Watershed Description

Physical Description - Geology / Natural History / Subwatersheds

The Pigeon Creek Watershed is located in the Indiana and Ohio Till Plain, and is part of the Steuben Morainal Lake physiographic region, which generally consists of rolling and hummocky or pot-hole topography formed by glacial recession. Bedrock is located approximately 250-400 feet below the surface and does not significantly affect local topography, drainage, and soil development. The Pigeon Creek Watershed can be naturally divided into three subwatersheds (see Figure 3). The Upper Watershed (52,202 acres) consists of a riverine stretch from the Cedar Swamp to the inlet to Long Lake. The Lake Chain Watershed (31,541 acres) consists of the area from the Long Lake inlet to the outlet of Hogback Lake. The Lower Watershed (24,067 acres) consists of the area from the Hogback Lake outlet to the western boundary of Steuben County.

Topography

The Pigeon Creek Watershed primarily consists of very gentle sloped to flat farmland with the occasional short hill. Steeper slopes are common around the lakes and immediate watercourse valley, with elevation variances of 50-60 feet. A topographic map of the watershed is included as Exhibit 1 (26x36 foldout enclosed at end of the report). Figure 4 presents locations of significant depressions within the watershed.

Soils

Soils in the Pigeon Creek Watershed are mainly composed of sandy silts to silty clays resulting from the last glacial episode. In low lying wetlands, organic soils are common due to decomposition of plant remains in a high water table environment. The dominant upland soils include well drained Miami, Morley, and Kendallville, somewhat poorly drained Blount, and very poorly drained Pewamo. Well drained Fox terrace soils are common in large areas in the lower reaches of the main valley. Valley soils primarily consist of muck, including the Houghton and Carlisle types, and sandy outwash soils of the Oshtemo, Brady, and Griffen varieties. The Natural Resource Conservation Service has classified soils into four Hydrologic Soil Groups based on the infiltration capacity and runoff potential of the soil. The soil groups are identified as A, B, C, and D. Group A has the greatest infiltration capacity and least runoff potential, while group D has the least infiltration capacity and greatest runoff potential. Figure 5 indicates the Hydrologic Soil Group classification of the soils within the watershed. The Upper Watershed primarily consists of group C soils, shown in green, which means this portion of the watershed has a lower infiltration capacity and a greater runoff potential. While the Lake Chain and Lower Watershed primarily consist of group B soils, shown in red, that are better at infiltration and less susceptible to runoff damage.

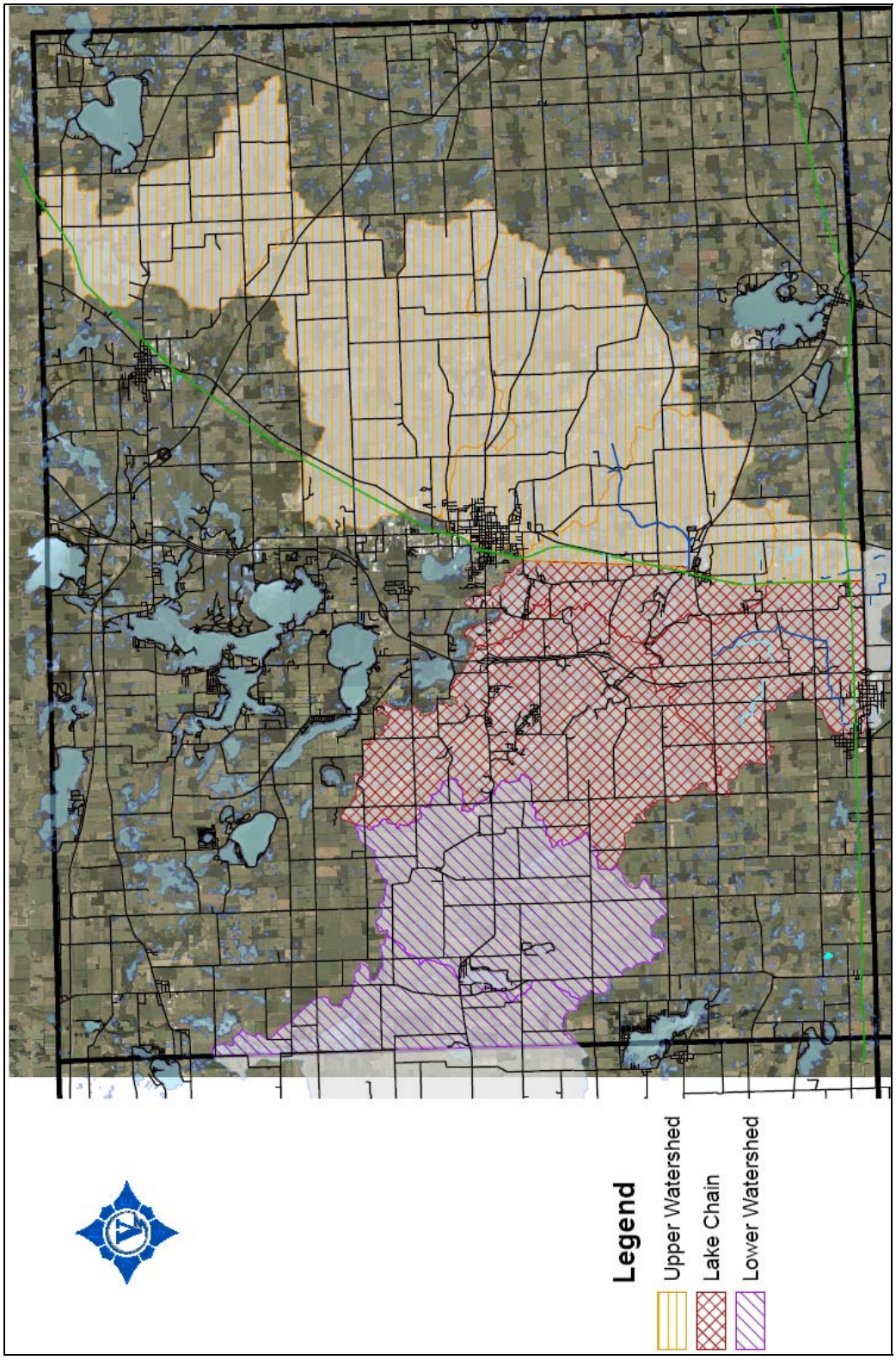

Figure 3: Pigeon Creek Subwatersheds.

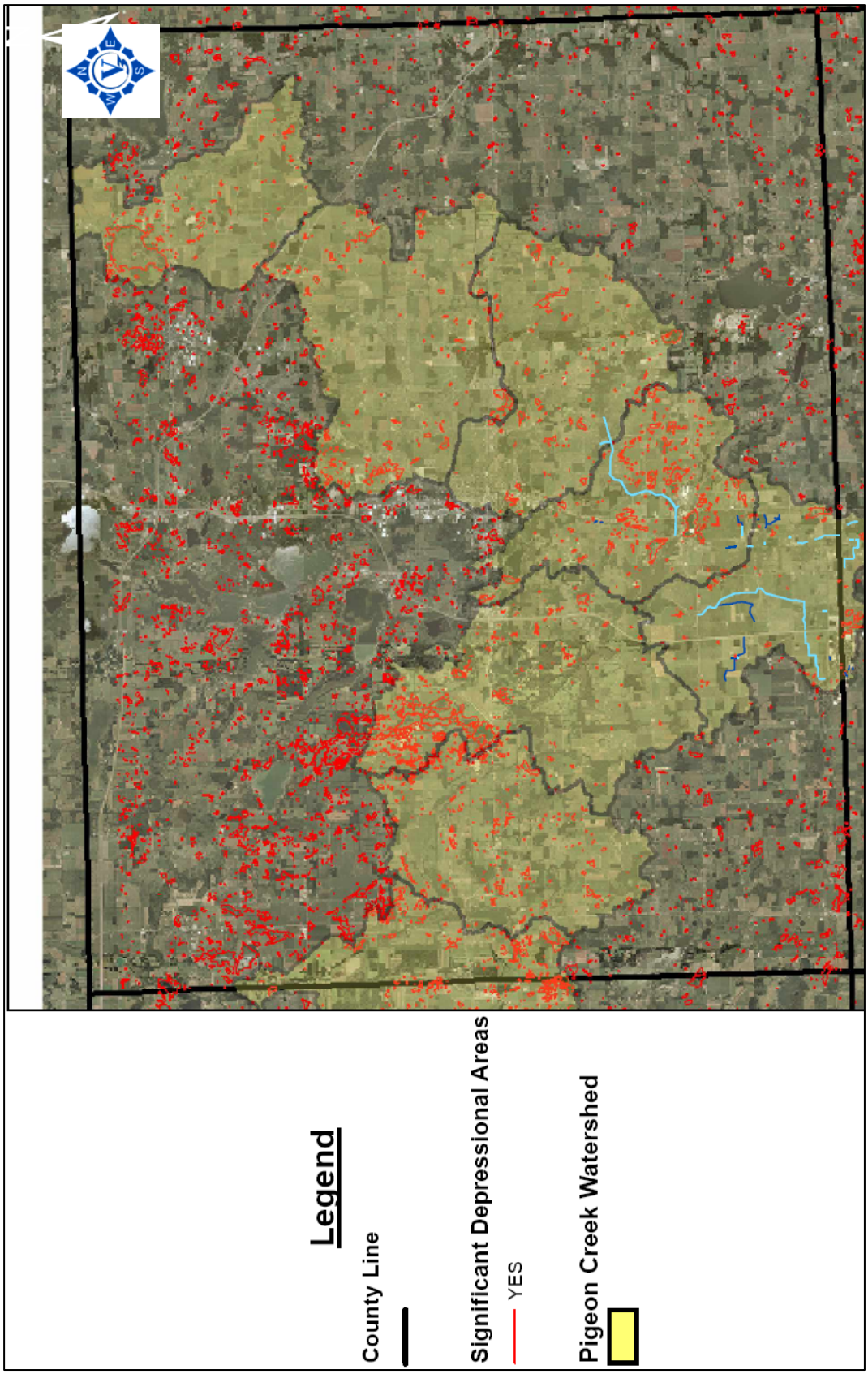

Figure 4: Significant Depressional Areas Map.

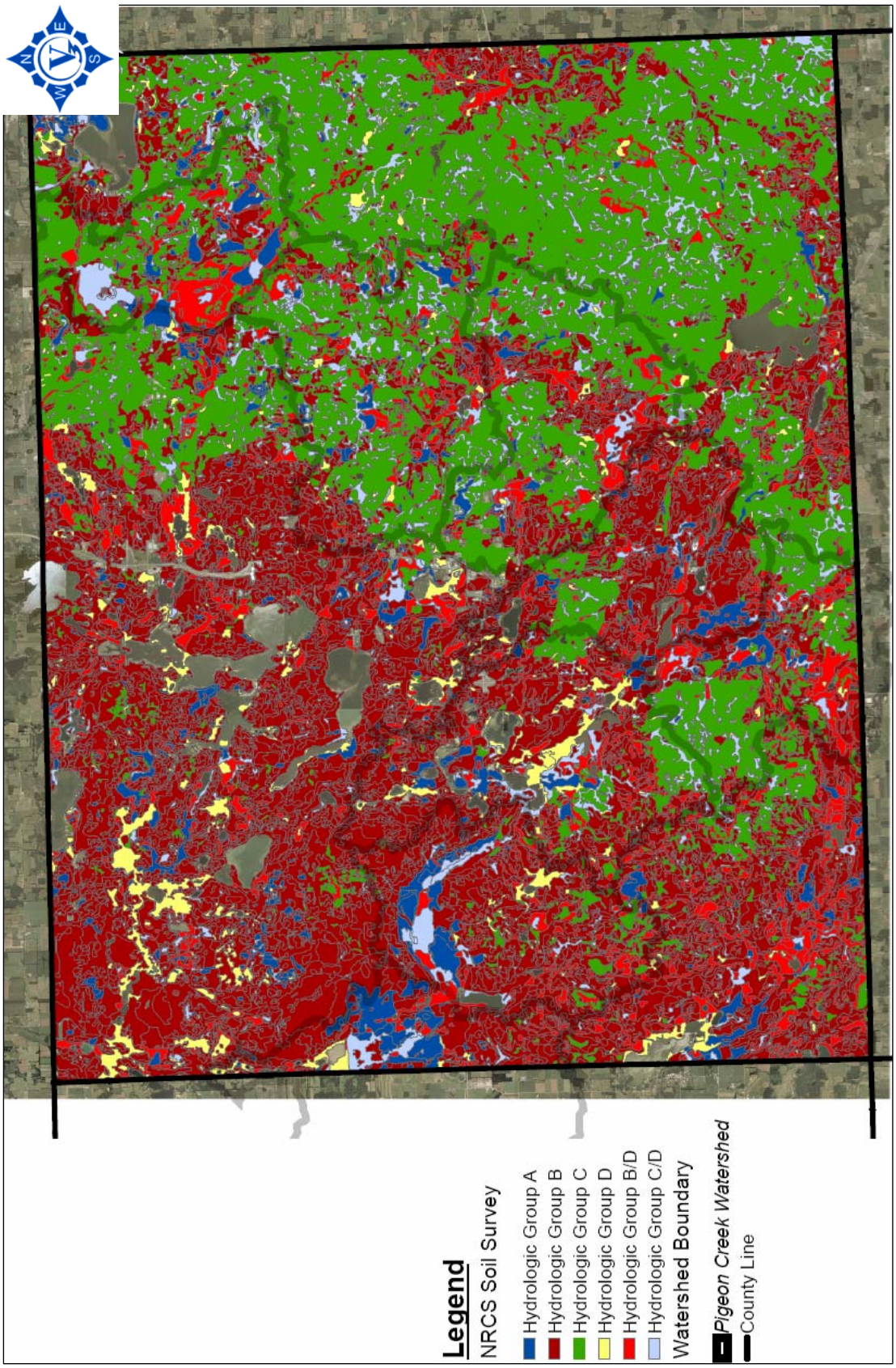

Figure 5: Hydrologic Soil Group Classification Map.

Hydric soils are scattered throughout the watershed and act as an indicator of former wetland sites and potential areas for wetland development. The greatest concentrations are found along Pigeon Creek, at Cedar Swamp, along Long Lake and Hogback Lake, and east of the crossing of Bill Deller Road and Pigeon Creek. Hydric soils are typically wet and will flood if proper drainage, overland or through field tiles, is not available. There are 14 different hydric soils within the Pigeon Creek watershed. Figure 6 indicates the location of hydric soils within the watershed. The Upper Watershed consists of 9,270 acres of hydric soils or 38% of the subwatershed's area. The Lake Chain subwatershed consists of 4,837 acres of hydric soils or 15% of the subwatershed's area. The Lower Watershed consists of 2,303 acres of hydric soils or 10% of the subwatershed's area. As one moves further downstream within the Pigeon Creek watershed, there is a decrease in the percentage of land area that has hydric soils.

Soils Loss

The Pigeon Creek annual soil loss estimate was calculated by Chad Hoover, City of Angola. This estimate was based on a portion of the Pigeon Creek watershed that had an area of 77,791.42 acres. The results of this calculation projected an estimated value of 1.90 tons/acre/year. This value was extrapolated to include the remaining portions of the Pigeon Creek watershed, which has a total acreage of 79,335 acres. The results of this projected estimate is 1.94 tons/acre/year of soil loss. Erosion from the agricultural portions of the watershed provides a significant bedload of silt that is carried by the Pigeon Creek, through the lake chain and setteling out as sediment wherever the velocity of the transport water slows down enough to deposit the suspended materials. Figure 7 shows the location within the watershed of the tons/acre/year of soil loss.

Land Use – Settlement

Before settlement, Steuben County was primarily a hunting ground for the Potawatomi Indians. Originally a part of LaGrange County, Steuben County was settled in 1834 in the current town of Orland. The town was settled as the "Vermont Settlement", as many of the first settlers originated from Vermont. In the early 1900's, the county gained prominence for its 101 lakes. Today, Steuben County has over 30,000 residents and is one of the fastest growing counties in the state. Of the county's 30,000 residents, approximately 10,000 reside in the Pigeon Creek Watershed. In addition to full-time residents, several thousand part-time residents and tourists reside in the watershed during the summer months.

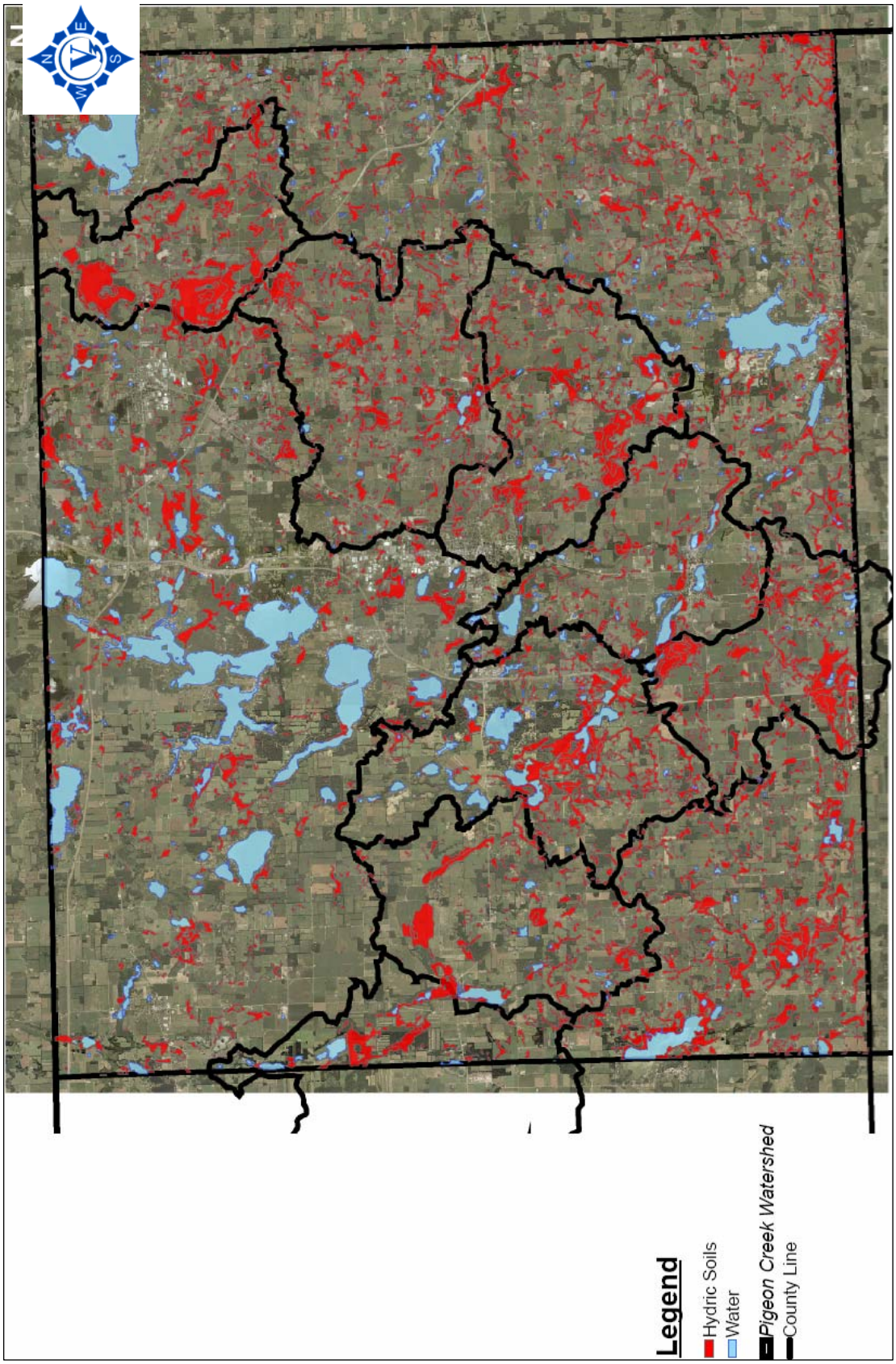

Figure 6: Hydric Soils Map.

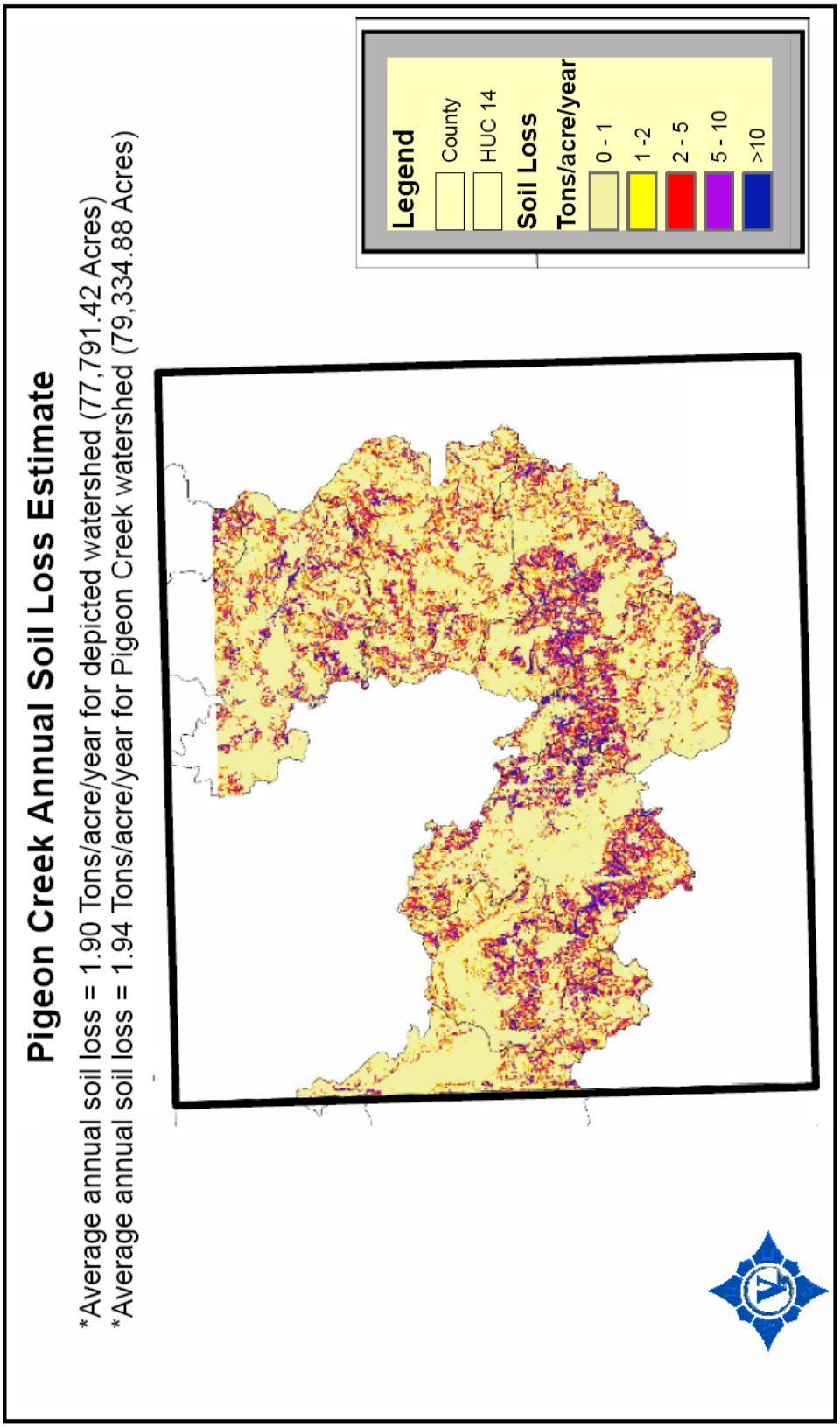

Figure 7: Pigeon Creek Annual Soil Loss Estimate.

Historical and Current Land Use

Steuben County economic income has long been based on agriculture with farming the primary historical land use. In 1995, approximately 70% of the watershed was classified as farmland. The remainder of the watershed consists of small clusters of development primarily on the outskirts of Angola, forests, lakes, and other undeveloped land. Although the majority of Angola is outside of the Pigeon Creek Watershed, the Angola Wastewater Treatment Plant discharges to a tributary of Pigeon Creek. Therefore, land use changes in the Angola vicinity will have an effect on the watershed. Figure 8 presents current land use within the Pigeon Creek Watershed and Steuben County.

According to the Pigeon Creek Water Quality Project (March 1997 to February 1999) the Pigeon Creek watershed consisted of the following land uses, shown in Table 3.

Land Use	Total Acres	Percent of Watershed
Cropland	52,824	71
Forest	10,416	14
Pasture/Hayland	744	1
Lakes/Water	1,488	2
Urban/Other	8,928	12
Totals	74,400	100

Table 3: Pigeon Creek Watershed Land Use Areas, data from 1987.

Current evaluation of the Pigeon Creek watershed through the evaluation of BASINS, 1996 provides the following land uses as shown in Table 4.

Land Use	Total Acres	Percent of Watershed
Cropland and Pasture	69,777.71	78.21
Deciduous Forest Land	3,893.23	4.36
Mixed Forest Land	2,078.86	2.33
Lakes	1,479.29	1.66
Residential	1,086.18	1.22
Nonforested Wetland	354.33	0.40
Commercial and Services	337.21	0.38
Transportation, Communication, Utilities	190.04	0.21
Strip Mines	135.30	0.15
Other Urban or Built-up	116.47	0.13
Other Agricultural Land	11.57	0.01
Totals	79,460.19	89.06

Table 4: Pigeon Creek Watershed Land Use Areas, data from 1996.

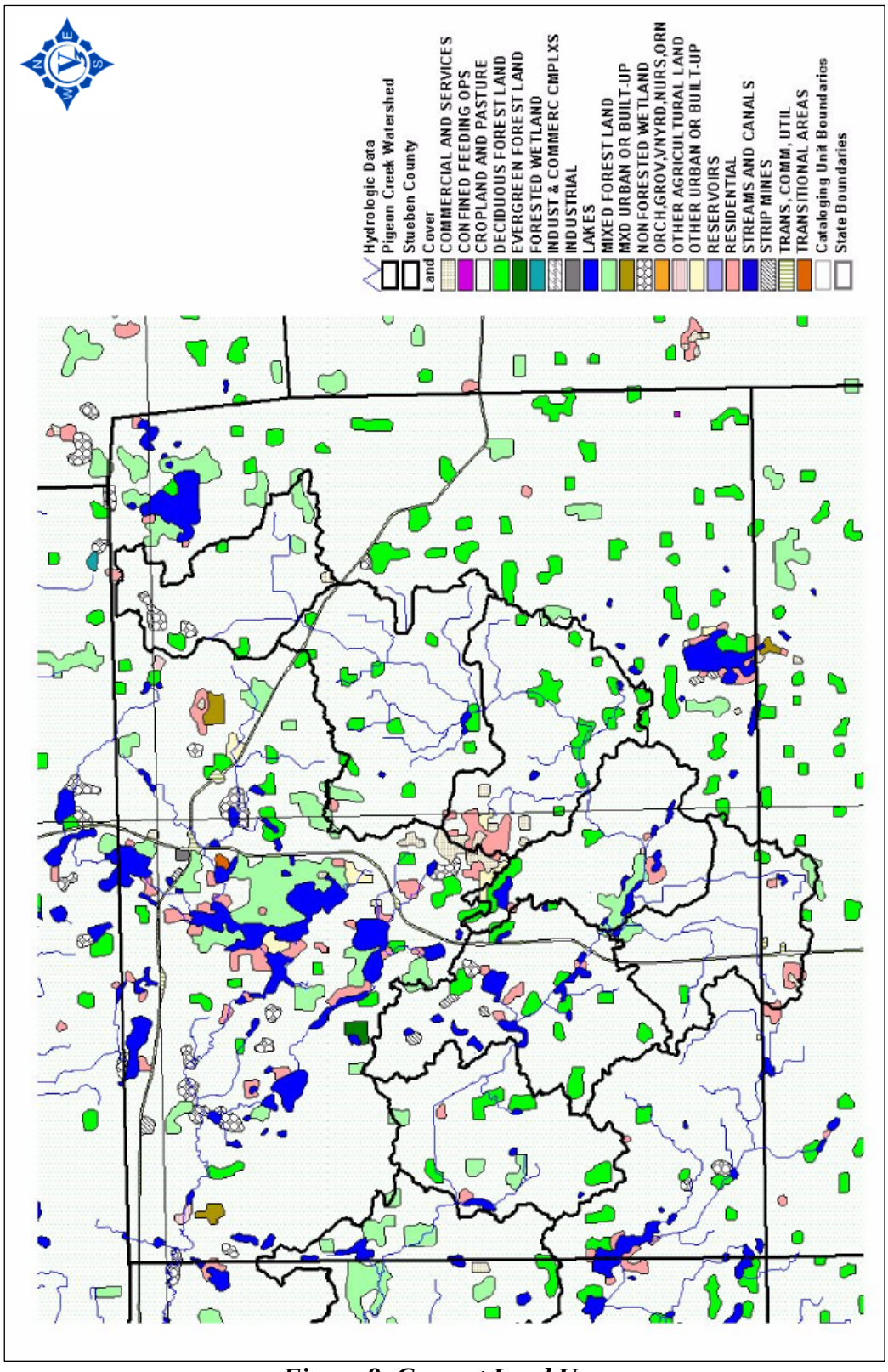

Figure 8: Current Land Use.

The National Land Cover Database (1999) provided by the U.S. Geological Survey and the U.S. Department of Agriculture provides the following land uses cover areas shown in Table 5.

Land Use	Total Acres	Percent of Watershed
Row Crops	51,072.00	57.25
Pasture/Hay	12,449.61	13.95
Unclassified/Other	9,598.00	10.76
Deciduous Forest	9,151.57	10.26
Forested Wetlands	2,736.62	3.07
Open Water	1,991.20	2.23
Emergent Wetlands	883.02	0.99
Low Intensity Residential	693.79	0.78
Commercial/Industrial/Transportation	426.57	0.48
Evergreen Forest	95.46	0.11
4 remaining covers, each less than 0.1%	118.37	0.14
Totals	89,216.22	100.00

Table 5: Pigeon Creek Watershed Land Cover Areas, data from 1999.

Table 6 provides the most recent land zoning areas for the Pigeon Creek watershed. There are only four zonings that have areas which comprise greater than one percent of the total watershed's area. Figure 9 presents current zoning within the county, with the watershed subboundaries depicted therein.

Land Zoning	Total Acres	Percent of Watershed
A – Agriculture	58,391	78
EC – Employment Center	11,895	16
R-1 – Single Family Residential	1,670	2
L-R – Low Density Residential	954	1

Table 6: Pigeon Creek Watershed Land Top Four Zonings.

Table 7 lists the total number of Livestock Locations for each subwatershed (as identified on Figure 3) and provides how many acres per farming operation. We have presented the data in this fashion as the Lower Watershed has fewer operations than the Upper Watershed, but since the subwatershed is less then half of the total area, the operations are more densely distributed. The Lake Chain subwatershed has the densest concentration of livestock operations in comparison to the entire watershed.

Subwatershed	Number of Livestock Operations	Total Acres of Subwatershed	Total Acres per Livestock Operation
Upper Watershed	38	52,202	1,374
Lake Chain	41	31,541	769
Lower Watershed	25	24,067	963

Table 7: Livestock Operations by Pigeon Creek Subwatershed.

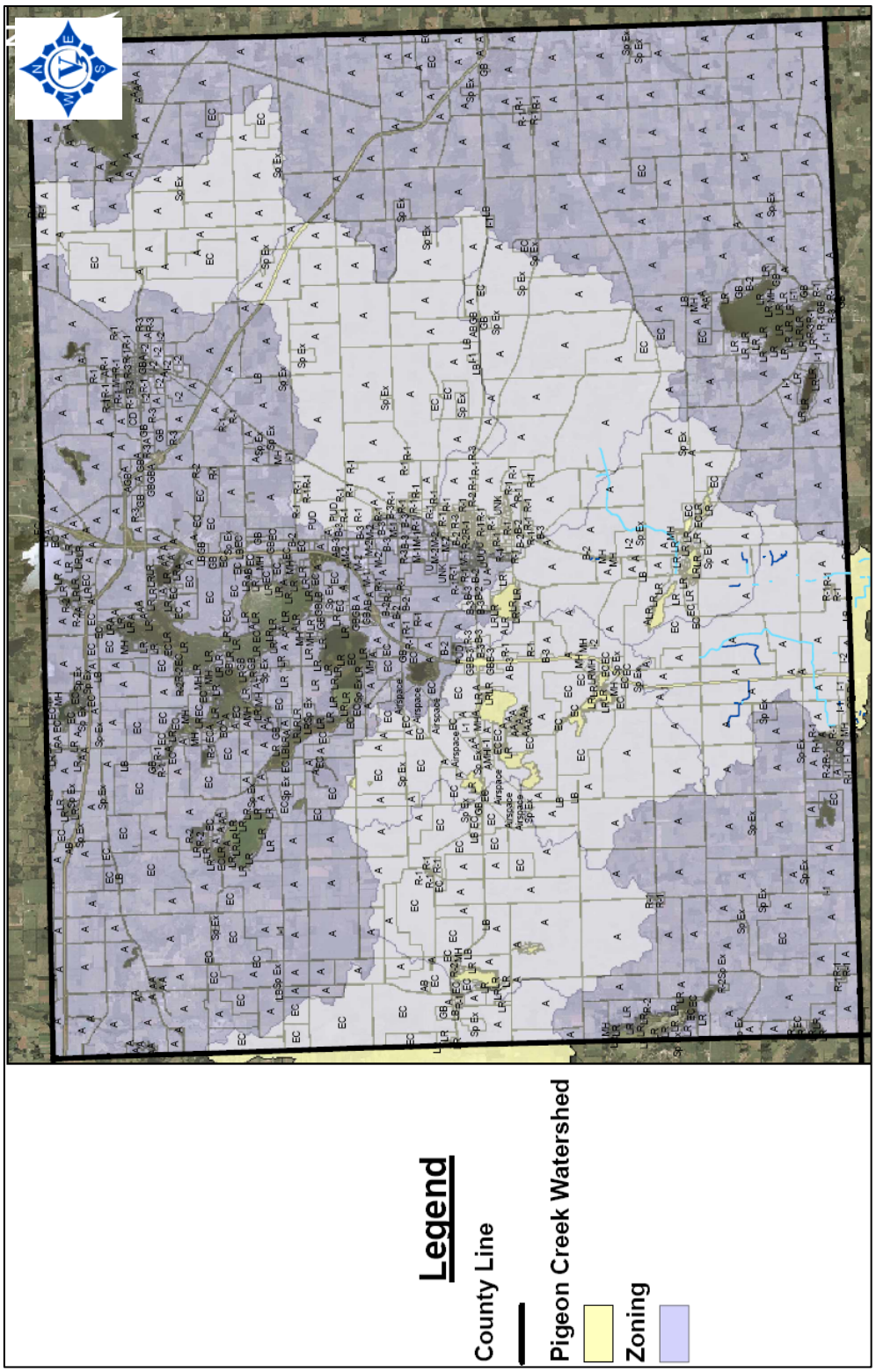

Figure 9: Current Land Zoning.

The correlation between Hydric Soils and Livestock Locations is visually displayed in Figure 10. Hydric soils are most concentrated in the Upper Watershed and the livestock operations are least concentrated in the Upper Watershed. The highest concentration of livestock occurs within the Lake Chain and the lowest concentration of hydric soils occurs in the Lower Watershed.

The total acreage of hydric soils and numbers of livestock operations throughout the watershed is: Upper Watershed = 9,270 acres of hydric soils and 38 livestock operations; Lake Chain = 4,837 acres of hydric soils and 41 livestock operations; and Lower Watershed = 2,303 acres of hydric soils and 25 livestock operations.

Figure 11 compares the locations of hydric soils to the land use locations. There are 16,410 acres of hydric soils throughout the Pigeon Creek watershed, and only 354 acres of nonforested wetlands.

Figure 12 provides the graphic of livestock locations over the land use backdrop. The total percentage of land use coverage for cropland and pasture is over 78%, however, there is a denser concentration of livestock operations within the Lake Chain portion of the watershed.

The Steuben County Soil and Water Conservation District, as part of the Indiana T by 2000, Watershed Soil Loss Transects Project, have tabulated all of Steuben County with respect to tillage practices. Unfortunately, this information is not able to be divided between which fields are within the Pigeon Creek Watershed and which fields are within the county but outside of the watershed. It is worth commending the efforts of the agricultural community within Steuben County for using conservation tillage practices on the majority of the agricultural fields in both 2004 and 2005. Table 8 presents this information.

	Number of Fields in 2004				Number of Fields in 2005			
Present Crop	No-Till	Mulch-Till	Reduced-Till	Conventional	No-Till	Mulch-Till	Reduced-Till	Conventional
Corn	75	20	19	37	59	17	26	48
Soybeans	140	18	2	12	129	19	8	2
Small Grains	1	1	0	2	0	0	0	1

Table 8: Indiana T by 2000 Watershed Soil Loss Transect data for Tillage Practices in Steuben County for 2004 and 2005.

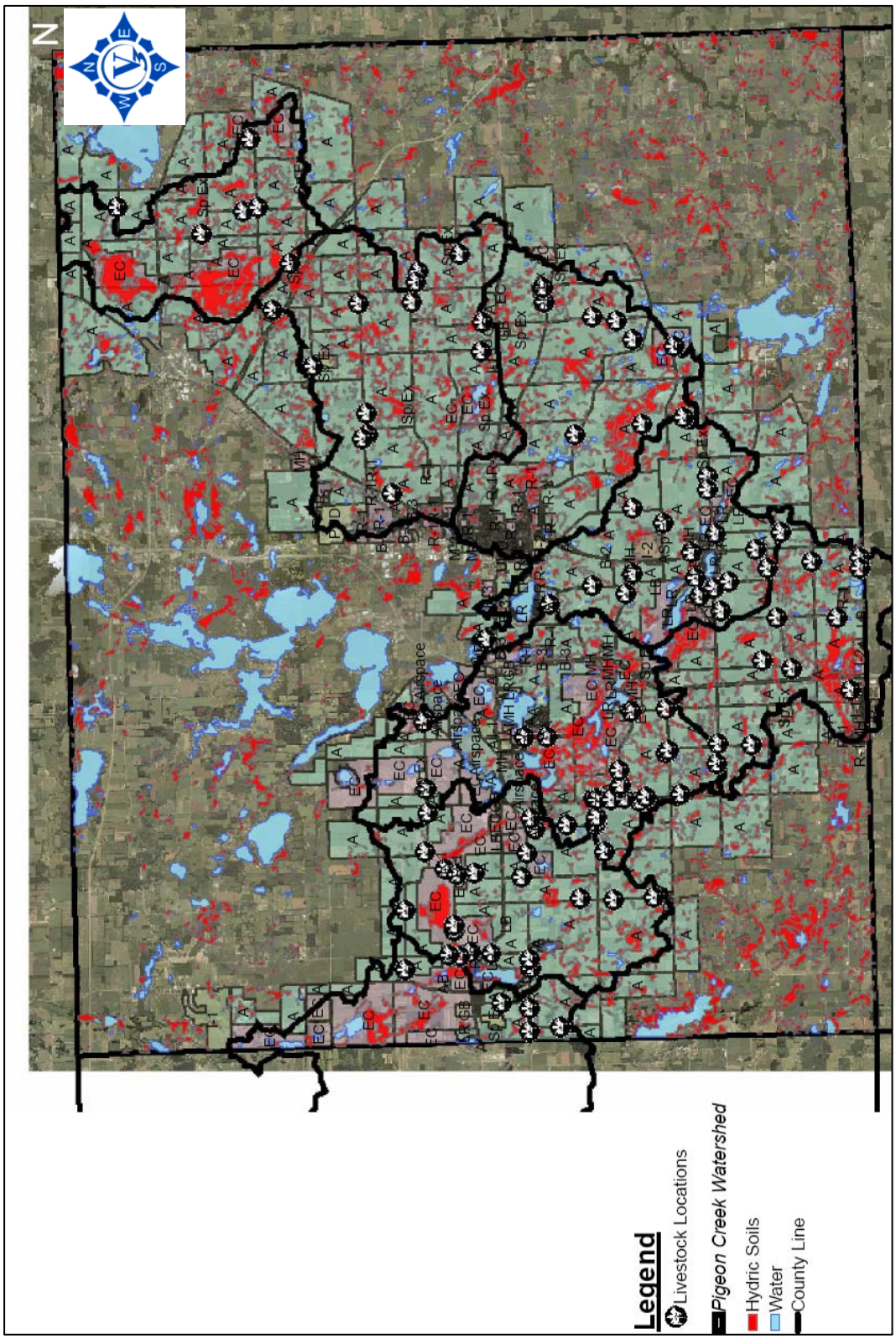

Figure 10: Comparison of Hydric Soils and Livestock Locations.

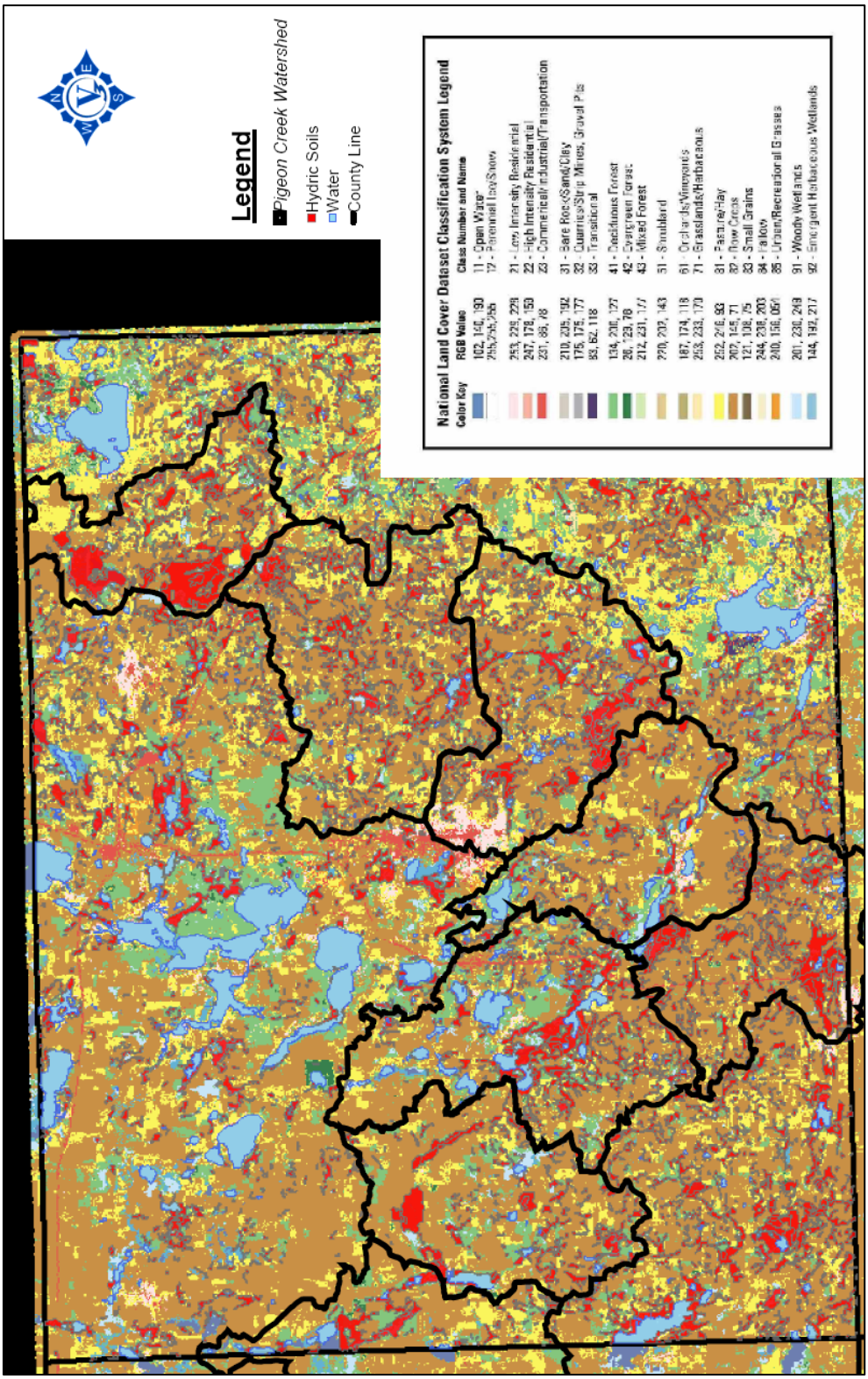

Figure 11: Comparison of Hydric Soils and Landuse.

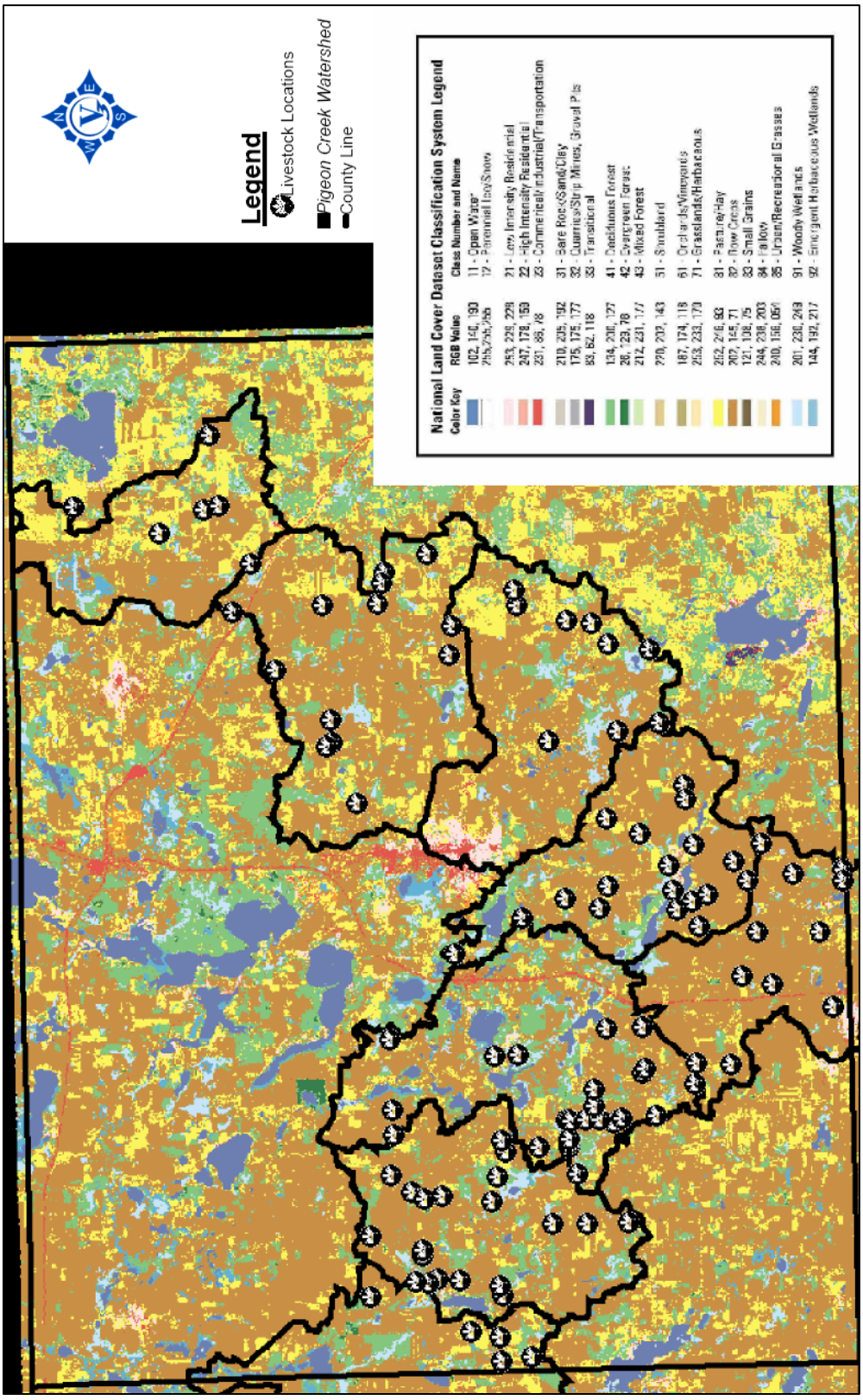

Figure 12: Comparison of Livestock Locations and Landuse.

Historical Events / Areas of Proposed Development

With a population of approximately 10,000 residents, the majority of the watershed remains agricultural, and there are no indicators to suggest an imminent major change from this setting. Indiana University has forecasted a population growth of 15.3% for Steuben County between years 2000 and 2040.

From a water quality perspective, a new wastewater treatment plant will be online in 2005 near Flint (150N and 800W) to serve lakes that are not currently within the Pigeon Creek Watershed. The plant expects to service 3,000 users, which are each charged an annual tax by Steuben County to assist in the maintenance of Pigeon Creek.

A second potential treatment plant is also under consideration by the Lions Club of Pleasant Lake. Any proposed treatment plants will have an effect on the water quality in the watercourse as the plant will be a new point discharge location; however, it is important to note that flooding should not be increased as the volume of effluent from a treatment plant is generally negligible when compared to the total volume conveyed by Pigeon Creek.

IDEM Rule 13 – Angola MS4

The City of Angola was classified as having a small municipal separate storm sewer system (MS4), which requires compliance under IDEM Rule 13 and application for a general permit for storm sewer discharge. Normally, small MS4 communities have a population of at least 10,000; however, Angola was included due to expected future growth. The permit requires development of a Storm Water Quality Management Plan (SWQMP) with six minimum control measures:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detention and Elimination
- Construction Site Runoff Control
- Post-Construction Stormwater Management
- Control of Developed / Redeveloped Areas

IDEM Water Quality Data

IDEM has collected water quality data from surface waterbodies within the Pigeon Creek Watershed. The data from these studies are maintained within IDEM's database and consist of Field Data, General Chemistry, Metals, Pesticides and Organics. The data from the Pigeon Creek Watershed within the Field Data database spans a time frame of July 1990 to October 2005 and includes the following parameters: dissolved oxygen, water temperature, percent DO saturation, pH, specific conductance, turbidity and water flowrate. Of note, dissolved oxygen levels on Mud Creek and tributaries of Mud Creek dropped below the minimum Indiana State Standard of 4.0 mg/L. This is likely due to the decay of algae or the dark-reaction of algae, indicative of situation of nutrient loading where excess phosphorus allows for severe algae blooms.

The content of this watershed management plan is founded on the available data presented in previously performed studies. The preparation of this plan did not involve the collection of any water quality data. This plan was prepared through the collection of public opinion and concern as it relates to problems within the watershed, both through the public meetings and through the steering committee. The abundance of flood study data compared to the limited water quality data is not indicative of the comparative importance of these two issues, it is merely a reflection of the focus of the previously performed analysis. There has disproportionately been more information available from flood studies as opposed to water chemistry, physical habitat or biological community studies.

The following studies within the Pigeon Creek watershed discuss the issues and concerns involving flooding but do not provide water quality data, issues or concerns: Action Plan, Pigeon River Watershed, 1997; Bridge Reinspection Report, 1994; Feasibility Report – Pigeon Creek Watershed, 1983; Hydraulic Analysis Report – CR 150W Over Pigeon Creek, 1996; John Leach Drain Watershed & Clyde Avenue Sewer Study, 1997; Lake Management Plan for Long Lake, 2004; Pigeon River Flooding Study – Phase I, 1994; Preliminary Flood Study – Pigeon Creek Watershed, 1995; Preliminary Investigation Report, 1967; Preliminary Investigation Report of Malone Ditch Watershed, 1994; Preliminary Investigation of the Johnson Ditch Watershed, 1994; Structure Inspection Report, CR 150W over Pigeon Creek, 1995.

The General Chemistry database contains data from June 2000 to October 2005 from the following parameters: alkalinity, CBOD5, CBOD-LR, chloride, COD, coliforms, cyanide, DO, *E. coli*, hardness, nitrogen ammonia, nitrogen as nitrate+nitrite, pH, total phosphorus, sulfate, TBOD5, TDS, TKN, TOC, TS and TSS. The colony forming units of *E. coli* exceeds the Indiana State Standard of 235 cfu per 100ml at various locations along the Pigeon Creek. The Indiana State Drinking Water Standards for Nitrate is 10.0 mg/L and Nitrite is 1.0 mg/L. Various sampling stations along Pigeon Creek exceed a value of 11 mg/L for combined nitrate+nitrite. Total phosphorus values larger than the 0.03 mg/L required for excessive algae growth were recorded at all of the sampling locations within the watershed.

Metals were tested in Pigeon Creek from June 2000 to October 2005. The metals analysis include: arsenic, cadmium, calcium, chromium, copper, lead, magnesium, mercury, nickel, selenium, silver and zinc. Pesticides were also analyzed between March 2000 and August 2000. There were 106 different parameters of pesticides (from Acetochlor to Vernolate) analyzed during this study within Pigeon Creek. In addition, thirty eight (38) different parameters of organics (from Acenaphthylene to Trifluralin) were also analyzed during this same time period of March 2000 to August 2000.

IDEM Fish Community Assessments

IDEM performed a fisheries assessment within the Pigeon Creek Watershed at three sampling locations during July 2000. All three stations were along the Pigeon Creek within Steuben County. Fish were collected using a backpack electroshocker. Table 9 lists the species of fish collected.

Fish Species – Common Name	Combined Total Number of Individuals Collected at Three Sampling Stations
Central Mudminnow	3
Grass Pickerel	5
Common Carp	19
Golden Shiner	2
Creek Chub	40
Central Stoneroller	3
Blacknose Dace	7
Bluntnose Minnow	3
White Sucker	9
Northern Hogsucker	13
Golden Redhorse	3
Yellow Bullhead	1
Stonecat	3
Mottled Sculpin	11
Rock Bass	11
Spotted Bass	9
Green Sunfish	13
Bluegill	7
Yellow Perch	3
Blackside Darter	11
Logperch	4
Johnny Darter	13
Rainbow Darter	12
TOTAL	206

Table 9: Pigeon Creek Fish Community Assessment, IDEM, July 17 – 18, 2000.

Significant Land Tracts

There is one major public land tract of 1,330 acres within the watershed that is State-owned. In addition, the Anthony Wayne Area Council owns approximately 1,000 acres in the watershed. Other large property tracts are primarily farms, which average 200 acres in size.

Public access to the watershed lake system is maintained by the Indiana Department of Natural Resources (IDNR). Table 10 presents a list of IDNR land tracts within the watershed.

Property	Acreage
Cedar Swamp	863
Pigeon River Fish and Wildlife	2,476
Pigeon Lake Public Access	61
Fox Lake Public Access	142
Big Bower Public Access	35
Golden Lake Public Access	119
West Otter Lake Public Access	119
Pigeon Creek Public Access (SR 327 & CR 175N)	106

Table 10: IDNR Land Tracts.

Hydrology – Flooding Problems

Steuben County has a continental climate, with cold winters and hot summers. The mean annual temperature at Angola is 48 degrees Fahrenheit, but varies from a mean of 22 degrees Fahrenheit in January to 72 degrees Fahrenheit in July. Steuben County receives a mean annual precipitation of 35 inches. Frequent, short but intense rainfall events are common in spring and summer months, which results in high runoff volumes and flow rates. A significant amount of runoff is also generated during the annual spring snowmelt.

Flooding has been a long documented issue in the Pigeon Creek Watershed. Originally, Pigeon Creek consisted of a series of meandering drainage ways. In 1904, George Shrimplin Ditch was dredged to straighten the creek in order to provide greater conveyance capacity.

The chain of lakes along Pigeon Creek are heavily affected by extreme rainfall events. The 1967 "Preliminary Investigation Report" acknowledges the extreme fluctuation in lake levels after heavy rain events, which floods cottages along Bower, Golden, Hogback, and Long Lakes. The report notes that the lake water level fluctuates at least five feet annually, where a rise of six feet is expected by a two-year rainfall event, and a rise of over seven feet is expected for a ten-year rainfall event. This is important to note that additional storage volume provided upstream in the watershed can have a substantial impact on decreasing flooding from frequent rainfall events.

The largest flood on record occurred March 22, 1982, due to extreme snow melt. The winter of 1981-1982 generated 66 inches of snow, approximately 26 inches above normal. As the snow melted, approximately 7 inches of runoff was created across the Pigeon Creek Watershed. This resulted in lake levels 8.5 feet above normal stage and damage to 380 homes. Minimal out of channel flooding was reported. The total damage in the watershed was estimated at approximately $800,000 (1982 Dollars). If a similar flood were to occur today, the damage would be significantly higher due to both inflation and additional development along the lake chain.

The 1982 flood was assigned the following frequencies: Long Lake – 60-year flood, Bower Lake – 50-year flood, and Hogback Lake – 100-year flood. The second largest flood on record occurred in 1950 and was estimated as a 20-year return frequency. It is interesting to note that the peak discharge from Hogback Lake was measured as 795 cfs in 1982 and 744 cfs in 1950. If the lake discharge is proportional to the lake flood stage, this would indicate that there is likely a small difference in the high water level between the 20-year and 100-year rainfall events. Figure 13 indicates the approximate areas of regulatory floodplain within the watershed that would be inundated by the 100-year flood. It should be noted that, according to the current Flood Insurance Rate Maps for Steuben County, dated July 3, 1986, flood elevations have not been determined for Pigeon Creek, and the floodplain shown is approximate.

To measure stream flow on Pigeon Creek, the United States Geological Survey installed a stream gauge downstream of Hogback Lake in 1946 that continuously records depth and flow measurements in the channel. The gauge has a tributary drainage area of approximately 106 square miles. Figures 14 and 15 present the location of the stream gauge and annual peak discharge measured at the site, respectively.

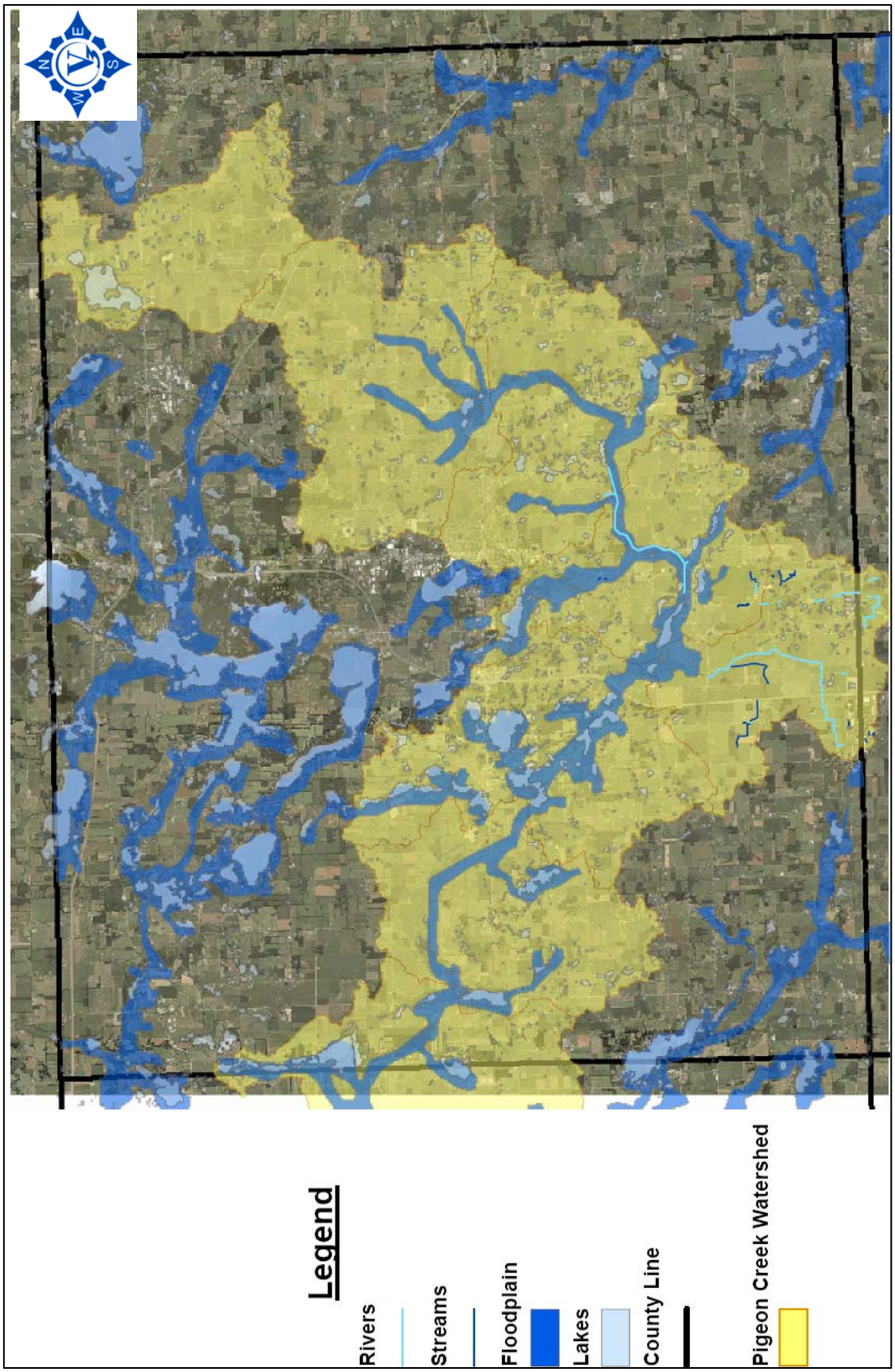

Figure 13: Floodplain Map.

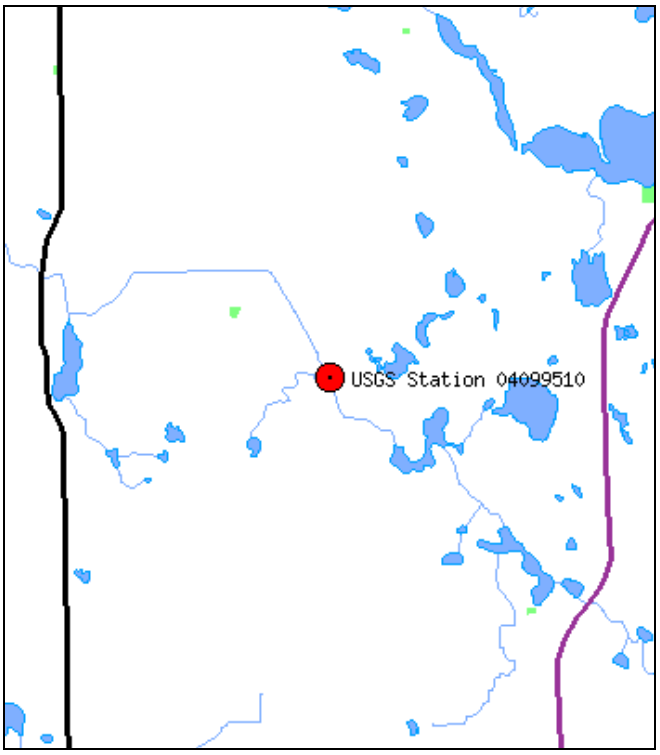

Figure 14: Stream Gauge Location Downstream of Hogback Lake.

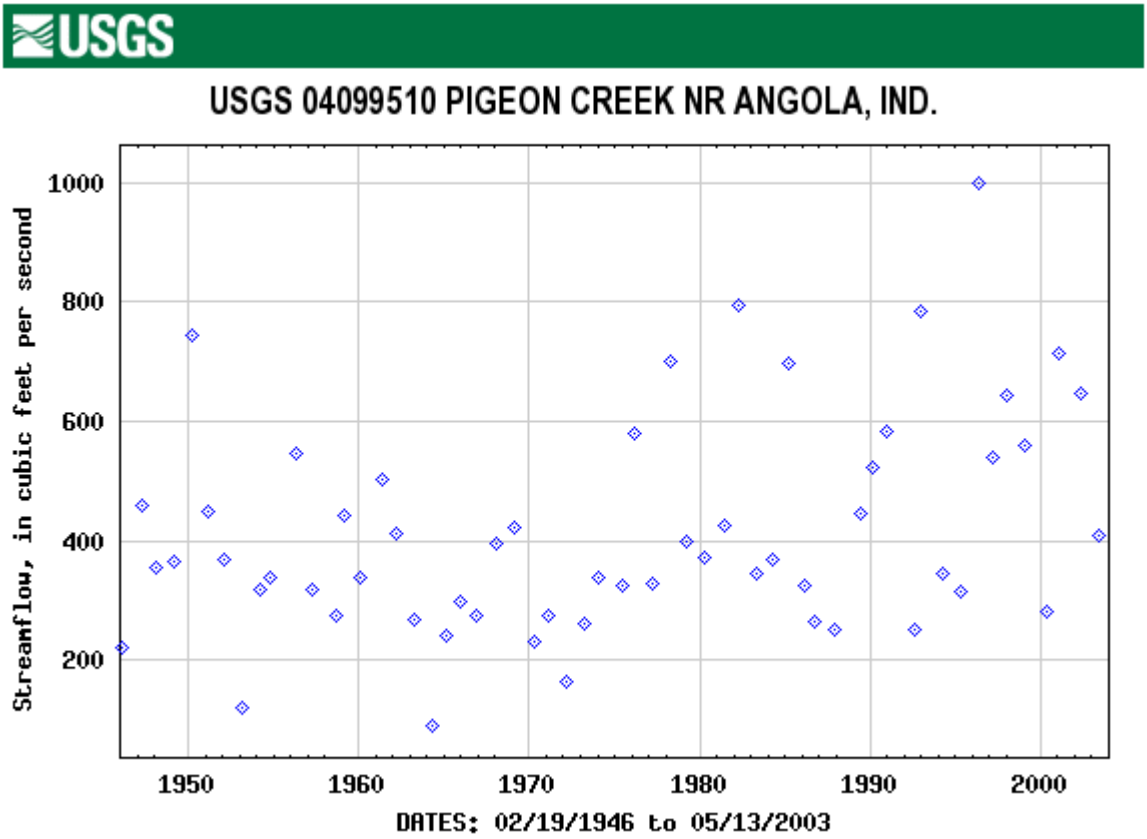

Figure 15: Annual Peak Discharge Downstream of Hogback Lake.

Historical stream gauge data can also be used to determine the annual mean stream flow. This data is useful to quantify the relationship between increased rainfall and development over time and an increase in the amount of runoff conveyed by the creek. As shown in Figure 16, the annual mean stream flow downstream of Hogback Lake has an increasing trend, which indicates the current average flow of Pigeon Creek is greater than the amount conveyed in the past.

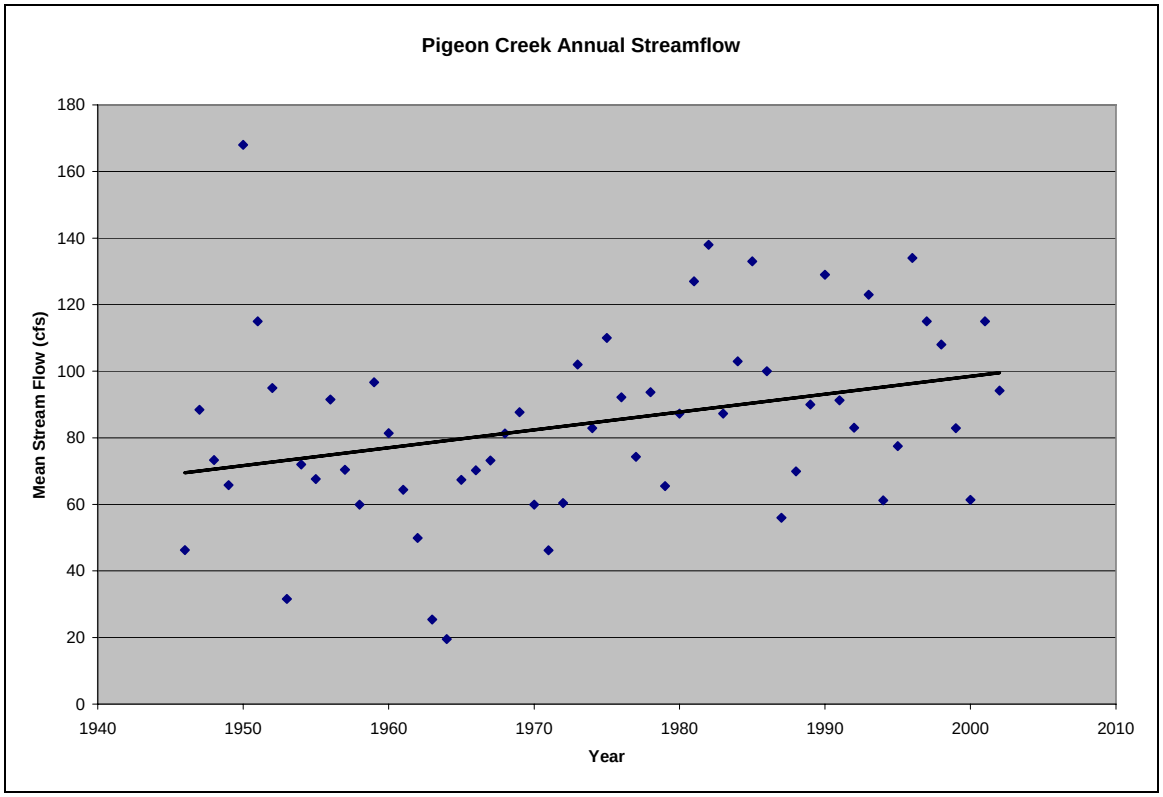

Figure 16: Annual Mean Stream Flow Downstream of Hogback Lake.

Hydrology – Historical Correspondence with Regulatory Agencies

In 1967, the Soil Conservation Service (now known as the Natural Resources Conservation Service (NRCS)) produced a "Preliminary Investigation Report" for the Pigeon River Watershed. The report identified two structural improvements within Steuben County: a 1600 acre multipurpose flood control, recreational, and wildlife facility, as well as 16 miles of channel clearing. The proposed flood control facility included a dam located between Bill Deller and Meridian Roads that would retain 4.3 inches of runoff from the tributary watershed. The watershed tributary to the proposed structure represented 40% of the total watershed area and 50% of the watershed tributary to Hogback Lake. The dam was designed such that the emergency spillway would be active at the 50-year rainfall event. The study was terminated in 1967 due to lack of public support.

In 1981, the Indiana Department of Natural Resources initiated a re-evaluation of the NRCS study. The IDNR work was halted in 1982, when the U.S. Army Corps of

Engineers (COE) initiated a Section 205 Reconnaissance Study of the Pigeon Creek flooding.

In 1984, the COE completed an initial appraisal of the watershed. The report concluded that elevating the residential structures along the chain of lakes would be a viable solution to the flooding problem in the watershed. In addition, the report stated that additional Federal Interest was warranted. In 1985, the COE terminated its investigation after determining that the Pigeon Creek Watershed did not meet the 10 Year – 800 CFS requirement, and was therefore outside of the COE jurisdiction for flood control investigations.

The current IDNR Coordinated Discharge Graph for Pigeon Creek and Pigeon River, dated 1982, provides Drainage Area – Discharge relationships for the watercourse for drainage areas between 105 and 360 square miles. The graphs indicate that the 10 Year – 800 CFS requirement is met at a drainage area of 150 square miles, which is downstream of the Steuben County border. This assessment concurs with the conclusions made in the COE 1985 correspondence.

In 1993, IDNR assistance was requested to develop solutions to the watershed flooding situation. The IDNR reviewed the previous investigations and stated that the storage structure proposed by the NRCS in 1967 would have minimal effect on flood stages along Pigeon Creek. Previous IDNR modeling indicated that the proposed dam would shorten the amount of time the lakes were at peak flood stage, but did not decrease the peak flood elevation. The IDNR concurred with the COE determination that the most viable solution was to elevate the residential structures within the floodplain above the base flood elevation.

Wetlands

Wetlands of various quality are scattered throughout the watershed, primarily at locations of identified hydric soils. Wetlands reduce stormwater runoff volumes and provide filtering of sediment and nutrients. The vegetative communities within the wetlands bind the excess nutrients within their living plants tissue and provide an additional wildlife habitat. The wetlands provide both a water quality and habitat benefit to the watershed and should be protected and enhanced. Figure 17 presents locations of identified wetlands within the watershed. The total area of wetlands by subwatershed is provided in Table 11.

Pigeon Creek Subwatershed	Total Acres of Wetlands (approximate)	Wetland Percent for Subwatershed Area
Upper Watershed	4,140	7.9%
Lake Chain	3,930	12.5%
Lower Watershed	2,025	8.4%

Table 11: Total Wetland Acres within the Pigeon Creek Subwatersheds.

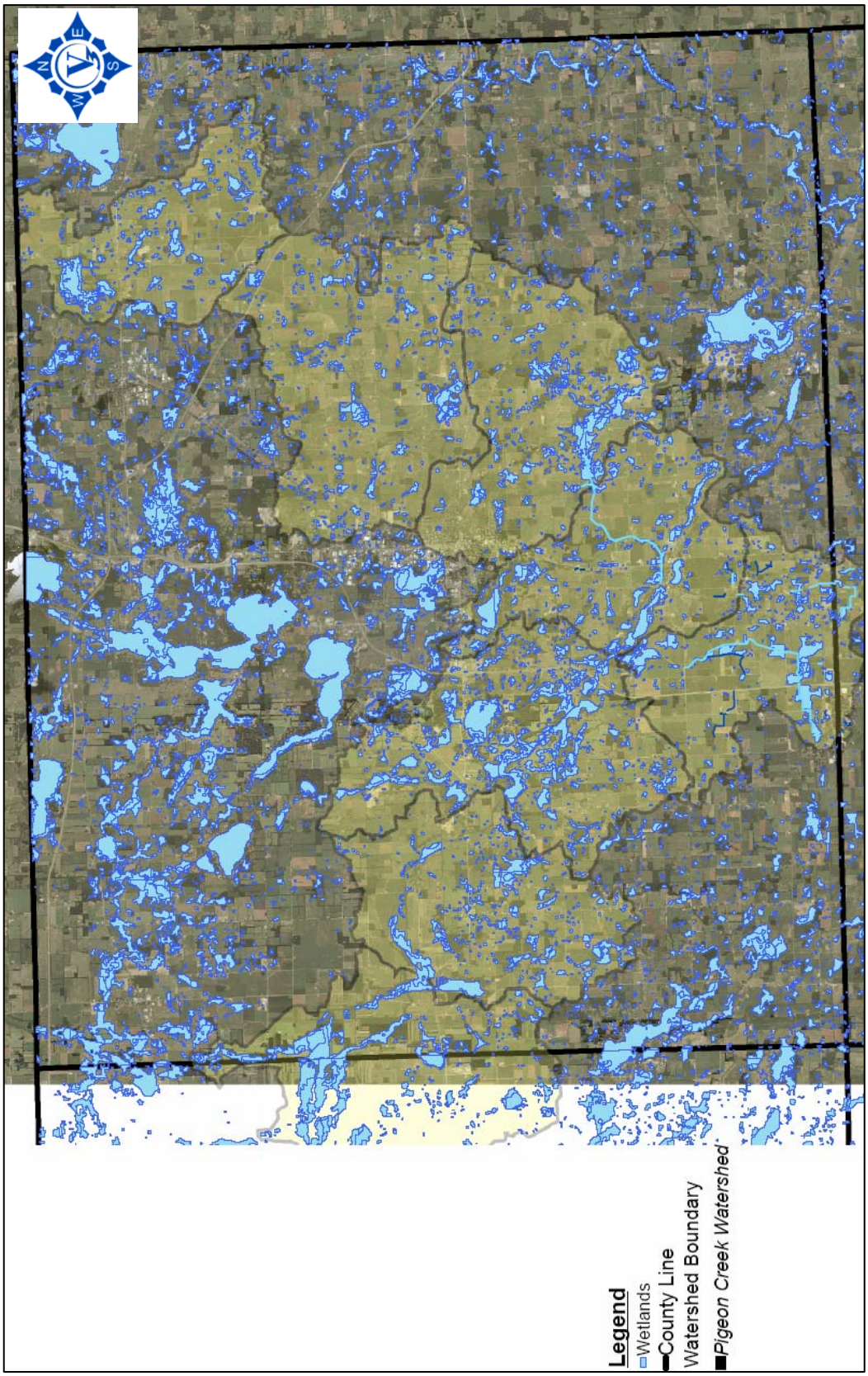

Figure 17: Wetland Location Map.

Endangered Species

The 1987 "Watershed Protection Plan" indicated that the Indiana bat (Myotis sodalist) is the only identified threatened or endangered species that may be present in the watershed. As part of our efforts during this watershed management plan, we sent inquiry letters to the U.S. Fish and Wildlife Service (USFWS) and IDNR requesting information on the endangered, threatened or rare (ETR) species, high quality natural communities, and natural areas documented from the Pigeon Creek Watershed within Steuben County. The following is the response from the IDNR. The species and areas are what is currently of concern, as the watershed improvement projects are designed and implemented, it is important to incorporate protective measures or avoidance of the species and areas that are listed at that time. This list is being provided as the framework for understanding what protected species and areas exist within the watershed at the time of the preparation of the watershed management plan.

DNR Indiana Department of Natural Resources

Mitchell E. Daniels, Jr., Governo
Kyle J. Hupfer, Director

Division of Nature Preserv
402 W. Washington St., Rm W2
Indianapolis IN 46204-27

August 1, 2005

Ms. Maggie A. Kallai
V3 Companies of Illinois, LTD
7325 Janes Avenue
Woodridge, IL 60517

Dear Ms. Kallai:

I am responding to your request for information on the endangered, threatened, or rare (ETR) species, high quality natural communities, and natural areas documented from the Pigeon Creek Watershed, Lagrange and Steuben Counties, Indiana. The Indiana Natural Heritage Data Center has been checked and enclosed you will find information on the ETR species documented from the watershed area.

For more information on the animal species mentioned, please contact Katie Smith, Nongame Supervisor, Division of Fish and Wildlife, 402 W. Washington Room W273, Indianapolis, Indiana 46204, (317)232-4080.

The information I am providing does not preclude the requirement for further consultation with the U.S. Fish and Wildlife Service as required under Section 7 of the Endangered Species Act of 1973. You should contact the Service at their Bloomington, Indiana office.

U.S. Fish and Wildlife Service
620 South Walker St.
Bloomington, Indiana 47403-2121
(812)334-4261

At some point, you may need to contact the Department of Natural Resources' Environmental Review Coordinator so that other divisions within the department have the opportunity to review your proposal. For more information, please contact:

Kyle Hupfer, Director
Department of Natural Resources
attn: Christie Kiefer
Environmental Coordinator
Division of Water
402 W. Washington Street, Room W264
Indianapolis, IN 46204
(317)232-4160

Maggie Kallai 2 August 1, 2005

Please note that the Indiana Natural Heritage Data Center relies on the observations of many individuals for our data. In most cases, the information is not the result of comprehensive field surveys conducted at particular sites. Therefore, our statement that there are no documented significant natural features at a site should not be interpreted to mean that the site does not support special plants or animals.

Due to the dynamic nature and sensitivity of the data, this information should not be used for any project other than that for which it was originally intended. It may be necessary for you to request updated material from us in order to base your planning decisions on the most current information.

Thank you for contacting the Indiana Natural Heritage Data Center. You may reach me at (317)232-8059 if you have any questions or need additional information.

Sincerely,

Ronald P. Hellmich

Ronald P. Hellmich
Indiana Natural Heritage Data Center

enclosure: data sheet
invoice

DNR Indiana Department of Natural Resources

Mitchell E. Daniels, Jr., Governor
Kyle J. Hupfer, Director

Division of Nature Preserves
402 W. Washington St., Rm W267
Indianapolis IN 46204-2739

INVOICE

CLIENT: Ms. Maggie A. Kallai
V3 Companies of Illinois, LTD
7325 Janes Avenue
Woodridge, IL 60517

DATE OF SERVICES RENDERED: August 1, 2005

SERVICES RENDERED: Provided Indiana Natural Heritage Data Center data on endangered, threatened, or rare species, and high quality natural communities of Indiana documented from the Pigeon Creek Watershed, Lagrange and Steuben Counties, Indiana.

INVOICE AMOUNT: $30.00

DATE: 8-1-2005

BY: Ronald P. Hellmich
Ronald P. Hellmich
FOR: Division of Nature Preserves
Indiana Department of Natural Resources
402 W. Washington St., Room W267
Indianapolis, IN 46204
(317)232-4052

Please make checks payable to Indiana Division of Nature Preserves.

Invoice payable upon receipt.

Send check to the attention of

Ronald P. Hellmich
Division of Nature Preserves

August 08, 2005 Endangered, Threatened and Rare Species and High Quality Natural Communities documented from the Pigeon Creek Watershed area, Steuben County, Indiana

TYPE	SPECIES NAME	COMMON NAME	FED	STATE	TOWN RANGE	DATE	COMMENTS
Bird	Ixobrychus exilis	Least Bittern		SE	036N013E 16 NEQ	1982-05-14	
Bird	Ardea herodias	Great Blue Heron			037N014E 33 SWQ SWQ	1987-04-20	
Bird	Ardea herodias	Great Blue Heron			037N012E 18 SWQ NWQ SEQ	1988-05-15	
Bird	Gallinula chloropus	Common Moorhen		SE	038N014E 23 COMMON LINE	2001-07-26	
Bird	Certhia americana	Brown Creeper			036N013E 05	1882-05-08	
Bird	Certhia americana	Brown Creeper			037N013E 34	1883-05	
Bird	Cistothorus palustris	Marsh Wren		SE	037N012E 13	1987-06-08	
Fish	Coregonus artedi	Cisco		SSC	036N013E 14 SWQ SEQ	1992	
Fish	Coregonus artedi	Cisco		SSC	036N013E 23 EH NEQ	1990	
Mammal	Mustela nivalis	Least Weasel		SSC	037N014E 7	1998-12-06	
Mammal	Taxidea taxus	American Badger		SE	037N013E NEAR ANGOLA AND FOX LAKE ROAD	1986-11-18	
Mammal	Taxidea taxus	American Badger		SE	036N013E 22	1986-11	
Mammal	Lynx rufus	Bobcat		SE	037N012E JACKSON TWP	1987-11	
Mammal	Lynx rufus	Bobcat		SE	036N013E 24 SEQ SEQ SEQ	1992-12	
Mammal	Lynx rufus	Bobcat		SE	037N012E 17 SWQ NWQ NEQ	1994-04-23	
Mammal	Lynx rufus	Bobcat		SE	037N012E 23 SWQ NEQ	1998-10-04	
Reptile	Emydoidea blandingii	Blanding's Turtle		SE	037N014E 22	1961-08	
Reptile	Nerodia erythrogaster neglecta	Copperbelly Water Snake		SE	037N014E 22	1974	OBSERVED
High Quality Natural Community	Forest - upland dry	Dry Upland Forest		SG	037N012E 24	1981-07	
High Quality Natural Community	Forest - upland mesic	Mesic Upland Forest		SG	036N014E 04 & S33 037N014E	1984-08	
High Quality Natural Community	Wetland - flat muck	Muck Flat		SG	037N012E 24 SEQ	1983-09-29	
High Quality Natural Community	Wetland - flat muck	Muck Flat		SG	037N012E 25 NWQ	1983-10-04	
High Quality Natural Community	Wetland - swamp shrub	Shrub Swamp		SG	037N012E 24	1981-07	
Vascular Plant	Utricularia cornuta	Horned Bladderwort		ST	037N012E 25 NEQ NWQ	1982-08	
Vascular Plant	Utricularia purpurea	Purple Bladderwort		SR	037N012E 25 NEQ NWQ	1982-08-23	
Vascular Plant	Utricularia purpurea	Purple Bladderwort		SR	037N012E 24 SEQ	1983-08-30	
Vascular Plant	Utricularia resupinata	Northeastern Bladderwort		SX	037N012E 25	1934-08	
Vascular Plant	Circaea alpina	Small Enchanter's Nightshade		SX	037N013E 30	1906-07-25	
Vascular Plant	Salix serissima	Autumn Willow		ST	037N013E 30	1906-07-24	

Fed: LE = Endangered; LT = Threatened
State: SE = state endangered; ST = state threatened; SR = state rare; SSC = state species of special concern; SX = state extirpated; SG = state significant; WL = watch list

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August 08, 2005 Endangered, Threatened and Rare Species and High Quality Natural Communities documented from the Pigeon Creek Watershed area, Steuben County, Indiana

TYPE	SPECIES NAME	COMMON NAME	FED	STATE	TOWN RANGE	DATE	COMMENTS
Vascular Plant	Juniperus communis	Ground Juniper		SR	037N014E 01	1911-03-27	
Vascular Plant	Eleocharis robbinsii	Robbins Spikerush		SR	037N012E 25 NWQ NEQ NWQ	1983-08	
Vascular Plant	Fuirena pumila	Dwarf Umbrella-sedge		ST	037N012E 25 NWQ NEQ NWQ	1983-08	
Vascular Plant	Rhynchospora macrostachya	Tall Beaked-rush		SR	037N012E 25 NEQ NWQ	1982-08	
Vascular Plant	Rhynchospora macrostachya	Tall Beaked-rush		SR	037N012E 13 OR S18 OR S24	1906-07-22	
Vascular Plant	Psilocarya scirpoides	Long-beaked Baldrush		ST	037N012E 25 NWQ NEQ NWQ	1983-08-20	
Vascular Plant	Psilocarya scirpoides	Long-beaked Baldrush		ST	037N012E 24 SEQ	1983-08-30	
Vascular Plant	Scirpus subterminalis	Water Bulrush		SR	037N012E 25 NEQ	1983-08-30	
Vascular Plant	Scirpus subterminalis	Water Bulrush		SR	037N012E 25 NWQ NEQ NWQ	1983-08	
Vascular Plant	Triglochin palustris	Marsh Arrow-grass		SR	036N013E 14	1932-10	
Vascular Plant	Panicum boreale	Northern Witchgrass		SR	037N013E 30	1935-07-19	
Vascular Plant	Panicum leibergii	Leiberg's Witchgrass		ST	037N012E 36 NEQ NEQ	1928-07	
Vascular Plant	Glyceria borealis	Small Floating Manna-grass		SE	037N012E 23	1946-06-29	
Vascular Plant	Glyceria borealis	Small Floating Manna-grass		SE	037N012E 20	1928-07	
Vascular Plant	Potamogeton pusillus	Slender Pondweed		WL	037N012E 25 N HALF	1933-07	
Vascular Plant	Potamogeton robbinsii	Flatleaf Pondweed		SR	037N012E 25	1985-08-02	
CEDAR SWAMP WETLAND CONSERVATION AREA							
Vascular Plant	Glyceria grandis	American Manna-grass		SX	038N014E 14	NO DATE	
CHEESEBORO LAKE							
Amphibian	Rana pipiens	Northern Leopard Frog		SSC	037N012E 24 CENTER NH NEQ	1989-06-17	
Reptile	Clemmys guttata	Spotted Turtle		SE	037N012E 24 NEQ	1981-07-18	
High Quality Natural Community	Wetland - marsh	Marsh		SG	037N012E 24 NEQ	1981-07	
LITTLE GRASS LAKE							
High Quality Natural Community	Wetland - flat muck	Muck Flat		SG	037N012E 13	1983-08-30	
Vascular Plant	Rhynchospora macrostachya	Tall Beaked-rush		SR	037N012E 13 NWQ	1983-08	
PIGEON RIVER FISH AND WILDLIFE AREA							
Bird	Rallus limicola	Virginia Rail		SE	037N012E 07 NEQ NWQ	1993-SP	
Bird	Grus canadensis	Sandhill Crane		SE	037N012E 07	1994-07-16	ROOSTING AREA
Bird	Cistothorus platensis	Sedge Wren		SE	037N011E 01 NEQ SEQ SEQ	2000-07-08	
Mammal	Condylura cristata	Star-nosed Mole		SSC	037N012E 06 NWQ	1973-05-17	
Mammal	Condylura cristata	Star-nosed Mole		SSC	037N012E 07 SWQ SEQ	1985-05-29	

Fed: LE = Endangered; LT = Threatened
State: SE = state endangered; ST = state threatened; SR = state rare; SSC = state species of special concern; SX = state extirpated; SG = state significant; WL = watch list

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August 08, 2005 Endangered, Threatened and Rare Species and High Quality Natural Communities documented from the Pigeon Creek Watershed area, Steuben County, Indiana

TYPE	SPECIES NAME	COMMON NAME	FED	STATE	TOWN RANGE	DATE	COMMENTS
Mammal	Mustela nivalis	Least Weasel		SSC	037N012E 19 W1/2	1988-04-08	
Reptile	Emydoidea blandingii	Blanding's Turtle		SE	037N012E 07 NWQ	1989-05-28	
Reptile	Emydoidea blandingii	Blanding's Turtle		SE	037N012E 06	1986-04-10	
High Quality Natural Community	Forest - upland dry	Dry Upland Forest		SG	037N012E 17 NEQ SWQ	1997-06-17	
High Quality Natural Community	Lake - lake	Lake		SG	037N012E 06 NWQ	1975	
High Quality Natural Community	Lake - lake	Lake		SG	037N012E 17 NEQ SWQ	1969	
Insecta: Lepidoptera (Butterflies & Moths)	Euphydryas phaeton	Baltimore		SR	037N012E 06 NWQ	1984-07	
Vascular Plant	Drosera intermedia	Spoon-leaved Sundew		SR	037N012E 06 NWQ	1972-07	
Vascular Plant	Utricularia cornuta	Horned Bladderwort		ST	037N012E 06 NWQ NWQ	1972-06	
Vascular Plant	Utricularia minor	Lesser Bladderwort		ST	037N012E 06 NWQ NWQ	1980-09-08	
Vascular Plant	Carex flava	Yellow Sedge		ST	037N012E 17 NEQ SWQ	1981-06-01	
Vascular Plant	Triglochin palustris	Marsh Arrow-grass		SR	037N012E 06 NWQ NWQ	1981-07	
Vascular Plant	Triglochin palustris	Marsh Arrow-grass		SR	037N012E 17 NEQ SWQ	1974-07	
Vascular Plant	Lemna valdiviana	Pale Duckweed		SE	037N012E 06 NWQ NWQ	1974-07	
Vascular Plant	Tofieldia glutinosa	False Asphodel		SR	037N012E 06 NWQ	1980	
Vascular Plant	Zigadenus elegans var. glaucus	White Camas		SR	037N012E 06 NWQ NWQ	1981-07	
Vascular Plant	Deschampsia cespitosa	Tufted Hairgrass		SR	037N012E 06 NWQ NWQ	1981-06-01	
WOODLAND BOG NATURE PRESERVE							
High Quality Natural Community	Wetland - swamp forest	Forested Swamp		SG	037N014E 17 SWQ	1980	
Vascular Plant	Actaea rubra	Red Baneberry		SR	037N014E 17 SWQ	1972-08	

Fed: LE = Endangered; LT = Threatened
State: SE = state endangered; ST = state threatened; SR = state rare; SSC = state species of special concern; SX = state extirpated; SG = state significant; WL = watch list

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Indicator Species

The Cisco (*Coregonus artedi*) is a slender silver-colored fish that is a member of the salmon family and is primarily found in glacial lakes. The southernmost range of the Cisco extends into northern Indiana. Cisco populations in Indiana have been declining, and in some cases have disappeared completely. A layer of cold, well oxygenated water is required by Cisco for survival. Eutrophication is caused by increased nutrient loading which results in the loss of oxygen from the deeper, cold water regions utilized by Cisco. This is thought to be a cause for the decline in the Cisco populations of Indiana's lakes (IDNR 1993).

Gooseneck Lake and Meserve Lake are the only two lakes that had a Cisco population during the IDNR survey from 1990 to 1993 within both Steuben County and the Pigeon Creek Watershed (See Figure 18). There were four other lakes within Steuben County, but not within the watershed, that had a Cisco population during the survey. These lakes include Failing Lake, McClish Lake, Lake Gage and Seven Sisters Lakes.

The Indiana Department of Natural Resources Division of Fish and Wildlife has stocked Cisco in Green Lake, which is within Steuben County and the Pigeon Creek watershed. However, Green Lake does not have a direct surface water connection with Pigeon Creek.

The Cisco and other rare species can be used as an indicator of high quality water bodies. Populations should be closely monitored to foreworn of declining water quality.

Figure 18: Location of Cisco Population.