



ENVIRONMENTAL CHARACTERISTICS

GEOLOGY

Indiana is located within the Interior Plains Region which spreads across the stable center of North America. This area formed when several small continents collided and fused together more than a billion years ago. Precambrian, metamorphic, and igneous rocks now form the subterranean of the Interior Plains and make up the stable core of North America.¹

The geology of Delaware County is further classified into the Lower Paleozoic Era and Middle Paleozoic Era. The Paleozoic Era is a period of geologic time spanning between 544 and 248 million year ago, from the end of the Precambrian Era to the beginning of the Mesozoic Era. The word Paleozoic is a Greek word meaning “old life.” The Paleozoic Era is divided into seven Periods: Cambrian Period, Ordovician Period, Silurian Period, Devonian Period, Carboniferous Period, and Permian Period.²

Delaware County’s Lower Paleozoic Era geology includes sedimentary rocks from the Cambrian and Ordovician Periods. The Cambrian Period is the earliest period of the Paleozoic era spanning between 544 and 505 million years ago, and the Ordovician Period is the second earliest period of the Paleozoic era, spanning between 505 and 440 million years ago. The Lower Paleozoic Era is denoted as a light peach color on the geological map. Geological formations from this era comprise the very southern edge of Delaware County.³

Delaware County’s Middle Paleozoic Era geology includes sedimentary rocks from the Silurian, Devonian, and Mississippian Periods. The Silurian Period spanned the time between 440 and 410 million years ago, and the Devonian Period spanned the time between 410 and 360 millions years ago. Sediments laid down during the Middle Paleozoic Era are denoted as the periwinkle color on the geological map and represent the majority of Delaware County, including the Prairie Creek Subwatershed.⁴

The Prairie Creek Subwatershed is located within the New Castle Till Plains and Drainageways section of the Central Till Plain. The Till Plains lie to the south of the Great Lakes Plains and run through



Figure 2: Delaware County’s Geologic Eras.

Source: “National Geospatial Programs Office.” U.S. Geological Survey. 27 February 2006.

1 USGS/NPS Geology in the Parks Website, 2001, and Indiana Geological Survey Website, 2002. 27 February 2006. <http://vulcan.wr.usgs.gov/LivingWith/VolcanicPast/Notes/interior_plains_region.html>

2 USGS/NPS Geology in the Parks Website, 2001, and Indiana Geological Survey Website, 2002. 27 February 2006. <http://vulcan.wr.usgs.gov/LivingWith/VolcanicPast/Notes/interior_plains_region.html>

3 USGS Easter Region Website, Paleontology at the U.S. Geological Survey, 2003, and Newman, W.L., Geologic Time: USGS General Information Publication, online version, 1997. 27 February 2006.

4 USGS Easter Region Website, Paleontology at the U.S. Geological Survey, 2003, and Newman, W.L., Geologic Time: USGS General Information Publication, online version, 1997. 27 February 2006.

the central part of Indiana. The broad and fertile Till Plains in Indiana are a part of the Midwestern Corn Belt.⁵ The landscape of the Till Plains is characterized by low hills and valleys, and the shrink-swell characteristics are modest throughout the Prairie Creek Subwatershed. The subwatershed has no active industrial mineral mining sites. There are three abandoned sand and gravel pits located close to the southern tip of the Prairie Creek reservoir. There are also four gas wells and six petroleum test wells located throughout the subwatershed.⁶

SOILS

Miami soils are the state soil of Indiana. The less sloping Miami soils are used mainly for corn, soybeans, or winter wheat throughout the state. The steeper areas are used as hayland, pasture, or woodland. Miami soils are fertile and have a moderate available water capacity. Because of the highly productive Miami soils, as well as other prime farmland soils in the State, Indiana is nationally ranked for agricultural production.⁷

Only the most productive soils are considered prime farmland. “Soil, and its productive capacities, is a critical natural resource that can not be replaced, and therefore must be protected.”⁸ “Loss of agricultural land to urban development, by and large, is irreversible. The inflexibility of much urban land use makes it impractical, if not impossible, to bring such land back into production again. This is not the case when cropland is diverted to forestry, forage production or recreation uses.”⁹

Some soils are considered prime farmland if they are protected from flooding and/or drained. However, soils that are prime farmland if they are drained are more valuable and important if they are maintained as wetlands. Delaware County along with 39 other counties in Indiana have 0%-2.9% of their lands as wetland and deepwater habitat.¹⁰ Considering that 24% of Indiana was once covered by wetlands, the present coverage is a staggeringly small amount. Figure 3 represents soils classified according to their productivity capacities.

The dominant soil types in the Prairie Creek Subwatershed are Crosby and Miamian. The Miamian soils comprise approximately 27% of the total area, and the Crosby soils comprise approximately 23% of the total area.¹¹ Crosby soils are somewhat poorly drained and respond well to tile drainage. Other soil types are less abundant and make up less than 10% of the total area of the subwatershed.¹² Figure 4 shows the soils’ drainage capability in the Prairie Creek Subwatershed.

In most areas of Delaware County, septic systems should be discouraged due to the low carrying

5 “The Geography of Indiana.” 15 January 2006. Netstate.com. 27 February 2006. <http://www.netstate.com/states/geography/in_geography.htm>

6 Chapter 2: Describing the Subwatersheds. White River Watershed Management Plan. 2004. p. 40. 27 February 2006. <[chapter%202%20ebook\[1\].pdf](http://www.watershedmanagement.com/chapter%202%20ebook[1].pdf)>

7 “Miami-Indiana State Soil.” Natural Resources Conservation Service. 27 February 2006. <http://soils.usda.gov/gallery/state_soils/>

8 http://www.in.gov/dnr/reclamation/protect_resources/farmland/

9 <http://www.ces.purdue.edu/extmedia/AY/AY-245.html>

10 Jackson, Marion T. The Natural Heritage of Indiana. Indianapolis: Indiana University Press, 1997. 73

11 “Miami-Indiana State Soil.” Natural Resources Conservation Service. 27 February 2006.

12 “Miami-Indiana State Soil.” Natural Resources Conservation Service. 27 February 2006.

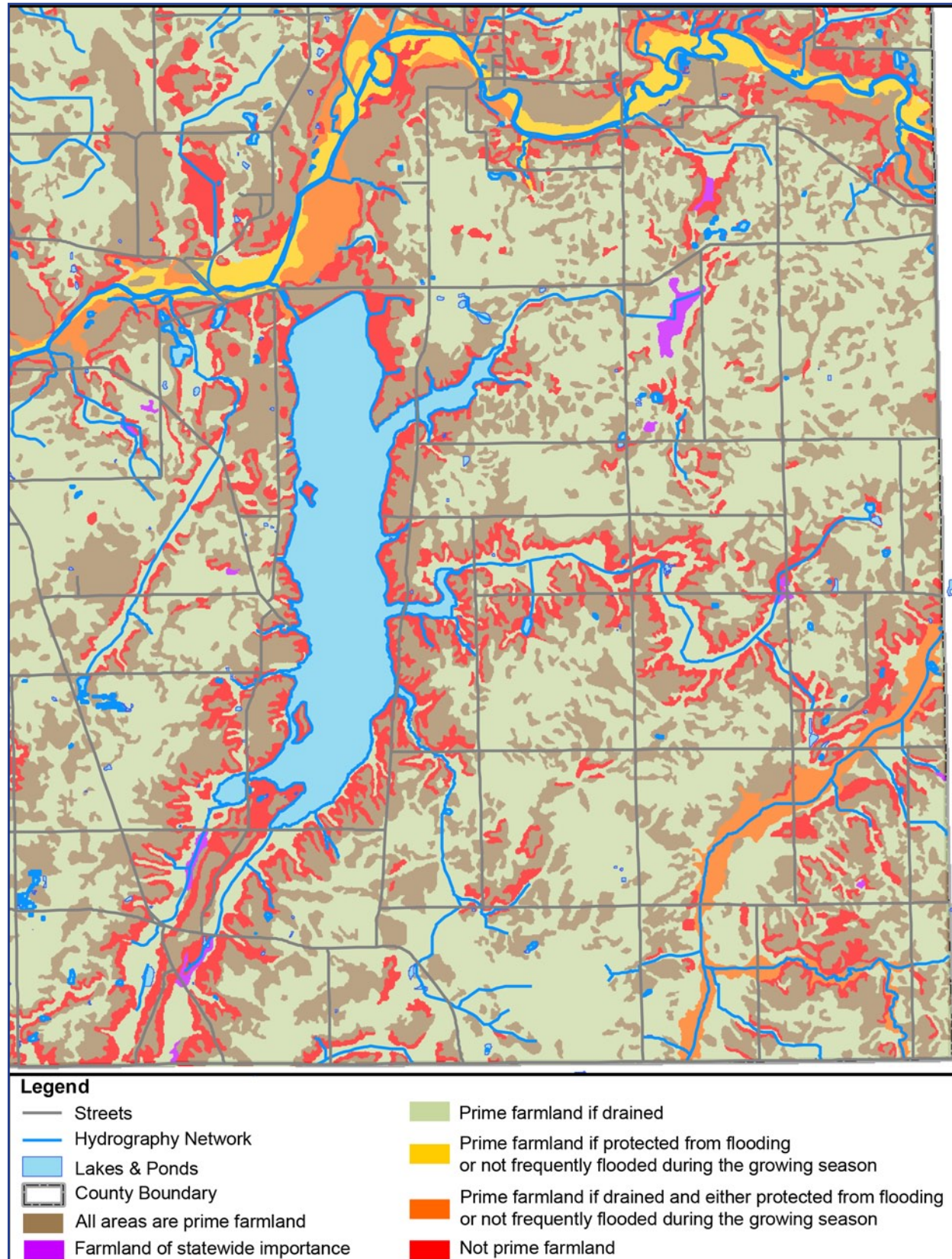


Figure 3: Soil Productivity Capacity Classification.

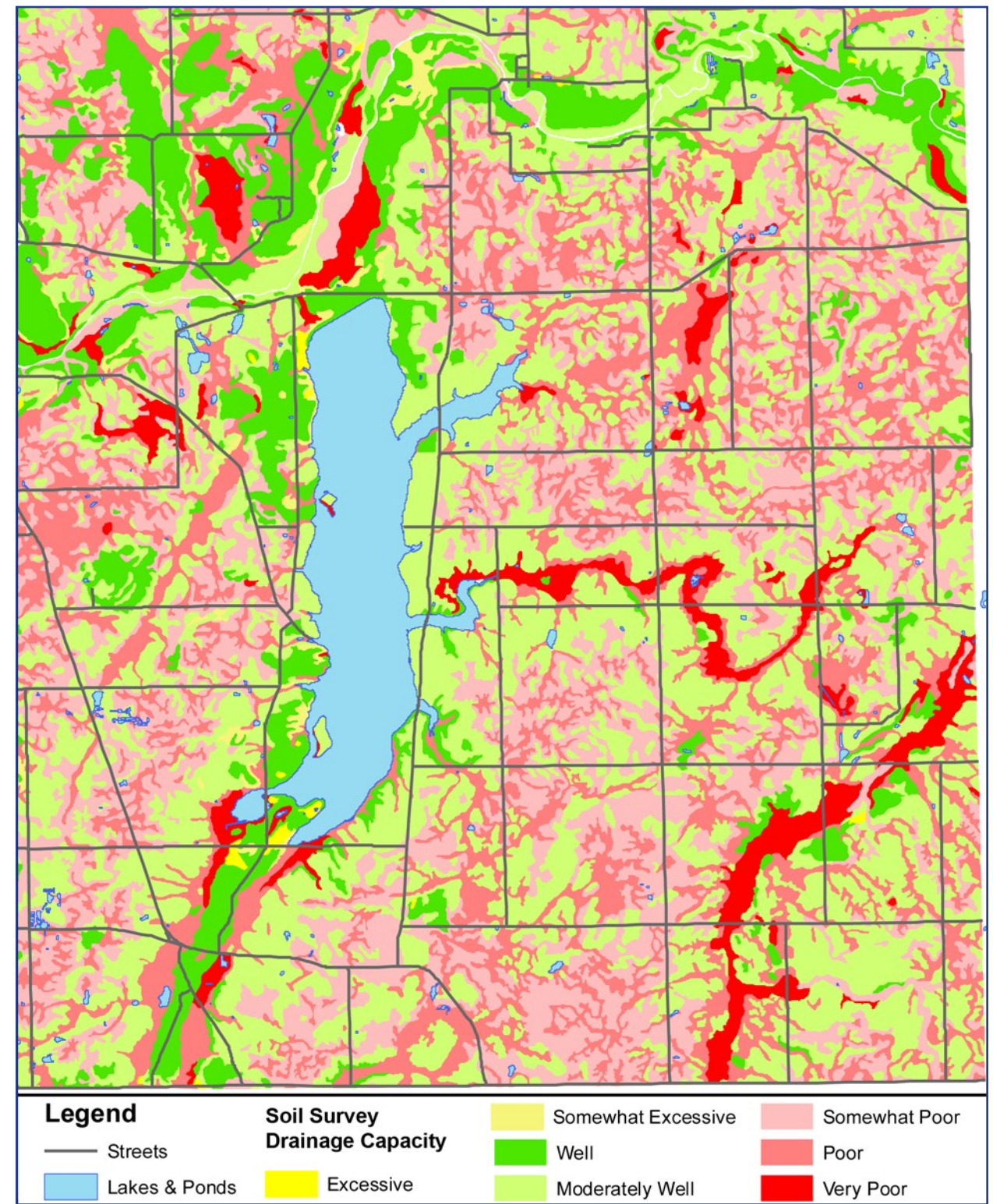


Figure 4: Soil Drainage Capacity Classification.

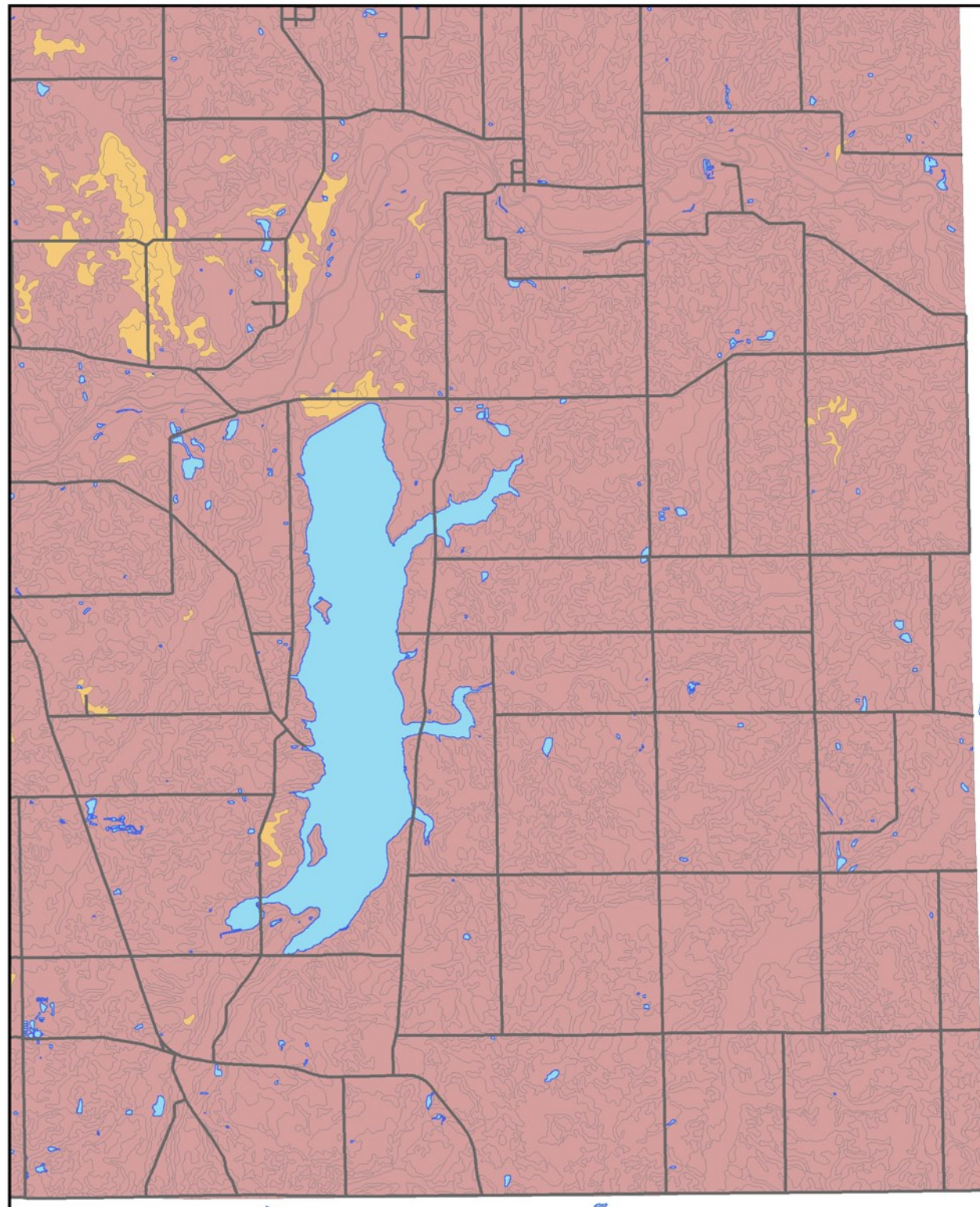


Figure 5: Soils Rated for Septic Tank Absorption Fields.

Legend

- Soil- Septic Field, Somewhat Limited
- Soil- Septic Field, Very Limited
- Lakes & Ponds
- Streets

capacity of the soils. Throughout Delaware County there are no soils ranked as “not limited” for septic tank absorption fields. In fact, there are only four soils (Martinsville loam, 0-2% slopes; Martinsville loam 2-6% slopes; Mountpleasant silt loam, 2-6% slopes, eroded; and urban land Wawaka-Miami complex, 1-6% slopes, eroded) that are rated “somewhat limited” for septic tank absorption fields. All other soils are rated “very limited” for septic tank absorption fields. Figure 5 represents soils ranked for septic tank absorption fields. Appendix B- Sewage Disposal and Soil Characteristics, gives an in depth explanation of the NRCS rankings (“very limited”, “somewhat limited”, and “not limited”), and provides information for the soils found throughout Perry Township.

HYDROLOGY

WATERSHEDS

watershed- the land area that drains water to a particular stream, river, or lake. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge. Large watersheds, like the Mississippi River basin contain thousands of smaller watersheds.¹³

Each watershed is identified by the designated proper name and Hydrologic Unit Code (HUC). The HUC is a set of numbers ranging from 2 to 16 digits long. The smaller the number, the larger the area that is being identified; the larger the number, the smaller the area that is being identified. For example HUC 05 identifies the Ohio Region, a drainage region that includes parts of Illinois, Indiana, Kentucky, Maryland, Ohio, Tennessee, Virginia, and West Virginia. HUC 0512 identifies the Wabash River Basin within the Ohio Region, including area within Illinois, Indiana, and Ohio. HUC 051202 identifies the Patoka and White River Basins in Indiana, which are within the Wabash River Basin. HUC 05120201 identifies the Upper White River Watershed, which is within the Patoka and White River Basins.

Prairie Creek Reservoir is located in the Prairie Creek Watershed, within the Upper White River Watershed, within the White River Basin. Figure 6 represents the various scales of watershed boundaries for the Prairie Creek Watershed.

HYDROGRAPHY

Prairie Creek was originally the main water body in the Prairie Creek subwatershed with several other tributaries, such as Huffman and Cunningham, flowing into it. In 1960, the United States Army Corps of Engineers constructed an earthen dam just above Prairie Creek’s convergence with the White River to create the Prairie Creek Reservoir. The reservoir, 1250 acres, is now the major water body in the subwatershed. It serves as a backup drinking water source to the White River for the City of Muncie and is fed by 5 main streams: Carmichael Ditch, Shave Tail Creek, James Huffman Ditch, Cemetery Run, and Cecil Ditch.

The Silurian-Devonian Aquifer is the principle aquifer located within the northern part of the Prairie

¹³ (<http://ga.water.usgs.gov/edu/dictionary.html#W>)

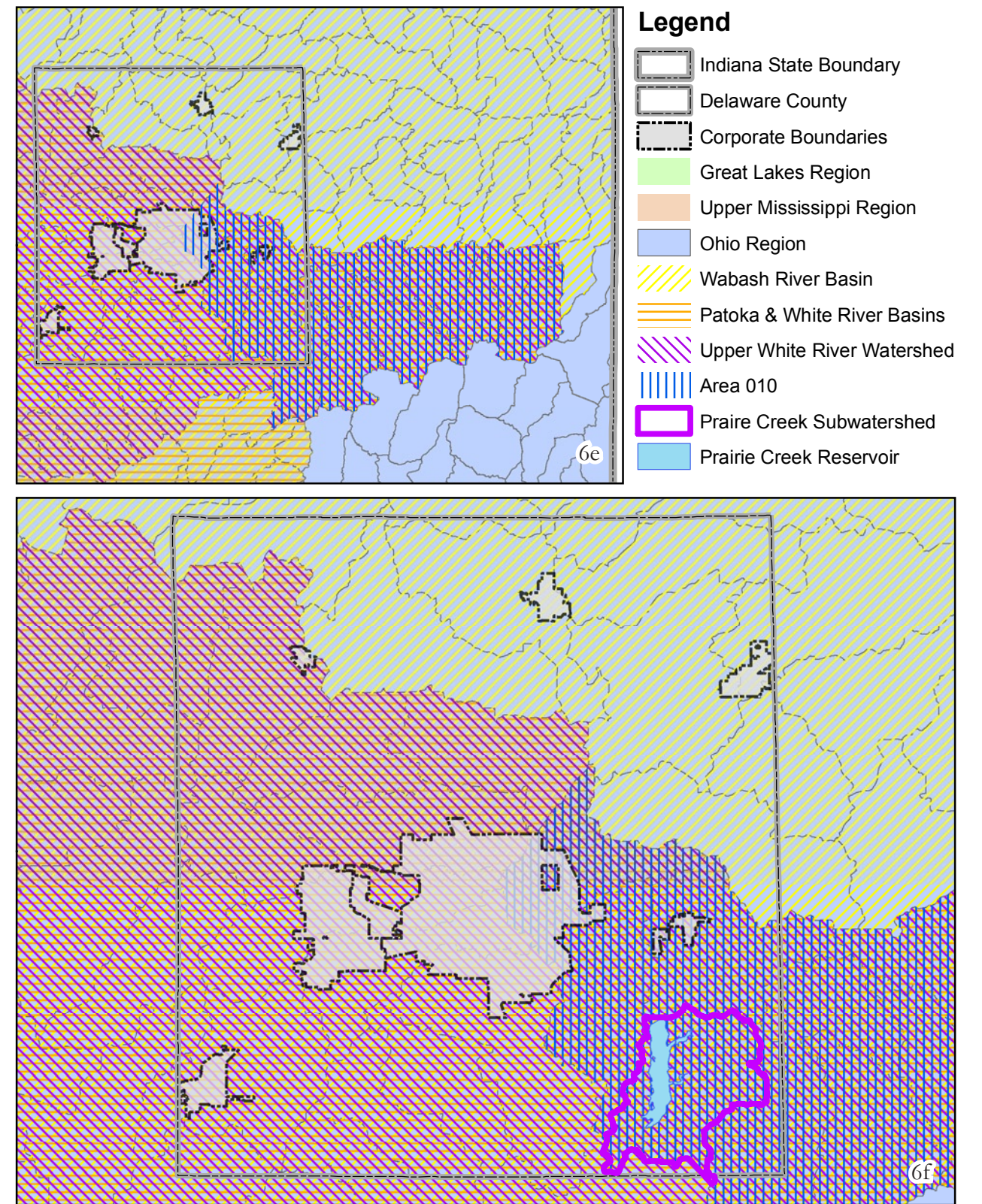
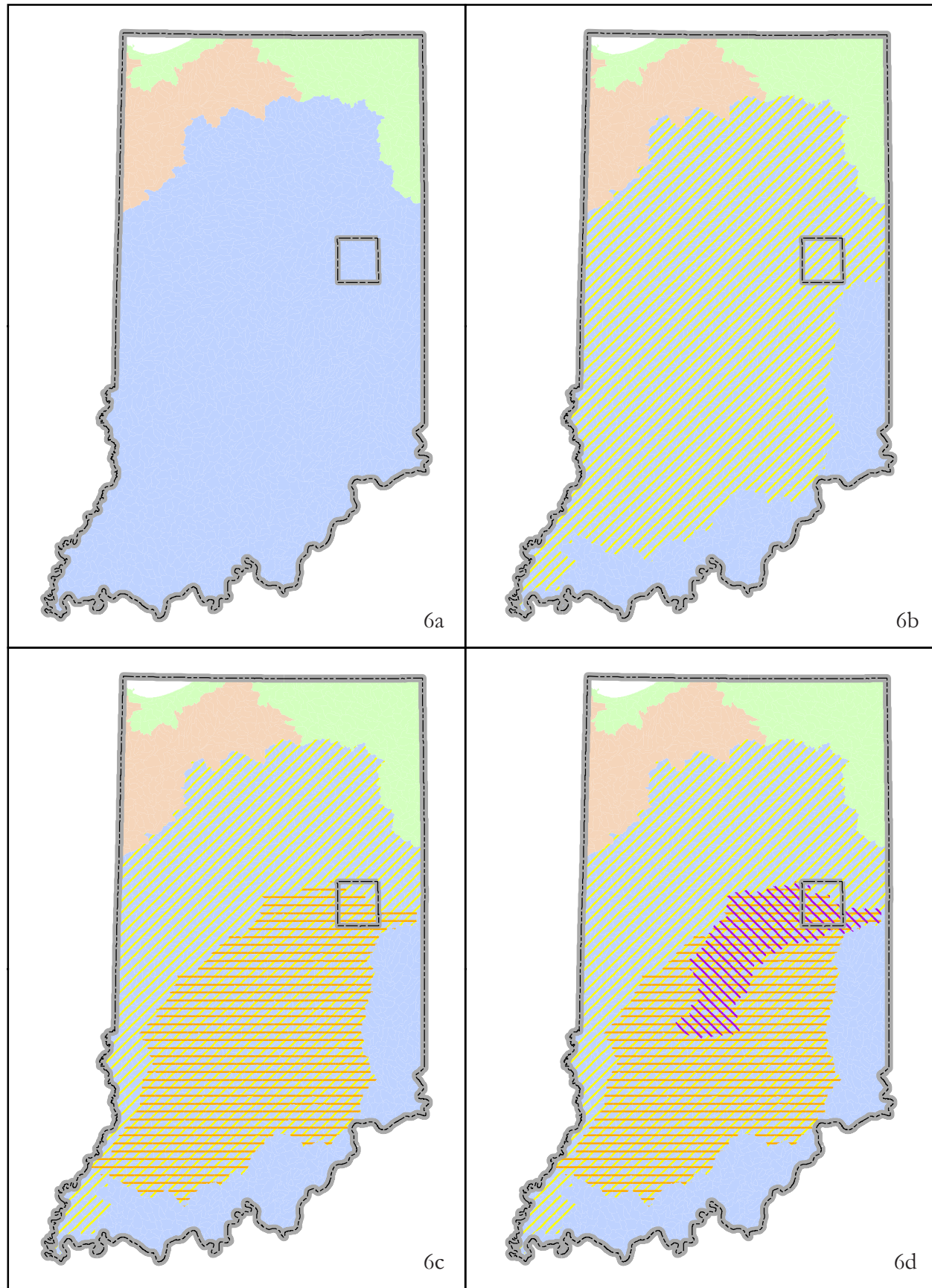


Figure 6: Watershed Boundaries in Indiana. 6a) the Ohio Region (Region 05); 6b) the Wabash River Basin; 6c) the Patoka & White River Basins; 6d) the Upper White River Watershed; 6e) Area 010; 6f) the Prairie Creek Watershed

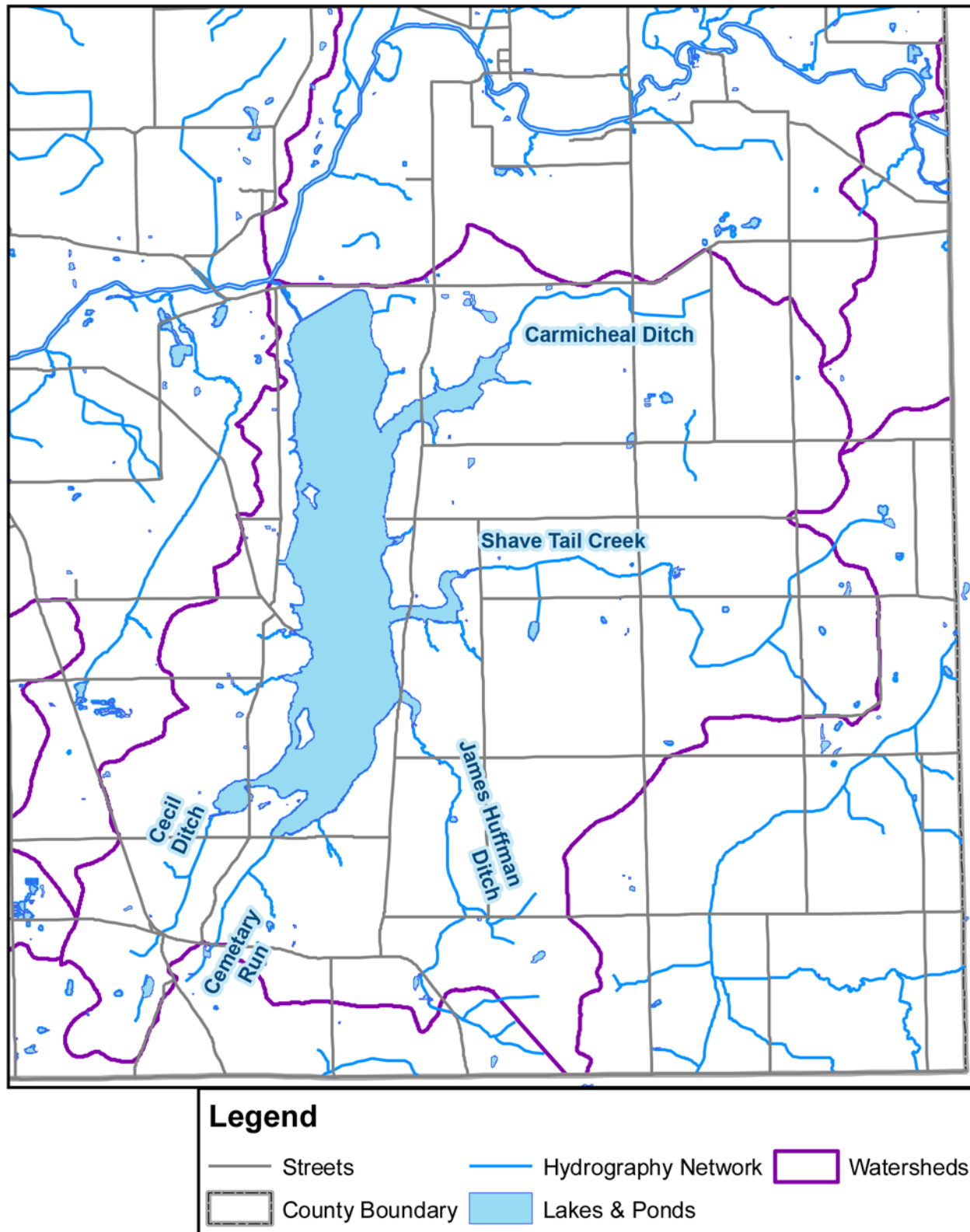


Figure 7: Hydrography of the Prairie Creek Watershed.
 Note: The watershed boundaries are based upon information created for the State of Indiana. This information is not accurate at this magnification, streams should not cross a watershed boundary.

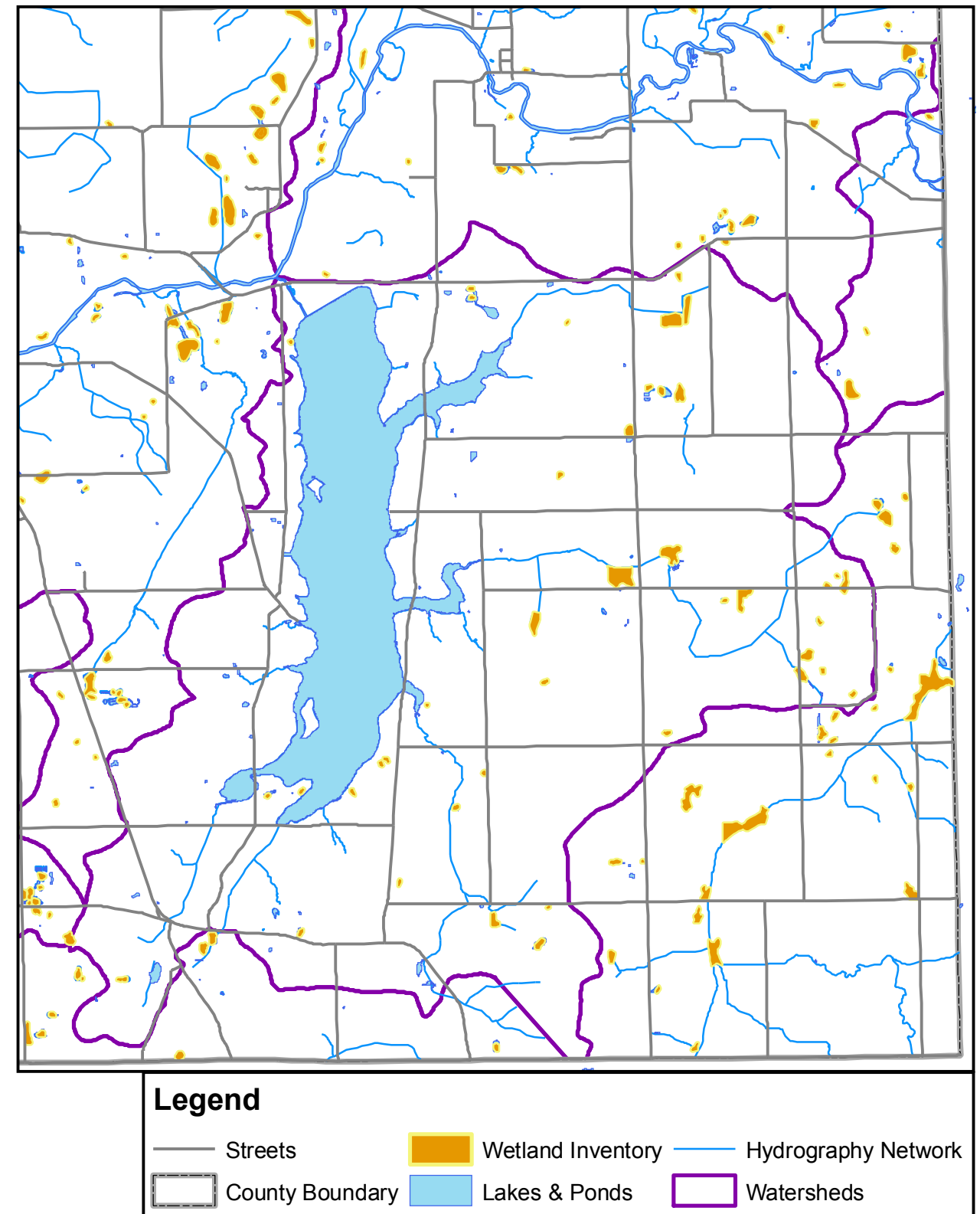


Figure 8: Wetlands in the Prairie Creek Watershed area.

Creek Subwatershed boundaries. The southern portion of the subwatershed gets groundwater through unconsolidated glacial till.¹⁴ There are approximately fifty five acres of wetlands in the Prairie Creek Subwatershed.¹⁵ Figure 7 shows the hydrology in the area.

WETLANDS

Wetlands clean our water, recharge groundwater aquifers, provide protection from flooding, control erosion, provide wildlife habitat, and educational and recreational opportunities. As previously mentioned, 24% of Indiana was once covered by wetlands. Wetlands not only provide environmental benefits, they are also a part of our natural heritage.

Currently less than 1.5% of Delaware County is covered by wetlands. The area surrounding Prairie Creek Reservoir reveals that only 0.5% of Prairie Creek Subwatershed is covered by wetlands. This small percentage of land cover is made up of 43 wetlands of the following types: 7- PEMA, 2- PEMAD, 1- PEMAH, 9- PEMC, 2- PEMF, 2- PFO1A, 1- PFO1AX, 2- PFO1C, 2- PSS1A, 1- PSS1AH, 1- PSS1C, 2- PUBG, 3- PUBGH, 8- PUBGX. All of these acronyms refer to wetland types that are palustrine; some of the variations refer to vegetative types, whether or not the land is always wet, temporarily wet, or seasonally wet, or if it contains open water.

“Over 70% of Indiana residents rely on ground water for part or all of their drinking water needs.”¹⁶ However, 100% of the residents in the Prairie Creek Reservoir area depend on groundwater for all or part of their drinking water needs for there are no water utilities in the watershed area. This factor makes wetlands an even more valuable resource for filtering surface water before it seeps into the groundwater.

Wetlands are also a valuable resource for recreation. “A 1996 survey by the U.S. Fish and Wildlife Service suggests that Indiana wetland habitats generate more than a million user days of nonconsumptive recreation each year,” with activities including bird watching, photographing wildlife, and hiking.¹⁷ Figure 8 shows wetlands within the Prairie Creek Reservoir Watershed area.

WATER QUALITY

Compared with the other waters of the county, the streams leading into Prairie Creek Reservoir have good water quality. Compared with other waters of the state, water quality is fair.¹⁸ There are no water bodies in this watershed listed on the impaired waters of the state list (303(d) list).

Water quality monitoring of the Prairie Creek watershed took place during 2002-2003 during the White River Watershed Project Phase I study. Nine sampling points were monitored, seven within the watershed, and two in the White River (one before the watershed drains into the river and one after the

¹⁴ Chapter 2: Describing the Subwatersheds.” 2004. White River Watershed Management Plan p. 42. 27 February 2006. <chapter%202%20ebook[1].pdf>

¹⁵ USFWS National Wetland Inventory [NWI], <http://wetlands.fws.gov/>

¹⁶ <http://www.in.gov/wetlands/whatis/index.html>

¹⁷ <http://www.cees.iupui.edu/Education/Wetlands/index.htm>

¹⁸ Rick Conrad, interview held during a Prairie Creek Master Plan Focus Group Presentation, Delaware County, Indiana, March 30th, 2006.

watershed drains into the river). Of the seven points within the watershed, four sampling points were from creeks and ditches that drain into the reservoir, two were in the reservoir, and the final sampling point was immediately below the reservoir’s spillway. Figure 9 represents the sampling point locations.

The results from the monitoring indicated the following : 1) Temperature and pH were within state or scientific standards for those parameters; 2) Biological oxygen demand was within the standard range during some sampling events, but high during others; 3) Dissolved oxygen was low; 4) Total suspended solids and ammonia were higher than state standards; 5) Nitrates and orthophosphate at certain sampling points were higher than state standards; 6) E. Coli were higher than state standards; 7) Atrazine and diazinon were within detectable limits at one point or another in this watershed during the sampling season; 8) Biological habitat and aquatic life scores varied due to low flow in the creeks leading into the reservoir. Parameters of concern (in order of priority) included ammonia, dissolved oxygen, nitrate, orthophosphate, and E. coli.

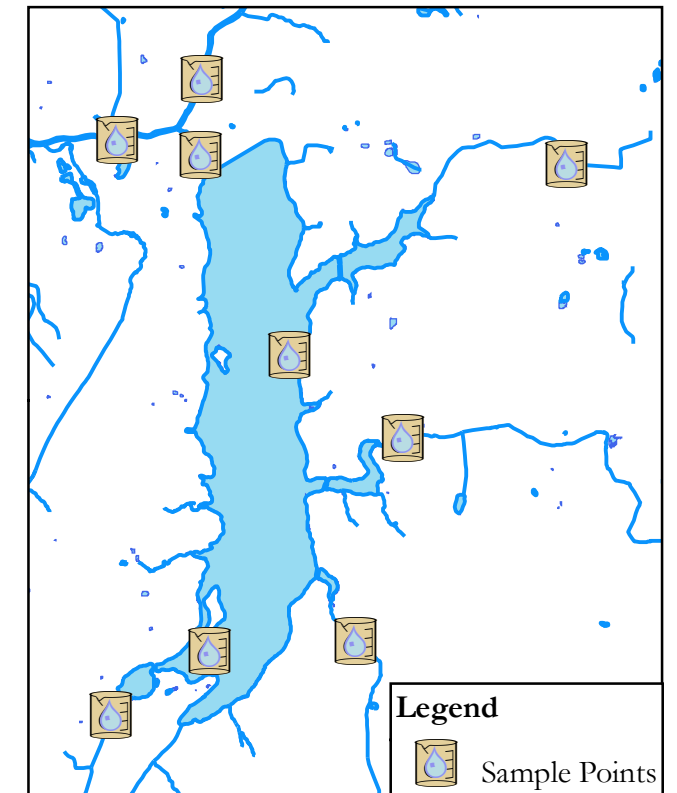


Figure 9: Sampling Points for the WRWP Phase 1.

Prairie Creek Reservoir continued to be a subject of study during 2005 and 2006. For this study, seven sampling points within the reservoir were monitored.

The goal of this study was to assess the current water quality status of the Prairie Creek Reservoir in Delaware County, Indiana, and to initiate a long-term monitoring effort that will hopefully continue into the future. The results of this two-year study provide only a glimpse into the reservoir’s water quality issues. Trends in a reservoir’s water quality develop over a long period of time (e.g. 8 to 10 years) and thus it is essential that this monitoring effort continues in order to support future management decisions in this watershed.¹⁹

This study revealed that Prairie Creek Reservoir is a warm water body with extremely low amounts of dissolved oxygen. Nitrate concentrations were acceptable for drinking water standards, however nitrates can encourage eutrophication. Ammonia concentrations were only measured in 2006 and only exceeded permissible levels in September. Average orthophosphate concentrations were well above the level recommended by the EPA. Secchi disk readings indicated that the reservoir is in a eutrophic state. E. coli levels were above recommended amounts only 3 times, however since the monitoring is conducted in open water the monitoring of E. coli was not as informative as it could be if testing were

¹⁹ Popovicova, Jarka. “Water Quality Assessment of the Prairie Creek Reservoir.” December 2006.

conducted in the streams and ditches that drain into the reservoir. In conclusion:

The reservoir is a warm eutrophic water body, meaning that the nutrient input has been the cause of algal growth and resulted in the current state of water quality: dissolved oxygen depletion within 40-60% of the reservoir depth from June through September, low water clarity, and concentrations of orthophosphates that exceed levels required to prevent eutrophication (increased biological production). Eutrophication at this reservoir has been an ongoing process and will continue into the future unless some measures are taken to manage input of nutrients from its watershed.

Lack of dissolved oxygen throughout 40-60% of water depth measured in 2006 can negatively affect fishing, recreation, and water supply. As uncontrolled input of nutrients to the reservoir continues, algal growth is expected to persist and even worsen, and thus affect the value and benefits of this water resource in the future. Therefore, improved management of current land use practices, wastewater disposal, and properly planned future development is absolutely necessary if the community wants to maintain the benefits of this reservoir. It is important to keep in mind that all pollutants from surrounding land are continuously drained to the reservoir either by stormwater runoff or through streams and ditches and therefore affect its water quality, and current and future uses and enjoyment.

While the reservoir itself can be managed for oxygen depletion and algal growth by various chemical methods, this strategy should be used as a last resort and watershed management upstream from the reservoir should be considered in order to deal with the consequences of eutrophication. These in-reservoir management practices only “medicate and reduce the symptoms” rather than solve the real problems, which lie within the watershed. For example, it is necessary that future development and watershed activities include management strategies that (1) reduce production of pollutants from various sources within the Prairie Creek watershed through mitigation and improvement of current onsite wastewater treatment and reduction of pollutants input from tile drains; and that (2) retain pollutants upstream

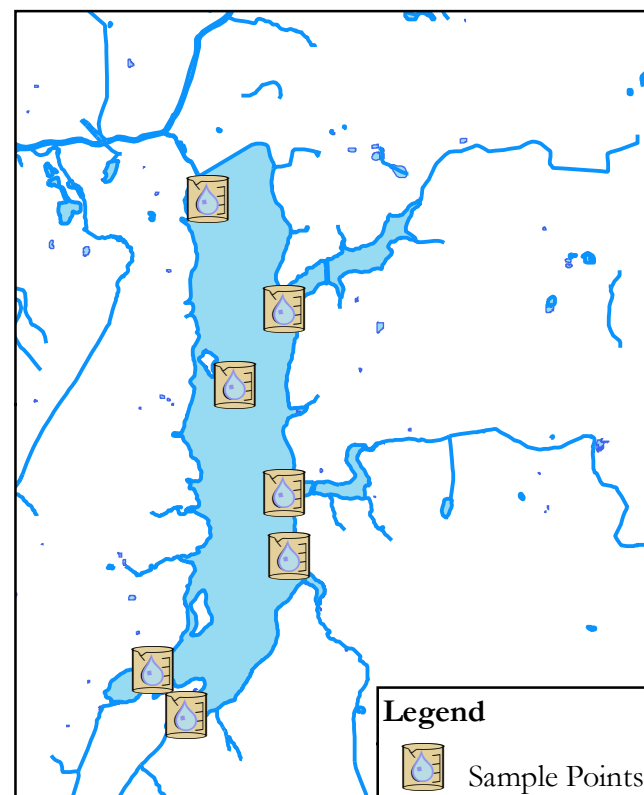


Figure 10: Sampling Points for the 2005-2006 study conducted by Dr. Jarka Popovicova.

from the reservoir to prevent their accumulation in the reservoir.²⁰

Dr. Jarka Popovicova prepared an in-depth summary of this study (*Water Quality Assessment of the Prairie Creek Reservoir*) which is included in its entirety in Appendix A.

CLIMATE

Indiana has an energizing climate with strongly marked seasons. The transition from cold to hot weather sometimes produces an active spring with thunderstorms and tornadoes. Harsh humidity and high temperatures arrive in summer. Autumn has lower humidity than the other seasons, and mostly sunny skies. Indiana’s location within the continent determines its climatic cycle. The Gulf of Mexico is a major player in Indiana’s climate. Southerly winds from the Gulf region bring warm, moisture-laden air into the state. The warm moist air collides with continental polar air brought southward by central and western Canada’s jet stream. A third air mass found in Indiana begins in the Pacific Ocean. However, this third air source arrives less frequently in the state than the other two due to the obstructions posed by the Rocky Mountains.²¹

Air temperatures in Indiana have a wide annual range due to the state’s location and natural characteristics. January is usually the coldest month of the year with normal daily maximum temperatures ranging from 31-38°F north to south across Indiana. Normal January minimum temperatures range between 15-21°F north to south. July is the warmest month with daily maximums averaging 80-83°F and minimums 63-65°F. Table 1 summarizes the monthly mean temperature for Muncie, IN.²²

Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Annual
24.5	28.5	38.8	50	61.5	70.6	75.5	72.3	65	53.1	41.3	30	50.8

Average annual precipitation in Indiana ranges from 37- 47 inches. May is the wettest month of the year with average rainfall between 4 and 5 inches across the state. Average rainfall decreases as the summer progresses. Autumn months are drier with 3 inches of rainfall typical in each month. Winters are the driest time of year in Indiana with less than 3 inches of precipitation commonly received each month. Precipitation increases in March and April as the spring soil moisture recharge season begins. Annual precipitation in Indiana is adequate, but an uneven distribution in the summer occasionally may limit crops. Floods occur in some part of the state almost every year and have occurred in every month of the year. The months of December through April have the greatest flood frequency. The primary cause of floods is prolonged periods of heavy rains, although rain falling on snow and frozen ground are sometimes contributing factors.²³

Snowfall amounts vary greatly from year to year depending on both temperature and the frequency

20 Popovicova, Jarka. “Water Quality Assessment of the Prairie Creek Reservoir.” December 2006.
 21 Scheeringa, Ken. “Climate of Indiana.” December 2002. Indiana State Climate Office: Purdue University. 27 February 2006. <<http://shadow.agry.purdue.edu/toolbox/narrative.html>>
 22 Scheeringa, Ken. “Climate of Indiana.” December 2002.
 23 Scheeringa, Ken. “Climate of Indiana.” December 2002. Indiana State Climate Office: Purdue University. 27 February 2006. <<http://shadow.agry.purdue.edu/toolbox/narrative.html>>

of winter storms. Measurable snow typically begins in late November and ends by early April. Table 2 shows the monthly mean precipitation for Muncie, IN.²⁴

Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Annual
2.13	2.22	3.02	3.49	4.05	4.26	4.01	3.44	2.96	2.52	3.34	2.83	38.27

NATURAL REGIONS

Natural regions are large delineations of the landscape where a distinctive and somewhat cohesive combination of natural features occurs. Such features include physiography (landforms) and types of soil, exposed bedrock, climate, vegetation, flora, and fauna. Subsets of these regions are called “sections.” Sections of a natural region have enough differences between them that recognition is warranted, but the differences are not as great as between regions.²⁵

Delaware County is in Indiana’s Central Till Plain Natural Region. This is the largest natural region in Indiana. “The Central Till Plain is largely a level to gently undulating, somewhat monotonous landscape that was formerly heavily forested. Its deep, fertile glacial soils supported great forests of beech and maple, oak and ash and elm.”²⁶

Delaware County contains 2 of the 3 sections of this natural region including Bluffton Till Plain and Tipton Till Plain. Both of these sections contain the best representations of flatwood communities. Central Till Plain Flatwoods are particularly significant due to their status on the list of endangered, threatened and rare species that are documented in Delaware County, Indiana. This high quality natural community is rated as significant, imperiled in the state of Indiana, and as globally rare or uncommon.

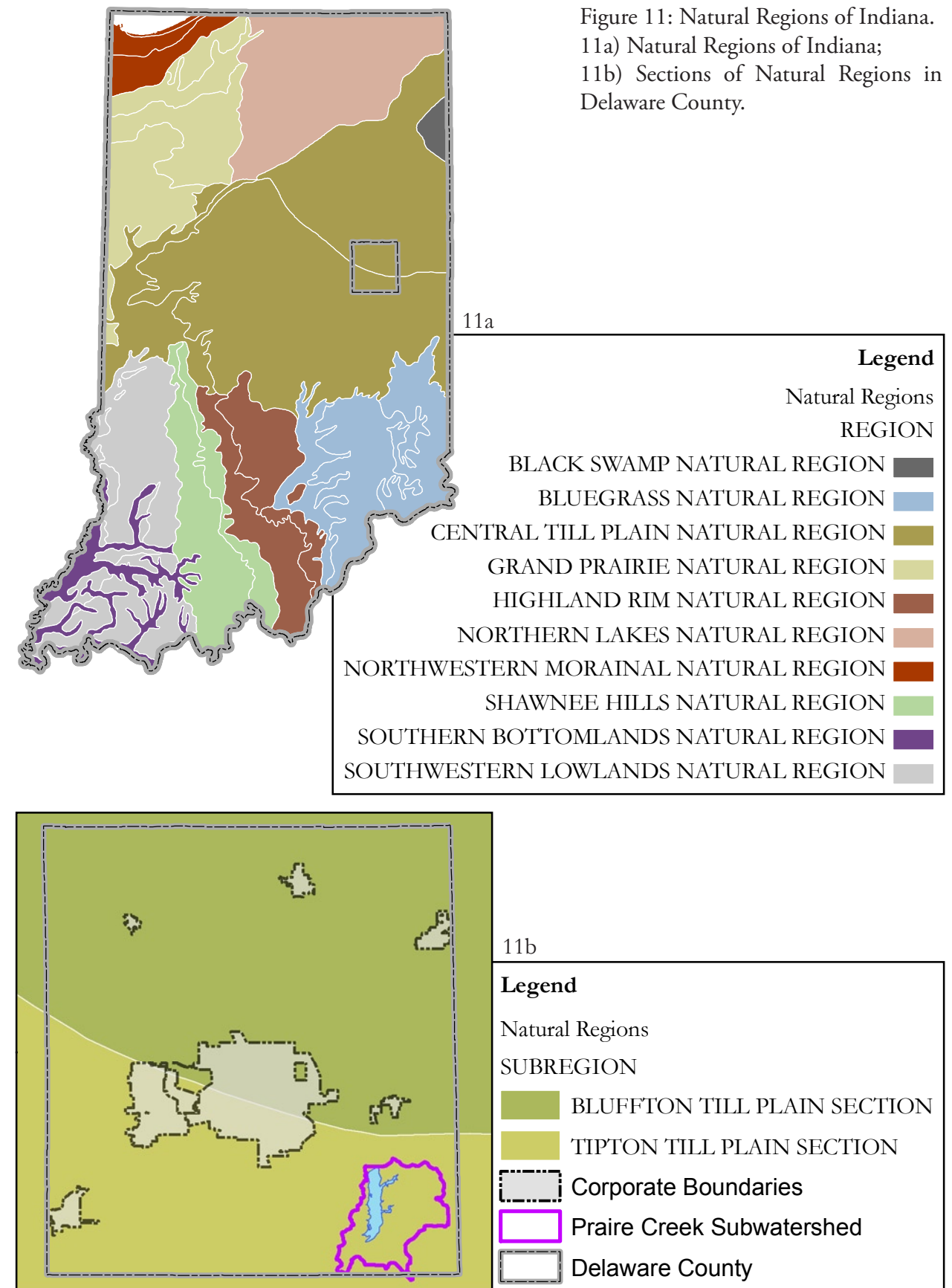
The Tipton Till Plain makes up the southern third of the county, including the area surrounding Prairie Creek Reservoir (see figure 11). This section is noted for flatwoods and mesic upland forests. Historically the flatwoods, which are often on poorly drained soils, were the most common type of forest in the region with mesic upland forests, with their particularly varied communities, well represented.

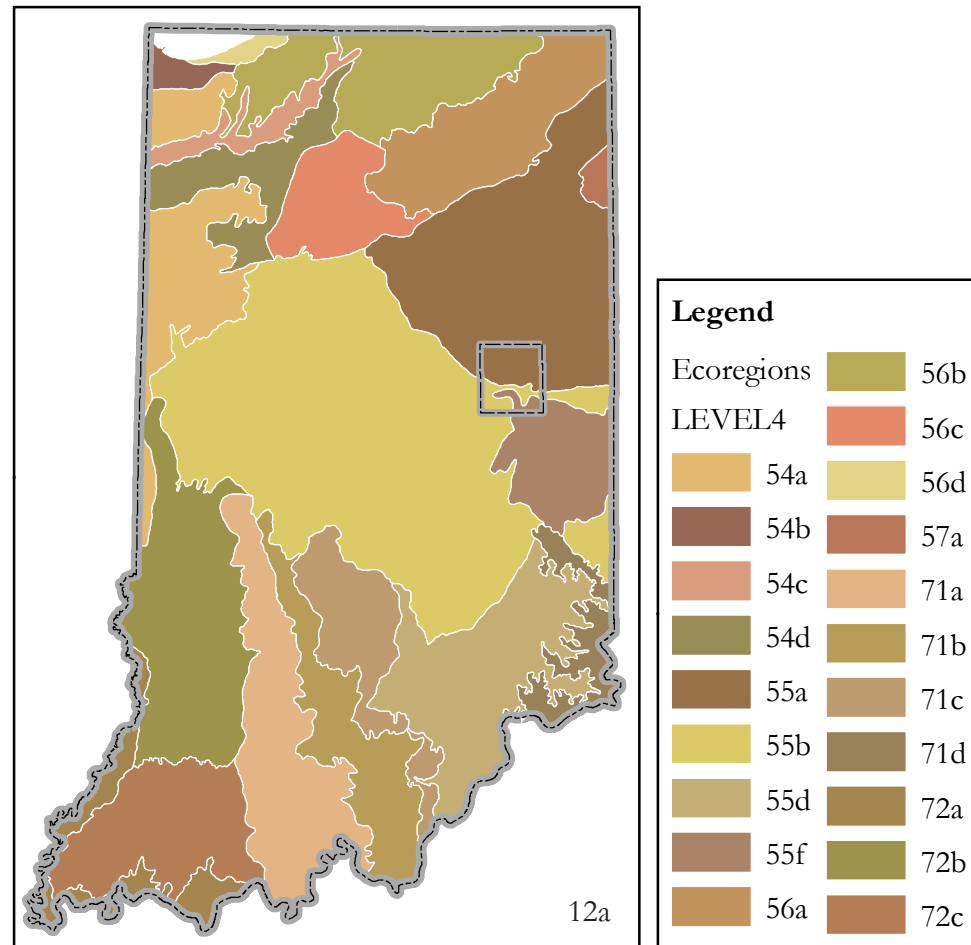
ECOREGIONS

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components.

24 Scheeringa, Ken. “Climate of Indiana.” December 2002.
 25 Jackson, Marion T. The Natural Heritage of Indiana. Indianapolis: Indiana University Press, 1997. 159.
 26 Jackson, Marion T. The Natural Heritage of Indiana. Indianapolis: Indiana University Press, 1997. 195.

Figure 11: Natural Regions of Indiana.
 11a) Natural Regions of Indiana;
 11b) Sections of Natural Regions in Delaware County.





The Loamy, High Lime Till Plains ecoregion, or 55b, contains soils that developed from loamy, limy, glacial deposits of Wisconsinan age; these soils typically have better natural drainage than those of Ecoregion 55a and have more natural fertility than those of Ecoregion 55d. Beech forests, oak-sugar maple forests, and elm-ash swamp forests grew on the nearly level terrain; today, corn, soybean, and livestock production is widespread.

The Whitewater Interlobate Area ecoregion, or 55f, has distinctive cool water, coarse-bottomed streams that are perennial and fed by abundant ground water. The reidside dace, northern stud fish, and banded sculpin occur; they are absent or uncommon in Ecoregion 55b. Unique Ozarkian invertebrates also occur in Ecoregion 55f. Dolomitic drift and meltwater deposits are characteristic and overlie limestone, calcareous shale, and dolomitic mudstone.²⁷

FLORA & FAUNA

Indiana has been the home of many species that are now extinct within its boundary. In the last 200 years Indiana has lost black bears, spotted skunks, porcupines, fishers, big-eared bats, elk, mountain lions, plains bison, Canada lynxes, red wolves, timber wolves, wolverines, and black rats. And that list only includes mammals. Most of these species' populations disappeared from Indiana shortly after European settlement between 1830 and 1860 while just a few of those species were able to maintain their populations in the state into the early and middle parts of the 20th century. Since European settlement, the majority of the forested areas have been cleared for agriculture, leaving behind fragmented woodlots.

Indiana also lost its populations of beavers and river otters. Beaver populations were able to make a come back within Indiana in the early 1900's. During the 1990's efforts began to reestablish populations of river otters.

Delaware County is home to 33 species of endangered, threatened or rare species including nine vascular plant species, nine species of mollusca, five species of reptiles, six species of birds, three species of mammals, and one high quality natural community (as previously mentioned). See Appendix C for the endangered, threatened and rare species list for Delaware County.

Dominant wildlife of the area include white-tailed deer, red and gray fox, raccoon, opossum, fox squirrel, and American robin. The reservoir area also provides habitat for waterfowl including belted kingfisher, double-crested cormorant, Canada goose, loon, gulls, and great blue herons. There are plans to erect 3 osprey nesting platforms by the end of 2006 in this area. Woodcock have been observed near the reservoir. Fish species are stocked yearly in the Prairie Creek Reservoir. The Indiana Department of Natural Resources inventories the fish in the lake; their latest inventory showed that the reservoir contains Channel Catfish, Northern Pike, Largemouth Bass, Smallmouth Bass, Bluegill, Blue Catfish, Crappie, Perch, and Walleye²⁸; common carp are a nuisance species of concern in the reservoir and its tributaries.

²⁷ ftp://ftp.epa.gov/wed/ecoregions/oh_in/ohin_front.pdf

²⁸ <http://www.in.gov/dnr/fishwild/publications/notes/prairie.pdf>

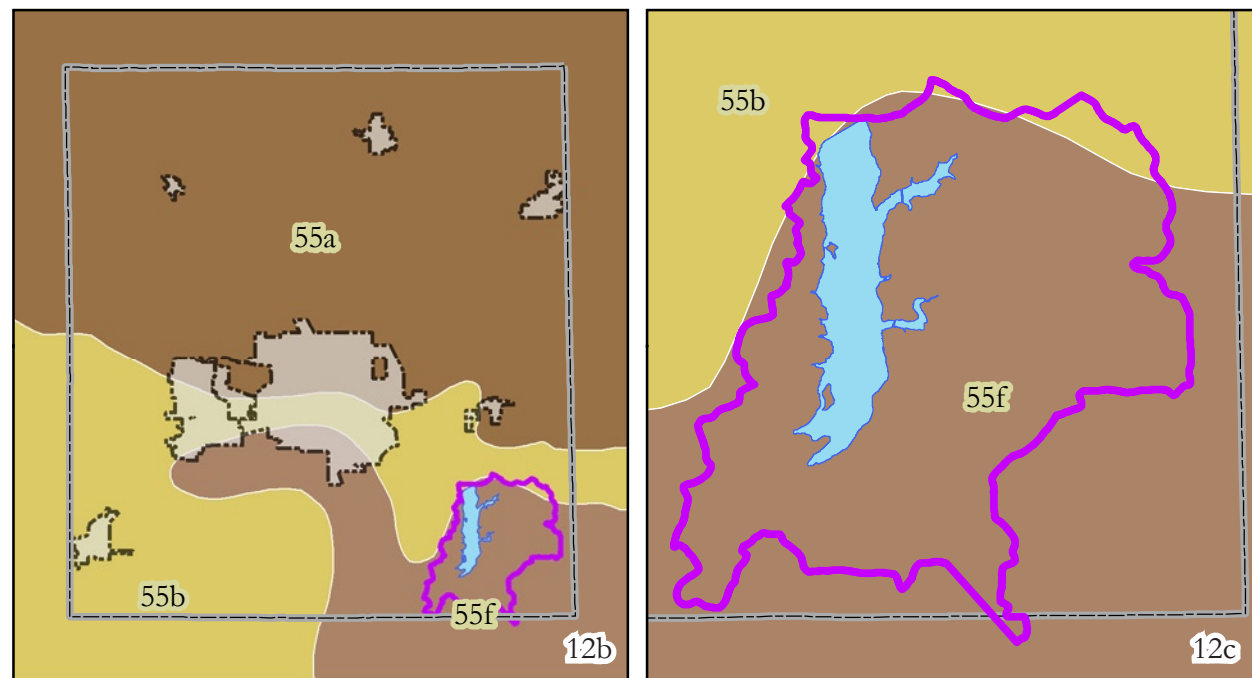


Figure 12: Ecoregions of Indiana. 12a) Ecoregions of Indiana; 12b) Ecoregions of Delaware County; 12c) Ecoregions of Prairie Creek Watershed.



Figure 13: Fish found in Prairie Creek Reservoir.

1) Gizzard Shad, 2) Longear Sunfish, 3) Bluegill, 4) Quillback, 5) White Sucker, 6) Green Sunfish, 7) White Bass, 8) Orangespotted Sunfish, 9) Yellow Perch, 10) Golden Shiner, 11) White Crappie, 12) Common Carp, 13) Walleye, 14) Black Crappie, 15) Channel Catfish

Fish illustrations: Iowa Department of Natural Resources, Maynard Reese: 1,3, 4, 6, 8, & 10; USFWS, Duane Raver: 2; Ohio Division of Wildlife: 5, 7, 9, 11-15

History

Delaware County is located in the east central part of Indiana. The County contains one centrally located second-class city, the City of Muncie and six incorporated towns; Eaton, Albany and Gaston located in the northern third of the County; Yorktown to the west of Muncie and Selma to the east of Muncie; and Daleville (the County's newest incorporated town) located in the southwest corner of the county. The Madison County town of Chesterfield has annexed territory in southwest Delaware County next to Daleville. There are also several small, unincorporated communities, some of which date back to the earliest settlements in Delaware County.

The early history of Muncie and Delaware County is mostly unknown until the Munsee Clan of the Delaware Indian Tribe moved into the area around 1790. After being driven from Eastern Pennsylvania by the Iroquois, the Munsee Clan was given permission by the dominant Miami Tribe to settle along the Wapahani, now White River. While here the Clan established 14 towns extending along the river from a point southeast of the present site of Muncie to an area near what is now Noblesville. One of these towns was located a short distance from what would later be the intersection of Walnut Street and Minnetrista Boulevard and is the source for the name Munsee town, now Muncie. The Munsee Indians remained in the area until late 1820 when they moved to land west of the Mississippi, as they agreed to do in a treaty signed with the federal government in 1818.

Following the departure of the Indians, federal surveyors arrived in the area and began work on setting up the township system. When this was completed in 1822, the land was officially opened for settlement. The abundance of fertile soil drew settlers into the area from the east as they migrated westward across northern Ohio. Others came up from the south after passing through the Cumberland Gap. By 1827 these settlers had decided to ask the Indiana General Assembly to organize and recognize the area as Delaware County, Indiana. Delaware County was organized January 18, 1827, and became effective April 1, 1827. It is 339 square miles and bounded on the north by Grant and Blackford Counties, on the east by Randolph County, on the south by Henry County, and the west by Madison County. Munseetown was founded and selected as the county seat in the same year, but the name was changed to Muncie by a state act in 1844. In 1849 it had a population of 800.¹ Other area communities settled at that time including Smithfield and Granville, both before 1830.

Muncie first had an opportunity for town status in 1847, but the community did not take action on incorporation until 1854. The reasons for the delay are not known, but it is thought that the impetus to finally incorporate was the arrival of Muncie's first railroad in 1852. The town grew at a modest rate and in the 1860's there was a movement for incorporation as a city. This resulted in an election in February 1865 with 293 votes for and one vote against incorporation. Later that month the first mayor, John Brady, and other city officials were elected into office. The city experienced normal growth and served as an agricultural-serving trade center for the next twenty-five years. Then, in 1886 a natural gas field was tapped near Eaton. This gas was piped to Muncie where it served as a major attraction for glass, rubber, metal and other industries. The economic expansion caused by the gas fields not only changed the city from an agricultural center to an industrial center, but also caused Muncie's population to double in the following ten years. This "boom" had turned into a "bust" by

¹ Delaware County." Copyright 2000-2006. Indiana County History Preservation Society. 13 Jan 2006. <<http://www.countyhistory.com/delaware/start.html>>

the turn of the century when the natural gas supply ran out. Many industries closed, others moved, but some remained. The employment slack picked up slightly after World War I with the introduction of automotive industry, but glass, stone and clay industries remained dominant until after World War II necessitated the expansion of the automotive industry.

Delaware County once contained eastern deciduous forests that were broken up by wet prairies that were excellent for meadows and pastures. The principle growth was timber: oak (*Quercus* spp), hickory (*Carya* spp), beech (*Fagus grandifolia*), poplar (*Liriodendron tulipifera*), and walnut (*Juglans nigra*). There were few acres in the County that could not be adapted for agricultural purposes. Following settlement most of the land was cleared of trees, drained and converted to farmland.

The White River has been the main water source for the City of Muncie since it's founding. During the 1950's it was decided that the projected growth of Muncie's industry and population warranted a back-up water source to supplement the White River. The site of the current reservoir was chosen because of topography, proximity to the river and the rural nature of the ground cover at the time. In 1960, the United States Army Corps of Engineers constructed an earthen dam just above Prairie Creek's convergence with the White River to create the Prairie Creek Reservoir. In the building process of the reservoir, land around the dam and beach was graded, but everything else was left "as is" – tree stumps, fence posts, roads, etc. The dam is earthen lakeside stabilized by riprap. The reservoir is fed water by Prairie Creek and other smaller tributaries. The outlet goes under the dam and the gates are manual. A spillway is located to the west of the dam.

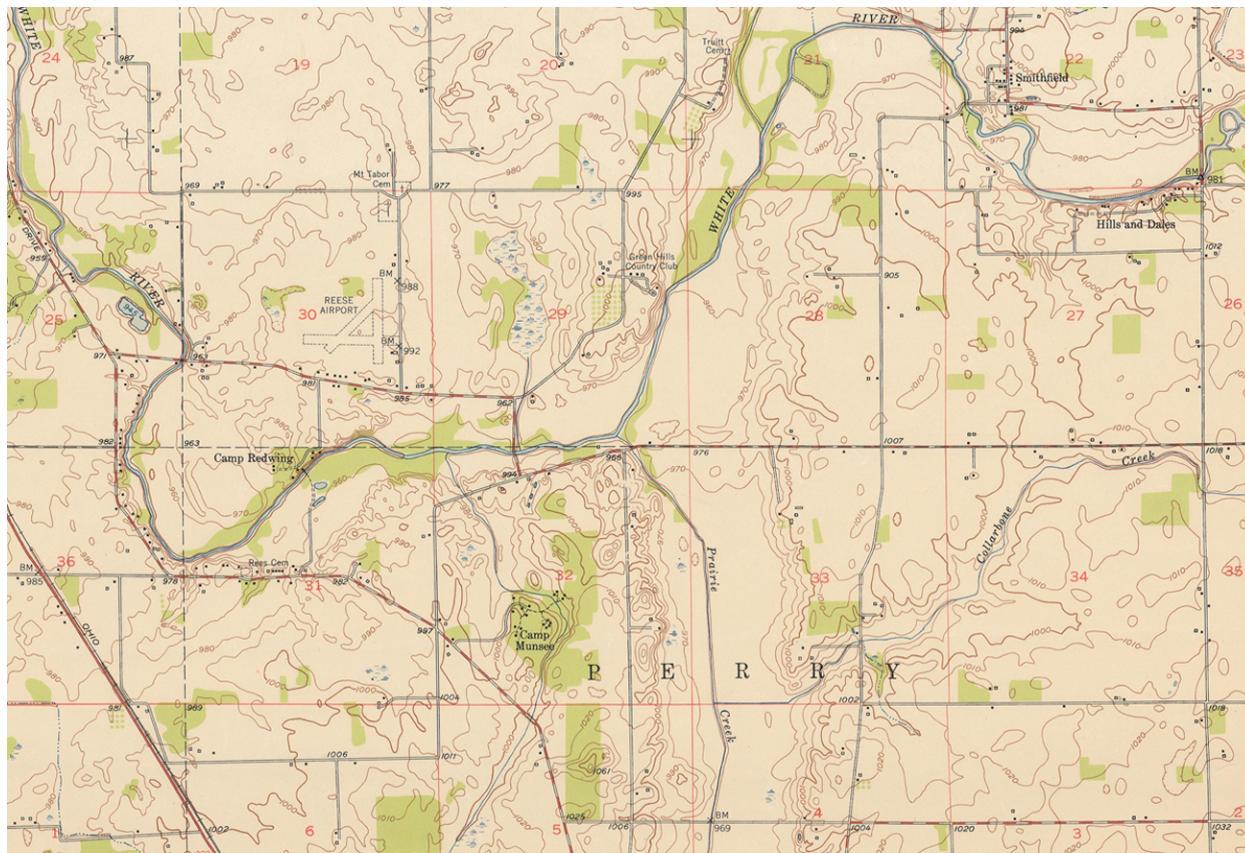


Figure 14: Pre-reservoir topographic map from 1952. Shows the northern part of the area that has since been converted into Prairie Creek Reservoir. Source: MUNCIE EAST, IND 1952; USGS & Indiana Department of Conservation

Land Use

The predominant land use in the Prairie Creek Subwatershed is agriculture followed by green space and water bodies. Currently, residential land use only comprises approximately 6% of the area but this could change as development pressures increase.

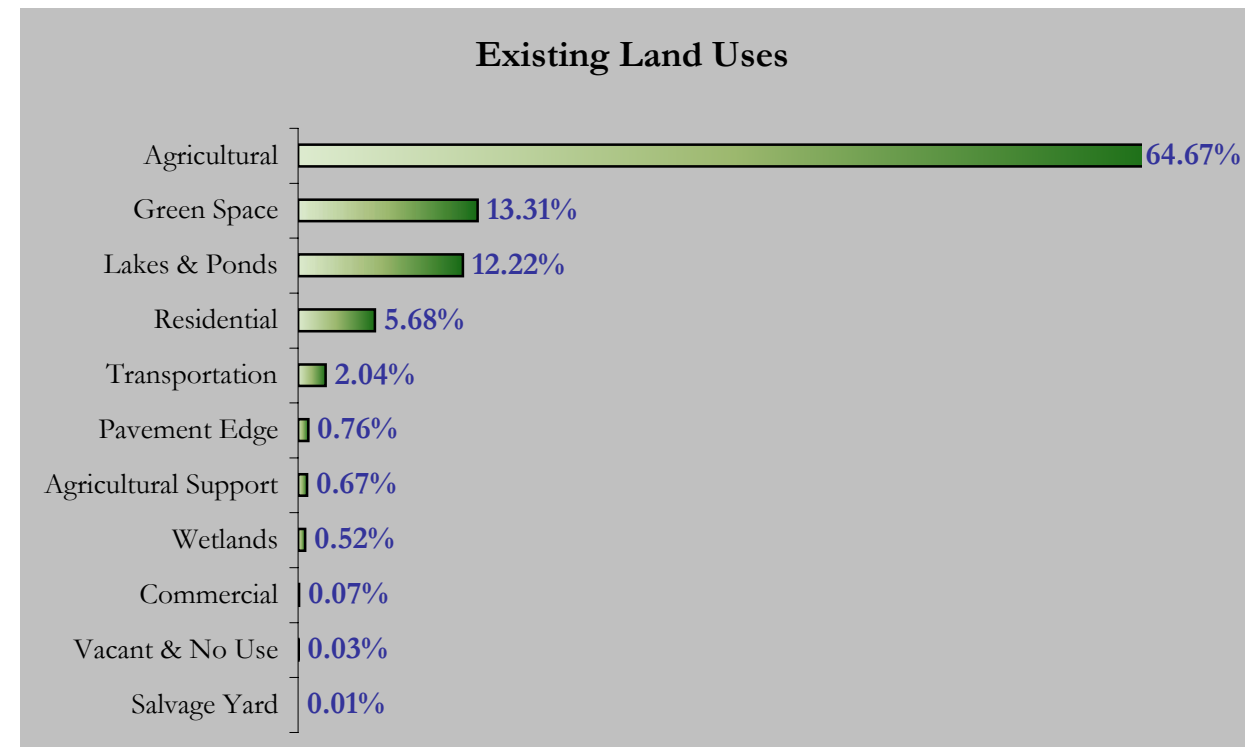


Figure 15: Land use breakdown in the Prairie Creek Watershed.

The existing development pattern is of a rural nature. There are several farms in the watershed and a number of homes on smallish one to five-acre parcels that line the county roads. The area around the reservoir is substantially wooded and open space grass. The banks of the White River and the streams feeding it are frequently wooded. Other land in the reservoir area is mostly covered by farm fields and with the yards of homes. There are a number of scattered woodlots separated by fields. Figure 16 shows the land cover in the Prairie Creek Reservoir watershed area.

New Burlington, a small, unincorporated community of about two-dozen homes abuts the reservoir. Mount Pleasant, another small unincorporated community lies about a mile southwest of the reservoir and has approximately three-dozen homes and a couple businesses. The area surrounding the reservoir and between the water and the county roads is mostly park administered by the City of Muncie Parks Department. To the east of the reservoir there are a number of businesses including a bar/restaurant, bait shop and a marina.

This section describes the current development located within a three mile buffer surrounding the Prairie Creek Reservoir. For general housing statistics for Delaware County and Perry Township see the Demographics section. The data was taken from the Delaware County Geographic Information

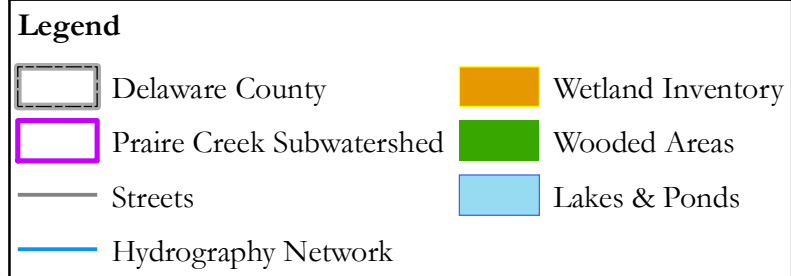
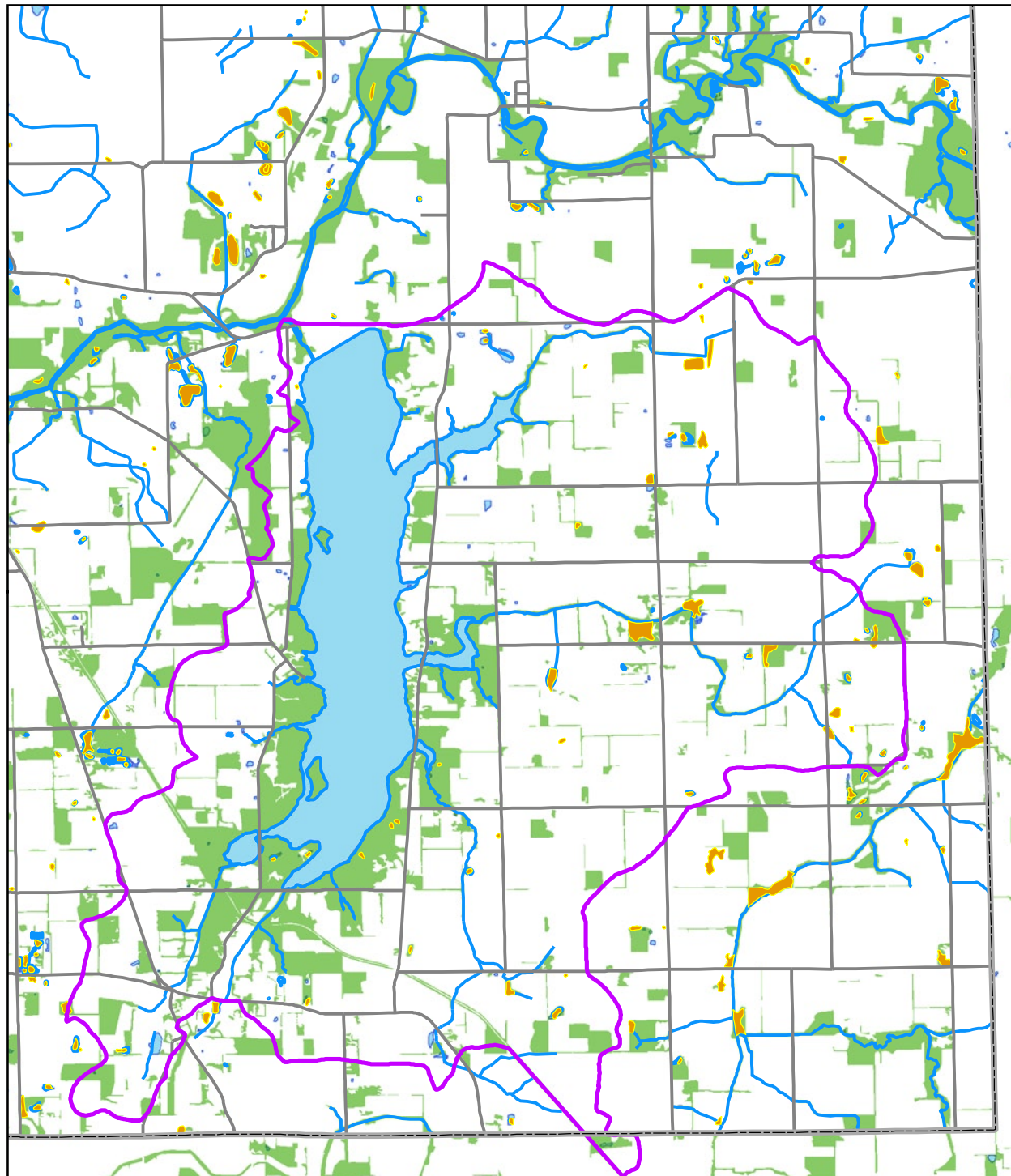
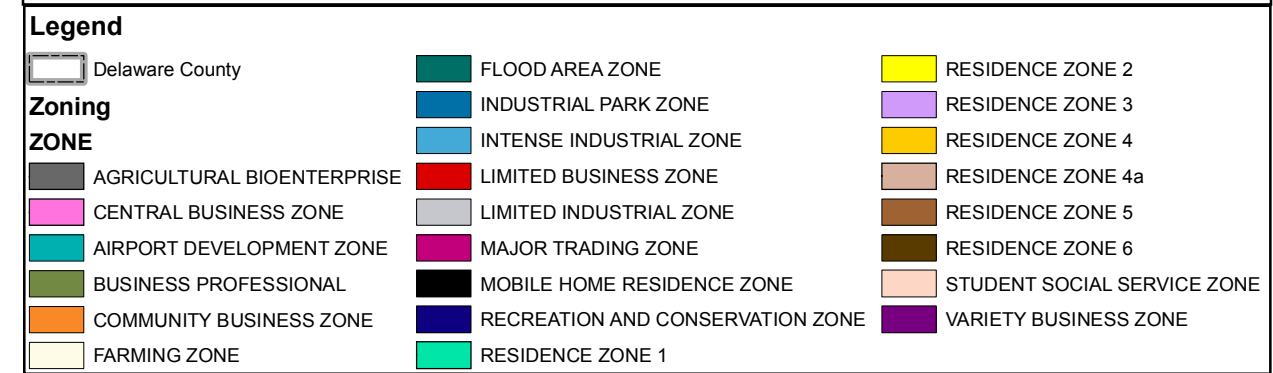
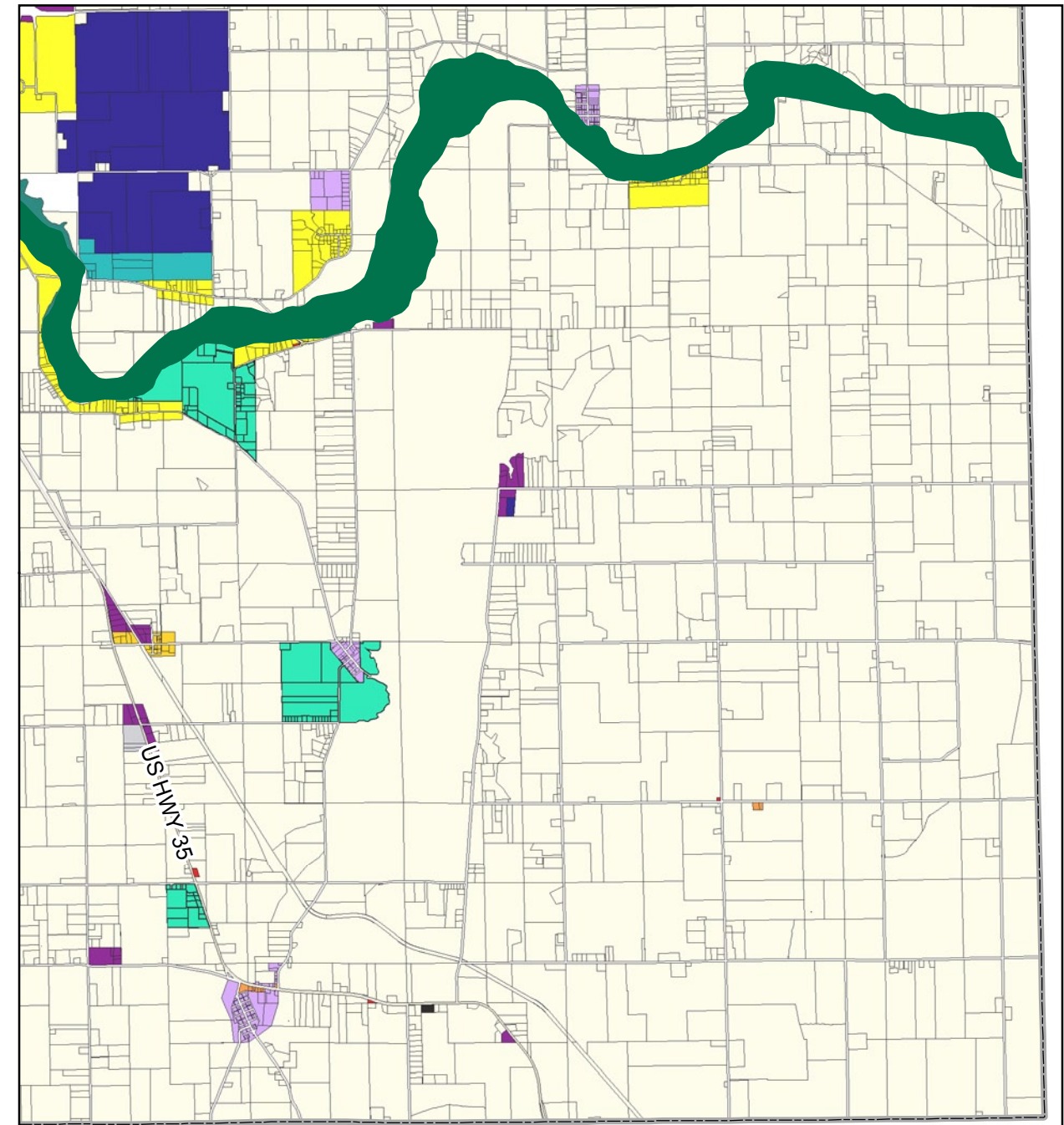


Figure 16 (above): Land Cover in the Prairie Creek Watershed area.

Figure 17 (p. 43): Zoning in the Prairie Creek Watershed area.



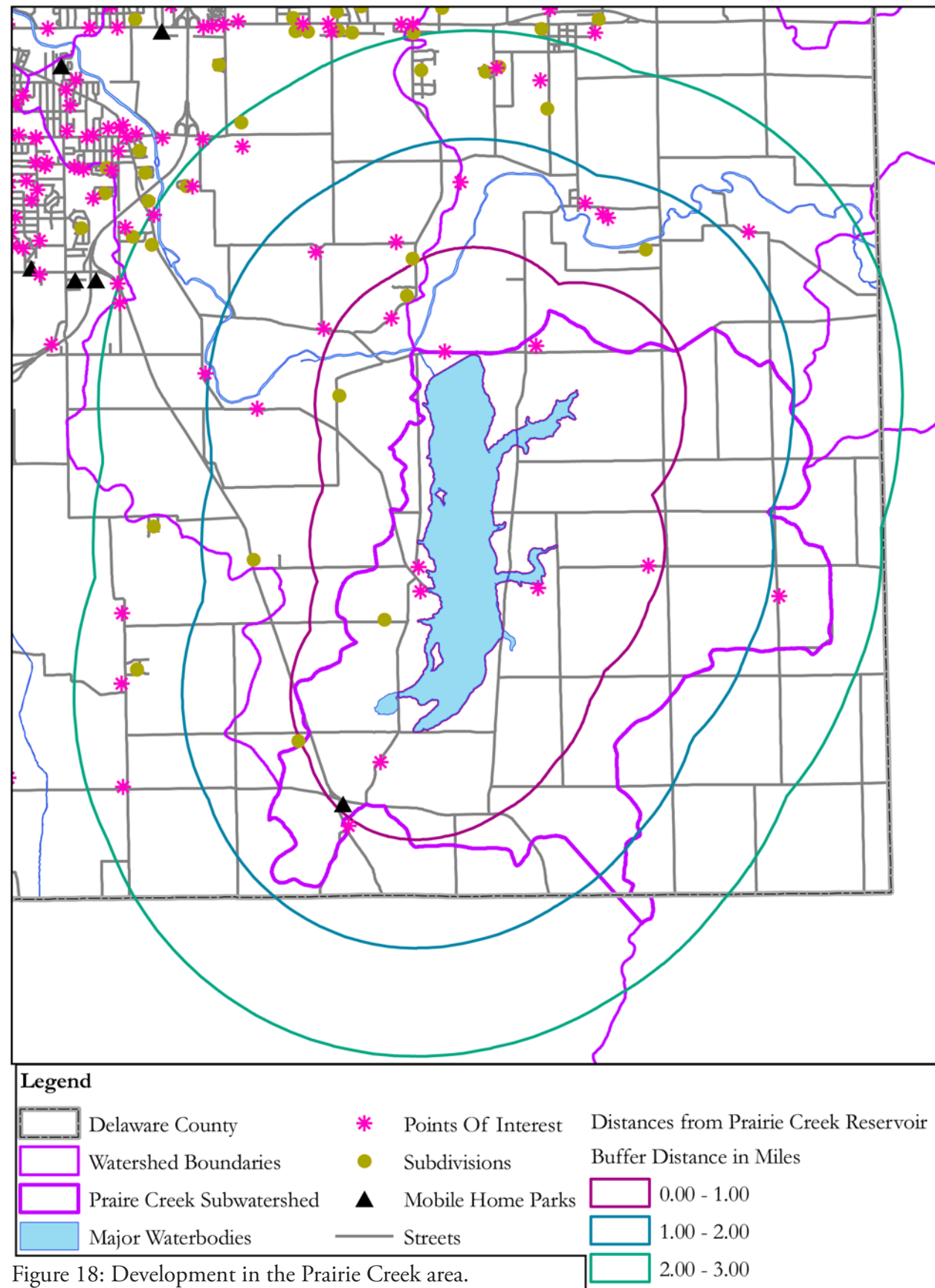


Figure 18: Development in the Prairie Creek area.

System's (G.I.S.) county subdivision, mobile home park, and points of interest layers. Information may be incomplete and is not exclusive. Most of the current development located within three miles around the reservoir tends to be on the southwest, west, and northwest sides. Figure 18 shows some of the current development in the area.

Within one mile of the reservoir there are two unincorporated communities: 1) New Burlington located 0.27 miles WSW of the reservoir; and 2) Mount Pleasant on U.S. 35 South about one mile southwest of the reservoir; and two subdivisions; 1) Lakeview situated approximately 0.78 miles WNW of the reservoir; and 2) Glenn Hills situated approximately 0.80 miles north of the reservoir. There is also one mobile home park named Quiet Acres Mobile Home park located approximately one mile southwest of the reservoir.

Located within the two mile buffer surrounding the Prairie Creek Reservoir are the unincorporated community of Medford on County Road 500 South and four residential subdivisions: 1) Rolling Hills Est. located just over a mile southwest of the reservoir and 0.75 miles northwest of the mobile home park; 2) Perry Heights positioned approximately 1.68 miles west of the reservoir; 3) Olde Wellington situated about 1.17 miles north of the reservoir; and 4) Hills and Dales located approximately 1.45 miles northeast of the reservoir. The South Muncie Kiwanis Club is located on Inlow Springs Road just over a mile northwest of the reservoir.

The limits of the City of Muncie and Town of Selma are just within three miles of the reservoir. There are also nine residential subdivisions located within the three mile buffer surrounding the reservoir: 1) Country Walk positioned about 2.6 miles WSW of the reservoir; 2) Fox Glenn located approximately 2.5 miles west of the reservoir; 3) Suburban Court A situated about 2.8 miles WNW of the reservoir; 4) Maple Manor located approximately 2.8 miles northwest of the reservoir; 5) Ironwood Estates positioned just under three miles north of the reservoir; 6) Meredith II situated about 2.9 miles north of the reservoir; 7) Liberty Village is located about 2.6 miles north of the reservoir; 8) Edgewood Addition is just east of Liberty Village about 2.6 miles from the reservoir; and 9) Huntington Village is situated approximately 2.5 miles north of the reservoir. Other points of interested located within the three mile boundary include: 1) Christian Chapel located on CR 200 E about 2.7 miles west of the reservoir; 2) Rosewood Manor on Burlington Drive just over 2 miles WNW of the reservoir; and 3) Academy of Model Aeronautics situated on Memorial Drive about 2.7 miles northwest of the reservoir.

Recreational Opportunities

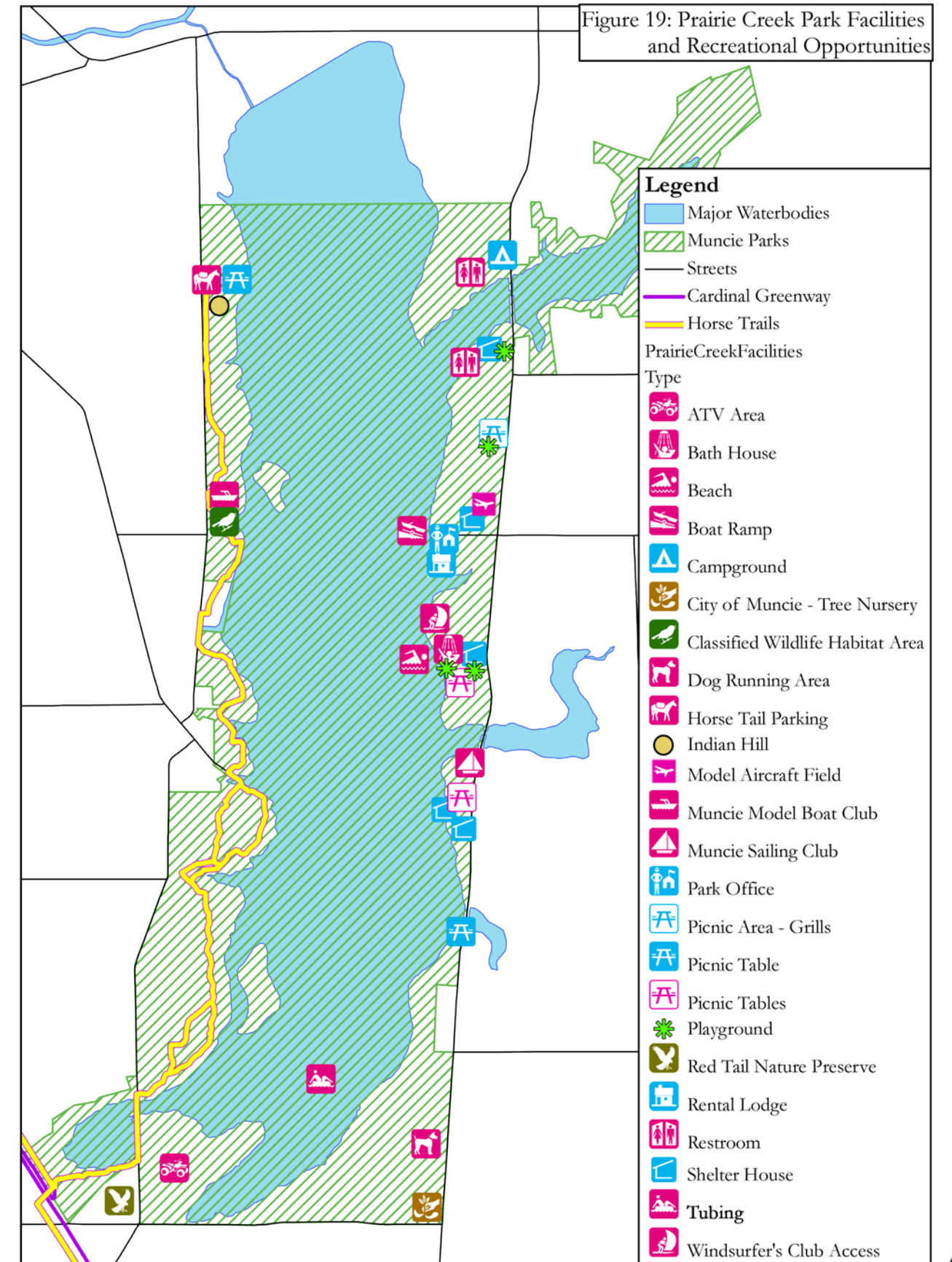
There are many recreational opportunities available at the Prairie Creek Reservoir Park and surrounding area. The Prairie Creek Reservoir Park is a 2,300 acre facility which holds a 1,242 acre stream-fed lake. The City of Muncie holds a long-term lease on approximately 740 acres of the land surrounding the water that comprises the park. Most of that land is devoted to passive recreation and is undeveloped. The park serves all of Muncie and Delaware County as well as surrounding counties. The Prairie Creek Reservoir Park begins full operation on April 15th each year and remains open until October 15th. During the off-season the park is open, but is staffed during limited hours.

On site recreational opportunities include fishing, boating, picnicking, playing at playgrounds, swimming (at the beach area only), basketball, volleyball, horseshoe pitching, barbecuing, camping, off-road vehicle trails, and horseback riding trails. Off site recreational opportunities include access to the Cardinal Greenway and the Red-Tail Nature Preserve. Various clubs and service groups use Prairie Creek Reservoir including the Muncie Sailing Club, Bass-fishing Club, The Munsee Sky Chiefs (a model aeronautics club), a windsurfers group, and the Muncie Model Boat Club.

Park facilities include handicapped fishing pier, row boat rentals, approximately 363 boating docks (permitting two boats at each dock) and one launch, moorings, open-air shelters, one rentable lodge, a beach area, concession stand, a basketball court, three main playgrounds with swing sets, slides, Teeter Totters, Whirls and other playground equipment, a volleyball court, a horseshoe pitch, three main picnic areas, barbeque grills, vending machines, restrooms, campground with 140 camp sites and bath house, off-road vehicle trails, and horseback riding trails. The Muncie Sailing Club offers dock facilities for sailboats that are privately operated.

Docks are taken out of water every winter. Dock fees are \$250 for city residents, \$300 for county residents and \$350 for out of county residents (includes private landowners). Docks are in high demand and there is a waiting list. The Parks Dept. puts piers on the “arms” of the reservoir for people who own private property along the tributaries. On a good summer day 100-200 people will put additional boats on the reservoir (\$5/day public access). There are 140 campsites. On holidays the campgrounds are usually full. There is a primitive camping area that usually has open spaces. The seasonal campsites are often fully occupied and there is a waiting list. There are three main picnic areas located by the beach. Playgrounds are near Dry Dock Marina, on the south shore, and in the campground. South of the beach there are two more shelter houses. A number of picnic tables are scattered about the park. The speed limit for boats is 20 mph. Figure 19 illustrate the facilities and recreational opportunities within and neighboring Prairie Creek Park.

Figure 20 represents trails and routes in the southeastern portion of Delaware County including the existing horse trail (yellow trail on map), existing Cardinal Greenway route (purple on map), existing open spaces (green), and proposed bike route suggestions taken from the 2005-2030 Delaware County Transportation Plan. A multi-modal approach to transportation planning in the Delaware-Muncie community was used to include the bicycle and the pedestrian component. The vision of the plan is that everyone within Delaware County is within ten minutes of connecting to “the system”.



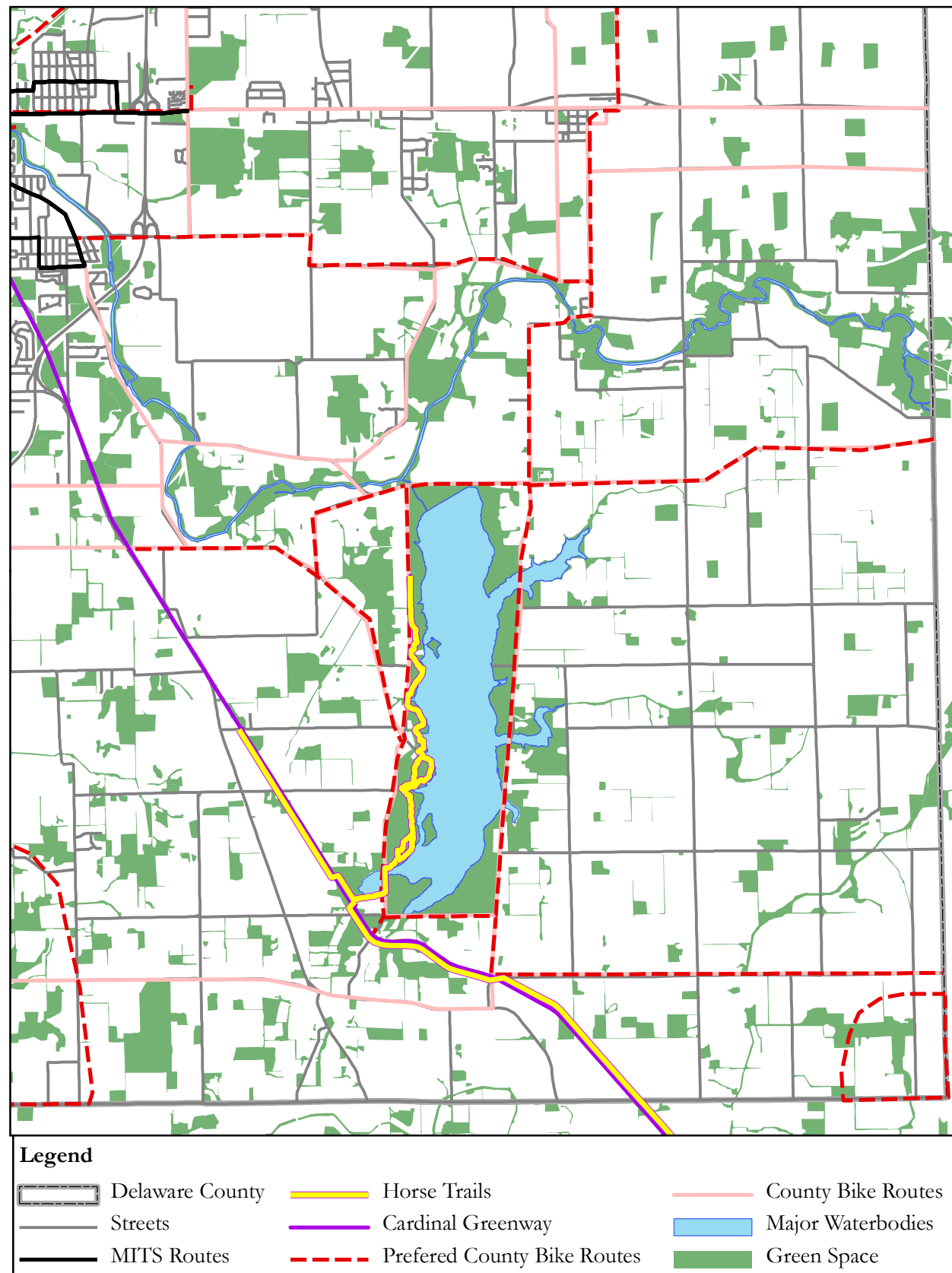


Figure 20: Recreational Trails and Routes in the Prairie Creek area.

Transportation Inventory

Delaware County’s most direct surface transportation connection to nearby metropolitan areas is I-69, located along the western edge of the county. I-69 runs north and south until it nears the southern end of the county where it turns southwest towards Anderson and Indianapolis. Interchanges occur at State Road 28, State Road 332 and State Road 67/32. State Road 28 runs east-west between I-69 and State Road 67. State Road 332 runs east-west from I-69 to the City of Muncie where it becomes McGalliard Road. State Road 67/32 extends northeast to the City of Muncie where it intersects State Road 3 and U.S. 35 and turns into the Muncie Bypass. State Road 3 runs north-south through the county intersecting both Muncie and Eaton and connecting New Castle in Henry County and Hartford City in Blackford County to Delaware County. U.S. 35 breaks off from the bypass and follows a southeastern course through Delaware County to Richmond in Wayne County, coming to within about a mile of the southwest corner of Prairie Creek Reservoir. State Road 32 splits from the bypass and goes east from Muncie through Selma to the county line and beyond connecting Winchester in Randolph County to Delaware County. State Road 67 runs northeast through Albany and connects Portland, in Jay County, and Muncie. See Figure 20 for the locations of the major roads in Delaware County.

Access to Prairie Creek Reservoir is through a combination of state and county roads. There is no direct route to the reservoir from either SR 35 or SR 32. Both routes involve taking county roads that are often winding and narrow. Many of the county roads in the area are less than twenty feet wide. Access from the City of Muncie is also indirect via winding and often narrow county roads (see Figure 21). The reservoir is accessible by bike from the Cardinal Greenway only by biking on those same narrow winding county roads. The rural nature of the roads in this area may be partially responsible for slowing residential growth and indirectly protecting the rural character of the watershed.

The roads adjoining Prairie Creek Park are County Road 575East on the east, County Road 475East on the west, County Road 650South to the south and Windsor Road on the north. County Road 575East approximately twenty feet wide, but sections are rated as only in ‘Fair’ condition in the County’s pavement inventory. County Road 475East is only about eighteen feet wide and narrows to as little as sixteen feet near County Road 700South. Together these four roads make up what is referred to as the “ring roads” surrounding the reservoir (see Figure 21). The County’s road inventory sites several problems along the ring roads that need attention. Potholes, missing or damaged signs and guardrail issues are noted.

Burlington Drive is the most direct route when coming from Muncie and is listed as in ‘Fair’ condition in the County’s inventory. Its width is generally about twenty feet. Access from U.S. 35 makes use of County Road 534East, one of the ‘Poor’ condition roads in the area according to the County’s inventory. Inlow Springs Road, another road on the route between Muncie and the reservoir, is also in “Poor” condition according to the County’s inventory. Figure 22 illustrates the road inventory for the area surrounding Prairie Creek Reservoir.

There is no public transit that currently has service to Prairie Creek Park, although the Muncie Indiana Transit System (MITS) has serviced the park in the past. MITS has no plans at this time to resume public transit service to the reservoir on a regular basis, however temporary service might be extended

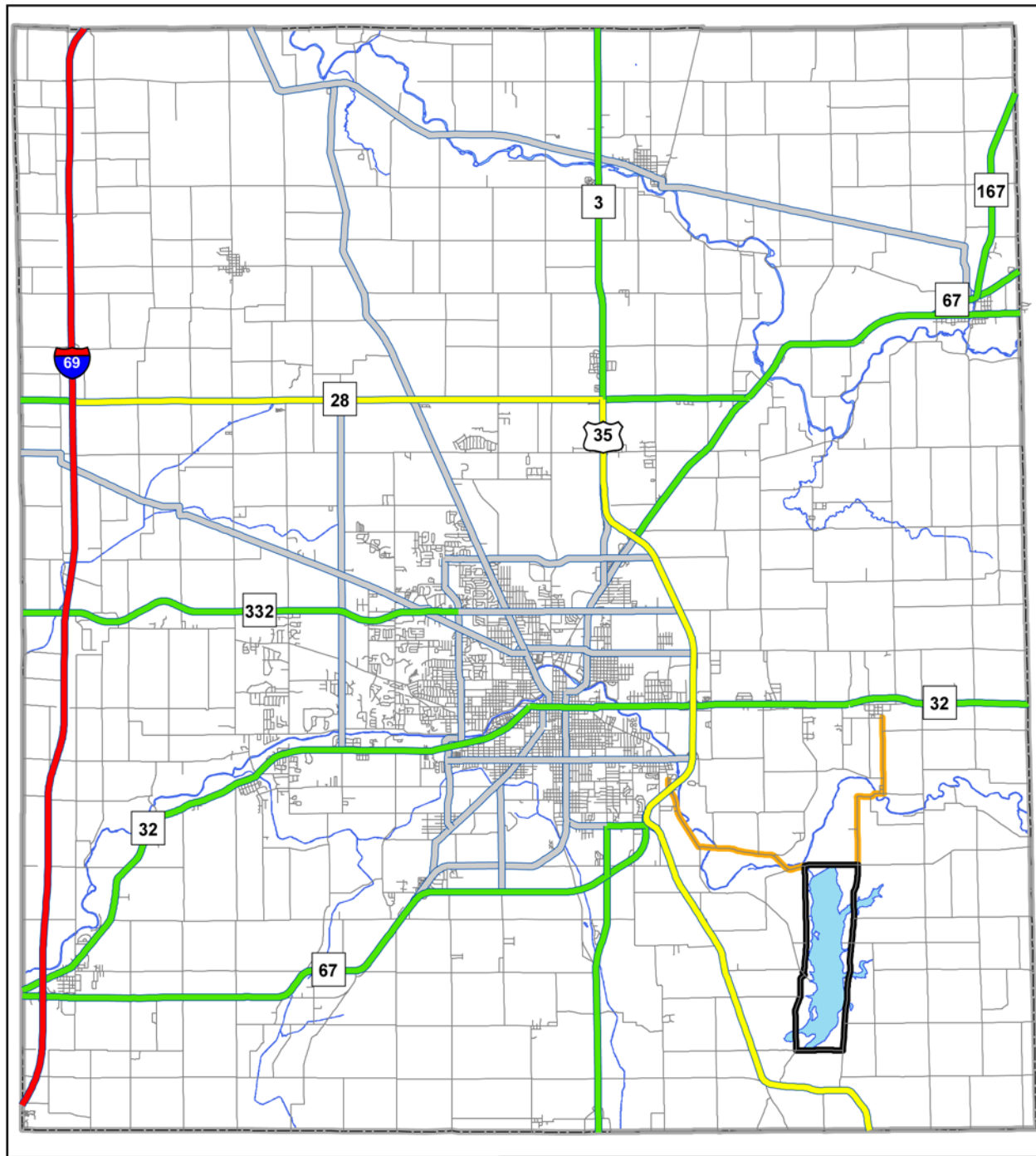


Figure 21: Roads in Delaware County.

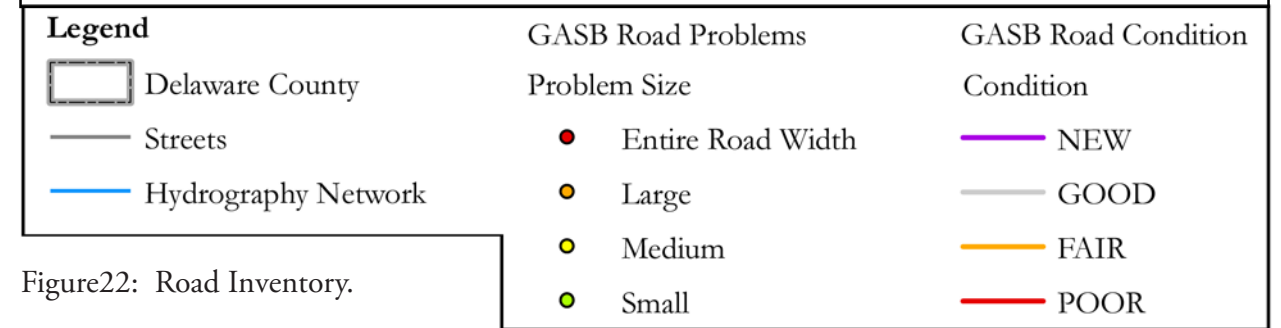
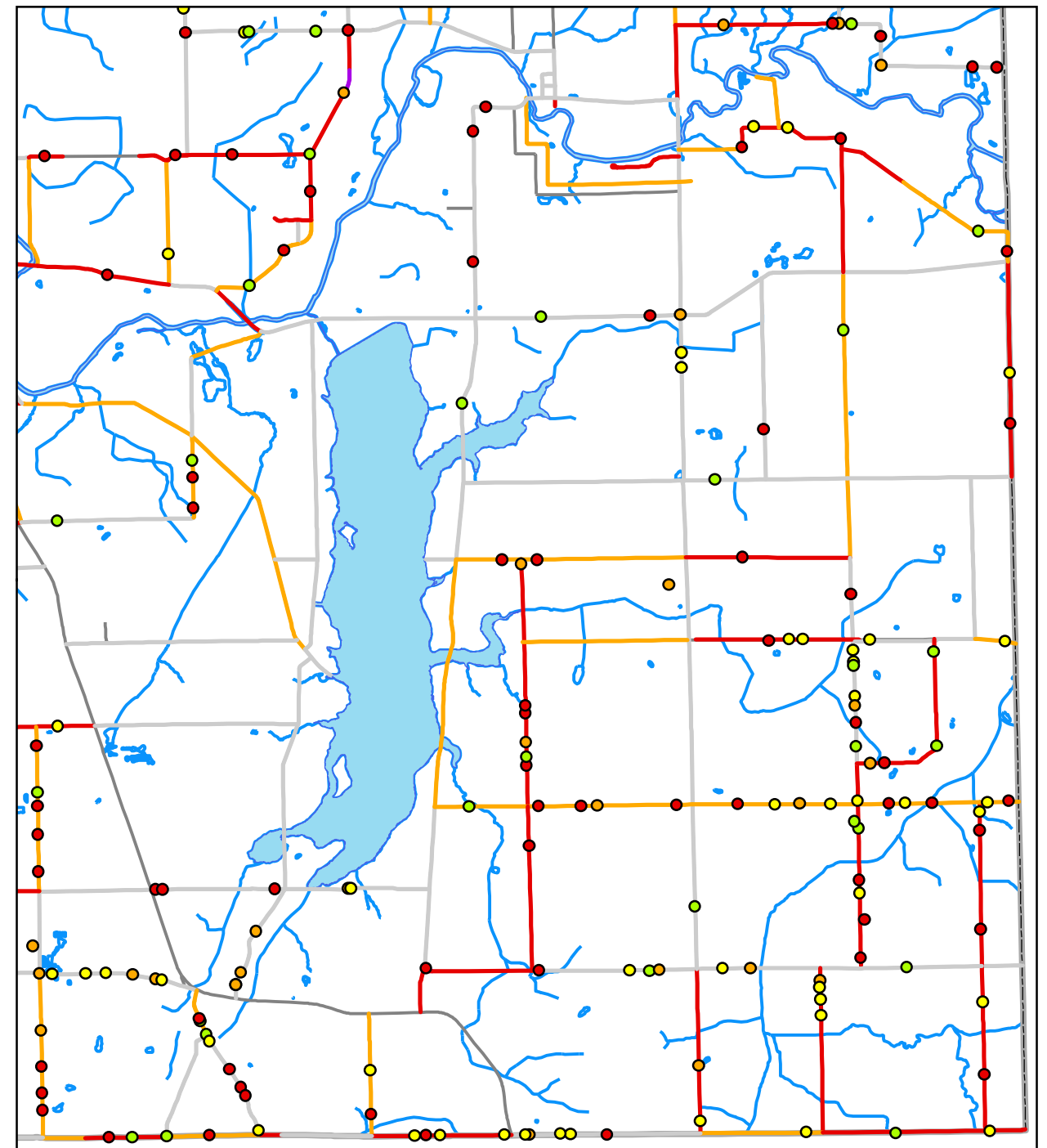
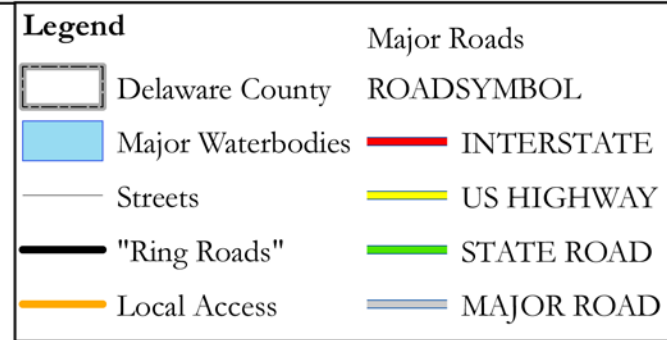


Figure22: Road Inventory.

for special events.

Scheduled transportation improvement projects for the Prairie Creek area include replacement of the Smithfield Bridge and improvements to County Road 700East from SR 32 south to the county line. The Smithfield Bridge is scheduled for replacement in 2009. At that time the road will probably be realigned and the new bridge placed so as to leave the historic truss bridge in place. The Transportation Improvement Plan for Delaware County has the section of County Road 700East north of Windsor Road and south of SR 32 scheduled for improvements in 2013. The road will remain two lanes, but most likely be widened and shoulder and ditch work done. The section of County Road 700East south of Windsor Road will most likely be improved soon after that work is completed.

Other possible future improvements not currently scheduled in the Delaware County Transportation Improvement Plan could include widening County Road 575East along the east side of the reservoir, widening, adding turn lanes and a bike lane and improving County Road 450 South from County Road 700East to County Road 575East. This could furnish improved access routes to Prairie Creek Reservoir from both SR 32 and US 35. Such improvements are not currently part of the Delaware County long-range transportation plans.

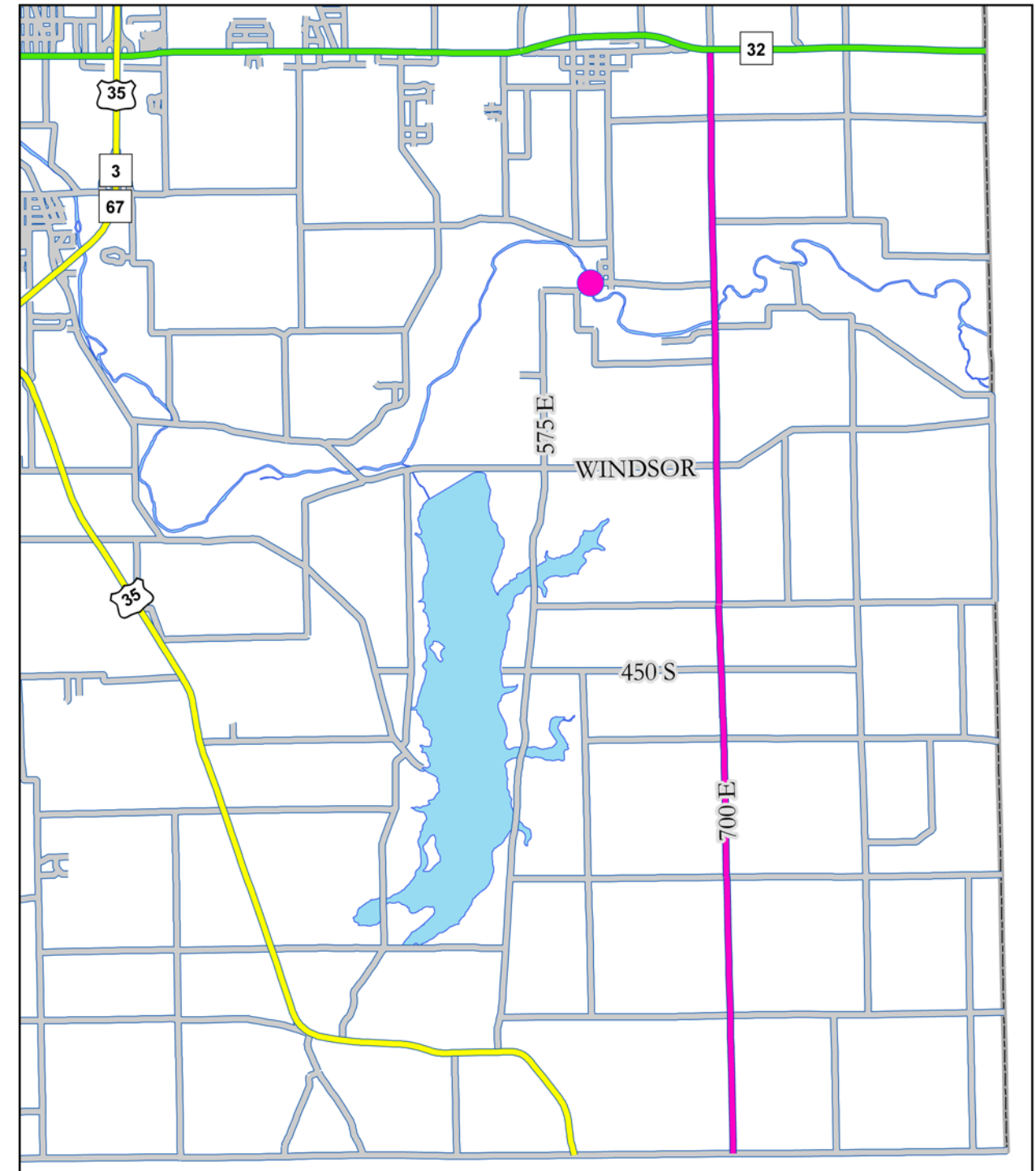


Figure 23: Scheduled Improvements through the Transportation Improvement Plan.



Existing Utilities

Prairie Creek Reservoir is owned and operated as a supplemental drinking water source for the City of Muncie by the Indiana-American Water Company. Public utilities at Prairie Creek and in the area surrounding it are limited to electric power and telephone service. Local water is supplied by private wells. There are no public or private wastewater treatment systems. Area homes and businesses are serviced by individual septic systems. It is believed that many of those are in need of maintenance or replacement. Storm water runoff is handled by county ditch and tile systems. The closest public wastewater treatment facility is Liberty Regional Wastewater located in Selma.

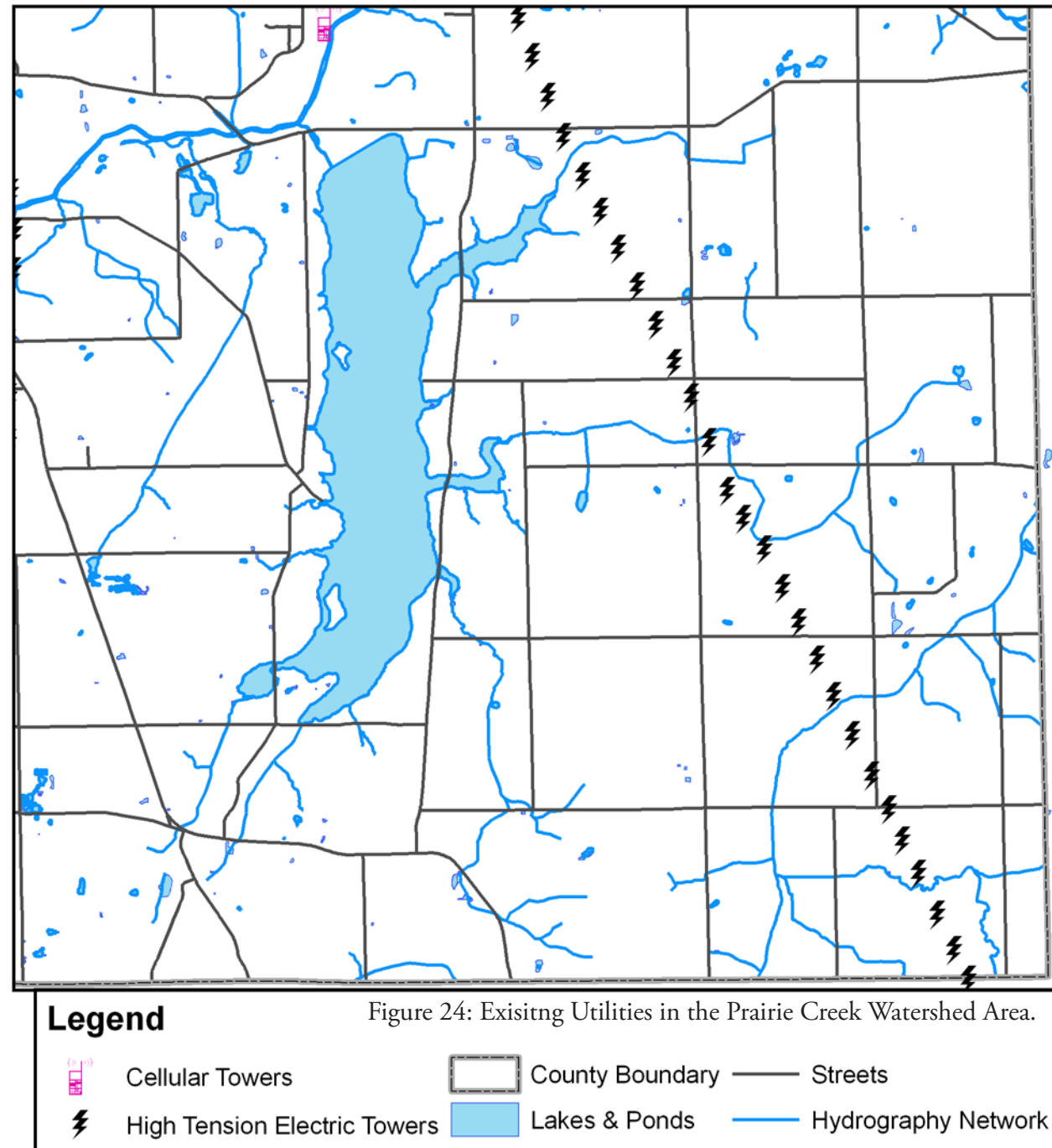


Figure 25: Aerial of Perry Twp. and part of Liberty Twp. (2005).