Indiana State Nonpoint Source Management Plan

2014 Update

Vision: "To restore waters impaired by nonpoint source pollution and maintain water quality in healthy watersheds through locally led partnerships."

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Indiana Department of Environmental Management
Office of Water Quality
Watershed Assessment and Planning Branch
Watershed Planning and Restoration Section

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Acronyms List

AIMS	Assessment Information Management System
AOC	Area of Concern
AWEP	Agricultural Water Enhancement Program
BMP	Best Management Practice
BONWR	Big Oaks National Wildlife Refuge
CAFO	Concentrated Animal Feeding Operation
CALM	Consolidated Assessment and Listing Methodology
CCPI	Cooperative Conservation Partnership Initiative
CEES	Center for Earth and Environmental Science
CFU	Colony Forming Unit
CIG	Conservation Innovation Grant
CLP	Clean Lakes Program
CNPCP	Coastal Nonpoint Control Program
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSO	Combined Sewer Overflow
CSP	Conservation Securities Program
CWA	Clean Water Act
CWI	Clean Water Indiana
CWSRF	Clean Water State Revolving Fund
CZARA	Coastal Zone Act Reauthorization Amendments
CZMA	Coastal Zone Management Act
DO	Dissolved Oxygen
DOR	Division of Reclamation
EDF	External Data Framework
EQIP	Environmental Quality Incentives Program
ERB	Environmental Review Board
EWPP	Emergency Watershed Protection Program
FFY	Federal Fiscal Year
FOTG	Field Office Technical Guide
FRPP	Farmland and Ranchland Protection Program
FSA	Farm Service Agency
FWA	Fish and Wildlife Area
GAO	Government Accountability Office
GIS	Geographical Information System
GLRI	Great Lakes Restoration Initiative
GRTS	Grants Reporting and Tracking System
GW	Ground Water
GWMN	Ground Water Monitoring Network
HAB	Harmful Algal Bloom
HR	Hoosier Riverwatch
HRI	Healthy Rivers Initiative

HUC	Hydrologic Unit Code
IAC	Indiana Administrative Code
IASWCD	Indiana Association of Soil and Water Conservation Districts
IBC	Impaired Biotic Communities
IBI	Index of Biotic Integrity
IC	Indiana Code
ICP	Indiana Conservation Partnership
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
IGS	Indiana Geological Survey
IR	Integrated Report
ISDA	Indiana State Department of Agriculture
ISDH	Indiana State Department of Health
IU	Indiana University – Bloomington
IU-SPEA	Indiana University School of Public and Environmental Affairs
IUPUI	Indiana University – Purdue University Indianapolis
IWLA	Indiana Watershed Leadership Academy
LaMP	Lakewide Management Plan
LARE	Lake and River Enhancement program
LMCP	Lake Michigan Coastal Program
L-THIA	Long-Term Hydrologic Impact Analysis tool
mIBI	Macroinvertebrate Index of Biotic Integrity
MOU	Memorandum of Understanding
MRBI	Mississippi River Basin Initiative
MS_4	Municipal Separate Storm Sewer System
NASS	National Agricultural Statistics Service
NH_3	Chemical formula for ammonia
NIPSCO	Northern Indiana Power Service Company
NIRPC	Northwest Indiana Regional Planning Commission
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWQI	National Water Quality Initiative
OISC	Office of the Indiana State Chemist and Seed Commissioner
ORSANCO	Ohio River Valley Sanitation Commission
OSDS	On-site Disposal System (a.k.a. septic systems)
OSMRE	Office of Surface Mining Reclamation and Enforcement
OSRW	Outstanding State Resource Water
OWQ	Office of Water Quality (IDEM)
P.L.	Public Law
ppb	Parts per billion
ppm	Parts per million
PWQ	Pathway to Water Quality
QAPP	Quality Assurance Project Plan
QHEI	Qualitative Habitat Evaluation Index

QMP	Quality Management Plan
RAP	Remedial Action Plan
RC&D	Resource Conservation and Development District
RCaP	Rural Community Assistance Program
RPT	Recovery Potential Tool
RWWTF	Rural Wastewater Task Force
SIDMA	Social Indicators Data Management and Analysis tool
SMCRA	Surface Mining Control and Reclamation Act
SRF	State Revolving Fund
SSC	Suspended sediment concentration
SSCB	State Soil Conservation Board
SWAP	Source Water Assessment Plan
SWCD	Soil and Water Conservation District
SWOT	Strengths, Weaknesses, Opportunities and Threats analysis
SWQMP	Storm Water Quality Management Plan
TBD	To Be Determined
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TSS	Total suspended solids
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
U.S. EPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WASCoB	Water and Sediment Control Basin
WHIP	Wildlife Habitat Incentive Program
WLEB	Western Lake Erie Basin
WMP	Watershed Management Plan
WQC	Water Quality Certification
WQMS	Water Quality Monitoring Strategy
WQS	Water Quality Standards
WREP	Wetland Reserve Enhancement Program
WRP	Wetland Reserve Program
WSS	Watershed Specialist
WWH	Warm-water habitat

Mission Statements

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

The Indiana Department of Environmental Management's core mission is to implement federal and state regulations to protect human health and the environment, while allowing the environmentally sound operation of industrial, agricultural, commercial, and governmental activities vital to a prosperous economy.

OFFICE OF WATER QUALITY

The Office of Water Quality's mission is to monitor, protect, and improve Indiana's water quality to ensure its continued use as a drinking water source, habitat for wildlife, recreational resource, and economic asset.

The office achieves this by developing rules, guidance, policies, and procedures; assessing surface and ground water quality; regulating and monitoring drinking water supplies and wastewater treatment facilities; and protecting watersheds and wetlands. The office also provides outreach and assistance to the regulated community and the public, while supporting environmentally responsible economic development.

Executive Summary

The Indiana State Nonpoint Source Management Plan ("Plan") guides the usage of Clean Water Act (CWA) Section 319 funds received by the Indiana Department of Environmental Management (IDEM) from the United States Environmental Protection Agency (U.S. EPA). Current U.S. EPA policy requires states to update their Plans every five years. This 2014 revision of the Plan is an update of the latest edition which was completed in 2008 (IDEM 2008).

Nonpoint source water pollution in general is a reflection of land uses on a given watershed landscape. Nonpoint source pollution in Indiana originates from a variety of sources, including agriculture, forestry, mining, and urban or residential land uses. Of the 63,130 miles of streams and rivers in Indiana and 106,205 acres of lakes, 27,452 miles of flowing waters and 43,613 lake acres are considered impaired for one or more designated use(s) (IDEM 2012a), the majority of which are believed to be impaired by nonpoint source.

Under its previous five-year program plan (approved in 2008), Indiana formulated a multi-layered approach to the treatment of nonpoint source pollution that includes monitoring, targeted implementation, and education and outreach. Monitoring and modeling form the basis of the program. Watersheds eligible for 319 funding must be included on the current 303(d) List of Impaired Waters ("impaired waters"); or have had a Total Maximum Daily Load (TMDL) calculated for pollutants in the watershed; or have an approved watershed management plan (WMP). Indiana has targeted its restoration dollars to watersheds with impaired waters that have demonstrated stakeholder interest in tackling nonpoint source issues and show the most potential for success. Section 319 watershed planning and implementation grant recipients undertake an outreach campaign for the local watershed and encourage the use of best management practices (BMPs) on targeted lands. Cost-share for those BMPs is often provided through a Section 319 grant or through the United States Department of Agriculture's (USDA) Farm Bill programs. As a result of these efforts, Indiana has been able to show successful restoration of several streams and watersheds (Table 6).

In April 2013 U.S. EPA released new guidance for state nonpoint source programs to adhere to. This 2014 Nonpoint Source Management Plan update has been written to meet that guidance. Over the next five years, Indiana's Section 319 program proposes to continue working with state, federal and local partners to produce and implement watershed management plans. However, with shrinking funds available to continue this important work, Indiana proposes to work with partners to prioritize its watersheds for funding. Indiana will work to achieve a balance between restoration and protection activities funded through its programs.

This Plan will be reviewed annually by program staff to assess its continued validity. The next full revision of this program plan will be completed in FFY 2018.

Purpose of the Indiana Nonpoint Source Management Plan

The need to protect America's waterways from anthropogenic pollution has been an issue of national significance for well over a century. In 1899 Congress passed the Rivers and Harbors Act, legislation which, among other actions, prohibited the dumping of refuse into navigable waterways or their tributaries. The Federal Water Pollution Control Act was first enacted in 1948 and addressed public health issues relating to the polluted condition of ground and surface water. The Act was amended many times between 1948 and 1987, but perhaps the most significant of these revisions occurred in 1977.

The 1977 Amendments to the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA), outlined actions to be taken by the nation in order to mitigate pollutants in, and prevent further pollution to, surface waterbodies in the United States of America. The goal of the CWA was to restore and maintain the chemical, physical and biological integrity of the Nation's waters, with an interim goal of "water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water be achieved by July 1, 1983"(P.L. 95-217). While early CWA implementation actions by the nation and states focused on mitigating point source pollution by regulating industry and municipal waste through the National Pollutant Discharge Elimination System (NPDES program), it became clear that additional federal assistance was needed to address nonpoint source (or "run-off") pollution. To address this need, the U.S. Congress amended the CWA in 1987 to establish the Section 319 Nonpoint Source Management Program (Appendix A).

Nonpoint source pollution is that pollution carried to rivers, streams, lakes, ponds, wetlands, and ground water through storm water run-off, run-off from snowmelt, and atmospheric deposition. It is diffuse in nature and difficult to control, often having many contributing sources.

The Section 319 Nonpoint Source Program exists today primarily as a grant program with funding provided each year by Congressional appropriations under CWA Section 319. These funds are distributed to the U.S. Environmental Protection Agency (U.S. EPA), and then to the states, tribes and territories of the United States to control nonpoint source pollution.[1] States are required to identify, through CWA Sections 303 and 305, those waterbodies that do not meet water quality standards, including those impaired by nonpoint source. The states then outline a nonpoint source management program (Plan) to mitigate nonpoint source (subject to approval by U.S. EPA) and request Section 319(h) funding to implement their program. The Nonpoint Source Management Plan guides states' efforts to identify strategic priorities, develop goals and milestones, and work effectively to address the evolving state of their waters and engage partners to address statewide nonpoint source priorities. A portion of the financial assistance provided should be used for pass-through

[1] Because of the unique relationship between U.S. EPA and First Nations and territories of the United States, only state grants and programs (including territorial programs when territories are "treated as states") will be discussed here and elsewhere in this document.

grants, fund projects in which states competitively award funding to statewide and local initiatives to address nonpoint source pollution, and for Nonpoint Source Program administration to manage the funds and establish statewide nonpoint source initiatives. Section 319 funds can be used for activities such as technical assistance, financial assistance, planning, education, training, technology transfer, demonstration projects, and monitoring to assess the success of nonpoint source implementation projects.

Federal funding levels for the 319(h) program have fluctuated over the years since its enactment (Figure 1). Indiana received its maximum funding allocation of $5,220,600 in federal fiscal year (FFY) 2003. Since that time, a downward trend in funding level has been observed. In light of this shrinking federal funding for the Section 319 program, as well as major nonpoint source-fueled water quality problems such as hypoxia in the Gulf of Mexico and sedimentation and algal blooms in Lake Erie, the efficient use of nonpoint source funds is now more urgent than ever. A study done by the Government Accountability Office (GAO) in 2012 found that both U.S. EPA and states can do more to ensure that nonpoint source funding is spent according to the most efficient use of funds (GAO 2012). U.S. EPA performed a similar study in 2011 to evaluate the 319 program (U.S. EPA 2011). As a result of these two studies, U.S. EPA has formulated new guidelines for the 319 program, including revised guidance to U.S. EPA Regions on how to make consistent satisfactory progress determinations for the states, updated guidance for state nonpoint source management plans, and updated Nonpoint Source Program and Grants Guidance that includes a requirement that 50 percent of states revise their state nonpoint source management plans by September 2013.

Indiana's State Nonpoint Source Management Plan was last updated in 2008. This Plan revision will describe Indiana's strategies for reducing and preventing nonpoint source through program implementation, and document the methods Indiana will use to meet the criteria included in the U.S. EPA guidance "Eight Key Elements of an Effective State Program" (Appendix B).

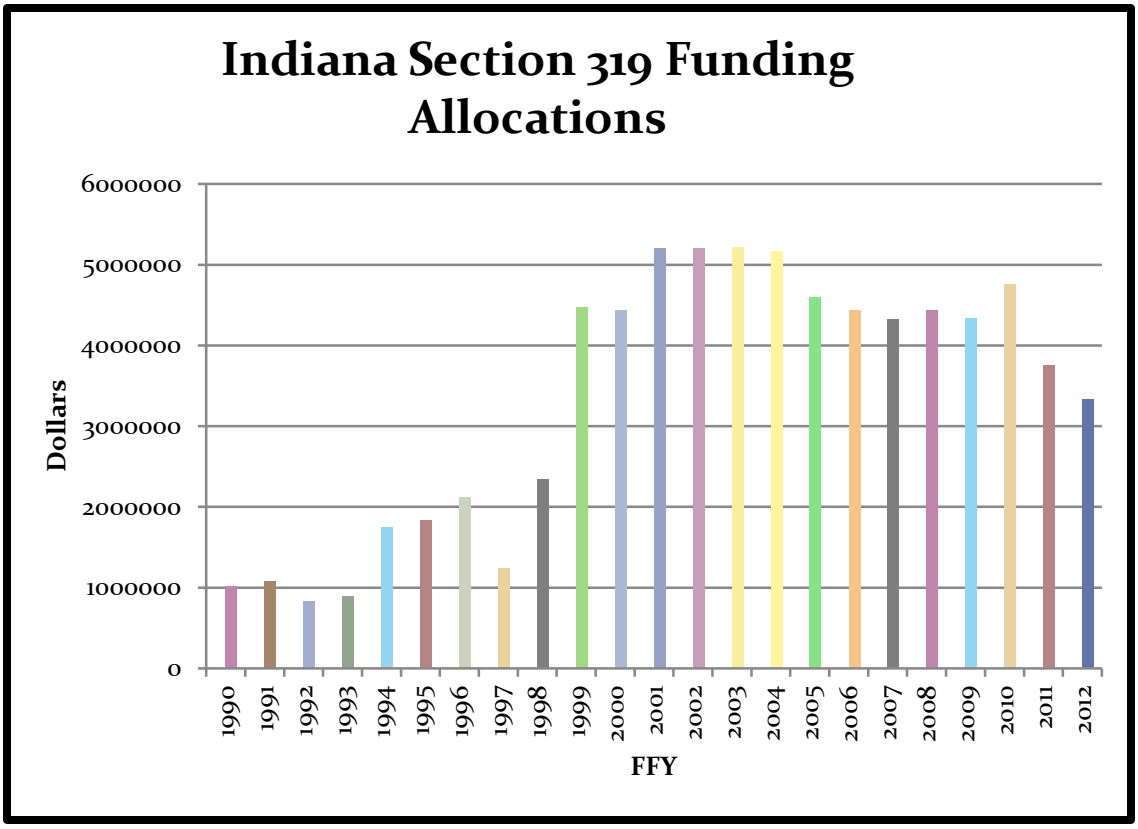

Figure 1. Section 319 Funding Allocation for Indiana.

Physical Inventory

Demographics, Population & Location

The State of Indiana covers more than 36,000 square miles in the Midwestern/Great Lakes Region of the United States and has a population approaching 6.5 million. Prior to European settlement, the state was predominately forested (primarily oak-hickory and beech-maple climax communities) and included large tracts of wetland in the north and small patches of prairies scattered throughout. Major rivers ran clear enough to see the substrate, as attested by the Native American names "Wabashiki" ("water over white stones") and "Wapahani" ("white sands") for the Wabash and White Rivers, respectively.

The state can be divided into several ecoregions: the Eastern Corn Belt Plains, Interior Plateau, Interior River Valleys and Hills, Central Corn Belt Plains, and Southern Michigan/Northern Indiana Drift Plains (Figure 2).

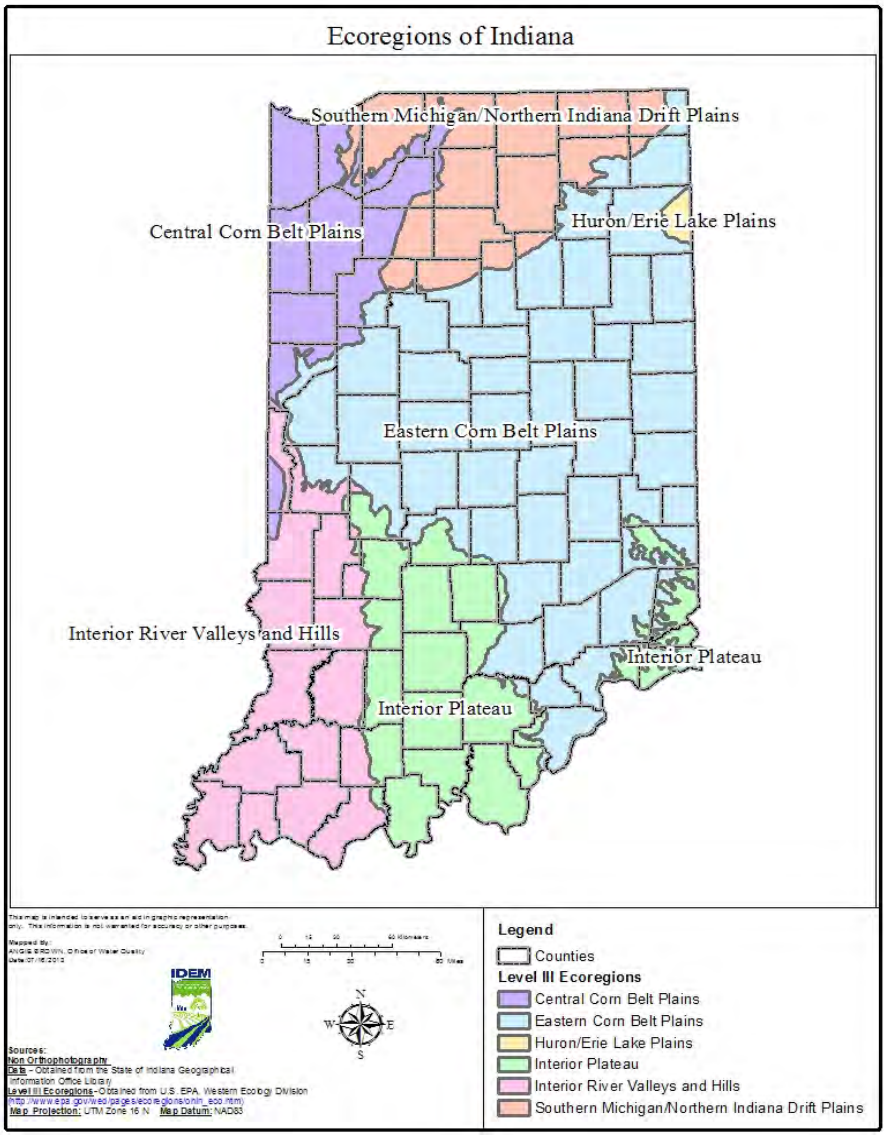

Figure 2. Ecoregions of Indiana. Data from http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm

Geology

Bedrock and Glacial History

Indiana is underlain by six different types of bedrock (limestone, shale, dolomite, sandstone, siltstone and coal) from five distinct geological periods (Figure 3). The topography of the state's bedrock drives drainage patterns to some extent. The highest points on the bedrock surface are found in Randolph and Wayne Counties, on a plateau from which four major river systems originate (White, Wabash, Whitewater and Great Miami Rivers). The lowest bedrock elevations are found in Posey and Vanderburgh Counties, near the confluence of the Wabash and Ohio Rivers.

The composition of bedrock has important implications for hydrologic networks in the state. In particular, limestone and dolomite are unstable over time, creating challenges for Indiana's construction and agricultural industries and recreational opportunities for Hoosier spelunkers. Limestone and dolomite were formed from the lithified remains of aquatic sea creatures that resided in the shallow sea covering Indiana during the early Paleozoic era (from the Cambrian through the Devonian period - approximately 542-359 million years ago) (Appendix C). These materials are rich in calcium carbonate and subject to dissolution from slightly acidic rainwaters. As a result of this dissolution, cave systems, sinkholes and sinking streams are formed, to create a landscape known as "karst." Karst geology is present in south-central and south-eastern Indiana. It is generally extremely vulnerable to pollution as surface water can bypass the filtering soil and infiltrate straight into ground water.

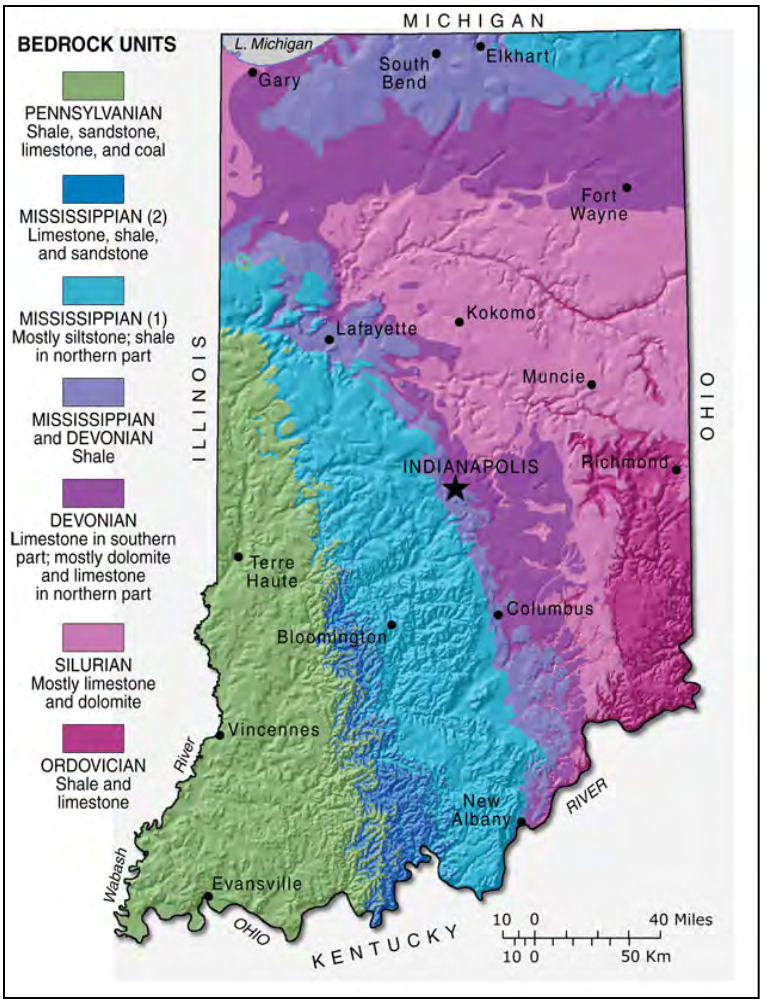

Figure 3. Bedrock Units of Indiana. (From Indiana Geological Survey; available from http://igs.indiana.edu/Bedrock/)

The surficial topography of Indiana has been shaped in large part by at least three major glaciations events of the Pleistocene epoch: the pre-Illinoian, Illinoian and Wisconsin glaciations.

As the shallow seas that covered Indiana receded, deposits of limestone, shale, siltstone, dolomite, sandstone and coal were left exposed to the erosive forces of wind and water. Over time, erosion and deposition caused soil to form atop the exposed bedrock. Around 2.5 million years ago, the most recent Ice Age began. Ice sheets from the Arctic reached down into the area that is now the United

States, eroding, churning and depositing the sediments born from bedrock. Several such events likely took place between 700,000 and 300,000 years ago, but since it is very difficult to characterize their chronology and extent, geologists simply refer to them as "pre-Illinoian." During the Illinoian glaciation (300,000-140,000 years ago), the ice sheet penetrated the majority of the state, excepting an upside-down "U"-shape that ranged from the Wabash-Ohio River confluence in the southwest, up to the Morgan-Monroe County line, and back down to present-day Jeffersonville in the southeast. When this ice sheet retreated, it left several tens of feet of sediment throughout its range in Indiana. The last glaciation occurred ca. 50,000 years ago when the Wisconsin glacier advanced into Indiana. It reached as far south as central Indiana, flattening the landscape and creating glacial lakes in northern Indiana, but leaving the rolling hills of southern Indiana virtually untouched.

Soils

Soil types in Indiana vary widely from well-drained prime farmland soils in the central and north-central region to the sandy soils of northwestern Indiana to very-poorly drained, mucky soils in certain parts of the central and east-central regions and southern bottomlands. Soil-related nonpoint source concerns include erosion from highly erodible and potentially highly erodible lands, depth to bedrock or ground water, potential nutrient run-off, hydric soils, and septic system suitability.

Statewide, nearly 2.4 million acres of cropland have been classified as "at risk" for sheet and rill erosion. Of those at-risk acres, 90 percent still need treatment. In addition, about 1 million acres of pasture and 2.4 million acres of forestland are also at risk due to sheet and rill erosion, with nearly 98 percent of pasture and 99.7 percent forest at-risk acreage still needing protection. While sheet and rill erosion are problematic in most of the state, soil damage via wind erosion is a concern in the northwestern portion of the state (NRCS 2011).

Field Indicators of Hydric Soils for All Soils	
A1.	Classified as a Histosol or Histel
A2.	Histic epipedon underlain by mineral soil material with chroma 2 or less.
A3.	Black Histic.
A4.	Hydrogen sulfide odor within 30 cm of soil surface.
A5.	Stratified Layers starting within the upper 15 inches.
A6.	2% or more organic bodies of muck or mucky modified mineral texture starting within 15 cm of soil surface.
A7.	Mucky mineral layer 5 cm or more thick, starting with 15 m of soil surface.
A8.	Layer of muck starting within 15 cm or more of the soil surface.
A9.	1 cm muck or more thick within 15 cm of surface.
A10.	2cm or more muck layer starting in first 15 cm.
A11.	Depleted below dark surface.
A12.	Thick dark surface.
A13.	Alaska gleyed
A14.	Alaska redox.
A15.	Alaska gleyed pores.
A16.	Coast prairie redox

Table 1. Selected Field Indicators of Hydric Soils. (NRCS 2010)

To a degree, soil can act as a filter of suspended and dissolved particles, chemicals and compounds. As surface water infiltrates, then percolates through soil, a variety of substances can become adsorbed, altered, or taken up by roots and microorganisms. The degree to which the soil can clean polluted water is highly variable, depending upon soil type, pollutants involved, and depth to ground water or impermeable materials. Where these conditions allow shortened contact time between the soil and pollutants, the risk of pollutants reaching the water table or surface water (through surface water recharge via ground water) is increased. Nutrients, pathogens, pesticides and household hazardous waste (e.g. paint, oil poured out on the ground) are some of the nonpoint source pollutants of concern in these scenarios.

Depth to bedrock and to ground water is highly variable throughout the state. In the glaciated northern two-thirds of Indiana, bedrock is covered by a relatively thick layer of unconsolidated materials (i.e. "soil"); while in the southern portion of the state, depth to bedrock is relatively shallow and exposed outcroppings of bedrock sometimes can be found.

Hydric soils are soils that have formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register 1994). Though these soils may be drained through the employment of open ditches or drainage tiles, which effectively lower the water table, indicators of prior wetness remain present (Table 1). Hydric soils are one criteria of a wetland determination and may provide an indication of where historic wetlands may have existed, and could be prioritized, for restoration purposes. Hydric soils are generally very limited to somewhat limited in their suitability for dwellings, out-buildings, roads, shallow excavations, lawns, septic systems and landfills. Approximately 24 percent of the major soil components in Indiana are hydric.

Septic System Suitability

Where wastewater treatment plants and sanitary sewer connection lines are not available, residents and commercial establishments treat their wastewater using "septic systems." Though there are many different kinds of septic systems employed to treat wastewater under a variety of soil conditions, these types of treatment systems always consist of a tank to hold solids and a mechanism to filter effluent. The tank is typically made of concrete and is buried near the home or building. A wasteline brings effluent into the tank where solids separate into two layers: scum (soap, grease, toilet paper) that floats to the top and solids (sludge) that settle to the bottom. Settled solids are broken down into organic matter by the anaerobic bacteria that naturally colonize the tank. The liquid effluent is passed through the tank chamber into the drainage field through the tank's outlet line. The effluent infiltrates the soil through the "fingers" of the drainage field, and then moves through the soil's pore spaces where microorganisms found in the pores of the soil break down additional bacteria and viruses that are present in the liquid. Other impurities also decompose in the drainage field. Eventually this purified water is taken up by nearby plants or deposited to ground water.

Septic systems depend, in large part, on soil porosity to treat wastewater. In order to operate properly, the tank must be pumped on a regular basis so that solids do not reach the level of the effluent line and escape to clog the drainage field. In addition, the effluent must have proper contact time with the soil so that the soil microorganisms can treat pathogens and adsorb or decompose impurities. Soils that are very well-drained (such as sandy soils) or are very wet (e.g. due to flooding), do not provide enough time for treatment before the effluent reaches the ground water. On the other hand, soils with a high clay content ("tight" soils), that have been compacted, or contain an impermeable layer, may not allow sufficient infiltration and create ponded conditions on top of a typical drainage field. In these types of soils, mounded or dosed systems may be more appropriate than a conventional drainfield.

The Natural Resources Conservation Service (NRCS) has rated all soils in Indiana for their suitability to be used as a conventional septic system drainage field. This rating system ranges from "very limited" for septic systems to "not limited." In Indiana, approximately 5 percent of soils are suitable for use as a conventional septic system drainage field. Modifications to septic systems can typically overcome soil limitations. Even so, it is estimated that 25 percent of the state's residential septic systems are inadequate and have failed or are failing to protect human health and the environment (Lee et al. 2005).

Current Land Use

Land Use	Acres	Square Miles	Percentage
Agriculture	**12,677,093**	**19,807.96**	**54.42**
Developed, High Intensity	**105,453**	**164.77**	**0.45**
Developed, Medium Intensity	**225,876**	**352.93**	**0.97**
Developed, Low Intensity	**681,388**	**1,064.67**	**2.93**
Developed, Open Space	**1,466,649**	**2,291.64**	**6.30**
Forest	**5,232,261**	**8,175.41**	**22.46**
Hay/Pasture	**1,711,464**	**2,674.16**	**7.35**
Open Water	**411,167**	**642.45**	**1.77**
Shrub/Herbaceous	**433,637**	**677.56**	**1.86**
Wetlands	**348,422**	**544.41**	**1.50**

Table 2. Indiana Land Use. (From Fry 2011, 2006 National Land Cover Database (NLCD), http://www.mrlc.gov) *Note: the wetland acres and percents differ between the NLCD and state data. In light of the ground-truthing done to verify acreages and wetland types, the state numbers will be carried through this plan

Land use information for Indiana was compiled in 2006 as a part of the National Land Cover Dataset, hosted and made available by the Multi-Resolution Land Characteristics (MLRC) Consortium (a federal partnership led by the United States Geological Survey (USGS)). As a part of that effort, land cover information available via satellite was converted into (among other things) corresponding land uses (Figure 4). The largest land use in Indiana is agriculture (61.77 percent, when hay and pasture are included), followed by forested use (22.46 percent). Various developed land uses account for 10.65 percent and wetlands and open water make up 3.27 percent of the state (Table 2). For the purposes of the Nonpoint Source Program, land uses will be characterized as "rural" (for agriculture, forestry, mining, wetlands and open water running through these landscapes) and "urban" (including cities and towns, residential areas in more rural locations, and open water surrounded by such uses).

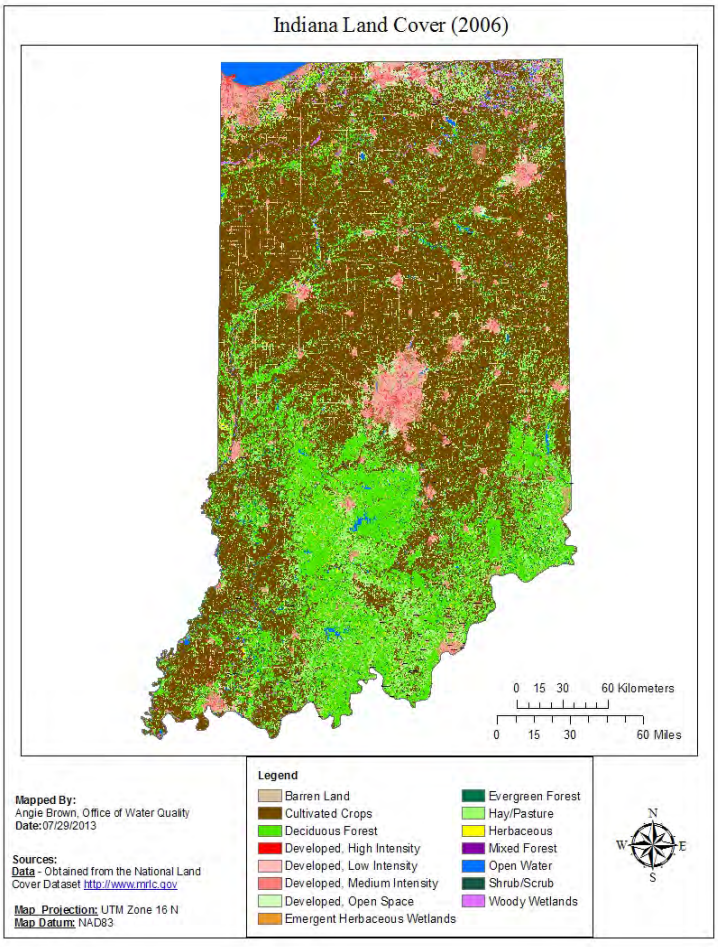

Figure 4. Indiana Land Use. (From Fry 2011, 2006 National Land Cover Database (NLCD), http://www.mrlc.gov)

Rural Land Uses

Since European settlement, Indiana has been predominately an agricultural state, though large tracts of forest cover remain in the southern and central portions of the state (Figure 4). In 2011 (the last year for which statistics are available), the National Agricultural Statistics Service (NASS) indicated that Indiana ranked third in the nation for its inventory of laying hens and fifth in the nation for both the value of its grains (including corn, wheat, oilseeds, dry soybeans and dry peas) and for the value of its hogs and pigs. This same year Hoosier farmers harvested nearly 6 million acres of corn, 5.3 million acres of soybeans, and 670,000 acres of hay. The state also maintained an inventory of 860,000 head of cattle (beef and dairy); 3.85 million hogs; 55,000 sheep; and some 37 million chickens. Indiana also boasts a good number of specialty crops (such as tomatoes, sweet corn, watermelons, cantaloupes and spearmint) and livestock (such as alpacas, buffalo and honeybees). In 2011, the Indiana agricultural industry netted some $4 billion (NASS 2012).

Not all land used for agricultural production in Indiana is operator-owned. A 2012 study reported that 55 percent of farmland acres in Indiana are absentee-owned. The NASS indicates that $752 million was paid as cash rent to produce crops on non-farmer owned lands in Indiana in 2011. In many cases, the actual landowners are absent from the county or state[2], often leaving the question of authority for agricultural management decisions (such as the installation of agricultural BMPs) somewhat ambiguous. This absentee landowner issue is a large one for Indiana conservation organizations to address and overcome.

In 2010, Indiana exported $278 million dollars worth of livestock products, nearly $767 million in corn (grain), and $1.5 billion in soybeans. Of the nearly 11.7 million acres of row crops planted in Indiana in 2011, 6.6 million were in conservation tillage (30 percent or more crop residue remained during planting) and the remainder were in a reduced tillage (16-30 percent residue cover) or conventionally-tilled (Figure 5). Conventional tillage leaves less than 30 percent residue on the land after planting, leaving the soil vulnerable to wind and water erosion.

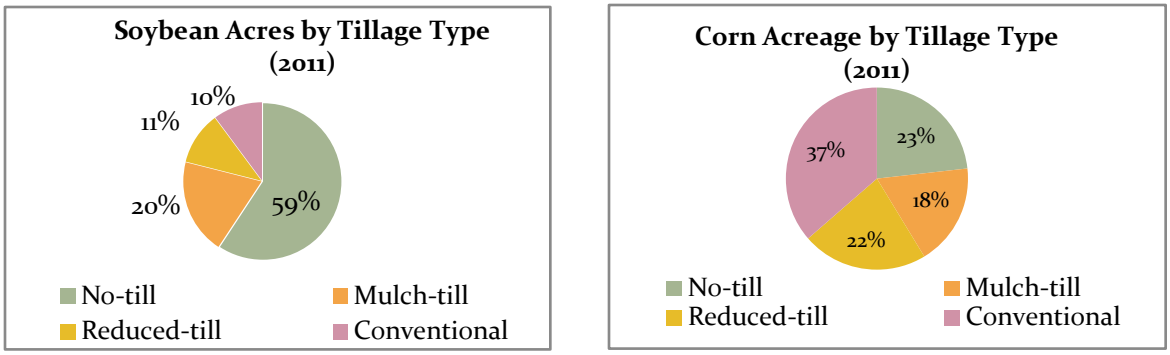

Figure 5. Tillage by commodity. (ISDA 2011).

In addition to row-crop and livestock agriculture, the state boasts approximately 5 million acres of forested land – approximately 20 percent of the land base. Ninety-eight percent of these acres are classified as "timberland" (forested land in which at least 20 ft^3 per acre is produced at peak

[2] A study done by Agren, Inc (of IA) and Peggy Petrzelka (of Utah State) states that 55% of farmland in Indiana is absentee-owned. Available from http://news.jrn.msu.edu/capitalnewsservice/2012/03/16/more-land-owned-by-absentees-study-finds/

productivity) and 2 percent of forested land is "reserved" (not harvested for timber). To qualify as "forested land," shelter belts and riparian areas must be at least 120 feet wide. The prevailing forest types are oak-hickory types. Surveys conducted by the United States Forest Service (USFS) indicate that Indiana is gaining forested land (Woodall et al. 2011).

Indiana's forest industry is the sixth largest manufacturing industry in the state. The state ranks first nationwide in the production of wood office furniture, wood kitchen cabinets, and hardwood veneer, along with several other products. Nearly $13.6 million in forest products were sold in Indiana in 2011.

Urban Areas

Significant urban areas in the state include Indianapolis and its suburbs in central Indiana, the major urban areas in northwest Indiana, Ft. Wayne in the northeast, Evansville in the southwest, and the South Bend/Elkhart area in the north. Smaller urban areas are spread out throughout the state; locations of note include Anderson, Bloomington, Lafayette, Muncie and Terre Haute. Despite the fact that developed space is only about 11 percent of the land cover in the state, the majority (77.4%) of Indiana's population lives in the urban areas.

Urban areas can be a large source of nonpoint source, especially when best management practices are not used by a large population base. Common urban sources of nonpoint source include construction activities, pet waste, fertilizing grassy areas, run-off from impervious surfaces, nuisance waterfowl waste, residential car washing done on the street or in the driveway, and stream bank erosion. Polluted waters from these activities can run over land or enter storm sewers to discharge directly into streams. To mitigate the pollutants generated by populated areas, the U.S. EPA, together with the state, has designated certain populated areas such as cities, towns, universities, colleges, hospitals, military bases, and certain correctional facilities to be permitted for their discharge of urban storm water run-off. These permittees are known as "municipal separate storm sewer systems" or MS4s. Indiana's MS4s are regulated under 327 IAC 15-13 or "Rule 13" and are issued a National Pollutant Discharge Elimination System (NPDES) permit. In MS4 areas, much of the storm water discharge is generated by overland flow, but since the water is captured via storm sewers and conveyed to the waterbody through pipes, the nonpoint source run-off becomes a "point" source discharge which can be regulated under the NPDES program.

One-hundred eighty-six MS4s have been designated in Indiana (Appendix D), though in many cases, two or more entities were co-permitted. These NPDES permits are reviewed and reissued (as applicable) on a five-year cycle. MS4 entities must submit a Storm Water Quality Management Plan (SWQMP) to IDEM that includes a baseline characterization and program implementation elements. Program elements must include the following six minimum control measures:

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Storm Water Run-off Control
5. Post-construction Storm Water Run-off Control
6. Municipal Operations, Pollution Prevention, and Good Housekeeping

Most MS4 municipalities have local storm water ordinances in place, and many fund their SWQMP activities through a storm water utility. Even though the pollution being mitigated

through MS4 regulation could be considered nonpoint source, regulated activities specifically outlined in the SWQMP cannot be funded with Section 319 funds. However, any nonpoint source activity that goes "above and beyond" the SWQMP may be funded through Section 319 funds.

Urban areas can serve as significant sources of chlorides when roads are treated with "salt" as de-icer for driving safety considerations. Populated areas that use sand instead of salt have an increase of sediment when sand enters stream system as run-off.

Mineral, Oil and Gas Extraction

Coal and Minerals

Southwestern Indiana includes land rich in minerals such as coal, clay, shale and shale oil (Figure 6). The Indiana Geologic Survey (IGS) estimates that Indiana has approximately 57 billion tons of unmined coal resources, of which 17 billion tons are recoverable using current technologies (IGS 2011a). As of the end of 2012, there were 30 active coal operations (DNR 2013a), two gypsum mines, and six shale and/or clay mines covering 590.95 acres in southwestern Indiana (IMCC 2012). Of these activities, the coal industry is the largest and has the potential to greatly impact water quality in the state.

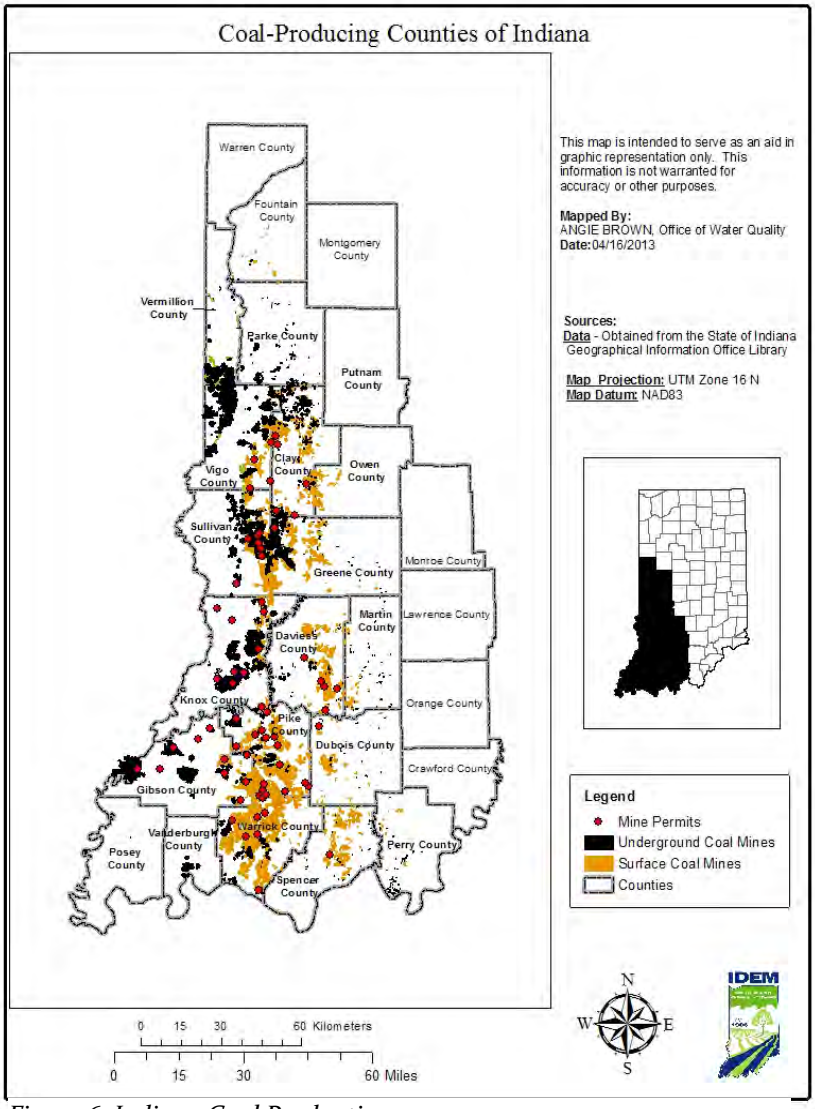

Figure 6. Indiana Coal Production.

Coal mining in Indiana dates back to the 1800s. Prior to 1941, there was no state or federal requirement that coal mining companies address environmental concerns resulting from the abandonment of spoil piles, coarse-grain refuse and tailings. Though some coal mining companies voluntarily began reclamation activities, not all companies took it upon themselves to do so. Major nonpoint source concerns from barren gob piles and tailings include erosion and acid mine drainage. Acid mine drainage occurs when water flowing through slurry waste piles becomes acidic, due to the reaction of water with sulphur-bearing materials in the waste. The reaction creates sulfuric acid, which then leaches heavy metals out of the rocks it comes into contact with. These waters are dangerous to humans, and aquatic life generally cannot tolerate the low pH present in these

environments. There is some evidence of acid mine drainage to waters of the state in southwest Indiana.

In 1941, Indiana passed a law that required coal mining companies to plant trees on spoil banks. By 1967, Indiana's mining regulations had incorporated additional protections for mined land, including provisions to allow farming activities, burial of certain acid-forming rocks, grading specifications, and a requirement for a performance bond so that reclamation activities would be guaranteed. Nationally, the environmental standards of the coal mining industry changed dramatically with the enactment of the federal Surface Mining Control and Reclamation Act (SMCRA) of 1977 (30 U.S.C. 25), which mandated that the coal industry take steps to control the environmental impacts of coal mining. SMCRA provides authority for the federal Office of Surface Mining Reclamation and Enforcement (OSMRE) to support and oversee state mining regulatory programs, as well as providing grants and oversight to state abandoned mine reclamation programs. Today, the State of Indiana, through the Department of Natural Resources (DNR) Division of Reclamation, oversees the mining and reclamation activities of 30 coal mines and the production of 32-36 million tons of coal per year.

Coal mining sites that are no longer active (whether abandoned or properly closed according to an IDNR-approved mine reclamation plan) can be rehabilitated for many land uses, including farmland, forest land, wildlife habitat, wetlands, and recreation areas. As of 2013, a total of 1,220 abandoned mine sites have been reclaimed by the IDNR-DOR at a cost of nearly $164 million. An additional 139 bond forfeiture sites have also been reclaimed at a cost of $11.8 million. Currently in the State of Indiana, there are approximately 2,600 acres of abandoned mine lands that are still in need of reclamation (S. Herbert, personal communication, 07/30/2013).

Aside from coal, several other minerals are mined in Indiana. The soft mineral gypsum is extracted from two underground mines in Martin County. The deposit is 350-600 feet beneath the surface and can be up to 16 feet thick. Gypsum is used to make drywall, cement, soil amendments, plaster of Paris, and finishing compound.

Southern Indiana also includes a belt of limestone situated between Bloomington and Bedford, where 2.7 million cubic feet of "Indiana limestone" (technically Salem limestone) is excavated from nine quarries annually for its uses in the building industry. In addition, sand and gravel seams, peat, and marl are distributed widely throughout the state. While 150 active sand and gravel mines across the state produce 25 million tons annually, some 2,000 sand and gravel quarries have been abandoned, with potential nonpoint source impacts on ground water. Water quality concerns from these mining activities include pesticide and fertilizer run-off leaching into ground water through abandoned quarries and erosion concerns.

Oil and Gas

Exploration of subsurface oil and gas probably began in Indiana during the middle of the 1800s stemming from early drilling for salt recovery and precipitation. Although gas springs and oil seeps were discovered in counties in southern Indiana along the Ohio River in the 1860s, the first major exploitation of gas and oil began with the discovery of the Trenton Field in east-central Indiana in 1876. This explosion in oil and gas development precipitously declined in the early 20th century due to wasted resources and poor drilling practices. As the Trenton Field exploration and exploitation declined, reserves in the Illinois Basin in southern Indiana were discovered and developed throughout the mid-1900s. Overall, the amount of oil production in Indiana has

declined since the 1960s, but has seen resurgence in the New Albany Shale Play in southeastern Indiana in the last 20 years (Figure 7).

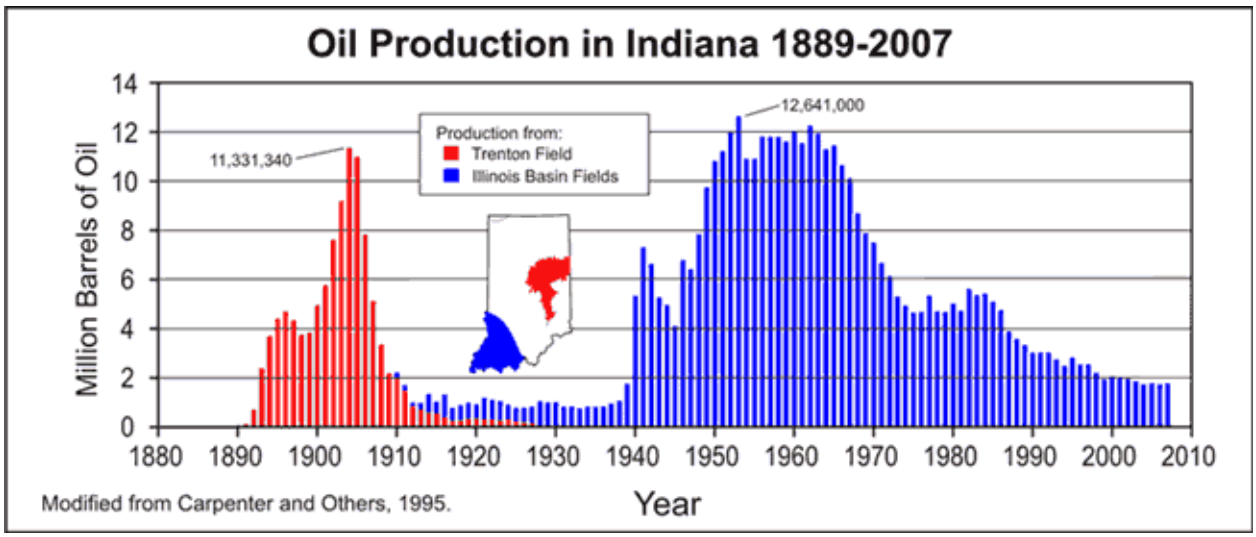

Figure 7. Historical Oil Production in Indiana (http://igs.indiana.edu/OilGas/History.cfm)

Unlike the shallower pits and mines created for mineral and coal mining, oil and gas wells in the U.S. average nearly 8,000 feet deep. The majority of Indiana has been drilled and explored for oil and gas, but only in the shallow range of the first few thousand feet. This restricted exploitation of only the shallow surface has potentially left undiscovered reserves of oil and gas available at greater depths. These potential deep, and unexplored, reserves may be more accessible with the advent of new technologies in oil and gas extraction, including but not limited to the application of advanced seismic acquisition and processing techniques, new drilling technologies including horizontal drilling and shale fracturing, and complex completion techniques such as CO_2 stimulation.

While early primitive drilling and oil extraction techniques had the potential to lead to surface "blow outs" and environmental contamination, modern techniques use blow out preventers that keep material within the bore-hole, preventing contamination to the environment. Although modern controls can prevent surface contamination, by-products from oil and gas wells (such as brine or chlorides) can reach shallow ground water aquifers through poor maintenance and defunct equipment, including corroded well casings and leaking storage tanks and/or pipelines. The proper handling of by-products from finishing can also be of concern to water resources if not disposed of properly. As new techniques are developed, including high-volume hydraulic fracturing, it will be important to keep up on the transparency of chemical use and the elimination of potential ground water contamination pathways. The IDNR Division of Oil and Gas is charged with regulating petroleum exploration, production and site abandonment activities, underground injection control, and test hole drilling.

Available IDNR records from 1986 to 2009 show that there have been 6,425 oil permits and 1,451 gas permits approved in Indiana. The total oil production in Indiana for 2012, the last year on record as of this writing, was approximately 2.35 million barrels. At an approximate price of $88.39 per barrel, the total production of oil in tax dollars from 2010 was roughly $2 million. The total gas production in Indiana for 2012 was approximately 8.8 million Mcf (an Mcf is 1000 cubic feet of gas). At an approximate price of $3.14 per Mcf, the total production of gas in tax dollars in 2012

was nearly $280,000. There seems to be a slight upward trend in total oil production and there appears to have been an increase in total gas production over the last ten years (DNR 2013b).

Indiana's Hydrology

Watersheds

Nonpoint source pollution is often called "run-off" pollution because pollution "runs off" the watershed and into the body of water. A watershed is an area of land that collects and drains water from high points (hills) to low points (valleys). When rain falls in a watershed, the water travels over natural and man-made terrain features toward the lowest point. Any area that drains water to one location is a watershed. Watersheds are synonymously called "basins," "catchments," and "drainage areas."

The United States Geological Survey (USGS) has categorized watersheds according to their size, using an address system known as hydrologic unit codes (HUCs). Watersheds are nested, with the drainage of a small creek belonging to the watershed of that creek, as well as the next larger watershed, and the next, continuing all the way to a major river that leads to an ocean. In order to capture this "basin within a basin" characteristic of watersheds, HUCs can describe very specific watersheds, but can be extrapolated to their larger watershed. The fewer the numbers in a HUC, the larger the area it covers; for example, the Upper White River watershed (of which Marion County and Indianapolis are a part) is the HUC-8 watershed (or 8-digit watershed) 05120201. It is part of the Patoka-White River drainage (051202), which is part of the larger Wabash River drainage (0512), which is part of the Ohio River drainage (05).

Figure 8. Indiana's 2-digit Watersheds

Indiana's HUCs were first described at the HUC-8, HUC-11, and HUC-14 scales by the USGS Indiana-Kentucky Water Science Center. However, in order to maintain consistency across the nation, Indiana's HUCs have been re-indexed to the HUC-8, HUC-10, and HUC-12 scales. Older maps and documents that depict or discuss watersheds will often describe 11- and 14-digit HUCs, while the newer figures and texts refer to the 10- and 12-digit HUCs. The 12-digit level is the smallest level that is described by HUCs (of which, Indiana has 1589), though watersheds smaller than 12-digits can be defined using software tools and land survey equipment. The State of Indiana can be divided into three regional watersheds (HUC-2 scale): the Great Lakes (04), Ohio

River (05) and the Mississippi River (07) regional watersheds (Figure 8). Over 81.8 percent of Indiana drains to the Ohio River, while 9.7 percent goes to the Great Lakes, and 8.5 percent goes to the Upper Mississippi River. Indiana wholly or partially contains 38 subbasins (8-digit HUCs) (Figure 9).

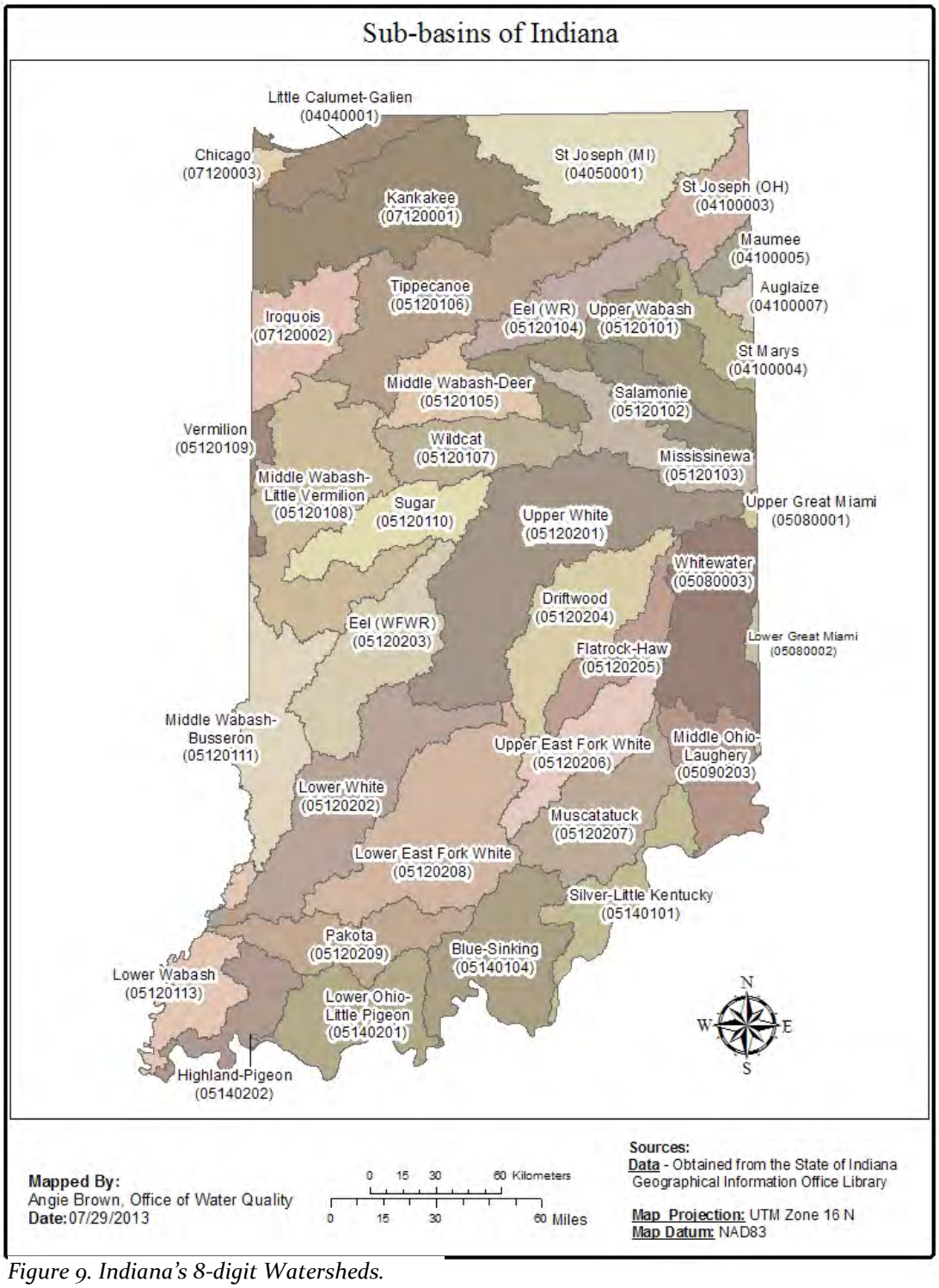

Figure 9. Indiana's 8-digit Watersheds.

Streams

Indiana contains 63,130 miles of streams and rivers, from headwater agricultural streams to the mighty Wabash (Figure 10). Warm water stream habitats dominate these stream miles, with cold water streams present in the Lake Michigan drainage only. Of these miles at least 81.42 percent are first and second order ("headwater") streams[3], with drainage areas of less than 5 mi^2 (Ward 2008).

Hydromodification of streams, and of headwater streams in particular, is a major issue in Indiana. Many portions of the state have wet soils that must be drained through ditches and subsurface drainage tiles in order to be farmed. In many instances, natural headwater streams were straightened and channelized in order to send water away from farm fields as fast as possible. In addition, many miles of forested riparian corridor have been removed to reduce the occurrence of in-stream log jams and root intrusion into the tile drainage system[4]. While such hydromodifications have rendered the majority of the state arable, from an ecosystem standpoint, the result has been reduced canopy cover resulting in higher water temperatures; mucky and embedded substrates unsuitable as habitat for many aquatic macroinvertebrates or fish spawning; loss of riffle-pool-run systems; flashy hydrographs; and disconnection with floodplain, resulting in downstream flooding.

While drainage projects have had a profound effect on Indiana's aquatic systems, they are not the only hydromodifications seen in Indiana. Pumping of ground water - both for irrigation and as drinking water for single-family dwellings as well as whole communities-- has effected changes in spring-fed streams. In addition, lowhead, hydroelectric and flood-control dams, drinking water impoundments, and road crossing culverts have disconnected stream segments and limit the migration of fish and mussel species.

Large Rivers

In Indiana, the Wabash and White Rivers, portions of the St. Joseph (Lake Michigan), Maumee River, and portions of the Kankakee River are "large rivers" (Indiana Biological Survey 2005). Characteristics of the Wabash and White Rivers (whose watersheds comprise the majority of Indiana's drainage) are detailed below.

[3] All Orders (Strahler 1957) of Streams were selected based on 1:100,000 scale of U.S. EPA's River Reach File 3. U.S. EPA National Health and Environmental Effects Research Laboratory (NHEERL), Western Ecology Division (WED), Corvallis, Oregon. Data sent by Barbara J. Rosenbaum, contractor to the U.S. EPA NHEERL-WED, to 9 Environmental Scientist IDEM, Office of Water Quality, Assessment Branch, Biological Studies Section. Strahler, A.N. 1957. Quantitative Analysis of Watershed Geomorphology. Trans. Am. Geophys. Un. 38,913-920.

[4] Note that even though a tile drainage system delivers stream discharge through a series of "pipes," any pollutants carried by the discharge would still be considered nonpoint source. This is not to be confused with MS4 discharges, which are point sources, as they are regulated under an NPDES permit.

Figure 10. Major Indiana Rivers.

Wabash River

The Wabash River is Indiana's state river and has played a major role in the state's history. Beginning near Ft. Recovery, OH, the river drains 32,910 mi^2 of Indiana, Ohio and Illinois. After flowing for approximately 30 miles in Ohio, the river enters Indiana and flows 61 miles before it is dammed for flood control at the J. Edward Roush Lake, upstream of Huntington, IN. From there, the Wabash River flows unimpeded for 411 miles and is the longest free-flowing river east of the Mississippi River (Karns et al. 2006).

The Wabash River watershed is connected to the Great Lakes watershed in Ohio through Beaver Creek, an outlet of Grand Lake Saint Marys and tributary of the Wabash. However, historically, the main trade route between the Great Lakes and Mississippi River during early European settlement was via the Wabash River through a portage at Ft. Wayne. Though commonly reported as a seven- to eight-mile portage, the actual passage could vary greatly, according to water levels; during times of intense flooding, travelers could navigate their canoes between the watersheds without portaging. Flood waters still comingle between the basins via Junk Ditch at the site of Eagle Marsh on the south side of Ft. Wayne. Control of the portage was a key reason that the Miami Indians situated their village "Kekionga" near the Three Rivers and why Fort Wayne was established here.

Once Indiana was granted statehood, its leadership embarked on the building of a canal that would connect the Lake Erie tributaries in Ft. Wayne to the Wabash (and ultimately, the Mississippi) River. The result of the project was the historic Wabash and Erie Canal. Between 1832 and 1853 Indiana constructed over 450 miles of canals with the assistance of federal land grants. At 468 miles, the canal connected the Maumee River at Fort Wayne with the Wabash River, then exited the Wabash at Terre Haute and continued south to Evansville by way of the Eel River. This canal system allowed steamboats and flatboats to navigate the traditional trade route much more efficiently. However, the canal soon fell into disuse when the railroad became the preferred method of transporting goods. In 1876 the Wabash and Erie Canal was auctioned off by its trustees; however, remnants of the system remain today, particularly near the town of Delphi in Carroll County and city of Logansport.

Towns established along the Wabash River in the late 19^{th} and early 20^{th} centuries have always been subject to flooding. A major flood of Peru, Logansport and Lafayette occurred in March 1913; and the Lower Wabash flood of January 1937 was the worst flood to occur in recorded history. These flooding events prompted the United States government to develop a plan for flood control to protect these Wabash riverfront towns. Over the course of several decades, the U.S. Army Corps of Engineers (USACE) devised a plan to construct eight flood-control reservoirs including three in the Upper Wabash River basin (Roush, Salamonie and Mississinewa), one in the Middle Wabash (Cecil M. Harden Lake), two in the White River watershed (Cagles Mill Lake and Lake Monroe), and one in the Patoka watershed (the aptly named Patoka Lake) (USACE 2011). Today, these reservoirs provide not only flood-control services, but also wildlife habitat, recreational opportunities, and in the Patoka, drinking water.

Despite the anthropogenic alterations to the river, its tributaries, and watershed, the Wabash still has the potential to regain the ecological diversity once present in its waters. The system has the last population of the lake sturgeon in the entire Mississippi River basin. A viable fishery of shovelnose sturgeon is also present in the mainstem. Though unionid mussel diversity has decreased significantly, at least 30 species maintain reproducing populations.

White River

Draining 11,400 mi², the White River is the major tributary of the Wabash River. The White River consists of two forks that flow in a generally southwesterly direction: the East Fork White River and the West Fork White River. The two forks converge northeast of Petersburg, IN and flow for an additional 45 miles as the White River. Altogether, the river flows for a combined 554 miles to its confluence with the Wabash near Mt. Carmel, IL.

The West Fork of the White River begins in a farm field in eastern Randolph County. The river quickly grows in size as it crosses the agricultural landscape as a result of numerous small tributaries in Randolph and eastern Delaware Counties. By the time it reaches the city of Muncie, the White River (along with several wells and tributaries) is large enough to be used as a drinking water source. Muncie is the first of several major urban areas that influence the White River. In

Figure 11. White River through Indianapolis.

the city of Muncie, major efforts have been undertaken by the city to clean up the pollution caused by the releases of numerous factories from the early 20th century. The Muncie Sanitary District's Bureau of Water Quality monitors fish and macroinvertebrate populations in the White River and its Delaware County tributaries to ensure that anthropogenic impacts are not causing additional degradation of the river.

As the West Fork White River progresses on its course through Madison, Hamilton and Marion counties, it grows larger from the contribution of major tributaries such as Killbuck Creek, Duck Creek, Pipe Creek, Fall Creek, Cicero Creek, Cool Creek, Stony Creek, Eagle Creek, and White Lick Creek, and flows through the cities of Anderson, Noblesville, Fishers and Carmel into Indianapolis. The White River and its three drinking water reservoirs supply drinking water to the city of Indianapolis. Though urban issues create various pollution issues, such as phosphorus from

lawn fertilization and pathogens from combined sewer overflows (CSOs), recreational use in this section of the river is relatively high, with angling being the most popular form of recreation employed (Hoffman 2005).

After the river leaves Marion County, it is no longer used for drinking water. It enters the more hilly terrain of southern Indiana and the southwestern coal fields before converging with the East Fork.

The East Fork White River begins at the confluence of the Flatrock and Driftwood Rivers in central Indiana near the city of Columbus. As it flows through primarily rural and wild lands, the East Fork is joined by major tributaries such as the Muscatatuck River, Salt Creek, Sand Creek, and Lost River, before confluencing with the West Fork to form the White River. Unlike the West Fork, the East Fork has little in the way of urban influences.

Great Rivers

The Ohio River, forming the southern border of the state, is Indiana's only "great river." The Ohio begins at the confluence of the Allegheny and Monongahela Rivers in Pittsburgh, Pennsylvania and flows 981 miles through six states before emptying into the Mississippi River at Cairo, IL. It is a warm-water, navigable river, with 20 high-lift dams to facilitate commercial shipping.

Despite the fact that it contains 1045 CSO outfalls and over 600 NPDES permitted discharges - including from industry, power-generating facilities, and municipalities – the river serves as a water supply for over 5 million people and as habitat for the federally-endangered pink mucket pearlymussel. Drainage from parts of 15 states (IL, IN, OH, PA, NY, MD, WV, KY, TN, VA, NC, GA, AL, MS & SC) and 203,940 mi^2 flows to the Ohio River. Because it shares drainage with so many states, water quality in the Ohio River is governed through the Ohio River Valley Water Sanitation Commission (ORSANCO), of which Indiana is a part (ORSANCO 2009).

Beyond Indiana: Hypoxia in the Gulf of Mexico

As a contributor to the Mississippi River watershed, Indiana (represented by the Indiana State Department of Agriculture, or ISDA) is involved in the Gulf Hypoxia Task Force. This quasi-governmental agency oversees work on the Gulf of Mexico Hypoxia Action Plan, the strategy for reducing and eliminating the annual dead zone in the Gulf of Mexico (Mississippi 2008). The dead zone appears to be the result of a massive yearly algal bloom, brought about by the over-enrichment of waters coming into the Gulf from the Mississippi/Atchafalaya River Basin. One prominent nutrient model (the SPAtially Referenced Regressions On Watershed attributes, or SPARROW model) indicates that Indiana is among several states that are responsible for significant exports of nitrogen and phosphorus to the Gulf. As such, ISDA (in collaboration with several other Indiana agencies and organizations) has prepared and submitted Indiana's nutrient reduction strategy to U.S. EPA. This strategy follows guidelines set forth by the Gulf Hypoxia Action Plan which include prioritization of HUC-8 and HUC-12 watersheds; a description of how the state will utilize and coordinate existing resources and programs within those watersheds, seek future funding, and grow and maintain conservation partnerships; a summary of current and future monitoring across the state; and the methods for which accountability will be provided to state and federal agencies, to conservation partners and to the public.

In addition, the agricultural industry has developed its own "Strategy to Reduce Nutrient Pollution through Adoption of Practices that Improve Soil health and Reduce Nutrient Losses." This strategy has also been shared with U.S. EPA.

Lakes

Indiana boasts over 1,000 public lakes covering 106,000 acres. The distribution of those lakes includes 452 natural lakes and 580 impoundments (DNR 2012b). Generally, the lakes in the northeastern and north central regions are natural kettle lakes or chains of lakes left over from the glacial period. Also in general, lakes in the central and southern portions of the state tend to be impoundments, though the flood control reservoirs can also be found in northeastern Indiana. Additional impoundments have been established for drinking water storage and recreation.

The majority of Indiana's public lakeshore has been developed. Potential pollutants from developed lakeshores include nutrients from fertilizer, pet waste and car-washing detergents; sediment from erosion; and *E. coli* from nuisance geese and failing septic systems.

In recent years, many of Indiana's lakes (both natural and man-made) have been experiencing harmful algal blooms (HABs). It is believed that high levels of phosphorus in addition to other factors are contributing to these freshwater algal blooms.

Great Lakes

Lake Michigan

Indiana's portion of the Lake Michigan shoreline is 59[5] miles located entirely within the Little Calumet-Galien watershed (HUC 04040001). This 8-digit watershed also roughly[6] corresponds to the area managed under the Coastal Zone Management Act (16 U.S.C. §1451 et seq.) through the IDNR Division of Nature Preserves Lake Michigan Coastal Program (LMCP). At present, all 59 miles of the shoreline in Indiana are listed as impaired for recreational and fishable uses. Several watershed management plans for subwatersheds of the Little Calumet-Galien have been approved (Appendix F), with at least one more under development. Additional water quality-related plans in the area include the Remedial Action Plan (RAP) for the Grand Calumet Area of Concern (AOC) and the Lake Michigan Lakewide Management Plan (LaMP; agreed to in the U.S –Canada Great Lakes Water Quality Agreement of 1987), 41 MS4 entities and associated SWQMPs, and several plans developed for the Indiana Dunes National Lakeshore through the National Park Service.

Indiana's share of Lake Michigan waters includes 154,176 acres of open water. The Indiana waters of Lake Michigan have been assessed for mercury and PCBs in fish tissue in accordance with IDEM's Consolidated Assessment and Listing Methodology (CALM). All 154,176 acres have been impaired for fishable use. Because Lake Michigan is assessed as a single unit, any impairment identified in any part of the lake is applied to all 154,176 acres of Lake Michigan.

[5] According to the National Hydrography Dataset available through the U.S. Geological Survey, http://nhd.usgs.gov

[6] The Program Boundary is based on the Historic Little Calumet Galien Watershed. This watershed includes the Chicago Diversion. The Program Boundary is squared off using township boundaries and the associated county roads. As such, some portions of the watershed are outside the Program Boundary and some areas outside the watershed are included in the Program Boundary.

In addition to the coastal zone and open waters of Lake Michigan, Indiana shares the St. Joseph River watershed (HUC 04050001), a major tributary to southeastern Lake Michigan, with the State of Michigan. A cooperative watershed management plan was developed for the 8-digit HUC using Michigan 319 funds, and is being implemented by partners in both states. Several smaller WMPs have been developed in both states, implemented by local groups.

Lake Erie

Though Indiana cannot claim to have Lake Erie lakefront real estate, the state does contribute drainage area to the Maumee River, the largest tributary to the Western Lake Erie Basin. Formed from the confluence of the St. Joseph (Lake Erie) and St. Marys Rivers, the Maumee flows eastward out of the city of Ft. Wayne, through Ohio, to Lake Erie. The watershed is predominantly agricultural, though the river itself runs through several urban areas (Ft. Wayne and New Haven in Indiana, as well as Defiance and Toledo in Ohio). Since 2003, a large plume of sediment and algae coming into the lake through Maumee Bay has been observable via satellite images. Several partnerships, including the Western Lake Erie Basin (WLEB) Partnership, the St. Joseph River Watershed Initiative, the Upper Maumee Watershed Partnership, and the Maumee River Basin Partnership of Local Governments, are working to improve water quality in the tributaries that lead to Maumee Bay. At the state level, ISDA actively participates in the WLEB Partnership and offers technical assistance to landowners to reduce nutrient loss in the watershed. IDEM has and continues to provide funding for watershed groups working in this area to reduce nonpoint source to the Lake.

<u>Wetlands</u>

Wetlands are present in every county in Indiana. The best estimate of the wetlands in Indiana prior to European settlement is based on the presence of hydric soils (soils that form under saturated, flooded or ponded conditions). Mapping of soils is conducted by the USDA Natural Resource Conservation Service, or NRCS (formerly the Soil Conservation Service or SCS). Based on an analysis of this data by the IDNR, it is believed there were approximately 5.6 million acres of wetlands in Indiana 200 years ago.

The value of wetlands, including wetland functions with economic impacts such as flood control, pollutant attenuation, and wildlife habitat, has not always been appreciated in Indiana. One historical bulletin issued from by the Indiana Bureau of Legislative Information in 1914 indicated that 625,000 acres stood to be "reclaimed" (i.e. drained) in Indiana at that time. Significant presettlement wetlands that existed as part of the Kankakee Grand Marsh in northwestern Indiana and the Great Black Swamp in northeastern Indiana were drained in order to exploit the prime farmland beneath the waters. Additional wetland acreage has been filled to allow for development and agriculture. Bogs are mined for peat, a horticultural amendment. Today, an estimated 863,000 acres of wetland remain in Indiana.

The nation's wetlands were mapped beginning in the 1970s by the U.S. Fish and Wildlife Service (USFWS) as part of the National Wetlands Inventory (NWI). Advances in remote sensing and Geographic Information System (GIS) technologies have been made since the state's wetlands were originally tallied as part of the NWI in 1985. IDEM contracted with Ducks Unlimited to update the NWI maps for Indiana in 2007. The project was completed in 2009. A total of 174,204 acres of emergent, 658,205 acres of forested/scrub-shrub, and 30,551 acres of lacustrine wetland were identified. Of the identified wetlands, 59 percent are under an acre in size.

Change in wetland acreage since the last NWI was completed suggests that some wetlands were converted to other uses over the intervening years. The analysis indicated that 45,415.96 acres were converted to other uses between the date of the original NWI (ca. 1980-1988) and the update year (ca. 2005). Approximately 72 percent were converted for agriculture purposes and nearly 24 percent for development (the remaining 4 percent of wetland conversions were categorized as recreational and "other"). Additionally, the report found that emergent wetlands occupied the greatest converted acreage (48%), with forested wetlands a close second (32%). Ditched and/or excavated wetlands accounted for 117,099 acres; while farmed wetlands totaled only 2,215 acres.

Combining the information from the National Wetlands Inventory (NWI) and the IDNR yields the following summary:

- Estimated wetlands circa 1780s: 5,600,000 acres
- Percent of surface area in wetlands circa 1780s: 24.1%
- Existing wetlands: 862,960 acres
- Percent of surface area in wetlands today: 3.5 %
- Percent of wetlands lost: 85%

The country's attitude toward wetlands shifted in the 1970s, evidenced by President Jimmy Carter's Executive Order 11990, which required federal programs to avoid wetland loss when possible. Later, the 1985 Farm Bill would include a "Swampbuster" provision (16 U.S.C. §§3801-3823) to discourage more wetland loss due to agriculture. President George H. W. Bush set a national policy of "No Net Loss" (of wetlands) in 1989, paving the way for compensatory wetland mitigations for drained or filled wetlands. Today, in Indiana, IDEM and the USACE permit wetland and riparian impacts requiring mitigation. Many groups throughout the state are preserving and restoring wetlands through Farm Bill programs, state monies, and private funding. Wetland restorations with notable state involvement include the Limberlost-Loblolly Swamp in Jay County, Goose Pond Fish and Wildlife Area in Greene County, the Healthy Rivers Initiative (including wetlands in the floodplains and bottomlands of Sugar Creek, Wabash River, and Muscatatuck River), Grand Kankakee Marsh (500,000 acres in eight northwestern Indiana counties), Jasper-Pulaski Fish and Wildlife Area (in Jasper and Pulaski Counties), Wabashiki Fish and Wildlife Area (Vigo County), and numerous smaller tracts dedicated as State Nature Preserves. In addition, several land trusts and conservancies are protecting wetland acres across the state.

<u>Ground Water</u>

Ground water is water that resides in aquifers, underground geologic formations that are capable of producing water through a well. Ground water doesn't "flow" (like a river or stream) so much as it slowly migrates through sediments and fissures in bedrock until equilibrium is reached. Ground water in the northern two-thirds of Indiana is typically found in sand and gravel of the glacial deposits and is generally plentiful. More than 300,000 public and private wells provide water for drinking and industrial uses in Indiana.

Given the absence of glaciers, and therefore the unconsolidated materials they generated, in southern Indiana, ground water is much scarcer. In addition, some portions of southern Indiana have karst landscapes that bypass the natural filtering capacity of soil and send water from the surface to deep underground through caverns and tunnels. Ground water in karst landscapes is very susceptible to pollution because there is no chance to filter the water through a soil layer

before it permeates into bedrock. The solution to this ground water scarcity has been to build drinking water reservoirs, such as Lake Monroe near Bloomington and Patoka Lake near Jasper.

Despite the widespread use of ground water as drinking water in Indiana, this source water receives less attention from the Nonpoint Source Program than surface water. Significant nonpoint source threats to ground water include:

- Nitrates
- Bacteria and other pathogens
- Arsenic (naturally occurring)
- Pesticides
- Improper abandonment of wells
- Dumping to quarries, mines and karst features

Considerable opportunities exist to coordinate the Nonpoint Source Program with IDEM's Ground Water (GW) Section to identify communities with source water intakes that do not have a watershed management plan and encourage the creation of a source water implementation plan. In addition, the GW Section has initiated a project to rank wellhead protection areas on the risk of contamination and target those high-ranking communities for additional technical assistance. Long-term, the Section is interested in using a tool that can predict ground water recharge and discharge areas of the state to better predict the magnitude of the risk of particular aquifers to contamination. Other states have programs that the GW Section is interested in emulating, including the ground water management zones in Oregon and the ground water-enhanced super gages in Montana.

Water Quality

Ambient surface water quality standards for the State of Indiana are found in Title 327 of the Indiana Administrative Code. 327 IAC 2-1-1.5 defines the water quality goal of the state: "to restore and maintain the chemical, physical, and biological integrity of the waters of the state." All waters in Indiana are designated for one or more beneficial uses in the state's water quality standards, which also contain numeric and narrative criteria to protect their water quality. These criteria are used to determine whether a waterbody is "fully supporting" the designated use or if the use is impaired. Beneficial uses take into consideration the use and value of the water as a public water supply, as habitat for the protection of aquatic wildlife, and as a source for recreation, industry and agriculture uses.

Unless otherwise noted in the IAC, all of Indiana's waters are designated for full-body contact recreation and warm water aquatic life use (327 IAC 2-1-3 and 327 IAC 2-1.5-5). In the Great Lakes, waters that meet the ecological conditions for salmonid reproduction and put-and-take trout fishing should also, by rule, maintain those conditions (327 IAC 2-1.5-5). The state also designates waters for public and industrial water supply, agriculture, and fish and wildlife uses, but generally, if a waterbody meets the water quality criteria for both the full-body contact and aquatic life use designation, it will meet the criteria for the remaining uses.

Every two years (in even-numbered years), Indiana submits to U.S. EPA the *Integrated Water Quality Monitoring and Assessment Report* (also known as the Integrated Report or IR). The IR describes the state of water quality in Indiana. Each waterbody for which data is available is assessed according to whether or not it meets the minimum water quality criteria for aquatic life

use and human health, which includes full-body contact recreation and fish consumption. The 2012 IR included the following summary of surface water quality conditions in Indiana:

Designated Beneficial Use	Total Size	Size Assessed	Size Fully Supporting	Size Not Supporting[7]	Size Not Attainable
River (Miles)					
Full Body Contact (Recreational Use)	42,411	20,804	4,776	16,027	0
Human Health and Wildlife (Fishable Use)	42,331	5,866	1,213	4,653	0
Public Water Supply	117	1	0	1	0
Warm Water Aquatic Life (Aquatic Life Use)	42,320	24,232	17,461	6,771	31
Lake Michigan Shoreline (Miles)					
Full Body Contact (Recreational Use)	67†	67†	5	62†	0
Human Health and Wildlife (Fishable Use)	67†	67†	0	67†	0
Public Water Supply	35	35	35	0	0
Warm Water Aquatic Life (Aquatic Life Use)	67†	67†	62†	5	0
Lake Michigan (Acres)					
Human Health and Wildlife (Fishable Use)	154,176	154,176	0	154,176	0
Lakes and Reservoirs (Acres)					
Full Body Contact (Recreational Use)	122,303	31,805	26%	23,799	8,006
Human Health and Wildlife (Fishable Use)	122,303	66,247	54%	7,820	58,427
Public Water Supply	29,541	16,615	56%	230	16,385
Warm Water Aquatic Life (Aquatic Life Use)	122,303	10,315	8%	3,690	6,625

Table 3. Assessment of monitored stream and lake miles in Indiana. From Indiana's 2012 Integrated Water Monitoring and Assessment Report. Note: "Not Supporting" indicates that the waterbody is capable of

[7] Note that the numbers in Table 3 are not cumulative since a given waterbody can be impaired for one or more uses. For example, if the same stream is impaired for both recreational use and fish consumption, its mileage would be reported in this table for each use. So, if the numbers for each use are added together, the number of impaired miles will be artificially inflated.

supporting the designated use, but is currently impaired due to one or more causes. "Size Not Attainable" designations include limited use waters whose natural low-flow condition renders them unable to support warm water aquatic life during much of the year. † *The number of miles listed in this table is inconsistent with the number of miles reported in the narrative portion of the IR. It is believed that this inconsistency arises from differing versions of the National Hydrography Dataset (medium resolution versus high resolution). Even so, IDEM-NPS chose to use the table without revision for the purposes of this plan.*

The Integrated Report also contains a Consolidated List of all the waters of the state. Each waterbody is placed into a category for each of its designated uses depending on the degree to which it supports that use:

- Category 1: The waterbody is fully supporting all of its designated uses and none of its uses are threatened.

- Category 2: The waterbody is fully supporting the designated use assessed and no other use is threatened; insufficient data and information are available to determine if the remaining uses are supported or threatened.

- Category 3: Insufficient data and information are available to determine if the waterbody is supporting its designated use.

- Category 4: The designated use is impaired or threatened but a Total Maximum Daily Load (TMDL) is not required because:

    a. A TMDL has already been completed for the impairment(s) and approved by U.S. EPA and is expected to result in attainment of all applicable water quality standards; or
    b. Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in a reasonable period of time; or,
    c. The impairment is not caused by a pollutant.

- Category 5: The designated use is impaired, and a TMDL is required because:

    a. The aquatic life use, recreational use, or drinking water use is impaired or threatened by one or more pollutant; or
    b. The concentration of mercury or PCBs in the edible tissue of fish collected from the waterbody exceeds Indiana's human health criteria for these contaminants.

The 303(d) list is comprised of the Category 5 waters on Indiana's Consolidated List and is included as an appendix to the IR. Category 5 waters may be impaired by point sources or nonpoint sources. If the cause and source of the impairment is determined to be driven by point sources, permits are revisited to remedy the impairment. If the impairment is driven by nonpoint source pollution, the waterbody is eligible for watershed planning and implementation through IDEM's Nonpoint Source Program. In either case, the state may need to prepare a TMDL for the impaired waterbody.

<u>TMDLs</u>

TMDL reports are assessments of water quality in rivers, lakes and streams where impairments exist. The report is mandated through CWA Section 303(d), and contains an overview of the

waterbodies, the sources of pollutants, the methods used to analyze data, reductions in levels of pollutants needed to restore water quality, actions that need to be taken to reduce pollutant levels, and actions that are being taken to improve water quality. Currently, Indiana's TMDLs are written on a watershed basis. In 2011, IDEM completed a project to create a TMDL template that would address several of the U.S. EPA's 9 Elements of a Watershed based Plan. FFY 2013 was the first year that this template was applied to TMDLs in Indiana.

Prior to FFY 2014, IDEM did not use Section 319 funding to develop TMDLs (including monitoring or staff time). However, with completion of the TMDL/WMP Template, TMDLs are being written to increase TMDL/Nonpoint Source Program integration and efficiency, include an implementation focus to align with current program needs. The opportunity exists to utilize 319 funding for TMDL development and implementation, with the acknowledgement that local adaptation may be necessary. Indiana will continue program assessment to determine whether or not nonpoint source TMDLs will be written using nonpoint source funds.

Regulatory Actions to Control Nonpoint Source

NPDES Storm Water Permits

Facilities and industries that discharge effluent to surface water bodies of the state must apply for and receive a permit under the NPDES Permit Compliance Program (CWA 308, 327 IAC 5, et seq.), housed in the IDEM Office of Water Quality (OWQ). This also applies to storm water discharges as defined under 327 IAC 15-5, 15-6 and 15-13 (respectively, Rule 5 – Storm Water Run-off Associated with Construction Activity; Rule 6 – Storm Water Discharges Exposed to Industrial Activity; and Rule 13 – Storm Water Run-off Associated with Municipal Separate Storm Sewer System Conveyance) and discharges associated with concentrated animal feeding operations (CAFO) in accordance with 327 IAC 15-16. The NPDES permitting area coordinates regulatory compliance activities with the Office of Enforcement and the Office of Voluntary Compliance (Office of Pollution Prevention and Technical Assistance), as well as informs the public, private sector, and regulated community about strategies to achieve regulatory compliance. Section 319 funds cannot be used to meet permit requirements. Permitted sources are only eligible to receive Section 319 funding from the state if the project is "above and beyond" the conditions of the sponsor's state or federal permit.

Section 401 Water Quality Certifications

IDEM regulates activities in lakes, rivers, streams and wetlands to ensure that those activities maintain the chemical, physical, and biological integrity of these waters. Our nation's wetlands and waterways provide beautiful scenery, drinking water/ground water recharge, and recreation value, along with many other benefits. They also provide raw materials for industry and medicine, hydroelectric power, a receptacle for wastewater, and a highway for commerce. While these uses provide great benefits to citizens, they can also alter and pollute our nation's waters and waterways. Federal permits or licenses are required to conduct many of these types of operations, including building and operating hydroelectric dams, discharging wastewater, altering flow paths, and placing fill materials into wetlands and waterways.

When a project is planned in Indiana that will impact a wetland, stream, river, lake, or other Water of the U.S., that project must apply for a Section 401 Water Quality Certification (401 WQC) from IDEM before the planned water quality impacts commence. A Section 401 WQC is a

required component of a federal permit and must be obtained before a federal permit or license can be granted.

Water Quality and Water Shortage

Indiana experienced the worst drought since the dust bowl era in 2012. During the drought, water use restrictions were put into place in several Indiana localities as streams dried up and lake levels lowered. As a result of the drought, the Indiana legislature reconvened the Water Resources Study Committee in the summer of 2013 to discuss issues of water scarcity and the development of a comprehensive water plan for the state.

Water quality is linked to water quantity, as noted in the caption to Table 3. During a drought, pollutants may become concentrated as flow is reduced and lake levels drop. Aquatic communities must seek pools as refugia in flowing systems or, in lake systems, move lower in the water column. As Indiana continues to discuss issues of water scarcity, it must also consider related water quality. No comprehensive water plan would be complete without a discussion of both.

Nonregulatory Actions to Control Nonpoint Source

Watershed Management Plans

Most actions to reduce and prevent nonpoint source pollution in Indiana are voluntary actions. Local "watershed groups" can be anything from an ad-hoc group of stakeholders meeting together to strategize about their water quality issues to incorporated 501(c)(3) nonprofit groups. When watershed groups come together to create a program to address nonpoint source in a local watershed, they often start with writing a watershed management plan (WMP). A WMP is a strategy and a work plan for achieving water resource goals that provides assessment and management information for a geographically defined watershed. It includes the analyses, actions, participants and resources related to development and implementation of the plan. The watershed planning process uses a series of cooperative, iterative steps to characterize existing conditions, identify and prioritize problems, define management objectives, and develop and implement protection or remediation strategies as necessary.

The main components (or chapters) in a watershed management plan include:

- Public Concerns
- Watershed Inventory - includes water quality, physical, and social data
- Problem Identification
- Identification of Sources of Problems
- Selection of Critical Areas
- Goals and Objectives
- Methods to Measure Success

These components include U.S. EPA's 9 Elements for Watershed Management Plans (U.S. EPA 2002), incorporated within a larger checklist of items needed within the plan before it is approvable. CWA Section 319 or 205j funds can be used to hire additional staff that may be required to produce a WMP. WMPs in Indiana are approved using the 2009 Indiana Watershed

Management Plan Checklist (Appendix E). Approved WMPs are then eligible to receive 319 implementation funding. Indiana currently has 97 approved WMPs (Appendix F).

Section 319 funding may be used to implement best management practices identified in a WMP, but many different sources of funding exist for water quality improvement projects. The "Funding Mechanisms" section (page 88) provides further details on implementation funding available for watershed implementation projects in Indiana.

Monitoring

Monitoring for water quality is a primary responsibility of the IDEM Office of Water Quality. The Office monitors for ambient water quality information (including ground water and surface water); potential permit violations; baseline watershed characterization; to support the development of public health advisories (such as fish consumption advisories and beach closures); identify trends in water quality improvement/degradation; to develop water quality criteria, to set permit limits and environmental indicators; identify impacts to beneficial uses; and to respond to citizen concerns. The State's full water quality monitoring strategy is described in the *Indiana Water Quality Monitoring Strategy 2011-2019.* However, only those monitoring activities related to nonpoint source programming will be included in this document.

Nonpoint Source Monitoring Strategy

Indiana's nonpoint source monitoring strategy has been evolving since it was first completed and submitted to U.S. EPA in late 2009. At that time, IDEM's monitoring staff and nonpoint source program staff were organizationally and spatially separated into IDEM's Assessment Branch (monitoring staff) and the Watershed Planning Branch (nonpoint source staff), and resided in different physical locations, making coordination between the programs somewhat difficult. In early 2010, IDEM combined these branches to more effectively utilize resources. Also in 2010, the newly created "Watershed Assessment and Planning Branch" embarked upon revising the water quality monitoring strategy (WQMS) for the state. Nonpoint source monitoring issues were incorporated into the updated WQMS and new programs commenced in the 2011 sampling season.

Essential Nonpoint Source Monitoring Strategy components retained in the new WQMS can be grouped under three broad topics which are summarized below. Additional information on each of these programs is available in the *Indiana WQMS 2011-2019*, the 2012-2017 *IDEM Quality Management Plan (QMP),* and internal project work plans.

1. Baseline Monitoring for Watershed Characterization Leading to the Formulation of a Watershed Management Plan

Watershed management plans funded through Section 319 grants to local watershed groups and other organizations must:

- Identify the causes of impairment within their watershed(s), the sources and/or stressors driving them, and the load reductions or other activities needed to control them.
- Identify and prioritize the critical areas in need of implementation measures to reduce nonpoint source pollution.

- Include a monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against a set of defined criteria that can be used to determine whether loading reductions are being achieved and whether progress is being made toward attaining water quality standards.

Watershed groups and other organizations participating in watershed planning and restoration activities may use data from any source, including but not limited to data collected by IDEM. Watershed groups commonly conduct their own monitoring to characterize water quality for such purposes as creating a watershed management plan (WMP) or detecting an improvement in water quality. Watershed groups typically use the most scientifically rigorous sampling and analytical methods their expertise and budget will allow, which can vary significantly from watershed group to watershed group. In order to identify the reliability and potential use of external data in OWQ programs, IDEM created the External Data Framework (EDF), which allows the state to evaluate data submitted to the state from external parties in terms of quality, methodology and rigor.

The EDF is a voluntary approach to systematically and transparently categorize external data sets submitted to IDEM for use in OWQ programs. IDEM uses a tiered approach to evaluate data submissions, with Level 1 consisting of data with low rigor (but based on solid science) that is appropriate as supplemental or educational information; Level 2, which includes a medium level of rigor and documented data quality that can be used for activities such as demonstrating the effectiveness of TMDL implementation efforts; and, Level 3 data which has high scientific rigor and can be used for 303(d) listing and delisting and regulatory decisions .

Because U.S. EPA requires all states to show progress on improving waters impacted by nonpoint source, and because IDEM has chosen delistings as the mechanism by which it will show progress, data quality level plays an important role in the characterization of nonpoint source and measuring the success of best management practices (BMPs) in a given watershed. IDEM anticipates that not all watershed groups can meet data quality level 3, which is necessary to make listing and delisting decisions. IDEM provides additional support to a limited number of watershed groups in characterizing water quality for a WMP in its baseline monitoring program and follow-up monitoring for success (delistings) each year. IDEM will provide this monitoring to either augment the monitoring to be conducted by the group under an approved Quality Assurance Project Plan (QAPP) or in lieu of the group conducting its own monitoring.

This monitoring will provide a reliable scientific baseline for later determining if improvements in water quality have been achieved as a result of any best management practices implemented in the watershed, which may help IDEM to meet some of the performance measures described in the following section.

IDEM is in the process of refining its selection criteria for baseline monitoring project assistance. The selection of watersheds chosen for monitoring assistance in 2011 & 2012 was based on the following criteria:

- The project selected is a new proposal for the funding cycle and does not yet have a monitoring program in place to support its planning activities.
- The project ranked highly in the proposal selection process and had already been selected for funding. The project selected needed the monitoring assistance more than other

projects slated for funding, which already have the necessary capacity to conduct their own monitoring.

In 2013, IDEM included the additional criterion that the project must be in an area slated for a TMDL. IDEM continues to evaluate the baseline monitoring program for efficiencies and opportunities to utilize data for multiple programmatic needs.

OWQ has not yet determined all the methods that will be used to analyze the data collected through the new baseline monitoring activities. In order to know the level of assistance watershed groups will need in best utilizing these data, OWQ has developed a process for early and ongoing coordination with the groups for whom baseline monitoring is conducted to ensure that the study will meet their needs, to determine the types of data analysis they need and whether they have the capacity to do this work. As a part of this ongoing coordination, local watershed coordinators have been invited to participate in the 305(b) assessment process in order to enhance the planning process by helping them to better understand how IDEM evaluates the data and determines potential sources. In addition, it has been suggested that IDEM use water quality information collected as part of baseline projects to create "water quality report cards." This approach will be piloted in Deep River in 2014 or 2015.

2. Identify Water Quality Improvements Accomplished by Watershed Restoration Efforts Funded Through Clean Water Act Programs

This monitoring objective comes from the National Water Program Guidance issued by U.S. EPA (U.S. EPA 2012b) that defines the measures to be used to assess progress in meeting the goals outlined in its Strategic Plan. This guidance contains both administrative and environmental performance measures for many of IDEM's CWA programs. IDEM's WQMS addresses those measures that require water quality monitoring data.

WQ-10 (or "Nonpoint Source Success Stories") – This performance measure requires that states develop "Nonpoint Source Success Stories" and submit them to U.S. EPA for the purposes of tracking how nonpoint source restoration efforts are improving water quality. To meet this measure, IDEM must identify nonpoint source-impaired waters that have been improved as a result of watershed restoration efforts funded in whole or in part by IDEM's Nonpoint Source Program.

SP 12 (or "Measure W") – This measure requires that OWQ show improvements in water quality conditions in impaired watersheds that have resulted from watershed planning and restoration activities. For the purposes of meeting this performance measure, improvements may be demonstrated by the delisting of at least 40 percent of the impairments or impaired miles/acres in the watershed or valid scientific information that indicates significant watershed-wide improvement in one or more water quality parameters associated with the impairments listed in 2002.

Both of these U.S. EPA performance measures involve identifying where water quality improvements are occurring, either as a result of OWQ grant-funded watershed planning and restoration efforts or for other reasons. To meet this monitoring objective, OWQ must conduct targeted monitoring of waters previously identified as impaired on Indiana's 303(d) list, with an emphasis on those watersheds where restoration efforts are known to have occurred. Because of

the need to delist streams, Level 3 data quality is necessary. The completion of the EDF will allow IDEM to accept third party data that meets Level 3 criteria and use those data to make delisting decisions when appropriate.

3. Lakes Monitoring

The Indiana Clean Lakes Program (CLP) is administered for IDEM by the Indiana University School of Public and Environmental Affairs (IU/SPEA) through a Section 319 grant from OWQ's Nonpoint Source Program and includes two primary but different monitoring components. IU/SPEA staff and students conduct the majority of the monitoring for the CLP and administer a volunteer monitoring program through which additional monitoring is conducted by a corps of trained citizen volunteers.

Lakes monitored by IU/SPEA are selected for sampling from a population of approximately 400 lakes and reservoirs throughout Indiana that are greater than five acres in surface area and that have a publicly accessible boat launching area. IU/SPEA samples approximately 80 lakes per year, and volunteers monitor approximately 100 more annually. The program uses a randomized sampling approach to select lakes from this population to monitor in order to explore additional statistical assessment methods for lakes.

Additional Monitoring Programs

In addition, several monitoring programs that are currently funded through sources other than 319 may be funded by Section 319 in the future. These include, but are not limited to, the following:

- Monitoring to Support Total Maximum Daily Load Development
- Monitoring to Support Development of Public Health Advisories
- Special Studies
- Ground water Monitoring
- Monitoring to Support the National Water Quality Initiative

Generally, OWQ's targeted monitoring approaches are designed to meet specific needs but are leveraged where possible to meet multiple water monitoring objectives. Sites and study areas are specifically selected based on known impairments, historical information, permitted dischargers, land use, watershed group focus areas, and other factors relevant to the monitoring objective for which the monitoring is to be conducted. Sampling projects and sites change annually and may occur anywhere in the state, depending on specific monitoring objectives. The targeted monitoring design allows for gathering a variety of biotic and abiotic information including bacteriological, fish and macroinvertebrate community measures, fish and sediment contaminant levels, in-stream and riparian habitat measures, and physical and chemical water chemistry parameters.

Environmental Indicators Collected by 319 Projects

In addition to data collected by IDEM, some watershed interest groups have the budget and expertise to conduct their own water quality monitoring programs. These groups have requested guidance from the Nonpoint Source Program as to the types of information that is important to

collect, as well as the appropriate methods to be used. In response to this need, IDEM partnered with Purdue University on a project to produce a manual for watershed groups collecting water quality data. The result of that project was the *Monitoring Water in Indiana: Choices for Nonpoint Source and Other Watershed Projects* handbook which lays out basic information on important nonpoint source parameters and biological indices, identifies core and supplemental indicators, suggests targets and protective levels, and provides information on photomonitoring. In addition it identifies methodologies used by the main water quality agencies in the state, including IDEM, IDNR- Lake and River Enhancement (LARE), USFWS, and USGS so that groups can choose to use methods comparable to larger datasets in the state.

Hoosier Riverwatch Program

Hoosier Riverwatch is a program of the IDEM Watershed Assessment and Planning Branch. The program began in Indiana to increase public awareness of water quality issues and concerns by training volunteers to monitor stream water quality. The mission of Hoosier Riverwatch is to involve the citizens of Indiana in becoming active stewards of Indiana's water resources through watershed education, water monitoring, and clean-up activities. Hoosier Riverwatch accomplishes this mission through the following goals:

- Educate citizens on watersheds and the relationship between land use and water quality.
- Train citizens on the basic principles of water quality monitoring.
- Promote opportunities for involvement in water quality issues.
- Provide water quality information to individuals or groups working to protect water resources.
- Support volunteer efforts through technical assistance, monitoring equipment, networking opportunities, and educational materials.

Prior to November 2012, Hoosier Riverwatch was a program within the IDNR where it was supported by a federal Sport Fish Restoration grant and state funding. The move to IDEM better integrates the volunteer water monitoring program into watershed monitoring and planning activities, and it is now 319-funded. Many watershed groups without large budgets or technical resources utilize Hoosier Riverwatch to monitor their watersheds.

QAPPs

Any monitoring data collection (including the collation of data collected by third parties) funded through IDEM's Nonpoint Source Program must be conducted under a QAPP approved by the Nonpoint Source Program prior to initiation of monitoring activities. QAPPs ensure that the data collected are the data needed to meet water quality objectives. QAPPs also lay out the sampling sites, protocols, and QA/QC measures that will be employed throughout the sampling program. More information related to QAPP requirements is available at http://www.idem.IN.gov/nps/3383.htm.

Management of Nonpoint Source Grant Project Data and Data Submitted Through the Office of Water Quality's External Data Framework

The IDEM Assessment Information Management System (AIMS) database includes the ability to integrate nonpoint source monitoring data collected by external organizations for projects funded through IDEM's Nonpoint Source Program and others interested in submitting their data through the External Data Framework (EDF) when implemented. The EDF, which is currently under

development, will guide IDEM's use of data submitted by external partners for the purposes of 305(b) water quality assessment.

While many of the external sources of information may be from volunteer or other monitoring professionals, the ability to integrate data from multiple sources will allow OWQ to better support internal and external data requests by providing a more comprehensive set of data, which is accurately characterized in terms of its data quality and appropriateness for various uses.
In addition to storing water quality data collected by nonpoint source project and other external partners, AIMSII also supports watershed planning and implementation efforts with its ability to store modeled results for load reduction estimates based on specific types of best management practices. The ability to store this type of information provides a single location for retrieving both nonpoint source data and data collected by the WAPB for the purposes of analyzing modeled load reductions and water quality data together.

The new nonpoint source function of AIMS supports the internal data management needs associated with the EDF and serves as an important component of the guidance that external organizations can receive. The templates developed for the submission of data from grant funded Nonpoint Source Program projects can also be used by external organizations who wish to provide their water quality data to IDEM. The templates will help participating organizations to standardize their project metadata, which describes the data they collect, and their water quality data for submission through the EDF. Providing such documentation will help external organizations ensure that the data they collect are of known quality, enhancing the usability of the data and creating new opportunities for collaboration.

Modeling

While monitoring water quality conditions is an approach taken by IDEM and many local watershed groups to characterize problems, causes, and source of nonpoint source, modeling is another way to approximate conditions in a given watershed. Models require data of some type – be it water quality data or land use data. Many models have been, and continue to be, produced for use by water quality practitioners. Common models utilized by groups in Indiana include the Long-term Hydrologic Impact Analysis tool (L-THIA), the Spreadsheet Tool for the Estimation of Pollutant Load (STEP-L), and the Soil and Water Assessment Tool (SWAT). Many additional models are available for cases in which the aforementioned tools are not well-suited.

Inventory of Stakeholders

Legal Framework Renders All Citizens Stakeholders Relative to Nonpoint Source
The Indiana Code legally defines water in a natural stream or lake as a public trust resource – property of the citizenry held in trust by the state (IC 14-25-1-2). To further paraphrase, the state is designated as the primary caretaker of water resources, acting on behalf of citizens and making determinations to protect the natural resource for future generations. Although the state protects Indiana's water resources, each Indiana resident is made a stakeholder in the quality of their water resources, whether it is for economic, recreational, or consumptive uses.

> **IC 14-25-1-2**
> **Waters declared natural resource**
> Sec. 2. (a) Water in a natural stream, natural lake, or another natural body of water in Indiana that may be applied to a useful and beneficial purpose is declared to be:
> (1) a natural resource and public water of Indiana; and
> (2) subject to control and regulation for the public welfare as determined by the general assembly.

IDEM is the agency designated by the state to administer the federal programs stemming from the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA), which gives it broad authority to act on behalf of citizens to reduce water pollution, including nonpoint source pollution. While the CWA and SDWA provide federal and state authority for protecting water quality, the State of Indiana has also put into place a legal framework whereby state agencies - IDEM as well as other agencies, such as the Office of the Indiana State Chemist (OISC) – can control nonpoint sources and protect water quality. Additional water-related functions fall under the jurisdiction of IDEM's sister and partner agencies, such as Soil and Water Conservation Districts (SWCDs), the Indiana State Department of Health (ISDH), the Indiana Department of Natural Resources (DNR), and Purdue Extension.

The Indiana Code itself empowers IDEM to protect Indiana from sources of pollution through a variety of avenues. More specifically, the Environmental Rules Board (ERB) has been established to adopt rules and promulgate those adopted rules to abate pollution. The state retains the authority to broadly interpret the IC in its protection of water resources; for example, IC 13-18-4-5 states that "a person may not throw, run, drain, or otherwise dispose; or cause, permit, or suffer to be thrown, run, drained, allowed to seep, or otherwise disposed; into any of the streams or waters of Indiana any organic or inorganic matter that causes or contributes to a polluted condition of any of the streams or waters of Indiana…" The Indiana Attorney General has suggested that this Act protects state water resources from pollution regardless of the activity from which it was created, including nonpoint sources.

The ERB is also tasked in the Indiana Code to establish the requirements for issuing permits, with IDEM establishing the guidelines for compliance and reporting (IC 13-15-1-2). While the majority of these permits regulate point source discharges, the Nonpoint Source Program works in partnership with most of these programs in their effort to eliminate nonpoint source, including the programs for storm water, drinking water, wetlands, and confined animal feeding, among others. The individual state programs established by Federal and State Acts are integral to protecting Indiana's water resources, and perform as important internal partners to the state Nonpoint Source Program.

Internal IDEM Program Partners

The Nonpoint Source Program is integral to the mission of improving water quality in Indiana, but it acts only as a part of several integral IDEM programs that work in parallel to enhance the resource. The Nonpoint Source Program staff work to engage these other agency programs when working with external partners and look to create efficiencies in their efforts to reduce nonpoint sources. Each internal partner brings a different piece to the puzzle that is holistic nonpoint source reduction. In no particular order, the internal IDEM partners that assist the Nonpoint Source Program are:

- Storm Water Program
- Wetlands Program
- Enforcement Program
- TMDL Program
- Monitoring & Assessment Programs
- Hoosier Riverwatch Volunteer Monitoring Program
- Brownfield Program
- Confined Feeding Program
- GW/Drinking Water Program

The Nonpoint Source Program works with these partners through attendance at their annual conferences, through information-sharing and coordination meetings, by providing technical assistance, accepting invitations to speak with local watershed groups on a variety of projects, and assisting in the resolution of water quality problems at the local level.

External Program Partners

While the Indiana Code gives IDEM broad authority to regulate many facets of water pollution, a large majority of nonpoint source planning and implementation requires the voluntary participation of partners external to the agency to improve water quality in Indiana. These stakeholders represent a wide array of interests, including federal, state, and local governments and agencies, as well as university, other nonprofit organizations, and ad hoc interest groups. External stakeholders are engaged in a variety of ways, including, but not limited to:

(1) Participation on watershed steering committees
(2) Providing technical assistance in their areas of expertise
(3) Partnering in nonpoint source and watershed education resource development
(4) Facilitation of outreach messaging
(5) Integration of resources to achieve nonpoint source goals and objectives
(6) Implementation of BMPs to reduce nonpoint source

IDEM targeted external partner feedback in this revision of the State Nonpoint Source Management Plan in the form of survey and response. More specifically, stakeholders were provided a questionnaire that asked that they provide their perspective on the Strengths, Weaknesses, Opportunities, and Threats (SWOT) of the current State Nonpoint Source Program. The questionnaire also solicited stakeholder opinion concerning the major state Nonpoint Source goals and objectives, and the best strategies to reduce nonpoint source and the role their organization might play in the process. The complete external stakeholder survey can be found in Appendix H, while the list of stakeholders originally targeted to receive the survey appears in Appendix I.

IDEM also actively looks to recruit new stakeholders in its mission to reduce nonpoint source in Indiana. This is primarily achieved through the duties carried out by the regional watershed specialists and other nonpoint source staff. The watershed specialists assist local and regional groups with watershed planning, but also actively assist groups in stakeholder recruitment, and actively look to develop new partnerships through their participation in agency, academic, and professional organization meetings and conferences. The watershed specialists, and other staff, also represent IDEM on external working committees, including the Indiana Conservation Partnership (ICP) and the Indiana Association of Soil and Water Conservation Districts (IASWCD), among others.

The current list of external partners is varied in its scope, but continues to grow as the Nonpoint Source Program investigates new partnerships and unique opportunities. Current external Nonpoint Source Program partners include:

External Agency Partners

- Indiana Department of Natural Resources (DNR) Programs
  - DNR – LMCP
  - DNR – LARE Program
  - DNR – Forestry
  - DNR – Fish and Wildlife – Fisheries Section
  - DNR – Fish and Wildlife – Wildlife Diversity Program, Nongame Section
  - DNR – Parks and Reservoirs
  - DNR – Healthy Rivers Initiative
  - DNR – Heritage Trust
  - DNR – Reclamation
  - DNR – Oil and Gas
  - DNR – Water
- ISDH
- Indiana State Department of Agriculture (ISDA)
- OISC
- State Revolving Fund (SRF) Program
- USACE
- U.S. Department of Agriculture (USDA) Programs
  - NRCS
  - Farm Service Agency (FSA)
- USGS
- U.S. EPA

- Adjacent state environmental agencies
- Local governments
- Indiana Conservation Partnership

Nonprofit Partners

- Indiana Association of Soil and Water Conservation District (IASWCD)
- Resource Conservation and Development (RC&D) Councils
- The Nature Conservancy (TNC)
  - Wabash River Basin Initiative
  - Western Lake Erie Basin Initiative
- Alliance for Indiana Rural Water
- Local watershed and conservancy groups, lake associations
- Ad hoc interest groups
- Water utilities

Academia

- Purdue University
- Indiana University-School of Public and Environmental Affairs (SPEA)
- Indiana University –Center for Earth and Environmental Science (CEES)
- Manchester University
- Grace College – Kosciusko Lakes and Streams program
- Taylor University
- Indiana University-Purdue University – Fort Wayne (IPFW)

Problems, Causes, Sources

Problem

Many of Indiana's waters are not meeting one or more of their designated uses. All Indiana waters, except where otherwise noted, are designated for recreational use and warm water aquatic life use (327 IAC 2-1-3). Even so, about 16,000 miles of the approximately 63,130 miles of streams in Indiana are impaired for one or more of their designated uses (IDEM 2012a), and 144 of the approximately 1,502 lakes in Indiana (not including Lake Michigan) are impaired.

Causes

Important nonpoint source pollutants and the designated use(s) impacted in Indiana include:

- Sediment – aquatic life use
- Nutrients (phosphorus in lakes and stagnant pools, nitrogen as ammonia and nitrate) – aquatic life, recreational, and drinking water (ground water) use
- Pathogens (*E. coli* as indicator) – recreational use
- Heavy metals – aquatic life use
- Pesticides – aquatic life use, drinking water use
- Oil, grease, and toxic chemicals – aquatic life, recreational, and drinking water use
- Pharmaceuticals and personal care products – aquatic life use
- Anions, particularly chloride and sulfates – aquatic life and drinking water use

Any one or more of these pollutants, along with the physical conditions in a waterbody, can have an individual or combined effect on water quality resulting in an impairment of one/more designated uses. Indiana's water quality standards contain numeric water quality criteria (Table 4) that can be use to assess the potential impacts of these pollutants (327 IAC 2-1 et seq.). Numeric targets for various indicators of pollution and degraded water quality have also been developed for this purpose (Table 5).

Parameter	Target	Reference/Other Information
Total Ammonia (NH_3)	Range between 0.0 and 0.21 mg/L depending upon temperature and pH	Indiana Administrative Code (327 IAC 2-1-6)
Atrazine	Max: 3.0 ppb	U.S. EPA Drinking Water Standard
Dissolved Oxygen (DO)	Min: 4.0 mg/L Max: 12.0 mg/L	Indiana Administrative Code (327 IAC 2-1-6)
	Min: 6.0 mg/L in coldwater fishery streams	Indiana Administrative Code (327 IAC 2-1.5-8)
	Min: 7.0 mg/L in spawning areas of coldwater fishery streams	Indiana Administrative Code (327 IAC 2-1.5-8)
E. coli	Max: 235 CFU/ 100mL in a single sample	Indiana Administrative Code (327 IAC 2-1.5-8)
	Max: Geometric Mean of 125 CFU/ 100mL from 5 equally spaced samples over a 30-day period	Indiana Administrative Code (327 IAC 2-1.5-8)
Nitrate	Max: 10 mg/L in drinking water class of water	Indiana Administrative Code (327 IAC 2-11-6)
Nitrite	Max: 1 mg/L in drinking water class of ground water	Indiana Administrative Code (327 IAC 2-11-6)
Nitrate-N + Nitrite-N	Max: 10 mg/L in surface waters designated as a drinking water source	Indiana Administrative Code (327 IAC 2-1-6)
Temperature	Dependant on time of year and whether stream is designated as a cold water fishery	Indiana Administrative Code (327 IAC 2-1-6)
Heavy Metals	Variable, depending upon hardness	Indiana Administrative Code (327 IAC 2-1-6)
pH	Min: 6.0/Max: 9.0	Indiana Administrative Code (327 IAC 2-1-6)
Chlorides	Dependent upon sulfate and hardness in general; Max: 250 mg/L (coldwater fishery)	Indiana Administrative Code (327 IAC 2-1-6)
Sulfates	Dependent on chlorides and hardness in general; Max: 250 mg/L (coldwater fishery)	Indiana Administrative Code (327 IAC 2-1-6)

Table 4.Water quality standards for common nonpoint source pollutants. (from http://www.idem.IN.gov/nps/3484.htm)

Parameter	Target	Reference/Other Information
Nitrate-nitrogen (NO_3)	Max: 0.633 mg/L	U.S. EPA recommendation*
	Max: 1.0 mg/L	Ohio EPA recommended criteria for Warm Water Habitat (WWH) headwater streams in Ohio EPA Technical Bulletin MAS//1999-1-1 [PDF]
	1.5 mg/L	Dividing line between mesotrophic and eutrophic streams (Dodds, W.K. et al., 1998, Table 1, pg. 1459, and in EPA-822-B-00-002 [PDF], p 27.)
	10.0 mg/L	IDEM draft TMDL target based on drinking water targets
Ortho-Phosphate also known as Soluble reactive phosphorus (SRP)	Max: 0.005 mg/L	Wawasee Area Conservancy Foundation recommendation for lake systems, NESWP344
Suspended Sediment Concentration (SSC)	Max: 25.0 mg/L	U.S. EPA recommendation for excellent fisheries
	Range: 25.0-80.0 mg/L	U.S. EPA recommendation for good to moderate fisheries
Total Kjeldahl Nitrogen (TKN)	Max: 0.591 mg/L	U.S. EPA recommendation *
Total Phosphorus	Max: 0.076 mg/L	U.S. EPA recommendation
	0.07 mg/L	Dividing line between mesotrophic and eutrophic streams

Parameter	Target	Reference/Other Information
		(Dodds, W.K. et al., 1998, Table 1, pg. 1459, and in EPA-822-B-00-002 [PDF], p 27.)
	Max: 0.08 mg/L	Ohio EPA recommended criteria for Warm Water Habitat (WWH) headwater streams in Ohio EPA Technical Bulletin MAS//1999-1-1 [PDF]
	Max: 0.3 mg/L	IDEM draft TMDL target
Total Suspended Solids (TSS)	Max: 80.0 mg/L	Wawasee Area Conservancy Foundation recommendation to protect aquatic life in lake systems
	Max: 30.0 mg/L	IDEM draft TMDL target from NPDES rule for lake dischargers in 327 IAC 5-10-4 re: monthly average for winter limits for small sanitary treatment plants
	Range: 25.0-80.0 mg/L	Concentrations within this range reduce fish concentrations (Waters, T.F.,, 1995). Sediment in streams: sources, biological effects and control. American Fisheries Society, Bethesda, MD. 251 p.
	Max: 40.0 mg/L	New Jersey criteria for warm water streams
	Max: 46.0 mg/L	Minnesota TMDL criteria for protection of fish/macroinvertebrate health
Turbidity	Max: 25.0 NTU	Minnesota TMDL criteria for protection of fish/macroinvertebrate health
	Max: 10.4 NTU	U.S. EPA recommendation
Nitrate-nitrogen (NO_3)	Max: 0.633 mg/L	U.S. EPA recommendation *
Conductivity	Max: 1200 µhmos/cm (at 25°C)	Indiana Administrative Code (327 IAC 2-1-6)

* U.S. EPA recommended criteria are different for parts of southwest Indiana within Ecoregion IX. See Ecoregional Nutrient Criteria Documents for Rivers & Streams for more information.

Table 5. Water quality targets for common nonpoint source pollutants. (from http://www.idem.IN.gov/nps/3484.htm)

Pollution Indicators

The parameters shown in Table 5 are considered indicators of pollution if they are found in concentrations that exceed their associated targets. In addition to these parameters, the following parameters and indices (several parameters with results for each combined into a single score), are commonly used to indicate nonpoint source pollution in Indiana:

- Indices of Biotic Integrity (IBI – fish - and macroinvertebrates - mIBI) – indicates the condition of the current biological community against a perceived representative/ideal community. When a community quality is lower than the threshold, the biology indicates that something in the environment (habitat, chemicals, invasive species, etc.) is negatively impacting the aquatic life use in the waterbody. Biological indicators are valuable for water quality monitoring because, unlike chemical parameters, the organisms living in the water can indicate conditions in the water over time. When a waterbody does not meet the threshold for acceptable IBI, the stream reach is listed for "Impaired Biotic Communities" or IBC.
- Qualitative Habitat Evaluation Index (QHEI) – indicates the quality of the aquatic habitat.
- *Escherichia coli* bacteria – indicates fecal contamination from warm-blooded animals.
- Chlorophyll *a* – indicates the presence of algae, which in itself indicates potential nutrient enrichment.
- Indiana Trophic Status Index – a measurement of water quality in Indiana lakes.
- Percent impervious surfaces – indicates increased potential for stream "flashiness" which leads to scouring, increased sediment and decreased habitat quality for aquatic life.

These indicators, together or separately, help water quality professionals to determine if impairment exists and to identify potential sources of the degraded water quality; for example, a low IBI score could be the result of a habitat condition (little/no shade, lack of woody debris), sanitary/illicit discharge of wastewater (ammonia), nutrient enrichment (especially when combined with low DO, little shade and/or abundant algal growth), heavy metals/high pH, or excess siltation. Site conditions can help to tease out particular land uses that may be impacting water quality.

Sources of Nonpoint Source Pollution

Because nonpoint source pollution is generally transported through overland flow, widespread land use practices have the greatest potential for contributing nonpoint source. Major sources of nonpoint source in Indiana include:

- Agricultural Management – These activities can cause nutrient, sediment, pesticide, and pathogen loading to waterways through field crop and livestock production, including land application of livestock manure as crop fertilizer.
- Atmospheric Deposition – Pollutants in the atmosphere, such as mercury and lead, can be deposited in waterways through rainfall or through the intermixing of air and water.
- Closed Landfills and Solid Waste Disposal Sites – Rainwater infiltrating improperly closed landfills can cause diffuse pollution to enter the ground water or surface water.
- Ground water – Rainwater infiltrating into the ground can carry with it nutrients, metals, and hydrocarbons that can contaminate ground water resources. In ground water-fed streams, these pollutants can enter the surface water through the ground water interface.
- Hydromodification – Hydromodification, or the alteration of natural waterways through straightening, hard-armoring, and damming. Hydromodification includes channelized streams, denuded streams, low-head and hydropower dams and impoundments, drainage of wetlands/tile drainage and dredged channels. Increased sedimentation and habitat loss are concerns in modified waterbodies.
- Land Application of Nonagricultural Wastes – Land application of nonagricultural wastes, or biosolids, can pollute ground and surface water through run-off and infiltration of nutrients, pathogens, salts and heavy metals.
- Urban Issues – Urban run-off and drainage systems provide a direct access for sediment, hydrocarbons, pesticides, nutrients, pathogens, salts, heavy metals and thermal pollution to enter waterways.
- Natural Resource Extraction – Natural resource extraction, i.e. coal extraction, oil and gas production, and nonenergy mineral extraction, can be a conduit for sediment, heavy metals, sulfates, hydrocarbon, brine and acid pollution.
- On-Site Sewage Disposal – On-site sewage disposal, or septic systems, can be a source of nutrients, pathogens, salts and pharmaceuticals and personal care product pollution in both surface water and ground water.
- Stream bank/Shoreline Erosion – Erosion of stream banks and shorelines mainly supplies sediment, but also some small amounts of nutrients, to surface waters.

- Timber Management – Erosion of land from timber harvesting techniques, access roads, and loss of vegetation cover can cause sediment pollution.
- Transportation – Run-off from transportation facilities and infrastructure can pick up pollutants similar to urban areas, including hydrocarbons, salts, and sediments.

This Nonpoint Source Management Plan will work to address the above sources as stakeholders express interest. However, during the next five years, the IDEM Nonpoint Source Program will not fund activities to control nonpoint source from atmospheric deposition. Even so, any watershed group that is funded through a Section 319 grant can count the monies expended to address atmospheric deposition (excluding federal funds or other ineligible expenses) as matching funds.

History of the Nonpoint Source Program in Indiana

The 1987 Clean Water Act (CWA) amendments created a federal source of dedicated nonpoint-source funding available to the states, provided that the states assessed the status of their nonpoint source pollution and reported that status to U.S. Environmental Protection Agency (U.S. EPA). Indiana prepared its first assessment of nonpoint source pollution in the state in 1989[8]. At that time, it was estimated that 3579 total stream/river miles and 20,539 lake acres in Indiana were affected by nonpoint source pollution. Key sources of impairment listed in the report included agriculture (crop production, pasture and range land, as well as feedlots and aquaculture), silviculture, construction and urban run-off, resource extraction/exploration/development, land disposal, hydrologic/habitat modification and "other" (including atmospheric deposition, waste storage/storage tank leaks, spills, and natural sources) (IDEM 1989).

Indiana received its first appropriation of $1,012,520 of Section 319 dollars in FFY 1990. The money was administered by the Indiana Department of Environmental Management (IDEM), Indiana's CWA designee. IDEM created a new Nonpoint Source Program in its Water Quality Surveillance and Standards Branch in the Office of Water Management. With this funding IDEM set up an internal structure to administer funds, continued its nonpoint source assessment activities, and passed through $355,000 to statewide and local projects. Over the next twenty-two years, IDEM would receive nearly $77 million in Section 319 funding to assist with implementation of the State Nonpoint Source Management Plan.

Since the Nonpoint Source Program was established in Indiana, it has undergone a myriad of internal shifts and evolutions in response to changing priorities and needs at the federal, state, and local levels. Just a few of them are highlighted here.

From the program's inception, the state recognized that nonpoint source management was larger than the program housed at IDEM. In order to complete the first nonpoint source assessment, leaders of the IDEM and Indiana Department of Natural Resources (IDNR) pulled together an inter-agency task force to analyze the most up-to-date information on potential sources of nonpoint source and devise strategies to ameliorate it. Members of the task force included the Lieutenant Governor's Office; IDNR's Divisions of Water, Reclamation, Forestry, Fish and Wildlife, Soil Conservation, and Oil and Gas; the Office of the State Chemist (OISC); Purdue's Cooperative Extension Service; the Agricultural Stabilization and Conservation Service (now the Farm Service Agency, or FSA); the Soil Conservation Service (now the Natural Resources Conservation Service, or NRCS); State Department of Highways; the State Board of Health; and IDEM's Offices of Water and Solid and Hazardous Waste Management.

[8] From *Nonpoint Source Assessment Report* (IDEM 1989): "Of the estimated 90,000 miles of water courses in Indiana, only about 20,000 miles of streams and rivers are large enough to support all designated uses throughout most of the year" (p.1)

Many potential sources of nonpoint source were (and continue to be) present in Indiana. However, due to the large presence of agricultural land use in the state (nearly 62%), and its potential to be a large source of nonpoint source in Indiana, IDEM partnered with NRCS early in its nonpoint source work to coordinate with the local Soil and Water Conservation Districts (SWCDs) and their local field offices to reach out to the agricultural community. In FFY 1992, IDEM funded a nonpoint source liaison between NRCS and itself. This arrangement lasted for eleven years. From FFY 1999 through 2003 IDEM also used Section 319 dollars to fund NRCS personnel to work with local watershed interests and provide technical assistance around the state. This "Watershed Team" was very effective at getting watershed initiatives off the ground at the local level. Due to the success of the Watershed Team, when NRCS could no longer spare personnel for the Nonpoint Source Program (in 2003), IDEM was able to create four in-house Watershed Specialist (WSS) positions (in 2004) that continue to provide local support and technical assistance to the present.

By 2003, the Indiana Nonpoint Source Program had blossomed into its own. Several key accomplishments were completed in this year. By this time the Nonpoint Source Program had released a Watershed Management Plan (WMP) checklist (in 2001); which was revised in 2003 to include the 9 Key Elements of a Watershed Management Plan (U.S. EPA 2002). Also in 2003, the program published a comprehensive manual for organizing a watershed group and writing a management plan[9]. The State Revolving Fund Loan Program had also developed a nonpoint source program to dovetail with the Nonpoint Source Grants Program and completed its first project with the city of Evansville in 2003[10].

Another internal reorganization moved the Nonpoint Source Program into closer integration with the TMDL and 305(b)/303(d) Assessments programs in 2007 when the Watershed Management Section (WMS) combined with those two programs to become the Nonpoint Source/TMDL Section in the Watershed Planning Branch. The staff had grown to 14 in number and included six project managers, a Quality Assurance Project Plan (QAPP) Coordinator, the Section Chief, a Geographic Information Systems (GIS) Coordinator, a clerical assistant, and four WSS. The WSS were equivalent to the Watershed Conservationists; they frequently traveled to local watershed group steering committee meetings, public meetings, one-on-one meetings with watershed coordinators throughout the state, groups that were interested in writing a WMP, and groups looking for funding for their remediation activities.

The Nonpoint Source Program endured another internal shift when it became part of the Watershed Assessment and Planning Branch in 2010. There it remained collocated with the 305(b)/303(d) and TMDL programs and was paired with the Assessment Branch (Biological Studies Section, Surveys Section, and Toxicology and Chemistry Section). This alignment enabled the Nonpoint Source Program to capitalize on the monitoring expertise of the Assessment Branch to begin baseline studies for watershed plans and follow-up monitoring for success. At present, the Nonpoint Source Program remains in the Watershed Assessment and Planning Branch as part of the Watershed Planning and Restoration Section.

[9] *Indiana Watershed Planning Guide*

[10] The project remediated a rail site and contaminated ground water that flows to Pigeon Creek.

Current Approach

IDEM's current approach to managing nonpoint source pollution is multi-layered. Through careful monitoring, targeted grantmaking, strategic outreach and education, powerful partnerships, and responsible administration, Indiana has been able to show successful restoration of several streams and watersheds.

Monitoring

Indiana's Nonpoint Source Program encourages grantees to monitor their watersheds for the purposes of characterizing the watershed for watershed management plans and to document trends in water quality during and subsequent to implementation of a WMP. Grantees and other interested parties sometimes use the state volunteer monitoring program Hoosier Riverwatch in combination with other methods to gather water quality data for their particular project. However, until 2014, Hoosier Riverwatch and other grantee-generated data was generally not included in the state's dataset for assessment purposes because it generally did not attain a high enough rigor (or, data quality level, set through quality assurance and quality control practices of the monitoring organization); nor, was there generally official follow-up by IDEM to evaluate water quality improvements. The data was reported to IDEM, relayed to U.S. EPA as part of the project's final report, and stored for future use. Now that the Hoosier Riverwatch program is a part of IDEM, Indiana is developing protocols for importing Hoosier Riverwatch data into the U.S. EPA's Storage and Retrieval Data Warehouse (STORET) as part of the state dataset.

Beginning in 2009, IDEM made strides to allocate resources for targeted success monitoring of watersheds that had received 319 funding. Also in 2009, the state adopted the Nonpoint Source Monitoring Strategy into the state Water Quality Monitoring Strategy (WQMS). In late 2010-early 2011, the state thoroughly revised its WQMS, the document that guides the way in which IDEM will deploy staff and other monitoring resources. Among other things, the 2011-2019 WQMS prescribes baseline monitoring for at least one watershed group receiving nonpoint source funding per year and follow-up success monitoring where 319 implementation funding has been spent in order to document improvements in water quality. A build-out of the monitoring program's Assessment Information Management System (AIMS) database stores nonpoint source project data for future reference and analysis. Additional monitoring information is in the "Monitoring" section beginning on page 29.

Targeted Grantmaking for Water Quality Improvement

The majority of 319 funding provided to Indiana by U.S. EPA is passed through to state and local organizations to monitor water quality issues, prepare community-based 9 Element watershed management plans, implement those plans (including the installation of on-the-ground practices), and perform outreach and education activities. Each fall, IDEM solicits proposals from nonprofits, agencies, watershed groups, universities and other eligible entities for water quality projects in furtherance of the applicant's mission and the State Nonpoint Source Management Plan. From FY 2008-2012, IDEM obligated over $14.8 million to pass through to these grantees.

Strategic Outreach and Education

IDEM NPS grants support statewide and local education efforts to both further public awareness of nonpoint source pollution and to train local watershed leaders to develop and implement

watershed management plans at the local level. Local watershed grantees are encouraged to include an outreach aspect to each nonpoint source project funded through IDEM Nonpoint Source. In addition, IDEM has supported various statewide outreach campaigns.

Local leaders and watershed coordinators have an annual opportunity to receive advanced training in watershed management through the Indiana Watershed Leadership Academy (IWLA). Since 2006, Purdue University has trained 224 watershed coordinators, leaders, volunteers, consultants and local government leaders through its IWLA program, funded through IDEM's 319 grant program. Participants learn skills related to watershed planning, working with local government and plan commissions, sharing the work with volunteers, monitoring water quality, and estimating load reductions. IDEM continues to support this program while encouraging the university to find alternative funding sources to sustain the program.

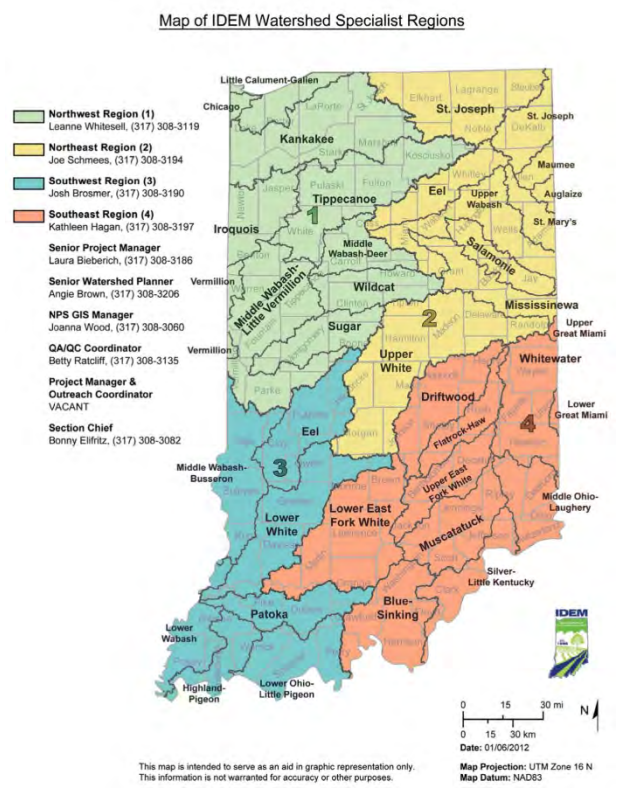

Figure 12. Watershed Specialist coverage areas.

IDEM also employs four regional WSS to work with local watershed efforts to build community buy-in, set appropriate watershed goals, coordinate with similar efforts in the area, find sources of funding, and coordinate statewide messaging. The WSS are housed in Indianapolis and serve stakeholders in assigned basins across the state.

Powerful Partnerships

The IDEM Nonpoint Source Program utilizes multiple partnerships to reach diverse stakeholder groups and further its goals in Indiana. Some of those partnerships are highlighted below.

IDEM is one of eight agencies and organizations comprising the **Indiana Conservation Partnership** (ICP). Along with the Indiana State Department of Agriculture (ISDA), NRCS, USDA- Farm Service Agency (FSA), Purdue University Extension, the Indiana Association of Soil and Water Conservation Districts (IASWCD), the State Soil Conservation Board, and the Indiana Department of Natural Resources (IDNR), IDEM works toward the conservation and/or protection of Indiana's soil and water resources. Several initiatives, such as the Conservation Cropping Systems Initiative (CCSI; education on the use of a system of practices, such as cover crops, nutrient management, continuous no-till/strip-till, and pest management to promote soil health); the ICP Training and Certification Program; Indiana's Nutrient Reduction Strategy; Indiana's Rapid Watershed Assessments; and a multitude of local watershed efforts have a direct effect on nonpoint source management in Indiana. Pooling our resources as a partnership avoids redundancy and inconsistent messaging to local stakeholders.

Aside from the ICP, the Nonpoint Source Program coordinates with several **state and federal agencies** at the state and local levels to share data, pool resources, and leverage expertise on key

nonpoint source issues and projects. Partners such as the USGS provide monitoring expertise and the Indiana State Department of Health (ISDH) and local health departments are valued partners for laboratory support and outreach on septic system issues. The Lake Michigan Coastal Management Program (LMCP), administered through the DNR Division of Nature Preserves, provides additional federal funding, local coordination, and technical assistance to accomplish nonpoint source prevention. The DNR's Division of Reclamation is a key partner to revitalizing former mining areas in the southwest part of the state, while their Division of Oil and Gas has coordinated with the Nonpoint Source Program on oil and mine extraction-related nonpoint source issues.

Academia has long been a partner in dealing with Indiana nonpoint source. The Indiana Clean Lakes Program (CLP) is conducted by Indiana University – School of Public and Environmental Affairs (SPEA) under a grant agreement with IDEM. It is funded through the 319 program to sample a subset of Indiana's lakes to provide water quality data to make assessments on whether or not those lakes are meeting designated uses. In addition, they run a volunteer lakes monitoring program that educates stakeholders and trains them to collect data for trend analysis, and encourages them to get involved in lake stewardship. Another partnership with Indiana University-Purdue University Indianapolis (IUPUI) assisted with the initiation of Indiana's blue-green algae surveillance program. The Indiana Geological Survey (IGS), housed at IU, is a strong ally on ground water issues research and characterization.

Purdue University is also a major academic partner for the Nonpoint Source Program. Aside from the IWLA referenced above, Purdue has participated in the nonpoint source conversation through research on agricultural tile drainage, septic systems, and the human dimensions of natural resource management. Purdue has developed several online watershed tools to assist state and local watershed managers including the Long Term Hydrologic Impact Analysis tool (L-THIA), the Indiana Watershed and Watershed Group Finders, the Social Indicators Data Management and Analysis (SIDMA) tool, and the Indiana Water Monitoring Inventory.

Partnerships with **nonprofit groups** such as The Nature Conservancy (TNC) and the Indiana Association of Counties have resulted in the placement of best management practices on the ground. Additional nonprofit partners include Indiana's land trusts (particularly those with staff), incorporated watershed organizations, conservation-oriented nonprofits (such as the IASWCD and Resource Conservation and Development Councils), and lake associations, including the Indiana Lake Management Society.

Of course, partnerships between **programs internal to IDEM** are integral to accomplishing the Nonpoint Source Program's mission. Some examples of these are working with the Clean Water State Revolving Fund (CWSRF) program to provide state match to the federal 319 grant; coordinating with the Total Maximum Daily Load (TMDL) program to provide data and load reductions for watershed management plans; IDEM's monitoring team provides sampling services for baseline and targeted monitoring projects; and the integrated report coordinator assesses the data provided to validate impairments and successes. Ground water (GW) staff members work with nonpoint source staff to discuss how source water protection plans could be written to meet WMP approval requirements. Work with the Storm Water Program staff members, including the MS4 coordinator, has led to the introduction of MS4 operators and watershed groups in a number of communities, with the potential of unified messaging to the public on storm water issues. The Nonpoint Source Program has also held coordination meetings with IDEM's Office of Land

Quality Confined Feeding staff to understand the rules being applied to confined feeding of livestock, and to pass on contacts for local concerned citizens.

Responsible Administration

IDEM is constantly seeking efficiencies in its use of taxpayer dollars. In 2011, IDEM combined the positions of Project Manager and WSS so that each of four identified regions would be served by one person, instead of two. This allowed efficiencies in staff salary and benefits, travel time and cost, and increased productivity when grantees had one contact instead of two at IDEM. In addition, this freed up staff members to conduct administrative projects (such as the revision of this document) in-house. In 2013, the administrative budget was reduced by $169,929 from the FFY2012 level by reassigning 3 FTEs to other funding sources and by basing equipment, supply and travel budgets on recent expenditures and carefully planned needs.

IDEM has also adapted project policies and procedures to better serve its grantees. Both the Section 319 application form and instructions were updated in FFY 2013 to help the Nonpoint Source Program receive relevant applications and encourage good projects. In FFY 2014, a Notice of Intent requirement was added to the Request for Proposals. The program also updated the proposal review process in an attempt to reduce subjectivity and provide all reviewers with the same background information (when there was such) on applicants. The program also recently changed its cover crop maintenance policy from five years to one year, to encourage the use of cover crops at the local level, and allowing payments on cover crops up to three years.

Program Successes to Date

The Nonpoint Source Program has experienced a number of successes to date.

Successes in Water Quality Monitoring
Nonpoint source funding has had a profound effect on water quality monitoring in Indiana. The Clean Lakes Program, which began in 1989 and continues to this day, conducts both professional and volunteer monitoring on Indiana's public freshwater lakes. Through a 319 contract with IU, samples are collected from a subset of Indiana lakes each year for the purposes of 305(b) and 314 assessments.

The toxics sampling program (fish and sediment) began as a 319-funded project in 1989. Though sediment sampling is no longer a part of IDEM's water quality monitoring program, the fish tissue sampling, for the purposes of 305(b) assessments and preparation of fish consumption advisories, remains in place. The program is no longer funded through 319, but has transitioned to Section 106 and state funding sources.

Indiana's first Nonpoint Source Monitoring Strategy was submitted and conducted in 2010. At present, IDEM performs nonpoint source-related monitoring, including baseline monitoring for watershed groups (since 2011), monitoring for success (since 2010) and beach monitoring for cyanobacteria and cytotoxins (since 2010).

Indiana's Hoosier Riverwatch program has been the state's leading volunteer organization for stream monitoring since 1994. Since that time, hundreds of volunteers have been trained to measure water quality parameters in waters of the state. Until late 2012, the program resided at the IDNR. However, given that many watershed groups utilize Riverwatch methods to monitor water quality in their watersheds, and that Riverwatch methods are designed to detect the most common nonpoint source pollutants, it just made sense to more closely connect the program to IDEM's nonpoint source programs. In 2013, the Riverwatch program was moved to IDEM's Watershed Assessment and Planning Branch and is now funded using 319 funds.

Successes in Water Quality Improvement
Over the life of the program, 97 watershed management plans have been written and approved by IDEM; nearly $14 million dollars have gone toward implementing those plans; and an estimated 281,714 tons/year of sediment, 493,170 lbs/yr phosphorus, and 805,029lbs of nitrogen have been kept out of Indiana and downstream waters as a direct result of this program. IDEM has also shown direct results of success through Success Story and Measure W reports to U.S. EPA. Through these reporting mechanisms, IDEM has documented a total of 16 segments (157.56 miles) that have been delisted or improved as a direct result of Section 319 nonpoint source involvement.

Waterbody Name	Miles	Impairment Removed	Reported as (Measure W/ Success Story)
Pigeon Creek	32	Chlordane	Success Story
Lower Clifty Creek	8.12	*E. coli*	Measure W/SS
Big Walnut	50.4	*E. coli*	Success Story
Bull Run	25.09	Impaired Biotic Communities	Measure W/SS
Metcalf Ditch	14.33	Impaired Biotic Communities	Measure W/SS
Stotts Creek (2)	14.48	Impaired Biotic Communities	Measure W/SS
Mill Creek	13.14	Impaired Biotic Communities	Measure W

Table 6. Waterbodies Reported to U.S. EPA under its Measure W (WQ-SP12.N11) and Success Stories (WQ-10) programs.

Successes in Water Quality Protection

Refuges, Preserves, and Easement Programs

The state has also seen success in water quality protection, in particular through the establishment of several refuges and easement programs to protect water quality and aquatic life use. In the original 1989 nonpoint source Assessment, Indiana reported that the USFWS was working to create the **Patoka National Wildlife Refuge** (to add to the Muscatatuck Refuge, which was established in 1966). The Refuge was established in 1994 along 30 miles of the Patoka River corridor. It includes wetlands, floodplain forest, and uplands – all beneficial for nonpoint source control. Information from the USFWS indicates that, in addition to fish and wildlife habitat goals, one of the purposes of establishing the refuge was to improve water quality. In addition, **Big Oaks NWR** (BONWR) was established in 2000, on the closed Jefferson Proving grounds. Big Oaks is located on 50,000 acres in Jefferson, Jennings, and Ripley Counties. While the BONWR is known as a Globally Important Bird Area, it also encompasses several aquatic habitats including Big, Otter and Graham Creeks; cave systems; fens, seeps and springs; and flatwoods within its boundaries.

In addition to the federal refuges, several significant state projects have been initiated to increase wildlife habitat and improve water quality. The **Healthy Rivers INitiative**, launched in 2010, aspires to protect some 69,000 acres along the Wabash and Muscatatuck Rivers and Sugar Creek. The project also involves restoration and enhancement of riparian and aquatic habitats and the species that use them. Project partners include Clean Water Indiana, NRCS, TNC, and other NGOs. Similar projects include the **Goose Pond Fish and Wildlife Area (FWA)** in Greene County, **Wabashiki FWA** in Vigo County, and the **Loblolly Marsh Nature Preserve** in Jay County.

Indiana's Conservation Reserve Enhancement Program (**CREP)** is a federal-state partnership offering water quality practices and land retirement to riparian and wetland landowners at an attractive rate. The goal of the program is the enrollment of 26,250 acres in land retirement. The program requires a 20 percent state match, which is achieved through the Clean Water Indiana (CWI) fund. Indiana CREP is available in eleven 8-digit watersheds in 65 counties (Figure 13):

Highland-Pigeon (HUC 05140202)
Lower Wabash (HUC 05120113)
Lower East Fork White (HUC 05120208)
Lower White (HUC 05120202)
Middle Wabash-Busseron (HUC 05120111)

Middle Wabash-Deer (HUC 05120105)
Middle Wabash – Little Vermillion (HUC 05120108)
Tippecanoe (+Tippecanoe Priority Area additional incentive) (HUC 05120106)
Upper East Fork White (HUC 05120206)
Upper Wabash (HUC 05120101)
Upper White (+Upper White Priority fish kill area additional incentive) (HUC 05120201)

As of Jan 1, 2012, there were 874 CREP contracts in place, covering more than 7,000 acres and protecting approximately 600 linear miles of stream reaches in Indiana. CREP goals are to:

- Protect a minimum of 3,000 linear miles of watercourses through the installation of conservation buffer practices.
- Reduce by 8 percent the amount of sediments, nutrients, and agricultural chemicals entering watercourses within the targeted watersheds.
- Increase the acres of wetlands in the watersheds for erosion control, sediment reduction, storm water retention, and nutrient uptake.
- Enroll 15 percent of the eligible watersheds' cropland, subject to normal Conservation Reserve Program (CRP) acreage limits by county.
- Enroll 8 percent of the CREP acres in voluntary, 10-year contracts in the Tippecanoe watershed.
- Enroll 10 percent of the CREP enrolled acres in voluntary, permanent easements in the Tippecanoe and Upper White River watersheds.

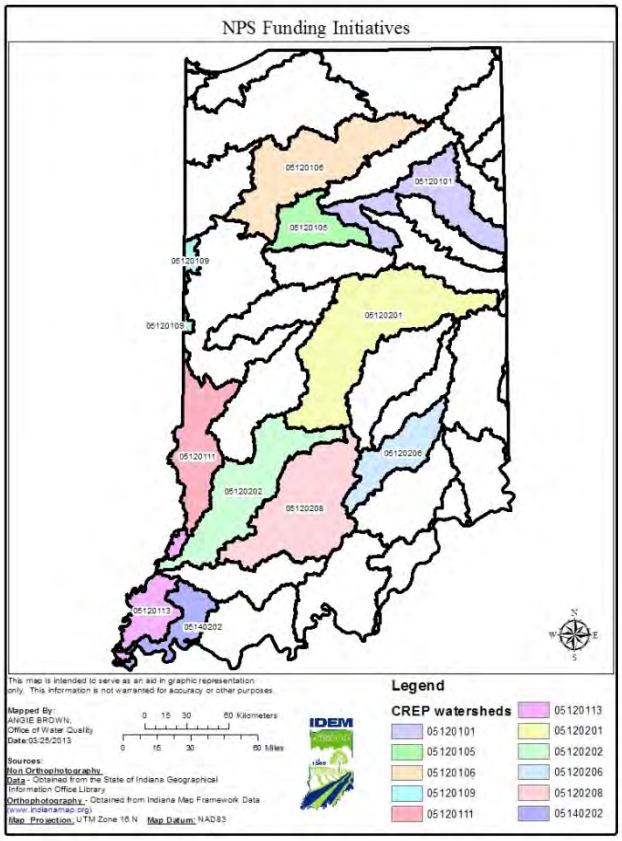

Figure 13. CREP watersheds.

- Seek enrollment of 26,250 acres of eligible cropland including frequently flooded agricultural lands and restorable wetlands.

As of the end of state fiscal year 2012, Indiana has enrolled 7060.6 acres in CREP. To date, Indiana has contributed $2.3 million to the CREP program.

As of July 1, 2013, three eligibility restrictions on wetland restorations within CREP have been lifted. Wetland restorations, CREP's largest cost-share BMP, now share the same guidelines as those in the USDA Conservation Reserve Program. These changes will allow a significant number of acres across all 11 watersheds to be eligible for enrollment into the program.

The **Bicentennial Nature Trust** dedicated $20 million in state funds and a $10 million matching grant from the Lilly Endowment for a total of $30 million committed to preserving important natural areas for the

future (in the same spirit as the state parks system was created for the centennial celebration). This is a short-term project ending in 2016.

The **Indiana Heritage Trust** was founded in 1992 to protect Indiana's natural heritage for future generations. It provides funding for conservation easements and land acquisitions in sensitive areas of the state (e.g. rare habitats and species). It is funded through appropriations from the General Assembly, sales of the Environmental license plate, and private donations. Though funding has been declining from the license plate because of the plethora of plates and significant reductions in appropriations, it has protected more than 56,000 acres to date, including wetlands and riparian acres.

State-funded Erosion-Control Programs

In addition, Indiana has had several state-led erosion-control programs for agricultural lands. T by 2000, LARE, CREP, and CWI programs have all served at one time or another to control sedimentation by installing best management practices on vulnerable erosive soils. These programs are described thoroughly as part of the Funding Mechanisms section of this Plan.

Regulatory Protections

Rules 5, 6 and 13 are Indiana's storm water rules. Rule 5 regulates sediment releases from construction sites where land disturbance is one acre or more in size. Rule 6 is the industrial storm water rule which regulates the discharge of pollutants that are associated with industrial activities for specific industries operating under specific standard industrial classification codes . Rule 13 is the MS4 rule for populated areas.

In addition, Indiana has promulgated rules to protect water quality from confined feeding operations (both the federally-defined "concentrated animal feeding operations" and the state-defined "confined feeding operations" [327 IAC 19]) spills, inappropriate fertilizer applications (355 IAC 7) and pesticides (e.g. 355 IAC 4 et seq.; 357 IAC 1-12).

Successes in Integrating Programs/Partnerships

Since the last revision of the State Nonpoint Source Management Plan, the Nonpoint Source Program has been working hard to break down silos and integrate related programs to extend the resources of all nonpoint source programs. Specific initiatives are referenced below.

Monitoring

The IDEM Office of Water Quality (OWQ) reorganized in 2010 to combine the Watershed Planning Branch with the Assessments Branch to create the Watershed Assessment and Planning Branch. This integration has permitted crucial conversations regarding targeted monitoring needs and how watershed groups should be monitoring; and has allowed baseline characterizations for watershed groups to be completed by IDEM. These conversations culminated in an updated WQMS for 2011-2019 which included efficiencies in staff time and use of limited resources. In addition, IDEM assumed the Hoosier Riverwatch (citizen-monitoring) program in 2012 from the IDNR.

Integration With Other Nonprofit, Local, State and Federal Programs

As illustrated throughout this document, the Nonpoint Source Program has a multitude of nonprofit, local, state and federal partners with whom it works. Since the last revision of the Plan, IDEM Nonpoint Source has:

- Completed work on a TMDL/WMP template that will bring TMDLs into alignment (to the extent practicable) with the WMP needs of the watershed group.
- Commenced baseline monitoring for watershed groups/grantees.
- Coordinated with the IDEM monitoring sections and the 305(b)/303(d) coordinator on success reporting.
- Conferred with the IDNR-LARE program on watershed management plans and diagnostic studies.
- Contributed to the LMCP Coastal Nonpoint Program plan.
- Incorporated requirements of 6217 into the 2009 watershed management plan checklist so that all Coastal area watershed management plans to be approved by IDEM must meet 6217 requirements.
- Called program coordination meetings with nonpoint source-related programs including Confined Feeding, Storm water, Wetlands, and IDNR – Forestry, Ground Water (Source Water and Wellhead Protection), USFWS, OISC, and U.S. Geological Survey.
- Collaborated with the Indiana Rural Wastewater Task Force, Indiana Rural Community Assistance Program, and Alliance for Indiana Rural Water on septic system and drinking water issues.
- Funded monitoring strategy for Coastal Nonpoint Plan (ARN 305-4-59, FFY 2002, TERM 6/3/2004-8/2/2005).
- Collaborated with IDNR Division of Reclamation and the Southwest Indiana Brine Coalition on coal, oil and gas-related watershed issues.
- Collaborated with the Indiana County Surveyors Association, TNC, Purdue and Indiana University Center for Earth and Environmental Sciences, as well as several consultants, on drainage and hydromodification issues.
- Collaborated with other members of the ICP on the ICP's Leadership, Training and Certification Program, and Pathway to Water Quality (PWQ) committees.
- Cooperated with the ISDH on multiple training opportunities.

Successes in Outreach and Education

IDEM has made a large investment in outreach and education over the past five years. In addition to continuing the WSS outreach and program coordination efforts, IDEM also updated its website content and produced web-based tools to reach out to the citizens of Indiana. The online watershed toolkit includes information specific to Indiana watershed efforts trying to organize a group, write a watershed management plan, inventory their watershed, choose and cost-share BMPs, educate stakeholders, and procure sustainable funding for their watershed work. The Nonpoint Source Program also revised the Indiana Watershed Planning Guide and made it available online to watershed coordinators and volunteers.

IDEM completed additional outreach and education projects in collaboration with partners. IDEM sends representatives to participate in the PWQ exhibit and steering committee (an ICP outdoor learning center housed at the Indiana State Fairgrounds), the IWLA (hosted by Purdue University), the IASWCD's Conference Planning Committee (the IASWCD conference is the largest conservation-oriented conference in the state and where the ICP and other Nonpoint source partners annually congregate to share successful endeavors as well as lessons learned), and Networking Roundtables where programs educating on nonpoint source topics can coordinate their training efforts, instead of duplicating them. In addition, IDEM contributed grant support to

the Indiana-based Clear Choices Clean Water campaign, which has resulted in an estimated 18,532 lbs phosphorus saved across the country, the majority of which is in Indiana.

Successes in Adaptive Management

IDEM believes in the philosophy of continuous improvement. As such, it is continually analyzing and adapting programs to better meet the needs of the state and watershed stakeholders. In the past five years, IDEM has adapted its program policies to increase participation in practices that will keep nonpoint source pollution out of streams. One example of this is the decision to change the cover crops maintenance requirement from five years to one year, which increased adoption of the practice. Another example is the decision to publish a list of "Eligible BMPs" that are not subject to preapproval by IDEM (Appendix J). Having this list available allows grantees to respond more quickly to potential cost-share participants.

In response to a request for more guidance to grantees developing WMPs, IDEM Nonpoint Source updated its Watershed Planning Checklist in 2009 (Appendix E) to better clarify IDEM's expectations on WMP elements. A similar request for monitoring guidance led IDEM to contract with Purdue University to develop a set of environmental indicators of water quality improvement, memorialized as the *Monitoring Water in Indiana: Choices for Nonpoint Source and Other Watershed Projects* manual (a.k.a. "the Monitoring Handbook").

Program Challenges to Date

The Indiana Nonpoint Source Program has experienced a number of challenges to date. In some cases, IDEM Nonpoint Source has the authority to resolve those challenges. In other cases, outside forces impose challenges on the program, which will need to adapt in order to continue providing satisfactory progress on its commitments to U.S. EPA. In both cases, it is the intention of the Nonpoint Source Program to address the identified challenges through the goals and strategies of this Plan.

Decrease in Funding for Projects

One of the largest challenges of Indiana's Nonpoint Source Program is a decrease in dedicated funding for planning and mitigating nonpoint source. Nonfederally-linked state funding for nonpoint source is almost exclusively available through the CWI and LARE programs, which – when fully funded – have a combined annual appropriation of approximately $4 million. (Note that the state recycled funds of the CWSRF are not included in this total, as those dollars depend upon previous federal appropriations to make loans available.) Therefore, the state relies heavily on the federally-funded 319 program to reduce and prevent nonpoint source in Indiana. However, the U.S. EPA study of 2011 demonstrated a downward trend in federal funding of the 319 program, from an all-time high of $238.5million in 2003 to $175.5 million in 2011. Though it could be argued that these reductions are offset by increased targeted federal funding available to Indiana, such as funding for the Great Lakes through the Great Lakes Restoration Initiative (GLRI - through the U.S. EPA Great Lakes National Program Office) or drainage to the Gulf of Mexico through the Mississippi River Basin Initiative (MRBI, available through the NRCS), these types of regionally-competitive funding sources do not insure that Indiana will receive any portion of those funding sources, nor that the most critically-impaired watersheds in Indiana will be prioritized for regional funding.

Watershed management plans (WMPs) that meet U.S. EPA's 9 Elements are the cornerstone of Indiana's nonpoint source reduction efforts. These WMPs identify the extent of pollution problems, identify causes and sources of that pollution, and outline a strategy to reduce nonpoint source in the targeted watershed. Funding for implementation of a plan can be from diverse sources, including local, state, and federal mechanisms. However, funding for planning is still necessary. As of 2013, roughly 32 percent of Indiana's 12-digit HUC watersheds have a watershed management plan. With the federal shift to an emphasis on implementation of WMPs and other allowable plans (U.S. EPA 2013), planning for watersheds that still do not have a WMP may be slowed.

In addition, funding for staffing of watershed groups/projects is diminishing. Though several federal programs (including Great Lakes Commission, GLRI, MRBI, and National Water Quality Initiative funding) have provided dollars for on-the-ground practices since the 1990's, the funding generally does not include monies for staff or technical assistance, choosing rather to emphasize implementation of on-the-ground mitigation measures. In Indiana, this presents a difficulty for watershed groups and others working on watershed-related projects (e.g. SWCDs), as state and local funding for such positions is typically very limited.

Lack of Assessment Methodology for Some Nonpoint Source Pollutants

Water quality standards, and their interpretation in the form of CWA assessments, form the foundation of the state's water quality program. Water quality standards and CWA assessments are determined at the state level, with approval by U.S. EPA, to reflect the conditions of both point and nonpoint source pollutants in the state as appropriate to meet the "fishable, swimmable" goals of the CWA. Utilizing these tools, the state is able to determine which waters are "impaired" or do not meet beneficial use requirements (i.e. the WQS are the basis of the 303(d) list). In Indiana, numeric surface water criteria related to nonpoint source include *E. coli*, metals, salts (e.g. chloride and sulfates), ammonia, pH, temperature, pesticides, and other organic substances (327 IAC 2-1-6 et seq.). Data is currently being collected to determine appropriate numeric nutrient criteria for streams and a rule-making is in progress to set a numeric criterion for phosphorus in lakes. While narrative criteria are in place mandating that all surface waters of the state be free from discharges which will, in essence, render them unsafe for fishable and

Nutrient Criteria Development Milestones for FY14: *INDIANA*			Date: 10/21/13	
			Completed By: Shivi Selvaratnam	
Total Phosphorus				
Milestone		**Target date**	**Completion date**	**Comments**
Lakes & Reservoirs	Planning for criteria development	*completed*	*completed*	
	Collection of information & data	*completed*	*completed*	
	Analysis of information & data	*completed*	July 2010	
	Proposal of criteria	Dec 2015		IDEM 2nd Notice
	Adoption of criteria into the state's WQS	December 2016		
Rivers & Streams	Planning for criteria development	*completed*	*completed*	
	Collection of information & data	*completed*	*completed*	
	Analysis of information & data	Oct. 2012	*completed*	
	Proposal of criteria	Dec 2016		To begin after TP rulemaking for lakes
	Adoption of criteria into the state's WQS	Dec 2017		
Total Nitrogen				
Milestone		**Target date**	**Completion date**	**Comments**
Lakes & Reservoirs	Planning for criteria development	*completed*	*completed*	
	Collection of information & data	*completed*	*completed*	
	Analysis of information & data	*		*To begin after TP
	Proposal of criteria			
	Adoption of criteria into the state's WQS			
Rivers & Streams	Planning for criteria development	*completed*	*completed*	
	Collection of information & data	*completed*	*completed*	
	Analysis of information & data	Oct. 2012	*completed*	
	Proposal of criteria	**		**IDEM not ready
	Adoption of criteria into the state's WQS			

Table 7. Schedule for adoption of nutrient water quality standards numeric criteria. (IDEM Water Quality Standards Program 2013)

swimmable uses, several nonpoint source pollutants and issues (e.g. sediment, "flashiness" and biological oxygen demand) lack specific numeric surface water quality criteria and a defensible assessment methodology through which they could be assessed as "impaired" or "unimpaired" for particular nonpoint source pollutants. In these cases, these waters are assessed based on the narrative criteria using a combination of surrogate parameters and conditions present over a prescribed frequency (IDEM 2012b). Consequently, some waters that appear on the 303(d) list may be degraded or impaired by parameters in addition to those that appear on the list (e.g. sediment/turbidity/ TSS does not appear on the 303(d) list *even when* sediment is the principle agent of degradation). In Indiana, the most common of these circumstances is when sediment or nutrients lead to impaired biotic communities (IBC). However, since IBC can result from a number of issues including degraded habitat, elevated nutrients, low dissolved oxygen, high temperatures, pharmaceutical and personal care product contamination, etc., the listing itself does not necessarily indicate the cause or source of the problem.

WQS and assessment methodologies allow IDEM to determine whether or not a waterbody is impaired for its designated uses. Impairment places a waterbody on the 303(d) List of Impaired Waters (those waters that require a TMDL). Once a TMDL has been written for a waterbody, permit modification and watershed management planning are the next steps for TMDL implementation. IDEM's Nonpoint Source Program uses 303(d) listings as one factor to determine priority for grant awards. Because some nonpoint source pollutants do not have numeric criterion codified in the WQS, waters may not be listed as impaired for those parameters and it is possible that the IDEM is missing opportunities for better watershed management in polluted watersheds that are a lower priority for funding based upon their 303(d) status.

This challenge is not easily resolved. IDEM has collected data on nutrients, which will be used to develop numeric criteria for nutrients, but available resources limit the pace at which revisions to the WQS can be developed and implemented. IDEM will continue to work with U.S. EPA, including to provide U.S. EPA updated milestone information on the adoption of numeric nutrient criteria in subsequent nonpoint source reports. Current draft milestones are listed in Table 7.

Staff Turnover at the Federal, State and Local Levels

Section 319 staff turnover, particularly among state-level primary project managers, has been a challenge since the program's inception. With staff turnover at the state level, local project staff can become frustrated with their working relationship with the state as uncertainty enters into their project. This uncertainty results from a lack of experience in new staff and the lag time it takes to get them up to speed. Newly-hired project managers experience a learning curve in regard to program policies, current/standard operating procedures, and expectations of project performance, all of which increase the time needed to respond appropriately to grantees. Turnover at the state level has occurred for a number of reasons, both personal and professional, at all levels of program management. Within the past five years, turnover among primary project managers has mostly been due to the pay grade and status level of the position. Prior to July 2011, project manager positions at IDEM were entry-level positions. Consequently, project manager turnover was relatively high as staff in those positions were promoted within the agency or left the agency for more lucrative employment. With the integration of project management duties into the WSS positions, it is expected that staff turnover will decrease, as these positions are near the top of the agency's nonsupervisory staff paygrade.

Federal employee turnover can also cause delays in project completion and project success. On the regional level (e.g. U.S. EPA Region V staff), turnover can cause delays in receiving grant awards, approvals of workplans and management plans, and answers to questions relating to eligibility. When federal employees turn over on the local level (e.g. NRCS field employees), delays to conservation plans, practice designs, and contracting can occur – all of which could lead a group to ask for an extension of their grant agreement or risk project incompletion and landowner mistrust.

Local watershed groups also experience high staff turnover. This is often the case when watershed coordinators are funded solely with Section 319 funds. While some watershed coordinators are able to stick with the project until the end of their grant(s) period, others leave for more stable employment before the end of the grant term. At times, there is a lag between project grant awards such that a coordinator faces unemployment for several months before the next grant is awarded. Staff turnover at the local level is detrimental to projects because, as learned by one of the program's grantees:

> "The more partnerships and contacts the projects has the more successful it will be – the more people you know or know you the easier it is to schedule workshops, obtain good speakers, and assist with other projects" (IDEM 2011 Annual Nonpoint Source Program Report).

Local project success is built on rapport with local leaders. When project staff changes, that rapport is not transferred to the new leadership, who will need time to gain trust with stakeholders. This cyclical process delays watershed improvements and has been long-recognized as a major obstacle to successful projects. Strategies to manage this challenge at a statewide level have been unsuccessful to date.

Challenging Sources

While there are many sources of nonpoint source in Indiana, two in particular have been difficult to address, both at the legislative and programmatic levels.

Septic Systems

Residential septic systems are regulated by the ISDH, who delegates administration of most routine septic installations and inspections to the county health departments. While 410 IAC 6-8.3 regulates the standards of construction of septic systems, there is no uniform statewide control on failed or failing septic systems or legacy straight-pipes (i.e. illicit discharges and "dumps to ditch" systems). County health departments typically do not have the staff or political backing to initiate maintenance inspections of septic systems and rely on complaints to investigate potential sanitary pollution. While water quality standards can, and have been, used to stop discharges from straight pipes, enforcement action at this level is relatively rare. Septic systems are expensive (and sometimes impossible, due to lot size limitations) to replace. Legacy straight-pipes are believed to be relatively common, but difficult to detect. Currently, Indiana funds sewer expansion through the CWSRF. Through the nonpoint source program of the CWSRF, communities can request to take septic systems off-line as part of a sewer expansion project. And, while at least 10,500 homes that were on septic systems are now on sewer[11], the funding is limited to projects sponsored by municipalities that also have a traditional infrastructure loan through CWSRF. The rural

[11] Through CWSRF since 2004.

homeowner who is not in or near a community with a CWSRF infrastructure loan does not have access to those funds to repair or replace a septic system.

Many opportunities are available to strategize about the septic problem. Lawmakers discuss the issue in nearly every General Assembly session. One group, the Rural Wastewater Task Force (RWWTF), attempts to inform public policy related to on-site sewage disposal (i.e. "septic") systems. The group meets regularly during the Indiana General Assembly's legislative sessions and also between sessions. The Rural Community Assistance Program (RCaP) provides assistance to rural water and wastewater treatment systems, including regional sewer districts that often result in the removal of septic systems from the landscape. Formal and ad-hoc meetings of representatives from multiple agencies and statewide organizations, such as IDEM and ISDH, RCaP, the Alliance for Indiana Rural Water, Indiana Office of Community and Rural Affairs, USDA's Rural Development, among many others, present various opportunities to brainstorm solutions to pollution from failed or failing septic systems.

Modified Hydrology

Agricultural Drainage/Loss of Wetlands

Nonpoint source prevention and drainage are not mutually exclusive goals. Indiana's current drainage code dates back to the federal Swamp Act of 1850 (9 Stat. 519), which provided land to the states by the federal government on the condition that it be drained and plowed. Indiana's first statewide drainage code became effective in 1852 when roughly 25 percent of the state was wetlands. An Indiana Bureau of Legislative Information bulletin from 1914 estimated that 625,000 acres of "waste" lands could be arable with adequate drainage (Kettleborough 1914). It also notes that 1.5 million acres had been drained by 1914 – mostly in northwestern IN. The benefits of drainage outlined in the document include: economic (able to occupy and farm the land) and public health (reduce malaria, change in air quality and humidity, drinking water, mosquito/bug and reptile threats). Drainage of the land through lowering water tables and shunting the excess water to channelized, denuded streams was a common practice in early statehood that persists through today. Through drainage programs/projects, 4,737,000 acres of wetland have been drained. The hydrological significance of this loss is seen in major flood events and the water quality significance is great (erosion, head-cutting, nitrate delivery to streams through field tiles, lost nutrient uptake functions of wetlands). Recently, county surveyor participation in water quality projects and outreach events, such as water quality presentations at the annual Purdue Road School training, installation of two-stage ditches, and attendance at the IWLA, has increased the number of drainage projects that consider water quality needs as well as water quantity.

Urban Impacts

Likewise, streams in urban areas have not escaped impacts. As towns and cities grew up around lakes, rivers, and streams, construction often took place in the floodplains, which in turn increased the need to protect buildings and infrastructure from floodwaters. Streams were placed into hard conveyances, such as concrete and pipes, and sometimes buried to protect dwellings and other structures. The sediment transport function of moving waters is a threat to buildings and infrastructure. When erosion impacts upon man-made structures become imminent, rivers and streams are typically straightened and hard-armored to reduce erosion.

Cities and towns are rife with hard surfaces such as roads, parking lots, sidewalks, and roofs. These surfaces are referred to as "impervious surfaces" – rain that falls on these surfaces runs off

through overland flow instead of infiltrating through the soil to slowly recharge nearby waterbodies. The result of moving water off the land more quickly than natural is "flashy" streams – those that very quickly receive water (through an infrastructure of drainage pipes or through overland flow) and fill their banks, but transport water so efficiently that low flow conditions are once again achieved in an unnaturally fast recovery. Flashy streams can contribute flooding to their adjacent landscapes, as well as downstream. Aquatic life does not adapt well to flashy streams. Substrate is scoured away relatively quickly, banks are eroded, sediment is deposited on top of remaining substrate, and water levels are highly variable.

Pollution from populated areas varies from lawn and garden debris to pet waste to road salt to oil and other automotive chemicals. In warm weather, the water flowing over impervious surfaces picks up heat from those surfaces and adds thermal pollution to receiving waters. This effect is exacerbated by a lack of canopy cover from shallow or nonexistent riparian buffers that expose water to direct sunlight, further raising the temperature.

Other

Man has been harnessing the power of moving water to perform work for centuries. Today, Indiana still uses the power of rivers to produce energy through the workings of hydroelectric dams. Five hydroelectric dams are on-line in Indiana, providing 32 GWh of power to Indiana per year (U.S. EIA 2012).

Hydroelectric Dam	**Waterbody**	**Owner**
Norway Dam	Lake Schafer	NIPSCO
Oakdale Dam	Lake Freeman	NIPSCO
Twin Branch Dam	St. Joseph River (Lake MI)	Indiana-Michigan Power
Elkhart Dam	Elkhart River	Indiana-Michigan Power
Markland Locks and Dam	Ohio River	Duke Energy

Table 8. Hydroelectric Dams in Indiana.

Small lowhead dams are also a part of Indiana's hydromodification history. These dams often powered grist and wood mills in the early years of Indiana's statehood. However, once the mills were taken out of service, the lowhead dams often were not removed. Lowhead dams are a barrier to fish migration, collect sediment and contaminants behind them, and endanger paddlers and other persons recreating on the water. They also crumble and break down, creating swift velocities through notches in the dam, and potentially transporting contaminated sediments downstream. Perhaps the biggest challenge of lowhead dams is that they are expensive to remove and often the party that originally installed the dam no longer exists. Through its

Figure 13. Lowhead dam and bridge over the Patoka River in Dubois County.

National Inventory of Dams, the USACE reports that there are 927 known dams in Indiana; 272 of those dams are rated "high hazard potential." While there is no statewide initiative to remove these dams, at least two watershed groups have worked with the USFWS to remove the dams or create fish structures to allow the movement of fish between waters upstream and downstream of the dam within the past ten years.

Uncompleted Projects

The 2012 GAO report to Congress on the national Nonpoint Source Program indicates that, nationwide, nearly 30 percent of projects funded with 319 dollars are not able to accomplish the proposed goals of their project. Indiana's projects are no exception to this. In FFYs 2007 and 2008 (the last grant years to have closed out), a total of $513,929 in 319 dollars were returned to the state to be reprogrammed due to grantees being unable to spend all of the money that they had requested. In response to this phenomenon, extensive efforts are made during the Request for Proposals process to ensure that 319 funds will be awarded only to potentially successful projects. In order to be granted 319 funds, groups must make the case that they have the right partners on board to deal with their particular water quality problems and sources. Recently, successful implementation proposals have included letters of commitment from landowners who would put practices on the ground to abate nonpoint source. WSS work with these groups long before proposals are due in order to ensure that the projects proposed are feasible and of water quality benefit. Still, circumstances beyond the control of the grantee (e.g. a wet or drought year; land changing hands; sudden loss of the watershed coordinator) may keep them from expending funds allocated to their project.

Measuring Success

The past five years have seen an increased emphasis on measuring and reporting success at the state and regional levels. U.S. EPA included strong, numeric, achievable success measures in both its 2006-2011 and 2011-2015 strategic plans, including milestones that were passed on to states. Two of those measures, SP-12 and WQ-10, are particularly relevant to the state Nonpoint Source Program. Measure SP-12 (also referred to as "Measure W") requires states to report on 12-digit watershed improvements as compared to the 2002 303(d) List of Impaired Waters. From FFY2007 to FFY2012, Indiana was tasked with showing success in at least five 12-digit watersheds. Despite inherent difficulties with using the 2002 303(d) list as the baseline upon which improvements would be measured, Indiana was able to meet its commitment of documenting improved water quality of six watersheds in that time period (Table 6).

WQ-10 (or "Success Stories") is a reach-related measure indicating miles or acres of fully or partially-restored waterbodies that were listed on any state 303(d) list for nonpoint source causes and for which Section 319 money was expended. Again, the target was set for showing improvements in five segments in the five year period 2007-2012.

While IDEM Nonpoint Source has been able to work with its partners to report successes to U.S. EPA as requested, there still remains some difficult points that continue to hinder the ability of IDEM to show improvement in water quality. One of those hindrances is the continued use of 2002 as the base year against which improvement is measured. This is problematic, as data collection and list development processes were still evolving for the 2002 list year. In addition, many more impairments for nonpoint source have been added to the lists since that time. Until U.S. EPA can allow flexibility in base year against which to show Measure W improvements, the finding and reporting of success measures will consume continually more 319 funds for staff time.

In addition, from a success reporting perspective, it presents a difficulty that the Food, Conservation, and Energy Act of 2008 (P.L. 110-234, Sec. 1619) specifically prohibits NRCS and FSA from disclosing the geospatial references of land related to program participants, except in limited circumstances or in aggregate. IDEM is currently negotiating a data-sharing agreement with Indiana's USDA office for the release of some georeferenced information in order to collaborate on the National Water Quality Initiative (NWQI), and may also include an agreement to share data for additional purposes; however, until that agreement has been executed, it is difficult for IDEM Nonpoint Source to associate conservation practices installed under USDA programs with stream improvement for WQ-10.

Finally, reporting measures of success is a challenge for IDEM as it requires baseline monitoring against which subsequent equivalent monitoring can be evaluated. IDEM shows successes by using the "delisting option" for showing improvement (U.S. EPA 2008b). However, in order to list and delist stream segments, data must be collected at the Level 3 data quality objective level (IDEM 2013). The result of this need is that IDEM can only delist a stream segment where IDEM has already performed baseline monitoring. This becomes a difficult proposition when the state is tied to the FFY2002 303(d) list, as there simply weren't as many sites sampled in a given watershed at that time. In order to correct this issue, IDEM has begun baseline sampling for a limited number of watershed groups undertaking planning activities. These watersheds will be targeted for follow-up monitoring after a sufficient implementation period has elapsed.

Clarification of Policy for Watershed Management Planning Activities

Watershed groups in Indiana continue to struggle with the identification of critical areas for their WMPs. Critical areas are required to be included in the plan before the plan can be approved by IDEM. A systematic guidance for critical areas determinations has not been provided by IDEM, even though it is clearly needed (IDEM 2011). In addition, some groups working on older plans that have been implemented for several years are seeing the need to update or revise their WMP. IDEM has not clearly stated how it will ask projects to provide those updates. IDEM needs to provide guidance for WMP revision and critical area updates when groups find additional nonpoint source problems or have exhausted their list of landowners willing to install BMPs.

Prioritizing Waters

The Indiana Department of Environmental Management (IDEM) Nonpoint Source program began a prioritization process to target its Section 319 funding in 1997. At that time, a committee consisting of IDEM's nonpoint source partners analyzed available data to formulate twelve priority sources of nonpoint source for funding. These priorities were included in the 1999 State Nonpoint Source Management Plan:

1. agricultural production;
2. stream bank/shoreline erosion and aquatic habitat degradation;
3. land application of nonagricultural wastes;
4. timber harvesting and loss of forest lands;
5. land development;
6. on-site sewage disposal;
7. landfills;
8. transportation;
9. coal mining;
10. oil and gas production;
11. nonenergy mineral extraction; and
12. atmospheric deposition.

In the FFY 2006 grant cycle, the Indiana Nonpoint Source Program prioritized waters impaired by nonpoint source for Section 205j and 319(h) funding. Since that time, the following three priorities have guided the expenditure of nonpoint source funds:

1. Watershed management planning in watersheds with waterbodies on the current 303(d) list.
2. Watershed management planning/implementation in watersheds with completed Total Maximum Daily Load reports (TMDLs).
3. Watershed implementation in watersheds with plans that meet U.S. Environmental Protection Agency's (U.S. EPA) 9 Elements and IDEM's current checklist.

In FFY 2013, IDEM NPS further targeted the expenditure of its grant funds to priority geographical areas: the Lake Michigan Coastal Zone (hydrologic unit code (HUC) 04040001), waters of the Wabash River watershed (HUCs 05120101-05120113), and waters of the East Fork White River watershed (HUCs 05120204-08). The purpose of this geographical targeting was to align the state's limited nonpoint source funding with the conditionally-approved Lake Michigan Coastal Program's Nonpoint Control Program (LMCP) and the goals of the Indiana Conservation Partnership (ICP).

With shrinking federal funding and an emphasis on showing success, IDEM has determined that it needs to even further refine its funding priorities. IDEM identified several approaches by which it could prioritize its funding, as well as the advantages and disadvantages of each.

Approach #1. Use the 303(d)/consolidated list (e.g. "stay the course")

Pros:	Cons:
IDEM-NPS does not have to develop anything new	Moving target (new waters are added and waters removed each list cycle)
Takes into consideration scientifically-defensible water quality monitoring	Only reports on parameters that Indiana has a standard or CALM methodology for (others represented by surrogate, such as IBC)
Is an objective tool that either identifies waters as impaired or not (or not enough info)	Specifies stream segments, not watersheds– if a particular monitoring site is located on a large waterbody, the results cannot be extrapolated back to any particular feeding stream. Vice versa with headwater and receiving streams. To diagnose nonpoint sources in a watershed, need characterization monitoring, not scatter-shot sampling sites

Table 9. Prioritization Approach #1 Decision Table.

Approach #2. Prioritize by source (e.g. conventionally tilled fields, livestock with stream access, denuded stream banks, eroding stream banks, drinking water resources)

Pros:	Cons:
More waterbodies of the state than using the 303(d)/consolidated list alone	Sources are very widespread. Likely that further prioritization within these sources would be necessary.
Address more sources than through using the 303(d)/consolidated list alone	Not targeted to provide demonstrable success through easy monitoring procedures
Likely that some place in every part of the state will be eligible (i.e. more real estate would be eligible than using HUCs or stream reach IDs to prioritize) – more politically tenable	Might perpetuate condition in which implementation of BMPs is so spread out, improvements in water quality cannot be observed for many years
More in-line with other funding sources/mechanisms (EQIP, WRP, USFWS funds, etc)	Many sources in a given watershed – would each source be given equal weight? Would all sources be addressable at any given time?
Could build statewide outreach on particular sources	

Table 10. Prioritization Approach #2 Decision Table.

Approach #3. Prioritize implementation of current plans only

Pros:	Cons:
Provide focus on implementation, as is emphasized in the 2013 U.S. EPA guidelines	Might still be too spread out to show success; may still have to prioritize certain geographical locations
Might provide a catalyst for groups to find a way to fund planning using dollars other than 319	Watersheds building momentum for planning may be stifled
	Political backlash

Table 11. Prioritization Approach #3 Decision Table.

Approach #4. Only provide funding for local project staff, not cost share (i.e. fund outreach, monitoring, planning, and coordination-related tasks)

Pros:	Cons:
More projects funded, even with limited dollars	Everybody is going to want to fund staff – lots of applications for a little bit of money
Leverages funding with other, more robust cost-share programs (319 funds staff – Farm Bill and USFWS programs typically do not fund staff)	Inter-watershed wars – each county (or SWCD) in a watershed might want their own "coordinator"
	It is possible that less BMPs will be funded
	There is no guarantee that there will be funding available for cost-share – could be funding staff with no/limited funds available for implementation.

Table 12. Prioritization Approach #4 Decision Table.

Approach #5. Prioritize areas with no planning for planning
This approach is not feasible if 50 percent of the 319 allocation is to go to implementation

Approach #6. Use state/federal prioritizations already in place for MRBI, GLRI, endangered species, OSRWs, others

Pros:	Cons:
Work of prioritization has already been done, for programs similar in scope and need	Does not take into consideration 319-specific needs such as working in critical areas or developing a plan before providing cost-share funds
Leverages the funds that are being provided by special initiatives with 319 funding	It is possible that over-saturation of funding will occur where more money is dedicated to a geographic area than that area can obligate within the allotted timeframe
	It is possible that no stakeholders from these areas will apply for 319 funds
	There are watersheds (e.g., OH River) not covered by these initiatives that have water quality issues as well

Table 13. Prioritization Approach #6 Decision Table.

Approach #7. Prioritize using the U.S. EPA's Recovery Potential Tool

Pros:	Cons:
Science-based analysis of areas in need of restoration – prioritizes those areas most likely to recover	Data is not equally available for all parts of the analysis
Flexibility of scale - the analysis can be large (8-digit) or small (12-digit)	Priority data may differ across the state (i.e. slope may be more of a factor in southern and western IN than eastern and central IN)

Table 14. Prioritization Approach #7 Decision Table.

IDEM has chosen to use a combination of Approaches #1, 2, 6, and 7 to develop a hierarchy of prioritized waters. Development of the prioritization scheme will progress as follows:

FFY 2014: IDEM will continue to use the 2006 priorities (impaired waters, waters with TMDL, and waters with an approved management plan), with additional emphasis on implementation in the Coastal Nonpoint Program Area and the Wabash River and East Fork White River basins and priority watersheds described in the State Nutrient Reduction Strategy.

FFY 2014: IDEM will pilot the U.S. EPA's Recovery Potential Tool (RPT) as a part of its TMDL program and evaluate its potential utility in prioritizing Indiana waters for nonpoint source funding.

FFY 2015: IDEM will embark on identifying a prioritization exercise with other agencies and organizations involved in the ICP. The anticipated output of this process will be a list and/or map of specific geographic watersheds that all partners in the ICP agree to be a priority for nonpoint source funding opportunities that may become available to the partnership. While this process is intended to identify the most critical watersheds, it will not assign a priority ranking to all watersheds in the state.

FFY 2017: IDEM will have developed a list of priority waters or nonpoint source causes/sources to address through its nonpoint source funding.

Goals and Management Measures

The Indiana Department of Environmental Management's (IDEM) Nonpoint Source Management Plan is a vision and mission-driven strategy. All goals, objectives, milestones, and measures of success are based upon these two statements.

Program Vision:
The vision of Indiana's Nonpoint Source Program is to restore waters impaired by nonpoint source pollution and maintain water quality in healthy watersheds through locally led partnerships.

Mission: "To work with our partners to make measurable improvements in, and prevent degradation of, water quality by addressing nonpoint source pollution through education, planning, and implementation."

Because nonpoint source in Indiana primarily results from run-off across the landscape, it is best dealt with using a *watershed approach*. The "watershed approach" is a method of strategically addressing water pollution that takes into account all sources of point source and nonpoint source pollution in a watershed and engages all stakeholders of the geographic region through the watershed planning process. It provides a framework for coordinating and integrating the myriad programs and resources available to stakeholders in the watershed. The watershed approach is based on four basic principles:

1. Geographic focus, based on hydrological rather than political boundaries.
2. Water quality objectives based on scientific data.
3. Coordinated priorities and integrated solutions.
4. Diverse, well-integrated partnerships.

Vision:
The vision of Indiana's Nonpoint Source Program is to restore waters impaired by nonpoint source pollution and maintain water quality in healthy watersheds through locally led partnerships.

Mission: "To work with our partners to make measurable improvements in, and prevent degradation of, water quality by addressing nonpoint source pollution through education, planning, and implementation."

In the past, IDEM's Nonpoint Source Program emphasized the use of a watershed approach for local projects, but the agency did not mimic this approach on a statewide level. In the next five years, the Nonpoint Source Program proposes to more purposefully use a watershed approach to restoring and protecting water quality in the state. For FFY 2013-2014, Section 319 funds have been targeted to reduce nutrient loadings in the Wabash and East Fork White River basins. In 2015 through 2018, IDEM plans to work with partners to build consensus on data-driven statewide priority watersheds where nonpoint source resources can be focused. IDEM will bring to the process water quality data and an analysis of recovery potential for particular hydrologic areas. The IDEM Watershed Planning and Restoration Section will utilize the U.S. Environmental Protection Agency's (U. S. EPA) Recovery Potential Tool (RPT) to develop Total Maximum Daily Loads (TMDLs) reports with the maximum potential to recover, as well as to integrate TMDLs and watershed planning activities, both through baseline monitoring and through the use of the TMDL-Watershed Management Plan (WMP) template.

The goals of this State Nonpoint Source Management Plan are very similar to the goals of any given WMP approved in the State of Indiana. This Plan proposes to form and utilize partnerships to define and address nonpoint source issues; monitor the status of those issues; provide outreach and education to citizens of the state to raise awareness of nonpoint source issues; remediate the causes and sources of nonpoint source; and protect areas already meeting water quality standards and those areas threatened by nonpoint source. Proposed short-, medium-, and long-term objectives outlined under each of these broad goals are categorized as "programmatic," "financial," and "technical."

Goal 1: Utilize partnerships to leverage resources available for nonpoint source management.

Cooperation with state, federal, local, and private partners is critical to Indiana's Nonpoint Source Program. IDEM believes that coordinating with these partners increases the funds, staff, physical resources (buildings, landholdings, etc), and political capital available to Indiana's work on nonpoint source issues. IDEM has allied itself, and will continue to collaborate, with numerous agencies and organizations in the pursuit of cleaner water. Many of IDEM's internal and external partners were described in the "Stakeholders" section and other sections of this document. However, over the next five years, several significant joint efforts between state and federal agencies and IDEM will be taking place and warrant special recognition within this strategy.

U.S. EPA/USDA and the National Water Quality Initiative

In FFY 2012, the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) and U.S. EPA collaborated on a national effort to increase agricultural BMPs in critical watersheds. This effort was called the National Water Quality Initiative (NWQI). Five percent of each state's Environmental Quality Incentives Program (EQIP) funds were to be dedicated to one to three priority 12-digit watersheds with a goal of showing water quality improvement. In Indiana, NRCS coordinated with IDEM to choose three watersheds that: were impaired (listed on the 2008 303(d) list) for pollutants associated with agricultural run-off; were largely agricultural in land use; were identified as critical areas in IDEM-approved watershed management plans; had a currently-active locally-led watershed group; had a perceived willingness of producers to implement BMPs through EQIP; and had a strong monitoring program in place to measure change. In addition, the NRCS State Technical Committee added a criterion for "drinking water source." The three 12-digit hydrologic unit code (HUC) watersheds chosen were Silver Creek (HUC 051201040501), Ell Creek (HUC 051202090405) and Eagle Creek (HUC 051202011108).

In FFY 2013, NRCS continued implementing in the three watersheds chosen to be a part of the NWQI in FFY 2012. IDEM is currently coordinating with NRCS to allow for appropriate water quality monitoring in selected watersheds. In future years that the NWQI is implemented, IDEM foresees working closely with NRCS to evaluate effectiveness of the program and consider adaptive management practices as they are warranted.

Coordinating With CWSRF to Address Nonpoint Source

The Clean Water State Revolving Fund (CWSRF) Nonpoint Source Program has been providing state match for the Section 319 grant through recycled state funds since 2005. Eligible projects for SRF funding and 319 match include:

- Wetland restoration/protection.
- Erosion control measures – vegetative and structural or nonstructural.
- Ground water remediation for nonpoint impairments.
- Failing septic system – repair, replacement or connection to sewer.
- Storm Water Phase II (Rule 13) best management practices (BMPs) that are not required by permit.
- Source water and wellhead protection measures.
- Brownfield Remediation with water quality benefits.
- Conservation easements.
- Agricultural and waste management BMPs.

Indiana's CWSRF-Nonpoint Source Program works in conjunction with its loan program and all nonpoint source projects must be tied to a CWSRF loan. Loan project applicants are encouraged to include a nonpoint source component through an interest rate reduction of up to 0.5 percent, which generally covers the cost of the nonpoint source project. Additionally, those projects that include nonpoint source components in their loan applications increase their project priority score which moves the project higher on the list for funding.

IDEM NPS is seeking increased coordination with the CWSRF-Nonpoint Source Program in order to address the challenge of decreasing funds for nonpoint source projects. While WMPs have been used by CWSRF's Nonpoint Source Program to document need for a particular project, a strong link between the two programs has not been established. Increased coordination of the CWSRF and IDEM-NPS programs has taken place as a result of the preparation of this Plan. The CWSRF program has included the following long-term goal in its Clean Water SRF Intended Use Plan: "(LT14) Provide interest rate breaks to communities which adopt Nonpoint Source Projects. The CWSRF Loan Program will meet quarterly with the Indiana Department of Environmental Management (IDEM) Nonpoint Source Section to identify Projects on the CWSRF PPL which may benefit from SRF funding." In order to achieve this goal, the programs have agreed to more frequent communication, including quarterly coordination meetings, monthly project status reports, IDEM-NPS PM participation in community orientation/planning meetings, and completed projects to be reported in GRTS.

Working With the Lake Michigan Coastal Program

Indiana has an approved Coastal Zone Management Program (authorized through the CZMA of 1972). The Indiana Department of Natural Resources (IDNR), Division of Nature Preserves administers the program on behalf of the state. Indiana submitted its Lake Michigan Coastal Program (LMCP) Document/Final Environmental Impact Statement – covering 604 square miles of land and 241 square miles of the lake itself – to NOAA for approval in 2002. It was approved the same year. The Coastal Zone Act Reauthorization Amendments (CZARA) of 1990 includes a requirement for all states that have approved Coastal Zone Management Programs to develop a Coastal Nonpoint Control Program (CNPCP) as a part of their CZM program. This program was

not intended to supersede the CZMA or Section 319 programs, but to work as a supplement to these programs. Federally, the CNPCP is jointly administered by NOAA and U.S. EPA, who provide approval of CNPCPs for CZARA and Section 319 funding.

Indiana received conditional approval of its 2005 draft CNPCP submission to NOAA and U.S. EPA in 2005. The draft program detailed how Indiana would meet the 55 management measures provided through NOAA/U.S. EPA guidance. After working with local, state, and federal partners, the LMCP submitted a revised CNPCP to NOAA and U.S. EPA in 2010 and again in late 2012, in which several of the 2005 conditions were satisfied. Several more remain (Appendix L). U.S. EPA has directed the IDEM NPS Program to allocate, on average, at least $100,000 per year of Section 319 funding to the Coastal Zone until the remaining conditions are satisfied. Projects funded for this purpose shall be jointly developed by LMCP and Section 319 staff. LMCP and Section 319 staff members shall work with local partners to identify specific projects that satisfy additional management measures an example of a potential project is modeling to demonstrate BMP effectiveness.

In addition to the $100,000 Section 319 average annual allocation to the Coastal Zone, IDEM intends to coordinate with the LMCP to obtain full approval of its CNPCP. In FFY 2013, IDEM participated in coordination meetings with the LMCP and authored portions of the CNPCP program document related to IDEM's monitoring program, IDEM-NPS's definition of critical areas, 319-eligible BMPs, and wetland protection/restoration programs that may be used to satisfy Section 6217 requirements. The programs still need to provide NOAA and U.S. EPA with evidence of a linkage between the CZM agency and the enforcing authority, as well as a monitoring and tracking system for the CNPCP (Appendix L). Additional measures, such as agricultural and on-site disposal measures, are being completed by the LMCP with support from the IDEM-NPS program as needed. The partners set FFY2018 as the target to address all remaining outstanding Section 6217 management measures.

IDEM Section 319 program requires WMPs funded with 319 funds in the Coastal Zone to meet Section 6217 requirements. Section 319 implementation funds awarded to the region must be used to address critical areas identified in the WMP (which are included under the definition of "critical coastal areas" for the purposes of 6217) which may include (but is not limited to) providing cost-share dollars and technical assistance to install BMPs, conducting an outreach and education program to raise awareness of nonpoint source issues and critical coastal areas, and administrative funding to hire staff and administer the grant. Approved Coastal Zone WMPs are incorporated in this Plan by reference (Appendix F). For FFY2010-2013, IDEM had a grant agreement with the nonprofit organization Save the Dunes to revise the WMP, incorporating updated information that was collected as a part of completing an updated TMDL report. Due to extenuating circumstances, the grant was closed before the WMP was complete. IDEM has also awarded Save the Dunes a grant to complete a WMP for the East Branch Little Calumet River during FFY 2012-2014. For FFY 2013-2016, IDEM has a grant agreement in place with the LaPorte County Soil and Water Conservation District (SWCD) to implement the Trail Creek WMP. In addition, IDEM has awarded FFY 2013 Section 319 funds to the Northwest Indiana Regional Plan Commission's (NIRPC) to draft and implement a WMP for the Deep River watershed (four year project duration; FFY 2013-2017). Additional proposals for planning and implementation in the Coastal Zone will be considered as they are received during the solicitation period.

IDEM will track all 319 projects, including those in the Coastal Zone, in the Grants Reporting and Tracking System (GRTS) and will report on load reductions in its nonpoint source annual report. Specific segments listed and delisted will appear on a biennial basis via the Integrated Report and the 303(d) List of Impaired Waters. The DNR LMCP will provide additional documentation of progress made to NOAA and U.S. EPA as it is required.

Indiana's State Nutrient Reduction Strategy

The Indiana State Department of Agriculture (ISDA) is Indiana's representative on the Gulf of Mexico Hypoxia Task Force. This agency has been charged with preparing Indiana's Nutrient Reduction Strategy ("the Strategy"), both for the Mississippi and Great Lakes basins. As the state water quality agency designated by U.S. EPA to administer CWA programs, IDEM is participating in the work group to prepare the Strategy, as well as taking an active role in authoring portions of the document. A final draft Strategy was submitted to U.S. EPA in the second quarter of 2013. It has been released for public comment and the committee awaits comment from U.S. EPA.

Individual Goal 1 objectives are outlined below.

Objectives

Programmatic Objectives

1.1 Assist the DNR-LMCP to obtain full approval of all outstanding measures on the LMCP CNPC plan. (FFY 2014-2018, ongoing)
   a. IDEM NPS NW WSS will assist the LMCP with on-site disposal systems measures as needed/requested (FFY 2014-2018, ongoing)
   b. IDEM NPS will host a coordination meeting with U.S. EPA Region V, LMCP, and IDEM NPS to discuss the "linkage" requirement of 6217 (FFY 2014 or early 2015)
   c. IDEM will conduct probabilistic and targeted sampling in the Little Calumet-Galien watershed in FFY 2018 (some results may not be available until FFY 2019).

1.2. Complete ongoing TMDLs and WMPs in the Coastal Zone.
   a. East Branch Little Calumet River (FFY 2012-2014)
   b. Deep River TMDL and WMP. (FFY 2013-2015)
   c. Salt Creek (FFY 2010-2018)

1.3. Restore and protect water quality in critical areas of coastal WMPs.
   a. Trail Creek: FFY 2014
   b. Deep River: FFY 2015-2017
   c. Other Coastal watersheds with IDEM-approved 9-Elements Plans, such as Dunes Creek, Galena River, and Little Calumet (West Branch), as well as Salt Creek and East Branch Little Calumet River, when completed, for which funding is sought by local sponsors (FFY TBD)

1.4. Support the Conservation Reserve Enhancement Program (CREP), Mississippi River Basin Initiative (MRBI), Great Lakes Restoration Initiative (GLRI), Lake and River Enhancement (LARE), Clean Water Indiana (CWI), and other Indiana Conservation Partnership (ICP) and statewide initiatives as they become available by:
   a. Forwarding solicitation or information as it becomes available (FFY 2014-2018, ongoing)
   b. Participating in ICP planning meetings to determine priorities for funding/initiatives that align with WMP critical areas, water quality, and/or TMDL priority areas (FFY 2014-2018, every other month)

c. Promoting the programs through the watershed specialists (WSS) and work with watershed groups to identify/recommend projects that would fit well under the priorities for each funding source (2014-2018, ongoing)
d. Including them in relevant TMDLs as methods for implementation. (FFY 2014-2018, ongoing)
e. Funding ISDA technicians to design and implement BMPs in select watersheds. (FFY 2014-2015, ARN 1-66)

1.5. Utilize the ICP as an advisory group for priority nonpoint source policies and updates by participating in bimonthly leadership meetings). (FFY 2014-2018, ongoing)

1.6. Continue to provide technical assistance to local watershed groups through the WSS or project manager as documented through quarterly site visit reports and the Section 319 Annual Report. (FFY 2014-2018, ongoing)

1.7. Utilize the TMDL-WMP template for TMDLs written in 2014 and beyond. (FFY 2014-2018, annually)

1.8. Continue to partner with the IN-USDA-NRCS on the National Water Quality Initiative (NWQI) for as long as the Initiative remains a national priority. (FFY 2014-2018)
a. Begin monitoring for the NWQI (FFY 2015)
b. Coordinate with NRCS on at least an annual basis to share in the decision-making on next steps for the Initiative. (FFY 2014-2018, annually)
c. Fund Silver Creek (051201040501) implementation as a critical area of the larger Middle Eel watershed through their Section 319 grant (ARN 3-4, FFY 2012, TERM 1/3/2013 – 1/2/2016)
d. Provide implementation funding for the Middle Patoka River watershed, thereby indirectly providing outreach and education to Ell Creek (051202090405), which, though not a critical area as defined in the Middle Patoka WMP, will receive benefits from the 319 grant (ARN 3-31, FFY 2012, TERM 1/18/2013-1/17/2016)

1.9. Support implementation of the State Nutrient Reduction Strategy once approved. (FFY 2014-2018)
a. Review priorities of both documents and import objectives of nonpoint source-related importance to the State Nonpoint Source Management Plan (FFY 2014).

Financial Objectives

1.10. Dedicate an average of $100,000 in 319 funds to the Coastal Zone (Little Calumet-Galien watershed, HUC 04040001) annually until all of the remaining conditions of the LMCP CNPCP are met. (FFY 2014-until full approval occurs)

1.11. Coordinate with CWSRF to link loan applicants and local watershed groups. (FFY 2014-2018)
a. IDEM NPS will cross-reference the monthly SRF project status report with active 319 projects and/or other known watershed efforts to identify watershed opportunities and meet quarterly (March, June, September, December) with CWSRF Loan Program to communicate those that may benefit from SRF funding (FFY 2014-2018, ongoing).

b. Annually, the IDEM –NPS Program will notify the CWSRF and DWSRF program of the 319 projects that are approved for funding, upon notice from U.S. EPA. (FFY 2014-2018)
c. Where there are potential projects, the appropriate IDEM-NPS staff participates with the CWSRF staff in the community orientation or planning meeting. A fact sheet describing the potential nonpoint source project(s) opportunity is included in the SRF packet to the community, and the IDEM-NPS staff promotes the potential project(s), provides contacts for technical assistance, and provides information on other funding sources active in the watershed (such as NRCS, Clean Water Indiana, 319, 205(j) etc.) (FFY 2014-2018, ongoing)
d. The CWSRF program communicates to the IDEM-NPS Program those nonpoint source project BMPs funded through CWSRF that were identified in the approved 319 WMPs. IDEM-NPS staff ensures that this information is input into GRTS. This information is included in the Annual 319 Report to U.S. EPA. (FFY 2016-2017)

Technical Objectives

1.12. Work with partners to model, assess, and prioritize critical watersheds in the state. (FFY 2015-2018)

1.13. Use current IDEM WSS to assist partners with nonpoint source planning and implementation activities. (FFY 2014-2018, ongoing)

Goal 2: Monitor and assess Indiana waters for nonpoint source impairments and improvements.

IDEM's strategy for monitoring water quality in the state, including the status of nonpoint source, is described in the *Indiana Water Quality Monitoring Strategy 2011-2019* (WQMS). Broadly, IDEM will use the following types of monitoring to evaluate and characterize nonpoint source in the state:

- Probabilistic monitoring – characterization of water quality throughout the entire state (lakes, rivers, and streams) through statistically-valid sampling using a rotating basins approach to categorize the causes and sources of pollution.
- Baseline monitoring – characterization of a smaller watershed (used in conjunction with a TMDL process when possible) that will allow for follow-up monitoring after restoration activities have been implemented.
- Success monitoring – follow-up monitoring after restoration activities have taken place to evaluate the water quality (e.g. Measures SP-12 and WQ-10) as compared to baseline water quality that was determined by IDEM through probabilistic, TMDL, baseline, or other IDEM-conducted monitoring.
- Special projects – projects necessary to develop water quality criteria to include in Indiana's water quality standards; to characterize nutrient loads of Indiana waters that contribute nonpoint source to the Gulf of Mexico and the Great Lakes; to develop TMDLs; to participate in national initiatives, such as the U.S. EPA's National Aquatic Resource Surveys (NARS) and the NWQI; and other priority projects as opportunities become available.

Baseline monitoring was discussed in the Inventory section of this plan. Watersheds for follow-up success monitoring are identified by locating the co-occurrence of 319 implementation projects and 2002 impaired waterbodies. Watersheds for evaluation are also suggested by watershed specialists/project managers who believe a watershed is a good candidate for showing water quality improvement. If necessary, the data stored in NPS-AIMS can be mined for trends of improving water quality.

In addition, IDEM-NPS grantees often monitor water quality in their watersheds of interest, utilizing a variety of methods. Prior to 2012, IDEM did not provide consistent guidance on the parameters that should be monitored by 205j and 319 grant-funded projects in order to characterize water quality. In 2012, IDEM issued *Monitoring Water in Indiana: Choices for Nonpoint Source and Other Watershed Projects* (a.k.a., "the Monitoring Handbook"; Frankenberger and Esman 2012) outlining the core indicators that all nonpoint source grant projects are required to include if they are going to conduct water quality monitoring utilizing Section 319 or 205j monies (see Appendix K) as well as a number of supplemental indicators that they may monitor, depending upon their project needs. Different methods for monitoring these indicators are suggested in the handbook, but specific methods are not required. Providing this monitoring guidance has helped IDEM to communicate to its grantees the types of nonpoint source water quality issues most watershed groups are likely to encounter and should characterize in their watershed management plans. Watershed groups wishing to monitor for less common nonpoint source parameters that are not contained within the Monitoring Handbook (e.g. chlorides, sulfides, pesticides) may coordinate with IDEM -NPS to do so.

Many groups use Hoosier Riverwatch (Indiana's citizen monitoring program) methods to conduct their water quality monitoring and to raise stakeholder awareness of water quality in their watersheds. In fact, so many groups utilize Hoosier Riverwatch methods that a standardized Quality Assurance Project Plan (QAPP) is now being developed to be used as a template for nonpoint source grantees. With the shift of the Hoosier Riverwatch program from the IDNR to the IDEM, IDEM-NPS has taken responsibility for continuing to train groups in and hosting the web-based Hoosier Riverwatch database which serves as a repository for water quality monitoring data collected by volunteers trained through the program. IDEM-NPS also funds a similar program for volunteer monitoring of Indiana lakes. Indiana's Clean Lakes Program is administered through Indiana University-Bloomington (IU) and funded through a CWA Section 319 grant.

IDEM also will be participating in several special nonpoint source monitoring projects in the next five years. Nationally, IDEM will be monitoring for NWQI watersheds and participating in the NARS. In 2010-2015 205j funds are being used to support monitoring on the Wabash River at the New Harmony bridge to characterize Indiana's nutrient loads to the Ohio River, and ultimately, the Gulf of Mexico.

Water quality monitoring alone will not improve water quality conditions in Indiana. The information generated through monitoring efforts must be converted into effective decision-making. Sometimes that requires modeling to interpolate and extrapolate for conditions that are not reflected in the monitoring effort or to integrate collected data into a decision-making framework. Specific modeling efforts that will be undertaken by IDEM in the next five years includes use of the U.S. EPA's RPT to gauge which waters should receive limited resources available and the load/flow duration curves for TMDL development. IDEM will also be increasing

its capacity to assess nonpoint source in the state through work on the External Data Framework (EDF), a program that will allow IDEM to use data collected by partners to its fullest potential. It is anticipated that many groups will reach data quality level 2, whose criteria are still being developed by IDEM. As a long-term goal, the Nonpoint Source Program aspires to revisit statewide land use, water quality data, assessments and modeling, as well as integrate what partners and local groups are finding as to what is critical, to update the nonpoint source assessment completed in 1989 and perhaps refine the sources & magnitude of nonpoint source in the state. Finally, IDEM will reinvigorate its internal BMPs mapping project – a tool that will create a GIS layer of all Indiana's Section 319 BMP implementation locations.

IDEM evaluates and makes adjustments in its monitoring program annually, between sampling seasons.

Objectives

Programmatic Objectives

2.1. Require the use of the Environmental Monitoring for Watershed Groups handbook for 319 grantees. (FFY 2014-2018, annually)

2.2. Coordinate with NRCS to develop a sampling regime for NWQI projects. (FFY 2014-2015)

2.3. Import 319 grantee data meeting appropriate data quality criteria into NPS-AIMS or the Hoosier Riverwatch Database to be uploaded into STORET on a routine basis. The number and/or percentage of data sets that are imported will be reported (FFY 2014-2018, annually)

2.4 Invite the participation of local project leaders when conducting 305(b) CWA assessments on baseline monitoring data. (FFY 2014-2018, at least annually).

2.5 Evaluate results of the monitoring program and make adaptive management decisions on an annual basis. (FFY 2014-2018)

2.6 Long-term: Revisit the way in which we characterize the sources and magnitude of nonpoint source-impaired waters. Investigate what it might take to pursue a Nonpoint Source Assessment Methodology and use that information to look at trends and how that information would be used to make decisions in the Nonpoint Source Program.

a. Conduct exploratory meeting to determine desired outcomes/outputs of a nonpoint source assessment methodology (FFY 2015).

b. Investigate the inputs required to develop a nonpoint source assessment methodology, and, if a nonpoint source assessment methodology is still feasible, develop a timeline for methodology development. (FFY 2015)

Financial Objectives

2.7 Continue to fund the Clean Lakes Program (volunteer and professional) data collection for use in Clean Water Act 305(b) and 314 assessments and 303(d) listing. (FFY 2014-2018)

2.8 Direct IDEM resources to perform baseline characterization monitoring of at least one watershed annually to support TMDL and watershed planning efforts.
Measures:
2013 – Deep River TMDL and WMP
2014 – Lower Whitewater TMDL and WMP
2015 –Mississinewa TMDL and WMP
2016 – 2017 – TBD, based on funding applications and awards

2.9 Utilize IDEM resources to monitor waterbodies identified as targets of the National Water Quality Initiative as described in the sampling design developed by IDEM and NRCS. (FFY 2015-2018)

Technical Objectives

2.10 Integrate Hoosier Riverwatch voluntary monitoring program into IDEM's monitoring and assessment schemas.

a. Complete Hoosier Riverwatch QAPP template. (FFY 2014)
b. Provide support for 20 Hoosier Riverwatch workshops (volunteer trainings) and maintain current loaner/teaching trunks. (FFY 2014-2018, annually)
c. Provide support for maintenance and upgrades of the Hoosier Riverwatch water quality monitoring database and associated websites. (FFY 2014-2018, ongoing)

2.11 Complete the following components of the External Data Framework

a. Complete acceptance criteria for EDF. (FFY 2014)
b. Complete the development of technical assistance materials for the EDF and web site development to support its implementation. (FFY 2014)
c. Begin accepting, reviewing and ranking water quality data provided by external organizations and, if appropriate, using the data to make 305(b)/303(d) water quality assessment and listing decisions. (FFY 2014)

2.12 Utilize IDEM resources to delist waters, or to otherwise demonstrate water quality improvements, where nonpoint source pollution has been abated.

a. Evaluate water quality data submitted through the EDF process, as well as grantee monitoring, to identify watersheds that should be surveyed for possible nonpoint source water quality improvements (FFY 2014-2018, annually).
b. Use additional resources (e.g., staff, funds, and technical support) to monitor water quality in watersheds where nonpoint source restoration activities have occurred. The monitoring data will be compared to baseline information, if available, to gauge the efficacy of the work. (FFY 2014-2018. annually)
c. Utilize probabilistic monitoring, along with some targeted monitoring, to determine water quality improvements in the coastal zone. (FFY 2018)

2.13 Continue ground water (GW)/source water monitoring through Section 106 funding. (FFY 2014-2018, annually)

2.14 Long-term goal: Analyze the findings of all ground water data taken by the state to characterize the causes, sources, and magnitude of nonpoint source in ground water

a. Meet with IDEM-GW staff to discuss level of analysis occurring and needed to characterize causes, sources, and magnitude of nonpoint source in ground water (FFY 2014)
b. Gather data and develop a timeline for completing the analysis and reporting mechanism (Data gathering – FFY 2014; Timeline – 2015)
c. Determine the frequency of future ground water analyses and reporting (FFY 2015)

Goal 3: Develop and conduct a strategic outreach and education program.

Despite the fact that nonpoint source remains the biggest water quality threat to the nation, 70 percent of participants with a high-school or "some college" education could not define "watershed" in a regional survey of the Chesapeake Bay watershed (McClafferty 2002)[12]. This statistic suggests that raising awareness of nonpoint source issues among the general public continues to be an important issue that should be addressed by water quality agencies and organizations. In Indiana, the opportunity to work with partners on unified messaging regarding nonpoint source is great. IDEM realizes that any nonpoint source messaging campaign undertaken by the agency should be consistent with partners across the state. Indiana does not have the resources to provide conflicting or redundant information. In the next five years, IDEM plans to focus its outreach and education to issues identified in the Program Challenges to Date section of this plan by working with its partners (including internal and external partners identified in the Stakeholders section of this plan, as well as agencies and organizations not listed but who express interest) to create sound messaging to bring attention to these challenging sources.

In the interim, IDEM will continue to utilize strong components of its current program. IDEM's nonpoint source website, in particular, will continue to be updated and promoted to target audiences such as nonpoint source grantees and partners. IDEM will also continue to work with partners on training initiatives, such as the Indiana Watershed Leadership Academy (IWLA) sponsored by Purdue University and the ICP's Training and Certification Program for ICP staff. In addition, IDEM will continue to utilize the IDEM-NPS staff to engage interested groups and communities, through direct contacts, conference attendance, involvement in statewide and regional committees, and webinar and other training opportunities, as well as updating current educational pieces.

Objectives

Programmatic Objectives

3.1. Initiate meetings with partners to discuss IDEM's goal of strategic messaging for the state on septic system care.
   a. Work with partners to define the purpose of the outreach program. (FFY 2014)
   b. Work with partners to identify the target audience. (FFY 2014)
   c. Work with partners to develop a consistent statewide message. (FFY 2015)
   d. Publicize success stories through multiple media applications. (FFY 2014- 2018, ongoing)
   e. Support technical events to exchange information between government partners, watershed groups, and citizens. (FFY 2014 – 2018)
   f. Assist in providing outreach on on-site disposal (or, septic) systems in the Lake Michigan Coastal Zone
      i. Market on-site disposal system inspections at property transfer to lending institutions in the Coastal Zone. (FFY 2014-2015)

[12] When compared to the general public, the population surveyed for this study contained fewer males, was more educated, and was wealthier overall. Given these parameters, it is possible that a similar survey of Indiana residents would result in fewer correct answers to the definition of a "watershed."

ii. Work with partners to develop Septic Awareness Campaign regarding septic impacts. Items may include developing Public Service Announcements regarding the importance of proper on-site disposal system maintenance. (FFY 2014)
iii. Promote the use of the Revolving Loan Fund for Septic upgrades and repairs. (FFY 2014-18, annually)

3.2. Initiate meetings with partners to discuss IDEM's goal of strategic messaging for the state on hydromodification.
   a. Work with partners to define the purpose of the outreach program. (FFY 2014)
   b. Work with partners to identify the target audience. (FFY 2014)
   c. Work with partners to develop a consistent statewide message. (FFY 2016)
   d. Publicize success stories through multiple media applications. (FFY 2014-2018, ongoing)
   e. Continue outreach to the community of County Surveyors to become involved in water quality improvement through the IWLA, the Indiana Association of County Surveyors, local watershed groups, and county contacts. (FFY 2014-2018, ongoing).

3.3. Initiate meetings with partners to discuss IDEM's goal of strategic messaging for the state on sediment and nutrient pollution.
   a. Work with partners to define the purpose of the outreach program. (FFY 2014)
   b. Work with partners to identify the target audience. (FFY 2014)
   c. Work with partners to develop a consistent statewide message. (FFY 2015)
   d. Publicize success stories through multiple media applications. (FFY 2014-2018, ongoing)
   e. Work with other ICP organizations to strategize about outreach to absentee landowners. (FFY 2015-2018).

3.4. At least annually review print and electronic materials for updates and republish as needed. (FFY 2014-2018, annually)

3.5. Continue to provide citizen monitoring training through Hoosier Riverwatch and the Clean Lakes Program. (FFY 2014-2018)

3.6. Highlight successes of the Nonpoint Source Program, including successful grantees and other partners
   a. Produce five "Success Stories" (U.S. EPA WQ-10 Strategic Measure) by end of FFY 2017 and publicize widely within Indiana. (FFY 2014-2017)
   b. Publicize any awards given to watershed groups related to their water quality efforts in Indiana. (FFY 2014-2018)

3.7. Provide cost-effective outreach to audiences in Indiana.
   a. Utilize social media to provide up-to-the minute information to followers of IDEM's social media outlets. (FFY 2014-2018)
   b. Continue to participate in the Pathway to Water Quality at the Indiana State Fairgrounds. (FFY 2014-2018)

Financial Objectives

3.8. Long-term goal: use 319 funds to leverage for partner-based statewide marketing campaign including widely disseminated materials such as statewide television/radio commercials/billboards.

a. Interim milestones to meet this goal include the source-specific discussions under programmatic objectives.

Technical Objectives

3.9. Continue to build capacity for water quality improvement in the state.
   a. Continue to provide technical assistance to Purdue University's Indiana Watershed Leadership Academy. (FFY 2014-2018)
   b. Continue to support the ICP's Training and Certification Program on watershed related issues by sitting on the Technical Research Board and the advisory team. (FFY 2014-2018)

Goal 4: Improve Indiana's water quality, including surface and ground water, by reducing nonpoint source pollutants such as nutrients, sediment, and bacteria; restoring aquatic habitats; and establishing flow regimes that mimic natural conditions.

The heart of Indiana's Nonpoint Source Program is its effort to restore waterbodies polluted by nonpoint source. The state's land use and hydrology have been highly modified by human activity. It is not the intention of the Nonpoint Source Program to attempt to revert to precolonial land use and hydrological regime, but rather to obtain a balance of uses so that water quality conditions can meet the state's water quality goals of "swimmable" and "fishable."

Many of IDEM's restoration activities take place through grant agreements with state and local partners. Indeed, without these partnerships, IDEM would be hard-pressed to meet its swimmable/fishable goals. Partners leverage Section 205j and Section 319 grant funding with other federal, state, local, and private funding to write and implement watershed management plans (WMPs) that will ultimately improve water quality in Indiana's watersheds.

When applicable and appropriate, IDEM encourages grantees to consider best management practices that will provide positive impacts to meet multiple objectives; for example, in the waters of the Coastal Zone, restoration activities undertaken with Section 319 funds will also be in accordance with the CZARA Section 6217 (g) measures. IDEM is currently modeling this "bigger bang for the buck" concept through its TMDL/Nonpoint Source Program. TMDLs are being written on the TMDL-WMP template that allows watershed groups to easily incorporate TMDL data into their WMPs and streamline the watershed planning process.

Objectives

Programmatic Objectives

4.1 Capitalize on the monitoring and load-calculations done during TMDL development to inform forthcoming watershed planning projects.
   a. Utilize the TMDL-WMP template for TMDLs sampled for and written in 2014 and beyond so that they are implementable using 319 funds. (FFY 2014-2018)
   b. Prioritize TMDLs for the next five years to give watershed groups an idea of where TMDLs will be pursued. (FFY 2014-2014)

c. Link TMDLs with baseline water monitoring projects for Section 319 watershed management planning applications. (FFY 2014-2018)

4.2 Develop guidance for updating WMPs. (FFY 2014-2016)

4.3 Promote integration of WMPs with local comprehensive plans. (FFY 2014-2018)

4.4 Integrate disparate Nonpoint Source Program databases into one centralized integrated Watershed database to assist with tracking and reporting (2018)
a. Develop scope of work for the integrated databases project (FFY 2014-2015)
b. Hire contractor to work on the project (FFY 2016)
c. Develop database (FFY 2016-2018)

Financial Objectives

4.5 Use Section 319 funding to support implementation of WMPs that meet the U.S. EPA's 9 Key Elements of a Watershed Plan (including staff support and outreach as well as the placement of BMPs in critical areas as identified in the WMPs). (FFY 2014-2018, annually)

4.6 Repair previously-installed BMPs with the caveats outlined in the program policy. (FFY 2014-2018)

4.7 Continue to leverage LARE and CWI funds to address erosion, sedimentation and nutrient input concerns as long as the General Assembly continues to approve appropriations. (FFY 2014-2018)

Technical Objectives

4.8 Develop guidance for the identification of critical areas. (FFY 2014)

4.9 Show partial or total restoration in at least five 12-digit watersheds (at least 5 SP12 and 5 WQ-10; watersheds identified may count for both measures) in the five-year cycle 2013-2017. (FFY 2014 - 2017)

4.10 Determine a way to track *E. coli* load reductions. (FFY 2014-2015)

4.11 Geolocate all BMPs installed through the Section 319 grant program in order to enhance the BMP GIS layer located in the Nonpoint Source Program. (FFY 2014-2018, ongoing)

4.12 Solicit for proposals to use Section 319 funding to support implementation of WMPs that meet the U.S. EPA's 9 Key Elements of a Watershed Plan (includes staff support as well as eligible BMPs, described in Appendix M). (FFY 2014-2018, annually):

a. Agricultural BMPs: fencing livestock, soil erosion prevention practices, nutrient management practices, *E. coli*-reducing practices, pesticide reduction/management measures, two-stage ditches; rotational/other grazing practices; riparian tree plantings; drainage bioreactors; controlled drainage

b. Urban/residential BMPs: sediment and erosion control/capture practices; nutrient reduction/capture practices; installing rain gardens, rain barrels, pervious concrete/pavement, green roofs, daylighting, swales, and other green infrastructure practices; brownfields ground water remediation that is not under an NPDES permit; local land use ordinances; septic demos, repair/replace, operation and maintenance , and sewer

lines from house to street (but not line to wastewater treatment plants (WWTP)/point source)

c. Forestry BMPs: stream bank stabilization; riparian buffer; sediment traps (not in "waters of the state"); road and trail design, construction, maintenance, and closure conforming to standards; water bars; temporary bridges/culverts; seeding skid trails and other eroding areas; fords; diversions; log landings; silt fences

d. (Abandoned) Mining/oil and gas extraction BMPs: erosion controls; grading; lime and other chemicals to treat acid mine drainage; revegetation; phytoremediation; soil amendments; soil removal/disposal; drainage controls; well abandonment; ground water remediation; mine shaft and adit (horizontal tunnel) closings; ditches to divert surface water from mine waste, tailings or mine works; removal and consolidation of small waste piles; removal of large waste piles from water sources; relocation of stream from waste rock dump or tailings pile; capping waste rock piles or tailings with uncontaminated soils followed by revegetation; aeration and settling ponds to promote precipitation of metals from mine drainage; sulfate-reducing wetlands; oxidation wetlands; passive acid mine drainage treatment facilities; active acid mine drainage treatment facilities; as well as agricultural BMPs to improve soil structure and fertility while reducing erosion, such as:

    - Cover Crops – to build soil structure, biomass, and significantly reduce erosion.
    - Compaction Avoidance Techniques
    - Controlled Traffic Zones (no earlier than year five, maybe later)
    - Conservation Crop Rotation – especially those that include long-term crops such as clover and alfalfa
    - Contour Farming
    - No-till / Conservation Tillage. It is important to note that some tillage may be required in the initial years of production to address settling issues and resulting erosion potential.
    - Regrading – Especially important in the initial years of production to address settling issues and resulting erosion potential
    - Soil Testing and Variable Rate Applications of Nutrients. Because of changes to soil structure, it may be more effective to use electrical conductivity-based systems (such as Soil Doctor and VERIS) rather than traditional 2.5 acre grid samples.
    - Use of animal manures / compost to promote rebuilding of soil structure and organic matter.
    - Terraces
    - Water and Sediment Control Basins (WASCoBs)
    - Grassed Waterways
    - Filter Strips / Buffers
    - Conservation BMPs. Those practices required through permitting may be augmented after bond release:
        - Nutrient / Sediment trapping wetlands
        - Two-stage ditches / Drainage water management
        - Field Buffers
        - Wildlife Habitat protection and management

e. Aquatic habitat restoration: lowhead dams removal, stream bank stabilization, wetland restoration/creation, National Fish Habitat Program, dredging lakes, natural channel/two-stage ditch/self-forming channel and other restoration designs, levee or dike modification/removal

Goal 5. Protect sensitive, vulnerable, and high quality waters of the state so that they may continue to meet their designated uses.

Prior to FFY 2013, IDEM's Nonpoint Source Program emphasized the restoration of impaired waters, while the issue of protecting sensitive, threatened, or high-quality waters was largely unrecognized. With the passage and U.S. EPA approval of state antidegradation rules (327 IAC 2-1.3) in 2012, it is only fitting that these waters be considered in the Nonpoint Source Program. While the main priority of Indiana's nonpoint source program must remain the restoration of impaired waters, there remains room to consider projects for which protection is an objective. For the purposes of this goal, the Nonpoint Source Program considers "sensitive, vulnerable and high quality waters" to include water quality assessment Category 1 waters, watersheds including karst landscapes, outstanding state resource waters (OSRWs – which include national resource waters), drinking water source waters, cold/coolwater/salmonid waters, and waterbodies harboring endangered species.

Category 1 waters are defined by the Integrated Report as those waters that fully support all designated uses and none of its uses are threatened. The definitions of exceptional use, outstanding state resource waters, outstanding national resource waters, and high quality waters of the state are codified at 327 IAC 2-1-11, IC 13-11-2-149.5, IC 13-11-2-149.6, and 327 IAC 2-1.3-2, respectively. Portions of 17 rivers, streams, and Great Lakes have been identified as OSRWs, (Appendix N), and portions of 11 downstate rivers and streams have been identified as Exceptional Use waters. A total of 16 waterbodies are listed in Category 1 of the 2012 consolidated list, three of which are also Exceptional Use waters (Table 15). Eight salmonid streams, 46 surface water source waters, 51 waters harboring habitat for endangered, threatened, or rare (ETR) species, 1410 wellhead protection areas (operated by 681 public water systems), and two major karst landscapes (Mitchell and Muscatatuck Plateaus) are also in need of protection.

COUNTY	HUC12	HUC14	2012 ASSESSMENT UNIT ID	2012 ASSESSMENT UNIT NAME
Decatur	050800030502	05080003050030	ING0352_T1003	Righthand Fork Salt Creek
Franklin	050800030502	05080003050030	ING0352_T1006	Righthand Fork Salt Creek
Ripley	050902030601	05090203070020	INV0372_T1032	Laughery Creek
Ripley	050902030601	05090203070030	INV0373_T1033	Laughery Creek
Clinton	051201070303	05120107040070	INB0733_03	Kilmore Creek
Decatur	051202060301	05120206030010	INW0631_00	Gas Creek and Other Tributaries
Decatur	051202060304	05120206030020	INW0632_00	Lost Creek and Other Tributaries
Jennings	051202070404	05120207050090	INW0759_00	North Fork-Deer Creek
Jennings	051202070404	05120207050090	INW0759_T1011	Vernon Fork, North Fork Water Intake
Jefferson	051202070603	05120207010100	INW071A_01	Big Creek (Downstream of Walton Creek)

Jefferson	051202070603	05120207010120	INW071C_00	Big Creek
Monroe	051202080802	05120208090020	INW0892_00	May Creek and Other Tributaries
Washington	051202081203	05120208150010	INW08F1_T1043	South Fork Lost River
Washington	051202081204	05120208150020	INW08F2_T1042	North Fork Lost River
Orange	051202081204	05120208150030	INW08F3_T1041	Lost River-Carters Creek
Dubois	051202090402	05120209020010	INP0921_T1002	Patoka River

Table 15. 2012 Category 1 waters. Category 1: The waterbody is fully supporting all of its designated uses and none of its uses are threatened. (from http://www.idem.IN.gov/nps/2348.htm). Note that the South Fork Lost River (AUID INW08F1_T1043), North Fork Lost River (AUID INW08F2_T1042), and Lost River-Carters Creek (AUID INW08F3_T1041) are also exceptional use streams.

Indiana contains many more impaired waters than high-quality waters. The following lists of watersheds are targeted for protection over the next five years. Priority watersheds may be further limited by the priorities for any particular IDEM-NPS funding cycle.

HUC 10	Watershed Name	Protected for (1)	Protected for (2)
0404000101	Trail Cr-Frontal Lake MI	salmonids	
0404000102	Galena River	salmonids	
0404000103	Salt Creek	salmonids	
0404000104	East Arm Little Calumet River	salmonids	
0404000106	Calumet River - Frontal Lake MI	salmonids	
0405000108	Fawn River	cisco	
0405000111	Pigeon River	ETR	
0405000113	Mill Creek-St Joseph River	ETR	
0405000115	N Branch Elkhart R	cisco	
0405000119	Elkhart River	ETR	
0405000120	Puterbaugh Creek-St Joseph River	ETR	
0405000121	Baugo Creek	ETR	
0405000122	Brandywine Creek - St. Joseph R	salmonids	
0410000302	W Branch St. Joseph	cisco	
0410000304	Fish Creek	ETR	
0410000307	Cedar Cr	exceptional use	
0410000308	St Joseph River	ETR	Source water

Table 16. Watersheds targeted for protection in the Great Lakes drainage.

HUC 10	Watershed Name	Protected for (1)	Protected for (2)	Protected for (3)
0509020306	Hayes Branch-Laughery Creek	ETR	CAT 1	source water
0509020307	South Fork Laughery Creek-Laughery Creek	ETR		
0509020310	Big Bone Creek-Ohio River	ETR		
0514010103	Corn Creek-Ohio River	ETR		
0514010107	Muddy Fork	source water		
0514010109	Bear Grass Creek-Ohio River	ETR		
0514010401	Otter Creek-Ohio River	ETR		
0514010407	Mill Creek - Blue River	Exceptional Use	source water	

HUC 10	Watershed Name	Protected for (1)	Protected for (2)	Protected for (3)
0514010408	Whiskey Run-Blue River	ETR	Exceptional Use	
0514010409	Blue River	ETR	Exceptional Use	
0514010410	Wolf Creek-Ohio River	ETR		
0514020104	Anderson R	source water		
0514020107	Lead Creek-Ohio River	ETR		
0514020108	Pup Creek-Ohio River	ETR		
0514020109	Barren Fork - Little Pigeon Creek	source water		
0514020112	Caney Creek-Ohio River	ETR		
0514020204	Canoe Creek-Ohio River	ETR		
0514020206	Bayou Creek-Ohio River	ETR		

Table 17. Watersheds targeted for protection in the Ohio Tributaries drainage.

HUC 10	Watershed Name	Protected for (1)	Protected for (2)
0512020101	Muncie Creek - White River	source water	
0512020103	Killbuck Creek-White River	ETR	
0512020108	Geist Reservoir - Fall Creek	source water	
0512020109	Fall creek	source water	
0512020111	Eagle Creek	source water	
0512020203	Plummer Creek	ETR	
0512020210	White River	ETR	
0512020303	Deer Creek	source water	
0512020402	Little Blue River	ETR	
0512020404	Little Sugar Creek-Sugar Creek	ETR	
0512020407	Sugar Creek	ETR	
0512020501	Shankatank Creek-Flatrock River	ETR	
0512020504	Mill Creek-Flatrock River	ETR	source water
0512020603	Sand Creek	CAT 1	source water
0512020605	Thompson Slough - E Fork White	source water	
0512020702	Graham Creek	ETR	
0512020703	Otter Creek	ETR	
0512020704	Brush Creek - Vernon Fork Muscatatuck R	Cat 1	source water
0512020706	White Oak Branch - Muscatatuck R	cat 1	source water
0512020707	Vernon Fork-Muscatatuck River	ETR	
0512020708	Cammie Thomas Ditch	source water	
05120208o1	Twin Creek - East Fork White	source water	
0512020803	Lick Branch - east Fork White	source water	
0512020805	Middle Fork Salt Creek	source water	
0512020807	Lake Monroe - Salt Creek	source water	
0512020808	Salt Creek	cat 1	
05120208l0	Leatherwood Creek-East Fork White River	ETR	source water
05120208l1	Boggs Creek	ETR	

HUC 10	Watershed Name	Protected for (1)	Protected for (2)
0512020812	Dry Branch - Lost River	Exceptional Use	CAT 1
0512020813	Lost River	Exceptional Use	source water
0512020814	Barn Run-East Fork White River	ETR	
0512020815	East Fork White River	ETR	

Table 18. Watersheds targeted for protection in the White River drainage.

HUC 10	Watershed Name	Protected for (1)	Protected for (2)	Protected for (3)
0512010114	Treaty Creek-Wabash River	ETR		
0512010116	Little Pipe Creek-Wabash River	ETR		
0512010204	Salamonie River	ETR		
0512010401	Blue River	cisco		
0512010406	Weesau Creek-Eel River	ETR		
0512010407	Eel River	ETR	source water	
0512010501	Crooked Creek-Wabash River	ETR		
0512010502	Rock Creek-Wabash River	ETR		
0512010503	Rattlesnake Creek-Wabash River	ETR		
0512010505	Deer Creek	ETR		
0512010506	Sugar Creek-Wabash River	ETR		
0512010601	Grassy Creek - Tippecanoe River	cisco		
0512010602	Walnut Creek-Tippecanoe River	ETR	source water	
0512010603	Trimble Creek-Tippecanoe River	ETR		
0512010604	Chippewanuck Creek-Tippecanoe River	ETR		
0512010605	Eddy Creek-Tippecanoe River	ETR		
0512010606	Bruce Lake Outlet-Tippecanoe River	ETR		
0512010607	Mill Creek	ETR		
0512010608	Indian Creek	ETR		
0512010609	Dickey Creek-Tippecanoe River	ETR		
0512010612	Honey Creek-Tippecanoe River	ETR		
0512010613	Tippecanoe River	ETR		
0512010701	Kokomo creek - wildcat creek	source water		
0512010703	South Fork Wildcat Creek	ETR	exceptional use	Cat 1
0512010704	Wildcat Creek	ETR	exceptional use	
0512010802	Burnett Creek-Wabash River	ETR		
0512010804	Big Pine Creek	ETR	exceptional use	
0512010805	Kickapoo Creek-Wabash River	ETR		

HUC 10	Watershed Name	Protected for (1)	Protected for (2)	Protected for (3)
0512010907	Jordan Creek-Middle Branch	ETR		
0512010908	North Fork Vermilion River	ETR		
0512011001	Browns Wonder Creek-Sugar Creek	ETR		
0512011004	Prairie Creek-Sugar Creek	ETR		
0512011302	River Deshee-Wabash River	ETR		
0512011303	Coffee Bayou-Wabash River	ETR		
0512011306	French Creek-Wabash River	ETR		
0512011307	Big Creek	ETR		
0512011308	Fox River-Wabash River	ETR		
0512011309	Levy Slough-Wabash River	ETR		
0512011006	Sugar Creek	exceptional use		
0512010806	Big Shawnee Creek - Wabash river	exceptional use		

Table 19. Watersheds targeted for protection in the Wabash River and Tributaries drainage.

HUC 10	Watershed Name	Protected for
0712000103	Headwaters Yellow River	ETR
0712000105	Yellow River	ETR
0712000201	Oliver Ditch	ETR
0712000203	Bruner Ditch-Iroquois River	ETR
0712000207	Sugar Creek	ETR
0712000104	Mill Creek - Kankakee River	ETR
0712000110	Crooked Creek - Kankakee River	source water

Table 20. Watersheds targeted for protection in the Kankakee River drainage.

HUC 10	Watershed Name	Protected for (1)	Protected for (2)	Protected for (3)
0508000301	Martindale Creek - Whitewater River	ETR		
0508000302	Greens Fork Creek	ETR		
0508000304	Williams Creek - Whitewater River	ETR		
0508000305	Salt Creek	ETR	cat 1	source water
0508000306	Pipe Creek - Whitewater River	ETR		
0508000307	East Fork Whitewater	ETR	source water	
0508000308	Whitewater River	ETR		

Table 21. Watersheds targeted for protection in the Whitewater River drainage.

HUC 10	Watershed Name	Protected for (1)	Protected for (2)
512020901	Patoka Lake - Patoka River	source water	
512020903	Hunley Creek	source water	
512020904	Altar Cr - Patoka River	Cat 1	source water

512020906	Stone Coe - Patoka River	source water	
512020907	S F Patoka River	source water	

Table 22.Watersheds targeted for protection in the Patoka River drainage.

Objectives

Programmatic Objectives

5.1 Encourage watershed planning activities in watersheds with Category 1 waters (including those waters identified in Table 15 and in subsequent Integrated Reports). (FFY 2015-2018)

5.2 Identify and prioritize for planning watersheds with source water intakes. (FFY2015-2018)

5.3 Participate as requested in Phase II wellhead protection planning. (FFY 2014-2018)

5.4 Develop priorities for plans and implementation in watersheds that impact Outstanding State Resource Waters and waters important for aquatic habitat. (FFY 2015)

Financial Objectives

5.5 Fund 319-eligible protection strategies identified in critical areas of IDEM-approved9-Elements watershed management plans proposed by Section 319 grant applicants whose implementation applications rank high enough for funding (FFY 2015-2018)

Technical Objectives

5.6 Work with IDEM's Ground Water section and watershed groups, as well as CWSRF and Drinking Water SRF, to identify wells in need of proper decommission (FFY 2015-2018)

Funding Mechanisms

Currently, Indiana uses a wide range of funding mechanisms to prevent and reduce nonpoint source pollutants. To the extent that these resources remain available for nonpoint source work, Indiana will continue to utilize them.

Clean Water Act Grants
Indiana utilizes 319, 205(j), 212 (State Revolving Funds), and 106 (regular and supplemental) to perform nonpoint source activities. The majority of 319(h) funds are passed through to fund local projects, while the remainder funds program staff at the state level. In the recent past, IDEM has utilized 205(j) funds received to fund the development of nutrient criteria, conduct monitoring at the outlet of the Wabash River to support the development of the Ohio River TMDL (in partnership with ORSANCO), and to write watershed management plans (WMPs) at the local level. The 106 funds granted to IDEM largely underwrite the monitoring programs described elsewhere in this document, as well as Assessment and TMDL program staff.

Section 319 requires states to match the federal 319 funding provided at a federal to state ratio of 60:40. Indiana currently uses repaid loan dollars through the Clean Water State Revolving Fund (CWSRF) program (which are considered state funds), or local funds used for these projects, to match its administrative and technical support (programmatic) funding. It is anticipated that this arrangement will continue. Local project match (40 percent of the total project cost) is provided by project sponsors. At no time is federal money used to match federal grants.

State-Led Programs: T by 2000, Lake and River Enhancement, Clean Water Indiana, and the Healthy Rivers INitiative
Historically, Indiana has used appropriations generated from the state cigarette tax as dedicated funding to support local Soil and Water Conservation Districts (SWCDs) and water quality improvement projects. State dedicated funding was recommended by the Governor's Soil Resources Study Commission in 1985. The Commission was charged with assessing the state of soil erosion in Indiana and to develop recommendations to address concerns that arose from the study. The state legislature established "T by 2000" funds to create the Division of Soil Conservation in the Indiana Department of Natural Resources (IDNR).

The Lake and River Enhancement (LARE) program began in 1987 when the funding for T by 2000 was first appropriated, with the goal to protect lakes from excessive sedimentation from upstream sources. Rivers were added to the eligible waters to receive funding in 1991. Initially, LARE funds constituted 10 percent of the T by 2000 program, about $300,000 at that time. The source of funding was changed to a lake and river enhancement fee paid through boat owners' annual registration through the Bureau of Motor Vehicles.

Erosion and sedimentation problems have persisted beyond the year 2000. The T by 2000 program was renamed Clean Water Indiana (CWI) and continues today. In 2005, the IDNR Division of Soil Conservation, and related CWI funding, was transitioned to the newly-created State Department of Agriculture (ISDA). During this transition, the LARE program remained in the IDNR, under the Division of Fish and Wildlife and became 100 percent funded through the lake and river enhancement fee annually paid by boat owners. Though funding amounts

fluctuate, approximately $1.8 million is annually available for LARE projects. In 2011, the General Assembly added logjam removal to the list of available projects to be funded through LARE.

The CWI program is codified at IC 14-32-8 and is administered by the ISDA as directed by the State Soil Conservation Board. The purpose of the fund is to "provide financial assistance to soil and water conservation districts, land occupiers, and conservation groups to implement conservation practices to reduce nonpoint sources of water pollution through education, technical assistance, training, and cost sharing programs" (P.L. 160-1999, amended by P.L.175-2006, SEC.18). CWI is currently funded through one-sixth of the cigarette tax fund, which is dwindling due to state and federal no-smoking educational campaigns. In the 118th First Session of General Assembly of the State of Indiana, conservation organizations such as the Indiana Association of Soil and Water Conservation Districts (IASWCD) encouraged lawmakers to appropriate more money to and to consider a different dedicated funding source for the CWI fund.

The Healthy Rivers INitiative is a relatively young state program. Begun in 2010, it is a land conservation program to protect floodplains in the Wabash River, Sugar Creek, and the Muscatatuck River. Though not a "traditional" funding source, this initiative is working with willing landowners to protect over 43,000 acres of vulnerable floodplain while creating floodwater storage and increasing public awareness of recreational and water quality issues.

Coastal Zone Management Act

Indiana utilizes funding received through the National Oceanic and Atmospheric Administration (NOAA) Office of Ocean and Coastal Resource Management program to fund:

- Protection and restoration of significant natural and cultural resources.
- Programs to prevent the loss of life and property in coastal hazard areas.
- Improved public access for recreational purposes.
- Revitalized urban waterfronts and ports.
- Improved coordination among government agencies in policy and decision-making processes.
- Pollution prevention initiatives, including nonpoint source pollution into coastal waters.

USDA Programs

The United States Department of Agriculture (USDA) provides grant and cost-share funding for conservation measures through the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA). These programs are subject to change with subsequent Farm Bills, but as of the writing of this document, the following USDA programs are in place:

<u>Conservation Reserve (Enhancement) Program</u>

FSA administers the Conservation Reserve Program (CRP) and the Conservation Reserve Enhancement Program (CREP). These are voluntary land retirement programs that allow producers to take environmentally-sensitive lands (e.g. highly erodible lands, riparian lands) out of production and plant them to some type of conservation cover for an environmental benefit. CRP practices help to maintain a higher percent native cover (as compared to cropland), which is an important contributor to watershed integrity. The FSA pays the producer an annual rental payment to off-set the cost of maintaining the land. CRP contracts are available for 10-15 year

terms. Popular CRP practices in Indiana include filter strips (CP21), grassed waterways (CP8A), and native grass plantings (CP2).

The Conservation Reserve Enhancement Program (CREP) was described in the Program Successes section. CREP is a federal-state partnership that adds an additional appropriation to the state for certain CRP conservation practices (Table 23) and provides a one-time incentive payment from the state. In Indiana, CREP is available to 65 counties across eleven HUC-8 watersheds. The ISDA has technical assistance available to producers in the CREP watersheds to supplement federal agency support for the program.

Practice Code	Name	Environmental Benefit
CP2	Native Grasses	Remove sediment & nutrients, wildlife
CP3A	Hardwood Tree Planting	Wildlife, erosion control, reduced pollution from water, air and land, buffers waterways
CP4D	Wildlife Habitat	Wildlife, nutrient & sediment removal, recreation
CP21	Filter Strip	Wildlife, pollutant removal
CP22	Riparian Buffers	Stream shading, wildlife, pollution removal
CP23, CP23A	Wetland Restoration	Wildlife, nutrient & sediment removal
CP31	Bottomland Timber	Erosion control, wildlife, carbon sequester, pollution removal

Table 23. Indiana Eligible CREP Practices

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) is a voluntary cost-sharing program, administered by NRCS, intended to provide assistance to producers in installing conservation practices to address environmental concerns. EQIP is easily the most popular program for "working lands" (crop and livestock agriculture, silviculture) in Indiana. Many of the practices (Appendix J) provide a water quality benefit. Producers compete for EQIP funds by applying for funds during a set period. Applications in each county are ranked according to local, state and federal priorities. The applications with the highest scores after ranking are prioritized for funding. In FFY 2013, $26 million was made available to Indiana's producers through the general EQIP sign-up.

In addition to the regular appropriation to EQIP, several additional programs are funded through set-aside state or federal EQIP funds. These include the National Water Quality Initiative (NWQI), the Mississippi River Basin Initiative (MRBI), the Great Lakes Restoration Initiative (GLRI) and the Agricultural Water Enhancement Program (AWEP).

National Water Quality Initiative

The NWQI is a joint initiative between the NRCS and the U.S. Environmental Protection Agency (U.S. EPA), whereby 5 percent of state EQIP funds are set aside to address high-priority water quality concerns in watersheds with a nutrient or sediment impairment. The funding is to be allocated through landowner contracts for land in one to three 12-digit watersheds that have been chosen by NRCS and the water quality agency (IDEM) to be a part of the initiative. In Indiana, three watersheds were chosen: Silver Creek (HUC 051201040501), Ell Creek (051202090405) and Eagle Creek (051202011108). These watersheds were targeted for the additional EQIP dollars in FFY

2012 and 2013. While it remains to be seen whether or not the NWQI will continue to be offered in these watersheds for the duration of this plan, IDEM will coordinate with NRCS as long as this Initiative is implemented.

Agricultural Water Enhancement Program

The Agricultural Water Enhancement Program (AWEP) is a voluntary cost-sharing program that improves water quality or conserves surface or ground water on agricultural land. Unlike many of the Farm Bill programs, eligible program *partners* submit an application for their area of interest to NRCS. If the application is approved, additional EQIP monies will be made available for landowners in the area covered by the application; individual producers will have access to these dollars through a traditional EQIP contract with NRCS. In Indiana, two areas have been approved for AWEP funding: the St. Joseph River (MI) watershed (HUC 04050001) and LaPorte County.

Conservation Innovation Grants (CIG)

Under CIG, the NRCS can award grants to partners with innovative projects to address natural resource concerns, particularly using technology transfer. The funding and authority for this program are provided under EQIP and program eligibility must be met by landowners who will benefit from the proposed CIG project.

<u>Wetland Reserve (Enhancement) Program</u>

The Wetland Reserve Program (WRP) is the NRCS's wetland easement program. Under this program, historically-farmed wetlands can be returned to native wetland vegetation and hydrology. The program is voluntary and can provide restoration funds with or without an easement. Easements can be for 30 years or permanent. In addition, wetlands that were previously restored under a local, state or federal program can be placed into long-term protection.

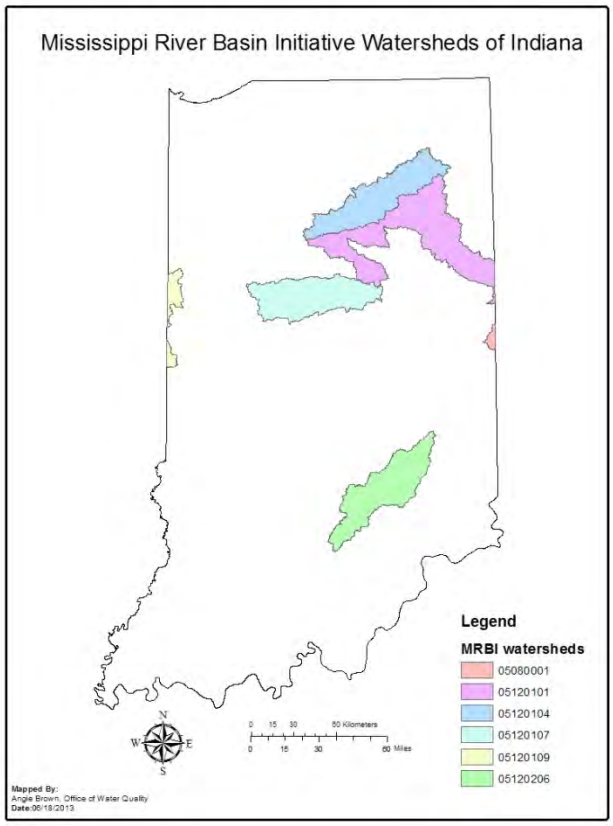

Figure 14. Indiana watersheds eligible for Mississippi River Basin Initiative (MRBI) funds.

The Wetland Reserve Enhancement Program (WREP) is one component of the Wetland Reserve Program. Leveraging resources from partners, NRCS enrolls lands into the easement program for protection and restoration. Indiana NRCS has partnered with The Nature Conservancy on two WREP projects – one in southwest Indiana and one in the Upper Wabash watershed.

<u>Mississippi River Basin Initiative</u>

MRBI is a regional competitive program administered under NRCS, funded through the Cooperative Conservation Partnership Initiative (CCPI), EQIP, CIG, Wildlife Habitat Incentive program (WHIP), CSP, and WREP programs. NRCS has identified six priority 8-digit watersheds in Indiana capable of

competing for funding under the Initiative (Figure 14). As of 2013, Indiana had five MRBI projects.

Great Lakes Restoration Initiative (EQIP, WHIP, FRPP, EWPP –Floodplain Easements)
NRCS programs are one source of GLRI funding available to watersheds that drain to the Great Lakes. Sixty thousand acres of privately-owned lands have been put into conservation through NRCS GLRI funding.

Western Lake Erie Basin Initiative (EQIP)
The Western Lake Erie Basin (WLEB) Initiative was put in place to address agricultural nutrient and sediment inputs into Lake Erie. The project area includes 820,770 acres in the St. Joseph River (OH), St. Marys River, Upper Maumee River, and Auglaize River watersheds in Indiana. Nineteen best management practices are eligible under this program.

Cooperative Conservation Partnership Initiative (EQIP, WHIP, CSP)
The Cooperative Conservation Partnership Initiative (CCPI) is a joint project initiative between NRCS and approved program partners. Under the CCPI, the NRCS has authority to make EQIP, WHIP, and/or Conservation Stewardship Program (CSP) resources available within an approved CCPI project area. Indiana currently has four CCPI projects, including Hoosier National Forest and statewide forestry projects; southwest Indiana irrigation project; and Wildcat Creek Invasives project.

Private and Other Grants
While the majority of funding for nonpoint source projects is provided through the programs described above, partners will occasionally use private funders and other state and federal grants to accomplish their nonpoint source goals.

Indicators of Success

From an economics point of view, nonpoint source pollution has been characterized as a "wicked problem" – a problem that is not solved, as much as it is either improved, made worse, or remains constant (Doering 2013). Wicked problems are not easily described, due to differing perspectives of the observers and the complex nature of the problem itself; and involve a great deal of uncertainty, complexity and conflict. Under these conditions, wicked problems are not a typical "scientific problem," in which the problem is observed, defined, analyzed, and solved in a series of steps. Rather, the problems are somewhat defined by the solutions. Suggested methods for tackling wicked problems include authoritative strategies where a small number of people are made responsible for the larger problem; competitive strategies where the most opposing viewpoints are made responsible for choosing their most preferred solution, thereby generating many possible "best solutions" from which to choose; and collaborative strategies that include as many perspectives as possible to share knowledge and generate a consensus on an approach to tackle the problem (Roberts 2000).

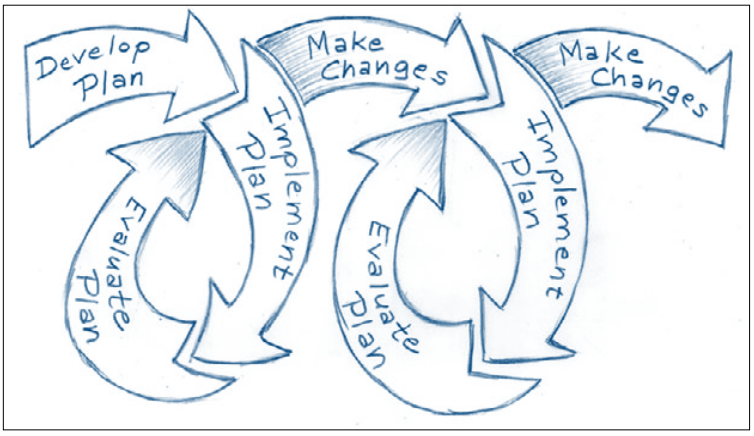

Figure 15. Adaptive management. (From U.S. EPA 2008)

Indiana's Nonpoint Source Program has chosen to work on the wicked problem of nonpoint source under a collaborative process. The approach includes an iterative process of planning, implementing, evaluating, and adaptive management.

The indicators the Indiana Department of Environmental Management (IDEM) uses to evaluate its program will have an impact on the definition of "success" and, in turn, will influence decisions that are made. Acknowledging this truth, IDEM has identified means of measuring program success based on both environmental and administrative measures.

Environmental Indicators

U.S. EPA's Strategic Measures: Measure WQ-SP10.N11 and WQ-SP12.N11

U.S. EPA, in its Strategic Plan 2011-2015, has set a national goal of attaining water quality standards for all pollutants and impairments in more than 3,360 water bodies identified in 2002 as not attaining standards (designated as Management Measure WQ-SP12.N11 or SP12). Additionally, by 2015, the U.S. EPA has a national goal to improve water quality conditions in 330 impaired watersheds nationwide using the watershed approach (designated as Management Measure WQ-SP10.N11 or WQ-10). On a regional scale, U.S. EPA has asked Indiana to show improvement in or delisting of five waterbodies that have appeared on the 2002 or subsequent Indiana 303(d) List of Impaired Waters to satisfy the WQ-10 commitment. Additionally, IDEM is to report on five 12-digit watersheds whose water quality conditions have improved (to satisfy the SP12 commitment).

The baseline approach for indicating success is complicated for Indiana. Though IDEM does list the common nonpoint source pollutant *E. coli* on its 303(d) list and can report on its improvement, IDEM generally does not list for other common nonpoint source pollutants such as nutrients or sediment, as Indiana does not have numerical water quality standards for those. Instead IDEM's Impaired Biotic Communities (IBC) is an indicator that there are water quality problems in the watershed – elevated nutrients that cause algal blooms and deplete oxygen is making life difficult for aquatic organisms in the waterbody or elevated sediment is creating poor habitat for fish and macroinvertebrates. Water quality improvements generally take a long time to manifest. IDEM's approach thus far has been to monitor those waters that are 1) listed on Indiana's 2002 303(d) List of Impaired Waters for *E. coli* and/or IBC; and 2) that have utilized 319 funding or a "watershed approach" to delist or show a trend of improvement. In accordance with the 2011-2019 Water Quality Monitoring Strategy, IDEM will continue to use additional resources (e.g. staff, funds, and technical support) to monitor water quality in select watersheds where nonpoint source restoration activities have occurred. The monitoring data will be compared to baseline information, if available, to gauge the efficacy of the work. IDEM will also, to the extent practicable, continue to participate in the discussion of the appropriate baseline indicators to report to Congress and U.S. taxpayers the improvements being made through the use of Section 319 and related funds.

Estimated Load Reductions

Many of the nonpoint source-related listings on the Indiana 303(d) List of Impaired Waters are due to elevated sediment, nutrients and bacteria. IDEM will track, in the federal Grant Reporting and Tracking System (GRTS) database, estimated load reductions of these sediment and nutrients that are reported to the Nonpoint Source Program. At this time, IDEM does not have a means by which to track bacterial load reductions, though when it is able to do so, those reductions will be tracked as well. While the Nonpoint Source Program can only track those reductions that have been reported (most of which are BMPs funded and reported by 319 grantees), IDEM believes that reductions in these parameters indicate future improvements in water quality, as sources/causes of pollution are removed from the system.

Program Progress - Administrative Indicators

Additional indicators of success will be administrative in nature and demonstrate the success of the Nonpoint Source Program in meeting the goals of this plan. Some of these indicators include:

- Percentage of state covered by WMPs
- Money passed through to local entities for planning and implementation
- Number of watershed groups serviced through the program, grant-wise or through contact with watershed specialists
- Implementation of the External Data Framework and the submission of water quality data for potential use in making water quality assessments and determining nonpoint sources of pollution
- Final approval of the Indiana 6217 Coastal Nonpoint Pollution Control Program plan by NOAA/U.S. EPA

Action Register

The U.S. EPA guidance *Key Components of an Effective State Nonpoint Source Management Program* requires states to identify annual milestones against which the Nonpoint Source Program will be evaluated. The previous goals and indicators section provided a narrative accounting of the strategies Indiana will use to control and mitigate nonpoint source pollution. The following action register provides a consolidated listing of the goals, objectives, and management measures described above, as well as identifying annual milestones as required by U.S. EPA. Deliverables and activities are also categorized by year in Appendix O.

Note: Products listed alongside an ending FFY will be submitted to U.S. EPA by the completion of that FFY. All starting and ending dates are projected and contingent upon normal processing times and administrative procedures. Should state or federal bureaucratic obstacles be encountered, these dates will be amended as appropriate.

TMDL numbers are based upon current evaluations of the gathered data and do not include additional impairments that may be discovered upon reassessment.

Goal 1	Utilize partnerships to leverage resources available for nonpoint source management.		Responsible Party	Funding Source	Subcontractor/ Sponsor	FFY Starting	FFY Ending (Projected)	Product	Measure
	A. Programmatic Objectives								
	1.1. Assist Indiana Department of Natural Resources, Lake Michigan Coastal Program to obtain full approval of all outstanding measures on the LMCP CNPC plan.		IDEM/DNR	319	In-house	2014	2018 (ongoing)	Final Coastal Nonpoint Control Program and 15/5 Plan	Assistance is provided to DNR-LMCP as requested
	a.	IDEM-NPS NW WSS will assist the LMCP with on-site disposal systems measures as needed/requested	IDEM	319	In-house	2014	2018 (ongoing)	Measure will receive full approval	Number of meetings attended/communications on septic issue
	b.	IDEM -NPS will host a coordination meeting with U.S. EPA Region V, LMCP, and IDEM NPS to discuss the "linkage" requirement of 6217	IDEM	319	In-house	2014	2015 (one-time)	Meeting with next steps toward meeting the linkage requirement of 6217	Meeting has occurred
	c.	IDEM will conduct probabilistic and targeted sampling in the Little Calumet-Galien watershed	IDEM	106/319	In-house	2018	2018 (some results may not be available until FFY 2019) (one-time)	Raw data, 303(d) listings/delistings, possible Measure W or Success Story	Monitoring occurred
	1.2. Complete ongoing TMDLs and WMPs in the Coastal Zone.								
	a.	East Branch Little Calumet River	IDEM/DNR	319	Save the Dunes	2012	2014 (ongoing)	IDEM-approved WMP	Progress on WMP
	b.	Deep River	IDEM/DNR	319	NIRPC	2013	2015 (ongoing)	TMDLs (65) submitted to U.S. EPA and IDEM-approved WMP	Progress on TMDLs and WMP
	c.	Salt Creek	IDEM	319	Save the Dunes	2010	2018 (ongoing)	TMDLs (38) approved by U.S. EPA and IDEM-approved WMP	Progress on TMDLs and WMP
	1.3. Restore and protect water quality in critical areas of coastal WMPs.								
	a.	Trail Creek	IDEM/DNR	319	LaPorte Co SWCD	2013	2014 (ongoing)	BMPs; estimated load reductions	No. of BMPs installed/ load reductions recorded

	b.	Deep River	IDEM/DNR	106, 319	NIRPC	2015	2017 (ongoing)	BMPs; estimated load reductions	No. of BMPs installed/load reductions recorded
	c.	Other Coastal watersheds with IDEM-approved 9-Elements Plans, such as Dunes Creek, Galena River, and Little Calumet (West Branch), as well as Salt Creek and East Branch Little Calumet River, when completed, for which funding is sought by local sponsors	IDEM	319/Farm Bill/CZM	TBD	TBD	TBD (ongoing)	BMPs; estimated load reductions	No. of BMPs installed/load reductions recorded
	1.4. Support the Conservation Reserve Enhancement Program (CREP), Mississippi River Basin Initiative (MRBI), Great Lakes Restoration Initiative (GLRI), Lake and River Enhancement (LARE), Clean Water Indiana (CWI), and other Indiana Conservation Partnership (ICP) and statewide initiatives as they become available.								
	a.	Forwarding solicitation or information as it becomes available	IDEM	319	In-house	2014	2018 (ongoing)	N/A	Solicitations/information forwarded
	b.	Participating in ICP planning meetings to determine priorities for funding/initiatives that align with WMP critical areas, water quality, and/or TMDL priority areas (every other month)	IDEM	319	In-house	2014	2018 (ongoing)	Priorities determined	Meeting participation
	c.	By promoting the programs through the watershed specialists (WSS) and work with watershed groups to identify/recommend projects that would fit well under the priorities for each funding source	IDEM	319	In-house	2014	2018 (ongoing)	Projects identified	No. of customers served by WSS
	d.	By including them in relevant TMDLs as methods for implementation	IDEM	106	In-house	2014	2018 (ongoing)	TMDLs include ICP programs as methods for implementation	No. of TMDL reports in which programs included
	e.	By funding ISDA technicians to design and implement BMPs in select watersheds (ARN 1-66)	IDEM/ISDA	319	ISDA	2011	2015 (ongoing)	BMPs installed; estimated load reductions	BMPs installed/ load reductions estimated
	1.5. Utilize the ICP as an advisory group for priority state nonpoint source policies and updates by participating in bimonthly leadership meetings.		IDEM	319	In-house	2014	2018 (ongoing)	N/A	IDEM participates in leadership meetings to provide updates and receive input on nonpoint source policies and priorities
	1.6. Continue to provide technical assistance to local watershed groups through the WSS or project manager as documented through quarterly site visit reports and the Section 319 Annual Report.		IDEM (WSS)	319	In-house	2014	2018 (ongoing)	Site visit reports	No. of groups served by WSS
	1.7. Utilize the TMDL-WMP template for 2014 TMDLs and beyond.								
	a.	White Lick Creek (HUC 0512020113)	IDEM–TMDL	106	In-house		2014	TMDLs (45) on template submitted to U.S. EPA	# of TMDLs complete and on template
	b.	Lower Big Blue River (HUCs 0512020402, 0512020408)	IDEM–TMDL	106	In-house		2014	TMDLs (31) on template submitted to U.S. EPA	# of TMDLs complete and on template
	c.	East Fork White River (HUCs 0512020602, 0512020605, 0512020606)	IDEM–TMDL	106	In-house		2014	TMDLs (33) on template	# of TMDLs complete and on template
	d.	Deep River (HUC 0404000105)	IDEM–TMDL	106	In-house	2013	2014	TMDLs (65) on template submitted to U.S. EPA; baseline monitoring for WMP	# of TMDLs complete and on template

	e.	Southern Whitewater River (HUCs 0508000305, 0508000306, 0508000308)	IDEM–TMDL	106	In-house	2014	2015	TMDLs (169) on template submitted for U.S. EPA; baseline monitoring for WMP	# of TMDLs complete and on template
	f.	Mississinewa River (HUCs 0512010303, 0512010304)	IDEM–TMDL	106	In-house		2015	TMDLs (30) on template submitted to U.S. EPA; baseline monitoring for WMP	# of TMDLs complete and on template
	1.8. Continue to partner with the IN-USDA-NRCS on the National Water Quality Initiative (NWQI) for as long as the Initiative remains a national priority.								
	a.	Begin monitoring for the NWQI	IDEM	319/106	In-house	2015	2015 (once to begin)	Raw data	Data collected
	b.	Coordinate with NRCS on at least an annual basis to share in the decision-making on next steps for the Initiative (annually).	IDEM	319	In-house	2014	2018 (annually)	Next steps defined	Coordination has occurred
	c.	Fund Silver Creek (051201040501) implementation as a critical area of the larger Middle Eel watershed through their section 319 grant (ARN 3-4)	IDEM	319	Manchester College	2012	2016 (ongoing)	BMPs; estimated load reductions	BMPs entered into GRTS; estimated load reductions entered into GRTS
	d.	Provide implementation funding for the Middle Patoka River watershed, thereby indirectly providing outreach and education to Ell Creek (051202090405), which, though not a critical area as defined in the Middle Patoka WMP, will receive benefits from the 319 grant (ARN 3-31)	IDEM	319	Alliance of Indiana Rural Water	2013	2016 (ongoing)	Outreach; BMP implementation; estimated load reductions	BMPs; estimated load reductions
	1.9. Support implementation of the State Nutrient Reduction Strategy once approved.		IDEM/ISDA	TBD	ICP	2014	2018 (ongoing)	BMPs, estimated load reductions	# of Priorities adopted by IDEM-NPS
	a.	Review priorities of both documents and import objectives of nonpoint source-related importance to the State Nonpoint Source Management Plan	IDEM	319	In-house	2014	2014 (one-time)	Updated State NPS Plan reconciled with State Nutrient Reduction Strategy	State NPS Plan reviewed against approved Nutrient Reduction Strategy
	B. Financial Objectives								
	1.10. Dedicate an average of $100,000 in 319 funds to the Coastal Zone (Little Calumet-Galien watershed, HUC 04040001) annually until all of the remaining conditions of the LMCP CNPCP are met.		IDEM	319	In-house	2014	Until full approval occurs	WMPs, BMPs, CNPCP	Funding allocated
	1.11. Coordinate with CWSRF to link loan applicants and local watershed groups.								
	a.	IDEM NPS will cross-reference the monthly SRF project status report with active 319 projects and/or other known watershed efforts to identify watershed opportunities and meet quarterly (March, June, September, December) with CWSRF Loan Program to communicate those that may benefit from SRF funding.	IDEM	319	In-house	2014	2018 (ongoing)	List of potential NPS projects available to SRF loan communities? WMP(s) with projects available to communities?	Projects identified for communities
	b.	Annually, the NPS Program will notify the CWSRF and DWSRF programs of the 319 projects that are approved for funding, upon notice from U.S. EPA.	IDEM	319	In-house	2014	2018 (annually)	List of projects awarded 319 funding	U.S. EPA-funded projects communicated to SRF programs

	c.	Where there are potential projects, the appropriate NPS staff participates with the CWSRF staff in the community orientation or planning meeting. A fact sheet describing the potential NPS project(s) opportunity is included in the SRF packet to the community, and the NPS staff promotes the potential project(s), provides contacts for technical assistance, and provides information on other funding sources active in the watershed (such as NRCS, Clean Water Indiana, 319, 205(j) etc.)	IDEM	319	In-house	2014	2018 (ongoing)	Fact sheets produced, contacts and funding sources provided	Percentage of community orientation or planning meetings where NPS projects with an active group working with the IDEM-NPS Program have been identified that are attended by WSS or PM
	d.	The CWSRF program communicates to the NPS Program those NPS project BMPs funded through CWSRF that were identified in the approved 319 WMPs. NPS staff ensures that this information is input into GRTS. This information is included in the Annual 319 Report to U.S. EPA.	SRF	N/A	IFA	2016	2018 (annually)	BMPs funded; estimated load reductions	BMPs; estimated load reductions input into GRTS and included in Annual Report
	C. Technical Objectives								
	1.12. Work with partners to model, assess, and prioritize critical watersheds in the state.		IDEM/ NRCS	319/ partner funds	ICP	2015	2018 (on-going)	List of priority watersheds	Progress on prioritizing watersheds
	1.13. Utilize IDEM WSS to assist partners with NPS planning and implementation activities.		IDEM	319	In-house	2014	2018 (on-going)	WMP, load reductions	# of watershed groups assisted by WSS or PM

* Listed (303d) parameters, but depending on new sampling data, TMDL may not be written for all parameters

Goal 2	**Monitor and assess Indiana waters for NPS impairments and improvements**		**Responsible Party**	**Funding Source**	**Subcontractor/ Sponsor**	**FFY Starting**	**FFY Ending**	**Product**	**Measures**
	A. Programmatic Objectives								
	2.1. Require the use of the Environmental Monitoring for Watershed Groups handbook for 319 grantees.		IDEM	319	Grantees	2014 (annually)	2018 (annually)	Data	% of grantees who monitor core indicators as prescribed in the Handbook
	2.2. Coordinate with NRCS to develop a sampling regime for NWQI projects.		IDEM/ NRCS	319	In-house	2014	2015 (one-time)	Sampling plan	Sampling plan developed
	2.3. Import 319 grantee data meeting appropriate data quality criteria into NPS-AIMS or the Hoosier Riverwatch Database to be uploaded into STORET on a routine basis.		IDEM	319	In-house /enfoTech/HRW DB contractor	2014 (ongoing)	2018 (ongoing)	Data, DB updates/maintenance	Sample sets uploaded into NPS-AIMS or HRW DB
	2.4. Invite the participation of local project leaders when conducting 305(b) CWA assessments on baseline monitoring data.		IDEM	106, 319	In-house	2014 (ongoing)	2018 (ongoing)	Baseline assessments with local insight on sources	Local watershed leaders invited to assessment meetings on baseline water quality data
	2.5. Evaluate results of the monitoring program and make adaptive management decisions on an annual basis.		IDEM	319	In-house	2014 (annual)	2018 (annual)	Revised monitoring strategy, when appropriate	Monitoring strategy is reviewed and adaptively managed
	2.6. Long-term goal: Revisit the way in which we characterize the sources and magnitude of NPS-impaired waters. Investigate what it might take to pursue NPS Assessment Methodology and using that information to look at trends and how that information would be used to make decisions in the NPS Program.								
	a.	Conduct exploratory meeting to determine desired outcomes/outputs of NPS assessment methodology	IDEM- NPS & Assessments Programs	319/106	In-house	2015	2015	Desired outcomes/outputs of NPS assessment methodology	Meeting conducted. Desired outcomes/outputs

Goal 2	Monitor and assess Indiana waters for NPS impairments and improvements		Responsible Party	Funding Source	Subcontractor/ Sponsor	FFY Starting	FFY Ending	Product	Measures
									determined.
	b.	Investigate the inputs required to develop a NPS assessment methodology and if development of a NPS assessment methodology is feasible, develop a timeline for methodology development	IDEM – NPS & Assessments Programs	319/106	In-house	2015	2015	Decision on feasibility of NPS assessment methodology development and timeline	Required inputs and feasibility determined. Decision on whether to proceed made.
	B. Financial Objectives								
	2.7. Continue to fund the Clean Lakes Program (volunteer and professional) data collection for use in Clean Water Act 305(b) and 314 assessments and 303(d) listings.		IDEM	319	IU-SPEA	2014	2018	Data; 305(b) and 314 assessments; 303(d) listings	Monitoring has occurred
	2.8. Direct IDEM resources to perform baseline characterization monitoring of at least one watershed annually to support TMDL and watershed planning efforts.								
	a.	Deep River TMDL and WMP	IDEM	319, 106	TMDL- IDEM WMP - NIRPC	2013	TMDL – 2014 WMP – 2016 WMP implementation funded thru 2017	Data entered into AIMS and uploaded to STORET (2014), assessments (2014), TMDL submitted to U.S. EPA (2014), WMP (2015), BMPs; estimated load reductions	Progress of TMDL, WMP; BMPs implemented; estimated load reductions
	b.	Lower Whitewater TMDL and WMP	IDEM	319, 106	TMDL - IDEM WMP - Dearborn Co SWCD	2014	TMDL – 2015 WMP – 2016	Data, assessments, TMDL submitted to U.S. EPA, IDEM-approved WMP	Progress on data collection, assessments, TMDL, WMP
	c.	Mississinewa TMDL and WMP	IDEM	205, 106	TMDL – IDEM WMP – Delaware Co SWCD	2015	TMDL – 2015 WMP - 2016	Data, assessments, TMDL submitted to U.S. EPA, IDEM-approved WMP	Progress on data collection, assessments, TMDL, WMP
	2.9. Utilize IDEM resources to monitor waterbodies identified as targets of the National Water Quality Monitoring Initiative (NWQI) as described in the sampling design developed by IDEM and NRCS.		IDEM/NRCS	319, 106	USGS, IUPUI	2015	2018	Data	Data collection has occurred
	C. Technical Objectives								
	2.10. Integrate Hoosier Riverwatch voluntary monitoring program into IDEM's monitoring and assessment schemas.								
	a.	Complete Hoosier Riverwatch QAPP template	IDEM	106	In-house	2014	2014	QAPP template	Progress on template
	b.	Provide support for 20 Hoosier Riverwatch workshops (volunteer trainings) and maintain current loaner/teaching trunks	IDEM	319	HR Coordinator & Volunteer Trainers	2014 (annually)	2018 (annually)	Trained volunteers, HR manuals,20 fully-stocked loaner trunks	No. of trainings, no. of trained volunteers, no. of fully-stocked loaner trunks
	c.	Provide support for maintenance and upgrades of the Hoosier Riverwatch water quality monitoring database and associated websites.	IDEM	319	Contractor (TBD)	2014 (ongoing)	2018 (ongoing)	HR website and updated/upgraded database	No. of hits on HR website; no. of upgrades to HRW DB; new entries/datasets entered
	2.11 Complete the following components of the External Data Framework.								
	a.	Complete acceptance criteria for External Data Framework	IDEM	106	In-house	2014	2014	Acceptance criteria	% completion
	b.	Complete the development of technical assistance materials for the EDF and web site development to support its implementation.	IDEM	Supp 106	D.J. Case	2014	2014	Web pages	% completion
	c.	Begin accepting, reviewing and ranking water quality data	IDEM	106	In-house	2014	Accepting-	More robust data set for	External data is accepted

Goal 2	Monitor and assess Indiana waters for NPS impairments and improvements		Responsible Party	Funding Source	Subcontractor/ Sponsor	FFY Starting	FFY Ending	Product	Measures
		provided by external organizations and, if appropriate, using the data to make 305(b)/303(d) water quality assessment and listing decisions.					2014 1st listing cycle where data reflected - 2016	the IR	and reviewed against the EDF for consideration in listing decisions
	2.12. Utilize IDEM resources to delist waters, or otherwise demonstrate water quality improvements, where NPS pollution has been abated.								
	a.	Evaluate water quality data submitted through the EDF process, as well as grantee monitoring, to identify watersheds that should be surveyed for possible NPS water quality improvements.	IDEM	319, 106	In-house	2014 (annually)	2018 (annually)	List of waters to be surveyed	Data is evaluated
	b.	Use additional resources (e.g., staff, funds, and technical support) to monitor water quality in watersheds where NPS restoration activities have occurred. The monitoring data will be compared to baseline information, if available, to gauge the efficacy of the work.							
		i. Upper Tippecanoe	IDEM	319, 106	In-house	2013	2013	Raw data; possible Success Story submitted to U.S. EPA	Data is collected and reviewed; Success Story is submitted to U.S. EPA if appropriate
		ii. Blue River	IDEM	319, 106	In-house	2013	2013	Raw data; possible Measure W	Data is collected and reviewed; Measure W is submitted to U.S. EPA if appropriate
		iii. Deep River follow-up monitoring	IDEM	319, 106	In-house	2018	2019	Raw data; possible Measure W/Success Story submitted to U.S. EPA	Data is collected and reviewed; Measure W/Success Story is submitted to U.S. EPA if appropriate
		iv. Watersheds with known impairments where restoration activities have occurred and that have yet to be identified	IDEM	319, 106	In-house	2014 (annually)	2018 (annually)	Raw data; possible Measure W/Success Story submitted to U.S. EPA	Data is collected and reviewed; Measure W/Success Story is submitted to U.S. EPA if appropriate
	c.	Utilize probabilistic monitoring, along with some targeted monitoring, to determine water quality improvements in the coastal zone	IDEM	319, 106	In-house/LMCP input	2018	2020	Raw data	Data collected and reviewed; improvements reported to DNR-LMCP, U.S. EPA, and NOAA
	2.13. Continue the Ground water Monitoring Network (GWMN).		IDEM	106	Ground water Section	2013	2018	Raw data/reports	Ground monitoring network continued
	2.14.Long-term goal: Analyze the findings of all ground water data taken by the state to characterize the causes, sources, and magnitude of NPS in ground water.		IDEM	106	Ground water Section	TBD	TBD	Reports	Analysis has occurred and reported to U.S. EPA
	a.	Meet with IDEM-GW staff to discuss level of analysis occurring and needed to characterize causes, sources, and magnitude of NPS in ground water	IDEM-NPS	319	IDEM-GW	2014	2014	Meeting has occurred and next steps are outlined	Meeting has occurred; level of analysis currently occurring and needed for purposes of objective is understood
	b.	Gather data and develop a timeline for completing the	IDEM-	106	IDEM- GW	Data	Data	Data; timeline	Data collected; timeline

Goal 2	Monitor and assess Indiana waters for NPS impairments and improvements		Responsible Party	Funding Source	Subcontractor/ Sponsor	FFY Starting	FFY Ending	Product	Measures
		analysis and reporting mechanism	GW/NPS			collection – 2014 (ongoing) Timeline - 2015	collection – 2018 (ongoing) Timeline - 2015		developed
	c.	Determine the frequency of future ground water analyses and reporting	IDEM – GW/NPS	106	IDEM-GW	2015	2015	Decision made on future analyses and reporting and that decision communicated to U.S. EPA	Meetings have occurred to discuss future analyses and reporting; decision made on frequency

Goal 3	Develop and conduct a strategic outreach and education program.		Responsible Party	Funding Source	Subcontractor/ Sponsor	FFY Starting	FFY Ending	Product	Measures
	A. Programmatic Objectives								
	3.1. Initiate meetings with partners to discuss IDEM's goal of strategic messaging for the state on septic system care.								
	a.	Work with partners to define the purpose of the outreach program.	IDEM-NPS	319	In-house	2014	2014	Purpose statement	Purpose defined
	b.	Work with partners to identify the target audience.	IDEM-NPS	319	In-house	2014	2014	Target audience(s) identified	Audience identified
	c.	Work with partners to develop a consistent statewide message.	IDEM-NPS	TBD	TBD	2015	2015	Message	Progress on message development
	d.	Publicize success stories through multiple media applications.	IDEM-NPS	319	TBD	2014 (ongoing)	2018 (ongoing)	Press releases to partner outlets, social media, newspaper, television, radio, list servs, websites	No. of releases
	e.	Support technical events (such as IEHA annual conference) to exchange information between government partners, watershed groups, and citizens.	IDEM NPS	319	In-house	2014	2018		Send staff as appropriate to attend, speak at, and work booths at events that speak to the topic
	f.	Assist in providing outreach on septic systems in the Lake Michigan Coastal Zone							
		i. Market on-site disposal system inspections at property transfer to lending institutions in the Coastal Zone.	DNR-LMCP	CZM	Septic System Committee	2014	2015 (ongoing)	Promotional package; meetings with lenders	Option is promoted to lenders in coastal zone
		ii. Work with partners to develop and/or promote existing Septic Awareness Campaign regarding septic impacts. Items may include developing Public Service Announcements regarding the importance of proper on-site disposal system maintenance.	DNR-LMCP/IDEM-NPS	CZM/319	Septic System Committee	2014	2014	Campaign materials; possible PSAs	Campaign materials developed/identified and promoted
	iii.	Promote the use of the Revolving Loan Fund for Septic upgrades and repairs.	DNR-LMCP/IDEM-NPS	CZM/319/SRF	Septic System Committee	2014 (annually)	2018 (annually)	Septic upgrades and repairs through SRF	Information provided to communities at SRF loan meetings and to watershed groups in active planning and implementation phases
	3.2. Initiate meetings with partners to discuss IDEM's goal of strategic messaging for the state on hydromodification.								

Goal 3	Develop and conduct a strategic outreach and education program.		Responsible Party	Funding Source	Subcontractor/ Sponsor	FFY Starting	FFY Ending	Product	Measures
	a.	Work with partners to define the purpose of the outreach program.	IDEM-NPS	319	In-house	2014	2014	Purpose statement	Purpose defined
	b.	Work with partners to identify the target audience.	IDEM-NPS	319	In-house?	2014	2014	Target audience(s) identified	Audience identified
	c.	Work with partners to develop a consistent statewide message.	IDEM-NPS	TBD	TBD	2016	2016	Message	Progress on message development
	d.	Publicize success stories through multiple media applications.	IDEM-NPS	319	TBD	2014 (ongoing)	2018 (ongoing)	Press releases to partner outlets, social media, newspaper, television, radio, list servs, websites	No. of releases
	e.	Continue outreach to the community of County Surveyors to become involved in water quality improvement through the IWLA, the Indiana Association of County Surveyors, local watershed groups, and county contacts.	IDEM-NPS	319	In-house	2014 (ongoing)	2018 (ongoing)	Surveyor support of watershed groups and water quality practices such as filter strips, riparian forested buffers, livestock exclusion, stream crossings, and two-stage ditches	Communications with Surveyors, individually or as a group; Surveyors enrolled in IWLA; Surveyor support of watershed groups
	3.3. Initiate meetings with partners to discuss IDEM's goal of strategic messaging for the state on sediment and nutrient pollution.								
	a.	Work with partners to define the purpose of the outreach program.	IDEM-NPS	319	In-house	2014	2014	Purpose statement	Purpose defined
	b.	Work with partners to identify the target audience.	IDEM-NPS	319	In-house	2014	2014	Target audience(s) identified	Audience identified
	c.	Work with partners to develop a consistent statewide message.	IDEM-NPS	TBD	TBD	2015	2015	Message	Progress on message development
	d.	Publicize success stories through multiple media applications.	IDEM-NPS	319	TBD	2014 (ongoing)	2018 (ongoing)	Press releases to partner outlets, social media, newspaper, television, radio, list servs, websites	No. of releases
	e.	Work with other ICP organizations to strategize about outreach to absentee landowners.	IDEM-NPS	319	ICP subcommittee	2015	2018	Strategy for outreach	No. of meetings, progress on development of outreach strategy
	3.4. At least annually review print and electronic materials for updates and republish as needed.		IDEM-NPS	319	In-house	2014 (annually)	2018 (annually)	Updated outreach materials	Materials are reviewed for accuracy
	3.5. Continue to provide citizen monitoring training through Hoosier Riverwatch and the Clean Lakes Program.		IDEM	319	In-house/IU-SPEA	2014 (ongoing)	2018 (ongoing)	Websites, manuals, workshops, staff	No. of workshops for HRW, manuals printed, sampling events logged/submitted
	3.6. Highlight successes of the NPS Program, including successful grantees and other partners.								
	a.	Produce 5 "Success Stories" (U.S. EPA WQ-10 Strategic Measure) by 2017 and publicize widely within Indiana	IDEM/ICP	319/Partner funds	In-house	2014	2017	Success Stories produced and submitted to U.S. EPA	Success Stories are submitted to U.S. EPA and are publicized widely in Indiana
	b.	Publicize any awards given to watershed groups related to their water quality efforts in Indiana	IDEM	319	In-house	2014	2018	Press releases	No of releases for awards

Goal 3	Develop and conduct a strategic outreach and education program.		Responsible Party	Funding Source	Subcontractor/ Sponsor	FFY Starting	FFY Ending	Product	Measures
	3.7. Provide cost-effective outreach to audiences in Indiana.								
	a.	Utilize social media to provide up-to-the minute information to followers of IDEM's social media outlets	IDEM	319/PPG	In-house	2014 (ongoing)	2018 (ongoing)	Tweets, posts, etc	IDEM utilizes Tweets, Facebook posts, etc
	b.	Continue to participate in the Pathway to Water Quality at the Indiana State Fairgrounds	IDEM/ICP	319/Partner funds	IASWCD	2014 (ongoing)	2018 (ongoing)	Facetime with fair-goers/contacts made	Hours of participation to prep exhibit and work Fair
	B. Financial Objectives								
	3.8. Long-term goal: use 319 funds to leverage for partner-based statewide marketing campaign including widely disseminated materials such as statewide television/radio commercials/billboards based on above identified work groups.								
	a. (3.1)	Initiate meetings with partners to discuss IDEM's goal of strategic messaging for the state on septic system care.	IDEM-NPS	319	In-house	2014	2015	Message	Progress on message development
	b. (3.2)	Initiate meetings with partners to discuss IDEM's goal of strategic messaging for the state on hydromodification.	IDEM-NPS	319	In-house	2014	2016	Message	Progress on message development
	c. (3.3)	Initiate meetings with partners to discuss IDEM's goal of strategic messaging for the state on sediment and nutrient pollution.	IDEM-NPS	319	In-house	2014	2015	Message	Progress on message development
	C. Technical Objectives								
	3.9. Continue to build capacity for water quality improvement in the state.								
	a.	Continue to provide technical assistance to Purdue University's Indiana Watershed Leadership Academy	IDEM	319	In-house	2014 (ongoing)	2018 (ongoing)	Watershed leaders trained	Technical assistance provided
	b.	Continue to support the ICP's Training and Certification Program on watershed related issues by sitting on the Technical Research Board and the advisory team	IDEM	Partner funds	In-house	2014	2018 (ongoing)	Development of training and certification program	Technical assistance provided

Goal 4	Improve Indiana's water quality, including surface and ground water, by reducing NPS pollutants such as nutrients, sediment, and bacteria; restoring aquatic habitats; and establishing flow regimes that mimic natural conditions.		Responsible Party	Funding Source	Subcontractor/ Sponsor	FFY Starting	FFY Ending	Product	Measures
	A. Programmatic Objectives								
	4.1. Capitalize on the monitoring and load-calculations done during TMDL development to inform forthcoming watershed planning projects.								
	a.	Utilize the TMDL-WMP template for TMDLs sampled for and written in 2014 and beyond so that they are implementable using 319 funds	IDEM	106	In-house	2014 (ongoing)	2018 (ongoing)	TMDLs on template as described in Goal 1.7	All TMDLs identified in Goal 1.7 written on TMDL-WMP template or modified template as negotiated with U.S. EPA
	b.	Prioritize TMDLs for the next five years to give watershed groups an idea of where TMDLs will be pursued	IDEM	106	In-house	2014	2014	TMDL priorities list	TMDL priorities list prepared
	c.	Link TMDLs with baseline water monitoring projects for Section 319 watershed management planning applications	IDEM	106, 319	In-house/grantees	2014	2018 (ongoing)	TMDL+baseline data collected; TMDL submitted to U.S. EPA	Data collected; data provided to local sponsor preparing WMP
	4.2. Develop guidance for updating watershed management plans.		IDEM	319	In-house	2014	2016	Guidance published for grantees	Progress on guidance development
	4.3. Promote integration of WMPs with local comprehensive plans.		IDEM-WSS	319	In-house	2014	2018 (ongoing)	Widely reported successes	No. of communities where this has been promoted

Goal 4	**Improve Indiana's water quality, including surface and ground water, by reducing NPS pollutants such as nutrients, sediment, and bacteria; restoring aquatic habitats; and establishing flow regimes that mimic natural conditions.**	**Responsible Party**	**Funding Source**	**Subcontractor/ Sponsor**	**FFY Starting**	**FFY Ending**	**Product**	**Measures**
	4.4. Integrate disparate NPS Program databases into one centralized integrated Watershed database to assist with tracking and reporting.							
	a. Develop scope of work for the integrated databases project	IDEM	319	In-house	2014	2015	Scope of work	Progress on scope of work
	b. Hire contractor to work on the project	IDEM	TBD	TBD	2016	2016	Contract	Progress on development
	c. Develop database	IDEM	TBD	IDEM-IS/External contractor	2016	2018	Integrated database	Progress on development
	B. Financial Objectives							
	4.5. Use Section 319 funding to support implementation of WMPs that meet the U.S. EPA's 9 Key Elements of a Watershed Plan (including staff support and outreach as well as the placement of BMPs in critical areas as identified in the WMPs).	IDEM	319	TBD	2014	2018	BMPs; estimated load reductions	At least 50% of state 319 funds allocated to implementation of WMPs; BMPs and estimated load reductions reported in GRTS
	4.6. Repair previously-installed BMPs with the caveats outlined in the program policy.	IDEM	319	Grantees	2014	2018	BMPs	Repaired BMPs will be tracked and reported
	4.7. Continue to leverage LARE and CWI funds to address erosion, sedimentation and nutrient input concerns as long as the General Assembly continues to approve appropriations.	IDEM/ICP	319/LARE/ CWI	SWCDs, Lake associations	2014	2018	BMPs, education/outreach	LARE/CWI funds/BMPs and estimated load reductions will be tracked/reported to U.S. EPA when possible
	C. Technical Objectives							
	4.8. Develop guidance for the identification of critical areas.	IDEM	319	In-house	2014	2014	Guidance published for grantees	Progress on guidance development
	4.9. Show partial or total restoration in at least 5 12-digit watersheds (at least 5 SP12 and 5 WQ-10; watersheds identified may count for both measures) in the five-year cycle 2013-2017.	IDEM	319	In-house	2013	2017	5 Success Stories & 5 Measure Ws reported to U.S. EPA	No. of watersheds reported for success metrics
	4.10. Determine a way to track E. coli load reductions achieved.							
	a. Investigate and adopt a standard method to estimate *E. coli* reductions	IDEM & Region V	319	In-house	2014	2014	Methodology for tracking E. coli reductions	Methodology identified and adopted
	b. Train staff and grantees on the method	IDEM	319	In-house	2015	2015		Staff and grantees are trained
	c. Track implementation of *E. coli* reducing-practices and reductions achieved	IDEM/grantees	319	In-house/grantees	2015	2015	Reductions reported in GRTS	Reductions reported in GRTS
	4.11. Geolocate all BMPs installed through the Section 319 grant program in order to enhance the BMP GIS layer located in the NPS Program.	IDEM	319	In-house	2014	2018 (ongoing)	GIS shapefile/ geodatabase	Percent of BMPs geolocated
	4.12. Solicit for proposals to use Section 319 funding to support implementation of WMPs that meet the U.S. EPA's 9 Key Elements of a Watershed Plan (includes staff support as well as BMPs).	IDEM	319	In-house	2014	2018 (annually)	Solicitation	Proposals are solicited at least annually
	a. Provide financial and technical support to install agricultural BMPs in critical areas identified in the plan	IDEM/ICP	319	TBD	2014	2018 (annually)	BMPs/estimated load reductions in critical areas	BMPs; estimated load reductions input into

Goal 4	Improve Indiana's water quality, including surface and ground water, by reducing NPS pollutants such as nutrients, sediment, and bacteria; restoring aquatic habitats; and establishing flow regimes that mimic natural conditions.		Responsible Party	Funding Source	Subcontractor/ Sponsor	FFY Starting	FFY Ending	Product	Measures
									GRTS
	b.	Provide financial and technical support to install urban and/or residential BMPs in critical areas identified in the plan	IDEM	319	TBD	2014	2018 (annually)	BMPs/estimated load reductions in critical areas	BMPs; estimated load reductions input into GRTS
	c.	Provide financial and technical support to install forestry BMPs in critical areas identified in the plan	IDEM/IDNR – Forestry	319	TBD	2014	2018 (annually)	BMPs/ estimated load reductions in critical areas	BMPs; estimated load reductions input into GRTS
	d.	Provide financial and technical support to install abandoned mine BMPs in critical areas identified in the plan	IDEM/IDNR-DOR	319	TBD	2014	2018 (annually)	BMPs/ estimated load reductions in critical areas	BMPs; estimated load reductions input into GRTS
	e.	Provide financial and technical support to install hydrological and aquatic habitat BMPs in critical areas identified in the plan	IDEM/IDNR-LARE	319	TBD	2014	2018 (annually)	BMPs/ estimated load reductions in critical areas	BMPs; estimated load reductions input into GRTS

Goal 5	**Protect sensitive waters of the state so that they may continue to meet their designated uses.**	**Responsible Party**	**Funding Source**	**Subcontractor/ Sponsor**	**FFY Starting**	**FFY Ending**	**Product**	**Measures**
	A. Programmatic Objectives							
	5.1. Encourage watershed planning activities in watersheds with Category 1 waters (including those waters identified in Table 15 and in subsequent integrated reports).	IDEM	319	In-house	2015	2018 (ongoing)	WMPs	WSS communications with and technical assistance to interested groups in watersheds identified; 319/205j applications from those groups; independent planning and assessment activities by those groups
	5.2. Identify and prioritize for planning watersheds with source water intakes.	IDEM-GW & NPS	319, 106	In-house	2015	2015 – identify 2018 – prioritize (ongoing)	Prioritized list of watersheds	Progress made on list development
	5.3. Participate as requested in Phase II wellhead protection planning.	IDEM-NPS	319	In-house	2014	2018 (ongoing)	Updated WHPPs	% of NPS participation in WHPP activities they are invited to
	5.4. Develop priorities for plans and implementation in watersheds that impact Outstanding State Resource Waters (OSRWs) and waters important for aquatic habitat.	IDEM	319	In-house	2015	2015	Updated 319 grant priorities for OSRWs and waters important for aquatic habitat	Priorities included in solicitation
	B. Financial Objectives							
	5.5. Fund 319-eligible protection strategies identified in critical areas of IDEM-approved9-Elements watershed management plans proposed by Section 319 grant applicants whose implementation applications rank high enough for funding.	IDEM	319	In-house/grantees	2015	2018 (annually)	BMPs	Strategies funded – work with U.S. EPA to track and report
	C. Technical Objectives							
	5.6. Work with IDEM's Ground Water section and watershed groups, as well as CWSRF and Drinking Water SRF, to identify wells in need of proper decommission.	IDEM	319, 106, 212	GW/SRF	2015	2018 (ongoing)	Wells properly decommissioned	No. wells identified for decommission/ no. of wells decommissioned

Adaptive Management

Adaptive management is a cornerstone of the Indiana Nonpoint Source Program. It drives change through the practical application of an open and honest program evaluation. As new tools are developed and inefficiencies are discovered, Indiana Department of Environmental Management (IDEM) adapts its administrative process accordingly. Examples of adaptive management that have taken place over the last five years are:

- Transitioned watershed specialist (WSS) positions to be a WSS/project managers.
- Began baseline monitoring and targeted monitoring.
- Became better integrated with partners at the state level.
- Improved the 319 grant process by revising the application, review criteria, and BMP implementation guidance.

IDEM NPS will evaluate its program annually and report on the status of the goals outlined in this plan. The Nonpoint Source Annual Report will be made available to the public via the IDEM nonpoint source website, http://www.idem.IN.gov/nps/ .

IDEM will work with U.S. Environmental Protection Agency (U.S. EPA) to correct any deficiencies that might become apparent in the program through the Nonpoint Source Annual Report. Where annual milestones prove unachievable, IDEM will seek technical assistance from U.S. EPA to revise those milestones. As goals are completed, they can be moved from the Goals section to the Program Successes section. Though minor programmatic adjustments may be made on an ad hoc basis, IDEM NPS will prepare a thorough update of this plan in 2018.

References

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