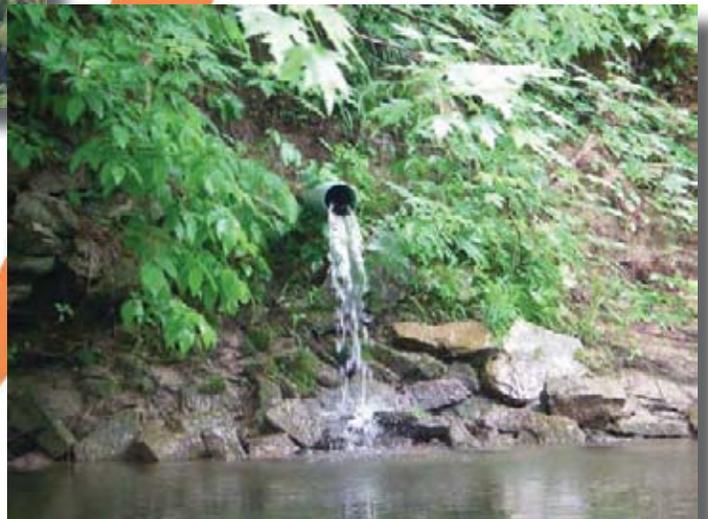
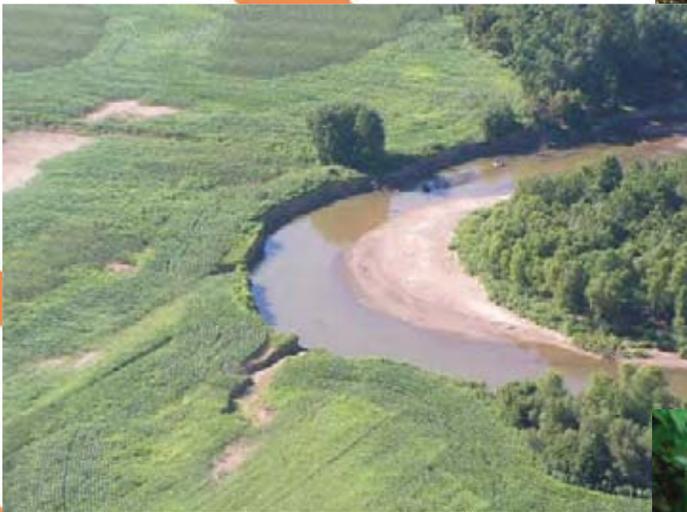
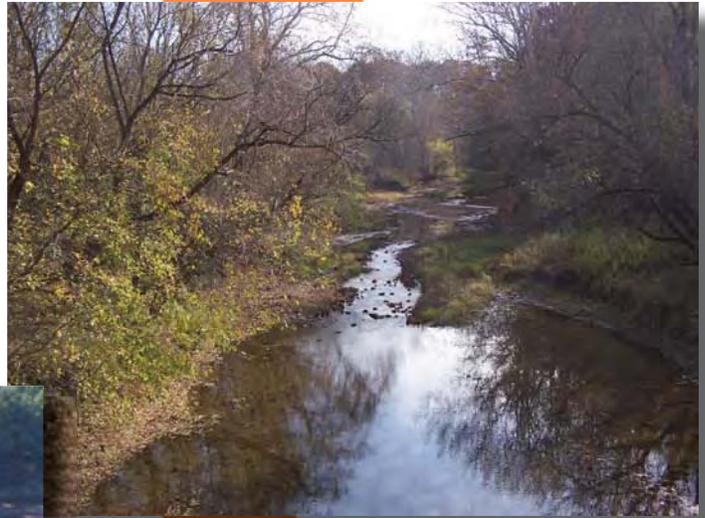


Big Walnut Creek Watershed Management Plan



Putnam County SWCD
Empower Results, LLC

January 19, 2009

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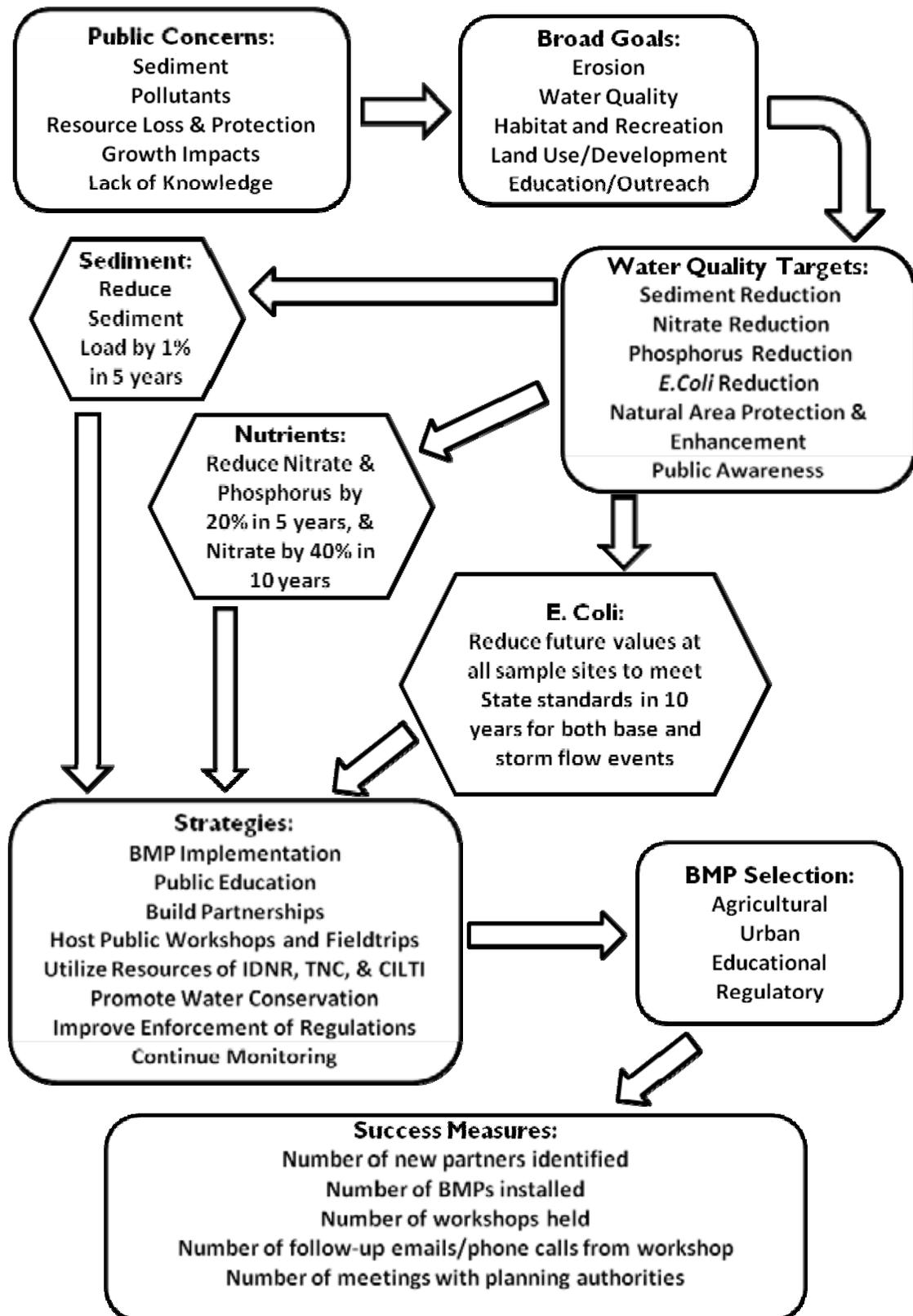
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1.0 EXECUTIVE SUMMARY



2.0 INTRODUCTION

The Big Walnut Creek Watershed Management planning process was initiated by the Putnam County Soil and Water Conservation District (SWCD). A variety of local land use and water quality concerns exist throughout the watershed. The interconnected nature of these concerns, as well as the desire to protect local natural resource assets, led the Putnam County SWCD to explore funding for a comprehensive watershed management plan that would lead to a strategic approach for conversation and restoration in the watershed.

2.1 Local Leadership

The following watershed management plan and assessment was funded via a Section 319 grant from the Indiana Department of Environmental Management (IDEM). While the Putnam County SWCD oversaw the grant administration, decisions related to the planning process were arrived at via consensus and collaboration among a diverse Steering Committee with multi-county representation. Technical aspects of this project were guided by a Watershed Coordinator and associated team of environmental consultants from Empower Results, LLC.

The Steering Committee

The Steering Committee was comprised of individuals from the following organizations:

- Boone County SWCD
- Hendricks County SWCD
- Putnam County SWCD
- Natural Resource Conservation Service
- Putnam County Board of Health
- Hendricks County Surveyor/Clean Water Department
- Sycamore Trails RC&D
- Putnam County Extension
- Greencastle Water Works
- Putnam County Planning & Zoning
- Area 30 Career Center – DePauw University
- Putnam County Commissioners
- The Nature Conservancy
- Little Walnut Creek Conservancy District
- Heritage Lake Conservancy District
- Altra Indiana, LLC
- Putnamville Correctional Facility

As the Steering Committee began to develop its mission statement and goals, the group began to refer to itself as the Big Walnut Creek Watershed Alliance (BWCWA). A formal identity will likely help the group grow and gain recognition in the community.

2.2 Mission Statement

The Big Walnut Creek Watershed Alliance is focused on improving water quality in the Big Walnut and Deer Creek areas by raising public awareness, protecting natural areas, enhancing adjacent landscapes, and allowing for the public use and enjoyment of the river.

2.3 Watershed Location

The Big Walnut Watershed is located in the west central portion of Indiana approximately 50 miles west from Indianapolis (Figures A, B1-B6). It encompasses 271,267 acres, or 424 square miles, of land across portions of five counties – Boone, Clay, Hendricks, Parke, and Putnam. The majority of the watershed is located within Putnam County. The Big Walnut Watershed is comprised of five smaller 11-digit watersheds. The watershed includes two major streams - Big Walnut Creek and Deer Creek. The headwaters of the watershed begin in Boone County, just south of Lebanon and flow southwesterly, through northwest Hendricks County and then on through Putnam County. Deer Creek flows into Mill Creek. Mill Creek continues westwardly where it meets with Big Walnut Creek and the Eel River begins here at the confluences of Big Walnut Creek and Mill Creek. US Highway 36 runs east-west through the central portion of the watershed, dividing it in half. Greencastle is the largest city located within the watershed area as it is the county seat of Putnam County. Other notable towns within the watershed include Jamestown, Lizton, North Salem, Bainbridge, Fillmore, and Cloverdale (Figure C).

2.4 Brief History of the Big Walnut Watershed

The Big Walnut Watershed has been studied for decades by several well-known biological scientists. Thomas Simon and Dr. James Gammon have researched the Big Walnut Creek to much extent. Their work has focused primarily on fish habitat and communities within the Big Walnut and Deer Creek Watersheds. Dr. Gammon's works on Big Walnut Creek date as far back as 1967.

Volunteer stream monitoring data is also available dating back to 2002. Several other scientists and conservation groups have expressed interest in protecting and managing Big Walnut watershed resources as well. Some of these scientists include staff from the Indiana Department of Natural Resources' Division of Nature Preserves (IDNR-DNP), The Nature Conservancy (TNC), and the Central Indiana Land Trust (CILTI). Several natural resource professionals concur that elements of the Big Walnut Watershed are unique, high quality, and regionally significant from an ecological perspective.

3.0 WATERSHED DESCRIPTION

3.1 Physical Setting

3.1.1 Topography

The Big Walnut Watershed encompasses approximately 271,267 acres, or 424 square miles, of land across portions of five counties – Boone, Clay, Hendricks, Parke, and Putnam. The majority of the watershed is located within Putnam County. This large watershed is located in all or portions of 17 USGS 7.5 minute quadrangles. The topography of the watershed ranges from flat rolling agricultural fields to undulating hills and valleys (Figure D). The Big Walnut Watershed is comprised of five smaller 11-digit watersheds, HUC numbers 05120203010, 05120203020, 05120203030, 05120203040, 05120203050.

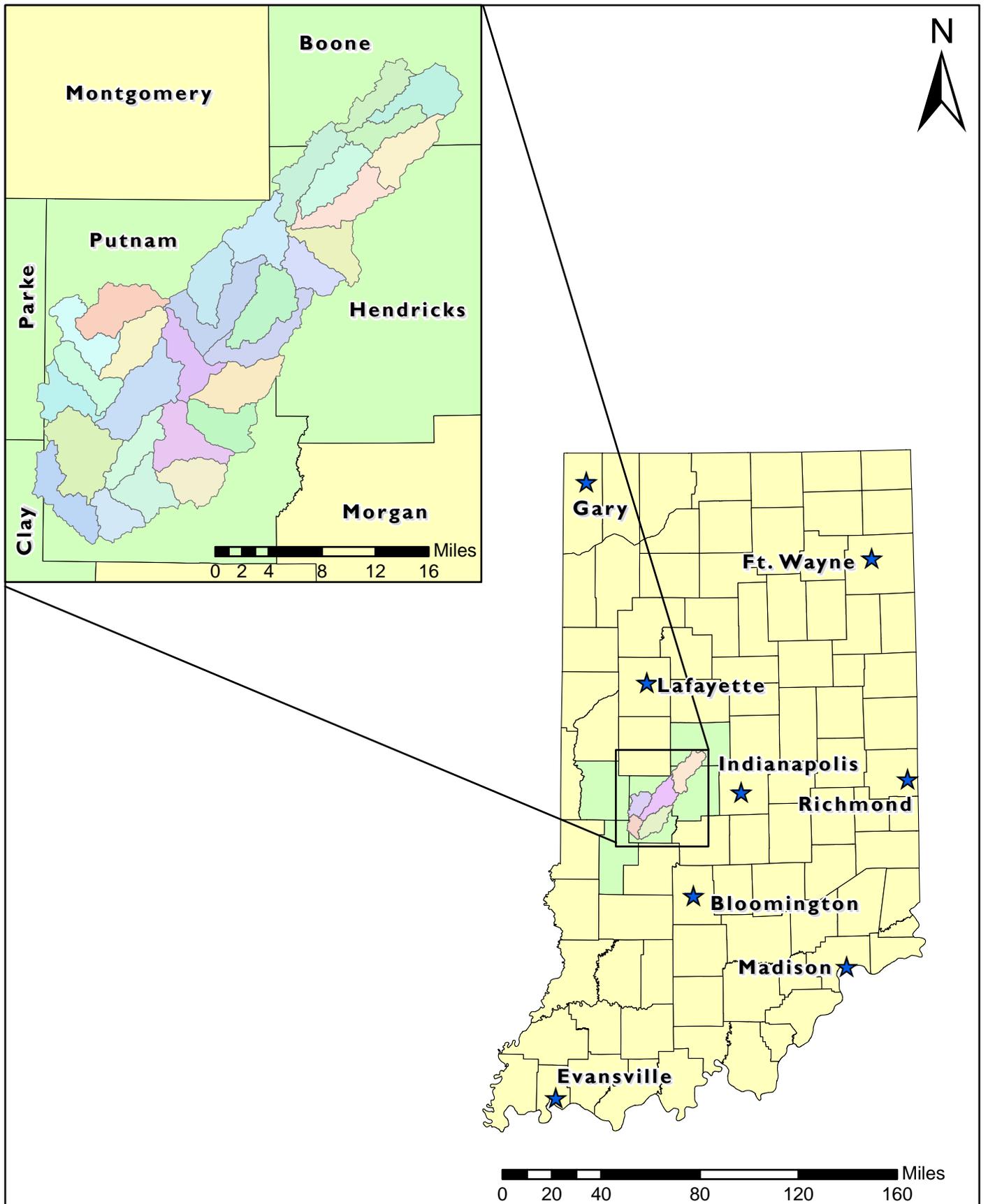


Figure A - Watershed Location Map
 Big Walnut Creek Watershed
 Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana

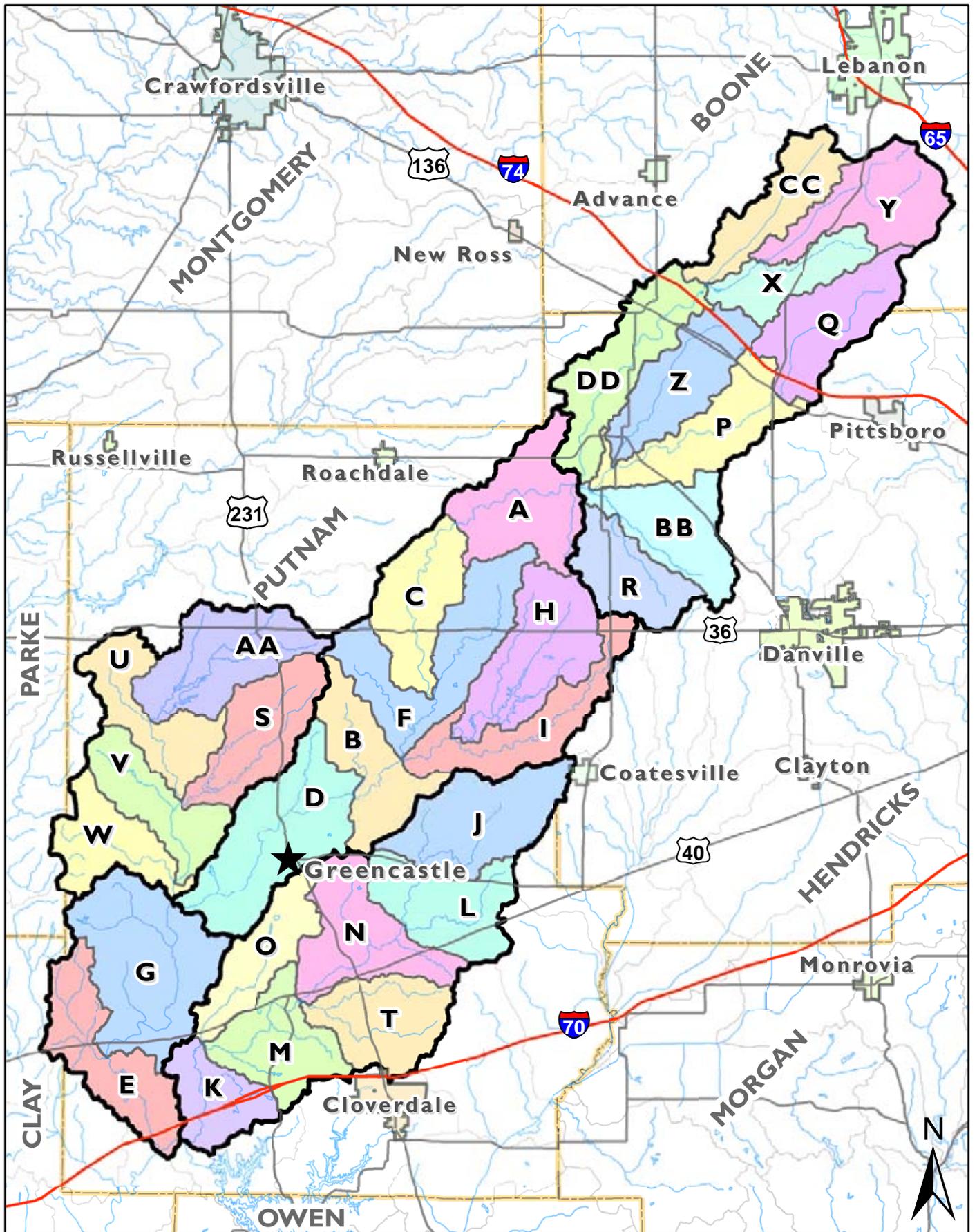
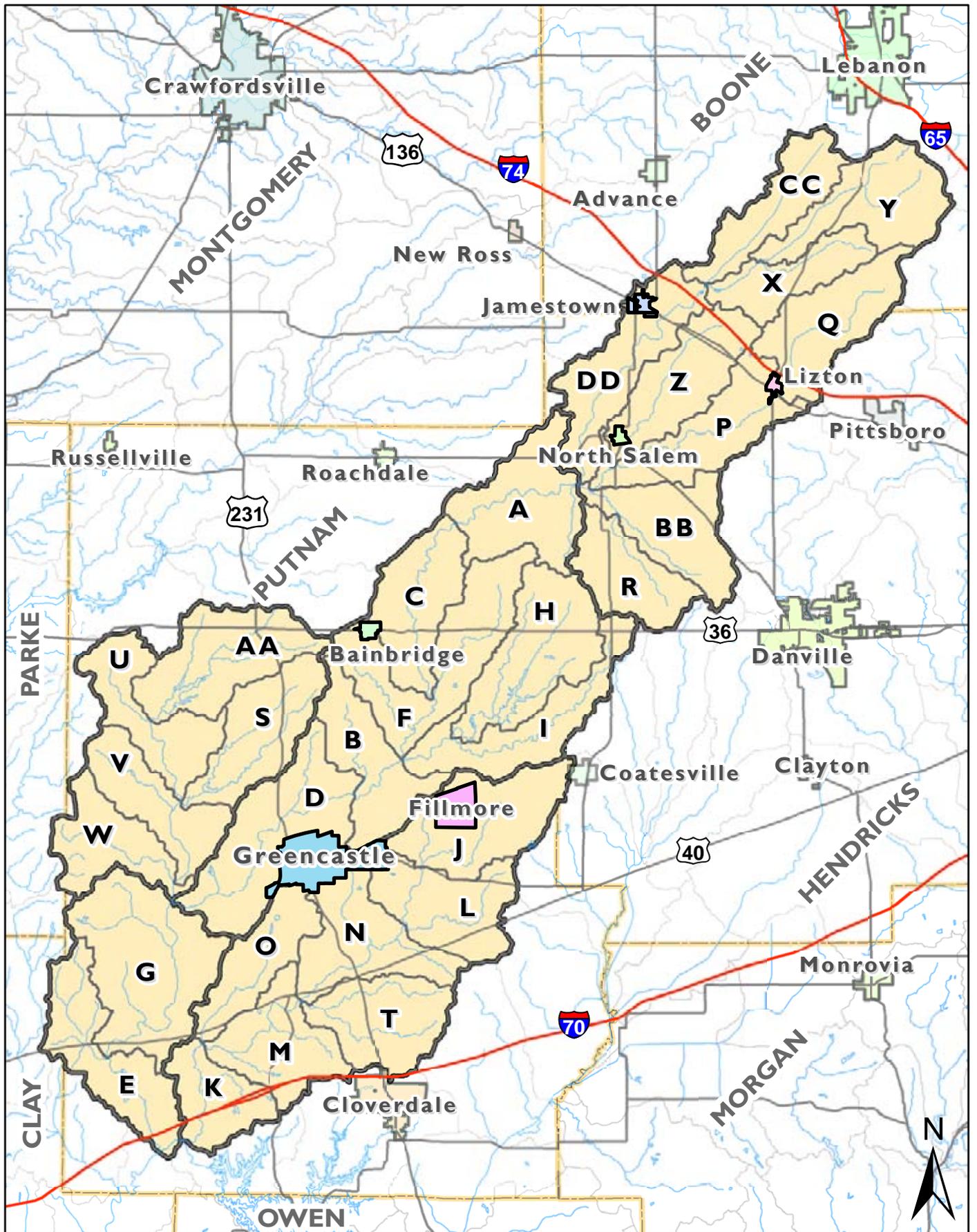


Figure B1 - Big Walnut Watershed

Big Walnut Creek Watershed
 Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana



0 2 4 8 12 Miles

Figure C - Prominent Towns and Cities

Big Walnut Creek Watershed
Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana

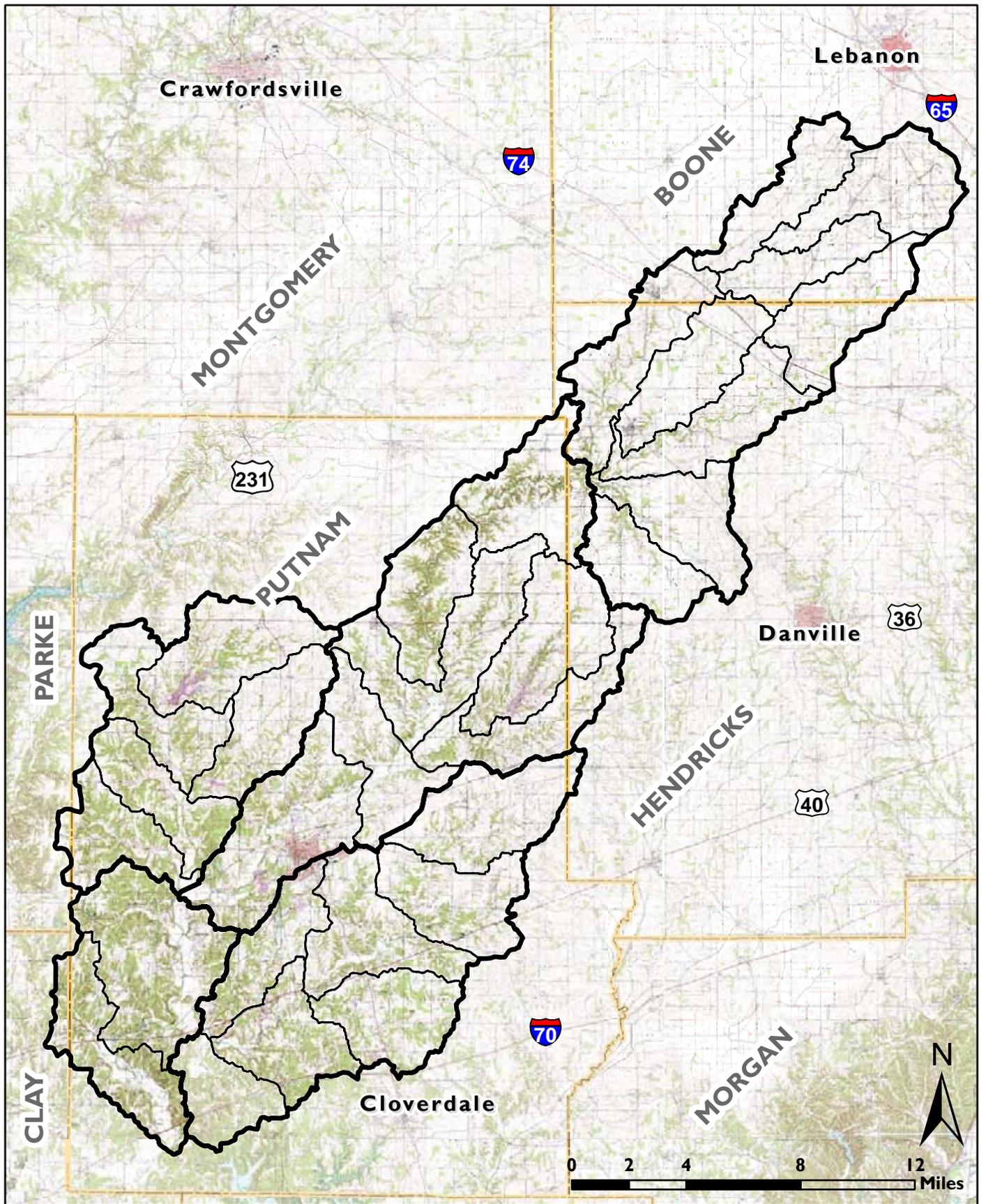


Figure D - Topography

Big Walnut Creek Watershed
Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana

3.1.2 Hydrology

Streams

Big Walnut Creek begins in south central Boone County as the West Fork, Middle Fork, and East Forks of Big Walnut. These three streams merge together to form Big Walnut Creek southwest of North Salem in Hendricks County.

Deer Creek begins and ends within Putnam County. The headwaters of Deer Creek originate near Fillmore. The stream flows southwesterly past Putnamville to its confluence with Mill Creek.

In addition to Big Walnut and Deer Creeks, there are approximately 77 miles of perennial streams within the watershed (Figure E). The main stem of Big Walnut Creek is the longest stream within the watershed flowing approximately 19 miles and draining 212,740 acres (332 sq mi) of land. Deer Creek flows approximately 7 miles and drains 50,400 acres (79 sq mi) of land.

Lakes and Ponds

Many lakes are present within the watershed (Figure E). Most of the lakes were created by man-made impoundments out letting to surface waters. The lakes have been created for recreation, flood control, wildlife, and residential development. Ponds and lakes present special concern to the water quality within the watershed as they trap sediments, nutrients, and other contaminants.

Wetlands

In 1974 the U.S. Fish and Wildlife Service (USFWS) founded the National Wetland Inventory (NWI) as a way to provide information on the location, extent, and types of wetlands and deepwater habitats. Wetlands indicated on the maps were identified from aerial imagery based on visible vegetation, hydrology, and geology. The maps use the same grid as the USGS 7.5 minute topographic quadrangles.

Wetlands work to filter sediments and nutrients from run-off, store water; provide opportunity for groundwater recharge and discharge, and provide habitat for wildlife. These wetland functions often improve water quality and the biological health of nearby and downstream streams and lakes.

According to data from the NWI maps (Figures F1-F21, Appendix A), wetlands cover approximately 390 acres of land within the watershed (Table I). Table I also summarizes the acres of wetland within each 14-HUC watershed based upon four classifications – forested, scrub-shrub, emergent, and open water.

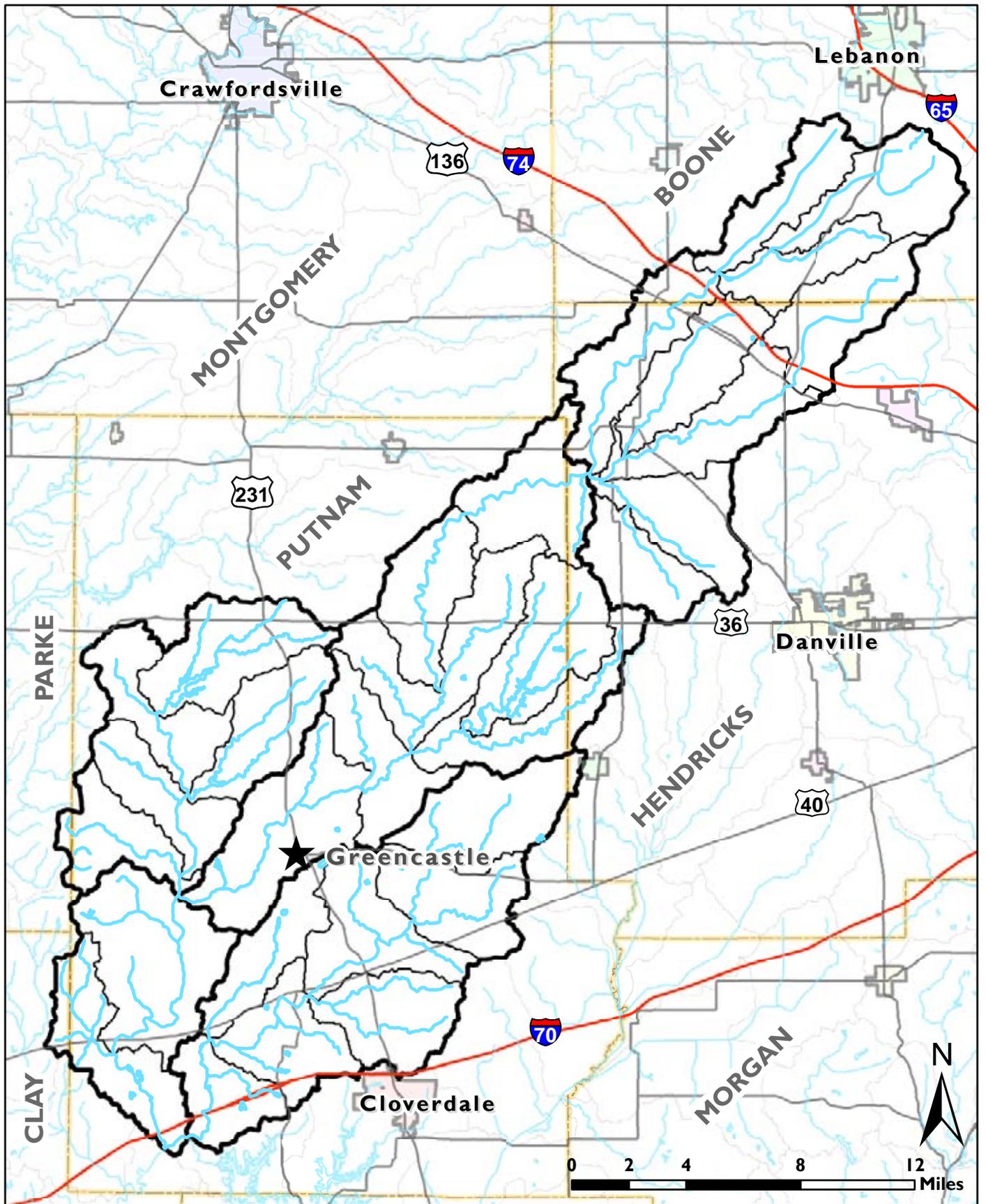


Figure E1 - Lakes and Streams

Big Walnut Creek Watershed
Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana

Table I: NWI Wetland Acreages						
	Wetland Type	Forested Acres	Scrub-Shrub Acres	Emergent Acres	Open Water Acres	Total Wetland Acres
A	Big Walnut Creek - Barnard	9.00	0.00	0.16	6.86	16.02
B	Big Walnut Creek - Dry Branch	12.70	0.00	0.08	3.69	16.47
C	Big Walnut Creek - Ernie Pyle Memorial Highway	18.76	0.00	0.39	2.71	21.86
D	Big Walnut Creek - Greencastle	18.35	0.02	0.19	10.08	28.64
E	Big Walnut Creek - Johnson Branch	12.23	0.00	0.05	7.80	20.08
F	Big Walnut Creek - Plum Creek/Bledsoe Branch	11.04	0.11	0.09	2.95	14.19
G	Big Walnut Creek - Snake Creek/Maiden Run	17.14	0.22	0.06	7.89	25.31
H	Clear Creek Headwaters (Putnam)	3.64	0.33	0.30	37.21	41.48
I	Clear Creek - Miller Creek	9.83	0.01	0.10	1.79	11.73
J	Deer Creek Headwaters (Putnam)	3.63	0.00	0.30	4.33	8.26
K	Deer Creek - Leatherwood Creek	4.38	0.00	0.00	2.34	6.72
L	Deer Creek - Little Deer Creek	2.02	0.40	0.13	2.86	5.41
M	Deer Creek - Mosquito Creek	4.35	0.23	0.08	7.10	11.76
N	Deer Creek - Owl Branch	0.86	0.00	0.12	3.95	4.93
O	Deweese Creek	3.77	0.06	0.16	8.21	12.20
P	East Fork Big Walnut Creek - Lower	11.80	0.00	0.92	1.64	14.36
Q	East Fork Big Walnut Creek - Ross Ditch	4.20	0.00	0.21	0.43	4.84
R	Hunt Creek	4.64	0.10	0.70	0.77	6.21
S	Jones Creek	7.01	0.00	0.43	6.50	13.94
T	Limestone Creek	2.62	0.00	0.08	2.28	4.98
U	Little Walnut Creek - Headwaters	7.48	0.03	0.03	1.80	9.34
V	Little Walnut Creek - Leatherman Creek	7.75	0.21	0.07	1.82	9.85
W	Little Walnut Creek - Long Branch	1.58	0.00	0.00	1.18	2.76
X	Main Edlin Ditch - Grassy Branch	1.52	0.00	0.16	1.59	3.27
Y	Main Edlin Ditch - Smith Ditch	1.09	0.00	0.89	0.81	2.79
Z	Middle Fork Big Walnut Creek	7.60	0.13	0.69	1.11	9.53
AA	Owl Creek	3.67	0.00	1.73	33.69	39.09
BB	Ramp Run - East Fork Outlet	6.14	0.00	0.14	1.13	7.41
CC	West Fork Big Walnut Creek Headwaters	0.00	0.00	1.32	1.55	2.87
DD	West Fork Big Walnut Creek - Lower	9.35	0.13	1.33	2.09	12.90
	Totals	208.15	1.98	10.91	168.16	389.20

3.1.3 Soils

The Big Walnut Watershed consists of nearly level to gently sloping productive till plain. Most of the soils have a high water holding capacity. Figures G1-G5 (Appendix A) illustrates the location of hydric and upland soils within each 11-HUC watershed. Erosion can be of concern in areas with gentle slopes. The nearly level soils are usually wet in the spring holding free water within one foot of the surface.

The majority of the soils in the watershed are silt loams and silty clay loams. The major soil units include: Xenia silt loam (XeB2); Reelsville silt loam (ReA); Crosby silt loam (CrA or CudA); Treaty silty clay loam (ThrA); and Brookston silty clay loam (Bs).

The silt loams in this area are of the till plains landform with parent material of loess over loamy till. Their drainage ranges from somewhat poorly drained to moderately well drained with a water table of 6 inches to 24 inches. Silty clay loams are either of the till plains or glacial drainage channels landforms. The parent material is loess over loamy till. The drainage class of silty clay loams is poorly drained with a water table of 0 to 12 inches. Many of the silty clay loam soils are classified as hydric soils.

Table 2 summarizes the acres of hydric soil, percent hydric soil, acres of wetland, percent wetland, acres of floodplain, and percent floodplain for each 14-HUC watershed and for the entire Big Walnut Creek Watershed.

In addition to hydric soils, highly erodible land (HEL) was also researched. This information came from the NRCS, but is quite dated. The most current and official data is from 1987. According to this information, the majority of the soil types present within the watershed are considered highly erodible. Figures H1-H5 (Appendix A) illustrates the majority of HEL within the watershed on an 11-digit HUC.

The soils of the Big Walnut Creek Watershed were also researched for suitability for septic systems. The majority of the soils within the watershed have a very limited to somewhat limited rating on septic tank absorption fields and sewage lagoons. It is a common concern among the public and county agencies that many of the septic systems in the Big Walnut Creek Watershed are failing and contributing to water quality problems. However, if properly sited and maintained septic systems can be safe and effective for treating wastewater. Recommendations related to septic system maintenance and education will be addressed in future sections of this Plan.

3.1.4 Climate

Indiana is known regionally to have a climate with well-defined seasons. The location of the state within the continental US is the major factor in this seasonal cycle fluctuation. The Gulf of Mexico brings warm, moist air, while jet streams from Canada bring cold, polar air. Weather in Indiana changes every few days as the jet stream fluctuates bringing either cold polar air or warm tropical air.

Indiana's local climate varies statewide as it is influenced by differences in latitude, terrain, soils, and lakes. The Big Walnut Watershed's mean temperature between 1971 and 2000 ranged

Table 2: Hydric Soils, NWI, & Floodplains								
Subwatershed		Watershed Acreage	Acres of Hydric Soil	Percent Hydric Soil	Acres of NWI Wetlands	Percent NWI Wetlands	Acres of Floodplain	Percent Floodplain
A	Big Walnut Creek - Barnard	10027	1830.47	18.26%	16.02	0.16%	1349.42	13.46%
B	Big Walnut Creek - Dry Branch	8145	138.65	1.70%	16.47	0.20%	1577.54	19.37%
C	Big Walnut Creek - Ernie Pyle Memorial Highway	8417	368.70	4.38%	21.86	0.26%	1874.25	22.27%
D	Big Walnut Creek - Greencastle	14170	112.60	0.79%	28.64	0.20%	3599.22	25.40%
E	Big Walnut Creek - Johnson Branch	9462	50.75	0.54%	20.08	0.21%	3070.40	32.45%
F	Big Walnut Creek - Plum Creek/Bledsoe Branch	12122	393.92	3.25%	14.19	0.12%	2210.77	18.24%
G	Big Walnut Creek - Snake Creek/Maiden Run	15537	185.30	1.19%	25.31	0.16%	4731.32	30.45%
H	Clear Creek Headwaters (Putnam)	11125	1166.12	10.48%	41.48	0.37%	3043.60	27.36%
I	Clear Creek - Miller Creek	8778	806.39	9.19%	11.73	0.13%	929.37	10.59%
J	Deer Creek Headwaters (Putnam)	10573	710.52	6.72%	8.26	0.08%	450.90	4.26%
K	Deer Creek - Leatherwood Creek	5852	21.43	0.37%	6.72	0.11%	1464.85	25.03%
L	Deer Creek - Little Deer Creek	8798	372.65	4.24%	5.41	0.06%	1453.22	16.52%
M	Deer Creek - Mosquito Creek	8094	17.56	0.22%	11.76	0.15%	2188.67	27.04%
N	Deer Creek - Owl Branch	9727	93.07	0.96%	4.93	0.05%	2640.76	27.15%
O	Deweese Creek	7006	109.63	1.56%	12.20	0.17%	1956.26	27.92%
P	East Fork Big Walnut Creek - Lower	8909	2213.82	24.85%	14.36	0.16%	1866.64	20.95%
Q	East Fork Big Walnut Creek - Ross Ditch	8975	6594.90	73.48%	4.84	0.05%	0.00	0.00%
R	Hunt Creek	6880	1780.79	25.88%	6.21	0.09%	564.39	8.20%
S	Jones Creek	8704	323.68	3.72%	13.94	0.16%	1740.03	19.99%
T	Limestone Creek	8366	35.52	0.42%	4.98	0.06%	2831.42	33.84%
U	Little Walnut Creek - Headwaters	7780	476.40	6.12%	9.34	0.12%	1888.78	24.28%
V	Little Walnut Creek - Leatherman Creek	7303	134.30	1.84%	9.85	0.13%	2026.52	27.75%
W	Little Walnut Creek - Long Branch	6991	183.47	2.62%	2.76	0.04%	1159.35	16.58%
X	Main Edlin Ditch - Grassy Branch	5622	5441.71	96.79%	3.27	0.06%	2349.50	41.79%
Y	Main Edlin Ditch - Smith Ditch	9377	9282.08	98.99%	2.79	0.03%	1586.98	16.92%

Table 2: Hydric Soils, NWI, & Floodplains (cont)								
Subwatershed		Watershed Acreage	Acres of Hydric Soil	Percent Hydric Soil	Acres of NWI Wetlands	Percent NWI Wetlands	Acres of Floodplain	Percent Floodplain
Z	Middle Fork Big Walnut Creek	8681	2831.21	32.61%	9.53	0.11%	1634.87	18.83%
AA	Owl Creek	10343	315.98	3.06%	39.09	0.38%	1610.67	15.57%
BB	Ramp Run - East Fork Outlet	8219	1748.68	21.28%	7.41	0.09%	977.04	11.89%
CC	West Fork Big Walnut Creek Headwaters	7065	6958.16	98.49%	2.87	0.04%	1120.43	15.86%
DD	West Fork Big Walnut Creek - Lower	10107	3559.23	35.22%	12.90	0.13%	2966.18	29.35%
	Totals	271155	48257.69	17.80%	389.20	0.14%	56863.35	20.97%

from a low of 17.7°F in January to a high of 86.6°F in July, with the average low at 25.9°F and the average high at 75.5°F. Precipitation in the area from 1971 to 2000 ranges from a minimum of 2.40 inches to a maximum of 5.41 inches during any one month, with an annual average of 44.20 inches.

The frost free growing season in Indiana varies from 150 days in northeastern Indiana to over 200 days in southwestern Indiana. From 1971 to 2000, the Greencastle/Putnam County area averages 184 days at a base temperature of 32°F. The last spring frost usually occurs on April 21 and the first fall frost usually occurs on October 20. Appendix B includes available historical growing season, precipitation, and temperature data.

3.1.5 Natural History

The Big Walnut Watershed lies within three ecoregions as designated by the Environmental Protection Agency (EPA) (Figure I). The regions are the Eastern Corn Belt Plains (55), the Interior Plateau (71); and the Interior River Lowland (72).

EASTERN CORN BELT PLAINS

The Eastern Corn Belt Plains is comprised of rolling till plains with local end moraines. Soils are rich, loamy, and well drained. Extensive glacial deposits of the Wisconsinan age are present. Native vegetation was mostly beech forests with elm-ash swamp forests present in wetter areas. Corn, soybean, and livestock production predominate as today's land use.

INTERIOR PLATEAU

The Interior Plateau is characterized by landforms of open hills, irregular plains, and tablelands composed of limestone, chert, sandstone, siltstone, and shale. Native vegetation was primarily oak-hickory forests with some bluestem prairie areas. Land use today consists of mostly forest with some cropland.

INTERIOR RIVER VALLEYS AND HILLS

The Interior River Lowland is characterized by forested valley slopes, wide and flat bottomed valleys, and glacial till plains. Native vegetation consisted of oak-hickory forests and swamp forests were common in the lowlands. Land use today is a mix of cropland, forests, and surface coal mining.

3.1.6 Endangered Species and Significant Natural Areas

The Indiana Department of Natural Resources (IDNR) Division of Nature Preserves maintains the Indiana Natural Heritage Data Center database. This database keeps track of Indiana's endangered, threatened, or rare (ETR) species and high quality natural communities. Development of the database allowed for documentation of significant species and areas and management priorities for areas where these special species or habitats are present.

ETR Species

A number ETR species and natural areas are present within the Big Walnut Watershed. Since the Big Walnut Watershed is so large, the number of ETR species is numerous. Lists of the ETR species by county have been included as Appendix C. State and federal classification guidelines are listed below.

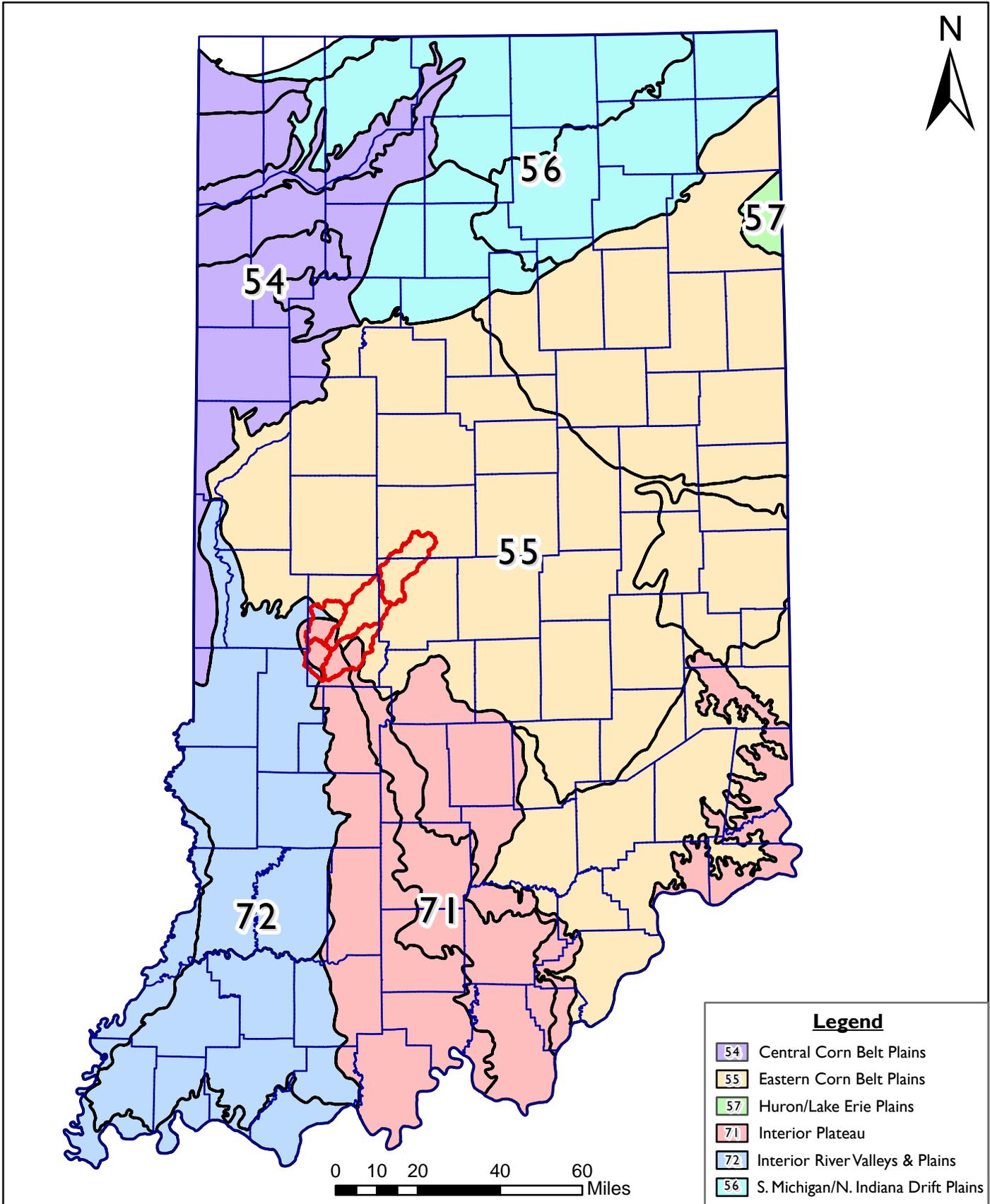


Figure I - Ecoregions
 Big Walnut Creek Watershed
 Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana

STATE

Endangered: Any species whose chances of survival within the state are in jeopardy and are in danger of disappearing from the state. Species listed as endangered by the federal government and occur in Indiana are included on this list.

Rare: A species is rare if it is common nowhere. This generally means that the species has very specific habitat requirements and that the habitat itself is rare. A species can also be rare if populations can survive in niches outside the area that is considered to be common.

Special Concern: Any species with known or suspected concern of limited abundance or distribution in Indiana.

FEDERAL

Endangered: Any species in danger of becoming extinct throughout all or part of its range.

Threatened: Any species likely to become endangered in the near future throughout all or part of its range.

All counties within the Big Walnut Watershed are listed within the range of the federally endangered Indiana bat (*Myotis sodalis*). The bald eagle (*Haliaeetus leucocephalus*) was recently delisted.

Significant Natural Areas

Several significant natural areas are present within the Big Walnut Watershed (Figures J1-J5, Appendix A). These areas are maintained, preserved, and protected by a number of different organizations including IDNR, The Nature Conservancy (TNC), and the Central Indiana Land Trust Incorporated (CILTI).

Table 3 identifies natural areas located within the Big Walnut Watershed, the county of location, and the organization that maintains and/or manages them.

Table 3: Natural Areas

Natural Area	Location	Organization
Big Walnut Nature Preserve	Putnam County	TNC, IDNR
Fern Cliff Nature Preserve	Putnam County	TNC
Hall Woods Nature Preserve	Putnam County	IDNR
Hemlock Ridge Nature Preserve	Putnam County	CILTI
McCloud Nature Park	Hendricks County	Hendricks County Parks

Big Walnut Nature Preserve consists of approximately 2700 acres along Big Walnut Creek in northeastern Putnam County. It was designated a National Natural Landmark in 1985 and is known for its rolling hills and steep ravines.

Fern Cliff Nature Preserve is a 157 acre preserve in western Putnam County. The preserve was dedicated as a National Natural Landmark in 1980. It's a popular sanctuary in Indiana known for its steep, forested cliff and ravines. The ferns found in Fern Cliff Nature Preserve provide an abundance of unique vegetation.

Hall Woods Nature Preserve is another preserve located along Big Walnut Creek just east of Bainbridge. It is approximately 90 acres and has a high frequency of large white oak trees present. Other species present include sassafras, buckeye, maple, dogwood, beech, tulip trees, and many others.

Hemlock Ridge Nature Preserve is approximately 40 acres in the Big Walnut Creek Corridor. It is named for its stands of Canadian or Eastern Hemlock (*Tsuga canadensis*) present along the bedrock bluffs. The preserve also has two notable ravines which lead to a breath-taking view of Big Walnut Creek. Hemlock Ridge is also home to two State Rare plant species: Longstalk Sedge (*Carex pedunculata*) and Wolf Bluegrass (*Poa wolfii*).

McCloud Nature Park is a 232 acre park located in northwestern Hendricks County. The park is open to the public and offers numerous activities and programs throughout the year. It also provides access to Big Walnut Creek for those wishing to take a canoe or kayak trip.

The IDNR Division of Nature Preserves has drafted a corridor habitat protection plan for the Big Walnut Creek Corridor to continue the protection of key lands such as the ones mentioned above and others nearby that are currently publically managed lands. Figure K represents lands that are currently being managed and those that are priorities to be protected.

3.2 Built Environment

3.2.1 Cities and Towns

Several towns and one city are located in the Big Walnut Watershed. The City of Greencastle, located at the intersection of US 231 and IN 240, is the largest population center in the watershed and is the county seat of Putnam County. Greencastle was founded in 1821 by Ephraim Dukes and is believed to have been named after Greencastle, Pennsylvania. Greencastle is also home to DePauw University.

Other notable towns located in the watershed include: Jamestown, Lizton, North Salem, and Bainbridge. Coatesville and Cloverdale are right on the boundary of the watershed, but the majority of the towns do not lie within the watershed. Many other unincorporated towns are also located within the watershed. These are shown on Figure L and include: Milledgeville, New Brunswick, Barnard, New Maysville, New Winchester, Groveland, Clinton Falls, Brick Chapel, Cary, Fillmore, Fox Ridge, Limedale, Mount Meridian, Westland, Putnamville, Cradick Corner, Jenkinsville, Pleasant Gardens, Reelsville, Brunerstown, Keytsville, and Manhattan.

3.2.2 Population

Increases in population lead to decreases in the availability of land and resources for agricultural and natural resource uses. The Big Walnut Watershed is located in a predominately rural area. The watershed is mostly located in Putnam County, which ranks 43rd in population out of the 92 Indiana counties. Greencastle, Bainbridge, and Fillmore combine for a total population based

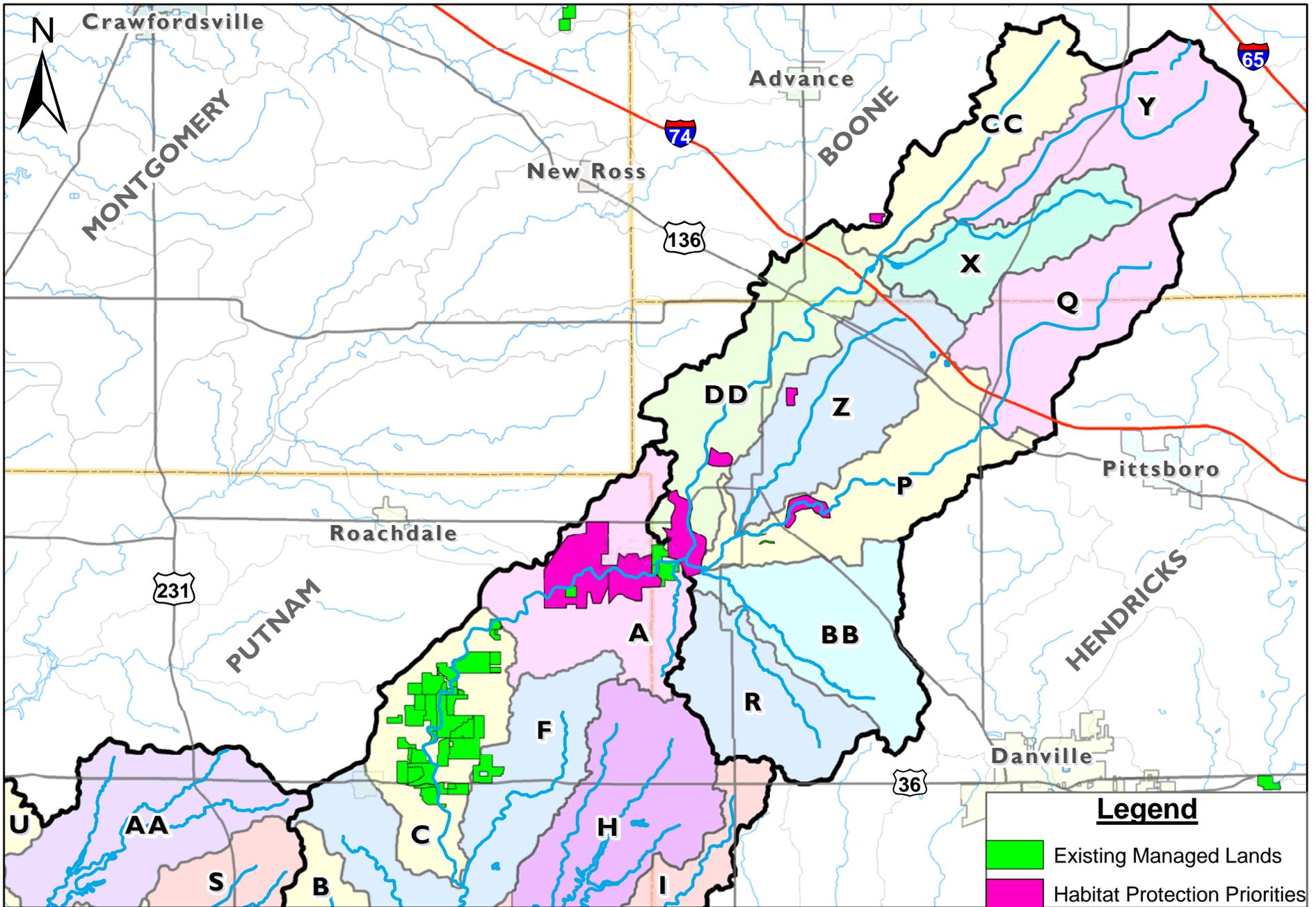


Figure K - IDNR Habitat Protection Priority Sites
 Big Walnut Creek Watershed
 Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana

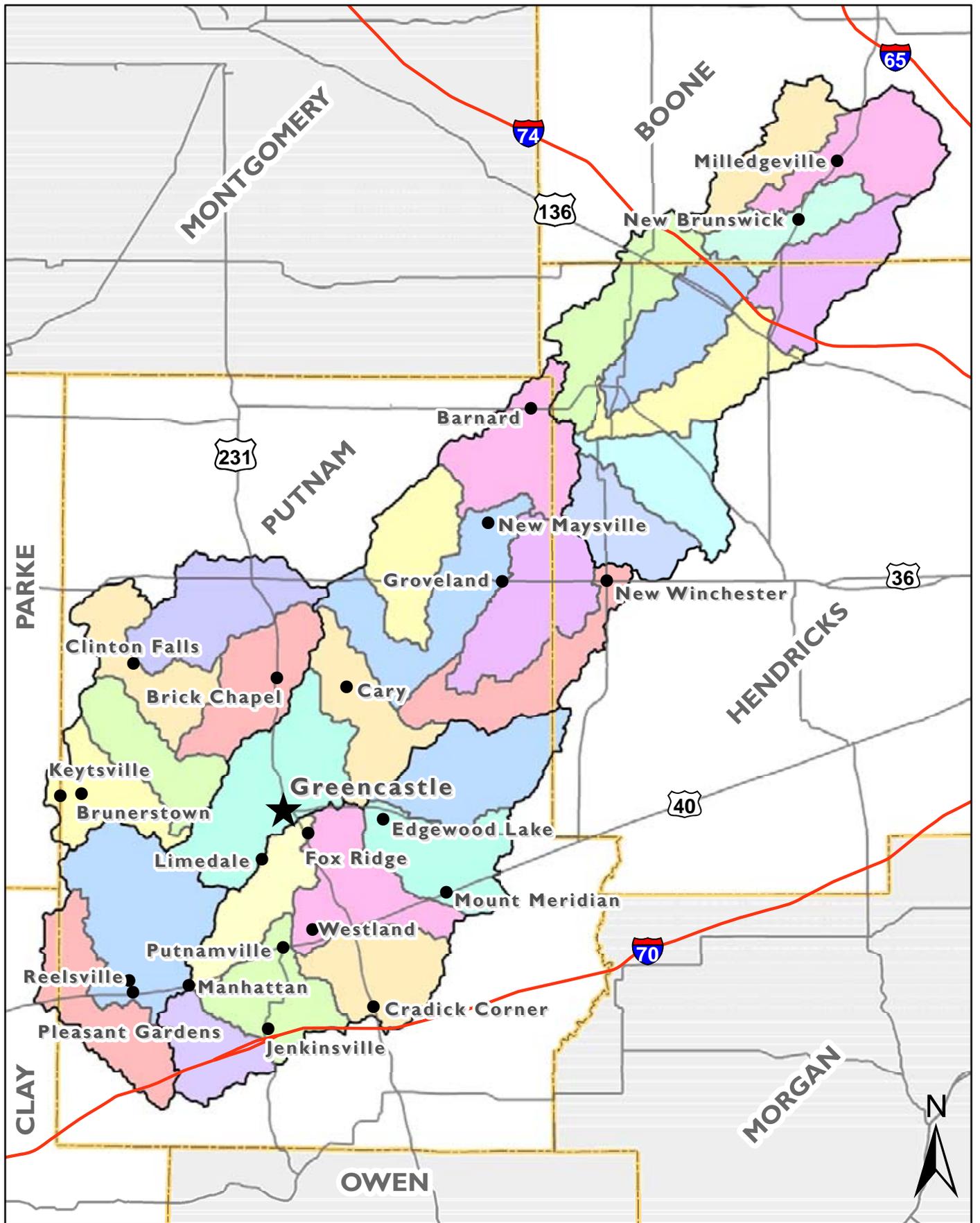


Figure L - Towns
 Big Walnut Creek Watershed
 Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana

on July 2005 estimates of 11,415 persons. The population for these three towns according to the April 2000 Census was 11,168 persons. The area showed a population change of 3.29 percent from April 2000 to July 2005.

Some of the other towns that contribute to the population of the watershed include Jamestown with 957 persons, Lizton with 358 persons, and North Salem with 636 persons for a total of 1951 persons. The April 2000 Census showed the combined population of these three towns to be 1849 persons with a change of 3.95 percent from April 2000 to July 2005. As shown by Census data, no one area of the watershed is developing or growing faster than any other. Population growth rates are steady and comparable across the watershed.

However regardless of the rate of population increase, the given population number and/or density of a given area often creates carries additional regulator complexity in regard to land use and utility planning. Due to the population densities that define Greencastle and DePauw University, both communities are considered Municipal Separate Storm Sewer entities (MS4s) and as such, have advanced stormwater management requirements. Similarly, Greencastle is also governed by more municipal ordinances than other population centers in the watershed.

3.2.3 Municipal Separate Storm Sewer Systems (MS4s)

Under NPDES Phase II stormwater regulations, several communities, universities, or other entities with concentrated populations were required to begin managing stormwater and reducing urban pollutant loads. These entities are referred to as Municipal Separate Storm Sewer Systems, or more commonly called MS4s. The name relates to the concept of understanding and managing stormwater influences from storm sewers that are not part of combine storm sewer systems. This sort of storm sewer infrastructure and associated outfalls to local streams is widespread geographically and often quite diverse in engineering design. Official MS4 entities are required to address six Minimum Control Measures (MCMs) in their effort to improve water quality:

1. Public Education Outreach
2. Public Involvement
3. Illicit Discharge Detection & Elimination
4. Construction Site Stormwater Runoff Control
5. Post-Construction Site Stormwater Runoff Control
6. Pollution Prevention & Good Housekeeping

There are two localized MS4 entities in the Big Walnut watershed, Greencastle and DePauw University. Boone and Hendricks Counties have other MS4 entities within their respective counties, but these areas are not within the Big Walnut Creek Watershed. Greencastle and DePauw are combined entities for the purposes of MS4 permitting and therefore work together to address the required Minimum Control Measures outlined in the Phase II regulation. This MS4's boundary is shown in Figures M1-M2. Known stormwater outfalls within the Greencastle/DePauw MS4 are also shown in this figure.

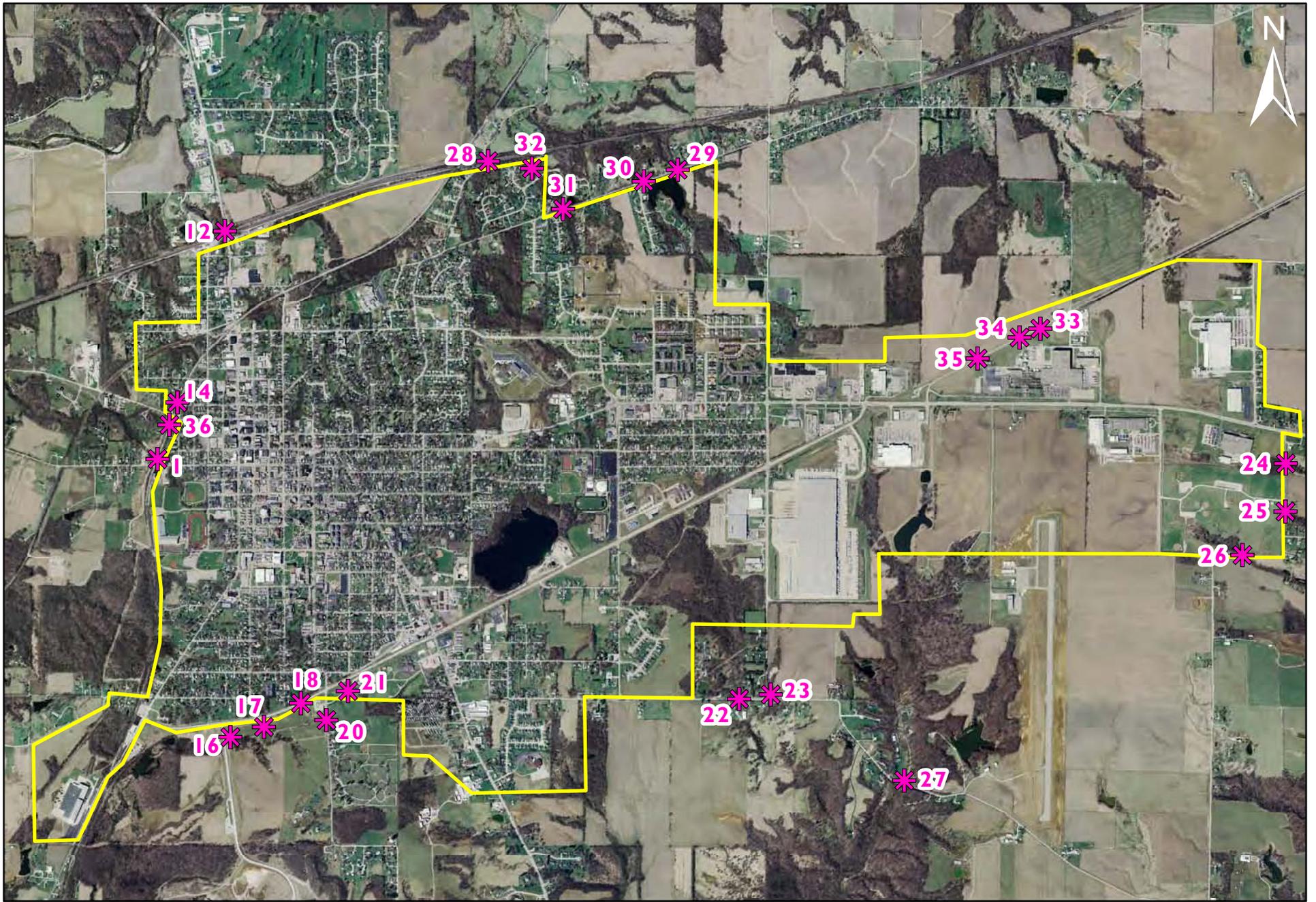
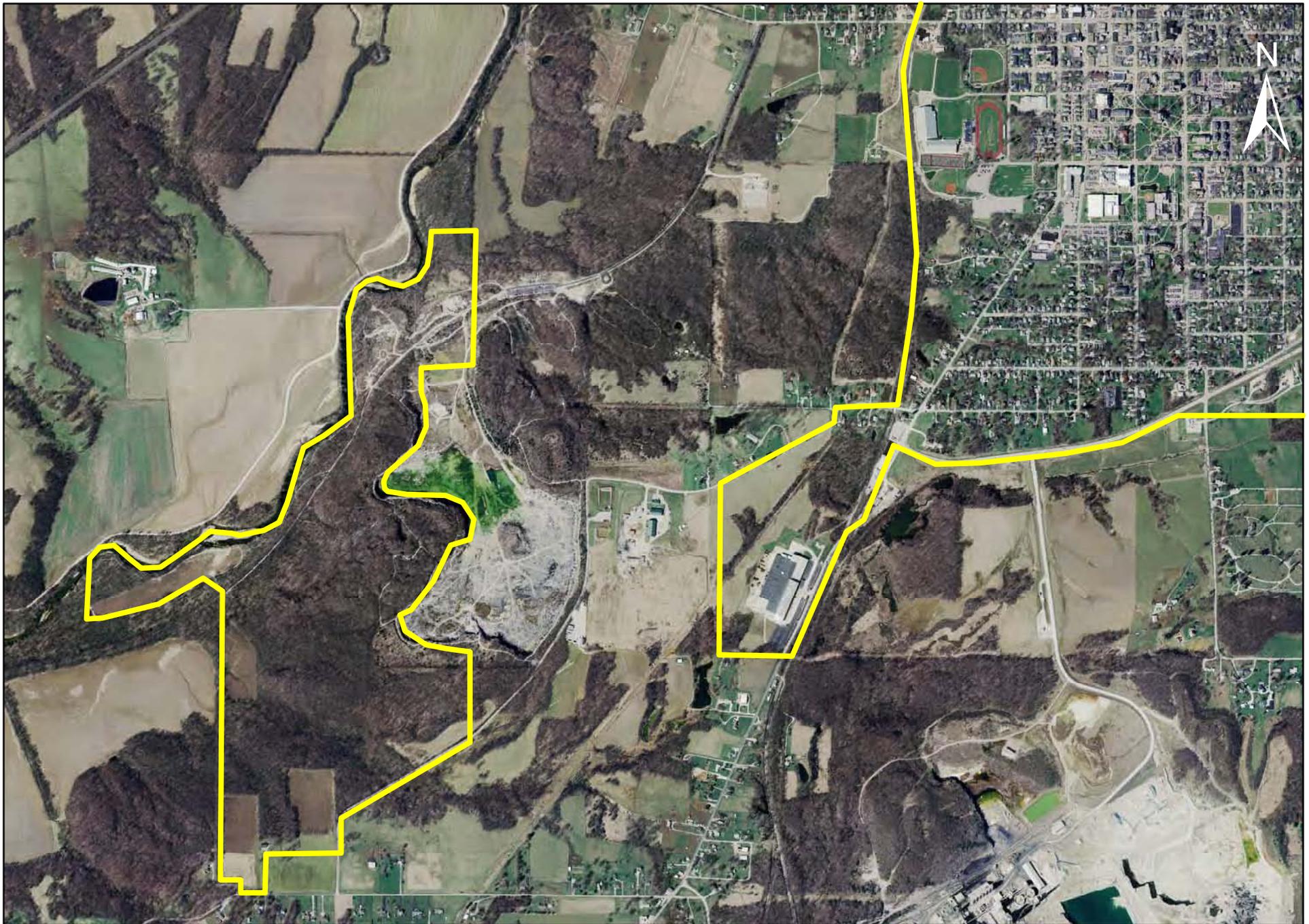


Figure M1- Greencastle/DePauw University MS4 Area & Outfalls

Big Walnut Watershed

Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana





0 0.15 0.3 0.6 0.9 Miles

Figure M2- Greencastle/DePauw University MS4 Area & Outfalls

Big Walnut Watershed

Boone, Clay, Hendricks, Parke, & Putnam Counties, Indiana

BOONE COUNTY

The Boone County Surveyor has taken on the responsibility of managing the Phase II Stormwater Program within the unincorporated portion of the County. Primary Contact information is:

Kenny Hedge
County Surveyor
116 West Washington Street
Lebanon, IN 46052
765-483-4444
khedge@co.boone.in.us

HENDRICKS COUNTY

There are six official MS4 entities in the Hendricks County. These include Avon, Brownsburg, Danville, Pittsboro, Plainfield, and the remaining unincorporated areas in the county. The Hendricks County Surveyor's Office has implemented a program that includes many of the State mandated MS4 requirements as an official MS4. Currently, the program includes the enforcement of a storm water and sediment control ordinance, mapping of stormwater inlets, and educational signage at stormwater inlets. All inlets, outlets, and drains are being built into the county GIS.

Primary Contact for the unincorporated areas of Hendricks County is:

Clean Water Department
355 S. Washington St., #214
Danville, IN 46122
phone 317-718-6068
fax 317-718-6105

Primary contact for MSC 1 and 2 is:

Brooke Moore, Education Coordinator for Hendricks County
Hendricks County Partnership for Water Quality
195 Meadow Drive, Suite 1
Danville, IN 46122
317-718-6130
bmoore@co.hendricks.in.us

PUTNAM COUNTY

The Greencastle Planning Office has implemented the program that includes many of the State mandated MS4 requirements as an official MS4 for the city of Greencastle and DePauw University. Currently, the program includes the enforcement of a storm water and sediment control ordinance, mapping of stormwater inlets, and educational signage at stormwater inlets.

Primary contact for the MS4 program is:

Shannon Norman
City of Greencastle Planner
1 North Locust Street
PO Box 607
Greencastle, IN 46135
765-653-7719
snorman@cityofgreencastle.com

3.2.4 Recreational Areas

Recreational areas can be found throughout the Big Walnut Watershed (Figures J1-J5, Appendix A). These include such areas as city or county parks, golf courses, or water/motor sport activities. Greencastle and Putnam County are home to the majority of these features within the watershed. The county is home to two golf courses, two motor sport racetracks, a minimum of four recreational parks, a trail system, and a number of lakes. Jamestown, located in Boone County is also home to Tomahawk Hills Golf Course. Finally, McCloud Nature Park is located in North Salem, in Hendricks County.

3.2.5 Historic Structures

There are 15 structures located in the Big Walnut Watershed that are listed on the National Register of Historic Places and/or the State Register of Historic Places. One is located in Boone County and 14 in Putnam County. Table 4 indicates the historic feature, its location, historic significance, and period of significance. Historic features are an important part to the fabric of many rural counties. Their presence may limit or dictate surrounding land use and has the potential to impact the type of projects that may be undertaken in certain areas due to their status as protected resources.

4.0 EXISTING ENVIRONMENTAL CONDITIONS

4.1 State – 303d List

A search of the Indiana Department of Environmental Management (IDEM) Section 303(d) List of Impaired Waters for 2006 revealed that 29 segments of stream within the Big Walnut Watershed are listed (Figure N, see Appendix D for complete list by segment). Of the 29 listed, all but two are listed for *E. coli*. These two are listed for impaired biotic communities; one is listed as an impaired biotic community as well as *E. coli*. Seven streams are listed for fish consumption advisory (FCA) for Mercury.

Recent approval of the 2008 Section 303(d) List of Impaired Waters also lists 29 segments of stream within the Big Walnut Watershed. Of the 29 listed, all but two are listed for *E. coli*. These two are listed for impaired biotic communities; one is listed as an impaired biotic community as well as *E. coli*. Two streams are listed for fish consumption advisory (FCA) for Mercury.

4.2 Research Conducted by Dr. James Gammon

Dr. James Gammon, professor emeritus of Biological Sciences at DePauw University, has conducted much research on Big Walnut Creek. His work, focused primarily on fish