

## SECTION 1: INTRODUCE WATERSHED

### Location, Characteristics, and Size of the Elkhart River Watershed

The Elkhart River Watershed is approximately 447,000 acres of mixed landuse consisting mainly of row crop agriculture and pasture. The Watershed occupies portions of Elkhart, LaGrange, Noble, and Kosciusko counties. The headwaters begin with the North Branch of the Elkhart River in south-central LaGrange County and the South Branch of the Elkhart River in central Noble County. The Elkhart River then flows northwest into Elkhart County, forming the Goshen Dam Pond in Goshen, and finally draining into the St. Joseph River in the City of Elkhart (Exhibit 1).

Approximately 665 linear miles of cumulative waterways are contained in the Elkhart River Watershed. Some of the major tributaries include the North and South Branches of the Elkhart River, Yellow Creek, and Solomon Creek. Turkey Creek, a major tributary of the Elkhart River, originates in Kosciusko County and is the outlet for a chain of lakes including Lake Wawasee, a 3,400-acre lake (Exhibit 2).

## Location: Hydrologic Unit Codes

The Watershed consists of five (5) 11-digit Hydrologic Unit Codes or HUC codes including: 04050001170, 04050001180, 04050001190, 04050001200, 04050001210; and thirty-seven (37) 14-digit HUC codes including: 04050001170010, 04050001170020, 04050001170030, 04050001170040, 04050001170050, 04050001170060, 04050001170070, 04050001170080, 04050001180010, 04050001180020, 04050001180030, 04050001180040, 04050001180050, 04050001180060, 04050001190010, 04050001190020, 04050001190030, 04050001190040, 04050001190050, 04050001190060, 04050001190070, 04050001200010, 04050001200020, 04050001200030, 04050001200040, 04050001200050, 04050001200060, 04050001200070, 04050001200080, 04050001200090, 04050001200100, 04050001210010, 04050001210020, 04050001210030, 04050001210040, 04050001210050, 04050001210060.

## Climate

The Elkhart River Watershed is characterized by a humid continental climate, which is somewhat modified by the Great Lakes. This modification or “lake effect” can manifest itself by a moderation of temperature and increased precipitation. This is due to winds blowing over the lake and being influenced by water temperature in the lake and evaporation from the lake. This can have a cooling effect in these areas in the summer compared to other parts of the country, and can result in warmer temperatures in the winter months. Precipitation within the Elkhart River Watershed is well distributed throughout the year, and is adequate for most crops.

The average daily maximum temperature in July is 84.5°F, and the average daily minimum in January is 17.0°F. Typical relative humidity is about 55% - 65% in the mid-afternoon. Humidity is higher in the evening and averages from 80% - 100% at dawn. Using climate data from Goshen, Indiana, from 1971 – 2000, the average temperature in winter is around 25.9°F with the average daily minimum being approximately 18.5°F. The lowest temperature on record occurred on January 25, 1950 and again on February 11, 1999 and was -24°F. In summer, the average temperature is about 71°F with the average daily maximum temperature being around 82°F. Winds are most often from the southwest, although in winter the dominant direction is from the northwest. Average velocities range from 8mph in August to 12mph in March and April.

Precipitation and temperature data can be found in Table 1 (Appendix A). Precipitation is generally well distributed throughout the year but is slightly lower in mid to late winter. Rainfall is moderate and averages 36.59 inches annually. The record rainfall based on data from 1915 – 2001 occurred on July 26, 1981, and totaled 5.7 inches. Average annual snowfall is 39.3 inches. The record snowfall occurred on January 26, 1978, and totaled 14.0 inches.

## Trends in Land Development

The Elkhart River Watershed consists of approximately 447,000 acres of mixed landuse (Table 2, Appendix A and Exhibit 3, see below). Landuse for each of the five separate 11-digit hydrologic unit codes (HUC) codes is shown in Exhibits B-1 through B-6 (Appendix B) and Tables 3 – 7 (Appendix A), and will be referred to in discussions of water quality and pollutant loading analysis.

The overall Watershed has landuse percentages of 3.4% residential and commercial, 12.7% forest and wetlands, and 80.6% agriculture. Evaluation of landuse for the individual 11-digit HUCs indicate percentages that are relatively close to these numbers. HUC 04050001210 includes Goshen and portions of Elkhart, so urban and industrial landuse percentages are a little higher with 10% of landuse in this category. HUC 04050001180 has the lowest percentage of landuse in urban and industrial with a percentage of 0.83%. This HUC, which includes the South Branch Elkhart River in Noble County, is largely agricultural and includes a number of natural lakes. The largest town in this portion of the Watershed is Albion. Looking at each of the 11-Digit HUCs, urban and industrial landuse ranges from 0.83 – 10%, forest and wetland landuse ranges from 9.1 – 18.6%, and agricultural landuse ranges from 77.4 – 88.5%.

Many of the metropolitan areas across the country and in Indiana are experiencing extraordinary growth rates. Between 2000 and 2006, the population in the four counties with land within the Elkhart River Watershed was estimated to rise near or above the average population increase for the State (Table 8, Appendix A). The increase for the State was 3.8%, whereas estimates of population increases for Elkhart, Kosciusko, LaGrange, and Noble Counties were 8.4%, 3.4%, 6.8%, and 3.6% respectively. Therefore, based on the percent of land within each county, it is estimated that the population within the Elkhart River Watershed has increased from 148,825 in 2000 to 158,846 in 2006.

Urban growth must therefore be considered an important issue in the Elkhart River Watershed. Exhibit B-6 (see Appendix B) shows the population in the Elkhart River Watershed based on area in 2000. It also indicates trends from 1970 to 2000. Most of the growth is occurring in the Elkhart-Goshen area in Elkhart County. However, other areas in Noble and Kosciusko Counties are experiencing growth, such as the area around Albion in Noble County. To ensure the protection and improvement of the water quality of the rivers and streams within the Elkhart River Watershed and the protection of high-quality farmland and other important natural resources, it is vital that growth in the Elkhart River Watershed is sustainable. Options to protect land from development in this Watershed include: conservation easements on farmland through Wood-Land-Lakes Resource Conservation and Development program; and preservation and enhancement programs available through The Nature Conservancy, ACRES, and Trillium Land Conservancy.

## Recreational Resources and Significant Natural Areas

A host of recreational opportunities and natural areas are scattered throughout the Elkhart River Watershed. They range from parks, nature preserves, and conservation clubs to fair grounds, recreational facilities, golf courses, and activities on school and university grounds (Exhibit 4, see below and Table 9, Appendix A).

In addition, other natural areas and features are shown on Exhibit 5 (see below) and listed in Table 10- Significant Natural Areas and Managed Lands, Table 11- Natural Features within the Elkhart River Watershed, and Table 12- Trails within the Elkhart River Watershed located in Appendix A. The Elkhart River Watershed is also fortunate to have a large number of lakes which offer prospects for swimming, fishing, boating, and enjoyment of the aesthetic beauty within these aquatic systems. A few of these unique opportunities are discussed below.

### Chain O' Lakes State Park

Chain O' Lakes State Park in Noble County centers around eight connecting lakes and is located near Albion, Indiana. One can paddle through the eight lakes, hike the many trails, or attend an interpretive program. This state park hosts one of the thirteen interpretive centers organized and maintained by the IDNR. Many centers have live plants and animals inside and offer special viewing windows where guests can sit down, relax, and enjoy the native wildlife. Chain O' Lakes State Park has amenities to suit almost everyone from primitive camping and RV sites with electric hook-up, to family cabins. Other accommodations include fishing, swimming, picnicking, cross-county skiing, and others. One can also take a break from nature and visit the nearby Gene Stratton-Porter Home, a State Historic Site, in Rome City.

### Olin Lake Nature Preserve

Olin Lake Nature Preserve consists of a 269 acre site in LaGrange County near Wolcottville, Indiana. The lake itself is just over 100 acres and is the largest lake in Indiana with a completely undeveloped shoreline. The entire shoreline is protected within the boundaries of the preserve. Most of the shoreline is low with extensive wetland vegetation, a trait that undoubtedly protected it from development in the past. The shoreline is surrounded by swamp forest with tree species such as tamarack, silver maple, red maple, and green ash. Skunk cabbage is common in low, mucky areas. The lake bottom consists of marl; thus, it is not conducive to aquatic vegetation. Upland portions of the preserve have a number of large trees including sugar maple, beech, red oak and hackberry. Large stumps remain where tulip, oak, and walnut trees were harvested before the area became a nature preserve.

### Lake Wawasee

Lake Wawasee is located in Kosciusko County near Syracuse and North Webster, Indiana. It is Indiana's largest natural lake with over 3,500 acres of open water. Lake Wawasee provides opportunities for fishing, boating, skiing, tubing, swimming, and sailing. The lake is also home to the Wawasee Yacht Club. Located on the southeast shores, the state-owned Wawasee Family Fishing Site provides a place to fish, picnic, and relax outdoors. The fishery is healthy, and 28 species of fish were noted in a 2004 study (V3, 2006). Bluegill, black crappie, perch and bass are abundant, and northern pike are present. A number of annual events often attract large numbers of visitors and residents. Perhaps the most notable are the Fourth of July celebrations

that include the Wawasee Flotilla, a display of lighted boats, and fireworks. Public boat ramps are provided at no charge for visitors wanting to use their own boats.

### **Elkhart Environmental Center**

The mission of the Elkhart Environmental Center is to “preserve, protect, and restore the environment and to promote environmental responsibility to the public through education, habitat enhancement, community services, and outreach.” In 1991 the log cabin education center was built and dedicated. As a testament to what can be accomplished, the beautiful facilities and grounds are built on what was operated as the Lusher Avenue city dump from 1959 to 1972. It is now home to restored wetlands, woods, and prairie. Today this unique educational facility has many well established environmental services and programs in operation. It also provides a beautiful site to hike along the Elkhart River or meander through the woods and small prairie areas.

## Current Watershed Conditions

### Geology and Soils

The bedrock geology of Indiana formed during the Paleozoic Era. The principal bedrock formations in the Elkhart River Watershed are associated mainly with rocks of Silurian to middle Mississippian age, and consist primarily of layered Paleozoic limestone, dolomite, sandstone, siltstone and shale, indicative of ancient inland seas (Beaty, 1987).

The bedrock is covered by a thick layer of glacial drift. Because most water wells and test wells are confined to this glacial material, there is limited data of actual bedrock depths within the Elkhart River Watershed. Data from wells throughout the greater St. Joseph River watershed, of which the Elkhart River is a part, place the depth of the bedrock units from less than 30 feet to nearly 500 feet in depth.

Three major Shale units can be found within the Elkhart River Watershed. The main branch of the Elkhart River lies above the Ellsworth Shale unit. Tributaries in the southern portion of LaGrange County and the northeast portion of Elkhart County flow through a region dominated by the Coldwater Shale unit. Tributaries flowing from the northern portion of Kosciusko County and the central and southern portions of Noble County are within the region dominated by Antrim Shale.

The present topography within the Elkhart River Watershed has been a result of glacial and post glacial activity rather than the topography of the underlying bedrock. This geology represents a very complex glacial history consisting of the results of older glaciation along with several sequences laid down by different Wisconsinan glacial events. The resulting surface topography is also complex and leads to an area at times referred to as half land and half water due to the many lakes and wetland complexes that can be found throughout the Elkhart River Watershed. This complex glacial history also leads to complex sequences of soils throughout the Elkhart River Watershed.

There are hundreds of different soil types throughout Indiana based on their unique characteristics (Table 13, Appendix A). Each county arranges these soil types by like characteristics into groups, or major soil associations. These soil associations can give one an overall feel for the soils in the county, but should not be used at the farming level for decision making. The major soil associations in the Elkhart River Watershed are shown in Table 14 (Appendix A) along with their general characteristics, the percent of the county where they are found, and their use. A comprehensive map of soil types throughout the Elkhart River Watershed may be found on Exhibit 6 (see below) and Table 15 (Appendix A).

## Septic Tank Suitability

In rural areas, households usually depend on septic tank absorption fields. These waste treatment systems require soil characteristics and geology that allow gradual seepage of wastewater into the surrounding soils. Seasonal high water tables, shallow compact till, and coarse soils present limitations for septic systems. While system design can often overcome these limitations (i.e. perimeter drains, mound systems or pressure distribution), sometimes the soil characteristics prove to be unsuitable for any type of septic system.

Heavy clay soils require larger (and therefore more expensive) absorption fields; while sandier, well-drained soils are often suitable for smaller, more affordable gravity-flow trench systems.

The septic disposal system is considered failing when the system exhibits one or more of the following:

- The system refuses to accept sewage at the rate of design application thereby interfering with the normal use of plumbing fixtures
- Effluent discharges exceed the absorptive capacity of the soil, resulting in ponding, seepage, or other discharge of the effluent to the ground surface or to surface waters
- Effluent is discharged from the system causing contamination of a potable water supply, ground water, or surface water.

In Indiana, prior to 1990, residential homes on 10 acres or more of land—and at least 1,000 feet from a neighboring residence—did not have to comply with any septic system regulations. A new septic code in 1990 fixed this loophole but many of these homes still do not have functioning septic systems. The septic effluent from many of these older homes discharges into field tiles and eventually flows to open ditches and waterways. Unfortunately, the high cost of septic repair (typically from \$4,000 to \$15,000) has been an impediment to modernization.

Individual septic sites must be evaluated on a case-by-case basis to determine septic system suitability. Systems for new construction cannot be placed in the 100-year floodplain and systems for existing homes must be above the 100-year flood elevation.

Exhibit 7 (see below) is a map of soil classes related to septic suitability within the Watershed. Soils labeled “very limited” indicate that the soil has at least one feature that is unfavorable for septic systems. There are approximately 239,810 acres (55.8%) of “very limited” soils within the Watershed.

Soils labeled “somewhat limited” indicate that the soils have features that are moderately favorable for septic systems. There are approximately 5,277 acres (1.2%) of “somewhat limited” soils within the Watershed. Approximately 17,215 acres (3.8%) of the soils within the Watershed are “not rated.” These soils have not been assigned a rating class because it is not industry standard to install a septic system in these geographic locations. Soils designated “not limited” were not found in the Elkhart River Watershed.

## Highly Erodible Soils (HEL Soils)

Exhibit 8 (see below) shows the soils within the Elkhart River Watershed that are considered highly erodible or potentially highly erodible. These soils are especially susceptible to the erosional forces of wind and water. Approximately 133,694 acres (30%) of the soils in the Elkhart River Watershed are considered to be in this category (Table 16, Appendix A). Approximately 16% of land within Elkhart County is highly erodible. Noble County has the highest percentage of highly erodible lands with approximately 74%. Both Kosciusko County and LaGrange County have fairly low percentages of highly erodible lands with approximately 2% and 8%, respectively (Table 17, Appendix A). Erosion increases not only sedimentation of the water but is also a source for nutrient impairments. Although erosion cannot be prevented, the effects can be moderated so that it does not diminish the productive capacity of the soil or result in excessive sedimentation in rivers, streams, and lakes throughout the Watershed.

In addition, a suggested BMP for agricultural lands is the use of no-till or reduced till farming practices (conservation tillage) to help reduce soil erosion (listed in Section 6 of this document). Based on the 2007 Indiana Cropland Tillage Transect Survey, no-till corn increased in the State of Indiana from 19% (2004) to 27% (2007) and soybeans went from 61% (2004) to 69% (2007). However, in Elkhart County, no-till corn practices decreased from 19% (2004) to 15% (2007), while no-till soybean practices decreased from 59% (2004) to 55% (2007), based on percentage. In Kosciusko County, no-till corn practices increased from 24% (2004) to 26% (2007), and no-till soybean practices decreased from 68% (2004) to 66% (2007). The no-till corn practices of LaGrange County increased from 14% (2004) to 21% (2007), and no-till soybeans decreased from 64% (2004) to 53% (2007). Finally in Noble County, no-till corn practices increased from 29% (2004) to 49% (2007), and no-till soybeans increased from 70% (2004) to 81%.

## Hydric Soils

Soils that remain saturated or inundated with water for a sufficient length of time become hydric through a series of chemical, physical, and biological processes. Once a soil takes on hydric characteristics, it retains those characteristics even after the soil is drained. Approximately 114,998 acres or 26% of the soils in the Elkhart River Watershed are considered hydric (Exhibit 9, see below and Table 18, Appendix A). However, a large majority of these soils have been drained for either agricultural production or urban development. This information can be used to consider locations for possible wetland creation or enhancement.

Exhibit 10 shows the location of soils unsuitable for septic, highly erodible soils, and hydric soils. This exhibit gives a comprehensive view of the soils within the Watershed which may affect landuse.

## Wetlands and Riparian Zones

Of the total land area in the Elkhart River Watershed, approximately 48,695 acres are wetlands. Of this, 9,958 acres are considered lacustrine, 38,234 acres are palustrine, and 504 acres are riverine (Exhibit 11, see below and associated key (Appendix C); Table 19, Appendix A).

Lakes within the Elkhart River Watershed are shown in Exhibit 2. The largest lake is Lake Wawasee which is located in northeastern Kosciusko County and is 3,500 acres. Lake Wawasee is the largest natural lake in Indiana and is highly valued recreationally for a number of reasons. The lake has no speed limit, has a public access site, its shoreline is almost completely developed, and it has an excellent fishery. The other major lake systems within the Elkhart River Watershed are discussed in further detail within the Recreational Resources and Significant Natural Areas section of this report.

Wetlands provide numerous valuable functions that are necessary for the health of the Watershed. They play a critical role in protecting and moderating water quality. Water quality is improved through a combination of filtering and stabilizing processes. Wetland vegetation adjacent to waterways help to stabilize slopes and prevent mass wasting, thus reducing the sediment load within the river system. An unprotected streambank can easily erode, which results in an increase of sediment and nutrients entering the water. Additionally, wetland vegetation removes pollutants through the natural filtration that occurs, or by absorption and assimilation. This effective treatment of nutrients and physical stabilization leads to an increase in overall water quality to downstream reaches.

In addition, wetlands have the ability to increase stormwater detention capacity, increase stormwater attenuation, and moderate low flows. These benefits help to reduce flooding and erosion. Wetlands also facilitate groundwater recharge by allowing water to seep slowly into the ground, thus replenishing underlying aquifers. This groundwater recharge is also valuable to wildlife during the summer months when precipitation is low and the base flow of the river draws on the surrounding groundwater table.

Although wetlands occupy a small percentage of the surrounding landscape, these areas typically contain large percentages of wildlife and produce more flora and fauna per acre than other ecosystems. As a result of this high diversity, wetlands provide many recreational opportunities, such as fishing, hunting, boating, hiking, and bird watching. All of these recreational activities are available in the wetland areas within the Elkhart River Watershed.

Isolated and adjacent wetlands are regulated through IDEM and the USACE, respectively. Although wetlands are typically avoided during the development phase of properties, permits have been given to fill wetlands that cannot be avoided. Some isolated wetlands are being converted to detention/retention basins in new developments. The wetlands within the Watershed have experienced degradation due to urbanization.

## Regulatory Floodplains

Flooding is one of the most common hazards in the United States. Floods can occur on a local level, or can affect entire river basins. The Federal Emergency Management Agency (FEMA) has

developed Flood Insurance Rate Maps (FIRMs) for many parts of the country in order for individuals and governments to assess the risk of flooding in specific areas. These maps also indicate what insurance rates property owners may need to pay to develop property in these areas. The current FIRM panels for the Elkhart River Watershed are shown on Exhibit 12 (see below).

Approximately 7.7% (34,273 acres) of the total Watershed area lies within the 100-year floodplain. There are three flood hazard areas identified within the Watershed. Zone A, which is defined as an area inundated by 100-year flooding for which no base flood elevations (BFEs) have been established comprises 10,095 acres (or 2.3% of the Watershed). In this zone there is a 1% chance of annual flooding, and a 26% chance that the area will be inundated at sometime during the life of a 30-year mortgage.

Zone AE, which is defined as an area inundated by 100-year flooding for which BFEs have been determined, comprises 24,178 acres or 5.4% of the Watershed. Chance of flooding in Zone AE, is the same as in Zone A. However, Zone A floodplain boundaries are based off of approximate methods, and Zone AE floodplain boundaries are based off of detailed hydrologic and hydraulic analyses, establishing BFEs and making the delineation more accurate.

Zone X, which is defined as an area that is determined to be outside the 100-year and 500-year floodplains, comprises only an additional 484 acres. These Zone X areas have a 1% chance of sheet flow flooding where the average depths are less than 1 foot. No BFEs have been developed in this zone, and the purchase of flood insurance is not required.

## Location of Regulated Drains within the Elkhart River Watershed

Regulated drains consist of creeks, ditches, tiles (underground pipe systems), and other structures intended to move runoff water. Regulated drains are under the jurisdiction of the local county drainage board or the County Surveyor's office. Regulated drains are common in the Elkhart River Watershed.

Regulated drains are typically maintained by the County Surveyors office. This maintenance includes dredging with large construction equipment, removal of debris, and management of vegetation both within the regulated drains and within the riparian zone associated with the regulated drains. Based on the unpredictable maintenance schedule of regulated drains within the Watershed, it is difficult to assign a priority rating to these areas for potential improvement of wildlife habitat, water quality improvement measures, and erosion control measures within the Elkhart River Watershed.

Future potential BMPs within regulated drains in the Elkhart River Watershed should be evaluated prior to implementation. If regulated drains are considered for BMP measures, the Steering Committee should contact the local County Surveyors offices of Elkhart, Kosciusko, LaGrange, and Noble counties (see Appendix D) because the mapped locations of regulated drains change frequently.

## Threatened and Endangered Species

The IDNR was contacted to provide any Indiana Natural Heritage Data or related records for any listed threatened, endangered, or rare species, high quality natural communities or natural areas documented within the Elkhart River Watershed. Their response indicated that the Elkhart River Watershed is home to many Endangered and Threatened species, including two federally endangered species, the Indiana bat and American burying beetle, and one state endangered species, the eastern massasauga rattlesnake. The list of state endangered and threatened species is shown in Table 20 (Appendix A). The IDNR describes state endangered species as any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. The state also lists species that are rare, significant, and of special concern. There are 21 endangered animal species and 30 endangered and threatened vascular plant species within the Elkhart River Watershed (Appendix E). Endangered animal species include 12 bird species, 2 fish species, 1 insect species, 1 mammal species, and 5 reptile species. These plants and animals are indicators of high-quality natural communities.

The river otter is a success story that came out of enlistment as an endangered species. Reintroductions occurred across the state in 1997 – 1998. Thirty-five otters were released along the South Branch of the Elkhart River at the Mallard Roost Wetland Conservation Area in Noble County. Since the release, otters have survived, reproduced, and in 2005 were removed from the endangered species list. The Blanding's turtle is a state endangered species that will hopefully become another Elkhart River Watershed success story. The Blanding's Turtle is a medium-sized, semi-aquatic turtle that is state endangered. The most distinguishing feature of the Blanding's Turtle is its bright yellow chin and throat. Ronda DeCaire, Environmental Education Coordinator with the Elkhart Environmental Center, has seen Blanding's turtles frequently on site and within adjacent wetlands (pers. comm.) Blanding's turtles are best observed basking and are known to routinely use features within the wetland.