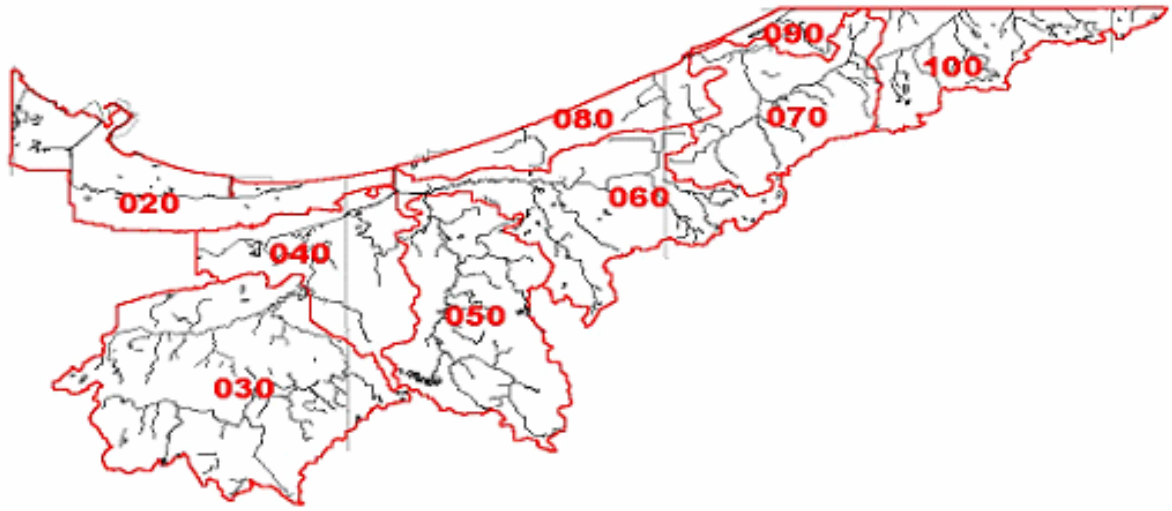
Indiana Coastal Nonpoint Pollution Control Program







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INDIANA
LAKE MICHIGAN
COASTAL PROGRAM

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Indiana Coastal Nonpoint Pollution Control Program

Submitted To:
National Atmospheric Oceanic Administration, Office of Coastal Resource Management
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6217 Workgroup Members

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Chapter 1
Introduction and Boundary Area

A. Overview

This document represents the effort of the Indiana Department of Natural Resources, Indiana Department of Environmental Management, and countless partner organizations to develop a Nonpoint Pollution Control Plan for the Indiana Lake Michigan drainage basin. This chapter provides background information, justification for boundary area selected, and general information on the coastal region.

As a part of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), Congress created a stand-alone provision, Section 6217, which requires that states and territories with approved coastal management programs develop a coastal Nonpoint pollution control program to address water quality impairment of coastal waters. According to Section 6217, the program must be submitted to the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (USEPA) for approval.

According to *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Water* (1993), the purpose of the coastal Nonpoint pollution control program "shall be to develop and implement management measures for Nonpoint source pollution to restore and protect coastal waters, working in close conjunction with other state and local authorities."

The guidance also states that coastal Nonpoint programs are not intended to supplant existing coastal zone management programs and Nonpoint source management programs. Rather, they are to serve as an update and expansion of existing Nonpoint source management programs, and are to be coordinated closely with existing coastal management programs. The legislative history indicates that the central purpose of Section 6217 is to strengthen the links between federal and state coastal zone management and water quality programs, and to enhance state and local efforts to manage land use activities that degrade coastal waters and coastal habitats. The legislative history further indicates that state coastal zone and water quality agencies have a shared responsibility for coastal Nonpoint programs, which is analogous to the sharing of responsibility between NOAA and USEPA at the federal level.

This Coastal Nonpoint Pollution Control Program document identifies the programs and enforceable authorities that Indiana uses to control Nonpoint pollution in each of six Nonpoint source categories, as defined in the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Water*. The six Nonpoint source pollution categories are:

1. **Agriculture**
2. **Forestry**
3. **Urban and Rural Areas**
4. **Marinas**
5. **Hydromodification**
6. **Wetlands, Riparian Areas and Vegetated Treatment Systems**

The *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Water* describes the 55 Nonpoint source management measures that states must address. The six federal Nonpoint source categories and 55 management measures are described in each of the six category chapters of this Coastal Nonpoint Program document. The programs and/or practices that Indiana uses to

address each Nonpoint source category are identified and summarized for each of the federally defined management measures.

Program Development and Approval Guidance provided with the Coastal Nonpoint Pollution Control Program (CNPCP) states in Section III.C.1; a state is allowed to exclude some categories, sub-categories, or sources from the requirements of its coastal Nonpoint program. Under the following two situations, exclusions may be allowed:

(1) If a Nonpoint source category or subcategory is neither present nor reasonably anticipated in the 6217 management area, or

(2) If a state can demonstrate that a category, subcategory, or particular source of Nonpoint pollution does not and is not reasonably expected to, individually or cumulatively, present significant adverse effects to living coastal resources or human health.

Moreover, as NOAA and USEPA assert in their "Final Administrative Changes to the CNPCP Guidance," states may focus resources on preventing and controlling significant impacts of Nonpoint source pollution on coastal resources. In addition, NOAA and USEPA encourage coordination and integration of coastal Nonpoint programs with other programs and water quality initiatives to establish priorities and develop strategies to meet CZARA 6217 program requirements.

In developing its CNPCP, Indiana intends to address all categories of Nonpoint source pollution that currently do or may in the future present significant adverse effects to its coastal waters. However, Indiana will exclude those that do not and are not reasonably expected, individually or cumulatively, to present significant adverse effects to living coastal resources or human health.

It is in keeping with this guidance that the Indiana CNPCP seeks full exclusion for eleven of the fifty-five management measures. Indiana proposes to exclude one agricultural and all forestry measures as follows:

1) Agricultural Irrigation,
2) Pre-harvest Planning Management Measure,
3) Streamside Management Areas (SMAs),
4) Road Construction/Reconstruction Management Measure,
5) Road Management,
6) Timber Harvesting,
7) Site Preparation and Forest Regeneration Management Measure,
8) Fire Management,
9) Revegetation of Disturbed Areas,
10) Forest Chemical Management, and
11) Wetlands Forest.

Justifications for each of these exclusions are presented in the appropriate chapter and are based upon the *Program Development and Approval Guidance* provided with the Coastal Nonpoint Pollution Control Program (CNPCP) states in Section III.C.1

The following chapters provide an in-depth review of the remaining non-excluded management measures and an overview of how the state intends to meet the requirements of each in turn. It is important to note that this document contains the framework for implementing the Section 6217 requirements. Specific details regarding implementable actions and timelines will be included in the 15 year strategy and 5 year implementation document. Each of the six Nonpoint pollution categories is addressed in Chapters two through seven. The general format for each chapter is presented as follows (there is some variation per chapter due to intrinsic difference among topics).

General Chapter Structure

A. Introduction
B. Potential Sources of Nonpoint pollution in Indiana's coastal watershed:
    1. Issue Area *(all applicable issue areas are addressed and discussed)*

C. Chapter specific management measures implemented in Indiana's coastal watershed
    1. Management Measure *(format applies to all management measures)*
        a. Definition
        b. Applicability
        c. Existing programs or practices and lead agencies (reference table)
        d. Enforcement Mechanisms

D. Coordination Methods

E. Goals and objectives for Chapter
    1. Introduction
    2. Goals
        a. Description
    3. Reference Table
        a. Objectives,
        b. Measure of success
        c. Resources needed
        d. Responsible organization
        e. Implementation timeframe

B. Nonpoint Source Pollution – Defined

As stated in the *6217(g) Guidance*[1] document Nonpoint source pollution generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage, or hydrologic modification. Technically, the term "Nonpoint source" is defined to mean any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the Clean Water Act. That definition states: *The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.* This term does not include agricultural storm water discharges and return flows from irrigated agriculture. Although diffuse runoff is generally treated as Nonpoint source pollution, runoff that enters and is discharged from conveyances such as those described above is treated as a point source discharge and hence is subject to the permit requirements of the Clean Water Act. In contrast, Nonpoint sources are not subject to Federal permit requirements. The distinction between Nonpoint sources and diffuse point sources is sometimes unclear. Therefore, at several points in the *6217g Guidance* document, EPA provides detailed discussions to help the reader discern whether a particular source is a point source or a Nonpoint source. Nonpoint pollution is the pollution of our nation's waters caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural pollutants and pollutants resulting from human activity, finally depositing them into lakes, rivers, wetlands, coastal

[1] Document available at: http://www.epa.gov/owow/nps/MMGI/

waters, and ground waters. In addition, hydrologic modification is a form of Nonpoint source pollution that often adversely affects the biological and physical integrity of surface waters.[2]

Significant Non-point Sources

The nature and type of pollutants varies depending on the source. Runoff resulting from construction, agricultural practices and sewer overflow introduce sediments and nutrients into waterways, while road runoff introduces salts, hydrocarbons and a variety of metals – in particular copper and lead. Industrial sources are among the most diversified pollution sources. Particularly problematic industrial pollutants include phenols (in particular PCB's), ammonia, phosphorous, metals and metallic compounds as well as hydrocarbons – including greases, oils, tars and assorted fuels.[3]

One of the more subtle forms of pollution is thermal pollution. This is particularly problematic in urban areas where pavement, roofing materials and other heat-absorbing surfaces compose a significant portion of the landscape. Power plants can also add significantly to thermal pollution of waterways. This is particularly relevant for the Little Calumet's watershed since there are several such facilities within this area.

Contaminated river sediments are an additional and particularly troubling source of pollutants. Even if all point and non-point pollution sources could be controlled, contamination from sediments would continue to migrate into the water-column. It is estimated that the Grand Calumet River and the Indiana Harbor and Ship Canal contain between four and five million cubic yards of contaminated sediments. Of these sediments, approximately 150,000 cubic yards migrate into the southern end of Lake Michigan annually (NRC, DNR, 2000).

C. Partners in Nonpoint Source Pollution Control

State enforceable authorities (statutes, rules and operation orders) are summarized in tables for each Nonpoint source category. In addition, all of the authorities cited in this document are listed in Appendix C. Programs and Associated Authorities.

Indiana's control of Nonpoint source pollution is achieved through a combination of federal, state, regional and local government programs and authorities. State agencies include the Indiana DNR, Indiana Department of Environmental Management, and the Indiana departments of Health (ISDH) and Transportation (INDOT). Nonpoint source pollution control efforts at the local level are the responsibility of the local units of government that are involved in health, highways, land use, local water planning, planning and zoning, and soil and water conservation. In addition, the Northwestern Indiana Regional Planning Commission participates as a Regional partner.

The approach used by these various federal, state, regional and local entities ranges from strong regulatory measures, to voluntary best management practices, to education. State enforceable authorities (statutes, rules and operation orders) are summarized in tables for each Nonpoint source category.

D. Coastal Polluted Runoff Program Boundary Area

The primary purpose of the Coastal Nonpoint Control Program is to restore and protect Indiana's coastal waters. The term, coastal waters, in Indiana refers to the lakes, rivers, and wetlands that drain into the Great Lakes. Indiana's coastal waters drain to both Lake Michigan and Lake Erie. However, Indiana's

[2] Information taken from *6217 (g) Guidance* at: http://www.epa.gov/owow/nps/MMGI/

[3] Information taken from *Watershed Diagnostic Study of the Little Calumet-Galien Watershed*, Applied Ecologic Services Inc., 2001

Coastal Nonpoint Pollution Control Program only includes the southern portion of Lake Michigan. The following information presented in Sections 1-5 is presented for background information. The rationale for the proposed CNPCP boundary is presented in Section 6.

1. Indiana's Coastal Waters

"Watershed boundaries are defined by the topographic features that dictate natural drainage patterns within an area."[4] A watershed perspective provides a comprehensive approach to managing natural resources that focuses on producing environmental results while incorporating the communities that depend on those natural resources. Proponents of the watershed approach also highlight its potential to improve government coordination and streamlining. "The approach can result in cost savings by leveraging and building upon the financial resources and the willingness of the people with interests in the watershed to take action. Through improved communication and coordination the watershed approach can reduce costly duplication of efforts and conflicting actions."[5]

The U.S. Geological Survey has defined watersheds of the United States by using a hierarchical classification of hydrologic drainage basins. The classification includes river basins (4 digit accounting units), sub-basins (8 digit cataloging units), and 14 digit hydrologic units, which are the smallest administrative unit available. Each hydrologic unit is identified by a unique code.

Indiana's coastal waters fall into Region 04, the Great Lakes Region. Three river basins are included in Indiana's Great Lakes Region: the Calumet River (0404), St. Joseph River (0405), and the Maumee River (0410) basins (Figure 1.1).

This large region is further divided into the following Great Lakes watersheds in Indiana:

- Calumet-Galien, 0404001
- St. Joseph-Lake Michigan, 04050001
- St. Joseph- Maumee, 04100003
- Upper Maumee, 04100005
- Auglaize, 04100007
- St. Mary's, 04100004

[4] Coastal America. January 1994. Toward a Watershed Approach" A Framework for Aquatic Ecosystem Restoration, Protection, and Management.
[5] U.S. Environmental Protection Agency, Office of Water. Watershed Approach Framework. http://www.epa.gov/OWOW/watershed/framework.html#2

Figure 1-1: 8 digit watersheds in Indiana

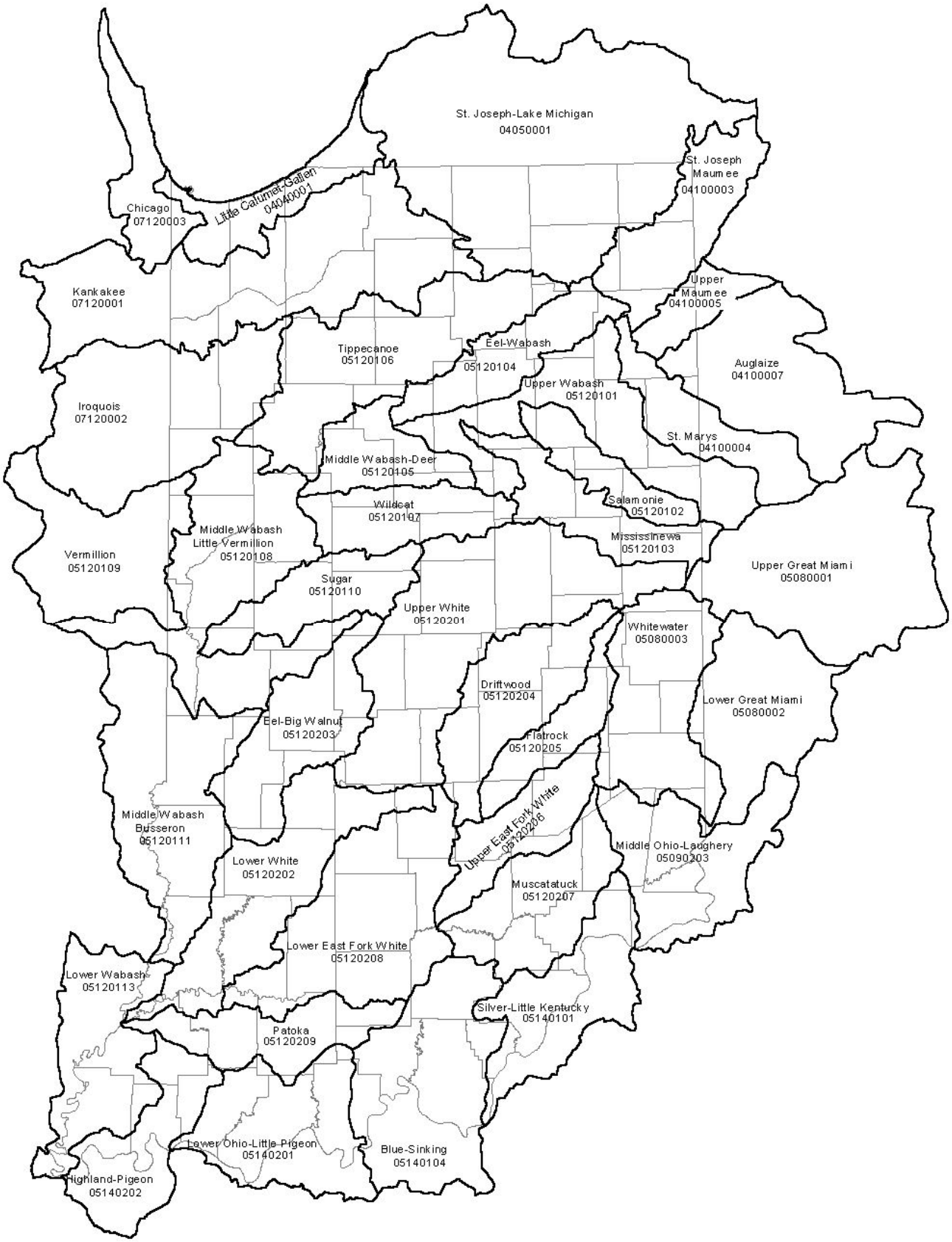
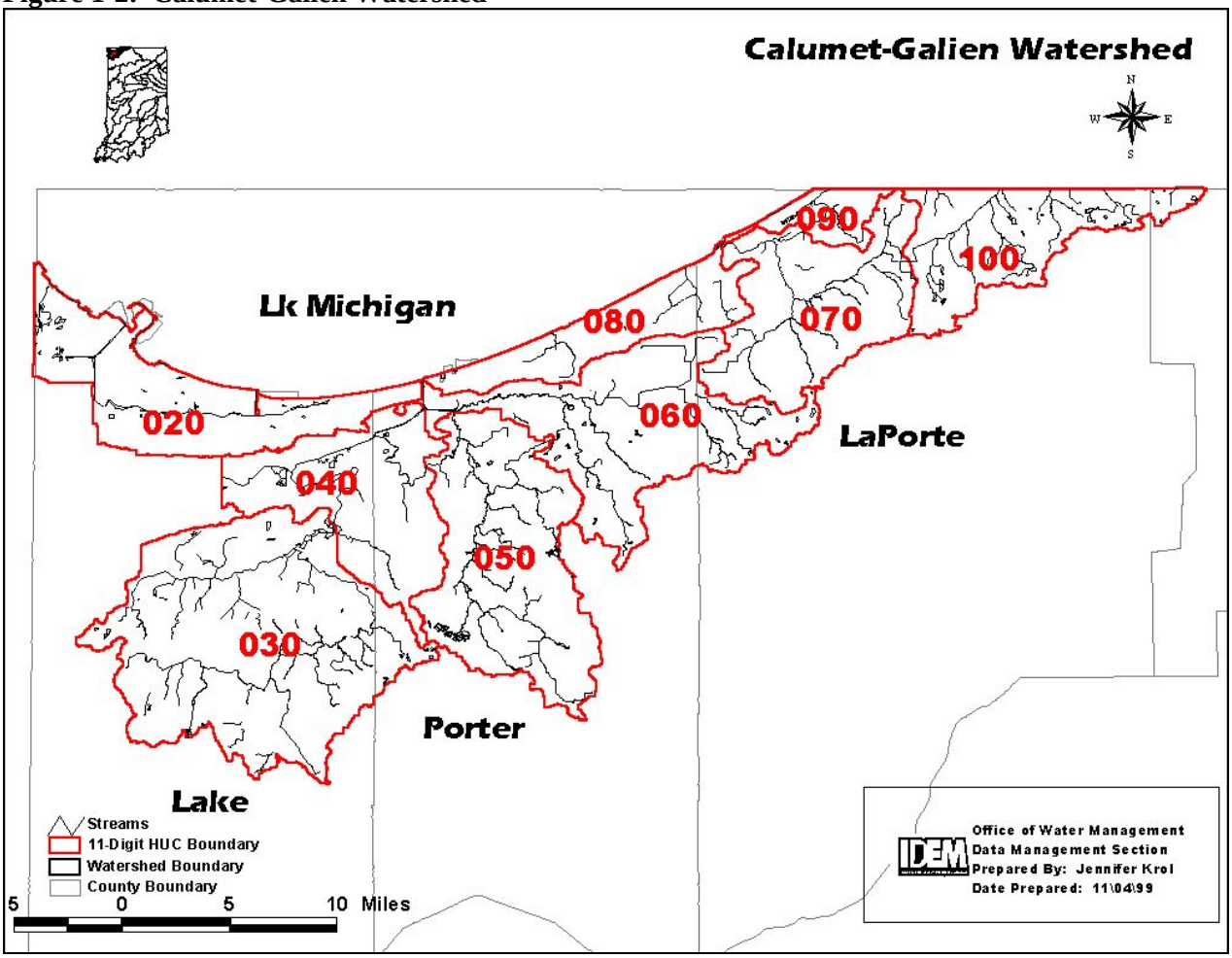


Figure 1-2: Calumet-Galien Watershed



2. Calumet River Basin

The boundary for the Indiana Coastal Nonpoint Pollution Control Program includes those counties adjacent to LaPorte County Indiana and the Calumet River basin. Approximately 80% of the Calumet River basin drains directly into the Indiana portion of Lake Michigan. The remaining portion of the Calumet River basin drains either into Illinois or Michigan. Most of the streamflow leaving Indiana to enter Michigan eventually reaches Lake Michigan. However, little if any, of the streamflow entering Illinois reaches Lake Michigan; instead, it is diverted to the Mississippi River basin. The Calumet River basin drains 604 square miles in Indiana and includes portions of Lake, Porter, and LaPorte Counties.[6]

The Grand Calumet River, Little Calumet River, Trail Creek, and the Galena River form the principle drainage network in the Calumet River basin.[7] The present hydrology of Lake Michigan coastal area in Indiana is significantly changed from what existed before development. The industrialization and urbanization, which began in northwest Indiana during the late nineteenth century extensively, altered the natural landscape and drainage patterns.

[6] State of Indiana, DNR, Division of Water 1994. Water Resource Availability in the Lake Michigan Region, Indiana; pp 2-3.
[7] State of Indiana, DNR, Division of Water 1994. Water Resource Availability in the Lake Michigan Region, Indiana; p. 59.

Today, the Grand Calumet River begins at the Marquette Park lagoons and flows west to the Indiana Harbor Ship Canal. The majority of streamflow from the east enters the Indiana Harbor Ship Canal and flows to Lake Michigan. West of the Indiana Harbor Ship Canal, the Grand Calumet River flows west into Illinois where it joins the Little Calumet River.

The Little Calumet River is divided into the East and West Arms. The East Arm of the Little Calumet River begins in Coolspring Township in LaPorte County and flows west to Porter County and the Portage Burns Waterway. Excavation of Burns Waterway in 1926 caused flow from the eastern part of the Little Calumet River to be diverted directly into Lake Michigan. The excavation of Hart Ditch in Lake County altered the West Arm of the Little Calumet River. The streamflow of the West Arm of the Little Calumet River diverges at Hart Ditch. Part of the Little Calumet River flows east from Hart Ditch to Burns Ditch where it flows north through Portage Burns Waterway into Lake Michigan. The remaining portion of the West Arm of the Little Calumet River flows west from Hart Ditch into Illinois. In Illinois, the Little Calumet River is diverted to the Mississippi River basin.

Trail Creek is also divided into two branches. The East Branch begins in Springfield Township and flows west to Michigan City where it joins the West Branch. The West Branch begins in Coolspring Township and flows northeast to Michigan City. The combined branches of Trail Creek then flow north into Lake Michigan. The mouth of Trail Creek was dredged to create a harbor and federal navigation channel used from 1836 to 1910.

The Galena River begins in Springfield Township in LaPorte County and flows northeast into Michigan. The Galena River in Indiana has not been significantly impacted by human influence.

3. Diverted Chicago Watershed

Figure 1-3: Chicago Watershed

Indiana's Lake Michigan watershed was historically altered during settlement so that a portion of the watershed draining to Lake Michigan was redirected to the Mississippi drainage basin. The portion of the watershed altered is now defined by the U.S. Geological Survey as the Chicago watershed, 07120003 (See Figure 1.3 for reference).

The historical drainage alteration projects in Indiana involved the Calumet- Galien watershed. In 1850, Hart Ditch was excavated from the town of Dyer to a site near Munster to improve local drainage. This diverted flow from the Little Calumet River to the Upper Plum Creek basin in Illinois. In 1922, the Calumet Sag Channel in Illinois was constructed. This new channel diverted runoff from part of the Little Calumet River watershed out of the Lake Michigan drainage basin and into the Mississippi River basin.

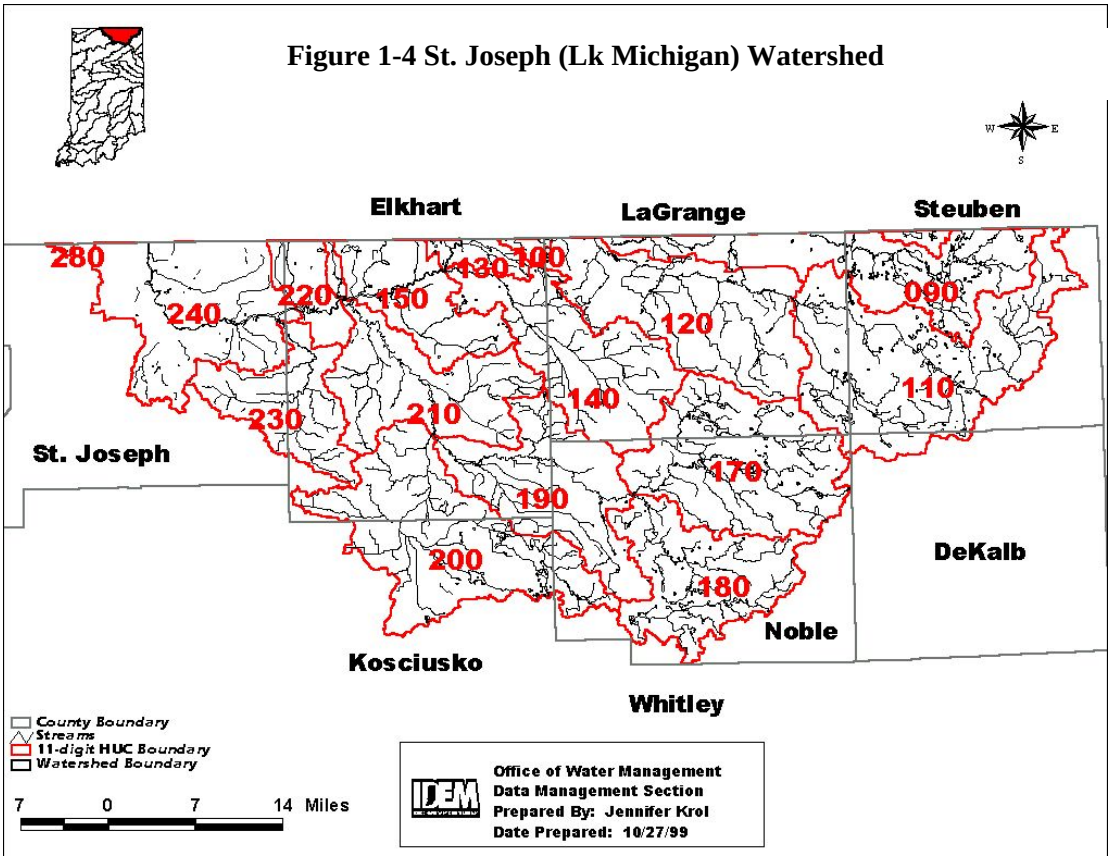
Similar construction projects affected the Grand Calumet River. In 1862, the Calumet Feeder Canal was constructed. This canal diverted the Grand Calumet River flow west into the Illinois and Michigan Canal and into the Mississippi River basin. Although these portions of the Little Calumet and Grand Calumet Rivers were once part of the Calumet-Galien Watershed, the man-made flow diversions have removed them from the U.S. Geological Survey's classification, which is based on surface drainage patterns.

Indiana's Great Lakes watersheds are connected to waters of Illinois, Michigan and Ohio. Illinois does not currently participate in the federal Coastal Zone Management Program. Both Michigan and Ohio developed programs to address coastal polluted runoff in their states. The Michigan Coastal Management Program only includes their portion of the Calumet River Basin in their coastal polluted runoff program.

4. St. Joseph River Basin – Lake Michigan Watershed

The St. Joseph River basin drains 1,699 square miles in Indiana and includes portions of Dekalb, Elkhart, Kosciusko, LaGrange, Noble, St. Joseph, and Steuben Counties.[8] Indiana's drainage area represents approximately 40% of the entire basin. Streamflow originates in Michigan, flows through Indiana, then re-enters Michigan and flows into Lake Michigan (See Figure 1.4).

Figure 1-4 St. Joseph (Lk Michigan) Watershed



The principal drainage network in the St. Joseph River basin is formed by the St. Joseph River, Elkhart River, and Pigeon River. The St. Joseph River begins in Hillsdale, Michigan and flows generally to the southwest. In South Bend, Indiana, the river turns abruptly northward, and then flows toward the northwest until it empties into Lake Michigan near Benton Harbor, Michigan. Approximately 41 miles of the St. Joseph River main stem lies in Indiana.

The chief tributary of the St. Joseph River in Indiana is the Elkhart River. The North and South Branches of the Elkhart River come together in Elkhart Township. The Elkhart River then flows generally northwest to the city of Elkhart where it joins the St. Joseph River. The Elkhart River, including the North and South Branches, drains approximately 1,090 square miles in Indiana.[9]

Pigeon River begins in Greenfield Township in LaGrange County. It flows generally northwest through LaGrange County into Michigan where it joins the St. Joseph River. The Pigeon River drains approximately 374 square miles in Indiana.[10]

[8] State of Indiana, DNR, Division of Water 1987. Water Resource Availability in the St. Joseph River Basin, Indiana; p21.
[9] State of Indiana, DNR, Division of Water, 1987. Water Resource Availability in the St. Joseph River Basin, Indiana; p21.
[10] State of Indiana, DNR, Division of Water, 1987. Water Resource Availability in the St. Joseph River Basin, Indiana; p21.

Figure 1-5: St. Joseph- Maumee Watershed

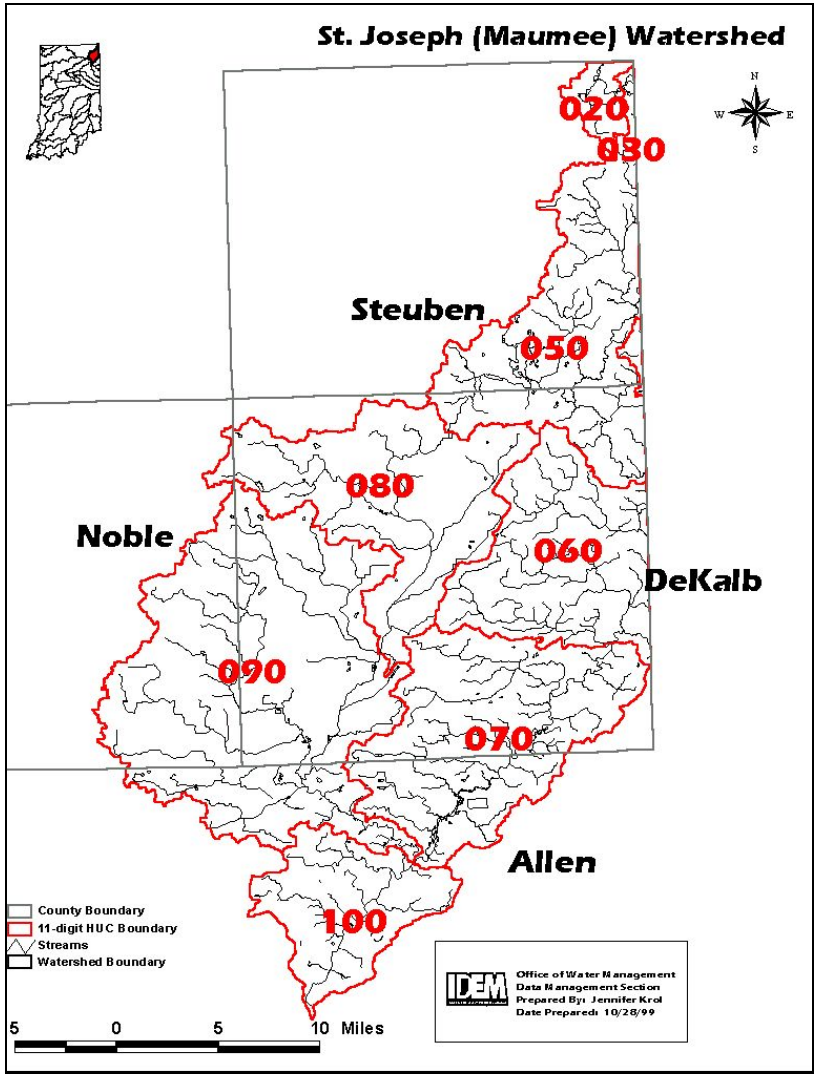
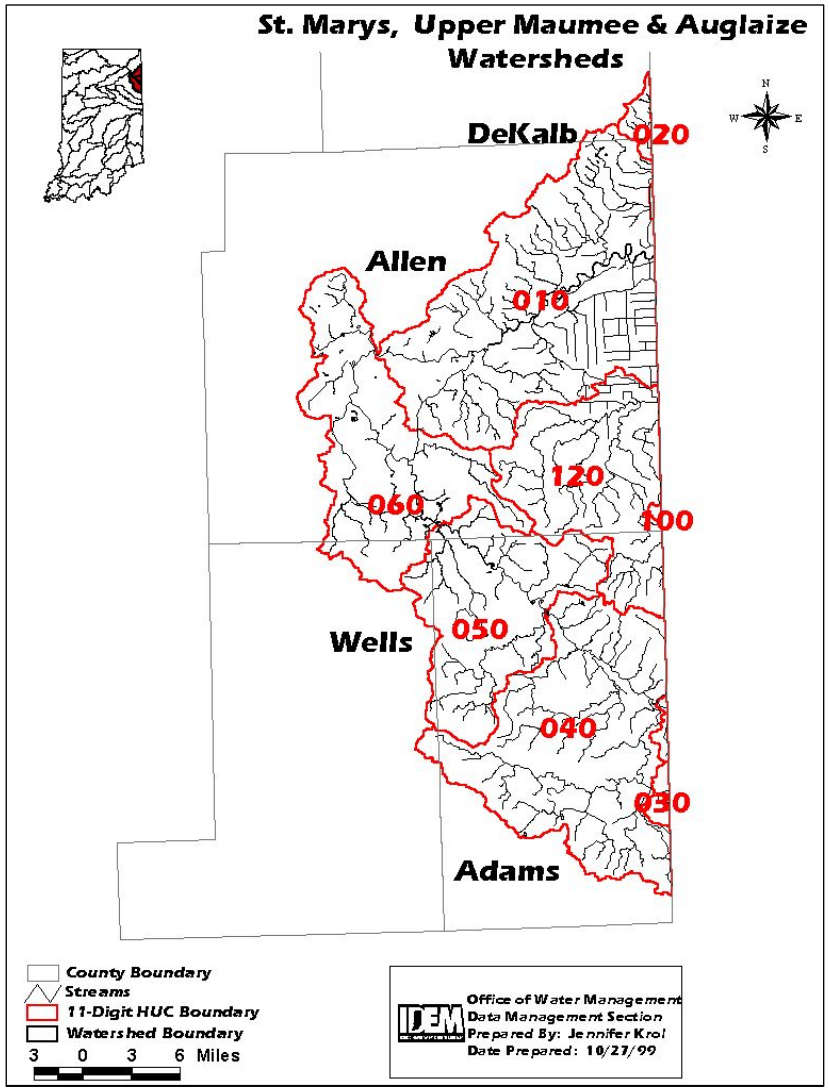


Figure 1-6: St. Mary's, Upper Maumee, and Auglaize Watersheds



5. Maumee River Basin

The boundary for the Ohio coastal polluted runoff program includes those counties adjacent to northeast Indiana (see Figure 1-8). Streamflow from Indiana's Maumee River basin enters the state of Ohio and eventually reaches Lake Erie. Indiana's Maumee River basin is approximately 1,283 square miles and includes portions of Adams, Allen, Dekalb, Noble, Steuben, and Wells Counties.[11] The Indiana portion of the Maumee River basin represents 19.4% of the entire basin, which spans Michigan, Indiana, and Ohio.

The St. Joseph River, the St. Mary's River, and the Maumee River form the principal drainage network in the Maumee River basin. The St. Joseph River originates near Hillsdale, Michigan, flows southwest and enters Indiana from Ohio, northeast of Fort Wayne. The St. Joseph River has a drainage area of 3,183 square miles in Indiana.[12] The St. Mary's River originates near New Bremen, Ohio and flows northwest to Fort Wayne, Indiana. The St. Mary's River has a drainage area of 1,383 square miles in Indiana.[13] At Fort Wayne, these two rivers join to form the Maumee River. The Maumee River then travels northeast approximately 134 miles to Maumee Bay, a 15 square mile embayment of western Lake Erie[14]. The Maumee River has a drainage area of 1,967 square miles in Indiana.[15]

[11] State of Indiana, DNR, Division of Water 1996. Water Resource Availability in the Maumee River Basin, Indiana; p3.
[12] State of Indiana, DNR, Division of Water, 1996. Water Resource Availability in the Maumee River Basin, Indiana; p92.
[13] State of Indiana, DNR, Division of Water, 1996. Water Resource Availability in the Maumee River Basin, Indiana; p92.
[14] State of Indiana, DNR, Division of Water. 1996. Water Resource Availability in the Maumee River Basin, Indiana; p. 69.
[15] State of Indiana, DNR, Division of Water, 1996. Water Resource Availability in the Maumee River Basin, Indiana; p. 92.

Figure 1-7: Michigan Coastal Nonpoint Program Boundary

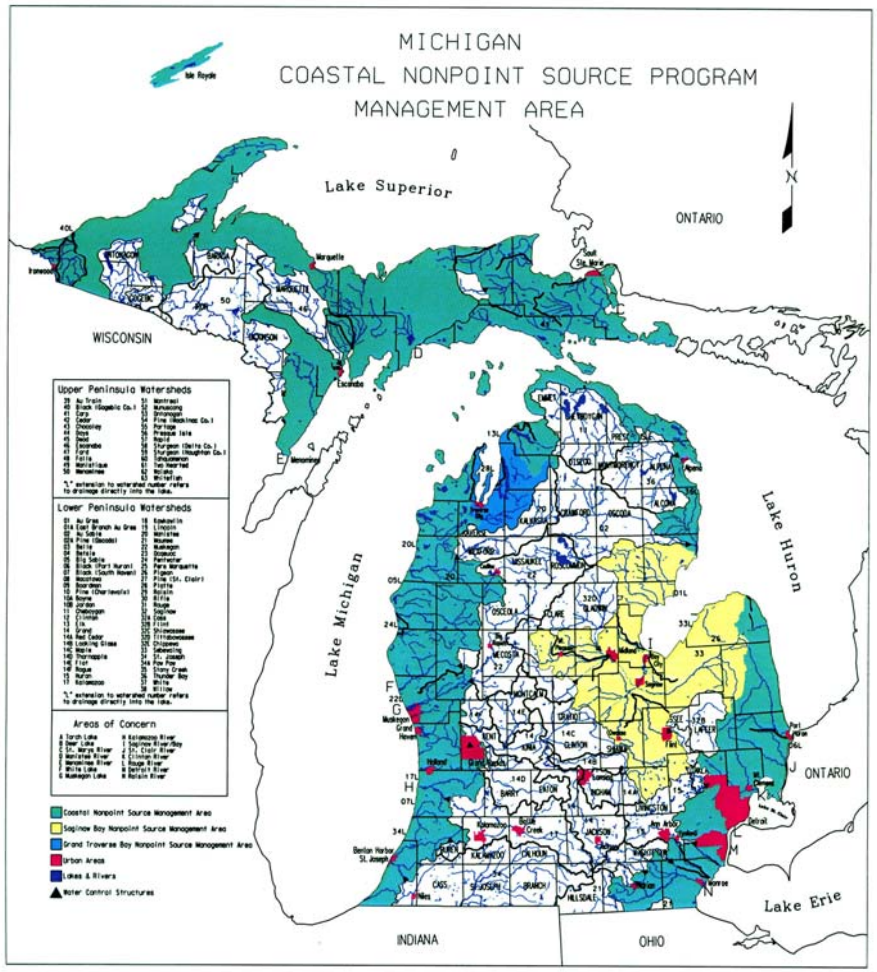


Figure 1-8: Ohio Coastal Nonpoint Program Boundary

6. Proposed Indiana Coastal Nonpoint Pollution Program Boundary

To successfully restore and protect Indiana's coastal waters, the Coastal Nonpoint Pollution Program (CNPCP) will address Nonpoint source pollution in areas that have the potential to significantly impact Indiana's coastal waters. There are approximately 241 square miles of southern Lake Michigan in the State of Indiana. The Calumet River basin is the primary basin affecting Indiana's potion of the Lake Michigan Coast. The majority of the St. Joseph River basin drainage area lies in Michigan. The Maumee River basin is hydrologically connected to western Lake Erie, which lies in the State of Ohio.

Based on the hydrology in each of the coastal watersheds, the Calumet-Galien Watershed has the greatest impact on Indiana's coastal waters. The Lake Michigan Coastal Program also developed program boundaries based on this watershed. Therefore, to most effectively restore and protect Indiana's portion of Lake Michigan, the Indiana Coastal Nonpoint Pollution Program will focus its efforts in the Calumet-Galien watershed. The State's Nonpoint Pollution Control Plan administered by the Indiana Department of Environmental Management includes all the waters of the state. Thus, although the Indiana Coastal Nonpoint Polluted Runoff Program does not include the St. Joseph or Maumee River, those watersheds are included in the State Nonpoint Management Plan.

E. Coastal Nonpoint Pollution Area Background Information

Much of the following description of the Lake Michigan region comes from the *Combined Coastal Program Document and Final Environmental Impact Statement for the State of Indiana*. The *CCPD-FEIS* contains complete citations for the references listed below, and is available on the Internet at: http://www.in.gov/dnr/lakemich/pdf/lmcp-feis.pdf

1. Land Use of the Region

The Indiana Coastal Nonpoint Pollution area is a mosaic of land uses. The region contains the only National Park property bordered on either side by a steel mill, petroleum tank farms adjacent to residential areas, abandoned industrial sites, and a multitude of transportation infrastructure. See Figure 1.10 for a visual depiction of the location of these land uses through the CNPCP area and Figure 1.11 for the location of 303 d impaired waterways and adjacent land uses. These categories can be generalized into four main groups for the purpose of this document: Agronomic (118,489 ac 35%), Urban (82,601 ac 24%), Natural Areas (141,862 ac 41%), and Other (97 ac <0%) (See Figure 1.9 for more details).

Of the Natural Areas acreage, Indiana Dunes National Lakeshore accounts for 15,060 acres. In addition, Indiana Dunes State Park accounts for 2,182 acres. City and local park departments account for an untold number of acreage of natural area. More detailed information regarding the remaining land uses are presented in the following chapters.

Figure 1-9: Land Use Categories and Acreage

NLCD Class	Description	Total Acres	Percentage
11	Open Water	6,600	1.92%
21	Low Intensity Residential	21,923	6.39%
22	High Intensity Residential	23,423	6.83%
23	Commercial/Transportation/Industrial	26,938	7.85%
31	Bare Rock/Sand	817	0.24%
32	Quarries/Strip Mines/Gravel	97	0.03%
41	Deciduous Forest	64,634	18.84%
42	Evergreen Forest	24,798	7.23%
43	Mixed Forest	2,911	0.85%
51	Scrubland	534	0.16%
71	Natural Grasslands	13,988	4.08%
81	Pasture/Hay	42,538	12.40%
82	Row Crops	75,770	22.09%
83	Small Grains	190	0.06%
85	Other Grasslands (Maintained)	10,317	3.01%
91	Woody Wetlands	19,380	5.65%
92	Emergent Herbaceous Wetlands	8,200	2.39%
	Total Acres	343,058	
	Total Acres in Watershed	343,124	
	Acres Not Accounted For	66	

Source: MRLC National Land Cover Data 2001

Figure 1-10: Land Uses in CNPCP Boundary

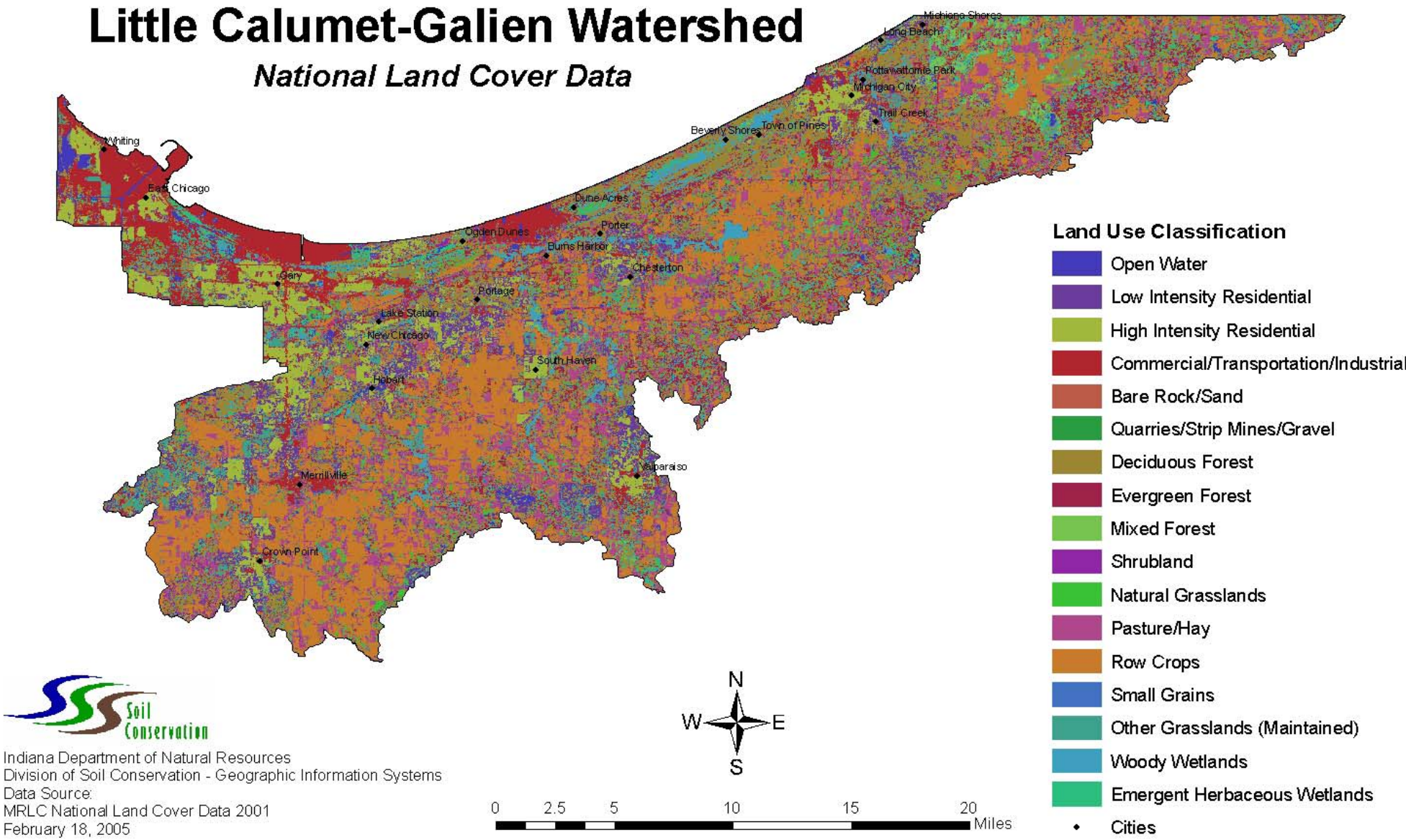
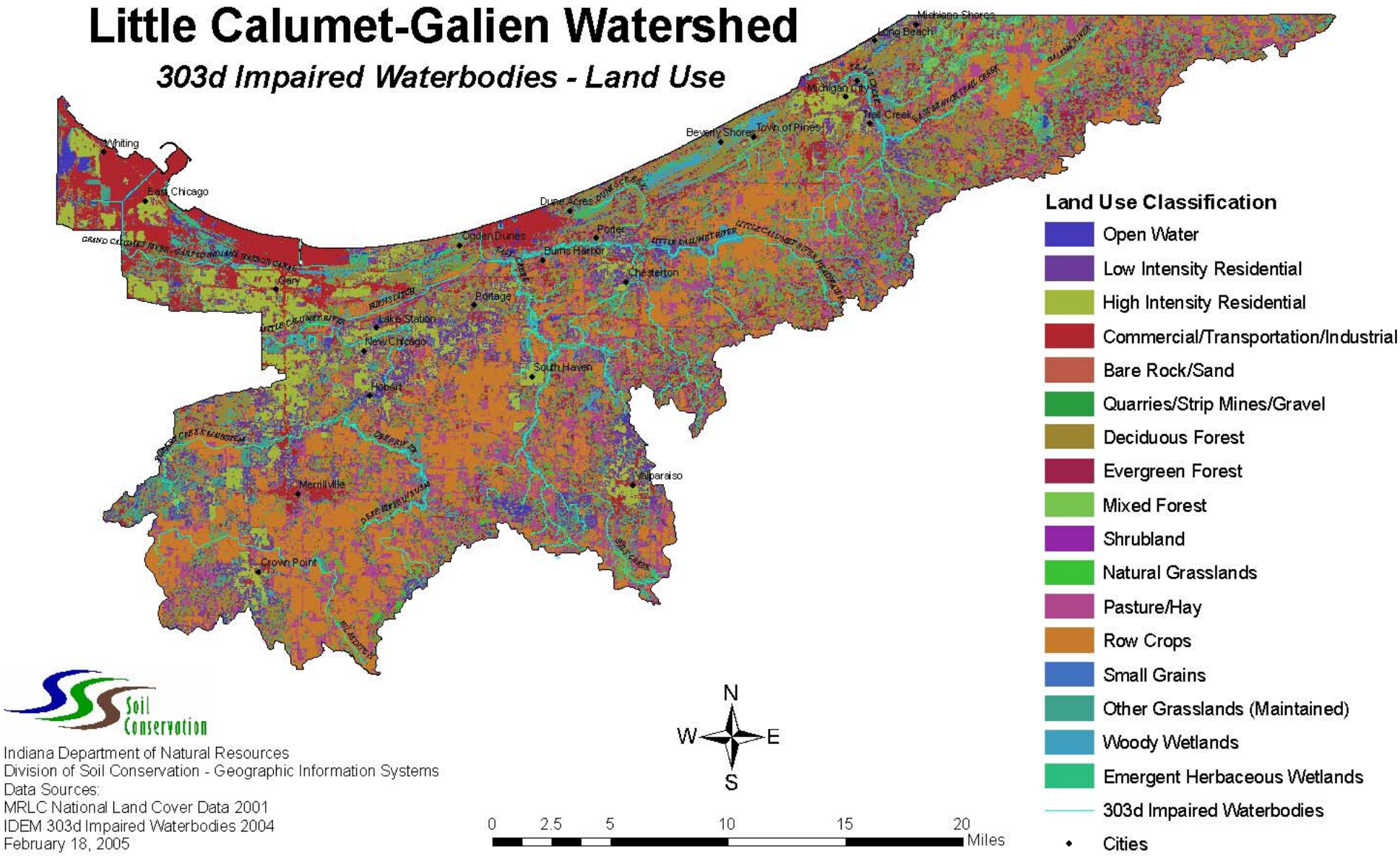


Figure 1-11: Land uses and 303(d) Impaired Waterways



2. Climate

Lake Michigan, the second largest of the Great Lakes, is the only Great Lake entirely within the United States. However, because of movement of fish between Lake Michigan and Lake Huron and of its discharge to Lake Huron, Lake Michigan is important internationally. Lake Michigan is 307 miles (494 km) in length and 118 miles (190 km) in width. With an average depth of 279 feet (85 m), Lake Michigan holds 1,185 cubic miles (4,920 cubic km) of water with a retention time of 99 years. The temperate southern basin spans Illinois, Indiana, and Michigan and contains highly urbanized areas. Indiana borders 45 miles (72.5 kilometers) of Lake Michigan's southern basin. The southern basin is relatively smooth with a contour sloping to a maximum depth of approximately 558 feet (170 m).

The presence of Lake Michigan alters the local climate in northwest Indiana. Although modifications of climate are most pronounced within a mile or two of the shore, several lake-effect features extend about 25 miles (15.5 km) inland. The lake significantly influences the entire Lake Michigan region in Indiana.

Compared to areas of similar latitude, Northwest Indiana can experience warmer falls, cooler springs, higher humidity; increased fogs, winter cloudiness, and higher snow fall. The most critical factor producing these climate modifications is the slower change of the lake's surface water temperature relative to the change of the adjacent land's surface temperature. The normal annual ambient temperature averages 50° Fahrenheit (10° C). Normal seasonal temperature averages 49° Fahrenheit (9.5 C) in spring, 72° Fahrenheit in summer (22° C), 54° in autumn (12° C) and 27° in winter (-2.7 C).

3. Geology and Soils

The geology and soils of the Lake Michigan drainage basin were created during the late Pleistocene and Holocene Epochs. "During the Pleistocene Epoch, the continental glaciers repeatedly advanced over the Great Lakes region from the north. The first glacier began to advance more than a million years ago. As they inched forward, the glaciers, up to 6,500 ft (2,000 m) thick, scoured the surface of the earth, leveled hills, and altered forever the previous ecosystem." As the glaciers retreated, sand, silt, clay and boulders were deposited and large volumes of meltwater formed glacial lakes.

Malott (1922) divided Indiana into nine physiographic regions according to topography and the effect of glaciers on the landscape. The Lake Michigan Region lies within the extreme northwestern part of the Northern Lake and Moraine Region and includes the northern part of the Valparaiso Morainal Area and the entire Calumet Lacustrine Plain. During the late Wisconsin Age, ancestral Lake Michigan advanced across the coastal region. The glacial ice retreat of about 12,000 years ago, and fluctuating lake levels in combination with wind and wave actions contributed to the formation of the physiography of the coastal area.

The Valparaiso Moraine is the oldest end moraine in the Lake Michigan Region. As ancestral Lake Michigan advanced across the region, the Valparaiso Moraine formed along the limits of the glacial ice. The crest of the moraine forms most of the drainage divide between the Kankakee River Basin to the south and the Lake Michigan Region to the north.

The Calumet Lacustrine Plain lies between the Valparaiso Morainal Area and Lake Michigan. The plain ranges in elevation from about 580 feet (177 m) at the present shoreline to as much as 760 feet (232 m) above mean sea level (m.s.l.) at dune-capped beach ridges. The Indiana Dunes National Lakeshore and the Indiana Dunes State Park in northern Porter County, areas where the physiography is relatively

unaltered, served as research sites where data was collected on the major physiographic features in the Calumet Lacustrine Plain.

The Calumet Lacustrine Plain consists of a topography referred to as ridge and swale; this topography is characterized as relict dune-capped beach ridges separated by extensive interridge marshes. Three relict beach ridges mark semi-stable shorelines of ancestral Lake Michigan during its late Pleistocene and Holocene history. The Glenwood Beach, Calumet Beach and Toleston Beach occur within the Calumet Lacustrine Plain.

The Glenwood Beach is a relict beach that occurs on the lakeward side of the Valparaiso Moraine. Although the beach complex is a discontinuous ridge, Glenwood Beach is the highest dune and beach complex in the Lake Michigan region. The crest of the dune and beach complex has an average elevation of about 650 feet (198 m) above m.s.l.

The Calumet Beach is adjacent to the Glenwood Beach, on its lakeward side. However, it truncates Glenwood Beach near the town of Tremont in Porter County. Dune-capped areas of the Calumet Beach have an average elevation of about 630 feet (192 m) above m.s.l. and the foreshore deposits have an average elevation of 607 feet (185 m) above m.s.l. Calumet Beach deposits consist of dune sediments overlying beach and nearshore sediments.

Closest to Lake Michigan and therefore the youngest dune and beach complex is the Toleston Beach. The landward part of this complex consists of linear ridges of fused cone-shaped or parabolic dunes separated by interdunal wetlands, and the lakeward portion is comprised of large dome-shaped and small parabolic dunes, as well as over 150 beach ridges in its western part. Elevations at the top of large domal dunes are as much as 750 feet (229 m) above m.s.l. Foreshore, upper shoreface and back-barrier lacustrine deposits occur in the internal core of the complex. The top of the foreshore sequence of the Toleston Beach ranges from 597 to 603 feet (182 m to 184 m) above m.s.l. Modification of the Toleston Beach is still occurring in the eastern part of the region because of the reorientation of dominant wind direction across Lake Michigan.

Today, the lakebed of southern Lake Michigan begins at the shoreline with sand. Gravel occurs from 50 to 100 feet deep and in the deep parts of the lake, mud predominates. The Calumet Lacustrine Plain has many wetlands that occur in the swales between beach ridges. In addition to wetlands formed due to a gentle relief, wetlands formed in wide floodplains and as temporary ponds.

4. Lakes

Many fresh water lakes lie within the Lake Michigan region. Lakes were formed through depressions carved by the glaciers, buried glacial ice, inter-ridge swale depressions, isolation of old river channels that became oxbow lakes, and artificially created pits and impoundments. The two largest artificial impoundments in the coastal region are Lake George in Hobart and Lake Louise in west Central Porter County. "An unknown number of lakes in the region have been totally destroyed or greatly diminished in size by drainage or infilling." Three lakes were known to exist at the western edge of the Calumet lacustrine plain, Wolf, George, and Berry Lakes.

Only Wolf Lake remains primarily intact today. Wolf Lake once flowed north into Lake Michigan. Many early accounts of the lake prior to extensive settlement describe a haven of wildlife and natural beauty. Wolf Lake today consists of seven interconnected, artificially divided basins with their center along the Indiana-Illinois state line. The lake has a surface area of approximately 385 acres and a maximum depth of approximately eight feet. The City of Hammond owns the majority of Indiana's Wolf Lake shoreline,

which supports a city beach and park. Also in Hammond is George Lake. Once a much larger lake, George Lake is now a 78-acre shallow lake, having a maximum depth of approximately 12 feet.

An important oxbow lake is located at Kennedy Park in Hammond. This lake was formally part of the Little Calumet River and formed when a loop of the river was levied and excavated. The levee separated the lake from the river and a small culvert connects both bodies of water at normal water levels. Lagoons were also formed by modification of the Grand Calumet River. Marquette Park Lagoons, once the mouth of the Grant Calumet River, is a 25.6-acre lake partially owned by the City of Gary and by the Indiana Dunes National Lakeshore. Marquette Park Lagoons are divided into two basins. The western lagoon is located partially on U.S. Steel property. This lagoon is connected to Marquette Park by a shallow channel.

Impoundments have been created at Lake George in Hobart and Lake Louise near Valparaiso. Lake George is an impoundment of the Deep River originally created to power a gristmill. It is the largest lake in the region with a surface area of approximately 270 acres. Lake Louise is the second largest lake with a surface area of 228 acres. It was created by an impoundment of Salt Creek and is privately owned.

Two borrow pit lakes were created by the construction of the interstate system. Grand Boulevard Park Lake at Lake Station is 40 acres and has a maximum depth of eight feet. This is now a city park with a beach and boat ramp. Rosser Park Lake is a 40-acre lake with a maximum depth of 26 feet. The lake is located at the junction of I-80/94 and I-65.

Several inter-ridge lakes still exist in the Coastal region. Watershed drainage alterations and natural succession has altered the structure of these lakes and reduced their extent considerably. Near the Porter and LaPorte county line are Long Lake, Mud Lake, Blag Slough, and Little Lake. Long Lake was the largest of the interdunal lakes. Early surveyors described Long Lake as more than three miles long, almost five miles if one includes the marshes extending from its eastern end. Mud Lake is the second largest of the interdunal lakes. Just a few miles east of Long Lake, it was drained and filled for industrial construction. Early surveys indicate that Mud Lake may have once covered 160 acres. Blag Slough and Little Lake were drained for development of the Town of Dune Acres. They have returned to open water as a result of ground-water level changes associated with development of a nearby dike and fly ash ponds.

Additional lakes can be found throughout the coastal region. Many are scattered along floodplains and some have begun to undergo eutrophication. This is a process in which open water is gradually filled by sedimentation and plant growth. Some of these lakes are now classified as wetland marshes or palustrine wetlands.

5. Wetlands

"Wetlands are a major hydrologic feature of the Lake Michigan Region. In general terms, wetlands occur where the ground water table is usually at or near the ground surface, or where the land is at least periodically covered by shallow water." Based on a 1981 inventory by the U.S. Fish and Wildlife Service, the region contains about 7,242 wetlands covering a total of approximately 65 to 68 square miles or roughly 11% of the total land area. There are three categories of wetlands in Indiana that are described by the U.S. Fish and Wildlife Service: Lacustrine, Riverine, and Palustrine. Lacustrine wetlands are permanently flooded lakes; Riverine wetlands are contained within a channel that carries flowing water; and Palustrine wetlands are found in areas that support shallow water for a portion of the growing season.

Based on inventory data palustrine wetlands constitute about 98% of the region's wetlands and about 92% of the total wetland area. Examples of palustrine wetlands include marshes, swamps, bogs, sloughs, and fens. Palustrine wetlands characterized by forest vegetation and those characterized by emergent vegetation, such as cattails, together constitute 59% of the wetlands and 76% of the wetland area.

About 50% of the region's wetlands are either seasonally flooded or temporarily flooded. These wetlands serve important roles in the watershed, but can be difficult to identify when they are not flooded. The region also supports several small wetlands. "About 40% of the region's individual wetlands are one acre or smaller; 48% are between one acre and 10 acres; 10% are between 10 acres and 40 acres; and 2 percent are greater than 40 acres."

As settlement began in the Lake Michigan area, wetlands were generally considered wastelands, undesirable for farming and development. The marshland areas were primarily used for food from the plants and small animals found there. In 1850, Congress gave the "swamp lands" of the country to the individual states in which they were located. The swamplands were to be sold and the money used to drain and "reclaim" the lands. Swampland in the Calumet region sold for an average of $1.25 per acre.

Between the Calumet Beach Ridge (a narrow area just south of the west arm of the Little Calumet River) and the Lake Michigan dunes, a vast wetland referred to as the Great Marsh existed. Wetlands dotted other areas of the dunes and further inland; however, none were as continuous as the wetland north of the Calumet Beach Ridge. From Michigan City west through the Indiana Dunes National Lakeshore was the Great Marsh, which averaged half a mile in width. The Great Marsh was centered on Dunes Creek, which flowed to Lake Michigan between the dunes. To the west of the Great Marsh, the wetland narrowed to approximately one-quarter mile. Further west, the wetland broadened again to encompass the lower meanders of the Little Calumet River. The enormous wetland complex evolved as back waters of Dunes Creek and the Calumet Rivers and as lagoons that were left standing after Lake Michigan finally retreated to its present lake level.

Portions of the Great Marsh still exist at its eastern- most points. A remaining example of the pockets of wetlands among the dunes may be found behind the foredunes on present-day West Beach near Ogden Dunes. There were also parallel beach ridges with intervening swales, which contained classic interdunal wetlands such as the ones found in Miller Woods at Gary.

6. Rivers and Streams

The surface waters of the Lake Michigan coastal area include: Lake Michigan; the Little Calumet River, Grand Calumet River, Turkey Creek, Deep River, Salt Creek, Coffee Creek, Dunes Creek, Trail Creek, and the Galena River; several smaller tributaries and man-made ditches; many natural and man-made lakes; ponds and man-made excavations; and scattered remnants of marshes, swamps, and other wetlands. The present hydrology of the Lake Michigan coastal area in Indiana is significantly changed from what existed before development. The industrialization and urbanization that began in northwest Indiana during the late nineteenth century extensively altered the natural landscape and natural drainage patterns.

The Grand Calumet River and the Little Calumet River have undergone extensive changes by both man and nature. At one time, these two rivers were a single waterway that followed a hairpin course. The source was in LaPorte County near its western boundary. The river flowed west through Porter and Lake Counties into Illinois. In Illinois the river flowed toward the northwest and then sharply curved to the northeast and re-entered Lake County. The river finally emptied into Lake Michigan at what is now Marquette Park in Gary.

A second waterway formed in early 1850 when Native Americans opened a new channel to Lake Michigan in Illinois. Canoes were pushed and pulled through the marshes between Wolf Lake and Lake Calumet until a permanent channel was opened to Lake Michigan about twelve miles south of the Chicago River. The southern river, flowing west across the Calumet region and discharging into the Lake

from Illinois became the Little Calumet River. The northern river, flowing east and discharging into Lake Michigan in Indiana became the Grand Calumet River.

The mouth of the river in Illinois was cleared in 1870 for the development of Calumet Harbor. By 1872 the mouth of the river in Indiana was so clogged with aquatic vegetation and sand that it no longer could empty into the Lake. A map made by the US Topographic Bureau in 1845 showed that the Grand Calumet River no longer flowed into Lake Michigan in Indiana. Instead, the current had been reversed and its waters flowed with the Little Calumet in Illinois. The present outlet for the Grand Calumet River in Indiana was created in the 1900s when the Indiana Harbor and Ship Canal was constructed.

The Lake Michigan watershed was further modified when Hart Ditch was constructed from the town of Dyer to a site near Munster in 1850 to improve local drainage. The watershed of Hart Ditch was enlarged when Cady Marsh and Spring Street Ditches were created to drain areas where Highland, Griffith and Schererville are now located. In 1908, Randall Burns of Chicago launched an effort to 'reclaim' the land. The high sands of the Tolleston Beach and the dunes separating Cady marsh and Lake Michigan were cut. The flow of the Little Calumet River and the Deep River, which joins the Little Calumet, were diverted into the lake just east of Ogden Dunes. The Little Calumet River was also dredged to the mouth of Salt Creek. These projects reclaimed more than 20,000 acres in Porter County and in Gary.

In 1922, the construction of the Calumet Sag Channel drastically altered the hydrology of the Lake Michigan area. The new channel connected the Little Calumet River at its hairpin turn in Illinois to the Chicago Sanitary and Ship Canal. Runoff from part of the Little Calumet River watershed was permanently diverted from the Lake Michigan Basin to the Mississippi Basin.

In 1926, Burns Ditch (now Portage Burns Waterway) was completed, changing the nature and course of the Little Calumet River. Because of periodic floods of the Little Calumet, the surrounding area was a marshland. The river would flow over the roads of Gary. In winter, ice jams also formed at the Broadway Bridge. Dredging is still conducted along the Calumet River system to maintain navigation channels at authorized depths to accommodate deep-draft vessels. Contaminants in dredged spoil from portions of the river, however, pose serious environmental concern. The flood plain of the Little Calumet River and its tributaries is one of the most flood-prone areas in the state. In 1980, the Little Calumet River Basin Development Commission was created by state statute to provide non-federal sponsorship and funding for flood control, recreation, and recreational navigation improvements along the Little Calumet River in Lake and Porter Counties.

Chapter 2
Management Measures for Agricultural Sources

A. Introduction

Indiana, the smallest state west of the Allegheny Mountains, is a tremendous producer of agricultural products. Its soils, topography, and climate all favor intense agricultural production. According to 2001-2002 Indiana Agricultural Statistics, Indiana ranks second in tomatoes; third in soybeans; fourth in corn, peppermint, spearmint, and egg production; fifth in cantaloupe and swine; sixth in watermelon; seventh in snap beans and turkeys; eighth in cucumbers; ninth in tobacco and blueberries; and leads the nation in chicks hatched.

Even with the rapid conversion of land in the region from agricultural to urban uses, agriculture is still a significant regional industry. Land devoted to agricultural production within the Indiana Coastal Nonpoint Pollution Control area totals 118,498 acres or approximately 35 percent of the land area (see Table 2-1 and Figure 2-2 for more information). Within the three county areas, there are 1,687 farms averaging 315 acres in size (Indiana Agricultural Statistics, 2001-2002). Given that approximately 35 percent of the land in the watershed is devoted to agricultural land uses, it is not surprising to find agricultural Nonpoint source pollution within Indiana's Lake Michigan Coastal Zone Area (Figure 2-4).

Table 2-1: Agriculture Land use within CNPCP Boundary Area

Category	Acreage	Percent of Watershed
Pasture/Hay	42,538	12.40%
Row Crops	75,770	22.09%
Small Grains	190	0.06%
Total	118,498	35%
Watershed Total	343,124	100%

Source: MRLC National Land Cover Data 2001

Figure 2-2 Land Use in the Indiana CNPCP Boundary Area

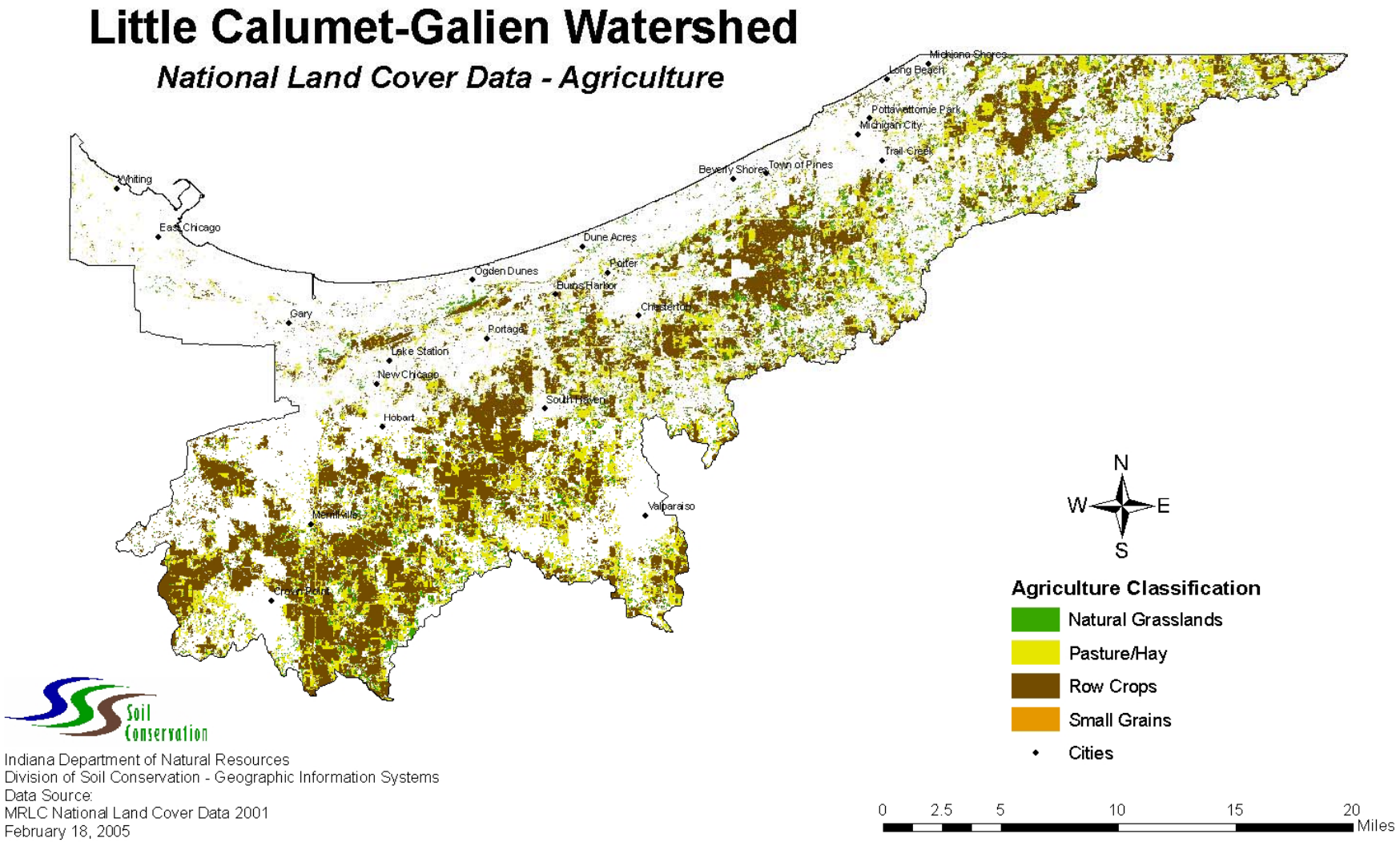


Figure 2-3: Percentage Prime Farmland Adjacent to 303(d) Waterways

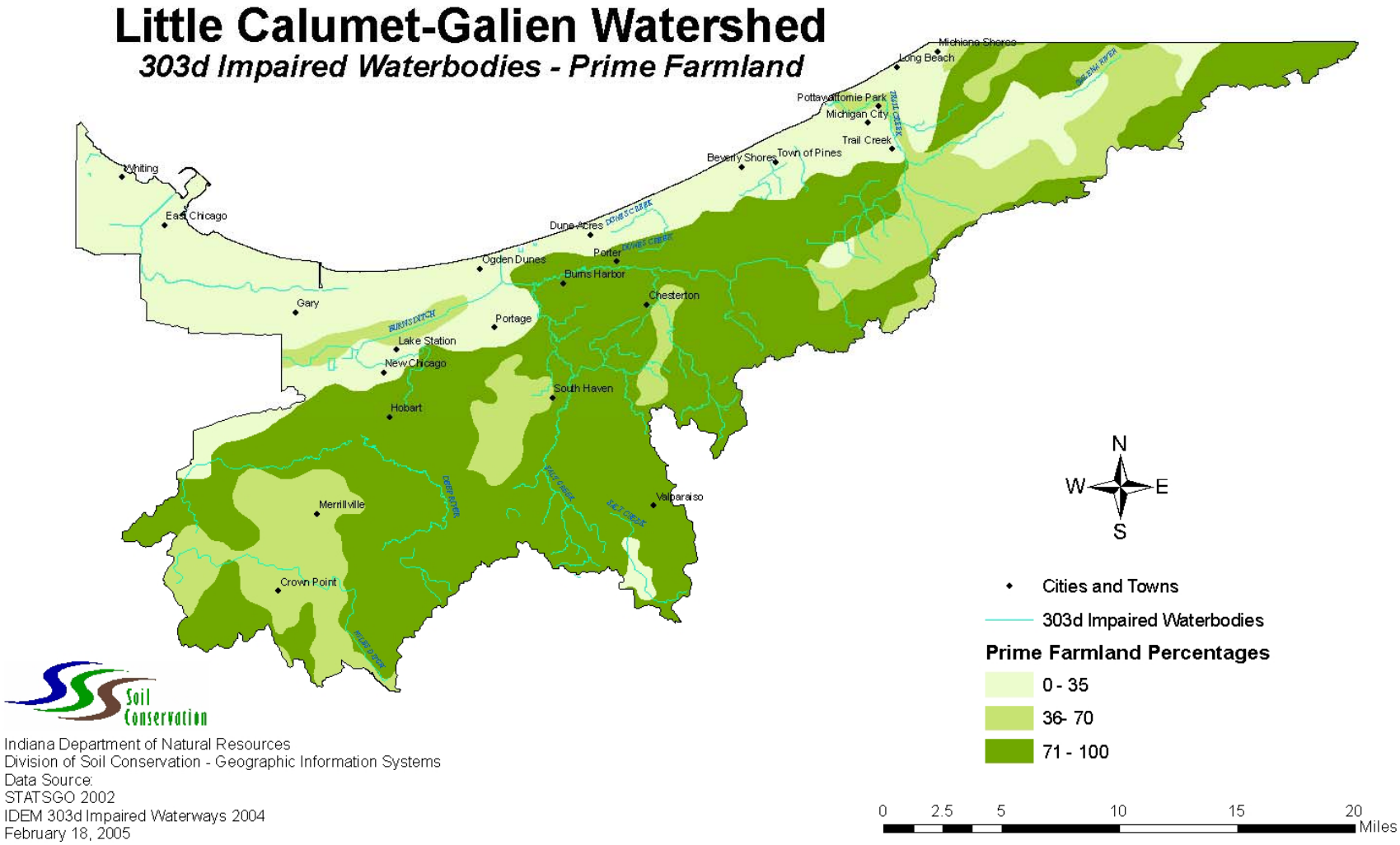
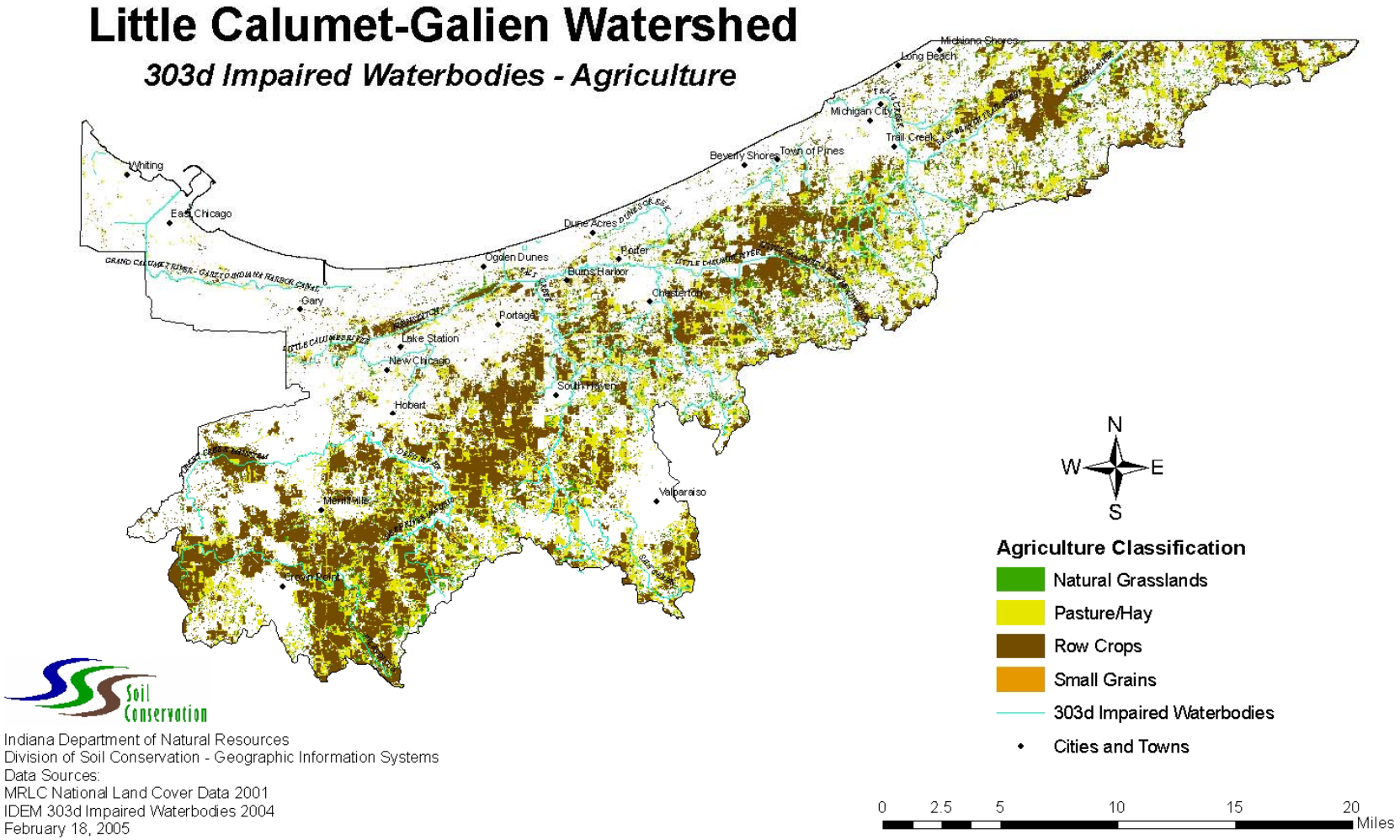


Figure 2-4: 303(d) Impaired Waterways and Adjacent Agriculture Activities



B. Potential Sources of Agricultural Nonpoint Pollution in Indiana's Coastal Nonpoint Pollution Watershed

1. Erosion from Cropland

The Little Calumet-Galien coastal watershed (Lake Michigan Program Area) boundary contains an estimated 118,498 acres of land in agricultural use. The primary agricultural land use is row cropland, which totals nearly 75,770 acres or 64 percent of the agricultural land use in the watershed. The balance of the land described as agricultural is primarily in hay and pasture totaling 42,538 acres which includes land used for recreational horses; perennial grass and legume cover; enrolled in the Conservation Reserve Program; or year-round vegetative cover while waiting to be developed. The cropland portion is nearly all devoted to row crop production of corn, popcorn and soybeans. There are also some small grains including wheat estimated at 190 acres (*Table 2-1*).

The agricultural land devoted to row crop production has potential to contribute significant amounts of sediment and attached nutrients and pesticides during storm events. The majority of the remaining agricultural land use in the Little Calumet-Galien Watershed as described above is in vegetative cover throughout the year and therefore not a significant source of erosion. In fact, it would be considered to be under an effective erosion and sediment control measure.

The most significant concern with cropland erosion as it relates to water quality in this coastal watershed is off-site sediment from crop fields. The types of erosion associated with cropland that produce sediment are (1) sheet and rill erosion and (2) gully erosion.

Soil erosion can be characterized as the transport of particles that are detached by rainfall, flowing water, or wind. Eroded soil is either re-deposited in the same field or transported from the field in runoff. Sediment that leaves the cropland and enters water bodies becomes an agricultural Nonpoint source pollutant and is being addressed in this plan. Sediment that originates from cropland has a higher pollution potential than from other agricultural land uses. The topsoil of a crop field is usually richer in nutrients and other chemicals because of past fertilizer and pesticide applications, as well as nutrient cycling and biological activity. Unprotected cropland with slopes greater than two percent may be the most susceptible to the erosive effects of rainfall and subsequent water movement over its surface. Table 2-5 shows the estimated number of acres of cropland within the watershed with slopes of two percent or greater by county, that total of 43,591 acres represents approximately 54 percent of the cropland.

Table 2-5 Acres of Row Cropland with 2 percent Slopes or Greater within the CNPCP Boundary[16]

County	Acres of Cropland
Lake	14,578
LaPorte	18,887
Porter	10,126
Total	**43,591**

Data Source: Information gathered from local USDA/NRCS, DNR/DSC, SWCD, and USDA/FSA Personnel April 25, 2003.

[16] Data for percent cropland 2 percent slope or greater was not readily available only for the CNPCP boundary area.

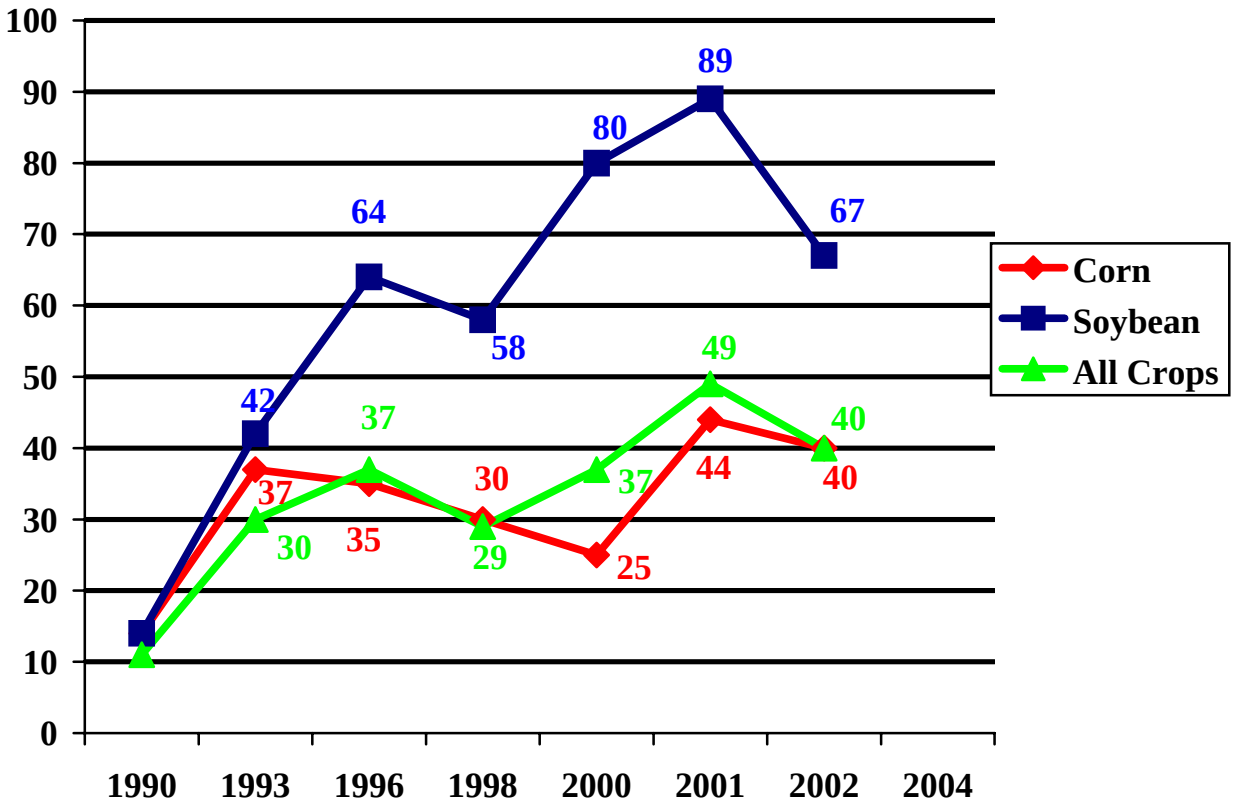
Sediment affects the use of water in many ways. Suspended solids reduce the amount of sunlight available to aquatic plants; cover fish spawning areas and food supplies; clog the filtering capacity of filter feeders; and clog and harm the gills of fish. Turbidity interferes with the feeding habits of fish. These effects combine to reduce fish, shellfish, and plant populations and decrease the overall productivity of lakes, streams, estuaries, and coastal waters. In addition, recreation is limited because of the decreased fish population and the water's unappealing, turbid appearance. Turbidity also reduces visibility, making swimming less safe.

Changes in the aquatic environment, such as the chemistry in the overlying waters or the development of anaerobic conditions in the bottom sediments, can cause accumulated chemicals to be released from the sediment. Adsorbed phosphorus transported by the sediment may not be immediately available for aquatic plant growth, but serves as a long-term contributor to eutrophication.

Soil eroded and delivered from cropland as sediment usually contains a higher percentage of finer and less dense particles than the parent soil on the cropland. This change in composition of eroded soil is due to the selective nature of the erosion process. For example, larger particles are more readily detached from the soil surface because they are less cohesive, but they also settle out of suspension more quickly because of their size. Organic matter is not easily detached because of its cohesive properties, but once detached it is easily transported because of its low density. Clay particles and organic residues will remain suspended in water for longer periods and at lower velocities than will larger or denser particles. This selective erosion can increase overall pollutant delivery per ton of sediment delivered because small particles have a much greater adsorption capacity than larger particles. As a result, eroding sediments generally contain higher concentrations of phosphorus, nitrogen, and pesticides than the parent soil (e.g., enriched).

The most effective practices that can be applied on working row cropland to reduce erosion and resulting off-site sedimentation are conservation tillage and no-till. Conservation tillage is defined as leaving at least 30% of the soil surface covered with crop residue after planting. Conservation tillage can reduce soil losses to about half of the losses expected when a field is clean-tilled. No-till is even more effective at reducing soil losses. No-till maintains higher vegetative cover because the soil is only disturbed during seeding. Typical no-till practice, knifes the seed into the ground thus minimizes the soil exposed to possible erosion. Figure 2-6 shows the significant growth in adoption of no-till that has occurred in the watershed from 1990 to 2002. Average adoption of conservation tillage in the watershed in 2002 is 52 percent compared to 33 percent in 1990. This statistically reliable data is obtained from Indiana’s Cropland Transect Survey conducted now annually in each county.

Figure 2-6: Little Calumet-Galien Watershed Tillage Data, (No-Till) Indiana Cropland Transect Survey 1990-2002



The second strategy is to route runoff from fields through practices that remove sediment. Practices that could be used to accomplish this are filter strips, field borders, grade stabilization structures, sediment retention ponds, water and sediment control basins (WASCOBs), conservation reserve acres (CRP), etc. Site conditions will dictate the appropriate combination of practices for any given situation.

A summary of the conservation practice accomplishments applied in the Watershed during the last five years as supplied by local agricultural agency personnel on April 25, 2003 is shown in Table 2-7.

Table 2-7: Conservation Practices/Measures Installed Within the Last 5 Years in the Little Calumet – Galien Watershed

County	Waterway		Filter Strip		Riparian Buffer		CRP (Ac.)
	No.	Acres	No.	Acres	No.	Acres	
Lake	8	12	1	3	0	0	800
LaPorte	5	9.7	8	43.6	10	51	2061
Porter	6	6	2	3	0	0	1,500
Totals:	**19**	**27.7**	**11**	**49.6**	**10**	**51**	**2,300**

Data Source: Information gathered from local USDA/NRCS, DNR/DSC, SWCD, and USDA/FSA Personnel April 25, 2003

2. Facility Wastewater and Runoff Control from Confined Animal Facilities

According to "Indiana Agricultural Statistics 2001-2002" issued cooperatively by the USDA National Agricultural Statistics Service and Purdue University Agricultural Research Programs, documented the following livestock numbers in Lake, Porter, and LaPorte Counties: 33,800 cattle (*January 2002*); 50,679 hogs and 1,546 sheep (*1997*). Poultry numbers were insignificant. The number of small livestock operations in the target area is limited. The Indiana Department of Environmental Management (IDEM) reports only one (1) permitted Confined Feeding Operation subject to 327 IAC5-4-3, Rule 3, Concentrated Animal Feeding Operations, operating in the Little Calumet-Galien Watershed Table 2-8 provides an estimate provided by local technical experts of the number and types of small livestock operations within the Watershed that, because of their size, are not currently required to hold permits from IDEM.

Table 2-8: Estimated Number & Types of Livestock Operations Not Requiring IDEM CFO Permits within the Little Calumet – Galien Watershed

County	Swine	Beef	Dairy	Ducks	Chickens	Turkeys	Sheep	Horses*
Lake	4	15	1	0	0	0	3	10
LaPorte	2	3	5	0	0	0	0	1
Porter	1	6	1	0	0	0	0	1
Totals	7	24	7	0	0	0	3	12

**Includes only operations with an average of 20 or more horses.*
Data Source: Information gathered from local USDA/NRCS, DNR/DSC, SWCD, and USDA/FSA Personnel April 25, 2003.

Animal waste (manure) includes the fecal and urinary wastes of livestock and poultry; process water from milking parlors; and the feed, bedding, litter, etc. from livestock operations. Confinement operations concentrate animal wastes from large numbers of animals on feeding floors, concrete pits below animal housing units, lagoons, settling basins, and other temporary holding structures designed to store animal wastes until they can be applied to cropland. Unless adequate storage capacity is planned for the storage of animal wastes, overflows from confined animal facilities have the potential of contributing to offsite water quality problems. The potential for additional pollution problems is often compounded by rainfall, which if not handled properly, has the effect of adding volume to feeding floors and manure storage areas.

Waste water from confined animal facilities often contains the following pollutants: oxygen demanding substances; nitrogen, phosphorus, and many other major and minor plant nutrients; organic solids; salts; bacteria, viruses, and other microorganisms; and sediments.

When runoff, wastewater, and manure from confined feeding operations occur in surface waters, fish kills often result because of oxygen depletion or dissolved ammonia. Decomposing organic material in surface waters often results in the depletion of dissolved oxygen. The result is anoxic or anaerobic conditions. Under these conditions, the water has an unpleasant taste, odor, and appearance due to the accumulation of methane, sulfides, and amines. Domestic or recreational uses of the water are then rendered unsuitable.

Because of the high nutrient and salt content of manure and runoff from confined feeding areas, eutrophication of waterbodies may be accelerated over time by the release of nutrients from solids. The potential also exists for ground water pollution if inadequate storage/seepage and or over application of livestock wastes to cropland occur.

The potential for the transmittal of animal diseases to humans can be a problem if animal waste is not treated or disposed of properly. Manure from livestock operations contains high numbers of pathogens. Runoff from cropland receiving livestock manure that has not been incorporated exhibits high numbers of bacteria. The result can be high coliform counts, stream advisories, beach closings, etc.

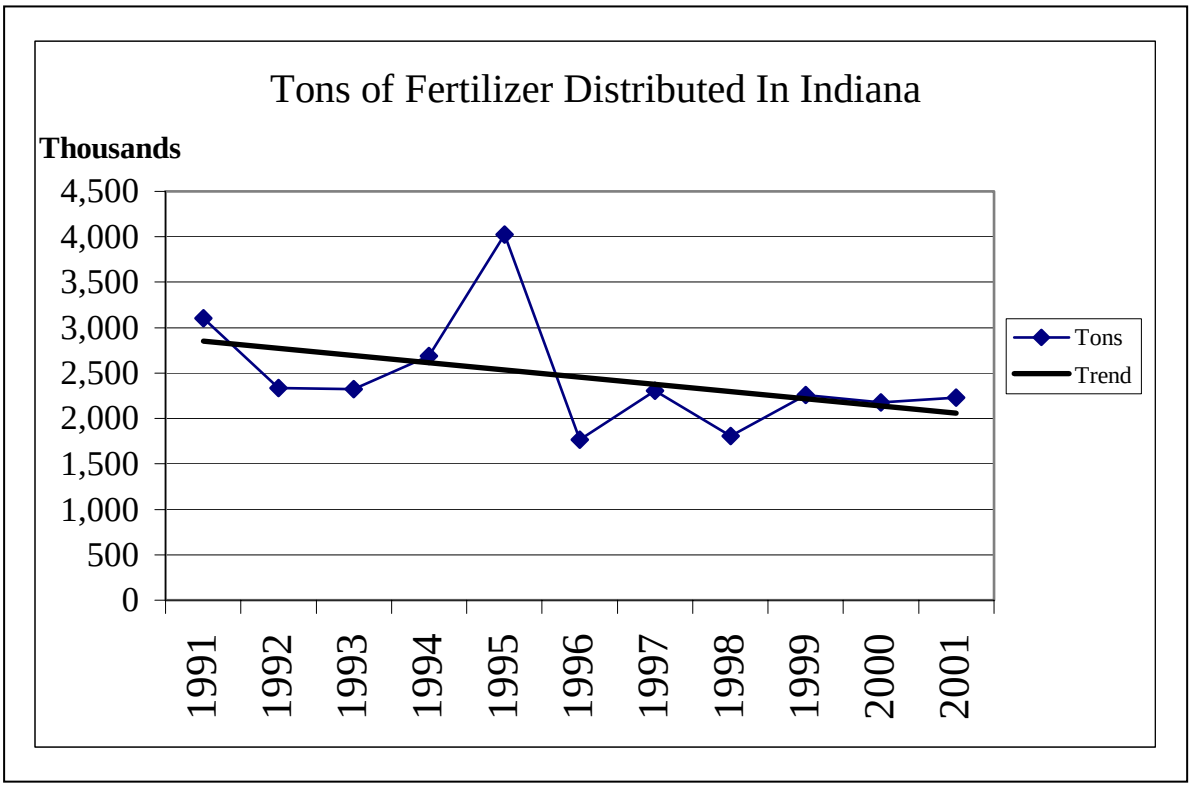
Water quality contamination from livestock wastes is most often affected by the method of application, timing, and the amount applied. Manure applied to the surface has the greatest potential for runoff. When livestock wastes are applied to frozen ground, the potential for runoff is even greater during rainfall or snow melt. When livestock manures are “knifed into” the soil, the potential for runoff and the pollution of surface water is reduced significantly.

When the application rate of livestock waste to cropland exceeds the amount of nitrogen, phosphorus, and potassium utilized by the crop, the potential for surface and groundwater pollution is increased. Soils generally have the capacity to adsorb the phosphorus contained in livestock manures; however, surface water may still be impacted with phosphorus if soil particles are transported offsite through the soil erosion process. Phosphorus is also water- soluble and moves with the drainage water. Nitrates are water-soluble and can move freely with drainage water into both surface and ground water supplies. Potassium is held tightly on the soil particle and only a small amount is available for plant use. Generally, the potassium that moves is attached to a soil particle and only becomes a water quality problem when soil erosion occurs.

3. Application of Nutrients to Cropland

The application of fertilizer to crops especially grain producing crops such as corn, soybeans and wheat is a common practice on cropland in the watershed and for the most part a necessary production practice to achieve economically viable crop yields. Nitrogen (N) and phosphorus (P) are the two major nutrients applied to cropland that have the potential to degrade water quality. Agricultural fertilizer is applied to cropland in several different forms including dry, liquid and gas (anhydrous ammonia) and is applied a variety of ways including broadcasting, banding, injecting and incorporating. Data obtained from the Indiana Agricultural Statistics Report (2001-2002) shows a small decrease in the total tons of fertilizer sold statewide from 1991 to 2001. The distribution of fertilizer in 1991 was 3,101,533 tons compared to 2,227,300 tons in 2001. Figure 2-9 illustrates the tonnage distributed in Indiana from 1991 – 2001.

Figure 2-9 Tons of Fertilizer Distributed in Indiana (1990-2002)



Data Source: Indiana State Chemist Office, Indiana Agricultural Statistics

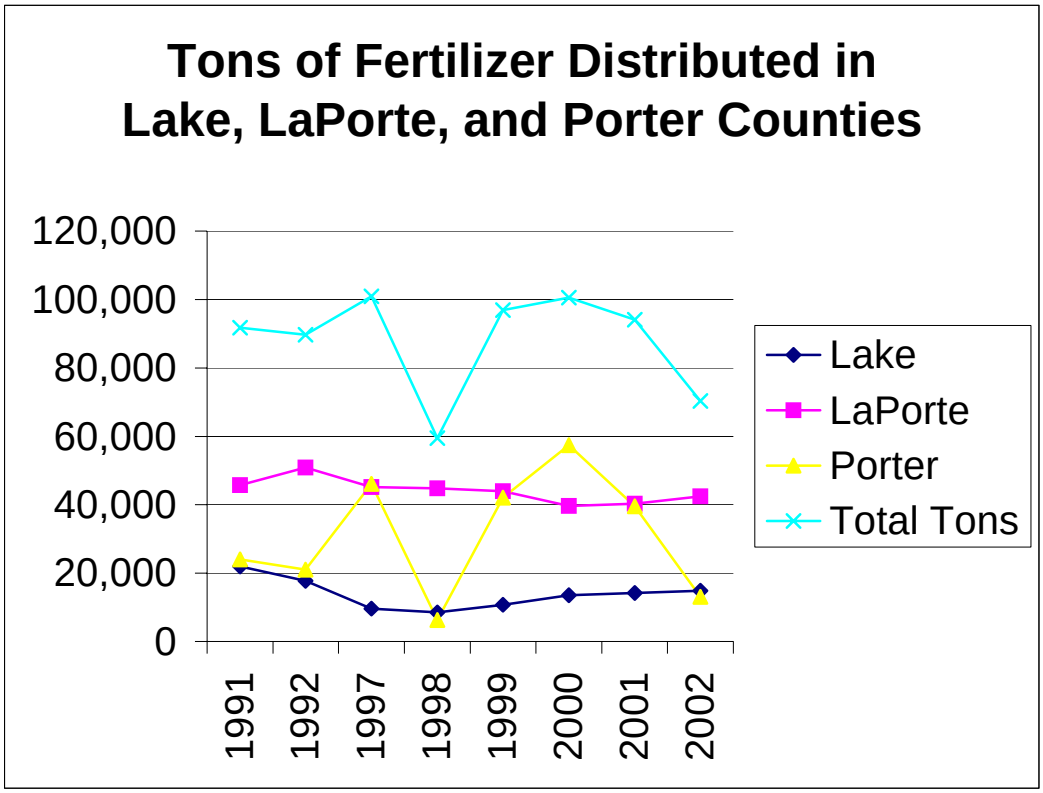
The Indiana Agricultural Statistics Service was also able to supply historical information on the amount of agricultural fertilizer distributed countywide in each of the three counties that encompass the Little Calumet-Galien Watershed. As shown in detail in Table 2-10 and illustrated in Figure 2-11, the downward trend in agricultural fertilizer sales in the three counties was more significant than the statewide trend. The total tons distributed in the three counties were 70,345 in 2002 as compared to 91,756 in 1991, a reduction of 21,411 tons.

Table 2-10: Tons of Fertilizer Distributed in Lake, LaPorte, and Porter Counties

County	1991	1992	1997	1998	1999	2000	2001	2002
Lake	21,963	17,799	9,639	8,481	10,792	13,519	14,239	14,871
LaPorte	45,718	50,854	45,144	44,781	44,005	39,650	40,310	42,418
Porter	24,075	21,052	46,114	6,265	42,124	57,389	39,543	13,056
Total Tons	91,756	89,705	100,897	59,527	96,921	100,558	94,092	70,345

Data Source: Indiana State Chemist Office, Indiana Agricultural Statistics

Figure 2-11: Tons of Fertilizer Distributed in Lake, LaPorte and Porter Counties



According to local agency personnel and staff, variations in the tons of commercial fertilizer distributed within Lake, LaPorte, and Porter Counties was most impacted by local weather and fertilizer prices. Specific information on fertilizer distributed only within the Little-Calumet - Galien Watershed was not available; however, local agency personnel indicated at a meeting on April 25, 2003 that they would expect fertilizer application trends within the watershed to be very similar to countywide trends.

Other sources of nutrients that might be applied to agricultural land and have the potential to runoff and impact water quality include manure applied on cropland from animal production, and municipal and industrial treatment plant sludge containing nitrogen, phosphorous, potassium secondary nutrients and organic solids. Other sources of nutrients that might leach or runoff from agricultural and impact water quality include legume and crop residues containing nitrogen, phosphorous, potassium, secondary nutrients, and micronutrients and nutrients from atmospheric deposition such as nitrogen and sulfur.

All living things require adequate nutrients for growth. In aquatic environments, low nutrient availability usually limits plant growth. Nitrogen and phosphorus generally are present at background or natural levels below 0.3 and 0.05 mg/L, respectively. When these nutrients are introduced into a stream, lake, or estuary at higher rates, aquatic plant productivity may increase dramatically. This process, referred to as cultural eutrophication, may adversely affect the suitability of the water for recreation, swimming and other uses. Increased aquatic plant productivity results in more organic material, which eventually dies and decays. The decaying organic matter produces unpleasant odors and depletes the oxygen supply required by aquatic organisms. Depleted oxygen levels, especially in colder bottom waters where dead organic matter tends to accumulate, can reduce the quality of fish habitat and encourage the propagation of fish that are adapted to less oxygen or to warmer surface waters. Highly enriched waters will stimulate

algae production, with consequent increased turbidity and color. Increased turbidity results in less sunlight penetration and availability to submerged aquatic vegetation (SAV). Since SAV provides habitat for small or juvenile fish, the loss of SAV has severe consequences for the food chain. All forms of transported nitrogen are potential contributors to eutrophication in lakes, estuaries, and some coastal waters. In addition to contributing to eutrophication, excessive nitrogen causes other water quality problems. Dissolved ammonia at concentrations above 0.2 mg/L may be toxic to fish, especially trout. Nitrates in drinking water are potentially dangerous, especially to newborn infants. Nitrate is converted to nitrite in the digestive tract, which reduces the oxygen-carrying capacity of the blood (methemoglobinemia), resulting in brain damage or even death. The U.S. Environmental Protection Agency has set a limit of 10-mg/L nitrate-nitrogen in water used for human consumption (*USEPA, 1989*).

Nitrogen is naturally present in soils but must be added to increase crop production. Nitrogen is added to the soil primarily by applying commercial fertilizers and manure, but also by growing legumes (biological nitrogen fixation) and incorporating crop residues. Not all nitrogen that is present in or on the soil is available for plant use at any one time. For example, in the eastern Corn Belt, it is normally assumed that about 50 percent of applied N is assimilated by crops during the year of application (*Nelson, 1985*). Organic nitrogen normally constitutes the majority of the soil nitrogen. It is slowly converted (2 to 3 percent per year) to the more readily plant-available inorganic ammonium or nitrate.

The chemical form of nitrogen affects its impact on water quality. The most biologically important inorganic forms of nitrogen are ammonium (NH4-N), nitrate (NO3-N), and nitrite (NO2-N). Organic nitrogen occurs as particulate matter, in living organisms, and as detritus. It occurs in dissolved form in compounds such as amino acids, amines, urines, and urea.

Nitrate-nitrogen is highly mobile and can move readily below the crop root zone, especially in sandy soils. It can also be transported with surface runoff, but not usually in large quantities. Ammonium, on the other hand, becomes adsorbed to the soil and is lost primarily with eroding sediment. Even if nitrogen is not in a readily available form as it leaves the field, it can be converted to an available form either during transport or after delivery to waterbodies.

Phosphorus typically plays the controlling role in algae growth in freshwater systems. Although the phosphorus content of most soils in their natural condition is low, between 0.01 and 0.2 percent by weight, recent soil test results show that the phosphorus content of most cropped soils in the Northeast have climbed to the high or very high range (*Sims, 1992*). Manure and fertilizers increase the level of available phosphorus in the soil to promote plant growth, but many soils now contain higher phosphorus levels than plants need (*Killorn, 1980; Novais and Kamprath, 1978*). Phosphorus can be found in the soil in dissolved, colloidal, or particulate forms.

Runoff and erosion can carry some of the applied phosphorus to nearby water bodies. Dissolved inorganic phosphorus (orthophosphate phosphorus) is probably the only form directly available to algae. Particulate and organic phosphorus delivered to waterbodies may later be released and made available to algae when the bottom sediment of a stream becomes anaerobic, causing water quality problems.

4. Pesticide Application to Cropland

The term *pesticide* includes any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest or intended for use as a plant regulator, defoliant, or desiccant. Herbicides, insecticides, fungicides, miticides and nematicides all fall under the general term pesticides. The principal pesticidal pollutants that may be detected in surface water

and in ground water are the active and inert ingredients and any persistent degradation products. Pesticides may enter ground and surface water in solution, in emulsion, or bound to soil colloids. Despite the documented benefits of using pesticides to control plant pests and enhance production, these chemicals may, in some instances, cause impairments to the uses of surface water and ground water. Some types of pesticides are resistant to degradation and may persist and accumulate in aquatic ecosystems.

The application of pesticides to cropland to control weeds, insects and other pests during crop production is a common and most often-necessary production practice. According to Indiana Agricultural Statistics 2001-2002 report, herbicides were applied to 99 percent of the corn in Indiana and 98 percent of the soybeans. Insecticides were applied to 47 percent of the corn. The most predominate herbicide use on corn was atrazine at 94 percent of the corn acreage. Metolachlor was 32 percent and acetochlor was applied to 27 percent of the corn. All other corn herbicides listed were used on less than 15 percent of the corn ground in 2001. The highest used insecticide used for corn was Tefluthrin at only 14 percent of the corn acreage. No other insecticides listed were greater than 10 percent of the acreage.[17]

The most predominately used herbicide on soybeans was glyphosate at 85 percent of the acreage. No other herbicide listed for soybeans was greater than 10 percent of the acreage. This is the result of the high adoption of bioengineered Roundup Ready soybeans[18]. No county data on agricultural pesticide use was available for the three counties that encompassed the Little Calumet-Galien Watershed; however, local agency personnel indicated on April 25, 2003 that the types of pesticides used and the percentage of corn and soybean acreage in the watershed treated with pesticides would mirror the patterns documented above for statewide use.

If pesticides move offsite into rivers, streams, and lakes they may impact water quality and the environment by eliminating or reducing populations of desirable organisms, including endangered species. Sub lethal effects include the behavioral and structural changes of an organism that jeopardize its survival. For example, certain pesticides have been found to inhibit bone development in young fish or to affect reproduction by inducing abortion.

Herbicides in the aquatic environment can destroy the food source for higher organisms, which may then starve. Herbicides can also reduce the amount of vegetation available for protective cover and the laying of eggs by aquatic species. Sometimes a pesticide is not toxic by itself but is lethal in the presence of other pesticides. This is referred to as a *synergistic effect*, and it may be difficult to predict or evaluate. Bioconcentration is a phenomenon that occurs if an organism ingests more of a pesticide than it excretes. During its lifetime, the organism will accumulate a higher concentration of that pesticide than is present in the surrounding environment. When the organism is eaten by another animal higher in the food chain, the pesticide will then be passed to that animal, and on up the food chain to even higher level animals.

Sources of pesticide contamination include: atmospheric deposition, spray drift during the application process, misuse, and spills, leaks, and discharges that may be associated with pesticide storage, handling, and waste disposal.

[17] *Page 44 of the Indiana Agricultural Statistics 2001-2002 report*
[18] Id. Page 45

The primary routes of pesticide transport to aquatic systems are: (*Maas et al., 1984*):

1. Direct application
2. Runoff
3. Volatilization and subsequent atmospheric deposition
4. Uptake by biota and subsequent movement in the food web.

The amount of field-applied pesticide that leaves a field in the runoff and enters a stream primarily depends on:

1. The intensity and duration of rainfall or irrigation;
2. The length of time between pesticide application and rainfall occurrence;
3. The amount of pesticide applied and its soil/water partition coefficient;
4. The length and degree of slope and soil composition;
5. The extent of exposure to bare (vs. residue or crop-covered) soil;
6. Proximity to streams;
7. The method of application; and
8. The extent to which runoff and erosion are controlled with agronomic and structural practices.

Pesticide losses are generally greatest when rainfall is intense and occurs shortly after pesticide application, a condition for which water runoff and erosion losses are also greatest. Pesticides can be transported to receiving waters either in dissolved form or attached to sediment. Dissolved pesticides may be leached to ground-water supplies. Both the degradation and adsorption characteristics of pesticides are highly variable.

The rate of pesticide movement through the soil profile to ground water is inversely proportional to the pesticide adsorption partition coefficient or Kd (a measure of the degree to which a pesticide is partitioned between the soil and water phase). The larger the Kd, the slower the movement and the greater the quantity of water required leaching the pesticide to a given depth.

5. Grazing Management

Surface water quality problems associated with livestock grazing become evident when livestock are allowed free access to sensitive areas such as stream banks, wetlands, estuaries, ponds, lakeshores, and riparian areas. The actual physical disturbance caused by livestock denudes vegetative cover and increases stream bank, shoreline, and riparian area soil erosion and sedimentation. In addition, the direct loading of animal wastes caused by livestock directly seeking water from surface water bodies is increased significantly. Finally, overgrazing and overstocking can also lead to diminished vegetative cover and increase soil erosion accompanied with offsite sedimentation and nutrient problems.

Local investigations indicate there is a limited amount of grazing by cattle and horses adjacent to streams in the Watershed as well as some access by other types of livestock. At a technical information gathering meeting held on April 25, 2003, local USDA/NRCS, DNR/DSC, SWCD, and USDA/FSA personnel provided the following estimates of acres of grazing land and miles of streams impacted in the Little Calumet - Galien Watershed: Lake - 850 acres, two miles of streams impacted; LaPorte - 750 acres, two miles of streams impacted; and Porter – 300 acres, three miles of streams impacted. The total estimated grazing acreage and streams impacted in the Watershed was 1,900 acres and seven miles of streams.

6. Irrigation of Cropland (Justification for Exclusion)

Table 2-12: Estimated Number of Irrigation Systems Type, Acres and Percentage Source of Water in the CNPCP Boundary Area

County	Center Pivot	Big Gun	Trickle/Drip	In-Furrow	Drag Hose	Other	Acres	Percent Wells	Percent Surface
Lake	2	0	7	0	0		160	85	15
LaPorte	2	0	0	0	0	0	185	0	100
Porter	0	0	0	0	3	0	40	0	100
Total	**4**	**0**	**7**	**0**	**3**	**0**	**380**	**na**	**na**

Data Source: Information gathered from local USDA/NRCS, DNR/DSC, SWCD, and USDA/FSA Personnel April 25, 2003.

As indicated on Table 2-12 there were only 14 irrigation systems identified by local agricultural agency personnel used seasonally on an estimated 380 acres of cropland out of a total of 75,770 acres of row cropland in the watershed which equates to less than 0.5% of the cropland. Included in table above are three systems in Porter County which comprise the only three agriculturally related irrigation users in the watershed that the IDNR-Division of Water has on their records as users with the capacity to pump 70 gallons/minute or more.[19] The search of irrigators with a pumping capacity of 70 gal/min yielded only 24 names for the entire counties of Lake, LaPorte and Porter with 21 of them being golf courses or county, municipal park users. Follow up with local agricultural agency personnel revealed that the three agricultural users in Porter County, on IDNR's list, were in the watershed but they were all drag hose systems for vegetable/truck crop growers with a combined total of 40 acres drawing surface water from constructed ponds or in one case a nearby ditch.

Add this information to the reality of rapid urbanization, particularly in Porter County, and to exclude irrigation from the sub-categories of agricultural Nonpoint source concerns to be addressed becomes a logical choice. Even though irrigation is excluded from the agricultural management measure requirements for the Little Calumet-Galien Watershed, the agricultural agencies will continue to work with the few irrigation users in the watershed to apply best management practices for irrigation. The agencies include the Soil and Water Conservation Districts (SWCDs), Purdue Cooperative Extension Service (CES), IDNR-Division of Soil Conservation and the USDA-Natural Resources Conservation Service (NRCS). The key practices that agency field staff will encourage and provide technical assistance on are irrigation scheduling, nutrient and pest management, and conservation tillage and conservation buffers.

C. Agricultural Management Measures to be Implemented in Indiana's Coastal Nonpoint Boundary Area

This section covers the agricultural management measures that will be implemented in the Little Calumet-Galien Watershed to address each of the following potential sources of Nonpoint pollution:

1. Erosion and Sediment Control
2. Facility Wastewater and Runoff Control From Confined Animal Facilities
3. Nutrient Management
4. Pesticide Management
5. Grazing Management
6. Irrigation Water Management (Excluded due to limited applicability)

[19] These three users were identified on a computer search of IDNR-Division of Water's list of registered irrigators.

The following discussion lists: management measures, definitions, and measures of success, applicable existing regulatory programs/practices, voluntary programs, outreach and education programs, and enforcement mechanisms. The Objective Table at the end of this chapter contains a complete listing of all referenced programs with: program authorities, program classification, responsible entity, enforceable mechanism, evaluation mechanism, and all Management Measures that are applicable. The coordination section further explains how each program will apply to the various management measures. In addition, a complete description of all referenced programs is included in Appendix B.

1. *Erosion and Sediment Control Management Measure*

a. Definition

The management measure for erosion control on agricultural land is to apply the erosion control component of a Conservation Management System (CMS). This erosion control component is defined in the Field Office Technical Guide of the USDA Natural Resources Conservation Service (NRCS): to minimize delivery of sediment from agricultural lands to surface waters and/or design and install a combination of management and physical practices to settle and filter solids and associated pollutants in runoff delivered from the contributing area for storms of up to and including a 10-year, 24 hour-hour frequency.

b. Applicability

This management measure applies to activities that cause erosion on agricultural land, which includes cropland, irrigated cropland, range and pasture land, hay land, orchards, specialty crop production and nursery crop production. Application of this management measure will reduce the mass load of sediment reaching a water body and improve water quality and the use of the water resource. Cropland, because of its significant acreage relative to other agricultural land uses in the Little Calumet-Galien Watershed, has the greatest potential to cause erosion and sediment impact on coastal waters. As mentioned in the introduction, there are nearly 80,000 acres of row cropland in the watershed. Local USDA NRCS staff records show 43,591 acres or approximately 54 percent of the cropland in the watershed with slopes of 2 percent or greater. This sloping cropland, if unprotected, is the most susceptible to the effects of erosion by water (Table 2-5).

This measure can be implemented by using one of two different strategies or a combination of both. The first, and most desirable, strategy would be to implement practices on the field that would prevent erosion and the transport of sediment from the field. A key practice used to accomplish this in the watershed is conservation tillage. Figure 2-7 illustrates the significant growth in adoption of conservation tillage that has occurred in the watershed from 1990 to 2002. The adoption of conservation tillage for corn in the watershed has grown from about 10% in 1990 to 40% in 2002. The adoption rate for soybeans is even more impressive going from about 12% in 1990 to 67% in 2002. This statistically reliable data is obtained from Indiana's Cropland Transect Survey conducted annually in each county. There is good potential to continuing to increase the adoption of conservation tillage for both of these row crops.

The second strategy is to route runoff from fields through practices that remove sediment. Practices that could be used to accomplish this are filter strips, field borders, grade stabilization structures, sediment retention ponds, water and sediment control basins (WASCOBs), conservation reserve acres (CRP), etc. Site conditions will dictate the appropriate combination of practices for any given situation.

Conservation practices used to route runoff from crop fields, implemented over the last five years in the Watershed, are summarized in Table 2-7. Local agricultural agency personnel reported these accomplishments on April 25, 2003.

While the practice accomplishments are notable, local agency personnel pointed out that the number of practices installed through federal and state cost share programs often lags behind those implemented in more rural watersheds. Local agency personnel explained that many landowners are reluctant to enter into the 10-15 year contracts required for participation. The reason, repayment of cost-share assistance with interest is required if conservation measures are destroyed prior to the expiration of the contract. Because this is rapidly urbanizing region landowners want to keep open their option to sell their agricultural land for development unencumbered by long-term agreements that includes penalties if conservation practices are not maintained for the full life of the agreement.

c. Existing Practices and Programs for implementing Erosion and Sediment Control

Well suited for this watershed, conservation practices from the Indiana NRCS Field Office Technical Guide follow along with the reference number for each practice:

1. Conservation Cropping Sequence (328)
2. Conservation Tillage (329)
3. Crop Residue Use (344)
4. Critical Area Planting (342)
5. Cover Crops (340)

The most common Indiana NRCS Technical Guide approved conservation practices applied in Indiana to route runoff from fields and reduced sediment in runoff include:

1. Filter Strip (393)
2. Field Border (386)
3. Grassed Waterway (412)
4. Diversion (362)
5. Water and Sediment Control Basin (638)
6. Sediment Basin (350)
7. Grade Stabilization Structures (410)

Indiana has a significant number of programs available from federal, state and local sources to address erosion and sedimentation from agricultural land. They are for the most part voluntary and provide technical and financial assistance to landusers for applying practices and management techniques that reduce erosion and sediment. A listing of the programs available from federal, state and local sources follows. A description of each of the programs is included in Appendix A part 2. In addition Tables C1-C7 Appendix C provides information on the enabling legislation, program authority, lead implementing agency, enforcement provisions and evaluation methods for each of the federal, state and local programs listed.

1. Existing Programs: Federal

There are a significant number of federal programs available to agricultural landusers that provide technical and financial assistance to help control erosion and reduce sediment as a Nonpoint source of water pollution. The great majority of existing federal programs are administered through USDA's Natural Resources Conservation Service (NRCS) and the

Farm Service Agency (FSA). Nearly all of the federal programs listed were authorized under the conservation provisions of the 1985, 1996 and/or 2002 Farm Bills. Federal programs used to address cropland erosion control include:

- Conservation Compliance
- Swampbuster Compliance
- Sodbuster Compliance
- Wetland Reserve Program (WRP)
- Environmental Quality Incentives Program (EQIP)
- Conservation Reserve Program (CRP)
- Grasslands Initiative (GLI)
- Grasslands Reserve Program (GRP)
- Conservation Operations (CO)
- Watershed Protection and Flood Prevention Act (PL 566)
- Water Quality Improvement Demonstration Grants (CWA-Section 319)

2. Existing Programs: State and Local

The IDNR-Division of Soil Conservation in cooperation with 92 local soil and water conservation districts administers state programs to reduce erosion from cropland. Educational, technical, and cost sharing assistance is provided through both the state's Division of Soil Conservation and local soil and water conservation districts to help landusers evaluate alternatives and implement conservation measures and practices to solve soil erosion problems, reduce offsite sedimentation, and improve water quality. The legislature has also established the following state programs that assist landusers in controlling erosion and reducing sedimentation.

- The Clean Water Indiana Program (CWI)
- The Lake and River Enhancement Program (LARE)

<u>Implementing Agencies for Erosion and Sediment Control</u>

The agencies with primary responsibility for addressing erosion and sediment from agricultural lands at local, state and federal level respectively are Soil and Water Conservation Districts (SWCDs), the IDNR Division of Soil Conservation and the USDA Natural Resources Conservation Service. The District Law, IC 14-32, governing soil and water conservation districts located in each county charges SWCDs with the responsibility of identifying and prioritizing soil and water conservation problems within each district and to establish or enlist programs and partners to address them. The DNR Division of Soil Conservation is responsible for providing administrative and technical assistance to SWCDs in carrying out their programs and for administering state soil and water programs under the policies of the State Soil Conservation Board. The USDA Natural Resources Conservation Service (NRCS) is responsible for providing technical assistance to SWCDs to carry out soil and water conservation programs and for providing technical and administrative assistance to carry out federally mandated conservation programs.

In addition to these three primary agencies, the Farm Service Agency (FSA) administers a number of conservation programs that provide incentives and cost sharing to landusers for applying agricultural erosion and sediment control practices. The Cooperative

Extension Service (CES) also provides educational support to conservation districts and other agencies and groups as well as landusers to increase awareness and understanding of programs and practices available to reduce agricultural erosion and sediment.

d. Enforcement Mechanism

Participation in federal programs is voluntary; however, there are some cross-compliance provisions that require landowners and operators who voluntarily participate in USDA's commodity support programs to adhere to conservation compliance provisions for highly erodible cropland, existing wetlands and grasslands being brought into crop production. All incentives and cost sharing provided to landusers through any of the existing federal, state and local program are offered through a contractual agreement between the landuser and the agency administering the respective program dollars. The contract spells out a life expectancy for each practice installed with financial assistance and authorizes the contracting agency to recover the money from the respective landuser in the event the practice is destroyed or not maintained for the life of the practice.

Indiana code IC 14-32 provides authorization for the State Soil Conservation Board, IDNR's Division of Soil Conservation, and the state's 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under this code to develop a state wide regulatory program when all reasonable voluntary approaches to erosion and sedimentation have been exhausted.

State Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM has also begun implementing federal provisions requiring that a plan be developed and implementation be underway within a scheduled timeline to assure that a Total Maximum Daily Load is not exceeded from all water pollution sources (both point and Nonpoint) entering impaired streams and other water bodies listed on the state's 303(d) list which is provided to EPA annually.

(See Tables C1-C7 description of programs and enforceability Appendix C for more detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

2. Facility Wastewater and Runoff from Confined Animal Facility Management Measure (Large and Small Units)

a-1. Definition: Large Unit (at least 6,000 cattle, 12,000 swine or sheep, 600,000 fowl 327 (IAC 16-4-3)

Limit the discharge from the confined animal facility to surface waters by:

1. Storing both facility wastewater and runoff from confined animal facilities that is caused by storms up to and including a 25-year, 24-hour frequency storm. Storage structures should:
    a) Have an earthen lining or plastic membrane lining, or
    b) Be constructed with concrete, or
    c) Be a storage tank; and

2. Managing stored runoff and accumulated solids from the facility through an appropriate waste utilization system.

a-2. Definition: Small Unit (less than 300 cattle, 600 swine or sheep, or 30,000 fowl, 327 IAC 16-2-5)

1. Design and implement systems that collect solids, reduce contaminant concentrations, and reduce runoff to minimize the discharge of contaminants in both facility wastewater and in runoff that is caused by storms up to and including a 25-year, 24-hour frequency storm. Implement these systems to substantially reduce significant increases in pollutant loadings to ground water.

2. Manage stored runoff and accumulated solids from the facility through appropriate waste utilization system.

b. Applicability

This management measure applies to confined livestock activities from which the runoff of livestock wastes could pollute rivers, streams, and lakes within the watershed. The water quality problems associated with concentrated animal feeding operations result from runoff of facility wastewater and manure. Application of this management measure will reduce the loading of nutrients, organic matter, pathogens, etc. from reaching a water body. Implementation of this management measure will improve water quality and the use of the water resource.

Livestock production in the Little Calumet-Galien Watershed has the potential to cause reduced surface water quality in coastal waters. Investigations with IDEM have identified one (1) CAFO as shown in the previous map. Local agricultural agency personnel have estimated that approximately 50 feeding operations exist in the watershed. Only one of the confined feeding operations in the watershed is large enough that it requires a permit under current requirements of Indiana’s Confined Feeding Law. The other confined feeding operations identified by local technical experts are well below the numbers that require an operating permit.

However, significant changes to Indiana's Law 327 IAC 15-15-12 (Section 3) covering Concentrated Animal Feeding Operations have recently been published for public comment. Under the proposed revision refereed to as Rule 3, Concentrated Animal Feeding Operations, all Concentrated Animal Feeding Operations (CAFO's) are considered point sources that require NPDES permits for discharges or potential discharges. Under the proposed rule, all large, medium and small CAFO owners or operators must seek coverage under either an individual NPDES permit or a general NPDES permit under 327 IAC 15-15. In addition any animal feeding operation regardless of size will come under the requirements of this law as amended if it is detected of discharging pollutants in the waters of the state.

c. Existing practices and programs for managing facility wastewater and runoff from confined feeding operations

The most common Indiana NRCS Field Office Technical Guide approved animal waste management practices that are well suited for this watershed includes combinations of the

following practices. The Indiana NRCS Field Office Technical Guide practice number is provided for each management practice. A description of each of these practices is included in Appendix A. part 1. Many of these practices are components of a comprehensive nutrient management plan (CNMP) which is required to be developed and implemented by producers of confined feeding operations that require a state permit to operate or who accept cost-sharing from the Environmental Quality Incentive Program (EQIP). The existing practices include:

- Diversions (362)
- Roof runoff management (558)
- Waste storage pond (425)
- Dikes (356)
- Waste storage structure (313)
- Waste treatment lagoon (359)
- Waste utilization (633)
- Nutrient Management (590)
- Field Border (386)
- Composting facility (317)
- Plus use of any and or all of the conservation practices listed under the erosion and sediment control section B. 1. (c) Including but not limited to conservation tillage, cover crops, filter strips and other conservation buffers.

Indiana has several programs available from federal, state and local sources to address facility wastewater and runoff from confined animal feeding operations. There are both voluntary programs that provide technical and financial assistance to animal feeding operators for applying management techniques and practices to control runoff from animal waste and regulatory requirements. A listing of the programs available from federal, state and local sources follows. A description of each of the programs is included in Appendix A part 2. In addition Tables C1-C7 for description of programs and enforceability Appendix C material provides information on the enabling legislation, program authority, lead implementing agency, enforcement provisions and evaluation methods for each of the federal, state and local programs listed.

1. Existing Programs: Federal

There are several federal programs available to operators that provide educational, technical and financial assistance to help manage animal manure and waste water runoff. Nearly all of the existing federal programs are administered through USDA's Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA) under the conservation provisions of the 1996 and 2002 Farm Bills or other federal legislation. A listing of these programs follows. A brief description of each program is provided in Appendix A part 2.

- Environmental Quality Incentives Program (EQIP)
- Conservation Reserve Program (CRP)
- Conservation Operations (CO)
- Water Quality Improvement Demonstration Grants (CWA-Section 319)

2. Existing Programs: State and Local

The IDNR-Division of Soil Conservation in cooperation with 92 local soil and water conservation districts administers state programs to help manage animal manure and waste water runoff. Educational, technical, and cost sharing assistance is provided through both the state's Division of Soil Conservation and local soil and water conservation districts to help landusers evaluate alternatives and implement practices to reduce runoff of animal waste and or facility wastewater associated with confined animal feeding and improve water quality. The legislature has also established the following state programs that assist landusers in controlling erosion and reducing sedimentation.

- The Clean Water Indiana Program (CWI)
- The Lake and River Enhancement Program (LARE)

Implementing Agencies for Facility Wastewater and Runoff from Confined Animal Facilities Management

The agencies with primary responsibility for implementing practices to address animal waste and wastewater runoff from agricultural lands at local, state and federal level respectively are Soil and Water Conservation Districts (SWCDs), the DNR Division of Soil Conservation, and the USDA Natural Resources Conservation Service. The District Law governing soil and water conservation districts located in each county charges SWCDs with the responsibility of identifying and prioritizing soil and water conservation problems within each district and to establish or enlist programs and partners to address them. The DNR Division of Soil Conservation is responsible for providing administrative and technical assistance to SWCDs in carrying out their programs and for administering state soil and water programs under the policies of the State Soil Conservation Board. The USDA Natural Resources Conservation service (NRCS) is responsible for providing technical assistance to SWCDs to carry out soil and water conservation programs and for providing technical and administrative assistance to carry out federally mandated conservation programs.

In addition to these three primary agencies, the Farm Service Agency (FSA) helps administer a number of conservation programs that provide incentives and cost sharing to landusers for applying practices to manage manure and wasterwater runoff from confined animal feeding facilities. The Cooperative Extension Service (CES) also provides educational support to conservation districts and other agencies and groups as well as landusers to increase awareness and understanding of programs and practices available to control runoff from confined animal feeding facilities.

d. Enforcement Mechanisms

The overriding enforcement mechanism for implementing this measure will be the Indiana Confined Animal Feeding Law and the impending revisions (IAC 5-4-3 Rule 3) as mentioned previously. (See Tables C1-C7 for description of programs and enforceability Appendix C material) In addition The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM has also begun implementing federal provisions requiring that a plan be developed and implementation be underway within a scheduled timeline to assure that a Total Maximum Daily Load is not exceeded from all water pollution sources (both point and Nonpoint) entering impaired streams and other waterbodies listed on the state's 303(d) list which is provided to EPA annually.

(See Tables C1-C7 description of programs and enforceability Appendix C for more detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

3. Nutrient Management Measure

a. Definition

Develop, implement, and periodically update a nutrient management plan to: (1) apply nutrients at rates necessary to achieve realistic crop yields, (2) improve the timing of nutrient application, and (3) use agronomic crop production technology to increase nutrient use efficiency. When the source of the nutrients is other than commercial fertilizer, determine the nutrient value and the rate of availability of the nutrients. Determine and credit the nitrogen contribution of any legume crop. Soil and plant tissue testing should be used routinely. Nutrient management plans contain the following core components:

- Farm and field maps showing acreage, crops, soils, and waterbodies.
- Realistic yield expectations for the crop(s) to be grown based primarily on the producer's actual yield history, State Land Grant University yield expectations for the soil series, or SCS Soils-5 information for the soil series.
- A summary of the nutrient resources available to the producer, which at a minimum include:
- Soil test results for pH, phosphorus, nitrogen, and potassium;
- Nutrient analysis of manure, sludge, mortality compost (birds, pigs, etc.), or effluent (if applicable);
- Nitrogen contribution to the soil from legumes grown in the rotation (if applicable); and
- Other significant nutrient sources (e.g., irrigation water).
- An evaluation of field limitations based on environmental hazards or concerns, such as:
- Sinkholes, shallow soils over fractured bedrock, and soils with high leaching potential,
- Lands near surface water,
- Highly erodible soils, and
- Shallow aquifers.
- Use of the limiting nutrient concept to establish the mix of nutrient sources and requirements for the crop based on a realistic yield expectation.
- Identification of timing and application methods for nutrients to: provide nutrients at rates necessary to achieve realistic crop yields; reduce losses to the environment; and avoid applications as much as possible to frozen soil and during periods of leaching or runoff.
- Provisions for the proper calibration and operation of nutrient application equipment.

b. Applicability

This management measure applies to the application of nutrients to agricultural land. The application of nutrients especially through the use of commercial fertilizer to increase crop production on cropland is very common in Indiana and in this coastal management area. Data obtained from the Indiana Agricultural Statistics Report as shown previously in Figure 2-11 and Table 1-10, indicated a downward historical trend since 1991 in the distribution of

fertilizer for agricultural use in the three counties that encompass the Little Calumet - Galien Watershed. Local agricultural agency representatives indicate there is a similar trend occurring in tons of fertilizer distributed to the Watershed. However, the amount of fertilizer applied to cropland is still significant enough to warrant wide use of this management measure on cropland in the watershed.

The goal of this management measure is to minimize edge-of-field delivery of nutrients and minimize leaching of nutrients from the root zone. Nutrient management is pollution prevention achieved by developing a nutrient budget for the crop, applying nutrients at the proper time, applying only the types and amounts of nutrients necessary to produce a crop, and considering the environmental hazards of the site. In cases where manure is used as a nutrient source, manure-holding areas may be needed to provide capability to avoid application to frozen soil.

This measure may result in some reduction in the amount of nutrients being applied to the land, thereby reducing the cost of production as well as protecting both ground water and surface water quality. However, application of the measure in some cases may cause more nutrients to be applied where there has not been a balanced use of nutrients in the past. This will usually allow all the nutrients to be used more efficiently, thereby reducing the amount of nutrients that will be available for transport from the field during the non-growing season. While the use of nutrient management should reduce the amount of nutrients lost with surface runoff to some degree, the primary control for the transport of nutrients that are attached to soil particles will be accomplished through the implementation of erosion and sediment control practices outlined for control of erosion from cropland (section 1-c.)

c. Existing Practices and Programs Utilized for Nutrient Management

The Indiana NRCS Field Office Technical Guide approved practice specifically developed to address management of nutrients applied to cropland to protect water quality while improving economic return for the producer is:

- **Nutrient Management (590)** A list of integral management practice that support the development of implementation of a nutrient management plan to achieve this practice standard are outlined with this practice in Appendix A section 1.
- Plus use of any and or all of the conservation practices listed under the erosion and sediment control section B. 1. (c) Including but not limited to conservation tillage, cover crops, filter strips and other conservation buffers.

Indiana has a significant number of programs available from federal, state and local sources to address nutrient management on cropland. For the most part voluntary, these programs provide technical and financial assistance to landusers to apply practices that reduce erosion, runoff and management techniques to insure efficient, economical and environmentally sound use of nutrients on cropland. A listing of these programs follows. A brief description of each program is provided in Appendix A part 2.

1. Existing Programs—Federal

There are a significant number of federal programs available to agricultural landowners and operators that provide educational, technical and financial assistance to help reduce nutrient runoff or leaching into public waters of the state. Most of the existing federal programs are administered through USDA's Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA) under the conservation provisions of the

1985, 1996 and 2002 Farm Bills or other federal legislation. The federal programs include:

- Conservation Compliance
- Swampbuster Compliance
- Sodbuster Compliance
- Wetland Reserve Program (WRP)
- Environmental Quality Incentives Program (EQIP)
- Conservation Reserve Program (CRP)
- Conservation Operations (CO)
- Watershed Protection and Flood Prevention Act (PL 566)
- Water Quality Improvement Demonstration Grants (CWA-Section 319

2. Existing Programs: State and Local

The IDNR-Division of Soil Conservation in cooperation with 92 local soil and water conservation districts administers state programs to help landusers manage the application of nutrients to cropland to reduce potential runoff and leaching of nutrients into public water sources. Educational, technical, and cost sharing assistance is provided through both the state's Division of Soil Conservation and local soil and water conservation districts to help landusers implement runoff prevention practices and effective management techniques for nutrient management to improve water quality. The legislature has established the following state programs to assist in nutrient management.

- The Clean Water Indiana Program (CWI)
- The Lake and River Enhancement Program (LARE)

Implementing Agencies for Nutrient Management

The agencies with primary responsibility for addressing nutrient management on agricultural lands at local, state and federal level respectively are Soil and Water Conservation Districts (SWCDs), the DNR Division of Soil Conservation and the USDA Natural Resources Conservation Service. The District Law governing soil and water conservation districts located in each county charges SWCDs with the responsibility of identifying and prioritizing soil and water conservation problems within each district and to establish or enlist programs and partners to address them. The DNR Division of Soil Conservation is responsible for providing administrative and technical assistance to SWCDs in carrying out their programs and for administering state soil and water programs under the policies of the State Soil Conservation Board. The USDA Natural Resources Conservation Service (NRCS) is responsible for providing technical assistance to SWCDs to carry out soil and water conservation programs and for providing technical and administrative assistance to carry out federally mandated conservation programs.

In addition to these three primary agencies, the Farm Service Agency (FSA) administers a number of conservation programs that provide cost share incentives to landusers to apply nutrient management practices. The Cooperative Extension Service (CES) also becomes involved by providing educational support to conservation districts, other agencies, and landusers to increase awareness and understanding of nutrient management programs and practices.

d. Enforcement Mechanisms

All incentives and cost sharing provided to landusers through any of the existing federal, state and local program are offered through a contractual agreement between the landuser and the agency administering the respective program dollars. The contract spells out a life expectancy for each practice installed with financial assistance and authorizes the contracting agency to recover the money from the respective landuser in the event the practice is destroyed or not maintained for the life of the practice.

Indiana code IC 14-32 provides authorization for the State Soil Conservation Board, IDNR's Division of Soil Conservation, and the state's 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under this code to develop a state wide regulatory program when all reasonable voluntary approaches to erosion and sedimentation have been exhausted.

In addition The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM has started to implement federal provisions that require a plan be developed and implemented within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded in impaired streams and other water-bodies. This program applies to both point and Nonpoint source. Provided to the EPA annually, the state's 303(d) list identifies the impaired streams and water bodies.

(See Tables C1-C7 description of programs and enforceability Appendix C for more detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

4. Pesticide Management Measure

a. Definition

To reduce contamination of surface water and ground water from pesticides by sound management practices.

- Evaluate the pest problems, previous pest control measures, and cropping history.
- Evaluate the soil and physical characteristics of the site including mixing, loading, and storage areas for potential leaching or runoff of pesticides. If leaching or runoff is found to occur, steps should be taken to prevent further contamination.
- Use integrated pest management (IPM) strategies that:

    a. Apply pesticides only when an economic benefit to the producer will be achieved (e.g., applications based on economic thresholds); and

    b. Apply pesticides efficiently and at times when runoff losses are unlikely.

- When pesticide applications are necessary and a choice of registered materials exists, consider the persistence, toxicity, runoff potential, and leaching potential of products in making a selection;

- Periodically calibrate pesticide spray equipment; and
- Use anti-backflow devices on hoses used for filling tank mixtures.

b. Applicability

This management measure applies to the application of pesticides to agricultural lands. Pesticide use on cropland in Indiana is significant as documented by the data from the Indiana Agricultural Statistics 2001-2002 report (see page 35). As noted on page 35, local agricultural agency personnel that we met with on April 25, 2003 believe pesticide usage in the Little Calumet - Galien Watershed follows the same pattern as state data relative to the types of pesticides used and the percentage of corn and soybeans treated in the Watershed. However, it is important to note that most of the pesticides used on cropland today have shorter half-lives, have minimal bioaccumulation effects, and have smaller impacts on non-target organisms than the organochlorine compounds used in the past.

The goal of this management measure is to reduce contamination of surface water and ground water from pesticides. The basic concept of the pesticide management measure is to foster effective and safe use of pesticides without causing degradation to the environment. The most effective approach to reducing pesticide pollution of waters is, first, to release fewer pesticides and/or less toxic pesticides into the environment and, second, to use practices that minimize the movement of pesticides to surface water and ground water. In addition, pesticides should be applied only when an economic benefit to the producer will be achieved. Such an approach emphasizes using pesticides only when, and to the extent, necessary to control the target pest. This usually results in some reduction in the amount of pesticides being applied to the land, plants, or insects, thereby enhancing the protection of water quality and possibly reducing production costs as well.

c. Existing Practices and Programs Utilized for Pesticide Management

The Indiana NRCS Field Office Technical Guide approved practice specifically developed to address the management of pesticides applied to cropland to protect water quality while improving economic return for the producer is:

- **Integrated Crop Management System (Pest Management (595)** A list of integral management practice that support Pest Management (595) and the implementation of integrated crop management to achieve this practice standard are outlined with this practice in Appendix A section 1.
- Use of any and or all of the conservation practices listed under the erosion and sediment control section B. 1. (c) Including but not limited to conservation tillage, cover crops, filter strips and other conservation buffers.

Indiana has a significant number of programs available from federal, state and local sources to address pesticide management on agricultural land. They include both voluntary and regulatory programs providing educational, technical and financial assistance to landusers for applying approved pest management techniques that reduce the risk of runoff or leaching of pesticides into public waters. A listing of these programs follows. A brief description of each program is provided in Appendix A part 2.

1. Existing Programs: Federal

There are a significant number of federal programs available to agricultural landowners and operators that provide educational, technical and financial assistance to help manage the application of pesticides in an effective, economical and environmentally sound way to reduce pesticide runoff and leaching as a Nonpoint source of water pollution. Most of the existing federal programs are administered through USDA's Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA) under the conservation provisions of the 1985, 1996 and 2002 Farm Bills or other federal legislation. The federal programs include:

- Conservation Compliance
- Swampbuster Compliance
- Sodbuster Compliance
- Wetland Reserve Program (WRP)
- Environmental Quality Incentives Program (EQIP)
- Conservation Reserve Program (CRP)
- Conservation Operations (CO)
- Watershed Protection and Flood Prevention Act (PL 566)
- Water Quality Improvement Demonstration Grants (CWA-Section 319

2. Existing Programs: State and Local

The most important program at the state and local level for addressing pesticide management are both educational and regulatory. All commercial pesticide applicators are required to have training and continuing education hours to obtain and retain a commercial applicators license. In addition farmers and other private applicators are required to have training and continuing education to hold a private applicators permit. This training, licensing and re-certification program is called:

- Private Applicator Re-certification Program (PARP)

In addition to the education, training and licensing program the following soil and water conservation provide education, technical assistance and financial incentives for adopting land management practices that support effective pesticide management:

- The Clean Water Indiana Program (CWI)
- The Lake and River Enhancement Program (LARE)

Implementing Agencies for Pesticide Management

The agencies with primary responsibility for addressing pesticide management on agricultural lands at local, state and federal level respectively are the Purdue Cooperative Extension Service and the Office of the Indiana State Chemist. (OISC) Purdue Cooperative Extension Service (CES) provides the training programs for both commercial and private applicators in cooperation with the Office of the State Chemist. The State Chemists Office administers the Commercial Applicators Licensing Program and the Private Applicators Re-Certification Program. These lead agencies receive assistance from Soil and Water Conservation Districts (SWCD) and the DNR Division of Soil Conservation. Land management practices assistance is offered to land owners to reduce pesticide runoff and leaching. The USDA Natural Resources Conservation Service (NRCS) is responsible for providing technical assistance to SWCDs to carry out soil and water conservation programs and for providing technical and administrative assistance to carry out federally mandated conservation programs.

In addition to these three primary agencies, the Farm Service Agency (FSA) administers a number of conservation programs in cooperation with NRCS that provide cost share incentives to landusers to apply pesticide management practices and techniques.

d. Enforcement Mechanisms for Pesticide Management

The pesticide section of the Office of the Indiana State Chemist (OISC) is charged with the administration of the Indiana Registration Law (IC 15-3-3-5), the Indiana Pesticide Use and Application Law (IC 15-3-3-6), and also represents the Environmental Protection Agency (US EPA) in Indiana for the purpose of enforcing the Federal Insecticide Rodenticide Act (FIFRA). A full time field staff performs inspections, samples pesticide procedures and investigates complaints concerning the use or alleged misuse of pesticide products. The monitoring of certification, licensing, and registration of individuals and companies that apply pesticides continue to be a priority for OISC. Initial training and re-certification of commercial applicators is the responsibility of OISC. Initial training and re-certification training for private applicators through a program called Private Applicator Re-certification Program (PARP), is conducted by Purdue Cooperative Extension through Extension Educators located in each county. Private applicators, once licensed, are required to attend three (3) approved programs sponsored by an extension educator within five years of receiving their initial license. Tables C1-C7 in Appendix C provides more detail on authorizing legislation, program authority, lead implementing agency, enforcement mechanisms and evaluation methods for each program that will be used to implement this measure in the watershed.

5. Grazing Management Measure

a. Definition

Protect the waters in the watershed adjacent to pasture, and other grazing lands by:

1. Implementing one or more of the following to protect sensitive areas (such as streambanks, wetlands, estuaries, ponds, lake shores and riparian zones): exclude livestock, provide stream crossings or hardened watering access for drinking water locations, provide alternative drinking water locations; locate salt and additional shade, if needed, away from sensitive areas, or use improved grazing management (e.g.: herding) to reduce the physical disturbance and reduce direct loading of animal waste and sediment caused by livestock; *and,*

2. Implementing the range and pasture components of a Conservation Management System (CMS as defined in the Indiana Field Office Technical Guide of the USDA-NRCS by applying the progressive planning approach of the USDA-Soil Conservation Service (NRCS) to reduce erosion, or maintain range, pasture, and other grazing lands in accordance with activity plans established by either the Bureau of Land Management of the U.S. Department of the Interior or the Forest Service of USDA.

b. Applicability

The focus of the grazing management measure is on the riparian zone, yet the control of erosion from pasture, and other grazing lands above the riparian zone is also encouraged. Application of this management measure will reduce the physical disturbance to sensitive areas and reduce the discharge of sediment, animal waste, nutrients, and chemicals to surface waters. The management measure will be applied to grazing lands in the watershed used by

domestic livestock with particular focus on locations where livestock currently have access to streams and other waterbodies. There are limited locations in the Watershed where cattle and horses access open streams as a water supply. Local USDA/NRCS, DNR/DSC, SWCD, and USDA/FSA personnel estimate there are approximately 2 miles of streams impacted by livestock in Lake County's portion of the Watershed; 2 miles of streams in LaPorte County's share; and 3 miles of streams in Porter County. These concerns will be addressed through this measure by developing comprehensive grazing land management plans, which include providing alternative water supplies and livestock exclusion from water bodies by fencing.

The key options that will be considered when developing a comprehensive grazing management plan at a particular location include the development of one or more of the following:

Grazing management systems. These systems ensure proper grazing use through:

1. Grazing frequency (includes complete rest);
2. Livestock stocking rates;
3. Livestock distribution;
4. Timing (season of forage use) and duration of each rest and grazing period;
5. Livestock kind and class; and Forage use allocation for livestock and wildlife;
6. Proper water and salt supplement facilities;
7. Livestock access control.

The health of the riparian system, and thus the quality of water, is dependent on the use, management, and condition of the related uplands. Therefore, the proper management of riparian and wetland ecosystems will involve the correct management of livestock grazing and other land uses in the total watershed.

c. Existing Practices and Programs for Grazing Land Management

The Indiana NRCS Field Office Technical Guide approved practices to improve grazing land management and their practice number are listed below: A description of each of these practices is included in Appendix A. part 1.

- Deferred grazing (352)
- Planned grazing system (556)
- Prescribed grazing (528A)
- Pasture and hay planting (512)
- Pasture and hayland management (510)
- Brush (and weed) management (314)

Alternate Water Supply Practices:

Providing water and salt supplement facilities away from streams will help keep livestock away from streambanks and riparian zones. The establishment of alternate water supplies for livestock is an essential component of this measure when problems related to the distribution of livestock occur in a grazing unit. Descriptions of alternative water supply practices are provided below:

- Pipeline (516)
- Pond (378)
- Trough or tank (614)
- Well (642)
- Spring development (574)

Livestock Access Limitation Practices:

It may be necessary to minimize livestock access to streambanks, ponds or lakeshores, and riparian zones to protect these areas from physical disturbance. Practices to accomplish this include:

- Fencing (382)
- Livestock exclusion (472)
- Stream crossing (interim)
- Critical area planting (342)

Indiana has several programs available from federal, state and local sources to address facility wastewater and runoff from confined animal feeding operations. There are both voluntary programs that provide technical and financial assistance to animal feeding operators for applying management techniques and practices to control runoff from animal waste and regulatory requirements. A listing of these programs follows. A brief description of each program is provided n Appendix A part 2.

1. Existing Programs: Federal

There are a several federal programs available to operators that provide educational, technical and financial assistance to help manage grazing lands. Nearly all of the existing federal programs are administered through USDA's Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA) under the conservation provisions of the 1996 and 2002 Farm Bills. They include:

- Environmental Quality Incentives Program (EQIP)
- Conservation Reserve Program (CRP)
- Conservation Reserve Enhancement Program (CREP)
- Grazing Lands Initiative (GLI)
- Grasslands Reserve Program (GRP)
- Conservation Operations (CO)
- Water Quality Improvement Demonstration Grants (CWA-Section 319)

2. Existing Programs: State and Local

The IDNR-Division of Soil Conservation in cooperation with 92 local soil and water conservation districts administers state programs to assist landusers with grazing land management. Educational, technical, and cost sharing assistance is provided through both the state's Division of Soil Conservation and local soil and water conservation districts to help landusers evaluate alternatives and implement conservation measures and practices to establish and/or improve grazing land management which helps reduce Nonpoint source pollution. The legislature has also established the following state programs that assist landusers in grazing land management.

- The Clean Water Indiana Program (CWI)
- The Lake and River Enhancement Program (LARE)

Implementing Agencies for Grazing Lands Management

The agencies with primary responsibility for addressing the grazing lands management measure at the local, state and federal level respectively are: Soil and Water Conservation

Districts (SWCDs), the DNR Division of Soil Conservation, and the USDA Natural Resources Conservation Service. The District Law governing soil and water conservation districts located in each county charges SWCDs with the responsibility of identifying and prioritizing soil and water conservation problems within each district and to establish or enlist programs and partners to address them. The DNR Division of Soil Conservation is responsible for providing administrative and technical assistance to SWCDs in carrying out their programs and for administering state soil and water programs under the policies of the State Soil Conservation Board. The USDA Natural Resources Conservation Service (NRCS) is responsible for providing technical assistance to SWCDs to carry out soil and water conservation programs and for providing technical and administrative assistance to carry out federally mandated conservation programs including Farm Bill Conservation Provisions to address grazing land management. In addition to these three primary agencies, the Farm Service Agency (FSA) administers a number of conservation programs that provide incentives to landusers for establishing and/or improving grazing land management. The Purdue Cooperative Extension Service (CES) also becomes involved by providing educational support to conservation districts, other agencies, and landusers to increase awareness and understanding of proper grazing land management practices.

d. Enforcement Mechanisms

All incentives and cost sharing provided to landusers through any of the existing federal, state and local program are offered through a contractual agreement between the landuser and the agency administering the respective program dollars. The contract spells out a life expectancy for each practice installed with financial assistance and authorizes the contracting agency to recover the money from the respective landuser in the event the practice is destroyed or not maintained for the life of the practice.

Indiana code IC 14-32 provides authorization for the State Soil Conservation Board, IDNR's Division of Soil Conservation, and the state's 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under this code to develop a state wide regulatory program when all reasonable voluntary approaches to erosion and sedimentation have been exhausted.

In addition The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM has also begun implementing federal provisions requiring that a plan be developed and implementation be underway within a scheduled timeline to assure that a Total Maximum Daily Load is not exceeded from all water pollution sources (both point and Nonpoint) entering impaired streams and other waterbodies listed on the state's 303(d) list which is provided to EPA annually.

(See Tables C1-C7 description of programs and enforceability Appendix C for more detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

6. Irrigation Water Management – Management Measure (Excluded)

a. Definition:

To reduce Nonpoint source pollution of surface waters caused by irrigation:

1. Operate the irrigation system so that the timing and amount of irrigation water applied match crop water needs. This will require, as a minimum: (a) the accurate measurement of soil-water depletion volume and the volume of irrigation water applied, and (b) uniform application of water.
2. When chemigation is used, include backflow preventers for wells; minimize the harmful amounts of chemigated waters that discharge from the edge of the field, and control deep percolation. In cases where chemigation is performed with furrow irrigation systems, a tailwater management system may be needed.

b. Applicability

An investigation into the use of irrigation water on cropland documented that there is very little use of this practice on cropland in the Little Calumet-Galien Watershed. The little that is being used on row cropland only occurs in years with unseasonable dry weather or on vegetable crop production where either trickle or drag hose systems are normally used.

In the guidance document titled "The Coastal Nonpoint Pollution Control Program (CNPCP): Program Development and Approval Guidance", Section III.C.1. states that "a state is allowed to exclude some categories, sub-categories, or sources from the requirements of its coastal Nonpoint program under either of the following two situations:

(1) If a Nonpoint source category or subcategory is neither present nor reasonably anticipated in the 6217 management area, or

(2) If a state can demonstrate that a category, subcategory, or particular source of Nonpoint pollution does not and is not reasonably expected to, individually or cumulatively, present significant adverse effects to living coastal resources or human health.

The information obtained from our investigation into the use of irrigation on cropland in the Little Calumet-Galien Watershed clearly supports an exclusion of the irrigation on cropland under clause (2) because it does not and is not reasonably expected to present a significant adverse effect on living coastal resources or human health.

Local agricultural agency personnel working in the watershed provided the following information shown on Table 6-1 describing their best estimate of the extent and types of irrigation systems used in the watershed.

D. Coordination

Indiana's Lake Michigan Coastal Program (LMCP) is administered by the Indiana Department of Natural Resources, Division of Soil Conservation. Successful implementation of the Agricultural Management Measures outlined in this chapter will require coordination and cooperation between local, state and federal agencies and other potential partners. The agencies with primary responsibility for addressing agriculturally related water quality concerns at local, state and federal level respectively are Soil and Water Conservation Districts, IDNR- Division of Soil Conservation, Purdue Cooperative Extension Service and the USDA Natural Resources Conservation Service. These agencies will rely heavily upon a voluntary approach for addressing agricultural non-point pollution concerns utilizing education, technical assistance and financial incentives to assist landusers in implementing best management practices and technologies to reduce the potential risk of runoff and

/or leaching of the agricultural non-point pollutants such as sediment, nutrients, pesticides and livestock waste.

Soil and Water Conservation Districts (SWCD) located in each county are charged with the responsibility of identifying and prioritizing soil and water conservation problems within each district and to establish or enlist programs and partners to address them. The DNR Division of Soil Conservation is responsible for providing administrative and technical assistance to SWCDs in carrying out their programs and for administering state soil and water programs under the policies of the State Soil Conservation Board. The Cooperative Extension Service (CES) provides educational support to conservation districts and other agencies and groups as well as landusers to increase awareness and understanding of programs and practices available to reduce agriculture's contribution to water quality degradation. The USDA Natural Resources Conservation Service (NRCS) is responsible for providing technical assistance to SWCDs to carry out soil and water conservation programs and for providing technical and administrative assistance to carry out federally mandated conservation programs. These four agencies are referred to as the "Indiana Conservation Partnership" and the leadership of these agencies met regularly to coordinate efforts. In addition to these three primary agencies, the Farm Service Agency (FSA) administers a number of conservation programs that provide incentives and cost sharing to landusers for applying agricultural best management practices. All of these agencies work in close cooperation with Indiana's Department of Environmental Management (IDEM) and the Indiana Stream Pollution Control Board to help them carry out their respective responsibilities and utilize their authorities to achieve their mutual goals of improved water quality.

Coordination and Cooperation Anticipated in the Little Calumet-Galien Watershed

At the local level the three soil and water conservation districts that encompass the Little Calumet-Galien Watershed (Porter, Lake, and LaPorte) will:

- Make implementation of best management practices and technologies to improve water quality in the Little Calumet-Galien Watershed a high priority in their respective District Business Plans.
- With the assistance of their local offices of the Purdue Cooperative Extension Service inform agricultural landusers about the Lake Michigan Coastal Program and the agriculturally related water quality concerns and solutions identified in its Nonpoint Source Implementation Plan.
- Seek assistance from agencies, organizations and other partners to increase the adoption of agricultural management measures on agricultural land in the watershed.

Indiana government coordination and cooperation will include:

- DNR-Division of Soil Conservation providing technical assistance to agricultural landusers utilizing existing technical staff in the area
- State Soil Conservation Board placing a high priority on getting Lake and River Enhancement Projects initiated in the watershed utilizing funds available through Indiana's Lake and River Enhancement Program administered by the Division of Soil Conservation
- Indiana Department of Environmental Management (IDEM) placing a high priority on utilizing Clean Water Act Section 319 funds to establish Agricultural Nonpoint Source Control Demonstration Projects in the watershed
- IDEM providing increased in-field inspections of approved livestock waste management facilities

- Purdue Cooperative Extension Service Specialists and the Office of the State Chemist providing Continuing Education on proper storage and application of pesticides.

Federal government coordination and cooperation will include:

- The USDA Natural Resource Conservation Service (NRCS) providing technical assistance to agricultural landusers existing technical staff in the area
- NRCS making the Little Calumet-Galien Watershed a high priority in their State Ranking System for the use of Environmental Quality Incentive Program (EQIP) funds.

In addition to these specific agency examples of coordination and cooperation implementation this plan will require coordination and cooperation with a number of conservation organizations both public and private with a vested interest in both agriculture and the near shore water quality of Lake Michigan.

(See Tables C1-C7 Appendix C for description of programs and enforceability and more detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

E. Goal and Objectives for Implementing Agricultural Management Measures

Goal:

Indiana will implement agricultural non-point sources management measures in the Little Calumet-Galien Watershed to the extent practicable to achieve and maintain applicable water quality standards.

Priority Agricultural Nonpoint Source Concerns to be Addressed

The priority agricultural landscapes and activities that will be addressed in the 6217 management area (Little Calumet-Galien Watershed) are:

- Row cropland with 2 percent or greater slopes within a watershed of a stream or lake listed on the state's 303(d) list for impaired biotic communities and /or pathogens (see attached map);
- Confined Animal Facilities with animal units well below the numbers that require Confined Feeding Operation Permits (20-300 animal units) but located with ½ mile of a perennial stream or a lake;
- Confined Livestock Feeding Operations (small units) between 300 and 1,000 animal units;
- Nutrients applied to cropland within a watershed of a stream or lake listed on the state's 303(d) list for impaired biotic communities and /or pathogens without reference to a nutrient management plan;
- Pesticides applied to cropland within a watershed of a stream or lake listed on the state's 303(d) list for impaired biotic communities and /or pathogens without reference to a pesticide management plan;
- Livestock grazing within ½ mile of a perennial stream or a lake of 10 or more animal units;

Objectives:

The tables on the next several pages describe the objectives developed by the Agricultural Work Group for implementing each agricultural management measure that will be used to address the priority concerns listed above in order to achieve the goal. Each of the objectives is accompanied by measures of success, resources needed, a listing of responsible entities and a timeline for accomplishing each objective.

Objective Table for Agriculture

Table 2-13 Erosion and Sediment Control Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entities	Time Line
Minimize the delivery of sediment from agricultural lands to surface waters by working with landowners and operators to develop and apply the erosion control component of a conservation management system (CMS) on their cropland to reduce erosion.	* Number of conservation plans developed that include the erosion control component of a conservation management system (CMS) * Number of erosion control practices and technologies implemented to settle solids and associated pollutants in runoff from the contributing area for storms up to and including a 10 year, 24 hour frequency. * Reduced sediments and attached pollutants in surface water	* More technical personnel * More funds for cost-sharing/ incentives * Educational resources for educating the public * Cooperation and support from agricultural agencies, organizations and other interest groups * More Technical Service Providers	* Natural Resource Conservation Service (NRCS) - Soil Conservation Act of 1935 - Farm Security and Rural Investment act of 2002 · Farm Bill Conservation Program Provisions * Indiana Department of Natural Resources (IDNR) - IC 14-32-2-12 and IC 14-32-7-12 · Lake and River Enhancement Program * Purdue Cooperative Extension Service (CES) - Smith-Lever Act -1862 * Indiana Department of Environmental Management (IDEM) - IC 13-18 Sections 4-5 · Clean Water Act Section 319 Demonstration Projects * Soil and Water Conservation Districts (SWCD) - IC 14-32-5 · Clean Water Indiana Program	1-15 years

Table 2-14 Wastewater and Runoff from Confined Animal Facilities (small units)

Objective	Measure of Success	Resources Needed	Responsible Entities	Time Line
Minimize the discharge of contaminants from facility wastewater and storm water runoff by working with owners and operators of small confined animal facilities to design and implement animal waste storage and waste utilization systems.	* Number of manure management plans developed which include the design of a system to collect, store and properly utilize accumulated solids and wastewater from the confinement facility along with the runoff from storms up to and including 25 year, 24 hour frequency. * Number of animal waste storage facilities installed * Number of animal waste utilization systems implemented * Improved water quality by a reduction of pathogens in surface water	* Increased technical personnel * More funds for cost sharing/incentives * Educational resources for educating the public * Cooperation and support from agricultural agencies, organizations and other interest groups * More Technical Service Providers	* Indiana Department of Environmental Management (IDEM) - 327 IAC 5-4-3 · Clean Water Act Section 319 Demonstration Projects * Natural Resource Conservation Service (NRCS) - Soil Conservation Act of 1935 - Farm Security and Rural Investment Act of 2002 · Farm Bill Conservation Program Provisions * Purdue Cooperative Extension Service (CES) * Smith-Lever Act -1862 * Indiana Department of Natural Resources (IDNR) * IC 14-32-2-12 and IC 14-32-7-12 · Lake and river Enhancement Program * Soil and Water Conservation Districts (SWCD) * IC 14-32-5 · Clean Water Indiana Program	1-10 years

Table 2-15 Runoff and Leaching of Nutrients Applied to Cropland Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entities	Time Line
Reduce the potential for runoff and/or leaching of nutrients applied to cropland into surface and/or groundwater by working with landowners and operators to develop and implement nutrient management plans.	* Number of nutrient management plans developed that describe the nutrient rates necessary to achieve realistic crop yields based on current soil tests and other agronomic information while maximizing nutrient use efficiency * Number of nutrient management plans implemented * Improved water quality as a result of a reduction of nutrients in surface and groundwater.	* More technical personnel * More funds for cost-sharing/ incentives * Educational resources for educating the public * Cooperation and support from agricultural agencies, organizations and other interest groups * More Technical Service Providers	* Indiana Department of Environmental Management (IDEM) - IC 13-18 Sections 4-5 * Natural Resource Conservation Service (NRCS) - Soil Conservation Act of 1935 - Farm Security and Rural Investment Act of 2002 · Farm Bill Conservation Program Provisions * Indiana Department of Natural Resources (IDNR) - IC 14-32-2-12 and IC 14-32-7-12 · Lake and River Enhancement Program * Purdue Cooperative Extension Service (CES) - Smith-Lever Act -1862 * Soil and Water Conservation Districts (SWCD) - IC 14-32-5 · Clean Water Indiana Program	1-15 years

Table 2-16 Runoff of Leaching of Pesticides Applied to Cropland Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entities	Time Line
Reduce the potential for runoff and/or leaching of pesticides applied to cropland into surface and/or groundwater by working with landowners and operators to develop and implement pesticide management plans.	* Number of pest management plans developed that evaluate pest problems and incorporate integrated pest management strategies to improve use efficiency and effectiveness while minimizing risk of runoff and/or leaching * Number of pest management plans implemented * Improved water quality as a result of a reduction of pesticides in surface and groundwater.	* More technical personnel * More funds for cost-sharing/ incentives * Educational resources for educating the public * Cooperation and support from agricultural agencies, organizations and other interest groups * More Technical Service Providers	* Purdue Cooperative Extension Service (CES) - Smith-Lever Act-1862 - IC 15-3-3 Sections 5-6 * Natural Resource Conservation Service (NRCS) - Soil Conservation Act of 1935 - Farm Security and Rural Investment Act of 2002 · Farm Bill Conservation Program Provisions * Indiana Department of Natural Resources (IDNR) - IC 14-32-2-12 and IC 14-32-7-12 · Lake and River Enhancement Program * Indiana Department of Environmental Management (IDEM) - IC 13-18 Sections 4-5 * Soil and Water Conservation Districts (SWCD) - IC 14-32-5 · Clean Water Indiana Program	1-15 years

Table 2-17 Grazing Land Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entities	Time Line
Reduce physical disturbance and direct loading of animal waste and/or sediment caused by grazing livestock by working with landowners and operators to plan and apply the pasture components of a conservation management system on grazing land.	* Number of grazing land management plans developed that include the pasture components of a conservation management system (CMS). * Number of grazing land management plans implemented * Number of rotational grazing systems established * Number of feet of fencing installed to remove access of livestock to streams, riparian areas and wetlands * Improved surface water quality from reduced input of sediment and pathogens related to livestock access to sensitive areas and/or runoff from poorly vegetated grazing lands.	* More grazing land specialists * More funds for cost-sharing/ incentives * Educational resources for educating the public * Cooperation and support from agricultural agencies, organizations and other interest groups * Promotion of conservation easements by local planning groups	* Natural Resource Conservation Service (NRCS) - Soil Conservation Act of 1935 - Farm Security and Rural Investment Act of 2002 · Farm Bill Conservation Program Provisions * Indiana Department of Natural Resources (IDNR) - IC 14-32-2-12 and IC 14-32-7-12 · Lake and River Enhancement Program * Purdue Cooperative Extension Service (CES) - Smith-Lever Act-1862 * Indiana Department of Environmental Management (IDEM) - IC 13-18 Sections 4-5 · Clean Water Act Section 319 Demonstration Projects * Soil and Water Conservation Districts (SWCD) - IC 14-32-5 · Clean Water Indiana Program	1-10 years

Chapter 3
Management Measures for Forestry
Request for Exclusion of Forestry Category

A. Introduction

Program Development and Approval Guidance provided with the Coastal Nonpoint Pollution Control Program (CNPCP) states in Section III.C.1; a state is allowed to exclude some categories, sub-categories, or sources from the requirements of its coastal Nonpoint program. Under the following two situations, exclusions may be allowed:

(1) If a Nonpoint source category or subcategory is neither present nor reasonably anticipated in the 6217 management area, or

(2) If a state can demonstrate that a category, subcategory, or particular source of Nonpoint pollution does not and is not reasonably expected to, individually or cumulatively, present significant adverse effects to living coastal resources or human health.

Moreover, as NOAA and USEPA assert in the *Final Administrative Changes to the CNPCP Guidance*, states may focus resources on preventing and controlling significant impacts of Nonpoint source pollution on coastal resources. In addition, NOAA and USEPA encourage coordination and integration of coastal Nonpoint programs with other programs and water quality initiatives to establish priorities and develop strategies to meet CZARA 6217 program requirements.

In developing its CNPCP, Indiana intends to address all categories of Nonpoint source pollution that currently do or may in the future present significant adverse effects to its coastal waters. However, Indiana LMCP will exclude those that do not and are not reasonably expected, individually or cumulatively, to present significant adverse effects to living coastal resources or human health.

Lake Michigan coastal watershed commercial forestry activities are minimal. As there is limited commercial forestry within the watershed, Nonpoint pollution associated with commercial forestry operations are minimal to nonexistent. In addition, the future urbanization of the area precludes the chance that there will be any new future development of commercial forestry harvesting activities. Information, data, and opinions received from other agencies and programs support Indiana's opinion that it would not be productive or useful to develop priorities and strategies for a watershed activity that is minimally present and consequently an insignificant source of Nonpoint pollution. Therefore, based on the following information and per item (2) above, Indiana believes a categorical exclusion for forestry is justified.

Geography, Forest Cover, and Land Uses

Indiana's Lake Michigan Coastal Program Area, identified as the Little Calumet-Galien watershed, and is defined as the eight-digit hydrologic unit code (HUC). The Illinois and Indiana state line defines the western boundary. The northern boundary follows the Lake Michigan shore over to the Indiana-Michigan state line in LaPorte County. At the widest extent, the boundary extends south away from the shoreline seventeen miles to the Crown Point area and at its narrowest point, is less than two miles, just north of Hudson Lake in LaPorte County. The

boundary follows the 45-mile shoreline and approximately 52 miles along an east-west trajectory across the Valparaiso Moraine.

In Indiana's Lake Michigan Coastal Zone the native vegetation is a mixture of prairie and oak-hickory forest in various stages of succession. Encompassing a total area of 343,124 acres, Indiana's Lake Michigan Coastal Zone is 24 percent commercial, residential and industrial acreage, 41 percent natural acreage, and 35 percent agricultural acreage. No database was found that reported any commercial forestland in the coastal zone. Several existing data sources list forestland area. To better evaluate commercial forest activity in the region we consulted the National Agricultural Statistics Service (NASS) census data. Although NASS data is **county** specific rather than watershed specific, the three county area data provides an overall picture of potential commercial forestland activity. Data in Table 3-1 for the counties of Lake, LaPorte and Porter reveal minimal commercial forestry acreage. The ranking within Indiana alone demonstrates the small potential these three counties have for any significant commercial forest activity. Indiana's Coastal Zone contains only 30.1 percent of the total land area of these three counties, and the Coastal Zone contains the highest percentage of urban/suburban/commercial lands within the three counties.

Table 3-1

County	County Acreage	Indiana Forested Acres Rank	Classified Forest Acreage	# Of Tracts
Lake	318,095	88th	337	16
LaPorte	382,897	56th	4,252	123
Porter	267,660	86th	1,234	37
Totals:	**968,652**	**N/A**	**5,823**	**176**

Source: 1997 National Agricultural Statistics Service & DNR Division of Forestry

Based on NASS data LaPorte ranks the highest for forested acreages of the three drainage basin counties at 56th as compared to Indiana's 92 counties. Porter and Lake rank 86th and 88th, respectively. Most of the contiguous forested areas are in the eastern most sections of the drainage basin. No large tracts of commercial forest exist within Indiana's Lake Michigan Coastal Program boundaries. Only two known sawmills operate in the watershed, supplied by logs hauled in from outside the watershed. According to DNR Division of Forestry records, these mills are upstream in the watershed inland from the immediate coast. No comprehensive list of woodland owners in the coastal program area exists. DNR Division of Forestry records make no distinction between private versus agency or organizational forest ownership. Forest ownership is becoming divided among an increasing number of owners. This fragmentation is attributed to increased residential development, which negates the ability of forest managers to effectively manage forestland for timber harvesting. Fractured, small and discontinuous tracts of trees in an urbanizing area would describe much of the woodland not contained in parks or other preserved areas. These urban forests are not viable logging areas for commercial forestry interests due to the proximity to significant urban areas with a large urban population and the proximity of home dwellings. Existing highways and interstates facilitate new housing developments that continue to divide existing forestland areas and reduce the potential for future timberland harvests.

Private individuals have different reasons for owning timberland. Numerous, differing motivations makes predicting how landowners will manage forest resources difficult. When private owners were asked in a DNR Division of Forestry survey what they expect from their

forests over the next decade, most responded that they expected visual enjoyment of their forests. Other less important benefits include: farm and home use, recreation, increasing land values, and firewood (*Birch, 1996*).

The State of Indiana, counties, municipalities, and the U.S. government own and maintain timberland. "State" ownership includes a small amount of county and municipal land. Management strategies vary across and within public agencies. Variables include quantity of forest resources, access to the public property, goals and management objectives of the agency, the interests of the public, and amount of private land surrounding the public land. With few exceptions, most public lands in the area are already protected from harvesting activities.

Nonpoint Programs, Inventories and Information

While Indiana recommends exclusion of forestry from its 6217 CNPCP, there are several programs currently available to assist woodland owners. These programs provide sound management practices that are conducive to minimizing Nonpoint source contributions from small logging practices. Many of these programs are suited for small tracts where portable saw mills might be used for selective harvests. Other programs empower localities to protect or maintain woodland for parks and other recreational uses.

These state programs encourage individuals to voluntarily implement forest management plans for wise use of private forestlands. Individuals who voluntarily participate receive incentives like tax breaks, cost share or lease agreements. Programs offered by the state of Indiana include the Classified Forest Program initiated by the Forest Land Classification Act. Classified forests are ten acres or more in size and support growth of native or planted trees which have been set aside for the production of timber, wildlife habitat, watershed protection, and soil erosion control. Lands designated as such by the State Forester are eligible for assessment at $1.00 per acre and taxes are paid on that assessment. The Classified Forest Act requires the classified forest owner to follow minimum standards of good timber management as prescribed by the Department of Natural Resources, and follow a written management plan that is approved by the district forester. The plan must be prepared by a professional forester in consultation with and signed by the owner. Indiana provides tax breaks for forestry operations contingent upon the adoption and implementation of forestry management plans. The consequence for violating the plan or withdrawing from the program is the loss of the tax break with the recapture of the taxes avoided in the preceding ten years.

The state supports and utilizes federal programs to complement state programs. The Forest Land Enhancement Program (FLEP) replaces the Forest Improvement Program (FIP) and Forest Stewardship Incentive Program. The FLEP concerns the supply of wood products and encourages stewardship for privately owned woodlands. The USDA Conservation Reserve Program (CRP) removes erodible land from row crop production. All of these programs require that the forest owner follow a plan approved by the DNR district forester and involve cost sharing for eligible expenditures. Such expenditures include tree planting, timber stand improvement and critical area stabilization. Planting trees for windbreaks, reforestation, and future timber harvest or erosion control may qualify the landowner for cost sharing assistance. FLEP has potential to refund up to 50 percent of planting costs, while the CRP may refund 50 percent of the planting costs plus an annual crop rental fee for the mandatory ten-year duration of the program. Landowners who plant trees, grasses or legumes in critical areas (such as forest roads or other areas with erosion problems), may be eligible for a 50 percent refund on expenditures.

Rules are currently not finalized for the Conservation Security Program (CSP). The 2002 Farm bill states that forestland that is an incidental part of an agricultural operation can receive

technical/cost share assistance for water quality best management practices. While this is a voluntary program, participants will be bound by contractual agreements. CSP cooperation between state and federal agencies will continue in the same manner as FIP and SIP program cooperation. State Forestry Agencies in coordination with their State Forest Stewardship Coordinating Committees began developing a State Priority Plan for FLEP during the spring 2003. This Plan will provide the details for how the FLEP funds will be utilized, including minimum acres, maximum acres, aggregate payment, use for technical, educational and cost-share assistance, and all other factors for the program.

Landowners are required to have a forest management plan to be eligible for cost-share. The practices to be cost-shared and the cost-share rate will be described in the State Priority Plan. FLEP is available for all Non-industrial Private Forest (NIPF) owners. The cost-share practices are limited to the treatment of 1,000 acres per year with an aggregate payment not to exceed $100,000 for the life of this Farm Bill. A waiver for the treatment of up to 5,000 acres is available if significant public benefit is shown. The waiver is granted through the State Forester and approved by the Regional Forester. There is no limit set on the amount of forestland owned by an individual as long as the person qualifies as an NIPF owner.

Well-managed forests produce timber and other forest products; provide wildlife habitat, recreational opportunities, improved water quality, and other amenities. Though our national and corporate owned forests are often managed to maximize these benefits, too often NIPF lands do not receive such careful management. NIPF landowners generally own relatively small tracts of forestland, and subsequently make only occasional management choices, usually with very little technical understanding of the impacts of their decisions. The Forest Stewardship Program (FSP), formerly known as the Rural Forestry Program (RFP), provides a foundation for Federal technical assistance to the States, and helps the States field well informed, trained, and equipped forest professionals to help NIPF landowners with the confounding set of forestry related issues confronting them.

Federal and state cooperation has occurred and is ongoing. The US Forest Service worked on the task force for developing a state Nonpoint source management plan. The US Forest Service consults with IDEM regarding responsibilities under the Clean Water Action Plan.

Description and Documentation of Data Rationale

Several data sources document and provide a rationale for exclusion of forestry from Indiana's CNPCP. This discussion focuses on excluding forestry due to the minimal quantity of commercially harvested forestland in the watershed. The most significant data sources show that forest harvesting is minimally present is primarily based from corroborating the USDA National Agricultural Statistics Service (NASS) data with DNR Division of Forestry ownership maps found at the USDA Forest Service website. Significant forestland in the 6217 coastal watershed is in public ownership. Based on management plans of the public agencies these public lands are managed primarily for recreation or preservation rather than timber harvesting.

In 1997 all Indiana Soil and Water Conservation Districts conducted a series of meetings often referred to as "Locally Led" meetings. The scope of these meetings was to obtain local input regarding natural resource concerns from the general public and cooperating agencies and organizations. Referring to an analysis of that data (Purdue Publication AGRY-00-06) there were no indications by any of the three counties—Lake, Porter, or LaPorte—that forestry was a local natural resource concern. This is consistent with the fact that commercially harvested forestland and timber production activity are minimal in the area and consequently is an insignificant Nonpoint source contributor.

Discussion of the Indiana Department of Environmental Management (IDEM), 305b findings and (d) list is limited since the contribution of commercial forest production is a minimal landuse in the watershed. The fact that forestry did not show up as a contributing Nonpoint source in any of the 305(b) report findings from IDEM testing that began during 2002 in the 6217 CNPCP watershed area supports this conclusion.

B. Conclusion and Recommendation

A variety of information, data, and opinions obtained from agencies at the federal, state and local program level strongly support the exclusion of forestry from Indiana's Coastal Nonpoint Pollution Control Program. The following key factors support that conclusion:

- Commercial forestland use in Indiana's Lake Michigan Coastal Area represents an insignificant portion of the total land usage. The forested areas in the watershed are highly fragmented due to urban/suburban development and existing industrial/ commercial usage. Forests in the Coastal Area are further fragmented by a concentration of transportation infrastructure. Indiana's Coastal Area supports a transportation corridor where interstates, state highways and rail systems merge to connect the nearby Chicago Metropolitan Area with Indiana and points beyond.
- Sawmill and commercial forests are few in number and are not located near the coastal dune areas.
- Individuals who reside in low-density suburban settings own most forestland. These small tracts of property make commercial logging unfeasible. In most cases there is no desire to log the property.
- Preserved woodlands are numerous and extensive in the area in the form of federal, state, and local parks where timber harvesting is prohibited.
- Nonpoint source inventories and data (305(b) and 303(d)) do not suggest significant contributions of degradation by forestry management or harvesting activities.
- Much of the soil erosion occurring in the 6217 boundary area can be traced to sediments from stream bank erosion caused by more extreme flow variation due to the ever increasing impervious surface areas commonly found in urban/suburban watersheds.

Indiana intends to integrate forestry practices into the agricultural and urban components of its CNPCP for the purpose of reducing Nonpoint pollution problems. The strategies should be two-fold: 1) utilize existing programs best suited for rural forested areas like riparian buffers, fencing of livestock from wooded and/or riparian areas, and 2) utilize and develop urban forest programs that support healthy riparian zones, maintain canopy densities to slow runoff, and target funding to prioritize those needs in urban streams.

Based on the information and data presented, commercial forestry-related activities are not now significant nor are they foreseen, either individually or cumulatively, to present significant adverse impacts to Indiana's living or non-living coastal resources or human health. Thus, Indiana believes a categorical exclusion for forestry from its CNPCP is reasonable and warranted.

Chapter 4
Management Measures for Urban/Rural Areas

A. Introduction

Lake, Porter, and LaPorte counties contain Indiana's Lake Michigan coastal area. The Little Calumet-Galien Watershed lies within the northern portion of these three counties and drains 343,124 total acres of land. In the watershed 82,601 acres (24 %) are considered urban land. Approximately 23,423 acres are considered high-density urban land and 21,923 acres are considered low-density urban land. Commercial/Industrial/Transportation accounts for the 26,938 acres. The remaining 10,317 acres is comprised of maintained urban grasslands. Urbanized land contains a mixture of residential, commercial, and industrial development and transportation networks (See Figure 4-2: Urban Landuses).

The highest percentage of urbanized land lies in Lake County followed by Porter County and LaPorte County (see Figure 4-2). Historically, heavy industrial development primarily occurred along the coast of Lake Michigan. Steel mills, oil refineries, and specialized industry have located on or near the Indiana Coast. Lake County has the highest density of industrial development. The highest density of residential development exists adjacent to this industry where small cities and towns grew to support the work force. Table 4-1 depicts the percent of developed land in the Lake Michigan Coastal Area based on the 14 Digit Hydrologic Unit Areas. Information regarding population density is presented in Figure 4-5.

Table 4-1: Percentage of Developed Land in the Lake Michigan Coastal Area*

Hydrologic Unit Areas	Percent Developed
Turkey Creek-Merrillville	25-50%
Deep River-Little Calumet River	50-75%
Burns Ditch-Willow Creek	50-75%
Little Calumet River-Burns Ditch Outlet	25-50%
Trail Creek-Otter Creek	25-50%
Salt Creek-Sagers Lake/Valparaiso	25-50%
Lake Michigan Shoreline-Indiana Harbor Canal	50-75%
Grand Calumet River-Gary	50-75%

* Most heavily developed sub-watershed areas. Does not present all areas in CNPCP area

Today, most new development in the coastal region is occurring inland, away from the Lake Michigan coastline. A number of cities and towns within the coastal region are pursuing re-development of areas within their communities. Based on information provided by the United States Department of Commerce, Bureau of the Census, a Purdue University study has documented population trends for Lake, LaPorte, and Porter Counties and local communities. The study, as shown in Table 4-3, entitled "Population Trends for Indiana Counties, Cities, and Towns, 1970 – 2000" reveals the following population trends.

Figure 4-2: Urbanized Areas of CNPCP

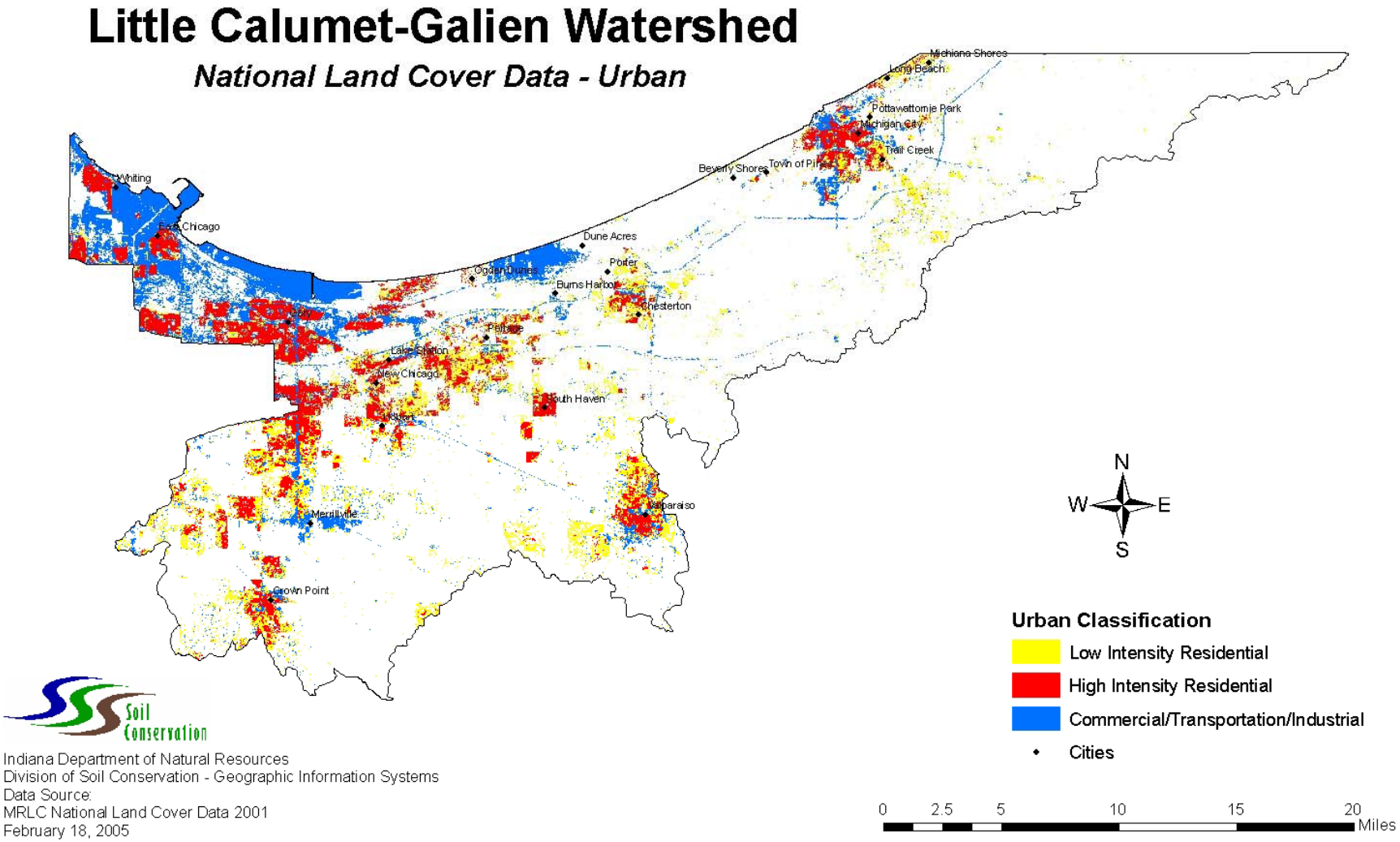


Table 4-3: Population Trends for Indiana Counties, Cities, and Towns

County	Population 2000	Population 1990	Population Difference	Percent Change	Percent Rural [120]
Lake	484,564	475,594	8,970	1.89	8.37
LaPorte	110,105	107,066	3,039	2.84	41.46
Porter	146,798	128,932	17,866	13.86	41.77

Source: United States Department of Commerce, Bureau of the Census

Based on the information above, population growth has been greatest in LaPorte and Porter Counties.

The following tables from the same study show trends for cities and towns. The cities and towns that occur within the Lake Michigan Coastal Area are highlighted. Upon evaluation of this data, it is clear that the significant growth in population has occurred in those communities to the south of the established urban centers and the outlying county areas.

Table 4-4: Indiana Population Growth, 1970-2000

	City/Town	2000	1990	1980	1970	%Change 1990- 2000
Lake County	**Cedar Lake**	**9,279**	**8,885**	**8,754**	**7,589**	**4.43%**
	Crown Point	**19,806**	**17,728**	**16,455**	**10,931**	**11.72%**
	Dyer	**13,895**	**10,923**	**9,555**	**4,906**	**27.21%**
	East Chicago	**32,414**	**33,892**	**39,786**	**46,982**	**-4.36%**
	Gary	**102,746**	**116,646**	**151,953**	**185,415**	**-11.92%**
	Griffith	**17,334**	**17,916**	**17,026**	**18,168**	**-3.25%**
	Hammond	**83,048**	**84,236**	**93,714**	**107,983**	**-1.41%**
	Highland	**23,546**	**23,696**	**25,935**	**24,947**	**-0.63%**
	Hobart	**25,363**	**21,822**	**22,987**	**21,485**	**16.23%**
	Lake Station	**13,948**	**13,899**	**14,294**	**9,858**	**0.35%**
	Lowell	**7,505**	**6,430**	**5,827**	**3,839**	**16.72%**
	Merrillville	**30,560**	**27,257**	**27,677**	**0**	**12.12%**
	Munster	**21,511**	**19,949**	**20,671**	**16,514**	**7.83%**
	New Chicago	**2,063**	**2,066**	**3,284**	**2,231**	**-0.15%**
	Schererville	**24,851**	**19,926**	**13,209**	**3,663**	**24.72%**
	Schneider	**317**	**310**	**364**	**426**	**2.26%**
	St. John	**8,382**	**4,921**	**3,974**	**1,757**	**70.33%**
	Whiting	**5,137**	**5,155**	**5,630**	**7,054**	**-0.35%**
	Winfield	**2,298**	**0**	**0**	**0**	**0.00%**
	Cities/Towns	**444,003**	**435,657**	**481,095**	**463,748**	**1.92%**
	Rural Areas	**40,561**	**39,937**	**41,870**	**82,505**	**1.56%**
	County Total	**484,564**	**475,594**	**522,965**	**546,253**	**1.89%**

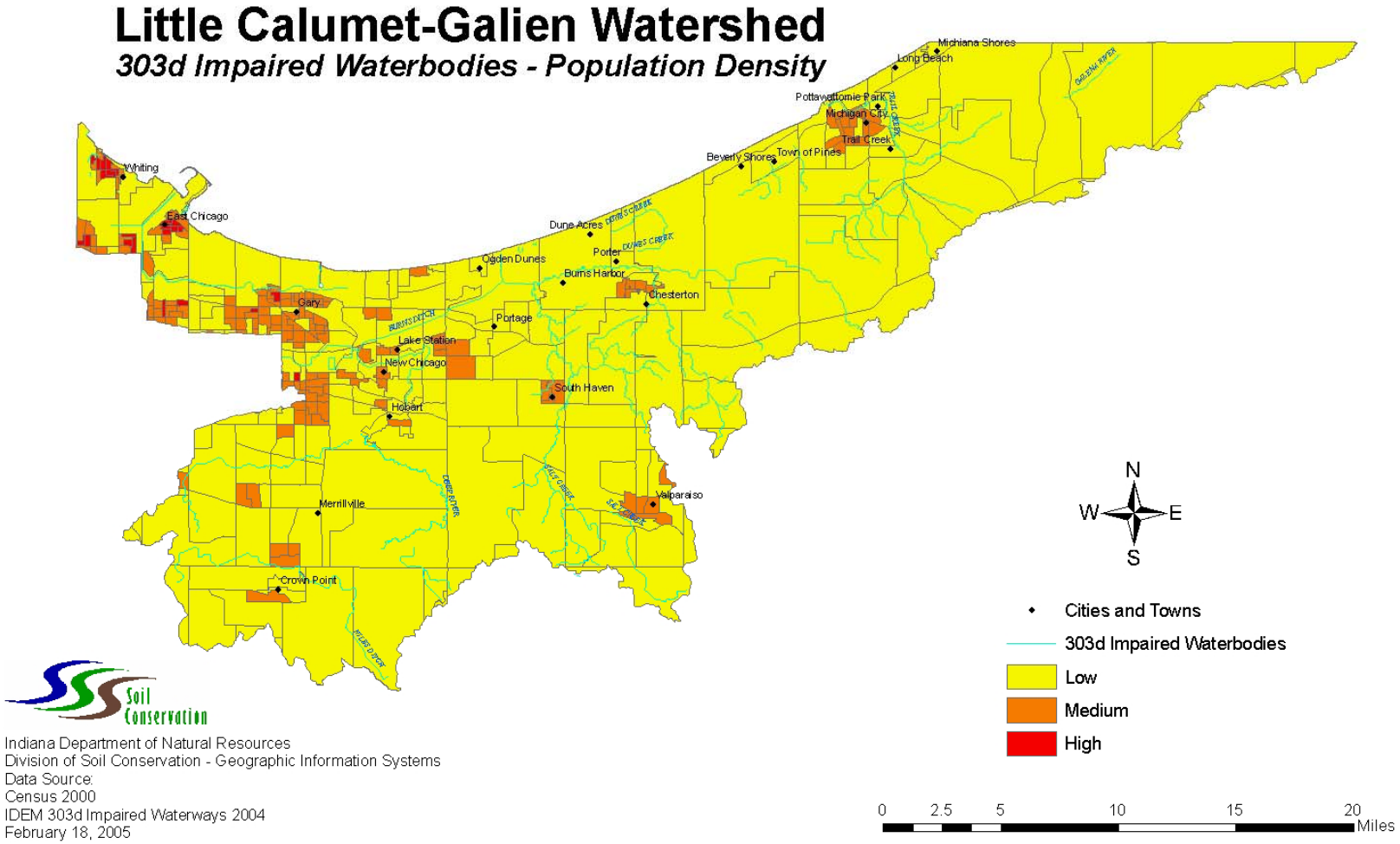
[20] The population figures for rural areas were determined for each county as the difference between total county population of all incorporated cities and towns in the county. Therefore, the population figures for rural areas represent all unincorporated areas of each county.

	City/Town	2000	1990	1980	1970	%Change 1990-2000
LaPorte County	Kinsbury	229	258	329	314	-11.24%
	Kingsford Heights	1,453	1,486	1,618	1,200	-2.22%
	Lacrosse	561	677	713	696	-17.13%
	LaPorte	21,621	21,507	21,796	22,140	5.30%
	Long Beach	1,559	2,044	2,262	2,740	-23.73%
	Michiana Shores	330	378	464	449	-12.70%
	Michigan City	32,900	33,822	36,850	39,369	-2.73%
	Pottawatomie Park	380	281	284	374	35.23%
	Trail Creek	2,296	2,463	2,581	2,697	-6.78%
	Wanatah	1,013	852	879	773	18.90%
	Westville	2,116	5,255	2,887	2,614	-59.73%
	Cities/Towns	64,458	69,023	70,663	73,366	-6.61%
	Rural Areas	45,648	38,043	37,969	31,976	19.99%
	County Total	110,106	107,066	108,632	105,342	2.84%

	City/Town	2000	1990	1980	1970	%Change 1990-2000
Porter County	Beverly Shores	709	622	864	946	13.99%
	Burns Harbor	766	788	920	1,284	-2.79%
	Chesterton	10,488	9,124	8,531	6,177	14.95%
	Dune Acres	213	263	291	301	-19.01%
	Hebron	3,596	3,183	2,696	1,624	12.98%
	Kouts	1,698	1,603	1,619	1,388	5.93%
	Ogden Dunes	1,313	1,499	1,489	1,361	-12.41%
	Pines	798	789	962	1,007	1.14%
	Portage	33,496	29,060	27,409	19,127	15.26%
	Porter	4,972	3,118	2,988	3,058	59.46%
	Valparaiso	27,428	24,414	22,247	20,020	12.35%
	Cities/Towns	85,477	74,463	70,016	56,293	14.79%
	Rural Areas	61,321	54,469	49,800	30,821	12.58%
	County Total	146,798	128,932	119,816	87,114	13.86%

Data Source: United States Department of Commerce, Bureau of the Census

Figure 4-5: Population Density



Background - Storm Water Permit Requirements for Point & Nonpoint Sources in Indiana

1. Phase I Implementation in Indiana

In the early 1990s, the U.S. Environmental Protection Agency (EPA) promulgated National Pollutant Discharge Elimination System (NPDES) regulations based on requirements of the Clean Water Act. In 1992, under authority granted by EPA, Indiana adopted Rules to address the requirements of the NPDES program. The Indiana Department of Environmental Management (IDEM) was given the responsible for issuing NPDES permits.

One of the Rules adopted by the Indiana Department of Environmental Management is Indiana Administrative Code 327 IAC 15-5. 327 IAC 15-5 is a performance-based regulation designed to reduce pollutants, principally sediment, as a result of soil erosion associated construction and/or land disturbing activities. The requirements of 327 IAC 15-5 apply to all persons who are involved in construction activity (which includes clearing, grading, excavation and other land disturbing activities) that results in the disturbance of five (5) acres or more of total land area. If the land disturbing activity results in the disturbance of less than five (5) acres of total land area, but is part of a larger common plan of development or sale, the project is still subject to stormwater permitting.

In Indiana, 327 IAC 13-5 is administered by the Indiana Department of Environmental Management Office of Water Quality (IDEM, OWQ) in cooperation with the Indiana Department of Natural Resources, Division of Soil Conservation (DNR-DSC), and Indiana's Soil and Water Conservation Districts (SWCDs). This partnership was established to address permit administration and in particular field implementation of the rule. Each partner has specific responsibilities related to implementation of the rule.

Indiana Department of Environmental Management, Office of Water Quality
Role: *Administer and Enforce 327 IAC 15 - 5*
Responsibilities:

- Keep Records of NOI Letters
- Enforce Requirements of 327 IAC 15 – 5
- Provide Training on the Rule

Soil and Water Conservation District and DNR, Division of Soil Conservation
Role: *Field Level Oversight to Assist and Ensure that Applicants are complying with the Rule.*
Responsibilities:

- Review and Approve Erosion and Sediment Control Plans
- Notify IDEM, OWQ of Receipt of an Acceptable Erosion and Sediment Control Plan
- Act as an Agent of the IDEM, OWQ for the Purpose of Inspection of Construction Sites for Compliance
- Provide Technical Assistance to the Responsible Party to Maintain Compliance
- Provide Training on Erosion and Sediment Control Principles and Best Management Practices

- The DNR, DSC also Coordinates Implementation of the Rule at a Regional and State Level to ensure Consistency with the Rule

2. Phase II Implementation in Indiana

In 1992 Indiana began regulating, through NPDES permitting, all construction site activities including clearing, grading, and excavation that result in five (5) acres or more of land disturbance or that are part of a larger common plan of development or sale. In 2003, Indiana revised its NPDES Rules to bring its programs into compliance with Phase II of the U.S. Environmental Protection Agency's regulations. Indiana's rule revisions included adding omissions from the program's Phase I rules and updating existing rules to clarify issues that have been associated with the administration of the rules since 1992.

327 IAC 15-5 which regulates erosion and sedimentation associated with construction and/or land-disturbing activities has been revised to meet the requirements of Phase II. In November of 2003 the new rules became effective and significant changes include:
Projects with land disturbance of one (1) acre or more will be required to obtain NPDES permits

- Five (5) year permit term
- Estimate of peak discharges, 10 year storm event (Pre-Construction and Post-Construction)
- A revised requirement for plan review and verification the plan meets the requirements of the rule
- Required monitoring of project site by project owner or their designated representative (including documentation)
- Provisions for spill prevention and response
- Requirements to address concrete washout
- Requirements for pollution prevention on individual lots within permitted sites
- Contractor notification of Stormwater Pollution Plan and associated activities
- Posting of project information
- Post construction pollutant reduction

The implementation of 327 IAC 15-5 will continue to be administered cooperatively between the Indiana Department of Environmental Management, Soil and Water Conservation Districts, and the Division of Soil Conservation. The program will be administered in a similar fashion as was described in Section A, Item 1.

In addition to revisions of 327 IAC 15-5, IDEM established a new rule (327 IAC 15-13), which will regulate Municipal Separate Storm Sewer Systems (MS4s). Under Phase I, the general permit rule for MS4 communities was not necessary because Indianapolis was the only city to meet the population threshold criteria of 100,000. Since Indianapolis was the only city to meet the Phase I criteria, IDEM chose to issue the city an individual stormwater permit.

MS4s are defined as a conveyance or system of conveyances owned by a State, city, town, or other public entity that discharges to waters of the U.S. and is designed or used for collecting or conveying stormwater. A regulated conveyance system includes roads with drains, municipal streets, catch basins, curbs, gutters, storm drains, piping, channels, ditches, tunnels and conduits. It does not include combined sewer overflows and publicly owned treatment works (POTW).

Under Phase II, 327 IAC 15-13 was written to regulate most MS4 entities (cities, towns, universities, colleges, correctional facilities, hospitals, conservancy districts, homeowner's associations and military bases) located within mapped urbanized areas, as delineated by the U.S. Census Bureau, or, for those MS4 areas outside of urbanized areas, serving an urban population greater than 7,000 people.

The Indiana Department of Environmental Management has established a criterion that is utilized to determine those entities regulated under 327 IAC 15-13 (Rule 13). As information becomes available, the designation listing and criteria may be revised.

MS4 *Designation Criteria*

A. Any entity located on a Census Bureau urbanized area map is automatically designated (based on 2000 Census data mapping) - urbanized area maps are available at the Census Bureau web page.
B. Any entity whose population (based on 2000 Census data) is greater than or equal to 10,000 is automatically designated (regardless of percentages of combined sewer systems);
C. Any entity whose population (based on 2000 Census data) is greater than or equal to 7,000 is potentially designated if:
    i. The community had a percent growth between 1990 and 2000 greater than or equal to 10 (see percent growth table); or
    ii. The community population, when combined with other entity populations/full-time equivalent enrollments within the community (e.g. universities, correctional facilities, hospitals, military bases), is greater than or equal to 10,000
D. Any entity (e.g. universities, correctional facilities, hospitals, military bases) with a daily user population/full-time equivalent enrollments of 1,000 or more is potentially designated if:
    i. The entity is located within a designated community or mapped urbanized area; and
    ii. The entity has, and is responsible for, a storm water conveyance system.
E. Any entity that is either physically connected to a regulated MS4 entity, or has documented evidence of contributing to impairment of water quality is potentially designated (to be used after the initial MS4 list is designated, when more data is available).
F. Within a mapped urbanized area, a community that has a population under 1,000 people is conditionally exempt, as long as the exempted community is not contributing to an impairment of water quality.

The entities listed below lie in whole or in part within the Lake Michigan Coastal Area and have been notified by the Indiana Department of Environmental Management of their status as MS4s (see Figure 4-6 Designated MS4 Communities). Designated entities have not yet submitted boundaries for areas regulated under the MS4 guidelines. Figure 4-6 presents the location of the city centers of designated communities. (More complete information will be provided as available)

Based on 2000 Urbanized Area Map:

- Lake County
- LaPorte County
- Porter County
- Chesterton
- Crown Point
- East Chicago
- Gary
- Hammond
- Hobart
- Lake Station
- Long Beach
- Merrillville
- Michigan City
- New Chicago
- Ogden Dunes
- Portage
- Porter
- South Haven Census Defined Place
- Trail Creek
- Valparaiso
- Whiting

Based on Residential Population and Location within an Urbanized Area (*Not Identified on Figure 4-6)*

- Aberdeen Property Owner's Association.
- Independence Hill Conservancy District

Based on Inmate Population and Location within an Urbanized Area (*Not Identified on Figure 4-6)*:

- Lakeside-Michigan City

Based on Universities/College Enrollment and Location within an Urbanized Area:

- Valparaiso University

Based on Infrastructure Criteria (*Not Identified on Figure 4-6)***:**

- State owned and operated roadways, bridges, associated structures
- State owned and operated roadway maintenance facilities

The entities listed below are within the Lake Michigan Coastal Area and have been conditionally exempted from the MS4 Rule based on low population or enrollment.

Urbanized Area Communities that are conditionally exempt based on Low Population:

- Beverly Shores

- Burns Harbor
- Dune Acres
- Duneland Beach
- Michiana Shores
- Pottawattamie Park
- Town of Pines
- Tremont

Urbanized Area Universities/Colleges that are conditionally exempt based on Low Enrollment or no MS4:

- Purdue University-Calumet

Based on the areas designated by IDEM it could be concluded that the entire coastal area will be covered by a permitted MS4. However, 327 IAC 15-13 has provisions that enable an MS4 to designate only a portion of their legal boundaries for permit coverage. If only a portion of an MS4 is regulated, the boundaries of the regulated area must correspond to the nearest township or section containing the mapped urbanized area. This provision in the rule, if enacted by an MS4, allows some areas to not be covered by the MS4s Stormwater Program. The overall authority to regulate these excluded areas will be through 327 IAC 15-5, should this situation occur.

Stormwater Quality Management Plan

The MS4 Rule, 327 IAC 15-13, establishes requirements for designated communities to develop a Stormwater Quality Management Plan. The plan must include six (6) minimum control measures. These measures include:

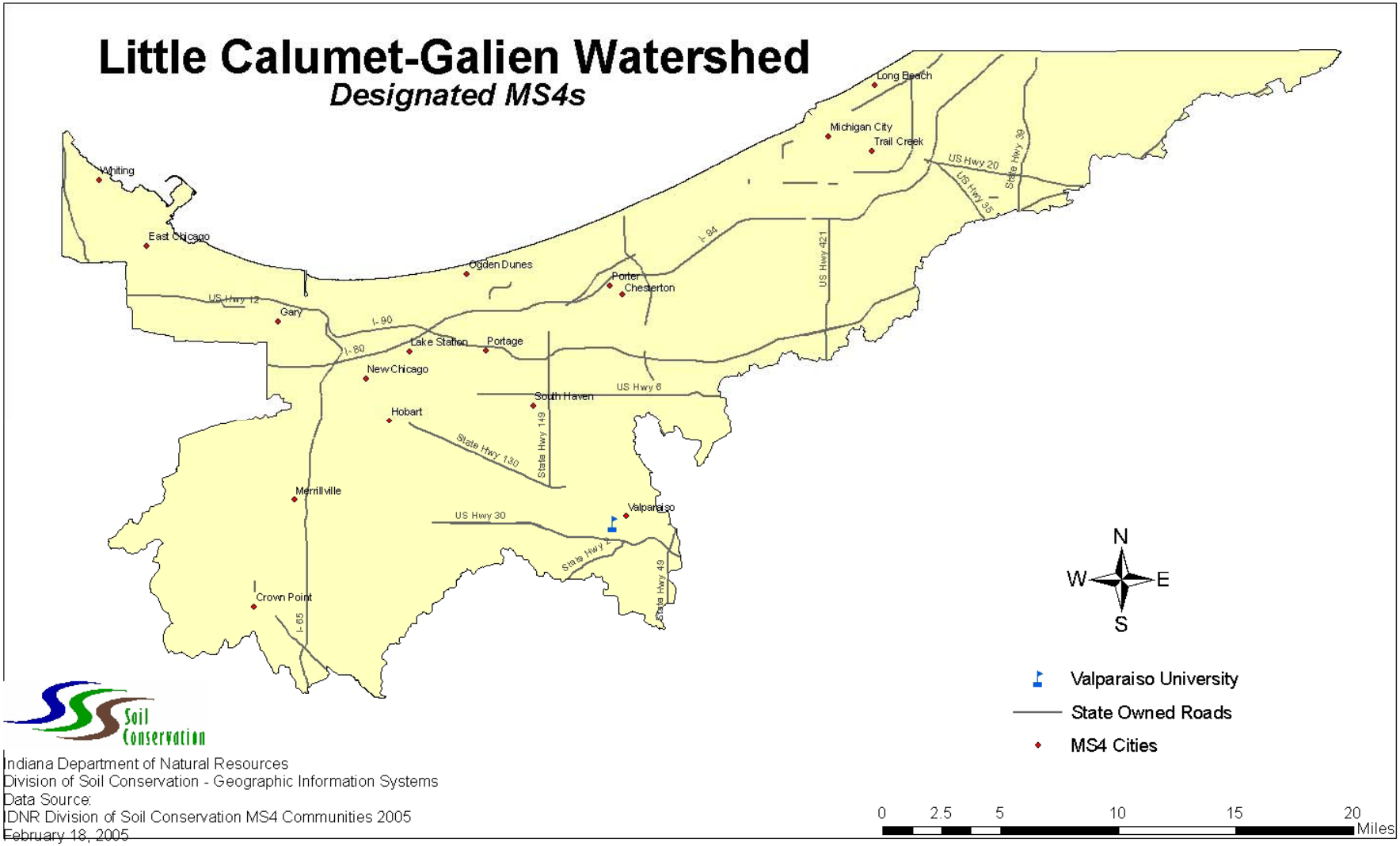
A. Public Education and Outreach

The purpose of this measure is to implement a public education program through the development and distribution of materials and/or conduct equivalent outreach activities with regard to stormwater runoff.

Indiana's new rules require MS4s to develop programs which include outreach activities and the distribution of educational materials explaining the impacts of stormwater discharges on water bodies and steps that the public can take to assist in reducing stormwater runoff pollutant loadings. MS4s are encouraged to tailor their programs to target specific groups and entities that are likely to have a significant impact on stormwater quality. MS4s are encouraged to enter into partnerships with other entities or organizations to fulfill this requirement. It is generally more cost effective to use an existing program or to develop a new regional or statewide education program, than to have numerous entities developing their own local programs.

Lawn chemical runoff, water quality, stream restoration, and storm drain marking are only a few issues that may be addressed under this component.

Figure 4-6: Designated MS4 Communities



B. Public Involvement and Participation
Each MS4 will be required to develop a public participation process. The public can provide valuable input into the development of a stormwater management program.

The primary purpose of this control measure is to gain public support and acceptance of the MS4 program. MS4s will be able explain the purpose of their program and build consensus within the community Gaining public support and understanding of the issues will make the MS4 program stronger and more successful.

Methods for achieving this management measure could include establishing local stormwater management panels, establishing citizen advisory groups, holding public hearings, and/or establishing volunteer monitoring programs.

C. Pollution Prevention / Good Housekeeping for Municipal Operations
The purpose of this minimum control measure is to reduce water pollution associated with activities and/or municipal operations within an MS4. As part of this control measure, an MS4 must develop an "Operations and Maintenance" program to prevent or reduce the discharge of pollutants associated with day-to-day operations and provide annual employee training and awareness on proper procedures for the prevention and reduction of stormwater pollutants associated with their municipal activities.

Each designated entity must develop appropriate pollution prevention discharge controls, long-term inspection procedures, and maintenance schedules for activities associated with park and open space maintenance, buildings and grounds maintenance, storm drain system maintenance, fleet maintenance, storage of materials such as salt, sand, and cinders used in road deicing, street sweeping, and litter control.

D. Illicit Discharge Detection and Elimination
The purpose of this minimum control measure is to identify, develop, and initiate a program that addresses illicit discharges. Illicit discharges include, but are not limited to, sanitary wastewater, effluent from septic tanks, car wash wastewater, and improper disposal of auto and household toxic wastes.

As part of this control measure, each designated entity is required to map their local stormwater system, identify all storm-drain outfalls, and identify the names of all receiving waters. This measure is intended to help the MS4 locate priority problem areas, trace pollutant source origination, address and remove illegal connections, and conduct program evaluations and assessments. Each MS4 must also develop an action plan that raises public awareness of illicit discharge impacts on water quality and develop an ordinance or other regulatory mechanism that prohibits illicit discharge connections, provides a mechanism for reporting of illicit discharges, and establishes an enforcement policy.

Items that MS4s can incorporate into their programs include encouraging the public to report illicit discharges, distributing outreach materials, and developing storm drain marking programs.

E. Construction Site Stormwater Runoff
This minimum control measure is very similar to 327 IAC 15-5 (Rule 5). It requires MS4s to develop a construction site stormwater runoff control program that meets or

exceeds the State's requirements for stormwater runoff associated with construction activities on all sites where land-disturbing activities will equal or exceed one (1) acre. Each designated entity will be required to develop an ordinance, or other regulatory procedure, that establishes a protocol for plan review, requires use of appropriate stormwater pollution prevention measures during construction, provides a mechanism for site inspections and enforcement, and sets penalties for non-compliance.

MS4s are encouraged to use existing tools and up-date existing ordinances that address construction site stormwater runoff, establish a protocol for the inspection and enforcement of project sites based on potential for impairment of water bodies, and provide training opportunities for MS4 employees and construction industry personnel. They are also encouraged to establish non-compliance enforcement measures such as issuing citations, stop work orders, denying the issuance of building or occupancy permits, and so on.

F. Post-Construction Storm Water Management

MS4s are required to address post-construction stormwater runoff associated with new development and re-development in existing urbanized areas. The purpose of this minimum control measure is to minimize water quality impacts from developed areas.

Each designated entity will be required to develop an ordinance, or other regulatory procedure, addressing runoff from existing land uses. The regulatory device must address stormwater quantity as well as stormwater quality and provide for the long-term inspection, maintenance, and operation of the stormwater pollution prevention measures. As with the construction site minimum control measure, the regulatory ordinance must establish a protocol for plan review, require use of appropriate stormwater pollution prevention measures, provide a mechanism for site inspections and enforcement, and set penalties for non-compliance.

Achieving the objectives of this minimum control measure will require the use of structural and /or non-structural stormwater pollution prevention measures or practices. It is recommended that management measures be selected based on the type or types of pollutants associated with the specific land use and with the goal of maintaining pre-development runoff conditions.

As each MS4 develops their Stormwater Quality Management plan they will begin to identify pollutants and sources within their community. The plan should identify actions and implementation schedules to address each of the issues. In some cases MS4s will utilize existing programs in other situations they will develop programs to meet the needs of their community.

MS4s will also be required to evaluate and assess their programs and ordinances to ensure that they meet the requirements of 327 IAC 15-13 and 327 IAC 15-5 and that they adequately address local resource concerns and issues within the community. MS4s are being encouraged to use a watershed approach when conducting these evaluations and assessments.

The MS4 program will be locally implemented, but IDEM will retain authority and oversee the program. IDEM will require MS4s to report their program activities and accomplishments. In addition, IDEM will work cooperatively with the DNR, Division of Soil Conservation and local Soil and Water Conservation Districts to monitor activities

associated with the construction program. The Division of Soil Conservation and local Soil and Water Conservation Districts will provide technical support and oversight to MS4s and provide training to MS4 staff in regard to reviewing plans and conducting site inspections.

327 IAC 15-13 requires MS4s to submit an annual progress report to the Indiana Department of Environmental Management. The report must certify that they are in compliance with their Stormwater Quality Management Plan and the provisions of the rule.

As part of the program/permit review, IDEM may request data to facilitate, identify, or quantify pollutants that may be discharged to the environment from an MS4 conveyance or to determine the effectiveness of the minimum control measures. Any projects meeting the applicability requirements of 327 IAC 15-5 and within a regulated MS4 are also subject to inspection and enforcement by IDEM or their designated representatives.

IDEM may take enforcement actions against any person or an MS4 entity who fails to meet the conditions specified in their 327 IAC 15-13 General Permit. The MS4 operator is responsible to implement their respective programs. However, if the MS4 entity is not complying with their permit requirements the entity can be subject to investigation and possible enforcement actions for violations of 327 IAC 15-13 or any of the prohibited acts listed in IC 13-30-2-1. Under IC 13-30, IDEM has the authority to issue agreed orders, commissioner orders to cease and desist, civil penalties up to $25,000 per day, Class C infractions for interfering with an investigation, and Class D felonies for intentional, knowingly, or recklessly violating rules. Under IC 13-14-10, IDEM has the authority to request and act upon emergency orders in situations where there is a clear and present danger to the health and safety of persons in any area.

3. Inventory of management measures excluded from the Coastal Polluted Runoff Program due to coverage as a point source under Phase I and Phase II (geographically limited exclusions).

In addition to the Management Measures identified above, several other Management Measures have been excluded from coverage due to requirements established under NPDES Phase I and Phase II associated with the establishment of permitted Municipal Separate Storm Sewer Systems (MS4s). Indiana had only one designated community during Phase I and that was the city of Indianapolis. The MS4s identified for Phase II by the Indiana Department of Environmental Management are based on population and population density. MS4s will be required to develop their own stormwater quality management plan that specifically addresses many of the items required by Coastal Zone Act Reauthorization of 1990 (CZARA) Section 6217. The Management Measures included in this list that are applicable to MS4s are:

- New Development
- Existing Development
- Road, Highway, and Bridge Operation and Maintenance
- Road, Highway, and Bridge Runoff Systems

Fully Excluded Management Measures

- Construction Site Erosion and Sediment Control
- Construction Site Waste and Chemical Control
- Road, Highway, and Bridge Construction Projects

- Road, Highway, and Bridge Construction Site Waste and Chemical Control

B. Potential Sources of Urban Non-point Pollution in Indiana's Coastal Watershed

This section focuses on the impacts associated with urbanization and the impact existing and new development has on Lake Michigan and its tributaries.

1. Runoff from Developing Areas

Physical, chemical, and biological characteristics of a watershed are generally altered after construction activities have been completed and the project becomes operational. Urban stormwater runoff quantity and quality are significantly affected as the watershed undergoes development. The hydrology of the land is altered. Developed land undergoes a significant change when impervious surfaces replace natural landscapes. The impact of impervious surfaces typically results in increased runoff volumes and pollutant loading.

Hydrological changes to a watershed are magnified due to an increase in impervious surfaces, such as rooftops, streets, sidewalks, and parking lots. Increased flow rates associated with development requires the construction of conveyance systems. These systems are typically designed to convey runoff in an efficient manner without regard for its impact. The overall result is a significant change to the pre-development hydrology of the watershed and the following impacts created by those changes:

- Increased peak discharges
- Increased volume of urban runoff
- Increased runoff velocity during storm events due to the combined effects of higher peak discharges, increased time of concentration, smoother hydraulic surfaces, and highly efficient stormwater conveyance systems.
- Decreased time for runoff to reach a stream or body of water
- Increased severity and frequency of flooding

Increased peak runoff volumes from impervious surfaces can result in the alteration of stream channels, natural drainage ways, and riparian habitat. These impacts in turn may result in the elimination or reduction of aquatic vegetation and organisms and the degradation of water quality. Other potential effects include increased bank erosion, streambed scouring, siltation, increases in water temperature, decreases in dissolved oxygen, and changes to the morphology of the watercourse.

Stormwater runoff from impervious surfaces also results in an increase in the discharge of pollutants. Pollutants associated with urban areas are specific to the type and intensity of the land use. Some examples of pollutants include sediments, nutrients, oxygen demanding substances, road salt, heavy metals, oil and grease, hydrocarbons, and bacteria.

Runoff from commercial land areas such as shopping centers, business districts, office parks, and parking lots or garages may contain high hydrocarbon loadings and metal concentrations. Pollutant loadings from these types of land use can be a significant pollutant source in stormwater runoff and can be attributed to heavy traffic volumes and large impervious surface areas.

Gas stations, in most communities, are designated as a commercial land use and are subject to the same controls as shopping centers and office parks. However, gas stations may generate higher concentrations of heavy metals, hydrocarbons, and other automobile-related pollutants because of

the type of day-to-day activities associated with the industry and the volume of clientele that use the facilities. There's a high probability for spills to occur at these facilities due to human error.

2. Runoff from Construction Sites

Typically, the pollutant most associated with runoff from construction sites or land disturbance is sediment. Sediment ranks as the number one pollutant by volume of surface waters in the United States and is the pollutant primarily considered by state and local officials when regulating a construction project. However, other pollutants, such as pesticides, petroleum products, nutrients, solid wastes, and construction chemicals are often also associated with construction activities.

Types of pollutants associated with construction activities are dependent on several factors such as the nature of the construction activity and the physical characteristics of the project site. For example, the efficiency by which pollutants are discharged off-site or to surface waters or ground water can be significantly impacted by the following factors: amount, intensity, and frequency of rainfall; soil type; infiltration rate; organic matter content; soil surface roughness; slope length and steepness; and ground cover. The overall impact of stormwater discharge as related to water quality also depends on the location of the construction site in relation to the receiving waters.

The nature of the construction activity also plays an important part in the types of pollutants that may be released from a construction site. For example, construction activity that results in massive earthmoving is likely to have a higher potential for off-site pollutant discharge. An alternative is to develop a project by working with the natural landscape of the site, which will result in minimal land disturbance and reduce the generation of pollutants. On projects where heavy equipment is utilized potential exists for pollutants from vehicle refueling, fuel storage facilities, and equipment maintenance areas.

An effective erosion and sediment control plan includes both structural and nonstructural controls. Nonstructural measures are used to control erosion at the source. Structural measures, on the other hand, are designed to control erosion and the movement and capture of sediment. However, it should be noted that some erosion and soil loss is unavoidable during land-disturbing activities. While proper siting and design will help prevent areas prone to erosion from being developed, construction activities will invariably produce conditions where erosion may occur. To reduce the adverse impacts associated with construction, the construction management measure suggests a system of nonstructural and structural erosion and sediment controls for incorporation into an erosion and sediment control plan. Erosion controls have distinct advantages over sediment controls. Erosion controls reduce the amount of sediment transported off-site, thereby reducing the need for sediment controls. When erosion controls are used in conjunction with sediment controls, the size of the sediment control structures and associated maintenance may be reduced, decreasing the overall treatment costs.

3. Runoff from Existing Development

Protecting or improving water quality in existing urban areas is often difficult due to diverse pollutant loadings, large runoff volumes, limited areas suitable for surface water runoff treatment systems, high cost associated with structural implementation of stormwater quality practices, and the non-existence of natural or manmade buffer zones.

Only in very recent times have planners and communities begun to consider the impact of stormwater drainage from development activities. As a consequence most existing development was constructed without consideration for water quality protection. This lack of planning makes

pollutant reduction in existing developments difficult. Usually space limitation prevents the ability to choose the most cost effective and efficient practice to achieve pollutant removal.

The pollutant and resource issues associated with existing development have already been discussed in Section B, Item 1, "Runoff from Developing Areas".

4. On-site Sewage Disposal Systems

On-site sewage disposal systems are designed and installed for the purpose of wastewater treatment. Design and installation is site specific. The systems may require high maintenance. Failure of these systems can have a significant impact on the health and well being of a community.

Failure can often be attributed to incorrectly characterizing waste load allocations and not taking into account limiting soil or geologic features when the system is designed. Soil and geologic features that need to be considered include depth to impermeable soil layers (e.g.: glacial till, bedrock), depth to a highly permeable layer (e.g.: sand and gravel) that does not allow for proper treatment of effluent, depth to a seasonal water table, organic loading, and hydraulic loading. An increase in water usage over a period of time can also exceed the design capability of a system and result in failure.

A statewide research study conducted by Purdue University and reported in Purdue News on August 7, 1998 states that local health officials across Indiana cited the following issues, for their specific counties, associated with direct discharges into waters of the state:

- "2,000 to 3,000 illegal systems, with the total number of the systems in the county totaling 3,200"
- "800 septic tanks discharge directly to surface water"
- "Many systems are tanks or 55 gallon drums with a discharge line to the nearest ditch"
- "I have no idea how many failures/discharging systems there are. I'd probably faint if I knew"

This study also cites that between 1940 and 1960 approximately 300,000 homes switched to indoor plumbing. Many of these indoor systems sent wastewater directly to tile lines or ditches, and still do.

While this information is not specific to the Lake Michigan Coastal area, it is indicative of the issues that are associated with on-site sewage disposal systems in Indiana. Technology associated with on-site sewage disposal systems has progressed over the years and continues to do so. In addition, state and local requirements for the installation of systems continues to be updated to ensure that the best available technology is used in the design and installation of systems.

The inherent properties of soils in Indiana are also limited with regard to supporting on-site sewage disposal systems. Severe limitations as described in the table below do not necessarily restrict the use of an on-site sewage disposal system, but is an indication that the soil conditions may not necessarily support a system without modification to the design.

Table 4-7- Wastewater Disposal Data by Indiana County

	Percent of Households with Onsite Wastewater Disposal (Septic)[21]	Number of Households with Onsite Wastewater Disposal (Septic)	County Area (acres)	Density of Septic Systems (ac/septic system)	Percent of Area with Soils Having "Severe Limitations" for Septic Systems[22]
Lake	10.0%	18,274	396,962	21.7	96.0%
LaPorte	43.0%	18,002	389,865	21.7	74.0%
Porter	31.0%	14,444	334,267	23.1	83.0%

Discharge of wastes associated with failing systems can introduce pathogens, parasites, bacteria, and viruses which can cause communicable diseases through indirect or direct body contact or ingestion of contaminated water. Pathogens pose a particular threat when sewage pools on soil surface or migrates to waters that are used for recreation.

In addition nitrogen and phosphorous are pollutants associated with on-site sewage disposal systems. Nitrogen and phosphorous are nutrients that contribute to eutrophication and depletion of oxygen in surface waters. Excessive nitrate-nitrogen in drinking water can also cause metheoglobinemia in infants and complications for pregnant women. Livestock also can suffer health impacts from drinking water high in nitrate.

5. General Sources (Including Household, Commercial, and Landscaping)

General sources of pollutants are those that are generated as the result of day-to-day activities by the public and businesses. The primary sources include household activities, lawn and garden care, turfgrass management, vehicle use and maintenance, on-site sewage disposal systems, illegal discharges, and pet and domesticated animal waste.

Everyday household activities generate numerous pollutants that may affect water quality. Common household waste includes, paint, solvents, lawn and garden care products, detergents and cleansers, and automotive products such as antifreeze and oil. A household product that contains hazardous substances becomes household hazardous waste once the consumer no longer has a use for it and disposes of it. These pollutants are typically introduced into the environment due to ignorance on the part of the user or the lack of proper disposal options. The public unknowingly assumes that storm drains discharge into sanitary sewers and dump materials into storm drains under the assumption that treatment will occur at the sewage treatment plant. Users commonly dump or dispose many of these products directly onto the ground, not realizing that the materials can be carried to surface waters by runoff or pollute ground water if they leach through the soil. Hazardous waste from households is not regulated as hazardous waste under federal and Indiana laws.

Landscaping (e.g.: homeowners, golf courses) can contribute to the pollutant loading of water bodies within a watershed. For example, improper application or over-application of fertilizers

[21] Note: Percent and number of households with onsite wastewater disposal (septic systems) are from the 1990 Census, which continues to be the most recent information available. The 2000 Census did not ask people about wastewater. Calculations of density are by Jane Frankenberger and Joe Yahner.

[22] Based on National Resources Conservation Service (NRCS) Soil Survey information, calculated by Bill Hostetter, Soil Scientist in the Indiana NRCS State Office. "Severe limitations" are based on NRCS criteria, which are more restrictive than those required by the Indiana State Department of Health.

and pesticides can impair surface waters. Over-application of nitrogen can contribute to water impairment either through entry into surface water bodies by runoff or it can pollute ground water when it leaches through highly permeable soils. Improper disposal of lawn trimmings can also lead to increased nutrient levels in water runoff. Lawn trimmings deposited in street gutters can be washed into the storm sewer system and result in elevated nutrient loadings of the receiving water body.

Improper installation and maintenance of on-site sewage disposal systems can result in the introduction of pollutants into the environment. This issue was discussed in Section C, Item 4, "On-site Sewage Disposal Systems".

Litter and debris can be significant contributors to the degradation of surface and ground water. Smaller materials can be carried by runoff and deposited in surface waters. Larger items such as refrigerators and air conditioners can impair water quality through the release of fluids into surface and ground waters. These items also degrade the aesthetic and recreational value of surface waters and may be a hazard to some species of wildlife and aquatic organisms.

Domestic pet droppings have been found to be an important contributor of non-point source pollution. It has been shown that these waste materials can elevate fecal coliform and fecal streptococcal bacteria levels of water bodies. This type of pollutant is most commonly associated with dogs. However, other urban animals such as domesticated or semi-wild ducks and Canadian geese can be major contributors to the non-point source problem in areas where their populations are high.

Potential for impairment of surface waters and ground water can be greatly reduced through the proper handling, disposal, and management of the pollutants discussed in this section.

6. Roads, Highways, and Bridges

Pollutant sources associated with roads, highways, and bridges include both those generated during construction activity as well as those that are generated once the roadway becomes operational. Sources of pollutants associated with construction activities include sediment, on-site fuel storage and fueling operations, solid waste generation, chemicals associated with day-to-day operations, and fertilizer used during site stabilization. Pollutants associated with operational activities include roadway maintenance operations (e.g.: fertilizers, pesticides), solid waste generated from littering, and pollutants washed from the pavement (e.g.: hydrocarbons, heavy metals, deicing chemicals).

Highway maintenance garages and rest areas can also be major contributors to pollutant loadings. Maintenance garages are typically used for refueling and storage of sand and salt materials. If not properly managed, these substances can become potential pollutants. Rest areas can contribute to pollutant loadings because of their large, impervious parking areas and the high volume of vehicles that utilize these facilities.

C. Urban Management Measures

The following discussion lists: management measures, definitions, measures of success, applicable existing regulatory programs/practices, voluntary programs, outreach and education programs, and enforcement mechanisms. The Objective Table at the end of the chapter contains a complete listing of all referenced programs with: program authorities, program classification, responsible entity, enforceable mechanism, evaluation mechanism, and all Management Measures that are applicable.

The coordination section further explains how each program will apply to the various management measures. In addition, a complete description of all referenced programs is included in Appendix B.

1. Urban Runoff New Development Management Measure- (Geographically Excluded)

a. Definition

This management measure is intended to address pollutants that are associated with the inherent land use of a project and to reduce the impact of runoff volumes and quantities typically associated with new development and induced changes in hydrology. Federal guidelines specify that runoff associated with the "New Development Management Measure" should meet two basic criteria:

i. After construction has been completed and the site is permanently stabilized, reduce the average annual total suspended solid (TSS) loadings by 80 percent. For the purpose of this measure, an 80 percent TSS reduction is to be determined on an average annual basis* or reduce the post development loadings of TSS so that the average annual TSS loadings are no greater than predevelopment loadings, and

ii. To the extent practicable, maintain post development peak runoff rate and average volume at levels that are similar to predevelopment levels.

Sound watershed management requires that both structural and nonstructural measures be employed to mitigate the adverse impacts of storm water. Watershed Management Protection Measure and Site Development Management Measure, both non-structural can be effectively used to reduce both the short-and long-term costs of meeting the treatment goals of this management measure.

*Based on the average annual TSS loading from all storms less than or equal to the 2-year/24-hour storm. TSS loadings from storms greater than the 2-year/24-hour storm are not expected to be included in the calculation of the average annual TSS loadings

b. Applicability

State coastal non-point control programs are no longer required to include the "New Development Management Measure" for any new development, redevelopment, or new and relocated road, highway and bridge projects occurring in urbanized areas regulated by NPDES Phase I and II MS4 permits (Refer to Section A, Item 2, Phase II Implementation in Indiana). However, management measures in conformance with 6217 (g) guidance are still required for any new developments occurring outside of designated MS4 areas.

c. Existing Programs or Practices and Lead Agencies

Following is a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 1.a. (i) and (ii).

Regulatory

- 327 IAC 15-5 - IDEM
- 327 IAC 15-13 - IDEM

Education, Public Outreach and Technical and Financial Assistance

- Indiana Handbook for Erosion Control in Developing Areas - IDNR

- Phase II NPDES - IDEM
- Planning with POWER (Protecting Our Water and Environmental Resources) – Illinois-Indiana Sea Grant
- Indiana Local Technical Assistance Program (LTAP), formerly HERPICC (Highway Extension and Research Project for Indiana Counties and Cities)

d. Enforcement Mechanisms

The Indiana Department of Environmental Management is responsible for the enforcement of Indiana's NPDES rules for construction activities regulated under 327 IAC 15-5 and for ensuring MS4 compliance with their general permit. IDEM has the authority to assess civil penalties for administrative and performance based violations as referenced in the requirements and performance standards established in the rules.

In addition to the above, IDEM has the authority to issue citations or initiate enforcement actions for documented violations of the state water quality standards (327 IAC 2-1). State water quality standards also apply to sites smaller than one acre regardless of whether or not they are required to have an NPDES permit.

At the local level, MS4s will have the authority to enforce their local ordinances for post construction as required by 327 IAC 15-13. This may take the form of issuing citations, stop work orders, denying the issuance of building or occupancy permits, and so on. The IDEM retains authority to enforce state rules. IDEM can initiate enforcement actions in addition to those penalties assessed by a local MS4 or where an MS4 fails to initiate appropriate actions through their ordinance.

2. Watershed Protection Management Measure

a. Definition

The purpose of this management measure is to reduce the generation of pollutants and the impacts of urban runoff that result from new development or redevelopment, including the construction of new and relocated roads, highways, and bridges. The measure is intended to provide goals for local agencies and communities in developing comprehensive programs for guiding future development and land use activities.

The overall objective of this measure is to utilize sound planning principles that will encourage the protection and wise use of sensitive ecological areas, unique resources, minimize land disturbance, and retain natural drainage and vegetation on a watershed or regional basis. This management measure is considered to be a non-structural approach that directs the growth of communities away from environmentally sensitive areas or areas that are beneficial for water quality improvement.

Federal guidelines specify the following criteria associated with development and initiation of a watershed protection program:

i. Avoid conversion to the extent practicable of areas that are particularly susceptible to erosion and sediment loss;
ii. Preserve areas that provide important water quality benefits and/or are necessary to maintain riparian and aquatic biota; and
iii. Site development, including roads, highways, and bridges, to protect to the extent practical the natural integrity of water bodies and natural drainage systems.

b. Applicability

This management measure is intended to be applied by States to reduce the generation of non-point source pollution in all areas within the section 6217 management area. This management measure is required to ensure that communities within Indiana's coastal region implement solutions that result in behavioral changes to reduce non-point source pollutant loading from the sources listed in the management measure. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so.

c. Existing Programs or Practices and Lead Agencies

Following is a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 2. a. (i), (ii), and (iii).

The Watershed Management Protection Measure requires an emphasis by local communities and counties to address planning issues associated with this management measure. Below is a list of existing programs that will impact acceptance of these standards.

Regulatory

- Establishment of MS4s through NPDES Phase II
- 327 IAC 15-13 - IDEM
- 401 Water Quality Certification – IDEM
- Environmental review of projects regulated by the Department of Natural Resources – IDNR
- Indiana Department of Natural Resources – IDNR
    - Division of Water Lake Preservation Act (IC 14-26-2) - Lake Construction Activities Rule (312 IAC 11)
    - Lowering of Ten Acre Lakes Act (IC 14-26-5) - Lake Construction Activities Rule (312 IAC 11)
    - Flood Control Act (IC 14-28-1) - Flood Plain Management Rule (312 IAC 10), and
    - Navigable Waterways Act (IC 14-29-1) -Navigable Waterways Rule (312 IAC 6)
- Indiana Department of Environmental Management (IDEM)
    - Water Quality Certification permits within Indiana (327 IAC 2-1, and 327 IAC 2-1.5)
    - Section 401 of the federal Clean Water Act (CWA)

Education, Public Outreach, and Technical and Financial Assistance

- Planning with POWER (Protecting Our Water and Environmental Resources)
- Hoosier Riverwatch - IDNR
- Project WET - IDNR
- Indiana Handbook for Erosion Control in Developing Areas - IDNR
- Phase II implementation program - training opportunities that include planning principles and stormwater quality measures that can be utilized to address issues associated with the "Watershed Protection Management Measure" – IDEM
- Indiana Local Technical Assistance Program (LTAP), formerly HERPICC (Highway Extension and Research Project for Indiana Counties and Cities)
- IDEM Clean Water Act Authority

- Section 104 (b) (3)
- Section 205 (j)
- Section 319 (h)
  - Watershed assessments,
  - Development and implementation TMDLs and watershed management plans
  - Technical assistance,
  - Demonstration of new technology and
  - Education and outreach

- Indiana Conservation Districts Act (IC 14-32)
  - Creates Soil and Water Conservation Districts
  - Clean Water Indiana Program
  - Lake and River Enhancement Program (LARE)

d. Enforcement Mechanisms

Enforcement and implementation of most of these programs will need to be conducted at the local level as programs are developed and implemented. The only authorities that currently have potential for enforcement of this management measure is through evaluation and assessment of local MS4 Stormwater Quality Programs by the Indiana Department of Environmental Management and specific permit requirements that are assigned to projects under the jurisdiction of the Indiana Department of Environmental Management and the Department of Natural Resources as described in item 2. c. above.

The Indiana Department of Environmental Management is responsible for the enforcement of Indiana's NPDES rules and for ensuring compliance of MS4s with their general permit. IDEM has the authority to assess civil penalties for administrative and performance based violations as referenced in the requirements and performance standards established in the rules.

In addition to the above, IDEM has the authority to issue citations or initiate enforcement actions for documented violations of the State Water Quality Standards (327 IAC 2-1). State water quality standards also apply to sites smaller than one acre regardless of whether or not they are required to have an NPDES permit.

At the local level, MS4s will have the authority to enforce their local ordinances that are applicable to this management measure as required by 327 IAC 15-13. This may take the form of issuing citations, stop work orders, denying the issuance of building or occupancy permits, and so on.

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

3. Site Development Management Measure

a. Definition

The purpose of this management measure is to address, at the planning stage, the reduction of non-point source pollution and mitigate the impacts of urban runoff and its associated pollutants from all site development, including activities associated with roads, highways,

and bridges. In regard to this management measure, policies and controls applied and implemented during the planning and review process are intended to provide guidance for controlling non-point source pollution through proper design and development of individual sites.

The need to address the impacts of impervious surfaces and pollutants associated with land use should be addressed during the planning and development phase of all projects. This should be done prior to any land disturbing activities because it is at this time that water quality measures addressing pollutants of concern can be planned and designed into the project thereby reducing overall project costs and the potential costs of retrofitting a site once it becomes operational.

This management measure differs from the “New Development Management Measure” which applies to post development runoff and the "Watershed Protection Management Measure", which applies to implementation on a watershed or regional drainage basin.

Federal guidelines specify that activities associated with the “Site Development Management Measure” should meet the following criteria. Plan, design, and develop sites to:

i. Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss;
ii. Limit increases of impervious areas, except where necessary;
iii. Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss; and
iv. Limit disturbance of natural drainage features and vegetation.

b. Applicability

States are encouraged to apply this management measure to all development activities including those associated with roads, highways, and bridges. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so.

c. Existing Programs or Practices and Lead Agencies

Following are a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 3.a. (i), (ii), (iii) and (iv).

Regulatory

- MS4s through NPDES Phase II - IDEM
- 327 IAC 15-13 - IDEM
- 327 IAC 15-5 – IDEM
- The criteria listed in 3.a. (i), (ii), (iii) and (iv) are not specific requirements that states must incorporate in their respective stormwater regulations. However, several of the criteria, items (iii) and (iv) are widely accepted plan design principles, that when implemented, can be very effective in addressing pollutants associated with development. For example, limiting land disturbance activities such as clearing and grading, minimizing cut and fill, and limiting the disturbance of natural drainage features and vegetation can be very effective in reducing soil erosion and sediment loss. The other two criteria, (i) Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss and (ii) Limit

increases of impervious areas are not specifically addressed in the state's rules, but are important considerations in site development.

- 401 Water Quality Certification - IDEM
- Water Quality Certification permits within Indiana (327 IAC 2-1).
- Environmental review of projects regulated by the Department of Natural Resources – IDNR
- Indiana Department of Natural Resources,
    - Division of Water Lake Preservation Act (IC 14-26-2) - Lake Construction Activities Rule (312 IAC 11).
    - Lowering of Ten Acre Lakes Act (IC 14-26-5) - Lake Construction Activities Rule (312 IAC 11).
    - Flood Control Act (IC 14-28-1) - Flood Plain Management Rule (312 IAC 10), and
    - Navigable Waterways Act (IC 14-29-1) -Navigable Waterways Rule (312 IAC 6)

Education, Public Outreach, and Technical and Financial Assistance

- Indiana Handbook for Erosion Control in Developing Areas - IDNR
- Planning with POWER (Protecting Our Water and Environmental Resources) – Illinois-Indiana Sea Grant
- Phase II implementation program - training opportunities that include planning principles and stormwater quality measures that can be utilized to reduce the impact of pollutants from developments - IDEM
- Indiana Local Technical Assistance Program (LTAP), formerly HERPICC (Highway Extension and Research Project for Indiana Counties and Cities)
- IDEM Clean Water Act Authority
    - Section 104 (b) (3)
    - Section 205 (j)
    - Section 319 (h)
        - Watershed assessments,
        - Development and implementation TMDLs and watershed management plans
        - Technical assistance,
        - Demonstration of new technology and
        - Education and outreach
- Indiana Conservation Districts Act (IC 14-32)
    - Creates Soil and Water Conservation Districts (SWCD)
    - Clean Water Indiana Program – IDNR/SWCDs
    - Lake and River Enhancement Program (LARE) - IDNR

d. Enforcement Mechanisms

The Indiana Department of Environmental Management is responsible for the enforcement of Indiana's NPDES rules and for ensuring compliance of MS4s with their general permit. IDEM has the authority to assess civil penalties for administrative and performance based violations as referenced in the requirements and performance standards established in the rules.

In addition to the above, IDEM has the authority to issue citations or initiate enforcement actions for documented violations of the state water quality standards (327 IAC 2-1). State water quality standards also apply to sites smaller than one acre regardless of whether or not they are required to have an NPDES permit.

At the local level, MS4s will have the authority to enforce their local ordinances for post construction as required by 327 IAC 15-13. This may take the form of issuing citations, stop work orders, denying the issuance of building or occupancy permits, and so on.

Enforcement of this management measure may also occur through specific permit requirements that are assigned to projects under the jurisdiction of the Indiana Department of Environmental management and the Department of Natural Resources as described in item 3. c. above.

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

4. Construction Site Erosion and Sediment Control Management Measure - (Excluded)

a. Definition

This management measure minimizes or reduces the discharge of sediment, resulting from construction activities or other land disturbing activities using effective erosion and sediment control techniques. The most effective method to reduce the discharge of sediments is to keep the soil on site. The next measure is to build specific stormwater devices like sediment retention ponds to trap sediments before they are discharged off-site or into waters of the state.

Federal guidelines specify that activities associated with construction should meet two basic criteria:

(i) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction, and

(ii) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

b. Applicability

State coastal non-point control programs are no longer required to include the "Construction Site Erosion and Sediment Control Management Measure" because NPDES stormwater regulations associated with construction activity applies throughout the coastal management zone of Indiana.

5. Construction Site Waste and Chemical Control Management Measure - (Excluded)

a. Definition

As previously discussed sedimentation is typically the pollutant most associated with construction activity. This management measure addresses pollutants such as pesticides, chemicals, nutrients, petroleum products, and solid waste materials generated from or associated with construction activities.

Federal guidelines specify that construction activities that generate wastes and chemicals should meet three basic criteria:

i. Limit application, generation, and migration of toxic substances;

ii. Ensure the proper storage and disposal of toxic materials; and
iii. Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface water.

b. Applicability

State coastal non-point control programs are no longer required to include the "Construction Site Chemical Control Management Measure" because NPDES stormwater regulations associated with construction activity applies throughout the coastal management zone of Indiana.

6. Existing Development Management Measure (Geographically Excluded)

a. Definition

This management measure specifically targets existing development and industry. The primary focus of this measure is to address those pollutants that are being discharged from existing residential and industrial facilities. Pollutants associated with a specific land use will dictate the nature and amount of pollutant loading. For example a shopping center with large buildings and parking areas will have a greater impact on the water resources than a small residential subdivision with common areas that are maintained in vegetative cover.

Selection of stormwater quality measures are site specific and therefore may require the planner to incorporate a particular measure or measures into the development or possibly retrofit existing structures or on-site facilities. Watershed management programs identifying the types of pollutants and the source of those pollutants should be developed. The plan should also specify appropriate control measures and provide an implementation and maintenance schedule for each respective measure.

Federal guidelines specify the following criteria associated with existing development: Develop and implement watershed management programs to reduce runoff pollutant concentrations and volumes from existing development.

(i) Identify priority local and/or regional watershed pollutant reduction opportunities, e.g., improvements to existing urban runoff control structures;
(ii) Contain a schedule for implementing appropriate controls;
(iii) Limit destruction of natural conveyance systems; and
(iv) Where appropriate, preserve, enhance, or establish buffers along surface waterbodies and their tributaries.

b. Applicability

State coastal non-point control programs are no longer required to include the "Existing Development Management Measure" for any existing development within urbanized areas subject to NPDES Phase I or Phase II MS4 permits. Management measures in conformance with 6217 (g) guidance are still required for any existing developments outside of these designated MS4 areas.

c. Existing Programs or Practices and Lead Agencies

Following is a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 1.a. (i), (ii), (iii), and (iv).

Regulatory

- 327 IAC 15-13 - IDEM
- 327 IAC 2-1 - State Water Quality Standards - IDEM

Education, Public Outreach, and Technical and Financial Assistance

- IDNR, DoSC - Indiana Handbook for Erosion Control in Developing Areas
- Planning with POWER (Protecting Our Water and Environmental Resources)
- IDEM Clean Water Act Authority
    - Section 104 (b) (3)
    - Section 205 (j)
    - Section 319 (h)
        - Watershed assessments,
        - Development and implementation TMDLs and watershed management plans
        - Technical assistance,
        - Demonstration of new technology and
        - Education and outreach

d. Enforcement Mechanisms

IDEM has the authority to issue citations or initiate enforcement actions for documented violations of the state water quality standards (327 IAC 2-1).

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

7. New On-site Sewage Disposal Systems Management Measure

a. Definition

This management measure addresses concerns associated with the installation of new on-site sewage disposal systems. The overall purpose of this measure is to ensure that state and local officials are utilizing the best available technology in the placement, design, and installation of onsite sewage disposal systems. In addition, it emphasizes the long-term maintenance of these systems. The overall goal is to avoid the installation of systems in areas that will not provide for the adequate treatment of effluent that could ultimately result in an impact to surface and ground water.

When properly planned, designed, installed, and operated/maintained an on-site sewage disposal system can effectively remove or treat pathogens, BOD, and nutrients in human sewage. However, system failure can result in the release of phosphorus, pathogens, nitrogen, and other pollutants into surface and/or ground water.

Location and design of on-site sewage disposal systems is site specific. Factors influencing site location and design include soil properties and limitations such as soil permeability, depth to a seasonal high water table, and depth to limiting layers (e.g.: compact glacial till or bedrock). Another factor affecting site location and design is topography or landscape position. Slope steepness and position on the slope can dictate where the system might be located. Required setbacks used to protect domestic wells, surface waters, and unique natural features can also affect site location and design.

System failures over the years can be attributed to installation prior to state and local regulations, installation in locations that were poorly suited to the practice, and use of outdated technologies.

Federal guidelines specify the following criteria for new on-site waste disposal systems:

(i) Ensure that new on-site sewage disposal systems are located, designed, installed, operated, inspected, and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground water that are closely hydrologically connected to surface waters. Where necessary to meet these objectives: (a) discourage the installation of garbage disposals to reduce hydraulic and nutrient loadings; and (b) where low-volume plumbing fixtures have not been installed in new developments or redevelopments, reduce total hydraulic loadings to the on-site sewage disposal systems by 25 percent. Implement on-site sewage disposal systems inspection schedules for pre-construction, construction, and post construction.

(ii) Direct placement of on-site sewage disposal systems away from unsuitable areas. Where on-site sewage disposal systems placement in unsuitable areas is not practicable, ensure that the on-site sewage disposal systems is designed or sited so as not to adversely affect surface waters or ground water that is closely hydrologically connected to surface water. Unsuitable areas include, but are not limited to, areas with poorly or excessively drained soils; areas with shallow water tables or areas with high seasonal water tables; areas within floodplains; or areas where nutrient and/or pathogen concentrations in the effluent cannot be sufficiently treated or reduced before the effluent reaches sensitive waterbodies.

(iii) Establish protective setbacks from surface waters, wetlands, and floodplains for conventional as well as alternative on-site sewage disposal systems. The lateral setbacks should be based on soil type, slope, hydrologic factors, and type of on-site sewage disposal systems. Where uniform protective setbacks cannot be achieved, site development with on-site sewage disposal systems so as not to adversely affect waterbodies and/or contribute to a public health nuisance;

(iv) Establish protective separation distances between on-site sewage disposal system components and groundwater, which is closely hydrologically connected to surface waters. The separation distances should be based on soil type, distance to ground water, hydrologic factors, and type of on-site sewage disposal systems.

(v) Where conditions indicate that nitrogen-limited surface waters may be adversely affected by excess nitrogen loadings from ground water, require the installation of on-site sewage disposal systems that reduce total nitrogen loadings by 50 percent to ground water that is closely hydrologically connected to surface water.

b. Applicability

States are expected to apply this management measure to all new on-site sewage disposal systems including package treatment plants and small-scale or regional treatment facilities not covered by NPDES regulations. This management measure should address location, design, installation, and operation and maintenance of the system. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so.

c. Existing Programs or Practices and Lead Agencies

Following are a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 1.a. (i), (ii), (iii), (iv), and (v).

Regulatory

- Indiana State Department of Health (ISDH)
  - 410 IAC 6-8.1 Residential Sewage Disposal, and
  - 410 IAC 6-10 titled Commercial Sewage Disposal
- County Health Departments
  - 410 IAC 6-8.1 Residential Sewage Disposal

The Indiana State Department of Health and local health departments are responsible for the inspection of on-site sewage disposal systems under their authorities. The installation of on-site sewage disposal systems requires specific protocol to ensure that systems are installed in accordance with 410 IAC 6-8.1 and 410 IAC 6-10, local ordinances, and the requirements of the system permit. In addition to the authority of the state and local health departments the owner of the system or their agent and the installer are required to meet specific requirements during the installation process to ensure the integrity of the system.

Indiana currently requires an on-site analysis of soil properties and limitations as well as an evaluation of the landscape to determine the best location for a proposed on-site sewage disposal system. By rule an evaluation for all commercial systems must be conducted by an individual certified by the Indiana Association of Professional Soil Classifiers or the American Registry of Certified Professionals in Agronomy, Crops, and Soils (ARCPACS). Indiana recently passed legislation (IC 25-31.5) that allows for the registration of soil scientists in Indiana. Individuals registered by the state are qualified to perform on-site soil evaluations. All residential sites must also be evaluated and can either be conducted by an individual registered through one of the three entities listed above or by staff of a local health department who are proficient in the ability to observe, measure, and describe soil properties and landforms.

The design of on-site sewage disposal systems is based on requirements established by rule. The rules specify that soil absorption fields will be sized in relation to soil permeability and the number of bedrooms. Where the soil permeability is 2 to 6 inches per hour, 250 square feet of lateral are required per bedroom and where permeability is 1 to 2 inches per hour 350 feet of lateral are required per bedroom. Other design considerations include specific setbacks associated with the location of the system:

Table 4-8 – Septic System Setback Requirements

Minimum Distance in Feet From	Septic Tank, Dosing Tank, Lift Station	Upslope from Absorption Field	Downslope for Absorption Field
Private Water Supply Well	50 *	50 *	50 *
Private Geothermal Well	50 *	50 *	50 *
Commercial Water Supply	100 *	100 *	100 *
Commercial Geothermal Well	100 *	100 *	100 *
Public Water Supply Well or Reservoir	200 *	200 *	200 *
Other Lake or Reservoir	50 *	50 *	50 *
Stream, Ditch, or Drainage Tile**	25 *	25 *	25 *
Dwelling, Inground Swimming Pool, or other Structure	10 *	10 *	50 ***
Front, Side, or Rear Lot Lines	5 *	5 *	5 *
Water Lines Continually Under Pressure	10 *	10 *	10 *
Suction Water Lines	50 *	50 *	50 *

*The distances enumerated shall be doubled for soil absorption systems constructed where there exist horizons, layers or strata within thirty-four (34) inches of the ground surface with a loading rate greater than seventy-five hundredths (0.75) gallons per day per square foot as determined from Table V of section 49(4) of this rule, unless that hazard can be overcome through system design.
**See Table IV of section 43(d) of this rule for perimeter drain separation
***If the slope of the site on which the absorption system is to be built is greater than two percent (2%) or if the loading rate of the soil in the dispersal area has a loading rate of three-tenths (0.3) gallons per day per square foot or less, at least fifty (50) feet of dispersal area must be provided downslope of the absorption system. If the slope of the site on which the absorption system is to be built is two percent (2%) or less and if the loading rate of the soil in the dispersal area is not less than five-tenths (0.5) gallons per day per square foot, at least thirty (30) feet of dispersal area must be provided downslope of the absorption system. No obstruction to horizontal flow of water such as parking areas, building foundations, swimming pools, or any other facility that would compact soil in the dispersal area, may be placed in the dispersal area.

On-site sewage disposal systems may not receive water from any of the following: roof drains, foundation drains, sump pumps, swimming pool drains, hot tub drains, area drains. Floor drains are not be used for the disposal of chemical waste or chemical wastewater other than water softener or iron filter waste (normal household cleaners do not constitute chemical waste).

Indiana is currently revising their on-site sewage disposal system rules. Once enacted the rules will clarify the existing regulations and provide for additional provisions for

implementation of Indiana's on-site sewage disposal system regulations. Both residential and commercial requirements will be under one rule titled 410 IAC 6-8.2.

Education, Public Outreach, and Technical and Financial Assistance

- Purdue University - informational brochures
  - Operation and maintenance of systems,
  - Construction guidelines for a variety of systems,
  - Wastewater wetlands, and
  - Small community wastewater cluster systems.
- ISDH training sessions for local health officials on
  - State requirements,
  - System design, and
  - Soil evaluation.
- ISDH training sessions for on-site sewage disposal system installers and designers.
- ISDH coordinates program implementation with the USDA, Natural Resources Conservation Service and the Indiana Association of Professional Soil Classifiers. This cooperative working arrangement has provided a venue for sharing information, training, and program coordination in relation to soil information. The efforts of these agencies and organization are also responsible for IC 25-31.5, which established a registration board for soil scientists and required registration of individuals practicing soil science in the state of Indiana.
- IDEM Clean Water Act Authority
  - Section 104 (b) (3)
  - Section 205 (j)
  - Section 319 (h)
    - Watershed assessments,
    - Development and implementation TMDLs and watershed management plans
    - Technical assistance,
    - Demonstration of new technology and
    - Education and outreach
- Planning with POWER (Protecting Our Water and Environmental Resources)

d. Enforcement Mechanisms

Agents of the ISDH and local health department have the authority to enter all properties to determine compliance with 410 IAC 6-8.1. Both agencies also have the authority to issue written orders for any systems under their jurisdiction. They may also issue stop work orders for violations associated with the construction of any system.

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

8. Operating Onsite Sewage Disposal Systems Management Measure

a. Definition

The purpose of this management measure is to minimize pollutant loading from operating on-site sewage disposal systems and requires systems to be modified, operated, repaired, and maintained to reduce nutrient and pathogen loading in order to enhance and protect surface waters.

Federal guidelines specify the following criteria for existing on-site waste disposal systems:

i. Establish and implement policies that require existing on-site sewage disposal systems to be properly operated and maintained. Where necessary to meet these objectives, encourage the reduced use of garbage disposals, encourage the use of low-volume plumbing fixtures, and reduce total phosphorus loadings to the on-site sewage disposal systems by 15 percent (if the use of low-level phosphate detergents has not been required or widely adopted by on-site sewage disposal systems users). Establish and implement policies that require on-site sewage disposal systems to the repaired, replaced, or modified when the on-site sewage disposal systems fails.

ii. Inspect on-site sewage disposal systems at a frequency adequate to ascertain whether on-site sewage disposal systems are failing;

iii. Consider replacing or upgrading on-site sewage disposal systems to treat influent so that total nitrogen loadings in the effluent is reduced by 50 percent. This provision applies when nitrogen-limited surface waters may be adversely impacted by nitrogen loading from on-site sewage disposal systems.

b. Applicability

States are expected to apply this management measure to all operating on-site sewage disposal systems including package treatment plants and small-scale or regional treatment facilities not covered by NPDES regulations. This management measure should address location, design, installation, and operation and maintenance of the system. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so.

c. Existing Programs or Practices and Lead Agencies

Following are a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 2.a. (i), (ii), and (iii).

Regulatory

- Indiana State Department of Health (ISDH)
  - 410 IAC 6-8.1 - Residential Sewage Disposal
  - 410 IAC 6-10 - Commercial Sewage Disposal
- County Health Departments
  - 410 IAC 6-8.1

The Indiana State Department of Health and local health departments are responsible for the inspection of on-site sewage disposal systems under their authorities. On-site sewage disposal systems may not receive water from any of the following: roof drains, foundation drains, sump pumps, swimming pool drains, hot tub drains, area drains. Floor drains are not be used for the disposal of chemical waste or chemical wastewater other than water softener or iron filter waste (normal household cleaners do not constitute chemical waste).

Education, Public Outreach, and Technical and Financial Assistance

- Purdue University - informational brochures

- Operation and maintenance of systems,
- Construction guidelines for a variety of systems,
- Wastewater wetlands, and
- Small community wastewater cluster systems.

- IDEM CWA
  - Section 104 (b) (3)
  - Section 205 (j)
  - Section 319 (h)
    - Watershed assessments,
    - Development and implementation TMDLs and watershed management plans
    - Technical assistance,
    - Demonstration of new technology and
    - Education and outreach

d. Enforcement Mechanisms

Agents of the ISDH and local health department have the authority to enter all properties to determine compliance with 410 IAC 6-8.1. Both agencies also have the authority to issue written orders for any systems under their jurisdiction. They may also issue stop work orders for violations associated with the construction of any system.

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

9. Pollution Prevention Management Measure

a. Definition

This management measure is intended to prevent or reduce non-point source pollutant loadings generated from a variety of activities within urban areas. Everyday activities of citizens, municipalities, and businesses have the potential to contribute to non-point source pollutant loadings. Some of the major sources include improper disposal of household hazardous wastes, lawn and garden activities, turf grass management, operation and maintenance of diesel and gasoline vehicles, illicit discharges to urban runoff conveyances, commercial activities, and pet wastes. Reducing pollutant generation can decrease adverse water quality impacts from these sources.

The practices presented in this management measure are often referred to as source reduction practices. These practices are nonstructural in nature and reduce the amount of pollutants generated, thereby reducing the burden of treatment to maintain water quality. Costs of source control practices are typically associated with programmatic expenses such as signage, outreach materials, workshops, and development and enforcement of ordinances. Source reduction practices can reduce the quantity of runoff and the concentration of pollutants entering runoff treatment facilities. Often times the end result is an overall cost savings because fewer or smaller stormwater pollution prevention structural measures can be installed, resulting in lower material, installation, and maintenance costs.

Federal guidelines specify the following criteria associated with pollution prevention activities:

Implement pollution prevention and education programs to reduce non-point source pollutants generated from the following activities, where applicable:

(i) The improper storage, use, and disposal of household hazardous chemicals, including automobiles fluids, pesticides, paints, solvents, etc.;

(ii) Lawn and garden activities, including the application and disposal of lawn and garden care products, and the improper disposal of leaves and yard trimmings;

(iii) Turf management on golf courses, parks, and recreational areas;

(iv) Improper operation and maintenance of Onsite Sewage Disposal Systems;

(v) Discharge of pollutants into storm drains including floatables, waste oil, and litter;

(vi) Commercial activities including parking lots, gas stations and other entities not under NPDES purview; and

(vii) Improper disposal of pet excrement.

b. Applicability

This management measure is intended to reduce the generation of non-point source pollution in all areas within the Lake Michigan Coastal Management area. Adoption of the Pollution Prevention Management Measure does not exclude applicability of other management measures associated with the pollutant sources listed in this section. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop Coastal NPS programs in conformity with this management measure and will have flexibility in doing so.

c. Existing Programs or Practices and Lead Agencies

Following are a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 1.a. (i), (ii), (iii), (iv), (v), (vi), and (vii).

Regulatory

- 327 IAC 15-13 - IDEM
- 327 IAC 2-1 - State Water Quality Standards - IDEM
- IC 13-21-3 - Solid Waste Management Districts
  - Lake, LaPorte, and Porter Counties have all formed and are independently operating their own Solid Waste Management Districts.
- The “Household Hazardous Waste Mobile Collection Program.”
- The On-site sewage disposal system rules are also applicable to the “Pollution Prevention Management Measure”. Requirements associated with the regulation of on-site sewage disposal systems are described in more depth in Section G, Item 1 and 2.

Education, Public Outreach, and Technical and Financial Assistance

- IDEM
  - Office of Pollution Prevention and Technical Assistance (OPPTA)
    - Grant opportunities,
    - Public recognition awards,
    - Broad-based educational programs, and
    - Technical assistance.

- Purdue University Cooperative Extension Service publishes technical information concerning turf management.
- IDNR, DoSC - Indiana Handbook for Erosion Control in Developing Areas
- Hoosier Riverwatch - IDNR
- Project WET - IDNR

d. Enforcement Mechanisms

Mechanisms available for enforcement of the provision associated with the "Pollution Prevention Management Measure" are through the review and enforcement of activities that are developed as part of the SWQMP of the MS4; IDEM's regulatory authority over the implementation of programs and activities that specifically target the function and operation of Solid Waste Management Districts; and IDEM's regulatory authority over state water quality standards.

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

10. Management Measures for Planning, Siting, and Developing Roads and Highways

a. Definition

The intent of this management measure is to locate roads and highways away from areas classified as sensitive ecosystems and areas susceptible to erosion and sediment loss. The siting of such structures should not adversely impact water quality. This can be achieved through minimizing land disturbance, reducing impervious surfaces, and retaining natural vegetation and drainage features. The best time to address these issues is during the initial planning and design phase for a highway or road project.

Federal guidelines specify that planning; siting, and developing roads and highways should meet three basic criteria. Plan, site, and develop roads and highways to:

i. Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;

ii. Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and

iii. Limit disturbance of natural drainage features and vegetation.

b. Applicability

States are expected to apply this management measure to site development and land disturbing activities for new, relocated, and reconstructed roads and highways to reduce the generation of non-point source pollutants and to mitigate the impacts of urban runoff and associated pollutants from such activities. Under the Coastal Zone Act reauthorization amendments of 1990, states are subject to a number of requirements as they develop coastal non-point source programs in conformity with the "Planning, Siting, and Developing Roads and Highways Management Measure" and will have flexibility in doing so.

c. Existing Programs or Practices and Lead Agencies

Following is a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 1.a. (i), (ii), and (iii).

Regulatory

- Rule (327 IAC 15-5) – IDEM
- Environmental review - IDNR
- IDNR, Division of Water
  - Lake Preservation Act (IC 14-26-2),
  - Lowering of Ten Acre Lakes Act (IC 14-26-5),
  - Flood Control Act (IC 14-28-1), and
- Indiana Department of Natural Resources,
  - Division of Water Lake Preservation Act (IC 14-26-2) - Lake Construction Activities Rule (312 IAC 11).
  - Lowering of Ten Acre Lakes Act (IC 14-26-5) - Lake Construction Activities Rule (312 IAC 11).
  - Flood Control Act (IC 14-28-1) - Flood Plain Management Rule (312 IAC 10), and
  - Navigable Waterways Act (IC 14-29-1) -Navigable Waterways Rule (312 IAC 6)
- Indiana Department of Environmental Management - IDEM
  - Water Quality Certification permits within Indiana (327 IAC 2-1).
  - Section 401 of the federal Clean Water Act (CWA)

Education, Public Outreach, and Technical and Financial Assistance

- IDNR, DoSC - Indiana Handbook for Erosion Control in Developing Areas
- Planning with POWER (Protecting Our Water and Environmental Resources) – Illinois-Indiana Sea Grant
- Phase II implementation program - training opportunities that include planning principles and stormwater quality measures that can be utilized to address issues associated with the "Watershed Protection Management Measure" – IDEM
- Indiana Local Technical Assistance Program (LTAP), formerly HERPICC (Highway Extension and Research Project for Indiana Counties and Cities)
- IDEM Clean Water Act Authority
  - Section 104 (b) (3)
  - Section 205 (j)
  - Section 319 (h)
    - Watershed assessments,
    - Development and implementation TMDLs and watershed management plans
    - Technical assistance,
    - Demonstration of new technology and
    - Education and outreach

d. Enforcement Mechanisms

The Indiana Department of Environmental Management is responsible for the enforcement of Indiana's NPDES rules and for ensuring compliance of MS4s with their general permit. IDEM has the authority to assess civil penalties for administrative and

performance based violations as referenced in the requirements and performance standards established in the rules.

In addition to the above, IDEM has the authority to issue citations or initiate enforcement actions for documented violations of the State Water Quality Standards (327 IAC 2-1). State water quality standards also apply to sites smaller than one acre regardless of whether or not they are required to have an NPDES permit.

At the local level, MS4s will have the authority to enforce their local ordinances for post construction as required by 327 IAC 15-13. This may take the form of issuing citations, stop work orders, denying the issuance of building or occupancy permits, and so on.

Enforcement of this management measure may also occur through specific permit requirements that are assigned to projects under the jurisdiction of the Indiana Department of Environmental management and the Department of Natural Resources as described in item 3. c. above.

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

11. Management Measure for Bridges

a. Definition

This management measure requires that runoff associated with bridges be assessed and that appropriate stormwater quality measures and treatment are utilized to protect critical habitat, wetlands, fisheries, and water supplies. The best time to address these issues is the initial planning and design phase of a bridge project.

Bridges that utilize deck drains to manage stormwater runoff are a particular concern because they typically discharge directly into the surface water.

Federal guidelines specify that planning; sitting, and developing bridges should meet the following criteria:

i. Site, design, and maintain bridge structure so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.

b. Applicability

This management measure applies to new, relocated, and rehabilitated bridge structures in order to control erosion, streambed scouring, and surface runoff from such activities. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS Programs in conformity with this management measure and will have home flexibility in doing so.

c. Existing Programs or Practices and Lead Agencies

Following is a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 1.a. (i).

Regulatory

- Rule (327 IAC 15-5) – IDEM

- Environmental review - IDNR
- IDNR, Division of Water
  - Lake Preservation Act (IC 14-26-2),
  - Lowering of Ten Acre Lakes Act (IC 14-26-5),
  - Flood Control Act (IC 14-28-1), and
- Indiana Department of Natural Resources,
  - Division of Water Lake Preservation Act (IC 14-26-2) - Lake Construction Activities Rule (312 IAC 11).
  - Lowering of Ten Acre Lakes Act (IC 14-26-5) - Lake Construction Activities Rule (312 IAC 11).
  - Flood Control Act (IC 14-28-1) - Flood Plain Management Rule (312 IAC 10), and
  - Navigable Waterways Act (IC 14-29-1) -Navigable Waterways Rule (312 IAC 6)
- Indiana Department of Environmental Management – IDEM
  - Water Quality Certification permits within Indiana (327 IAC 2-1)
  - Section 401 of the federal Clean Water Act (CWA)

Education, Public Outreach, and Technical and Financial Assistance

- IDNR, Division of Soil Conservation- Indiana Handbook for Erosion Control in Developing Areas
- Planning with POWER (Protecting Our Water and Environmental Resources) – Illinois-Indiana Sea Grant
- Phase II implementation program - training opportunities that include planning principles and stormwater quality measures that can be utilized to address issues associated with the "Watershed Protection Management Measure" – IDEM
- Indiana Local Technical Assistance Program (LTAP), formerly HERPICC (Highway Extension and Research Project for Indiana Counties and Cities)

d. Enforcement Mechanisms

The Indiana Department of Environmental Management is responsible for the enforcement of Indiana's NPDES rules and for ensuring compliance of MS4s with their general permit. IDEM has the authority to assess civil penalties for administrative and performance based violations as referenced in the requirements and performance standards established in the rules.

In addition to the above, IDEM has the authority to issue citations or initiate enforcement actions for documented violations of the state water quality standards (327 IAC 2-1). State water quality standards also apply to sites smaller than one acre regardless of whether or not they are required to have an NPDES permit.

At the local level, MS4s will have the authority to enforce their local ordinances for post construction as required by 327 IAC 15-13. This may take the form of issuing citations, stop work orders, denying the issuance of building or occupancy permits, and so on.

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

12. *Management Measure for Road, Highway, and Bridge Construction Projects* - (Excluded)

a. Definition

This intent of this management measure is to reduce the discharge of sediment from construction sites and other land disturbing activities to surface waters. This is accomplished through effective erosion and sediment control. The most effective method to reduce the discharge of sediments is to control the erosion on a site. The next step is to build in specific stormwater quality measures that will trap and detain sediments before they are discharged off-site or into waters of the state.

This measure calls for the development and implementation of an approved erosion and sediment control plan prior to construction, which would reduce erosion and improve retention of sediments onsite during and after construction.

Federal guidelines specify that runoff from new development should meet two basic criteria:

i. Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction and

ii. Prior to land disturbance, prepare and implement an approved erosion control plan or similar administrative document that contains erosion and sediment control provisions.

b. Applicability

State coastal non-point control programs are no longer required to include the "Road, Highway and Bridge Construction Projects Management Measure" since the NPDES stormwater regulations associated with construction activity applies throughout the coastal management area of Indiana.

13. Management Measure for Road, Highway, and Bridge Construction Site Waste and Chemical Control - (Excluded)

a. Definition

As previously discussed sedimentation is typically the pollutant most associated with construction activity. This management measure addresses those pollutants that are generated during construction and include pesticides, petroleum products, nutrients, solid wastes, and construction chemicals. The measure limits toxic and nutrient loadings at construction sites by ensuring the proper use, storage, and disposal of toxic materials to prevent significant chemical and nutrient runoff to surface water.

Federal guidelines specify that chemical control associated with road, highway, and bridge construction meet two basic criteria:

a) Limit the application, generation, and migration of toxic substances;
b) Ensure the proper storage and disposal of toxic material; and
c) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface water.

b. Applicability

State coastal non-point control programs are no longer required to include the "Road, Highway, and Bridge Construction Site Waste and Chemical Control Management Measure"

since the NPDES stormwater regulations associated with construction activity applies throughout the coastal management area of Indiana.

14. Management Measure for Road, Highway, and Bridge Operation and Maintenance – (Geographically limited Exclusion)

a. Definition

This measure provides an operation and maintenance approach designed to reduce pollutant loadings from a variety of activities to receiving waters during operation and maintenance of roads, highways, and bridges.

Some of the major sources include salt/sand storage and application, application of pesticides and fertilizers, and litter. Reducing pollutant generation can decrease adverse water quality impacts from these sources.

The practices presented in this management measure are often referred to as source reduction practices. These practices are nonstructural in nature and reduce the amount of pollutants generated, thereby reducing the burden of treatment to maintain water quality. Costs of source control practices are typically associated with programmatic expenses such as signage, outreach materials, and workshops. Source reduction practices can reduce the quantity of runoff and the concentration of pollutants entering runoff treatment facilities. Often times the end result is an overall cost savings because fewer or smaller stormwater pollution prevention structural measures can be installed, resulting in lower material, installation, and maintenance costs.

Federal guidelines specify that operation and maintenance activities associated with roads, highways, and bridges should meet the following criteria:

> Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.

b. Applicability

State coastal non-point control programs are no longer required in include the “Road, Highway, and Bridge Operation and Maintenance Management Measure” for any road, highway, and bridge runoff systems in urbanized areas subject to Phase I or Phase II MS4 permits. Management measures in conformance with the 6217 (g) guidance will still be required for any operation and maintenance activities of roads, highways, and bridges occurring outside of the permitted MS4 boundaries.

c. Existing Programs or Practices and Lead Agencies

Following are a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 5. a. (i).

Regulatory

- IAC 15-13 (Refer to Section B, Item 2).
- Indiana Department of Environmental Management regulates spills under 327 IAC 2-6.

Education, Public Outreach, and Technical and Financial Assistance

- IDNR, Division of Soil Conservation - Indiana Handbook for Erosion Control in Developing Areas

d. Enforcement Mechanisms

The two primary enforcement mechanisms available for enforcement of the provisions associated with the "Road, Highway, and Bridge Operation and Maintenance Management Measure" are through review and enforcement of activities that are developed as part of the plan of the MS4.

In addition to the above, IDEM has the authority to issue citations or initiate enforcement actions for documented violations of the State Water Quality Standards (327 IAC 2-1). State Water Quality Standards also apply to sites smaller than one acre regardless of whether or not they are required to have an NPDES permit.

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

15. *Management Measure for Road, Highway, and Bridge Runoff Systems –* (Geographically limited Exclusion)

a. Definition

This measure specifies development of runoff management systems to reduce pollutant concentrations in runoff from existing roads, highways, and bridges. Runoff management systems should identify priority pollutant reduction opportunities and schedule implementation of retrofit projects to protect impacted areas and threatened surface waters.

Federal guidelines specify that runoff conveyance systems associated with roads, highways, and bridges meet two basic criteria:

Develop and implement runoff management systems for existing roads, highways, and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.

(i) Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures); and
(ii) Establish schedules for implementing appropriate controls.

b. Applicability

State coastal non-point control programs are no longer required in include the "Road, Highway, and Bridge Runoff Systems Management Measure" for any road, highway, and bridge runoff systems in urbanized areas subject to Phase I or Phase II MS4 permits. Management measures in conformance with the 6217 (g) guidance will still be required for runoff systems associated with roads, highways, and bridges occurring outside of the permitted MS4 boundaries.

c. Existing Programs or Practices and Lead Agencies

Following is a list of programs and activities that are being implemented in Indiana and their applicability in meeting the federal guidelines listed in 6.a. (i) and (ii).

Regulatory

- Indiana does not currently have a regulatory requirement to reduce pollutant discharges from existing roads, highways, and bridges through the implementation of individual water quality treatment measures. However, 327 IAC 15-13 does require MS4s to conduct water quality characterization of all known waters that receive stormwater discharges within the MS4 area. Through this assessment MS4s are to identify areas that have potential or are actually contributing to water quality degradation. This assessment should also include recommendations for the placement and implementation of additional stormwater quality measures within the MS4 area that specifically target critical discharge points identified in the assessment.

- The Indiana Department of Transportation has also been designated an MS4 and will have an individual permit for their operations. Aspects of this management measure will be incorporated into their individual permit.

- The majority of highways systems within the Lake Michigan Coastal Area will be part of an MS4. However, those few entities that have been excluded can address water quality concerns associated with roads, highways, and bridges through watershed planning and the implementation of watershed management plans that specifically target those issues identified in 6.a. (i) and (ii). Where necessary and deemed appropriate, local communities can establish ordinances to address specific issues that are determined to be a high priority.

- If an unregulated MS4 entity is determined to be a significant contributor of pollutants to waters of the state or a regulated MS4 area, the Indiana Department of Environmental Management can designate the unregulated MS4. If it is determined that the unregulated MS4 is a significant contributor of pollutants to waters of the state or another regulated MS4 entity, that entity can either be regulated through 327 IAC 15-13 or through an individual NPDES stormwater permit.

Education, Public Outreach, and Technical and Financial Assistance

- IDNR, Division of Soil Conservation - Indiana Handbook for Erosion Control in Developing Areas
- IDEM Clean Water Act Authority
    - Section 104 (b) (3)
    - Section 205 (j)
    - Section 319 (h)
        - Watershed assessments,
        - Development and implementation TMDLs and watershed management plans
        - Technical assistance,
        - Demonstration of new technology and
        - Education and outreach

d. Enforcement Mechanisms

IDEM has the authority to issue citations or initiate enforcement actions for documented violations of the State Water Quality Standards (327 IAC 2-1).

(See Tables C8-C12 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement

mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

D. Coordination

Indiana's Lake Michigan Coastal Program (LMCP) is administered by the Indiana Department of Natural Resources, Division of Soil Conservation. Successful implementation of the Urban Management Measures outlined in this chapter will require coordination and cooperation between local, state and federal agencies and other potential partners. The agencies with primary responsibility for addressing agriculturally related water quality concerns at local, state and federal level respectively are Soil and Water Conservation Districts, IDNR- Division of Soil Conservation, Indiana Department of Environmental Management, Indiana State Department of Health, and U.S. Army Corps of Engineers. These agencies will rely heavily upon a voluntary approach for addressing Urban Nonpoint pollution concerns utilizing education, technical assistance and financial incentives to assist landusers in implementing best management practices and technologies to reduce the potential risk of runoff and /or leaching of the Urban Nonpoint pollutants. These voluntary measures are above and beyond the regulatory measures already in place. It is important to remember that the Indiana Coastal Nonpoint Pollution Control Plan is based upon a network of existing state, local and federal programs and practices. These existing programs and practices are presented in two categories as follows (1) Regulatory, and (2) Education, Public Outreach and Technical and Financial Assistance.

Tables 4-9 to 4-19 provide additional information regarding the various programs and their applicability to the various management measures of this chapter.

Regulatory

Regulatory measures are traditionally the most effective at protecting the resource. There are numerous regulatory programs in place to address Nonpoint source pollution from Urban and rural sources. These programs are broken out into seven main categories. Summary information and how the programs apply to 6217 management measures follow.

The seven main programs are:

- IDEM Rule 5
- IDEM MS4
- IDEM Section 401
- IDNR Water Regulations
- IDEM Waste Regulations
- ISDH Septic
- Solid Waste Management Districts

1. Currently Indiana's NPDES permit for construction activity does not require a planner to address post construction pollutants in their construction plans. However, Indiana recently updated their construction program rule (327 IAC 15-5) in response to EPA's NPDES Phase II requirements for construction activities. The revised rule will require plan preparers to consider pollutants that will be associated with a project once it is operational and integrate stormwater quality measures into the plan (Refer to Section B, Item 2). Therefore, the new provisions of 327 IAC 15-5 address post construction stormwater management in relation to the "New Development Management Measure" outside of those areas designated as MS4s.

327 IAC 15-5 does not specify the requirements listed in item 1. (a) (i). The 80 percent removal of TSS will be a standard established in the Indiana Stormwater Quality Manual (currently under development). This manual is referenced in Indiana's NPDES Guidance Documents as a technical resource for NPDES permits. In addition, effluent guidelines currently being established for the NPDES program by EPA will be included in Indiana's rules once EPA finalizes the requirements.

The MS4 rule (327 IAC 15-13), discussed earlier, will require designated entities to establish ordinances that will address this issue. If a county or municipality designated under this program has an established ordinance, that entity will need to assess the ordinance to ensure it meets the minimum state requirements established in 327 IAC 15-5 and 327 IAC 15-13.

The lead agency for implementation of 327 IAC 15-5 and 327 IAC 15-13 is the Indiana Department of Environmental Management (IDEM). However, Indiana's Soil and Water Conservation Districts and the Division of Soil Conservation will work cooperatively with IDEM to implement the construction program outside the designated MS4 areas and assist in monitoring MS4 program operations that are within the jurisdictional area of the MS4.

2. Indiana does not currently have a regulatory requirement to reduce pollutant discharges from existing developments through the implementation of individual water quality treatment measures. However, 327 IAC 15-13 does require MS4s to conduct water quality characterization of all known waters that receive stormwater discharges within the MS4 area. Through this assessment MS4s are to identify areas that have potential or are actually contributing to water quality degradation. This assessment should also include recommendations for the placement and implementation of additional stormwater quality measures within the MS4 area that specifically target critical discharge points identified in the assessment.

   If an unregulated MS4 entity is determined to be a significant contributor of pollutants to waters of the state or a regulated MS4 area, the Indiana Department of Environmental Management can designate the unregulated MS4. If it is determined that the unregulated MS4 is a significant contributor of pollutants to waters of the state or another regulated MS4 entity, that entity can either be regulated through 327 IAC 15-13 or through an individual NPDES stormwater permit.

   In addition, local planning agencies, regardless of MS4 status, can address water quality concerns associated with existing developments through watershed planning and the implementation of watershed management plans that specifically target those issues identified. Where necessary and deemed appropriate, local communities can establish ordinances to address specific issues that are determined to be a high priority.

3. A contribution of the state to satisfy the requirements of this management measure is through permitting for 401 Water Quality Certification (IDEM) and environmental review of projects regulated by the Department of Natural Resources (DNR). Within the regulatory authority of each agency, staff assigns permit conditions that specifically target the preservation and/or improvement of natural resources. The Indiana Department of Environmental Management (IDEM) is responsible for issuing Water Quality Certification permits within Indiana (327 IAC 2-1). Section 401 of the federal Clean Water Act (CWA) requires any applicant applying for a federal permit to carry out

activities resulting in the discharge of pollutants to a water of the United States to first obtain a Water Quality Certification permit (WQC) from the state. Therefore, anyone wishing to discharge pollutants into wetlands or waters of the state, through activities such as filling, excavating or mechanical clearing, must first receive authorization from the state.

4. The Indiana Department of Natural Resources, Division of Water is responsible for administering regulatory programs under the Lake Preservation Act (IC 14-26-2), Lowering of Ten Acre Lakes Act (IC 14-26-5), Flood Control Act (IC 14-28-1), and the Navigable Waterways Act (IC 14-29-1). Implementation of these various regulatory programs has been further defined through the adoption of the following rules: Navigable Waterways Rule (312 IAC 6), Flood Plain Management Rule (312 IAC 10), and Lake Construction Activities Rule (312 IAC 11). As part of the Division of Water's responsibilities in administering these regulatory programs, each request for a permit receives an environmental evaluation by representatives of other Divisions within the Department in accordance with their areas of expertise to assess the overall impacts of a project. Departmental staff evaluate existing physical site conditions, nature of the project, project design, method of construction, maintenance provisions of new projects, and physical condition and state of maintenance of existing projects to ensure that the project, either individually or cumulatively when compared with other nearby projects, does not constitute an unreasonable detrimental effect upon the fish, wildlife, or botanical resources.

5. The Indiana Department of Environmental Management through 329 IAC 10-32 regulates the proper disposal of waste generated at construction sites. Rule 329 IAC 10-32 requires the disposal of materials at a permitted landfill. Several exclusions exist with regard to the type of waste generated at the site. Vegetative wastes are excluded under 329 IAC 11-3-1 (7) and may be disposed of through burying the material (caution is raised with regard to subsidence). With this in mind it is recommended that vegetative wastes are disposed of either through registered yard waste composting facilities or that it is composted on-site. The second exclusion is for uncontaminated rock, brick, concrete, road demolition debris, and dirt and therefore does not need to be disposed of in a landfill. This exclusion is defined under 329 IAC 10-3-1 (1). Material handling and storage associated with construction activities should be monitored and in the event of a spill reported and addressed through appropriate clean-up measures. The Indiana Department of Environmental Management regulates spills under 327 IAC 2-6.

6. Indiana regulates the installation of new on-site sewage disposal systems through the Indiana State Department of Health (ISDH) under the authority of 410 IAC 6-8.1 titled Residential Sewage Disposal and 410 IAC 6-10 titled Commercial Sewage Disposal. The purpose of these rules is to establish requirements and criteria for the design, installation, construction, maintenance, and operation of on-site sewage disposal systems. The overall intent of the rules are that, “No person may cause or contribute to a health hazard or water pollution by disposing of any organic or inorganic matter from an on-site system into surface water, groundwater or onto the ground surface”.

   410 IAC 6-8.1 establishes the authorities of local health departments and the Indiana State Department of Health. The Indiana State Department of Health can issue various levels of system review and approvals to local health departments.

The Indiana State Department of Health and local health departments are responsible for the inspection of on-site sewage disposal systems under their authorities. The installation of on-site sewage disposal systems requires specific protocol to ensure that systems are installed in accordance with 410 IAC 6-8.1 and 410 IAC 6-10, local ordinances, and the requirements of the system permit. In addition to the authority of the state and local health departments the owner of the system or their agent and the installer are required to meet specific requirements during the installation process to ensure the integrity of the system.

Indiana currently requires an on-site analysis of soil properties and limitations as well as an evaluation of the landscape to determine the best location for a proposed on-site sewage disposal system. By rule an evaluation for all commercial systems must be conducted by an individual certified by the Indiana Association of Professional Soil Classifiers or the American Registry of Certified Professionals in Agronomy, Crops, and Soils (ARCPACS). Indiana recently passed legislation (IC 25-31.5) that allows for the registration of soil scientists in Indiana. Individuals registered though the state is also qualified to perform on-site soil evaluations. All residential sites must also be evaluated and can either be conducted by an individual registered through one of the three entities listed above or by staff of a local health department who are proficient in the ability to observe, measure, and describe soil properties and landforms.

The design of on-site sewage disposal systems is based on requirements established by rule. The rules specify that soil absorption fields will be sized in relation to soil permeability and the number of bedrooms. Where the soil permeability is 2 to 6 inches per hour, 250 square feet of lateral are required per bedroom and where permeability is 1 to 2 inches per hour 350 feet of lateral are required per bedroom. Other design considerations include specific setbacks associated with the location of the system:

On-site sewage disposal systems may not receive water from any of the following: roof drains, foundation drains, sump pumps, swimming pool drains, hot tub drains, area drains. Floor drains are not be used for the disposal of chemical waste or chemical wastewater other than water softener or iron filter waste (normal household cleaners do not constitute chemical waste).

7. In 1990, Indiana counties were required by Indiana Code 13-21-3 to form either single or multi-county solid waste management districts. Solid Waste Management Districts were formed to help the State reach its goal of 50% waste reduction at disposal facilities by the year 2001.

   Once the Solid Waste District is established, the District is required to adopt and submit a plan to the Indiana Department of Environmental Management. The purpose of the plan is to establish policy and to provide an integrated approach to solid waste management issues within the district.

   Lake, LaPorte, and Porter Counties have all formed and are independently operating their own Solid Waste Management Districts. Solid waste management districts within the Lake Michigan Coastal area have specific programs that promote waste reduction, reuse, and recycling. There are several programs that specifically address tire and appliance disposal, yard waste, and household hazardous chemicals. Education and public outreach is also an important component of each of the solid waste management districts. Each

district conducts numerous educational programs that address many of the requirements listed in 1.a. (i), (ii), (iii), (iv), (v), (vi), and (vii).

Education, Public Outreach and Technical and Financial Assistance

Whereas regulatory measures are traditionally most effective at protecting resources, they often fail to address rapid changes in technology. There are numerous education, outreach, and technical and financial assistance programs in place to address Nonpoint source pollution from Urban and rural sources. These programs are broken out into eleven main categories. Summary information and how the programs apply to 6217 management measures follow.

- IDNR, Division of Soil Conservation – Indiana Handbook for Erosion Control in Developing Areas
- Planning with POWER
- Indiana Local Technical Assistance Program
- Hoosier RiverWatch
- Project WET
- IDEM/IDNR Phase II Training
- IDEM CWA Funding Authorities
- Indiana Conservation Districts Act
- Purdue – Informational brochures
- Indiana State Department of Health
- Indiana Department of Environmental Management, (OPPTA) financial/technical assistance

1. The Indiana Department of Natural Resources, Division of Soil Conservation is currently revising the Indiana Handbook for Erosion Control in Developing Areas. The new manual will not only update current erosion and sediment control planning principles and practices, but will also include background information, planning and design principles, and stormwater quality measures addressing post construction pollutants. Once this rewrite is completed the new manual will be renamed the Indiana Stormwater Quality Manual to better reflect its contents.

2. The Planning with POWER (Protecting Our Water and Environmental Resources) project is coordinated by the Illinois-Indiana Sea Grant College Program and the Purdue University Cooperative Extension Service. Planning with POWER is a statewide educational program that links land use planning with natural resource protection at the local level. The project is designed to empower communities to prevent and solve natural resource problems resulting from changing land use in growing watersheds and to empower local officials to incorporate watershed protection measures into comprehensive land use plans.

3. Indiana Local Technical Assistance Program (LTAP), formerly HERPICC (Highway Extension and Research Project for Indiana Counties and Cities) has been serving highway and street departments in Indiana's local communities for over 35 years.

   Indiana LTAP provides technical assistance and training to the highway, road, and street departments of all 92 counties, 117 cities, and over 456 towns in Indiana. This

organization provides assistance through the development of technical publications and training programs. Specific topics related to the "New Development Management Measure" are hydraulics and hydrology, erosion control, stormwater drainage and management, and ordinances. Numerous training sessions are held annually, including "Purdue Road School".

4. Hoosier RiverWatch is a statewide volunteer stream monitoring program that raises public awareness of water quality issues through training workshops, grants for monitoring equipment, and support for stream bank cleanup. This program is administered through the Indiana Department of Natural Resources, Division of Soil Conservation and Purdue University Cooperative Extension Service.

5. The goal of Project WET is to facilitate and promote awareness, appreciation, knowledge, and stewardship of water resources through the development and dissemination of classroom teaching aids and the establishment of state sponsored Project WET programs. This program is administered through the Indiana Department of Natural Resources, Division of Soil Conservation, and Purdue University Cooperative Extension Service.

6. As part of the Phase II implementation program, the Indiana Department of Environmental Management, Department of Natural Resources, and other partners will provide training opportunities that include planning principles and stormwater quality measures that can be utilized to address issues associated with the "Watershed Protection Management Measure".
7. The Indiana Department of Environmental Management, Watershed Management Section administers several grant programs through the authority of the federal clean water act. These grant programs include Section 104 (b) (3), 319 (h), and 205 (j). These programs are described in more detail below:
    - The Section 104 (b) (3) program provides opportunities for developing, implementing, and demonstrating new concepts or requirements that will improve the effectiveness of the NPDES permit program, which regulates point source discharges. Assistance through this program should address the water pollutant sources and activities regulated by the NPDES program. Organizations eligible for Section 104 (b) (3) funding include state water pollution control agencies, interstate agencies, colleges and universities, and other public or nonprofit organizations. For-profit entities, private associations and individuals are not eligible to receive this assistance.

    - The Section 205 (j) program funds projects that gather and map information on non-point and point source water pollution, develop recommendations for increasing the involvement of environmental and civic organizations in watershed planning and implementation activities, and develop and implement watershed management plans. Funds are to be used to determine the nature, extent and causes of point and non-point source pollution problems and to develop plans to correct these problems. Organizations eligible for funding include municipal governments, county governments, regional planning commissions, and other public organizations. For-profit entities, nonprofit organizations, private associations and individuals are not eligible to receive this assistance.

- The Federal Clean Water Act Section 319 (h) provides funding for various types of projects that work to reduce non-point source water pollution. Funds may be used to conduct assessments, develop and implement TMDLs and watershed management plans, provide technical assistance, demonstrate new technology and provide education and outreach. Organizations eligible for funding include nonprofit organizations, universities, and local, State or Federal government agencies.

8. The Indiana Conservation Districts Act (IC 14-32) states, "That the land and water resources of Indiana are among the basic assets of Indiana and that the proper management of these resources is necessary to protect and promote the health, safety, and general welfare of the people of Indiana." As such, IC 14-32 identifies the responsibilities and duties of the State Soil Conservation Board, IDNR's Division of Soil Conservation, the state's 92 county Soil and Water Conservation Districts. Specific responsibilities include technical and educational assistance that promote erosion control, sediment reduction, and water quality improvement on agricultural and non-agricultural lands. This statute also outlines specific programs including Lake and River Enhancement and Clean Water Indiana. These programs are administered by the Division of Soil Conservation, according to policies established by the State Soil Conservation Board, in cooperation with local Soil and Water Conservation Districts.
    - Soil and Water Conservation Districts provide assistance to local communities through educational and technical programs. The focus of the Soil and Water Conservation Districts is to assist land users evaluate and assess natural resource issues, recommend alternatives to address the issues, and implement the appropriate measures that address soil erosion, reduce off-site sedimentation, and improve water quality. The local Soil and Water Conservation District is also a technical resource for natural resource related issues.

    - The DNR Division of Soil Conservation subject to the State Soil Conservation Board approval administers the Clean Water Indiana Program. The Clean Water Indiana Program, through local Soil and Water Conservation Districts, provides educational, technical, and financial assistance to land users and conservation groups interested in implementing conservation measures to reduce non-point sources of water pollution.

    - The Lake and River Enhancement Program (LARE) is administered by the DNR, Division of Soil Conservation. LARE provides technical and financial assistance to Soil and Water Conservation Districts and local entities for lake and stream studies, engineering feasibility studies, engineering design studies, watershed land treatment projects, and water quality monitoring. Activities specifically targeted to implement urban conservation practices are potentially available, but require approval of the State Soil Conservation Board on a case-by-case basis.

9. Purdue University publishes a series of informational brochures. These brochures include topics on the operation and maintenance of systems, construction guidelines for a variety of systems, wastewater wetlands, and small community wastewater cluster systems.

10. The Indiana State Department of Health conducts training sessions for local health officials on state requirements, system design, and soil evaluation. In addition, sessions are also conducted for on-site sewage disposal system installers and designers.

    The ISDH has coordinated their program implementation very closely with the USDA, Natural Resources Conservation Service and the Indiana Association of Professional Soil Classifiers. This cooperative working arrangement has provided a venue for sharing information, training, and program coordination in relation to soil information. The efforts of these agencies and organization are also responsible for IC 25-31.5, which established a registration board for soil scientists and required registration of individuals practicing soil science in the state of Indiana.

11. The Indiana Department of Environmental Management, through the Office of Pollution Prevention and Technical Assistance (OPPTA) promotes the development of environmentally safe handling and disposal programs through various grant opportunities, public recognition awards, broad-based educational programs, and technical assistance. OPPTA works with communities and solid waste management districts to promote the development of household hazardous waste services. Residents seeking household hazardous waste disposal assistance should contact their local household hazardous waste collection program.

E. The Goal and Objectives of Urban and Rural Areas

Goal: Indiana will implement agricultural non-point sources management measures in the Little Calumet-Galien Watershed to the extent practicable to achieve and maintain applicable water quality standards.

Objectives: The following tables 4-9 to 4-19 describes the objectives developed by the Urban workgroup for implementing each Urban management measure that will be used to address the priority concerns to achieve the goal. Each of the objectives is accompanied by measures of success, resources needed, a listing of responsible entities and a timeline for accomplishing each objective.

Table 4-9 Urban Runoff New Development Management Measure Objective (Geographically limited Exclusion)

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 1 – (Geographically Excluded) Ensure the reduction of pollution and stormwater associated with new development and induced changes in hydrology, where applicable	(i) 80% Reduction in Total Suspended Solids or reduce post dev loadings of TSS so that average annual TSS loadings are no greater than predevelopment loadings & (ii) Maintain post development peak runoff and average volume similar to pre-development levels	- Partnerships with local entities - Technical assistance o Pre-construction – Developers and local government o Post-construction – Public and other - Funding - Staff o Monitor practice implementation - Policy/Program guidance/structure	- IDEM o Narrative Water Quality Standards (327 IAC 2-1, 327 IAC 2-1.5) - Rule 5 (327 IAC 15-5) - IDNR – Rule 5 - SWCDs - Drainage Boards - Local Planning and Zoning - ACOE (404) - Illinois-IN Sea Grant – Planning with Power	**Years 1-5**

Table 4-10 Watershed Protection Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 2 - Encourage sound planning principles, management, and mitigation measures to protect, enhance, and restore natural resources and reduce runoff to surface waters	(i) Avoid conversion to the extent practicable of areas that are particularly susceptible to erosion and sediment loss; (ii) Preserve areas that provide important water quality benefits and/or are necessary to maintain riparian and aquatic biota; and (iii) Site development, including roads, highways, and bridges, to protect to the extent practical the natural integrity of water bodies and natural drainage systems.	- Funding - Partnerships with: o Local Watershed groups o Local Entities o State Entities o Federal Entities - Staff - Technical Support	- NIRPC - IDEM o Section 401 o Section 319(h) o Section 205(j) o Section 104(b) o 327 IAC 2-1 - IDNR – o Lake Preservation Act (IC 14-26-2), o Lowering of Ten Acre Lake Act (IC 14-26-5), o Flood Control Act (IC14-28-1), o Navigable Waterways Act (IC 14-29-1), o Navigable Waterways Rule (312 IAC 6), o Flood Plain Management Rule (312 IAC 10), o Lake Construction Activities Rule (312 IAC 11) o Lake and River Enhancement Program o Clean Water Indiana - Sea Grant Planning with Power - Project Wet - Hoosier Riverwatch - Indiana Local Technical Assistance Program - Indiana Conservation Districts (IC 14-32) - Other various partners - Planning & Zoning Boards - Drainage Boards - Cities, Towns, and Counties	**Years 1-15**

Table 4-11 Site Development Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 3 - Ensure that site-specific development designs protect, enhance, and restore natural resources and reduce runoff to surface waters	(i) Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss; (ii) Limit increases of impervious areas, except where necessary; (iii) Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss; and (iv) Limit disturbance of natural drainage features and vegetation.	- Pilot Projects/Demonstration Sites - Funding - Technical Assistance/Education & Outreach - Model Ordinances	- ACOE (404) - Sea Grant – Planning with Power - LMCP - SWCDs - DNR/IDEM (401) - Planning & Zoning Boards - Drainage Boards - Cities, Towns, and Counties - IDEM o Section 319(h) o Section 205(j) o Section 104(b) o 327 IAC 2-1 - IDNR – o Lake Preservation Act (IC 14-26-2), o Lowering of Ten Acre Lake Act (IC 14-26-5), o Flood Control Act (IC14-28-1), o Navigable Waterways Act (IC 14-29-1), o Navigable Waterways Rule (312 IAC 6), o Flood Plain Management Rule (312 IAC 10), o Lake Construction Activities Rule (312 IAC 11) o Lake and River Enhancement Program o Clean Water Indiana - Project Wet - Hoosier Riverwatch - Indiana Local Technical Assistance Program - Soil and Water Conservation (IC 14-32)	**Years 1-15**

Table 4-12 Existing Development Management Measure - (Geographically limited Exclusion)

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 6 –Ensure the decrease of pollution being discharged from existing residential and industrial facilities where applicable	(i) Identify priority local and/or regional watershed pollutant reduction opportunities, e.g., improvements to existing urban runoff control structures; (ii) Contain a schedule for implementing appropriate controls; (iii) Limit destruction of natural conveyance systems; and (iv) Where appropriate, preserve, enhance, or establish buffers along surface waterbodies and their tributaries.	- Funding (for BMPs) - Staffing (identify priority areas using watershed plans/develop watershed plans where absent) - Model Ordinances (to protect buffered areas) - Technical Assistance/Education & Outreach	- DNR – Indiana Handbook for Erosion Control in Developing Areas (Name is being changed to Indiana Stormwater Quality Manual) - IDEM o Section 319(h) o Section 205(j) o Section 104(b) o 327 IAC 2-1 - Counties - Cities - SWCDs - Homeowners/Lake Associations - RC&Ds	**Year 10-15**

Table 4-13 New On-site Sewage Disposal Systems Management Measures

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 7 - Ensure state officials permit the use of best available technology for installation and maintenance of new onsite sewage disposal systems	(i) Ensure that new on-site sewage disposal systems are located, designed, installed, operated, inspected, and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground water that are closely hydrologically connected to surface waters (ii) Direct placement of on-site sewage disposal systems away from unsuitable areas (iii) Establish protective setbacks from surface waters, wetlands, and floodplains for conventional as well as alternative on-site sewage disposal systems.	- Funding - Staff - Model Ordinances - BMPs - Partnerships with o Cities o Counties o Planning Depts. o Researchers o Sanitary Districts o ISDH o County Dept Health o SWCDs - Education/Outreach (Maintaining your septic system)	- Indiana State Dept of Health (410 IAC 6-8.1) - County Health Departments (410 IAC 6-8.1) - Sanitary Districts - Purdue Extension - IDEM o Section 319(h) o Section 205(j) o Section 104(b) o 327 IAC 2-1 - Planning with Power -	**Years 1-15**

Table 4-14 Operating Onsite Sewage Disposal Systems Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 8 - Reduce non-point source pollution resulting from onsite disposal systems.	(i) Establish and implement policies and systems to ensure that existing on-site sewage disposal systems are operated and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. (ii) Inspect on-site sewage disposal systems at a frequency adequate to ascertain whether on-site sewage disposal systems are failing; (iii) Reduce total nitrogen loadings in the effluent by 50 percent.	- Funding - Partnerships with o Local entities o Regulators (State) - (Sewer Connections for existing septic areas) - Staff	- ISDH (410 IAC 6-8.1) - County Health Depts. (410 IAC 6-8.1) - Sanitary Districts - Property Owners of septics - IDEM o Section 319(h) o Section 205(j) o Section 104(b) o 327 IAC 2-1	**Year** 1-15

Table 4-15 Pollution Prevention Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 9 - Reduce the amount of non-point source pollution from everyday residential and commercial uses and activities.	(i) The improper storage, use, and disposal of household hazardous chemicals, including automobiles fluids, pesticides, paints, solvents, etc.; (ii) Lawn and garden activities, including the application and disposal of lawn and garden care products, and the improper disposal of leaves and yard trimmings; (iii) Turf management on golf courses, parks, and recreational areas; (iv) Improper operation and maintenance of Onsite Sewage Disposal Systems; (v) Discharge of pollutants into storm drains including floatables, waste oil, and litter; (vi) Commercial activities including parking lots, gas stations and other entities not under NPDES purview; and (vii) Proper disposal of pet excrement.	- Partnerships with o Solid Waste Districts o Park Districts o Private Entities o Sanitary Districts o City Services - Model Ordinances - Local Entities/IOSHA/IDEM o (Identify entities with Contingency Plans) - Education/Outreach	- Cities/Towns/Park Districts/State Parks - State Chemist Office - Purdue Extension - Solid Waste Management Districts (IC 13-21-3) - Sanitary Districts - IDEM – OPPTA - Purdue Extension – Turf Management guidance - Hoosier Riverwatch – Increased awareness - Project WET – Increased awareness -	**Year 1-15**

Table 4-16 Management Measures for Planning, Siting, and Developing Roads and Highways

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective10 - Ensure that state officials plan, site and develop roads and highways away from areas classified as eco-significant and susceptible to erosion and sediment loss	(i) Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss; (ii) Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and (iii) Limit disturbance of natural drainage features and vegetation.	- Partnerships with o Cities o Counties o Planning Depts. o SWCDs	- Toll Road Commission - INDOT - NIRPC - IDNR – o Lake Preservation Act (IC 14-26-2), o Lowering of Ten Acre Lake Act (IC 14-26-5), o Flood Control Act (IC14-28-1), o Navigable Waterways Act (IC 14-29-1), o Navigable Waterways Rule (312 IAC 6), o Flood Plain Management Rule (312 IAC 10), o Lake Construction Activities Rule (312 IAC 11) - IDEM o Section 319(h) o Section 205(j) o Section 104(b) o 327 IAC 2-1 - Planning with Power - Indiana Local Technical Assistance Program	Years 1-15

Table 4-17 Management Measure for Bridges

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 11 – Ensure runoff associated with bridges is assessed and that appropriate stormwater quality measures and treatment is utilized to protect critical habitat, wetlands, fisheries, and water supplies, and sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.	(i) Site, design, and maintain bridge structure so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.	- Partnerships with o Cities o Counties o Planning Depts. o SWCDs	- Toll Road Commission - INDOT - NIRPC - IDNR – o Lake Preservation Act (IC 14-26-2), o Lowering of Ten Acre Lake Act (IC 14-26-5), o Flood Control Act (IC14-28-1), o Navigable Waterways Act (IC 14-29-1), o Navigable Waterways Rule (312 IAC 6), o Flood Plain Management Rule (312 IAC 10), o Lake Construction Activities Rule (312 IAC 11) - IDEM o 327 IAC 2-1 - Planning with Power - Indiana LTAP	Years 1-15

Table 4-18 Management Measure for Road, Highway, and Bridge Operation and Maintenance - (Geographically limited Exclusion)

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 14 – (Geographically Excluded) Utilize an operation and maintenance controls to reduce pollutant loadings to receiving waters during operation and maintenance of roads, highways, and bridges.	(i) Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.	- Partnerships with o Cities o Counties o Planning Depts. o SWCDs o Highway Departments o Toll Road Authority o Drainage Boards	- Toll Road Commission - INDOT - Highway Department - County Gov. - City Gov. - State Gov. - IDNR – Indiana Handbook for Erosion Control in Developing Areas - IDEM o 327 IAC 2-1	**Years 1-15**

Table 4-19 Management Measure for Road, Highway, and Bridge Runoff Systems - (Geographically limited Exclusion)

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Objective 15 - (Geographically Excluded) Runoff management systems for existing roads, highways, and bridges should identify priority pollutant reduction opportunities and schedule implementation of retrofit projects to protect impacted areas and threatened surface waters.	(i) Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures); and (ii) Establish schedules for implementing appropriate controls.	- Partnerships with o Cities o Counties o Planning Depts. o SWCDs o Highway Departments o Toll Road Authority o Drainage Boards	- Toll Road Commission - INDOT - Highway Department - County Gov. - City Gov. - State Gov. - IDNR – Indiana Handbook for Erosion Control in Developing Areas - IDEM o Section 319(h) o Section 205(j) o Section 104(b) o 327 IAC 2-1	**Years 1-15**

Chapter 5
Marinas and Recreational Boating

A. Introduction

An extremely important resource for Indiana, Lake Michigan supports a sport fishing industry, industrial and public water supply, international shipping and extensive recreational use. On Indiana's 45 miles of coast, 21 marina facilities provide boating access to Lake Michigan with approximately 2,850 existing boat slips and more planned (See figures 5-1 and 5-2). A new condo/marina/retail area planned for Portage, Indiana will add 300 new slips. With over 700,000 people in the watershed, a lakeshore that attracts visitors from several states and over 400,000 recreational boats on Lake Michigan, the demand for boating access to Lake Michigan remains high. In 1996 the IDNR Division of Outdoor Recreation collected surveys and focus group information to help assess needs and demands on the resource. "In general, the majority of the attendees felt there was a lack of adequate access to the lake shore. For whatever use…" This summary statement from the focus group highlights the pressures, demands and needs felt by users. High use and demand go hand in hand with Nonpoint pollution problems.

Nonpoint source pollution associated with marinas and recreational boating can pose a significant threat to the health of Indiana's coastal waters. The recently released second National Coastal Condition Report (NCCRII) found that: "The highest percentage of beaches closed or under advisory occurred in Indiana;" 71% of Indiana's Lake Michigan beaches reported at least one beach notification due to elevated bacteria levels. The report further categorizes the source of beach advisories/ closures for all of the Great Lakes as: Boats 5%; Stormwater runoff 23%; wildlife 22%; unknown 25%; and other 11%. The majority of known closings originated from Nonpoint sources of contamination. In 2000 over 1.7 million people used Indiana's Lake Michigan beaches. With usage of Indiana's Lake Michigan resources compressed in only forty-five miles of coast the need for effective reduction of Nonpoint source pollution will continue to be a priority.

Mismanaged or poorly designed marinas negatively impact coastal waters. Improved control of Nonpoint water quality impacts from marinas and boating can improve and maintain the quality of Indiana's Lake Michigan coastal waters.

1. Definition of Marina

- A marina is defined as a structure that can service simultaneously at least five watercraft and provides fuel, docks, repair, and/ or sales and or service.
- Boat maintenance or repair areas adjacent to the water.
- Public or commercial boat ramps.
- Any residential or planned community marina with five or more slips.
- Any mooring field where five or more boats are moored.

2. Overview of Existing Governmental Programs

Several Federal and State programs have been established in Indiana's Lake Michigan coastal region to control Nonpoint source pollution from recreational boating and the construction and operation of marinas.

Overview of Existing Federal Programs

Several Federal statutes relate to environmental impacts associated with marinas. The construction of new marinas or expansion of existing marinas comes under the jurisdiction of, Section 401 and 404 of the Clean Water Act, which concerns any activity that may result in any discharge into navigable waters. Marina developers must submit plans to the United States Army Corps of Engineers for approval under the Rivers and Harbors Act of 1899 for construction, excavation, or deposition of materials in or affecting U. S. navigable waters. The Archaeological Resources Preservation Act requires that marina developers apply for a permit to remove any archaeological resources located on public land where a marina is built or expanded. The Endangered Species Act requires completion of a biological assessment to determine the presence of endangered species before construction activities may commence. The Fish and Wildlife Conservation Act requires marina developers to consult with the U.S. Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration (NOAA) to ensure that the project will not adversely impact fish and wildlife resources. The Underground Storage Tank Program ensures regulated underground storage tanks meet the U.S. Environmental Protection Agency's (EPA) requirements for leak detection, spill, and overflow prevention, plus corrosion protection. It also insures that tanks not meeting the requirements are either closed or upgraded. This program applies to any fuel storage tanks that a marina installs or maintains for the fueling of boats.

To maintain and improve water quality in boating waters in the United States, the Clean Vessel Act of 1992 was passed. The goal of the Act was to evaluate existing conditions for sewage disposal from recreational boats and to implement improvements where needed. Under the Act, the USFWS is authorized to make grants to coastal states for the construction, renovation, operation, and maintenance of pumpout and dump stations for the disposal of sewage discharged by recreational boats.

Also the Nonpoint Source Program in Indiana establishes a way to integrate methods to reduce Nonpoint source pollution. The Indiana Department of Environmental Management (IDEM) manages funding for the program from the Clean Water Act under Sections 319, 104(b) (3), and 205(j) federal programs. Standards and criteria for each program are identified in the Indiana Nonpoint Pollution Management Plan. Indiana University manages The Clean Lakes Program, which is funded through several grant programs directed to water quality. The program receives the funds to assess the water quality of a number of Indiana lakes each year.

3. Overview of Existing State Programs

All waters in Indiana, including Lake Michigan and its tributaries, must meet State Water Quality Standards. This means that all waters in the Great Lakes basin must be free from substances, materials, debris, oil or scum attributable to municipal, industrial, agricultural, and other land use practices. Also, other discharges must not form objectionable deposits; not be in amounts to be unsightly; not produce color, visible oil sheen, odor, or other objectionable conditions; or not be in concentrations that will contribute to the growth of algae or aquatic plants to a degree of being a nuisance; and should not be in amounts that are toxic to aquatic life, other animals or humans.

Bathing Beach Monitoring requires local county health departments to collect and analyze water from bathing beaches weekly for E. coli and fecal coliform during the swimming season. Swimming in the water at bathing beaches can be restricted when water quality does not meet standards set by the rule. The Marina Pumpouts Program requires marinas to have an approved wastewater treatment facility or on-site disposal system and is a prerequisite for the construction

permit program when new marina construction is involved. The Remedial Action Plan for the Grand Calumet River, Indiana Harbor and Ship Canal, and Near Shore Lake Michigan, is a plan developed to improve and eliminate environmental threats and damages in this Lake Michigan geographic area. The Lake Michigan Lakewide Management Plan (LaMP) proposes actions to improve the water quality in Lake Michigan. The Plan's focus is on reducing "critical pollutants" to restore beneficial uses of the lake.

Figure 5-1 Marina Locations in CNPCP Area

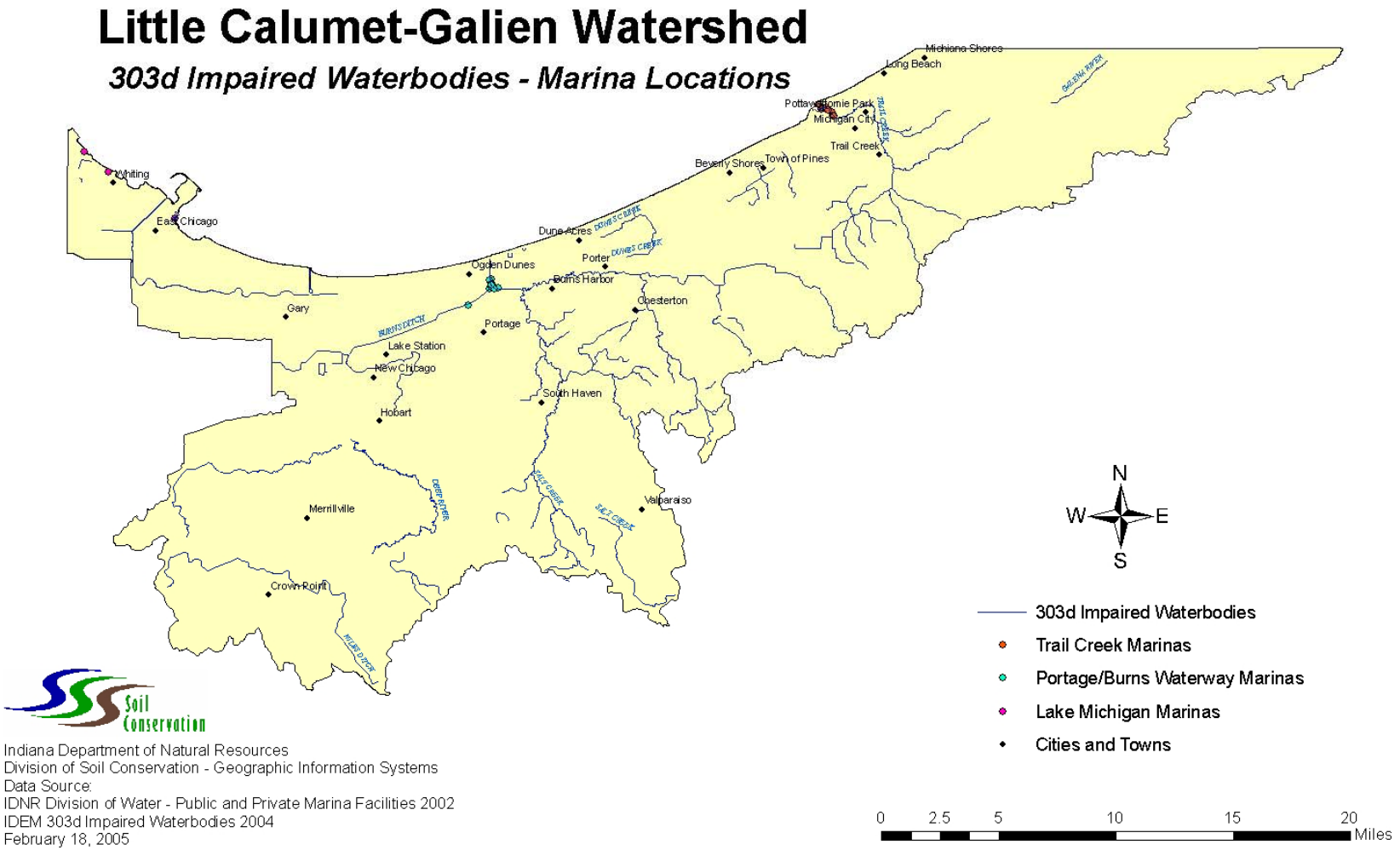
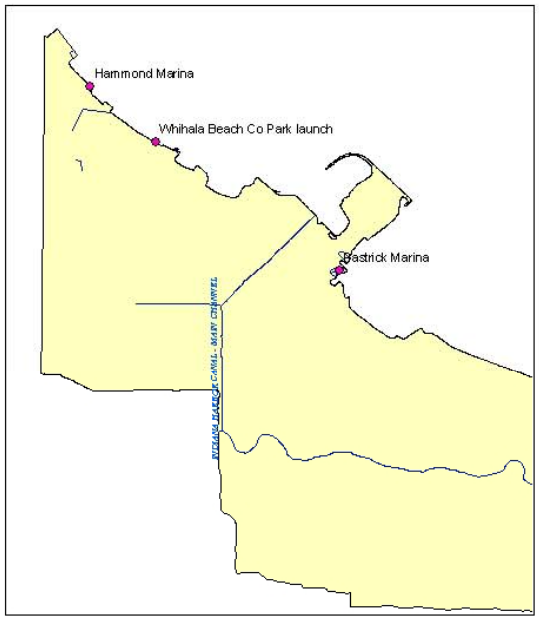


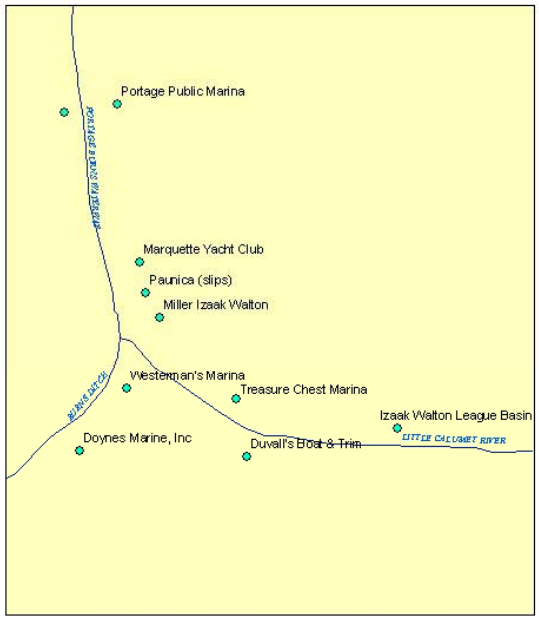
Figure 5-2 Marina Locations by Area

Little Calumet-Galien Watershed

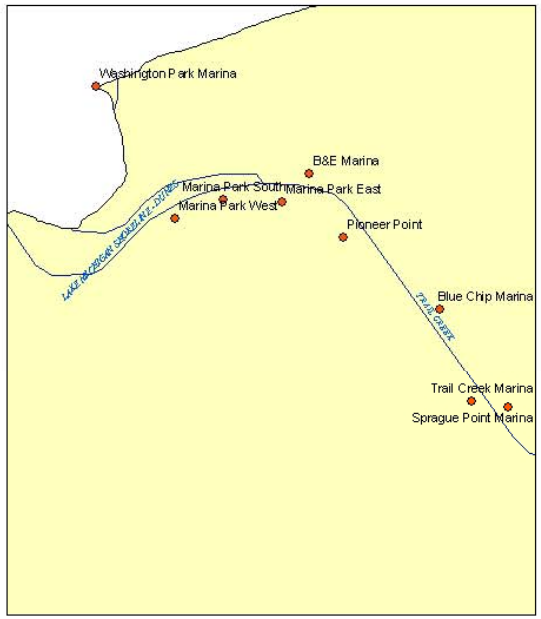
303d Impaired Waterbodies - Marina Locations



Lake Michigan Marinas



Portage/Burns Marinas



Trail Creek Marinas

Soil Conservation

Indiana Department of Natural Resources
Division of Soil Conservation - Geographic Information Systems
Data Source:
IDNR Division of Water - Public and Private Marina Facilities 2002
IDEM 303d Impaired Waterbodies 2004
February 18, 2005

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The Indiana Department of Environmental Management (IDEM) has broad-based authority over impairments to water quality, regardless of the nature of the source. A person must not drain, cause, or allow any organic or inorganic matter that causes or contributes to a polluted condition to enter any waters. Rule 5 now applies to construction activities disturbing one or more acres of land and functions to reduce pollutants, principally sediment from soil erosion, in storm water discharges into surface waters of the State. Rule 6 applies to stormwater discharges associated with industrial discharges. IDEM also manages the Land Application Program, which regulates the land application of sewage treatment plant sludge and industrial waste products.

The Indiana Department of Natural Resources (DNR) manages the Clean Water Indiana Program, which provides financial assistance to land occupants and conservation groups to implement conservation practices to reduce Nonpoint sources of water pollution through education, technical assistance, training and cost sharing programs. This program has expanded this year and has received increased funding. DNR also manages the Hoosier Riverwatch Program which increases public awareness of water quality issue by training volunteers to care for and monitor the health of Indiana's streams and rivers. DNR's Construction in a Floodway Permit Program addresses construction activities in Indiana floodways. The Pesticide Program is run by the Indiana State Chemists Office and provides protection of ground water resources through the regulation of pesticide use.

The Indiana Natural Resources Commission has responsibility for marina licensing in Indiana. Marina License requirements address marina location, operation, maintenance, fueling, waste disposal, and other aspects of marinas.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

B. Potential Sources of Marina & Recreational Boating Nonpoint Pollution

1. Fish waste can result in water quality problems at marinas with large numbers of fish landings or at marinas that have limited fish landings but poor flushing.

2. Liquid Materials operations represent a constant threat to waters in marinas. Boat cleaning and maintenance activities may cause Nonpoint pollution. Liquid materials such as oil, solvents, antifreeze, and paints must be properly managed to prevent pollution. Fuel spilled during fueling is a source of pollution.

3. Improper solid waste disposal will result in Nonpoint pollution. This category includes boat cleaning and maintenance activities, runoff from marina parking lots, rooftops, and other impervious surfaces and waste from pets. Trash disposal must be managed properly.

4. Sewage waste disposal needs to be properly managed to prevent contamination from entering the water. Sewage/ human waste can be a problem on land at and around the marinas, and in the water from improper disposal or spillage from recreational boating.

5. Improper boat operation can result in destruction of shallow water habitat and re-suspend bottom sediment and pollutants. It can cause turbidity, which can affect photosynthetic activity of

algae and submerged aquatic vegetation that provides habitat for aquatic wildlife. Boat wakes can cause shoreline erosion and affect bottom habitats.

6. Poorly designed marinas can cause pollutants to concentrate to unacceptable levels in the water and/or sediments and impact beds of aquatic vegetation, or other habitats. Construction and expansion of marinas can also affect the shoreline resulting in erosion problems.

C. Marinas & Recreational Boating Management Measures to be Implemented

The following management measures are designed to protect coastal waters from sources of Nonpoint pollution from the construction and operation of marinas and from recreational boating. These measures apply to the following facilities and their associated services that support recreational boating.

The following discussion lists: management measures, definitions, measures of success, applicable existing regulatory programs/practices, voluntary programs, outreach and education programs, and enforcement mechanisms. The Objective Table at the end of the chapter contains a complete listing of all referenced programs with: program authorities, program classification, responsible entity, enforceable mechanism, evaluation mechanism, and all Management Measures that are applicable. The coordination section further explains how each program will apply to the various management measures. In addition, a complete description of all referenced programs is included in Appendix B.

1. Site Location and Design Management Measure

a. Definition

Site and design new or expansion of marinas so that all new construction will show no degradation of water quality.

b. Applicability

The location of a marina affects water circulation and flushing characteristics in the basin. Circulation and flushing can be influenced by the basin configuration and orientation to prevailing winds. Circulation and flushing play important roles in the distribution and dilution of potential contaminants in a marina harbor. The final design represents a compromise that provides the most desirable combination of marina capacity, services, and access, while minimizing environmental impacts, dredging requirements, protective structures, and other site development costs. Marina siting and design should be done to ensure that marinas and their associated structures do not cause direct or indirect adverse water quality impacts or endanger wildlife and its habitat both during and following marina construction.

Many factors influence the long-term impact a marina will have on water quality within the immediate vicinity of the marina and the adjacent waterway. Initial marina site selection is the most important factor. Selection of a site that has favorable hydro geographic characteristics and requires the least amount of modification can reduce potential impacts.

c. Existing Practices and Programs for Site location & Design Management Measure

New and expanded marinas must meet storm water construction standards for parking garages and lots. In-line filters are used to remove waste from storm water runoff.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act apply to projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 7-2 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7- 2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

2. Marina Flushing Management Measure

a. Definition

Site and design marinas such that tides and or currents will aid in flushing the basin and/or renew its water regularly.

b. Applicability

This management measure applies to new and expanding marinas in the coastal area.

c. Existing Practices and Programs for Marina Flushing Measures

Maintaining water quality within a marina basin depends primarily on flushing as determined by water circulation within the basin. If not properly flushed, pollutants within the marina area will concentrate to unacceptable levels in the water or sediments and may impact the biological resource. In non-tidal coastal waters, such as Lake Michigan, wind drives water circulation, producing cells that have a flushing effect within a marina. Several hours of consistent wind are required to fully develop wind driven currents and change the water in a marina basin. In many situations wind driven currents will provide adequate flushing. Variations in winds, water current and water levels create significant variability in how well a basin is flushed. By considering these variables when siting a marina the probability of good flushing is increased.

Consideration of marina flushing in the siting and design of new marinas in Indiana is part of the agency review process under IDEM's Section 401 Water Quality Certification and Clean Water Act Programs. Under Section 401, planned marina sites are reviewed for consistency with State water quality standards. IDNR reviews projects under the Navigable Waterways Permit Program to insure that the planned marina would not impair the navigability of the waterway, cause significant harm to the environment, or pose a hazard to life or property. The proposed project's impact on others is also evaluated.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The State Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 7- 2 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable

Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7-2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The State Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

3. Water Quality Assessment Management Measure

a. Definition

Assess potential water quality impacts as part of marina design.

b. Applicability

This management measure is applied to new and expanding marinas in the coastal area.

c. Existing Practices and Programs for Water Quality Assessment Management

Existing programs that support the implementation of this management measure are the same as those listed under Siting and Design Management Measure for Marina Flushing. The assessment of water quality as part of marina siting and design criteria is implemented under IDEM's Section 401 Water Quality Certification and Clean Water Act programs.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS.

State and Local: The State Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 4 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7- 2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The State Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

4. Habitat Assessment Management Measure

a. Definition

Site and design marinas to protect against adverse effects on shellfish resources, wetlands, submerged aquatic vegetation, or other important riparian and aquatic habitat areas as designated by local, State, or Federal governments.

b. Applicability

This management measure applies to new and expanding marinas where site changes may affect wetlands, shellfish beds, submerged aquatic vegetation, or other important habitats throughout the 6217 management area.

c. Existing Practices and Programs for Habitat Assessment Management Measure

Marina's are required to comply with several federal and state statutes relating to environmental impacts on important habitat areas associated with the construction or expansion of marinas in Indiana's 6217 management area. An assessment of the impacts of proposed marina projects on important aquatic habitat areas may be required under the Archaeological Resources Preservation Act, the Endangered Species Act, and the Fish and Wildlife Conservation Act. Also, developers must submit plans to the ACOE for approval under the Rivers and Harbors Act of 1899 for construction, excavation or deposition of materials in or affecting U.S. navigable waters, and under Section 404, Clean Water Act for projects affecting wetland areas. Existing Indiana State programs, which support the implementation of this management measure, include the IDEM Section 401 Water Quality Certification and Clean Water Act water quality programs. The IDEM Assessment Branch monitors all waters of the State on a five-year rotation and reports on the condition of the State's waters.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 7-2 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7- 2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

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In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

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5. *Shoreline Stabilization Management Measure*

a. Definition

Shorelines should be stabilized where erosion is a Nonpoint source pollution problem. Vegetative methods are strongly preferred unless structural methods are more cost-effective, considering the severity of wave and wind erosion, offshore bathymetry, and the potential adverse impact on other shorelines and offshore areas.

b. Applicability

This management measure applies to new and expanding marinas where site changes may result in shoreline erosion.

c. Existing Practices and Programs

Erosion along the Indiana shore of Lake Michigan has been severe at times. Installation of erosion control measures typically requires a permit from the ACOE pursuant to the Rivers and Harbors Act of 1899 and Section 404 Clean Water Act, a Section 401 Water Quality Certification from IDEM. A Navigable waterway Fill Permit (IC 14-29- 1-8) may need to be obtained from DNR for beach nourishment.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 7-2 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7-2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. . IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

6. Stormwater Runoff Management Measure

a. Definition

Implement effective runoff control strategies, which include the use of pollution prevention activities and the proper design of hull maintenance areas.

b. Applicability

This management measure applies to new and expanding marinas and to existing marinas for at least the hull maintenance areas. If boat bottom scraping, sanding, or painting is done in areas other than those designated as hull maintenance area, the management measure applies to those areas as well. This measure is not applicable to runoff that enters the marina property from upland sources.

c. Existing Practices and Programs Stormwater Runoff Management Measure

IDEM, DNR, and NRCS have defined recommended practices for stormwater management, land development, and urban stream protection. These practices are set forth in the Indiana Handbook for Erosion Control in Developing Areas. Rule 5 is a general permit, which addresses construction activity stormwater runoff control. It was adopted in 1992 by the Indiana State Water Pollution Control Board, and administered by the IDEM applies to all sites where construction activity disturbs one acre or more. In addition, state authority to enforce the control of urban runoff and pollutants from development sites can be invoked by the IDEM through citation for violations of the State's Water Quality Standards under the Clean Water Act. The IDEM also administers the state regulations that require stormwater permits for construction under the NPDES Permit Program for all construction sites greater that 5 acres and for the industrial activity stormwater NPDES general permits. Locally, municipalities, townships and counties all have authority to regulate stormwater and land development through Local Ordinances.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The State Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 7-2 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes

Water Quality Guidance, and Rule 5. (See Table 7-2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

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In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

7. Fueling Station Design Management Measure

a. Definition

Design fueling stations to allow for ease in cleanup of spills.

b. Applicability

This management measure applies to new and expanding marinas in the 6217 management area where fueling stations are to be added or moved.

c. Existing Practices and Programs for Fueling Station Design Management Measure

The IDEM has authority under the Clean Water Act, over discharges into waters of the State if contaminants are released into the air, land or water. Also under the Voluntary Remediation Program Resource Guide, it is provided for voluntary cleanup of contaminated property and no IDEM enforcement action will be exercised. Natural Resource Damage Assessment provides for following the discharge of oil or hazardous materials, the Department of the Interior have issued regulations for conducting damage assessments.

The State Fire Marshals Office has regulations concerning marine service stations. They address the construction of the facilities; the storage and handling of associated liquids; the dispensing of fuels; fire prevention and protection methods; and the venting of tanks.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 7-2 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7-2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

8. Sewage Facility Management Measure

a. Definition

Install pumpout, dump station, and restroom facilities where needed at new and expanding marinas to reduce the release of sewage to surface waters. Design these facilities to allow ease of access and post signage to promote use by the boating public.

b. Applicability

This management measure applies to new and expanding marinas in the 6217 management area where adequate marine sewage collection facilities do not exist. Marinas that do not provide services for vessels that have marine sanitation devices (MSDs) do not need to have pumpouts, although dump stations for portable toilets and restroom facilities should be available. This measure does not address direct discharges from vessels covered under CWA Section 312.

c. Existing Practices and Programs for Sewage Facility Management Measure

Efforts to reduce the release of sewage into marina waters are carried out in Indiana through programs administered by IDEM and DNR. These programs promote the installation, maintenance, and usage of adequate sewage facilities. New marinas providing boat dockage for 5 or more watercraft and existing marinas that expand substantially are subject to licensing requirements under Indiana State law. A written license is required from the DNR to place a marina along a navigable waterway. Under Indiana State Law, new marinas must address the subject of sewage disposal. Under the Clean Vessel Act, the USFWS provides the opportunity for marinas to obtain grant funding for the installation and restoration of boat sewage pumpout facilities. This program provides seventy-five percent of the funds. Also under the Clean Water Act, activities into navigable waters of the State must meet State water quality standards. The installation of sewage disposal facilities is also governed by the Indiana Department of Health and their guidelines for their construction.

New Marina Pumpout Language under 312 IAC 6-4-3 allows small marinas and marinas in the same area (clusters of marinas) to use another marina's pumpouts as long as they meet the requirements.

Also the IDEM administers the Indiana Boating Infrastructure Grant Program. This program is intended to provide funding for construction of facilities that will enhance boating for non-trailerable recreational boats which are in transient status. Like the Clean Vessel funds, these funds come from the Sport Fishing and Boating Safety Act. Funds come from the Sport Fish Restoration Account of the Aquatic Resources Trust Fund.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The State Water Pollution Control Board, Indiana Department of Natural

Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 4 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7-2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The State Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

9. Solid Waste Management Measure

a. Definition

Properly dispose of solid waste produced by the operation, cleaning, maintenance and repair of boats to limit entry of solid wastes to surface water.

b. Applicability

This management measure applies to all marinas in the 6217 management area.

c. Existing Practices for Solid Waste Management Measure.

Any activity that may result in any discharge into navigable waters of the State and threaten State water quality standards are addressed by the Clean Water Act. The IDEM has broad based authority over impairments to water quality, regardless of the nature of the source. In the Great Lakes Initiative, which addresses water quality in the Great Lakes, it is policy that the discharge of toxic substances in toxic amounts is prohibited. The DNR regulates the disposal of waste near a lake and prohibits the disposing of contaminants or waste within 15 feet of a lake or in a floodway.

Also the IDEM administers the Indiana Boating Infrastructure Grant Program. This program is intended to provide funding for construction of facilities that will enhance boating for nontrailerable recreational boats which are in transient status. Like the Clean Vessel funds, these funds come from the Sport Fishing and Boating Safety Act. Funds come from the Sport Fish Restoration Account of the Aquatic Resources Trust Fund.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 4 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7-2, for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

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The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

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10. Fish Waste Management Measure

a. Definition

Promote sound fish waste management through a combination of fish-cleaning restrictions, public education, and proper disposal of fish waste.

b. Applicability

This management measure applies to new and expanding marinas in the 6217 management area where fish waste is determined to be a source of water pollution.

c. Existing Practices and Programs

Indiana code states that all offal or filth of any kind accruing from the catching, curing, cleaning, or shipping of fish in or near the water of Lake Michigan shall be burned, buried, or otherwise disposed of in a sanitary manner that does not pollute the water. It also states that the waste should not become detrimental to public health or comfort. Also the Clean Water Act addresses any activities that may result in any discharge into navigable waters of the State and threaten State water quality standards. The IDEM has broad based authority over

impairments to water quality, regardless of the nature of the source. In the Great Lakes Initiative, which addresses water quality in the Great Lakes, it is policy that the discharge of toxic substances in toxic amounts is prohibited. The DNR regulates the disposal of waste near a lake and prohibits the disposing of contaminants or waste within 15 feet of a lake or in a floodway. The DNR Division of Law Enforcement also addresses this issue as a prevention method, in their education materials and programs.

A significant number of Federal, State and Local programs apply to marina location and design.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 7- for more detail, including Legislative References.) Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7-2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The State Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

11. Liquid Material Management Measure

a. Definition

Provide and maintain appropriate storage, transfer, containment, and disposal facilities for liquid material, such as oil, harmful solvents, antifreeze, and paints, and encourage recycling of these materials.

b. Applicability

This management measure applies to marinas in the 6217 management area where liquid materials used in the maintenance, repair, or operation of boats are stored.

c. Existing Practices and Programs for Liquid Material Management Measure

Any activity that may result in any discharge into navigable waters of the State and threaten State water quality standards are addressed by the Clean Water Act and handled in Indiana by the IDEM. The IDEM has broad based authority over impairments to water quality, regardless of the nature of the source. In the Great Lakes Initiative, which addresses water quality in the Great Lakes, it is policy that the discharge of toxic substances in toxic amounts is prohibited. The DNR regulates the disposal of waste near a lake and prohibits the disposing of contaminants or waste within 15 feet of a lake or in a floodway.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The State Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 7- for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable

Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7-2, for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The State Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

12. Petroleum Control Management Measure

a. Definition

Reduce the amount of fuel and oil from boat bilges and fuel tank air vents entering marina and surface waters.

b. Applicability

This management measure applies to boats that have inboard fuel tanks.

c. Existing Practices and Programs for Petroleum Control Management Measure

IDEM has authority under the Clean Water Act to enforce water quality standards. IDEM also has authority under RCRA to regulate the storage, disposal, application, generation, and migration of toxic and hazardous substances.

The State Fire Marshal's Office requires marina fueling stations and boat owners to follow extensive guidelines for the fueling of watercraft. This entails proper installation, use, maintenance and venting of storage and fueling equipment.

A significant number of Federal, State and Local programs apply petroleum control management measures. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 4 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 7- 2 for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The State Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. . IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

13. Boat Cleaning Management Measure

a. Definition

For boats that are in the water, perform cleaning operations to minimize, to the extent practicable, the release to surface waters of (a) harmful cleaners and solvents and (b) paint from in-water hull cleaning.

b. Applicability

This management measure applies to marinas in the 6217 management area where boat topsides are cleaned and where hull scrubbing in the water has been shown to result in water or sediment quality problems.

c. Existing Practices and Programs for Boat Cleaning Management Measure

IDEM's authority under the Clean Water Act is used to reduce pollution by enforcing water quality standards. Another method is IDEM's authority under RCRA to regulate the storage, disposal, application, generation, and migration of toxic and hazardous substances. Also, the Federal Refuse Act prohibits the dumping of any refuse into waters.

IDEM has General Authority over Water Quality Impairment. This is a broad-based authority over impairments regardless of the nature of the source. This authority originates with the Indiana Water Pollution Control Board. This issue is also addressed by, DNR's Division of Law Enforcement in their boater educational materials.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 4 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes

Water Quality Guidance, and Rule 5. (See Table 7-2, for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

14. Public Education Management Measure

a. Definition

Public education/outreach/training programs should be instituted for boaters, as well as marina owners and operators, to prevent improper disposal of polluting material.

b. Applicability

This management measure applies to all environmental control authorities in the 6217 management area where marinas are located.

c. Existing Practices and Programs

There are several education, outreach and training programs used in Indiana to instruct boat and marina owners. With funding provide through the Clean Vessel Act, IDEM has developed an education plan designed to educate and inform the boating community about water quality issues related to marine sanitary waste, the benefits of proper sanitary waste disposal, location of existing facilities, and proper use of pumpout and dump stations.

IDEM's Office of Pollution Prevention and Technical Assistance promotes the advantages of pollution prevention through educational endeavors.

The DNR has a boater education program sponsored by their Division of Law Enforcement that promotes safe boating and educates on various aspects of boating and related pollution prevention.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 4 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5.

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

15. Maintenance of Sewage Facilities Management Measure

a. Definition

Ensure that sewage pumpout facilities are maintained in operational condition and encourage their use.

b. Applicability

This management measure applies to marinas in the 6217 management areas where marine sewage disposal facilities exist.

c. Existing Practices and Programs

The Indiana Natural Resources Commission states that no person shall operate a marina unless a wastewater treatment or disposal facility is constructed and maintained. Under the Clean Vessel Act, the USFWS provides the opportunity for marinas to obtain grant funding for the installation and restoration of boat sewage pumpout facilities. This program provides Seventy-five percent of the funds.

Also the IDEM administers the Indiana Boating Infrastructure Grant Program. This program is intended to provide funding for construction of facilities that will enhance boating for non-trailerable recreational boats which are in transient status. Like the Clean Vessel funds, these funds come from the Sport Fishing and Boating Safety Act. Funds come from the Sport Fish Restoration Account of the Aquatic Resources Trust Fund.

A significant number of Federal, State and Local programs apply to marina location and design. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 7-2, for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes

Water Quality Guidance, and Rule 5. (See Table 7-2, for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

16. Boat Operation Management Measure

a. Definition

Restrict boating activities where necessary to decrease turbidity and physical destruction of shallow-water habitat.

b. Applicability

This management measure applies only to boating and is intended by EPA to be applied to non-marina surface waters where evidence indicates that boating activities are impacting shallow-water habitats. The potential for such impacts exists in Indiana, and this management measure applies throughout the 6217 management area.

c. Existing Practices and Programs

The Indiana Natural Resources Commission has addressed this issue by restricting boat speed to idle within 200 feet of the shoreline of Lake Michigan. Within this near-shore zone, the only legal boating operations are for trolling or to leave or enter a dock, pier, or wharf.

Informational buoys are often placed to assist the boater in identifying the 200-foot near-shore zone, but the existence of these buoys is not required to establish the offense. Where these informational buoys exist, they are white and marked with an orange rectangle and black lettering.

The Indiana Department of Natural Resources, Division of Law Enforcement offers boating courses and instruction that aid boaters in their understanding of this environmental issue. Most of this information is on line.

A significant number of Federal, State and Local programs apply to the Boat Operation Management Measure. Federal Agencies: The United States Army Corps of Engineers, NOAA, and USFWS. State and Local: The Water Pollution Control Board, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and Soil and Water Conservation Districts.

1. Existing Programs: Federal

The Endangered Species Act, The Fish and Wildlife Conservation Act on projects greater than 10 acres, The Rivers and Harbors Act of 1899, The Navigable Waterways Permit Program, Section 404 of the Clean Water Act. The Clean Vessel Act provides grants for installation & restoration of sewage pumpout facilities. (See Table 5-4 for more detail, including Legislative References.)

2. Existing Programs: State & Local

Archaeological Resources Preservation Act, Navigable Waterways Permit, Section 401 Water Quality, The Rivers and Harbors Act, Construction in Floodway or Navigable Waters Permit, Marinas, Marina Pumpouts, Floodplain Management Act, Great Lakes Water Quality Guidance, and Rule 5. (See Table 5-2, for more detail, including Legislative References.)

d. Enforcement Mechanisms

Indiana code provides authorization for the State Soil Conservation Board, IDNR's Division of Water and Soil Conservation, and the states 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under code to develop a state wide regulatory program when all reasonable voluntary approaches to pollution prevention and reduction have been exhausted.

The Water Pollution Control Board has established Great Lakes Water Quality Guidance that has criteria for 29 pollutants and provides for Citations and Fines to enforce the provisions.

The State Water Pollution Control Board and the Indiana Department of Environmental Management (IDEM) have the responsibility to enforce the Federal Clean Water Act and State Water Quality Standards. IDEM is implementing federal provisions that require a plan be developed and underway within a scheduled timeline to assure that Total Maximum Daily Load is not exceeded from all water pollution sources. This program applies to impaired streams and other waterbodies listed on the state's 303(d) list.

In addition the United States Army Corps of Engineers and IDNR require permits for construction in navigable waterways. The Permit review process allows these agencies to evaluate the suitability of a proposed marina site and/or expansion.

(See Tables C13-C20 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

D. Coordination

Indiana's Lake Michigan Coastal Program (LMCP) is administered by the Indiana Department of Natural Resources, Division of Soil Conservation. Successful implementation of the Marina and Recreational Boating Management Measures outlined in this chapter will require coordination and cooperation between local, state and federal agencies and other potential partners. The agencies with primary responsibility for addressing marina and recreational boating related water quality concerns follows:

Local Agencies
Soil and Water Conservation Districts (SWCD) located in each county are charged with the responsibility of identifying and prioritizing soil and water conservation problems within each district and to establish or enlist programs and partners to address them. Other local entities (cities, towns, counties) have the responsibility to work with marinas concerning construction, waste issues, and the storage and use of petroleum products.

State Agencies
The IDNR Division of Soil Conservation is responsible for providing administrative and technical assistance to SWCDs in carrying out their programs and for administering state soil and water programs under the policies of the State Soil Conservation Board. Their primary responsibility concerning marinas is during the siting and construction of new marinas. The districts provide educational information as well as technical assistance.

The IDNR Divisions of Nature Preserves and Fish and Wildlife monitor and preserve wildlife that is threatened, endangered or protected. Their primary responsibility concerning marinas is during the siting and construction phases of new marinas.

The IDNR Division of Law Enforcement enforces marina and boating laws; such as speed, sewage and gray water waste dumping, littering, discharge of petroleum products, fish waste disposal, and chemical treatment of aquatic weeds. The IDNR Division of Law Enforcement addresses many of these issues through boater education programs. The Law Enforcement Division works closely with other agencies to accomplish their tasks. They work with the IDEM and the U.S. Fish and Wildlife Service on sewage pumpout issues, such as utilizing the Clean Vessel Act Pumpout Program. Law Enforcement works with IDEM on other waste issues such as fish waste, sewage waste and other water pollution issues. Law Enforcement also works with the U.S. Coast Guard concerning boater issues, such as boating safety and operation, waste disposal, and petroleum spillage.

The IDNR Division of Water (DOW) is responsible for the dredging and filling of waterways and for the approval to construct Marinas. They work with the IDEM and USACOE Section 401 and 404 program to address these issues. They also work with the state and local Board of Health and State Department of Health concerning marinas that are required to have approved wastewater treatment facilities or on site disposal systems.

The IDEM Office of Water Quality is responsible for any activity that may result in any discharge into navigable waters. They also have broad based authority over impairments to water quality, regardless of the source. There is policy that the discharge of toxic substances in toxic amounts is prohibited. The OWQ in cooperation with the IDNR and U.S. ACOE through the 401/404 program, work on dredging and filling issues. This is primarily with the construction or expansion of marinas. The OWQ also in cooperation with IDNR works with sewage disposal from watercraft issues. IDEM also works with the U.S. FWS and IDNR concerning funding for marinas to install or restore pumpout facilities in the Clean Vessel Program. The OWQ in cooperation with IDNR and the local SWCD work to reduce pollutants as a result of soil erosion in stormwater discharges into surface waters where construction disturbance occurs.

The IDEM, OER has responsibility for assistance in emergency situations caused by discharges or that threat of contaminants into the air, land or water if the state. They work with programs that provide for voluntary cleanup of spills. OER works with IDNR on conducting damage assessments following the discharge of oil or the release of hazardous substances.

The IDEM UST program has responsibility to ensure and educate concerning regulated underground storage tanks meet the requirements for leak detection, spill and overflow prevention and corrosion protection. They want to ensure that tanks not meeting the requirements are closed or upgraded. The UST program also provides for investigation, assessment and remediation at sites where emergency conditions are present. They also assist in order to encourage voluntary cleanup of tank system releases.

The State Fire Marshals Office works to ensure the proper storage of fuel and oil to protect against fire.

Federal Agencies
The U.S. FWS works with the IDNR on Endangered Species Act issues. They work with NOAA concerning the preservation of habitat for the endangered species. These three agencies work on Fish and Wildlife Conservation Act issues. These two areas of concern are primarily important in the locating and placement of new or expanding marinas.

The U.S. ACOE through the Rivers and Harbors Act is responsible for channel dredging and engineering; which is important in locating new or expanding marinas. The U.S. ACOE works with the IDEM and IDNR concerning construction in navigable waters and with wetland issues.

E. Goals and Objectives of Marinas

Goal: Ensure that marina construction and operation, and recreational boating in the Lake Michigan coastal area meet and maintain applicable water quality standards.

Priority Marina and Recreational Boating NPS Concerns to be addressed in the Lake Michigan 6217 Management Area.

1. Marina siting and construction will be done in a safe and environmentally responsible manner.

2. Fuel and other petroleum products will be stored and dispensed in a safe and environmentally responsible manner.

3. Sewage and other waste from recreational boats and marinas will be handled in an environmentally responsible manner.

4. Solid waste including litter, maintenance refuse, and pet waste from marinas and recreational boats will be handled in an environmentally responsible manner.

5. Fish waste from fishing will be disposed of properly.

6. Hazardous liquid materials from marinas and recreational boats will be handled, stored, and disposed of in a safe manner.

7. Educational materials for recreational boaters will be readily distributed.

8. Marinas will ensure that adequate bottom depth is maintained to avoid stirring bottom sediments by recreational boats.

Objectives: The following tables 5-3 to 5-9 describes the objectives developed by the Marina workgroup for implementing each marinas management measure that will be used to address the priority concerns listed above in order to achieve the goal. Each of the objectives is accompanied by measures of success, resources needed, a listing of responsible entities and a timeline for accomplishing each objective. Several of the objectives address multiple management measures due to the overlapping nature of issues and associated programs/practices to address them.

Table 5-3: Management Measures 1-5

Objective	Measures of Success	Resources Needed	Responsible Agency	Time Frame
Objectives 1-5 concerning locating and constructing marinas. Site and design new marinas so that all new marinas have good circulation. No environmental degradation. Stormwater runoff control from parking lots and walkways, rooftops, & other hard surfaces.	1) Post construction proves no degradation. 2) Improved habitat for aquatic species.	1) For new marinas, storm water construction standards for parking garages and lots. 2) Vegetative buffer strips, also constructed wetlands. 3) In-line filters. 4) Vacuum unit for dry materials (sanding, paint chips, litter). 5) Plastic tarps to trap dry debris (boat hull maintenance, shrink wrap disposal).	USCOE, USFWS, Water Pollution Control Board, IDNR, IDEM, SWCD, Local	1-15

Table 5-4: Management Measures 7 and 11

Objective	Measures of Success	Resources Needed	Responsible Agency	Time Frame
Objectives 7 & 11 concerning petroleum products. Ensure that no petroleum products enter the waters. Ensure good fueling station design and operation. Ensure proper disposal for used oil, gas, & bilge water.	1) Elimination or reduction of oil or gas spills at boat docks or from marine vessels. 2) No need for the use of oil booms illustrates success.	1) Fuel. 2) Automatic over-fill prevention. 3) Tank vent located away from fuel in-let (boats differ widely). 4) Trained personnel needed by marina. 5) Bilge pump internal spill, gets pumped out automatically. 6) Oil boom to capture known spill. 7) Whistler device in vent line.	IDEM, State Fire Marshal, USCOE,	1-15

Table 5-5: Management Measures 8 and 15

Objectives	Measures of Success	Resources Needed	Responsible Agency	Time Frame
Objectives 8 & 15 concerning sewage disposal. Assure that sewage pumpout stations and MSD's are present, used, and properly maintained. Petition EPA to make Indiana waters no-dump zone for MSD's. Trash litter. Pet waste issue.	1) No sewage spills. 2) Annual survey of marinas to ensure pumpouts are used & maintained. 3) EPA designates Indiana waters as no dump zone for MSD's. Check for absence of litter and pet waste.	Pleasure boats have no dump valve; set up is for pumpout only. Other boats may have valves for draining of tank. These must be disabled here. New law needed to allow DNR and other agencies to enforce unsealed dump valves. 'No Dump Law'. Trash containers & recycling bins. Education. Pooper-scooper and bags. Separate pet area.	IDEM, IDNR, Water Pollution Control Board, USFWS,	1-5 years

Table 5-6: Fish Waste Management Measure

Objectives	Measures of Success	Resources Needed	Responsible Agency	Time Frame
Objective 10 concerning fish waste management. Marinas should provide adequate numbers of fish cleaning stations. Provide proper collection basins for the waste. And proper disposal for the fish waste such as a sewer line or off site disposal.	1) On site survey of the marina operators by agency staff to assure stations are properly used and maintained, and see what is being done with fish waste. 2) On site survey of fisherman. 3) Use fishing clubs to assist with this management measure.	Signs/education at public launch ramps. Fishing guides to include fish waste disposal etiquette.	IDNR, IDEM	1-5 years

Table 5-7: Management Measure 11 Liquid Material Management Measure

Objective	Measures of Success	Resources Needed	Responsible Agency	Time Frame
Marinas should provide collection sites for hazardous liquid materials and provide for proper disposal.	1) Provides site for disposal and show proof of disposal, such as a contract or receipt.	Containment for drums. Liability of accepting liquids, which may be seriously contaminated (PCBs, etc).	IDEM, IDNR	1-5 years

Table 5-8: Objective 14 Public Education Management Measure

Objective	Measures of Success	Resources Needed	Responsible Agency	Time Frame
Onsite visits from appropriate officials. Marina operators provide list of regulations/services to each registered user (for example: when check is collected, an information pamphlet is provided.) Same thing for pay to launch users, they receive an information pamphlet. When licensing a boat, get a pamphlet. Mooring registration payment, get a pamphlet.	1) Have adequate brochures on hand. 2) Marinas invite participation.	Need survey of what prompts an inspection from responsible agencies. Seasonality, customers don't think of rules until ready to boat.	IDEM, IDNR, Coast Guard	1-5 years

Table 5-9: Boat Operation Management Measure

Objective	Measures of Success	Resources Needed	Responsible Agency	Time Frame
Marinas must maintain proper dredging to facilitate adequate bottom depth to assure that boats don't stir bottom sediment. Boat owners shall not cause disturbance of bottom, i.e.: propeller dredging.	1) Turbidity in marinas is absent and no boat trails are observed.	Individual permits are necessary.	IDEM, ACOE, IDNR	1-5 years

Chapter 6
Hydromodification

A. Introduction

Hydrology of the Lake Michigan coastal area in Indiana is significantly altered from what existed pre-settlement. The area has undergone significant changes to the waterways over the course of human history. The human influence has come mainly from development for residential, industrial, commercial and marine uses along the Lake Michigan coastline. The current Grand Calumet and Little Calumet River systems have a long history of channel modifications, flow reversals and diversions.

The industrialization and urbanization that began in northwest Indiana during the late nineteenth century extensively altered the natural landscape and natural drainage patterns. The Grand Calumet River and the Little Calumet River have undergone extensive changes by both man and nature. At one time, these two rivers were a single waterway that followed a hairpin course. The source was in LaPorte County near the county's western boundary. The river flowed west through Porter and Lake Counties into Illinois. In Illinois the river flowed toward the northwest and then sharply curved to the northeast and re-entered Lake County. The river finally emptied into Lake Michigan at what is now Marquette Park in Gary.

A second waterway formed in early 1850 when Native Americans opened a new channel to Lake Michigan in Illinois. Canoes were pushed and pulled through the marshes between Wolf Lake and Lake Calumet until a permanent channel was opened to Lake Michigan about twelve miles south of the Chicago River. The southern river, flowing west across the Calumet region and discharging into the Lake from Illinois, became the Little Calumet River. The northern river, flowing east and discharging into Lake Michigan in Indiana became the Grand Calumet River. The mouth of the river in Illinois was cleared in 1870 for the development of Calumet Harbor. By 1872 the mouth of the river in Indiana was so clogged with aquatic vegetation and sand that it no longer could empty into the Lake. A map made by the US Topographic Bureau in 1845 showed that the Grand Calumet River no longer flowed into Lake Michigan in Indiana. Instead, the current had been reversed and its waters flowed with the Little Calumet in Illinois.[23] The present outlet for the Grand Calumet River in Indiana was created in the 1900s when the Indiana Harbor and Ship Canal was constructed.[24]

The Lake Michigan watershed was further modified when Hart Ditch was constructed from the town of Dyer to a site near Munster in 1850 to improve local drainage. The watershed of Hart Ditch was enlarged when Cady Marsh Ditch and Spring Street Ditch were created to drain areas where Highland, Griffith and Schererville are now located. In 1908, Randall Burns of Chicago launched an effort to ‘reclaim’ the land. The high sands of the Tolleston Beach and the dunes separating Cady Marsh and Lake Michigan were cut. The flow of the Little Calumet River and the Deep River, which joins the Little Calumet, were diverted into the lake just east of Ogden Dunes. The Little Calumet River was also dredged to the mouth of Salt Creek. These projects reclaimed more than 20,000 acres in Porter County and in Gary.[25]

In 1922, the construction of the Calumet Sag Channel drastically altered the hydrology of the Lake Michigan area. The new channel connected the Little Calumet River at its hairpin turn in Illinois to the Chicago Sanitary and Ship Canal. Runoff from part of the Little Calumet River watershed was permanently diverted from the Lake Michigan Basin to the Mississippi Basin.[26]

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[23] Moore, P. The Calumet Region: Indiana's Last Frontier, p. 11 (1959)
[24] DNR, Water Resources Availability in the Lake Michigan Region, Indiana, p. 61 (1994).
[25] Moore, P. The Calumet Region: Indiana's Last Frontier, p. 13 (1959)
[26] DNR, Water Resources Availability in the Lake Michigan Region, Indiana, p. 61 (1994)

In 1926, Burns Ditch (now Portage Burns Waterway) was completed, changing the nature and course of the Little Calumet River. Because of periodic floods of the Little Calumet, the surrounding area was a marshland. The river would flow over the roads of Gary. In winter, ice jams also formed at the Broadway Bridge.

The flood plain of the Little Calumet River and its tributaries is one of the most flood-prone areas in the state. In 1980, the Little Calumet River Basin Development Commission was created by state statute to provide non-federal sponsorship and funding for flood control, recreation, and recreational navigation improvements along the Little Calumet River in Lake and Porter Counties. [27] But later the project changed to only include Lake County. Currently it only goes from I-65 to the Illinois state line.

These changes have had a dramatic impact on the water quality of the basin. Lake Michigan and its contiguous harbor areas have been designated for multiple uses including recreation, aquatic life, potable water supply and industrial water supply in Indiana Regulation 317 IAC 2-1. This regulation outlines the criteria and minimum standards of water quality that must be maintained in the lake.[28]

The ecological resources of Lake Michigan's coastal lake plain region have been radically transformed. The principle agents of these changes have been urbanization and industrialization. Throughout the better part of the 20th century, Lake Michigan's dunes were under constant threat of destruction from excavation and sand mining, while the beaches were threatened with filling. Fully 10 square miles of land have been "reclaimed" from Lake Michigan in this manner.

Concurrent with changes to the dunes, the region's hydrology has also been impacted. Specific impacts include channelization of the Little Calumet River, the Grand Calumet River and other tributaries to Lake Michigan, and the construction of drainage canals, in particular the Indiana Harbor Canal. Additional changes include drainage and filling of vast acreages of wetlands while native soil surfaces have been replaced with impermeable, urban surfaces. *[Ref. p. 8, " Watershed Diagnostic Study of the Little Calumet—Galien River Watershed "]*

Given that over 20 percent of the Calumet-Galien area's land is devoted to industrial, commercial, residential, and transportation uses, the impervious surfaces in these areas increase the amount of polluted runoff into rivers and streams during storm events. *[Source: MRLC, 2000 from p. 8 Lake Michigan Shoreline TMDL for E. Coli Bacteria Data Report]*. The increased runoff contributes to increased levels of streambank erosion and resulting sediment loading due to the increased flow levels and intensity and frequency of the flows.

Lake Michigan waters are affected by changes to natural tributaries and by man-made drainage and commercial channels. Any physical alteration of a stream, altering flow, is "hydromodification." Examples include: channelization, damming, dredging, changing floodplain functions, increasing impervious surface in the watershed, removing riparian vegetation and modifying stream banks. Hydromodification includes short and long term water quality degradation, accelerated erosion and sedimentation, destruction of aquatic habitat, and impairment or elimination of certain beneficial functions performed by Indiana's waters.

River and Stream Hydrology -- Background About the Fluvial System

The term fluvial refers to moving water. Rivers and streams are highly complex systems. To understand a single watershed requires the scientific principles found in hydrology, physics, ecology, geomorphology and chemistry.

The fluvial system has a number of parts, the first and largest is the watershed. A watershed encompasses the entire area surrounding a stream that contributes water. The streams draining a watershed are divided up

[27] DNR, Water Resources Availability in the Lake Michigan Region, Indiana, p. 62 (1994)
[28] Ref. p. 74, "Indiana 305(b) Report 1994-1995, IDEM"

by the size of the channel. Headwater streams are they smallest and most numerous found in the upper reaches of the watershed. These areas are particularly sensitive and usually harbor a large number of wetland areas. The headwater areas provide numerous ecologically benefits by:

- Removing and sequestering pollutants before they reach the stream and as they are transported downstream.
- Supplying organic material like branches and leaves that form the energy base of a healthy food chain.
- Increasing the trophic state of nutrients as simple nutrients are incorporated into the food web as macroinvertebrates, fish, etc.
- Providing unique habitats for key aquatic species, some of which may be rare, endangered or threatened species.
- Providing large amounts of water storage and contributing to groundwater baseflow.

In a natural system, streams provide four basic functions:

- Drainage of overland flow – headwater stream areas form the principal interface between land and water resources. They collect water runoff and deliver it downstream in a more concentrated pattern.
- Trapping of pollutants and sediments – in natural headwater streams, vegetated near-stream riparian areas trap pollutants and sediments carried by sheet flow. Nitrogen, phosphorus, and sediments can all be trapped in this manner.
- Water storage and slow release – headwater stream areas have a great capability to store water in their banks, beds, and floodplains and later release this water in a gradual manner, which serves to replenish and maintain base flows.
- Basic energy supply – organic materials contributed by headwater stream areas form the basis for healthy aquatic life. Debris from wooded riparian corridors and overland flow is delivered to the stream and forms the basic building blocks for the aquatic food web.

Headwater streams are often designated as “first order streams” by the Strahler Order system. The ordinate system proceeds as follows, when two 1st order streams converge, they become a 2nd order stream, likewise when two 2nd order streams come together they become a 3rd order stream, etc. In the Lake Michigan basin of Indiana, the Galien and Grand Calumet Rivers achieve the highest stream order. These two rivers encompass the second part of the watershed called **Mainstem Rivers.**

Mainstem rivers differ from headwater streams and smaller order streams in numerous ways. Mainstem rivers are larger, and carry more water and sediment than their tributary streams. They have a well developed **floodplain** (also called a **riparian area**) that provides an overflow area when the river is in flood stage. The floodplain provides a place for the river to dissipate energy both in the form of water (by spreading out) and sediment (by depositing material). The floodplain of a river is one of the most important aspects of the stream, not only providing respite for the river during floods, but also acting as an incredibly complex habitat for a unique community of species.

Headwater streams, mainstem rivers and their adjacent riparian zone harbor the most diverse ecological assemblages we have in the Midwest. They are the “rain forest” of the cornbelt so to speak. The complexity of habitats and species that occupy the channel and adjacent wetlands and uplands of the floodplain and headwaters represent a complex community that has evolved over time into a multitude of species, from birds such as herons and waterfowl to sport fish like bass and catfish, to potentially endangered amphibians like salamanders turtles and frogs. All of these creatures are dependant on the specific habitats provided by the river. But for all of its complexity, the fluvial system is incredibly sensitive to changes in its watershed.

Hydromodification

Rivers and streams are conduits for both sediment and water. Rivers and streams drain their watershed, allowing surface and subsurface water to move through and ultimately out of the watershed. Rivers also move sediment that is transported into the channel from adjacent uplands in the watershed. The size and pattern of the channel is directly related to the amount of water and sediment that the stream must pass. Channels are larger in the lower reaches of the watershed because they carry more water and sediment than the channels found in headwater areas. Streams are influenced by a number of variables, and, as is the case with so many natural systems, if one variable is changed, it produces change in the others. Five variables in particular are the controlling factors in rivers:

- **Flow**: The volume and velocity of water delivered to the stream.
- **Gradient**: The slope of the streambed.
- **Sediment Load**: The amount of natural sediment delivered to and transported by the river system.
- **Channel Width:** The width from bank to bank of the stream (usually varies)
- **Channel Depth:** The depth from the top of the bank to the bottom of the stream (usually varies)

Changes in any of these variables, defined as hydromodification, affects the balance of the river system and can produce drastic changes throughout the channel. Hydromodification activities adversely affect these five variables, which in turn affect the complex function of the fluvial system. Hydromodification, the direct physical alteration of habitats, is the most prevalent source of degradation in streams. The primary causes for such alterations are agricultural activities and suburban and urban development. Historically, agriculture has been the most prevalent source of impairment, but urban development activities are increasing at a rapid rate, and the impacts on the surface waters are among the most severe and least restorable. In Indiana's Lake Michigan coastal area, the greatest degree of hydrologic modification has come from urbanization and industrialization activities. Hydromodifications include activities that occur within the watershed of the stream, the riparian/floodplain area of the stream, or in the channel itself. Some of the common hydromodifications and the response they generate in the channel are listed below.

Hydromodification Activities That Alter Fluvial Systems

- Channelization – Widening or deepening a stream to increase capacity. Usually causes sediment deposition as the stream attempts to return to its stable width and depth, and can cause intermittent flows during normal low flow periods because of the oversized channel.
- Stream relocating – Moving streams to the property edge to maximize amount of developable areas in new land development projects resulting in channelization and loss of habitat.
- Headwater stream and wetlands fills – Filling in headwater streams and small wetland (such as vernal pools or swales) removes an important filter in the fluvial system. It also removes an important storage area for groundwater recharge and the source of baseflow in the stream.
- Straightening – Increasing the gradient to raise the flow velocity. Straightening increases the slope of the channel dramatically by decreasing the length of the stream. This causes an increased transport capacity in the river and usually results in the river eroding into its bed and banks and the channel becoming unstable.
- Levee construction – Confining floodwaters by raising the height of the channel banks. This removes the energy dissipation mechanism for a river during floods. Sediment is then deposited in the channel, thus raising the bed, and often creating a cycle of raising the levee to account for the subsequent rise in the channel following major floods.
- Bank armoring/Bank stabilization – Use of structures and hard engineering (e.g. gabions, riprap, steel piles) to control bank erosion.
- Clearing and snagging – Decreasing the hydraulic resistance and increasing the flow velocity by removing obstructions. This removes important ecological habitat, and research has shown the effects of trees are only pronounced in very small floods and almost negligible during large floods (Note: These are hydromodifications that the ACOE may not regulate.)

- Riparian encroachment – Clearing stream or riverbanks of trees and woody vegetation to decrease resistance and increase the flow velocity or merely to provide a view of the river or creek. The removal of trees often causes bank instability as the roots that once held the soil in place decay. (Note: This is a hydromodification that the US Army Corps of Engineers [ACOE] may not regulate.)
- Flow regulation – Impoundments, water withdrawal, and dams constructed for flood control, water supply or power generation. Dams cause a block in the sediment transport capacity of the river. Downstream from dams, the river will often erode into its bed and banks to pick up additional sediment for transport.
- Bridge and Culvert Construction – Construction of river crossings that may require culverts or support structures in the river that change the flow pattern or channel slope. If not designed properly crossings change the width of the stream and cause significant backwatering in the channel during flood events.
- Draining, filling – Removing water from natural wetlands by increasing the rate of drainage to the river system causes a loss to groundwater recharge. Increasing the amount of water getting into the river increases flow, which in turn requires a larger channel to carry the water. This is often the source of channel widening and incision.
- Urbanization- the process of increasing impermeable areas in the watershed. The time it takes for a raindrop to reach the stream is increased from days or weeks to minutes or hours causing the peak flow of a river to increase by orders of magnitude. This then results in channel instability as the stream tries to make itself bigger to handle the additional flow. The specific urbanization activities that affect the function of streams are those that change runoff patterns and alter the amounts of natural inputs (for example, sediment or organic matter). Increasing impervious surfaces, directing roof runoff directly into storm sewers, concentrating runoff, or piping small streams change the velocity, volume, and delivery patterns of runoff, and disturbs natural balance of the watercourses.

Often, downstream problems, like flooding, bank erosion, and deepening of channels, can be directly attributed to upstream degradation. Because of this knowledge the old approach of fixing river problems at only the site of apparent failure has been replaced throughout the nation by the more successful watershed approach. In the watershed approach, the river is characterized throughout its length. Then the solutions to problems are made within the context of what happens in upstream and downstream reaches.

B. Potential Sources of Hydromodification Nonpoint Pollution in Indiana's Coastal Watershed

1. Channel Modification

Channel modification is an term used to describe river and stream channel engineering undertaken for the purpose of flood control, navigation, and drainage improvement. Channel modification includes such activities as straightening, widening, deepening or relocating existing stream channels. These forms of hydromodification typically result in more uniform channel cross-sections, steeper stream gradients, and loss of important pool areas.

The term flow alteration describes a category of hydromodification activities that result in either an increase or a decrease in the usual supply of fresh water to a stream, river, or estuary. Flow alterations include diversions and withdrawals. In rivers and streams, flow alteration can also result from undersized culverts, transportation embankments, tide gates, sluice gates, and weirs.

This section also addresses levees along a stream or river channel. A levee is defined by the U.S. Army Corps of Engineers (ACOE) as "an embankment or shaped mound for flood control or hurricane protection" (ACOE, 1981).

The section on channel modification will be divided into two parts to address six concerns. The first part will address three physical and chemical characteristics of surface waters as affected by channel modification activities; these include changed sediment supply, reduced freshwater availability, and accelerated delivery of pollutants. The second part will address three concerns caused by modifications of instream and riparian habitat; these include loss of contact with overbank areas, changes to ecosystems, and changes caused by secondary effects.

2. Dams

A dam can be defined as any man made structure which impounds or stores water beyond the normal capacity of the channel during average flows and acts as a barrier to downstream and upstream transport of material (biological or inert) in the river. Numerous dams were built at the turn of the century for power to cut timber and grind grain. The siting and construction of a dam can be undertaken for many purposes, including flood control, power generation, irrigation, livestock watering, fish farming, navigation, municipal water supplies, and recreation.

Dams are divided into the following classes: run-of-the-river, mainstem, transitional, and storage. A run-of-the-river dam is usually a low dam, with small hydraulic head, limited storage area, short detention time, and no positive control over lake storage. The amount of water released from these dams depends on the amount of water entering the impoundment from upstream sources. A retention time of approximately 25 days and a reservoir depth of approximately 50 to 100 feet characterize Mainstem dams, which include run-of-the-river dams. In mainstem dams, the outflow temperature is approximately equal to the inflow temperature plus the solar input, thus causing a "warming" effect. A retention time of about 25 to 200 days and a maximum reservoir depth of between 100 and 200 feet characterize transitional dams. In transitional dams, the outflow temperature is approximately equal to the inflow temperature so that during the warmer months coldwater fish cannot survive unless the inflows are cold. The storage dam is typically a high dam with large hydraulic head, long detention time, and positive control over the volume of water released from the impoundment. Dams constructed for either flood control or hydroelectric power generation are usually of this storage class. These dams typically have a retention time of over 200 days and a reservoir depth of over 100 feet. The outflow temperature is sufficient for coldwater fish, even with warm inflows.

A variety of impacts can result from the siting, construction, and operation of dams. The siting of dams can result in the inundation of wetlands, riparian areas, and upland areas. The siting of dams can reduce or eliminate the downstream flooding needed by some wetlands and riparian areas. Dams can impede or block migration routes of fish. Dam construction can cause increased turbidity and sedimentation in the waterway. Fuel and chemical spills may occur during dam construction and operation. The cleaning of construction equipment also has the potential for creating Nonpoint source pollution. The operation of dams can generate Nonpoint pollution from the controlled release of water: as increased loads of BOD, phosphorus, nitrogen, changes in pH, increased erosion of the streambed by scouring the channel below the dam, and change water temperature downstream.

Locations and details about dams in the Little Calumet-Galien Watershed are shown in Table 6-1 and Figure 6-2 below.

3. Streambank And Shoreline Erosion

Streambank erosion is considered the excessive loss of land along streams and rivers of the inland part of the Lake Michigan coastal watershed. Shoreline erosion is the loss of beach and other land along the Lake Michigan coastline. The loss of land due to excessive erosion is caused by a combination of factors; the loss of riparian vegetation and floodplain roughness that protects the soil and dissipates the energy of the rivers, and the increased peak flow discharge in rivers which increases the erosive power.

Under normal conditions, the erosion of shorelines and streambanks is a natural process that can have either beneficial or adverse impacts on the creation and maintenance of riparian habitat. Sands and gravels eroded from streambanks are deposited in the channel and are used as instream habitat during the life stages of many benthic organisms and fish. The same materials eroded from the shores of coastlines maintain the beach as a natural barrier between the open water and wetlands and forest buffers inland. Beaches are dynamic, ephemeral landforms that move back and forth onshore, offshore, and along shore with changing wave conditions *[Bascom, 1964]*. The finer-grained silts and clays derived from the erosion of shorelines and streambanks are sorted and carried as far as the quiet waters of wetlands where benefits are derived from addition of the new material.

Excessive erosion of shorelines and streambanks can have adverse impacts on riparian habitats due to increased sediment loads, turbidity and nutrients.

Table 6-1: Dams in Indiana's Lake Michigan Coastal Area watersheds

Dam	State ID #	Height In feet	Surface Area-acres
LAKE COUNTY			
Hobart Deep River (in channel)	45-1	Approx. 10	?
Hooseline &Molchan Lake Dam	45-10	16 – 20	12
Lake George Dam	45-2	22	242
Doubletree Lake Estates N.	45-11	28.5	90
Doubletree Lake Estates W.	45-12	6	90
PORTER COUNTY			
Cyrus Noayad Lake Dam	64-10	10-20	9.6
Lake Louise Dam	64-8	45	228
Lake of Four Seasons (dam “A”)	64-13	27	56.84
Lake of Four Seasons (dam “B)	64-12	31	14.35
Lake of the Woods Dam	64-2	22	20.41
Linde Dam (in channel)	64-21	11	11
Loomis Lake Dam	64-9	17	49.72
Norman Olson Lake Dam	64-6	20	14
Old Longs Mill Dam	64-3	15	9.91
Rice Lake Dam	64-7	15	17.03
Robbins Pond Dam	64-14	10	20
Roy Nicholson Dam	64-4	10	1
LAPORTE COUNTY			
Camp Red Mill Lake Dam	46-8	21	21.69
Dingler Lake Dam	46-1	Approx. 16	10
Jack Ragle Low Head Dam	46-12	4.3	1
La Lumiere	46-11	15	15
Seven Springs Lake Dam	46-4	12	42.2
Seybert Lake Dam	46-3	6	1
Wallace Lake Dam	46-9	Approx. 15	38
Walton Lake Dam	46-10	8	19.44
Bethlehem Steel Check Dam #1	64-16	4	1
Bethlehem Steel Check Dam #2	64-17	4	1
Bethlehem Steel Check Dam #3	64-18	4	1
Bethlehem Steel Check Dam #4	64-19	4	1
Bethlehem Steel Check Dam #5	64-20	?	16
Bethlehem Steel Check Dam #6	64-22	?	21
Lakeside Estates Dam	46-13	17.2	2.5
Michigan City Golf Course	46-14	12	1

Figure 6-2: Location of Dams within Lake Michigan's Coastal Area

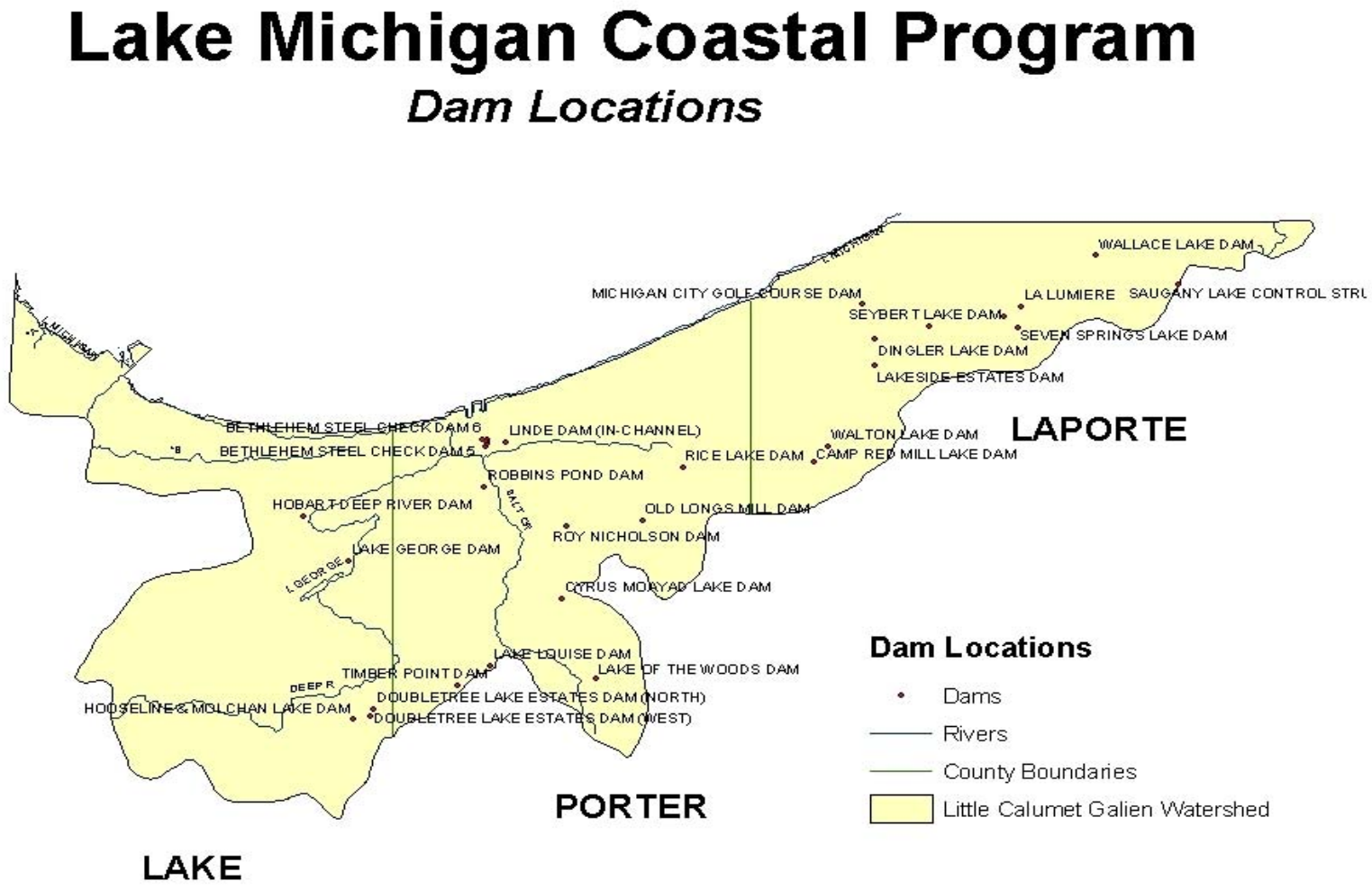
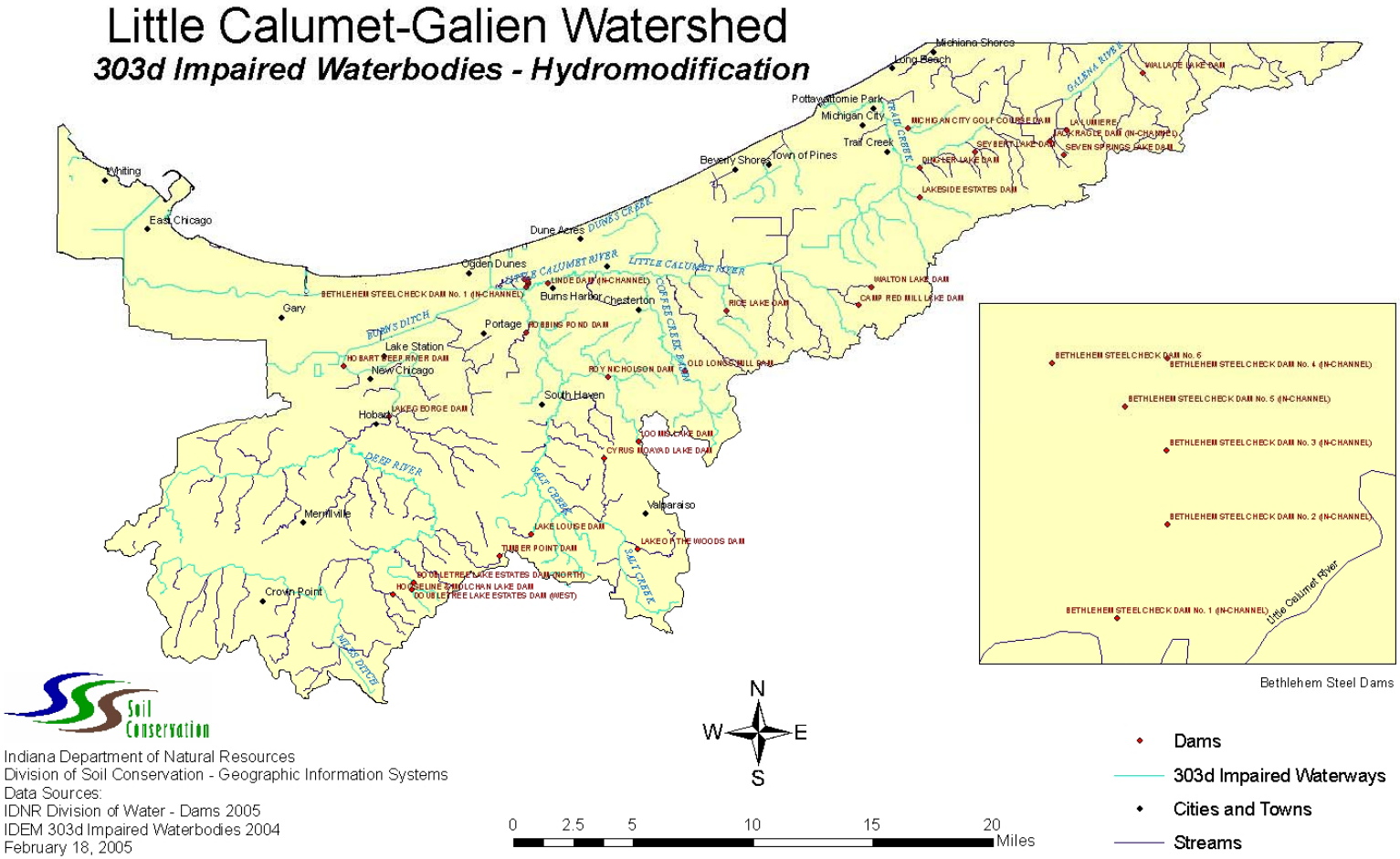


Figure 6-3: Dams and Impaired Waterways



C. Hydromodification Management Measures to be Implemented

1A. Channel Modification: Management Measure for Physical and Chemical Characteristics of Surface Waters

1. Evaluate the potential effects of proposed channel modifications on the physical and chemical characteristics of surface waters in coastal areas;
2. Plan and design channel modification to reduce/ eliminate adverse impacts to streams and rivers; and
3. Develop an operation and maintenance program for modified channels that includes identification and implementation of restoration and mitigation opportunities to improve physical and chemical characteristics of surface waters in those channels.

a. Definition

The purpose of this management measure is to ensure that the planning process for new hydromodification projects comprehensively address potential adverse impacts to physical and chemical characteristics of surface waters that may occur as a result of the proposed work. Hydromodification projects should be evaluated based on our knowledge of the historic impacts projects have had on river systems. Implementation of this management measure is intended to occur concurrently with the implementation of Management Measure 1B (Instream and Riparian Habitat Restoration) of this section. For existing projects, the purpose of this management measure is to ensure that the operation and maintenance program uses any opportunities available to improve the physical and chemical characteristics of the surface waters. Changes created by channel modification activities are problematic if they unexpectedly alter environmental parameters to levels outside normal or desired ranges. The physical and chemical characteristics of surface waters that may be influenced by channel modification include sediment, turbidity, salinity, temperature, nutrients, dissolved oxygen, oxygen demand, and contaminants.

Implementation of this management measure in the planning process for new projects will require a watershed approach as described below.

1. Survey the watershed and define existing conditions in the areas of geomorphic channel stability, hydrology, ecological function, historic channel modifications, areas of point and Nonpoint source pollution, and of existing and future land use.

2. Evaluate, with numerical models, and field studies when appropriate the types of Nonpoint source pollution related to instream changes and watershed development.

3. Address Nonpoint source pollution problems stemming from proposed instream changes or watershed development with a combination of nonstructural and structural practices.

The best available technology that can be applied to examine the physical and chemical effects of hydraulic and hydrologic changes to streams, rivers, or other surface water systems are models and past experience in situations similar to those described in the case studies discussed in this chapter. These models can simulate many of the complex physical, chemical, and biological interactions that occur when hydraulic changes are imposed on surface water systems. Additionally, models can be used to determine a combination of practices to mitigate the unavoidable effects that occur even when a project is properly planned. Models, however, cannot be used independently of expert judgment gained through past experience. Models need to be calibrated and validated to ensure the results fit the given fluvial system. When properly applied models are used in conjunction with

expert judgment, the effects of channel modification projects can be evaluated and many undesirable effects prevented or eliminated.

In cases where existing channel modification impacts can be reversed or mitigated to enhance instream or streamside characteristics, several practices can be included as a part of regular operation and maintenance programs. New channel modification projects that cause unavoidable physical or chemical changes in surface waters need to use one or more practices to mitigate the undesirable changes. Mitigation measures include bioengineering bank stabilization, constructed riffles for grade control, supplemental riparian planting, close attention to instream sediment inputs from construction, and removing riparian levees or setting them back far enough to allow re-attachment of the channel to its floodplain. These are new and progressive techniques that work to maintain the historic form and function of the meandering floodplain river, while still accomplishing municipal goals of flood control and conveyance. By using one or more of these practices in combination with predictive modeling, the adverse impacts of channel modification projects can be evaluated and possibly eliminated.

This management measure addresses three of the effects of channel modification that affect the physical and chemical characteristics of surface waters: changed sediment supply; reduced freshwater availability; and accelerated delivery of pollutants.

b. Applicability

This management measure is intended as part of the 6217 program to be applied by States to public and private channel modification activities in order to prevent the degradation of physical and chemical characteristics of surface waters from such activities. This management measure applies to any proposed channel modification projects, including levees, to evaluate potential changes in surface water characteristics, as well as to existing modified channels that can be targeted for opportunities to improve the surface water characteristics necessary to support desired fish and wildlife.

c. Existing Programs or Practices and Lead Agencies

Federal Programs:

- Rivers and Harbors Act Of 1899 (33 United States Code 401 and 403) Sect. 9 & 10 - This regulation requires permits for the construction of dams or ditches across navigable waters, or obstruction or alteration of navigable waters.

- Clean Water Act Of 1987, Sections 401 and 404 - This section of the CWA regulates the discharge of dredge or fill material into the waters of the United States and requires a Water Quality Certification and permit. IDEM's Office of Watershed Management has been delegated the authority to issue 401Water Quality Certifications by 327 IAC 2-1.5-5-4.

- Water Resources Development Act Of 1996, Section 516(E) - This Section gives authority to the US Army Corps of Engineers (ACOE) to consult and coordinate with Great Lakes states in developing a tributary sediment transport model for each major river system or set of major river systems depositing sediment into a Great Lakes federally authorized commercial harbor, channel maintenance project site, or Area of Concern identified under the Great Lakes Water Quality Agreement. Indiana's coastal area has three systems that fall into this jurisdiction: Grand Calumet River, Portage Burns Waterway, and Trail Creek. A model has been developed for the Grand Calumet Area of Concern and is being used to assist with TMDL development. A scoping workshop, a local fact-gathering precursor to model development, was held in May 2003 for the Burns Waterway. Modeling for Trail Creek is not scheduled. After development, the sediment-modeling tool is to be used by

local land managers and decision makers to improve water quality by minimizing erosion and sedimentation problems in the contributing waterways.

Several practices in the USDA-Natural Resources Conservation Services (NRCS) "toolbox" apply to assisting with this resource concern. While NRCS is the primary federal agency that provides technical assistance for agriculture resource issues, this same assistance is also available for other community needs. Practices that would apply to streambank and shoreline erosion would be as follows:

- Streambank and shoreline protection (Practice Code 580) - using vegetation or structures to stabilize and protect banks of streams, lakes, estuaries, or excavated channels against scour and erosion. This practice may be used for any of the following purposes: 1) to prevent the loss or damage to utilities, road, buildings or other facilities adjacent to the banks; 2) to maintain the capacity of the channel; 3) to control channel meander that would adversely affect downstream facilities; 4) to reduce sediment loads causing downstream damages and pollution; or 5) to improve the stream for recreation or as a habitat for fish and wildlife.

- Clearing and snagging (Practice Code 326) - removing snags, drifts or other obstructions from a channel. This practice may be used to increase the flow capacity of a channel by improving its flow characteristics, to prevent streambank erosion cause by eddies, to reduce the forming of alluvial bars, and to minimize blockage by debris and ice. Caution needs to be used in implementing this practice so as not to cause more damage through channel erosion, landscape impairment, or fish or wildlife habitat impairment.

State Programs:

- Navigable waters act (IC-14-29-1) - Provides for an approval before placing, filling or erecting a permanent structure in or water withdrawal from, or mineral extraction from a navigable waterway or Lake Michigan.

- Sand and gravel permits (IC 14-29-3) - Regulates the removal of sand gravel, stone or other mineral resources from or under the bed of navigable waterways, including streambanks and shorelines.

- Construction of channels act (IC-14-29-4) - Regulates the construction or improvement of artificial or natural watercourses for providing boat access. The act includes provisions for stabilization of streambanks once construction is completed.

- Lake and River Enhancement Program (LARE) - Established under IC-14-32-7, LARE provides help for watersheds to diagnose problems on Indiana's lakes, rivers and streams and provides cost-share and technical assistance in establishing best management practices for hydromodification and water management.

- Regulated drains - Local county drainage boards work in conjunction with county surveyors to provide maintenance to regulated drains. Major projects may include reconstruction and maintenance of ditches and waterways through a local taxing authority for the benefit of landholders that benefit from drainage by the waterway. Provisions are made to assure reseeding or other stabilization of streambanks once maintenance or reconstruction work is completed.

- Hoosier Riverwatch - Statewide volunteer water quality monitoring and education program. Sponsors "Adopt-A-River" program that promotes local participation to monitor water

quality and provide for periodic maintenance and clean up of riparian corridors. Creates awareness and appreciation of the resource through grass roots participation and oversight.

d. Enforcement Mechanisms

See Tables C-21 to C-30 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.

1B. Channel Modification: Instream and Riparian Habitat Restoration Management Measure

1. Evaluate the potential adverse effects of proposed channel modification on instream and riparian habitat in coastal areas;
2. Plan and design channel modification to reduce or eliminate adverse impacts to instream and riparian habitat; and
3. Develop an operation and maintenance program with specific timetables for existing modified channels that include identification of opportunities to mitigate and restore instream and riparian habitat in those channels.

a. Definition

The purpose of this management measure is to correct or prevent detrimental changes to instream and riparian habitat from the impacts of channel modification projects. Implementation of this management measure is intended to occur concurrently with the implementation of the previous subsection (Physical and Chemical Characteristics of Surface Waters).

Contact between floodwaters and floodplain soil and vegetation, can be increased by removing barriers such as levees and floodwalls. Streams that have incised due to changes in hydrology may have lost hydraulic connection to their floodplain. Measures that can alleviate this problem include, raising the bed and/or lowering the adjacent floodplain to reset the hydraulic connection based on the new, altered hydrology. Existing levees can be moved back away from the streambank (setback levees) and constructed to allow for overbank flooding, which provides surface water contact to important streamside areas including wetlands and riparian areas while still providing flood control. Compound-channel designs consist of a narrow meandering channel to carry surface water during base-flow periods, a staged overbank area into which the flow can expand during design flow events, and an extended overbank area for high-flow events. Planting of the extended overbank with suitable vegetation completes the design. These designs mimic the historic river and adjacent floodplain, in a slightly more controlled setting. Important meanders and pool, riffle sequences in low channel provide ample habitat, but larger overbank areas actually convey the majority of the flood flows.

Preservation of ecosystem benefits can be achieved by site-specific design to obtain predefined optimum or existing ranges of physical environmental conditions. Calibrated and validated models can be used to assist in site-specific design. Instream and riparian habitat alterations caused by secondary effects can be evaluated by the use of models and other decision aids in the design process of channel modification activity. After using models to evaluate secondary effects, restoration programs can be established.

b. Applicability

This management measure pertains to surface waters where channel modifications have altered or have the potential to alter instream and riparian habitat such that historically present fish or wildlife are adversely affected. This management measure is intended to apply to any proposed channel

modification project to determine changes in instream and riparian habitat and to existing modified channels to evaluate restoration and mitigation for impacts to instream and riparian habitat.

There will be opportunities for implementation of management measures under this section in some of the reaches of the Little Calumet River system. The Little Calumet River Basin Development Commission was established to "provide for the creation, development, maintenance, administration, and operation of park, recreation, marina, flood control, and other public works projects" along the west arm of Little Calumet River in Lake and Porter Counties. *[IC 14-13-2-7]* This Commission is developing the Local Flood Control and Recreation Project for the Little Calumet River in Indiana. The project is being designed and constructed by the ACOE. The project covers the segment of the Little Calumet River reaching from the Illinois-Indiana state line to Gary. The project involves the construction of set-back levees, levees and floodwalls; installation of a flow diversion structure and modification of four major highway bridges along the river corridor to permit better flow; and creation of hiking and biking trails connecting recreational developments.[29]

This measure may also be applicable across the coastal area for the reconstruction and maintenance of regulated and other drains. State legislation provides that drainage is largely controlled through county drainage boards. The Drainage Code is primarily concerned with excess water removal. *[IC 36-9-27]* The focus of its impact is upon regulated drains. *[IC 36-9-27-2]* The county surveyor is required to classify all regulated drains as being in need of: (1) reconstruction, (2) periodic maintenance or, (3) vacation. These classifications are themselves dependent upon the adequacy of the waterway to properly drain lands affected. *[IC 36-9-27-34]*

c. Existing Programs or Practices and Lead Agencies
Please refer to the previous section. The same programs, practices and lead agencies are applicable for this section.

d. Enforcement mechanisms
See Tables C-21 to C-30 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.

2A. Dams: Management Measure for Erosion and Sediment Control

State coastal Nonpoint source pollution control programs are no longer required to include the Erosion and Sediment Control for Dams Management Measure.

In Indiana, all dams must be registered with the Indiana Department of Natural Resources Division of Water (IDNR-DOW) and each is inspected for safety at regular intervals pursuant to statute IC 14-27-7 and 7.5. Enforcement authority is given to the Division of Water to order repairs to dams or the removal of such if deemed necessary.

A registry of dams in the Indiana Lake Michigan Watershed is maintained by the Indiana Department of Natural Resources, Division of Water, and is included as Table 6-1. A map showing dam locations numerically is included as Figure 6-2.

[29] Dan Gardner, Meet Our Partner: Little Calumet River Basin Development Commission, CHICAGO BREEZE, 4 (January/February 1998)

2B. Dams: Management Measure for Chemical and Pollutant Control

State coastal Nonpoint source pollution control programs are no longer required to include the Hydromodification - Chemical and Pollutant Control for Dams Management Measure because the National Pollution Discharge Elimination System (NPDES) storm water regulations for industrial activities on construction sites apply throughout the coastal management areas of the states and territories.

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2C. Dams: Management Measure for Protection of Surface Water Quality and Instream and Riparian Habitat

Develop and implement a program to manage the operation of dams in coastal areas that includes an assessment of:

1. Surface water quality, in stream and riparian habitat, fish passage and potential for improvement, and:
2. Significant Nonpoint source pollution problems that result from excessive surface water withdrawals, as well as D.O and temperature impacts related to increased residence time in reservoirs

a. Definition

The 33 dams in the Lake Michigan watershed are small and relatively low head structures with surface water flowing through them as opposed to "operated" structures such as flood control reservoirs using bottom releases, or hydro-electric dams with turbine discharge. "Operated" dams may be of high flow at times and of serious detriment to water temperature, channel or bank scouring and deposition of sediment in streambeds. For the purpose of this section, existing dams will be addressed first. Then potential problems with future dams will be addressed.

Excessive surface water withdrawal from regulated drains is regulated (IC 36-9-27).

- **Streambed Sedimentation** is a problem only when structures "over top" during extreme storm events. Normal flow causes no sedimentation, and there is no 'bottom release' of water from any of the existing dams to create sedimentation problems. Introducing 'fill' materials into waterways is regulated. *[IC 13-18-4-5, IC 13-13-5-1, 327 IAC 2-1.5-5-4]*

  Evidence of severe dam damage due to erosion has occurred in the watershed during 100-year storm events and even lesser storm events. Structures have "overtopped" and dams have been seriously eroded. In these cases, reconstruction has been necessary; and re-engineering has been recommended to strengthen emergency spillways and water conveyances. "Overtopping" has led to "scouring" that has resulted in excessive erosion and deposition of sediment down stream. Division of Water inspection reports detail this engineering need to permit holders so that corrective measures may be taken.

- **Bottom Releases** - Spillway levels are constant in all dam structures in the watershed, there are no problems in this category. However, it must be considered for future dams. The 'bottom release' of water may cause low dissolved oxygen, downstream deposition of sediments and water temperature differentials that impact water and habitat quality. *[Water quality standards are regulated under the Clean Water Act and sedimentation is regulated under IC 13-18-4-5]*

- **Fish Migration** is a problem. There's only one fish pool in the area to allow fish to move upstream and it is not very functional during low water. To be considered: Establishing adequate fish passage or alternative spawning ground and instream habitat for fish species *[Andrews, 1988]*. Alternative ways to establishing fish passage include removal of the dam, construction of fishways, and fish ladders. Removal tends to be the cost effective, and best for public safety as dams exceed their design life and require repair or replacement.

  IAC 14-22-9-9 is the Indiana Regulation regarding fish migration. Improvements to structures may be enhanced via this regulation.

- **Riparian Habitat** is inconsistent throughout the area and is in need of evaluation and improvement. Improvement possibilities include the construction of woody debris jams for fish habitat, supplemental riparian planting to provide shade and cover, and even dam removal if the structure is failing.

- **Water Quality** –All the streams in the watershed are on the 303 (d) list indicating that they are all considered impaired. Water testing to evaluate each stream will help identify management practices to rectify problems. To be considered: Improving watershed protection by installing and maintaining BMPs in the drainage area above the dam to remove phosphorus, suspended sediment, and organic matter and otherwise improve the quality of surface waters flowing into the impoundment *[Kortmann, 1989]*. Thermal impairments to streams can also be a major concern as water normally shaded by a riparian canopy is exposed to solar gain in a reservoir and then the heated water released downstream.

b. Applicability

This management measure, intended to be applied by States to dam operations results in the loss of desirable surface water quality, and of desirable instream and riparian habitat. Dams are defined as constructed impoundments that are either:

- 25 feet or more in height *and* greater than 150 acre-feet in capacity, or

- 6 feet or more in height *and* greater than 50 acre-feet in capacity.

This measure does not apply to projects that fall under National Pollution Discharge Elimination System (NPDES) jurisdiction. This measure also does not apply to the extent that its implementation under State law is precluded under *California* v. *Federal Energy Regulatory Commission*, 110 S. Ct. 2024 (1990) (addressing the supersede of State instream flow requirements by Federal flow requirements set forth in Federal Energy Regulatory Commission (FERC) licenses for hydroelectric power plants under the Federal Power Act).

Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal Nonpoint source pollution programs in conformity with this measure and will have some flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

The purpose of this management measure is to protect the quality of surface waters and aquatic habitat in reservoirs and in the downstream portions of rivers and streams that are influenced by the quality of water contained in the releases (tailwaters) from reservoir impoundments. Impacts from the operation of dams to surface water quality and aquatic and riparian habitat should be assessed

and the potential for improvement evaluated. Additionally, new upstream and downstream impacts to surface water quality and aquatic and riparian habitat caused by the implementation of practices should also be considered in the assessment. The overall program approach is to evaluate a set of practices that can be applied individually or in combination to protect and improve surface water quality and aquatic habitat in reservoirs, as well as in areas downstream of dams. Then, the program should implement the most cost-effective operations to protect surface water quality and aquatic and riparian habitat and to improve the water quality and aquatic and riparian habitat where economically feasible.

A variety of approaches have been developed and tested for their effectiveness at improving or maintaining acceptable levels of dissolved oxygen, temperature, phosphorus, and other constituents in reservoirs and tailwaters.

Future dams to be constructed will have an impact on water quality should the structures have bottom release features for water, hydroelectric capability which may become a problem to fish migration, or other features which may impair habitats or water quality.

Elements to be considered with Future, Potentially Larger Dams:

Oxygenation: One general method uses pumps, air diffusers, or airlifts to induce circulation and mixing of the oxygen-poor, but cold hypolimnion with the oxygen-rich, but warm epilimnion. The desired result is a more thermally uniform reservoir with increased dissolved oxygen (DO) in the hypolimnion. Reservoir mixing improves water quality both in the reservoir and in tailwaters and helps to maintain the temperatures required by warm-water fisheries.

Another approach to improving water quality in tailwaters is appropriate if trout fisheries are desired downstream. In this approach, air or oxygen is mixed with water passing through the turbines of hydropower dams to increase the concentration of DO. Air or oxygen can be selectively added to impoundment waters entering turbine intakes. Reservoir waters can also be aerated by venting turbines to the atmosphere or by injecting compressed air into the turbine chamber.

A third group of approaches include engineering modifications to the intakes, the spillway, or the tailrace, or the installation of various types of weirs downstream of the dam to improve temperature or DO levels in tailwaters. These practices rely on agitation and turbulence to mix the reservoir releases with atmospheric air in order to increase the concentrations of dissolved oxygen. Selective withdrawal of water from different depths allows dam operators to maintain desired temperatures for fish and other aquatic species in downstream surface waters.
The quality of reservoir releases can also be improved through adjustments in the operational procedures at dams. These include scheduling releases or the duration of shutoff periods, instituting procedures for the maintenance of minimum flows, and making seasonal adjustments in the pool levels and in the timing and variation of the rate of drawdown.

Dam operators such as the Tennessee Valley Authority (TVA) further recognize the need for watershed management as a valuable tool to reduce water quality problems in reservoirs and dam releases. Reducing NPS pollutants coming from watersheds surrounding reservoirs can have a beneficial effect on concentrations of DO and pollutants within a reservoir and its tailwaters.

There is also a need for riparian habitat maintenance and restoration in the areas around the impounded reservoir and downstream from a dam. Reservoir shorelines are important riparian areas, and they need to be managed or restored to realize their many riparian habitat and water quality benefits. Examples of downstream aquatic habitat improvements include maintaining minimum instream flows, providing scouring flows when and where needed, providing

alternative spawning areas or fish passage, protecting streambanks from erosion, and maintaining wetlands and riparian areas.

The individual application of any particular technique, such as aeration, change in operational procedure, restoration of an aquatic or riparian habitat, or implementation of a watershed protection best management practice (BMP), will, by itself, probably not improve water quality to an acceptable level within the reservoir impoundment or in tailwaters flowing through downstream areas. The individual practices discussed in this portion of the guidance will usually have to be implemented in some combination in order to raise water quality in the impoundment or in tailwaters to acceptable levels.

One such combination of practices has addressed low DO levels at the Canyon Dam [Guadalupe River, Texas]. A combination of turbine venting and a downstream weir was used to increase DO levels to acceptable levels. The concentration of dissolved oxygen in water entering the dam was measured at 0.5 mg/L. After passing through the turbine (but still upstream of the aeration weir), the DO concentration was raised to 3.3 mg/L. The concentration of the same water after passing through the aeration weir was 6.7 mg/L *[EPRI, 1990]*.

Another combination of practices, consisting of a vacuum breaker turbine venting system and a stream flow re-regulation weir, has been implemented at Norris Dam [Clinch River, Tennessee]. The vacuum breaker aeration system uses hub baffles and appears to be the most successful design *[EPRI, 1990]*. The baffles induce enough air to add from 2 mg/L to 4 mg/L to the discharge, while reducing turbine efficiency less than 0.5 percent. The downstream weir retains part of the discharge from the turbines when they are not in operation to sustain a stream flow of about 200 cubic feet per second. Prior to these improvements, the tailwaters of the Norris Dam had DO levels below 6 mg/L an average of 131 days per year and DO levels below 3 mg/L an average of 55 days per year. After installation of the turbine venting system and re-regulation weir, DO levels were below 6 mg/L only 55 days per year and were above 3 mg/L at all times *[TVA, 1988]*.

Combinations of increased flow, stream aeration, and waste load reduction (from municipal and industrial sources) were found to be necessary to treat releases from the Fort Patrick Henry Dam [Holston River, Tennessee]. An unsteady state flow and water quality model was used to simulate concentrations of dissolved oxygen in the 20-mile downstream reach from Fort Patrick Henry Dam and to explore water quality management alternatives. Several pollution abatement options were considered to identify the most cost-effective alternative. These options included changing wasteloads of the various dischargers, varying the flows from the reservoir, and improving aeration levels in water leaving the reservoir and in areas downstream. The modeling study identified flow regime modifications as more effective in improving DO than wasteload modifications. However, a decision to increase flow from the dam when stream levels are low might result in unacceptable reservoir drawdown in dry years. Although at some projects the increased DO will persist for many miles, improvements that were predicted by aeration of dam releases diminished rapidly at this particular site because they decreased the DO deficit and reduced natural re-aeration rates. No wasteload treatments short of total recycle would achieve the 5-mg/L standard under base conditions *[Hauser and Ruane, 1985]*.

c. Existing Programs or Practices and Lead Agencies

Federal Programs:

- RIVERS AND HARBORS ACT OF 1899 (33 UNITED STATES CODE 401 AND 403) Sect. 9 & 10 - This regulation requires permits for the construction of dams or ditches across navigable waters, or obstruction or alteration of navigable waters.

- CLEAN WATER ACT OF 1987, SECTIONS 401 and 404 - This section of the CWA regulates discharge of dredge or fill materials into the waters of the United States and requires a Water Quality Certification and permit. IDEM's Office of Watershed Management has been delegated the authority to issue 401Water Quality Certifications by 327 IAC 2-1.5-5-4.

State Programs:

- Navigable waters act (IC-14-29-1) - Provides for an approval before placing, filling or erecting a permanent structure in or water withdrawal from, or mineral extraction from a navigable waterway or Lake Michigan.

- Construction of channels act (IC-14-29-4) - Regulates the construction or improvement of artificial or natural watercourses for providing boat access. The act includes provisions for stabilization of streambanks once construction is completed.

3A. Streambank and Shoreline Erosion Management Measures

1. Where streambank or shoreline erosion is a Nonpoint source pollution problem, streambanks and shorelines should be stabilized. Vegetative methods are strongly preferred unless structural methods are more cost-effective, considering the severity of wave and wind erosion, offshore bathymetry, and the potential adverse impact on other streambanks, shorelines, and offshore areas.

2. Protect streambank and shoreline features with the potential to reduce NPS pollution.

a. Definition

This management measure is intended to apply to streambank and shoreline stabilization techniques to control coastal erosion wherever it is a source of Nonpoint pollution. Techniques involving marsh creation and vegetative bank stabilization ("soil bioengineering") will usually be effective at sites with limited exposure to strong currents or wind-generated waves. In other cases, the use of engineering approaches, including beach nourishment or coastal structures, may need to be considered. In addition to controlling those sources of sediment input to surface waters that are causing Nonpoint source pollution, these techniques can halt the destruction of wetlands and riparian areas located along the shorelines of surface waters. Once these features are protected, they can serve as a filter for surface water runoff from upland areas, or as a sink for nutrients, contaminants, or sediment already present as NPS pollution in surface waters.

Stabilization practices involving vegetation or coastal engineering should be properly designed and installed. These techniques should be applied only when there will be no adverse effects to aquatic or riparian river habitat, or to the stability of adjacent shorelines, from stabilizing a source of shoreline sediments. Finally, it is the intent of this measure to promote institutional measures that establish minimum setback requirements or measures that allow a buffer zone to reduce concentrated flows and promote infiltration of surface water runoff in areas adjacent to the shoreline.

b. Applicability

This management measure applies to eroding shorelines in coastal bays and to eroding streambanks in coastal rivers and creeks that constitute a Nonpoint source pollution problem in surface waters of Indiana. The erosion of shorelines and streambanks can contribute significantly to Nonpoint source pollution in surface waters. The intent of this measure is to promote the implementation of streambank and shoreline stabilization techniques that will be effective in controlling coastal erosion wherever it is a source of Nonpoint pollution. The measure does not imply that all shoreline and streambank erosion must be controlled only excessive erosion. It is not intended to hamper the efforts of the state or any localities to “retreat” rather than harden the shoreline.

c. Existing Programs or Practices and Lead Agencies

Federal Programs:

- RIVERS AND HARBORS ACT OF 1899 (33 UNITED STATES CODE 401 AND 403) Sect. 9 & 10 - This regulation requires permits for the construction of dams or ditches across navigable waters, or obstruction or alteration of navigable waters.

- CLEAN WATER ACT OF 1987, SECTIONS 401 and 404 - This section of the CWA regulates the discharge of dredge or fill materials into the waters of the United States and requires a Water Quality Certification and permit. IDEM's Office of Watershed Management has been delegated the authority to issue 401Water Quality Certifications by 327 IAC 2-1.5-5-4.

Several practices in the USDA-Natural Resources Conservation Services (NRCS) "toolbox" apply to assisting with this resource concern. While NRCS is the primary federal agency that provides technical assistance for agriculture resource issues, this same assistance is also available for other community needs. Practices that would apply to streambank and shoreline erosion would be as follows:

- Streambank and shoreline protection (Practice Code 580): Using vegetation or structures to stabilize and protect banks of streams, lakes, estuaries, or excavated channels against scour and erosion. This practice may be used for any of the following purposes: 1) to prevent the loss or damage to utilities, road, buildings or other facilities adjacent to the banks; 2) to maintain the capacity of the channel; 3) to control channel meander that would adversely affect downstream facilities; 4) to reduce sediment loads causing downstream damages and pollution; or 5) to improve the stream for recreation or as a habitat for fish and wildlife.

- Clearing and snagging (Practice Code 326): removing snags, drifts or other obstructions from a channel. This practice may be used to increase the flow capacity of a channel by improving its flow characteristics, to prevent streambank erosion caused by eddies, to reduce the forming of alluvial bars, and to minimize blockage by debris and ice. Caution needs to be used in implementing this practice so as not to cause more damage through channel erosion, landscape impairment, or fish or wildlife habitat impairment. Most snags and drifts in channels are unlikely to significantly alter the flow carrying ability of the channel.

State Programs:

- Navigable waters act (IC-14-29-1) - Provides for an approval before placing, filling or erecting a permanent structure in or water withdrawal from, or mineral extraction from a navigable waterway or Lake Michigan.

- Sand and gravel permits (IC 14-29-3) - Regulates the removal of sand gravel, stone or other mineral resources from or under the bed of navigable waterways, including streambanks and shorelines.

- Construction of channels act (IC-14-29-4) - Regulates the construction or improvement of artificial or natural watercourses for providing boat access. The act includes provisions for stabilization of streambanks once construction is completed.

- Lake and River Enhancement Program (LARE) - Established under IC-14-32-7, LARE provides help for watersheds to diagnose problems on Indiana's lakes, rivers and streams and provides cost-share and technical assistance in establishing best management practices for hydromodification and water management.

- Regulated drains - Local county drainage boards work in conjunction with county surveyors to provide maintenance to regulated drains. Major projects may include reconstruction and maintenance of ditches and waterways through a local taxing authority for the benefit of landholders that benefit from drainage. Provisions are made to assure reseeding or other stabilization of streambanks once maintenance or reconstruction work is completed.

- Hoosier Riverwatch - Statewide volunteer water quality monitoring and education program. Sponsors "Adopt-A-River" program that promotes local participation to monitor water quality and provide for periodic maintenance and clean up of riparian corridors. Creates awareness and appreciation of the resource through grass roots participation and oversight.

d. Enforcement Mechanisms

Table 6-4 lists the various enforcement mechanisms available to state and local authorities for implementation of management measures.

Table 6-4: Programs, legislation, type of practices, category (voluntary, regulatory, incentive, or disincentive), implementing agency, inclusion of enforcement provisions and evaluation measures (type of required reporting or compliance monitoring).

Program Authority	Legislation	Program/ Regulation	Applicable Measures	Status	Implementing Agency	Enforcement Provisions	Evaluation Measures
	Clean Water Act Section 401, 404 IC 13-18-4-5 IC 13-13-5-1	327 IAC 2-1.5-5-4	Discharge of Dredge/Fill Material into Waterways	Regulatory	ACOE IDEM-OWM	Permit/ Certification	
Navigable Waters Act	IC 14-29-1		Approval for placing, filling, or erecting a permanent structure in; water withdrawal from; or mineral extraction from a navigable waterway or Lake Michigan	Regulatory	DNR-DOW	Permit (No fee)	
Sand and Gravel Permits	IC 14-29-3		Regulates removal of sand, gravel, stone, or other mineral resources from or under the bed of navigable waterways	Regulatory	DNR-DOW	Permit ($50)	
Construction of Channels Act	IC 14-29-4		Regulates construction or improvement of artificial or natural watercourses for providing boat access.	Regulatory	DNR-DOW	Permit ($100)	
Lake & River Enhancement Program	IC 14-32-7	LARE	Cost & Tech. Assist. Hydromod. & Water Mgt. BMPs	Incentive Tech. Asst. Education	DNR-DSC		
Regulated Drains	IC 36-9-27		Removal of excess water in areas with regulated drains	Regulatory Voluntary	County Surveyor/ County Drainage Board		Reconstruction, periodic maintenance, vacation
Hoosier Riverwatch Program			Volunteer water quality monitoring program	Voluntary	DNR-DOSC Purdue CES		Periodic WQ database

Coordination Methods – Hydromodification and Dams

Table 6-5 Channelization - Physical and Chemical Characteristics of Surface Waters Management Measure

Objective	Measures of Success	Resources Needed	Responsible Entities	Timeline
Evaluate the effects of channelization	Improved water quality	Water quality testing To document gain or loss in water quality	Owners of property affecting waters Local interest groups IDNR DOW Local SWCDs	1 to 5 years
Plan and design channelization to reduce undesirable impacts	Improved water quality	Qualified design firms to accomplish plan and designs. Funding for the same	Owners of the properties affecting water quality DNR-DOW (IC 14-29-4) (Construction of Channels Act)	3 to 5 years
Develop an operation and maintenance program to improve physical and chemical characteristics in channels	Improved water quality	Qualified firm(s) to develop the programs	County Drainage Board Owners of the properties affecting water quality County Drainage Board	3 to 5 years

Table 6-6: Instream and Riparian Habitat Restoration Management Measure

Objective	Measures of Success	Resources Needed	Responsible Entities	Timeline
Evaluate the potential effects of proposed channelization on instream and riparian habitats	Environment conducive to maintaining healthy plant and aquatic life	Physical study of current and proposed channel to determine the anticipated habitat	Owners of properties affecting channel County Drainage Board	1 to 5 years
Plan and design channelization to reduce undesirable impacts		Qualified design firms	Owners of properties affecting channel	2 to 5 years
Develop an operation and maintenance program with specific timetables for existing modified channels which includes opportunity to restore instream and riparian habitat	Environment conducive to maintaining healthy plant and aquatic life	Qualified design firms	Owners of properties affecting channel IDNR-DOW	3 to 5 years

Table 6-7: Dams – Erosion and Sediment Control Management Measure

Objective	Measures of Success	Resources Needed	Responsible Entities	Timeline
Construction and maintenance of dams in the Lake Michigan Coastal Area must comply with MS-4 guidelines	Minimize erosion and eliminate off site sedimentation Improved water quality	Agencies responsible for the oversight of each MS-4 must review plans for new construction and maintenance	The agencies with jurisdiction over the various MS-4 areas	Currently in effect

Table 6-8: Chemical and Pollutant Control Management Measure

Objective	Measures of Success	Resources Needed	Responsible Entities	Timeline
Construction and maintenance of dams in the Lake Michigan Coastal Area must comply with MS 4 guidelines	Minimize erosion and eliminate off site sedimentation Improved water quality	Agencies responsible for the oversight of each MS-4 must review plans for new construction and maintenance	The agencies with jurisdiction over the various MS-4 areas	Currently in effect

Table 6-9: Protection of Surface Water Quality and Instream Riparian Habitat Management Measure

Objective	Measures of Success	Resources Needed	Responsible Entities	Timeline
Develop and implement a program to manage dams for the improvement of surface water quality and instream and riparian habitat Develop and implement a program to manage dams to minimize problems caused by excess water withdrawal	Reduce stream scouring, stream Bank erosion and maintain stable water levels Improved water quality Improved water quality	Maintain standards for releasing waters from dams to address problems and minimize them Utilize “stoplog” type structures for water level control rather than “bottom pipes” Dialogue with any industry or group withdrawing waters from dammed pools	Owners of dams IDNR-DOW (IC 13-18-4-5 Regulates bottom release and sediment control) Owners of Dams and agencies withdrawing water from pools IDNR-DOW (IC 36-9-27) Excess water withdrawal is regulated	1 to 2 years 1 to 2 years

Table 6-10: Stream Bank and Shoreline Erosion – Protection of Stream Bank and Shoreline Features Management Measure

Objective	Measures of Success	Resources Needed	Responsible Entities	Timeline
Stabilize stream banks with vegetative materials; Protect stream bank and shoreline features with the potential to reduce NPS pollution	Minimize erosion by planting banks No loss of stream banks Improved water quality Reduce NPS pollution utilizing protective vegetation to trap soil and sediments and to utilize nutrient in growth cycle ("nutrient uptake")	Funds for designing and implementing (bioengineering) plantings along stream banks and shorelines Local agencies and interest groups to monitor progress of growth and to watch for damaged areas which need maintenance Funds for designing and implementing (bioengineering) plantings along stream banks and shorelines Local agencies and interest groups to monitor progress of growth and to watch for damaged areas which need maintenance	Owners of the property IDNR-DOW (Permits construction in floodway) Local interest groups Owners of the property IDNR-DOW (Permits construction in floodway) Local interest groups	2 to 5 years 2 to 5 years

Chapter 7

Wetlands, Riparian Areas and Vegetation Treatment Systems

A. Introduction

In the early 1830's, an estimated 24.1 percent, or 5,600,000 acres, of Indiana's surface area was covered by wetlands, including swamps, bogs and marshes. Today, only 3.5 percent, or 813,000 acres, of Indiana's surface area is covered by wetlands, placing Indiana 4th (tied with Missouri) in proportion of wetland acres lost *[Dahl, 1990]*. The majority of lost wetland acres were drained to obtain rich, productive soils for a thriving agricultural industry in Indiana. Current size distribution for Indiana wetlands include 46.9 percent that are 1.0 acre or less in size, 29.5 percent that are 0.50 acres or less in size, and 11.6 percent that are 0.25 acres or less in size.

The Lake Michigan area of northwestern Indiana, in the counties of Lake, LaPorte and Porter contain one of the most concentrated areas of remaining wetlands in Indiana. Southern Lake Michigan as a whole is characterized by the wealth and diversity of its resources, people, habitats and environmental challenges. Approximately 12 percent of the rivers, lakes, dunes and swales and five percent of the wetlands are contained within the forested lands of the Southern Lake Michigan basin. Indiana contains a majority of these natural features.

A portion of the world's largest freshwater lakeshore dune system exists in the area. One of the most significant parts of this dune complex, Indiana Dunes National Lakeshore ranks third in *total number* of plant species of all national parks *[National Park Service, 1987]* and seventh among national parks for native plant *overall diversity [National park Service, 2001]*. A portion of the southern coastal basin has been designated a "Shoreline Biodiversity Investment Area" by the U.S. Environmental Protection Agency and Canada.

Concurrent with changes to the dunes, the region's hydrology has also been impacted. Specific impacts include channelization of the Little Calumet River, the Grand Calumet River and other tributaries to Lake Michigan, and the construction of drainage canals, in particular the Indiana Harbor Canal. Additional changes include draining and filling of vast acreages of wetlands while native soil surfaces have been replaced with impermeable, urban surfaces.

Historical wetlands estimates based on NRCS hydric soils determinations in the three county region place one-time wetlands acreage at approximately 360,000 acres. 1986 inventories place the current amount of wetlands at approximately 63,000 acres, or about 82.5 percent loss of previous wetlands acreages in the region.

Figure 7-1 Changed Wetland Acres in Indiana Lake Michigan Watershed Counties over Time

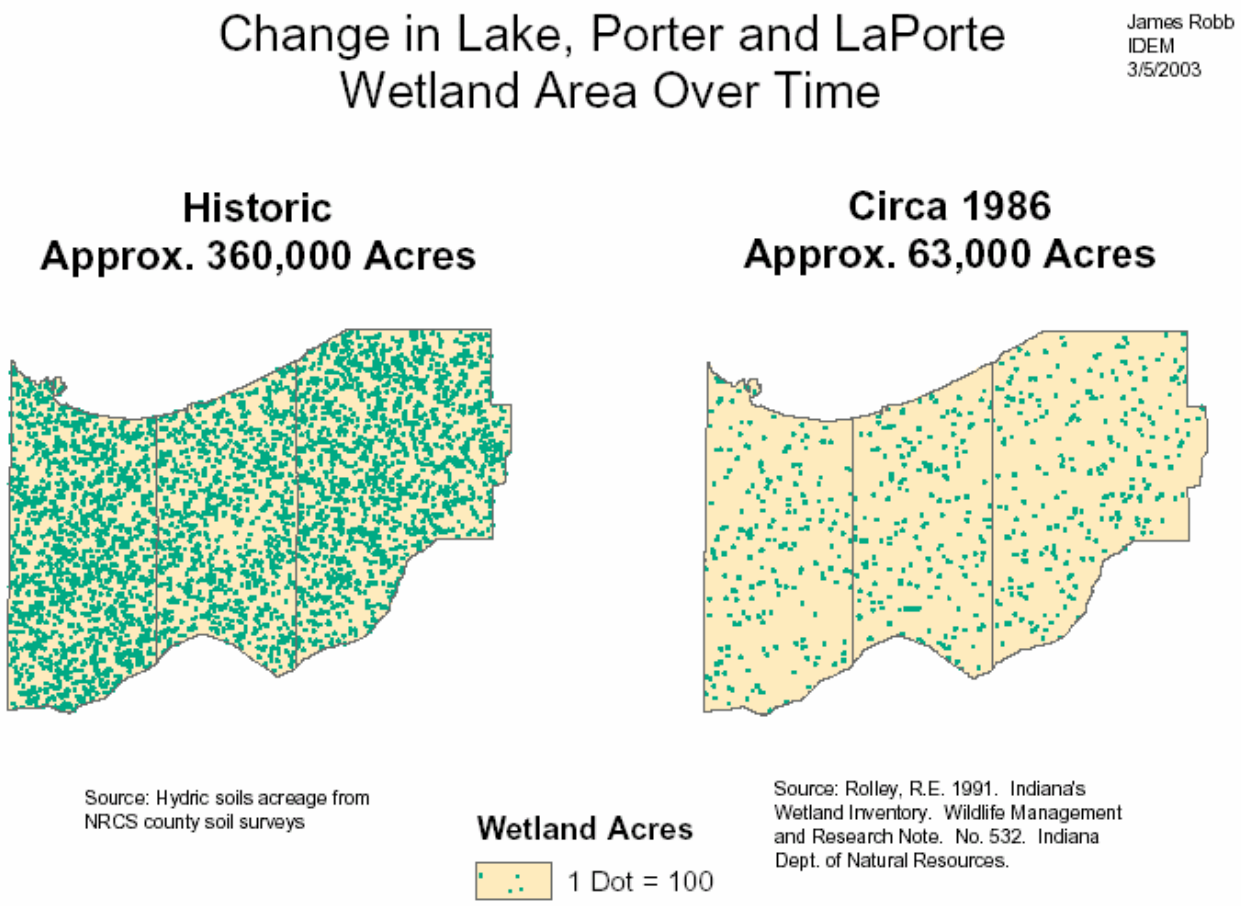
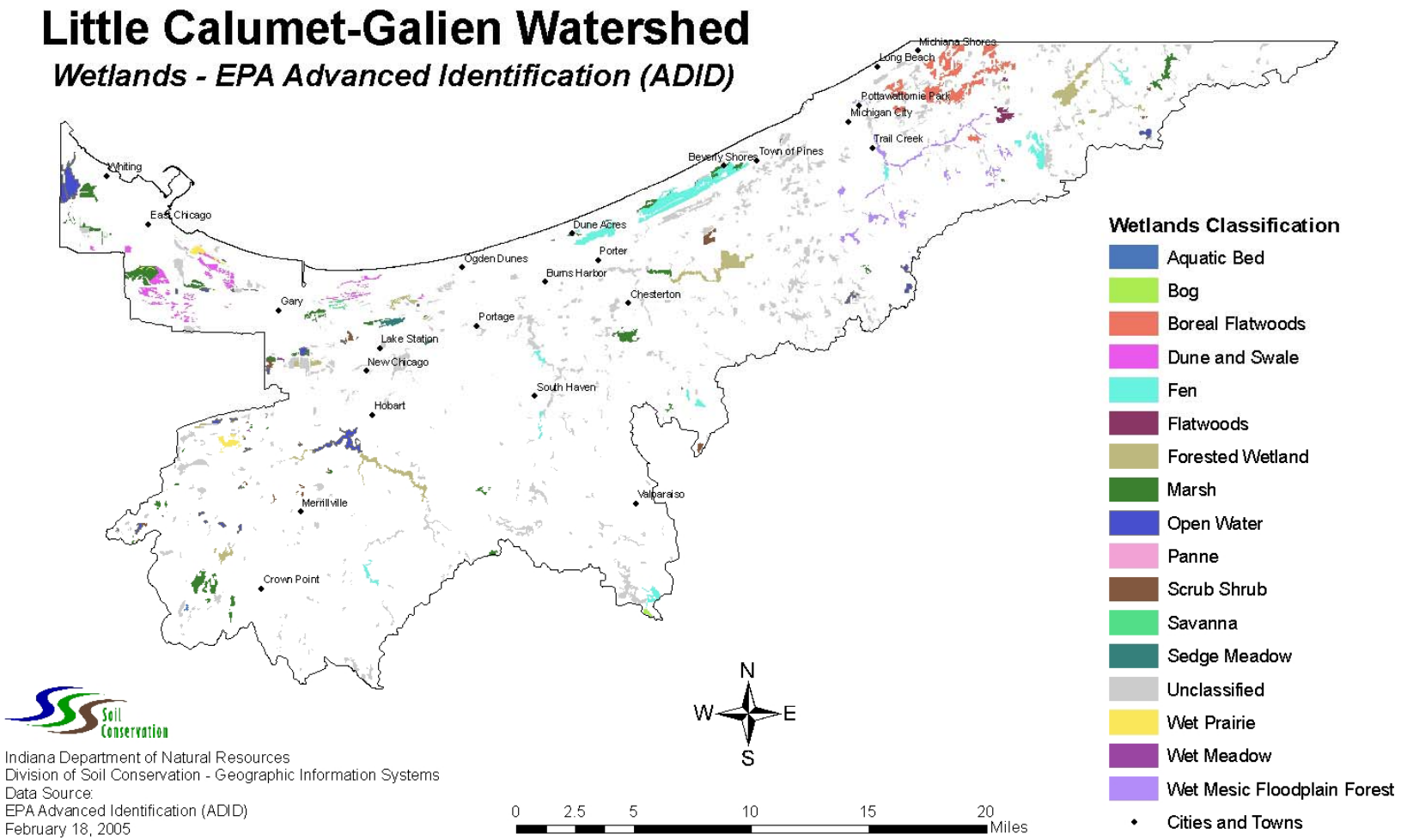


Figure 7-2 Current Wetlands in the Watershed



Of the 343,124 total acres in the watershed 34,185 acres are classified as wetlands. Woody wetlands comprise 19, 380 acres. Emergent herbaceous wetlands account for an additional 8,200 acres. Open water accounts for the 6,600 acres remaining. (Table 7-3)

Table 7-3 Wetlands in CNPCP Boundary Area

Classification	Acres	% CNPCP Area
Woody Wetlands	19,380	5.65%
Emergent Herbaceous Wetlands	8,200	2.39%
Open Water	6,600	1.92%
Source: MRLC National Land Cover 2001		

Included in the Little Calumet – Galien River watershed is the 15,000 acre Indiana Dunes National Lakeshore, home to a unique ecology that supports the third highest number of *native* plants in the national park system.[30] Only the Grand Canyon and Smoky Mountains National Parks exceed the Indiana Dunes National Lakeshore, which contains less than three percent of the total acreage of either park. With its mosaic of bogs, dune and swale wetlands, prairies, and woodlands, the area has long been known to botanists as a unique landscape where the tall grass prairie collides with the eastern deciduous forest, creating an area of ecological tension between these two dominating systems.

Ecologically complex, the Little Calumet – Galien River watershed's close proximity to Lake Michigan to the north and the (now drained) Kankakee swamp to the south allows for the co-existence of startlingly diverse habitats; including beaches, dunes, wetlands, forests and rivers – all within a space of slightly more than 900 square miles. This juxtaposition of highly disparate habitat types makes this region globally significant. Indiana Dunes National Lakeshore contains over 1,400 vascular plant species, over 90 of which are on Indiana's threatened or endangered list. According to the U.S. Park Service, Indiana Dunes National Lakeshore ranks seventh among national parks for *overall* native plant diversity.[31]

The rich habitat types within the watershed wetland areas are particularly susceptible to degraded water quality. While wetlands are often referred to as the "kidneys" of a natural system due to their ability to filter, contain, and transform nutrients, excessive levels of nutrients tend to drive biologically diverse wetland plant communities toward weedy species. As a result, emergent marshes tend to become dominated by monocultures of narrow leaved cattail or phragmites; sedge meadows are replaced with reed canary grass; and bottomland forests are replaced with sandbar willow and box elder. Animal diversity tends to decline as plant diversity declines.

1. *Description of wetlands and riparian areas in coastal region.*

According to the U.S. Fish and Wildlife Service's National Wetland Inventory *[1986]* approximately 11 percent, or 65-68 square miles of Lake Michigan's southern rim consists of wetlands *[DNR, 1994]*. Specific sub-types include: 1) Emergent wetlands, including estuaries, coastal marshes, and inland wetlands; 2) Shrub scrub wetlands, including shrub swamps and bogs; 3) Forested wetlands, including wooded swamps and bottomland hardwood forests; 4) Aquatic beds; and 5) Mudflats and other wetlands with unconsolidated bottom material.

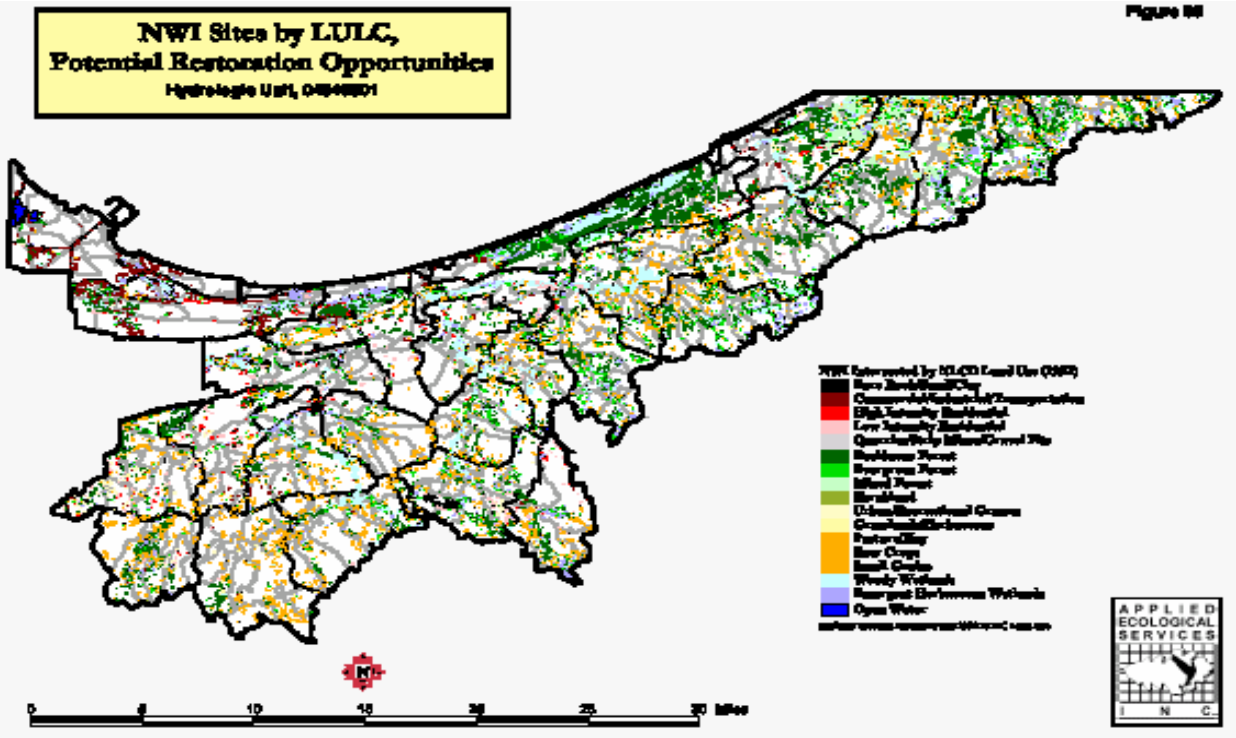
[30] National Park Service, 1987
[31] National Park Service, 2001

2. *Identification of specific wetlands and riparian areas in the coastal region adjacent to areas with NPS water quality issues.*

Areas of Potential Restoration

Within the watershed, numerous sites still exist for the potential restoration of wetland and riparian areas. Sites with the potential for restoration are dispersed throughout the entire watershed, but are most largely concentrated along existing rivers, stream, and other bodies of water, as well as associated floodplains and floodways.

Figure 7-4 Potential Wetland Restoration Site in Lake Michigan Watershed – Indiana Counties



Although a majority of the original wetland areas have been altered or destroyed for various reasons, most areas are capable of being restored to some degree. Through the use of GIS data layering, locations with high restoration priority can be identified based on selected 303(d) water quality concerns (such as impaired biotic communities, excessive nutrients, excessive total dissolved solids, or excessive pathogens). In these locations wetland and/or riparian area restoration might address noted water quality concerns. Potential restoration sites can be identified through several methods, including hydric soils identification, National Wetlands Inventory (NATIONAL WETLAND INVENTORY) mapping, and Federal Emergency Management Administration (FEMA) flood data inventories *[Applied Ecological Services, 2001]*.

Hydric Soils

The presence of drained hydric soils is an extremely useful indicator of potential wetland restoration sites *[Applied Ecological Services, 2001]*. Hydric soils developed over geologic time and identify the historically wet areas in the watershed. Although land use changed due to ditching and draining, the soil retains characteristics of pre-development, anaerobic conditions. Except in urban areas where soils are not mapped, this measure provides a reasonable estimate of pre-settlement wetland coverage.

Digital NRCS soils information is currently available only for LaPorte County within the watershed area. Hydric soils in LaPorte County were extracted from the soils GIS coverage and intersected with National Land Cover Data (NLDD) (land use/land cover data). The resulting coverage identified all hydric soils by five land use land cover classes —Developed, Barren, Herbaceous Planted/Cultivated, Forested Uplands and Herbaceous Uplands.

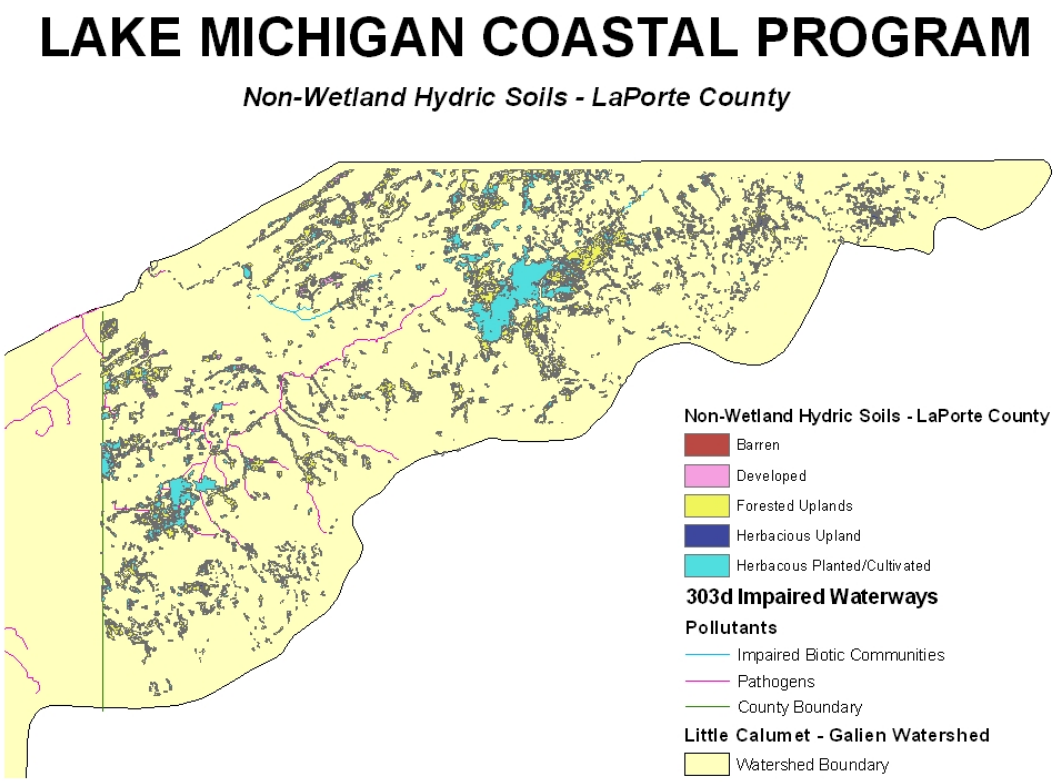
Only 18 percent of the original hydric soils in LaPorte County remain as wetland or water. Approximately 82 percent of the historic wetlands have been converted to non-wetland land uses. Restorable land includes all land use classes except Developed, Water and Wetlands. Using these criteria, 85 percent of the historic wetland area in the LaPorte County portion of the watershed is restorable.

Table 7-5: Hydric Soils Land Use – LaPorte County, Indiana

Hydric Soils Classified by 1992 Land Use Land Cover Type	Parcel Count	Acres	Percent
Barren	56	50	0%
Developed	4286	4490	24%
Forested Uplands	6571	4214.5	22%
Herbaceous Upland	1349	505	3%
Herbaceous Planted/Cultivated	5478	6172.5	33%
Scrubland	126	57.5	0%
Water	898	1335	7%
Wetlands	3582	2135	11%
TOTAL	**22,346**	**18957.5**	**100%**

Use of 303(d) impaired streams data further identifies areas adjacent to surface waters of concern to better prioritize locations of highest concern, with pathogens and impaired biotic communities representing the pollutants of largest concern for LaPorte County (Figure 7-6).

Figure 7-6: Potential Wetland Restoration Sites Based on Hydric Soils and 303(d) Impaired Stream Information – LaPorte County, Indiana



National Wetland Inventory (NATIONAL WETLAND INVENTORY) Maps

NATIONAL WETLAND INVENTORY maps provide a more recent measure of wetland loss *[Applied Ecological Services, 2001]*. NATIONAL WETLAND INVENTORY mapping has been complete since 1986. Almost 90% of the lower forty states have been mapped as of January 2000. NATIONAL WETLAND INVENTORY does not provide the same quality of mapping resolution as is required of soils mapping; as many of the smaller wetlands were not mapped which results in the NATIONAL WETLAND INVENTORY underestimating the existing extent of wetlands.

All of the Little Calumet – Galien River watershed has NATIONAL WETLAND INVENTORY mapping. These digital maps were intersected with NLCD land use/land cover data. The resulting coverage includes NATIONAL WETLAND INVENTORY sites by 1992 land use land cover classifications. There are approximately 40,000 acres of wetlands mapped in the watershed by the NATIONAL WETLAND INVENTORY program; however, more recent land classification identifies approximately 35,100 acres of wetlands (Table 7-3).

Table 7-7: National Wetlands Inventory Land Cover Type. *

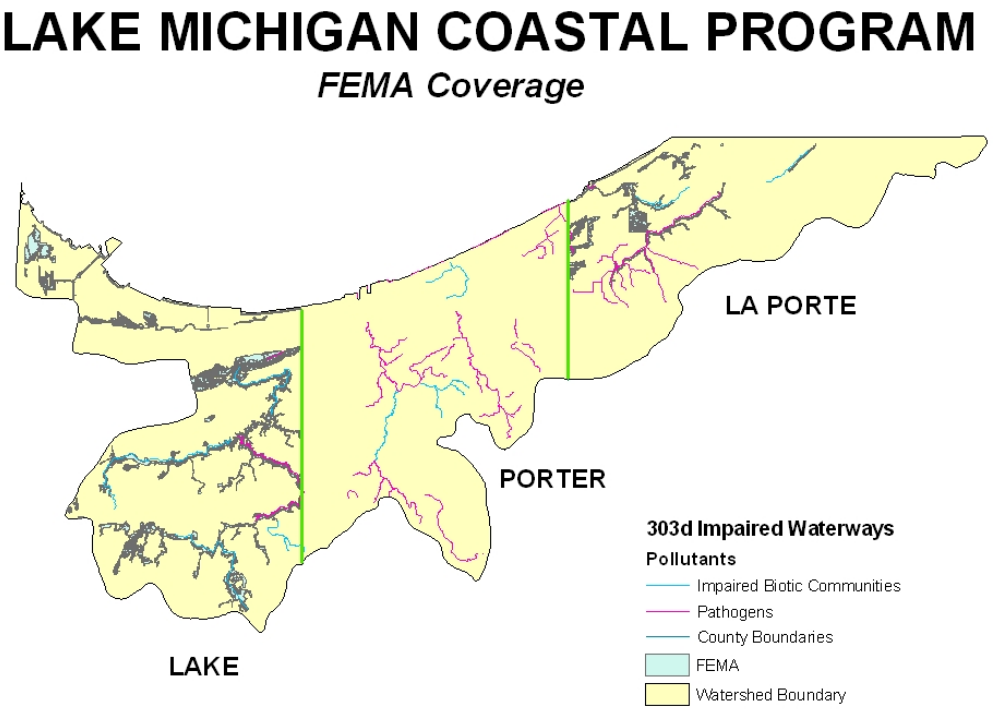
Land Use Land Cover Type	Parcel Count	Acres	Percent of Total
Barren	298	130	0%
Developed	7,451	2170	6%
Forested Uplands	27,857	14262.5	36%
Herbaceous Upland	4,769	1057.5	3%
Herbaceous Planted/Cultivated	14,406	4300	11%
Scrubland	183	27.5	0%
Water	4,704	3690	9%
Wetlands	26,168	13580	35%
TOTALS	**85,831**	**39,217.5**	**100%**

**This inventory represents a larger boundary area for the "Watershed Diagnostic Study of the Little Calumet-Galien River Watershed" September 2001, by Applied Ecological Services, Inc. for IDNR.*

FEMA Flood Data

The extent of floodplain areas is also useful in identifying non-developable properties that might be available for wetland restoration *[Applied Ecological Services, 2001]*. As with the use of hydric soils data, FEMA Q3 flood data can be used to identify soils already possessing some or all of the characteristics associated with wetlands locations. FEMA Q3 data has the additional benefit of indicating locations near identifiable 303(d) streams to address water quality and biotic community concerns associated with these streams. Currently FEMA's Q3 flood data, which identifies 100-year and 500-year flood prone areas, is only available for Lake and LaPorte Counties in GIS form.

Figure 7-8 Potential Wetland Restoration Sites Based on FEMA Q3 Flood Data and 303(d) Impaired Stream Information – Lake and LaPorte Counties, Indiana.



3. Description Of The Types Of Vegetated Treatment Systems (VTS) That Exist and Could Be Used In The Coastal Region

Introduction

- Vegetated Treatment Systems (VTS) have important potential for reducing the effects of Nonpoint pollution from a variety of sources.

- Vegetated Filter Strips are used to remove sediment and other pollutants from runoff and wastewater in order to reduce the amount entering surface water.

- Constructed Wetlands are engineered man made wetlands that benefit water quality by providing NPS pollution control and water retention.

Vegetated Filter Strips (VTSs) play a critical role in reducing Nonpoint source pollution by intercepting surface runoff and subsurface flow. Their role in water quality improvement is one of processing, removing, transforming, and storing such pollutions as sediment, nitrogen, phosphorus, and some heavy metals. Functions of VTS include water quality improvement, aquatic habitat, stream shading, shoreline stabilization, and runoff and flood control. Promotion of these systems will help control Nonpoint source pollutants in surface waters and are essential elements of Indiana's LMCP.

There are two kinds of Vegetated Treatment Systems:

- **Vegetated Filter Strips**
  The purpose of vegetated filter strips (VFS) is to remove sediment and other pollutants from runoff and wastewater by filtration, deposition, infiltration, absorption, adsorption, decomposition, and volatilization, thereby reducing the amount of pollution entering surface waters *[USDA Field Office Technical Guide, 1988]*. VFS are appropriate for use in areas adjacent to surface water that may receive runoff containing sediment, suspended solids, and/or nutrient runoff. VFS are most effective in the removal of sediment and other suspended solids.

  VFS can improve water quality and can be an effective management practice for the control of Nonpoint pollution from silvicultural, urban, construction, and agricultural sources of sediment, phosphorus, and pathogenic bacteria.

  - Cropland. The primary function of grass filter strips is to filter sediment from soil erosion and sediment-borne nutrients.

  - Urban Development. Vegetated filter strips filter and remove sediment, organic material, and trace metals.

  With proper planning and maintenance, VFS can be a beneficial part of a network of NPS pollution control measures for a particular site. They can help to reduce the polluting effects of agriculture runoff when coupled with either (1) farming practices that reduce nutrient inputs or minimize soil erosion or (2) detention ponds to collect runoff as it leaves a vegetated filter strip. Properly planned VFS can add to urban settings by framing small streams, ponds, or lakes, or by delineating impervious areas. VFS can add positive improvements to the urban environment by increasing wildlife and adding beauty to an area.

- **Constructed Wetlands**
  Constructed wetlands are typically engineered complexes of saturated substrates, emergent and submergent vegetation, animal life, and water that simulate wetlands for human use and benefits *[Hammer et al., 1989]*.

  Like vegetated filter strips, constructed wetlands offer an alternative to other systems that are more structural in design for NPS pollution control. In some cases, constructed wetlands systems can provide limited ecological benefits in addition to their NPS control functions. In other cases, constructed wetlands offer few, if any, additional ecological benefits, either because of the type of vegetation installed in the constructed wetland or because of the quantity of metals or pesticides and should be fenced or otherwise barricaded to discourage wildlife use. Constructed wetlands are also used for slowing water runoff and water retention. Also, research and demonstration have shown that constructed wetlands can be used to treat septic effluent.

B. Wetland And Riparian Area Management Measures Implemented In Indiana's Coastal Watershed

The following discussion lists: management measures, definitions, measures of success, applicable existing regulatory programs/practices, voluntary programs, outreach and education programs, and enforcement mechanisms. The Objective Table at the end of the chapter contains a complete listing of all referenced programs with: program authorities, program classification, responsible entity, enforceable mechanism, evaluation mechanism, and all Management Measures that are applicable. The coordination section further explains how each program will apply to the various management measures. In addition, a complete description of all referenced programs is included in Appendix B.

1. Protection of Wetlands and Riparian Areas

a. Definition

Protect from adverse effects wetlands and riparian areas that are serving a significant NPS abatement function and maintain this function while protecting the other existing functions of these wetlands and riparian areas as measured by characteristics such as vegetative composition and cover, hydrology of surface water and ground water, geochemistry of the substrate, and species composition.

b. Applicability

This management measure is intended to be applied by States to protect wetlands and riparian areas from adverse NPS pollution impacts. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so.

c. Existing Programs and Enforceable Policies and Mechanisms

Federal Legislation and Regulations

Several of the significant federal laws addressing wetlands, riparian areas, and natural areas of related significance relate to their relationship to drainage and water quality. "By and large the chief federal regulatory act concerning wetlands is the Clean Water Act." Noteworthy is the definition of "wetlands" contained within regulations to assist in implementation of Section 404 of the Clean Water Act. "Wetlands" are "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

The Rivers and Harbors Act, beginning in the 1960s, the US Army Corps of Engineers determined it should protect wetlands for ecological reasons if those wetlands are within or affect the navigable waters of the United States.

The Farm Bill of 1985 placed limited enforcement authority to conserve wetlands in the U.S. Department of Agriculture. The "Swampbuster" provisions of the bill provided for the denial of Department of Agriculture benefits to farmers who drain or clean wetlands to grow crops.

Under the Clean Water Act, the administrator of the Environmental Protection Act has

the ultimate authority to determine the geographic scope of "waters of the United States." This authority extends to the 404 regulatory program administered by the US Army Corps of Engineers. A Memorandum of Agreement between the Corps and the EPA defines the Corps administration of the Section 404 program.

Authority exercised through Section 404 of the Clean Water Act by the Environmental Protection Agency and the US Army Corps of Engineers overlaps the authority of the U.S. Department of Agriculture and the U.S. Fish and Wildlife Service regarding wetlands regulated under the Food Security Act. In January 1994, a Memorandum of Agreement was entered by the four federal agencies to provide a consistent procedure for wetlands delineations. The procedure is used by the U.S. Department of Agriculture under the Food Security Act for purposes of the Clean Water Act.

State Legislation and Rules

As with federal legislation, many of the statutes and rules addressing water quality also have pertinence to wetlands as well as water quantity. Several of these laws are reviewed below.

- The Water Pollution Control Board may adopt rules, which restrict "the polluting content of any waste material and polluting substances discharged or sought to be discharged into any streams or waters of Indiana." The Board's authority extends to all waters of the state.
- The Indiana Department of Environmental Management is responsible for the review of projects requiring Section 401 Water Quality Certification under the Clean Water Act. Section 401 requires an applicant to obtain certification from a state that the discharge of dredged or fill materials will not violate the water quality standards of the state. The US Army Corps of Engineers cannot complete its processing of the permit until the state provides Section 401 certification or waives the right.
- Indiana Water Quality Standards (327 IAC 2-1) include policies of maintenance of existing uses and non-degradation of water quality in waters of the state. Prohibited are projects whose impacts would cause or contribute to a polluted condition or which would adversely impact water quality. Issuance by IDEM of Section 401 Water Quality Certification indicates the project complies with Indiana's water quality standards.
- Section 305(b) of the Clean Water Act requires states to report to Congress every two years on their activities and the progress they have made toward meeting the goals of the act. According to the Indiana 1992-1993 305(b) Report, Indiana through its 401 Water Quality Certification Program, obtains approximately three acres of wetlands for every acre of wetlands lost. The actual, effective mitigation ratio is probably much less. The Indiana Department of Environmental Management hopes to follow-up on approved mitigation plans and when necessary, enforce the correct execution of these plans. To date, the program does not have a monitoring component that ensures compliance with mitigation requirements or to monitor the quality of reconstructed wetlands.
- In 1992, the Indiana Department of Environmental Management denied Section 401 Water Quality Certification for nine general permits of the Army Corps. Most significant to wetlands issues were the denials of Permit 26 and Permit 18. Permit 26 may be applied to projects in isolated wetlands of less than one acre, and Permit 18 includes discharges into specified aquatic sites, some of which include wetlands. More than 80 percent of the projects reviewed by IDEM for Section 401 Water Quality Certification involve wetlands less than one acre.

- Also pertinent to wetlands management at the state level is legislation pertaining to water rights and providing for water resource management. "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 a "natural resource and public water of Indiana" subject to control and regulation for the public welfare. The Indiana Natural Resources Commission is charged with the management of the state's water resources, including surface waters. "Surface waters" includes those in streams, lakes, ponds, swales, and marshes. One of the responsibilities of the Commission, with public input, is to develop "plans and recommendations for the development, conservation, and use of the water resource to best serve the needs of the people of Indiana for beneficial uses."
- The Indiana General Assembly passed House Enrolled Act 1798 (HEA 1798) and HEA 1277 during the 2004 legislative session. HEA 1798 was enacted on an override of a Governors veto. These enactments are largely in response to the U.S. Supreme Court's SWANCC decision, which declared isolated wetlands are outside the U.S. Army Corps of Engineers permitting authority under section 404 of the Clean Water Act. HEA 1798 creates a new isolated wetlands regulatory permit program, and HEA 1277 further amended certain provisions of HEA 1798. Together, these enactments require compensatory mitigation for permitted activities, allow high-quality wetlands be removed from potential development, allow activities to affect some isolated wetlands, and exempt some isolated wetlands from regulation. The legislation defines three classes of isolated wetlands generally based on the level of disturbance, support of wildlife or aquatic habitat, hydrologic function, and extent of invasive species. Class III is considered the highest-quality isolated wetlands and requires an individual permit for any proposed alteration. Class II isolated wetlands may require an individual permit depending on the level of potential impact. Class I isolated wetlands are covered by a state general permit and do not require an individual permit. Isolated wetlands are exempt from regulation if they were voluntarily created; are incidental features of lawns or landscaped areas, agricultural lands, roadside/irrigation ditches, or drainage control structures; fringe wetlands associated with private ponds; wetlands associated with water bodies or wetlands that have been created from dry land to collect and retain water for agricultural, commercial, industrial or aesthetic purposes; Class I wetlands one-half acre or less and Class II wetlands one-quarter acre or less; or one-quarter or one-half of total isolated wetlands on-site. Wetlands protection policies and standards – Indiana is in the process of implementing new rules for isolated wetlands as required by HEA 1798 and HEA 1277 (see above).

d. Enforcement Mechanisms

Pursuant to the Flood Control Act (Ind. Code § 14-28-1), the Indiana Department of Natural Resources exercises regulatory jurisdiction over wetlands located within floodways. For these purposes, a "wetland" is defined as a "transitional area between a terrestrial and deep water habitat (but not necessarily adjacent to a deep water habitat) where at most times the area is either covered by shallow water or the water table is at or near the surface and under normal circumstances," either:

1. The area predominantly supports hydrophytes, at least periodically, or the substrate is predominantly un-drained hydric soil, for example, peat or muck.
2. The substrate is not a soil but is instead saturated with water or covered by shallow water some time during the growing season, for example, marl beaches or sand bars.

Similarly, the Indiana Natural Resources Commission has exercised jurisdiction over wetlands within, but not outside, the shoreline of "public freshwater lakes." In an administrative proceeding, a definition of wetlands similar to that adopted by rule for floodways was used for public freshwater lakes.

Indiana has a "little NEPA," requiring state agencies to assess their activities for impact on biological resources. The Indiana Environmental Policy Act is similar to NEPA, but exempts state issuance of licenses and permits. (IC 13-1-10-1 et. seq.) In addition, it is seldom fully implemented.

Through the Lakes Preservation Act (IC 14-26-2) and the Ten Acre Lakes Act ("Ditch Act") (IC 14-26-5), the Indiana Department of Natural Resources exercises regulatory authority over the raising or lowering of water levels of Indiana lakes through alterations such as excavation, filling in, or any other change that may affect the lake's area or depth or affect related scenic beauty, lake contours, and natural resources. The Indiana Navigable Waterways Act (IC 14-29-1), also under the jurisdiction of the Indiana Department of Natural Resources, concerns the declaration of navigability of Indiana waterways, and the regulation of practices and structures, which may affect passage in such areas. All three acts require permit authorization to regulate the impact on Indiana's waterways and related areas such as wetlands and riparian zones.

In January 2001, the US Supreme Court, in Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers ("SWANCC") ruled that the "migratory bird rule" could not be used as the sole rationale for federal jurisdiction over wetlands that are isolated from navigable waters, leaving protection of "isolated" wetlands largely to individual states to resolve. In response, in April 2001, Indiana Department of Environmental Management issued a written policy that the "isolated" wetlands were "waters of the state" subject to state jurisdiction and that construction activity in a wetland would require an NPDES permit.

In February 2002, a Marion County Superior Court judge ruled in favor of a developer who challenged IDEM on the issue ("Twin Eagle"), but agreed to stay the ruling so that IDEM could appeal the decision. Legislation introduced during the 2003 Indiana General Assembly is attempting to further clarify the State's jurisdiction over "isolated" wetlands as "waters of the state", although no legislation has been passed to date.

Drainage Regulations Pertaining To Wetlands

State legislation provides that drainage is largely controlled through county drainage boards. The Drainage Code is primarily concerned with excess water removal. The focus of its impact is upon regulated drains. The county surveyor is required to classify all regulated drains as being in need of: (1) reconstruction, (2) periodic maintenance or (3) vacation. These classifications are themselves dependent upon the adequacy of the waterway to properly drain lands affected.

The Drainage Code does provide flexibility as to how the county may achieve proper drainage. Tiles may be deepened or widened, drains extended or courses changed, drainage basins and control dams constructed, erosion control and grade stabilization structures provided, or any other "major change to a drainage system that would be of public utility."

Utilizing this flexibility, counties have occasionally looked to wetlands as an element of drainage control. For example, the Steuben County Drainage Board has applied county drainage funds to purchase easements adjacent to a regulated drain in order to recreate

wetlands that can store water and reduce downstream storm water impacts. Wetlands were also included in the purchase of 886 acres in southern Lake County adjacent to the Kankakee River as part of the North American Waterfowl Management Plan, and these wetlands can assist in the implementation of the wide levee concept and the multi-county watershed management efforts of the Kankakee River Basin Commission.

Until recently, however, the Drainage Code made no direct reference to wetlands or even to the broader environmental concerns posed by other waterway management programs. In 1995, Public Law 185 sought to provide advance coordination for a project to reconstruct or maintain a regulated drain. An "onsite field investigation" is to be performed by a team including representatives from the county, the Indiana Department of Natural Resources, the Indiana Department of Environmental Management, and if applicable, the local Soil and Water Conservation District. Restrictions are placed upon terms the Department of Natural Resources may place on a permit governed by the Flood Control Act. For example, the DNR may not "require or recommend" placing a conservation easement at the site of the proposed work. The parties are encouraged to use negotiations to achieve an agreement as to permitting terms.

In 1996, the Indiana General Assembly gave new authority to county drainage boards to remove obstructions to a "drain" or "natural surface watercourse." The latter term is defined to include "an area of the surface of the ground over which water from falling rain or melting snow occasionally and temporarily falls in a definable direction." A person may petition to remove an obstruction. Upon the receipt of a petition, the county surveyor performs an investigation and reports to the drainage board as to the findings of the investigation. If the county drainage board finds an obstruction exists and its removal will "promote better drainage of the petitioner's land" and "not cause unreasonable damage to the land of the respondents," the drainage board is required to find for the petitioner.

The Flood Control Act (Ind. Code § 14-28-1) is also concerned with drainage, at least from the perspective of providing for relief from activities, which would increase the likelihood or intensity of flooding. "To prevent and limit floods, all flood control works and structures and the alteration of natural or present watercourses of all rivers and streams in Indiana should be regulated, supervised, and coordinated in design, construction, and operation according to sound and accepted engineering practices so as to best control and minimize the extent of floods and reduce the height and violence of floods." Floodway construction permits are not to be authorized for projects, which would "adversely affect the efficiency of or unduly restrict the capacity of the floodway."

Due to the difficulties posed by seeking a balance between the needs for drainage and the desire to maintain biological diversity, a Drainage Task Force was established to examine state and local laws regarding drainage and make recommendations to the legislators. The Task Force was comprised of representatives of county surveyors, state and federal regulatory agencies, agricultural interest groups, and environmental interest groups. This group met from June 1994 through September 1994, issuing a final report in October 1994. The report provided eight recommendations to the legislators.

During the 1995 legislative session, two measures were introduced which pertained to county drainage officials and state regulatory agencies. One measure, SB 368, resulted in the establishment of an early coordination process among county drainage officials, the Indiana Department of Environmental Management, and the Indiana Department of Natural Resources. This process is discussed in an earlier section of this chapter directed to

"Drainage." The other measure, SB 303, created a work group to prepare a handbook for recommended drainage practices, which was completed by DNR in 1996.

Mitigation Banking

Federal Guidance

The Army Corps of Engineers, Environmental Protection Agency, Natural Resource Conservation Service, Fish and Wildlife Service, and National Marine Fisheries Service have developed a policy guidance for the establishment, use, and operation of mitigation banks. The purpose of mitigation banks is to provide compensation for adverse impacts to wetlands and other aquatic resources. The guidance helps clarify how mitigation banks may be used to satisfy mitigation requirements of the Clean Water Act Section 404 permit program and the wetland conservation provision of the Food Security Act.

The policy defines "mitigation banking" as the "restoration, creation, enhancement, and in exceptional circumstances, preservation undertaken expressly for the purpose of compensating for unavoidable wetland losses in advance of development actions, when such compensation cannot be achieved at the development site or would not be as environmentally beneficial." The objective of a mitigation bank is to provide for the replacement of the chemical, physical and biological functions of wetlands and other aquatic resources, which are lost as a result of authorized impacts. Using appropriate methods, the newly established functions are quantified as mitigation "credits" which are available for use by the bank sponsor or by other parties to compensate for adverse impacts ("debits"). The guidance document became effective December 28, 1995.

State Guidance

In 1997, the Indiana Natural Resources Commission adopted a policy guidance directed to wetlands and habitat mitigation. The purpose of the guidance is to establish a general framework for the assessment and determination of wetlands or habitat compensatory mitigation where a construction project is likely to reduce or degrade an existing wetland or habitat. The Indiana Department of Natural Resources will reference the document when making licensing determinations and when commenting upon federal licenses, such as comments to the U.S. Army Corps of Engineers relative to Section 404.

The document indicates it is not intended to establish inflexible mitigation standards, but rather was formulated with the understanding "each parcel of real estate is unique and offers both challenges and opportunities which are peculiar to the parcel."

The document reflects that compensatory mitigation procedure may be accomplished by various methods. The procedure is often defined in terms of a ratio of units replaced to units altered. In other words, three acres may be replaced or reconstructed for one acre adversely impacted or destroyed. This compensatory mitigation is described as a ratio of 3:1. The document suggests varying ratios depending upon the type and value of the wetland to be disturbed.

Local Ordinances

Several local units of government in Northwest Indiana are considering or have adopted wetland protection ordinances. Among them are Beverly Shores, Porter County, and the City of LaPorte.

The LaPorte effort is illustrative. Ordinance No. 5-91 amended the municipal code in 1990 to

create a wetlands conservation district and to provide for the protection of wetlands. The ordinance also sought to restrict the development and use of wetlands within the city limits. The city adopted the ordinance upon a finding that wetlands were "indispensable and fragile natural resources" and that "damaging or destroying wetlands threatens public safety and the general welfare." According to the ordinance, the City of LaPorte determined it was necessary to "ensure maximum protection for wetlands by discouraging development activities" in wetlands, as well as those activities in upland areas that "may adversely affect wetlands." The ordinance requires a permit from the Zoning Administrator and compliance with "other applicable regulations." The Zoning Administrator is also charged with enforcement.

The Highway Extension Research Project for Indiana Counties and Cities at Purdue University has developed a model stormwater ordinance that can be adopted by local governments. Among several issues addressed in the ordinance is a retention or detention structure for new developments.

Non-regulatory Wetlands Programs

A variety of initiatives can be pursued at the federal, state, and local level, as well as in the private sector, that do not involve regulatory actions for the protection of wetlands and related areas. A few of the programs are reviewed here.

The Food Security Act of 1985 authorizes the Wetlands Reserve Program as administered by the Farm Services Agency. Through this program, eligible landowners can place land under a permanent or long-term easement to help protect wetlands. The landowner receives financial and technical assistance to implement restoration activities on the protected area. The program targets farmed wetlands, prior converted wetlands, wetlands farmed under natural conditions, riparian areas, and eligible buffer areas. The goal of the Wetlands Reserve Program is to enroll 330,000 acres by the end of 1995, and 975,000 acres by 2000.

The Conservation Reserve Program and Conservation Reserve Enhancement Program provide land rental payments, incentive payments, and cost share assistance to landowners who voluntarily enter 10 to 15 year contractual agreements with USDA to enroll eligible cropland and protect it by establishing grass, trees, shrubs or other long-term land cover.

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The Indiana Heritage Trust was established in 1992 to ensure that Indiana's rich natural heritage would be preserved and enhanced for present and succeeding generations. The Heritage Trust Program acquires land based on biological diversity, conservation, wildlife, threatened and endangered species, and rare and unique ecosystems, among other purposes. (IC 14-12-2-1) License plate sales fund the program, which raised $2 million statewide in the last three years. The trust is administered through the Indiana Department of Natural Resources.

Congress passed the Land and Water Conservation Fund (LWCF) in 1965 to assist eligible governmental units in the provision of new park areas. The LWCF is a matching assistance program that provides grants for 50 percent of the cost for the acquisition and/or development of outdoor recreation sites and facilities. Since the program began, Indiana has received approximately $75 million in federal funds. The allocation usually is divided between Department of Natural Resources' projects and local government park projects depending on funding levels. Over $36 million has been provided to local agencies through the program. More than 30,000 acres of land have been acquired statewide in Indiana with Land and Water Conservation Fund assistance for public outdoor recreation use and conservation. The main source of funding for the LWCF grants comes from federal offshore oil lease revenues.

Funds are provided through the National Park Service of the U.S. Department of the Interior, but the Indiana Department of Natural Resources' Division of Outdoor Recreation administers the program. Grant applications are limited to park and recreation boards under Indiana law and applications may consist of land acquisition and/or facility construction or renovation for local public parks for outdoor recreation. New parks or additions to existing parks may be funded. Examples of types of projects include: acquiring park or natural area, natural areas and interpretive facilities, campgrounds, fishing and hunting areas, and nature centers. Nationally, the Land & Water Conservation Fund has also provided more than $5.5 billion to acquire new federal recreation lands, including areas used to expand the Indiana Dunes National Lakeshore south of Lake Michigan.

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state funds, and plans statewide to acquire $8 million worth of natural areas for nature preserves. A state non-game fund is also used in part for wildlife habitat acquisition. (IC 14-22-34-20)

The Wildlife Habitat Cost Share Program reimburses landowners for up to 90 percent of the cost of developing wildlife habitat, not to exceed $1,000 per landowner. The landowner agrees to protect the habitat for a minimum of 5 years. Any type of land can qualify, and the program is available to any landowner who owns 10 or more acres of land. The Indiana Department of Natural Resources - Division of Fish and Wildlife offers the program to encourage the development of wildlife habitat for any type of native wildlife. Each year, the Division funds approximately 80 to 90 projects, improving about 500 to 600 acres/year. Assuming past participants maintain their habitats for a minimum of 5 years, at least 2,500 to 3,000 acres statewide are currently being maintained under this program. Since the program's beginning, approximately 11,000 acres of habitat has been improved. The funding for this program comes from the sale of hunting licenses.

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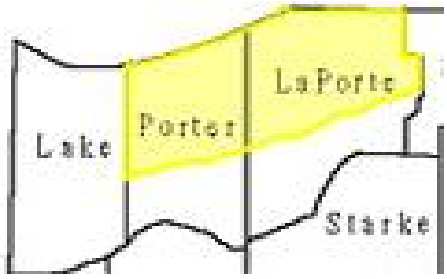
The Indiana Classified Forest Act, IC 6-1.1-6 was enacted on March 10, 1921 and is the oldest forest property tax incentive program in the United States. The intent of the program is "to encourage timber production and to protect watersheds by classifying certain lands." This program was developed to encourage people to keep areas in forestland or create forestlands (by planting trees) for the purpose of assuring a forest base for now and future generations. By entering forestland into the program, the landowner receives a property tax reduction. Currently, there are over 412,000 acres in the program on over 8600 tracts with 7500 landowners enrolled. Land classified as native forestland or forest plantation is assessed at $1 per acre for general property taxation purposes; periodic woodland inspections by professional foresters are required.

The Forest Legacy Program (FLP), a federal program in partnership with states, supports state efforts to protect environmentally sensitive forestlands. Designed to encourage the protection of privately owned forestlands, FLP is an entirely voluntary program. To maximize the public benefits it achieves, the program focuses on the acquisition of partial interests in privately owned forestlands. FLP helps the states develop and carry out their forest conservation plans. Most FLP conservation easements restrict development, require sustainable forestry practices, and protect other values. Participation in Forest Legacy is limited to private forest landowners. The federal government may fund up to 75 percent of program costs, with at least 25 percent coming from private, state or local sources. In addition to gains associated with the sale or donation of property rights, many landowners also benefit from reduced taxes associated with limits placed on land use. Once purchased, the

development rights are held by the state in perpetuity. The USDA Forest Service administers the Forest Legacy Program in cooperation with State Foresters.

One of six Legacy areas in Indiana is the Northwest Moraine Area, which encompasses a portion of LaPorte and Porter Counties. The remaining forests of this area represent the diminishing northwest morainal forest type, and provide unique wildlife habitat, recreation, aesthetic values and community green space.

Figure 7-9: Northwest Indiana Morainal Forest Legacy Program Area



Private/Local

Matching Aid to Restore States Habitat (MARSH) Program is a reimbursement program conducted by Ducks Unlimited that provides matching funds and grants to public and private agencies and organizations within each state based on a percentage of Ducks Unlimited net annual grassroots fundraising in that state plus any unused MARSH funds from the previous year. MARSH projects develop, maintain, restore, and preserve wetland and associated upland habitat in the United States. Projects protecting or restoring habitats within North American Waterfowl Management Plan Joint Venture areas receive first consideration.

The Southern Lake Michigan Rim Project was established in 1992 by The Nature Conservancy to help focus resources towards protecting and managing the most important biodiversity sites in the region, including wetland areas. With help from volunteers, interns, and agency and private partners, The Nature Conservancy has made efforts to reverse threats identified in key areas of biodiversity as well as educating the public on the importance of such natural resources.

Educational

In additional to regulatory and financial programs related to wetlands and related areas, numerous state and local educational programs exist to educate the public, youth, landowners, and policy makers about the potential benefits of wetlands and riparian areas.

The Indiana Department of Natural Resources, Indiana Department of Environmental Management, the Office of the Commissioner of Agricultural and Indiana agency wetlands protection partners established the Indiana Wetlands Web Site and the Hoosier Wetlands Newsletter. Efforts provide information on Indiana wetlands legislative efforts, contacts, wetlands locations, success stories, educational programs, and other wetlands related information.

Hoosier Riverwatch Program is a state-sponsored volunteer water monitoring initiative administered by Purdue University and the Indiana Department of Natural Resources –

Division of Soil Conservation. The Riverwatch Program was started in Indiana to increase public awareness of water quality issues and concerns by training volunteers to monitor water quality. Introductory, advanced, and instructor training workshops are held for the public to advance participant knowledge on water quality issues. Once certified, program participants then monitor water quality sites throughout Indiana and submit water quality data to the Hoosier Riverwatch database.

Indiana's Adopt-A-Wetland Program was developed in order to conserve valuable wetlands in Indiana communities through educational means. Local, community-based groups called "focus areas" primarily accomplish wetland conservation. Participants create their own focus area to protect a wetland by adopting one in their local community. After collecting important descriptive information about the wetland, participants communicate its values to other citizens in the area. The program is operated by the Indiana Department of Natural Resources – Division of Soil Conservation based on a concept developed by the Sierra Club and Indiana Department of Environmental Management.

The Planning with POWER (Protecting Our Water and Environmental Resources) Program is a statewide educational program designed to link local land use decisions and planning to watershed and natural resource based planning. Planning with POWER helps local decision-makers and citizens protect their water and natural resources while still providing for compatible economic growth in their community. The project brings together two successful statewide education and technical assistance projects: the Purdue Extension Land Use Team and the Indiana Conservation Partnership (composed of the Indiana Department of Natural Resources, the Natural Resources Conservation Service, Purdue Cooperative Extension Service, and the Soil and Water Conservation Districts). The Purdue Cooperative Extension Service and the Illinois-Indiana Sea Grant College Program coordinate planning with POWER.

Project WET (Water Education for Teachers), administered by Purdue University, is an international, interdisciplinary, water education program for formal and non-formal educators of students in grades K-12. The Wonders of Wetlands (W.O.W.) Program, available through Project WET from Environmental Concerns, Inc. and The Watercourse, provides additional water-related activities for educators interested in further exploration of topics with a wetlands focus. Numerous additional materials for adult and high school audiences focusing on watershed management and planning are also available through Project WET.

Project WILD, which focuses on fish and wildlife related issues, provides programs for educators of students from grades K-12. Project WILD is administered by the Indiana Department of Natural Resources – Division of Fish and Wildlife.

A third program is Project Learning Tree (PLT), which works with educational materials with a forestry viewpoint. Administered through the Indiana Department of Natural Resources – Division of Forestry, PLT works mainly with educator audiences of students for grades K-8.

The Integrated Environmental Curriculum - Wetlands Component, produced by the Sierra Club – Hoosier Chapter, US Fish and Wildlife, and the Indianapolis Zoo, provides activities related to the identification and conservation of soil, water, plant, animal, and other wetlands oriented components for formal and informal youth educators. Wetlands educational field sites for this program exist in Lake, LaPorte, and Porter counties and are operated by a variety of federal, state and local agencies as well as private conservation groups and organizations.

The Purdue University 4-H Department offers several projects involving wetlands and related topics. The 4-H Soil and Water Conservation Project explores soil, water, and related issues, the 4-H Wildlife Project focuses on wildlife identification and conservation topics, and the 4-H Forestry Project teaches forestry management and conservation. All three-project curriculums focus on project and life skills related conservation issues for ages 10-19.

(See Tables C-31 toC-35 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

2. Restoration of Wetlands and Riparian Areas Management Measure

a. Definition

Promote the restoration of the preexisting functions in damaged and destroyed wetlands and riparian systems in areas where the systems will serve a significant NPS pollution abatement function.

b. Applicability

This management measure is applied by States to restore the full range of wetlands and riparian functions in areas where the systems have been degraded and destroyed and where they can serve a significant NPS abatement function. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

c. Existing Programs

Indiana has a significant number of programs available from federal, state, and local sources to address the restoration of wetlands, riparian zones, and related biologically important areas. Programs are for the most part voluntary in nature and provide technical, financial, and/or educational assistance to landowners interested in the appropriate management practices.

Wetlands

Section 305(b) of the Clean Water Act requires states to report to Congress every two years on their activities and the progress they have made toward meeting the goals of the act. According to the Indiana 1992-1993 305(b) Report, Indiana through its 401 Water Quality Certification Program, obtains approximately three acres of wetlands for every acre of wetlands lost. The actual, effective mitigation ratio is probably much less. The Indiana Department of Environmental Management hopes to follow-up on approved mitigation plans and when necessary, enforce the correct execution of these plans. To date, the program does not have a monitoring component that ensures compliance with mitigation requirements or to monitor the quality of reconstructed wetlands.

In January 2001, the US Supreme Court, in Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers ("SWANCC") ruled that the "migratory bird

rule" could not be used as the sole rationale for federal jurisdiction over wetlands that are isolated from navigable waters, leaving protection of “isolated” wetlands largely to individual states to resolve. In response, in April 2001, Indiana Department of Environmental Management issued a written policy that the "isolated" wetlands were "waters of the state” subject to state jurisdiction and that construction activity in a wetland would require an NPDES permit.

The State is currently developing permitting guidelines for isolated wetlands. The permitting program is an effort to fill the gap left by the Federal SWANC decision

d. Enforcement Mechanisms

Drainage Regulations Pertaining To Wetlands

State legislation provides that drainage is largely controlled through county drainage boards. The Drainage Code is primarily concerned with excess water removal. The focus of its impact is upon regulated drains. The county surveyor is required to classify all regulated drains as being in need of: (1) reconstruction, (2) periodic maintenance, or (3) vacation. These classifications are themselves dependent upon the adequacy of the waterway to properly drain lands affected.

The Drainage Code does provide flexibility as to how the county may achieve proper drainage. Tiles may be deepened or widened, drains extended or courses changed, drainage basins and control dams constructed, erosion control and grade stabilization structures provided, or any other "major change to a drainage system that would be of public utility."

Utilizing this flexibility, counties have occasionally looked to wetlands as an element of drainage control. For example, the Steuben County Drainage Board has applied county drainage funds to purchase easements adjacent to a regulated drain in order to recreate wetlands that can store water and reduce downstream stormwater impacts. Wetlands were also included in the purchase of 886 acres in southern Lake County adjacent to the Kankakee River as part of the North American Waterfowl Management Plan, and these wetlands can assist in the implementation of the wide levee concept and the multi-county watershed management efforts of the Kankakee River Basin Commission.

Until recently, however, the Drainage Code made no direct reference to wetlands or even to the broader environmental concerns posed by other waterway management programs. In 1995, Public Law 185 sought to provide advance coordination for a project to reconstruct or maintain a regulated drain. An "onsite field investigation" is to be performed by a team including representatives from the county, the Indiana Department of Natural Resources, the Indiana Department of Environmental Management, and if applicable, the local Soil and Water Conservation District. Restrictions are placed upon terms the Department of Natural Resources may place on a permit governed by the Flood Control Act. For example, the DNR may not "require or recommend" placing a conservation easement at the site of the proposed work. The parties are encouraged to use negotiations to achieve an agreement as to permitting terms.

In 1996, the Indiana General Assembly gave new authority to county drainage boards to remove obstructions to a "drain" or "natural surface watercourse." The latter term is defined to include "an area of the surface of the ground over which water from falling rain or melting snow occasionally and temporarily falls in a definable direction." A person may petition to remove an obstruction. Upon the receipt of a petition, the county surveyor performs an investigation and reports to the drainage board as to the findings of the investigation. If the

county drainage board finds an obstruction exists and its removal will "promote better drainage of the petitioner's land" and "not cause unreasonable damage to the land of the respondents," the drainage board is required to find for the petitioner.

The Indiana General Assembly passed House Enrolled Act 1798 (HEA 1798) and HEA 1277 during the 2004 legislative session. HEA 1798 was enacted on an override of a Governors veto. These enactments are largely in response to the U.S. Supreme Court's SWANCC decision, which declared isolated wetlands are outside the U.S. Army Corps of Engineers permitting authority under section 404 of the Clean Water Act. HEA 1798 creates a new isolated wetlands regulatory permit program, and HEA 1277 further amended certain provisions of HEA 1798. Together, these enactments require compensatory mitigation for permitted activities, allow high-quality wetlands be removed from potential development, allow activities to affect some isolated wetlands, and exempt some isolated wetlands from regulation. The legislation defines three classes of isolated wetlands generally based on the level of disturbance, support of wildlife or aquatic habitat, hydrologic function, and extent of invasive species. Class III is considered the highest-quality isolated wetlands and requires an individual permit for any proposed alteration. Class II isolated wetlands may require an individual permit depending on the level of potential impact. Class I isolated wetlands are covered by a state general permit and do not require an individual permit. Isolated wetlands are exempt from regulation if they were voluntarily created; are incidental features of lawns or landscaped areas, agricultural lands, roadside/irrigation ditches, or drainage control structures; fringe wetlands associated with private ponds; wetlands associated with water bodies or wetlands that have been created from dry land to collect and retain water for agricultural, commercial, industrial or aesthetic purposes; Class I wetlands one-half acre or less and Class II wetlands one-quarter acre or less; or one-quarter or one-half of total isolated wetlands on-site. Wetlands protection policies and standards – Indiana is in the process of implementing new rules for isolated wetlands as required by HEA 1798 and HEA 1277 (see above).

The Flood Control Act (IC § 14-28-1) is also concerned with drainage, at least from the perspective of providing for relief from activities, which would increase the likelihood or intensity of flooding. "To prevent and limit floods, all flood control works and structures and the alteration of natural or present watercourses of all rivers and streams in Indiana should be regulated, supervised, and coordinated in design, construction, and operation according to sound and accepted engineering practices so as to best control and minimize the extent of floods and reduce the height and violence of floods." Floodway construction permits are not to be authorized for projects, which would "adversely affect the efficiency of or unduly restrict the capacity of the floodway."

Due to the difficulties posed by seeking a balance between the needs for drainage and the desire to maintain biological diversity, a Drainage Task Force was established to examine state and local laws regarding drainage and make recommendations to the legislators. The Task Force was comprised of representatives of county surveyors, state and federal regulatory agencies, agricultural interest group s, and environmental interest groups. This group met from June 1994 through September 1994, issuing a final report in October 1994. The report provided eight recommendations to the legislators.

During the 1995 legislative session, two measures were introduced which pertained to county drainage officials and state regulatory agencies. One measure, SB 368, resulted in the establishment of an early coordination process among county drainage officials, the Indiana Department of Environmental Management, and the Indiana Department of Natural

Resources. This process is discussed in an earlier section of this chapter directed to "Drainage." The other measure, SB 303, created a work group to prepare a handbook for recommended drainage practices, which was completed by DNR in 1996.

Mitigation Banking

Federal Guidance
The Army Corps of Engineers, Environmental Protection Agency, Natural Resource Conservation Service, Fish and Wildlife Service, and National Marine Fisheries Service have developed a policy guidance for the establishment, use, and operation of mitigation banks. The purpose of mitigation banks is to provide compensation for adverse impacts to wetlands and other aquatic resources. The guidance helps clarify how mitigation banks may be used to satisfy mitigation requirements of the Clean Water Act Section 404 permit program and the wetland conservation provision of the Food Security Act.

The policy defines "mitigation banking" as the "restoration, creation, enhancement, and in exceptional circumstances, preservation undertaken expressly for the purpose of compensating for unavoidable wetland losses in advance of development actions, when such compensation cannot be achieved at the development site or would not be as environmentally beneficial." The objective of a mitigation bank is to provide for the replacement of the chemical, physical and biological functions of wetlands and other aquatic resources, which are lost as a result of authorized impacts. Using appropriate methods, the newly established functions are quantified as mitigation "credits" which are available for use by the bank sponsor or by other parties to compensate for adverse impacts ("debits"). The guidance document became effective December 28, 1995.

State Guidance
In 1997, the Indiana Natural Resources Commission adopted a policy guidance directed to wetlands and habitat mitigation. The purpose of the guidance is to establish a general framework for the assessment and determination of wetlands or habitat compensatory mitigation where a construction project is likely to reduce or degrade an existing wetland or habitat. The Indiana Department of Natural Resources will reference the document when making licensing determinations and when commenting upon federal licenses, such as comments to the U.S. Army Corps of Engineers relative to Section 404.

The document indicates it is not intended to establish inflexible mitigation standards, but rather was formulated with the understanding "each parcel of real estate is unique and offers both challenges and opportunities which are peculiar to the parcel."

The document reflects that compensatory mitigation procedure may be accomplished by various methods. The procedure is often defined in terms of a ratio of units replaced to units altered. In other words, three acres may be replaced or reconstructed for one acre adversely impacted or destroyed. This compensatory mitigation is described as a ratio of 3:1. The document suggests varying ratios depending upon the type and value of the wetland to be disturbed.

Non-regulatory Wetlands Programs
A variety of initiatives can be pursued at the federal, state, and local level, as well as in the private sector, that do not involve regulatory actions for the restoration of wetlands and related areas. A few of the programs are reviewed here.

The U.S. Fish and Wildlife Service has an active program in Northwest Indiana for the restoration of fish and wildlife habitat through cooperative agreements with private landowners. In what it deems the Fish and Wildlife Service Partners for Wildlife Program, wetlands restorations under this program have been performed as follows: (1) Lake County 400.5 acres (of a total of 472.5 acres for habitat restoration); (2) LaPorte County 30 acres (of a total of 44 acres of habitat restoration); and (3) Porter County 110.5 acres (of a total of 185.7 acres of habitat restoration). To be noted is that these figures include areas within the Kankakee River watershed as well as the Lake Michigan watershed.

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The most common Indiana NRCS Field Office Technical Guide approved practices that assist in the restoration, establishment, and/or maintenance of wetlands and riparian areas in this watershed include:

- Constructed Wetland (656) A constructed shallow water ecosystem designed to simulate natural wetlands.
- Filter Strip (393) A strip or area of perennial vegetation established adjacent to streams or other watercourses for removing sediment and other pollutants from runoff.
- Riparian Forest Buffer (391) An area of trees and other vegetation consisting of two zones located in areas adjoining and upgradient from surface water bodies, designed to intercept surface runoff, and subsurface flows from upland sources prior to entry into surface waters and groundwater recharge areas.
- Wetland Creation (658) A wetland that has been created on a site location, which historically was not a wetland or is a wetland but the site will be converted to a wetland with a different hydrology, vegetation type, or function than naturally occurred on the site.
- Wetland Enhancement (659) The modification or rehabilitation of an existing or degraded wetland, where specific functions and /or values are modified for the

purpose of meeting specific project objectives. Some functions may remain unchanged while others may be degraded.

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Michigan City and the LaPorte County Health Department are participating in a program, funded by EPA, to demonstrate the wastewater treatment capabilities of wetlands. In the program, a wetland was designed and constructed to treat 450 gallons of wastewater daily, the approximate flow from a three-bedroom house. From a septic tank, the wastewater is pumped into the wetland, which is lined with plastic and filled with two feet of gravel. Cattails, common reed, and bull rush have been planted in the wetland. The wastewater is pumped evenly over the wetland for treatment by the vegetation. A perforated pipe collects the water from the wetland and pumps the water to an infiltration field for discharge into the ground. Other constructed wetlands have also been approved by the LaPorte County Health Department to assist in the treatment of effluent from septic systems, and the process has proven effective if the homeowner follows directions for wetlands construction and maintenance.

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The Classified Wildlife Habitat Program (est. 1979) offers property tax benefits to owners of land that is classified as wildlife habitat or riparian areas. IC 6-1.1-6.5-1. The Department of Natural Resources classifies land as wildlife habitat if it contains a good stand of vegetation that is capable of supporting wildlife species, and the landowner

enters into an agreement with the Department establishing standards of wildlife management. The parcel must contain at least 15 acres. A parcel of land may be classified as riparian land if the land is stream bed or vegetated land adjacent to stream bed and the land is conducive to riparian management for the purposes of fish and wildlife restoration or enhancement, erosion control, increased bank stability, improved water quality, or increased stream storage capacity. Land is assessed at $1 per acre for taxation purposes. There are 1,832 tracts of land enrolled in the program, with a total of 76,280 acres. Last year 38 landowners enrolled 2,172.67 acres into the program.

The Indiana Classified Forest Act, IC 6-1.1-6 was enacted on March 10, 1921 and is the oldest forest property tax incentive program in the United States. The intent of the program is "to encourage timber production and to protect watersheds by classifying certain lands." This program was developed to encourage people to keep areas in forestland or create forestlands (by planting trees) for the purpose of assuring a forest base for now and future generations. By entering forestland into the program, the landowner receives a property tax reduction. Currently, there are over 412,000 acres in the program on over 8600 tracts with 7500 landowners enrolled. Land classified as native forestland or forest plantation is assessed at $1 per acre for general property taxation purposes; periodic woodland inspections by professional foresters are required.

The Forest Legacy Program (FLP), a federal program in partnership with states, supports state efforts to protect environmentally sensitive forestlands. Designed to encourage the protection of privately owned forestlands, FLP is an entirely voluntary program. To maximize the public benefits it achieves, the program focuses on the acquisition of partial interests in privately owned forestlands. FLP helps the states develop and carry out their forest conservation plans. Most FLP conservation easements restrict development, require sustainable forestry practices, and protect other values. Participation in Forest Legacy is limited to private forest landowners. The federal government may fund up to 75 percent of program costs, with at least 25 percent coming from private, state or local sources. In addition to gains associated with the sale or donation of property rights, many landowners also benefit from reduced taxes associated with limits placed on land use. Once purchased, the development rights are held by the state in perpetuity. The USDA Forest Service administers the Forest Legacy Program in cooperation with State Foresters.

One of six Legacy areas in Indiana is the Northwest Moraine Area, which encompasses a portion of LaPorte and Porter Counties. The remaining forests of this area represent the diminishing northwest morainal forest type, and provide unique wildlife habitat, recreation, aesthetic values and community green space (see Figure 7-9 for boundary).

Private/Local

Matching Aid to Restore States Habitat (MARSH) Program is a reimbursement program conducted by Ducks Unlimited that provides matching funds and grants to public and private agencies and organizations within each state based on a percentage of Ducks Unlimited net annual grassroots fundraising in that state plus any unused MARSH funds from the previous year. MARSH projects develop, maintain, restore, and preserve wetland and associated upland habitat in the United States. Projects protecting or restoring habitats within North American Waterfowl Management Plan Joint Venture areas receive first consideration.

The Southern Lake Michigan Rim Project was established in 1992 by The Nature Conservancy to help focus resources towards protecting and managing the most important biodiversity sites in the region, including wetland areas. With help from volunteers, interns and agency and private partners, The Nature Conservancy has made efforts to reverse threats identified in key areas of biodiversity as well as educating the public on the importance of such natural resources.

Educational

In additional to regulatory and financial programs related to wetlands and related areas, numerous state and local educational programs exist to educate the public, youth, landowners, and policy makers about the potential benefits of wetlands and riparian areas.

The Indiana Department of Natural Resources, Indiana Department of Environmental Management, the Office of the Commissioner of Agricultural and Indiana agency wetlands protection partners established the Indiana Wetlands Web Site and the Hoosier Wetlands Newsletter. Efforts provide information on Indiana wetlands legislative efforts, contacts, wetlands locations, success stories, educational programs, and other wetlands related information.

Hoosier Riverwatch Program is a state-sponsored volunteer water monitoring initiative administered by Purdue University and the Indiana Department of Natural Resources – Division of Soil Conservation. The Riverwatch Program was started in Indiana to increase public awareness of water quality issues and concerns by training volunteers to monitor water quality. Introductory, advanced, and instructor training workshops are held for the public to advance participant knowledge on water quality issues. Once certified, program participants then monitor water quality sites throughout Indiana and submit water quality data to the Hoosier Riverwatch database.

Indiana's Adopt-A-Wetland Program was developed in order to conserve valuable wetlands in Indiana communities through educational means. Local, community-based groups called “focus areas” primarily accomplish wetland conservation. Participants create their own focus area to protect a wetland by adopting a one in their local community. After collecting important descriptive information about the wetland, participants communicate its values to other citizens in your area. The program is operated by the Indiana Department of Natural Resources – Division of Soil Conservation based on a concept developed by the Sierra Club and Indiana Department of Environmental Management.

The Planning with POWER (Protecting Our Water and Environmental Resources) Program is a statewide educational program designed to link local land use decisions and planning to watershed and natural resource based planning. Planning with POWER helps local decision-makers and citizens protect their water and natural resources while still providing for compatible economic growth in their community. The project brings together two successful statewide education and technical assistance projects: the Purdue Extension Land Use Team and the Indiana Conservation Partnership (composed of the Indiana Department of Natural Resources, the Natural Resources Conservation Service, Purdue Cooperative Extension Service, and the Soil and Water Conservation Districts). The Purdue Cooperative Extension Service and the Illinois-Indiana Sea Grant College Program coordinate planning with POWER.

Project WET (Water Education for Teachers), administered by Purdue University, is an international, interdisciplinary, water education program for formal and non-formal educators of students in grades K-12. The Wonders of Wetlands (W.O.W.) Program, available through Project WET from Environmental Concerns, Inc. and The Watercourse, provides additional water-related activities for educators interested in further exploration of topics with a wetlands focus. Numerous additional materials for adult and high school audiences focusing on watershed management and planning are also available through Project WET.

Project WILD, which focuses on fish and wildlife related issues, provides programs for educators of students from grades K-12. Project WILD is administered by the Indiana Department of Natural Resources – Division of Fish and Wildlife

A third program is Project Learning Tree (PLT), which works with educational materials with a forestry viewpoint. Administered through the Indiana Department of Natural Resources – Division of Forestry, PLT works mainly with educator audiences of students for grades K-8.

The Integrated Environmental Curriculum - Wetlands Component, produced by the Sierra Club – Hoosier Chapter, US Fish and Wildlife, and the Indianapolis Zoo, provides activities related to the identification and conservation of soil, water, plant, animal, and other wetlands oriented components for formal and informal youth educators. Wetlands educational field sites for this program exist in Lake, LaPorte, and Porter counties and are operated by a variety of federal, state and local agencies as well as private conservation groups and organizations.

The Purdue University 4-H Department offers several projects involving wetlands and related topics. The 4-H Soil and Water Conservation Project explores soil, water, and related issues, the 4-H Wildlife Project focuses on wildlife identification and conservation topics, and the 4-H Forestry Project teaches forestry management and conservation. All three-project curriculums focus on project and life skills related conservation issues for ages 10-19.

(See Tables C-31 toC-35 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

3. Engineered Vegetated Treatment Systems (VTS)

a. Definition

Promote the use of engineered vegetated treatment systems such as vegetated filter strips and constructed wetlands where these systems will serve a significant NPS pollution abatement function.

b. Applicability

This management measure is intended to be applied in cases where engineered systems of vegetated treatment systems and constructed wetlands can treat NPS pollution. Vegetated treatment systems and constructed wetlands often serve a significant NPS pollution abatement function. Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so. The

application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce

c. Existing Programs or Practices and Lead Agencies

Indiana has a number of programs available from federal, state and local sources to address water quality from surface water runoff. Most are voluntary and provide technical and financial assistance to landusers for applying VTS that reduce erosion and sedimentation. A description of these programs follows.

- **Swampbuster Compliance**- requires landusers who voluntarily participate in USDA commodity support programs to protect existing wetlands on land under contract.
- **Wetland Reserve Program (WRP) -** is an incentive program available to landowners who voluntarily restore wetlands on eligible cropland. This program provides payments and cost sharing for restoring wetlands.
- **Watershed Protection and Flood Prevention Act (PL 566) –** provides technical and financial assistance to local organizations for implementing watershed protection and flood prevention. Resource issues addressed, include: erosion and sediment control, flood control, water supply, water quality, wetland creation and restoration, fish and wildlife habitat enhancement, and public recreation projects on a watershed basis.
- **Fish and Wildlife Coordination Act and 1956 Fish and Wildlife Act –** provided cost share for wetland development and other practices in accordance with the US Fish and Wildlife Service.

State and Local

- **Clean Water Indiana Program (CWI) –** administered by the State Soil Conservation Board, program provides technical and cost share assistance to landusers and conservation groups who are interested in implementing conservation practices to reduce Nonpoint source water pollution.
- **Lake and River Enhancement Program (LARE) –** Administered by the State Soil Conservation Board, which provides grants for Nonpoint source watershed treatment.
- **Waste Water Treatment Guidelines –** regulations enforced by the Indiana State Department of Health on well water and septic systems.
- **Section 319 NPS Program –** watershed, water quality grants for BMPs. Administered by IDEM.

d. Enforcement Mechanisms –

Participation in federal programs is voluntary; however, there are some cross-compliance provisions that require landowners and operators who voluntarily participate in USDA's commodity support programs to adhere to conservation compliance provisions for highly erodible cropland, existing wetlands and grasslands being brought into crop production.

Indiana code IC 14-32 provides authorization for the State Soil Conservation Board, IDNR’s Division of Soil Conservation, and the state’s 92 county soil and water conservation districts (SWCDs), along with the Lake and River Enhancement and Clean Water Indiana Programs. The State Soil Conservation Board develops policy and is authorized under this code to develop a state wide regulatory program when all reasonable voluntary approaches to erosion and sedimentation have been exhausted.

In addition all incentives and cost sharing provided to landusers through any of the existing federal, state and local program are offered through a contractual agreement between the landuser and the agency administering the respective program dollars. The contract spells out a life expectancy for each practice installed with financial assistance and authorizes the contracting agency to recover the money from the respective landuser in the event the practice is destroyed or not maintained for the life of the practice.

(See Tables C-31 toC-35 Appendix C for description of programs and enforceability detail on authorizing legislation, program authority, lead implementing agency enforcement mechanism and evaluation methods for each program that will be used to implement this measure in the watershed.)

C. Coordination Methods

Several Indiana state agencies engage in cooperative management efforts related to the protection, enhancement, and/or creation of wetlands, riparian zones, and similar areas of biological significance. Most cooperation takes the form of inter-agency agreements and memoranda of understanding and technical, financial and educational assistance to private landowners.

For example, the State of Indiana cooperates with neighboring states in the management of the Lake Michigan watershed area; Indiana Department of Environmental Management, Indiana Department of Natural Resources, the Office of the Commissioner of Agriculture, and Indiana agency wetlands protection partners cooperatively maintain the Hoosier Wetlands newsletter and web sites; and the Indiana Department of Natural Resources, USDA-Natural Resources Conservation Service, and local Soil and Water Conservation Districts cooperatively maintain technical, financial, and educational programs to encourage wetlands and riparian area protection, enhancement, and creation.

State Regulation

1. Indiana Department of Environmental Management (IDEM) has traditionally regulated wetland fill via §401 of the federal Clean Water Act, applying state Water Quality Standards.

2. IDEM, IDNR, other agencies and representatives of the environmental and regulated interests worked for three years to develop rules to clarify IDEM's procedures and criteria for implementing Clean Water Act Section §401 Water Quality Certifications. The Water Pollution Control Board preliminarily adopted the rules in February 2002. Certain regulated groups and legislators objected and are currently seeking less definitive regulations. HEA 1306 (2002) barred final adoption of the rules until the EQSC could issue a final report on wetland-related policy matters.

3. Laws administered by IDNR that involve permitting for wetland protection, conservation, or management include:

- Flood Control Act (IC 14-28-1)
- Lake Preservation Act (IC 14-26-2)
- Lowering of Ten-Acre Lakes Act (IC 14-26-5)
- Navigable Waterways Act (IC 14-29-1)
- Sand and Gravel Permits Act (IC 14-29-3)
- Construction of Channels Act (IC 14-29-4)

4. In January 2001, the US Supreme Court, in Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers ("SWANCC") ruled that the "migratory bird rule" could not be used as the sole rationale for federal jurisdiction over wetlands that are isolated from navigable waters, leaving protection of "isolated" wetlands largely to individual states to resolve. In response, in April 2001, IDEM issued a written policy that the "isolated" wetlands were "waters of the state" subject to state jurisdiction and that construction activity in a wetland would require an NPDES permit. In February 2002, a Marion County Superior Court judge ruled in favor of a developer who challenged IDEM on the issue ("Twin Eagle"), but agreed to stay the ruling so that IDEM could appeal the decision. Legislation during the 2003 Indiana General Assembly is attempting to further clarify the State's jurisdiction over "isolated" wetlands as "waters of the state", although no legislation has been passed to date.

State Coordination of Conservation and Regulation Efforts

IDNR has coordinated the development and implementation of the Indiana Wetlands Conservation Plan (IWCP) since 1994. The IWCP was developed through an extensive process of information gathering, input, and review by a variety of interests across the state. The Wetlands Advisory Group and the Technical Advisory Team guided development of the IWCP. The Wetlands Advisory Group included diverse stakeholders in Indiana wetlands conservation; for example, environmentalists, county surveyors, farmers and coal mine operators. The Technical Advisory Team included representatives from state and federal agencies that have regulatory or oversight roles in wetlands conservation.

The IWCP includes a wetlands definition, goal, guiding principles, wetlands conservation priorities, and case studies of wetland conservation partnerships already up and running. The Hoosier Wetlands Conservation Initiative is the heart and soul of the IWCP. It provides a strategic approach to conserving Indiana's wetlands resources. The Initiative has six components:

- The cornerstone of the Initiative is an emphasis on planning and implementing the IWCP through local wetland conservation partnerships called focus areas.
- Obtaining increased scientific information on Indiana's wetland resources is critical to identifying and implementing long-term wetland conservation strategies and policies that are both effective and cost-efficient.
- The Initiative emphasizes positive incentives that motivate people to voluntarily conserve and restore wetlands.
- The Initiative calls for increased wetlands education for technical staff, people whom own/work the land, school children, and other audiences.
- The Initiative seeks the acquisition of permanent protection for the highest priority wetlands from willing owners.
- Continued work of the Wetlands Advisory Group and Technical Advisory Team in implementing the Initiative is critical to conserving Indiana's wetland resources.

Following adoption of the IWCP in 1996 by the Indiana Natural Resources Council, projects envisioned by the plan that have been implemented include:

- Financial support for model local efforts to develop techniques and a handbook for wetland acquisition and restoration to assist local land trusts in wetland conservation;

- Expansion of an Adopt-A-Wetland educational curriculum and hosting of several regional workshops on wetland ecology;

- Research/testing of a pilot rapid assessment protocol and classification method for evaluation, prioritization, and mapping of state wetlands; and

- Development of outreach materials (videos, brochures, and displays) on wetland conservation and regulation.

Individual IDNR divisions often interact internally over wetland issues through the permit system and technical assistance in wetland management. In addition, the IDNR provides assistance regarding wetland resources to external agencies and organizations, including the Indiana Department of Environmental Management, U.S. Environmental Protection Agency, U.S. Natural

Resources Conservation Service, and the various Soil and Water Conservation Districts. Differences in operating philosophies and missions among these groups can result in conflicts over particular wetland management issues.

Since 1995, a coalition of representatives from the IDNR divisions has worked together periodically to develop and update an internal wetlands policy and information bulletin. In the presence of diverse missions among the individual divisions, the bulletin acts as a unifying statement for the department that affirms the importance of wetland resources and provides a set of strategies for joint efforts in wetland protection and management through IDNR actions.

Based on existing laws, the IDNR shall implement strategies to do each of the following:

- Increase the quality, availability, and use of information concerning the historical, economic, and ecological values of wetland resources for present and future generations;
- Use scientific criteria to assess key functions and values of existing wetlands prior to disturbance and to monitor results of projects following creation or alteration of wetlands;
- Identify the remaining highest quality wetlands in order to prioritize them for protection or acquisition in a natural or semi-natural state and to employ human intervention when necessary to maintain ecological structures, processes, and natural resources productivity;
- Identify, restore, and manage intermediate or poor quality wetlands to accomplish specific purposes, (including ecological and natural resources productivity, flood control, water quality improvements, recreational opportunities, and aesthetic values) through biologically and scientifically sound manipulation;
- Create and maintain new wetlands to provide one or more benefits of natural wetlands, alleviate some of the lost wetland acreage in the state, and strengthen the use and development of bio-engineered systems for purposes such as wastewater treatment, floodwater retention, agricultural productivity, and landscape management; and
- Support the development of comprehensive wetland conservation plans that facilitate cooperative efforts between natural resource agencies and organizations involved in these issues.
- To further cooperative efforts within the State of Indiana's two lead wetlands agencies, IDEM and IDNR have also met regularly since the 2002 Indiana General Assembly legislative session to develop a coordinated approach to wetland management. These lead wetlands agencies propose increased activity in five major areas, as follows:
    - Expanding and updating a classification system and NATIONAL WETLAND INVENTORY-type inventory for wetlands statewide;
    - Clarifying legal definitions of wetlands, "private ponds", and their effects on state jurisdiction and resource management;
    - Participating in a state-level, administratively- or legislatively-established, conservation council on wetlands;
    - Optimizing mitigation requirements and mitigation banking protocols; and
    - Increasing private lands technical assistance for wetland conservation and regulation.

Outreach actions include development of a coalition of various environmental, conservation, and sporting interests to highlight the importance of wetland conservation and the necessity of strong environmental regulation balanced against private property rights.

Wetlands and Riparian Areas Measure Objectives

Table 7- 10: Protection of Wetlands and Riparian Areas Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Protect wetlands and riparian areas in Coastal Zone.	No net loss of wetlands and riparian areas	- Funding - Technical Assistance - Educational	- IDEM - Clean Water Act, Sec. 410; 403 (33 USC 26) - Clean Water Act, Sec 319 (33 USC 26) - Isolated Wetlands Rule HEA 1798 - IDNR - Clean Water Indiana Program (IC 14-32-8) - Construction of Channels Act (IC 14-29-4) - Flood Control Act (IC 14-28-1) - Indiana Heritage Trust (IC 14-12-2) - Lake and River Enhancement Program (IC 14-32-7) - Lake Preservation Act (IC 14-26-2) - Lowering of Ten-Acre Lakes Act (IC 14-26-5) - Navigable Waterways Act (IC 14-29-1) - Sand and Gravel Permits Act (IC 14-29-3) - Soil and Water Quality Education (IC 14-32) - SWCD - US Army Corps of Engineers - Dredging of Rivers & Streams (33 USC 403) - Protection of Wetlands (33 USC 26) - USDA - Cons. Reserve Program (Farm Bill 1985, 1996, 2002) - Env. Quality Incentives Prog. (Farm Bill 1996, 2002) - Soil Cons. & Domestic Allotment Act (16 USC 590) - Watershed Protection/Flood Prev. Prog. (P.L. 83-566) - Wetlands Reserve Program (Farm Bill 1996, 2002) - US Fish & Wildlife - N. Amer. Waterfowl Mgmt. Plan (16 USC 4401-4412) - Partners for Fish & Wildlife Prog. (35 USC 16) - Protection of Endangered Species (35 USC 16)	**1-5 years**

Table 7-11 Restoration of Wetlands and Riparian Areas Management Measure

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Restore and enhance wetlands and riparian areas in Coastal Zone	Increase in quantity and quality of wetlands and riparian areas	- Funding - Technical Assistance - Educational Assistance	- IDEM *- Clean Water Act, Sec 319 (33 USC 26)* - IDNR *- Clean Water Indiana Program (IC 14-32-8)* *- Indiana Heritage Trust (IC 14-12-2)* *- Lake and River Enhancement Program (IC 14-32-7)* - SWCD - US Army Corps of Engineers - USDA *- Cons. Reserve Program (Farm Bill 1985, 1996, 2002)* *- Env. Quality Incentives Prog. (Farm Bill 1996, 2002)* *- Soil Cons. & Domestic Allotment Act (16 USC 590)* *- Watershed Protection/Flood Prev. Prog. (P.L. 83-566)* *- Wetlands Reserve Program (Farm Bill 1996, 2002)* - US Fish & Wildlife *- N. Amer. Waterfowl Mgmt. Plan (16 USC 4401-4412)* *- Partners for Fish & Wildlife Prog. (35 USC 16)*	**1-5 years**

Table 7-12: Engineered Vegetated Treatment Systems (VTS)

Objective	Measure of Success	Resources Needed	Responsible Entity	Time Frame
Explore applications for use of vegetated treatment systems	i. Increased use and decreased cost of vegetated treatment systems	- Funding - Educational Assistance - Policy Changes for Select Systems	- IDEM *- Clean Water Act, Sec 319 (33 USC 26)* - IDNR *- Clean Water Indiana Program (IC 14-32-8)* *- Lake and River Enhancement Program (IC 14-32-7)* - Ind. State Board of Health - USDA *- Soil Cons. & Domestic Allotment Act (16 USC 590)* *- Wetlands Reserve Program (Farm Bill 1996, 2002)*	**5 -15 years**

Appendix A: List of Acronyms

ACOE	U.S. Army Corps of Engineers
AOC	Area of Concern
AOPA	Administrative Orders and Procedures Act
APC	Area of Particular Concern
BMP	Best Management Practices
CAA	Clean Air Act
CDF	Confined Disposal Facility
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CFR	Code of Federal Regulations
CNPCP	Coastal Nonpoint Pollution Control Program (6217)
CWA	Clean Water Act
CZARA	Coastal Zone Act Reauthorization Amendments of 1990
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DEIS	Draft Environmental Impact Statement
DNR	Indiana Department of Natural Resources
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHA	Federal Highway Administration
FWS	U.S. Fish and Wildlife Service
GIS	Geographic Information System
GLWQA	Great Lakes Water Quality Agreement
IAC	Indiana Administrative Code
IC	Indiana Code
IDEM	Indiana Department of Environmental Management
INDOT	Indiana Department of Transportation
IEPA	the Indiana Environmental Policy Act, IC 13-12-3 and IC 13-12-4
IREDB	Indiana Recycling and Energy Development Board
ISDH	Indiana State Department of Health
IURC	Indiana Utility Regulatory Commission
LMCP	Indiana Lake Michigan Coastal Program
ISTEA	Intermodal Surface Transportation and Efficiency Act
IGLD	International Great Lakes Datum
IJC	International Joint Commission
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NIRPC	Northwestern Indiana Regional Planning Commission
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint source pollution
NRCS	Natural Resources Conservation Service
OCRM	Office of Ocean and Coastal Resource Management
OHW	Ordinary high water mark

P/DEIS	Indiana Lake Michigan Coastal Program and Draft Environmental Impact Statement
P/FEIS	Indiana Lake Michigan Coastal Program and Final Environmental Impact Statement
RAP	Remedial Action Plan
RCRA	Resources Conservation and Recovery Act
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SDWA	Safe Drinking Water Act
SEMA	State Emergency Management Agency
SHPO	State Historic Preservation Officer
SWCD	Soil and Water Conservation District
USC	United States Code
USDA	U.S. Department of Agriculture
UST	Underground storage tank
WHPA	Well Head Protection Act

Appendix B
Program Descriptions

1. The following list of the practices was cited throughout the plan to implement the various management measures.

- **Conservation Cropping Sequence (328):** An adapted sequence of crops designed to provide adequate organic matter to maintain or improve soil tilth.
- **Conservation Tillage (329):** Any tillage and/or planting system that maintains at least 30 percent of the soil surface covered by crop residue after planting.
- **Crop Residue Use (344):** Using crop residues to protect cultivated fields during critical erosion periods.
- **Critical Area Planting (342):** Planting vegetation such as grasses or legumes on highly erodible or critically eroding areas.
- **Cover Crops (340):** A crop growing grasses, legumes or small grain grown for seasonal (winter) protection and soil improvement within a row crop rotation.
- **Filter Strip (393):** A strip or area of perennial vegetation established adjacent to streams and other watercourses for removing sediment and other pollutants from runoff.
- **Field Border (386):** A strip of perennial vegetation established at the edge of a field to remove sediment and other pollutants.
- **Grassed Waterway (412):** A constructed channel following the natural water flow from fields that is shaped and graded to required dimensions and established to suitable perennial vegetation for stable conveyance of runoff while preventing increased gully erosion.
- **Diversion (362):** A channel constructed across the slope with a supporting ridge on the lower side to route runoff to desired area.
- **Water and Sediment Control Basin (638):** An earthen embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water retention basin.
- **Sediment Basin (350):** Basin constructed to collect and store sediment and attached pollutants.
- **Grade Stabilization Structures (410):** A structure used to control the grade and head cutting in natural or artificial channels.
- **Roof runoff management (558):** A facility for controlling and disposing of runoff water from roofs.
- **Waste storage pond (425):** An impoundment made by excavation or earth fill for temporary storage of animal or other agricultural wastes.
- **Dikes (356):** An embankment constructed of earth or other suitable materials to protect land against overflow or to regulate water.
- **Waste storage structure (313):** A fabricated structure for temporary storage of animal wastes or other organic agricultural wastes.
- **Waste treatment lagoon (359):** An impoundment made by excavation or earth fill for biological treatment of animal or other agricultural wastes.
- **Waste utilization (633):** Using agricultural wastes or other wastes on land in an environmentally acceptable manner while maintaining or improving soil and plant resources.
- **Nutrient Management (590):** Managing the amount, source, placement, form and timing of the application of nutrients and soil amendments.
- **Composting facility (317):** A facility for the biological stabilization of waste organic material.
- **Nutrient Management (590):** Managing the amount, source, placement, form, and timing of the application of nutrients and soil amendments. The following practices support the development of implementation of a nutrient management plan.
    1. Use of detailed soil survey information to determine soil productivity, water-holding capacity, and other survey information to identify environmentally sensitive areas.
    2. Soil testing for PH, phosphorus and potassium.
    3. Use of producer documented yield information over the last 3-5 years and other relevant information to determine realistic yield expectations along with current soil test results. Then utilizing the Tri-State

Fertility Guide prepared jointly by Purdue, Ohio State and Illinois Universities to determine appropriate fertilizer application rates based on realistic yield goals and soil test information.

4. Plant tissue testing to determine nitrogen application for growing crops.
5. Manure, sludge and compost testing.
6. Use of proper timing, formulations and application methods for nutrients that maximize plant utilization of nutrients and minimize off-site loss. These application methods include split applications, banding, incorporation and injection. Other important management practices include the use of nitrification inhibitors and slow release formulations.
7. Recordkeeping that documents application location, amount, time, method and formulation for reference and to build field history for use in evaluation and future application decisions.
8. Use of any and or all of the conservation practices listed under the erosion and sediment control section B. 1. (c) Including but not limited to conservation tillage, cover crops, filter strips and other conservation buffers.

- **Integrated Crop Management System (Pest Management (595)** the use of pesticides in an economically and environmentally sound manner.

  The following practices support the implementation of an Integrated Pest Management System (595):

  1. Inventory current and historical pest problems, cropping rotation and along with past and current use of pesticides for each field.
  2. Evaluate the soil and physical characteristics of the target field (s) as well as the site for mixing, loading and storage for the potential of leaching and/or runoff of pesticides.
  3. Use Integrated Pest Management (IPM) strategies to minimize the amount and types of pesticides applied.
  4. When pesticide applications are necessary and a choice of pesticides exists, consider the persistence, toxicity, and the runoff / leaching potential of products along with other factors, including current label requirements, in making selections.
  5. Maintain detailed record of application of all pesticides applied, especially restricted use pesticides including product name, amount applied, date and time, field location (as well as location within fields if application doesn't include whole field), weather conditions and product registration number. Maintain this record for at least two years for each application.
  6. Use scouting and IPM principles determine when lower rates than those called for by label may be used to control the pest problem.
  7. Use of an Independent Certified Crop Advisor to conduct scouting and field evaluations of the economic thresholds for various pests before application decisions are made.
  8. Recalibrate spray equipment each spray season and use anti-backflow devices on hoses used for tank mixing and filling.
  9. Use of any and or all of the conservation practices listed under the erosion and sediment control section B. 1. (c) Including but not limited to conservation tillage, cover crops, filter strips and other conservation buffers.

- **Deferred grazing (352):** Postponing grazing or resting grazing land for prescribed period.
- **Planned grazing system (556):** A practice in which two or more grazing units are alternately rested and grazed in a planned sequence for a period of years, and rest periods may be throughout the year or during the growing season of key plants.
- **Prescribed grazing (528A):** The controlled harvest of vegetation with grazing or browsing animals, managed with the intent to achieve a specific objective.
- **Pasture and hay planting (512):** Establishing and re-establishing long term stands of adapted species of perennial and biennial or reseeding forage plants.
- **Pasture and hayland management (510):** Proper treatment and use of pasture or hayland.
- **Pasture and hayland planting (512):** Establishing and reestablishing long-term stands of adapted species of perennial, biannual, or reseeding forage plants. (Includes pasture and hayland renovation. Does not include grassed waterways or outlets or cropland.)

- **Brush (and weed) management (314):** Managing and manipulating stands of brush (and weeds) on range, pasture, and recreation and wildlife areas by mechanical, chemical, or biological means or by prescribed burning. (Includes reducing excess brush (and weeds) to restore natural plant community balance and manipulating stands of undesirable plants through selective and patterned treatments to meet specific needs of the land and objectives of the land user.)

Alternate Water Supply Practices:

Providing water and salt supplement facilities away from streams will help keep livestock away from streambanks and riparian zones. The establishment of alternate water supplies for livestock is an essential component of this measure when problems related to the distribution of livestock occur in a grazing unit. Descriptions of alternative water supply practices are provided below:

- **Pipeline (516):** Pipeline installed for conveying water for livestock or for recreation.
- **Pond (378):** A water impoundment made by constructing a dam or an embankment or by excavation of a pit.
- **Trough or tank (614):** A trough or tank, with needed devices for water control and wastewater disposal, installed to provide drinking water for livestock.
- **Well (642*):*** A well constructed or improved to provide water for irrigation, livestock, wildlife, or recreation.
- **Spring development (574):** Improving springs and seeps by excavating, cleaning, capping, or providing collection and storage facilities.

Livestock Access Limitation Practices:

It may be necessary to minimize livestock access to streambanks, ponds or lakeshores, and riparian zones to protect these areas from physical disturbance. Practices to accomplish this include:

- **Fencing *(*382):** Enclosing or dividing an area of land with a suitable permanent structure that acts as a barrier to livestock, big game, or people (does not include temporary fences).
- **Livestock exclusion (472):** Excluding livestock from an area not intended for grazing.
  - **Stream crossing (interim):** A stabilized area to provide access across a stream for livestock and farm machinery.
  - **Critical area planting (342):** Planting vegetation, such as trees, shrubs, vines, grasses, or legumes, on highly erodible or critically eroding areas. (Does not include tree planting mainly for wood products.)

Irrigation water management (449): Determining and controlling the rate, amount, and timing of irrigation water in a planned and efficient manner. Proper irrigation scheduling is a key element in irrigation water management. Irrigation scheduling should be based on knowing the daily water use of the crop, the water-holding capacity of the soil, and the lower limit of soil moisture for each crop and soil, and measuring the amount of water applied to the field. Also, natural precipitation should be considered and adjustments made in the scheduled irrigations. The key practices that may be used to accomplish proper irrigation scheduling is:

Water-measuring device: An irrigation water meter, flume, weir, or other water-measuring device installed in a pipeline or ditch.

Soil and crop water use data: From soils information the available water-holding capacity of the soil can be determined along with the amount of water that the plant can extract from the soil before additional irrigation is needed**.**

2. A complete list of the programs practices that were cited in the plan for use to implement the agricultural management measures are listed below along with a brief description of each.

- **Conservation Compliance** requires owners and operators of highly erodible cropland who voluntarily participate in USDA's commodity support program to develop and implement a conservation plan to reduce soil erosion on all highly erodible cropland under their control in order to receive support payments.

- **Swampbuster Compliance** requires owners and operators who voluntarily participate in USDA's commodity support program to protect existing wetlands on land under their control.

- **Sodbuster Compliance** requires owners and operators who voluntarily participate in USDA's commodity support program to develop and implement a site-specific conservation plan to reduce soil erosion on any grassland brought into cropland production.

- **Wetland Reserve Program (WRP)** is an incentive program available to landowners who voluntarily restore wetlands on eligible cropland. The program provides an incentive payment based on either a 30-year or permanent easement on acres eligible for wetland restoration. It also provides cost sharing from 75 to 100 percent of the cost of restoring the wetland(s).

- **Environmental Quality Incentives Program (EQIP)** provides educational and technical assistance, cost-sharing and/or incentive payments to landowners and operators who enter into 3 to 10 year contractual agreements with USDA to implement conservation practices on land under their control to address specific priority resource concerns. In Indiana those priority resource concerns include cropland soil erosion and water quality, livestock manure management, nutrient management and grazing land management.

- **Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Program (CREP)** provide land rental payments, incentive payments and cost-sharing assistance to landowners who voluntarily enter 10 to 15 year contractual agreements with USDA to enroll eligible cropland and protect it by establishing grass, trees, shrubs or other eligible long-term land cover.

- **Grazing Land Initiative (GLI)** provides educational and technical assistance to landusers on grazing land management.

- **Grass Land Reserve Program (GRP)** provides cost sharing assistance as well as a cash rental payment for restoring and protecting grassland for a contracted period of time (10-15 years) or an easement payment for signing either a 30 year or permanent easement that restricts the future use to grassland.

- **Conservation Operations (CO)** provides NRCS technical assistance to landowners and operators for conservation planning and technical assistance to survey, design and install conservation practices.

- **Watershed Protection and Flood Prevention Act (PL 566)** provides technical and financial assistance to local organizations for implementing watershed protection and flood prevention. The program may address any or all of the following resource issues; erosion and sediment control, flood control, water supply, water quality, fish and wildlife habitat enhancement, wetland creation and restoration, and public recreation projects on a watershed basis.
    - ***The Clean Water Indiana Program (CWI)*** *administered by the IDNR Division of Soil Conservation subject to the State Soil Conservation Board approval, provides educational, technical, and cost share assistance to land occupiers and conservation groups interested in implementing conservation practices to reduce non point sources of water pollution.*

    - ***The Lake and River Enhancement Program (LARE)*** *administered by IDNR Division of Soil Conservation includes an upland watershed land treatment component that provides grants to conservation districts to be used to provide incentives and cost-sharing to landusers for applying conservation practices and management techniques to help control erosion and resulting sediment from entering streams in specifically identified watershed that are being impacted by sediment and related Nonpoint pollutants.*

Appendix C
Program and Policies and applicable Management Measures Addressed

Table C-1: Agriculture Practices and Programs

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
1996 & 2002 Farm Bills	Conservation Provisions	Environmental Quality Incentive Program (EQIP)	Voluntary with financial incentives and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a. Grazing Management; 5a. Irrigation Water Management; 6a.
1985, 1996 and 2002 Farm Bills	Conservation Provisions	Conservation Reserve Program (competitive bids and continuous sign-up)	Voluntary with financial incentives and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks and annual reporting of acreage	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a. Grazing Management; 5a. Irrigation Water Management; 6a.
1985, 1996 and 2002 Farm Bills	Conservation Provisions	Conservation Compliance	Voluntary with disincentives for non-compliance	USDA-Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA)	Cross compliance between participation in commodity programs and requirements of conservation compliance	Spot checks, Annual compliance agreement in order to participate	Erosion from Cropland; 1a.

Table C-2 – Agriculture Practices and Programs

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
1985, 1996 and 2002 Farm Bills	Conservation Provisions	Sodbuster Compliance	Voluntary with disincentives for non-compliance	USDA-Natural Resources Conservation (NRCS)	Sodbuster compliance required for participation in commodity programs		Erosion from Cropland; 1a.
Public Law 566	Watershed Protection	Small Watershed Program	Voluntary with financial incentives and cost-sharing	USDA-Natural Resources Conservation Service	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a.
1996 and 2002 Farm Bills	Conservation Provisions	Wetland Reserve Program	Voluntary with financial incentives, technical assistance and cost-sharing	Voluntary with financial incentives and cost-sharing	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks and follow-up on citizen complaints of potential violation of agreement	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a.
Soil Conservation Act of 1935	Conservation Operations	Technical Assistance	Provides conservation planning, surveying and engineering for conservation practices at no charge to the landowner or operator	USDA-Natural Resources Conservation Service	N/A	N/A	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a. Grazing Management; 5a. Irrigation Water Management; 6a.

Table C-3 – Agriculture Practices and Programs

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
Indiana Code 14-32	Soil and Water Conservation, IC-14-32-8	Clean Water Indiana Program	Voluntary with financial assistance grants to implement conservation practices utilizing education, Technical assistance, training and cost sharing programs	IDNR-Division of Soil Conservation through grants to local Soil and Water Conservation Districts	Contractual Agreements	Annual reporting of expenditures and progress in fulfilling contractual agreement	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a. Grazing Management; 5a. Irrigation Water Management; 6a.
Indiana Code 14-32	Soil and Water Conservation, IC-14-32-7-12	Lake and River Enhancement Program (LARE) Upland Watershed Land Treatment Program	Voluntary with financial assistance grants to implement conservation practices utilizing education, Technical assistance, training and cost sharing programs	IDNR-Division of Soil Conservation through grants to local Soil and Water Conservation Districts	Contractual Agreements	Annual reporting of expenditures and progress in fulfilling contractual agreement	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a. Grazing Management; 5a. Irrigation Water Management; 6a.
Indiana Code IC 14-32	Soil and Water Conservation	Soil and Water Quality Education	Voluntary, Educational assistance to SWCD's programs and landusers	DNR-Division of Soil Conservation and Agronomy Dept-Purdue University	N/A	Reporting through SAM (System for Accountability and Management	Erosion from Cropland; 1a. Application of Nutrients to Cropland; 3a.

Table C-4 – Agriculture Practices and Programs

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
Federal Clean Water Act	Section 319	Water Quality Improvement Demonstration Grants	Voluntary with financial assistance grants to implement best management practices to reduce Nonpoint source pollution utilizing education, Technical assistance and cost sharing programs	US Environmental Protection Service (EPA) and Indiana Dept. of Environmental Management (IDEM)	Contractual Agreements	Quarterly reporting of expenditures and progress in fulfilling contractual agreements	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a. Grazing Management; 5a. Irrigation Water Management; 6a.
Fish and Wildlife Act of 1956	Fish and Wildlife Coordination Act	Partners for Fish and Wildlife and US Fish and Wildlife Private Lands Restoration Program	Technical assistance and cost sharing programs	US Fish and Wildlife Service	Contractual Agreements	Spot checks	Erosion from Cropland; 1a. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a.
Indiana Code IC 13-18-	IC 13-18 Sections 4-5	State Water Quality Standards	Regulatory	State Water Pollution Control Board and Indiana Dept. of Environmental Management (IDEM)	Fines and civil penalties	Water Quality Monitoring and Citizen Complaints	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a. Grazing Management; 5a. Irrigation Water Management; 6a.
1996 Farm Bill	Conservation Provisions	Grazing Lands Conservation Initiative	Voluntary, Educational and technical assistance	USDA- Natural Resources Conservation Service (NRCS)	N/A	Follow-up with clients	Confined Animal Facilities; 2a, 2b. Grazing Management; 5a.

Table C-5 – Agriculture Practices and Programs

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
327 IAC 5-4-3	Indiana Administrative Code -Rule 3	Concentrated Animal Feeding Operations	Regulatory	Indiana Pollution Control Board and Indiana Dept. of Environmental Management (IDEM)	Compliance requirements in order to obtain and retain an Operating Permit. Also citations and fines	Water quality monitoring and follow-up on citizen complaints	Confined Animal Facilities; 2a, 2b.
		Integrated Crop Management	Voluntary, Educational and technical assistance	Purdue University Cooperative Extension Service (CES)	N/A	Follow-up with clients	Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a.
Safe Drinking Water Act	Section 1453	Source Water Protection	Regulatory	US Environmental Protection Agency (EPA) and Indiana Dept. of Environmental Protection (IDEM) in cooperation with local jurisdictions	Citations, fines and civil penalties	Water quality monitoring and follow-up on citizen complaints	Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a.
1985,1996 and 2002 Farm Bills	Conservation provisions	Swampbuster Compliance Program	Voluntary with disincentives for non-compliance	USDA-Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA)	Swampbuster compliance required for participation in commodity programs	Spot checks, Annual compliance agreement in order to participate in commodity programs	Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a.
		Farm “A” Syst Program	Voluntary, Educational and technical assistance on proper pesticide storage	Purdue University Cooperative Extension Service (CES)	N/A	Follow-up with clients, feedback surveys	Application of Pesticides to Cropland; 4a.

Table C-6 – Agriculture Practices and Programs

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
Indiana Code IC 15-3-3 and Indiana Administrative Code 4-1	IC 15-3 Sections 4-6	Indiana Pesticide Application Certification Program	Regulatory, Educational and technical training	Indiana State Chemists Office and Purdue University	Required training to obtain and retain license to apply restricted use pesticides Citations and fines, revoking of license	Feedback surveys on training, tracking of the number of violations of pesticide application laws	Application of Pesticides to Cropland; 4a.
2002 Farm Bill	Conservation Provisions	Grasslands Reserve Program	Voluntary with financial incentives, technical assistance and cost-sharing	USDA- Natural Resources Conservation Service (NRCS)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks and follow-up on citizen complaints of potential violations	Confined Animal Facilities; 2a, 2b. Grazing Management; 5a
		Great Lakes Grazing Council and Indiana Forage Council	Voluntary, Educational and technical assistance	Purdue University Cooperative Extension Service (CES) and USDA Natural Resources Conservation Service (NRCS)	N/A	Follow-up with clients, feedback surveys	Confined Animal Facilities; 2a, 2b. Grazing Management; 5a
Indiana Code IC 14-25	Surface and groundwater protection	Use of surface and groundwater for irrigation	Regulatory, Educational and technical training	Water Pollution Control Board, Indiana Dept. of Environmental Management (IDEM) and DNR-Division of Water	Citations, fines and civil penalties	Water quality monitoring and follow-up on citizen complaints of potential violations	Irrigation Water Management; 6a.

Table C-7 – Agriculture Practices and Programs

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
Federal Clean Water Act	Section 303(d)	Total Maximum Daily Load (TMDL)	Regulatory	Indiana Dept. of Environmental Management (IDEM)	Citations, fines and civil penalties for violations of state water quality standards	Water quality monitoring and follow-up on citizen complaints of potential violations	Erosion from Cropland; 1a. Confined Animal Facilities; 2a, 2b. Application of Nutrients to Cropland; 3a. Application of Pesticides to Cropland; 4a. Grazing Management; 5a. Irrigation Water Management; 6a.

Urban Management Measures

Table C-8: Urban Programs and Practices

Program	Legislation	Program Authority	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
NPDES	Clean Water Act IC 13-14-8-7	327 IAC 15-5	Regulatory	IDEM Assisted by SWCDs/DNR-DSC	Civil Penalties	Plan Review, Inspection	Urban Runoff; C1 Construction Activities: D1. D2. Roads, Highways, & Bridges; H3. H4.
NPDES	Clean Water Act IC 13-14-8-7	327 IAC 15-6	Regulatory	IDEM	Civil Penalties	Plan Implementation and Program Review	Existing Development; E1.
NPDES	Clean Water Act IC 13-14-8-7	327 IAC 15-13	Regulatory	IDEM and Local MS4s Assisted by SWCDs/DNR-DSC	Civil Penalties	Plan Review, Inspection, Program Assessment	Urban Runoff; C1. C2., C3. Construction Activities: D1. D2 Existing Development E1 Roads, Highways, & Bridges; H1. H2., H3., H4., H5., H6
401 Water Quality Certification	Clean Water Act, Section 401 IC 13-14-8-7	327 IAC 2-1	Regulatory	IDEM	Civil Penalties	Permit Application, Review, Conditions, and Inspection	Urban Runoff; C2. C3.

Table C-9: Urban Programs and Practices

Program	Legislation	Program Authority	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
Material Handling and Storage	IC 13-14-8-7	327 IAC 2-6	Regulatory	IDEM	Civil Penalties	Inspection	Construction Activities; D2. Roads, Highways, & Bridges; H4. H5.
Solid and Hazardous Waste	IC 13 - 19 IC 13 - 20	329 IAC 10-32	Regulatory	IDEM	Civil Penalties	Inspection	Construction Activities; D2. Roads, Highways, & Bridges; H4. H5.
Solid Waste Management Districts	IC 13-21	IC 13-21-3	Regulatory	IDEM	Civil Penalties	Inspection and Program Evaluation	Pollution Prevention; G1.
Acts * Lakes Permit * Lowering of 10 Acre Lakes * Flood Control	IC 14-26 IC 14-26 IC 14-29	312 IAC 6, 10, and 11	Regulatory	IDNR	Civil Penalties	Permit Application, Review, Conditions, and Inspection	Urban Runoff; C2. C3. Roads, Highways, & Bridges; H1, H2
Residential and Commercial On-Site Sewage Disposal	IC 16-19-3	410 IAC 6-8.1 and 410 IAC 6-10	Regulatory	Indiana State Department of Health	Civil Penalties	Permits and inspection	On-Site Sewage Disposal Systems; F1. F2.
Office of Pollution Prevention and Technical Assistance	IC 13-27-2-6	Not Applicable	Voluntary	IDEM			Pollution Prevention; G1.

Table C-10: Urban Programs and Practices

Program	Legislation	Program Authority	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
Watershed Management, Grants (i.e. 319 etc.)	Clean Water Act	Not Applicable	Voluntary	IDEM	Contractual Agreements	Program Assessment and Reporting	Urban Runoff; C2. C3. Existing Development; E1. On-Site Sewage Disposal; F1. F2. Pollution Prevention; G1 Roads, Highways, & Bridges; H1. H6.
SWCD Programs	IC 14-32	IC 14-32-4 and 5	Voluntary	SWCDs	Not Applicable	Not Applicable	Urban Runoff; C2. C3. Construction Activities; D1. Roads, Highways, & Bridges; H3.
Lake & River Enhancement (LARE)	IC 14-32	IC 14-32-7-12	Voluntary	DNR-DSC	Contractual Agreements	Watershed Assessment to Document Water Quality Improvements	Urban Runoff; C2. C3. Pollution Prevention; G1.
Clean Water Indiana	IC 14-32	IC 14-32-8	Voluntary	DNR-DSC, Soil Conservation Board	Contractual Agreements	Program Assessment and Reporting	Urban Runoff; C2. C3. Pollution Prevention; G1.
Erosion & Sediment Control Training Course	Not Applicable	Not Applicable	Voluntary	DNR-DSC	Not Applicable	Not Applicable	Construction Activities; D1. Roads, Highways, & Bridges; H3.

Table C-11: Urban Programs and Practices

Program	Legislation	Program Authority	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
Hoosier Riverwatch	Not Applicable	Not Applicable	Voluntary	DNR-DSC, Purdue CES	Not Applicable	Track Program Implementation	Urban Runoff; C2. Pollution Prevention; G1
Indiana Stormwater Quality Manual	Not Applicable	Not Applicable	Voluntary	DNR-DSC	Not Applicable	Manual Update	Urban Runoff; C1. C2. C3. Construction Activities; D1. D2. Existing Development; E1 Roads, Highways, & Bridges; H1. H2. H3., H4., H5., H6.
Local Technical Assistance Program (LTAP)	Not Applicable	Not Applicable	Voluntary	Not Applicable	Not Applicable	Not Applicable	Urban Runoff; C1. C2. C3. Construction Activities; D1. D2 Roads, Highways, & Bridges; H1. H2. H3., H4., H5., H6.

Table C-12: Urban Programs and Practices

Program	Legislation	Program Authority	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	Applicable Management Measures
Planning w/ POWER	Not Applicable	Not Applicable	Voluntary	Purdue, CES	Not Applicable	Not Applicable	Urban Runoff; C1. C2. C3. Existing Development; E1. On-Site Sewage Disposal Systems; F1. F2. Roads, Highways, & Bridges; H1. H2.
Project WET	Not Applicable	Not Applicable	Voluntary	DNR-DSC, Purdue CES	Not Applicable	Track Program Implementation	Urban Runoff; C2. Pollution Prevention; G1

Table C-13: Marina Practices and Programs

Program	Program Description	Legislation	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measure
Archaeological Resources Preservation Act	Archaeological Resources on Public Lands require Permits for excavation or removal	IC 14-21-1-24 through 29	Regulatory	IDNR	Permits Fines Imprisonment	IDNR inspections Public awareness	Used in the locating and placement of a new or expanding marina.
Endangered Species Act	Endangered Species Act	7 USC 136 16 USC 460	Regulatory	IDNR, USFWS, NOAA	Permits Fines Imprisonment	IDNR determination	Used in the locating and placement of a new or expanding marina.
Fish and Wildlife Conservation Act	Fish and wildlife impacts considered on Projects >10 acres	16 USC 2901-2911	Regulatory	IDNR, USFWS, NOAA	Financial incentives to promote wildlife preservation	IDNR determination	Used in the locating and placement of a new or expanding marina.
Rivers and Harbors Act of 1899	Channel dredging and engineering	33 USC 403	Regulatory	ACOE	Permits	ACOE Determination	Used in the locating and placement of a new or expanding marina.
Navigable Waterways Permit Program	Construction of structures, removal of structures, in public waterways	IC 14-29-1 IC 14-29-4 312 IAC 6	Regulatory	IDNR, DOW	Permits Citations Fines	IDNR Determination	Whether the activity would unreasonably impair the navigability of the waterway; cause significant harm to the environment; pose hazard to life or property. Impact the activity will have on others is considered also.
Section 401 Water Quality Certification Prog. Section 404 of the Clean Water Act	Placement of fill or removal of dredged material require permits	33 USC 1341 IC 13-18-4-5 IC 13-13-5-1 327 IAC 2-1.5-5-4	Regulatory	IDEM, OWQ	Certification Citation Fines	IDEM Determination	Activities are reviewed for consistency with State Water Quality Standards.

Table C-14: Marina Practices and Programs

Program	Program Description	Legislation	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measure
Clean Water Act Rivers and Harbor Act 401 Water Quality Certification Construction in Floodway or Navigable waters permits.	Various IDNR/IDEM waterway permits	IC 14-28-1-22 IC 14-29-1-8	Regulatory	IDNR, DOW IDEM, OWQ	Permit/fines	IDEM or IDNR Determination	Dredging in a navigable waterway needs a permit. The discharge of dredged material is a permitted activity also.
Natural Resource Commission rule	Graywater defined disposal	312 IAC 5-2-16 IC 14-10-2-4 IC 14-11-2-1 IC 14-15-7-3	Regulatory	IDNR	Citation/fines	IDNR Determination	The discharge of graywater and other wastes from a watercraft that is located upon public water.
Natural Resource Commission rule	Marine Sanitation Device Defined Use of Sanitation Device	312 IAC 5-2-20 IC 14-10-2-4 IC 14-11-2-1 IC 14-15-7-3 312 IAC 5-2-20	Regulatory	IDNR IDEM	Citations/fines	IDNR Determination	Sewage disposal from a watercraft
Natural Resource Commission rule	Waste Disposal from a Watercraft	312 IAC 5-5-1 IC 14-10-2-4 IC 14-11-2-1 IC 14-15-2-8 IC 14-15-7-3 33CFR 159 40CFR 140	Regulatory	IDNR	Citations/fines	IDNR Determination	The disposal of sewage, graywater, & other wastes from watercraft located on public waters
Natural Resource Commission rule	Litter and other waste disposal from a watercraft	312 IAC 5-5-3 IC 14-10-2-4 IC 14-11-2-1 IC 14-15-7-3 40 CFR 1700	Regulatory	IDNR	Citation/fines	IDNR Determination	The disposal of other wastes from a watercraft
Natural Resource Commission rule	Marinas	IAC 6-4-1 IC 14-10-2-4 IC 14-15-7-3 IC 14-29-1-8 IC 14-29-1	Regulatory	IDNR, DOW IDNR, DOE	License/citation/fines	IDNR Application and follow up	Placement/Maintenance/Licensing of Marinas. Sewage pumpout facilities for watercraft

Table C-15: Marina Practices and Programs

Program	Program Description	Legislation	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measure
IDNR, DOW Administrative Rule regarding sanitary device disposal facilities	Marina Pumpouts	IC 14-15-2-7 410 IAC 6-10 327 IAC 3-2 327 IAC 5 312 IAC 6-2-6 312 IAC 6-4-3	Regulatory	IDNR, DOW ISBH	Permit	Application and follow-up	Requires marinas to have an approved wastewater treatment facility or on site disposal system. Prerequisite for construction permit programs when new marina construction is involved.
U.S. Fish and Wildlife Service grant funds	Clean Vessel Pumpout Program	Clean Vessel Act 33 U.S.C. 1322 16 U.S.C. 777	Voluntary	IDEM, OWQ	Agreement	Application for funds and follow-up with grantees	Voluntary program for marinas to obtain grant funding for installation & restoration of sewage pumpout facilities. 75% of funds provided.
General Authority over Water Quality Impairment.	Boat Hull Cleaning	IC 13-18-3-1 IC 13-18-4-5	Regulatory	Water Pollution Control Board	Rules	Follow up of complaints or reporting	IDEM has broad-based authority over impairments to water quality, regardless of the nature of the source.
IDEM has authority over discharges if contaminants into air, land, or water.	Fuel Spills	IC 13-14-10-3 IC 13-25-2-6 IC 13-25-4-1 327 IAC 2-6.1 327 IAC 2-10 327 IAC 3-18 327 IAC 3-49-7 327 IAC 9-4-4 329 IAC 9 Clean Water Act	Regulatory	IDEM, OER	Citations/fines	Follow up of complaints or reporting	Assistance in emergency situations caused by a discharge or threat of discharge of any contaminants into the air, land, or waters of Indiana.
IDEM	Fuel spills, Voluntary Cleanup of	IC 13-25-5 Voluntary Remediation Program Resource Guide Oct. 1995	Voluntary	IDEM, OER	Agreement	Avoids prosecution for fuel spills.	Provides for voluntary cleanup of contaminated property and no IDEM enforcement action will be exercised

Table C-16: Marina Practices and Programs

Program	Program Description	Legislation	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measure
CERCLA and the Clean Water Act	Natural Resource Damage Assessment (Land, fish, wildlife, air, water, groundwater, drinking water supplies, and other natural resources)	42 USC 9602 et seq. 33 USC 2701 et seq. 33 USC 1251 et seq. Public Trust Doctrine	Regulatory	IDEM IDNR	Citations Fines	Follow up of complaints or reporting	For Natural Resource Damage Assessment: The Dept. of Interior has issued regulations for conducting damage assessments following the discharge of oil or the release of hazardous substances
Water Pollution Control Board	Great Lakes Initiative	Great Lakes Water Quality Guidance	Regulatory	Water Pollution Control Board	Citations Fines	Follow up of complaints or reporting	Criteria for 29 pollutants to protect aquatic life, human health, & wildlife. Methodologies to develop criteria for other pollutants. Policy of the State is that the discharge of toxic substances in toxic amounts is prohibited.
Regulated underground storage tanks meet the EPA's requirements for leak detection spill, and overflow prevention and corrosion protection, and insure that tanks not meeting the requirements are closed or upgraded. Program also provides for education.	Underground Storage Tank Program	IC 13-11 IC 13-23 329 IAC 9 UST Notification, Reporting, and Closure Requirements UST Guidance Manual (1994)	Regulatory	IDEM	Citations Fines	Follow up of complaints or reporting	In order to prevent releases due to structural failure, corrosion, or spills, all owners & operators must meet the following requirements: 1) Tanks and piping must be installed according to code. 2) All owners & operators must demonstrate compliance.

Table C-17: Marina Practices and Programs

Program	Program Description	Legislation	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measure
Provides for investigation, assessment & remediation at any site where emergency conditions are present & sites with prioritized human health & environmental risk. Also assists in order to encourage voluntary clean up of tank system releases.	Leaking Underground Storage Program	IC 13-11 IC 13-23 310 IAC 16 329 IAC 9	Regulatory	IDEM	Citations Fines	Follow up of complaints or reporting	After a release from a UST system, the following initial response actions must be followed: 1) report the release to the agency; 2) take action to prevent further release; 3) identify and mitigate fire, explosion, and vapor hazards.
DNR regulates the disposal of waste near a lake or within a floodway.	Waste Disposal	IC 14-28-1-27 IC 14-28-1-36	Regulatory	IDNR, DLE	Citations Fines	Follow up of complaints or reporting	Disposing of contaminants or waste within 15 feet of a lake or in a floodway is prohibited.
Control the placement of wharves, piers, breakwaters, jetties, and similar structures.	Construction in Navigable Waters	Clean Water Act Navigable Waterways Act IC 14-29-1-8 IC 14-26-2	Regulatory	IDNR ACOE IDEM	Permit	Implementing Agency Investigation	Issuance of a permit for construction in the water. Project is evaluated for how the project would impact the "public trust doctrine" and all parties involved.
Structure erection or placing fill in the floodway	Flood Control Structures	Flood Control Act	Regulatory	IDNR, DOW	Permit	Implementing Agency Investigation	A permit is required prior to placing fill or erecting a structure in a floodway.
Regulation of new development in identified flood plains with communities.	Regulating the Construction Activities Within the Floodplain.	Floodplain Management Act	Regulatory	IDNR, DOW	Permit	Implementing Agency Investigation	A permit is required for construction within a flood plain

Table C-18: Marina Practices and Programs

Program	Program Description	Legislation	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Reduce pollutants, as a result of soil erosion in stormwater discharges into surface waters where construction disturbance occurs.	Regulate storm water runoff during construction activity	Rule 5 327 IAC 15-5	Regulatory	IDNR IDEM Local SWCD	Permit	Implementing Agency Investigation & Follow up of complaints or reporting	A plan to show what BMPs is to be used to reduce the runoff from the construction site.
Control of used oil	Improper disposal of used oil	IC 13-30-2-1 329 IAC 13 40 CFR 279	Regulatory	IDNR	Criminal proceedings	Follow up of complaints or reporting	Recycling of used oil Prevention of applying used oil to the ground
Control of waste from the catching, curing, cleaning, or shipping of fish	Fish Waste Disposal	IC 14-22-9-6	Regulatory	IDNR	Fines	Follow up of complaints or reporting	All offal or filth of any kind accruing from the catching, curing, cleaning, or shipping of fish in or near the water of Lake Michigan shall be burned, buried, or otherwise disposed of in a sanitary manner that does not pollute the water and is not or does not become detrimental to public health or comfort

Table C-19: Marina Practices and Programs

Program	Program Description	Legislation	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Regulation of certain open or tiled channels if a person wants to connect a private drain with a regulated drain.	Regulation of certain open or tiled drains	IC 36-9-27	Regulatory	County Surveyor	Fines	Implementing Agency Investigation	Can be done if determined that no pollution will result and that the regulated drain can handle the additional flow of water
Regulation of chemical treatment of aquatic plants	Chemical treatment of aquatic plants	IC 14-22-9-10	Regulatory	IDNR	Permit, Fines	Implementing Agency Investigation	Prevents chemically treating aquatic vegetation in the public waters or boundary waters of the state without a permit.
Wetlands projects can be required to adhere to conditions that become part of the federal plan	Wetlands	404 permit 33 SC 1344 401 Water Quality Certification	Regulatory	ACOE IDEM	License Permit Fines	Implementing Agency Investigation	Wetlands projects that require a federal 404 permit from the ACOE and a 401 certification from IDEM will be required to adhere to certain conditions that become part of the federal license or permit.
Fuel and oil must be stored properly to protect against fire	Storage of Fuel and Oil	2000 International Fire Codes	Regulatory	State Fire Marshals Office	Fines	Inspections	To ensure the proper storage of fuels and oil to prevent combustion and fires

Table C-20: Marina Practices and Programs

Program	Legislation	Program Authority	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
	Clean Water Act Section 401, 404 IC 13-18-4-5 IC 13-13-5-1	327 IAC 2-1.5-5-4	Regulatory	ACOE IDEM-OWM	Permit/ Certification		Discharge of Dredge/Fill Material into Waterways
Navigable Waters Act	IC 14-29-1		Regulatory	DNR-DOW	Permit (No fee)		Approval for placing, filling, or erecting a permanent structure in; water withdrawal from; or mineral extraction from a navigable waterway or Lake Michigan
Sand and Gravel Permits	IC 14-29-3		Regulatory	DNR-DOW	Permit ($50)		Regulates removal of sand, gravel, stone, or other mineral resources from or under the bed of navigable waterways
Construction of Channels Act	IC 14-29-4		Regulatory	DNR-DOW	Permit ($100)		Regulates construction or improvement of artificial or natural watercourses for providing boat access.
Lake & River Enhancement Program	IC 14-32-7	LARE	Incentive Tech. Asst. Education	DNR-DSC			Cost & Tech. Assist. Hydromod. & Water Mgt. BMPs
Regulated Drains	IC 36-9-27		Regulatory Voluntary	County Surveyor/ County Drainage Board		Reconstruction, periodic maintenance, vacation	Removal of excess water in areas with regulated drains
Hoosier Riverwatch Program			Voluntary	DNR-DOSC Purdue CES		Periodic WQ database	Volunteer water quality monitoring program

Table C-21: Hydromodification

Program	Legislation	Program Authority	Status	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
	Rivers and Harbors Act of 1899, Section 10		Regulatory	ACOE	Permit		Rivers and Stream Channel Dredging / Engineering
	Clean Water Act Section 401, 404		Regulatory	ACOE	Permit/ Certification		Discharge of Dredge / Fill Material into Waterways
	Clean Water Act S-401 & 404		Regulatory	IDEM			Construction of a Dam in a Navigable waterway
Sec. 319, NPS Program	Clean Water Act		Regulatory	IDEM	Citation for WQ Violations	WQ Monitoring; Complaints	Water Quality Standards, TMDLs, Antidegradation
Dam Construction	Flood Control Act	IC 14-28-1 IC 14-29-1-8	Regulatory	IDEM	Citations for violations	Off site sedimentation	Erosion reduction and sediment control
Dam Construction	Dam Regulation	IC 14-27-7 IC 14-27-7.5	Regulatory	DNR Div. of Water	Citation for violations	Construction Review	Engineering Specifications Inspections and safety
Dam Construction	327 IAC 15-5	Rule 5	Regulatory	IDEM	Citation for violation	Plan and site review	Sediment Control
Fish Migration	IAC 14-22-9-9	Obstruction in Waterway	Regulatory	DNR Div. of Fish & Wildlife	Class “c’” Infraction	Site review	Installation of ‘fish ladders’ Or structures for migration
Enforcement	Litter / Contaminants	IC 14-28-1-27 Section ‘c’	Enforcement	DNR Div. of Enforcement	Citation for violation	Site review Complaint Water testing	Prohibits the depositing of contaminants, letter, solid waste, etc. in waterways

Table C-22: Hydromodification

Program Authority	Legislation	Program/ Regulation	Status	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
	Rivers and Harbors Act of 1899, Section 10		Regulatory	ACOE	Permit		Rivers and Stream Channel Dredging/ Engineering
	Clean Water Act Section 401, 404		Regulatory	ACOE	Permit/ Certification		Discharge of Dredge/ Fill Material into Waterways
	Clean Water Act S-401 & 404		Regulatory	IDEM			Construction of a Dam in a Navigable waterway
Sec. 319, NPS Program	Clean Water Act		Regulatory	IDEM	Citation for WQ Violations	WQ Monitoring; Complaints	Water Quality Standards, TMDLs, Antidegradation
Dam Construction	Flood Control Act	IC 14-28-1 IC 14-29-1-8	Regulatory	IDEM	Citations for violations	Off site sedimentation	Erosion reduction and sediment control
Dam Construction	327 IAC 15-5 327 IAC 15-13	Rule 5	Regulatory	IDEM	Citation for violation	Plan and site review	Sediment Control

Table C-23: Hydromodification

Program Authority	Legislation	Program/ Regulation	Status	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
	Clean Water Act Section 401, 404 IC 13-18-4-5 IC 13-13-5-1	327 IAC 2-1.5-5-4	Regulatory	ACOE IDEM-OWM	Permit/ Certification		Discharge of Dredge/Fill Material into Waterways
Navigable Waters Act	IC 14-29-1		Regulatory	DNR-DOW	Permit (No fee)		Approval for placing, filling, or erecting a permanent structure in; water withdrawal from; or mineral extraction from a navigable waterway or Lake Michigan
Sand and Gravel Permits	IC 14-29-3		Regulatory	DNR-DOW	Permit ($50)		Regulates removal of sand, gravel, stone, or other mineral resources from or under the bed of navigable waterways
Construction of Channels Act	IC 14-29-4		Regulatory	DNR-DOW	Permit ($100)		Regulates construction or improvement of artificial or natural watercourses for providing boat access.
Lake & River Enhancement Program	IC 14-32-7	LARE	Incentive Tech. Asst. Education	DNR-DSC			Cost & Tech. Assist. Hydromod. & Water Mgt. BMPs
Regulated Drains	IC 36-9-27		Regulatory Voluntary	County Surveyor/ County Drainage Board		Reconstruction, periodic maintenance, vacation	Removal of excess water in areas with regulated drains
Hoosier Riverwatch Program			Voluntary	DNR-DOSC Purdue CES		Periodic WQ database	Volunteer water quality monitoring program

Table C-24: Hydromodification

Program Authority	Legislation	Program/ Regulation	Status	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
	Clean Water Act Section 401, 404 IC 13-18-4-5 IC 13-13-5-1	327 IAC 2-1.5-5-4	Regulatory	ACOE IDEM-OWM	Permit/ Certification		Discharge of Dredge/Fill Material into Waterways
Navigable Waters Act	IC 14-29-1		Regulatory	DNR-DOW	Permit (No fee)		Approval for placing, filling, or erecting a permanent structure in; water withdrawal from; or mineral extraction from a navigable waterway or Lake Michigan
Sand and Gravel Permits	IC 14-29-3		Regulatory	DNR-DOW	Permit ($50)		Regulates removal of sand, gravel, stone, or other mineral resources from or under the bed of navigable waterways
Construction of Channels Act	IC 14-29-4		Regulatory	DNR-DOW	Permit ($100)		Regulates construction or improvement of artificial or natural watercourses for providing boat access.
Lake & River Enhancement Program	IC 14-32-7	LARE	Incentive Tech. Asst. Education	DNR-DSC			Cost & Tech. Assist. Hydromod. & Water Mgt. BMPs
Regulated Drains	IC 36-9-27		Regulatory Voluntary	County Surveyor/ County Drainage Board		Reconstruction, periodic maintenance, vacation	Removal of excess water in areas with regulated drains
Hoosier Riverwatch Program			Voluntary	DNR-DOSC Purdue CES		Periodic WQ database	Volunteer water quality monitoring program

Table C-25: Hydromodification

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Endangered Species Act of 1973	Endangered Species, 35 USC 16	Partners for Fish and Wildlife Program	Voluntary with financial and technical assistance for restoration of degraded wetland habitat	US Fish and Wildlife Service, IDNR-Division of Fish and Wildlife, and IDNR-Division of Water	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a.
Endangered Species Act of 1973	Endangered Species, 35 USC 16	Protection of Endangered Species	Regulatory	US Fish and Wildlife Service, IDNR-Division of Fish and Wildlife, and IDNR-Division of Water	Civil penalties and fines	Spot checks	Protection of Wetlands and Riparian Areas; 1a
1985, 1996 and 2002 Farm Bills	Conservation Provisions	Conservation Reserve Program – Competitive bids and continuous sign-up (CRP)	Voluntary with financial incentives, technical assistance, and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and USDA-Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks and annual reporting of acreages	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a
1996 & 2002 Farm Bills	Conservation Provisions	Environmental Quality Incentive Program (EQIP)	Voluntary with financial incentives, technical assistance, and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and USDA-Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a.

Table C-26: Hydromodification

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
1996 & 2002 Farm Bills	Conservation Provisions	Wetlands Reserve Program (WRP)	Voluntary with financial incentives, technical assistance, and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and USDA-Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks and follow-up on citizen complaints of potential agreement violations	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems; 3a.
Federal Water Pollution Control Act - Clean Water Act of 1977, Sections 401 and 403	Navigation and Navigable Waters, 33 USC 26	Protection of Wetlands	Regulatory	US Army Corps of Engineers, Indiana Department of Environmental Management, and Indiana Department of Natural Resources	Permits and Certification	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Federal Water Pollution Control Act - Clean Water Act of 1977, Section 319	Navigation and Navigable Waters, 33 USC 1329	Water Quality Improvement Demonstration Grants	Voluntary with financial assistance to implement BMP to reduce Nonpoint source pollution utilizing education, technical assistance, and cost-share programs.	US Environmental Protection Agency (EPA) and Indiana Department of Environmental Management (IDEM)	Contractual Agreements	Quarterly reporting of expenditures and progress in fulfilling contractual agreements	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems; 3a

Table C-27: Hydromodification

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Fish and Wildlife Act of 1956	Fish and Wildlife Coordination Act	Partners for Fish & Wildlife Programs and US Fish and Wildlife Private Lands Restoration	Voluntary with technical assistance and cost-sharing in specific instances for protection of federally listed endangered species	US-Fish and Wildlife Service	Contractual Agreement	Spot Check	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a
Indiana Code 14-12	State Resource Development, IC 14-12-2	Indiana Heritage Trust Program	Voluntary with financial incentives to acquire actual and/or interests of unique real property	Indiana Heritage Trust	Contractual agreement	Spot check	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a.
Indiana Code 14-26	Lakes and Reservoirs, IC 14-26-2	Lake Preservation Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Indiana Code 14-26	Lakes and Reservoirs, IC 14-26-5	Lowering of Ten-Acre Lakes Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Indiana Code 14-29	Rivers, Streams, and Waterways, IC 14-29-4	Construction of Channels Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a

Table C-28: Hydromodification

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Indiana Code 14-29	Rivers, Streams, and Waterways, IC 14-29-1	Navigable Waterways Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Indiana Code 14-29	Rivers, Streams, and Waterways, IC 14-29-3	Sand and Gravel Permits Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Indiana Code 14-32	Soil and Water Conservation, IC 14-32-8	Clean Water Indiana Program (CWI)	Voluntary with financial assistance grants to implement conservation practices utilizing education, technical assistance, training, and cost sharing programs	IDNR-Division of Soil Conservation through grants to local Soil and Water Conservation Districts	Contractual Agreements	Annual reporting of expenditures and progress in fulfilling contractual agreements	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems; 3a.

Table C-29: Hydromodification

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Indiana Code 14-32	Soil and Water Conservation, IC 14-32-7-12	Lake and River Enhancement Program (LARE) Upland Watershed Land Treatment Program	Voluntary with financial assistance grants to implement conservation practices utilizing education, technical assistance, training, and cost sharing programs	IDNR-Division of Soil Conservation through grants to local Soil and Water Conservation Districts	Contractual Agreements	Annual reporting of expenditures and progress in fulfilling contractual agreements	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems; 3a.
Indiana Code 14-32	Soil and Water Conservation, IC 14-32	Soil & Water Quality Education	Voluntary educational assistance to Soil and Water Conservation Districts and landowners	Purdue University Agronomy Department and IDNR-Division of Soil Conservation	N/A	Reporting through the System for Accountability and Management (SAM)	Protection of Wetlands and Riparian Areas; 1a
North American Wetlands Conservation Act of 1989	Conservation, 16 USC 4401-4412	North American Waterfowl Management Program	Voluntary with financial incentives and cost-sharing for area acquisition	US Fish and Wildlife Service and IDNR-Division of Fish and Wildlife	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a.

Table C-30: Hydromodification

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Rivers and Harbors Act of 1899, Section 10	Navigation and Navigable Waters, 33 USC 403	Dredging of Rivers and Streams	Regulatory	US Army Corps of Engineers	Permits	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Soil Conservation and Domestic Allotment Act of 1935	Conservation, 16 USC 590	Technical assistance	Voluntary with technical assistance for conservation planning and engineering	USDA-Natural Resources Conservation Service (NRCS)	N/A	N/A	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems, 3a.
Watershed Protection and Flood Prevention Act, Public Law 83-566	Conservation, 16 USC 1001-1008	Watershed Protection and Flood Prevention Program	Voluntary with financial incentives and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and USDA-Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a

Table C-31: Wetlands and Riparian Areas

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Endangered Species Act of 1973	Endangered Species, 35 USC 16	Partners for Fish and Wildlife Program	Voluntary with financial and technical assistance for restoration of degraded wetland habitat	US Fish and Wildlife Service, IDNR-Division of Fish and Wildlife, and IDNR-Division of Water	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a.
Endangered Species Act of 1973	Endangered Species, 35 USC 16	Protection of Endangered Species	Regulatory	US Fish and Wildlife Service, IDNR-Division of Fish and Wildlife, and IDNR-Division of Water	Civil penalties and fines	Spot checks	Protection of Wetlands and Riparian Areas; 1a
1985, 1996 and 2002 Farm Bills	Conservation Provisions	Conservation Reserve Program – Competitive bids and continuous sign-up (CRP)	Voluntary with financial incentives, technical assistance, and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and USDA-Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks and annual reporting of acreages	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a
1996 & 2002 Farm Bills	Conservation Provisions	Environmental Quality Incentive Program (EQIP)	Voluntary with financial incentives, technical assistance, and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and USDA-Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a.
1996 & 2002 Farm Bills	Conservation Provisions	Wetlands Reserve Program (WRP)	Voluntary with financial incentives, technical assistance, and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and USDA-Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks and follow-up on citizen complaints of potential agreement violations	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems; 3a.

Table C-32: Wetlands and Riparian Areas

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Federal Water Pollution Control Act - Clean Water Act of 1977, Sections 401 and 403	Navigation and Navigable Waters, 33 USC 26	Protection of Wetlands	Regulatory	US Army Corps of Engineers, Indiana Department of Environmental Management, and Indiana Department of Natural Resources	Permits and Certification	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Federal Water Pollution Control Act - Clean Water Act of 1977, Section 319	Navigation and Navigable Waters, 33 USC 1329	Water Quality Improvement Demonstration Grants	Voluntary with financial assistance to implement BMP to reduce Nonpoint source pollution utilizing education, technical assistance, and cost-share programs.	US Environmental Protection Agency (EPA) and Indiana Department of Environmental Management (IDEM)	Contractual Agreements	Quarterly reporting of expenditures and progress in fulfilling contractual agreements	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems; 3a
Fish and Wildlife Act of 1956	Fish and Wildlife Coordination Act	Partners for Fish & Wildlife Programs and US Fish and Wildlife Private Lands Restoration	Voluntary with technical assistance and cost-sharing in specific instances for protection of federally listed endangered species	US-Fish and Wildlife Service	Contractual Agreement	Spot Check	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a
Indiana Code 14-12	State Resource Development, IC 14-12-2	Indiana Heritage Trust Program	Voluntary with financial incentives to acquire actual and/or interests of unique real property	Indiana Heritage Trust	Contractual agreement	Spot check	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a.
Indiana Code 14-26	Lakes and Reservoirs, IC 14-26-2	Lake Preservation Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a

Table C-33: Wetlands and Riparian Areas

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Indiana Code 14-26	Lakes and Reservoirs, IC 14-26-5	Lowering of Ten-Acre Lakes Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Indiana Code 14-29	Rivers, Streams, and Waterways, IC 14-29-4	Construction of Channels Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Indiana Code 14-29	Rivers, Streams, and Waterways, IC 14-29-1	Navigable Waterways Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Indiana Code 14-29	Rivers, Streams, and Waterways, IC 14-29-3	Sand and Gravel Permits Act	Regulatory	IDNR-Division of Water	Permit	Spot checks	Protection of Wetlands and Riparian Areas; 1a
Indiana Code 14-32	Soil and Water Conservation, IC 14-32-8	Clean Water Indiana Program (CWI)	Voluntary with financial assistance grants to implement conservation practices utilizing education, technical assistance, training, and cost sharing programs	IDNR-Division of Soil Conservation through grants to local Soil and Water Conservation Districts	Contractual Agreements	Annual reporting of expenditures and progress in fulfilling contractual agreements	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems; 3a.

Table C-34: Wetlands and Riparian Areas

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Indiana Code 14-32	Soil and Water Conservation, IC 14-32-7-12	Lake and River Enhancement Program (LARE) Upland Watershed Land Treatment Program	Voluntary with financial assistance grants to implement conservation practices utilizing education, technical assistance, training, and cost sharing programs	IDNR-Division of Soil Conservation through grants to local Soil and Water Conservation Districts	Contractual Agreements	Annual reporting of expenditures and progress in fulfilling contractual agreements	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems; 3a.
Indiana Code 14-32	Soil and Water Conservation, IC 14-32	Soil & Water Quality Education	Voluntary educational assistance to Soil and Water Conservation Districts and landowners	Purdue University Agronomy Department and IDNR-Division of Soil Conservation	N/A	Reporting through System for Accountability and Management (SAM)	Protection of Wetlands and Riparian Areas; 1a
North American Wetlands Conservation Act of 1989	Conservation, 16 USC 4401-4412	North American Waterfowl Management Program	Voluntary with financial incentives and cost-sharing for area acquisition	US Fish and Wildlife Service and IDNR-Division of Fish and Wildlife	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a.
Rivers and Harbors Act of 1899, Section 10	Navigation and Navigable Waters, 33 USC 403	Dredging of Rivers and Streams	Regulatory	US Army Corps of Engineers	Permits	Spot checks	Protection of Wetlands and Riparian Areas; 1a

Table C-35: Wetlands and Riparian Areas

Legislation	Program Authority	Program	Category	Implementing Agency	Enforcement Provisions	Evaluation Measures	NPS Issue Addressed; Applicable Management Measures
Soil Conservation and Domestic Allotment Act of 1935	Conservation, 16 USC 590	Technical assistance	Voluntary with technical assistance for conservation planning and engineering	USDA-Natural Resources Conservation Service (NRCS)	N/A	N/A	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a. Engineered Vegetated Treatment Systems, 3a.
Watershed Protection and Flood Prevention Act, Public Law 83-566	Conservation, 16 USC 1001-1008	Watershed Protection and Flood Prevention Program	Voluntary with financial incentives and cost-sharing	USDA-Natural Resources Conservation Service (NRCS) and USDA-Farm Service Agency (FSA)	Long term contracts with repayment language for failure to fulfill the contractual agreement	Spot checks	Protection of Wetlands and Riparian Areas; 1a. Restoration of Wetlands and Riparian Areas; 2a

Appendix D
Water Quality Monitoring Information

This information is not available at this time. The Indiana Geologic Survey at Indiana University is under contract with the Indiana Department of Environmental Management to compile this information. However, at this time the report is incomplete. Information will be updated when it becomes available.


INDIANA
LAKE MICHIGAN
COASTAL PROGRAM


DNR
Indiana Department of Natural Resources


IDEM
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT


UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE