is a problem within the stream. Results are located within Appendix 8.

~Parameter	Aquatic Use	Ag Use	Primary Contact	Out of Range Site #
pH	*6.5-9.0	NONE	NONE	NONE
Temperature	*8.3-29.4 C	NONE	NONE	NONE
Conductivity	*<2400micrmhos/cm @25 C	NONE	NONE	NONE
Dissolved Oxygen	*> 5.0 mg/l	NONE	NONE	NONE
Total Phosphorus	**<0.10 mg/l	NONE	NONE	#21, #23, #24, #25, #26, #27, #30
Total Nitrate-Nitrite	**<1.0 mg/l	* 100 mg/l	NONE	#1, #2, #3, #4, #5, #18, #22, #23, #24, #25, #26, #27
TKN	**<0.10 mg/l	NONE	NONE	#1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #13, #15, #16. #17 #18, #19, #20, #21, #23, #24, #25, #26, #27, #28, #30, #31
Total Suspended Solids	**<60.0 mg/l	NONE	NONE	NONE
E.coli	NONE	****576 per 100ml	* 126per 100 ml / 298per 100 ml	#1, #2, #4, #5, #6, #7, #9, #10, #11, #13, #14, #15, #16. #17 #18, #19, #20 #22, #23, #24, #25, #26, #27, #28, #29, #30, #31
Fecal	NONE	**** 5,000 cpu/100ml	* 1000 cpu/100ml	#1, #2, #4, #5, #7, #11, #13, #15, #16. #17 #18, #20 #22, #23, #24, #25, #27, #28, #29, #30, #31
Ammonia (NH3)	*1.1-13.0 mg/l	NONE	NONE	NONE
QHEI	***>60	NONE	NONE	NONE
Miwb	***>8.4	NONE	NONE	NONE
IBI	***>44	NONE	NONE	NONE

~	Parameter explanations in previous text
*	Target set from the Ohio EPA Rule 3745-1-07 of the Ohio Revised Code
**	Target set from reference to The OEPA Study *(Association between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers and Streams, 2003*
***	Target set from reference in an OEPA Study (The use of Biocrteria in Assessment of Non-Point Source & Habitat Impacts in Warmwater Streams, Rankin, 1991
****	Target set from OSU Extension Paper, Dr. Stephen Boyles

Table 26-Numerical Targets for Water Quality Data

Locations Referenced- Use Designations/Use Attainment

The use designations/ use attainment status was determined by analyzing the chemical, physical, and biological data that was collected at each site. The sites out of the attainment are displayed on Table 26. The miles of non attainment and attainment sites are represented in Appendix 17. The non attainment and attainment stream miles was calculated by measuring above sites out of attainment. The GIS map measurer was used to determine the distance.

Point Source Pollution

Point source pollution is a discharge with a definite source that flows into a body of water. Point source outlets can be pipes, ditch, tunnels, channels or some other identifiable source. Point sources pollution is any discharges of pollutant that could harm aquatic streams.

National Pollutant Discharge Elimination System (NPDES)

In 1972 the Clean Water Act adopted the NPDES permit program. This program has been a key program in healthier water quality. The NPDES permit program issues permits for the following: waste, water, toxics, air, and land. Industrial, municipalities, and other facilities require a NPDES permit.

Permitted NPDES Permits

In the Salt Creek Watershed there is only one facility that is has a NPDES to discharge water. (Table 34,35,36)

Subwatershed	NPDES Permits (H2O)	# Open Trash Dumps
050 40004 060 010 Salt Creek headwaters above Little Salt Creek	1	0
050 40004 060 020 Little Salt Creek	0	0
050 40004 060 030 White Eyes Creek	0	0
050 40004 060 040 Buffalo Creek	0	0
050 40004 060 050 Boggs Creek	0	0
050 40004 060 060 Manns Fork Salt Creek	0	0
050 40004 060 070 Salt Creek	0	0

Table 34- Permitted Water Discharges/Open Trash Dumps

OEPA Permitted Facilities				
	Permitted Discharge of Water	Toxic Releases	Hazardous Waste Handlers	Air Release Reported
# Facilities	1	1	12	4

Table 35-2001 OEPA Permitted Discharges of Facilities

Facility Name	Location		Permitted Water Discharges	Toxic Release Reported	Hazardous Waste Handler	Air Release Reported
Darling International 11720 Chandlersville Rd. Chandlersville, OH 43727	Latitude Longitude	39.966667 81.891667			X	
All American Homes 4005 All American Way Zanesville, OH 43701	Latitude Longitude			X	X	
BP Oil 4985 East Pike Zanesville, OH 43701	Latitude Longitude				X	
Browning Ferris Industries of Ohio Inc. 2175 Adamsville Rd. Zanesville, OH 43701	Latitude Longitude	39.979495 81.94107			X	
Federal Aviation Administration 850 Airport Rd. Zanesville, OH 43701	Latitude Longitude	39.95649 89.993293			X	
Federal Express Corporation 850 Airport Rd. Zanesville, OH 43701	Latitude Longitude	39.948413 81.892122			X	
Halliburton Industry US Route 40 Zanesville, OH 43701	Latitude Longitude					X
Halliburton Services 9350 East Pike Zanesville, OH 43701	Latitude Longitude	39.949597 81.892097			X	
Luburgh 4124 East Pike Zanesville, OH 43701	Latitude Longitude				X	
New Bakery of Ohio 750 Airport Rd. Zanesville, OH	Latitude Longitude	39.949591 81.892097				X
New Bakery of Ohio 3005 Eastpointe Dr. Zanesville, OH 43701	Latitude Longitude					X
Ohio Department of Transportation 3399 East Pike Zanesville, OH 43701	Latitude Longitude	39.95522 81.933711			X	
Sands Mining Corp INTIV of Rt. 93+ 4540	Latitude Longitude	39.95649 81.993293				X
65220 Air National Guard Base 4995 Old Wheeling Rd. Zanesville, OH 43701	Latitude Longitude	39.947228 81.899328			X	
General Electric Co. 35 Rix Mills Rd. New Concord OH, 43762	Latitude Longitude				X	
ODOT Rest Area I-70 Norwich, OH 43767	Latitude Longitude	39.957389 83.043177	X			

Table 36- Permitted Facilities

Spills and Illicit Discharges

Illicit are illegal dumping or illegal connections to storm water drainage systems by industries, businesses, or commercial establishments that are not entirely storm water runoff. Spills are defined as any spillage or release of hazardous substances. There was no reported spills or illicit discharges for the Salt Creek Watershed area.(Southeastern Ohio Joint Solid Waste District)

Open Trash Dumps

Open trash dumpsites are those site used to dump trash on that are not permitted. There are no reported open trash dumpsites within the Salt Creek Watershed boundaries (Southeastern Ohio Joint Solid Waste Management District).

Lake Quality

There are a total of six lakes in the Salt Creek Watershed (Table 33). Currently there is no past or past water quality on these six lakes.

# of Lakes	Township	Name
1	Blue Rock	Blue Rock State Park
4	Washington	Luburgh
1	Wayne	Fuller

Table 33- Lakes

Wetlands Quality

There are 0.29% of non-forested wetlands in the Salt Creek Watershed. There is no data determining the water quality in these wetlands.

Groundwater Quality

Throughout the watershed there is groundwater used for drinking sources by the residents and livestock. There is no past or current water quality for the groundwater sources.

Non Point Sources

Non-point source pollution is a pollution that comes from an indirect outlet. This outlet is not required to have a NPDES permit. Most sources of non -point sources can be control by humans. Runoff (agriculture, urban, industrial), soil erosion (construction sites, agriculture), failing septic systems, illegal dumps, and directly pouring contaminants into storm drains are the main sources for non-point source pollution.

Failing Home Sewage Treatment Systems

Failing home septic treatment systems are considered to be a non-point source contributor for water quality problems. Failing home septic treatment systems release untreated human waste into our water resources. From the lack of public sewage treatment systems and the education of non-point sources throughout the watershed failing home sewage septic systems is a major pollutant. Table-28 shows the number of reported and non-reported home sewage septic treatment systems within the Salt Creek Watershed. The reported number of septic systems is from 2003 records of the Muskingum County Health Department. This does not include the number of building with failing Home sewage treatment systems. The number of building

information was obtained from the Muskingum County Auditor. Also the average persons/ buildings are from the 2000 census. The comparison of unreported versus reported sewage treatment systems is shown in Table 29.

Watershed Population	Buildings Salt Creek Watershed	Reported Septic Systems	Persons/Buildings
9600	4485	2697	2.53

Table 28- 2003 Reported Sewage Septic Systems Statistics.

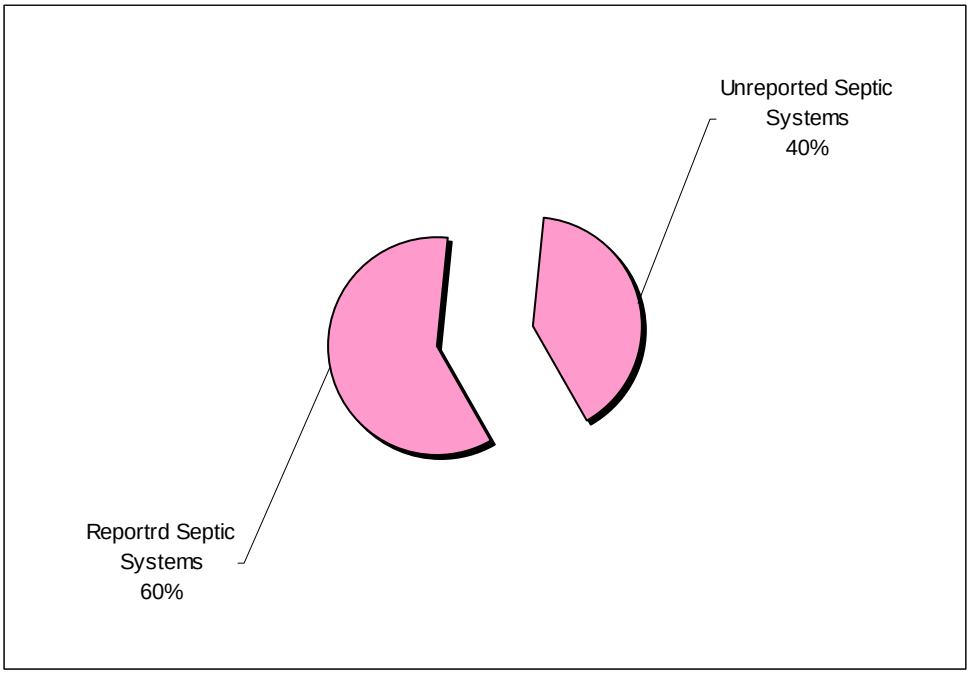

Table 29- Percentage of Unreported/ Reported Sewage Septic Systems

The increasing concern for failing home septic treatment systems has created an adverse affect on the water quality in some parts of the Salt Creek Watershed. The installation of septic systems in absorption fields is a critical area in the system for it to function correctly. Landowners and developers must research the site before installing the septic system for the soil type and flooding rates. Also they need to contact the Muskingum County Health Department prior to installation of the septic system. Contacting the Muskingum SWCD and referencing the Muskingum County Soil Survey can obtain the soil information. Table 30 references the Salt Creek Watershed soil limitations for septic tank absorption fields.

Soil Limitations for Septic Tank Absorption Fields			
Name	Symbol	Slope	Septic Tank Absorption Fields
Alford	AfB	2-8%	Slight
	AfC2	8-15%	Moderate
Berks	BeB	2-8%	Severe: depth to rock
	BeD2, BeE	15-25% / 25-40%	Severe: depth to rock, slope
Coshocton	CsC2	8-15%	Severe: wetness, percs slowly
	CsD	15-25%	Severe: wetness, percs slowly, slope
	CtE	25-40%	Severe: wetness, percs slowly, slope
Fitchville	FcA, FcB	0-2%/ 2-6%	Severe: wetness, percs slowly
Gilpin	GdB	2-8%	Severe: depth to rock
	GdC2	8-15%	Severe: depth to rock, slope
	GeD2, GeE2	15-25% / 25-40%	Severe: depth to rock, slope
Glenford	GfA, GfB	0-2%/ 2-6%	Severe: wetness, percs slowly
	GfC2	6-15%	Severe: wetness, percs slowly
Guernsey	GtC2	6-15%	Severe: wetness, percs slowly
	GtD2	15-25%	Severe: wetness, percs slowly
Lowell	LpC2	8-15%	Severe: wetness, percs slowly
	LpD2	15-25%	Severe: wetness, percs slowly, slope
	LrE2, LrF	25-40% / 40-70%	Severe: wetness, percs slowly
Newark	Ne	0-2%	Severe: flooding, wetness
Rigley	RfC	8-15%	Moderate: slope, poor filter
	RgD	15-25%	Severe: slope, poor filter
	RhE	25-40%	Severe: slope, poor filter
Wellston	WhB	0-2%	Moderate: thin layer, seepage
	WhC2	2-8%	Moderate: thin layer, seepage, slope
Westmoreland	WtC2	8-15%	Moderate slope, depth to rock, percs slowly
	WtD2, WtE	15-25% / 25-40%	Severe slope
	WuC2	8-15%	Moderate slope, depth to rock, percs slowly
Zanesville	ZnC2	6-15%	Severe: wetness, percs slowly

Table 30-Soil limitations

Effluent

The effluent of the home septic systems is described in Table 27. The 400 gallons per dwelling per day was an Ohio EPA estimated sewage flow per day in the ***Sewage: Collection, Treatment and Disposal – Where Public Sewers Are Not Available*** document. The number of buildings in each subwatershed was from the Muskingum County Auditor records. The reported septic systems statistics are from the 2003 Muskingum County Health Department records. The reported home sewage treatment systems do not include the failing systems that have failed after the initial reporting.

Subdivided by Subwatersheds	# Buildings	Reported Septic Systems	Unreported Septic Systems	Total gallons per Year	Estimated Reported Septic Systems gallons per day (400 gal. per dwelling per day)	Estimated Reported Septic Systems gallons per year(400 gal. per dwelling per day)	Estimated Unreported Septic Systems gallons per day(400 gal. Per dwelling per day)	Estimated Unreported Septic Systems gallons per year (400 gal. per dwelling per day)	Estimated Total Reported/ Unreported (400 gallons per dwelling per day)	Estimated Total gallons per Year (400 gallons per dwelling per day)
050 40004 060 010	761.0	525.0	236.0	111,106,000.0	210,000.0	76,650,000.0	94,400.0	34,456,000.0	304,400.0	111,106,000.0
050 40004 060 020	1322.0	514.0	808.0	193,012,000.0	205,600.0	75,044,000.0	323,200.0	117,968,000.0	528,800.0	193,012,000.0
050 40004 060 030	838.0	342.0	496.0	122,348,000.0	136,800.0	49,932,000.0	198,400.0	72,416,000.0	335,200.0	122,348,000.0
050 40004 060 040	304.0	114.0	190.0	44,384,000.0	45,600.0	16,644,000.0	76,000.0	27,740,000.0	121,600.0	44,384,000.0
050 40004 060 050	1009.0	934.0	75.0	147,314,000.0	373,600.0	136,364,000.0	30,000.0	10,950,000.0	403,600.0	147,314,000.0
050 40004 060 060	185.0	190.0	-5.0	27,010,000.0	76,000.0	27,740,000.0	-2,000.0	-730,000.0	74,000.0	27,010,000.0
050 40004 060 070	68.0	79.0	-11.0	9,928,000.0	31,600.0	11,534,000.0	-4,400.0	-1,606,000.0	27,200.0	9,928,000.0
Total	4487.0	2697.0	1790.0	655,102,000.0	1,079,200.0	393,908,000.0	715,600.0	261,194,000.0	1,794,800.0	655,102,000.0

Table 27- Effluent of Sewage Septic Systems

Number of Bridge/ Road Replacement, Resurfaced and Repairs

The Muskingum County Engineers provided the number of bridge/ road replacements and repairs in the Salt Creek Watershed during 2003. Construction along streams is potential for non point source pollution. Replacement, resurfacing and repairs on roads and bridges contributes to non-point sources pollution it also disrupts physical attributes of the streams natural setting. Table 31 shows the miles of road resurfaced and number of bridges repaired/ replaced.

Subwatershed	Miles Resurfaced	#Bridges Repair/ Replacement
050 40004 060 010 ***Salt Creek headwaters above Little Salt Creek***	1.1	2
050 40004 060 020 ***Little Salt Creek***	~~0~~	~~0~~
050 40004 060 030 ***White Eyes Creek***	~~0~~	~~0~~
050 40004 060 040 ***Buffalo Creek***	~~0~~	~~0~~
050 40004 060 050 ***Boggs Creek***	4.7	1
050 40004 060 060 ***Mann's Fork Salt Creek***	~~0~~	~~0~~
050 40004 060 070 ***Salt Creek***	1.06	~~0~~
Total Miles	**6.86**	**3**

Table 30- 2003 Bridge/ Road Replacement/Resurfaced/ Repairs

Number of Homes Being Built

Due to Muskingum County regulations there is no process in tracking new homes being built. Paul Holdsworth, MSWCD Urban Technician noted that there were 11 housing developments that were built during 2001-2004 from completing subdivision reviews. The subdivision reviews only include sites that had onsite leaching. (Table 39)

Year	# of Sub'd Reviews	# of Lots
2000	0	0
2001	1	12
2002	4	85
2003	3	82
2004	3	30

Table 39-Subdivision Review

Number and Size of Confined Livestock Operations

We base the confine livestock operations data off of the policy that if the livestock has been contained in one area for 45 consecutive days, it is considered confined livestock. No official data was available for the number of confined and non-confined operations in the Salt Creek Watershed so therefore these numbers are estimated. The Muskingum SWCD gathered the amount of confined and non-confined operations by locating current and past landowner's conservation practices and a drive around the Salt Creek Watershed. Table 31 describes the confined versus non-confined livestock areas within the Salt Creek Watershed. Confined livestock have the potential to cause non-point source pollution in streams when identifying the

confined livestock operations that may be contributing non point source pollution the operation herd size, location to the stream, and in-place conservation measures are taken into consideration. Confined livestock non-point source pollution is from run off of manure and sediment from feedlots or failed manure storage. The load reductions from the confined livestock operations were calculated by using the Ohio v.1.2 Region 5.STEPL2.2 load reduction model and displayed in Appendix 20.

Non Confined Livestock Operations

Non-confined livestock operations were calculated by using the policy of any animal not contained in a concentrated area for 45 consecutive days. No official data was available for the number of non-confined livestock in the Salt Creek Watershed so therefore these numbers are an educated estimate (Table 31). Non-confined livestock have the potential to cause non-point source pollution in the streams. The unrestricted livestock access to streams and herd size is taken into consideration when identifying non point source pollution due to livestock operations. Due to non-confined livestock having unrestricted access to streams, runoff from eroding stream banks or manure could cause pollution.

Operations	#	%
Total	114	100.00%
Confined	49	42.98%
Non Confined	65	57.02%

Table 31 Livestock Operations

Acres of Highly Erodible Land and potential soil loss

The Salt Creek Watershed contains all Highly Erodible Land (HEL). Referencing the soil type and HEL rating from the Natural Resource Conservation Service this conclusion was drawn. Appendix-14 list the soil types, Prime versus Important farmland rating, and percent/ acres of land. Prime farmland references land that is: efficiently supplied with water through precipitation/ irrigation, adequate growing season, temperature, no excessive erosion, and not saturated with water for long timeframes. Important farmland refers to farmland that does not contain the physical and chemical composition to exceed in production of food, feed, or crops. Important farmland can be acceptable to cropland, farmland, rangeland, and forestland except urbanization referencing NRCS Muskingum County data.

Is the stream culverted?

Culverts are used throughout all the roads in the Salt Creek Watershed to direct flow of tributaries. Culverts allow tributaries to flow across roads without vehicles degrading the stream banks. Installing culvert disturbs the aquatic habitat and natural state of the stream. After the culvert is established the stream is able to recover and return back into its natural state over a period of time.

Channelization

There is insufficient amount of channelization in the Salt Creek Watershed.

Levied Streams

None of the streams in the Salt Creek Watershed are levied.

Dammed (Impounded Stream Miles)

Dams in the Salt Creek Watershed are shown in Table 18. These dams have not shown any impounding to the streams in the Salt Creek Watershed. The impounded stream miles are insufficient at this time.

Low Head Dams

There are no low head dams in the Salt Creek Watershed.

Petition Ditches

Petition ditches are insufficient to the Salt Creek Watershed tributaries.

Riparian Buffers

The amount of riparian buffers can be found in Appendix 18.

Human Impact

Failing septic systems, livestock, and not enough riparian buffers are some of the human impact on the tributaries. These results can be explained by the physical, chemical, and biological data collected from the sampling locations throughout the Salt Creek Watershed.

Effluent

The effluent of the home septic systems is described in Table 27. The 400 gallons per dwelling per day was an Ohio EPA estimated sewage flow per day in the *Sewage: Collection, Treatment and Disposal – Where Public Sewers Are Not Available* document. The number of buildings in each subwatershed was from the Muskingum County Auditor records. The reported septic systems statistics are from the 2003 Muskingum County Health Department records. The reported home sewage treatment systems do not include the failing systems that have failed after the initial reporting.

Former Studies

The OEPA has conducted fish electro-shocking and QHEI on the Salt Creek Watershed. This data is the only other data collected in former studies (See Appendix8). The data collected during this survey met all OEPA standards.

Future Water Quality Monitoring

The Muskingum SWCD believes that continuous monitoring of the streams crucial to identify the impairments. The lack of water quality data in the Salt Creek Watershed prohibits the identification of non point and point source pollutants. Therefore when assembling the watershed management plan to provide continuous water quality monitoring in the Salt Creek Watershed. Our plan will implement this water quality monitoring by the following:

- **Implement a multi-faceted water quality monitoring program. By keeping the existing sampling locations and identifying more locations. This will provide a baseline database system of chemical, physical, and biological data.**
    - **A Quality Assurance Project Plan (QAPP) will be written for the water quality monitoring.** The QAPP will measure the quality assurance and quality

control over the water sampling and produce data of known quality and credibility.

- **Collection of samples to sent away for analysis.** The samples will be tested for Ammonia (NO3-NH3), Nitrate/Nitrites (NO3-NH3), Total Phosphorus (TKN-TP), E.coli, Fecal Coliform, Total Suspended Solids, and pH

- **All samplers and volunteers will be trained annually prior to participating in sample gathering.**

- **Water testing equipment will be used to determine the flow and check the accuracy of the lab results.** Purchasing a flow meter will allow us to measure the velocity and depth of the water. This information will be used to calculate the nutrient loading. The equipment we already own will be used to measure the pH, conductivity, D.O., and temperature.

The continuous water quality monitoring will track that the load reductions are being achieved throughout each subwatershed. With this continuous water quality monitoring we will be able to determine if the streams are improving from nonattainment to partial attainment, and then full attainment. Through this tracking of water quality we can determine if the watershed management plan needs to be modified.

Status and Trends

Currently the Salt Creek Watershed land area consists of mainly four uses: agricultural, wooded areas, and increasing urban land, and commercial. Historically the watershed consisted of agricultural and wooded areas. The topography of the area includes gently rolling hills and steep valleys. Agriculture in the area includes mainly beef cattle, sheep and hog operations. Beef cattle herds include an average of 50 head. The main crop is corn, which is conventionally planted.

The beautiful agricultural farms are increasingly being divided into housing developments. Urbanization is taking place along main highways and public water lines. Future trends include more urbanization and commercializing. This will reduce the amount of agricultural farmland.

Commercial development is increasing along the I-70 and State Route 40 corridor. This development has increased the number of NPDES permits in the watershed boundaries. Trends will continue to increase in the future.

The failing and non-existing home sewage treatment systems are a non point source pollutant that continues to contribute pollutants to the Salt Creek Watershed. This is an ongoing problem that will continue to grow in size if education and resources are not there to fix the issue.

References

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- Core of Engineers Huntington District
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- http://www.osuedc.org/profiles/profile_entrance.php?fips=39119
- http://www.osuedc.org/profiles/business_stats/business_stats.php?&fips=39119&
- OEPA Sewage: Collection, Treatment and Disposal – Where Public Sewers Are Not Available document.
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Appendix 1
Hydrological Unit Code with Dimensions

HUC	Description	Acres	Square Miles
050 40004 060 010	Salt Creek headwaters above Little Salt Creek	28,023.32	43.79
050 40004 060 020	Little Salt Creek	7,456.23	11.65
050 40004 060 030	White Eyes Creek	8,598.24	13.43
050 40004 060 040	Buffalo Fork	18,274.59	28.55
050 40004 060 050	Boggs Creek	10,333.41	16.15
050 40004 060 060	Mann's Fork Salt Creek	13,567.37	21.20
050 40004 060 070	Salt Creek	6,746.90	10.54
	Totals	93,000.05	145.31

Appendix 2

Subwatershed Stream Statistics

Subwatershed	Drainage sq. miles	Subwatershed Stream Names	Average cfs	Length (miles)	Average Gradient (ft/miles)
050 40004 060 010	43.79	Frog Run	2.39	5.5	27.4
Salt Creek headwaters above Little Salt Creek		Georges Run	n/a	3.7	30.00
		Prairie Fork	4.3	4.3	39.10
		Salt Creek	14.25	13.0	62.84
		Total		26.5	n/a
050 40004 060 020	11.65	Little Salt Creek	7.32	7.5	16.10
Little Salt Creek		**Total**		7.5	n/a
050 40004 060 030	13.43	White Eyes Creek	5.70	6.7	26.20
White Eyes Creek		Pleasant Run	n/a	1.9	47.90
		Total		8.6	n/a
050 40004 060 040	28.55	Buffalo Fork	9.11	9.5	21.2
Buffalo Fork		Williams Fork	1.53	4.7	38.5
		Lapage Run	n/a	0.9	35.5
		Total		15.1	n/a
050 40004 060 050	16.15	Boggs Creek	9.17	7.6	36.00
Boggs Creek		Indian Run	n/a	3.8	32.10
		Total		11.4	n/a
050 40004 060 060	21.20	Mann's Fork	2.84	7.5	28.50
Mann's Fork Salt Creek		Kent Run	0.46	5.9	47.30
		Total		13.4	n/a
050 40004 060 070	10.54	Salt Creek	14.25	14.1	68.16
Salt Creek		**Total**		14.1	n/a

Appendix 3 *continued*
Salt Creek Watershed Project Sampling Sites

HUC	Site #	Soret ID	Location	River Mile	Longitude	Latitude	Drainage sq. miles	Gradient ft. / mile
050 40004 060 010	1	R16G01	*Salt Ck. @ Knipe Rd.*	23.43	W81 52' 00.2 "	N 40 01'55.5"	43.79	28.34
Salt Creek Headwaters above Little Salt Creek	2	R16G02	*Salt Ck. @ Arch Hill Rd. C.B.*	15.52	W 81 50' 23.8"	N 39 59' 57.0"		19.47
	3	R16G03	*Salt Ck. @ Rt. 40 east of Bridgeville*	12.91	W81 50' 49.9"	N 39 58'25.0"		69.06
	4	R16G04	*Frog Run @ Arch Hill Rd.*	12.92/0.36	W81 51' 07.4"	N 39 55' 56.3"		16.13
	5	R16G05	*Salt Ck. @ Clay Pike Rd. 500-600' west of jct w/Spry Rd*	7.96	W81 51' 50.0"	N 39 55' 56.3"		10.60
	27	R16G91	*Salt Ck. @ Bethel Rd.*	n/a	W81 49' 41.3"	N40 01' 37.7"		127.14
050 40004 060 020	6	R16S02	*Little Salt Creek @ Clay Pike Rd.*	7.46/ 0.11	W81 52' 19.0"	N39 55'54.8"	11.65	9.27
Little Salt Creek	7	R16S16	*Little Salt Ck. @ Jackson Rd.*	7.46/ 6.38	W81 55' 25.5"	N39 59' 29.0"		25.56
	8	R16G17	*Boggs Ck. @ SR 146 just west of jct. w/Three Towers Rd.*	7.46/ 7.44	W81 56' 09.1"	N39 59' 29.0"		16.75
	26	R16G24	*Unnamed Trib. @ Park Lane Rd.*	n/a	W81 52' 26.2	N39 56' 59.8"		33.74

Appendix 3 *continued*
Salt Creek Watershed Project Sampling Sites

HUC	Site #	Soret ID	Location	River Mile	Longitude	Latitude	Drainage sq. miles	Gradient ft. / mile
050 40004 060 030	9	R16G07	*White Eyes Ck. @ Wolf Run Rd.*	6.45/ 0.39	W81 51'42.1"	N39 55' 21.9	13.43	8.21
White Eyes	10	R16G08	*White Eyes Ck. @ Okey Rd. upst. Pleasant Run*	61.45/ 1.67	W81 50'25.6"	N39 55' 31.1"		22.94
	11	R16G09	*White Eyes Ck. @ Zane Grey Rd. upst. Unnamed trib*	6.45/ 3.24	W81 49' 0.29"	N39 55' 48.0"		13.00
	12	R16G10	*White Eyes @ Southern Rd.*	6.45/ 4.96	W81 49' 03.3"	N39 55' 46.6"		28.83
050 40004 060 040	13	R16G11	*Buffalo Fk. @ Tumblin (Okey Rd.)*	4.45/ 2.14	W81 50' 20.2"	N39 54' 10.4"	28.55	7.55
Buffalo Fork	14	R16G12	*Buffalo @ South Leedom Rd.*	4.45/ 6.55	W81 47' 05.8"	N39 53'03.1"		39.02
	15	R16G13	*Williams Fk. @ Green Valley Rd.*	4.45/3.15/ 3.37	W81 46' 30.9"	N39 54' 57.1		7.01
	19	R16G14	*Buffalo Fk. @ SR 146 just west of jct. w/ Pryor Rd.*	4.45/4.17	W81 48' 54.1"	N39 53' 48.0"		13.97
	28	R16G92	*Buffalo Fk.@ High Freeland Rd.*	n/a	W81 46' 39.5"	N39 52' 46.7"		37.81
	29	R16G93	*Buffalo Fk. @ Green Valley Rd.*	n/a	W81 49' 17.9"	N39 53' 59.1"		25.75

Appendix 3 *continued*
Salt Creek Watershed Project Sampling Sites

HUC	Site #	Soret ID	Location	River Mile	Longitude	Latitude	Drainage sq. miles	Gradient ft. / mile
050 40004 060 050	16	R16G17	*Boggs Ck. @ SR 146 jst. wst. Of jct. W/ Three Towers*	2.55/4.04	W81 54' 16.7"	N39 55' 07.6	16.15	9.39
Boggs Creek	17	R16G15	*Boggs Ck. @ Salt Ck. Dr. just west of jct. w/Wilhelm Rd.*	2.55/0.93	W81 53' 07.8"	N39 53' 29.5"		17.73
	18	R16G16	*Boggs Ck. Near Mast Rd. just dst Indian Run*	2.55/2.09	W81 53' 52.6"	N39 53' 44.2"		29.58
	30	R16G94	*Boggs Ck. @ Miller Lane*	n/a	W81 55' 02.3"	N 39 55' 36.1		11.81
050 40004 060 060	20	R16G18	*Kent Run @ Browning Rd.*	2.10/2.53/1.17	W81 50' 44.9"	N39 51' 40.2"	21.20	27.70
Mann's Fork Salt Creek	21	R16G19	*Manns Fork Salt Ck. @ Cutler Lake Rd.*	2.10/3.70	W81 51' 49.5"	N39 52' 08.8"		50.05
	22	R16G20	*Manns Fork @ Mock Dr.*	2.10/2.31	W81 51' 49.5"	N39 52' 08.8"		16.03
	31	R16G95	*Sugar Grove Run@ Wion Ridge Rd.*	n/a	W81 49' 12.6"	N39 50' 15.6"		81.72
050 40004 060 070	23	R16G93	*Salt Ck. @ Burnt Mill Rd.*	3.45	W81 52' 28.4"	N39 53' 13.0"	10.54	8.61
Salt Creek	24	R16G22	*Salt Ck. @ St. Rt. 60 along Cutler Lake Rd.*	0.05	W81 51' 59.3	N39 50" 34.4"		32.16
	25	R16G23	Salt Ck. SR 146 jst. wst. w/ Wolf Run Rd.	n/a	W81 52' 26.2"	N39 56' 59.8"		11.24

Appendix 4
Land Use / Land Cover Salt Creek Watershed

050 40004 060 010

Salt Creek headwaters above Little Salt Creek

Land Use	
Total Acres	28023.32
% Urban (Open Impervious Surfaces)	0.29
% Agriculture/ Open Urban Areas (Non-Impervious)	55.21
% Shrub/ Scrub	1.14
% Wooded	43.13
% Open Water	0.02
% Non-Forested Wetlands	0.17
% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.05
Total % of the Watershed	30.1326

050 40004 060 020

Little Salt Creek

Land Use	
Total Acres	7456.23
% Urban (Open Impervious Surfaces)	0.92
% Agriculture/ Open Urban Areas (Non-Impervious)	59.56
% Shrub/ Scrub	0.84
% Wooded	37.82
% Open Water	0.27
% Non-Forested Wetlands	0.17
% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.10
Total % of the Watershed	8.02

050 40004 060 030

White Eyes Creek

Land Use	
Total Acres	8598.24
% Urban (Open Impervious Surfaces)	0.46
% Agriculture/ Open Urban Areas (Non-Impervious)	49.10
% Shrub/ Scrub	1.34
% Wooded	48.75
% Open Water	0.03
% Non-Forested Wetlands	0.24
% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.07
Total % of the Watershed	9.25

050 40004 060 040

Buffalo Fork

Land Use	
Total Acres	18274.59
% Urban (Open Impervious Surfaces)	0.06
% Agriculture/ Open Urban Areas (Non-Impervious)	42.21
% Shrub/ Scrub	1.40
% Wooded	56.05
% Open Water	0.02
% Non-Forested Wetlands	0.26
% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.00
Total % of the Watershed	19.65

Appendix 4 *continued*

Land Use / Land Cover Salt Creek Watershed

050 40004 060 050

Boggs Creek

Land Use	
Total Acres	10333.41
% Urban (Open Impervious Surfaces)	0.56
% Agriculture/ Open Urban Areas (Non-Impervious)	54.64
% Shrub/ Scrub	0.96
% Wooded	43.19
% Open Water	0.18
% Non-Forested Wetlands	0.46
% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.01
Total % of the Watershed	11.11

050 40004 060 060

Mann's Fork Salt Creek

Land Use	
Total Acres	13,567.37
% Urban (Open Impervious Surfaces)	0.04
% Agriculture/ Open Urban Areas (Non-Impervious)	34.39
% Shrub/ Scrub	1.33
% Wooded	63.71
% Open Water	0.15
% Non-Forested Wetlands	0.37
% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	-
Total % of the Watershed	14.59

050 40004 060 070

Salt Creek

Land Use	
Total Acres	6,746.90
% Urban (Open Impervious Surfaces)	0.09
% Agriculture/ Open Urban Areas (Non-Impervious)	40.16
% Shrub/ Scrub	1.35
% Wooded	58.08
% Open Water	0.01
% Non-Forested Wetlands	0.30
% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	-
Total % of the Watershed	7.25

Appendix 5
Salt Creek Watershed
Qualitative Habitat Evaluation Index

050 40004 060 010
Salt Creek

Site #	Location	River Mile	Total QHEI Score
1	*Knipe Rd.*	23.43	65.00
2	*Arch Hill Rd. C.B.*	15.52	75.50
3	*Rt. 40 east of Bridgeville*	12.91	79.50
5	*Clay Pike. 500-600' west of jct. Of Spry Rd.*	7.96	90.75
4	*Frog Run @ Arch Hill Rd.*	12.92/ 0.36	79.00

050 40004 060 020
Little Salt Creek

Site #	Location	River Mile	Total QHEI Score
6	*Clay Pike Rd.*	7.46/ 0.11	72.50
7	*Jackson Rd.*	7.46/ 6.38	n/a
8	*Church Hill Rd. Dst. Of unnamed trib*	7.46/ 7.44	n/a
26	*Unnamed Trib @ Park Lane*	?	84.00

050 40004 060 030
White Eyes Creek

Site #	Location	River Mile	Total QHEI Score
9	*Wolf Run Rd.*	6.45/ 0.39	74.50
10	*Okey Rd. upst. Pleasant Run*	6.45/ 1.67	93.00
11	*Zane Grey Rd. upst. Unnamed Trib*	6.45/ 3.24	81.00
12	*Southern Rd.*	6.45/ 4.96	76.50

050 40004 060 040
Buffalo Fork

Site #	Location	River Mile	Total QHEI Score
13	*Tumblin/ Okey Rd.*	4.45/ 2.14	86
14	*South Leedom Rd.*	4.45/ 6.55	80.00
19	*146 east of Pryor Rd.*	4.45/ 4.17	64.00
15	*Williams Fork @Green Valley Rd.*	4.45/ 3.15/ 3.37	80.00

Appendix 5 *continued*
Salt Creek Watershed
Qualitative Habitat Evaluation Index

050 40004 060 050 Boggs Creek			
Site #	**Location**	**River Mile**	**Total QHEI Score**
16	*Three Towers Rd.*	2.55/ 4.04	76.00
17	*Salt Creek Drive/Wilhelm Rd.*	2.55/ 0.93	88.00
18	*Near Mast Rd.*	2.55/ 2.09	79.00

050 40004 060 060 Mann's Fork			
Site #	**Location**	**River Mile**	**Total QHEI Score**
21	*Cutler Lake Rd.*	2.10/ 3.70	76.50
22	*Mock Drive*	2.10/ 2.31	88.00
20	*Kent Run @ Browning Rd.*	2.10/ 2.53/ 1.17	77.50

050 40004 060 070 Salt Creek			
Site #	**Location**	**River Mile**	**Total QHEI Score**
23	*Burnt Mill Rd*	3.45	76.00
24	*Rt. 60 along Cutler Lake Rd.*	0.05	0.00
25	*SR. 146 jst. Wst. Jct. W/ Wolf Run Rd.*	5.6	87.75

~ Sampling Sites 27-31 QHEI were not completed.

Appendix 6
Salt Creek Watershed
Macro Invertebrates

050 40004 060 010
Salt Creek

Site #	Location	River Mile	Total Score
1	*Knipe Rd.*	23.43	11.00
2	*Arch Hill Rd. C.B.*	15.52	12.00
3	*Rt. 40 east of Bridgeville*	12.91	17.00
5	*Clay Pike. 500-600' west of jct. Of Spry Rd.*	7.96	14.00
4	*Frog Run @ Arch Hill Rd.*	12.92/ 0.36	12.00

050 40004 060 020
Little Salt Creek

Site #	Location	River Mile	Total Score
6	*Clay Pike Rd.*	7.46/ 0.11	13.00
7	*Jackson Rd.*	7.46/ 6.38	n/a
8	*Church Hill Rd. Dst. Of unnamed trib*	7.46/ 7.44	n/a
26	*Unnamed Trib @ Park Lane*	?	11.00

050 40004 060 030
White Eyes Creek

Site #	Location	River Mile	Total Score
9	*Wolf Run Rd.*	6.45/ 0.39	9.00
10	*Okey Rd. upst. Pleasant Run*	6.45/ 1.67	12.00
11	*Zane Grey Rd. upst. Unnamed Trib*	6.45/ 3.24	20.00
12	*Southern Rd.*	6.45/ 4.96	14.00

050 40004 060 040
Buffalo Fork

Site #	Location	River Mile	Total Score
13	*Tumblin/ Okey Rd.*	4.45/ 2.14	12
14	*South Leedom Rd.*	4.45/ 6.55	16.00
19	*146 east of Pryor Rd.*	4.45/ 4.17	14.00
15	*Williams Fork @Green Valley Rd.*	4.45/ 3.15/ 3.37	14.00

Appendix 6 *continued*
Salt Creek Watershed
Macro Invertebrates

050 40004 060 050 Boggs Creek			
Site #	**Location**	**River Mile**	**Total Score**
16	*Three Towers Rd.*	2.55/ 4.04	11.00
17	*Salt Creek Drive/Wilhelm Rd.*	2.55/ 0.93	18.00
18	*Near Mast Rd.*	2.55/ 2.09	12.00

050 40004 060 060 Mann's Fork			
Site #	**Location**	**River Mile**	**Total Score**
21	*Cutler Lake Rd.*	2.10/ 3.70	16.00
22	*Mock Drive*	2.10/ 2.31	11.00
20	*Kent Run @ Browning Rd.*	2.10/ 2.53/ 1.17	11.00

050 40004 060 070 Salt Creek			
Site #	**Location**	**River Mile**	**Total Score**
23	*Burnt Mill Rd*	3.45	8.00
24	*Rt. 60 along Cutler Lake Rd.*	0.05	n/a
25	*SR. 146 jst. Wst. Jct. W/ Wolf Run Rd.*	5.6	24.00

~ Sampling Sites 27-31 Macro-invertebrate counts were not completed

Appendix 7

Qualitative Habitat Evaluation Index (QHEI) table for sites in the Salt Creek basin, sampled by the Ohio EPA

Location / Stream		Drain-age	Number of: Total Species	Minnow Species	Headwater Species	Sensitive Species	Darter & Sculpin Species	Simple Lithophilis	Percent of Individuals: Tolerant fishes	Omnivores	Pioneering fishes	Insectivores	DELT anomalies	Rel No. Minus tolerant /(0.3km)	IBI
050 40004 060 070: Salt Creek															
	17-940	13.80	26(5)	9(5)	3(3)	7(5)	7(5)	10(5)	29(5)	15(5)	30(5)	66(5)	0.1(3)	1017(5)	56
Year	1996														
River Mile	23.3														
Type	E														
Date	8/29/2002														
050 40004 060 060: Mann's Fork															
	17-941	19.60	21(5)	9(5)	3(3)	6(3)	4(3)	8(5)	51(3)	29(3)	56(1)	35(3)	0.0(5)	863(5)	44
Year	2002														
River Mile	0.8														
Type	E														
Date	7/15/2002														
050 40004 060 050: Boggs Creek															
	17-943	17.90	22(5)	13(5)	3(3)	5(3)	4(3)	8(5)	57(1)	48(1)	64(1)	32(3)	0.0(5)	967(5)	40
Year	2002														
River Mile	0.9														
Type	E														
Date	7/16/2002														
050 40004 060 040: Buffalo Fork															
	17-945	9.70	20(5)	7(5)	2(3)	5(3)	4(3)	6(5)	26(5)	13(5)	27(5)	41(3)	0.0(5)	2235(5)	54
Year	2002														
River Mile	6.6	16.00	24(5)	8(5)	2(3)	9(5)	6(5)	10(5)	35(3)	29(3)	41(3)	37(3)	0.0(5)	1197(5)	50
Type	E														
Date	8/20/2002														
Year	2002														
River Mile	3.7														
Type	E														
Date	8/8/2002														
050 40004 060 030: White Eyes Creek															
	17-948	12.40	23(5)	7(5)	1(1)	8(5)	7(5)	9(5)	40(3)	27(3)	44(3)	50(5)	0.0(5)	646(3)	48
Year	2002														
River Mile	0.3														
Type	E														
Date	7/23/2002														

Appendix 8

Fish Species Found In Salt Creek Watershed

050 40004 060 010						**Stream:**	**Salt Ck.**			
Basin:	**Muskingum River**					**Location:**				
Drainage Area (sq. mi): 13.8						**River Code/River Mile: 17-940/23.30**				
Distanced Fished: 0.17km						**Time Fished:**	**5700**			
Sampler Type: E						**Date: 1996 08/29/1996**				
Species Name/ ODNR Status	**IBI Grp**	**Feed Guild**	**Breed Guild**	**Tol**	**# of Fish**	**Relative Number**	**% by Number**	**Relative Wght.**	**% by Wght.**	**Ave (gm) Weight.**
Least Brook Lamprey		F	N		7	12.35	0.86			
Longnose Gar										
Gizzard Shad										
Quill Carp sucker										
Silver Redhorse										
Black Redhorse										
Shorthead Redhorse										
Golden Redhorse										
Northern Hog Sucker	R	I	S	M	24	42.35	2.96			
White Sucker	W	O	S	T	34	60.00	4.20			
River DsX Quillback										
Blacknose Dace	N	G	N	T	21	37.06	2.59			
Common Carp										
Creek Chub	N	G	N	T	78	137.65	9.63			
Suckermouth Minnow										
South Red belly Dace										
Emerald Shiner	N	I	S		15	26.47	1.85			
Redfin Shiner										
Silver Shiner										
Rosyface Shiner										
Striped Shiner	N	I	S		94	165.88	11.60			
Spotfin Shiner	N	I	M		1	1.77	0.12			
Sand Shiner	N	I	M	M	72	127.06	8.89			
Mimic Shiner										
Silverjaw Minnow	N	I	M		43	75.88	5.31			
Bluntnose Minnow	N	O	C	T	86	151.77	10.62			
Central Stone roller	N	H	N		38	67.06	4.69			
Channel Catfish										
Yellow Bullhead		I	C	T	2	3.53	0.25			
Bridled Madtom										
Trout Perch		I	M		1	1.77	0.12			
Black Crappie										
Rock Bass	S	C	C		8	14.12	0.99			
Smallmouth Bass	F	C	C	M	4	7.06	0.49			
Spotted Bass										
Warmouth Sunfish										
Largemouth Bass	F	C	C		2	3.53	0.25			
Green Sunfish	S	I	C	T	13	22.94	1.60			
Bluegill Sunfish	S	I	C	P	11	19.41	1.36			
Orangespotted Sunfish										
Longear Sunfish										
Blackside Darter	D	I	S		14	24.71	1.73			
Green SfX Bluegill Sf										
Hybrid X Sunfish										
Logperch										
Eastern Sand Darter										
Johnny Darter	D	I	C		21	37.06	2.59			
Greenside Darter	D	I	S	M	60	105.88	7.41			
Banded Darter	D	I	S	I	68	120.0	8.40			
Varigated Darter	D	I	S	I	1	1.77	0.12			
Rainbow Darter	D	I	S	M	13	22.94	1.6			
Fantail Darter	D	I	C		79	139.41	9.75			
Sauger X Walleye										
Freshwater Drum										
Mile Total					810	1429.43				
Number of Species					26					
Number of Hybrids					0					

Appendix 8 *continued*

Fish Species Found In Salt Creek Watershed

050 40004 060 010						Stream:	Salt Ck.			
Basin:	Muskingum River					Location:	at covered memorial bridge			
Drainage Area (sq. mi):	21					River/River Mile:	17-940/15.40			
Distanced Fished:	0.17km					Time Fished:	5400			
Sampler Type:	E					Date:	2002 08/08/2002			

Species Name/ ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave (gm) Weight.
Least Brook Lamprey										
Longnose Gar										
Gizzard Shad										
Quill Carp sucker										
Silver Redhorse										
Black Redhorse										
Shorthead Redhorse										
Golden Redhorse	R	I	S	M	25	39.47	2.48			
Northern Hog Sucker	R	I	S	M	52	82.11	5.15			
White Sucker	W	O	S	T	41	64.74	4.06			
River DsX Quillback										
Blacknose Dace										
Common Carp	N	G	S	T	2	3.16	0.20			
Creek Chub	N	G	N	T	32	50.53	3.17			
Suckermouth Minnow										
South Red belly Dace	N	H	S		1	1.58	0.10			
Emerald Shiner	N	I	S		2	3.16	0.20			
Redfin Shiner										
Silver Shiner	N	I	S	I	5	7.9	0.50			
Rosyface Shiner	N	I	S	I	38	60	3.77			
Striped Shiner	N	I	S		59	93.16	5.85			
Spotfin Shiner	N	I	M		48	75.79	4.76			
Sand Shiner	N	I	M M		89	140.53	8.82			
Mimic Shiner										
Silverjaw Minnow										
Bluntnose Minnow	N	I	M		15	23.68	1.49			
Central Stone roller	N	O	C	T	144	227.37	14.27			
Channel Catfish	N	H	N		204	322.11	20.22			
Yellow Bullhead										
Bridled Madtom		I	C	T	4	6.32	0.40			
Trout Perch		I	C	I	2	3.16	0.20			
Black Crappie										
Rock Bass	S	C	C		11	17.37	1.09			
Smallmouth Bass	F	C	C	M	10	15.79	0.99			
Spotted Bass										
Warmouth Sunfish										
Largemouth Bass										
Green Sunfish	S	I	C	T	1	1.58	0.10			
Bluegill Sunfish	S	I	C	P	4	6.32	0.4			
Orangespotted Sunfish										
Longear Sunfish										
Blackside Darter	D	I	S		6	9.47	0.59			
Green SfX Bluegill Sf										
Hybrid X Sunfish										
Logperch	D	I	S	M	1	1.58	0.10			
Eastern Sand Darter										
Johnny Darter	D	I	C		19	30	1.88			
Greenside Darter	D	I	S	M	67	105.79	6.64			
Banded Darter	D	I	S	I	25	39.47	2.48			
Variegated Darter										
Rainbow Darter	D	I	S	M	32	50.53	3.17			
Fantail Darter	D	I	C		70	110.53	6.94			
Sauger X Walleye										
Freshwater Drum										
Mile Total					1009	1593.20				
Number of Species					28					
Number of Hybrids					0					

Appendix 8 *continued*

Fish Species Found In Salt Creek Watershed

050 40004 060 030						**Stream:**	**White Eyes Creek**			
Basin:	**Muskingum River**					**Location:**	**dst. Wolf Run Rd.**			
Drainage Area (sq. mi):	**12.4**					**River/River Mile:**	**17-948/0.30**			
Distanced Fished:	**0.17km**					**Time Fished:**	**5700**			
Sampler Type:	**E**					**Date:**	**2002 07/23/2002**			

Species Name/ ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave(gm) Weight.
Golden Redhorse	R	I	S	M	8	14.12	1.31			
Northern Hog Sucker	R	I	S	M	19	33.53	3.1			
White Sucker	W	O	S	T	24	42.35	3.92			
Creek Chub	N	G	N	T	81	142.94	13.21			
Striped Shiner	N	I	S		53	93.53	8.65			
Spotfin Shiner	N	I	M		36	63.53	5.87			
Sand Shiner	N	I	M	M	29	51.18	4.73			
Silverjaw Minnow	N	I	M		20	35.29	3.26			
Bluntnose Minnow	N	O	C	T	139	245.29	22.68			
Central Stone roller	N	H	N		42	74.12	6.85			
Rock Bass	**S**	**C**	**C**		6	10.59	0.98			
Smallmouth Bass	F	C	C	M	13	22.94	2.12			
Warmouth Sunfish					1	1.77	0.16			
Largemouth Bass	F	C	C		2	3.53	0.33			
Green Sunfish	S	I	C	T	3	5.29	0.49			
Bluegill Sunfish	S	I	C	P	32	56.47	5.22			
Blackside Darter	D	I	S		1	1.77	0.16			
Logperch	D	I	S	M	4	7.06	0.65			
Johnny Darter	D	I	C		29	51.18	4.73			
Greenside Darter	D	I	S	M	16	28.24	2.61			
Banded Darter	D	I	S	I	3	5.29	0.49			
Rainbow Darter	D	I	S	M	19	33.53	3.1			
Fantail Darter	D	I	C		33	58.24	5.38			
Mile Total					613	1081.78				
Number of Species					23					
Number of Hybrids					0					

Appendix 8 *continued*

Fish Species Found In Salt Creek Watershed

050 40004 060 040		**Stream:**	**Buffalo Fork**
Basin: Muskingum River		**Location:**	
Drainage Area (sq. mi):		**River/River Mile:**	**17-945/1.90**
Distanced Fished: 0.0km		**Time Fished:**	
Sampler Type:		**Date:**	**1983 06/17/1983**

Species Name/ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave (gm) Weight.
Black Redhorse	R	I	S	I	1					
Golden Redhorse	R	I	S	M	4					
Northern Hog Sucker	R	I	S	M	11					
White Sucker	W	O	S	T	3					
River DsX Quillback	C	O	M		3					
Blacknose Dace										
Common Carp	G	O	M	T	2					
Creek Chub	N	G	N	T	7					
Suckermouth Minnow	N	I	S		5					
Striped Shiner	N	I	S		13					
Spotfin Shiner	N	I	M		8					
Sand Shiner	N	I	M	M	89					
Silverjaw Minnow	N	I	M		66					
Bluntnose Minnow	N	O	C	T	86					
Central Stone roller	N	H	N		22					
Yellow Bullhead										
Rock Bass	S	C	C		10					
Smallmouth Bass	F	C	C		1					
Spotted Bass										
Largemouth Bass										
Green Sunfish	S	I	C	T	1					
Bluegill Sunfish										
Green SfX Bluegill Sf										
Hybrid X Sunfish										
Logperch										
Johnny Darter	D	I	C		14					
Greenside Darter	D	I	S	M	10					
Banded Darter	D	I	S	I	3					
Rainbow Darter	D	I	S	M	2					
Fantail Darter	D	I	C		4					
Mile Total					365					
Number Of Species					21					
Number Of Hybrids					1					

Appendix 8 *continued*

Fish Species Found In Salt Creek Watershed

050 40004 060 040		**Stream:**	**Buffalo Fork**
Basin:	**Muskingum River**	**Location:**	
Drainage Area (sq. mi): 9.7		**River Code/River Mile:**	**17-945/6.60**
Distanced Fished: 0.17km		**Time Fished:**	**4200**
Sampler Type: E		**Date: 2002 08/20/2002**	

Species Name/ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave(gm) Weight.
Black Redhorse										
Golden Redhorse										
Northern Hog Sucker	R	I	S	M	15	26.47	0.88			
White Sucker	W	O	S	T	4	7.06	0.23			
River DsX Quillback										
Blacknose Dace	N	G	S	T	4	7.06	0.23			
Common Carp										
Creek Chub	N	G	N	T	135	238.24	7.89			
Suckermouth Minnow										
Striped Shiner	N	I	S		396	698.82	23.16			
Spotfin Shiner										
Sand Shiner	N	I	M	M	45	79.41	2.63			
Silverjaw Minnow	N	I	M		37	65.29	2.16			
Bluntnose Minnow	N	O	C	T	210	370.59	12.28			
Central Stone roller	N	H	N		627	1106.47	36.67			
Yellow Bullhead		I	C	T	9	15.88	0.53			
Rock Bass	S	C	C		11	19.41	0.64			
Smallmouth Bass	F	C	C	M	20	35.29	1.17			
Spotted Bass	F	C	C		1	1.77	0.06			
Largemouth Bass	F	C	C		1	1.77	0.06			
Green Sunfish	S	I	C	T	82	144.71	4.80			
Bluegill Sunfish	S	I	C	P	42	74.12	2.46			
Green SfX Bluegill Sf					3	5.29	0.18			
Hybrid X Sunfish										
Logperch										
Johnny Darter	D	I	C		2	3.53	0.12			
Greenside Darter	D	I	S	M	4	7.06	0.23			
Banded Darter										
Rainbow Darter	D	I	S	M	52	91.77	3.04			
Fantail Darter	D	I	C		10	17.65	0.58			
Mile Total					1710	3017.66				
Number Of Species					20					
Number Of Hybrids					1					

Appendix 8 *continued*

Fish Species Found In Salt Creek Watershed

050 40004 060 040		**Stream:**	**Buffalo Fork**
Basin:	**Muskingum River**	**Location:**	**Leedom Rd.**
Drainage Area (sq. mi):	**9.7**	**River Code/River Mile:**	**17-945/6.60**
Distanced Fished:	**0.17km**	**Time Fished:**	**4200**
Sampler Type:	**E**	**Date:**	**2002 08/20/2002**

Species Name/ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave(gm) Weight.
Black Redhorse										
Golden Redhorse										
Northern Hog Sucker	R	I	S	M	15	26.47	0.88			
White Sucker	W	O	S	T	4	7.06	0.23			
River DsX Quillback										
Blacknose Dace	N	G	S	T	4	7.06	0.23			
Common Carp										
Creek Chub	N	G	N	T	135	238.24	7.89			
Suckermouth Minnow										
Striped Shiner	N	I	S		396	698.82	23.16			
Spotfin Shiner										
Sand Shiner	N	I	M	M	45	79.41	2.63			
Silverjaw Minnow	N	I	M		37	65.29	2.16			
Bluntnose Minnow	N	O	C	T	210	370.59	12.28			
Central Stone roller	N	H	N		627	1106.47	36.67			
Yellow Bullhead		I	C	T	9	15.88	0.53			
Rock Bass	S	C	C		11	19.41	0.64			
Smallmouth Bass	F	C	C	M	20	35.29	1.17			
Spotted Bass	F	C	C		1	1.77	0.06			
Largemouth Bass	F	C	C		1	1.77	0.06			
Green Sunfish	S	I	C	T	82	144.71	4.80			
Bluegill Sunfish	S	I	C	P	42	74.12	2.46			
Green SfX Bluegill Sf					3	5.29	0.18			
Hybrid X Sunfish										
Logperch										
Johnny Darter	D	I	C		2	3.53	0.12			
Greenside Darter	D	I	S	M	4	7.06	0.23			
Banded Darter										
Rainbow Darter	D	I	S	M	52	91.77	3.04			
Fantail Darter	D	I	C		10	17.65	0.58			
Mile Total					1710	3017.66				
Number Of Species					20					
Number Of Hybrids					1					

Appendix 8 *continued*

Fish Species Found In Salt Creek Watershed

050 40004 060 050		**Stream:**	**Boggs Creek**
Basin:	**Muskingum River**	**Location:**	**Salt Creek Drive**
Drainage Area (sq. mi):	**18**	**River/River Mile:**	**17-943/0.90**
Distanced Fished:	**0.18km**	**Time Fished:**	**4980sec**
Sampler Type:	**E**	**Date:**	**2002 07/15/2002**

Species Name/ ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave(gm) Weight.
Blacknose Dace	N	G	S	T	4	6.67	0.30			
Creek Chub	N	G	N	T	102	170.00	7.61			
Suckermouth Minnow	N	I	S		4	6.67	0.30			
South Red belly Dace	N	H	S		1	1.67	0.07			
Emerald Shiner	N	I	S		17	28.33	1.27			
Rosyface Shiner	N	I	S	I	19	31.67	1.42			
Striped Shiner	N	I	S		21	35.00	1.57			
Spotfin Shiner	N	I	M		56	93.33	4.18			
Sand Shiner	N	I	M	M	12	20.0	0.90			
Mimic Shiner	N	I	M	I	8	13.33	0.60			
Silverjaw Minnow	N	I	M		85	141.67	6.34			
Bluntnose Minnow	N	O	C	T	649	1081.67	48.43			
Central Stone roller	N	H	N		151	251.57	11.27			
Yellow Bullhead		I	C	T	1	1.67	0.07			
Largemouth Bass	F	C	C		7	11.67	0.52			
Green Sunfish	S	I	C	T	4	6.67	0.3			
Bluegill Sunfish	S	I	C	P	89	148.33	6.64			
Orangespotted Sunfish	S	I	C		1	1.67	0.07			
Johnny Darter	D	I	C		11	18.33	0.82			
Greenside Darter	D	I	S	M	22	36.67	1.64			
Rainbow Darter	D	I	S	M	8	13.33	0.6			
Fantail Darter	D	I	C		68	113.33	5.07			
Mile Total					1340	2233.25				
Number of Species					22					
Number of Hybrids					0					

Appendix 8 *continued*

Fish Species Found In Salt Creek Watershed

050 40004 060 060		**Stream:**	**Mann's Fork**
Basin:	**Muskingum River**	**Location:**	**Road near Mouth**
Drainage Area (sq. mi):	**19.6**	**River/River Mile:**	**17-941/0.80**
Distanced Fished:	**0.16km**	**Time Fished:**	**5160sec**
Sampler Type:	**E**	**Date:**	**2002 07/15/2002**

Species Name/ ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave(gm) Weight.
Golden Redhorse	R	I	S	M	6	11.25	0.64			
Northern Hog Sucker	R	I	S	M	12	22.50	1.28			
White Sucker	W	O	S	T	10	18.75	1.07			
Blacknose Dace	N	G	S	T	1	1.88	0.11			
Creek Chub	N	G	N	T	189	354.28	20.21			
South Red belly Dace	N	H	S		1	1.88	0.11			
Striped Shiner	N	I	M		45	84.38	4.81			
Spotfin Shiner	N	I	M		33	61.88	3.53			
Sand Shiner	N	I	M	M	12	22.50	1.28			
Silverjaw Minnow	N	I	M		6	11.25	0.64			
Bluntnose Minnow	N	O	C	T	256	480.00	27.38			
Central Stone roller	N	H	N		136	255.00	14.55			
Rock Bass	**S**	**C**	**C**		14	26.25	1.5			
Smallmouth Bass	F	C	C	M	4.00	7.50	0.43			
Largemouth Bass	F	C	C		1	1.88	0.11			
Green Sunfish	S	I	C	T	19	35.63	2.03			
Bluegill Sunfish	S	I	C	P	18	33.75	1.93			
Johnny Darter	D	I	C		52	97.50	5.56			
Greenside Darter	D	I	S	M	2	3.75	0.21			
Rainbow Darter	D	I	S	M	38	71.25	4.06			
Fantail Darter	D	I	C		80	150.00	8.56			
Mile Total					935	1753.06				
Number of Species					21					
Number of Hybrids					0					

Appendix 8 *continued*

Fish Species Found In Salt Creek Watershed

050 40004 060 070						Stream:	Salt Ck.			
Basin:	Muskingum River					Location:				
Drainage Area (sq. mi):						River/River Mile:	17-945/2.00			
Distanced Fished:	0.00km					Time Fished:				
Sampler Type:						Date:	1982 05/12/1982			

Species Name/ ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave(gm) Weight.
Least Brook Lamprey		F	N		1					
Longnose Gar										
Gizzard Shad										
Quill Carpsucker										
Silver Redhorse										
Black Redhorse										
Shorthead Redhorse										
Golden Redhorse	R	I	S	M	1					
Northern Hog Sucker	R	I	S	M	7					
White Sucker										
River DsX Quillback										
Blacknose Dace	G	O	M	T	12					
Common Carp	N	G	N	T	5					
Creek Chub										
Suckermouth Minnow										
South Red belly Dace										
Emerald Shiner	N	I	S		4					
Redfin Shiner	N	I	N		6					
Silver Shiner										
Rosyface Shiner										
Striped Shiner	N	I	S		11					
Spotfin Shiner	N	I	M		11					
Sand Shiner	N	I	M	M	1					
Mimic Shiner										
Silverjaw Minnow	N	I	M		26					
Bluntnose Minnow	N	O	C	T	46					
Central Stone roller										
Channel Catfish	F		C		2					
Yellow Bullhead										
Bridled Madtom										
Trout Perch										
Black Crappie										
Rock Bass										
Smallmouth Bass	F	C	C	M	2					
Spotted Bass										
Warmouth Sunfish										
Largemouth Bass	F	C	C		1					
Green Sunfish	S	I	C	T	3					
Bluegill Sunfish										
Orangespotted Sunfish	S	I	C		1					
Longear Sunfish										
Blackside Darter										
Green SfX Bluegill Sf										
Hybrid X Sunfish										
Logperch										
Eastern Sand Darter										
Johnny Darter										
Greenside Darter										
Banded Darter	D	I	S	I	2					
Varigated Darter										
Rainbow Darter										
Fantail Darter										
Sauger X Walleye										
Freshwater Drum										
Mile Total					142					
Number of Species					18					
Number of Hybrids					0					

Appendix 8 *continued*
Fish Species Found In Salt Creek Watershed

050 40004 060 070											
						Stream:	Salt Ck.				
Basin:	Muskingum River					Location:					
Drainage Area (sq. mi):	0.2					River/River Mile:	17-940/8.60				
Distanced Fished:	0.17km					Time Fished:	3600sec				
Sampler Type:	F					Date:	1997 08/26/1997				
Species Name/ ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave(gm) Weight.	
Least Brook Lamprey											
Longnose Gar		P	M		4	8.00	1.79				
Gizzard Shad											
Quill Carpsucker											
Silver Redhorse											
Black Redhorse	R	I	S	I	3	6.00	1.35				
Shorthead Redhorse											
Golden Redhorse	R	I	S	M	5	10.00	2.24				
Northern Hog Sucker	R	I	S	M	9	18.00	4.04				
White Sucker	W	O	S	T	2	4.00	0.90				
River DsX Quillback											
Blacknose Dace											
Common Carp											
Creek Chub	N	G	N	T	1	2.00	0.45				
Suckermouth Minnow	N	I	S		2	4.00	0.90				
South Red belly Dace											
Emerald Shiner	N	I	S		11	22.00	4.93				
Redfin Shiner	N	I	S		11	22.00	4.93				
Silver Shiner											
Rosyface Shiner											
Striped Shiner											
Spotfin Shiner	N	I	M		25	50.00	11.21				
Sand Shiner	N	I	M	M	23	46.00	10.31				
Mimic Shiner											
Silverjaw Minnow	N	I	M		29	58.00	13.00				
Bluntnose Minnow	N	O	C	T	72	144.00	32.29				
Central Stone roller											
Channel Catfish	F		C		5	10.00	2.24				
Yellow Bullhead											
Bridled Madtom		I	C	I	1	2.00	0.45				
Trout Perch		I	M		1	2.00	0.45				
Black Crappie	S	I	C		1	2.00	0.45				
Rock Bass	S	C	C		1	2.00	0.45				
Smallmouth Bass	F	C	C	M	1	2.00	0.45				
Spotted Bass	F	C	C		4	8.00	1.79				
Warmouth Sunfish											
Largemouth Bass											
Green Sunfish											
Bluegill Sunfish	S	I	C	P	1	2.00	0.45				
Orangespotted Sunfish											
Longear Sunfish											
Blackside Darter	D	I	S		1	2.00	0.45				
Green SfX Bluegill Sf											
Hybrid X Sunfish											
Logperch											
Eastern Sand Darter											
Johnny Darter	D	I	C		1	2.00	0.45				
Greenside Darter	D	I	S	M	3	6.00	1.35				
Banded Darter	D	I	S	I	1	2.00	0.45				
Varigated Darter											
Rainbow Darter											
Fantail Darter											
Sauger X Walleye	E	P			1	2.00	0.45				
Freshwater Drum			M	P	4	8.00	1.79				
Mile Total					223	446.00					
Number of Species					26						
Number of Hybrids					1						

Appendix 8 *continued*
Fish Species Found In Salt Creek Watershed

050 40004 060 070						Stream:	Salt Ck.			
Basin:	Muskingum River					Location:				
Drainage Area (sq. mi):	13.8					River/River Mile:	17-940/23.30			
Distanced Fished:	0.17km					Time Fished:	5100sec			
Sampler Type:	E					Date:	1996 08/29/1996			

Species Name/ ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave(gm) Weight.
Least Brook Lamprey		F	N		7	12.35	0.86			
Longnose Gar										
Gizzard Shad										
Quill Carpsucker										
Silver Redhorse										
Black Redhorse										
Shorthead Redhorse										
Golden Redhorse										
Northern Hog Sucker	R	I	S	M	24	42.35	2.96			
White Sucker	W	O	S	T	34	60.00	4.20			
River DsX Quillback										
Blacknose Dace	N	G	N	T	21	37.06	2.59			
Common Carp										
Creek Chub	N	G	N	T	78	137.65	9.63			
Suckermouth Minnow										
South Red belly Dace										
Emerald Shiner	N	I	S		15	26.47	1.85			
Redfin Shiner										
Silver Shiner										
Rosyface Shiner										
Striped Shiner	N	I	S		94	165.88	11.60			
Spotfin Shiner	N	I	M		1	1.77	0.12			
Sand Shiner	N	I	M	M	72	127.06	8.89			
Mimic Shiner										
Silverjaw Minnow	N	I	M		43	75.88	5.31			
Bluntnose Minnow	N	O	C	T	86	151.77	10.62			
Central Stone roller	N	H	N		38	67.06	4.69			
Channel Catfish										
Yellow Bullhead		I	C	T	2	3.53	0.25			
Bridled Madtom										
Trout Perch		I	M		1	1.77	0.12			
Black Crappie										
Rock Bass	S	C	C		8	14.12	0.99			
Smallmouth Bass	F	C	C	M	4	7.06	0.49			
Spotted Bass										
Warmouth Sunfish										
Largemouth Bass	F	C	C		2	3.53	0.25			
Green Sunfish	S	I	C	T	13	22.94	1.60			
Bluegill Sunfish	S	I	C	P	11	19.41	1.36			
Orangespotted Sunfish										
Longear Sunfish										
Blackside Darter	D	I	S		14	24.71	1.73			
Green SfX Bluegill Sf										
Hybrid X Sunfish										
Logperch										
Eastern Sand Darter										
Johnny Darter	D	I	C		21	37.06	2.59			
Greenside Darter	D	I	S	M	60	105.88	7.41			
Banded Darter	D	I	S	I	68	120.0	8.40			
Varigated Darter	D	I	S	I	1	1.77	0.12			
Rainbow Darter	D	I	S	M	13	22.94	1.6			
Fantail Darter	D	I	C		79	139.41	9.75			
Sauger X Walleye										
Freshwater Drum										
Mile Total					810	1429.43				
Number of Species					26					
Number of Hybrids					0					

Appendix 8 *continued*
Fish Species Found In Salt Creek Watershed

050 40004 060 070							**Stream:**	**Salt Ck.**			
	Basin:	**Muskingum River**					**Location:**	**at covered bridge memorial**			
Drainage Area (sq. mi):	**21.2**						**River/River Mile:**	**17-940/15.40**			
Distanced Fished:	**0.19km**						**Time Fished:**	**5400sec**			
Sampler Type:	**E**						**Date:**	**2002 08/08/2002**			
Species Name/ ODNR Status	**IBI Grp**	**Feed Guild**	**Breed Guild**	**Tol**	**# of Fish**	**Relative Number**	**% by Number**	**Relative Wght.**	**% by Wght.**	**Ave(gm) Weight.**	
Least Brook Lamprey											
Longnose Gar											
Gizzard Shad											
Quill Carpsucker											
Silver Redhorse											
Black Redhorse											
Shorthead Redhorse											
Golden Redhorse	R	I	S	M	25	39.47	2.48				
Northern Hog Sucker	R	I	S	M	52	82.11	5.15				
White Sucker	W	O	S	T	41	64.74	4.06				
River DsX Quillback											
Blacknose Dace											
Common Carp	N	G	S	T	2	3.16	0.20				
Creek Chub	N	G	N	T	32	50.53	3.17				
Suckermouth Minnow											
South Red belly Dace	N	H	S		1	1.58	0.10				
Emerald Shiner	N	I	S		2	3.16	0.20				
Redfin Shiner											
Silver Shiner	N	I	S	I	5	7.9	0.50				
Rosyface Shiner	N	I	S	I	38	60	3.77				
Striped Shiner	N	I	S		59	93.16	5.85				
Spotfin Shiner	N	I	M		48	75.79	4.76				
Sand Shiner	N	I	M M		89	140.53	8.82				
Mimic Shiner											
Silverjaw Minnow											
Bluntnose Minnow	N	I	M		15	23.68	1.49				
Central Stone roller	N	O	C	T	144	227.37	14.27				
Channel Catfish	N	H	N		204	322.11	20.22				
Yellow Bullhead											
Bridled Madtom		I	C	T	4	6.32	0.40				
Trout Perch		I	C	I	2	3.16	0.20				
Black Crappie											
Rock Bass	S	C	C		11	17.37	1.09				
Smallmouth Bass	F	C	C	M	10	15.79	0.99				
Spotted Bass											
Warmouth Sunfish											
Largemouth Bass											
Green Sunfish	S	I	C	T	1	1.58	0.10				
Bluegill Sunfish	S	I	C	P	4	6.32	0.4				
Orangespotted Sunfish											
Longear Sunfish											
Blackside Darter	D	I	S		6	9.47	0.59				
Green SfX Bluegill Sf											
Hybrid X Sunfish											
Logperch	D	I	S	M	1	1.58	0.10				
Eastern Sand Darter											
Johnny Darter	D	I	C		19	30	1.88				
Greenside Darter	D	I	S	M	67	105.79	6.64				
Banded Darter	D	I	S	I	25	39.47	2.48				
Varigated Darter											
Rainbow Darter	D	I	S	M	32	50.53	3.17				
Fantail Darter	D	I	C		70	110.53	6.94				
Sauger X Walleye											
Freshwater Drum											
Mile Total					1009	1593.20					
Number of Species					28						
Number of Hybrids					0						

Appendix 8 *continued*
Fish Species Found In Salt Creek Watershed

050 40004 060 070					Stream:	Salt Ck.				
Basin:	Muskingum River				Location:	at private drive ford				
Drainage Area (sq. mi):	104.0				River/River Mile:	17-940/4.10				
Distanced Fished:	0.18km				Time Fished:	6660sec				
Sampler Type:	E				Date:	2002 08/07/2002				

Species Name/ ODNR Status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Wght.	% by Wght.	Ave(gm) Weight.
Least Brook Lamprey										
Longnose Gar		P	M		1	1.67	0.06	0.03	0.15	15.00
Gizzard Shad		O	M		4	6.67	0.26	0.66	3.9	99.25
Quill Carpsucker	C	O	M		2	3.33	0.13	1.93	11.33	577.50
Silver Redhorse	R	I	S	M	4	6.67	0.26	0.42	2.48	63.25
Black Redhorse										
Shorthead Redhorse	R	I	S	M	2	3.33	0.13	0.26	1.52	77.50
Golden Redhorse	R	I	S	M	23	38.33	1.48	3.04	17.91	79.35
Northern Hog Sucker	R	I	S	M	16	26.67	1.03	1.28	7.55	48.13
White Sucker	W	O	S	T	2	3.33	0.13	0.01	0.05	2.50
River DsX Quillback										
Blacknose Dace										
Common Carp	G	O	M	T	1	1.67	0.06	3.33	19.62	2000.00
Creek Chub	N	G	N	T	2	3.33	0.13	0.00	0.02	1.00
Suckermouth Minnow	N	I	S		35	58.33	2.26	0.22	1.27	3.69
South Red belly Dace										
Emerald Shiner										
Redfin Shiner										
Silver Shiner										
Rosyface Shiner	N	I	S	I	87	145.00	5.61	0.19	1.13	1.32
Striped Shiner	N	I	S		1	1.67	0.06	0.00	0.02	2.00
Spotfin Shiner	N	I	M		32	53.33	2.06	0.13	0.75	2.38
Sand Shiner	N	I	M	M	464	773.33	29.94	0.67	3.96	0.87
Mimic Shiner										
Silverjaw Minnow	N	I	M		39	65.00	2.52	0.14	0.79	2.08
Bluntnose Minnow	N	O	C	T	577	961.67	37.23	1.38	8.12	1.44
Central Stone roller	N	H	N		35	58.33	2.26	0.1	0.59	1.71
Channel Catfish	F		C		7	11.67	0.45	0.14	0.84	12.29
Yellow Bullhead		I	C	T	3	5.00	0.19	0.01	0.07	2.33
Bridled Madtom										
Trout Perch										
Black Crappie										
Rock Bass	S	C	C		3	5.00	0.19	0.08	0.46	15.67
Smallmouth Bass	F	C	C	M	26	43.33	1.68	0.44	2.58	10.12
Spotted Bass	F	C	C		4	6.67	0.26	1.04	6.1	155.50
Warmouth Sunfish										
Largemouth Bass	F	C	C		6	10.00	0.39	0.08	0.49	8.33
Green Sunfish	S	I	C	T	3	5.00	0.19	0.03	0.19	6.33
Bluegill Sunfish	S	I	C	P	34	56.67	2.19	0.4	2.33	6.97
Orangespotted Sunfish	S	I	C		5	8.33	0.32	0.04	0.25	5.00
Longear Sunfish	S	I	C	M	1	1.67	0.06	0.01	0.03	3.00
Blackside Darter	D	I	S		1	1.67	0.06	0.01	0.03	3.00
Green SfX Bluegill Sf										
Hybrid X Sunfish										
Logperch	D	I	S	M	4	6.67	0.26	0.05	0.28	7.00
Eastern Sand Darter	D	I	S	R	2	3.33	0.13	0.01	0.04	2.00
Johnny Darter	D	I	C		3	5.00	0.19	0.01	0.03	1.00
Greenside Darter	D	I	S	M	35	58.33	2.26	0.16	0.91	2.66
Banded Darter	D	I	S	I	62	103.33	4	0.1	0.61	1.00
Varigated Darter										
Rainbow Darter	D	I	S	M	4	6.67	0.26	0	0.02	0.50
Fantail Darter	D	I	C		18	30.00	1.16	0.04	0.22	1.22
Sauger X Walleye	E	P			2	3.33	0.13	0.58	3.4	173.00
Freshwater Drum										
Mile Total					1550	2583.33		16.99		
Number of Species					36					
Number of Hybrids					1					

Appendix 9
Agricultural / Land Status

050 40004 060 010 Salt Creek Headwater Above Little Salt Creek			
		Total Acres	28023.3
		% Urban (Open Impervious Surfaces)	0.29
		% Agriculture/ Open Urban Areas (Non-Impervious)	55.21
		% Shrub/ Scrub	1.14
		% Wooded	43.13
		% Open Water	0.02
		% Non-Forested Wetlands	0.17
		% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.05
		Total % of the Watershed	**30.13**
Agricultural Land		**Total Animal Units**	**3188**
% Pasture	59.38%	% Dairy	10.98
% Cropland	40.04%	% Beef	70.58
% Hay	0.59%	% Sheep	0.63
Total	100.00%	% Horse	1.38
		% Hogs	16.44
		% Total	100.00

050 40004 060 020 Little Salt Creek			
		Total Acres	7456.23
		% Urban (Open Impervious Surfaces)	0.92
		% Agriculture/ Open Urban Areas (Non-Impervious)	0.82
		% Shrub/ Scrub	0.84
		% Wooded	0.51
		% Open Water	0.27
		% Non-Forested Wetlands	0.17
		% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.1
		Total % of the Watershed	**8.02**
Agricultural Land		**Total Animal Units**	**572.5**
% Pasture	59.37%	% Dairy	9.17
% Cropland	40.63%	% Beef	90.83
% Hay	0.00%	% Sheep	0
Total	100.00%	% Horse	0
		% Hogs	0
		% Total	100.00

Appendix 9 *continued*

Agricultural / Land Status

050 40004 060 030 White Eyes Creek			
		Total Acres	8598.24
		% Urban (Open Impervious Surfaces)	0.46
		% Agriculture/ Open Urban Areas (Non-Impervious)	49.1
		% Shrub/ Scrub	1.34
		% Wooded	48.75
		% Open Water	0.03
		% Non-Forested Wetlands	0.24
		% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.07
		Total % of the Watershed	**9.25**
Agricultural Land		**Total Animal Units**	**920**
% Pasture	82.64%	% Dairy	0
% Cropland	17.36%	% Beef	98.37
% Hay	0.00%	% Sheep	0
Total	100.00%	% Horse	1.63
		% Hogs	0
		% Total	100.00

050 40004 060 040 Buffalo Creek			
		Total Acres	18274.59
		% Urban (Open Impervious Surfaces)	0.06
		% Agriculture/ Open Urban Areas (Non-Impervious)	42.21
		% Shrub/ Scrub	1.4
		% Wooded	56.05
		% Open Water	0.02
		% Non-Forested Wetlands	0.26
		% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0
		Total % of the Watershed	**19.65**
Agricultural Land		**Total Animal Units**	**1329.9**
% Pasture	76.72%	% Dairy	0
% Cropland	23.28%	% Beef	88.73
% Hay	0.00%	% Sheep	11.27
Total	100.00%	% Horse	0
		% Hogs	0
		% Total	100.00

Appendix 9 *continued*

Agricultural / Land Status

050 40004 060 050 Boggs Creek			
		Total Acres	10333.4
		% Urban (Open Impervious Surfaces)	0.46
		% Agriculture/ Open Urban Areas (Non-Impervious)	49.1
		% Shrub/ Scrub	1.34
		% Wooded	48.75
		% Open Water	0.03
		% Non-Forested Wetlands	0.24
		% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0.01
		Total % of the Watershed	**11.11**
Agricultural Land		**Total Animal Units**	**590**
Total	1085	% Dairy	0
% Pasture	86.64%	% Beef	100
% Cropland	13.36%	% Sheep	0
% Hay	0.00%	% Horse	0
Total	100.00%	% Hogs	0
		% Total	100.00

050 40004 060 060 Mann's Fork Salt Creek			
		Total Acres	13,567.37
		% Urban (Open Impervious Surfaces)	0.04
		% Agriculture/ Open Urban Areas (Non-Impervious)	34.39
		% Shrub/ Scrub	1.33
		% Wooded	63.71
		% Open Water	0.15
		% Non-Forested Wetlands	0.37
		% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	-
		Total % of the Watershed	**14.59**
Agricultural Land		**Total Animal Units**	**895.5**
Total	1850	% Dairy	0
% Pasture	63.24%	% Beef	87.66
% Cropland	28.38%	% Sheep	6.53
% Hay	8.38%	% Horse	0.00
Total	100.00%	% Hogs	5.81
		% Total	100.00

Appendix 9 *continued*

Agricultural / Land Status

050 40004 060 070 Salt Creek				Salt Creek Watershed Total			
		Total Acres	6746.9			**Total Acres**	93,000.06
		% Urban (Open Impervious Surfaces)	0.09			**% Urban (Open Impervious Surfaces)**	0.29%
		% Agriculture/ Open Urban Areas (Non-Impervious)	40.16			**% Agriculture/ Open Urban Areas (Non-Impervious)**	48.25%
		% Shrub/ Scrub	1.35			**% Shrub/ Scrub**	1.21%
		% Wooded	58.08			**% Wooded**	49.86%
		% Open Water	0.18			**% Open Water**	0.08%
		% Non-Forested Wetlands	0.3			**% Non-Forested Wetlands**	0.29%
		% Barren (Strip Mines, Quarries, Sand & Gravel Pits)	0			**% Barren (Strip Mines, Quarries, Sand & Gravel Pits)**	0.03%
		Total % of the Watershed	**7.25**			**Total % of the Watershed**	**100.00%**
Agricultural Land		**Total Animal Units**	**440**	**Agricultural Land**		**Total Animal Units**	**7935.9**
% Pasture	47.57%	% Dairy	39.77	% Pasture	65.64	% Dairy	7.28%
% Cropland	52.43%	% Beef	60.23	% Cropland	33.80	% Beef	81.84%
% Hay	0.00%	% Sheep	0	% Hay	0.56	% Sheep	2.88%
Total	100.00%	% Horse	0	**Total**	100.00	% Horse	0.74%
		% Hogs	0			% Hogs	7.26%
		% Total	100.00			**% Total**	100.00%

Appendix 10
Non Confined / Confined Livestock Operations

050 40004 060 010
Salt Creek Headwater Above Little Salt Creek

Total Operations	55
Animal Operations	44
Confined	18.18%
Non Confined	81.82%

050 40004 060 020
Little Salt Creek

Total Operations	11
Animal Operations	8
Confined	0.00%
Non Confined	100.00%

050 40004 060 030
White Eyes Creek

Total Operations	16
Animal Operations	14
Confined	7.14%
Non Confined	92.86%

050 40004 060 040
Buffalo Creek

Total Operations	19
Animal Operations	17
Confined	22.22%
Non Confined	77.78%

050 40004 060 050
Boggs Creek

Total Operations	9
Animal Operations	9
Confined	33.33%
Non Confined	66.67%

050 40004 060 060
Mann's Fork Salt Creek

Total Operations	19
Animal Operations	17
Confined	0.00%
Non Confined	100.00%

050 40004 060 070
Salt Creek

Total Operations	7
Animal Operations	5
Confined	0.00%
Non Confined	100.00%

Appendix 11
Flow Rate

050 40004 060 010: Salt Creek				
Site #	Location	River Mile	gal/sec	CFS
27	Bethel Rd.	n/a	n/a	n/a
1	Knipe Rd.	23.4	32.66	4.37
2	Arch Hill Rd. C.B.	15.5	197.28	26.37
3	Rt. 40 east of Bridgeville	12.9	157.46	21.05
5	Clay Pike. 500-600' west of jct. Of Spry Rd.	7.96	51.77	6.92
4	Frog Run@ Arch Hill Rd.	12.92/0.36	17.84	2.39

050 40004 060 020: Little Salt Creek				
Site #	Location	River Mile	gal/sec	CFS
8	Church Hill Rd. Dst. Of unnamed trib	7.44	0.00	0.00
7	Jackson Rd.	6.38	0.00	0.00
6	Clay Pike Rd.	0.11	54.75	7.32

050 40004 060 030: White Eyes Creek				
Site #	Location	River Mile	gal/sec	CFS
12	Southern Rd.	4.96	38.15	5.10
11	Zane Grey Rd. upst. Unnamed Trib	3.24	41.97	5.61
10	Okey Rd. upst. Pleasant Run	1.67	48.35	6.46
9	Wolf Run Rd.	0.39	31.47	5.61

050 40004 060 040: Buffalo Fork				
Site #	Location	River Mile	gal/sec	CFS
28	High Freeland Rd.	n/a	n/a	n/a
14	South Leedom Rd.	6.55	0.00	0.00
29	Green Valley Rd.	n/a	n/a	n/a
19	146 east of Pryor Rd.	4.17	0.00	0.00
15	Williams Fork @ Green Valley Rd.	3.15/ 3.37	0.00	0.00
13	Tumblin/Okey Rd.	2.14	0.00	0.00

050 40004 060 050: Boggs Creek				
Site #	Location	River Mile	gal/sec	CFS
30	Miller Lane	n/a	n/a	n/a
16	Three Towers Rd.	4.04	47.44	6.34
17	Near Mast Rd.	2.09	50.12	6.7
18	Salt Creek Drive/Wilhelm Rd.	0.93	108.13	14.5

050 40004 060 060: Mann's Fork				
Site #	Location	River Mile	gal/sec	CFS
21	Cutler Lake Rd.	3.7	24.08	3.22
31	Sugar Grove Rd.	n/a	n/a	n/a
20	Kent Run @ Browning Rd.	2.53/ 1.17	3.46	0.46
22	Mock Drive	2.31	18.38	2.46

050 40004 060 070: Salt Creek				
Site #	Location	River Mile	gal/sec	CFS
25	SR. 146 just. West. Jct. W/ Wolf Run Rd.	5.6	56.03	7.49
23	Burnt Mill Rd	3.45	184.14	24.62
26	Unnamed Trib@ Park Lane	?	65.59	8.77
24	Rt. 60 along Cutler Lake Rd.	0.05	0.00	0.00

~ Sampling Sites 27-31 QHEI were not completed.

Appendix 12
Gradient

050 40004 060 010:Salt Creek Headwaters above Little Salt Creek

Site #	Location	River Mile	Gradient	% Gradient	ft./mile
1	Knipe Rd.	23.4	0.005	0.54	28.34
2	Arch Hill Rd. C.B.	15.5	0.004	0.37	19.47
3	Rt. 40 east of Bridgeville	12.9	0.013	1.31	69.06
5	Clay Pike. 500-600' west of jct. Of Spry Rd.	7.96	0.002	0.20	10.60
4	Frog Run @ Arch Hill Rd.	12.92/ 0.36	0.003	0.31	16.13
27	Salt Ck. @ Bethel Rd.	n/a	0.024	2.41	33.74

050 40004 060 030: White Eyes Creek

Site #	Location	River Mile	Gradient	% Gradient	ft./mile
11	Zane Grey Rd. upst. Unnamed Trib	3.24	0.001	0.14	7.55
12	Southern Rd.	4.96	0.007	0.74	39.02
10	Okey Rd. upst. Pleasant Run	1.67	0.005	0.55	28.83
9	Wolf Run Rd.	0.39	0.002	0.25	13.00

050 40004 060 050: Boggs Creek

Site #	Location	River Mile	Gradient	% Gradient	ft./mile
16	Three Towers Rd.	4.04	0.002	0.18	9.39
18	Near Mast Rd.	2.09	0.006	0.56	29.58
17	Salt Creek Drive/Wilhelm Rd.	0.93	0.003	0.34	17.73
30	Boggs Ck. Miller Lane	n/a	0.002	0.22	11.81

050 40004 060 070: Salt Creek

Site #	Location	River Mile	Gradient	% Gradient	ft./mile
25	SR. 146 just. West. Jct. W/ Wolf Run Rd.	5.6	0.002	0.21	11.24
23	Burnt Mill Rd	3.45	0.002	0.16	8.61
24	Rt. 60 along Cutler Lake Rd.	0.05	0.006	0.61	32.16

050 40004 060 020: Little Salt Creek

Site #	Location	River Mile	Gradient	% Gradient	ft./mile
26	Unnamed Trib @ Park Lane	?	0.006	0.64	33.74
8	Church Hill Rd. Dst. Of unnamed trib	7.44	0.002	0.16	8.21
7	Jackson Rd.	6.38	0.003	0.32	16.75
6	Clay Pike Rd.	0.11	0.005	0.48	25.56

050 40004 060 040: Buffalo Fork

Site #	Location	River Mile	Gradient	% Gradient	ft./mile
14	South Leedom Rd.	6.55	0.007	0.74	39.02
19	146 east of Pryor Rd.	4.17	0.003	0.26	13.97
15	Williams Fork @ Green Valley Rd.	3.15/ 3.37	0.001	0.13	7.01
13	Tumblin/Okey Rd.	2.14	0.001	0.14	7.55
28	Buffalo Fk. @ High Freeland	n/a	0.007	0.72	37.81
29	Buffalo Fk. @ Green Valley	n/a	0.005	0.49	25.75

050 40004 060 060: Mann's Fork

Site #	Location	River Mile	Gradient	% Gradient	ft./mile
21	Cutler Lake Rd.	3.7	0.009	0.948	50.05
20	Kent Run @ Browning Rd.	2.53/ 1.17	0.005	0.525	27.70
22	Mock Drive	2.31	0.003	0.304	16.03
31	Sugar Grove Run @ Wion Ridge Rd.	n/a	0.015	1.548	81.72

Appendix 13

Salt Creek Watershed Project Chemistry Data (Highlighted # over target limit)

050 40004 060 010							Parameters												
Site Number	Site Location	River Mile	Sampling Round	Time	Date	Flow (HF-High & LF-Low)	Temperature Primary Contact 5.3-29.4	pH Primary Contact 6.5-9.0	Total Suspended Solids Primary Contact <60	Conductivity Primary Contact <2400	D.O. Primary Contact > 5.0 mg/L	Fecal Coliform Primary Contact 1000 - 2000 per 100 ml Secondary Contact 5000 per 100 ml	E.coli Primary Contact 126- 298 per 100ml Secondary Contact 576 per 100 ml	Ammonia (NO3-NH3) Primary Contact 1.1-13.0	Nitrate/Nitrites (NO3-NH3) Primary Contact <1.0 mg/L	TKN (TKN-TP) Primary Contact <0.10 mg/L	Total Phosphorus (TKN-TP) Primary Contact < 0.10 mg/L	Qualifier Code
#	Stream/ Road	Miles	#	a.m.	M/D/Y	HF/LF	c	s.u.	mg/L	microhms	mg/L	#/100ml	#/100ml	mg/L	mg/L	mg/L	mg/L	
1	Salt Ck. @ Knipe Rd.	10.19	1A	8:05	7/23/2003	L.F.	19.4	7.85	10	329.2	6.06	6400	n/d	0.260	1.86	0.5	0.05	J.L.
			1B	8:05	7/23/2003	L.F.	19.4	7.86	9	329.2	6.06	5100	n/d	0.251	1.85	0.77	0.059	J.L.
			2A	7:20	8/26/2003	H.F.	20.0	7.81	14	352.8	5.47	5500	n/d	0.068	1.28	0.60	0.069	
			2B	7:20	8/26/2003	H.F.	20.0	7.81	18	352.8	5.47	3800	n/d	0.067	0.29	0.58	0.063	
			3A	8:25	10/1/2003	L.F.	11.2	7.76	7	202.5	10.24	860	n/d	<0.050	2.55	0.35	0.024	J.L.
			3B	8:25	10/1/2003	L.F.	11.2	7.76	7	202.5	10.24	880	n/d	<0.050	2.56	0.28	0.027	J.L.
			1A	7:35	7/6/2004	H.F.	16.4	7.84	<5	259.1	7.95	4600	3400	<0.050	1.550	0.31	0.021	
			1B	7:35	7/6/2004	H.F.	16.4	7.84	<5	259.1	7.95	4100	2200	<0.050	1.620	0.32	0.020	
			2A	8:15	7/28/2004	L.F.	17.2	7.91	10	296.5	6.01	2100	1600	0.054	0.880	0.39	0.046	JL
			2B	8:15	7/28/2004	L.F.	17.2	7.9	11	296.5	6.01	1600	1200	<0.050	0.850	0.51	0.034	JL
			3A	8:15	9/1/2004	L.F.	16.4	7.88	6	266.7	7.60	2600	1300	0.053	1.910	0.39	0.050	J.L./B
			3B	8:15	9/1/2004	L.F.	16.4	7.87	5	266.7	7.60	1700	500	0.053	1.890	0.29	0.056	J.L.
			4	7:25	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	970	1700	n/d	n/d	n/d	n/d	J.L.
2	Salt Ck. @ Arch Hill Rd. C.B.	15.52	1	8:30	7/23/2003	L.F.	20.3	7.85	11	299.2	2.81	980	n/d	<0.050	1.24	0.300	0.086	J.L.
			2	7:45	8/27/2003	H.F.	20.8	7.75	32	324.8	4.83	2200	n/d	0.106	0.11	0.550	0.630	J.L.
			3	9:00	10/1/2003	L.F.	11.2	7.75	7	194.5	10.32	950	n/d	<0.050	2.44	0.230	0.028	
			1	8:15	7/1/2004	H.F.	17.4	7.89	5	242.4	7.68	1400	1100	<0.050	1.23	0.330	<0.010	J.L.
			\	8:50	7/28/2004	L.F.	18.3	7.85	6	263.3	7.11	1600	400	<0.050	0.75	0.240	0.139	JL
			3	9:30	9/1/2004	L.F.	17.5	7.66	25	243.2	7.23	2800	1120	0.076	1.91	0.360	0.049	J.L.
			4	7:45	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	1600	450	n/d	n/d	n/d	n/d	
3	Salt Ck. @ Rt. 40 east of Bridgeville	12.91	1	10:15	7/23/2003	L.F.	20.4	7.93	9	345.5	7.00	910	n/d	<0.050	1.24	0.25	0.017	J.L.
			2	8:25	8/26/2003	H.F.	20.5	7.9	13	368.8	7.21	3500	n/d	<0.050	0.86	0.29	0.028	J.L.
			3	9:35	10/1/2003	L.F.	11.1	7.87	6	225.8	10.48	490	n/d	<0.050	2.39	0.30	0.022	
			1	8:45	7/1/2004	H.F.	17.2	7.88	<5	270.4	8.54	810	250	<0.050	1.44	0.35	0.012	J.L.
			2	8:25	7/28/2004	L.F.	18.4	8.04	9	304.5	7.81	270	100	0.127	0.78	0.25	0.032	
			3	9:00	9/1/2004	L.F.	17.4	7.94	16	268.4	8.26	1500	400	<0.050	1.79	0.36	0.034	
			4	8:05	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	1000	340	n/d	n/d	n/d	n/d	
4	Frog Run @ Arch Hill Rd.	12.92/ 0.36	1	8:55	7/23/2003	L.F.	20.0	7.71	15	295.0	7.23	2200	n/d	<0.050	2.65	<0.20	0.047	
			2	8:05	8/26/2003	H.F.	20.7	7.76	10	340.9	6.68	3400	n/d	0.061	1.08	0.42	0.042	
			3	9:15	10/1/2003	L.F.	11.2	7.72	<5	208.3	10.19	510	n/d	<0.050	4.19	0.32	0.031	
			1	8:30	7/1/2004	H.F.	17.3	7.81	<5	250.7	8.37	1800	900	<0.050	2.920	0.36	0.023	
			2	8:05	7/28/2004	L.F.	18.1	7.84	9	271.1	7.91	<10	<10	<0.050	1.06	0.35	0.071	
			3	9:15	9/1/2004	L.F.	17	7.83	<5	268.4	8.26	1500	290	0.063	2.94	0.44	0.051	
			4	7:55	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	370	1700	n/d	n/d	n/d	n/d	
5	Salt CK. @ Clay Pike Rd. 500-600west of jct. W/Spry Rd.	7.96	1	9:40	7/22/2003	L.F.	22.4	7.87	13	356.6	6.94	470	n/d	<0.050	1.05	0.24	0.294	
			2	10:10	8/26/2003	H.F.	22.2	7.86	28	380.1	6.13	1400	n/d	0.063	0.75	0.28	0.039	
			3	10:30	9/30/2003	L.F.	10.8	7.89	6	217.7	10.60	860	n/d	<0.050	2.39	0.24	0.058	
			1	10:35	6/30/2004	H.F.	17.9	7.86	7	277.9	8.57	350	220	<0.050	1.10	0.20	0.015	
			2	10:15	7/27/2004	L.F.	19.8	7.98	28	n/a	7.41	10400	2200	<0.050	0.78	0.48	0.033	
			3	7:25	8/31/2004	L.F.	19.1	7.98	6	247.0	6.60	n/a	3600	<0.050	1.46	0.51	0.076	
			4	8:45	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	1300	70	n/d	n/d	n/d	n/d	
27	Salt Ck. @ Bethel Rd.		1	8:00	7/1/2004	H.F.	15.6	7.96	<5	287.8	7.89	2400	1500	<0.050	2.14	0.27	0.010	
			2	8:35	7/28/2004	H.F.	16.8	7.98	11	331.2	7.57	5000	2600	<0.050	1.16	<0.20	0.401	
			3	8:35	9/1/2004	L.F	15.8	7.77	<5	255.4	8.63	12000	5000	0.059	2.87	0.21	0.207	
			4	0.524	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	490	380	n/d	n/d	n/d	n/d	

~ n/d (no data)= data was not gather for that chemical parameter

~ n/a (not available)= accident during lab analysis or during field sampling

Appendix 13

Salt Creek Watershed Project Chemistry Data (Highlighted # over target limit)

050 40004 060 020

Site Number	Site Location	River Mile	Sampling Round	Time	Date	Flow (HF-High & LF-Low)	Parameters: Temperature Primary Contact 5.3-29.4	pH Primary Contact 6.5-9.0	Total Suspended Solids Primary Contact <60	Conductivity Primary Contact <2400	D.O. Primary Contact > 5.0 mg/L	Fecal Coliform Primary Contact 1000 - 2000 per 100 ml Secondary Contact 5000 per 100 ml	E.coli Primary Contact 126- 298 per 100ml Secondary Contact 576 per 100 ml	Ammonia (NO3-NH3) Primary Contact 1.1-13.0	Nitrate/Nitrites (NO3-NH3) Primary Contact <1.0 mg/L	TKN (TKN-TP) Primary Contact <0.10 mg/L	Total Phosphorus (TKN-TP) Primary Contact < 0.10 mg/L	Qualifier Code
#	Stream/Road	Miles	#	a.m.	M/D/Y	HF/LF	C	s.u.	mg/L	microhms	mg/L	#/100ml	#/100ml	mg/L	mg/L	mg/L	mg/L	
6	Little Salt Ck. @ Clay Pike Rd.	0.11	1	10:55	7/22/2003	L.F.	21.8	8.04	11	372.4	6.43	500		<0.050	0.65	0.5	0.014	
			2	10:20	8/26/2003	H.F.	21.5	7.93	20	503.0	6.57	800		<0.050	0.44	0.28	0.012	
			3	10:40	9/29/2003	L.F.	11.1	7.92	<5	309.1	10.48	390		<0.050	1.43	0.29	0.028	
			1	10:20	6/30/2004	H.F.	17.6	7.13	11	536.0	8.58	330	330	<0.050	0.29	0.270	<0.010	
			2	10:25	7/27/2004	L.F.	19.4	8.03	17	n/a	7.55	4600	2300	0.057	0.53	0.540	0.031	
			3	7:15	8/31/2004	L.F.	19	8.1	18	446.5	7.42	n/a	780	<0.050	0.53	0.860	0.163	
			4	8:40	9/21/2004	L.F.						430	150					
8	Little Salt Ck. @ Church Hill Rd.	7.44	1	10:40	7/23/2003	L.F.	19.3	7.34	14	1609.0	4.13	100		<0.050	0.10	0.32	0.031	
			2	6:30	8/26/2003	H.F.	20.9	7.37	16	954.0	5.80	800		0.056	<0.10	0.29	0.020	
			3	7:45	10/1/2003	L.F.	11.0	7.34	6	667.0	5.18	250		0.065	0.21	0.310	0.027	
			1	7:00	7/1/2004	H.F.	14.2	7.14	24	1133.0	5.00	660	310	0.119	0.14	0.370	0.017	J.L.
			2	10:15	7/28/2004	L.F.	15.8	7.37	11	1198.0	5.97	570	320	0.08	<0.10	0.310	0.036	
			3	7:25	9/1/2004	L.F.	15.6	7.4	13	1038.0	5.70	390	230	0.118	0.26	0.390	0.030	
			4A	7:10	9/21/2004	L.F.						210	80					
			4B	7:10	9/21/2004	L.F.						260	90					
7	Little Salt Ck. @ Jackson Rd.	6.38	1	10:15	7/23/2003	L.F.	20.4	7.93	11	938.0	5.76	1170		<0.050	0.550	0.38	0.018	
			2	6:50	8/26/2003	H.F.	20.8	7.86	36	749.0	5.71	4800		0.171	0.56	0.91	0.037	
			3	8:00	10/1/2003	L.F.	11.7	7.77	6	357.1	9.63	270		<0.050	1.30	0.30	0.044	
			1	7:00	7/1/2004	H.F.	18.1	7.93	<5	980.0	6.31	520	330	<0.050	1.220	0.450	0.016	
			2	7:45	7/28/2004	L.F.	17.8	7.86	6	920.0	6.80	2100	1800	<0.050	0.54	0.310	0.104	
			3	7:55	9/1/2004	L.F.	18.2	7.77	6	616.0	6.56	650	290	0.102	0.88	0.420	0.036	
			4	7:15	9/21/2004	L.F.						380	290					
26	Unnamed Trib @ Park Lane	?	1	9:40	7/23/2003	L.F.	20.7	8.02	6	575.0	6.9	960		<0.050	0.72	0.28	0.016	
			2	10:53	8/26/2003	H.F.	20.9	7.93	9	506.0	7.1	L.A.		<0.050	0.62	0.31	0.127	
			3	11:50	10/1/2003	L.F.	11.7	7.94	<5	337.3	10.3	190		<0.050	1.51	0.29	0.028	
			1	9:05	7/1/2004	H.F.	18.1	7.95	<5	612.0	7.12	240	210	<0.050	0.86	0.32	<0.010	J.L.
			2	9:45	7/28/2004	L.F.	18.5	8.05	6	603.0	7.79	330	380	<0.050	0.47	0.32	0.023	
			3	9:05	9/1/2004	L.F.	18.2	8.00	7	498.0	6.87	370	260	0.061	0.76	0.40	0.040	J.L.
			4	8:30	9/21/2004	L.F.						380	110					

~ n/d (no data)= data was not gather for that chemical parameter

~ n/a (not available)= accident during lab analysis or during field sampling

Appendix 13

Salt Creek Watershed Project Chemistry Data (Highlighted # over target limit)

050 40004 060 030							Parameters												
Site Number	Site Location	River Mile	Sampling Round	Time	Date	Flow (HF-High & LF-Low)	Temperature Primary Contact 5.3-29.4	pH Primary Contact 6.5-9.0	Total Suspended Solids Primary Contact <60	Conductivity Primary Contact <2400	D.O. Primary Contact > 5.0 mg/L	Fecal Coliform Primary Contact 1000 - 2000 per 100 ml Secondary Contact 5000 per 100 ml	E.coli Primary Contact 126- 298 per 100ml Secondary Contact 576 per 100 ml	Ammonia (NO3-NH3) Primary Contact 1.1-13.0	Nitrate/Nitrites (NO3-NH3) Primary Contact <1.0 mg/L	TKN (TKN-TP) Primary Contact <0.10 mg/L	Total Phosphorus (TKN-TP) Primary Contact < 0.10 mg/L	Qualifier Code
#	Stream/Road	Miles	#	a.m.	M/D/Y	HF/LF	°C	s.u.	mg/L	microhms	mg/L	#/100ml	#/100ml	mg/L	mg/L	mg/L	mg/L	
9	White Eyes @ Wolf Run Rd.	0.39	1	10:15	7/22/2003	L.F.	21.1	8.15	<5	380.7	7.75	510	n/d	<0.050	0.20	0.5	0.156	
			2	9:55	8/27/2003	H.F.	21.1	8.01	5	392.5	5.90	610	n/d	<0.050	0.19	<0.20	0.013	
			3	10:15	9/30/2003	L.F.	10.8	8.10	<5	256.7	10.56	380	n/d	<0.050	0.41	<0.20	0.016	
			1	10:05	6/30/2004	H.F.	16.9	7.95	<5	327.6	7.23	280	260	<0.050	0.11	<0.20	<0.010	
			2	10:00	7/27/2004	L.F.	19.3	8.07	<5	n/a	7.41	1400	690	<0.050	0.42	<0.20	0.029	J.L.
			3	7:35	8/31/2004	L.F.	18.2	8.11	<5	323.8	7.00	n/a	720	<0.050	0.32	0.29	0.059	
			4	8:50	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	650	100	n/d	n/d	n/d	n/d	
10	White Eyes @ Okey Rd.	1.67	1	9:50	7/22/2003	L.F.	20.7	8.12	<5	380.3	7.94	400	n/d	<0.050	0.21	<0.20	0.013	
			2	9:40	8/27/2003	H.F.	21.0	8.04	12	411.1	5.98	480	n/d	<0.050	0.21	<0.20	0.011	
			3	10:00	9/30/2003	L.F.	10.8	8.06	<5	267.9	10.66	280	n/d	<0.050	0.42	<0.20	0.022	
			2	9:45	7/27/2004	L.F.	19.3	8.1	<5	n/a	7.81	1700	840	<0.050	0.46	<0.20	0.054	
			3	7:50	8/31/2004	L.F.	18	8.12	14	329.6	7.85	n/a	890	<0.050	0.51	0.22	<0.010	
			4	9:00	9/21/2004	LF.	n/d	n/d	n/d	n/d	n/d	400	20	n/d	n/d	n/d	n/d	
11	White Eyes @ Zane Grey Rd.	3.24	1	9:40	7/22/2003	L.F.	20.3	7.93	8	393.6	6.88	1800	n/d	0.194	0.29	<0.20	0.240	
			2	9:25	8/27/2003	H.F.	20.7	7.85	7	195.0	5.76	2500	n/d	<0.050	0.27	0.20	<0.010	
			3	9:45	9/30/2003	L.F.	10.9	7.96	<5	265.7	9.93	1030	n/d	<0.050	0.44	0.33	0.028	
			1	9:30	6/30/2004	H.F.	17.1	7.84	<5	348.8	7.41	1000	1070	<0.050	0.22	<0.20	0.017	
			2	9:35	7/27/2004	L.F.	19.1	7.85	n/a	n/a	7.13	710	610	<0.050	0.41	0.20	0.037	
			3	8:00	8/31/2004	L.F.	17.9	8.03	26	331.3	7.48	n/a	710	<0.050	0.29	0.23	0.016	
			4	9:05	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	1300	<10	n/d	n/d	n/d	n/d	
12	White Eyes @ Southern Rd.	4.96	1	9:20	7/22/2003	L.F.	19.4	7.77	7	343.1	6.49	350	n/d	<0.050	0.17	<0.20	0.022	
			2	9:10	8/26/2003	H.F.	20.0	7.66	5	372.1	5.72	360	n/d	<0.050	0.19	<0.20	0.012	
			3	9:30	9/30/2003	L.F.	10.7	7.93	<5	273.0	9.76	180	n/d	<0.050	0.36	<0.20	0.021	
			1	9:15	6/30/2004	H.F.	16.6	7.7	<5	339.3	6.60	50	100	<0.050	0.11	<0.20	<0.010	
			2	9:20	7/27/2004	L.F.	18.8	7.78	<5	n/a	6.50	600	370	<0.050	0.51	<0.20	0.046	J.L.
			3	8:20	8/31/2004	L.F.	17.7	7.85	<5	325.7	7.05	n/a	n/a	<0.050	0.40	0.27	0.021	
			4	9:15	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	200	40	n/d	n/d	n/d	n/d	

~ n/d (no data)= data was not gather for that chemical parameter

~ n/a (not available)= accident during lab analysis or during field sampling

Appendix 13

Salt Creek Watershed Project Chemistry Data (Highlighted # over target limit)

050 40004 060 040 — Buffalo Fork — Parameters

Site Number	Site Location	River Mile	Sampling Round	Time	Date	Flow (HF-High & LF-Low)	Temperature Primary Contact 5.3-29.4	pH Primary Contact 6.5-9.0	Total Suspended Solids Primary Contact <60	Conductivity Primary Contact <2400	D.O. Primary Contact > 5.0 mg/L	Fecal Coliform Primary Contact 1000 - 2000 per 100 ml Secondary Contact 5000 per 100 ml	E.coli Primary Contact 126- 298 per 100ml Secondary Contact 576 per 100 ml	Ammonia (NO3-NH3) Primary Contact 1.1-13.0	Nitrate/Nitrites (NO3-NH3) Primary Contact <1.0 mg/L	TKN (TKN-TP) Primary Contact <0.10 mg/L	Total Phosphorus (TKN-TP) Primary Contact < 0.10 mg/L	Qualifier Code
#	Stream/Road	Miles	#	a.m.	M/D/Y	HF/LF	c	s.u.	mg/L	microhms	mg/L	#/100ml	#/100ml	mg/L	mg/L	mg/L	mg/L	
13	Buffalo Fk. @ Tumblin Rd. (Okey Rd.)	2.14	1A	8:00	7/22/2003	L.F.	21.9	8.14	14	661.0	6.51	1300	n/d	<0.050	0.19	0.5	0.018	
			1B	8:00	7/22/2003	L.F.	21.9	8.14	15	661.0	6.51	1130	n/d	<0.050	0.18	0.27	0.024	
			2A	7:40	8/27/2003	H.F.	22.4	8.09	67	753.0	5.83	1800	n/d	<0.050	0.11	0.27	0.016	
			2B	7:40	8/27/2003	H.F.	22.4	8.07	67	753.0	5.83	1000	n/d	0.053	0.29	0.25	0.022	
			3A	8:00	9/30/2003	L.F.	11.0	8.11	12	407.2	9.98	190	n/d	<0.050	0.57	0.21	0.019	
			3B	8:00	9/30/2003	L.F.	11.0	8.12	11	407.2	9.98	530	n/d	<0.050	0.59	0.24	0.026	
			1	7:15	6/30/2004	H.F.	17.6	7.92	31	700.0	6.43	690	160	<0.050	0.13	0.26	0.045	
			2	7:15	7/27/2004	L.F.	19.9	8.09	23	n/a	7.05	14000	2900	<0.050	0.49	0.29	0.038	
			3A	10:00	8/31/2004	L.F.	19.4	8.13	40	599.0	7.22	n/a	2000	<0.050	0.51	0.29	0.028	
			3B	10:00	8/31/2004	L.F.	19.4	8.14	41	599.0	7.22	n/a	2200	<0.050	0.44	0.30	0.410	
			4	7:30	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	760	380	n/d	n/d	n/d	n/d	
14	Buffalo Fk. @ South Leedom Rd.	6.55	1	8:40	7/23/2003	L.F.	20.8	8.08	<5	875.0	7.85	440	n/d	<0.050	<0.10	<0.20	0.291	
			2	8:20	8/26/2003	H.F.	21.4	7.95	31	985.0	5.54	1120	n/d	<0.050	0.10	<0.20	<0.010	
			3	8:50	9/30/2003	L.F.	10.8	8.06	<5	584.0	10.33	220	n/d	<0.050	0.12	<0.20	0.013	
			1A	8:00	6/30/2004	H.F.	16.5	7.94	7	1001.0	7.99	210	220	<0.050	0.29	<0.20	<0.010	JL
			1B	8:00	6/30/2004	H.F.	16.5	7.94	6	1001.0	7.99	130	230	<0.050	<0.10	<0.20	<0.010	JL
			2	8:00	7/27/2004	L.F.	19.7	8.03	31	n/a	6.92	650	270	<0.050	0.11	<0.20	<0.010	JL
			3	9:35	8/31/2004	L.F.	18.8	8.10	<5	1017.0	7.47	n/a	410	<0.050	0.13	0.23	0.013	
			4	7:45	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	530	310	n/d	n/d	n/d	n/d	
15	Williams Fk. @ Green Valley Rd.	3.15 / 3.37	1	9:00	7/23/2003	L.F.	19.7	7.88	<5	346.1	7.04	270	n/d	<0.050	0.16	0.24	0.011	
			2	8:45	8/27/2003	H.F.	20.2	8.06	59	467.0	6.64	530	n/d	<0.050	0.12	<0.20	<0.010	
			3	9:10	9/30/2003	L.F.	10.1	7.97	<5	322.9	10.04	430	n/d	<0.050	0.46	0.22	0.020	
			1	8:55	6/30/2004	H.F.	15.7	7.92	<5	401.3	8.71	210	140	<0.050	0.19	<0.20	0.010	
			2	7:55	7/27/2004	L.F.	19	7.94	27	n/a	7.55	6600	4800	<0.050	0.21	0.23	0.026	
			3	8:40	8/31/2004	L.F.	17.8	7.87	<5	376.4	7.95	n/a	730	<0.050	0.49	0.28	<0.010	
			4	9:30	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	160	30	n/d	n/d	n/d	n/d	
19	Buffalo Fk. @ SR 146 just west of jct. W/Pryor Rd.	4.17	1	8:30	7/23/2003	L.F.	20.7	8.10	<5	724.0	7.1	720	n/d	<0.050	<0.10	0.2	0.035	
			2	8:10	8/26/2003	H.F.	21.5	7.94	26	831.0	5.8	800	n/d	<0.050	<0.10	<0.20	<0.010	
			3	8:40	9/30/2003	L.F.	10.4	8.04	<5	447.2	10.2	500	n/d	<0.050	0.37	<0.20	0.024	
			1	7:40	6/30/2004	H.F.	16.6	7.91	<5	838.0	7.67	330	360	<0.050	<0.10	<0.20	<0.010	JL
			2	7:30	7/27/2004	L.F.	19.6	8.01	<5	n/a	7.23	1800	400	<0.050	0.20	0.21	0.029	
			3	9:45	8/31/2004	L.F.	18.9	8.11	<5	849.0	7.70	n/a	540	<0.050	0.3	0.22	<0.010	
			4	7:55	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	400	230	n/d	n/d	n/d	n/d	
28	Buffalo Fk. @ High Freeland	?	1	8:10	6/30/2004	H.F.	16.8	7.92	32	1117	7.28	320	320	<0.050	<0.10	<0.20	<0.010	
			2A	8:15	7/27/2004	L.F.	19.7	8.04	9	n/a	6.31	1400	520	<0.050	0.22	0.23	0.015	
			2B	8:15	7/27/2004	L.F.	19.7	8.04	7	n/a	6.31	870	440	<0.050	0.23	0.29	0.015	
			3	9:20	8/31/2004	L.F.	18.9	8.02	26	1080	6.71	n/a	2000	<0.050	0.29	<0.20	0.17	
			4	7:40	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	490	260	n/d	n/d	n/d	n/d	
29	Buffalo Fk. @ Green Valley Rd.	?	1	8:35	6/30/2004	H.F.	17.5	7.87	<5	852.0	7.38	270	330	<0.050	<0.10	<0.20	<0.010	
			2	8:40	7/27/2004	L.F.	19.8	8	8	n/a	6.92	2300	530	<0.050	0.2	<0.20	0.017	
			3	9:00	8/31/2004	L.F.	18.9	8.06	8	835.0	7.09	n/a	900	<0.050	0.31	0.25	0.016	
			4	9:35	9/21/2004	L.F.	n/d	n/d	n/d	n/d	n/d	320	110	n/d	n/d	n/d	n/d	

~ n/d (no data)= data was not gather for that chemical parameter

~ n/a (not available)= accident during lab analysis or during field sampling

Appendix 13

Salt Creek Watershed Project Chemistry Data (Highlighted # over target limit)

050 40004 060 050				Boggs Creek			Parameters											
Site Number	Site Location	River Mile	Sampling Round	Time	Date	Flow (HF-High & LF-Low)	Temperature Primary Contact 5.3-29.4	pH Primary Contact 6.5-9.0	Total Suspended Solids Primary Contact <60	Conductivity Primary Contact <2400	D.O. Primary Contact > 5.0 mg/L	Fecal Coliform Primary Contact 1000 - 2000 per 100 ml Secondary Contact 5000 per 100 ml	E.coli Primary Contact 126- 298 per 100ml Secondary Contact 576 per 100 ml	Ammonia (NO3-NH3) Primary Contact 1.1-13.0	Nitrate/Nitrites (NO3-NH3) Primary Contact <1.0 mg/L	TKN (TKN-TP) Primary Contact <0.10 mg/L	Total Phosphorus (TKN-TP) Primary Contact < 0.10 mg/L	Qualifier Code
#	Stream/Road	Miles	#	a.m.	M/D/Y	HF/LF	°C	s.u.	mg/L	microhms	mg/L	#/100ml	#/100ml	mg/L	mg/L	mg/L	mg/L	
16	Boggs Ck. SR 146 just west of jct. W/3 Towers Rd	4.04	1	10:45	7/21/2003	L.F.	21.3	7.8	16	494.0	7.2	4500	n/d	0.05	0.42	0.50	0.03	
			2	9:00	8/25/2003	L.F.	20.1	7.75	15	422.9	7.5	980	n/d	0.06	0.21	0.50	0.03	
			3	8:45	9/29/2003	L.F.	13	7.75	18	299.3	9.5	690	n/d	0.08	0.75	0.33	0.02	
			1	7:20	6/29/2004	H.F.	17.1	7.13	6.0	450.5	7.92	3000	400	<0.050	0.54	0.31	0.027	J.L.
			2	7:15	7/26/2004	L.F.	19.3	7.62	264.0	437.3	7.83	2700	16000	0.111	0.32	0.40	0.110	J.L.
			3	7:15	8/30/2004	H.F.	22.7	7.93	25.0	390.4	6.19	2900	n/a	<0.050	0.10	0.42	0.025	J.L.
			4	7:15	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	390	240	n/d	n/d	n/d	n/d	
17	Boggs Ck. @ Salt Ck. Dr./ Wilhelm Rd.	2.09	1	10:10	7/21/2003	L.F.	21.6	8.32	16	203	8.8	370	n/d	<0.050	0.62	0.30	0.033	
			2	9:55	8/25/2003	L.F.	20.2	8.21	9	221.3	8.5	650	n/d	0.055	0.31	0.52	0.026	
			3	9:15	9/29/2003	L.F.	12.7	8.04	16	291.1	9.7	820	n/d	0.057	1.03	0.36	0.034	
			1	8:00	6/29/2004	H.F.	17.2	7.88	7.0	440	8.00	3700	2700	<0.050	0.73	0.34	0.017	
			2	7:45	7/26/2004	L.F.	19.3	8.05	89.0	392.8	8.04	11000	5300	0.053	0.39	0.35	0.075	
			3	7:40	8/30/2004	H.F.	19.9	8.05	23.0	395.2	7.90	4100	n/a	0.062	0.29	0.57	0.023	
			4	8:20	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	920	380	n/d	n/d	n/d	n/d	
18	Boggs Ck. Near Mast Rd. just Dst. Indian Run	0.93	1	10:00	7/21/2003	L.F.		7.98	13	257.7	7.1	2100	n/d	0.054	0.42	0.5	0.030	
			2	9:45	8/25/2003	L.F.	19	7.82	66	450.8	7.2	570	n/d	0.055	0.21	0.5	0.026	
			3	11:50	9/29/2003	L.F.	12.2	7.81	15	268.2	9.7	1340	n/d	0.083	0.75	0.33	0.024	
			1	7:45	6/29/2004	H.F.	16.5	7.71	128.0	330.6	6.64	2600	2800	0.052	0.29	0.43	0.048	J.L.
			2	9:45	7/26/2004	H.F.	18.9	7.85	334.0	294.5	7.06	74000	80000	0.357	0.86	0.94	0.226	
			3	7:30	8/30/2004	H.F.	21.2	7.69	22.0	417.2	8.71	5900	n/a	0.191	1.01	0.70	0.073	
			4	8:10	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	1400	400	n/d	n/d	n/d	n/d	
30	Boggs Ck. @ Millers Lane	?	1	7:05	6/29/2004	H.F.	17.3	7.13	12.0	513	8.30	700	110	0.076	0.51	0.31	0.065	
			2	7:00	7/26/2004	H.F.	20.2	7.55	404.0	535	7.78	2200	800	0.101	0.19	0.49	0.160	
			3	7:00	8/30/2004	H.F.	22	7.66	6.0	509	6.98	600	n/a	0.061	0.17	0.54	0.037	
			4	7:10	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	540	280	n/d	n/d	n/d	n/d	

~ n/d (no data)= data was not gather for that chemical parameter

~ n/a (not available)= accident during lab analysis or during field sampling

Appendix 13

Salt Creek Watershed Project Chemistry Data (Highlighted # over target limit)

050 40004 060 060 — Manns Fork Salt Creek — **Parameters**

Site Number	Site Location	River Mile	Sampling Round	Time	Date	Flow (HF-High & LF-Low)	Temperature Primary Contact 5.3-29.4	pH Primary Contact 6.5-9.0	Total Suspended Solids Primary Contact <60	Conductivity Primary Contact <2400	D.O. Primary Contact > 5.0 mg/L	Fecal Coliform Primary Contact 1000 - 2000 per 100 ml Secondary Contact 5000 per 100 ml	E.coli Primary Contact 126- 298 per 100ml Secondary Contact 576 per 100 ml	Ammonia (NO3-NH3) Primary Contact 1.1-13.0	Nitrate/Nitrites (NO3-NH3) Primary Contact <1.0 mg/L	TKN (TKN-TP) Primary Contact <0.10 mg/L	Total Phosphorus (TKN-TP) Primary Contact < 0.10 mg/L	Qualifier Code
#	Stream/Road	Miles	#	a.m.	M/D/Y	HF/LF	°C	s.u.	mg/L	microhms	mg/L	#/100ml	#/100ml	mg/L	mg/L	mg/L	mg/L	
20	Kent Run @ Browning Rd.	2.53/ 1.17	1A	9:00	7/21/2003	L.F.	20.4	7.71	<5	6.3	5.28	70	n/d	<0.050	<0.10	0.5	0.010	
			1B	9:00	7/21/2003	L.F.	20.4	7.72	<5	6.3	5.28	60	n/d	<0.050	<0.10	<0.20	0.010	
			2	8:45	8/25/2003	L.F.	19.2	7.56	<5	842.0	4.56	<10	n/d	<0.050	<0.10	0.22	<0.010	
			3A	10:00	9/29/2003	L.F.	12.9	8.05	<5	475.0	8.91	170	n/d	<0.050	0.29	0.23	0.014	
			3B	10:00	9/29/2003	L.F.	12.9	8.05	<5	475.0	8.91	190	n/d	<0.050	0.10	<0.20	0.017	
			1A	9:00	6/29/2004	H.F.	17.2	7.76	<5	783.0	7.39	780	670	<0.050	0.16	<0.20	0.018	J.L.
			1B	9:00	6/29/2004	H.F.	17.2	7.76	<5	783.0	7.39	640	650	<0.050	0.15	<0.20	0.016	J.L.
			2A	8:40	7/26/2004	L.F.	19.6	7.85	33	660.0	6.25	600	1040	<0.050	<0.10	0.28	0.053	
			2B	8:40	7/26/2004	L.F.	19.6	7.84	32	660.0	6.25	1400	2200	<0.050	<0.10	0.26	0.037	
			3A	8:35	8/30/2004	H.F.	21.1	7.94	5	759.0	6.69	1500	n/a	<0.050	0.11	0.30	0.065	J.L.
			3B	8:35	8/30/2004	H.F.	21.1	7.91	<5	759.0	6.69	1600	n/a	<0.050	0.11	0.23	0.089	J.L.
			4A	8:50	9/20/2004	L.F.	n/d	n/d		n/d	n/d	n/d	250	90	n/d	n/d	n/d	n/d
			4B	8:50	9/20/2004	L.F.	n/d	n/d		n/d	n/d	n/d	200	70	n/d	n/d	n/d	n/d
21	Manns Fk. Salt Ck. @ Cutler Lake Rd.	3.7	1	8:30	7/21/2003	L.F.	20.8	7.79	12	297.3	5.37	140	n/d	0.106	<0.10	0.37	0.021	
			2	8:20	8/25/2003	L.F.	22.4	7.62	<5	368.7	3.07	10	n/d	<0.050	<0.10	0.22	<0.10	
			3	10:30	9/29/2003	L.F.	11.1	8.0	<5	241.1	9.49	100	n/d	<0.050	0.29	<0.20	<0.010	
			1	9:45	6/29/2004	H.F.	17.2	7.80	38	258.1	7.37	420	450	<0.050	<0.10	<0.20	0.332	
			2	9:15	7/26/2004	L.F.	19.4	7.79	20	265.2	5.30	800	120	<0.050	<0.10	<0.20	0.027	
			3	9:05	8/30/2004	H.F.	21.3	7.91	31	330.1	5.58	450	n/a	<0.050	<0.10	0.31	0.019	
			4	9:20	9/20/2004	L.F.	n/d	n/d		n/d	n/d	n/d	340	70	n/d	n/d	n/d	n/d
22	Manns Fk. @ Mock Dr.	2.31	1	9:40	7/21/2003	L.F.	21.0	8.04	<5	438.7	7.82	80	n.d	<0.050	0.27	<0.20	0.017	
			2	10:53	8/25/2003	L.F.	19.7	7.77	<5	528.0	6.2	140	n/d	<0.050	0.11	<0.200	<0.010	
			3	11:50	9/29/2003	L.F.	12.5	8.13	<5	340.7	9.73	160	n/d	<0.050	0.19	0.20	0.013	
			1	8:35	6/29/2004	H.F.	17.0	7.88	<5	530.0	8.22	1600	1400	<0.050	0.23	<0.20	0.221	
			2	8:10	7/26/2004	L.F.	19.1	7.96	98	416.7	7.64	2500	2300	<0.050	0.18	0.20	0.072	
			3	8:15	8/30/2004	H.F.	21.2	7.86	16	606.0	7.07	1600	n/a	<0.050	0.12	0.48	0.080	
			4	8:40	9/20/2004	L.F.	n/d	n/d		n/d	n/d	n/d	400	170	n/d	n/d	n/d	n/d
31	Sugar Grove Run @ Wion Ridge Rd.	?	1	9:20	6/29/2004	H.F.	16.4	8.02	<5	1008	7.63	2900	1800	<0.050	<0.050	<0.10	0.230	
			2	9:05	7/26/2004	L.F.	19.3	8.1	96	1378	7.97	4500	3000	<0.050	0.29	0.37	0.086	
			3	8:55	8/30/2004	H.F.	20.8	8.07	17	938	7.29	2700	n/a	<0.050	<0.10	0.36	0.056	
			4	9:00	9/20/2004	L.F.	n/d	n/d		n/d	n/d	n/d	420	140	n/d	n/d	n/d	n/d

~ n/d (no data)= data was not gather for that chemical parameter

~ n/a (not available)= accident during lab analysis or during field sampling

Appendix 13

Salt Creek Watershed Project Chemistry Data (Highlighted # over target limit)

050 40004 060 070				Salt Creek Above Little Salt Creek			Parameters											
Site Number	Site Location	River Mile	Sampling Round	Time	Date	Flow (HF-High & LF-Low)	Temperature Primary Contact 5.3-29.4	pH Primary Contact 6.5-9.0	Total Suspended Solids Primary Contact <60	Conductivity Primary Contact <2400	D.O. Primary Contact > 5.0 mg/L	Fecal Coliform Primary Contact 1000 - 2000 per 100 ml Secondary Contact 5000 per 100 ml	E.coli Primary Contact 126- 298 per 100ml Secondary Contact 576 per 100 ml	Ammonia (NO3-NH3) Primary Contact 1.1-13.0	Nitrate/Nitrites (NO3-NH3) Primary Contact <1.0 mg/L	TKN (TKN-TP) Primary Contact <0.10 mg/L	Total Phosphorus (TKN-TP) Primary Contact < 0.10 mg/L	Qualifier Code
#	Stream/Road	Miles	#	a.m.	M/D/Y	HF/LF	°C	s.u.	mg/L	microhms	mg/L	#/100ml	#/100ml	mg/L	mg/L	mg/L	mg/L	
23	Salt Creek @ Burnt Mill Rd.	3.45	1	9:35	7/21/2003	L.F.	22	7.97	13	448.9	6.97	650	n/d	<0.050	0.64	0.5	0.034	
			2A	9:20	8/25/2003	L.F.	19.8	7.94	26	457.4	7.19	950	n/d	<0.050	0.65	0.39	0.026	
			2B	9:20	8/25/2003	L.F.	19.8	7.94	26	457.4	7.19	950	n/d	0.05	0.65	0.39	0.025	
			3	9:30	9/29/2003	L.F.	12.5	8	27	265.9	9.73	1900	n/d	<0.050	0.29	0.23	0.042	
			1	8:10	6/29/2004	H.F.	18.1	7.80	13	429.7	7.42	3700	330	0.09	0.81	0.25	0.098	J.L.
			2	8:00	7/26/2004	L.F.	21.2	7.98	16	448.3	6.76	1200	1900	<0.050	0.24	0.28	0.031	J.L.
			3	7:55	8/30/2004	H.F.	21.7	7.86	572	282.2	6.72	60000	N/A	0.05	0.64	0.50	0.283	J.L.
			4	8:30	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	1100	120	n/d	n/d	n/d	n/d	
24	Salt Ck. @ Rt. 60 Along Cutler Lake Rd.	0.05	1	8:06	7/21/2003	L.F.	n/d	8.06	13	469.6	6.1	140	n/d	<0.050	0.86	0.56	0.045	
			2	8:00	8/25/2003	L.F.	23.2	8.35	25	425.4	7.0	420	n/d	<0.050	0.43	0.51	0.087	
			3	7:50	9/29/2003	L.F.	14.3	8.01	27	271.0	8.7	3000	n/d	0.05	1.25	0.47	0.041	
			1	10:10	6/29/2004	H.F.	19.6	7.57	12	413.6	5.94	170	140	<0.050	1.08	0.25	0.350	J.L.
			2	9:30	7/26/2004	L.F.	20.4	7.82	53	446.3	6.09	2200	890	0.06	0.47	0.28	0.047	
			3	9:25	8/30/2004	H.F.	22.0	7.86	306	263.5	6.20	<10	N/A	0.06	0.59	0.46	0.196	J,J.L.
25	Salt Ck. SR 146 just west w/Wolf Run Rd.	5.6	1	10:35	7/21/2003	L.F.	21.8	8.01	10	393.1	7.63	370	n/d	<0.050	0.77	0.26	0.015	
			2	7:25	8/27/2003	H.F.	22.4	7.9	26	437.3	5.08	680	n/d	<0.050	0.52	<0.20	0.160	
			3	7:45	9/30/2003	L.F.	11.1	7.71	13	240.5	9.63	980	n/d	<0.050	1.93	<0.20	0.035	
			1	7:00	6/30/2004	H.F.	17.6	7.74	6	393.9	7.50	570	430	<0.050	1.06	0.29	0.021	J.L.
			2	7:00	7/27/2004	L.F.	19.7	8.01	33	N/A	7.12	6300	2700	<0.050	0.56	<0.20	0.250	
			3	10:20	8/31/2004	L.F.	19.0	8.08	50	295.8	7.55	N/A	400	<0.050	0.98	0.37	0.141	
			4	11:07	9/20/2004	L.F.	n/d	n/d	n/d	n/d	n/d	1300	650	n/d	n/d	n/d	n/d	

~ n/d (no data)= data was not gather for that chemical parameter

~ n/a (not available)= accident during lab analysis or during field sampling

Appendix 14
Salt Creek Watershed Soils

Soil Name	Prime and Important Farmland Rating	Office HEL Rating	Salt Creek Watershed Acres	Salt Creek Watershed %
Glenford-Newark-Fitchville Association				
Prime	83.3%	H	6447.8	6.93%
Important	16.7%			
N	0.0%			
Westmoreland- Berks- Guernsey Association				
Prime	0.00%	H	37243.4	40.05%
Important	30.77%			
N	69.23%			
Lowell- Guernsey- Gilpin Association				
Prime	10.00%	H	12029.5	12.93%
Important	30.00%			
N	60.00%			
Wellston- Zanesville- Alford Association				
Prime	50.00%	H	8630.3	9.28%
Important	50.00%			
N	0.00%			
Westmoreland- Coshocton- Rigley Association				
Prime	0.00%	H	28649.6	30.81%
Important	61.54%			
N	38.46%			
Total Salt Creek Watershed				
Prime	18.75%	H	93000.5	100.00%
Important	39.58%			
N	41.67%			

Appendix 15
Livestock Access to the Stream

050 40004 060 010 Salt Creek headwaters above Little Salt Creek			
Total Non confined Livestock Operations	Appox. 500 Ft.	Total Ft. w/ Livestock Access	Total Miles w/ Livestock Access
48.0	x 500	24,000.0	4.55

050 40004 060 020 Little Salt Creek			
Total Non confined Livestock Operations	Appox. 500 Ft	Total Ft. w/ Livestock Access	Total Miles w/ Livestock Access
8.0	x 500	4,000.0	0.76

050 40004 060 030 White Eyes Creek			
Total Non confined Livestock Operations	Appox. 500 Ft.	Total Ft. w/ Livestock Access	Total Miles w/ Livestock Access
11.0	x 500	5,500.0	1.04

050 40004 060 040 Buffalo Fork			
Total Non confined Livestock Operations	Appox. 500 Ft.	Total Ft. w/ Livestock Access	Total Miles w/ Livestock Access
14.0	x 500	7,000.0	1.33

050 40004 060 050 Boggs Creek			
Total Non confined Livestock Operations	Appox. 500 Ft.	Total Ft. w/ Livestock Access	Total Miles w/ Livestock Access
6.0	x 500	3,000.0	0.57

050 40004 060 060 Mann's Fork Salt Creek			
Total Non confined Livestock Operations	Appox. 500 Ft.	Total Ft. w/ Livestock Access	Total Miles w/ Livestock Access
13.0	x 500	6,500.0	1.23

050 40004 060 070 Salt Creek			
Total Non confined Livestock Operations	Appox. 500 Ft.	Total Ft. w/ Livestock Access	Total Miles w/ Livestock Access
5.0	x 500	2,500.0	0.47

Total Watershed Salt Creek Watershed			
Total Non confined Livestock Operations	Appox. 500 Ft.	Total Ft. w/ Livestock Access	Total Miles w/ Livestock Access
105.0	x 500	52,500.0	9.94

Appendix 16

050 40004 060 010

Salt Creek headwaters above Little Salt Creek

Total Acres	***28,023.32***	***% of SubWatershed***	***30.13***

Land Use	Acres	%
Wooded	12,085.86	43.13%
Agriculture	15,471.05	55.21%
Pasture	9,186.69	59.38%
Cropland	6,193.85	40.04%
Hay	90.51	0.59%

Operations	#	%
Total	62.00	100.00%
Confined	14.00	22.58%
Non Confined	48.00	77.42%

`

Livestock Species	Total # of Animals	# of Animals Confined	# of Animals Non Confined	% Confined	% Non Confined
Dairy	350.00	350.00	-	100.00%	0.00%
Beef	2,665.00	920.00	1,745.00	34.52%	34.52%
Sheep	5.00	-	5.00	0.00%	100.00%
Horse	44.00	-	44.00	-	100.00%
Hogs	564.00	564.00	-	100.00%	0.00%

050 40004 060 020

Little Salt Creek

Total Acres	***7,456.23***	***% of SubWatershed***	***8.02***

Land Use	Acres	%
Wooded	3,796.07	50.91%
Agriculture	6,134.40	82.27%
Pasture	3,641.94	59.37%
Cropland	2,455.91	40.04%
Hay	35.89	0.59%

Operations	#	%
Total	8.00	100.00%
Confined	-	0.00%
Non Confined	8.00	100.00%

Livestock Species	Total # of Animals	# of Animals Confined	# of Animals Non Confined	% Confined	% Non Confined
Dairy	105.00	-	105.00	0.00%	100.00%
Beef	520.00	115.00	405.00	22.12%	77.88%
Sheep	-	-	-	-	-
Horse	-	-	-	-	-
Hogs	-	-	-	-	-
Other	-	-	-	-	-

Appendix 16 *Continued*

050 40004 060 030

White Eyes Creek

Total Acres	***8,598.24***	***% of SubWatershed***	***9.25***

Land Use	Acres	%
Wooded	4,191.95	48.75%
Agriculture	4,221.88	49.10%
Pasture	3,488.82	82.64%
Cropland	733.06	17.36%
Hay	-	0.00%

Operations	#	%
Total	14	100.00%
Confined	3.00	21.43%
Non Confined	11.00	78.57%

Livestock Species	Total # of Animals	# of Animals Confined	# of Animals Non Confined	% Confined	% Non Confined
Dairy	-	-	-	-	-
Beef	905.00	205.00	700.00	22.65%	77.35%
Sheep	-	-	-	-	-
Horse	15.00	-	15.00	0.00%	100.00%
Hogs	-	-	-	-	-
Other	-	-	-	-	-

050 40004 060 040

Buffalo Creek

Total Acres	***18,274.59***	***% of SubWatershed***	***9.25***

Land Use	Acres	%
Wooded	10,243.50	56.05%
Agriculture	7,713.30	42.21%
Pasture	5,917.74	76.72%
Cropland	1,795.56	23.28%
Hay	-	0.00%

Operations	#	%
Total	17	100.00%
Confined	3.00	17.65%
Non Confined	14.00	82.35%

Livestock Species	Total # of Animals	# of Animals Confined	# of Animals Non Confined	% Confined	% Non Confined
Dairy	100.00	-	100.00	0.00%	100.00%
Beef	1,030.00	295.00	735.00	28.64%	71.36%
Sheep	150.00	-	150.00	0.00%	100.00%
Horse	-	-	-	-	-
Hogs	-	-	-	-	-
Other	-	-	-	-	-

Appendix 16 *Continued*

050 40004 060 050

Boggs Creek

Total Acres	***10,333.41***	***% of SubWatershed***	***11.11***

Land Use	Acres	%
Wooded	4,463.05	43.19%
Agriculture	4,221.88	40.86%
Pasture	2,008.46	47.57%
Cropland	564.21	13.36%
Hay	-	0.00%

Operations	#	%
Total	9	100.00%
Confined	3.00	33.33%
Non Confined	6.00	66.67%

Livestock Species	Total # of Animals	# of Animals Confined	# of Animals Non Confined	% Confined	% Non Confined
Dairy	-	-	-	-	-
Beef	590.00	220.00	370.00	37.29%	62.71%
Sheep	-	-	-	-	-
Horse	-	-	-	-	-
Hogs	-	-	-	-	-
Other	-	-	-	-	-

050 40004 060 060

Manns Fork Salt Creek

Total Acres	***13,567.37***	***% of SubWatershed***	***11.11***

Land Use	Acres	%
Wooded	8,644.12	63.71%
Agriculture	4,665.71	34.39%
Pasture	2,950.75	63.24%
Cropland	1,324.05	28.38%
Hay	390.91	8.38%

Operations	#	%
Total	16	100.00%
Confined	3	18.75%
Non Confined	13.00	81.25%

Livestock Species	Total # of Animals	# of Animals Confined	# of Animals Non Confined	% Confined	% Non Confined
Dairy	-	-	-	-	-
Beef	785.00	130.00	655.00	16.56%	83.44%
Sheep	585.00	-	585.00	0.00%	100.00%
Horse	-	-	-	-	-
Hogs	52.00	20.00	32.00	38.46%	61.54%
Other	-	-	-	-	-

Appendix 16 *Continued*

050 40004 060 070

Salt Creek

Total Acres	***6,746.90***	***% of SubWatershed***	***7.25***

Land Use	Acres	%
Wooded	3,918.74	58.08%
Agriculture	2,709.54	40.16%
Pasture	1,289.00	47.57%
Cropland	1,420.53	52.43%
Hay	-	0.00%

Operations	#	%
Total	5	
Confined	0	0.00%
Non Confined	5.00	100.00%

Livestock Species	Total # of Animals	# of Animals Confined	# of Animals Non Confined	% Confined	% Non Confined
Dairy	-	-	-	-	-
Beef	295.00	100.00	195.00	33.90%	66.10%
Sheep	-	-	-	-	-
Horse	-	-	-	-	-
Hogs	-	-	-	-	-
Other	-	-	-	-	-

Salt Creek Watershed

Total Acres

Total Acres	***93,000.05***	***% Watershed***	***100.00***

Land Use	Acres	%
Wooded	46,367.50	49.86%
Agriculture	44,868.19	48.25%
Pasture	28,483.40	63.48%
Cropland	14,487.17	32.29%
Hay	517.31	1.15%

Operations	#	%
Total	131.00	100.00%
Confined	26.00	19.85%
Non Confined	105.00	80.15%

Livestock Species	Total # of Animals	# of animals Confined	# of Animals Non Confined	% Confined	% Non Confined
Dairy	555.00	350.00	205.00	63.06%	36.94%
Beef	6,790.00	1,985.00	4,805.00	29.23%	70.77%
Sheep	740.00	-	740.00	0.00%	100.00%
Horse	37.00	-	37.00	0.00%	100.00%
Hogs	1,360.00	584.00	776.00	42.94%	57.06%
Other	2.00	-	2.00	0.00%	0.00%

Appendix 17
Nonattainment / Attainment Miles

HUC	Site #	Location	River Mile	Gradient ft. / mile	Drainage sq. miles	Total Stream Miles	Nonattainment Miles	Partial Attainment Miles	Attainment Miles
050 40004 060 010	1	*Salt Ck. @ Knipe Rd.*	23.43	28.34	43.79	27.1	0.0`	19.23	7.87
	2	*Salt Ck. @ Arch Hill Rd. C.B.*	15.52	19.47					
Salt Creek Headwaters above Little Salt Creek	3	*Salt Ck. @ Rt. 40 east of Bridgeville*	12.91	69.06					
	4	*Frog Run @ Arch Hill Rd.*	12.92/0.36	16.13					
	5	*Salt Ck. @ Clay Pike Rd. 500-600' west of jct w/Spry Rd*	7.96	10.60					
	27	*Salt Ck. @ Bethel Rd.*	n/a	33.74					
050 40004 060 020	6	*Little Salt Creek @ Clay Pike Rd.*	7.46/ 0.11	25.56	11.65	7.5	0.0	4.12	3.38
	7	*Little Salt Ck. @ Jackson Rd.*	7.46/ 6.38	16.75					
Little Salt Creek	8	*Little Salt Ck. @ Church Hill Rd. just Dst. Unnamed trib.*	7.46/ 7.44	8.21					
	26	*Unnamed Trib. @ Park Lane Rd.*	n/a	33.74					

Appendix 17 *continued*
Nonattainment / Attainment Miles

HUC	Site #	Location	River Mile	Gradient ft. / mile	Drainage sq. miles	Total Stream Miles	Nonattainment Miles	Partial Attainment Miles	Attainment Miles
050 40004 060 030	9	*White Eyes Ck. @ Wolf Run Rd.*	6.45/ 0.39	13.00	13.43	8.6	0.0	4.63	3.97
White Eyes	10	*White Eyes Ck. @ Okey Rd. upst. Pleasant Run*	61.45/ 1.67	28.83					
	11	*White Eyes Ck. @ Zane Grey Rd. upst. Unnamed trib*	6.45/ 3.24	7.55					
	12	*White Eyes @ Southern Rd.*	6.45/ 4.96	39.02					
050 40004 060 040	13	*Buffalo Fk. @ Tumblin (Okey Rd.)*	4.45/ 2.14	7.55	28.55	15.1	0.0	8.47	6.63
	14	*Buffalo @ South Leedom Rd.*	4.45/ 6.55	39.02					
Buffalo Fork	15	*Williams Fk. @ Green Valley Rd.*	4.45/3.15/ 3.37	25.75					
	19	*Buffalo Fk. @ SR 146 just west of jct. w/ Pryor Rd.*	4.45/4.17	13.97					
	28	*Buffalo Fk.@High Freeland Rd.*	n/a	37.81					
	29	*Buffalo Fk. @ Green Valley Rd.*	n/a	7.01					

Appendix 17 *continued*

Nonattainment / Attainment Miles

HUC	Site #	Location	River Mile	Gradient ft. / mile	Drainage sq. miles	Total Stream Miles	Nonattainment Miles	Partial Attainment Miles	Attainment Miles
050 40004 060 050	16	*Boggs Ck. @ SR 146 jst. wst. Of jct. W/ Three Towers*	2.55/4.04	9.39	16.15	11.4	0.0	5.98	5.42
Boggs Creek	17	*Boggs Ck. @ Salt Ck. Dr. just west of jct. w/Wilhelm Rd.*	2.55/0.93	17.73					
	18	*Boggs Ck. Near Mast Rd. just dst Indain Run*	2.55/2.09	29.58					
	30	*Boggs Ck. @ Miller Lane*	n/a	11.81					
050 40004 060 060	20	*Kent Run @ Browning Rd.*	2.10/2.53/1.17	27.70	21.20	13.4	0.0	4.71	8.69
Mann's Fork Salt Creek	21	*Mann's Fork Salt Ck. @ Cutler Lake Rd.*	2.10/3.70	50.05					
	22	*Mann's Fork @ Mock Dr.*	2.10/2.31	16.03					
	31	*Sugar Grove Run@ Wion Ridge Rd.*	n/a	81.72					
050 40004 060 070	23	*Salt Ck. @ Burnt Mill Rd.*	3.45	8.61	10.54		0.0	5.10	2.76
Salt Creek	24	*Salt Ck. @ St. Rt. 60 along Cutler Lake Rd.*	0.05	32.16					
	25	Salt Ck. SR 146 jst. wst. w/ Wolf Run Rd.	n/a	11.24					

Appendix 18

Riparian Buffer 05040004 060 010	
Total Feet	245989.55
Miles w Riparian Buffer	23.29
Miles w/o Riparian Buffer	3.21
Total Stream Miles	26.5

Riparian Buffer 05040004 060 020	
Total Feet	55229.2
Miles w Riparian Buffer	5.23
Miles w/o Riparian Buffer	2.27
Total Stream Miles	7.50

Riparian Buffer 05040004 060 030	
Total Feet	83879.55
Miles w Riparian Buffer	7.94
Miles w/o Riparian Buffer	0.66
Total Stream Miles	8.60

Riparian Buffer 05040004 060 040	
Total Feet	70573.71
Miles w Riparian Buffer	6.68
Miles w/o Riparian Buffer	8.42
Total Stream Miles	15.10

Riparian Buffer 05040004 060 050	
Total Feet	70066.59
Miles w Riparian Buffer	6.64
Miles w/o Riparian Buffer	4.76
Total Stream Miles	11.40

Riparian Buffer 05040004 060 060	
Total Feet	138444.01
Miles w Riparian Buffer	13.11
Miles w/o Riparian Buffer	0.29
Total Stream Miles	13.40

Riparian Buffer 05040004 060 070	
Total Feet	51482.34
Miles w Riparian Buffer	4.88
Miles w/o Riparian Buffer	3.23
Total Stream Miles	8.11

Appendix 19

Salt Creek Watershed Evaluation Project

Salt Creek Community Focus Group

Please complete the following survey. Answers strictly confidential and will viewed only by resource personnel to help identify the conservation needs in the Salt Creek Watershed. Please return it to the Muskingum Soil and Water Conservation District Office or return by mail (see reverse side). Stop in the Muskingum SWCD Office. Thank you for your input.

Salt Watershed Boundaries

North:	**Adamsville**
East:	**Rix Mill Rd.**
South:	**Blue Rock State Forest**
West:	**St. Rt. 93**

Do you live in the Salt Creek Watershed? (Circle One)

Yes No

In which townships in your land located? (Circle One)

Perry	Rich Hill
Salt Creek	Blue Rock
Washington	Wayne
Union	Highland
Meigs	

Land Use(s): (Circle all that apply)

Agriculture	Commercial	(Industrial)
Residential	Recreation	(Hunting, etc.)
Idle	Other	

For the land uses listed above please list the approximate acreages: (Circle all that apply)

Woodland	Residential
Pastureland	Commercial
Cropland	Idle

Do you have livestock on this acreage: (Circle One)

Yes No

If yes, please indicate how many of each species: (Circle all that apply)

Beef	Sheep
Hogs	Horses
Dairy	Other

Is knowing the fertility level of your soil and/or the nutrient level of your manure important to you? (Circle One)

Yes No

Have you tested your soil or your manure in the last 3 years? (Circle One)

Yes No

Please check your water source's): (Circle all that apply)

Spring	Public
Well	Stream
Cistern	Pond

Maintenance of Septic Systems

Do you have public sewage systems or own a septic system? (Circle One)

Yes No

What is your maintenance?

Check your water use(s): (Circle all that apply)

Home Recreational

Livestock Industrial

Irrigation Other

Please check the items (s) that you feel are a problem in the Salt Creek Watershed: (Circle all that apply)

Animal water Runoff
Drinking Water (Lack of / Good)
Fertilizers & Pesticides Runoff
Flooding
Industrial Waste
Litter/ Trash Dumping
Log Jams
Oil/ Gas Wells (Brine)
Septic Systems (Failing)
Soil Loss (Erosion)
Erosion from farming
Erosion from timbering
Urban Runoff (Storm water)
Other

Do you have any solutions to address these problems?

How do you view the following?

	Positive	Negative	No Opinion
Farmland Preservation			
Urban Growth			

How would you like to be kept informed about the project? (Circle all that apply)

Newsletter Newspaper

Radio Field Days

Personal Contact Other

Would you like your name to be eliminated from the mailing list? (Circle One)

Yes No

To be personally contacted to have your name removed from the mailing list, please write your name address:

Name
Address
City
Zip
Phone

Appendix 20
Subwatersheds Load Reductions

05040004 060 010

	lbs./yr.
Pollutant Load Reductions: Biological Oxygen Demand Reduction	6570
Phosphorus Reduction	987
Nitrogen Reduction	5228

05040004 060 030

Pollutant Load Reductions: Biological Oxygen Demand Reduction	863
Phosphorus Reduction	130
Nitrogen Reduction	648

05040004 060 040

	lbs./yr.
Pollutant Load Reductions: Biological Oxygen Demand Reduction	3023
Phosphorus Reduction	454
Nitrogen Reduction	2268

05040004 060 050

Pollutant Load Reductions: Biological Oxygen Demand Reduction	2692
Phosphorus Reduction	404
Nitrogen Reduction	2020

05040004 060 010

Salt Creek Headwaters above Little Salt Creek

Land Uses

The Salt Creek Headwaters above Little Salt Creek subwatershed is the largest subwatershed has with 28,023.32 acres of land and is 30.13% of the watershed. The current land uses in this subwatershed are composed of 55.20% agricultural, 43.13% wooded areas, 1.14% Shrub Scrub, 0.29% Urban, 0.17% Non-Forested Wetlands, 0.05% Barren, and 0.02% Open Water (Figure 1). There are 43.79 drainage miles and 26.5 miles of streams. There are 3.21 miles of stream without riparian buffer and 19.23 miles in nonattainment status. The Salt Creek Headwaters above Little Salt Creek subwatershed has one of the largest populations compared to the other six HUC areas with approximately 2,527 individuals (Table 2).

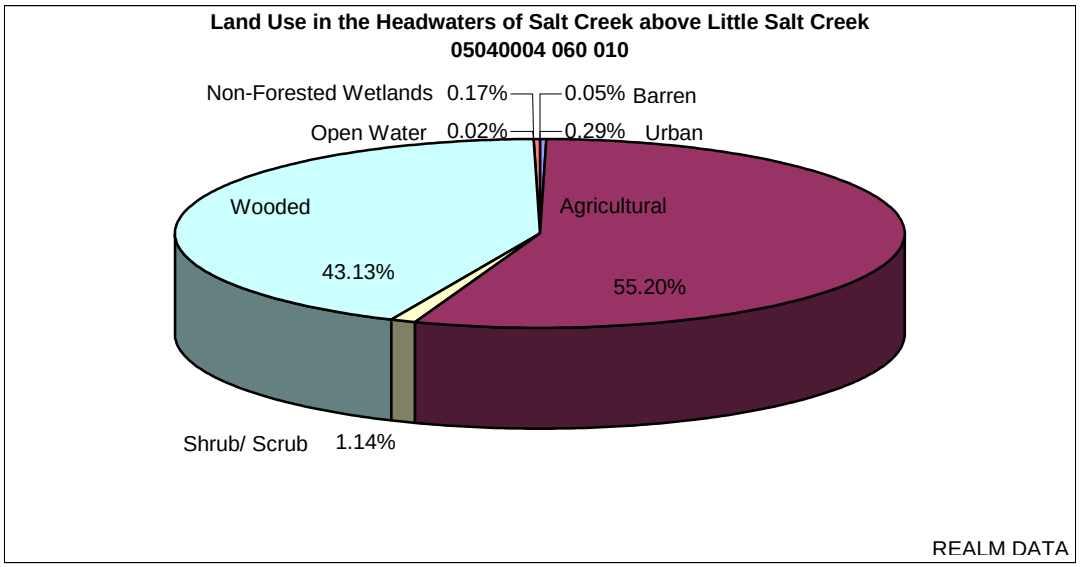


Figure 1 Land Uses in 05040004 060 010

Water Quality

Six sampling sites were analyzed in the Salt Creek Headwaters above the Little Salt Creek subwatershed. The six sampling sites give a comprehensive look at the water quality throughout the subwatershed. Each of the sampling sites were selected based on the following conditions: accessible bridge or road crossing, drainage area, representative of the major land use/ land cover patterns, represented sampling within the 14 digit HUC, and accessibility to perform habitat assessments. The sampling site locations give us better understanding of where the contaminants are derived from. The following are figures showing the comparison of 2003-2004 sampling data.

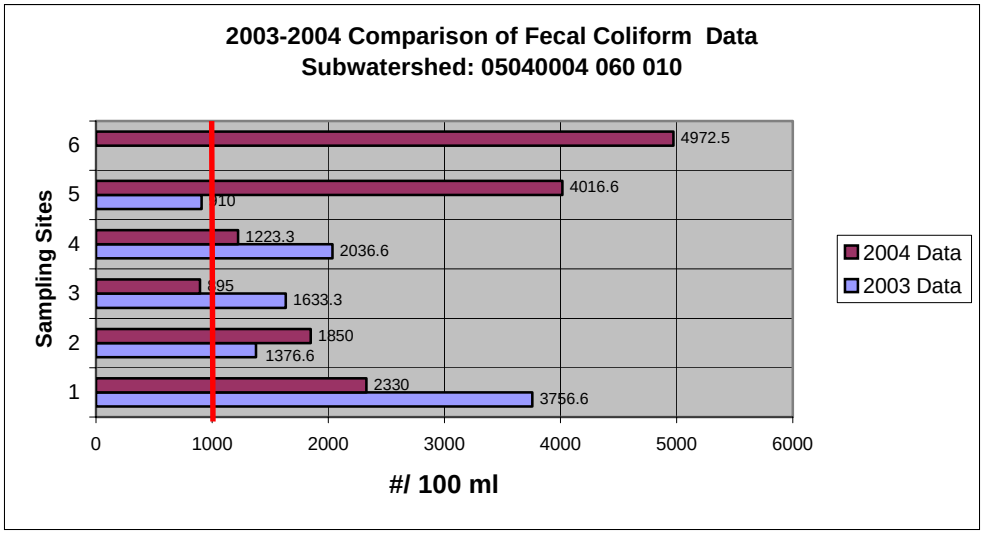


Figure 2- 05040004 060 010 Fecal Coliform Data

The fecal coliform target limit for aquatic streams is 1000- 2000 cpu/100ml for primary contact and 5000 cpu/100ml for agricultural use. (Figure 2)

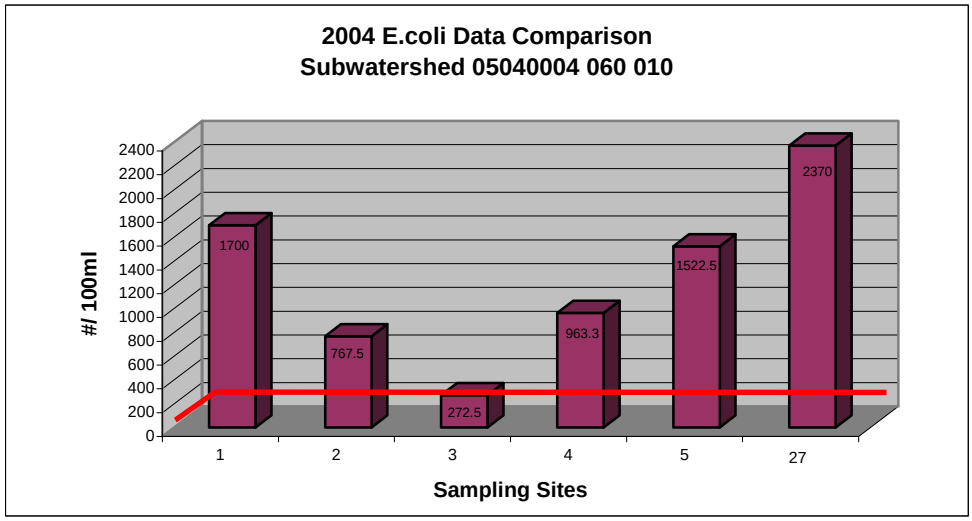


Figure 3- 05040004 060 010 E.coli Data

The E.coli target limit for aquatic streams is 576 per 100ml (animal use) and 126 per 100 ml or 298 per 100 ml. (human use). (Figure 3)

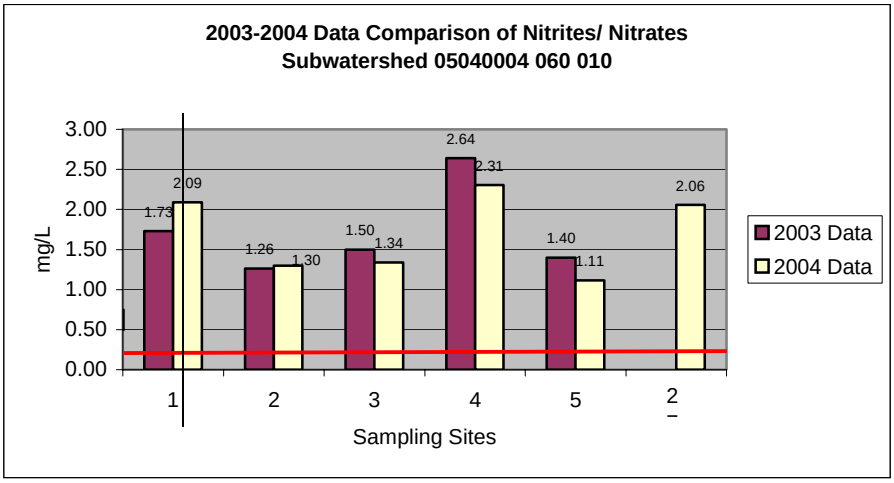


Figure 4- 05040004 060 010 Nitrites/ Nitrates Data

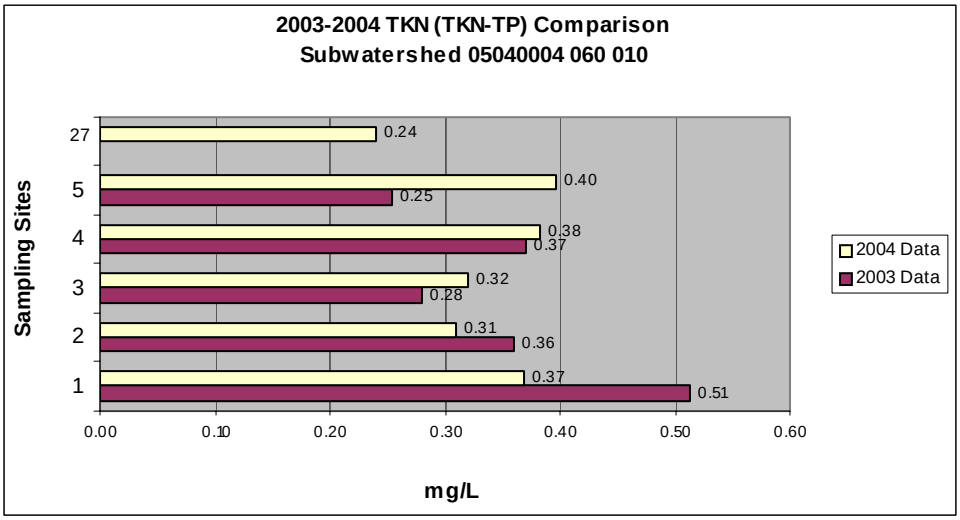


Figure 5- 05040004 060 010 TKN (TKN-TP) Data

Nitrite-Nitrate target limit for aquatic streams is < 0.10 mg/L. Nitrates that later combine with phosphorus can promote algae growth within streams. Nitrogen compounds entering streams are the result of livestock manure or feeding area runoff, fertilizers on yards or agricultural fields, sewage, and legumes. Nitrates/ Nitrites, being very water-soluble, have high potential in contaminating ground water. (Figure 4, 5)

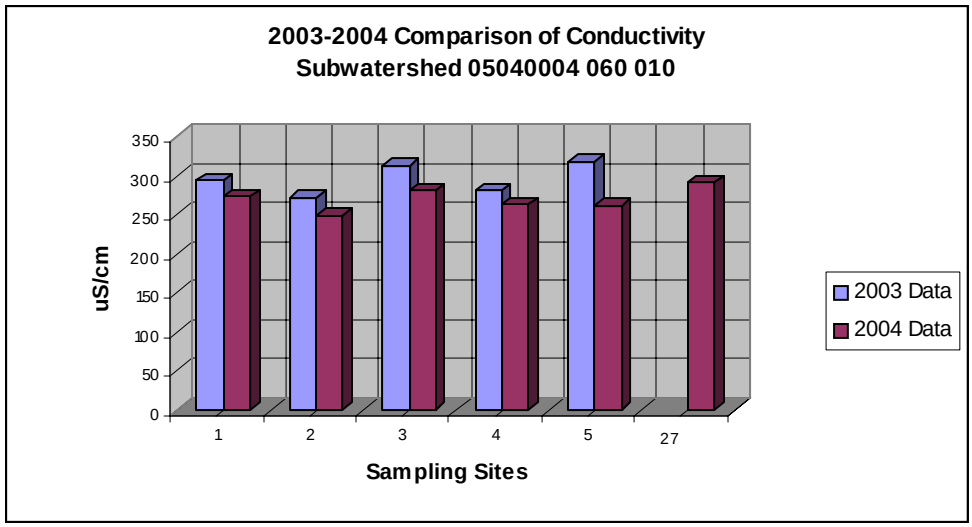


Figure 6-05040004060 010 Conductivity

The conductivity limit is <2400micrmhos/cm @25. All of the sampling sites are below 25C. (Figure 6)

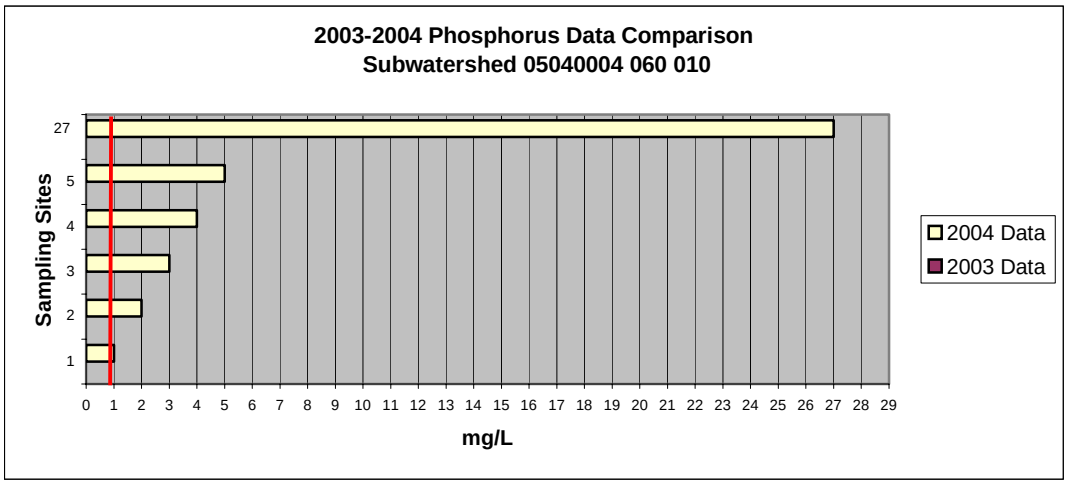


Figure 7-05040004 060 010 Phosphorus Data

The total phosphorus target for aquatic streams is <0.10 mg/L.(Figure 7)

Water Quality Problems

The Fecal Coliform and E.coli levels are extremely high throughout all six sampling sites. These high limits could be caused by failed or nonexisting home sewage treatment systems. The high Fecal Coliform and E.coli limits could also be caused by confined or non-confined livestock operations. The Nitrite/Nitrate levels are high in all six sampling locations also. The high levels could be from severe erosion and not enough riparian corridor. The phosphorus levels are high in some of the sampling locations. The 05040004 060 010 subwatershed has approximately 19.23 miles of streams in nonattainment status.

050 40004 060 010
Salt Creek headwaters above Little Salt Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non-existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department identify and upgrade 10 of the failing septic systems during the first 5 yrs. and 8 during the next 5 years.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Identify the failing home sewage treatment systems	Work with the Muskingum County Health Department to locate, onsite investigation, and propose solutions.	Health Department and Muskingum SWCD Intern (after training with the Muskingum County Health Department) to inspect failing systems.	Track the number of failing Systems inspected	2006-2008
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Write a HSTS Plan with the provision of guidelines to those residents upgrading, repairing, and installation.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Number of systems upgraded, repaired, and installed.	2008-2009
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Apply for a 319 HSTS grant to cost share program for on site septic systems replacement, repair, and upgrade	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Obtain grant providing cost share dollars to residents for replacement, repair, and upgrade.	2009-2010
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Replace, repair, and establishment of 10 home sewage septic systems.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Replace, repair, and establishment of 10 home sewage septic systems.	2010-2012
Failing or non existent home sewage treatment systems are a major contributor to the water quality impairments. The local residents and Muskingum County Health Department identified this as an increasing concern throughout the 05040004 060 010 subwatershed.					

050 40004 060 010

Salt Creek headwaters above Little Salt Creek

Education

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department provide education to the general public to increase the awareness of the failed or non existence home sewage systems.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Septic System Education	Provide Education for Proper Installation and Maintenance of Septic Systems	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Hold Annual Workshop for Home Septic Treatment System Maintenance.	2006-2012

050 40004 060 010

Salt Creek headwaters above Little Salt Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, and fertilizer runoff.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that there will be a decrease in nutrient loads.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load *Extreme amounts of sediment loss	Designing and installing Grade Stabilization Structure	Installation of rip/ rap along the stream bank for stabilization, reducing the sediment and nutrient run off.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Account for the amount of rip/ rap installed. Cost is varied site to site	2006-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The repair or roofing of Animal Waste Storage Facility	Roofing or Repair of animal waste storage facilities on 2 of the confined livestock operations.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation or repair of 2 manure storage facilities.	2006-2009
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Setting aside land and Filter Strips	Establish filter strip of cool season grasses/ legumes on 15 acres costing approximately $1580.00.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 15 acres of filter strips on confined livestock operations to reduce the runoff from the confined livestock operation to the stream.	2006-2009

050 40004 060 010
Salt Creek headwaters above Little Salt Creek
Technical

Problem Statement: Extreme amount of bank erosion and siltation has caused loss of land and impaired the streams water quality.

Goal: Working and educating the local producers, commercial builders, township trustees, and land owners on proper sediment loss and erosion control measures. By implementing these strategies the anticipation is that there will be a decrease in nutrient loads.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *High Nitrites/ Nitrates *High Phosphates	Install Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of livestock exclusion fencing on 2.0 miles of stream bank, costing approximately $1.10 per ft. with a total cost of $5,808.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Track the amount of livestock exclusion fence installed. Installation of livestock exclusion fencing on two miles (8500ft.) of livestock accessible streams.	2006-2009
*High levels of Fecal Coliform and E.coli *High Nitrites/ Nitrates *High Phosphates	The construction of Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of 10 livestock pipeline water systems with 8,400 ft. of tile, and troughs approximately cost $19,000.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 10 alternative watering systems on the non confined livestock operations.	2006-2010
*High levels of Fecal Coliform and E.coli *High Nitrites/ Nitrates *High Phosphates	Construction of Access Road and Heavy Use Area Protection	Installation of 5 livestock access stream crossings approximately cost $27,225.00 and 4 heavy use protection areas approximately costing $8,000.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 5 livestock access stream crossings on unconfined livestock operations and 4 heavy use area protection area	2006-2010
*High levels of Fecal Coliform and E.coli *High Nitrites/ Nitrates *High Phosphates	The setting aside land for forested riparian buffer strip next to the streambank.	Installation of riparian buffer on the stream bank using a 35 foot minimum buffer on 900 ft. of the total amount of unrestricted livestock access.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The planting of trees and cool season grasses/ legumes on 900 ft. for riparian buffer.	2006-2009
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	Township Road Ditch Erosion (Zoned or Not) Reduction of sediment loss and road ditch erosion.	Designing the road ditch or culvert at a 10 yr. Capacity to reduce sediment loss.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Designing the road ditch or culvert at a 10 yr. Capacity to reduce sediment loss. Track the mile of road ditch repaired.	2006-2009

*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	Advise Township Trustees on sediment loading and assist in reduction of sediment loss and erosion.	Assisting Township Trustees in looking at land development sediment loss, and erosion control structures.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The tracking of the number of assistants requested and number of acres under advisement. Measure by the acres and sediment reduction.	2006-2009
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	The reduction of peek post development flows.	To provide review or inspection services to the Muskingum County to ensure compliance.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Number of developed acres in the Salt Creek Watershed. Also if they are incompliance with the predevelopment flows.	2007-2011

050 40004 060 010

Salt Creek headwaters above Little Salt Creek

Education

Problem Statement: The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, fertilizer runoff, extreme bank erosion, and sediment loss.

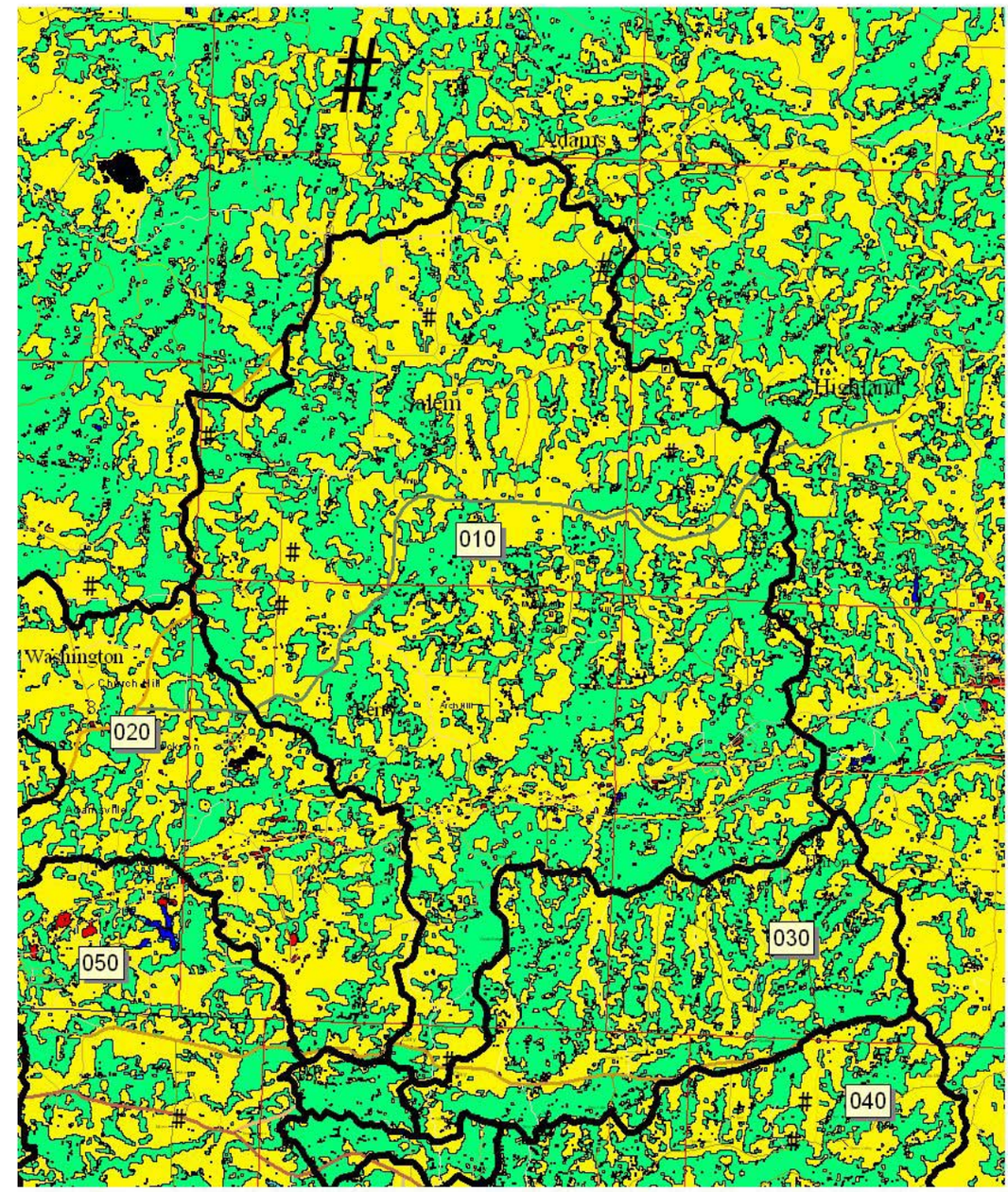
Goal: Educate the local producers on proper manure storage, application, grazing management, erosion control, stormwater management, and tillage methods.

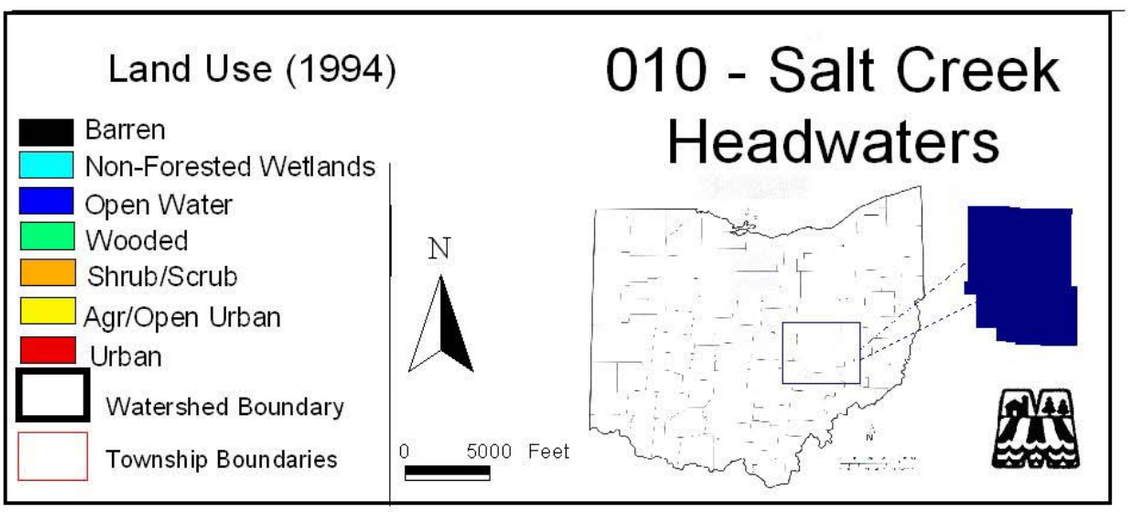
Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Provide information on proper Manure Application.	Educate watershed producers on proper manure storage and application. Encourage proper management to improve the water quality.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual LEAP 1 and LEAP 2 meetings. Hold an annual winter manure application meeting. Track the number of participants.	2006-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Increase the producers knowledge of Nutrient Management	Educate watershed producers on nutrient management and development of two CNMP.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Conduct CNMP Workshops to educate watershed livestock producers. Develop plans for 2 of the livestock producers.	2006-2011
*Heavy Nutrient Load	Increase the producer's knowledge of Intensive Grazing Management.	Educate watershed producers on grazing management and increase the amount of intensive grazing by 4 producers.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual grazing workshops and report the number of NRCS EQIP sign up and acres. Increase the amount of intensive grazing by 4 producers	2006-2011
*Heavy Nutrient Load	Provide information on Conservation Tillage and increase conservation tillage per subwatershed.	Educate watershed producers on tillage practices. Increase the no tillage by 900 acres in five years by allowing free rental of the no till drills to Salt Creek Watershed residents.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual conservation tillage workshop throughout the Salt Creek Watershed. Track the number of acres planted by the no till drill. Increase the acres by 900 in five years. Rental Rate $8.00 per acre =$7,200.00	2006-2011

*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on soil properties related to development. Help with soil loss reduction and erosion control.	Educate Realtors and Home Owners on soil properties related to development.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual realtors/ Home Owner Workshop. Track by the number attended and contacted.	2006-2011
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on stormwater management and erosion control.	Educate Commercial Developers and Consultants on erosion control and stormwater management.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual commercial developers and Consultants erosion control and stormwater management workshop. Track by the number in attendance.	2006-2011

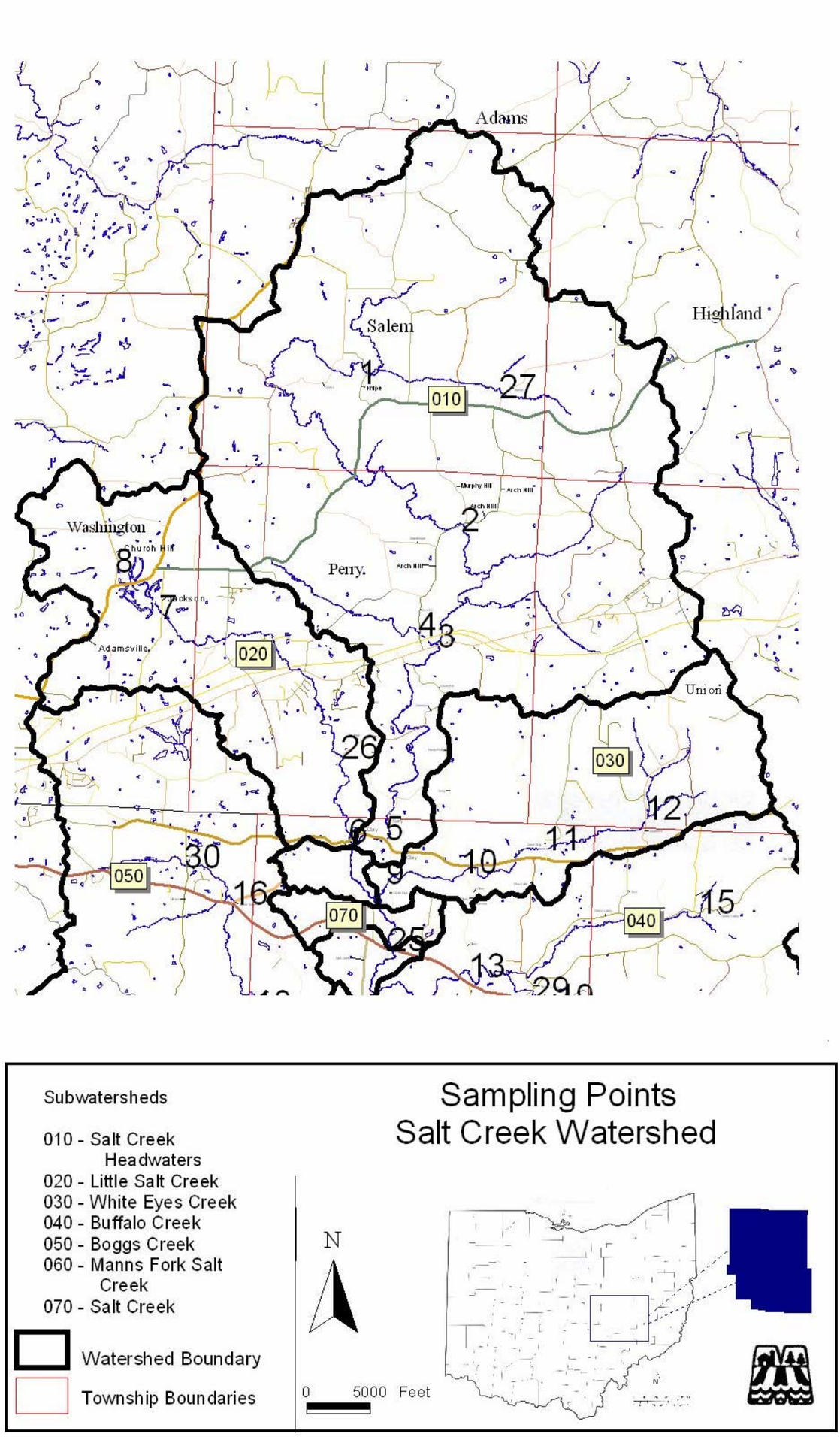
Considering the water quality and type/amount of land uses throughout the 05040004 060 010 sub watershed the above practices were selected to bring the water quality into full attainment. The cost was figured off of NRCS cost estimates. The reduction goal was based on the average concentration and flow rate. The total reduction goal is 10 % of the yearly load.

Pollutant Load Reductions:	Reduction Goal	Reference
Fecal Coliform/ E.coli Reduction	250 #/100 ml	Appendix 13 (Avg. #/100ml)
Phosphorus Reduction	300 lbs/per year	Appendix 13/ Figure 7 (lbs/year reduced by 10%)
Nitrogen Reduction	8,000 lbs/per year	Appendix 13/Figure 4 & 5 (lbs/year reduced by 10%)
Improve QHEI Scores	**75-95 Total QHEI**	Appendix 5
Improve Macroinvertebrate Counts	**17-22 Good**	Appendix 6





Map 1- 010- Land Use



Map 2- 010-030 Sampling Points

05040004 060 020

Little Salt Creek

Land Uses

The Little Salt Creek subwatershed is 8.01 % of the whole watershed with 7,456.23 acres of land. The current land uses in this subwatershed are composed of 59.75% agricultural, 37.94% wooded areas, 0.84% Shrub Scrub, 0.92% Urban, 0.17% Non-Forested Wetlands, 0.10% Barren, and 0.27% Open Water (Figure 8). There are 11.65 drainage miles and 7.5 miles of streams. There are 2.27 miles of stream without riparian buffer and 4.12 miles in nonattainment status. The Little Salt Creek subwatershed population is 1,557 individuals (2000Census). (Table 2).

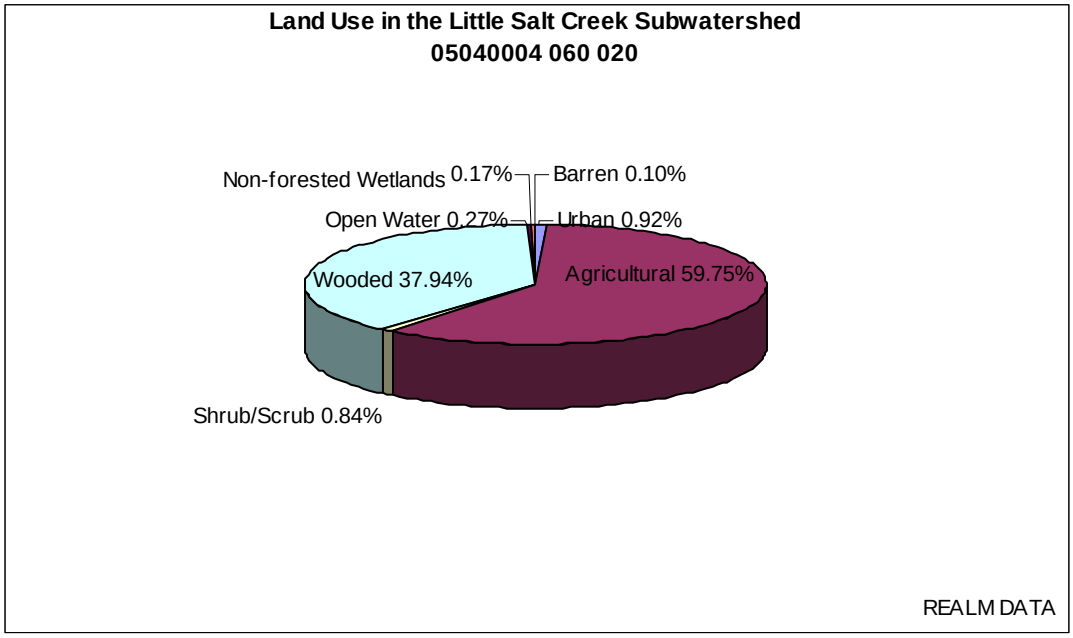


Figure 8- Land Uses in 05040004 060 020

Water Quality

Four sampling sites were analyzed in the Little Salt Creek subwatershed. The four sampling sites give a comprehensive look at the water quality throughout the subwatershed. Each of the sampling sites were selected based on the following conditions: accessible bridge or road crossing, drainage area, representative of the major land use/ land cover patterns, representative of sampling within the 14 digit HUC, and accessibility to perform habitat assessments. The sampling site locations give us better understanding of where the contaminants are derived from. The following are figures showing the comparison of 2003-2004 sampling data.

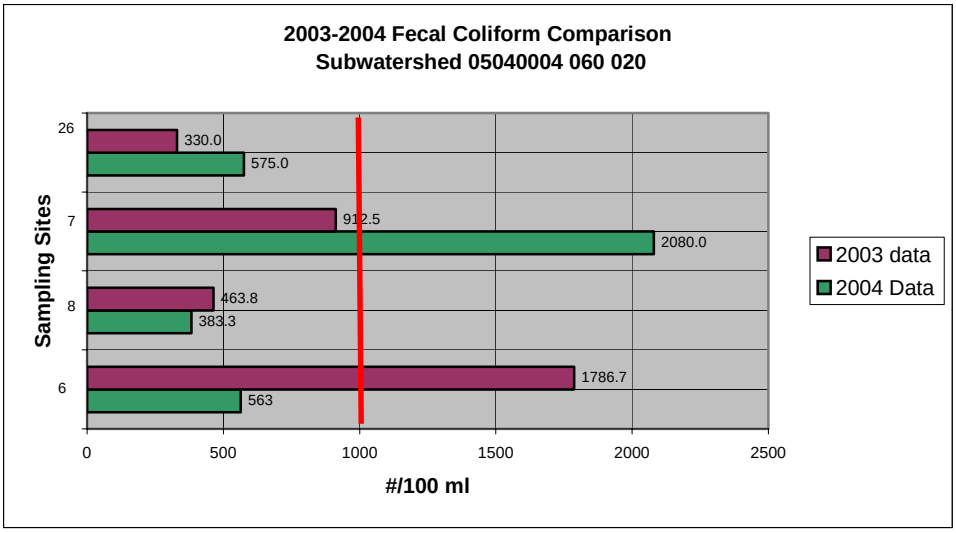


Figure 9- 05040004 060 020 Fecal Coliform Data

The fecal coliform target limit for aquatic streams is 1000- 2000 cpu/100ml for primary contact and 5000 cpu/100ml for agricultural use. (Figure 9)

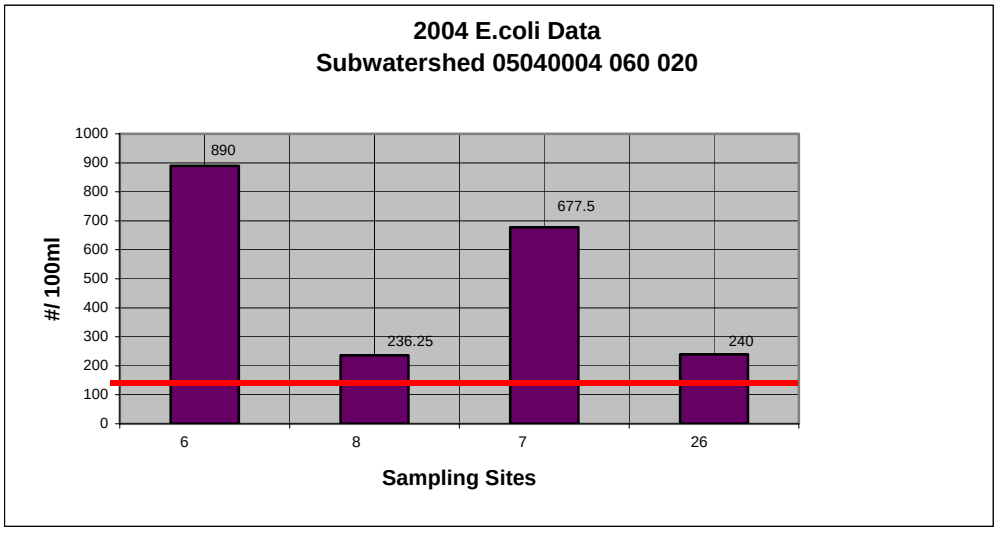


Figure 10- 05040004 060 020 E.coli Data

The E.coli target limit for aquatic streams is 576 per 100ml (animal use) and 126 per 100 ml or 298 per 100 ml. (human use). (Figure 10)

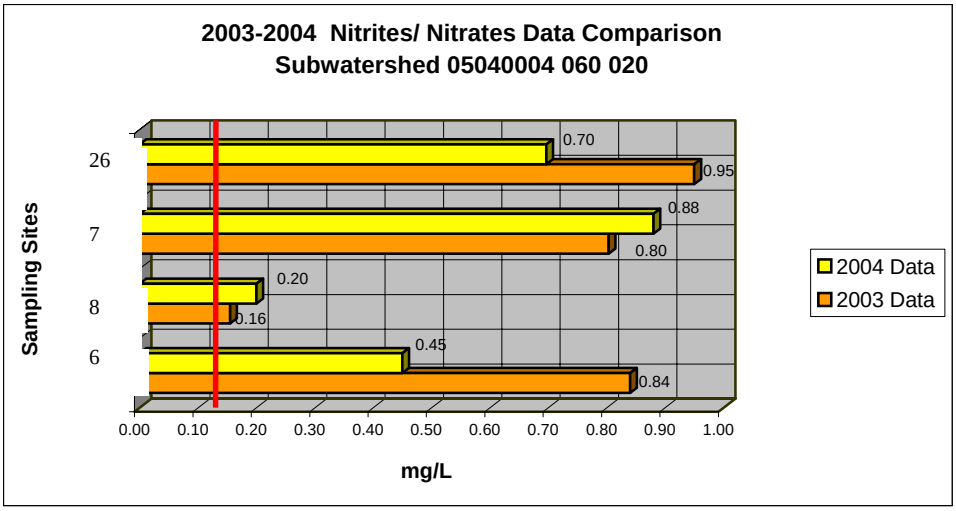


Figure 11- 05040004 060 020 Nitrites/ Nitrates Data

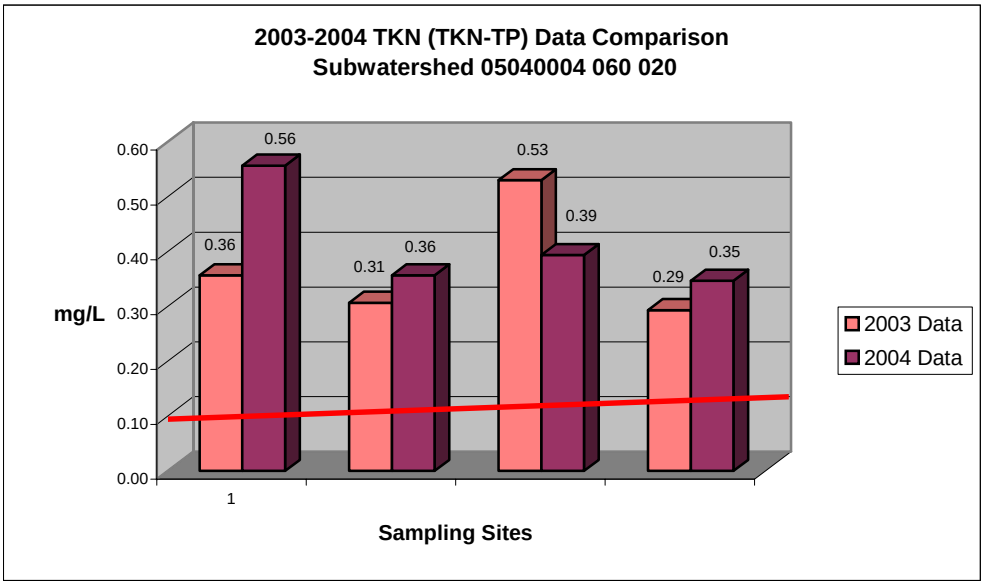


Figure 12- 05040004 060 020 TKN (TKN-TP) Data

Nitrite-Nitrate target limit for aquatic streams is < 0.10 mg/L. Nitrates that later combine with phosphorus can promote algae growth within streams. Nitrogen compounds entering streams are the result of livestock manure or feeding area runoff, fertilizers on yards or agricultural fields, sewage, and legumes. Nitrates/ Nitrites, being very water-soluble, have high potential in contaminating ground water. (Figure11, 12)

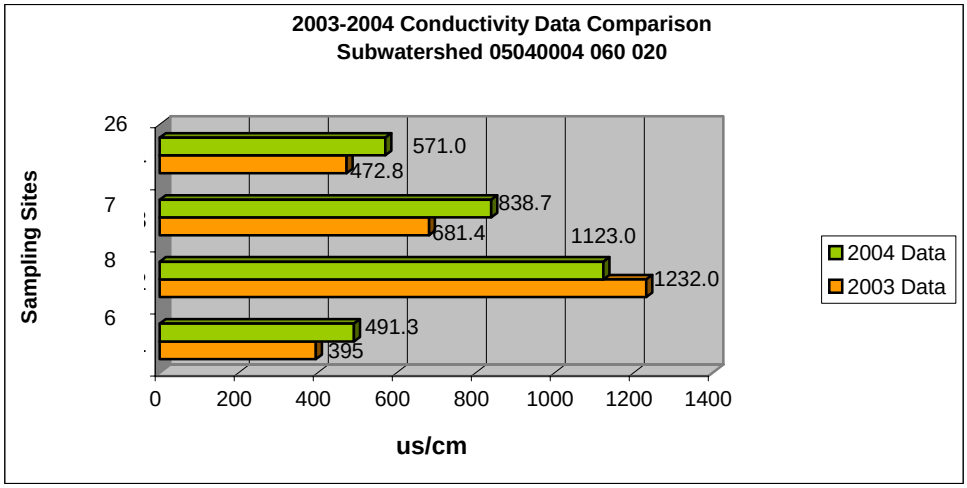


Figure 13-05040004060 020 Conductivity

The conductivity limit is <2400micrmhos/cm @25. All of the sampling sites are below 25C. (Figure 13)

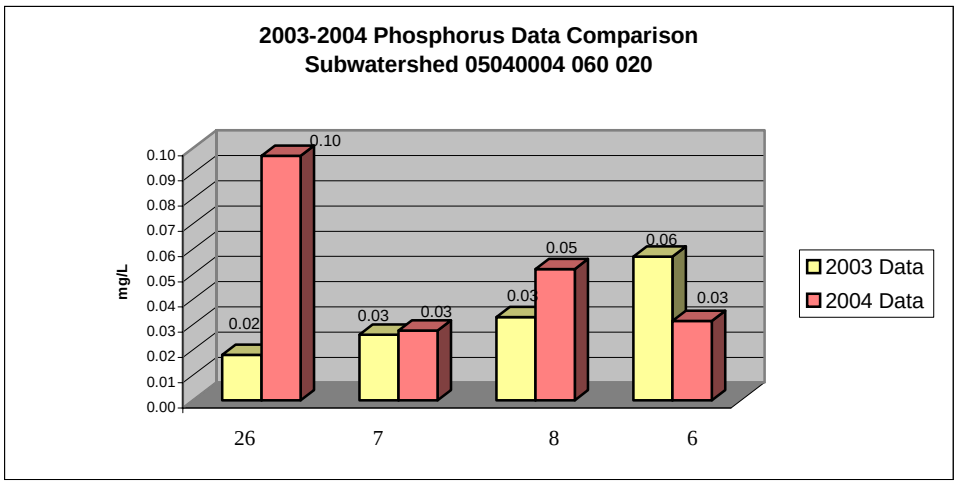


Figure 14- 05040004 060 020 Phosphorus Data

The total phosphorus target for aquatic streams is <0.10 mg/L. (Figure 14)

Water Quality Problems

The Fecal Coliform and E.coli levels are extremely high throughout all four sampling sites. These high limits could be caused by failed or nonexisting home sewage treatment systems. The high Fecal Coliform and E.coli limits could also be caused by non-confined livestock operations. The Nitrite/Nitrate levels are high in all four sampling locations also. The high levels could be from severe erosion and not enough riparian corridor. The phosphorus levels are all under the target limit. The 05040004 060 020 subwatershed has approximately 4.12 miles of streams in nonattainment status.

050 40004 060 020
Little Salt Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department identify and upgrade 5 of the failing septic systems during the first 5 yrs. and 5 during the next 5 years.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Identify the failing home sewage treatment systems	Work with the Muskingum County Health Department to locate, onsite investigation, and propose solutions.	Health Department and Muskingum SWCD Intern (after training with the Muskingum County Health Department) to inspect failing systems.	Track the number of failing Systems inspected	2006-2008
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Write a HSTS Plan with the provision of guidelines to those residents upgrading, repairing, and installation.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Number of systems upgraded, repaired, and installed.	2008-2009
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Apply for a 319 HSTS grant to cost share program for on site septic systems replacement, repair, and upgrade	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Obtain grant providing cost share dollars to residents for replacement, repair, and upgrade.	2009-2010
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Replace, repair, and establishment of 5 home sewage septic systems.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Replace, repair, and establishment of 5 home sewage septic systems.	2010-2012

Failing or non existent home sewage treatment systems are a major contributor to the water quality impairments. The local residents and Muskingum County Health Department identified this as an increasing concern throughout the 05040004 060 020 subwatershed

050 40004 060 020

Little Salt Creek

Education

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department provide education to the general public to increase the awareness of the failed or non existence home sewage systems.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Septic System Education	Provide Education for Proper Installation and Maintenance of Septic Systems	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Hold Annual Workshop for Home Septic Treatment System Maintenance.	2006-2012

050 40004 060 020
Little Salt Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli is suspected to because by the improper storage and application of livestock manure, unrestricted livestock stream access, and fertilizer. Also extreme amount of bank erosion and sediment loss also could cause the high nutrient loadings.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that the attaining water quality targets will be met

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Install Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of livestock exclusion fencing on 1.0 miles of stream bank, costing approximately $1.10 per ft. with a total cost of $5,808.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Track the amount of livestock exclusion fence installed. Installation of livestock exclusion fencing on 1.0 mile (5280ft.) of livestock accessible streams.	2007-2009
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The construction of Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of 3 livestock pipeline water systems with 1800 ft. of tile, and troughs approximately cost $7,740.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 3 alternative watering systems on the non confined livestock operations.	2008-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Construction of Access Road and Heavy Use Area Protection	Installation of 2 livestock access stream crossings approximately cost $11,000.00 and 1 heavy use protection areas approximately costing $2,000.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 2 livestock access stream crossings on non confined livestock operations and 1heavy use area protection area	2008-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The setting aside land for forested riparian buffer strip next to the streambank.	Installation of riparian buffer on the stream bank using a 35 foot minimum buffer on 5280ft. of the total amount of unrestricted livestock access.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The planting of trees and cool season grasses/ legumes on 5280 ft. of stream bank without riparian buffer.	2007-2009
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load *Extreme amounts of sediment loss	Designing and installing Grade Stabilization Structure	Installation of rip/ rap along the stream bank for stabilization, reducing the sediment and nutrient run off.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Account for the amount of rip/ rap installed. Cost is varied site to site	2007-2010

050 40004 060 020

Little Salt Creek

Education

Problem Statement: The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, fertilizer runoff, extreme bank erosion, and sediment loss.

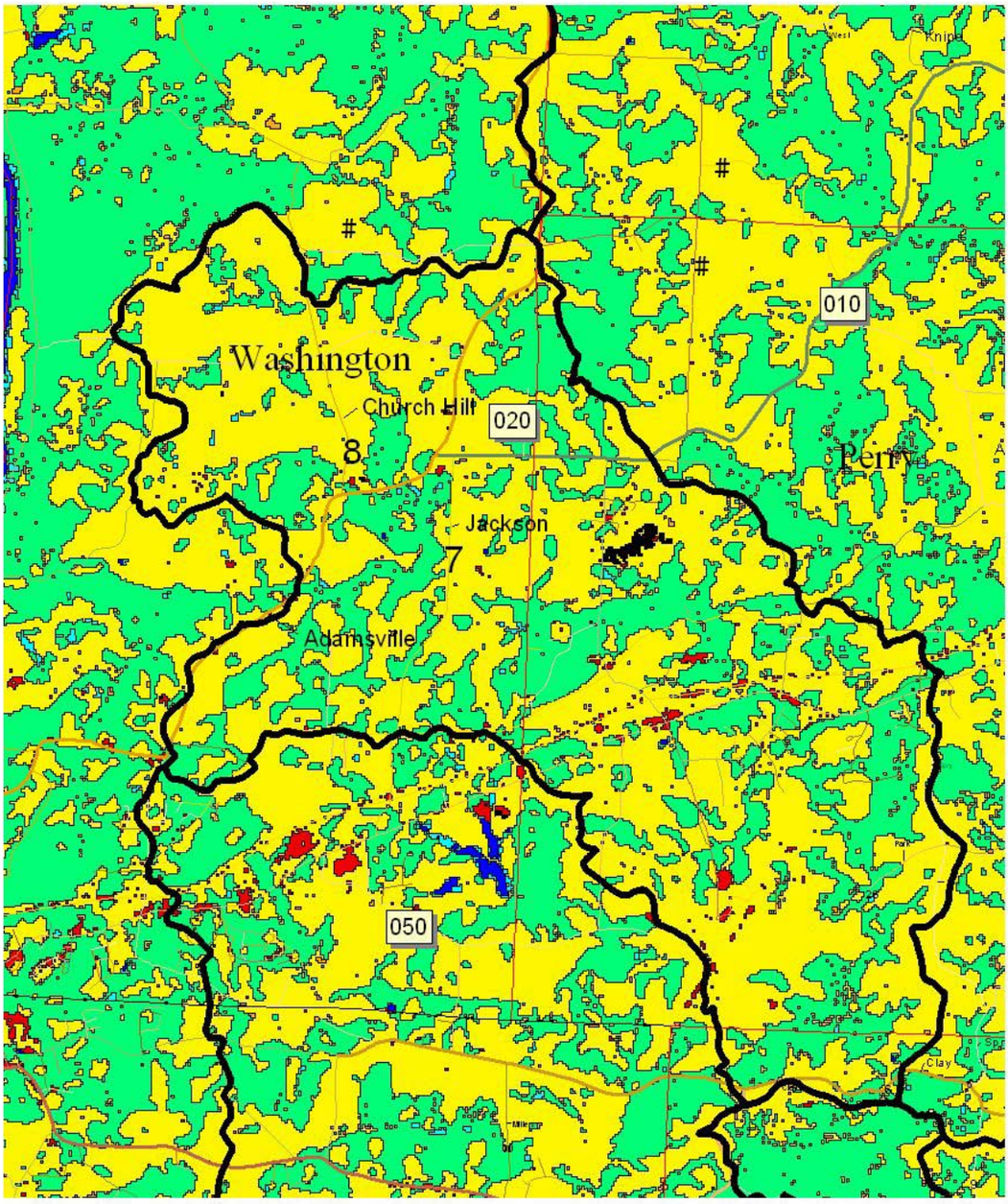
Goal: Educate the local producers on proper manure storage, application, grazing management, erosion control, stormwater management, and tillage methods.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Provide information on proper Manure Application.	Educate watershed producers on proper manure storage and application. Encourage proper management to improve the water quality.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual LEAP 1 and LEAP 2 meetings. Hold an annual winter manure application meeting. Track the number of participants.	2006-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Increase the producers knowledge of Nutrient Management	Educate watershed producers on nutrient management and development of two CNMP.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Conduct CNMP Workshops to educate watershed livestock producers. Develop plans for 2 of the livestock producers.	2006-2011
*Heavy Nutrient Load	Increase the producer's knowledge of Intensive Grazing Management.	Educate watershed producers on grazing management and increase the amount of intensive grazing by 1 producer.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual grazing workshops and report the number of NRCS EQIP sign up and acres. Increase the amount of intensive grazing by 1 producers	2006-2011
*Heavy Nutrient Load	Provide information on Conservation Tillage and increase conservation tillage per subwatershed.	Educate watershed producers on tillage practices. Increase the no tillage by 400 acres in five years by allowing free rental of the no till drills to Salt Creek Watershed residents.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual conservation tillage workshop throughout the Salt Creek Watershed. Track the number of acres planted by the no till drill. Increase the acres by 400 in five years. Rental Rate $8.00 per acre =$3,200.00	2006-2011

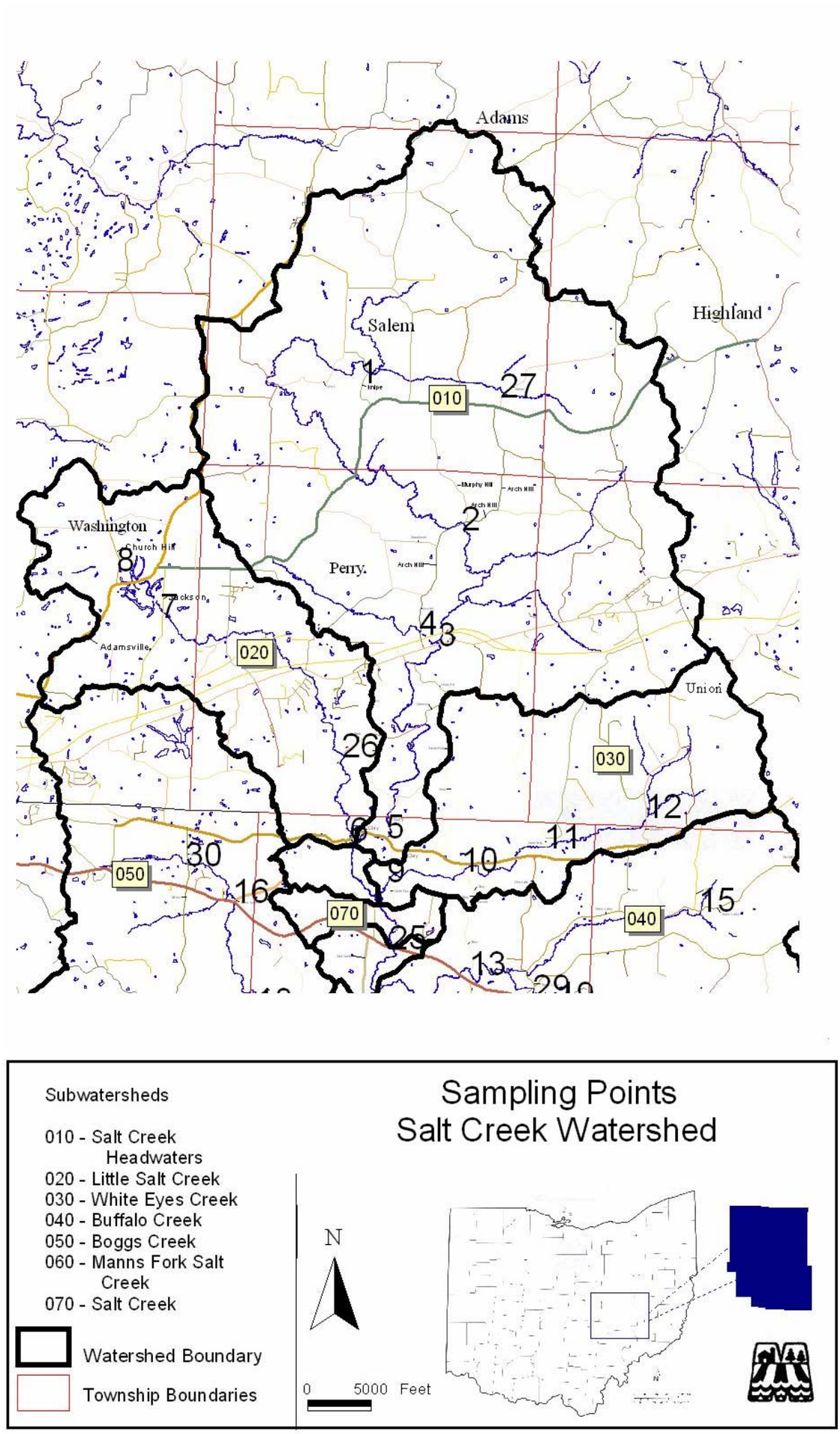
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on soil properties related to development. Help with soil loss reduction and erosion control.	Educate Realtors and Home Owners on soil properties related to development.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual realtors/ Home Owner Workshop. Track by the number attended and contacted.	2006-2011
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on stormwater management and erosion control.	Educate Commercial Developers and Consultants on erosion control and stormwater management.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual commercial developers and Consultants erosion control and stormwater management workshop. Track by the number in attendance.	2006-2011

Considering the water quality and type/amount of land uses throughout the 05040004 060 020 sub watershed the above practices were selected to bring the water quality into full attainment. The costs were figured off of NRCS cost estimates. The reduction goal was based on the average concentration and flow rate. The total reduction goal is 10 % of the yearly load.

Pollutant Load Reductions:	Reduction Goal	Reference
Fecal Coliform/ E.coli Reduction	250 #/100 ml	Appendix 13 (Avg. #/100ml)
Phosphorus Reduction	80 lbs/per year	Appendix 13/ Figure 7 (lbs/year reduced by 10%)
Nitrogen Reduction	2,000 lbs/per year	Appendix 13/Figure 4 & 5 (lbs/year reduced by 10%)
Improve QHEI Scores	**75-95 Total QHEI**	Appendix 5
Improve Macroinvertebrate Counts	**17-22 Good**	Appendix 6



Map 3- 020 Land Use



Map 2- 010-030 Sampling Points

05040004 060 030

White Eyes Creek

Land Uses

The White Eyes subwatershed is 9.25 % of the whole watershed with 8,598.24 acres of land. The current land uses in this subwatershed are composed of 49.10% agricultural, 48.75% wooded areas, 1.34 % Shrub Scrub, 0.46% Urban, 0.24% Non-Forested Wetlands, 0.07% Barren, and 0.03% Open Water (Figure 15). There are 13.43 drainage miles and 5.7 miles of streams. There are 0.66 miles of stream without riparian buffer and 4.63 miles in nonattainment status. The White Eyes Creek subwatershed population is 1,695 individuals (2000 Census). (Table 2)

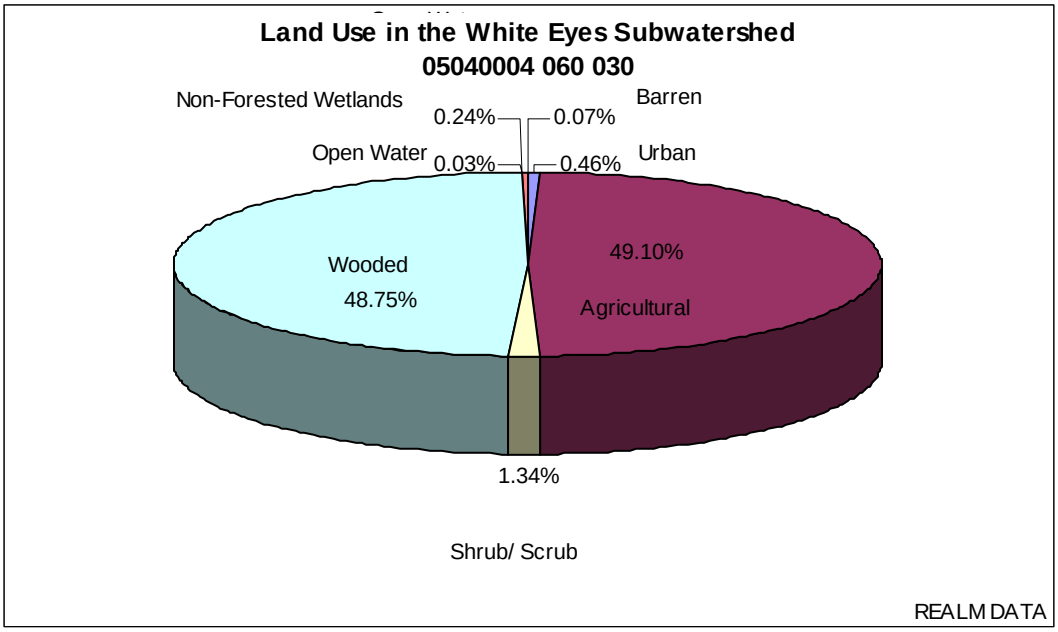


Figure 15- Land Uses in 05040004 060 030

Water Quality

Four sampling sites were analyzed in the White Eyes Creek subwatershed. The four sampling sites give a comprehensive look at the water quality throughout the subwatershed. Each of the sampling sites were selected based on the following conditions: accessible bridge or road crossing, drainage area, representative of the major land use/ land cover patterns, representative of sampling within the 14 digit HUC, and accessibility to perform habitat assessments. The sampling site locations give us better understanding of where the contaminants are derived from. The following are figures showing the comparison of 2003-2004 sampling data.

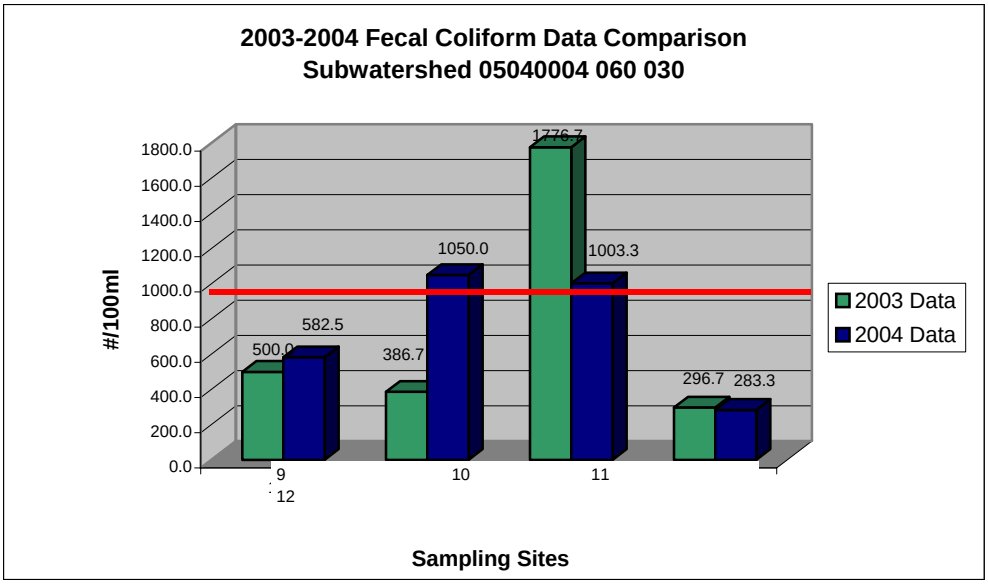


Figure 16- 05040004 060 030 Fecal Coliform Data

The fecal coliform target limit for aquatic streams is 1000- 2000 cpu/100ml for primary contact and 5000 cpu/100ml for agricultural use. (Figure 16)

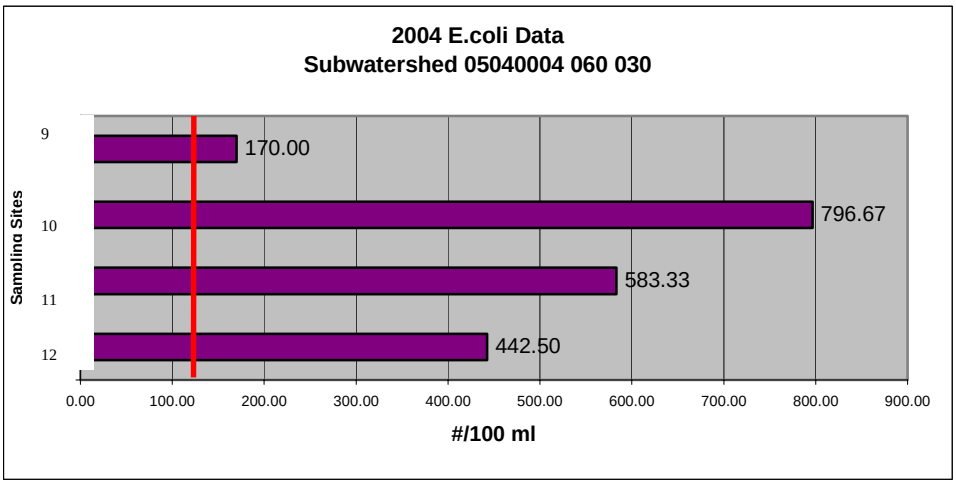


Figure 17- 05040004 060 030 E.coli Data

The E.coli target limit for aquatic streams is 576 per 100ml (animal use) and 126 per 100 ml or 298 per 100 ml. (human use). (Figure 17)

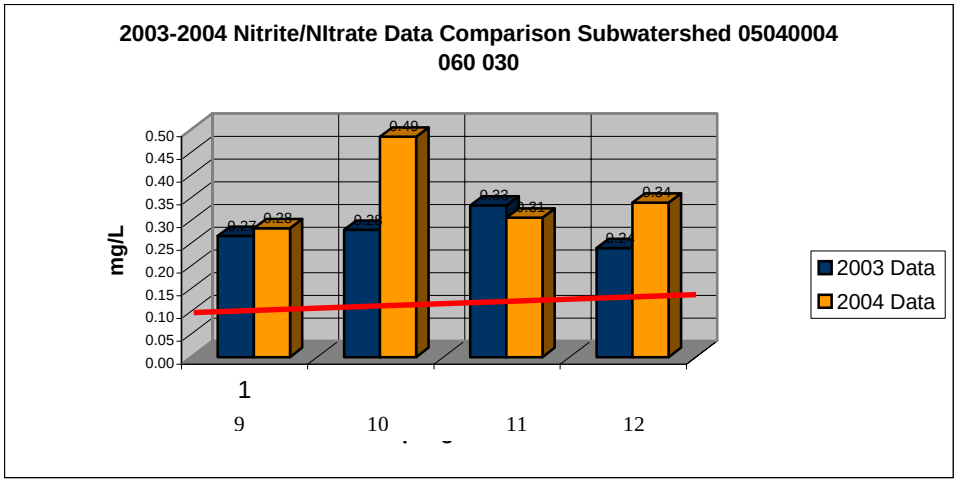


Figure 18- 05040004 060 030 Nitrites/ Nitrates Data

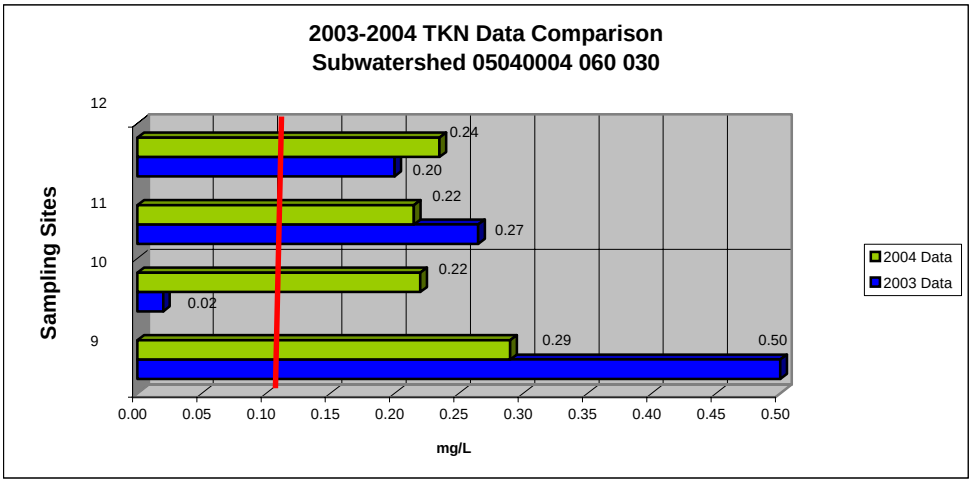


Figure 19- 05040004 060 030 TKN (TKN-TP) Data

Nitrite-Nitrate target limit for aquatic streams is < 0.10 mg/L. Nitrates that later combine with phosphorus can promote algae growth within streams. Nitrogen compounds entering streams are the result of livestock manure or feeding area runoff, fertilizers on yards or agricultural fields, sewage, and legumes. Nitrates/ Nitrites, being very water-soluble, have high potential in contaminating ground water. (Figure18, 19)

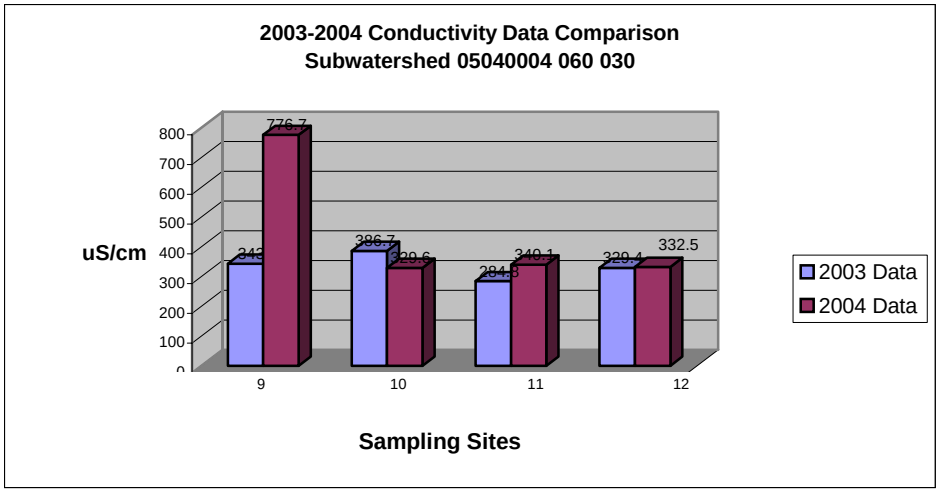


Figure 20-05040004060 030 Conductivity

The conductivity limit is <2400micrmhos/cm @25. All of the sampling sites are below 25C. (Figure 20)

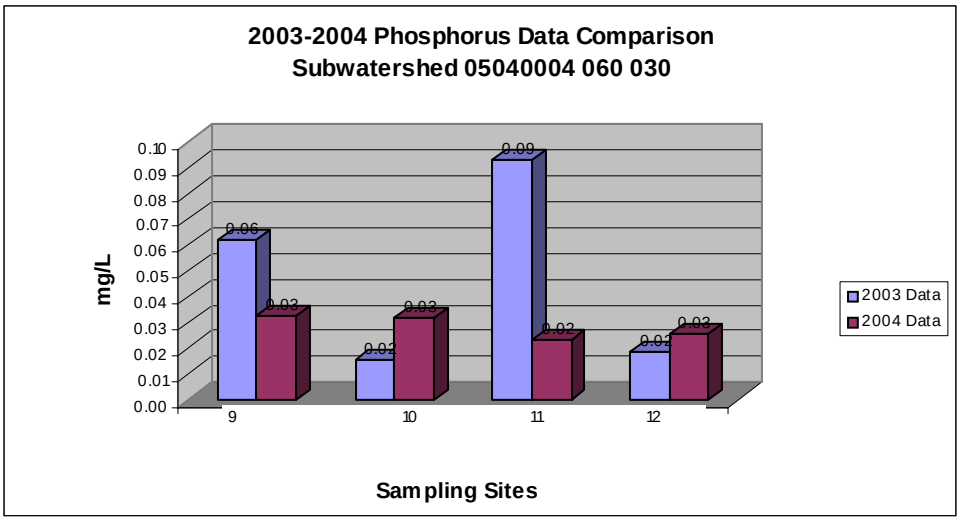


Figure 21- 05040004 060 030 Phosphorus Data

The total phosphorus target for aquatic streams is <0.10 mg/L. (Figure21)

Water Quality Problems

The fecal coliform is below the target limit at sample sites 9, 10, 12 and above the target limit at sampling site 11,which is also high in Nitrates/ Nitrites. E.coli levels are extremely high throughout all four sampling sites. These high limits could be caused by failed or nonexisting home sewage treatment systems. The high Fecal Coliform and E.coli limits could also be caused by confined or non-confined livestock operations. The Nitrite/Nitrate levels are high in all four sampling locations also. The high levels could be from severe erosion and not enough riparian corridor. The phosphorus levels below the target limit. The 05040004 060 030 subwatershed has approximately 4.63 miles of streams in nonattainment status

050 40004 060 030
White Eyes Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department identify and upgrade 8 of the failing septic systems during the first 5 yrs. and 6 during the next 5 years.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Identify the failing home sewage treatment systems	Work with the Muskingum County Health Department to locate, onsite investigation, and propose solutions.	Health Department and Muskingum SWCD Intern (after training with the Muskingum County Health Department) to inspect failing systems.	Track the number of failing Systems inspected	2006-2008
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Write a HSTS Plan with the provision of guidelines to those residents upgrading, repairing, and installation.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Number of systems upgraded, repaired, and installed.	2008-2009
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Apply for a 319 HSTS grant to cost share program for on site septic systems replacement, repair, and upgrade	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Obtain grant providing cost share dollars to residents for replacement, repair, and upgrade.	2009-2010
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Replace, repair, and establishment of 8 home sewage septic systems.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Replace, repair, and establishment of 8 home sewage septic systems.	2010-2012

Failing or non existent home sewage treatment systems are a major contributor to the water quality impairments. The local residents and Muskingum County Health Department identified this as an increasing concern throughout the 05040004 060 030 subwatershed

050 40004 060 030

White Eyes Creek

Education

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department provide education to the general public to increase the awareness of the failed or non existence home sewage systems.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Septic System Education	Provide Education for Proper Installation and Maintenance of Septic Systems	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Hold Annual Workshop for Home Septic Treatment System Maintenance.	2006-2012

050 40004 060 030

White Eyes Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, and fertilizer runoff.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that the water quality will be in full attainment.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Install Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of livestock exclusion fencing on 0.5 miles of stream bank, costing approximately $1.10 per ft. with a total cost of $2,904.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Track the amount of livestock exclusion fence installed. Installation of livestock exclusion fencing on 0.5 miles (2640ft.) of livestock accessible streams.	2008-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The construction of Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of 6 livestock pipeline water systems with 3,000 ft. of tile, and troughs approximately cost $11,143.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 6 alternative watering systems on the non confined livestock operations.	2007-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The setting aside land for forested riparian buffer strip next to the streambank.	Installation of riparian buffer on the stream bank using a 35 foot minimum buffer on 500 ft. of the total amount of unrestricted livestock access.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The planting of trees and cool season grasses/ legumes on 500 ft. of the total amount of unrestricted livestock access.	2008-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load *Extreme amounts of sediment loss	Designing and installing Grade Stabilization Structure	Installation of rip/ rap along the stream bank for stabilization, reducing the sediment and nutrient run off.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Account for the amount of rip/ rap installed. Cost is varied site to site	2007-2011

050 40004 060 030
White Eyes Creek
Technical

Problem Statement: Extreme amount of bank erosion and siltation has caused loss of land and impaired the streams water quality.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that the water quality will be in full attainment.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
The first two practices can be used to solve both problems.					
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Install Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of livestock exclusion fencing on 0.5 miles of stream bank, costing approximately $1.10 per ft. with a total cost of $2,904.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Track the amount of livestock exclusion fence installed. Installation of livestock exclusion fencing on 0.5 miles (2640ft.) of livestock accessible streams.	2008-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The construction of Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of 6 livestock pipeline water systems with 3,000 ft. of tile, and troughs approximately cost $11,143.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 6 alternative watering systems on the non confined livestock operations.	2008-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The repair or roofing of Animal Waste Storage Facility	Roofing or Repair of animal waste storage facilities on 1 of the confined livestock operations.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation or repair on 1 manure storage facility.	2008-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Construction of Access Road and Heavy Use Area Protection	Installation of 3 livestock access stream crossings approximately cost $16,335.00 and 2 heavy use protection areas approximately costing $4,000.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 3 livestock access stream crossings on unconfined livestock operations and 2 heavy use area protection area	2008-2012

*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Setting aside land and Filter Strips	Establish filter strip of cool season grasses/ legumes on 5 acres costing approximately $527.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 5 acres of filter strips on confined livestock operations to reduce the runoff from the confined livestock operation to the stream.	2008-2011

050 40004 060 030

White Eyes Creek

Education

Problem Statement: The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, fertilizer runoff, extreme bank erosion, and sediment loss.

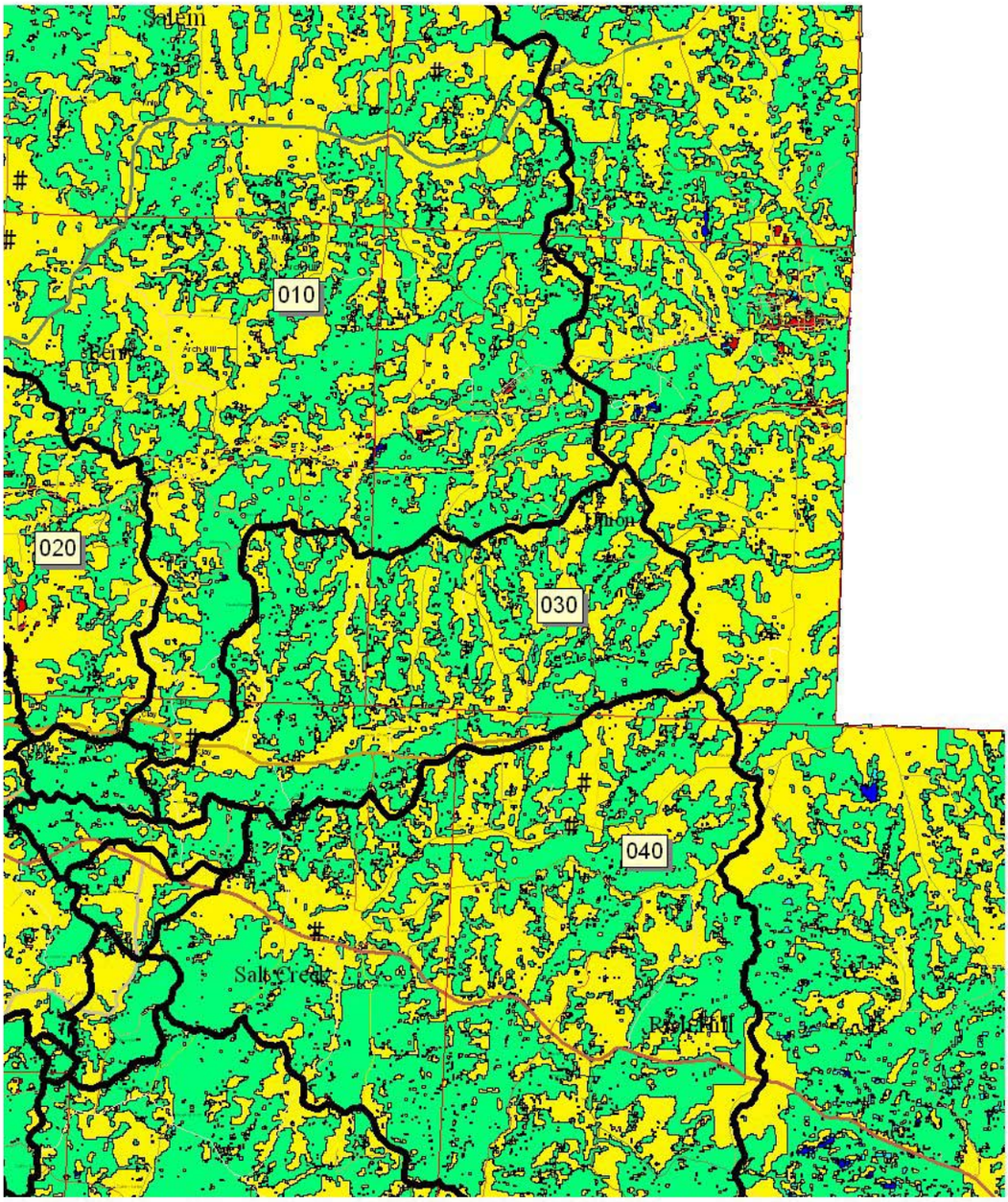
Goal: Educate the local producers on proper manure storage, application, grazing management, erosion control, stormwater management, and tillage methods.

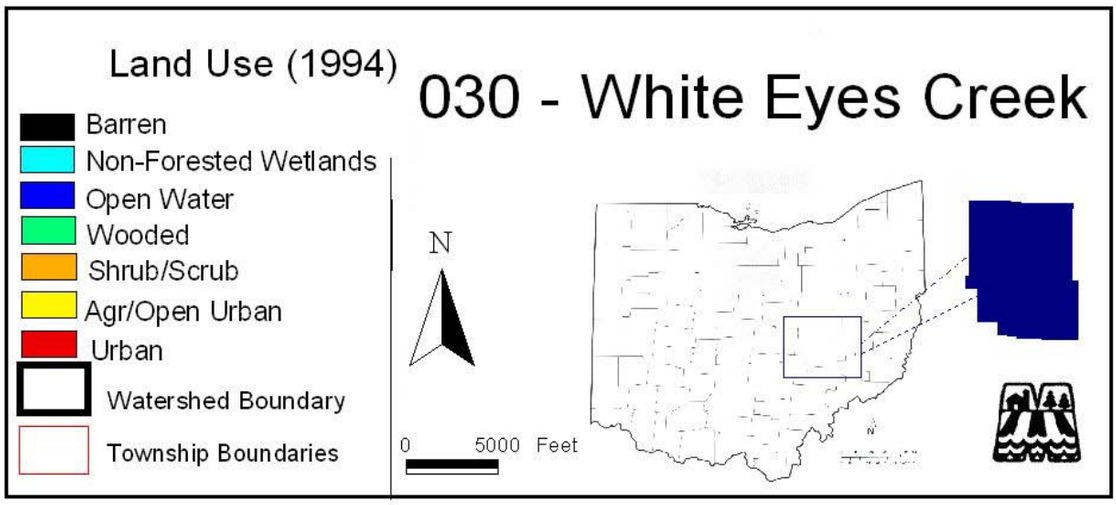
Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Provide information on proper Manure Application.	Educate watershed producers on proper manure storage and application. Encourage proper management to improve the water quality.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual LEAP 1 and LEAP 2 meetings. Hold an annual winter manure application meeting. Track the number of participants.	2006-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Increase the producers knowledge of Nutrient Management	Educate watershed producers on nutrient management and development of two CNMP.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Conduct CNMP Workshops to educate watershed livestock producers. Develop plans for 2 of the livestock producers.	2006-2012
*Heavy Nutrient Load	Increase the producer's knowledge of Intensive Grazing Management.	Educate watershed producers on grazing management and increase the amount of intensive grazing by 1 producer.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual grazing workshops and report the number of NRCS EQIP sign up and acres. Increase the amount of intensive grazing by 1 producers	2006-2012

*Heavy Nutrient Load	Provide information on Conservation Tillage and increase conservation tillage per subwatershed.	Educate watershed producers on tillage practices. Increase the no tillage by 400 acres in five years by allowing free rental of the no till drills to Salt Creek Watershed residents.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual conservation tillage workshop throughout the Salt Creek Watershed. Track the number of acres planted by the no till drill. Increase the acres by 400 in five years. Rental Rate $8.00 per acre =$3,200.00	2006-2012
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on soil properties related to development. Help with soil loss reduction and erosion control.	Educate Realtors and Home Owners on soil properties related to development.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual realtors/ Home Owner Workshop. Track by the number attended and contacted.	2006-2012
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on stormwater management and erosion control.	Educate Commercial Developers and Consultants on erosion control and stormwater management.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual commercial developers and Consultants erosion control and stormwater management workshop. Track by the number in attendance.	2006-2011

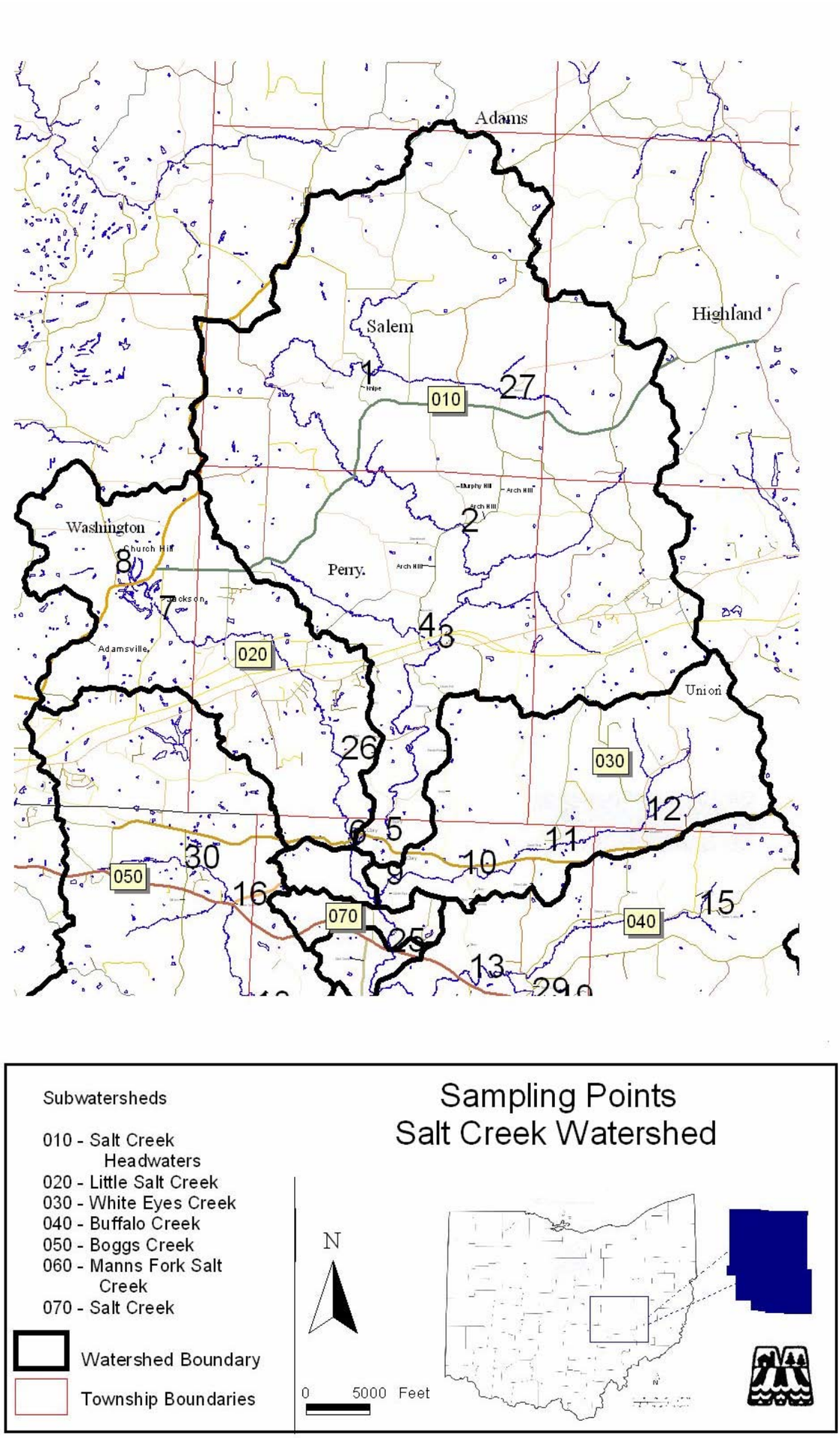
Considering the water quality and type/amount of land uses throughout the 05040004 060 030 sub watershed the above practices were selected to bring the water quality into full attainment. The costs were figured off of NRCS cost estimates. The reduction goal was based on the average concentration and flow rate. The total reduction goal is 10 % of the yearly load.

Pollutant Load Reductions:	Reduction Goal	Reference
Fecal Coliform/ E.coli Reduction	250 #/100 ml	Appendix 13 (Avg. #/100ml)
Phosphorus Reduction	50 lbs/per year	Appendix 13/ Figure 7 (lbs/year reduced by 10%)
Nitrogen Reduction	1,500 lbs/per year	Appendix 13/Figure 4 & 5 (lbs/year reduced by 10%
Improve QHEI Scores	**75-95 Total QHEI**	Appendix 5
Improve Macroinvertebrate Counts	**17-22 Good**	Appendix 6





Map 4- 030 Land Use



Map 2- 010-030 Sampling Points

05040004 060 040

Buffalo Fork

Land Uses

The Buffalo Fork subwatershed is 19.65 % of the whole watershed with 18,274.59 acres of land. The current land uses in this subwatershed are composed of 42.21% agricultural, 56.05% wooded areas, 1.40 % Shrub Scrub, 0.06% Urban, 0.26% Non-Forested Wetlands, 0.00% Barren, and 0.02% Open Water (Figure 22). There are 28.55 drainage miles and 15.1 miles of streams. There are 8.42 miles of stream without riparian buffer and 8.47 miles in nonattainment status. The Buffalo Fork subwatershed population is 500 individuals (2000 Census). (Table 2)

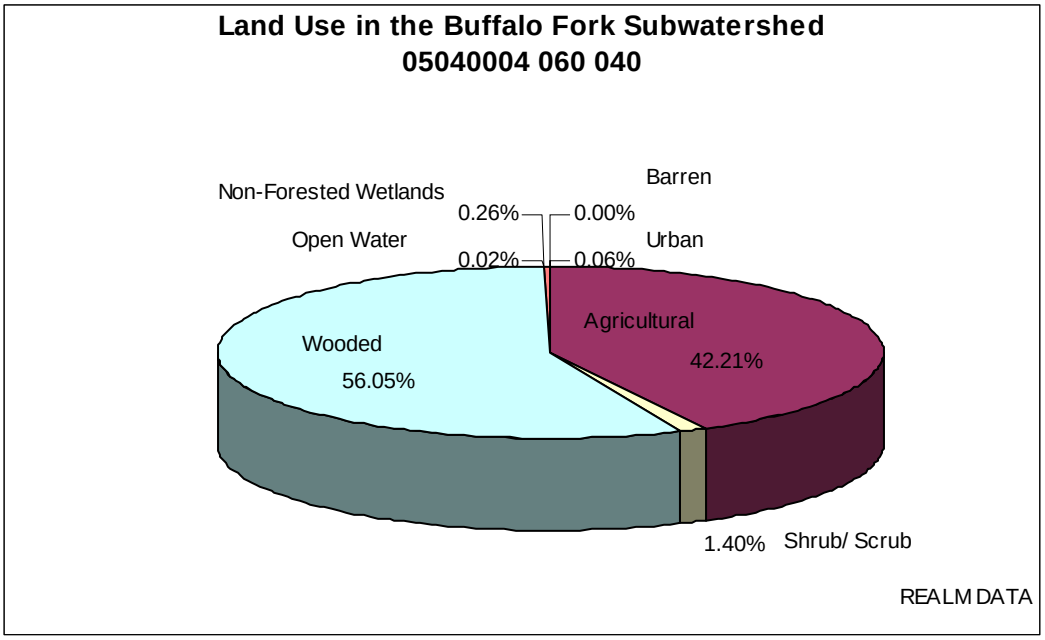


Figure 22- Land Uses in 05040004 060 040

Water Quality

Six sampling sites were analyzed in the White Eyes Creek subwatershed. The six sampling sites give a comprehensive look at the water quality throughout the subwatershed. Each of the sampling sites were selected based on the following conditions: accessible bridge or road crossing, drainage area, representative of the major land use/ land cover patterns, representative of sampling within the 14 digit HUC, and accessibility to perform habitat assessments. The sampling site locations give us better understanding of where the contaminants are derived from. The following are figures showing the comparison of 2003-2004 sampling data.

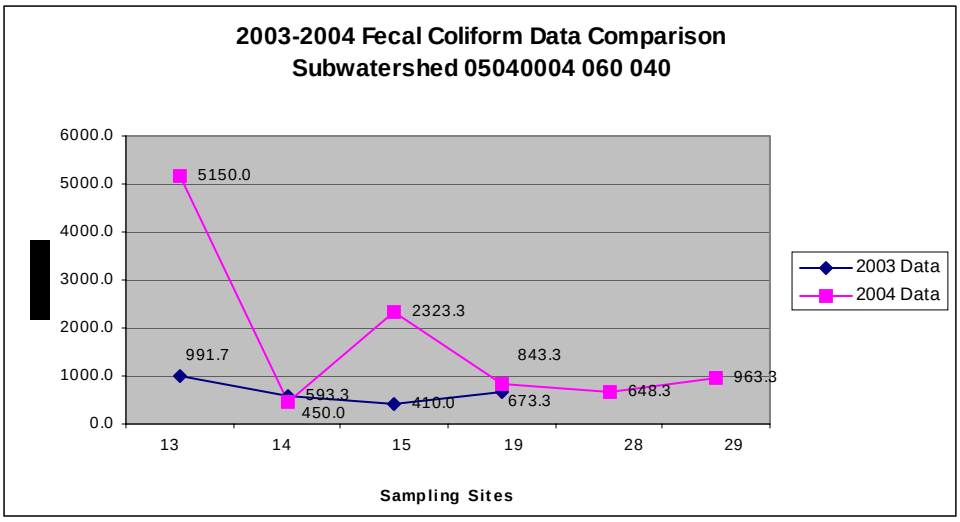


Figure 23- 05040004 060 040 Fecal Coliform Data

The fecal coliform target limit for aquatic streams is 1000- 2000 cpu/100ml for primary contact and 5000 cpu/100ml for agricultural use. (Figure 23)

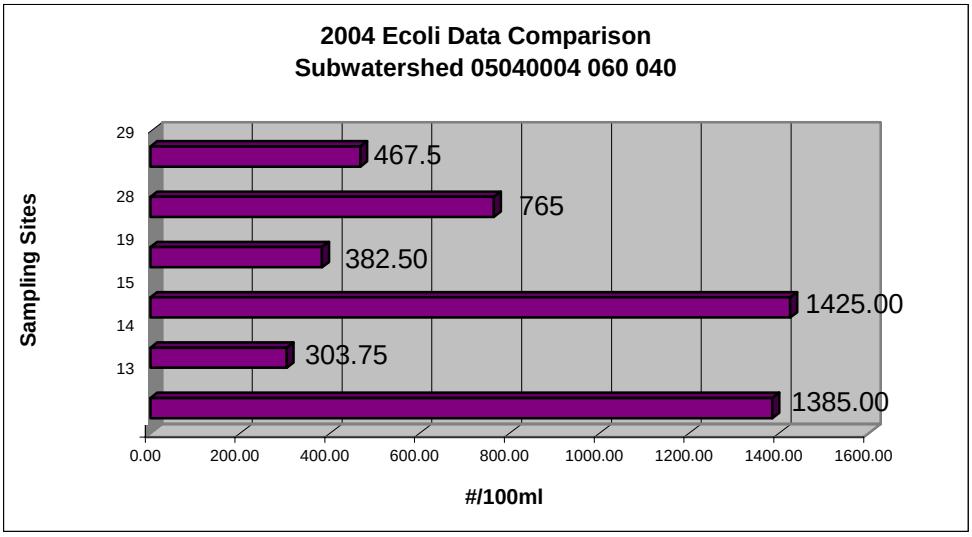


Figure 24- 05040004 060 040 E.coli Data

The E.coli target limit for aquatic streams is 576 per 100ml (animal use) and 126 per 100 ml or 298 per 100 ml. (human use). (Figure 24)

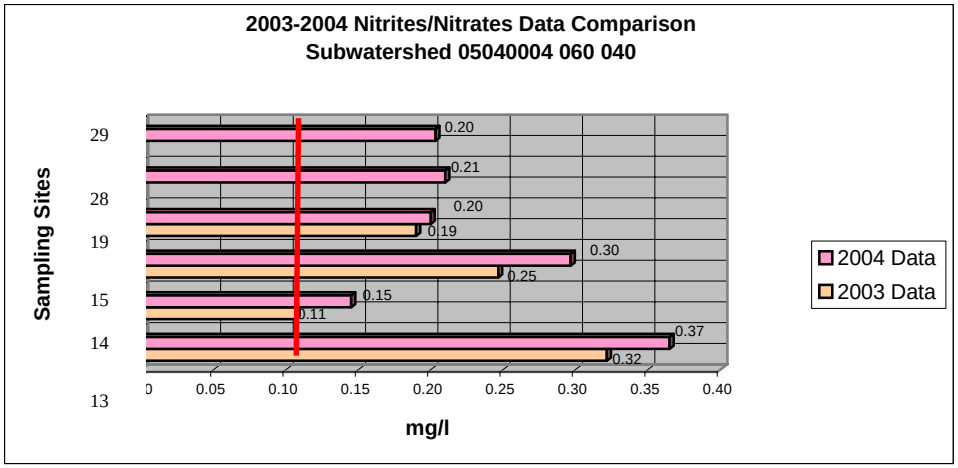


Figure 25- 05040004 060 040 Nitrites/ Nitrates Data

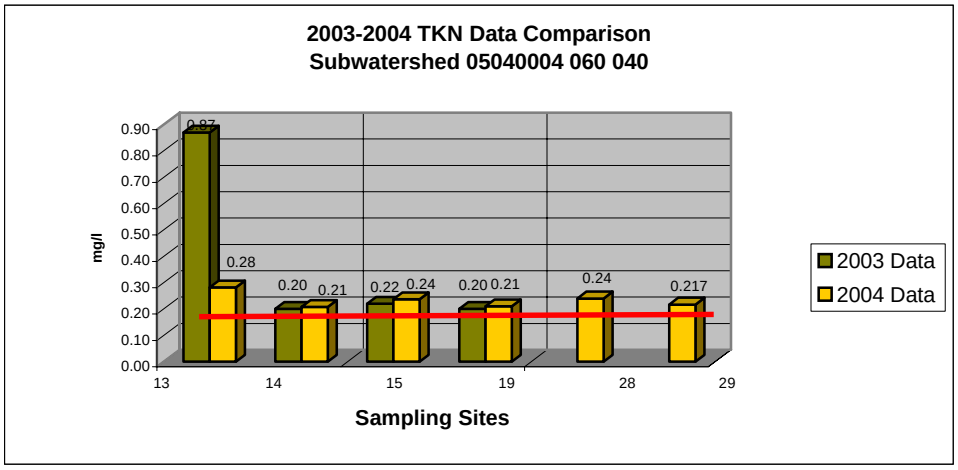


Figure 26- 05040004 060 040 TKN (TKN-TP) Data

Nitrite-Nitrate target limit for aquatic streams is < 0.10 mg/L. Nitrates that later combine with phosphorus can promote algae growth within streams. Nitrogen compounds entering streams are the result of livestock manure or feeding area runoff, fertilizers on yards or agricultural fields, sewage, and legumes. Nitrates/ Nitrites, being very water-soluble, have high potential in contaminating ground water. (Figure 25,26)

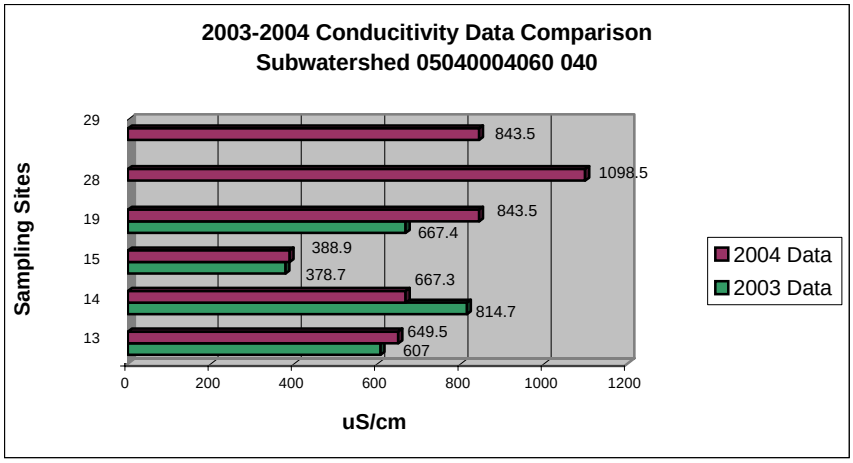


Figure 27-05040004060 040 Conductivity

The conductivity limit is <2400micrmhos/cm @25. All of the sampling sites are below 25C. (Figure 27)

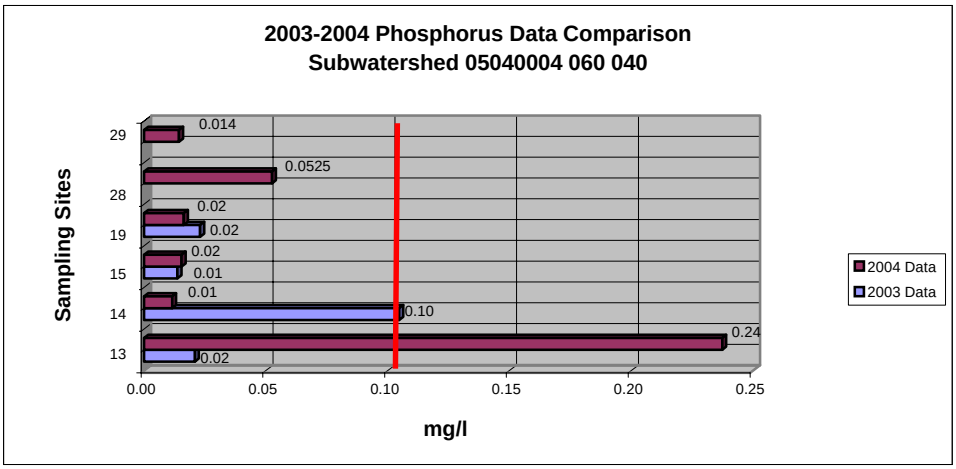


Figure 28- 05040004 060 040 Phosphorus Data

The total phosphorus target for aquatic streams is <0.10 mg/L. (Figure 28)

Water Quality Problems

The Fecal Coliform and E.coli levels are extremely high throughout all six sampling sites. These high limits could be caused by failed or nonexisting home sewage treatment systems. The high Fecal Coliform and E.coli limits could also be caused by confined or non-confined livestock operations. The Nitrite/Nitrate levels are high in all six sampling locations also. The high levels could be from severe erosion and not enough riparian corridor. The phosphorus levels below the target limit at sampling sties 14,15,19,28,29, and above at sampling site 13. The 05040004 060 040 subwatershed has approximately 8.47 miles of streams in nonattainment status.

050 40004 060 040
Buffalo Fork
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department identify and upgrade 8 of the failing septic systems during the first 5 yrs. and 7 during the next 5 years.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Identify the failing home sewage treatment systems	Work with the Muskingum County Health Department to locate, onsite investigation, and propose solutions.	Health Department and Muskingum SWCD Intern (after training with the Muskingum County Health Department) to inspect failing systems.	Track the number of failing Systems inspected	2006-2008
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Write a HSTS Plan with the provision of guidelines to those residents upgrading, repairing, and installation.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Number of systems upgraded, repaired, and installed.	2008-2009
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Apply for a 319 HSTS grant to cost share program for on site septic systems replacement, repair, and upgrade	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Obtain grant providing cost share dollars to residents for replacement, repair, and upgrade.	2009-2010
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Replace, repair, and establishment of 8 home sewage septic systems.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Replace, repair, and establishment of 8 home sewage septic systems.	2010-2012

Failing or non existent home sewage treatment systems are a major contributor to the water quality impairments. The local residents and Muskingum County Health Department identified this as an increasing concern throughout the 05040004 060 040 subwatershed

050 40004 060 040
Buffalo Fork
Education

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department provide education to the general public to increase the awareness of the failed or non existence home sewage systems.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Septic System Education	Provide Education for Proper Installation and Maintenance of Septic Systems	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Hold Annual Workshop for Home Septic Treatment System Maintenance.	2006-2012

050 40004 060 040

Buffalo Fork
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, and fertilizer runoff.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that the water quality will be in full attainment.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The repair or roofing of Animal Waste Storage Facility	Roofing or Repair of animal waste storage facilities on 2 of the confined livestock operations.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation or repair on 2 manure storage facilities.	2008-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Setting aside land and Filter Strips	Establish filter strip of cool season grasses/ legumes on 10 acres costing approximately $1054.00.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 10 acres of filter strips on confined livestock operations to reduce the runoff from the confined livestock operation to the stream.	2008-2010

050 40004 060 040
Buffalo Fork
Technical

Problem Statement: Extreme amount of bank erosion and sediment loss of land and impaired the streams water quality.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that t

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Install Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of livestock exclusion fencing on 2.0 miles of stream bank, costing approximately $1.10 per ft. with a total cost of $5,808.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Track the amount of livestock exclusion fence installed. Installation of livestock exclusion fencing on two miles (8500ft.) of livestock accessible streams.	2008-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The construction of Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of 8 livestock pipeline water systems with 4,800 ft. of tile, and troughs approximately cost $14,856.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 8 alternative watering systems on the non confined livestock operations.	2006-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Construction of Access Road and Heavy Use Area Protection	Installation of 3 livestock access stream crossings approximately cost $16.335.00 and 2 heavy use protection areas approximately costing $4,000.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 3 livestock access stream crossings on unconfined livestock operations and 2 heavy use area protection area	2006-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load *Extreme amounts of sediment loss	Designing and installing Grade Stabilization Structure	Installation of rip/ rap along the stream bank for stabilization, reducing the sediment and nutrient run off.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Account for the amount of rip/ rap installed. Cost is varied site to site	2006-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The setting aside land for forested riparian buffer strip next to the streambank.	Installation of riparian buffer on the stream bank using a 35 foot minimum buffer on 5,000 ft. of the total amount of unrestricted livestock access.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The planting of trees and cool season grasses/ legumes on 5,000 ft. of unrestricted riparian corridor.	2006-2009

050 40004 060 040

Buffalo Fork

Education

Problem Statement: The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, fertilizer runoff, extreme bank erosion, and sediment loss.

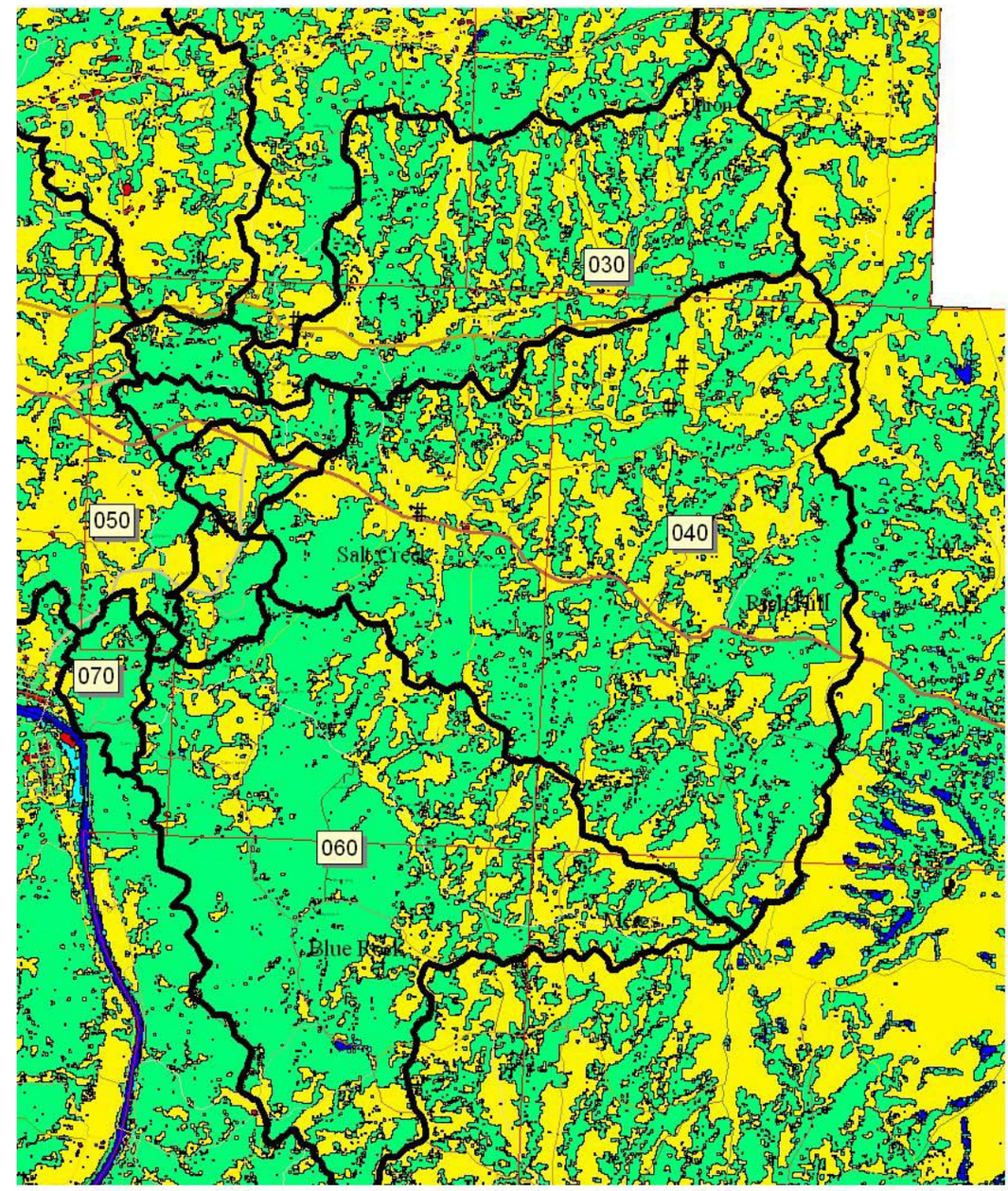
Goal: Educate the local producers on proper manure storage, application, grazing management, erosion control, stormwater management, and tillage methods.

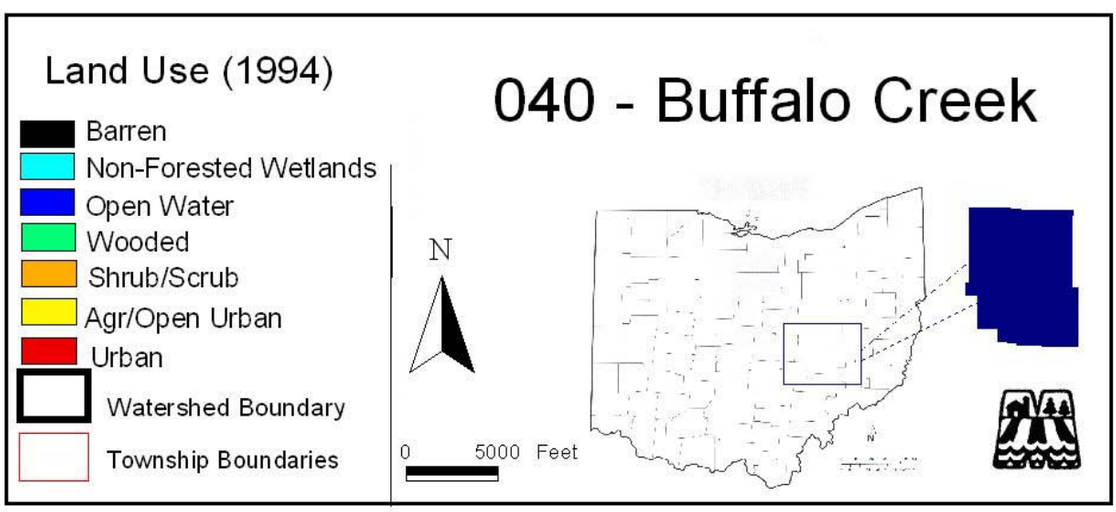
Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Provide information on proper Manure Application.	Educate watershed producers on proper manure storage and application. Encourage proper management to improve the water quality.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual LEAP 1 and LEAP 2 meetings. Hold an annual winter manure application meeting. Track the number of participants.	2006-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Increase the producers knowledge of Nutrient Management	Educate watershed producers on nutrient management and development of two CNMP.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Conduct CNMP Workshops to educate watershed livestock producers. Develop plans for 2 of the livestock producers.	2006-2011
*Heavy Nutrient Load	Increase the producer's knowledge of Intensive Grazing Management.	Educate watershed producers on grazing management and increase the amount of intensive grazing by 1 producer.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual grazing workshops and report the number of NRCS EQIP sign up and acres. Increase the amount of intensive grazing by 1 producers	2006-2011
*Heavy Nutrient Load	Provide information on Conservation Tillage and increase conservation tillage per subwatershed.	Educate watershed producers on tillage practices. Increase the no tillage by a total of 700 acres in five years by allowing free rental of the no till drills to Salt Creek Watershed residents.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual conservation tillage workshop throughout the Salt Creek Watershed. Track the number of acres planted by the no till drill. Increase the acres by a total of 700 in five years. Rental Rate $8.00 per acre =$5,600.00	2006-2011
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on soil properties related to development. Help with soil loss reduction and erosion control.	Educate Realtors and Home Owners on soil properties related to development.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual realtors/ Home Owner Workshop. Track by the number attended and contacted.	2006-2011

*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on stormwater management and erosion control.	Educate Commercial Developers and Consultants on erosion control and stormwater management.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual commercial developers and Consultants erosion control and stormwater management workshop. Track by the number in attendance.	2006-2011

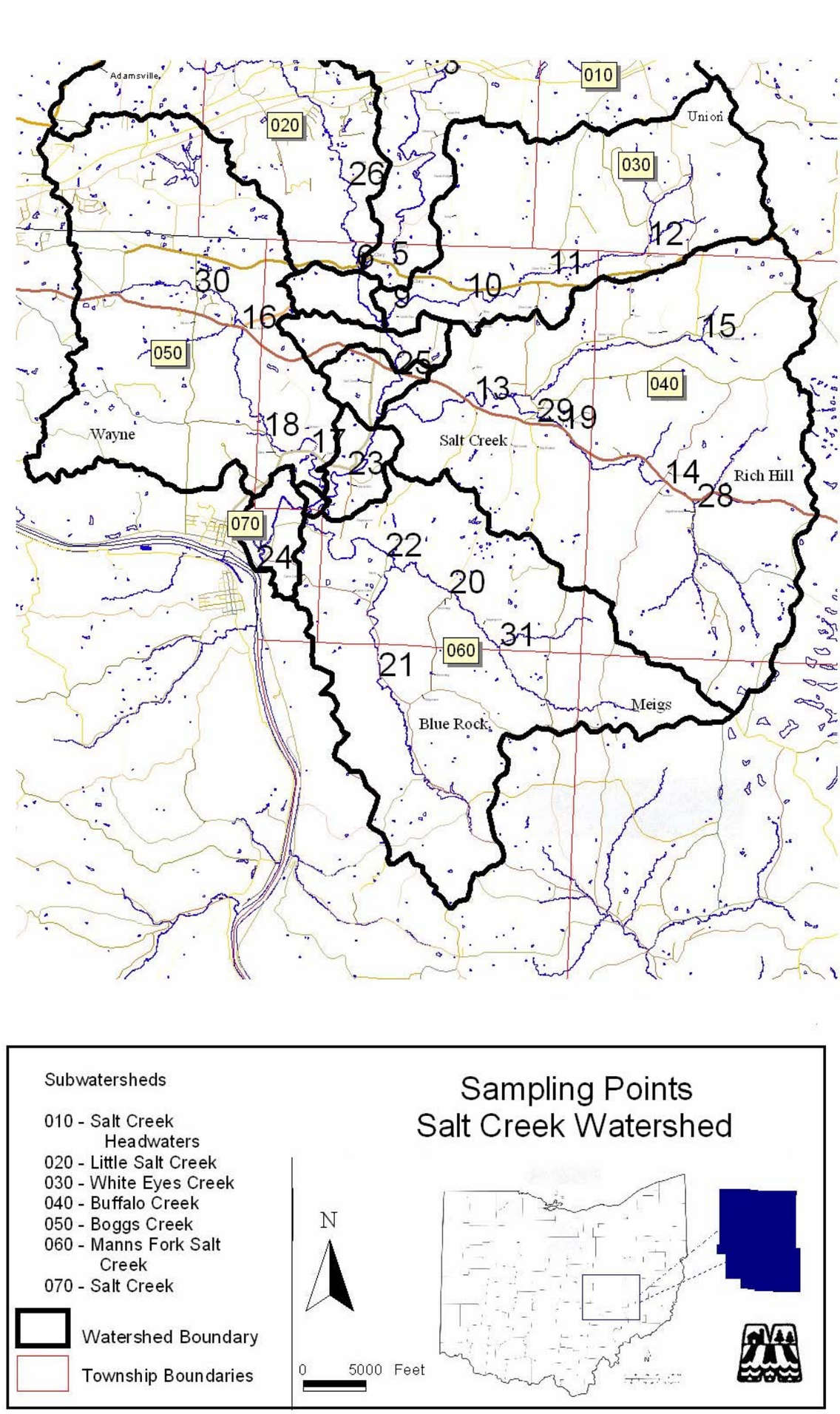
Considering the water quality and type/amount of land uses throughout the 05040004 060 040 sub watershed the above practices were selected to bring the water quality into full attainment. The costs were figured off of NRCS cost estimates. The reduction goal was based on the average concentration and flow rate. The total reduction goal is 10 % of the yearly load.

Pollutant Load Reductions:	Reduction Goal	Reference
Fecal Coliform/ E.coli Reduction	400 #/100 ml	Appendix 13 (Avg. #/100ml)
Phosphorus Reduction	50 lbs/per year	Appendix 13/ Figure 7 (lbs/year reduced by 10%)
Nitrogen Reduction	2,000 lbs/per year	Appendix 13/Figure 4 & 5 (lbs/year reduced by 10%)
Improve QHEI Scores	**75-95 Total QHEI**	Appendix 5
Improve Macroinvertebrate Counts	**17-22 Good**	Appendix 6





Map 5- 040 Land Use



Map 6- 040-070 Sampling Points

05040004 060 050

Boggs Creek

Land Uses

The Boggs Creek subwatershed is 11.11 % of the whole watershed with 10,333.41 acres of land. The current land uses in this subwatershed are composed of 54.64% agricultural, 43.19% wooded areas, 0.96 % Shrub Scrub, 0.56% Urban, 0.46% Non-Forested Wetlands, 0.01% Barren, and 0.18% Open Water (Figure 29). There are 16.15 drainage miles and 11.4 miles of streams. There are 4.76 miles of stream without riparian buffer and 5.98 miles in nonattainment status. The Boggs Creek subwatershed population is 2449 individuals (2000 Census). (Table 2)

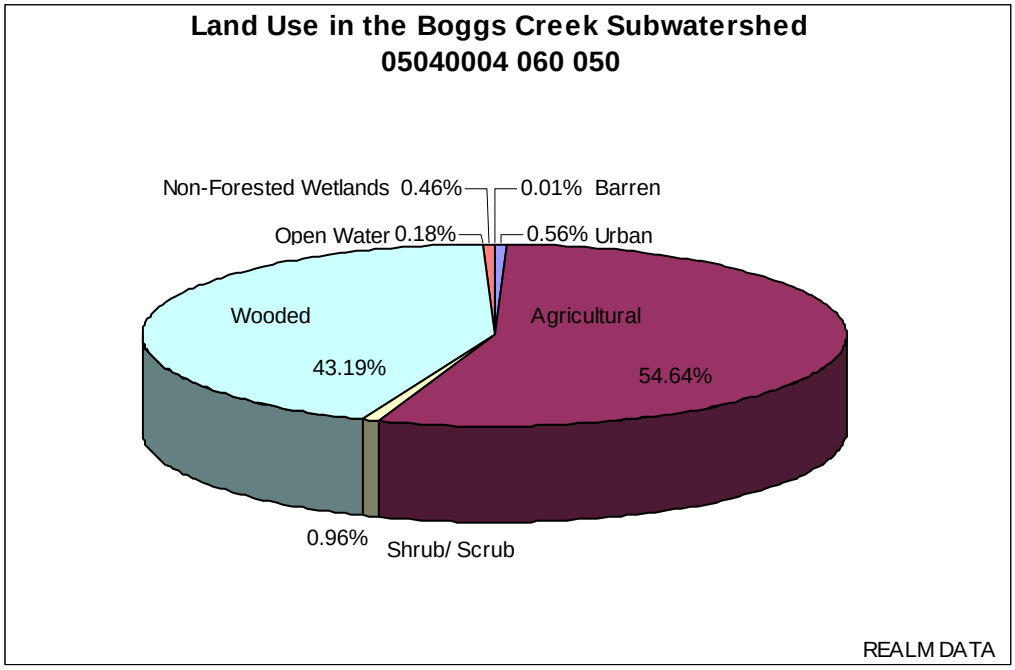


Figure 29- Land Uses in 05040004 060 050

Water Quality

Four sampling sites were analyzed in the White Eyes Creek subwatershed. The four sampling sites give a comprehensive look at the water quality throughout the subwatershed. Each of the sampling sites were selected based on the following conditions: accessible bridge or road crossing, drainage area, representative of the major land use/ land cover patterns, representative of sampling within the 14 digit HUC, and accessibility to perform habitat assessments. The sampling site locations give us better understanding of where the contaminants are derived from. The following are figures showing the comparison of 2003-2004 sampling data.

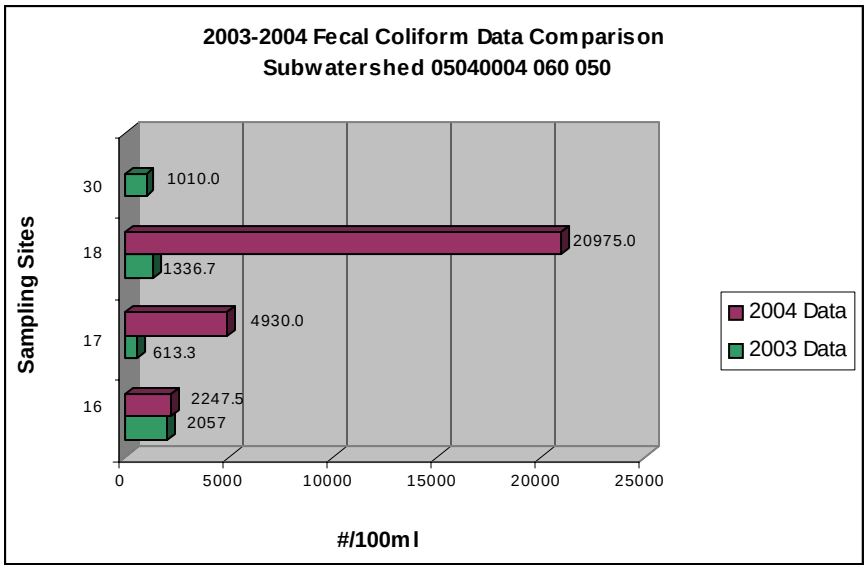


Figure 30- 05040004 060 050 Fecal Coliform Data

The fecal coliform target limit for aquatic streams is 1000- 2000 cpu/100ml for primary contact and 5000 cpu/100ml for agricultural use. (Figure 30)

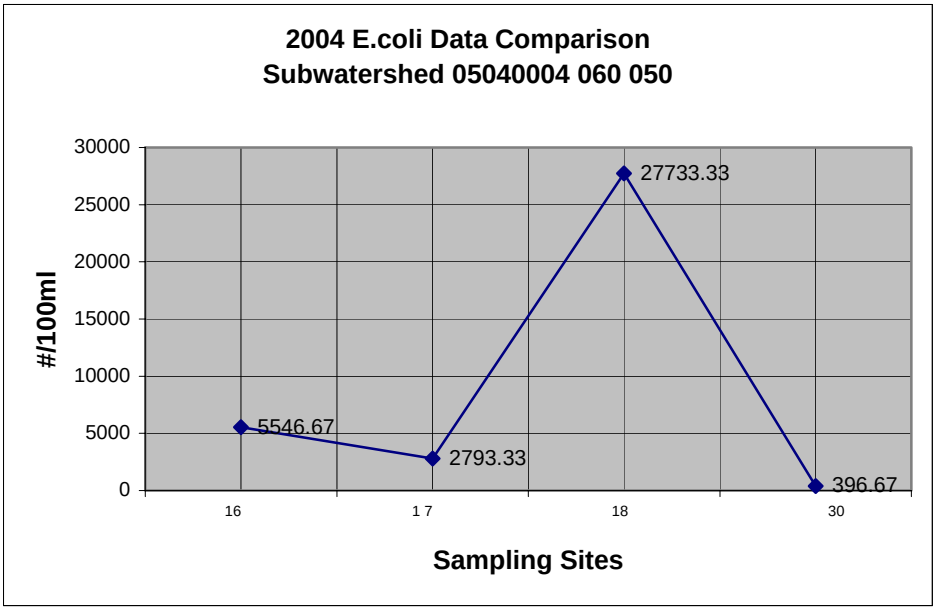


Figure 31- 05040004 060 050 E.coli Data

The E.coli target limit for aquatic streams is 576 per 100ml (animal use) and 126 per 100 ml or 298 per 100 ml. (human use). (Figure 31)

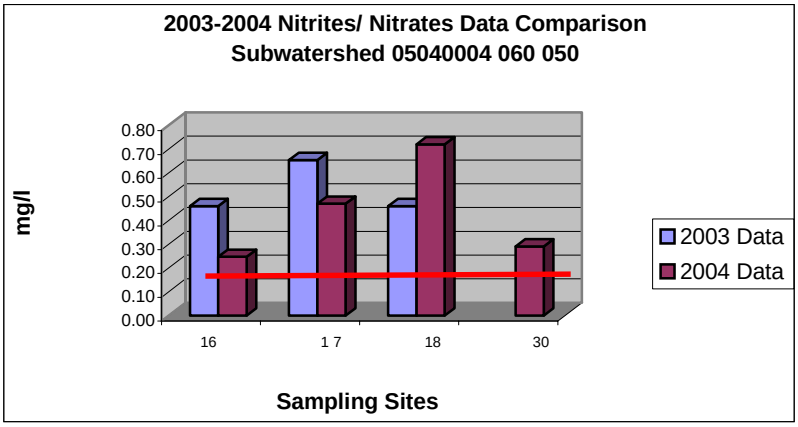


Figure 32- 05040004 060 050 Nitrites/ Nitrates Data

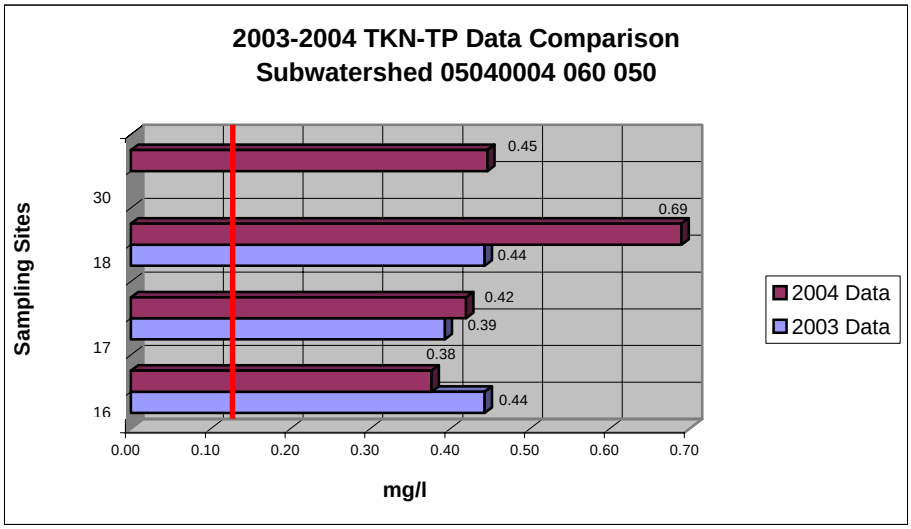


Figure 33- 05040004 060 050 TKN (TKN-TP) Data

Nitrite-Nitrate target limit for aquatic streams is < 0.10 mg/L. Nitrates that later combine with phosphorus can promote algae growth within streams. Nitrogen compounds entering streams are the result of livestock manure or feeding area runoff, fertilizers on yards or agricultural fields, sewage, and legumes. Nitrates/ Nitrites, being very water-soluble, have high potential in contaminating ground water. (Figure 32,33)

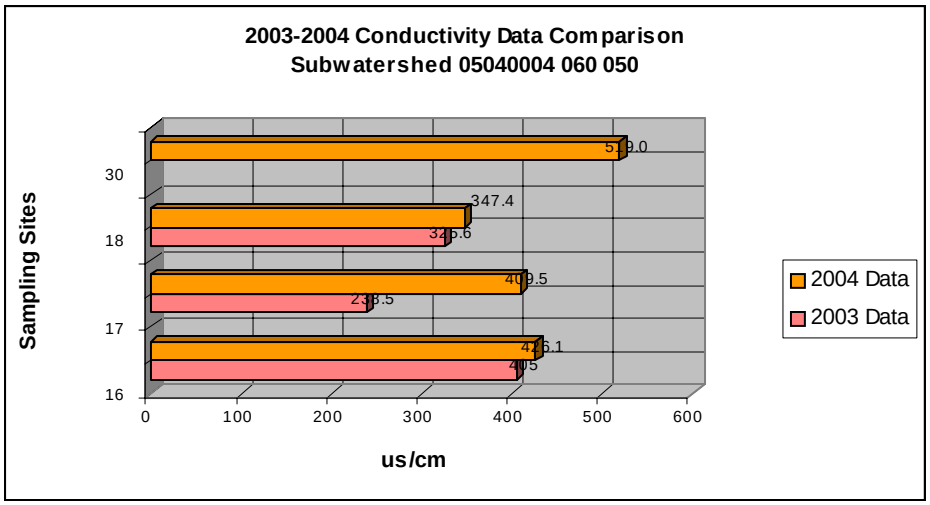


Figure 34-05040004060 050 Conductivity

The conductivity limit is <2400micrmhos/cm @25. All of the sampling sites are below 25C. (Figure 34)

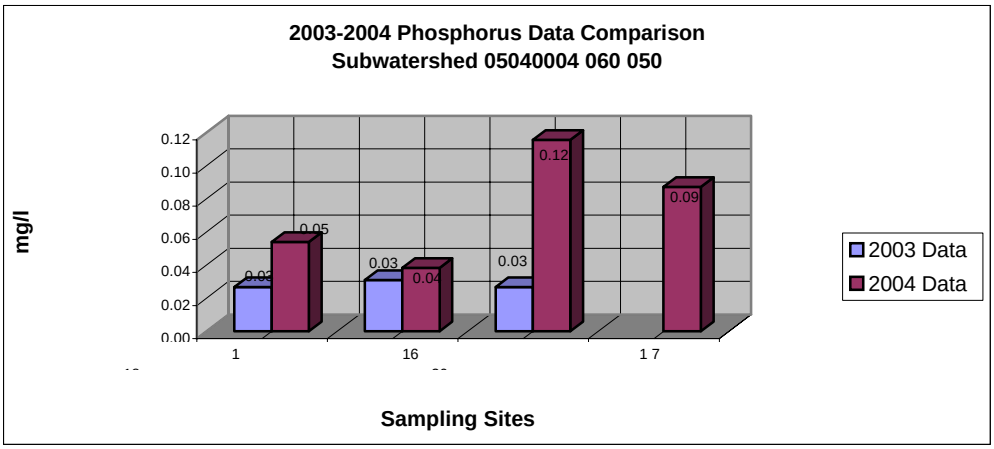


Figure 35- 05040004 060 050 Phosphorus Data

The total phosphorus target for aquatic streams is <0.10 mg/L. (Figure 35)

Water Quality Problems

The Fecal Coliform and E.coli levels are extremely high throughout all four sampling sites. These high limits could be caused by failed or nonexisting home sewage treatment systems. The high Fecal Coliform and E.coli limits could also be caused by confined or non-confined livestock operations. The Nitrite/Nitrate levels are high in all four sampling locations also. The high levels could be from severe erosion and not enough riparian corridor. The phosphorus levels below the target limit except sampling site 18, which is also high in fecal coliform and e.coli. The 05040004 060 050 subwatershed has approximately 5.98 miles of streams in nonattainment status

050 40004 060 050
Boggs Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department identify and upgrade 5 of the failing septic systems during the first 5 yrs. and 5 during the next 5 years.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Identify the failing home sewage treatment systems	Work with the Muskingum County Health Department to locate, onsite investigation, and propose solutions.	Health Department and Muskingum SWCD Intern (after training with the Muskingum County Health Department) to inspect failing systems.	Track the number of failing Systems inspected	2006-2008
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Write a HSTS Plan with the provision of guidelines to those residents upgrading, repairing, and installation.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Number of systems upgraded, repaired, and installed.	2008-2009
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Apply for a 319 HSTS grant to cost share program for on site septic systems replacement, repair, and upgrade	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Obtain grant providing cost share dollars to residents for replacement, repair, and upgrade.	2009-2010
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Replace, repair, and establishment of 5 home sewage septic systems.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Replace, repair, and establishment of 5 home sewage septic systems.	2010-2012

Failing or non existent home sewage treatment systems are a major contributor to the water quality impairments. The local residents and Muskingum County Health Department identified this as an increasing concern throughout the 05040004 060 050 subwatershed

050 40004 060 050

Boggs Creek

Education

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department provide education to the general public to increase the awareness of the failed or non existence home sewage systems.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Septic System Education	Provide Education for Proper Installation and Maintenance of Septic Systems	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Hold Annual Workshop for Home Septic Treatment System Maintenance.	2006-2012

050 40004 060 050

Boggs Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, and fertilizer runoff.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that the water quality will meet the water quality standards.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The repair or roofing of Animal Waste Storage Facility	Roofing or Repair of animal waste storage facilities on 2 of the confined livestock operations.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation or repair on2 manure storage facilities.	2006-2009
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Construction of Access Road and Heavy Use Area Protection	Installation of 5 livestock access stream crossings approximately cost $27,225.00 and 4 heavy use protection areas approximately costing $8,000.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 5 livestock access stream crossings on unconfined livestock operations and 4 heavy use area protection area	2006-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Setting aside land and Filter Strips	Establish filter strip of cool season grasses/ legumes on 15 acres costing approximately $1053.00.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 15 acres of filter strips on confined livestock operations to reduce the runoff from the confined livestock operation to the stream.	2006-2011

050 40004 060 050
Boggs Creek
Technical

Problem Statement: Extreme amount of bank erosion and siltation has caused loss of land and impaired the streams water quality.

Goal: Working and educating the local producers, commercial builders, township trustees, and land owners on proper sediment loss and erosion control measures. By implementing these strategies the anticipation is that there will be a decrease in nutrient loads.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Install Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of livestock exclusion fencing on 2.0 miles of stream bank, costing approximately $1.10 per ft. with a total cost of $5,808.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Track the amount of livestock exclusion fence installed. Installation of livestock exclusion fencing on two miles (8500ft.) of livestock accessible streams.	2008-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The construction of Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of 7 livestock pipeline water systems with 4,200 ft. of tile, and troughs approximately cost $13,000.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 7 alternative watering systems on the non confined livestock operations.	2008-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The setting aside land for forested riparian buffer strip next to the streambank.	Installation of riparian buffer on the stream bank using a 35 foot minimum buffer on 600ft. of the total amount of unrestricted livestock access.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The planting of trees and cool season grasses/ legumes on 600 ft. of the riparian corridor.	2008-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load *Extreme amounts of sediment loss	Designing and installing Grade Stabilization Structure	Installation of rip/ rap along the stream bank for stabilization, reducing the sediment and nutrient run off.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Account for the amount of rip/ rap installed. Cost is varied site to site	2008-2012

*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	Township Road Ditch Erosion (Zoned or Not) Reduction of sediment loss and road ditch erosion.	Designing the road ditch or culvert at a 10 yr. Capacity to reduce sediment loss.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Designing the road ditch or culvert at a 10 yr. Capacity to reduce sediment loss. Track the mile of road ditch repaired.	2008-2012
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	Advise Township Trustees on sediment loading and assist in reduction of sediment loss and erosion.	Assisting Township Trustees in looking at land development sediment loss, and erosion control structures.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The tracking of the number of assistants requested and number of acres under advisement. Measure by the acres and sediment reduction.	2008-2012
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	The reduction of peek post development flows.	To provide review or inspection services to the Muskingum County to ensure compliance.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Number of developed acres in the Salt Creek Watershed. Also if they are incompliance with the predevelopment flows.	2008-2012

050 40004 060 050
Boggs Creek
Education

Problem Statement: The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, fertilizer runoff, extreme bank erosion, and sediment loss.

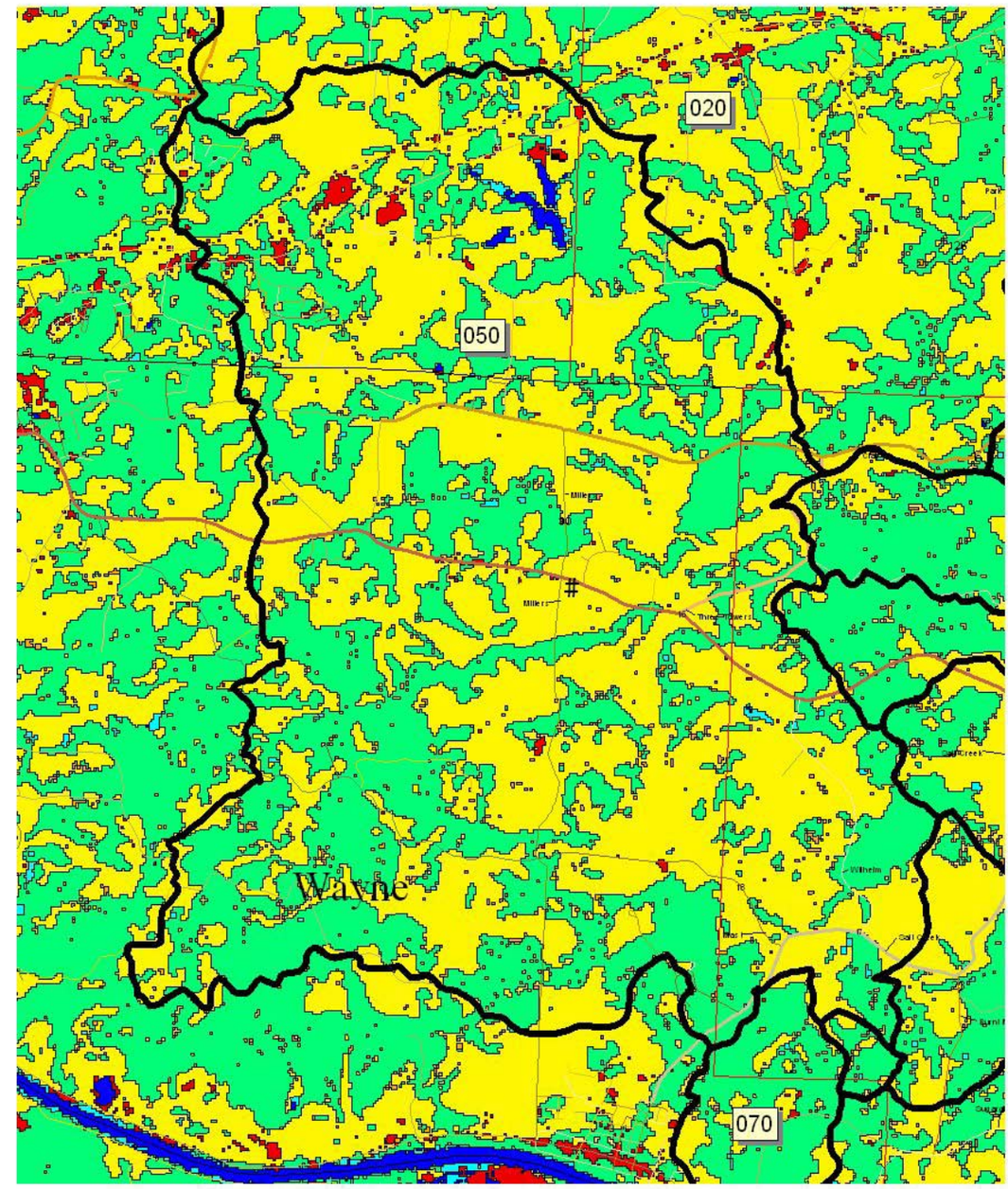
Goal: Educate the local producers on proper manure storage, application, grazing management, erosion control, stormwater management, and tillage methods.

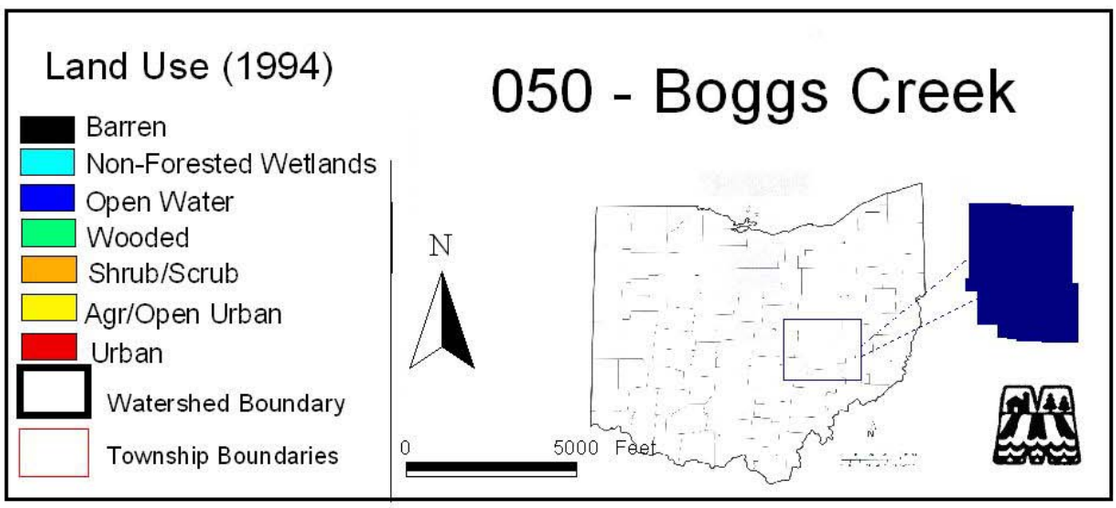
Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Provide information on proper Manure Application.	Educate watershed producers on proper manure storage and application. Encourage proper management to improve the water quality.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual LEAP 1 and LEAP 2 meetings. Hold an annual winter manure application meeting. Track the number of participants.	2006-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Increase the producers knowledge of Nutrient Management	Educate watershed producers on nutrient management and development of two CNMP.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Conduct CNMP Workshops to educate watershed livestock producers. Develop plans for 2 of the livestock producers.	2006-2011
*Heavy Nutrient Load	Increase the producer's knowledge of Intensive Grazing Management.	Educate watershed producers on grazing management and increase the amount of intensive grazing by 1 producer.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual grazing workshops and report the number of NRCS EQIP sign up and acres. Increase the amount of intensive grazing by 1 producers	2006-2011
*Heavy Nutrient Load	Provide information on Conservation Tillage and increase conservation tillage per subwatershed.	Educate watershed producers on tillage practices. Increase the no tillage by a total of 100 acres in five years by allowing free rental of the no till drills to Salt Creek Watershed residents.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual conservation tillage workshop throughout the Salt Creek Watershed. Track the number of acres planted by the no till drill. Increase the acres by 100 in five years. Rental Rate $8.00 per acre =$800.00	2006-2011

*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on soil properties related to development. Help with soil loss reduction and erosion control.	Educate Realtors and Home Owners on soil properties related to development.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual realtors/ Home Owner Workshop. Track by the number attended and contacted.	2006-2011
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on stormwater management and erosion control.	Educate Commercial Developers and Consultants on erosion control and stormwater management.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual commercial developers and Consultants erosion control and stormwater management workshop. Track by the number in attendance.	2006-2011

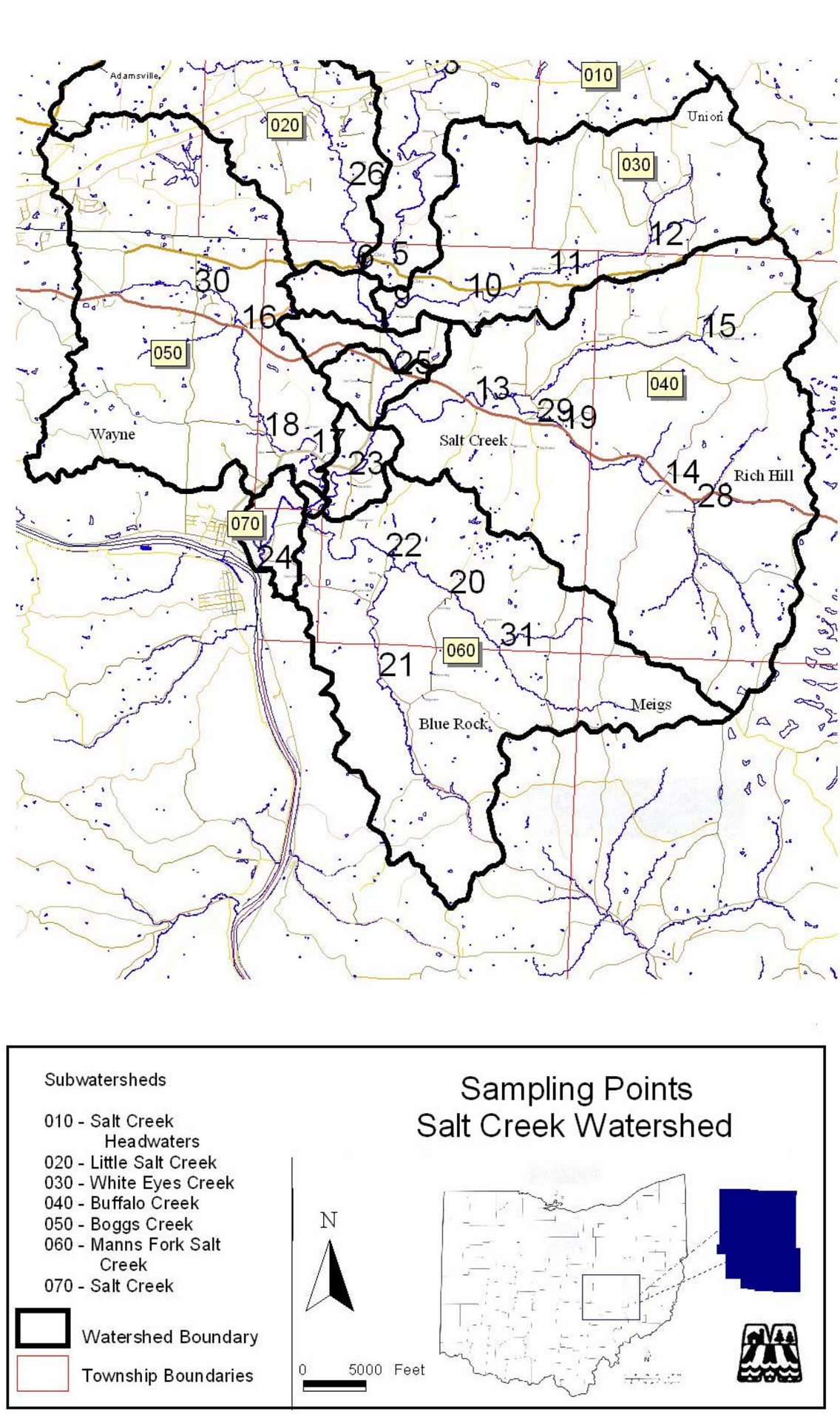
Considering the water quality and type/amount of land uses throughout the 05040004 060 050 sub watershed the above practices were selected to bring the water quality into full attainment. The costs were figured off of NRCS cost estimates. The reduction goal was based on the average concentration and flow rate. The total reduction goal is 10 % of the yearly load.

Pollutant Load Reductions:	Reduction Goal	Reference
Fecal Coliform/ E.coli Reduction	500 #/100 ml	Appendix 13 (Avg. #/100ml)
Phosphorus Reduction	50 lbs/per year	Appendix 13/ Figure 7 (lbs/year reduced by 10%)
Nitrogen Reduction	2,000 lbs/per year	Appendix 13/Figure 4 & 5 (lbs/year reduced by 10%)
Improve QHEI Scores	**75-95 Total QHEI**	Appendix 5
Improve Macroinvertebrate Counts	**17-22 Good**	Appendix 6





Map 7- 050 Land Use



Map 6- 040-070 Sampling Points

05040004 060 060

Mann’s Fork Salt Creek

Land Uses

The Mann's Fork Salt Creek subwatershed is 14.58% of the whole watershed with 13,567.37 acres of land. The current land uses in this subwatershed are composed of 34.39% agricultural, 63.72% wooded areas, 1.33 % Shrub Scrub, 0.04% Urban, 0.37% Non-Forested Wetlands, 0.00% Barren, and 0.15% Open Water (Figure 36). There are 21.20 drainage miles and 11.4 miles of streams. There are 0.29 miles of stream without riparian buffer and 4.71 miles in nonattainment status. The Mann's Fork Salt Creek subwatershed population is 543 individuals (2000 Census). (Table 2)

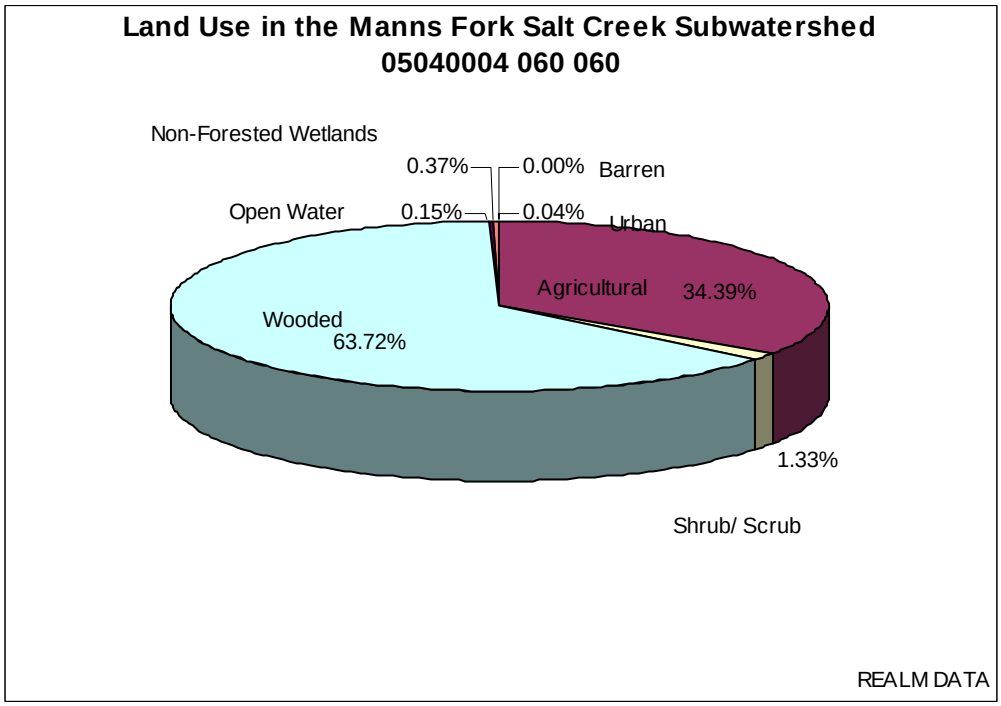


Figure 36- Land Uses in 05040004 060 060

Water Quality

Four sampling sites were analyzed in the White Eyes Creek subwatershed. The four sampling sites give a comprehensive look at the water quality throughout the subwatershed. Each of the sampling sites were selected based on the following conditions: accessible bridge or road crossing, drainage area, representative of the major land use/ land cover patterns, representative of sampling within the 14 digit HUC, and accessibility to perform habitat assessments. The sampling site locations give us better understanding of where the contaminants are derived from. The following are figures showing the comparison of 2003-2004 sampling data.

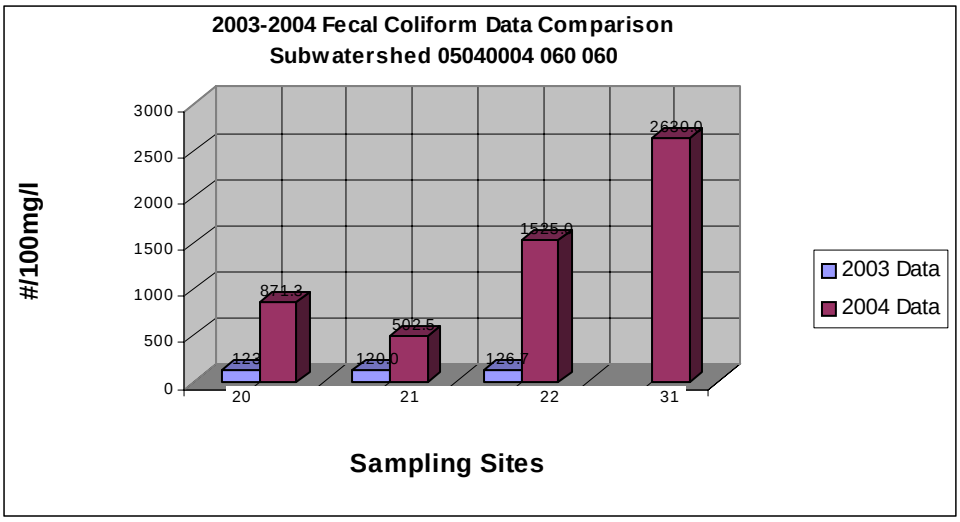


Figure 37- 05040004 060 060 Fecal Coliform Data

The fecal coliform target limit for aquatic streams is 1000- 2000 cpu/100ml for primary contact and 5000 cpu/100ml for agricultural use. (Figure 36)

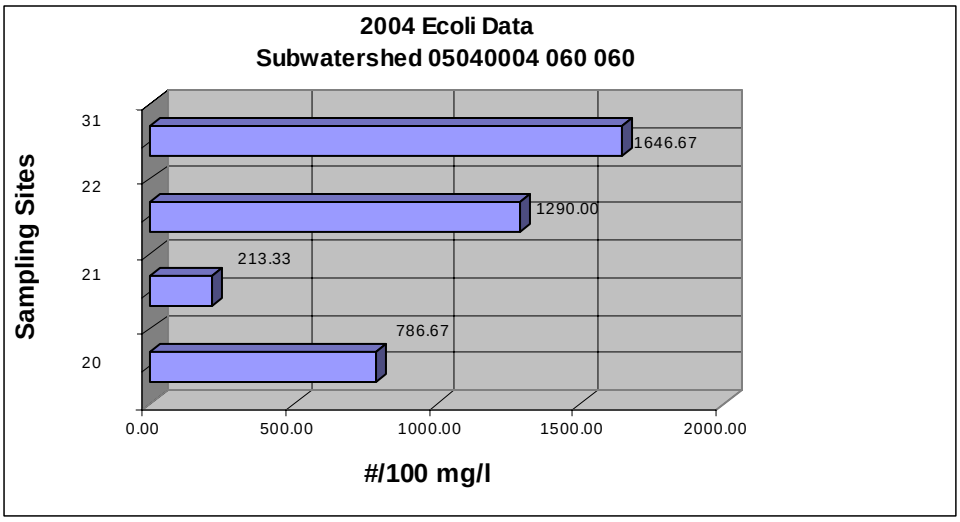


Figure 38- 05040004 060 060 E.coli Data

The E.coli target limit for aquatic streams is 576 per 100ml (animal use) and 126 per 100 ml or 298 per 100 ml. (human use). (Figure 37)

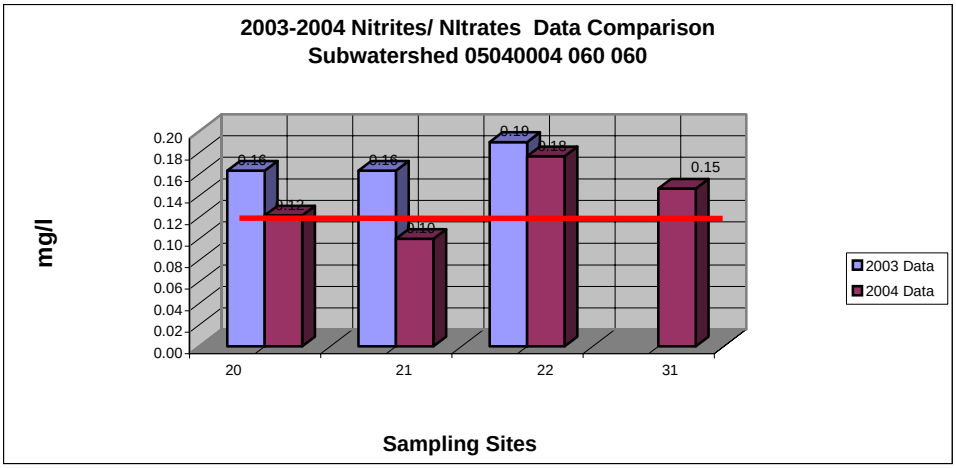


Figure 39- 05040004 060 060 Nitrites/ Nitrates Data

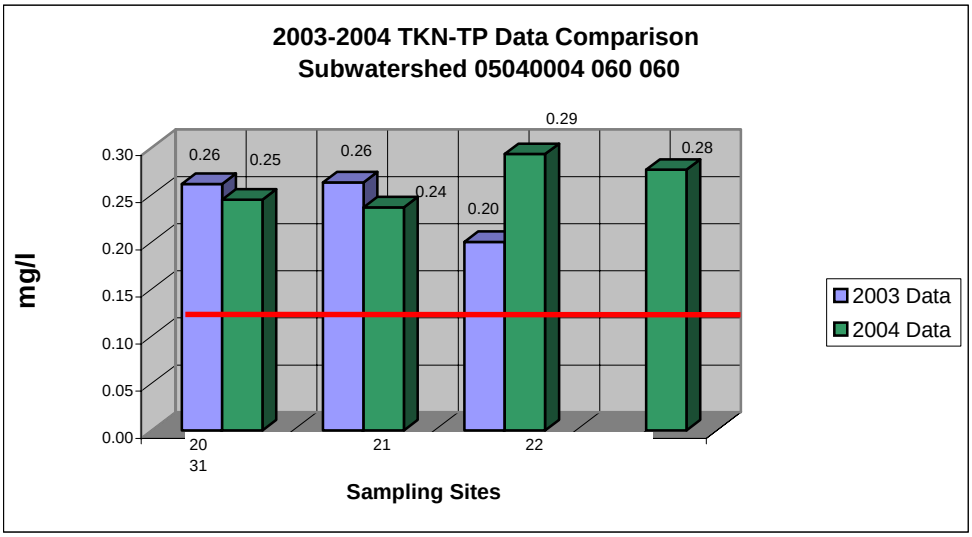


Figure 40- 05040004 060 060 TKN (TKN-TP) Data

Nitrite-Nitrate target limit for aquatic streams is < 0.10 mg/L. Nitrates that later combine with phosphorus can promote algae growth within streams. Nitrogen compounds entering streams are the result of livestock manure or feeding area runoff, fertilizers on yards or agricultural fields, sewage, and legumes. Nitrates/ Nitrites, being very water-soluble, have high potential in contaminating ground water. (Figure 38, 39)

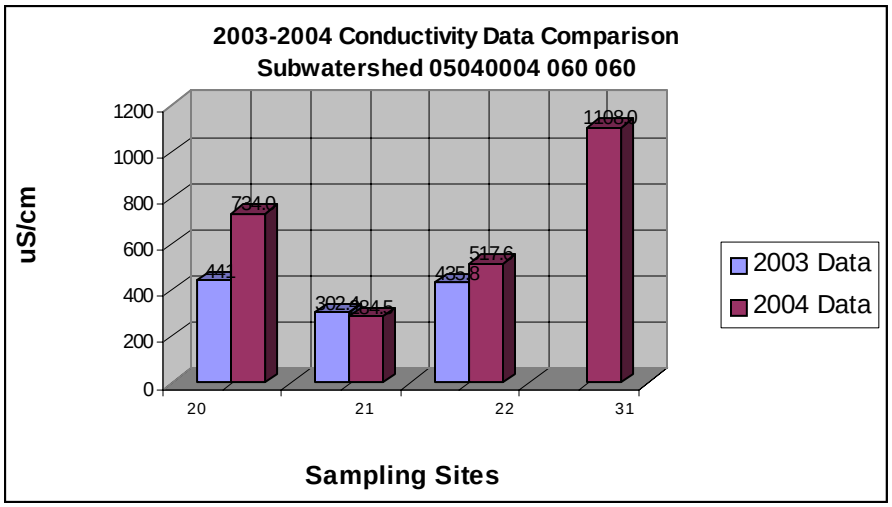


Figure 41-05040004060 060 Conductivity

The conductivity limit is <2400micrmhos/cm @25. All of the sampling sites are below 25C. (Figure 40)

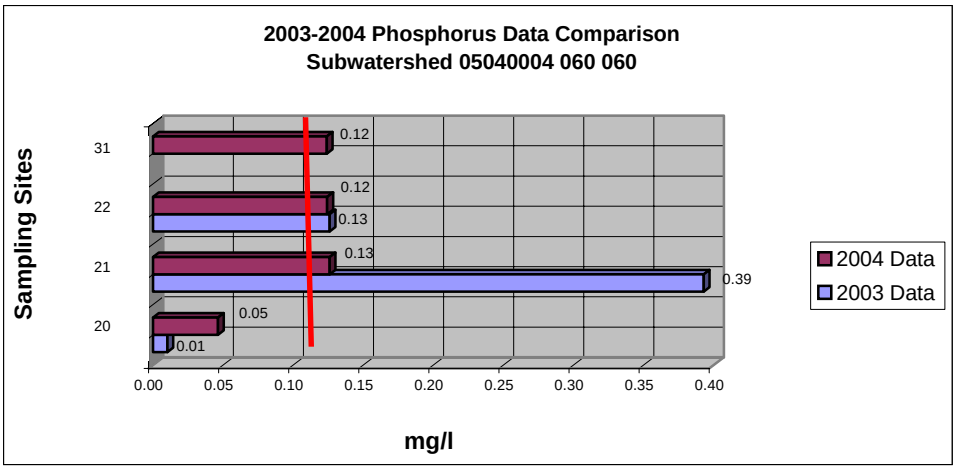


Figure 42- 05040004 060 060 Phosphorus Data

The total phosphorus target for aquatic streams is <0.10 mg/L. (Figure 41)

Water Quality Problems

The Fecal Coliform and E.coli levels are extremely high throughout all four sampling sites. These high limits could be caused by failed or nonexisting home sewage treatment systems. The high Fecal Coliform and E.coli limits could also be caused by confined or non-confined livestock operations. The Nitrite/Nitrate levels are high in all four sampling locations also. The high levels could be from severe erosion and not enough riparian corridor. The phosphorus levels below the target limit. The 05040004 060 060 subwatershed has approximately 4.71 miles of streams in nonattainment status

050 40004 060 060
Mann's Fork Salt Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department identify and upgrade 4 of the failing septic systems during the first 5 yrs. and 2 during the next 5 years.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Identify the failing home sewage treatment systems	Work with the Muskingum County Health Department to locate, onsite investigation, and propose solutions.	Health Department and Muskingum SWCD Intern (after training with the Muskingum County Health Department) to inspect failing systems.	Track the number of failing Systems inspected	2006-2008
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Write a HSTS Plan with the provision of guidelines to those residents upgrading, repairing, and installation.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Number of systems upgraded, repaired, and installed.	2008-2009
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Apply for a 319 HSTS grant to cost share program for on site septic systems replacement, repair, and upgrade	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Obtain grant providing cost share dollars to residents for replacement, repair, and upgrade.	2009-2010
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Replace, repair, and establishment of 2 home sewage septic systems.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Replace, repair, and establishment of 2 home sewage septic systems.	2010-2012

Failing or non existent home sewage treatment systems are a major contributor to the water quality impairments. The local residents and Muskingum County Health Department identified this as an increasing concern throughout the 05040004 060 060 subwatershed

050 40004 060 060

Mann's Fork Salt Creek

Educational

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department provide education to the general public to increase the awareness of the failed or non existence home sewage systems.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Septic System Education	Provide Education for Proper Installation and Maintenance of Septic Systems	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Hold Annual Workshop for Home Septic Treatment System Maintenance.	2006-2012

050 40004 060 060

Mann's Fork Salt Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, and fertilizer runoff.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that the water quality will be meet the water quality target limits.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Install Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of livestock exclusion fencing on 1.0 miles of stream bank, costing approximately $1.10 per ft. with a total cost of $5,808.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Track the amount of livestock exclusion fence installed. Installation of livestock exclusion fencing on two miles (5280ft.) of livestock accessible streams.	2008-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The construction of Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of 3 livestock pipeline water systems with 5,571 ft. of tile, and troughs approximately cost $5,571.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 3 alternative watering systems on the non confined livestock operations.	2008-2011

050 40004 060 060
Mann's Fork Salt Creek
Technical

Problem Statement: Extreme amount of bank erosion and sediment loss has caused loss of land and impaired the streams water quality.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that the water quality meet the water quality standards.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Install Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of livestock exclusion fencing on .25 miles of stream bank, costing approximately $1.10 per ft. with a total cost of $2,904.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Track the amount of livestock exclusion fence installed. Installation of livestock exclusion fencing on 0.25 miles (2604ft.) of livestock accessible streams.	2008-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The construction of Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of 3 livestock pipeline water systems with 1800 ft. of tile, and troughs approximately cost $7,740.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 10 alternative watering systems on the non confined livestock operations.	2008-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Construction of Access Road and Heavy Use Area Protection	Installation of 2 livestock access stream crossings approximately cost $10,890.00 and 2 heavy use protection areas approximately costing $4,000.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 2 livestock access stream crossings on unconfined livestock operations and 2 heavy use area protection area	2008-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load *Extreme amounts of sediment loss	Designing and installing Grade Stabilization Structure	Installation of rip/ rap along the stream bank for stabilization, reducing the sediment and nutrient run off.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Account for the amount of rip/ rap installed. Cost is varied site to site	2008-2011
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	Township Road Ditch Erosion (Zoned or Not) Reduction of sediment loss and road ditch erosion.	Designing the road ditch or culvert at a 10 yr. Capacity to reduce sediment loss.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Designing the road ditch or culvert at a 10 yr. Capacity to reduce sediment loss. Track the mile of road ditch repaired.	2008-2011

*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	Advise Township Trustees on sediment loading and assist in reduction of sediment loss and erosion.	Assisting Township Trustees in looking at land development sediment loss, and erosion control structures.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The tracking of the number of assistants requested and number of acres under advisement. Measure by the acres and sediment reduction.	2008-2011
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	The reduction of peek post development flows.	To provide review or inspection services to the Muskingum County to ensure compliance.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Number of developed acres in the Salt Creek Watershed. Also if they are incompliance with the predevelopment flows.	2008-2011

050 40004 060 060
Mann's Fork Salt Creek
Education

Problem Statement: The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, fertilizer runoff, extreme bank erosion, and sediment loss.

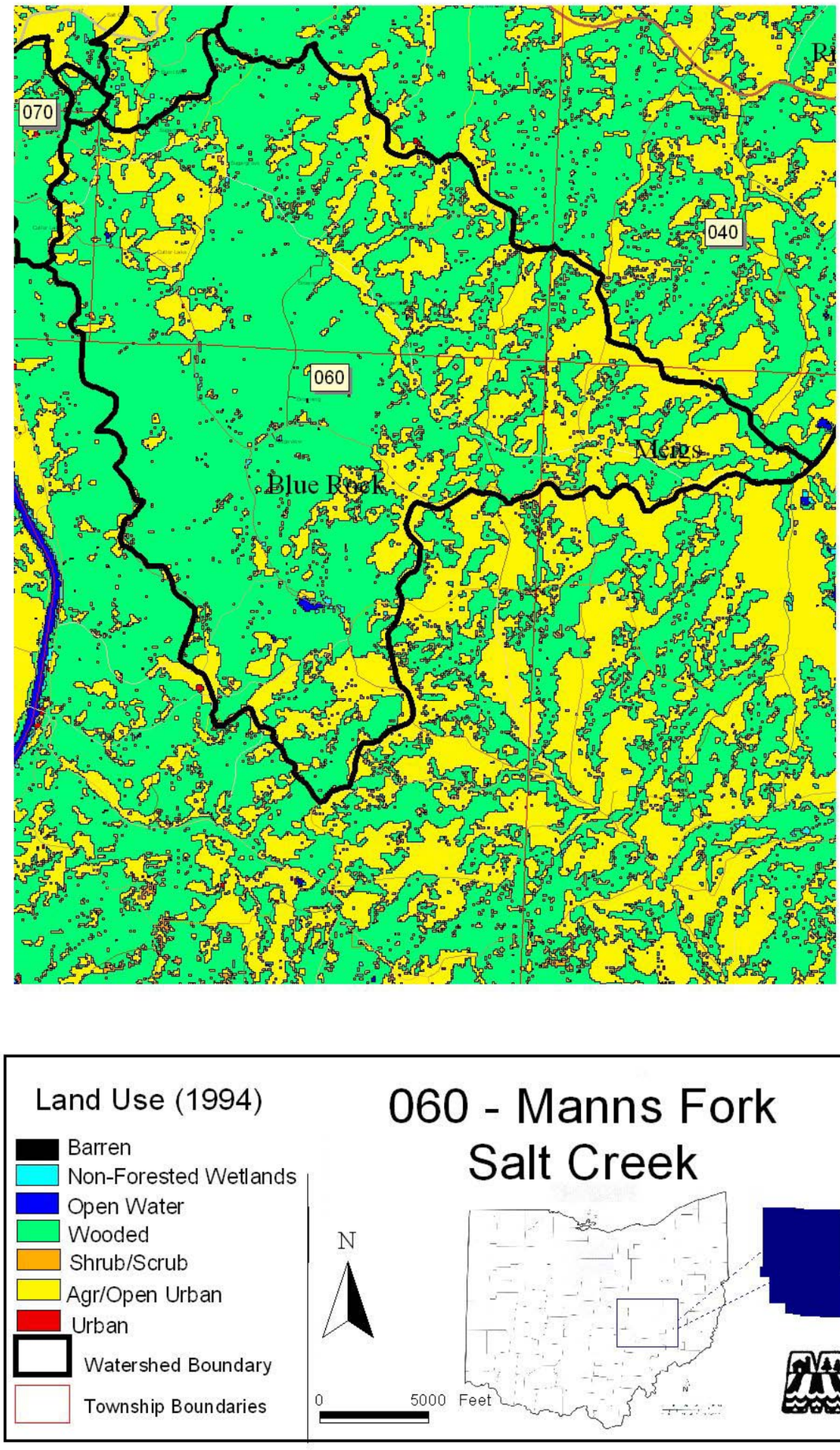
Goal: Educate the local producers on proper manure storage, application, grazing management, erosion control, stormwater management, and tillage methods.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Provide information on proper Manure Application.	Educate watershed producers on proper manure storage and application. Encourage proper management to improve the water quality.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual LEAP 1 and LEAP 2 meetings. Hold an annual winter manure application meeting. Track the number of participants.	2006-2012
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Increase the producers knowledge of Nutrient Management	Educate watershed producers on nutrient management and development of two CNMP.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Conduct CNMP Workshops to educate watershed livestock producers. Develop plans for 2 of the livestock producers.	2006-2012
*Heavy Nutrient Load	Increase the producer's knowledge of Intensive Grazing Management.	Educate watershed producers on grazing management and increase the amount of intensive grazing by 1 producer.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual grazing workshops and report the number of NRCS EQIP sign up and acres. Increase the amount of intensive grazing by 1 producers	2006-2012
*Heavy Nutrient Load	Provide information on Conservation Tillage and increase conservation tillage per subwatershed.	Educate watershed producers on tillage practices. Increase the no tillage by 150 acres in five years by allowing free rental of the no till drills to Salt Creek Watershed residents.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual conservation tillage workshop throughout the Salt Creek Watershed. Track the number of acres planted by the no till drill. Increase the acres by 150 in five years. Rental Rate $8.00 per acre =$1,200.00	2006-2012

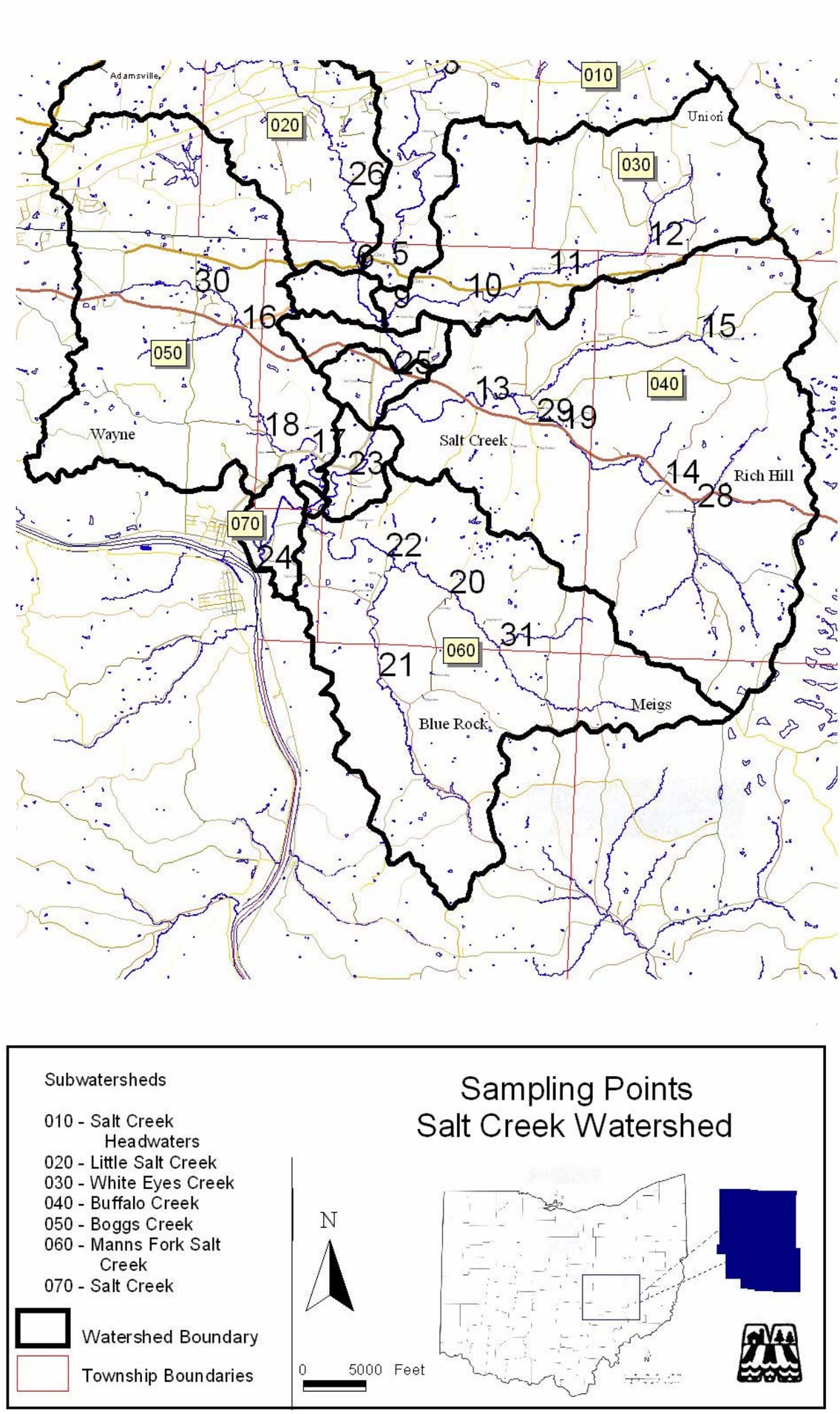
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on soil properties related to development. Help with soil loss reduction and erosion control.	Educate Realtors and Home Owners on soil properties related to development.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual realtors/ Home Owner Workshop. Track by the number attended and contacted.	2006-2012
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on stormwater management and erosion control.	Educate Commercial Developers and Consultants on erosion control and stormwater management.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual commercial developers and Consultants erosion control and stormwater management workshop. Track by the number in attendance.	2006-2012

Considering the water quality and type/amount of land uses throughout the 05040004 060 060 sub watershed the above practices were selected to bring the water quality into full attainment. The costs were figured off of NRCS cost estimates. The reduction goal was based on the average concentration and flow rate. The total reduction goal is 10 % of the yearly load.

Pollutant Load Reductions:	Reduction Goal	Reference
Fecal Coliform/ E.coli Reduction	800 #/100 ml	Appendix 13 (Avg. #/100ml)
Phosphorus Reduction	100 lbs/per year	Appendix 13/ Figure 7 (lbs/year reduced by 10%)
Nitrogen Reduction	500 lbs/per year	Appendix 13/Figure 4 & 5 (lbs/year reduced by 10%)
Improve QHEI Scores	**75-95 Total QHEI**	Appendix 5
Improve Macroinvertebrate Counts	**17-22 Good**	Appendix 6



Map 8- 060 Land Use



Map 6- 040-070 Sampling Points

05040004 060 070

Salt Creek

Land Uses

The Salt Creek subwatershed is 7.25% of the whole watershed with 6,746.90 acres of land. The current land uses in this subwatershed are composed of 10.46% agricultural, 58.09% wooded areas, 1.33 % Shrub Scrub, 0.04% Urban, 0.30% Non-Forested Wetlands, 0.00% Barren, and 0.01% Open Water (Figure 42). There are 10.54 drainage miles and 14.1 miles of streams. There are 3.23 miles of stream without riparian buffer and 5.10 miles in nonattainment status. The Salt Creek subwatershed population is 319 individuals (2000 Census). (Table 2)

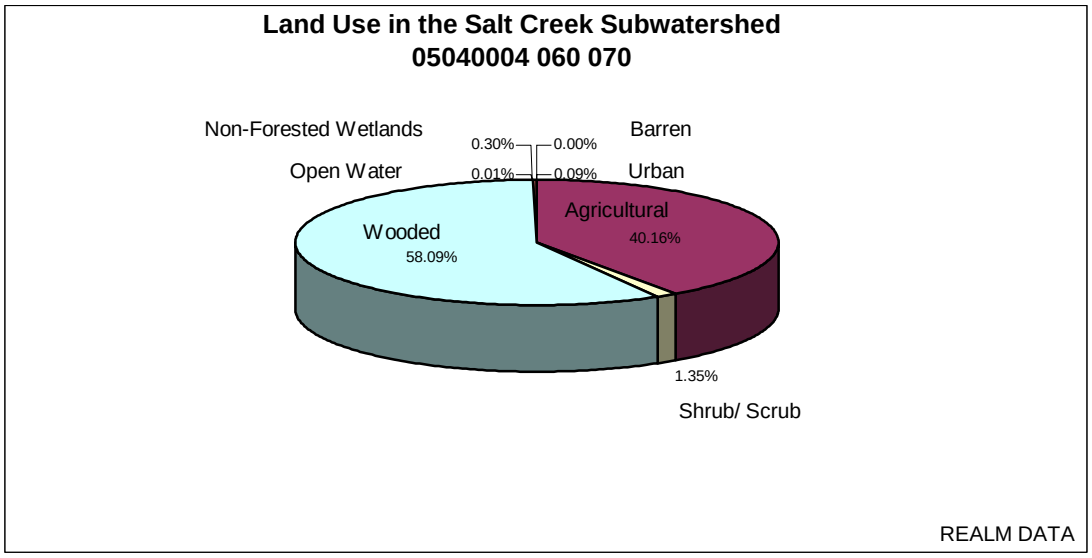


Figure 43- Land Uses in 05040004 060 070

Water Quality

Three sampling sites were analyzed in the White Eyes Creek subwatershed. The three sampling sites give a comprehensive look at the water quality throughout the subwatershed. Each of the sampling sites were selected based on the following conditions: accessible bridge or road crossing, drainage area, representative of the major land use/ land cover patterns, representative of sampling within the 14 digit HUC, and accessibility to perform habitat assessments. The sampling site locations give us better understanding of where the contaminants are derived from. The following are figures showing the comparison of 2003-2004 sampling data.

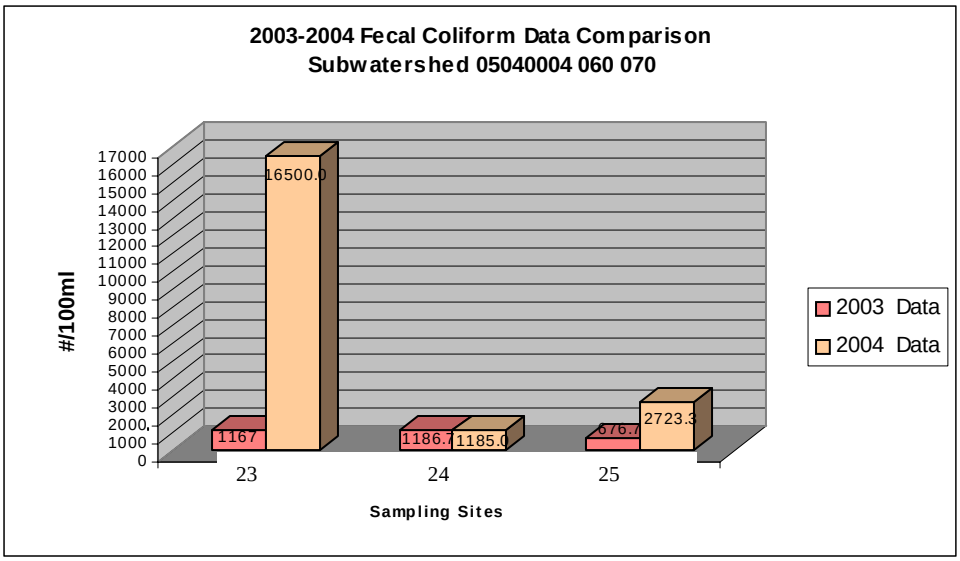


Figure 44- 05040004 060 070 Fecal Coliform Data

The fecal coliform target limit for aquatic streams is 1000- 2000 cpu/100ml for primary contact and 5000 cpu/100ml for agricultural use. (Figure 43)

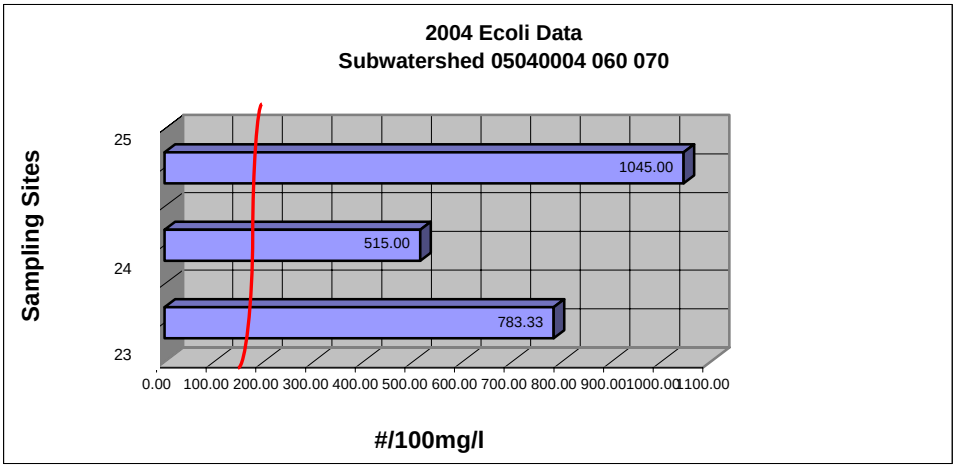


Figure 45- 05040004 060 070 E.coli Data

The E.coli target limit for aquatic streams is 576 per 100ml (animal use) and 126 per 100 ml or 298 per 100 ml. (human use). (Figure 44)

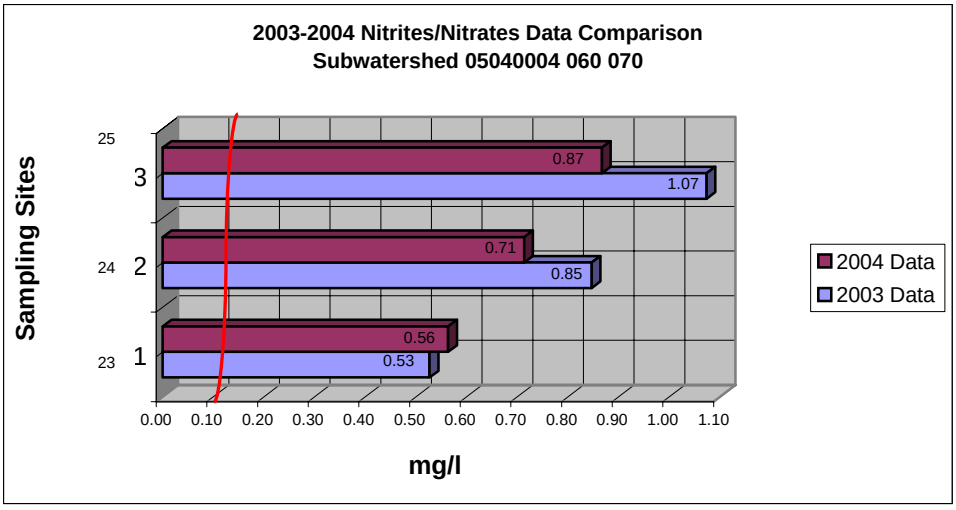


Figure 46- 05040004 060 070 Nitrites/ Nitrates Data

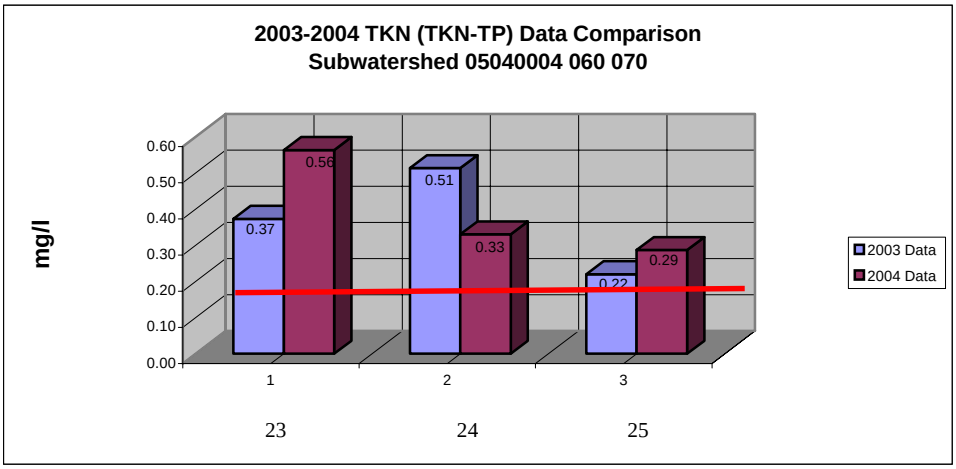


Figure 47- 05040004 060 070 TKN (TKN-TP) Data

Nitrite-Nitrate target limit for aquatic streams is < 0.10 mg/L. Nitrates that later combine with phosphorus can promote algae growth within streams. Nitrogen compounds entering streams are the result of livestock manure or feeding area runoff, fertilizers on yards or agricultural fields, sewage, and legumes. Nitrates/ Nitrites, being very water-soluble, have high potential in contaminating ground water. (Figure 45, 46)

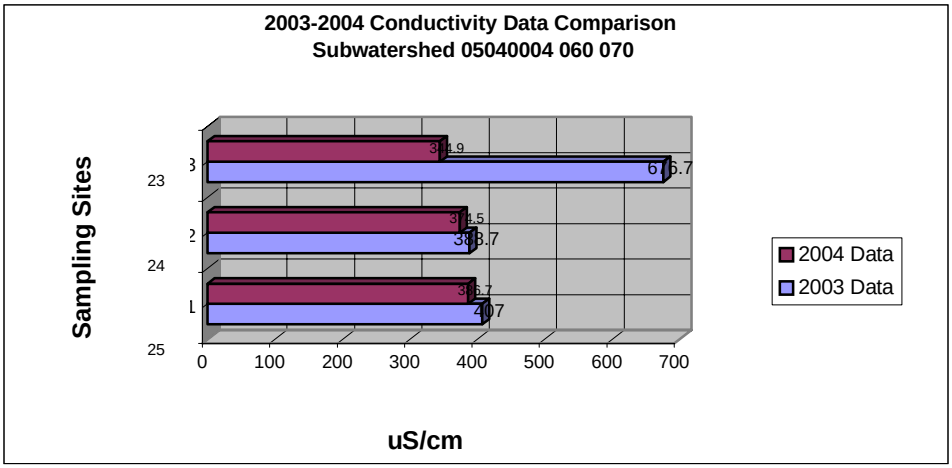


Figure 48-05040004060 070 Conductivity

The conductivity limit is <2400micrmhos/cm @25. All of the sampling sites are below 25C. (Figure 47)

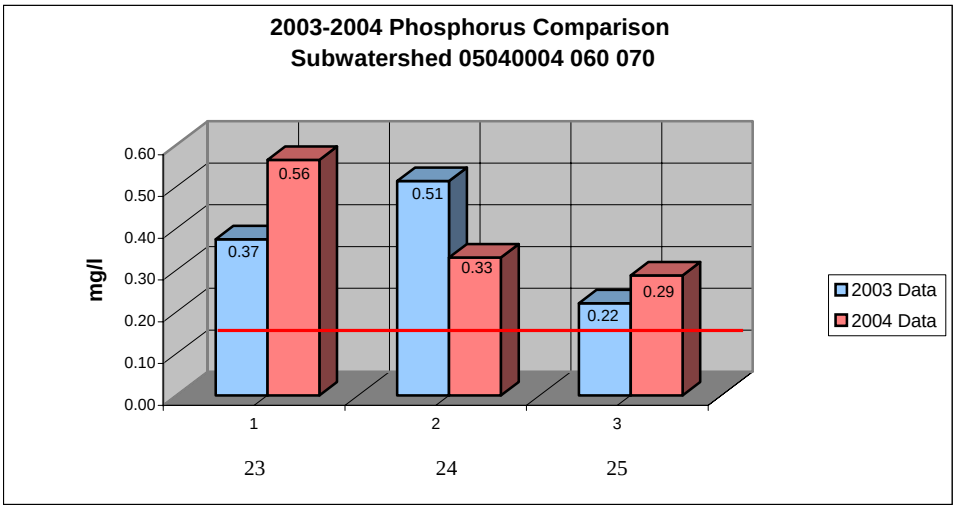


Figure 49- 05040004 060 070 Phosphorus Data

The total phosphorus target for aquatic streams is <0.10 mg/L. (Figure 48)

Water Quality Problems

The Fecal Coliform and E.coli levels are extremely high throughout all four sampling sites. These high limits could be caused by failed or nonexisting home sewage treatment systems. The high Fecal Coliform and E.coli limits could also be caused by non-confined livestock operations. The Nitrite/Nitrate levels are high in all three sampling locations also. The high levels could be from severe erosion and not enough riparian corridor. The phosphorus levels below the target limit. The 05040004 060 070 subwatershed has approximately 5.10 miles of streams in nonattainment status.

050 40004 060 070
Salt Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department identify and upgrade 3 of the failing septic systems during the first 5 yrs. and 3 during the next 5 years.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Identify the failing home sewage treatment systems	Work with the Muskingum County Health Department to locate, onsite investigation, and propose solutions.	Health Department and Muskingum SWCD Intern (after training with the Muskingum County Health Department) to inspect failing systems.	Track the number of failing Systems inspected	2006-2008
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Write a HSTS Plan with the provision of guidelines to those residents upgrading, repairing, and installation.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Number of systems upgraded, repaired, and installed.	2008-2009
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Apply for a 319 HSTS grant to cost share program for on site septic systems replacement, repair, and upgrade	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Obtain grant providing cost share dollars to residents for replacement, repair, and upgrade.	2009-2010
High levels of Fecal Coliform and E.coli	Replace/ Upgrade Failing Septic Systems	Replace, repair, and establishment of 3 home sewage septic systems.	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Replace, repair, and establishment of 3 home sewage septic systems.	2010-2012

Failing or non existent home sewage treatment systems are a major contributor to the water quality impairments. The local residents and Muskingum County Health Department identified this as an increasing concern throughout the 05040004 060 070 subwatershed

050 40004 060 070
Salt Creek
Education

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are due to the failed or non existence home sewage treatment systems.

Goal: Working cooperatively with the Muskingum County Health Department provide education to the general public to increase the awareness of the failed or non existence home sewage systems.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
High levels of Fecal Coliform and E.coli	Septic System Education	Provide Education for Proper Installation and Maintenance of Septic Systems	Muskingum SWCD assist the Muskingum County Health Department in writing a HSTS Plan.	Hold Annual Workshop for Home Septic Treatment System Maintenance.	2006-2012

050 40004 060 070
Salt Creek
Technical

Problem Statement: High levels of fecal coliform and E.coli have represented the heavy load of nutrients. The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, and fertilizer runoff.

Problem Statement: Extreme amount of bank erosion and siltation has caused loss of land and impaired the streams water quality.

Goal: Working and educating the local producers on proper manure application and storage. Increase the number of livestock manure storage facilities and limit the livestock access to the streams. By implementing these strategies the anticipation is that the water quality will meet water quality standards.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Install Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of livestock exclusion fencing on 1.0 miles of stream bank, costing approximately $1.10 per ft. with a total cost of $5,808.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Track the amount of livestock exclusion fence installed. Installation of livestock exclusion fencing on one mile (5280ft.) of livestock accessible streams.	2006-2009
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The construction of Livestock Exclusion (Fencing and Alternative Water Systems)	Installation of 2 livestock pipeline water systems with 1,200 ft. of tile, and troughs approximately cost $3,715.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 2 alternative watering systems on the non confined livestock operations.	2006-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Construction of Access Road and Heavy Use Area Protection	Installation of 2 livestock access stream crossings approximately cost $10,890.00 and 4 heavy use protection areas approximately costing $8,000.00	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Installation of 2 livestock access stream crossings on unconfined livestock operations and 4 heavy use area protection area	2006-2010
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	The setting aside land for forested riparian buffer strip next to the streambank.	Installation of riparian buffer on the stream bank using a 35 foot minimum buffer on 100 ft. of the total amount of unrestricted livestock access.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The planting of trees and cool season grasses/ legumes on 100 ft. on riparian buffer.	2006-2009

*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load *Extreme amounts of sediment loss	Designing and installing Grade Stabilization Structure	Installation of rip/ rap along the stream bank for stabilization, reducing the sediment and nutrient run off.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Account for the amount of rip/ rap installed. Cost is varied site to site	2006-2010
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	Township Road Ditch Erosion (Zoned or Not) Reduction of sediment loss and road ditch erosion.	Designing the road ditch or culvert at a 10 yr. Capacity to reduce sediment loss.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Designing the road ditch or culvert at a 10 yr. Capacity to reduce sediment loss. Track the mile of road ditch repaired.	2006-2009
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	Advise Township Trustees on sediment loading and assist in reduction of sediment loss and erosion.	Assisting Township Trustees in looking at land development sediment loss, and erosion control structures.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	The tracking of the number of assistants requested and number of acres under advisement. Measure by the acres and sediment reduction.	2006-2009
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	The reduction of peek post development flows.	To provide review or inspection services to the Muskingum County to ensure compliance.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Number of developed acres in the Salt Creek Watershed. Also if they are incompliance with the predevelopment flows.	2007-2011

050 40004 060 070

Salt Creek headwaters above Little Salt Creek

Education

Problem Statement: The high loads of nutrients are suspected to the improper storage and application of livestock manure, unrestricted livestock stream access, fertilizer runoff, extreme bank erosion, and sediment loss.

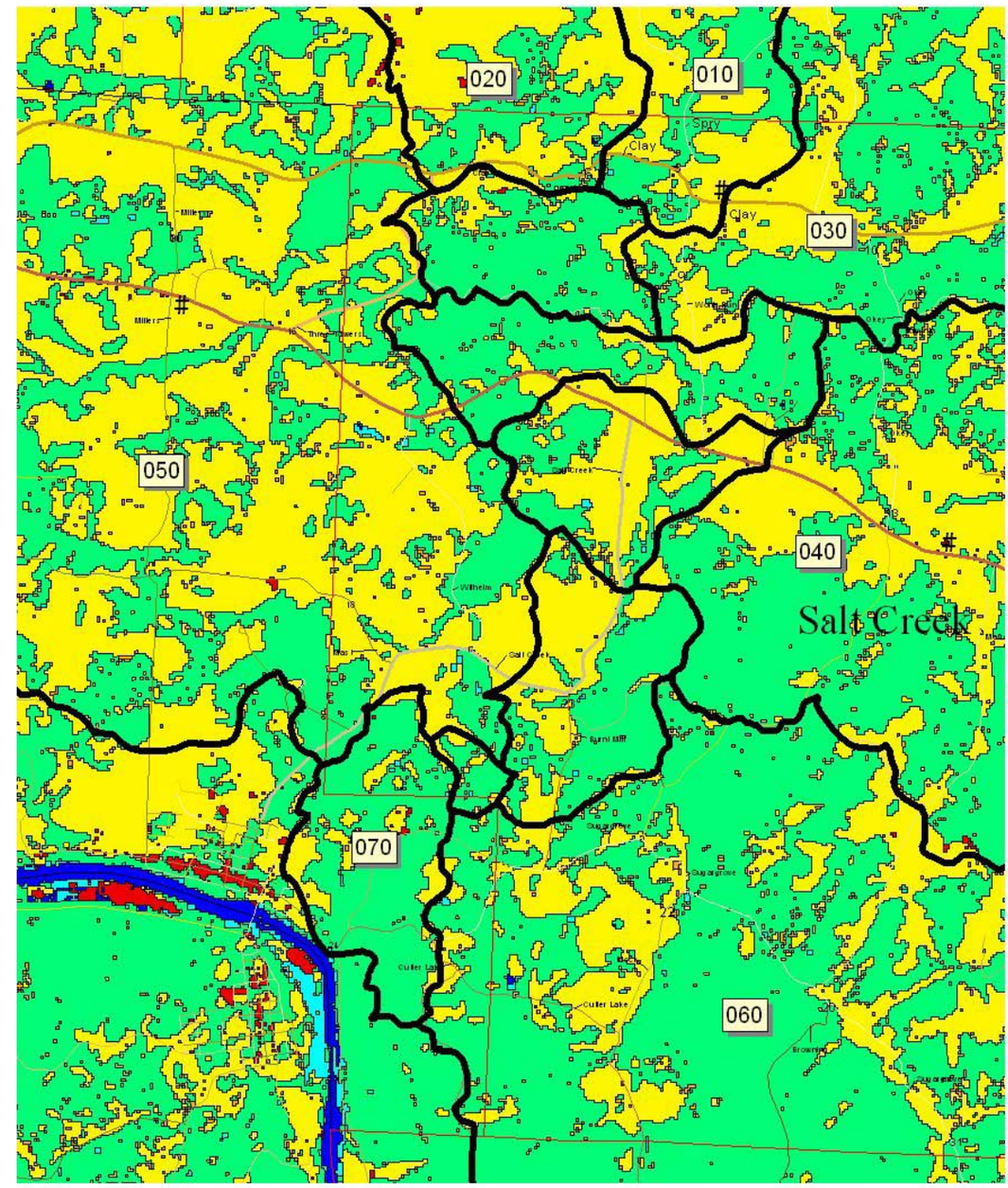
Goal: Educate the local producers on proper manure storage, application, grazing management, erosion control, stormwater management, and tillage methods.

Problem	Objective	Solution/ Action	Resources	Performance Indicators	Time Frame
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Provide information on proper Manure Application.	Educate watershed producers on proper manure storage and application. Encourage proper management to improve the water quality.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual LEAP 1 and LEAP 2 meetings. Hold an annual winter manure application meeting. Track the number of participants.	2006-2011
*High levels of Fecal Coliform and E.coli *Heavy Nutrient Load	Increase the producers knowledge of Nutrient Management	Educate watershed producers on nutrient management and development of two CNMP.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Conduct CNMP Workshops to educate watershed livestock producers. Develop plans for 2 of the livestock producers.	2006-2011
*Heavy Nutrient Load	Increase the producer's knowledge of Intensive Grazing Management.	Educate watershed producers on grazing management and increase the amount of intensive grazing by 1 producer.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual grazing workshops and report the number of NRCS EQIP sign up and acres. Increase the amount of intensive grazing by 1 producers	2006-2011
*Heavy Nutrient Load	Provide information on Conservation Tillage and increase conservation tillage per subwatershed.	Educate watershed producers on tillage practices. Increase the no tillage by 300 acres in five years by allowing free rental of the no till drills to Salt Creek Watershed residents.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold annual conservation tillage workshop throughout the Salt Creek Watershed. Track the number of acres planted by the no till drill. Increase the acres by 300 in five years. Rental Rate $8.00 per acre =$2,400.00	2006-2011

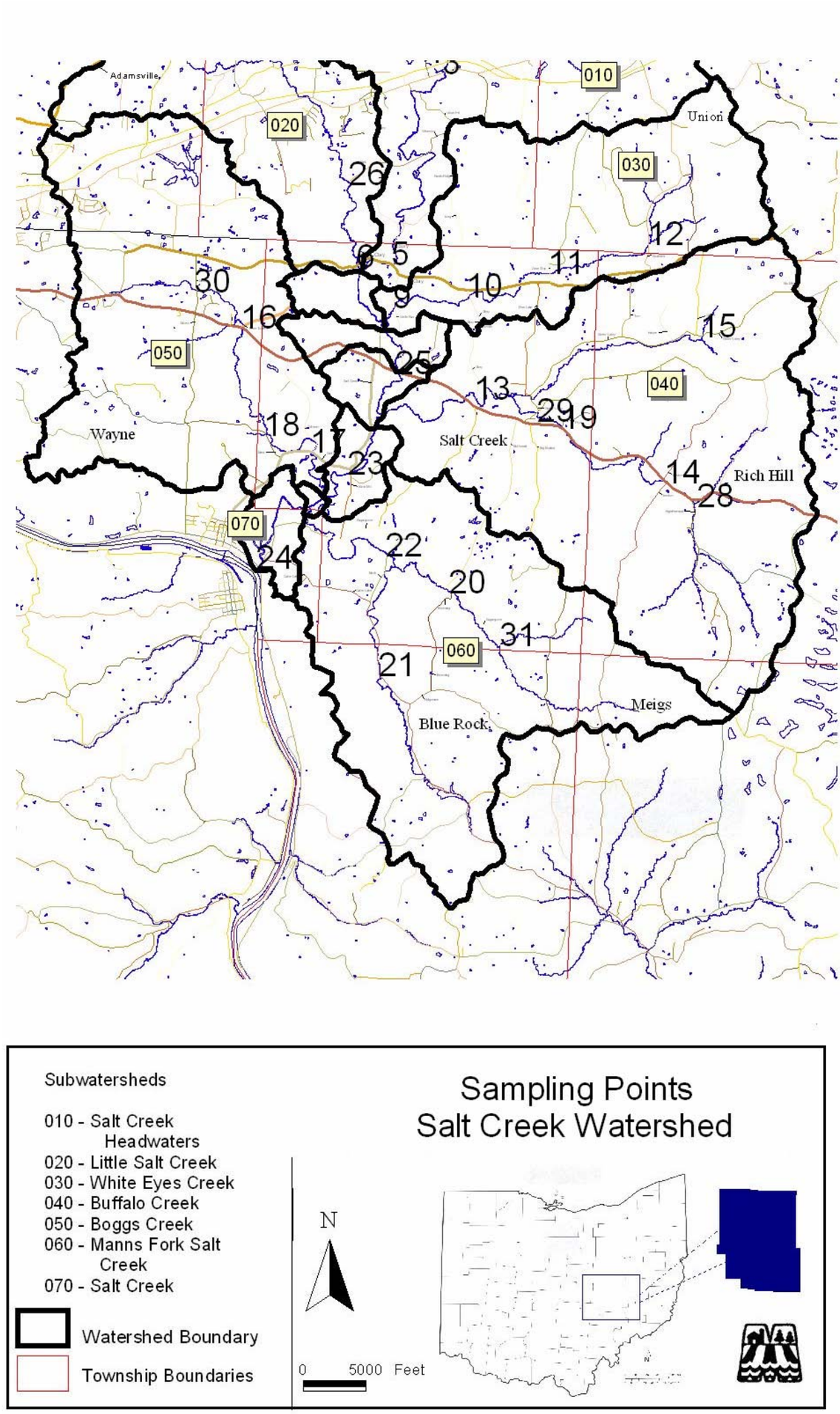
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on soil properties related to development. Help with soil loss reduction and erosion control.	Educate Realtors and Home Owners on soil properties related to development.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual realtors/ Home Owner Workshop. Track by the number attended and contacted.	2006-2011
*High Nitrites/ Nitrates *High Phosphates *Reduction of sediment loss and erosion.	To provide information on stormwater management and erosion control.	Educate Commercial Developers and Consultants on erosion control and stormwater management.	Muskingum SWCD Staff & programs, NRCS staff & programs, and ODNR-DWSC staff & programs	Hold an annual commercial developers and Consultants erosion control and stormwater management workshop. Track by the number in attendance.	2006-2011

Considering the water quality and type/amount of land uses throughout the 05040004 060 070 sub watershed the above practices were selected to bring the water quality into full attainment. The costs were figured off of NRCS cost estimates. The reduction goal was based on the average concentration and flow rate. The total reduction goal is 10 % of the yearly load.

Pollutant Load Reductions:	Reduction Goal	Reference
Fecal Coliform/ E.coli Reduction	800/ 500 #/100 ml	Appendix 13 (Avg. #/100ml)
Phosphorus Reduction	900 lbs/per year	Appendix 13/ Figure 7 (lbs/year reduced by 10%)
Nitrogen Reduction	650 lbs/per year	Appendix 13/Figure 4 & 5 (lbs/year reduced by 10%)
Improve QHEI Scores	**75-95 Total QHEI**	Appendix 5
Improve Macroinvertebrate Counts	**17-22 Good**	Appendix 6



Map 9- 070 Land Use



Map 6- 040-070 Sampling Points

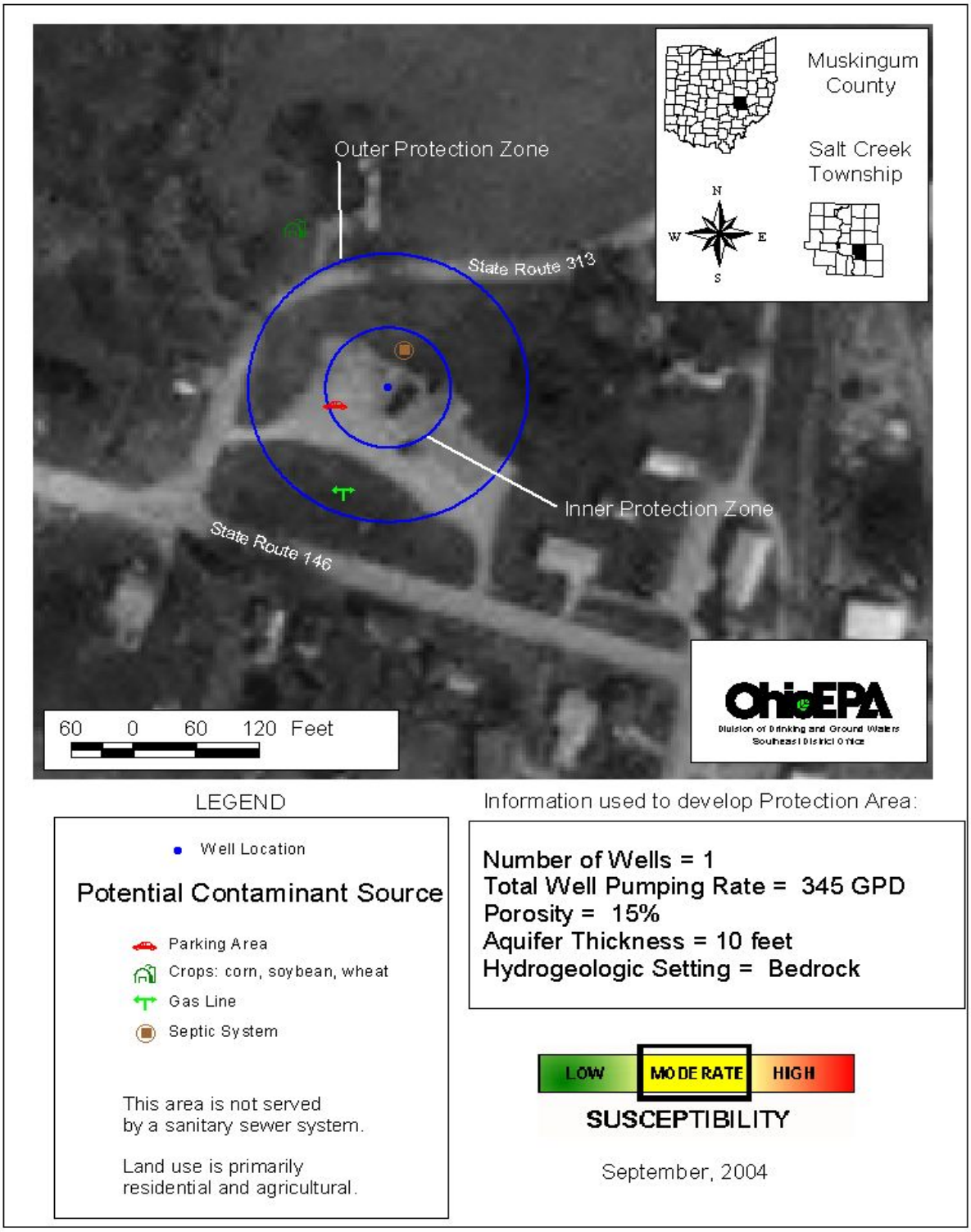
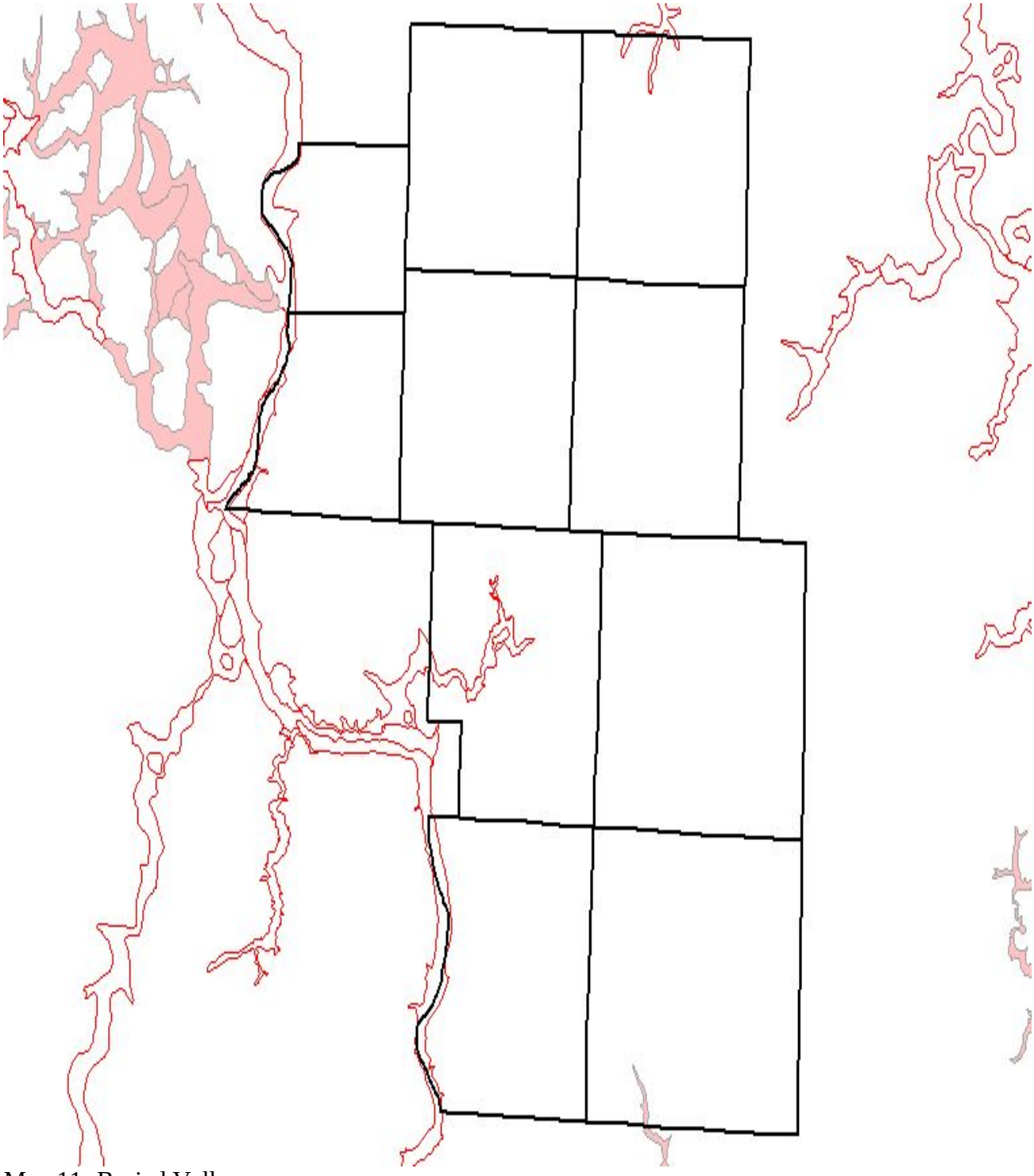
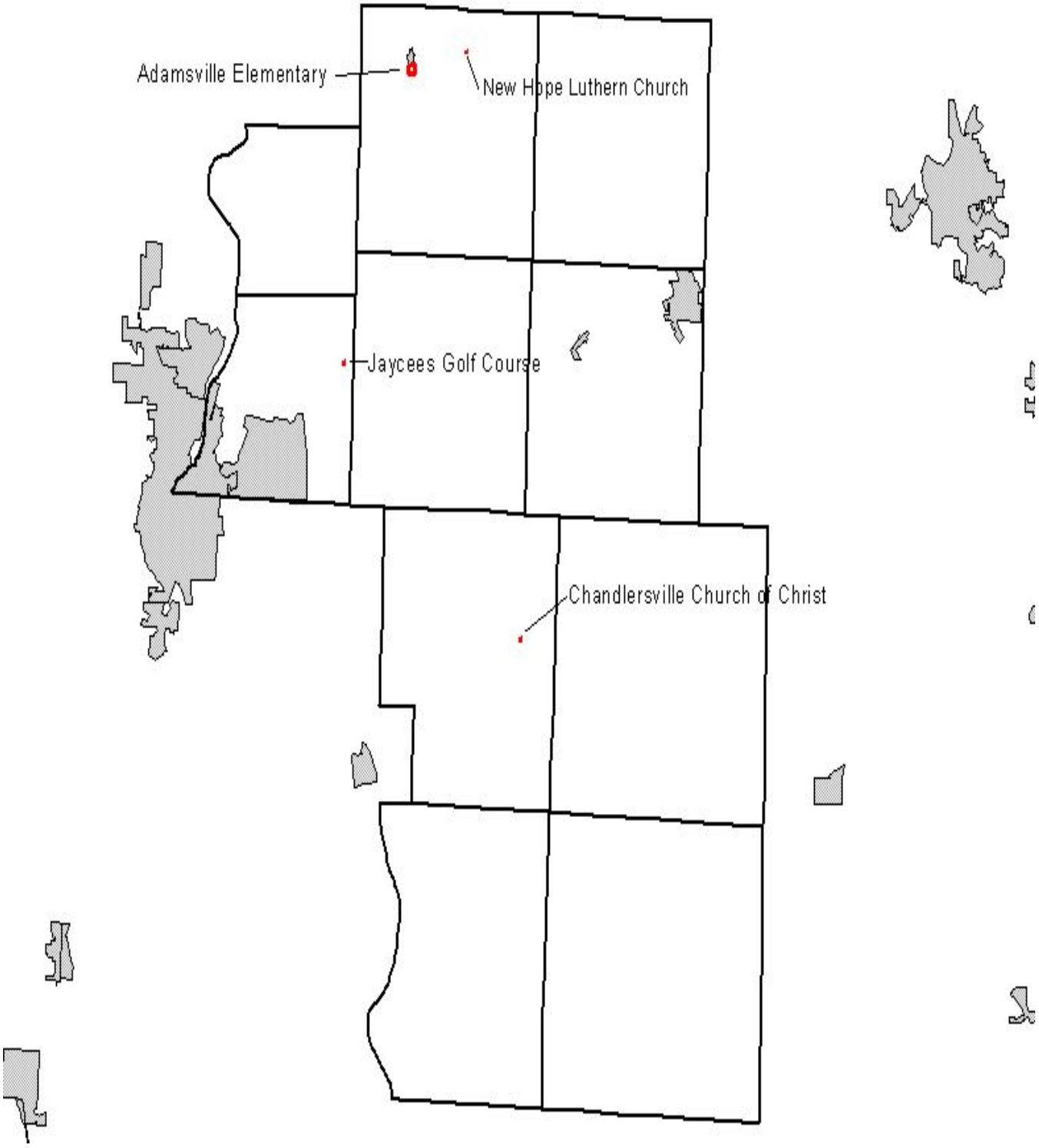


Figure 1. Drinking Water Source Protection Area for the Chandlersville Church of Christ #6042112.

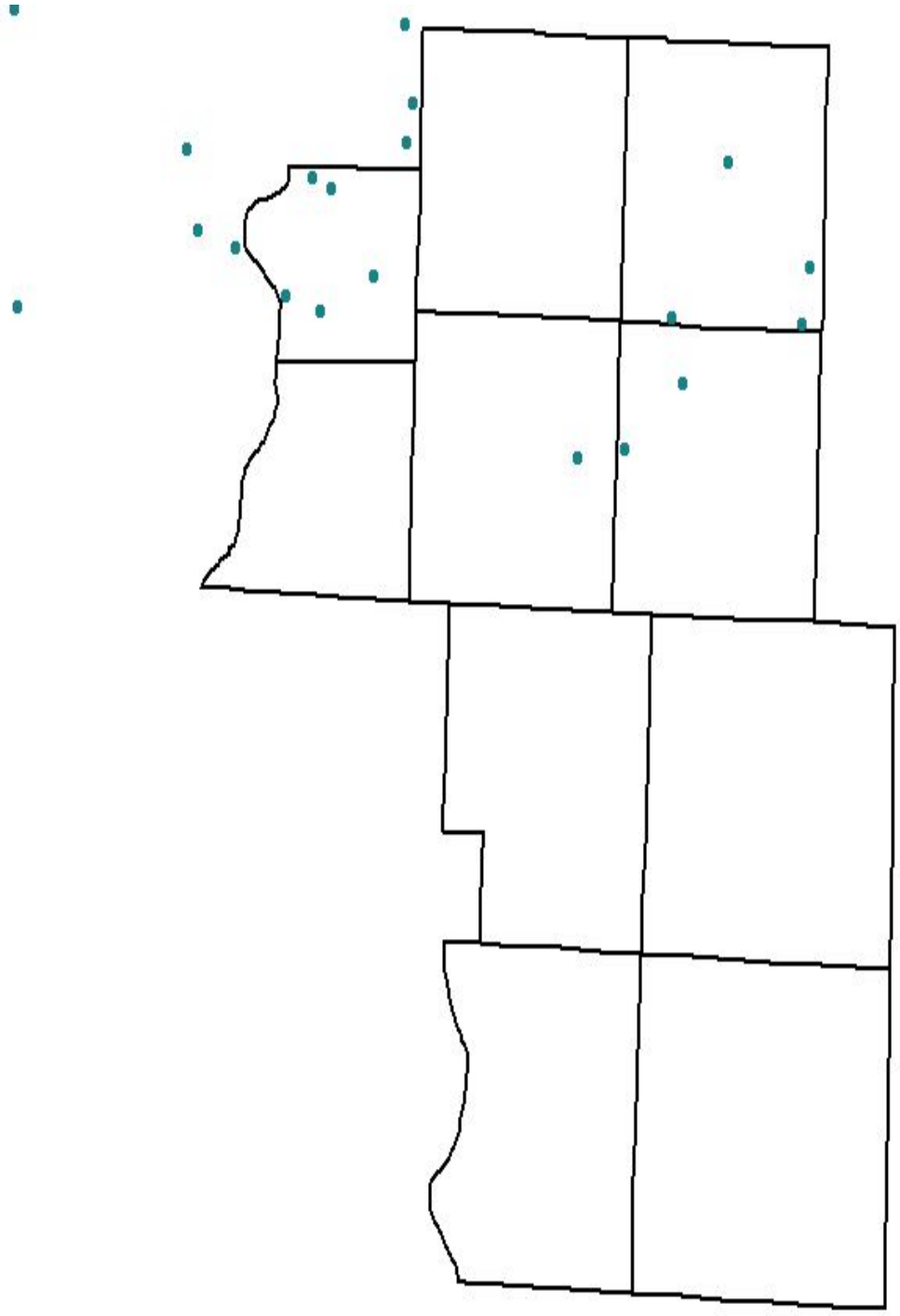
Map 10- Drinking Water Source Protection Area



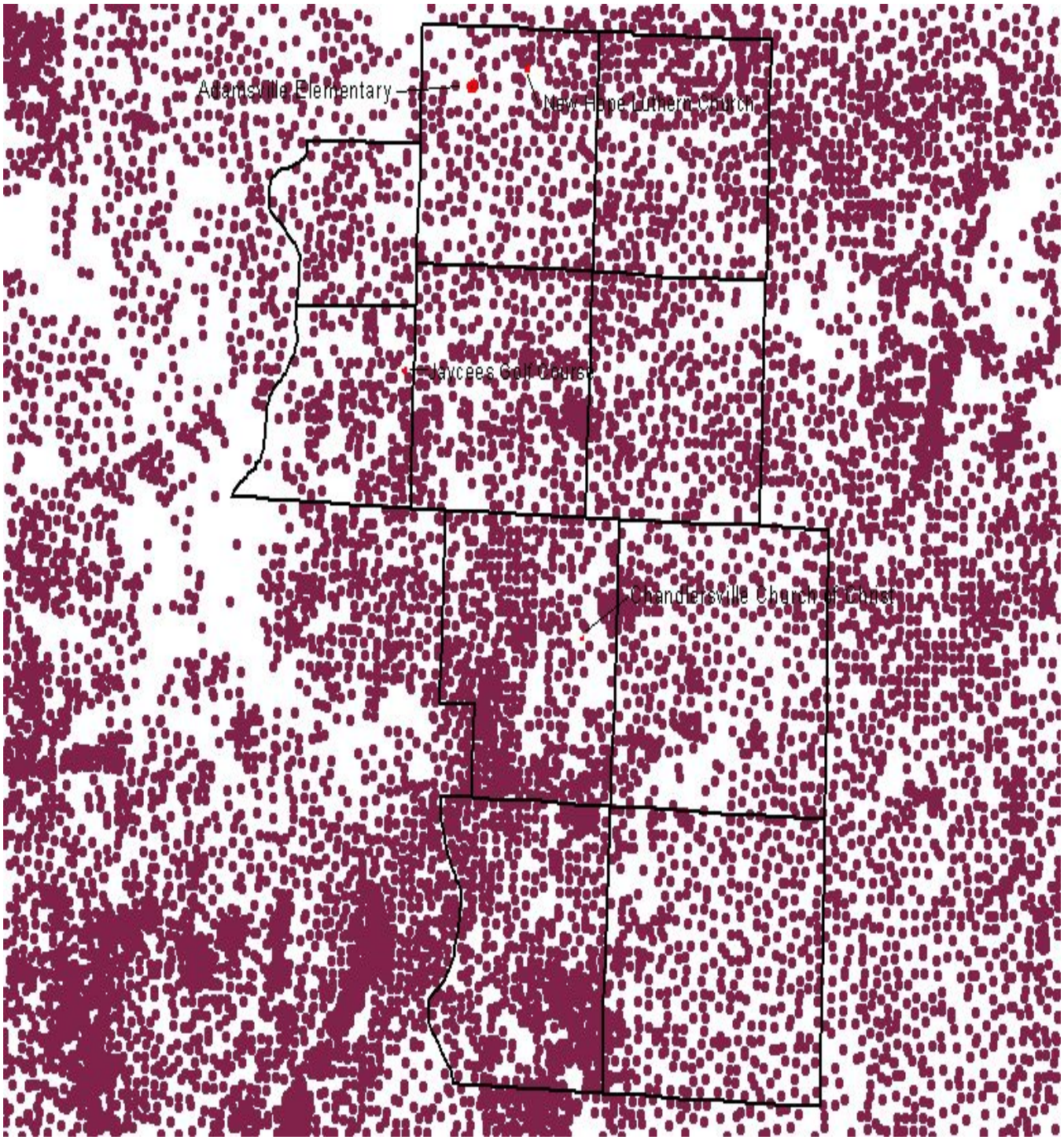
Map 11- Buried Valleys



Map 12- Public Water Sources in the Salt Creek Watershed

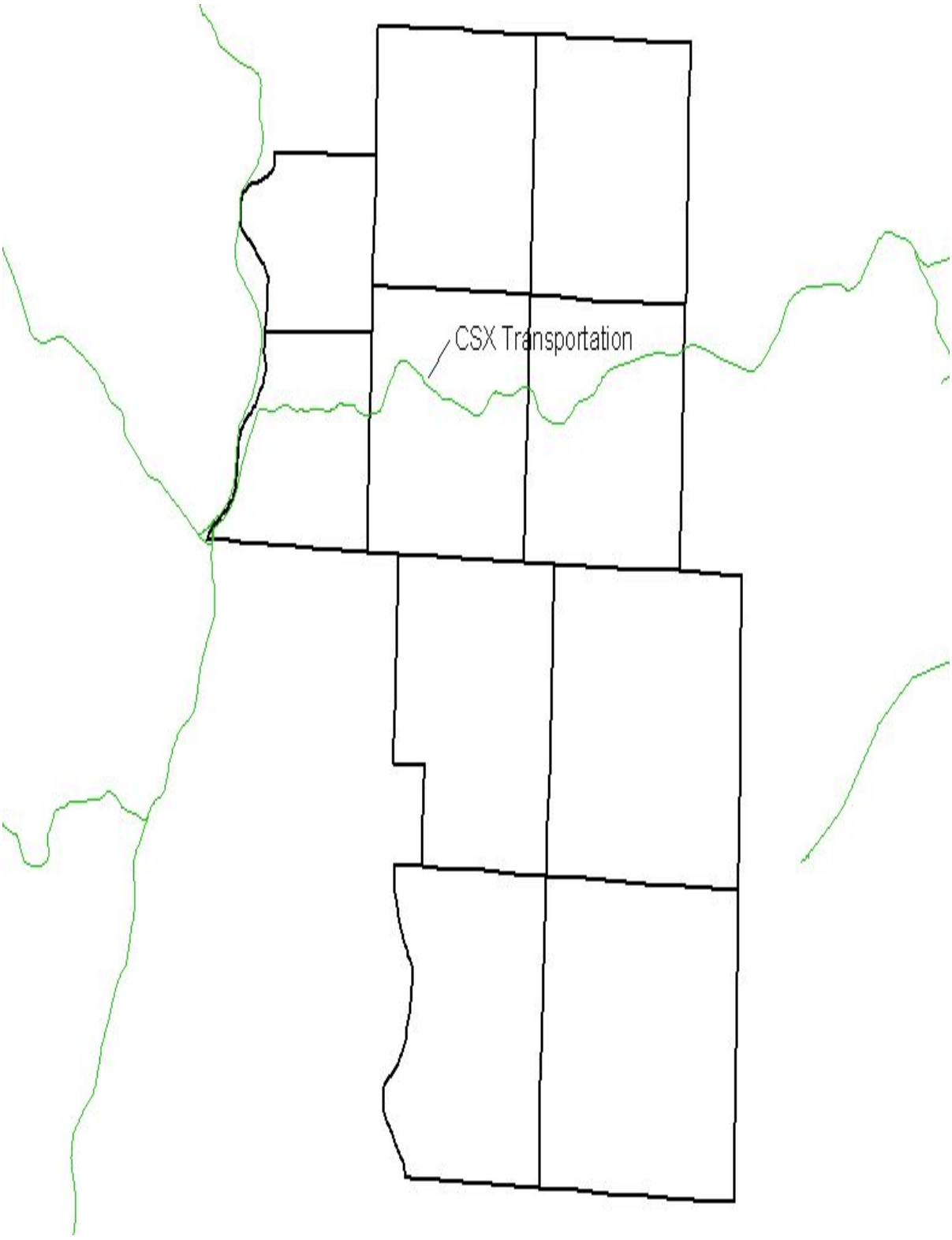


Map 13- Mine locations in the Salt Creek Watershed

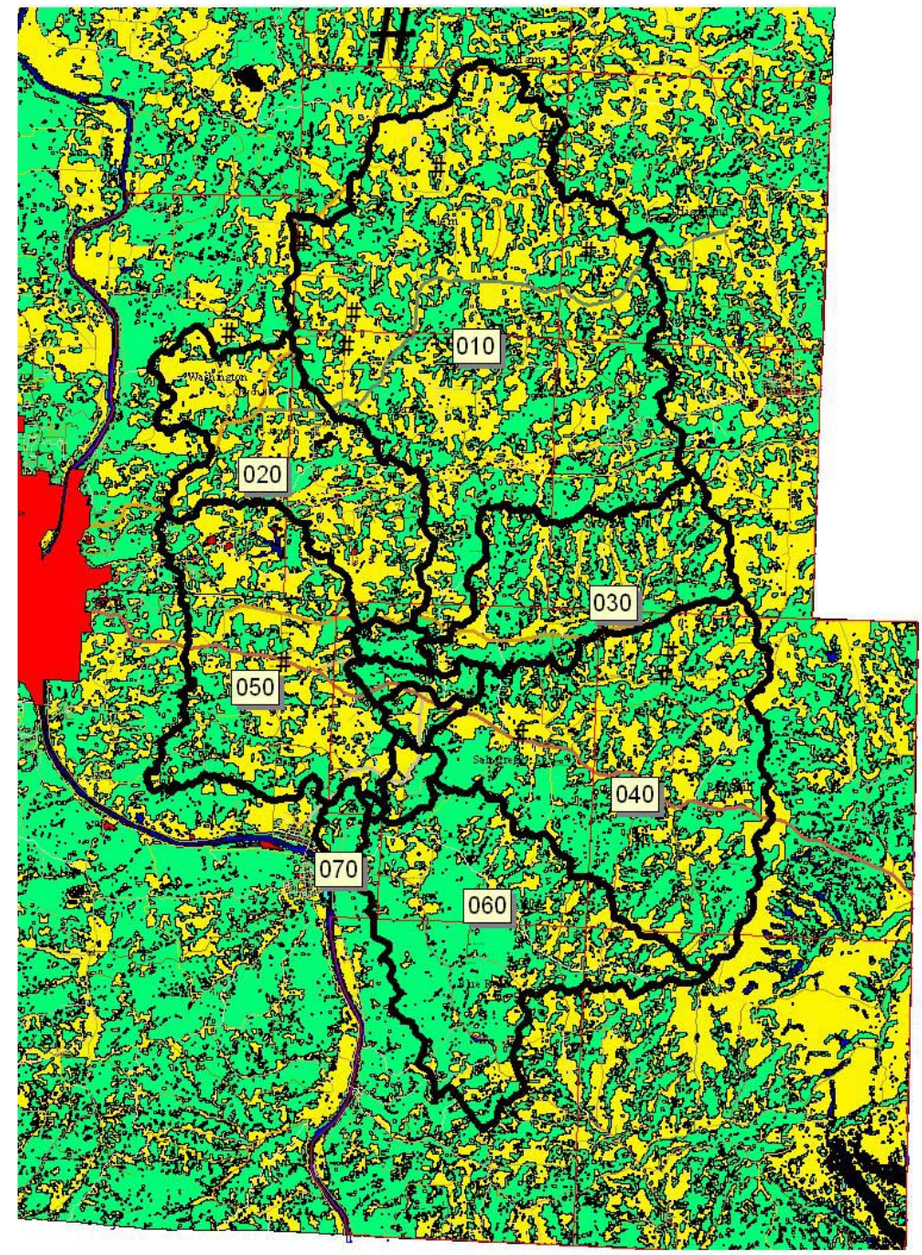


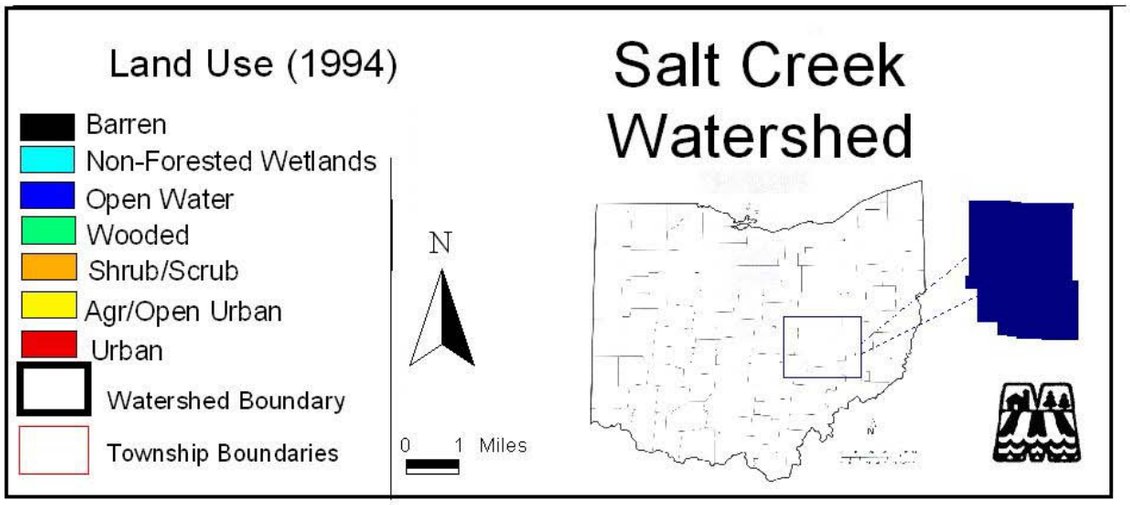
Map 14- Oil and Gas location in the Salt Creek Watershed

Map 15- Public Water Source



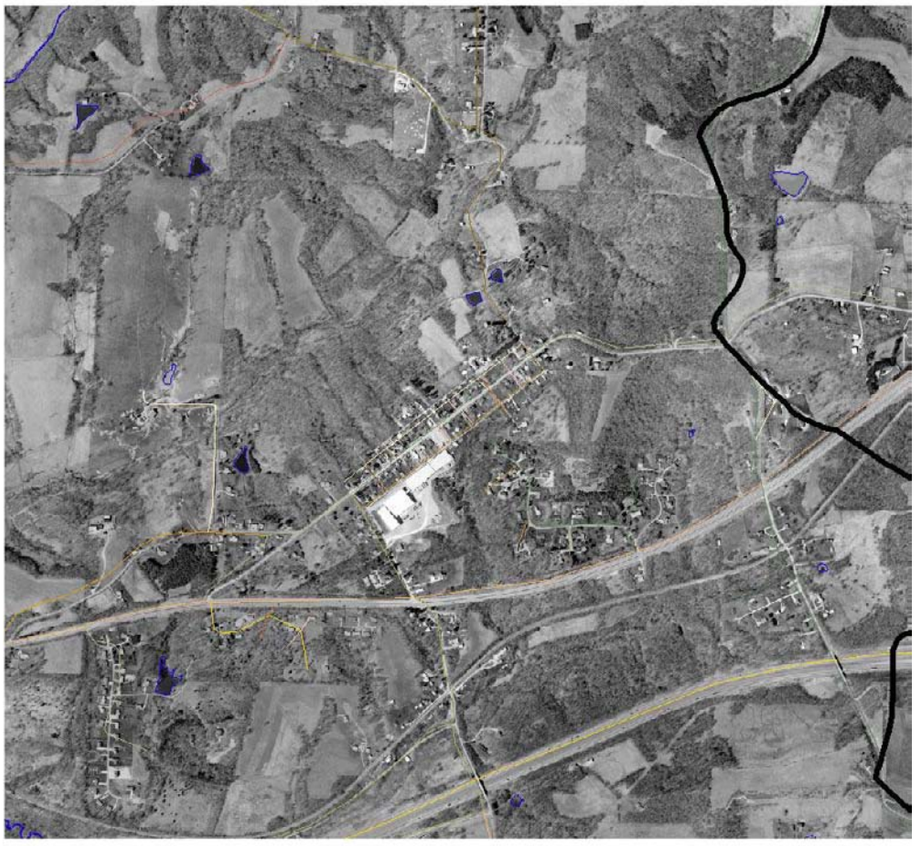
Map 16- Railroad

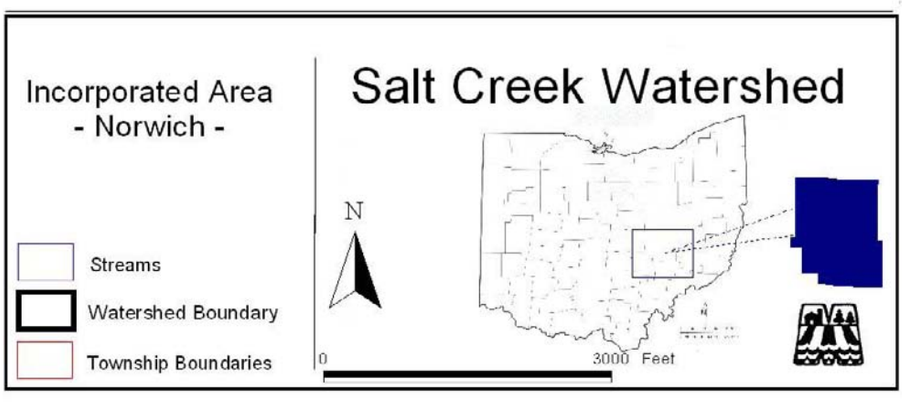




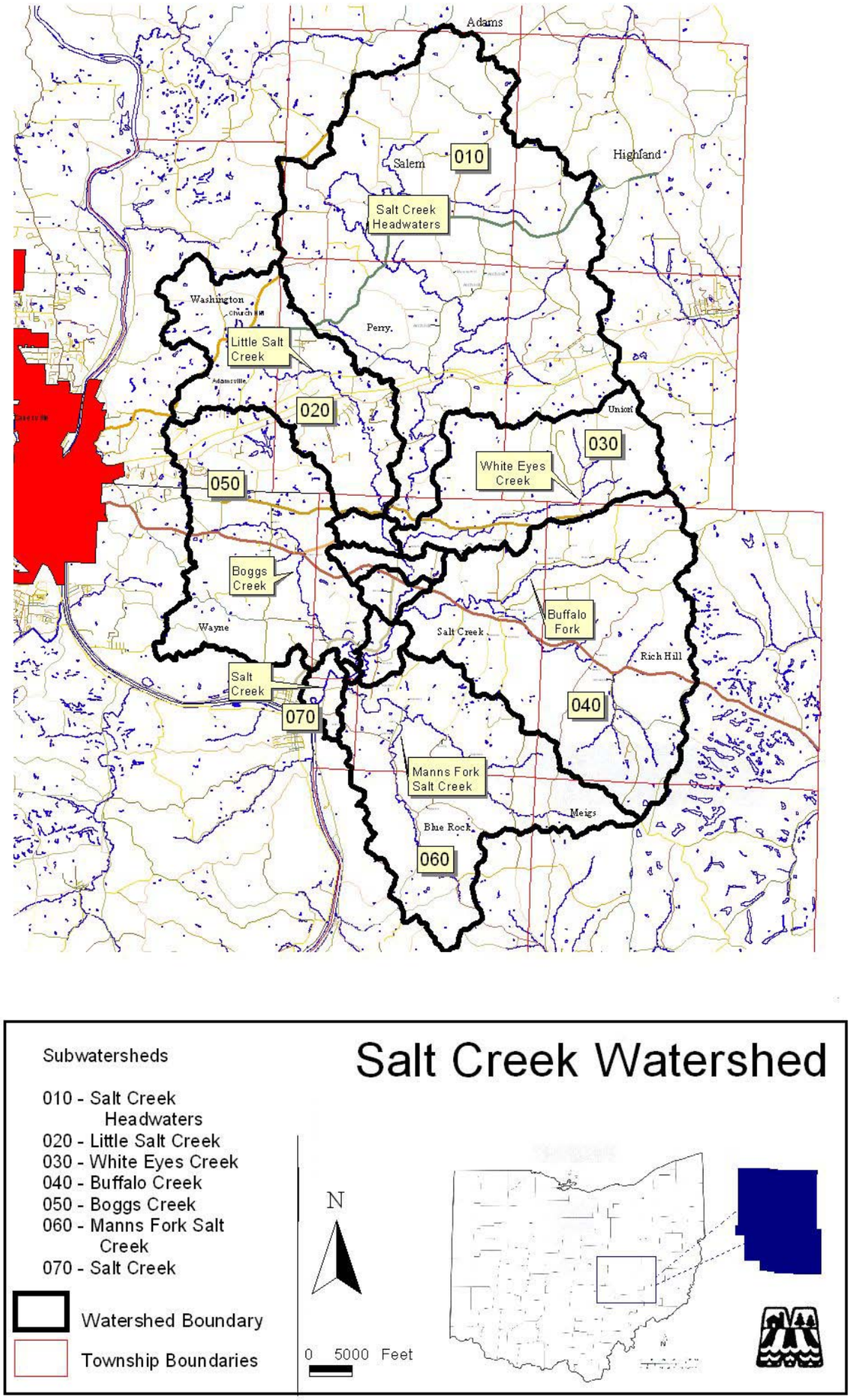
Map 17- Watershed Land Use

Map 18- Incorporated Area- Adamsville

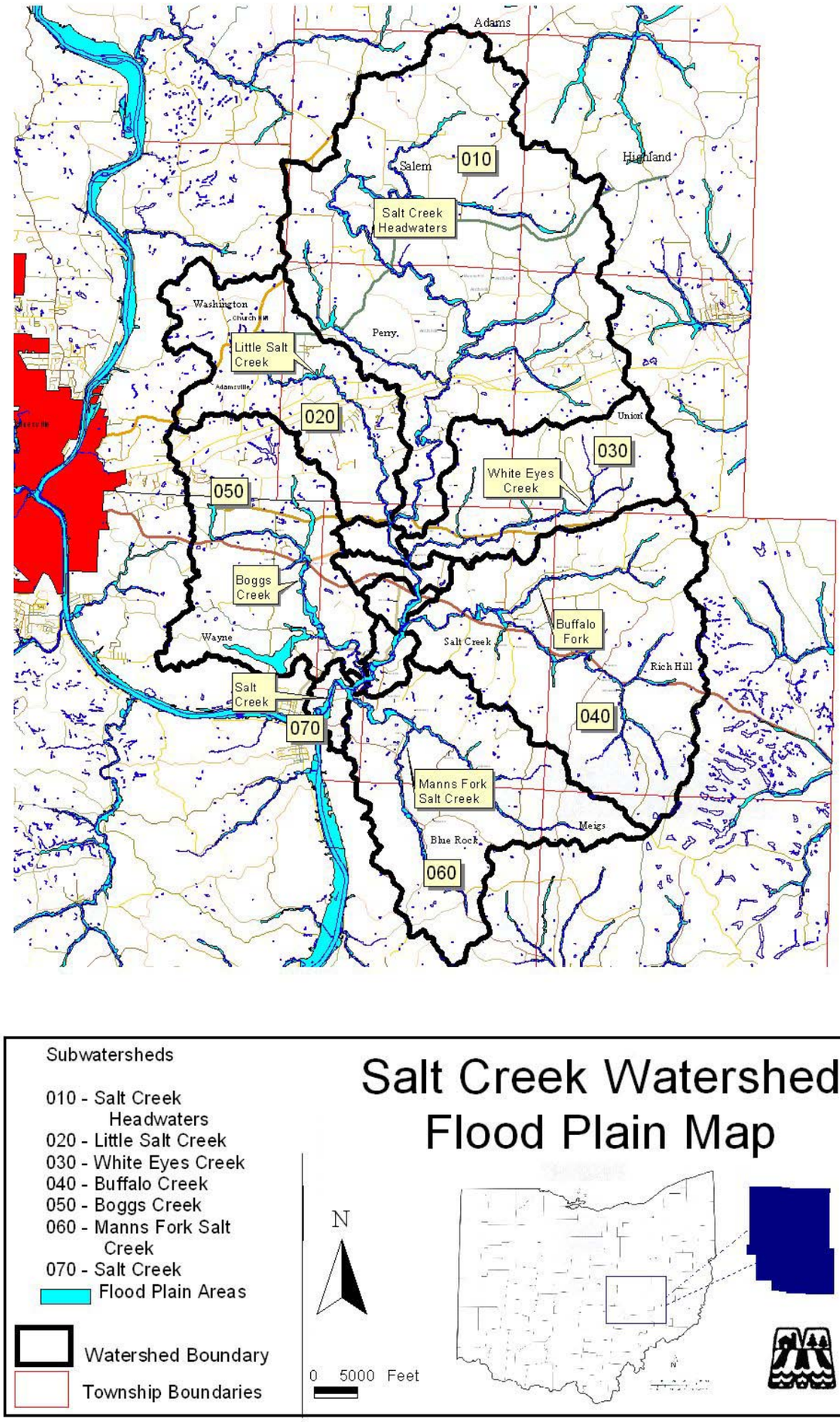




Map 19- Incorporated Area- Norwich



Map 20- 010-070 Stream



Map 21- 010-070 Floodplain