

Watershed Connections



Water Resources of Porter County, Indiana

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Introduction

Water is a vital resource for all citizens of Porter County. Water is essential for agriculture and industry, as well as for recreation and drinking. A healthy environment and economy require clean water and healthy watersheds. Porter County has an area of 425 square miles or 272,000 acres. Its population is approximately 145,000 people.

This publication gives basic information about surface and ground water resources of Porter County and discusses human activities that may be affecting them. Many sources of information were used in preparing this publication. All sources, along with dates for the statistics and numbers presented, are listed on the last page of this publication under "Sources of Information." The reader is encouraged to refer to these sources for further information.

Porter County Streams and Watersheds

A watershed is a region of land that drains into a lake, stream, or river. Watersheds are important because everything done on the land within a watershed can affect the lake or river into which it drains.

The quality of our water is affected not only by what might be dumped in the river, but by everything we do on the land in the watershed.

Porter County crosses two major watersheds of North America. The northern part of the county is in the Great Lakes watershed, which flows east to the Atlantic Ocean. The southern part of the county is in the Mississippi River watershed, which flows west and south to the Gulf of Mexico (see Figure 1).

Most of the Lake Michigan Watershed in Porter County flows through the Little Calumet River which originates in LaPorte County and drains into Lake Michigan through Burns Ditch in northwest Porter County. Its major tributary is Salt Creek. Figure 2 shows a map of Porter County with the major roads, towns, and waterbodies.

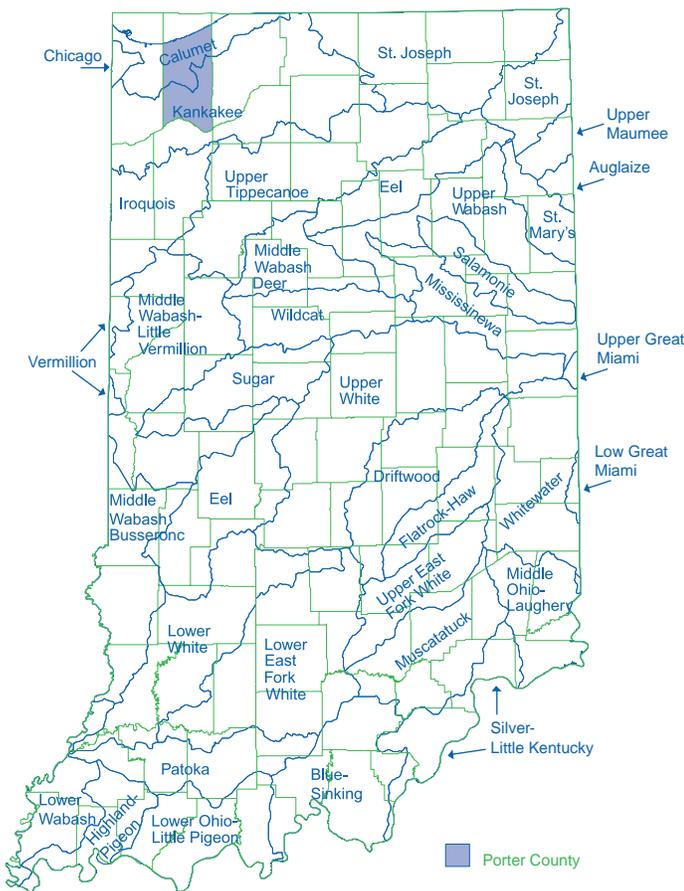


Figure 1. Major Watersheds of Indiana. Porter County is in the Calumet (Lake Michigan) and Kankakee River Watersheds.

Porter County

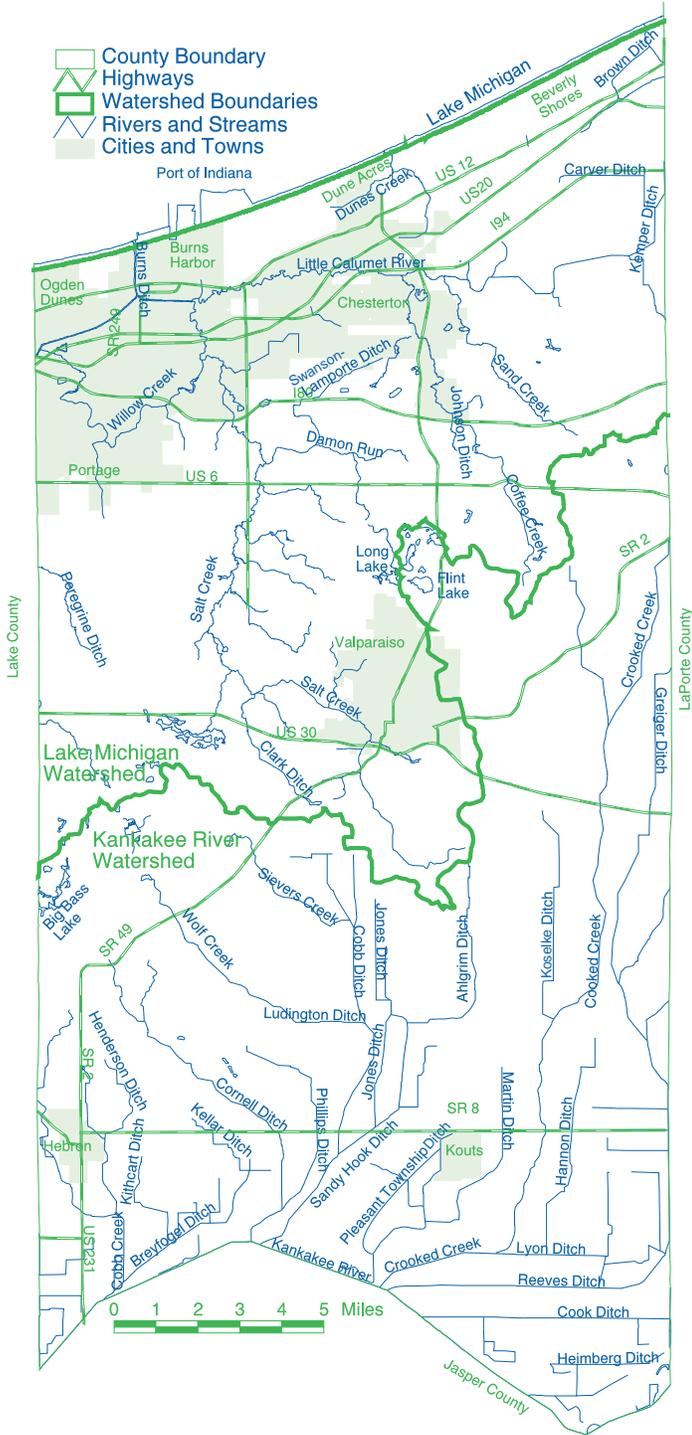


Figure 2: Porter County Streams and Watersheds.

The southern part of the county is drained by many ditches and streams that flow into the Kankakee River. The natural drainage in this area has been augmented through the installation of an extensive network of ditches and field tile. The Kankakee River itself was dredged and straightened in the early 1900's.

Discharge for a stream or river is the volume of water flowing per unit of time. A typical unit for measuring discharge is cubic feet per second (cfs). *Gauging stations* measure discharge continuously in a stream or river and are run by the U.S. Geological Survey in Porter County. Gauging stations are located in the Little Calumet River at Porter, Burns Ditch at Portage, and the Kankakee River near Kouts. The monthly average discharge for two of these streams is shown in Figure 3. Highest flows generally occur February through April while low flows usually occur August through October, a pattern typical for most streams in Indiana. However, maximum daily flows can vary widely due to flooding and droughts.

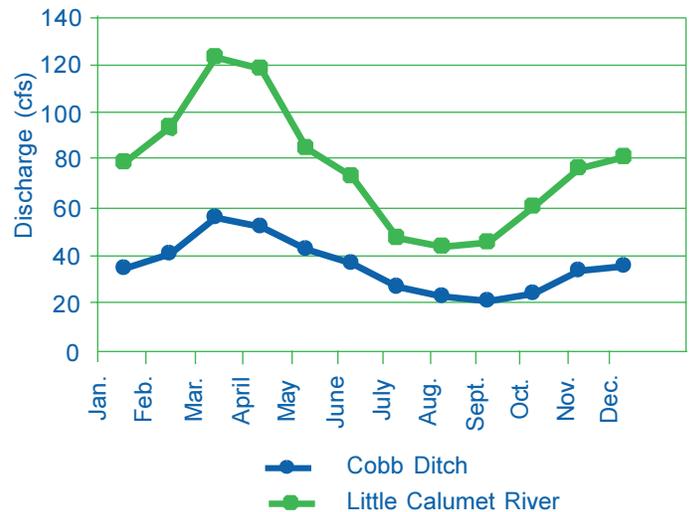


Figure 3. Average monthly discharge for two Porter County Rivers.

Floodplains are low areas adjacent to river or stream channels. Floodplains exist because river channels are rarely large enough to contain major floods. These areas have flooded in the past and will flood again. Floodplains have been delineated for Porter County by the Federal Emergency Management Agency. A general map of floodplains is shown in Figure 4. The Porter County Surveyor and the Natural Resources Conservation Service (NRCS) Office have maps that show detailed boundaries of floodplains, which should be reviewed before planning any development in an identified floodplain.

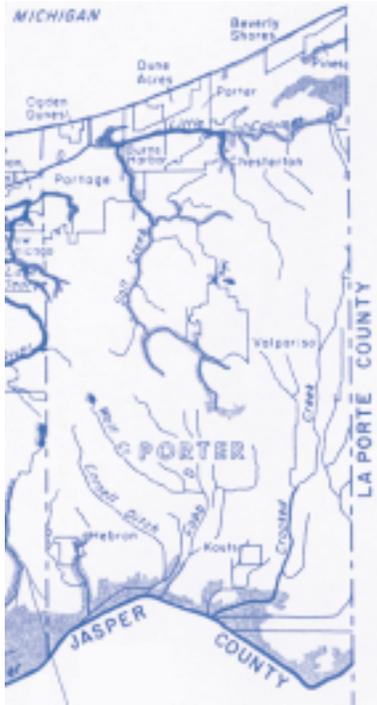
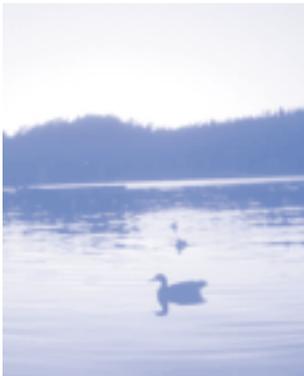


Figure 4: 100 Year Floodplains

Porter County Lakes and Wetlands

There are many lakes in Porter County, both natural and man-made. The larger lakes include Lake Michigan, Lake Eliza, Lake Louise, Big Bass Lake, Clear Lake, Holiday Lake, Sager Lake, Flint Lake, Loomis Lake, Spectacle Lake, Long Lake, Canada Lake, Moss Lake, and Wauhob Lake.



Porter County has about 18,000 acres of wetlands including about 10,000 forested acres. In the 1700's, much of northern Indiana was wetlands and marshes. Today approximately 6.6 % of Porter County acreage is wetland habitat. Wetlands help maintain the quality of surface and ground water by removing potential pollutants

such as sediments, nutrients, and pesticides from the water. Wetlands provide habitat for wetland flora and fauna. Also, wetlands provide aesthetics, recreation such as hunting and fishing, and reduction in peak flood levels.

The Lake Michigan shoreline is a major asset to Porter County. Lake Michigan is the only Great Lake that lies entirely within the United States. Lake Michigan has an average natural depth of 279 feet and holds 22% of the total volume of the Great Lakes.

Porter County Precipitation

The average yearly precipitation (rain, snow, sleet, and hail) in Porter County is approximately 40 inches. Precipitation is relatively constant throughout the year, as shown in Figure 5. The bars show average monthly precipitation, while the lines show the 20% wettest and driest year expected.

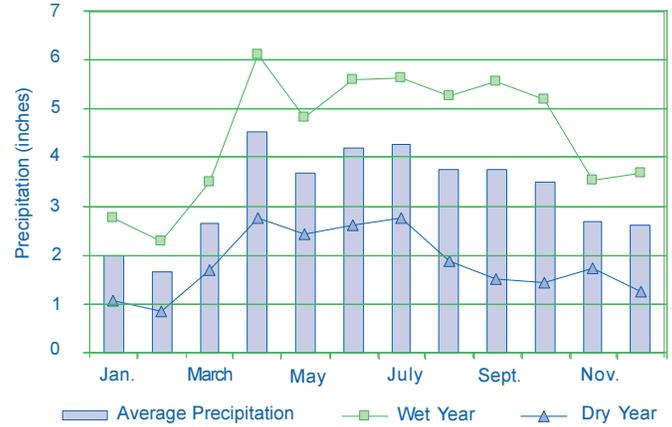


Figure 5. Average monthly precipitation in Porter County.

Individual storms can cause flooding, so precipitation records over many years have been analyzed to assess the probability of storms of a certain size occurring. Precipitation probability for a single storm is generally expressed in terms of a return period, which means the expected number of years between storms of a given size. A “5-year storm” has a 20% chance of occurring in any one year, so it is likely to occur about every 5 years, on the average. However, it is possible for a 5-year storm to occur many years in a row or even several times in a single year. A 100-year storm has a 1% chance of occurring in any year. The 100-year storm is particularly important, because the area that is expected to be flooded by the 100-year storm is generally considered to be the “floodplain” mapped in Figure 4. Figure 6 shows the expected 24 hour rainfall for Porter County for various return periods.

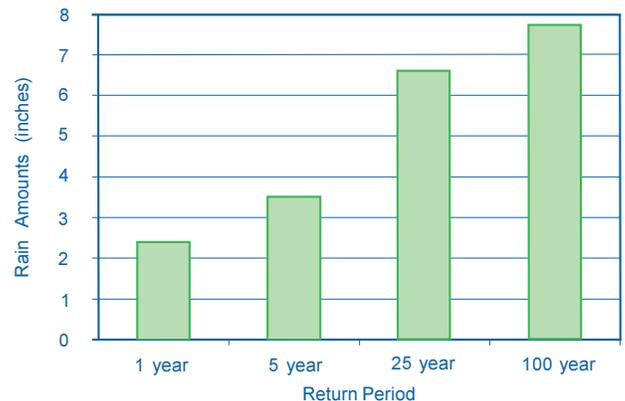


Figure 6: Expected 24 hour rainfall (inches). (from the Midwestern Climate Center Bulletin, #71)

Porter County Water Use

Porter County citizens and industry use water for many purposes. The largest water use in Porter County is for industry, and the second is thermoelectric (NISOURCE Power). The third is for domestic purposes, which include water in homes for drinking, washing, flushing toilets, and watering gardens. Approximately 60% of all wastewater comes from bathroom usage.

Table 1 shows how home wastewater is generated.

Action	Average Water Usage (Gallons)	
	Standard	Conservative
Toilet Flushing	6	1.5-3
Tub Bath	30 (half full)	15 (quarter full)
Shower (10 min)	50	25
Laundry	50 (whole units)	40 (newer units)
Dishwashing - By Hand	16 (faucet rinse)	6 (basin rinse)
Dishwashing- By Machine	12-15 (older rinse)	6-9 (newer units)
Brushing Teeth	2 (water running)	1/8 (turn off faucet)
Hand Washing	2 (water running)	1 (basin/brief rinse)
Shaving	3-5 (water running)	1 (basin/brief rinse)

Table 1. Average Home Water Usage (USGS, 1996).

Porter County Drinking Water

Drinking water is supplied either by public water systems (which may use surface water or ground water) or by private wells. About 67% of Porter County households use water supplied by one of the 18 public water systems, while the other 33% have their own wells. The major water supplier is Indiana American, which supplies water from Lake Michigan to the northwest quadrant of Porter County. One-third of Porter County residents use water from Lake Michigan. All public drinking water in Porter County must be used in the watershed (Lake Michigan or Kankakee) where it originates.

Ground water is used by the municipal systems of Valparaiso, Kouts, and Hebron. Many mobile home parks and developments use ground water wells. All community public water suppliers using ground water are required to develop a **Wellhead Protection Plan** to protect water quality. The city of Valparaiso was the first city in the state to successfully complete its Wellhead Protection Certification in February, 1999.

Each system must identify the area surrounding their wellhead (the wellhead protection area) where possible contaminants could reach the groundwater supply, identify potential sources of contamination within this area, and develop a management plan to minimize risk from these sources. Some examples of potential sources of contamination include fuel storage tanks, fertilizers and pesticides, septic systems, landfills, and industrial chemicals. For more information, contact your public water supplier, the Indiana Department of Environmental Management, or Purdue Extension (see "Sources of Information").

Public water systems test drinking water for a number of contaminants including:

- volatile organic compounds such as gasoline or solvents
- pesticides and other synthetic organic compounds
- lead, nitrate, and other inorganic substances
- microbial contaminants such as bacteria

Information on contaminant levels found in your tap water is available from your water supply system. Starting in 1999, all systems are required to send out an annual report on the quality of tap water they supply. This report provides all citizens the opportunity to know what is in the water they drink. Be sure to read yours, and contact the office of your water system supplier if you have any questions.

Porter County Water Quality

Surface Water Quality

Surface water quality in the United States has greatly improved since the enactment of the Clean Water Act in 1972. Sewage treatment plants and industries, which previously discharged minimally-treated pollution into streams, are now required to have permits for all discharges. Although much remains to be done, some rivers that once barely supported fish are now fully supportive of a variety of aquatic life. Several lakes were analyzed as part of a lake study carried out by the Indiana Clean Lakes Program in 1995. The Trophic State Index is an estimate of lake condition based on nutrition or biological productivity, ranging from 0 to 75. A lake with low Trophic State Index (0 to 25) has low concentrations of nutrients and is clear with little algae. A high Trophic State Index (50 to 75) has high concentrations of nutrients, low dissolved oxygen levels during summers, and abundant weeds and algae. Nutrients such as phosphorus or nitrogen stimulate increased growth in aquatic plants. Most of Porter County's lakes fall in the middle range of the index.

Table 2 shows the Trophic State Index for Porter County’s major lakes. Most lakes were clearer in 1995 than in 1970.

Lake	Surface area (acres)	Trophic State Index 1995	Trophic State Index 1970
Eliza	45	93	42
Flint	98	16	25
Long	95	31	33
Loomis	53	32	56
Spectacle	12	41	40
Wauhob	21	21	31

Table 2. Trophic State Index for Porter County Lakes.
(source: Indiana Clean Lakes Program)

Fish in most rivers and streams in the Lake Michigan watershed in Porter County are contaminated by PCBs or mercury, according to the 1999 Fish Consumption Advisory provided by the Indiana State Department of Health. Therefore, fish from rivers in Porter County should be consumed rarely, and some should not be consumed at all. These recommendations are particularly important for women who are pregnant or breastfeeding, women who plan to have children, and children under the age of 15. For more information, consult the most recent Indiana Fish Consumption Advisory. This publication is available from the Indiana Department of Natural Resources (100 Water Street, Michigan City).

Many streams in Porter County are on Indiana’s list of impaired water bodies that are scheduled to have TMDLs developed by about 2014. A TMDL (total maximum daily load) is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. In other words, it is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources, and includes a margin of safety and consideration of seasonal variations. In addition, a TMDL contains the reductions needed to meet water quality standards and allocates those reductions among the sources in the watershed. Water bodies that are impaired, along with the cause or reason they are listed, are given in Table 3.

Ground Water Quality

Ground water quality in Porter County is generally good. Some private wells may be contaminated by bacteria or nitrate, often from nearby faulty septic systems.

Water Body	Severity Ranking	Locations	Reason
Kankakee River	Medium	LaPorte to Lake Counties	PCBs and Mercury; E. Coli
Cobb Creek/Breyfogel Ditch	Medium	Hebron	Dissolved Oxygen
Little Calumet River	Medium	East of Chesterton	PCBs and Mercury
Little Calumet River	High	Porter to Chesterton	PCBs and Mercury; Cyanide, Pesticides, E. coli
Salt Creek	Low	Portage to Valparaiso	E. coli
Burns Ditch	High	Lake Station to Portage	PCB and Mercury Pesticides; Lead; E. Coli; Impaired Biotic Communities
Lake Michigan	High	LaPorte to Lake Counties	PCBs and Mercury; E. Coli
Crooked Creek	Medium	Valparaiso	Impaired Biotic Communities
Dunes Creek	Medium	Tremont	Impaired Biotic Communities

Table 3. Porter County Waterbody Impairment, 1998

One of the sources of information on Porter County ground water quality is a voluntary private well testing program carried out from 1997 through 1999 by the Porter County Soil & Water Conservation District and Purdue Extension (Table 4). Nitrate, which has adverse effects on infants, was found at levels above the drinking water standard in 6 wells tested (1.3%). These households should treat their water with reverse osmosis or distillation or used bottled water, particularly if an infant is present or expected in the household.

Contaminant	Number of Wells Tested	Number of Wells Exceeding the Drinking Water Standard
Nitrate	444	6
Triazine Herbicides	151	0
Acetanilide Herbicides	1161	1

Table 4. Well testing results in Porter County, 1997-1999.
(source: Nitrate and Pesticides in Private Wells of Indiana)

Screening was also done for two pesticide groups. Triazine herbicides include atrazine, Bladex, and Princep. None of the wells tested showed levels of concern for these pesticides. Acetanilide herbicides include Lasso, Dual, Ridomil, and the breakdown products of these herbicides. One well tested showed a level of concern for these pesticides, although a breakdown product of Dual may be responsible for this finding.

Testing of private wells should continue every few years to be sure that water remains safe. Call the Porter County Health Department for information on how you can have your water tested for E.coli bacteria. A current list of certified laboratories can be found in the Purdue Extension publication “Water Testing Laboratories” (See “Sources of Information”).

Potential Sources of Pollution in Porter County

Pollutants can be separated into two categories, point source and nonpoint source, depending on how they get into the water. *Point source pollution* refers to contaminants that enter the water directly, usually through a pipe. Examples are sewage treatment plants and industrial facilities, which have permits to discharge prescribed quantities of contaminants into a specific stream. *Nonpoint source pollution*, commonly referred to as run-off, originates polluted throughout the watershed, and enters the water at locations that cannot be easily identified. Examples of nonpoint source pollution include sediments, nutrients, pesticides, oil, and hazardous chemicals. Point and nonpoint source pollution are illustrated in Figure 7. Nonpoint source pollution, which is not regulated, is currently the primary cause of water quality degradation in the United States.

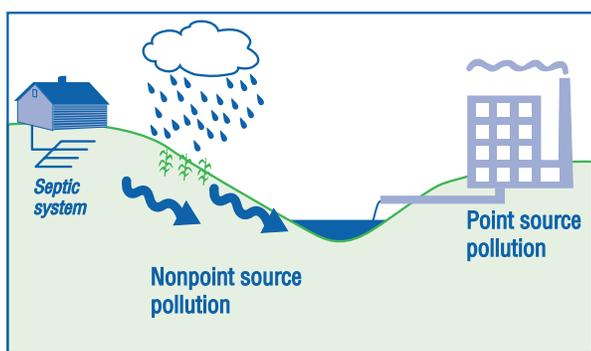


Figure 7: Point source and nonpoint source pollution.

Point Source Pollution

Excellent information is available about point source discharge because permits are required in Porter County. There are currently 32 facilities (municipal sewage treatment plants, factories, schools, packing plants, etc.) permitted to discharge wastes in Porter County’s water.

The largest dischargers are NISOURCE, Bethlehem Steel Corporation, National Steel (Midwest Division), the Chesterton, Portage, Valparaiso Municipal sewage treatment plants, and the South Haven Water Works, Inc.

Nonpoint Source Pollution

Nonpoint source pollution exists everywhere water runs off in the watershed, and can come from urban or rural areas. Nonpoint source pollution can result from normal home and farm activities as well as accidents or spills.

Urban and Residential Nonpoint Sources

Septic systems have the potential of leaching nutrients into the ground water and can contaminate the surface water if the systems are not functioning properly. About 30% of the 47,000 households in Porter County use a septic system for waste disposal, while the other 70% are connected to a public sewer system (which treats the waste and then discharges it into a river or lake as a point source). No information is available on how well the more than 14,000 septic systems in the county are performing, although persistent pathogens found in water sampling programs suggest that some systems may be failing or were constructed before current design criteria were established. According to the NRCS Soil Survey, 83% of the soils in Porter County have severe limitations, such as a high water table, for conventional septic systems. This limitation may be overcome by proper design, improved systems, and perimeter drainage.



Salt, oil, fertilizers and pesticides for lawns, and antifreeze are other examples of urban pollutants that can be washed off from rain and enter the water system as pollutants. No figures are available on runoff of urban lawn chemicals and animal wastes, which may be other sources of pollution from residential areas.

Agricultural Nonpoint Sources

Agriculture can also contribute to nonpoint source pollution. Sediment, nutrients, pathogens, and pesticides can be transported by water from cropped fields and land where manure is applied. Roughly 132,000 acres or 49% of Porter County is used for planting crops. Major crops are corn, soybeans, and small grains. Large livestock facilities require a permit from the Indiana Department of Environmental Management (IDEM).

No specific statistics are available for pesticide use or runoff in Porter County. Indiana Agricultural Statistics tracks pesticide use statewide and this information could be assumed to represent Porter County. In Indiana, the

most widely used pesticides are the herbicides atrazine, alachlor, and metolachlor. Modern pesticides and herbicides, when properly applied, generally break down to nontoxic components in about six months. Large-scale studies carried out in Indiana and elsewhere have shown that typically about 1% of applied pesticides end up in lakes or rivers.

Many farmers are changing their practices to protect water resources. Erosion and chemical runoff from fields can often be reduced by using conservation tillage, defined as any tillage or planting system that covers 30% or more of the soil surface with crop residue. Conservation tillage was used on 45% of the cropland of Porter County in 1995 and 65% in 2000. Most farmers test their soils to ensure that crops only receive the amount of fertilizer needed, and many have installed grass waterways and buffer strips to protect water quality and provide habitat for wildlife.

Protecting the Water

There are many things you can do to protect surface and ground water quality.

1. Be Informed

This publication gives you a start in becoming familiar with water issues that affect Porter County. You can obtain further information, such as the Water Quality series of publications, from the Porter County Extension office at the Porter County Administration Building (465-3555). The Porter County Soil and Water Conservation District, Natural Resources Conservation Service, and Indiana Department of Natural Resources - Soil Conservation can provide information and technical assistance to any Porter County resident (462-7515). The Porter County Plan Commission (465-3540) and Porter County Surveyor, Land Use and Drainage (465-3560) can provide information on land use issues and concerns. Web sites listed in the "Sources of Information" section can provide additional information.

2. Be Responsible

You can take actions in your own home and yard to protect water quality. For example, keep litter, pet waste, leaves, and grass clippings out of gutters and storm drains. Never dispose of any household, automotive, or gardening wastes in a storm drain. Keep your septic system in good working order. Always follow directions on labels for use and disposal of household chemicals. Take used motor oil, paints, and other hazardous household materials to proper disposal sites. For more information contact the Solid Waste District (465-3694).

In your yard, determine whether additional nutrients are needed before you apply fertilizers. If you own or manage land that a stream flows through, protect the stream banks by planting buffer strips of native vegetation. Buffer strips are tracts of land not cultivated along streams and rivers to reduce runoff of soil and pesticides into water bodies.

3. Be Involved

As a citizen, one of the most important things you can do is find out how your community protects water quality, and speak out if you see problems. Several groups are working locally in Porter County and neighboring counties to protect and improve water quality: Northwest Territory RC&D (call the NRCS office at 462-7515), and the Valparaiso Chain of Lakes Watershed Group (465-3560).

Porter County's water resources are plentiful, of good quality, and essential for continued health and prosperity. Everyone's help is needed to protect these vital water resources.

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Sources of Information

Introduction

- Area: Soil Survey of Porter County, U.S. of Department Agriculture, Soil Conservation Service, 1969.
- *Population*: Population estimates from the Indiana Business Research Center and the U.S. Census Bureau at <http://www.iupui.edu/it/ibrc/>

Porter County Streams and Watersheds

- Gauging stations and discharge: Water Resources Data - Indiana, Water Year 1994. U.S. Geological Survey Water - Data Report IN-94-1.
- Peak flows from the USGS Water Data Retrieval Site at <http://waterdata.usgs.gov/nwis-w/IN/>. The St. Joseph River at Fort Wayne is 04180500, and the St. Mary's River is 04182000.
- *Floodplains*: The Indiana Water Resource: Availability, Uses, and Needs. Governor's Water Resource Study Commission, State of Indiana, G.D. Clark, Editor, 1980.

Porter County Lakes and Wetlands

- Indiana Lake Water Quality Update for 1989-1993. Indiana Department of Environmental Management, Office of Water Management Clean Lakes Program, Indianapolis.
- Indiana 305(b) Report, Indiana Department of Environmental Management, Office of Water Management. 1994-1995.
- Wetlands estimates from National Wetlands Inventory, carried out in the 1980's by the U.S. Fish and Wildlife Service <http://wetlands.fws.gov>.

Porter County Precipitation

- *Amount of Precipitation*: Soil Survey of Porter County.
- *Storm Information*: Rainfall Frequency for Indiana. Department of Natural Resources, Division of Water. Sept. 1994.
- Midwestern Climate Center Bulletin, #71

Porter County Ground Water

- Indiana Historical Bureau at: <http://www.statelib.lib.in.us/WWW/ihb/physio.HTML>

Porter County Water Use

- 1996 Water Use from U.S. Geological Survey Water. Web page at: <http://water.usgs.gov/watuse>

Porter County Drinking Water

- 1990 census information
- U.S. Geological Survey Water Use Web page
- IDEM Office of Water Management, Drinking Water Branch, <http://www.ai.org/idem/owm/dwb>
- Purdue Extension "Safe Water for the Future" program, <http://www.ecn.purdue.edu/SafeWater>

Porter County Water Quality

- *Indiana 305(b) Report*, Indiana Department of Environmental Management (IDEM), Office of Water Management. 1994-1995.
- 1999 Indiana Fish Consumption Advisory. Indiana State Department of Health, Environmental Epidemiology Section. Obtain a copy at (317) 233-7808 or at <http://www.state.in.us/doh/html/fish/fishtoc.html>
- Water testing laboratories information: WQ-1, Water Testing Labs, available from the Porter County CES Office or 1-888-EXT-INFO.
- Nitrate and Pesticides in Private Wells of Indiana. The Water Quality Laboratory, Heidelberg College and Indiana Farm Bureau, 1994.
- IDEM Impaired water bodies, www.ai.org/idem/owm/planbr/wqs/

Potential Sources of Pollution in Porter County

- *Point Source Pollution*: "Envirofacts" Permit Compliance System of the U.S. Environmental Protection Agency at: http://www.epa.gov/enviro/pcs/pcs_query.html and toxic release information at: http://www.epa.gov/enviro/html/tris/tris_query_java.html
- *Septic Systems*: Estimates for the 1990 U.S. Housing Census at site <http://sasquatch.kerr.orst.edu/stateis.html>
- *Crops and Tillage*: Crop Residue Management Survey results from Conservation Technology Information Center at <http://www.ctic.purdue.edu/CRM/CRMoptions.html>
- *Fertilizer*: Indiana Fertilizer Tonnage Report. Office of Indiana State Chemist, Purdue University, 1996.
- *Livestock*: Agricultural Census at <http://govinfo.kerr.orst.edu/ag-stateis.html>

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