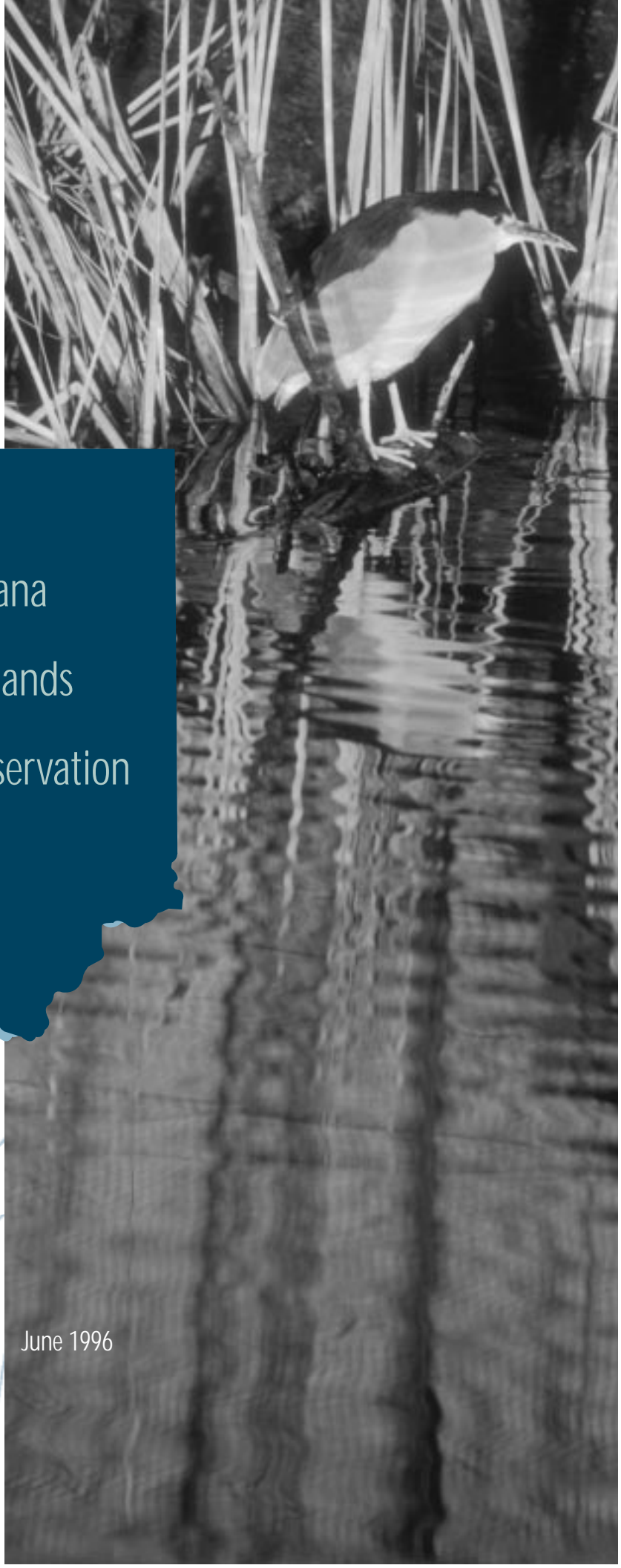


Black-crowned night heron



Indiana  
Wetlands  
Conservation  
Plan



June 1996

# Executive Summary

Wetlands, like soils, trees, fields, rivers, hills, and other natural resources, are vital components of the Indiana landscape. Wetlands serve important functions, both in human benefits such as maintaining the quality of the water we drink and controlling flooding, and in environmental benefits such as providing habitat for endangered species of wildlife and plants. The fact that the majority of the wetland resources once present in Indiana have been lost or converted to other uses makes wetlands especially critical resources for conservation.

Although wetlands conservation has at times been a controversial topic, there is broad agreement among diverse interests on many aspects of wetlands conservation and public responsibility. The purpose of the *IWCP*, and the long-term, intensive planning process used to develop it, is to achieve that conservation in ways that are beneficial to all Hoosiers. It establishes common ground on which progress in wetlands conservation can be made, and it sets forth specific actions designed to achieve that progress.

The *IWCP* has been developed through an extensive process of information gathering, input, and review by a variety of interests across the state. Development of the *IWCP* was guided by the Wetlands Advisory Group (people representing diverse stakeholders in Indiana wetlands conservation—from environmentalists to county surveyors; from farmers to coal mine operators) and the Technical Advisory Team (technical representatives from the 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:

1. The cornerstone of the *Initiative* is an emphasis on planning and implementing the *IWCP* through local wetland conservation partnerships called **focus areas**.
2. 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.
3. The *Initiative* emphasizes **positive incentives** that motivate people to voluntarily conserve and restore wetlands.
4. The *Initiative* calls for increased wetlands **education** for technical staff, people who own/work the land, school children, and other audiences.
5. The *Initiative* seeks the **acquisition** of permanent protection for the highest priority wetlands from willing owners.
6. **Continued work of the Wetlands Advisory Group and Technical Advisory Team** in implementing the *Initiative* is critical to conserving Indiana's wetland resources.

Specific objectives and actions for each of the six strategic components are outlined. Monitoring and evaluation of the *IWCP* are described.

# Preface

In April 1994, the Indiana Department of Natural Resources initiated a process to develop the *Indiana Wetlands Conservation Plan (IWCP)*.

This document represents the culmination of that process—a process that involved more than 900 individuals across Indiana. Some of their comments and observations on wetlands conservation and the *IWCP* are found throughout the document.

Although development of the *Indiana Wetlands Conservation Plan* has been coordinated by the Indiana Department of Natural Resources, the *IWCP* is intended as a guide for all wetlands conservation efforts in the state. The *IWCP* is designed to serve as a framework for discussing and problem-solving wetland conservation issues. It establishes common ground on which progress can be made, and sets forth specific actions to be accomplished.

The Indiana Department of Natural Resources is committed to implementation of the *IWCP*. On April 23, 1996, the Natural Resources Commission passed a resolution confirming that commitment (see page 3).

For additional information on the *IWCP*, contact:

Project Coordinator  
Indiana DNR  
Indiana Gov't. Center South  
402 W. Washington, Rm. W256  
Indianapolis, IN 46204-2748

**Phil Seng/David Case**  
Project Facilitators  
D.J. Case & Associates  
607 Lincolnway West  
Mishawaka, IN 46544  
Phone: (219) 258-0100  
Fax: (219) 258-0189  
e-mail: 102543.2572@compuserve.com

The cooperative process involving diverse interests that was used to develop the *IWCP* is as important as the printed document itself. We invite you to review the *IWCP* and join us in using it to conserve Indiana's wetland resources.

**RESOLUTION BY THE NATURAL RESOURCES COMMISSION  
FOR THE ADOPTION OF THE  
INDIANA WETLANDS CONSERVATION PLAN**

WHEREAS, wetlands are valuable natural resources that provide many benefits to the citizens of Indiana, including water quality, flood control, erosion control, groundwater recharge, economic benefits, recreation, and aesthetics.

WHEREAS, the majority of Indiana's wetlands have been altered or lost so as to provide for other valuable land uses but at the cost of important functions and benefits.

WHEREAS, the Department of Natural Resources has sought and encouraged (and subsequently received) the participation and support of many diverse stakeholders in wetlands conservation issues for the development of the *Indiana Wetlands Conservation Plan*.

WHEREAS, the *Indiana Wetlands Conservation Plan* provides strategic guidance for wetlands conservation efforts throughout the state, focused primarily on voluntary efforts at the local level.

NOW, THEREFORE, IT IS RESOLVED AS FOLLOWS:

- (1) The Natural Resources Commission adopts the Indiana Wetlands Conservation Plan.
- (2) The Department of Natural Resources is to use the Indiana Wetlands Conservation Plan to guide wetlands conservation efforts throughout the state.
- (3) The Department of Natural Resources is to pursue full implementation of the Indiana Wetlands Conservation Plan.

Dated: April 23, 1996

Attest:

John T. Costello

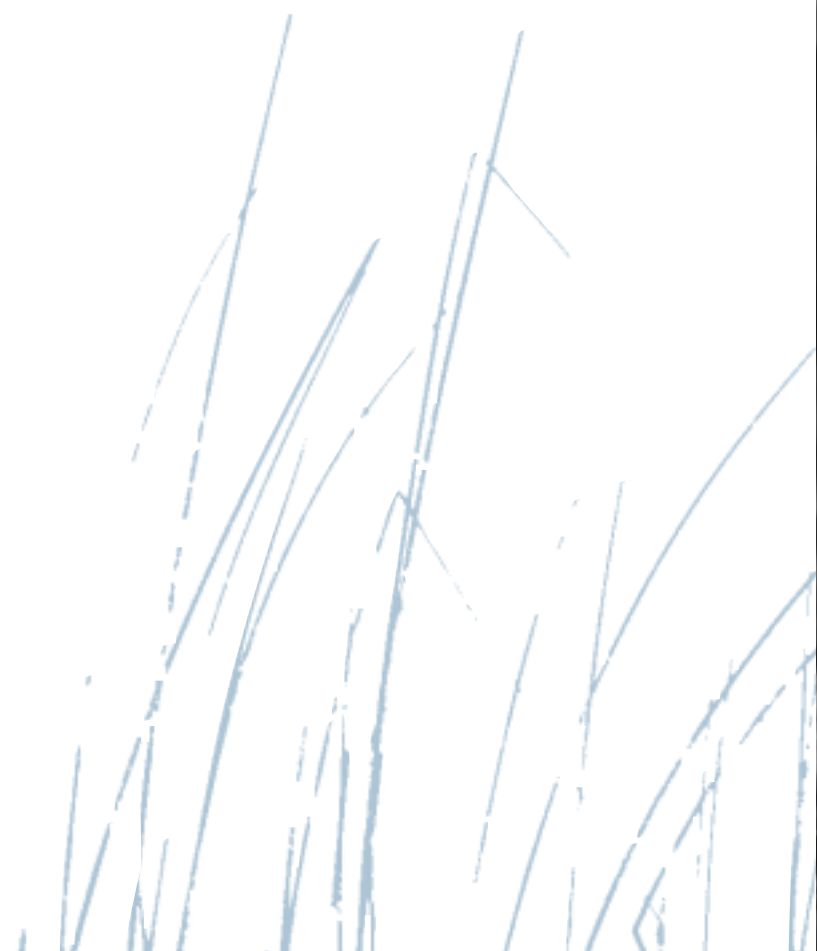
Michael J. Kiley  
Michael J. Kiley, Chair  
Natural Resources Commission

Patrick R. Ralston  
Patrick R. Ralston, Secretary  
Natural Resources Commission

APPROVED THIS 23 DAY OF APRIL, 1996



Great blue heron



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White-tailed deer

Introduction

6

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# Introduction

## Wetlands—Vital Resources

Wetlands, like soils, trees, fields, rivers, hills, and other natural resources, are vital components of the Indiana landscape. From these rich natural resources, Hoosiers have raised and provided for generations of families, and produced products to feed, clothe, shelter, and enhance the quality of life for people in Indiana and around the world. The continued health and vitality of Indiana is dependent on conservation of these precious natural resources.

Wetlands serve important functions, both in human benefits such as maintaining the quality of the water we drink and controlling flooding, and in environmental benefits such as providing habitat for endangered species of wildlife and plants. The fact that the majority of the wetland resources once present in Indiana have been lost or altered makes wetlands especially critical resources for conservation.

## A Controversial Issue

Poll after poll indicates that the citizens of Indiana and the United States strongly support efforts to provide a healthy environment in which to live.

People also depend upon and demand opportunities for economic growth, the ability to raise food for an ever-increasing world population, and the ability to do these things without undue restrictions of the freedoms on which this country was founded.

The difficulty in balancing these many considerations is nowhere more apparent than in wetlands conservation efforts. Wetlands provide myriad benefits to society (many of which are not fully understood), are part of large, complex ecosystems found throughout the state, and affect or are affected by almost everyone in the state. Add to this, the web of state and federal wetlands-related laws and regulations, and the historic conflict over wetlands management is no surprise.

## What Is the IWCP?

In spite of the controversy surrounding wetlands conservation, there is broad agreement among diverse interests on many aspects of wetlands conservation and public responsibility. These interests do not agree on everything, but they do agree that what is at stake (livelihoods and the environment) is too important and intertwined to be driven by confrontational debates between extreme viewpoints on the issue.

The *IWCP* is dedicated to conserving wetlands. It is based on the assumption that wetlands are important to Hoosiers and that conserving them is a conservation priority. It looks at the big picture and identifies big steps. The purpose of the *IWCP* and the long-term, intensive planning process used to develop it, is to achieve that conservation in mutually beneficial ways.

*“The Plan is not slanted toward the environmental side or the construction side. It’s a middle ground type of plan that everyone can live with.”*

*—John McNamara,  
St. Joseph County Surveyor*

*“This process was an opportunity to bring a lot of people together to work toward a common goal.”*

*—Tim Maloney,  
Hoosier Environmental Council*



*“The Indiana Department of Environmental Management is pleased to have been a part of the Indiana Wetlands Conservation Plan process. It is encouraging to participate in a project where diverse interests work together to find common ground and mutually beneficial solutions to issues and concerns.”*

—Kathy Prosser,

*Indiana Department of Environmental Management*

The *IWCP* does not, and is not designed to, address every issue surrounding wetlands conservation today. It does not seek to resolve every dispute or modify every program. What it has been designed to do is serve as a framework for discussion and problem-solving. It establishes common ground on which progress in wetlands conservation can be made, and it sets forth specific actions to achieve that progress.

The *IWCP* has four sections:

1. **Status.** An assessment of wetland resources and wetland conservation in Indiana.
2. **Setting Direction.** A description of what the *IWCP* is designed to accomplish and how—definitions, goals, guiding principles, priorities, and case studies.
3. ***Hoosier Wetlands Conservation Initiative.*** The action portion of the *IWCP*—strategic components, what will be accomplished, how it will be accomplished and when, and how it will be funded.
4. **Monitoring and Evaluation.** Measuring progress.

Development of the *IWCP* offers a tremendous opportunity. This process and the resulting *IWCP* may well become key points in the history of conservation in Indiana.

## The Process—How the *IWCP* Was Developed

Although development of the *Indiana Wetlands Conservation Plan* has been coordinated by the Indiana Department of Natural Resources, the *IWCP* is intended as a guide for all wetlands conservation efforts in the state. Funding for the project was provided through a grant from the U.S. Environmental Protection Agency to the Indiana Department of Natural Resources.

The *IWCP* has been developed through an extensive process of information gathering, input, and review by a variety of interests across the state.

The major components of this process include:

1. **Technical Advisory Team.** This group includes technical representatives from the state and federal agencies that have regulatory or oversight roles in wetlands conservation (Appendix A).
2. **Wetlands Advisory Group.** A group of people representing diverse stakeholders in Indiana wetlands conservation—from environmentalists to county surveyors; from farmers to coal mine operators (Appendix B). Through a series of full-day working sessions, the Group has developed much of what is contained in the *IWCP*.

*“This project brought together a wide range of divergent interests to focus on wetlands conservation. I think it was a valid process and one we were happy to participate in.”*

—Jim Barnett,

*Indiana Farm Bureau*

3. **Project reviewers.** This is a group of several hundred stakeholders that have been solicited for input on the *IWCP* by telephone and through the mail throughout the planning process (Appendix C).
4. **Public opinion survey.** A public opinion survey was conducted in November 1995 to determine Indiana residents' opinions on and attitudes toward wetlands and wetlands conservation.
5. **Facilitators.** In addition to facilitating the planning process, project facilitators also compiled information on various aspects of wetlands conservation in Indiana and the U.S. for use in developing the *IWCP*.
6. **Public review process.** Two drafts of the *IWCP* were made available for public review so all Hoosiers would have an opportunity to comment and make recommendations. A December 18, 1995 draft of the *IWCP* was distributed for public review and comment to 350 people, 60 of which had requested the draft based on publicity about its availability. A March 8, 1996 draft was distributed for public review and comment to 357 people, and 175 sets of comments on various drafts of the *IWCP* have been received. These comments have been compiled and are part of the public record.

*"The IWCP is a long needed guide to understanding and managing wetlands for the people of the state of Indiana."*  
—Thomas R. Anderson,  
*Save the Dunes Council*

## How You Can Be Involved

Successful conservation of Indiana's wetland resources will depend on the interest and involvement of citizens in the State. There are several things you can do to help achieve wetlands conservation in Indiana:

1. Review the *IWCP*—if you have questions, contact the Indiana Department of Natural Resources or any of the people, agencies, or organizations listed in the appendices of this document.
2. Encourage agencies, private conservation organizations, and businesses to support and help implement the *Indiana Wetlands Conservation Plan*.
3. Participate in local focus area efforts to conserve wetlands where you live.
4. Distribute accurate information about wetland functions and benefits. Most people do not realize how valuable wetlands are to society. Providing accurate information to people who own or impact wetlands can have far-reaching conservation benefits.

*"Local involvement is one of the key parts of this Plan that I think is extremely important."*  
—Pat Ralston,  
*Director, Indiana Department of Natural Resources*



The  
Status  
of Wetlands  
in Indiana

# Wetland Functions and Benefits

Wetlands provide Hoosiers with many vital physical, ecological, and economic functions and benefits that are listed below under general headings. Most of these functions and benefits overlap; for instance, the *Flood Control* and *Water Quality* functions that are listed under the *Water Resources* heading could also be listed under the *Economic* heading. In the interest of space and clarity, functions and benefits are only listed under a single heading.

For the purposes of this plan, the term *wetland loss* refers to the loss of these functions and benefits. The land itself is not gone, and in fact the wetland nature of the land may still remain, but the functions and benefits are lost—at least temporarily. There are many different ways that wetlands are impacted or *lost*, and some are more permanent than others. For instance, it would be much easier to restore the functions and benefits of a wetland that was tiled and farmed than one that was drained, filled, and covered with concrete.

It should be noted that not all wetlands perform all of the functions listed below. It is also worth mentioning that the effects of wetland losses are poorly understood. In most cases it is not clear how much loss can be sustained before the functions and benefits are degraded or lost.

*“The environment is benefited by wetlands all the way around.”*

*—John McNamara,  
St. Joseph County Surveyor*

## Water Resources

**Flood Control:** During heavy rains, wetlands store massive amounts of water and slow down the flow of surface water. This function reduces the danger of flooding during peak water flow, when potential flood damage is highest. By storing storm water, wetlands dampen the sharp peaks of water runoff into slower discharges over longer periods of time.

**Water Quality:** Wetlands play a major role in maintaining Indiana’s water quality. Wetlands absorb excess inorganic and organic nutrients such as farm fertilizers and septic system runoff, filter sediments such as eroded soil particles, and trap pollutants such as pesticides and some heavy metals. These materials can seriously degrade the quality of groundwater and surface water resources, but wetlands trap and hold them, “recycling” some of them within the wetland system.

Wetlands have a great capacity for assimilating treated sewage. Therefore, there is significant interest in the use of created wetlands in wastewater treatment—particularly for animal waste. Early studies by the Purdue Agricultural Research Program and others suggest that constructed wetlands can substantially reduce or eliminate the impact of animal waste runoff from livestock operations. There also has been some interest in constructing wetlands for municipal or domestic wastewater treatment, which has been done successfully under certain circumstances. This plan does not advocate the use of existing, natural wetlands for wastewater treatment—these are roles for constructed or “artificial” wetlands.

*“Wetland conservation is an important priority in Indiana.”*

*—Tim Maloney,*

*Hoosier Environmental Council*

**Groundwater Discharge and Recharge:** It is generally accepted that wetlands are sites of groundwater discharge (i.e., where groundwater moves laterally or upward to reach the surface). The reverse is also thought to be true—that wetlands recharge the aquifers and groundwater systems that provide the water many of us get from our faucets. The recharge potential of wetlands is affected by many factors including wetland type, location, season, soils, and precipitation, and appears to be more important in small wetlands than large ones. Nationwide, wetlands are an increasingly important source of ground and surface water near large urban centers.

## Biological/Ecological

**Fisheries:** Wetlands support Indiana fisheries by providing habitat and a variety of food sources for fish. Most freshwater fish can be considered wetland-dependent because they use the wetlands for spawning and as nursery grounds.

**Wildlife:** About 900 species of vertebrate animals require wetlands at some time in their lives. Muskrats and beavers are examples of Indiana mammals that are totally dependent on wetland environments. Wetlands provide the principal habitat for virtually all species of waterfowl nationwide, and also for many other birds, mammals, and reptiles. In Indiana, 11 species of waterfowl use wetlands for nesting, and 28 species use wetlands as migration/wintering habitat.

Nationwide nearly 35 percent of all rare and endangered animal species depend on wetlands for survival, although wetlands constitute only about 5 percent of the nation’s lands. More than 60 wetland-dependent animal species are listed as endangered, threatened, or of special concern in Indiana. Even animals not dependent on wetlands for survival find them to be excellent habitat. For instance, bottomland hardwood forests have been found to support nearly twice as many white-tailed deer per unit area as do upland forests, primarily because of the abundance of food in wetlands.

**Plants:** Fish and wildlife are not the only living things that require wetlands for survival. A great variety of plants thrive in wetlands as well, and some of the valuable functions and benefits that wetlands provide are due to the plant communities that live there. In addition, because so many wetlands have been lost or degraded, there are more than 120 species of wetland plants in Indiana that are endangered, threatened, or rare.



**Erosion Control:** Wetland systems help stabilize shorelines and prevent soil erosion. The roots of wetland plants bind the soil, holding it in place, while the above-ground portions of these plants absorb wave energy, slowing the water's flow. Wetlands also trap sediments suspended in moving water. Wetlands with emergent plants (such as cattails) can remove up to 95% of the sediments from flood waters.

In northern Indiana, many natural lakes have experienced serious shoreline erosion due to the wake wash from the growing number of boats and other pleasure craft. Wetlands fringing these lakes shield the shorelines from wave action, providing important erosion control that protects lakefront properties.

## Economic

**Food Production:** Wetlands provide habitat for fish, waterfowl, shellfish, and other animals that are harvested for food. Healthy and functioning wetland ecosystems are necessary to maintain the resource base for this food production economy. Because of their high productivity, wetlands also have unrealized food production potential through the harvest of vegetation and aquaculture.

**Wood Production:** Forested wetlands often contain high-value tree species, and under proper management, are an important source of timber and other forest products. In Indiana, more than half of the remaining wetland acres are forested. Indiana ranks third nationally in hardwood lumber production, contributing \$5 billion annually to the state's economy.

**Trapping:** Although it is not a major economic activity in Indiana, the harvest of fur-bearing animals does generate revenue for trappers. All of the economically significant furbearer species in Indiana are wetland-related.

**Recreation:** Many recreational activities take place in or around wetlands, including hunting, fishing, sightseeing, nature study, photography, bird-watching, canoeing, and boating. Some of these activities are directly dependent upon wetlands. Nationwide over \$10 billion is spent annually by an estimated 50 million people on fishing, hunting, boating, nature study, photography, and swimming. In Indiana, duck and goose hunting alone provide approximately 75,000 user days of recreation annually, and a survey by the U.S. Fish and Wildlife Service suggests that Indiana wetland habitats generate more than a million user days of nonconsumptive recreation each year.

*“Wetlands are one of the most important conservation issues we face in Indiana at the moment. They are some of the most diverse ecosystems we have.”*

—Jon Voelz,

*Indiana Wildlife Federation*

**Other:** Economic benefits of flood control, drought mitigation, groundwater recharge, water quality, public and private water supply, and soil conservation are large. For example, wetlands help prevent costly flood and drought damage. In addition, water taken for public water supplies requires less expensive treatment if the water has been filtered by wetlands.

## Intangible Benefits/Existence Value

In addition to physical, ecological, and economic values, wetlands also provide other, less tangible benefits that may be referred to as *existence* values.

**Ethical:** Many people feel a strong sense of stewardship for the natural world—that regardless of economic value, all forms of life deserve respect. Many also believe that humans have a moral responsibility to maintain natural ecosystems for ourselves and for future generations.

**Future Options:** Human understanding of the many values of the natural world is incomplete. Healthy wetland ecosystems may contain a treasure trove of as yet undiscovered benefits for agriculture, industry, medicine, and recreation. The best option for preserving this potential is to maintain the biodiversity present in healthy wetland ecosystems.

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# Indiana's Wetland Resources

Wetlands occur in and provide benefits to every county in Indiana (Figure 1). The lack of quantitative information on some aspects of Indiana's wetland resources is a major obstacle to improving wetland conservation efforts.

The most extensive database on wetland resources in Indiana is the National Wetlands Inventory developed by the U.S. Fish and Wildlife Service. In 1985, the Indiana Department of Natural Resources, Division of Fish and Wildlife entered into a cooperative agreement with the U.S. Fish and Wildlife Service to share the costs of mapping Indiana's wetlands.

Indiana's National Wetlands Inventory maps were produced primarily from interpretation of high-altitude color infrared aerial photographs (scale of 1:58,000) taken of Indiana during spring and fall 1980-87. Map production also included field investigations, review of existing information, quality assurance, draft map production, interagency review of draft maps, and final map production.

National Wetland Inventory maps indicate wetlands by type, using the classification system developed by Cowardin *et al.* (1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31. 104 pp.). The minimum wetlands size on National Wetland Inventory maps is generally one to three acres. Very narrow wetlands in river corridors and wetlands that were cultivated at the time of mapping are generally not depicted, and forested wetlands are poorly discriminated.

The most recent and complete analysis of this database was conducted in 1991 by the Indiana Department of Natural Resources. According to the report, Indiana had approximately 813,000 acres of wetland habitat in the mid-1980s when the data were collected. The extent of wetland loss or gain since that time is unknown.

Wetland habitats	Acres	% of total
scrub-shrub forested	42,131	5.2%
wet meadow	504,336	62.0%
shallow marsh	55,071	6.8%
deep marsh	67,564	8.3%
open water	20,730	2.5%
other	98,565	12.1%
total wetland habitats	813,032	100.0%

From Rolley, R. E. 1991. Indiana's Wetland Inventory. IDNR Wildlife Management and Research Notes no. 532. 6 pp.

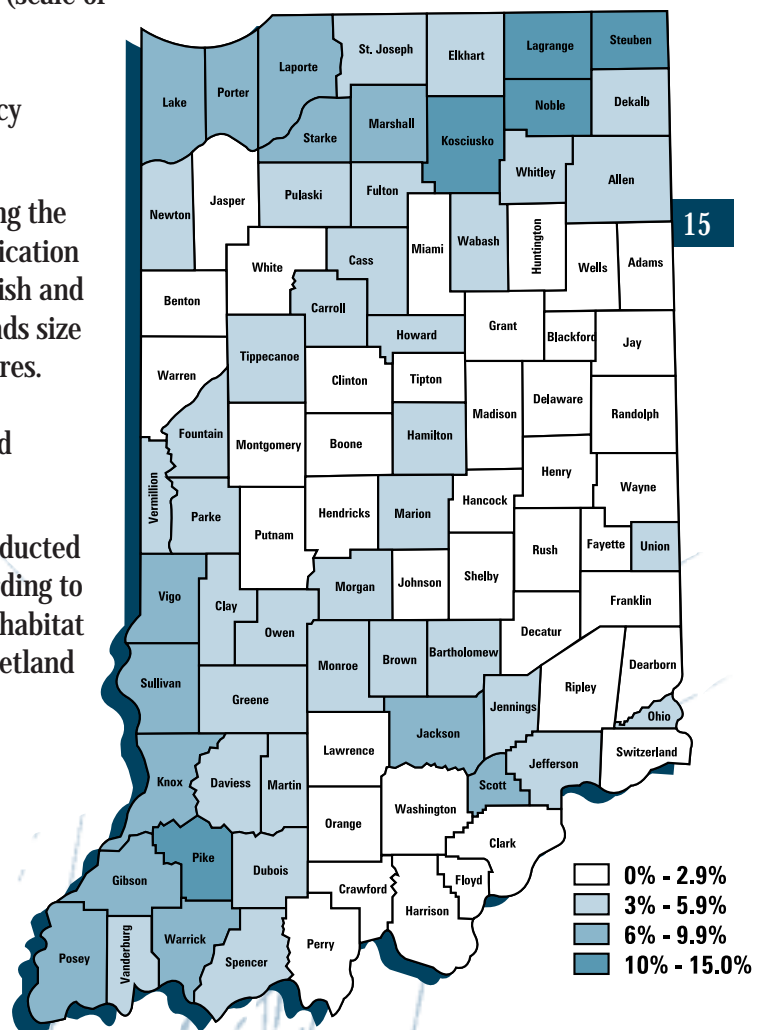


Figure 1. Distribution and density (percent acreage) of wetlands and deepwater habitats in Indiana by county, based on the National Wetland Inventory.

Map by Shelley Liu, IDNR-MIS, 1996

## Historic Wetland Losses

The best estimate of the wetlands in Indiana prior to settlement 200 years ago is an assessment based on hydric soils (soils that indicate the presence of wetlands) conducted by the USDA Soil Conservation Service (now the Natural Resources Conservation Service). Based on an analysis of this data by the Indiana Department of Natural Resources, Division of Outdoor Recreation in 1989, there were approximately 5.6 million acres of wetlands in Indiana 200 years ago. Combining the information from the National Wetlands Inventory and the Division of Outdoor Recreation yields the following summary:

- Total land area ----- 23,226,240 acres
- Estimated wetlands circa 1780s ----- 5,600,000 acres
- Percent of surface area in  
wetlands circa 1780s ----- 24.1%
- Existing wetlands ----- 813,000 acres
- Percent of surface area  
in wetlands today ----- 3.5 %
- Percent of wetlands lost ----- 85%

Among the 50 states, Indiana ranks 4th (tied with Missouri) in proportion of wetland acreage lost. (Dahl, T.E. 1990. *Wetland losses in the United States, 1780s to 1980s*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 13 pp.). The vast majority of the 85% of wetlands lost was due to drainage for agricultural production.

The rich, productive soils available as a result of these drainage activities have contributed significantly to the thriving agriculture industry in Indiana. In 1994, Indiana ranked first in the nation in popcorn production, second in spearmint, fourth in soybeans, fifth in corn for grain, and sixth in overall crop cash receipts.

## Current Wetland Losses

Indiana's wetlands are being lost or impacted today in a variety of ways, including agricultural activities, commercial and residential development, road building, water development projects, groundwater withdrawal, loss of instream flows, water pollution, and vegetation removal. Comprehensive data for the current extent and causes of wetland loss at the state level are not available.

# Existing Wetlands Conservation Programs

A variety of wetlands conservation programs are administered by state and federal agencies, non-profit conservation organizations, businesses, and individuals. The following is not an exhaustive list, but in cases where myriad programs do exist, one or more examples are given. Programs are listed here, followed by the administering agency/organization and a phone number. General information including a contact person is given for each program in a separate document titled *A Summary of Wetlands Conservation Programs in Indiana*.

## Incentive Programs

### Federal

- Agricultural Conservation Program (Farm Service Agency, 317-290-3030)
- Conservation Easement Program (Farm Service Agency, 317-290-3112)
- Conservation Reserve Program (Farm Service Agency, 317-290-3030)
- Federal tax benefits for land trust donations (Internal Revenue Service, 800-829-1040)
- Forestry Incentives Program (NRCS, 317-290-3202)
- National Natural Landmark Program (National Park Service, 402-221-3418)
- Partners for Wildlife (U.S. Fish & Wildlife Service, 812-334-4261)
- Water Quality Incentive Program (NRCS, 317-290-3202)
- Watershed Protection and Flood Prevention Program (NRCS, 317-290-3202)
- Wetlands Reserve Program (NRCS, 317-290-3202)

### State

- Appalachian Clean Streams Initiative (Indiana DNR, 812-354-6728)
- Indiana Classified Forest Program (Indiana DNR, 317-232-4105)
- Classified Wildlife Habitat Act (Indiana DNR, 317-232-4080)
- Forest Stewardship Program (Indiana DNR, 317-232-4105)
- Lake and River Enhancement Program (Indiana DNR, 317-233-3871)
- Clean Water Act, Section 319, Nonpoint Source Management Program (Indiana DEM, 317-308-3208)
- State Nature Preserve Dedication (Indiana DNR, 317-232-4052)
- Stewardship Incentives Program (Indiana DNR, 317-232-4105)
- Wildlife Habitat Cost-Share Program (Indiana DNR, 317-232-4080)

### Private/Local

- Indiana Tree Farm (Indiana Hardwood Lumbermen's Association, 317-342-3851)
- Southern Lake Michigan Conservation Initiative (The Nature Conservancy, 219-473-4312)
- Wildlife at Work (Wildlife Habitat Council, 301-588-8994)
- Focus Area Projects (these might also be considered as acquisition programs)
  - examples: Blue River (The Nature Conservancy, 219-665-9141)
  - Fish Creek (The Nature Conservancy, 219-665-9141)

### Cooperative

- Natural Areas Registry (The Nature Conservancy, 317-923-7547; Indiana DNR, 317-232-4052)

### Abbreviations Used:

- NRCS (Natural Resources Conservation Service)
- DNR (Department of Natural Resources)
- DEM (Department of Environmental Management)
- EPA (Environmental Protection Agency)



## Education Programs

### Federal

- Environmental Education Grants (U.S. EPA, 312-353-3209)
- Environmental Software (U.S. EPA, 312-353-6353)
- Enviroscope watershed model (U.S. EPA, 312-353-7314)
- Wetlands Information Hotline (U.S. EPA, 800-832-7828)

### State

- Project Learning Tree (Indiana DNR, 317-290-3223)
- Project WILD (Indiana DNR, 317-290-3223)

### Private/Local

- Know Your Watershed  
(Conservation Technology Information Center, 317-494-9555)
- National Wetlands Conservation Alliance  
(National Association of Conservation Districts, 202-547-6223)
- Partners for Wetlands Protection Kit (Izaak Walton League, 301-548-0150)
- The Wetlands Project (Indiana Sierra Club, 317-231-1908)
- WOW! The Wonders of Wetlands (Environmental Concern, Inc., 410-745-9620)
- Soil and Water Conservation Districts (SWCD)  
example: Exploring Wetlands (Clark County SWCD, 812-256-6171)
- County Parks  
example: We Need Wetlands Activity Pack for Educators  
(St. Joseph County Parks, 219-654-3155)

### Cooperative

- Integrated Environmental Curriculum Wetlands Component  
(Sierra Club Wetlands Project, U.S. Fish & Wildlife Service,  
Indianapolis Zoo, 812-334-4261)

## Acquisition Programs

### Federal

- National Forest Land Acquisition Program (U.S. Forest Service, 812-275-5987)
- National Park Service Land Acquisition Program  
(National Park Service, 202-343-8124)
- National Wildlife Refuge System (U.S. Fish & Wildlife Service, 812-334-4261)
- North American Waterfowl Management Plan  
(U.S. Fish & Wildlife Service, 812-334-4261)

## State

- Indiana Heritage Trust (Indiana DNR, 317-232-4080)
- Land and Water Conservation Fund (Indiana DNR, 317-232-4070)
- Wetland Conservation Areas (Indiana DNR, 317-232-4080)

## Private/Local

- MARSH (Matching Aid to Restore States' Habitat)  
(Ducks Unlimited, No. of SR 26, 219-463-4353; So. of SR 26, 812-397-2740)
- Hoosier Landscapes Capital Campaign: Saving *Our* Last Great Places  
(The Nature Conservancy, 317-923-7547)
- Waters of Life Campaign (The Nature Conservancy, 317-923-7547)
- Focus Area Projects (these might also be considered as incentive programs)  
examples: Limberlost Swamp Remembered (219-997-6494)  
Little River Wetlands Project, Inc. (219-429-4565)
- Land Trusts  
examples: Acres, Inc. (219-422-1004)  
Oxbow, Inc. (513-471-8001)  
Sycamore Land Trust (812-336-5257)

## Cooperative

- Indiana Natural Heritage Protection Campaign  
(The Nature Conservancy, 317-923-7547; Indiana DNR, 317-232-4052)

## Regulatory Programs

### Federal

- Clean Water Act, Section 404, Permit Program (U.S. EPA, 312-886-0241; U.S. Army Corps of Engineers, Detroit District, 313-226-6828; Louisville District, 502-582-5607)
- Clean Water Act, Section 401, Water Quality Certification (Indiana DEM, 317-233-2482)
- Wetland Conservation (Swampbuster) Provision (NRCS, 317-290-3202)

### State

- Indiana Flood Control Act, IC 14-28-1 (Indiana DNR, 317-232-4160)
- Lakes Preservation Act, IC 14-26-2 (Indiana DNR, 317-232-4160)
- Lowering of Ten Acre Lakes Act ("Ditch Act"),  
IC 14-26-5 (Indiana DNR, 317-232-4160)
- Indiana Navigable Waterways Act, IC 14-29-1 (Indiana DNR, 317-232-4160)
- Indiana Water Quality Standards, 327 IAC 2-1 (Indiana DEM, 317-233-2482)

### Private/Local

- City Councils  
example: City of Auburn Wetlands Conservation Ordinance  
(City of Auburn Department of Building, Planning & Economic  
Development, 219-925-6449)

# Issues and Concerns in Wetlands Conservation

To be effectively implemented, or implemented at all, development of a wetlands plan must involve the people who will implement the plan as well as the people who will be affected by its implementation. In addition, an effective plan must address the major issues or concerns important to both the people implementing the plan and the people who will be affected by its implementation.

The issues and concerns relating to wetlands conservation in Indiana were identified through the:

- Wetlands Advisory Group
- Technical Advisory Team
- Project reviewers
- Public opinion survey (see next section)

Given the complexity of wetland ecosystems and wetland conservation efforts, it is not a surprise that the list of issues and concerns is a long and varied one. The major issues and concerns on which much of the *IWCP* is based are summarized below. They are not listed in priority order.

## **Wetlands Laws and Regulations**

A host of concerns with current state and federal wetlands conservation regulations exist from a diverse array of interests—from regulations being too strict (and not strict enough) to inconsistencies in enforcement (and too little enforcement) to problems with the permitting processes.

## **Wetlands Definition**

Different definitions are used in different situations causing confusion and misunderstanding.

## **Positive Incentives**

The need to provide positive incentives versus a focus on restrictions and regulations.

## **Comprehensive Plan**

The lack of a plan to guide efforts on a statewide basis.

## **Mitigation**

The lack of a comprehensive mitigation program that specifically includes (or specifically does not include) mitigation banking.

## **Quantitative Information on Indiana's Wetland Resources**

The lack of quantitative information on some aspects of Indiana's wetland resources is a major obstacle to improving wetland conservation efforts.

### **Dispute Resolution**

The lack of a process or forum for regulators and regulatees to work through disputes to find mutually beneficial solutions.

### **Education**

In a broad sense, the lack of knowledge for and appreciation of the critical functions provided by wetlands among different segments of the public.

### **Property Rights**

There is concern about the impact regulations and other management activities have on private property rights.

### **Prioritization**

The lack of priorities for conserving wetlands hinders the effectiveness of programs.

### **Access to Resources**

A concern that conservation programs will close wetland areas off to any type of use resulting in negative economic impacts. Also, the concern that wetland conservation efforts will take valuable agricultural land out of production.

### **Access to Information**

There is a tremendous amount of information on wetlands, but this information is often not readily available to the people who need it. Also, people may not be aware that the information exists.

### **Focus on Conservation**

Concern that public agencies will bow to political pressure and not do what is needed for wetlands conservation.

### **Wetlands and Public Health**

Concern that increasing wetlands in the state may increase the incidence of diseases such as malaria.

*“This issue of property rights is a very real concern for anyone with urban or rural property.”*

*—Gordon W. Barnett,  
Oakland City, Indiana*

# Indiana Residents' Opinions on and Attitudes toward Wetlands Conservation

Following are summarized results of a survey concerning Indiana residents' opinions on and attitudes toward wetlands and wetlands conservation. This survey was conducted in November 1995 by Responsive Management, Inc. through telephone interviews with 600 randomly selected Indiana residents. Complete survey results are available in a separate document titled *Indiana Residents' Opinions on and Attitudes toward Wetlands Conservation*.

## Hoosiers were asked if they were aware that there are wetlands in Indiana:

- 79% yes
- 21% no

## Those who said they are aware of Indiana's wetlands were asked how much they had heard about wetlands:

- 4% nothing
- 48% little
- 31% moderate amount
- 17% great deal

## 22 Those aware of Indiana's wetlands were asked what they thought was the status of Indiana's wetlands:

- 19% don't know
- 61% declining
- 19% healthy and stable

## When asked what benefits, if any, they associated with wetlands, Indiana residents responded (this question was open-ended, meaning no choices were provided, but people gave their own responses, and multiple responses were allowed):

- 53% wildlife habitat
- 21% don't know
- 17% part of ecosystem
- 13% no benefits
- 6% recreation
- 6% pollution control
- 14% other (responses included: aesthetic, maintenance of groundwater levels, flood control, and educational)

## When asked what drawbacks, if any, they associated with wetlands, Indiana residents responded (this question was open-ended):

- 43% no drawbacks
- 22% don't know
- 11% takes farmland out of production (17% of respondents who listed their residence as rural stated this response)
- 11% mosquitos
- 13% other (responses included: development, increased public ownership of land, disease, can't do anything with land, flooding, and increased crop damage)
- 10% other (no specific responses given)

## When asked their opinions about protecting wetlands:

- 80% of Indiana residents (69% of rural respondents) said they strongly or moderately support efforts to protect Indiana's wetlands (15% said neither/don't know, and 5% said they strongly or moderately opposed such efforts)
- 88% think it is very or somewhat important for the state to protect Indiana's wetlands (8% said don't know, and 5% said not at all important)

## Hoosiers were asked who should be responsible for protecting Indiana's wetlands:

- 45% state government
- 16% don't know
- 9% everyone
- 9% private landowners
- 6% other
- 5% federal government
- 11% private groups, municipalities, DNR, or no one



**When asked their opinions about methods of protecting wetlands (choices were: strongly oppose, moderately oppose, neither, moderately support, strongly support):**

- 52% strongly or moderately support tax breaks to private landowners who protect wetlands on their property
- 68% strongly or moderately support private conservation groups providing compensation to private landowners who protect wetlands on their property
- 72% strongly or moderately support the state of Indiana purchasing land containing wetlands
- 76% strongly or moderately support private conservation groups purchasing land containing wetlands
- 78% strongly or moderately support state regulations designed to protect wetlands

**Residents were asked how they thought wetland conservation efforts should be paid for (this question was open-ended):**

- 27% don't know
- 25% voluntary donations
- 19% redistribute state revenues
- 17% increase state taxes
- 14% private conservation groups
- 15% other (responses included: user fees, lottery, increase property tax, shouldn't be protected, and hunt/fish licenses)
- 4% other (no specific responses given)

**Residents were asked where they get their information about wetlands (this question was open-ended):**

- 39% newspapers
- 23% television
- 22% magazines
- 19% no information
- 15% personal experience
- 13% family/friends
- 23% other (responses included: school, private conservation organization, radio, Indiana DNR, hunting experience, farming experience, books, work, don't know, cooperative extension service, and library)
- 5% other (no specific responses given)

**When asked which source of wetlands information they considered most credible, Hoosiers responded:**

- 43% Indiana DNR
- 21% private conservation groups
- 19% U.S. Fish & Wildlife Service
- 9% farmers
- 9% none of these, friends/family, or celebrities

Great blue heron

Setting  
Direction

© Mark Romesser



# Wetlands Definition

Wetlands, which are also commonly known as swamps, marshes, bogs, potholes, bottomlands, playas, or pocosins, are the transition zones between open water and dry land. Isolated wetlands that are not associated with open water also occur. One of the biggest challenges in the conservation of wetlands has been in determining where to draw the boundary lines around them (i.e., where do they begin and where do they end?).

The process of drawing lines around wetlands on the ground is called wetland *delineation*. The agency with regulatory jurisdiction over a wetland is responsible for the delineation. (Different agencies have jurisdiction over different wetlands—depending on the program in question). A private consulting firm can perform a delineation for a landowner, but the appropriate regulatory agency has final decision-making authority. This process has been complicated by the fact that different agencies have used different wetland definitions as the basis for making delineations on the ground.

After much discussion, the Technical Advisory Team agreed upon a wetland definition for the *IWCP*. This definition has two components. The first component is the broad, scientific definition that sets the scope of what a wetland is. **This component of the definition is *not* regulatory in nature, and is not intended for use in making wetland delineations on the ground.**

The second component identifies the various state and federal regulatory definitions currently in place—definitions that are a reality for everyone who is impacted by or has impacts on wetlands in Indiana. The *IWCP* does not alter any existing regulatory definitions at any level, nor does it create any new regulatory definitions.

## Broad Wetland Definition

The *IWCP* recognizes the following scientific definition of wetlands:

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes:

- (1) at least periodically, the land supports predominantly hydrophytes;
- (2) the substrate is predominantly undrained hydric soil; and
- (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

(From Cowardin *et al.* 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service FWS/OBS-79/31. 104 pp.)

*“Definitions of such abstract concepts as wetlands are difficult to produce in such a manner as to satisfy all stakeholders. This definition fits the Plan well.”*

—Larry Hilgeman,  
Aristokraft, Inc.

*“As good a description of the ‘definition’ as I have seen.”*

—Phil Brechbill,  
Indiana Soybean Grower’s Association

NOTE: This is a scientific definition—not a regulatory definition. It is not intended for use in conducting regulatory delineations. The *Plan* also recognizes that there are other scientific definitions of wetlands in existence (e.g., the National Academy of Science, National Research Council: *Wetlands: Characteristics and Boundaries*). However, the *Plan* is non-regulatory in nature and therefore not dependent on a specific legal definition; and the Cowardin definition remains the most widely accepted and used scientific definition to date. Therefore, the WAG and the TAT agreed upon use of the Cowardin definition for purposes of the *IWCP* at this time.

## Regulatory Definitions of Wetlands

The *Indiana Wetlands Conservation Plan* recognizes that there are state and federal regulations currently in place that define and delineate wetlands for specific purposes. Therefore, parts of the *Plan* that come under the jurisdiction of these regulations will be subject to these definitions. The *Plan* does not add to or alter the existing regulations in any way.

**State of Indiana Definition** (from rules adopted by the Natural Resources Commission to help administer the Indiana Flood Control Act)

“Wetland” means 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 any of the following conditions are met:

- (A) The area predominantly supports hydrophytes, at least periodically, or the substrate is predominantly undrained hydric soil; for example, peat or muck.
- (B) 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.

**Environmental Protection Agency and U.S. Army Corps of Engineers Definition** (from Section 404(b) (1) Guidelines under Section 404 of the Clean Water Act (40 CFR Part 230.3(t)))

The term “wetlands” means 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.

## U.S. Department of Agriculture Definition (Food Securities Act, Part 12.2)

- (a) (29) *Wetlands* are defined as lands that —
- (i) Have a predominance of hydric soil; and
  - (ii) Are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions; and
  - (iii) Under normal circumstances do support a prevalence of hydrophytic vegetation.

# Goal

The goal is the end result that development and implementation of the *IWCP* is designed to achieve:

Conserve Indiana's remaining wetland resources, as defined by acreage, type, and function, and restore and create wetlands where opportunities exist to increase the quality and quantity of wetland resources.

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This goal embraces the following concepts:

- No-net-loss of wetlands. In other words, the necessity of impacting some wetlands is recognized, but the goal is to have no overall loss of wetlands.
- Conservation of existing wetlands is important in terms of acreage, type, and function. *Acreage* refers to the quantity or amount of wetlands. *Type* refers to the ecological community; for example, a bog or a marsh. *Function* refers to the role of wetlands in the environment; for example, groundwater recharge, flood water storage, or endangered species habitat.
- In most cases, restoring wetlands that have been drained or modified in some way is preferred to creating wetlands where none existed previously. However, there are opportunities for creating wetlands for specific purposes such as wastewater treatment.
- Includes preservation as part of conservation. Some wetlands are sensitive, and to the degree possible, should be protected from all human disturbance— what some people refer to as *preservation*. However, the conservation of many wetlands is compatible with other uses such as timber harvesting or hunting.
- Explicitly acknowledges the importance of conserving the quality of wetlands as well as the quantity of wetlands.
- The short-term goal is to conserve the wetland resources that exist in Indiana today. The long-term goal is to increase Indiana's wetland resources.
- Is consistent with the Indiana Department of Natural Resources' December 1, 1995 non-rule policy on wetlands conservation (Appendix D).



# Guiding Principles

The guiding principles describe the principles by which the *IWCP* has been developed and will be implemented. The *Indiana Wetlands Conservation Plan*.

*“The guiding principles are very well presented, showing that all interests involving wetlands and wetland conservation are being considered in this process.”*

—John Konik,

*U.S. Army Corps of Engineers, Detroit District*

1. Is based on the best scientific information available
2. Is fair—considers diverse points of view
3. Recognizes importance of wetlands to society
4. Recognizes private property rights
5. Addresses funding of wetland conservation efforts as a critical factor
6. Emphasizes voluntary, non-mandatory efforts
7. Strives for consistency
8. Emphasizes partnerships, cooperation, and coordination (efficiency of efforts)
9. Prioritizes—focuses efforts on priority wetlands
10. Encourages flexibility and creativity
11. Uses existing programs in the best way possible
12. Emphasizes and facilitates local involvement
13. Conserves wetlands on an ecosystem or watershed basis
14. Is practicable
15. Is long-term oriented—for future generations

*“The Plan is pragmatic and sets a good tone for the future direction of wetlands conservation in Indiana.”*

—Mike Litwin,

*U.S. Fish and Wildlife Service*

# Wetlands Conservation Priorities

Given the limited resources (time and funding) available for wetlands conservation, determining the number of acres and the types of wetlands that should be conserved will be a challenge. Such *prioritization*, however, is fundamentally important to the *IWCP*. The more specific the plan can be about how many acres of what types of wetlands need to be conserved and where they are, the more efficient and cost-effective the wetlands conservation strategies can be.

Two things make setting priorities difficult, especially on a statewide basis. First, as discussed in the Status section of this plan, detailed, up-to-date information on the location, status, and threats to existing wetlands is not readily available.

Second, and more important, the many functions and benefits derived from wetlands make it difficult to set priorities. For example, how do we compare the value of protecting existing wetlands or restoring drained wetlands for purposes of flood control versus for conserving biological diversity?

After considerable work, discussion, and review by both the Technical Advisory Team and Wetlands Advisory Group, the following recommendations were made regarding prioritization. These recommendations represent progress to date and do not constitute a complete prioritization process. They should be used as a starting point for implementing Actions 2.2.1 and 2.3.1 in the *Hoosier Wetlands Conservation Initiative* (page 40).

1. Given that 85% of Indiana's wetlands have been lost, all remaining wetlands are important and should be considered important for conservation. However, a system for prioritizing wetlands for conservation must be developed.
2. Priorities for conserving wetlands based on water quality, flood control, and groundwater benefits should be made at the watershed or sub-watershed level. Criteria for identifying priorities based on water quality, flood control, and groundwater benefits were developed and are included in Appendix E. A description of Indiana's 12 water management basins or "watersheds" is included in Appendix F.
3. Special concerns for water quality, flood control, and groundwater should be identified for each watershed. An initial list of concerns developed by the Technical Advisory Team is listed in Appendix F.

*"The Natural Resources Conservation Service of USDA is pleased with the process utilized over the past two years in preparing the first Indiana Wetlands Conservation Plan."*

*—Robert L. Eddleman,*

*Natural Resources Conservation Service*

4. Statewide priorities for conserving wetlands based on biological and ecological functions should be developed based on the following criteria:
  - a. Rarity of wetland type
  - b. Presence of endangered, threatened, or rare species
  - c. Presence of endangered, threatened, or rare species habitat, but species not yet identified at the site
  - d. Diversity of native species
  - e. Diversity of wetland community types
  - f. Proximity of other valued ecosystem types
  - g. Natural quality (amount of disturbance/degradation)
  - h. Irreplaceability (can the wetland type be re-created)
  - i. Recoverability (can the wetland type recover from disturbance it has experienced)
  - j. Size
  - k. Location

The priorities should be identified based on the natural regions currently used by the Indiana Department of Natural Resources, Division of Nature Preserves and many other agencies and organizations. The natural regions and wetland communities found in each watershed are identified in Appendix F. Wetland communities are described in Appendix G.

5. Historical and recreational benefits of wetlands should be considered in identifying priorities.
6. Based on the statewide biological and ecological priorities, a process should be developed to assist in identifying wetland priorities at the watershed or sub-watershed level.
7. Better information on Indiana's wetland resources is needed to more effectively identify scientifically based priorities described in Appendix G.

*"It's always inspiring to see a voluntary group putting so much time and energy into addressing issues and solutions together."*

—Cathy Garra,

*U.S. Environmental Protection Agency,*

*Region 5*

# Case Studies

Following are a few of the focus area efforts that exist in Indiana. These samples were selected to show the variety of ways that local people, agencies, and organizations can work together for wetlands conservation.

## Case Study: Fish Creek Watershed Project

### **A Nationally Acclaimed Project**

The Fish Creek Watershed Project has been hailed around the country as a model for local area watershed conservation efforts. How did this project come by such high praise?

### **It Started With a Cat's Paw**

A 1988 survey of the St. Joseph/Maumee River watershed in northeast Indiana showed that populations of mussels (freshwater clams) had severely declined. In addition, the survey found that one particular mussel, the white cat's paw pearly mussel, was exterminated in the watershed with the exception of one tributary—Fish Creek.

Although the potential loss of any species was cause for grave concern, perhaps of greater concern was the reason for the loss. Mussels are indicators of water quality, and severe declines in mussel populations meant severe declines in water quality. As a result, a federal/state/private partnership was formed among the U.S. Fish and Wildlife Service, Natural Resources Conservation Service, Indiana and Ohio Departments of Natural Resources, and The Nature Conservancy to address problems in the Fish Creek watershed. By 1992, the partnership swelled to 13 organizations, and had a full-time coordinator, Larry Clemens. "The first thing we did was to form an advisory group of people from the local area," says Clemens. "The partners come up with good ideas, but the advisory group figures out how to implement them on the ground."

### **What's Being Done?**

Project partners determined that erosion and excessive runoff were the primary causes for the decrease in Fish Creek's water quality, and they focused their attention on reducing or eliminating these causes. Wetlands can play a major role in those efforts. Says Clemens: "Wetlands are known to slow the flow of water, reducing soil erosion and siltation in the creek. They are also able to filter out harmful chemicals and excess fertilizers that run off from agricultural fields, industrial sites, and suburban lawns."

*"One of the best outcomes of this Plan could be to inspire local communities to learn from the successful case studies listed here and duplicate these successes around our State."*

*—Jon Voelz,*

*Indiana Wildlife Federation*

*"The first thing we did was to form an advisory group of people from the local area. The partners come up with good ideas, but the advisory group figures out how to implement them on the ground."*

*—Larry Clemens,*

*Fish Creek Watershed Project*

*“Gathering a diverse group of agencies, organizations, and individuals together is the key to success in this kind of effort.”*

*—Larry Clemens,*

*Fish Creek Watershed Project*

In addition to voluntarily restoring wetlands, partners also encouraged local landowners to plant trees and filter strips along the Fish Creek corridor, and encouraged farmers to adopt conservation tillage practices to reduce erosion. And they don't just talk about it either. Partner organizations provide the technical expertise needed to do the projects right. Perhaps more importantly, they provide cost shares and other funding for these measures through internal programs as well as grants received from outside sources.

### **Partnerships Are the Key**

According to Clemens, “Gathering a diverse group of agencies, organizations, and individuals together is the key to success in this kind of effort. We found it worked best to keep the partnership informal. Every partner brings different talents and resources to the table, and we don't worry about who's getting recognition for it.”

Clemens highly recommends that the partnership have a full-time, locally based coordinator who can keep things moving forward. “It means a lot to the local interests when you can meet with them face-to-face. Then the partnership becomes real—it has a name and a face—and it's not just a pie-in-the-sky idea anymore.” Clemens also says that getting the “right” local people involved can make a big difference. “We sought support and participation from community and neighborhood leaders in addition to leaders in the local units of government. Probably the best promotion that the partnership gets is through word-of-mouth among neighbors.”

Interestingly, the partnership aspect also helps when it comes to funding the conservation efforts. “Partnerships is a buzzword in the fund-raising arena,” says Clemens. “People want to give to partnerships because they know their money will go farther and be used more effectively that way.” Clemens points out that location can also play a role in funding. “There's a lot of national attention being placed on water quality in the Great Lakes Region right now. It's a good time to get funding for these critical efforts from the Environmental Protection Agency, Great Lakes National Program Office and Great Lakes Commission.”

As final words of advice to other local areas who are considering forming a partnership like Fish Creek, Clemens says: “Put a high priority on getting some projects done right away. It's a lot easier to build and sustain momentum for the whole effort when you can point to a restored wetland or a completed tree planting.”

**For more information, contact Larry Clemens, (219) 665-9141.**



## Case Study: Little River Wetlands Project

### Thinking Big

When Paul McAfee, Jane Dustin, Keith McMahon, and Carl Hofer sat down to discuss wetland conservation in 1989, they were thinking big. Specifically, they were discussing the possibility of forming a large nature preserve in northeast Indiana. What arose from that discussion was the Little River Wetlands Project, Inc. (LRWP).

The LRWP became a not-for-profit corporation in 1990 with the official mission of: *Facilitating the restoration of wetlands in the Little River watershed and providing educational opportunities that inspire and challenge individuals to be good stewards of all natural resources.* Although they are legally able to acquire land (and willing if the need arises), the LRWP is just as interested in the educational side of wetlands conservation. Paul McAfee, one of LRWP's founders, puts it this way: "We want to get the next generation involved in conservation efforts today."

### Cooperation With Other Interests

When a sanitary landfill in the watershed planned to expand, filling an existing wetland, the LRWP sprang into action. After researching the proposed action and all the alternatives, the LRWP decided it was in everyone's best interest to cooperate with the landfill company and help them successfully restore a 14-acre wetland in a nearby protected area as mitigation. Because of their cooperative, reasonable approach, they were able to help plan the restoration, successfully lobbied for inclusion of a wetland boardwalk, and coordinated the participation of local high school students to help plant trees—a wonderful educational experience for the students.

The LRWP works with landowners throughout the watershed, helping them plan restorations and other conservation practices, and putting them in touch with the right agencies and organizations when they have questions or problems. Throughout these efforts, McAfee explains how they always keep their educational goals in mind. "Whenever possible, we try to get agreements with landowners where we provide the trees and planting labor in exchange for use of the wetland for educational purposes."

### The Bottom Line

"We have shown ourselves, the community, corporations, and other agencies that by working together it is possible to make the best of any situation," says McAfee. "By taking a proactive approach to wetlands conservation, a not-for-profit organization can restore wetlands, and in the process, help people learn more about wetland ecology and ultimately about the environment as a whole."

**For more information, contact Paul McAfee, (219) 489-5032.**

*"We have shown ourselves, the community, corporations, and other agencies that by working together it is possible to make the best of any situation."*

—Paul McAfee,

*Little River Wetlands Project*

*“We said from the very beginning that we can’t wait on someone else to come along and help us do this. We said if we’re going to get it done, we’ve got to be the ones to get out there and do it.”*

*—Norma Flannery,  
Oxbow, Inc.*

## Case Study: Oxbow, Inc.

### Protecting the Land

While some focus area groups pursue a wide range of wetland conservation efforts, such as restoration, enhancement, and education, Oxbow, Inc. has chosen to focus on a much narrower strategy—permanent protection of existing wetlands.

The “Oxbow” is a 2,500-acre area of Ohio River bottomlands and floodplains along the Indiana/Ohio border. It is one of the few remaining wetland ecosystems within 100 miles of the Cincinnati, Ohio, metropolitan area. As such, it provides critical habitat to many kinds of wildlife, including more than 275 species of birds. It also provides water quality and flood control functions to the Great Miami River and the Ohio River.

### The Rallying Point

In 1984, a bill was introduced into the Ohio Senate that would have established an industrial port on the Ohio River in the Oxbow area. Recognizing that this would significantly alter the ecological integrity of this unique area, several local conservation organizations and many concerned individuals conducted a letter-writing campaign that caused the bill to be withdrawn. The Oxbow was spared. In the wake of their successful efforts, the loosely knit group decided to incorporate into a not-for-profit organization in order to help prevent future attempts at converting this area from its natural state. Thus was born Oxbow, Inc.

“Our goal is to conserve and protect the natural integrity of the Oxbow area,” says Norma Flannery, president of Oxbow, Inc. “We do this through the purchase of permanent conservation easements or outright purchase of land.” Oxbow, Inc. has not pursued restorations, enhancements, or other wetland-related projects. “We only have so much time, money, and energy,” says Flannery. “Sometimes, people call us up with an interest in restoring a wetland on their property. We try to put them in touch with someone who can help, but we don’t get involved ourselves. That’s just not our focus.”

The Oxbow area comprises 1,000 acres in Ohio and 1,500 acres in Indiana. By involving county agencies in their project, Oxbow Inc. was successful in encouraging the Hamilton County (Ohio) Park District to secure conservation easements on 99% of the Ohio acreage. Consequently, their current efforts are directed at the Indiana side of the line. “Easements work well for us and for the landowner,” says Flannery. “Much of the land around here has been in people’s families for more than a century, and they don’t want to part with it. Who can blame them? We just want to see this unique ecosystem protected in its natural state. A conservation easement is the tool that allows both the landowner and Oxbow, Inc. to satisfy their individual priorities.”

Oxbow, Inc. is a grassroots organization that has more than 1,100 members from around the country. It is funded primarily through membership dues, although it has been the recipient of several large settlements from industries that have caused pollution in the area.

### **Getting It Done**

For other focus area efforts just getting started, Flannery offers this advice: “Try to attract prominent members of the local communities to join your effort. They have the financial resources and influential friends that can really help—especially when you’re just getting started.” Although she admits that fortunate timing had a lot to do with the success of Oxbow, Inc., Flannery also credits the can-do attitude of the members and the Board of Directors. “We said from the very beginning that we can’t wait on someone else to come along and help us do this. We said if we’re going to get it done, we’ve got to be the ones to get out there and do it.” To date, 1,541 acres are preserved or protected. So far so good.

**For more information, contact Norma Flannery, (513) 471-8001.**

## Case Study: Cedar Creek Watershed Alliance

### **Clean Drinking Water and a Lot More**

No one wants to drink water that is laced with pesticides and herbicides, yet that is the reality that faced the 175,000 residents of Fort Wayne and other cities and towns along the St. Joseph River in northeast Indiana. Today, some forward-thinking people are working together to do something about it.

Cedar Creek winds its way through prime agricultural lands before emptying into the St. Joseph River above Fort Wayne. Chemicals that do wonderful things for crop yields were finding their way into city water supplies, where they were not at all welcome. Fort Wayne water treatment officials and local environmental organizations took on individual aspects of the problem as best they could, but there was no coordinated effort to address the overall situation.

Then in 1994, a Noble County commissioner (Harold Troyer), suggested that a broad array of agencies, organizations, and individuals should work together to try to resolve the water quality issues in the Creek and its watershed. Thus began the Cedar Creek Watershed Alliance (CCWA).

*“Most landowners want wetlands restored on their property because they provide such great wildlife habitat. The water quality and flood control benefits are just icing on the cake.”*

*—Randy Jones,*

*Cedar Creek Watershed Alliance*

### **How to Get Started?**

Based on Troyer’s recommendation, a core group of about 20 people who shared a common concern came together to form the CCWA. Most members represent other agencies and organizations, including the city of Fort Wayne, Allen County Soil and Water Conservation District, Natural Resources Conservation Service, Indiana Department of Natural Resources, Izaak Walton League, Pheasants Forever, and others.

Originally, the group was part of the Maumee River Basin Commission, which covers Dekalb, Noble, and Allen counties. There are several river basin commissions in Indiana, and these can be very helpful to local area efforts just getting started. The Maumee River Basin Commission helped the group get on its feet, then took a back seat so that local interests could take control. A local farmer now serves as the CCWA project chairman. Randy Jones, who is a project coordinator for the Allen County Soil and Water Conservation District, is the watershed coordinator, and his office serves as the project headquarters. “Having an agency person serve as coordinator has several advantages,” says Jones. “It allows the effort to have a full-time representative, a permanent mailing address and phone number, and often provides exposure for the project through the agency contacts.”

### **Wetlands Can Help**

Jones recalls how the CCWA recognized the benefits of wetlands early on: “We talked about how wetlands within the watershed could provide many functions that would help our cause. [Wetlands] are able to take up or filter out many pesticides, herbicides, and fertilizers that run off agricultural lands, keeping them out of the water supply.” The CCWA has worked together with the U.S. Fish and Wildlife Service to help interested local landowners restore and enhance wetlands on their property. “Most landowners want wetlands restored on their property because they provide such great wildlife habitat,” says Jones. “The water quality and flood control benefits are just icing on the cake.”

### **How Does the Group Operate?**

As the core group of the CCWA came together, they agreed that they needed a systematic approach for discussing issues and making decisions. At the suggestion of the Soil and Water Conservation District, the group decided to use the Coordinated Resource Management process. In this process, participants have a facilitated discussion about an issue until everyone agrees on a single course of action. This process seeks to find common ground and to avoid creating

“winners and losers,” as often happens when issues are decided by voting. “I would strongly recommend the Coordinated Resources Management (CRM) process to anyone who is considering starting a local conservation effort such as ours,” asserts Jones. “Gather all your interested parties together and get CRM training at the very beginning. It will really pay off in everything you do.”

### **Bigger and Better**

Today, the CCWA is part of an even larger watershed conservation effort, the St. Joseph River Watershed Initiative. This initiative is comprised of local efforts (such as the CCWA) in Indiana, Michigan, and Ohio—along the entire length of the St. Joseph River and its tributaries. It just goes to show what can be accomplished by a few determined people working together.

**For more information, contact Randy Jones, (800) 748-3704.**

## Case Study: Grand Kankakee Marsh Restoration Project

### **The Big One**

In Indiana, the Grand Kankakee Marsh Restoration Project (GKMP) is “the big one.” With a budget of nearly 4 million dollars, it is larger in size and scope than any other Indiana wetland conservation project currently in existence. However, despite its scope, it is still managed and administered by local people through a partnership of private organizations, corporations, and local, state, and federal agencies. Although it was developed and funded through unique circumstances, there is still much that other local area efforts can learn from the GKMP experience.

### **No Other Place Like It**

At one time the Grand Kankakee Marsh covered up to one million acres of Indiana’s northwest corner, from South Bend to the Illinois line. Historical accounts of the waterfowl and other wildlife in the marsh are the stuff of dreams. Beneath the marsh lay the stuff of other kinds of dreams—fertile farmland—and as early as 1850, settlers began to drain the marsh for farming. By the early 1900s the drainage was completed, and today only small remnants of the original marsh remain.

*“The first thing we did was to put together a steering committee made up of local people. In order to be successful, this effort had to be run at the local level.”*

*—George Seketa,*

*Grand Kankakee Marsh Restoration Project*



*“You’ve got to have dedicated, locally based people who are open-minded and willing to work together for common goals.”*

—George Seketa,  
Grand Kankakee Marsh  
Restoration Project

The history of the marsh has lived on in the minds of many area residents. This, combined with a deteriorating agricultural drainage system and the potential for funding under the North American Wetland Conservation Act, led to the establishment of the Indiana Grand Kankakee Marsh Restoration Project in 1993.

### **A Unique Situation**

Recognizing that wetlands provide many benefits to society, Congress passed the North American Wetland Conservation Act, which makes funds available to states for wetland conservation. Through this Act, the GKMP became eligible for a grant of a whopping 1.5 million dollars—but there was a catch. The grant had to be matched with money from the state.

To help achieve this goal, the Indiana Department of Natural Resources appointed a project coordinator, George Seketa. “The first thing we did was to put together a steering committee made up of local people,” says Seketa. “In order to be successful, this effort had to be run at the local level.” The steering committee developed a project plan and then sought out other partners to help fund the Indiana portion of the matching grant.

These efforts proved very successful, as 13 partners stepped forward and raised \$2.3 million in cash, land donations, and in-kind services. Partners include Northern Indiana Public Service Company, Lake County Parks and Recreation Department, Waterfowl USA, Ducks Unlimited, Kankakee River Basin Commission, The Nature Conservancy, and others. New partners are welcome to join the effort at any time.

### **How Does It Work?**

Based on technical expertise of the partners, the local steering committee decides how to use the grant money to best achieve the GKMP’s guidelines, which are to protect, restore, enhance, and manage wetland habitats in the Kankakee River watershed. All lands that are acquired by the project are purchased from willing sellers. Each parcel has a management plan developed for it, and after all restoration and enhancement work is completed, ownership of the parcel is turned over to a local entity, such as a county parks and recreation department. If no local entities are interested in ownership, the title becomes state ownership. Through this process, GKMP will purchase and restore nearly 4,500 acres of wetlands and associated uplands during the first two years of the project.

### **Keys to Success**

Seketa believes that having the right steering committee is a major factor in making local area efforts successful. “You’ve got to have dedicated, locally based people who are open-minded and willing to work together for common goals,” he says. He also believes that selecting the right chairperson of the committee is critical. Once the committee and chairperson are in place, they must develop a plan of action that communicates their vision and mission to the public and to potential project partners. “Grants and other sources that provide money on a matching basis are the best bet for project funding,” Seketa says, “because they create and encourage the formation of partnerships, which makes all of the efforts more powerful.” The final keys to success that Seketa mentions are the intangibles. “Sometimes, you just need some good luck—to be in the right place at the right time. That’s what happened with the GKMP; I still can’t believe we’ve done what we’ve done.”

**For more information, contact Dick Blythe (Project Chairman), (219) 924-4403.**

*“Sometimes, you just need some good luck—to be in the right place at the right time.”*

*—George Seketa,  
Grand Kankakee Marsh  
Restoration Project*

Yellow warbler



Hoosier

Wetlands

Conservation

Initiative



The *Hoosier Wetlands Conservation Initiative* is the action part of the *IWCP*. It represents a strategic approach to conserving Indiana's wetland resources. Carrying out the actions identified in this *Initiative* over the next two years (1996-98) will make significant progress in conserving Indiana wetlands, and just as importantly, lay the foundation for long-term, sustainable wetland conservation efforts with broad public support.

## A Strategic Approach

The Initiative has six strategic components:

1. **Focus areas.** The cornerstone of the *Initiative* is an emphasis on planning and implementing the *IWCP* through local (watershed or sub-watershed level) wetland conservation partnerships. Projects driven by local wetland conservation needs and local people will be most effective.
2. **Increased scientific information on Indiana's wetland resources.** Obtaining more 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.
3. **Positive incentives.** Positive incentives that motivate people to voluntarily conserve and restore wetlands are emphasized.
4. **Education.** The *Initiative* emphasizes targeted educational efforts for technical staff, people who own/work the land, school children, and other audiences. This component seeks to provide better, more timely information on wetlands and wetlands-related programs and an increased understanding of the functions and benefits of wetlands.
5. **Acquisition.** The *Initiative* seeks to acquire permanent protection for the highest priority wetlands from willing owners.
6. **Continued work of the Wetlands Advisory Group and Technical Advisory Team.** The *IWCP* is the tangible result of work by and input from many people and groups over the past year, but especially the Wetlands Advisory Group and Technical Advisory Team. This *Initiative* details great progress. However, the development of a statewide, comprehensive effort to conserve Indiana's wetland resources is not complete. Implementation of the *IWCP*, including the *Initiative*, should be facilitated through the Wetlands Advisory Group and Technical Advisory Team in the same cooperative, partnership approach that has been used to develop the *IWCP*. The Indiana Department of Natural Resources should provide the leadership and coordination support needed to continue this process.

*"The Hoosier Wetlands Conservation Initiative is the key to making things happen."*

—Will Ditzler,  
J.F. New & Associates

# Objectives and Actions

Listed below under each of the six strategic components are specific objectives (what will be accomplished) and actions (how they will be accomplished and when). Following the six components is a section called “Funding the *Initiative*,” which outlines how the *Initiative* will be funded and where the money will come from.

## 1. Focus areas

### Background

The cornerstone of the *Initiative* is an emphasis on planning and implementing the *IWCP* through local wetland conservation partnerships. Although many existing wetland conservation programs are administered at the state or federal levels, implementation and application at the local level is the most effective means for delivery. Many successful focus area projects are already in place in Indiana. The case studies (page 31) illustrate the diversity and effectiveness of focus area projects.

**Objective 1.1** Increase the number of focus area projects in Indiana.

**Action 1.1.1** Promote the benefits of and need for focus area projects in promoting the *IWCP* (see Action 4.1.1).

**Action 1.1.2** By May 1997, develop a *Wetlands Focus Area Sourcebook* that provides guidelines for forming focus area projects.

Whether focus area projects are initiated and/or funded by state or federal resource agencies, conservation organizations, or concerned citizens, there are some “lessons learned” that will help focus area projects form in a way that will be as productive as possible. Some considerations for development of the focus area guidelines:

- Involve soil and water conservation districts and county drainage boards.
- When possible, have project coordinators (paid staff) at focus area level to assist with/coordinate:
  - Project planning
  - Incentives
  - Education
  - Information on programs
  - Information on regulations
  - Identification of future needs

*“We support the objectives and actions identified in the Indiana Wetlands Conservation Plan. We will continue to participate in its implementation along with other stakeholders who are interested in conserving vital wetland resources.”*

—Kathy Prosser,  
Indiana Department of Environmental  
Management



- Have a “Project Team” of local interests that guides the project.
- Seek funding package for seed money from a variety of sources—federal, state, local, private.
- Emphasize the multiple functions and benefits of wetlands—integrate water quality, flood control, wildlife habitat, timber production, and recreational programs.
- Design in ways to leverage existing programs and money.
- Consider variabilities between areas—a strength of the focus area approach.
- Recognize that these efforts are long-term.

Additional information in the handbook would include:

- Funding sources.
- Wetland conservation programs, materials, and contacts.

**Action 1.1.3** Provide funding to get focus area projects started.

A description of options should be included in the *Wetlands Focus Area Sourcebook*. Examples of potential sources of funding include: 1) the Nonpoint Source Program funded through the Indiana Department of Environmental Management under Section 319 of the Federal Clean Water Act; 2) the Lake and River Enhancement Program (LARE) in the Division of Soil Conservation, Indiana Department of Natural Resources; and 3) wetland restoration programs sponsored by the U.S. Fish and Wildlife Service.

**Objective 1.2** Increase the effectiveness of existing focus area projects.

**Action 1.2.1** Provide funding (see Action 1.1.3).

**Action 1.2.2** Develop a *Wetlands Focus Area Sourcebook* by May 1997 (see 1.1.2).

**Action 1.2.3** By May 1997, create a statewide network to share information, experiences, and expertise among focus area projects.

*“The IWCP is a product of significant effort by a great number of people which will potentially play an important role in resource conservation in Indiana.”*

*—Bob Hittle,*

*American Consulting Engineers, Inc.*

## 2. Increased scientific information on Indiana wetland resources

### Background

The lack of quantitative information on some aspects of Indiana’s wetland resources is a major obstacle to improving wetland conservation efforts. 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. High priority should be attached to achieving these scientific information objectives.

*“The IWCP is a long needed guide to understanding and managing wetlands for the people of the state of Indiana.”*

*—Thomas R. Anderson,  
Save the Dunes Council*

**Objective 2.1** Have a standardized method for functional assessment of wetland quality in place by May 1998.

Some individual wetlands of one type are higher quality than others of the same type and thus should be given a higher priority for conservation. A standardized method for assessing wetland quality is needed. Both existing and new methods for functional assessment should be considered.

**Action 2.1.1** The next steps for obtaining a functional assessment method will be determined by the Technical Advisory Team and Wetlands Advisory Group.

**Objective 2.2** Have an inventory system capable of quantitatively identifying and monitoring Indiana’s wetlands in place by May 1998.

This is a major undertaking. It is important to note that the system for conducting the inventory should be in place by May 1998, but it is unlikely the actual inventory will be completed by then. The inventory system would be designed to try to answer the following questions:

- How many of what types of wetlands are there in Indiana and where are they found?
- How many of what types of wetlands are we gaining or losing?
- What is causing the gain or loss?
- What impact do specific wetland conservation programs, regulations, and policies have on wetland resources?

The inventory should be updated at regular, periodic intervals.

**Action 2.2.1** By March 1997, a task force should develop a description of the system needed, the costs to get it established, and a timetable for having it in place by the target date of May 1998.

The task force should be multi-disciplinary with representatives from resource agencies, universities, and the private sector.

**Objective 2.3** Prioritize Indiana’s wetlands for conservation by community type and watershed by May 1999.

**Action 2.3.1** Develop a process that integrates the inventory described in Objective 2.2 with the Natural Heritage Inventory database. The process should consider the multiple functions and benefits of wetlands and should incorporate monitoring information from the focus area projects.

**Objective 2.4** Have a method for assessing the impacts (costs and benefits) of wetland conservation efforts on local economies, communities, agricultural production, tax revenues, etc.

*Action 2.4.1* By March 1997, a task force should develop a description of the impacts that need to be assessed and a process for assessing them.

### 3. Incentives—positive incentives to voluntarily conserve and restore wetlands

#### **Background**

A variety of positive incentives to voluntarily conserve and restore wetlands is currently available in Indiana. Although these have been very popular and successful in conserving wetlands, with additional funding and/or promotion, they could be more effective. Existing incentives should be better utilized and additional incentives should be developed to fill priority needs.

**Objective 3.1** Identify existing, effective incentives and specific additional incentives needed in Indiana.

*Action 3.1.1* Compile an inventory of existing federal, state, local, and private incentives.

This inventory has been completed as part of the *IWCP* project. Detailed information on the incentives listed on page 17 of the *IWCP* are available in a separate document titled *A Summary of Wetlands Conservation Programs in Indiana*.

*Action 3.1.2* Assess incentive opportunities, review existing incentives, and identify modifications or additional incentives with the interests to whom the incentives are/will be targeted—the “end-users” (owners of agricultural land, owners of forested land, developers, owners of public land, lake associations, conservation groups, etc.) by August 1997. Additional considerations:

- Because the different interests will likely have different concerns and motivations, input from *all* interests should be gathered. Their input should be substantive—*they* should identify the incentives.

*“The Plan represents a significant effort to define the status of wetlands and develop public education and awareness of wetlands.”*

—Stephanie Morse,  
*Consulting Engineers of Indiana*

*“[The Plan represents] lots of dedicated effort moving in the right direction!”*

*—David Grandstaff,*

*Wawasee Property Owners Association*

- Consider incentives for:
  - Conservation of existing wetlands.
  - Restoration and then conservation of drained or modified wetlands.
  - Creation of wetlands.
- Identify needs for specific focus area projects, and promote and deliver incentives through the focus areas.

#### 4. Education—targeted efforts for technical staff, people who own/work the land, school children, and other audiences

##### **Background**

The need for better, more timely information on wetlands and wetlands-related programs, and an increased understanding of the functions and benefits of wetlands have been consistently identified as high priority needs. This call for *education* comes from a broad diversity of interests, including environmental groups, developers, and county surveyors, who identify a lack of information and misunderstanding as major obstacles. *Education* is a broad topic. The following objectives and actions focus efforts through 1998. The efforts should be delivered at both statewide and focus area levels.

**Objective 4.1** Inform Hoosiers of the *IWCP*—what it is, what it means to them, and how they can get involved.

*Action 4.1.1* Distribute information directly by mailing copies of the *IWCP* to all interests and communicating through the media upon completion of the *IWCP* in May 1996. In addition:

- Use existing mechanisms and programs.
- Emphasize the multiple benefits and functions of wetlands.
- Make all *IWCP*-related information available on the Internet.

**Objective 4.2** Identify existing, effective education efforts and specific additional education efforts that are needed in Indiana.

*Action 4.2.1* Compile an inventory of existing education efforts.

This inventory has been completed as part of the *IWCP* project. Detailed information on the education efforts listed on page 18 of the *IWCP* are available in a separate document titled *A Summary of Wetlands Conservation Programs in Indiana*.

**Action 4.2.2** Assess needs, evaluate existing efforts, and identify modifications and additional efforts needed by August 1997. The assessment should include three entities from throughout the state:

- People who represent the “recipients” of the information (landowners, developers, soil and water conservation districts, etc.).
- Wetlands conservation entities (technical people).
- Education community (people involved in conservation and environmental education as well as education in general).

**Objective 4.3** Improve the accessibility of existing wetlands information to all interests.

**Action 4.3.1** Develop outreach efforts for interests that currently have direct impacts on wetlands. Considerations include:

- The efforts should be developed cooperatively with the various interests—developers, county surveyors, farmers, soil and water conservation districts.
- The efforts should be small group-oriented (e.g., seminars, workshops, and one-on-one contacts).
- Emphasize wetlands avoidance by providing information on techniques for designing projects and conducting operations and land management practices in ways that avoid adverse impacts on wetlands.
- Deliver and coordinate efforts through the Wetlands Advisory Group, Technical Advisory Team, and focus areas.
- Emphasize two-way exchange of information.

*“The Indiana Wetlands Conservation Plan is comprehensive and addresses the problems in a thorough manner. It seems eminently workable.”*  
—Norma Flannery,  
Oxbow, Inc.

## 5. Acquisition—efforts to acquire permanent protection for priority wetlands from willing owners

### Background

Acquisition of enough land to conserve all of the functions and benefits wetlands provide in Indiana and to achieve the goal of the *IWCP* is neither feasible nor desirable. However, there is broad support for providing permanent protection of some wetlands because of their rarity, susceptibility to loss, or other factors. It is important to emphasize that acquisitions should be from willing sellers and that permanent protection can be obtained in ways other than fee title such as permanent easements.

**Objective 5.1** Identify long-term, statewide wetland acquisition priorities.

*Action 5.1.1* Compile an inventory of existing acquisition efforts.

This inventory has been completed as part of the *IWCP* project. Detailed information on the acquisition efforts listed on page 18 of the *IWCP* are available in a separate document titled *A Summary of Wetlands Conservation Programs in Indiana*.

*“This document has obviously been well thought out.”*

—James H. Keith,  
*Earth Tech*

*Action 5.1.2* By May 1999, develop long-term acquisition priorities based on the overall wetland conservation priorities identified under Action 2.3.1.

**Objective 5.2** Increase acquisition efforts for current high priority wetlands from willing sellers.

*Action 5.2.1* Provide additional funding to the Heritage Trust Program.

*Action 5.2.2* Provide funding for high priority wetlands identified through focus area projects.

**Objective 5.3** Address the issue of tax revenue reductions to local communities as a result of wetland acquisition programs.

*Action 5.3.1* Review options for addressing this issue based on the results of the task force work identified in Action 2.4.1.

## 6. Continue the work of the Wetlands Advisory Group and Technical Advisory Team

### **Background**

Both the Wetlands Advisory Group and Technical Advisory Team feel strongly that the approach used in developing the *IWCP* has been very effective, but considerable work remains.

The objectives and actions listed above can be most effectively achieved through continuation of the work of the Wetlands Advisory Group and Technical Advisory Team—through the same cooperative, partnership approach that has been used to develop the *IWCP*.

The benefits of this partnership approach are threefold:

1. Most of the expertise needed to address Indiana’s wetlands conservation issues is found in these two groups, and people whose expertise is needed can be recruited to participate.



2. The majority of statewide interests that affect or are affected by wetlands conservation efforts are represented. Interests not represented can be recruited to participate.
3. It is cost- and time-efficient. New organizations, programs, divisions, or sections are not created to develop or administer the *IWCP*. Instead, the activities of existing organizations are coordinated in a synergistic way.

The Wetlands Advisory Group and Technical Advisory Team should continue to function through at least 1998. Their role should include:

- Continuing as a forum for information-sharing, problem-solving, and discussion.
- Guiding overall work on the *IWCP*.
- Facilitating implementation of various actions identified in the *IWCP*.

As in the development of the *IWCP* to date, the Indiana Department of Natural Resources should provide the leadership and coordination support needed to continue this process.

In addition to the components, objectives, and actions identified above, two important issues that should be addressed in the continued work of the Wetlands Advisory Group and Technical Advisory Team are:

**Wetland Mitigation.** Considerable work has been done in other states and some progress has been made in Indiana to address this critical issue. There is a need for a clearly defined program that addresses mitigation banking.

**Wetland Regulations.** The need for improved coordination, efficiency, and consistency of local, state, and federal wetland regulations is a priority. Considerations for improving coordination, efficiency, and consistency of regulations through the *IWCP* process:

- Information on existing regulations and how to work with them should be communicated through the focus areas.
- Considerable progress can be made to address coordination and consistency issues through the focus areas efforts.
- Federal wetlands legislation and regulations are currently being reviewed by Congress and may change dramatically in the coming months.

*“I think the Indiana Wetlands Conservation Plan was much-needed and long overdue.”*  
—John McNamara,  
St. Joseph County Surveyor

*“The Indiana Wetlands Conservation Plan was very well formulated by a broad cross section of people.”*  
—Ursell Cox,  
Indiana Builders Association

# Funding the Initiative

The objectives and actions above describe what end results are desired, what actions should be taken to achieve those end results, and in most cases, identify a time frame for when they should be accomplished. However, in the real world, very little is accomplished without money.

When it comes to funding wetland conservation efforts, a few things are clear:

*“Funding must occur first and foremost- BEFORE THE PLAN is IMPLEMENTED! The costs should not be placed solely on the property owner, or the county!”*

—Jay D. Poe,  
Huntington County Surveyor

- In this era of agency down-sizing and tight budgets, extra diligence in spending public money (and private money for that matter) is imperative.
- Funding for existing local, state, and federal government wetlands conservation programs should be used in the most effective manner possible.
- Additional funding for wetland conservation efforts must come from all levels (local, state, and national) and all sources (business, conservation, and government).

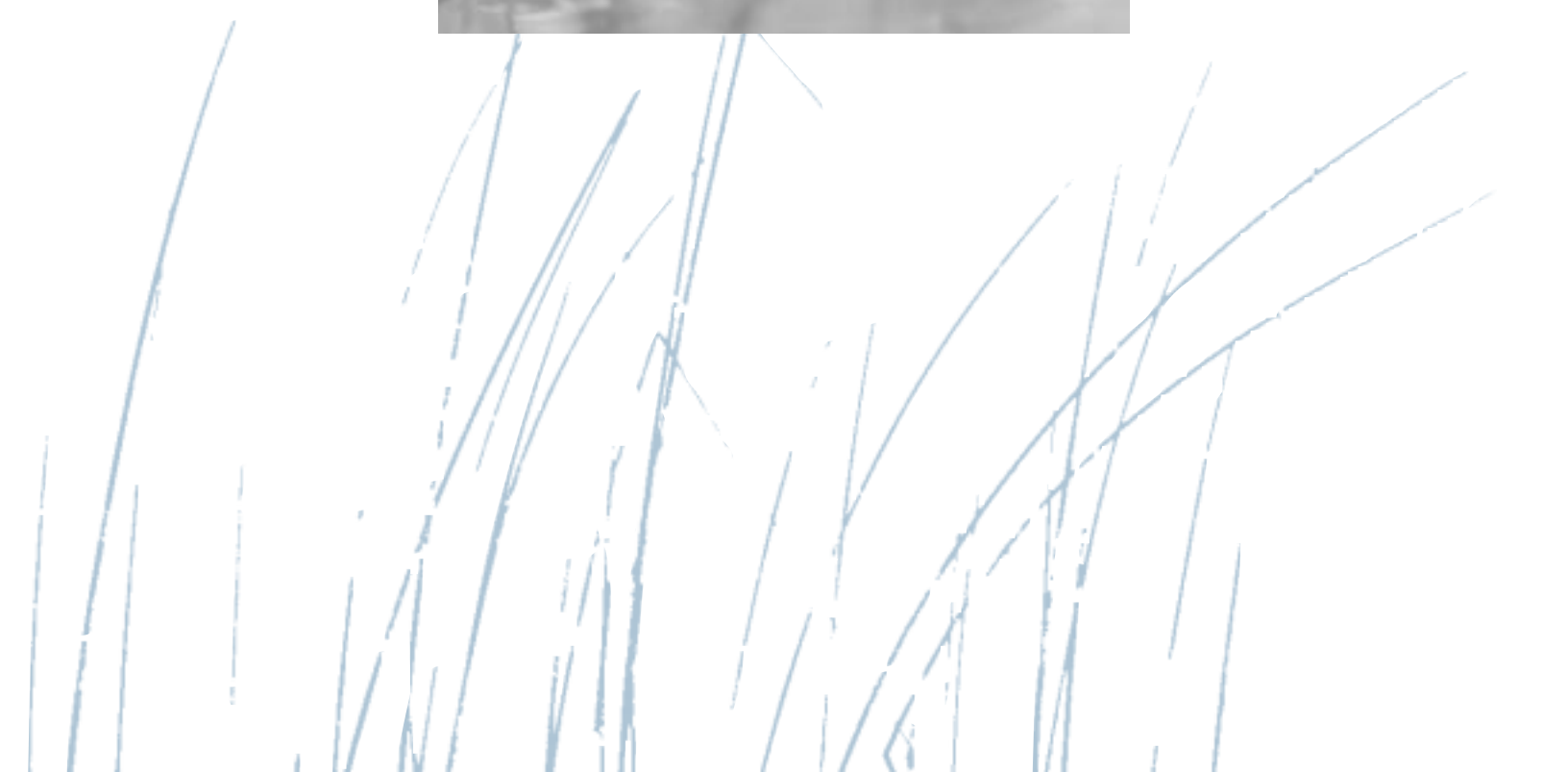
Funding for implementation of the *Initiative* over the next two years falls into three categories:

1. Time and expenses for people who participate on the Wetlands Advisory Group and Technical Advisory Team. All indications are that the agencies, organizations, and individuals on these groups are committed to continuing their involvement.
2. Coordination and facilitation support. The first two years of the project were funded through a grant from the EPA to the DNR.
3. Funding for specific actions. The amount of funding needed for each action will be determined and reviewed by the Technical Advisory Team and Wetlands Advisory Group. Funding sources will then be identified and pursued.

*“My concern is that the wetlands plan won’t have any impact on the wetlands in Indiana unless it’s implemented. So the next phase of the process needs to continue.”*

—Vicki Carson,  
Indiana Hardwood Lumbermen’s Association

Yellow warbler





Monitoring  
and  
Evaluation

# Monitoring and Evaluation

The monitoring and evaluation of Indiana's wetlands and wetland conservation efforts are critical to the success of the *Indiana Wetlands Conservation Plan*. The "bottom-line" measurement of *IWCP* success is to be able to ask and answer, at any given point in time, the question: Are (have) the goal and objectives of the *IWCP* being (been) achieved?

The goal of the *IWCP* is to: Conserve Indiana's remaining wetland resources, as defined by acreage, type, and function, and restore and create wetlands where opportunities exist to increase the quality and quantity of wetland resources.

The inventory system identified in Objective 2.2 of the *Initiative* will provide the mechanism by which the goal can be measured.

Many of the objectives listed in the *Initiative* can be evaluated with a yes or no answer. For example, Objective 5.1 under the Acquisition component states "Identify long-term statewide wetland acquisition priorities." At any given time, an evaluator can state whether this has been accomplished or not, so a yes or no answer is the evaluation. Progress toward objectives such as these will be monitored by determining whether the actions identified for achieving the objectives have been or are being carried out.

Listed below are objectives for which specific monitoring or evaluation actions are recommended.

**Objective 1.1** Increase the number of focus area projects in Indiana.

*Evaluation Action:* Keep a running list of focus area projects as part of the *Wetlands Focus Area Sourcebook*.

**Objective 1.2** Increase the effectiveness of existing focus area projects.

*Evaluation Action:* Conduct periodic evaluations via group discussions and mail questionnaires as part of the statewide focus area project network.

**Objective 3.1** Identify existing, effective incentives and specific additional incentives needed in Indiana.

*Evaluation Action:* Evaluation actions should be developed for any specific incentives that are recommended.

**Objective 4.2** Identify existing, effective education efforts and specific additional education efforts that are needed in Indiana.

*Evaluation Action:* Evaluation actions should be developed for any specific education efforts that are recommended.

*Evaluation Action:* The public opinion survey conducted in 1995 should be conducted again in 2000.

**Objective 4.3** Improve the accessibility of existing wetlands information to all interests.

*Evaluation Action:* Conduct periodic mail surveys and/or focus groups through organizations on the Wetlands Advisory Group and Technical Advisory Team.

*"The Indiana Wetlands Conservation Plan will not be put on a shelf. The DNR will take the lead in implementing it, working in close cooperation with local agencies, organizations, and individuals."*  
—Pat Ralston,  
Director, Indiana Department  
of Natural Resources



Great blue heron

# A ppendices

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# Appendix D

## **DNR** MEMORANDUM

State of Indiana • Department of Natural Resources • Indianapolis

### **IDNR WETLAND CONSERVATION GUIDELINES**

The following statement shall serve to guide the Indiana Department of Natural Resources in proactively protecting and managing Indiana's wetland resources.

IDNR recognizes that over 85% of Indiana's natural wetlands have been drained or filled and as more wetlands are lost, the value of remaining wetland resources has increased.

IDNR also recognizes that wetlands provide many benefits to the citizens of Indiana by:

- 1) supporting the state's forest, fish, and wildlife resources with critical habitat for species that have commercial and recreational value;
- 2) retaining and gradually releasing floodwater;
- 3) recharging groundwater resources;
- 4) reducing the effects of erosion and chemical pollution in our state's waterways and freshwater lakes by trapping and utilizing nutrient and sediment runoff;
- 5) providing areas for many types of recreation; and
- 6) sustaining a number of rare and endangered plant and animal species;

**AND:**

IDNR realizes that to protect these benefits, it must embark on wetland management activities that include protection, acquisition, enhancement, and creation of wetland resources.



**Therefore:**

The Indiana Department of Natural Resources will implement strategies that:

- 1) increase the quality, availability, and use of information concerning the historical, economic, and ecological values of wetland resources for present and future generations;
- 2) 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;
- 3) 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 and processes;
- 4) restore and manage intermediate or poor quality wetlands to accomplish specific purposes, including ecological productivity, flood control, water quality improvements, recreational opportunities, and aesthetic values, through biologically and scientifically sound manipulation;
- 5) 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
- 6) support the development of comprehensive wetland conservation plans that facilitate cooperative efforts between natural resource agencies and organizations involved in these issues.

It is by following these guidelines that all citizens of the State of Indiana will continue to enjoy wetland resources which are necessary for maintaining a higher quality of life in Indiana.

# Appendix E

## Prioritization Criteria for Physical/Chemical Functions of Wetlands

The following is a preliminary list of components or functions that could be used to rank and prioritize Indiana wetlands in order to serve the purposes of water quality, flood control, and groundwater recharge.

### Functional categories

Categories of *water quality* and *groundwater recharge* were combined into one category which addresses quality and quantity of surface and groundwater. Flood control remains as a separate function.

### Classification units

Rankings assigned to the functions will differ mostly depending on watershed, rather than natural region or ecoregion, because the functions of water quality and flood control are related to the physical boundaries and geologic history of a watershed.

### Prioritization factors

#### I. Water Quality of Surface and Groundwater

##### A. Location

1. Ecosystem connections
  - a. Proximity to stream, lake or other wetlands
  - b. Current quality of adjacent aquatic ecosystems
2. Surrounding land use
  - a. Pollution sources
  - b. Water supplies
    - 1) Human consumption
    - 2) Contact recreation
    - 3) Livestock consumption
    - 4) Use by critical species
3. Geology
  - a. Karst
  - b. Aquifers

##### B. Size and shape

1. Ratio of wetland to watershed area
2. Depth and filtration area
3. Storage capacity
  - a. Rate of sediment filling
  - b. Retention time
4. Flow rate and pathway
  - a. Number of inlets
  - b. Location of inlets relative to outlets
  - c. Sheetflow or channel flow
  - d. Discharge differential  
(outflow exceeds inflow and evaporation)

### C. Soils

1. Chemical composition
2. Particle size
3. Soil horizons
  - a. Depth of soil
  - b. Depth to water table
4. Infiltration and percolation time
5. Microbial activity

### D. Vegetation

1. Nitrogen uptake
2. Phosphorus uptake
3. Heavy metal ion uptake
4. Organic uptake (e.g., pesticides, herbicides)

## II. Flood Control

### A. Location

1. Ecosystem connections
  - a. Proximity to stream, lake, or other wetlands
  - b. Current function of adjacent aquatic ecosystems
  - c. Relationship to existing flood control structures
2. Surrounding land use
  - a. Area of protected watershed
  - b. Economic importance of floodplain activities
  - c. Timing of flooding and human activities
  - d. Extent and duration of flooding
  - e. Use of flood flows by critical species

### B. Size and shape

1. Ratio of wetland to watershed area
2. Storage capacity
  - a. Rate of sediment filling
  - b. Retention time
3. Flow rate and pathway
  - a. Number of inlets
  - b. Location of inlets relative to outlets
  - c. Sheetflow or channel flow
  - d. Outflow
    - 1) Constriction
    - 2) Single point of discharge (control of outflow)

### C. Soils

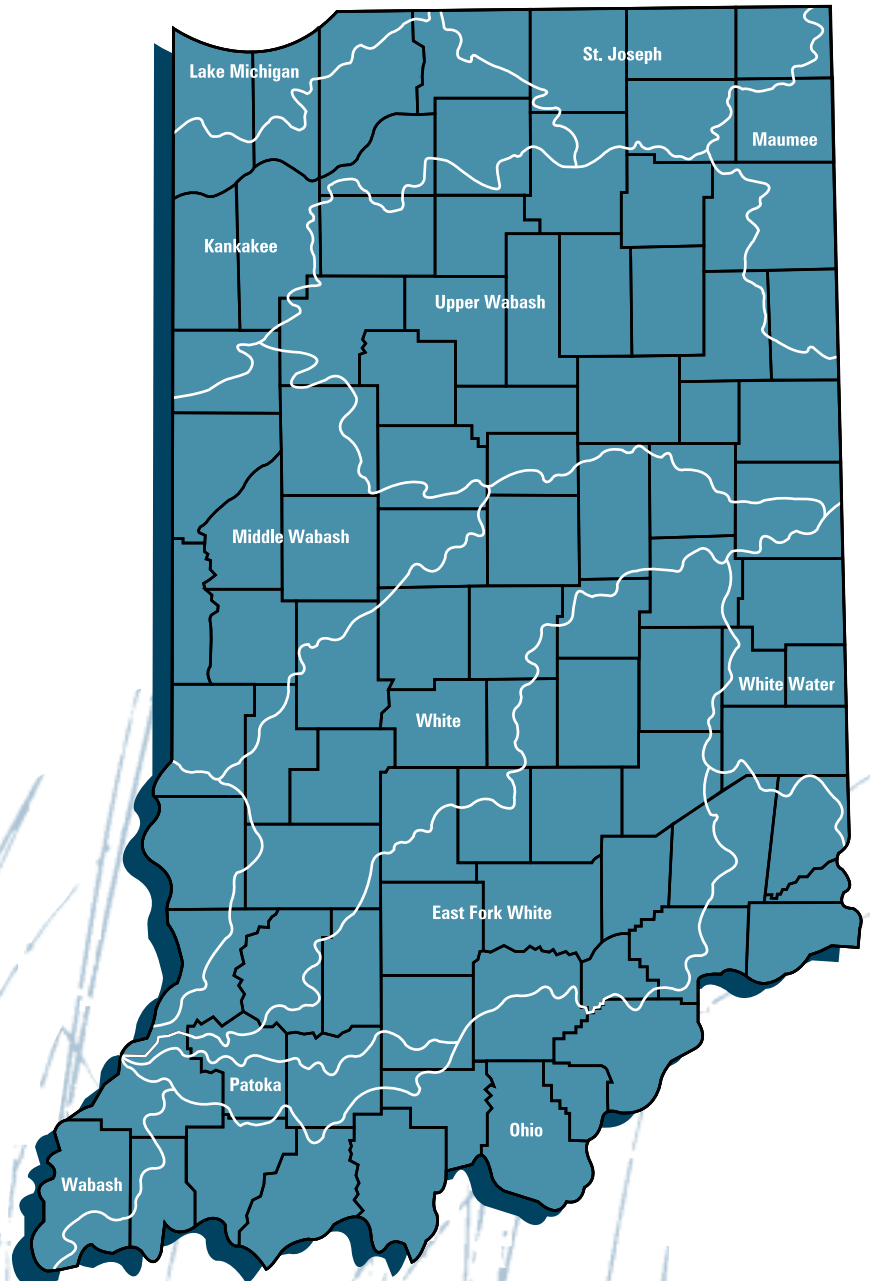
1. Infiltration rate
2. Water storage capacity
  - a. Depth to hardpan
  - b. Soil type (absorbs water)
  - c. Saturation (depth to water table)

### D. Vegetation

1. Roughness
2. Evapotranspiration

## Appendix F

Indiana's 12 water management basins were designated by the Natural Resources Commission and published by USGS in "Hydrogeologic Atlas of Aquifers in Indiana." These units also match the watersheds used by Indiana Department of Natural Resources, Division of Water in basin studies, and by IDEM for 305(b) reporting purposes.



## Lake Michigan

### Description

The Lake Michigan basin, located in the far northwestern part of Indiana, encompasses a land area of 604 square miles within the northern halves of Lake and Porter counties and the northern one-third of LaPorte County. In addition, the northern part of the basin includes a 241- square mile area beneath Lake Michigan. Within the basin is a major urban and industrial area that includes the cities of Gary, Hammond, East Chicago, and Merrillville.

### Special concerns for water quality and flood control in watershed

- chemical contamination
- flooding (Little Calumet)
- Great Lakes fishery

### Wetland communities in watershed

Northwest morainal natural region

- floodplain forest
- sand flatwoods
- wet prairie
- marsh
- northern swamp
- shrub swamp
- fen
- bog
- sedge meadow
- panne
- seep
- lake
- pond
- boreal flatwoods

## St. Joseph

### Description

The St. Joseph River basin, which encompasses an area of 1,699 square miles in northeastern Indiana, is part of the St. Lawrence drainage system. The basin includes all of Lagrange County, most of Elkhart, Steuben, and Noble counties, and parts of St. Joseph, Kosciusko, and Dekalb counties. The St. Joseph River flows into Indiana in Elkhart County and flows out of the State in St. Joseph County. Major cities with the basin are South Bend, Mishawaka, Elkhart, Goshen, Kendallville, and Angola.

### Special concerns for water quality and flood control in watershed

- lake water quality
- coldwater fishery

### Wetland communities in watershed

Northern lakes natural region

- floodplain forest
- sand flatwoods
- marsh
- northern swamp
- shrub swamp
- fen
- bog
- sedge meadow
- marl beach
- seep
- muck and sand flats
- lake
- pond
- wet prairie

## Kankakee

### Description

The Kankakee River basin, located in northwestern Indiana, is the sixth largest (2,989 square miles) of the 12 water-management basins in the State. The basin includes most of Newton, Jasper and Starke counties and one-half to two-thirds of Lake, Porter, LaPorte, St. Joseph, Marshall and Benton counties. Most of the towns in the basin are farming communities; the largest cities are LaPorte, Plymouth, Knox, and Rensselaer.

### Special concerns for water quality and flood control in watershed

- flooding (Newton, Lake counties)
- water quality
- massive historical conversion of wetlands (wetland restoration)
- levee systems in agricultural areas

### Wetland communities in watershed

#### Grand prairie natural region

- floodplain forest
- sand flatwoods
- wet prairie
- marsh
- fen
- bog
- sedge meadow
- muck and sand flats
- lake
- pond
- northern swamp
- shrub swamp

#### Northern lakes natural region

- floodplain forest
- sand flatwoods
- marsh
- northern swamp
- shrub swamp
- fen
- bog
- sedge meadow
- marl beach
- seep
- muck and sand flats
- lake
- pond
- wet prairie

## Maumee

### Description

The Maumee River basin in northeastern Indiana is 1,283 square miles and includes parts of Adams, Allen, Dekalb, Noble, and Steuben counties. Principal cities within the Maumee River basin include Auburn, Decatur, Fort Wayne, Garrett and New Haven. The Maumee River begins in Fort Wayne, Indiana, at the confluence of the St. Marys and St. Joseph Rivers. Most of the Maumee River basin in Indiana is drained by these two tributaries. From the confluence, the Maumee River flows 28 miles east-northeast to the Indiana-Ohio state line. The mouth of the Maumee River is in northwestern Ohio, at the southwestern end of Lake Erie. In Ohio, the Maumee River flows 108 miles to Lake Erie; thus, the total length of the Maumee River is 136 miles.



### Special concerns for water quality and flood control in watershed

- water quality of Fish Creek (mussel populations)
- flood control (Fort Wayne)

### Wetland communities in watershed

#### Grand prairie natural region

- floodplain forest
- sand flatwoods
- wet prairie
- marsh
- fen
- bog
- sedge meadow
- muck and sand flats
- lake
- pond
- northern swamp
- shrub swamp

#### Northern lakes natural region

- floodplain forest
- sand flatwoods
- marsh
- northern swamp
- shrub swamp
- fen
- bog
- sedge meadow
- marl beach
- seep
- muck and sand flats
- lake
- pond
- wet prairie

#### Till plain and black swamp natural regions

- floodplain forest
- till plain flatwoods
- marsh
- shrub swamp
- fen
- seep
- pond
- wet prairie
- northern swamp

## Upper Wabash

### Description

For management purposes, the Indiana Department of Natural Resources has divided the Wabash River basin into three subbasins: an upper basin, a middle basin, and a lower basin. The Upper Wabash River basin extends from the Indiana-Ohio state line downstream to include Wildcat Creek near Lafayette, Tippecanoe County. This area is approximately 110 miles east-west by 70 miles north-south.

The Upper Wabash River basin is 6,918 square miles and includes all or most of Blackford, Carroll, Cass, Clinton, Fulton, Grant, Howard, Huntington, Jay, Miami, Pulaski, Wabash, White, Whitley, and Wells counties, and parts of 13 other counties. Principal cities in the basin include Bluffton, Columbia City, Frankfort, Hartford City, Huntington, Kokomo, Logansport, Marion, Monticello, North Manchester, Peru, Portland, Rochester, Wabash, and Warsaw.

### Special concerns for water quality and flood control in watershed

- lake water quality
- mussel diversity in Tippecanoe
- headwater water quality
- agricultural contamination (crops, livestock)

### **Wetland communities in watershed**

#### Grand prairie natural region

- floodplain forest • sand flatwoods • wet prairie
- marsh • fen • bog • sedge meadow
- muck and sand flats • lake • pond
- northern swamp • shrub swamp

#### Till plain and black swamp natural regions

- floodplain forest • till plain flatwoods
- marsh • shrub swamp • fen • seep
- pond • wet prairie • northern swamp

## Middle Wabash

### **Description**

The Middle Wabash basin, as defined in this report, encompasses 3,453 square miles of west-central Indiana. The basin is bounded on the west by Illinois, extends eastward to approximately 12 miles east of Lebanon, and extends north-south from approximately 10 miles south of Terre Haute to approximately 18 miles north of Lafayette. The Middle Wabash River basin includes all of Fountain, Montgomery, Vermillion, and Warren counties, significant parts of Benton, Boone, Parke, Tippecanoe, and Vigo counties, and small parts of six other counties. The largest population centers in the middle Wabash River basin (listed in order of relative size) are Terre Haute, Lafayette, West Lafayette, Crawfordsville, and Lebanon.

### **Special concerns for water quality and flood control in watershed**

- urban areas (Lafayette, Terre Haute)
- agricultural (crops, livestock)

### **Wetland communities in watershed**

#### Grand prairie natural region

- floodplain forest • sand flatwoods • wet prairie
- marsh • fen • bog • sedge meadow
- much and sand flats • lake • pond
- northern swamp • shrub swamp

#### Till plain and black swamp natural regions

- floodplain forest • till plain flatwoods • marsh
- shrub swamp • fen • seep • pond
- wet prairie • northern swamp

#### Southwest wetlands and bottom lands natural regions

- floodplain forest • southwest flatwoods
- southern swamp • shrub swamp • seep
- lake • pond • marsh

## Lower Wabash

### Description

The Lower Wabash River basin incorporates the drainage basin of the Wabash River between Honey Creek in Vigo County and the mouth of the Wabash River at the Ohio River in Posey County. The basin has an area of 1,339 square miles and includes most of Sullivan and Posey counties, plus parts of Vigo, Greene, Knox, Gibson, and Vanderburgh counties in southwestern Indiana. The major cities and towns in the basin are Vincennes, Sullivan, and Princeton.

### Special concerns for water quality and flood control in watershed

- flooding (floodplain forest)

### Wetland communities in watershed

Southwest wetlands and bottom lands natural regions

- floodplain forest
- southwest flatwoods
- southern swamp
- shrub swamp
- seep
- lake
- pond
- marsh

## White River

### Description

The White River basin spans nearly the entire width of south-central Indiana. The basin, as defined in this report, includes the areas from the headwaters of the White River in Randolph County to the confluence with the Wabash River in Knox County, but does not include the basin of the East Fork White River. The White River basin encompasses 5,603 square miles in 27 counties and includes all or large parts of the following counties: Boone, Clay, Davies, Delaware, Greene, Hamilton, Hendricks, Knox, Madison, Marion, Monroe, Owen, Putnam, Randolph, and Tipton. Principal cities within the basin are Anderson, Carmel, Greencastle, Indianapolis, Linton, Martinsville, Muncie, Noblesville, Spencer, Washington, and Winchester.

### Special concerns for water quality and flood control in watershed

- urban areas (Anderson, Bloomington, Muncie, Indianapolis, Hamilton County)
- agricultural (crops, livestock)
- mining (lower section)
- rural septic

### Wetland communities in watershed

#### Till plain and black swamp natural regions

- floodplain forest • till plain flatwoods • marsh
- shrub swamp • fen • seep • pond
- wet prairie • northern swamp

#### Southwest wetlands and bottom lands natural regions

- floodplain forest • southwest flatwoods
- southern swamp • shrub swamp • seep
- lake • pond • marsh

#### Shawnee hills and highland rim natural regions

- floodplain forest • sinkhole swamp • sweep
- spring • sinkhole pond • marsh
- southern swamp • shrub swamp

## East Fork White River

### Description

The East Fork White River basin, located in south-central Indiana, extends from the southwestern to the east-central part of the State. The basin has an area of 5,746 square miles, and its long axis trends northeast-southwest for a distance of approximately 150 miles. The East Fork White River basin includes all, or part of, the following counties: Bartholomew, Brown, Davies, Decatur, Dubois, Hancock, Henry, Jackson, Jefferson, Jennings, Johnson, Lawrence, Marion, Martin, Monroe, Orange, Pike, Ripley, Rush, Scott, Shelby and Washington. Principal cities include Bedford, Bloomington, Columbus, Franklin, Greenfield, Greensburg, Loogootee, New Castle, North Vernon, Rushville, Seymour, and Shelbyville.

### Special concerns for water quality and flood control in watershed

- karst (underground rivers)
- groundwater quality
- septic systems

### Special concerns for the middle fork of the east fork of the White River

- agricultural runoff
- siltation

### Wetland communities in watershed

#### Till plain and black swamp natural regions

- floodplain forest • till plain flatwoods • marsh
- shrub swamp • fen • seep • lake
- wet prairie • northern swamp

#### Shawnee hills and highland rim natural regions

- floodplain forest • shrub swamp • sweep
- sinkhole swamp • sinkhole pond • spring
- marsh • southern swamp

#### Bluegrass natural region

- floodplain forest • shrub swamp • pond
- bluegrass flatwoods • marsh • southern swamp

## Whitewater

### Description

The Whitewater River water-management basin is located in southeastern Indiana. The basin extends approximately 75 miles along the Indiana-Ohio state line. Its maximum width is approximately 30 miles, south of the Brookville Reservoir. The basin encompasses an area of 1,425 square miles and includes all of Wayne and Union counties, most of Fayette and Franklin counties, and parts of Randolph, Henry, Decatur, and Dearborn counties. The largest cities in the basin are Richmond and Connersville.

### Special concerns for water quality and flood control in watershed

- urban headwaters (Richmond)
- agricultural (crops)

### Wetland communities in watershed

#### Till plain and black swamp natural regions

- floodplain forest • till plain flatwoods • marsh
- shrub swamp • fen • seep • pond
- northern swamp • wet prairie

#### Bluegrass natural region

- floodplain forest • bluegrass flatwoods • pond
- marsh • southern swamp • shrub swamp

## Patoka

### Description

The Patoka River drains 862 square miles within a long, narrow basin in southwestern Indiana. The basin is approximately 12 to 16 miles wide throughout most of its 78-mile length. The Patoka River basin includes parts of northern Gibson County, the southern three-quarters of Pike and Dubois counties, the southern one-third of Orange County, the northeastern corner of Crawford County, and smaller areas in three adjacent counties.

### **Special concerns for water quality and flood control in watershed**

- mining
- flooding (floodplain forest)

### **Wetland communities in watershed**

Southwest wetlands and bottom lands natural regions

- floodplain forest
- southwest flatwoods
- southern swamp
- shrub swamp
- seep
- lake
- pond
- marsh

Shawnee hills and highland rim natural regions

- floodplain forest
- sinkhole swamp
- seep
- spring
- sinkhole pond
- shrub swamp
- marsh
- southern swamp

## Ohio

### **Description**

The Ohio River basin is the southernmost water-management basin in Indiana. It extends approximately 200 miles across southern Indiana, from Lawrenceburg in eastern Indiana to about 10 miles southwest of Mt. Vernon in western Indiana. The Ohio River basin, the fourth largest basin in the State, encompasses 4,224 square miles. The basin includes all of Ohio, Switzerland, Floyd, Harrison, and Perry counties and large parts of Dearborn, Ripley, Jefferson, Clark, Washington, Crawford, Spencer, Warrick, and Vanderburgh counties. Principal cities within the basin include Evansville, New Albany, Madison, Lawrenceburg, Jeffersonville, Mt. Vernon, Salem, Boonville, Tell City, and Charlestown.

### **Special concerns for water quality and flood control in watershed**

- slow flow, short segments draining directly into Ohio River

### **Wetland communities in watershed**

Southwest wetlands and bottom lands natural regions

- floodplain forest
- southwest flatwoods
- southern swamp
- shrub swamp
- seep
- lake
- pond
- marsh

Shawnee hills and highland rim natural regions

- floodplain forest
- sinkhole swamp
- seep
- spring
- sinkhole pond
- marsh
- southern swamp
- shrub swamp

Bluegrass natural region

- floodplain forest
- bluegrass flatwoods
- pond
- marsh
- southern swamp
- shrub swamp



# Appendix G

## Wetland Communities in Indiana

(based on Natural Community Classifications, IDNR, Division of Nature Preserves)

**Acid bog (shrub/herb bog)**—an acidic wetland of kettle holes in glacial terrain. Consists of low shrubs and mosses such as sphagnum. The bog can also be a floating, quaking mat. These systems have non-flowing or very slow flowing water that fluctuates seasonally.

**Acid seep**—a bog-like wetland that is groundwater-fed and located in upland terrains. It is characterized by flowing water during at least part of the year. It is naturally irrigated by the outflow of groundwater.

**Circumneutral seep (seep-spring)**—a groundwater-fed wetland on organic soils and is primarily herbaceous with a scattered tree canopy. Typically it is situated on the lower slopes of hills, particularly those bordering larger drainages. It is characterized by slowly flowing water during at least part of the year and is naturally irrigated by the outflow of groundwater.

**Circumneutral bog (scrub bog)**—a bog-like wetland that receives ground water. These bogs can sometimes be found as a quaking or floating mat. The soils are usually peat or other low nutrient organic substrates, which are saturated and neutral to slightly acid. These systems have non-flowing or very slow flowing water that fluctuates seasonally.

**Fen**—calcareous, groundwater-fed wetlands. They are often a mosaic of grassy areas, sedge areas, grass-sedge areas, and tall shrub areas. These systems have very slow flowing water in which the water level fluctuates seasonally.

**Flatwoods**—a forest on level upland terrain characterized by a mosaic of wet depressions and slightly elevated soils. Different types of flatwoods are differentiated by substrate and/or vegetation and/or geography (e.g., sand flatwoods, post oak flatwood, boreal flatwoods, and central till plain flatwoods). Soils are typically poorly drained. Water levels, an accumulation of direct precipitation (not flooding), are normally ephemeral above the soil surface.

**Forested swamp**—a permanently inundated wetland of large river bottoms. They normally occur in depressions and sloughs of the bottomlands. The soils are usually very poorly drained and is seasonally to permanently saturated or ponded.

**Forested fen**—a tree-dominated wetland on organic soil which receives groundwater. They are often a mosaic of tree areas, tall shrub areas, and herbaceous areas.

**Gravel wash**—a plant community occurring on gravelly substrates along streams and rivers. Ground cover consists of mixed herbs, grasses, and vines with shrubs present at times. These communities are subject to brief but severe flooding.

**Lake**—a natural standing water body larger than four acres. Lakes have temperature stratification, and may have beaches formed from wave action. These communities have plant mosaic patches that correlate with water depth and types of substrates. Water levels may fluctuate seasonally, and there is little or no water flow.

**Marl beach prairie**—fen-like community located on the marly muck shorelines of lakes; the surface is firm and moist but not saturated, and marl precipitation is evident.

**Marsh**—herbaceous wetland of more or less permanent, non-flowing water bodies, either in lakes or water-filled depressions; water levels may fluctuate, but rarely recede to expose the soil surface.

**Muck flat**—a shoreline and lake community possessing a unique flora of sedges and annual plants, many of which are also found on the Atlantic and Gulf Coastal Plains. They are situated at the margins of lakes or are covering shallow basins. This system has a peat substrate and may float on the water surface, but during high water periods are usually inundated. The water level fluctuates seasonally or from year to year in response to the amount of precipitation.

**Open water**—a wetland of less than 20 acres, the bottom of which has at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%. They lack bottom surfaces large and stable enough for plant and animal attachment. Water regimes are subtidal, permanently and semipermanently flooded, and intermittently exposed.

**Panne (calcareous seep)**—an herbaceous wetland occupying interdunal swales near Lake Michigan. They are located on the lee side of the first or second line of dunes from the lakeshore. Pannes are naturally irrigated by the outflow of ground water.

**Sand flat**—a shoreline and lake community possessing a unique flora of sedges and annual plants that resemble those found on the Atlantic and Gulf Coastal Plains. They are found at the margins of lakes or covering shallow basins. This system has a sand substrate and during high water periods are inundated. The water level fluctuates during a season or from year to year in response to the amount of precipitation.

**Sedge meadow**—sedge-dominated wetland of stream margins and river floodplains, lake margins, or upland depressions. These systems usually occupy the ground between a marsh and upland. The substrate of a sedge meadow is typically highly organic, and is at or just above the water level.

**Shrub swamp**—a shrub-dominated wetland that is more or less permanently inundated. It commonly occurs in depressions. They are characterized by non-flowing or very slowly flowing water which fluctuates seasonally.

**Sinkhole swamp**—an unusual and small semi-permanently flooded wetland of limestone landscapes. They are located in depressions that were formed when underground chambers dissolved in a limestone plateau and collapsed. The water levels are more or less permanently elevated above the soil surface, but may dry down in drought conditions.

**Sinkhole pond**—a water-containing depression, generally smaller than four acres, in limestone topography; normally consists of open water and marshy borders with little or no water flow.

**Wet prairie**—herbaceous wetland that occurs in deep swales; substrates range from very black mineral soils to muck.

**Wet sand prairie**—herbaceous wetland that occurs in deep swales; substrate is sand (sometimes mixed with muck).

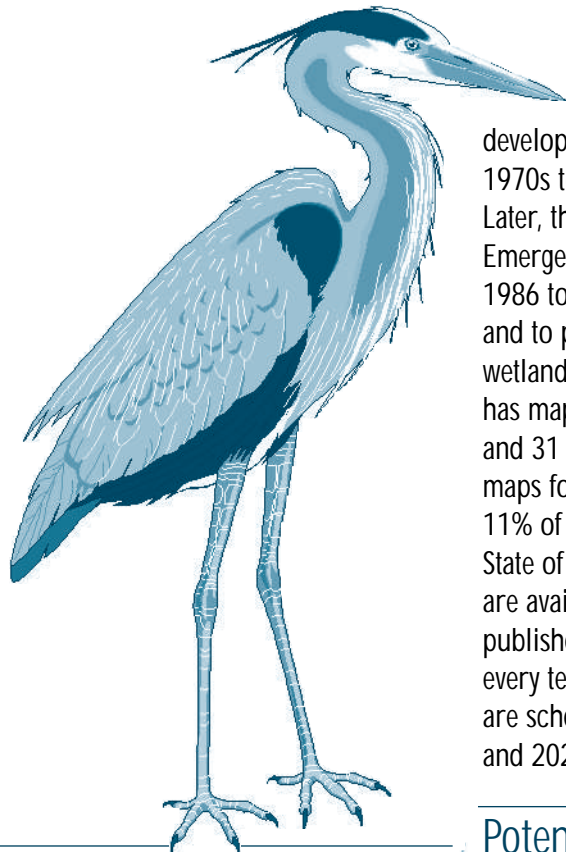
**Wet floodplain forest (bottomland hardwood forest)**—a broadleaf deciduous forest of river floodplains. It has traits of long flooding and hydric soils that are intermediate between wetlands and terrestrial systems.

**Wet-mesic floodplain forest**—a broadleaf deciduous forest of river floodplains. A great diversity of tree species is found in these systems as compared to the wet floodplain forest type. These systems have imperfectly and poorly-drained neutral silt loam soils which are poorly aerated. Despite flooding, the soils and flora suggest a terrestrial rather than palustrine system.

**Wet-mesic sand prairie**—upland herbaceous community dominated by grasses, and occurring in shallow swales or lower slopes of sand plains; substrate is typically sand or loamy sand.



# National Wetlands Inventory Maps



developed the NWI system in the late 1970s to use for wildlife inventories. Later, the USFWS was directed by the Emergency Wetland Resources Act of 1986 to continue mapping U.S. wetlands and to produce a computerized (digital) wetlands database. As of 1998, the NWI has mapped 89% of the lower 48 states and 31 % of Alaska, and has digitized maps for 39% of the lower 48 states and 11% of Alaska. All NWI maps for the State of Indiana have been digitized and are available to the public. The USFWS publishes 'status and trends' reports every ten years; future national updates are scheduled for the years 2000, 2010, and 2020.

## Did You Know ... ?

Do you deal with wetlands? Do you need to know the location, size, type, and other information about wetlands in a particular area? If so, National Wetlands Inventory maps may be able to help.

## Background

The National Wetlands Inventory (NWI) system is a system of mapping wetlands in the U.S. NWI maps are 7.5-minute U.S. Geological Survey topographic maps that have additional information on water bodies and wetlands. The U.S. Fish & Wildlife Service (USFWS)

determining the location of transportation corridors, schools, and other buildings.

**Private Sector Planning**---determining the location and nature of wetlands to help develop alternative plans in order to meet regulatory requirements; preventing problems from developing; providing facts that allow sound business decisions to be made quickly, accurately, and efficiently.

**Resource Managers**---management and acquisition of wildlife habitat, especially waterfowl; fisheries restoration; floodplain planning; development and implementation of endangered species recovery plans.

**Regulatory Agencies**---preliminary wetland identification and determining wetland types.

## Only a Preliminary Tool

The NWI maps are a preliminary tool for determining jurisdictional wetlands for regulation under Section 404 of the Clean Water Act (the "Corps' permit" program). The maps alone are not sufficient for determining if a wetland is present for this purpose. A wetland delineation must be done on-site, by a trained investigator examining soils, water indicators, and plants using the method described in the 1987 Delineation Manual. For more details, consult the

Corps ([www.usace.army.mil/inet/functions/cw/cecwo/reg](http://www.usace.army.mil/inet/functions/cw/cecwo/reg)). For wetlands in agricultural settings, consult your local Natural Resources Conservation Service office for assistance.

## How is the NWI System Different from the Army Corps of Engineers System?

The NWI system is described in detail in the document entitled "Classification of Wetlands and Deepwater Habitats of the United States" by Lewis M. Cowardin et al., published by the USFWS in 1979. The NWI system, which was originally developed for wildlife inventory purposes, predated the U.S. Army Corps of Engineers' (Corps) 1987 Wetland Delineation Manual, which is used for jurisdictional and regulatory purposes. The NWI system focuses on water indicators and landscape location, and does not require that wetlands possess all 3 criteria specified in the Corps' manual and regulatory program (water indicators, hydric soil, and wetland vegetation).

## Proper Use of NWI Maps

The User's Guide to National Wetland Inventory Maps, published by the USFWS in June 1993 states, "When using NWI maps, it is important to remember that the NWI is inventorying all wetlands without emphasis on any particular type or location, nor is it restricted to wetlands regulated by Federal, State or local regulatory agencies." The User's Guide also points out that all map products contain special notes to the effect that:

- the aerial photography analysis has an inherent margin of error.
- the system is not intended to coincide with jurisdictions of wetland regulatory agencies.

## Important Precautions

- Know the dates of the NWI maps you use, remembering that changes in land use and wetlands could have occurred since that time.
- There are always limitations inherent in map scale.
- Because NWI maps have been prepared from aerial photographs, they can be less accurate for locating wetlands in forested areas.

## For More Information

To find out more about the National Wetlands Inventory, visit the NWI website at [www.nwi.fws.gov](http://www.nwi.fws.gov), or contact the Indiana Department of Natural Resources at:

IDNR Division of Fish and Wildlife  
Room W273 I.G.C.S.  
402 West Washington Street  
Indianapolis, IN 46204  
317 232-4080

## How to Obtain NWI Maps

If you can locate the area of interest on a U.S.G.S. topographic map first, it will be much easier to find the site on an NWI map. For information and product availability, or to order hard copy maps or digital data for delivery on magnetic tape, call 1-800-USA-MAPS. Or you can contact Indiana's state distribution center at:

Indiana DNR  
Map Sales Division

402 W. Washington St., W160  
Indianapolis, IN 46204-2742  
317-232-4180

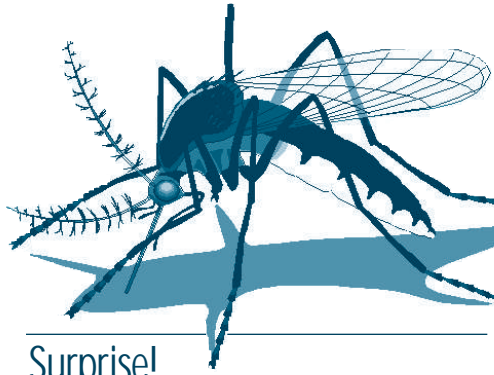
If you have access to the Internet, you can download data from the NWI website ([www.nwi.fws.gov](http://www.nwi.fws.gov)).



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## Did You Know? ... Healthy Wetlands Devour Mosquitoes



### Surprise!

Contrary to popular belief, healthy, functioning wetlands can actually *reduce* mosquito populations.

### But Everybody Says ...

Mosquito control programs commonly recommend that wetlands be drained in order to control mosquitoes. This is because mosquitoes require standing water to breed, and if there is no standing water, there will be no mosquitoes. Quite true. However, mosquitoes have a very short life cycle (from 4 days to a month), and their eggs can remain dormant for more than a year, hatching when flooded with water. Therefore, even after a wetland has been drained, it may still hold enough water after a rain to breed mosquitoes. The *drained* area may actually produce more mosquitoes than it did when it was a wetland!

### Healthy Wetlands Versus Wet Areas and Standing Water

A healthy wetland provides habitat for many unique animals including natural enemies of mosquitoes. These natural predators keep the mosquito population low. Mosquitoes become a problem, however, in areas that have standing water, yet do not support the beneficial animals that feed on mosquitoes. Most any kind of wet area or standing water makes a good breeding site for mosquitoes: old tires, cans, and other containers that collect rainfall; even hollow logs that hold water, and low spots in the ground where water pools. And because these types of places do *not* provide good homes for those beneficial insects and other kinds of wildlife that feed on mosquitoes, the mosquitoes quickly reproduce out of control.

### The Balance of Nature

Mosquito populations are held in check in healthy wetlands. Certain birds, frogs, fish, and insects live in these wetlands and feed on mosquito larvae and/or adults.

*The following insects are natural enemies of mosquitoes:*

- Dragonflies
- Damselflies
- Water Striders
- Backswimmers
- Predacious Diving Beetles

But these insects need proper habitat (healthy wetlands) to survive. You won't

find them in the typical areas where mosquitoes thrive--small spots of open, standing water and other wet areas where mosquitoes can become thick as fog.

### Reduce Mosquito Populations Restore A Wetland!

Wetland restoration decreases mosquito populations in two ways: by providing proper habitat for the natural enemies of mosquitoes, and by preventing or reducing flooding (in areas that aren't normally wet and thus support mosquitoes but not their predators). When the Essex County Mosquito Control Project restored a 1,500 acre wetland in Massachusetts, the mosquito population *dropped by 90 percent*. The experts there know that wetland restoration is synonymous with genuine mosquito control (Audubon Magazine, November-December 1996). And in Indiana, the most serious mosquito problems tend to occur in floodwaters and woodland pools. So by restoring healthy wetlands, we really can do ourselves and all Hoosiers a big favor!

### Make a Lasting Improvement

If you own or manage drained wetlands, you can expect "blooms" of mosquitoes after every rain. If you're tired of donating blood, consider restoring or creating a healthy wetland. Within days, natural predators of mosquitoes will begin to return. Not only will you be reducing the mosquito population, you'll also be

creating excellent wildlife habitat, reducing the likelihood of flooding on adjacent ground, improving water quality, and possibly other benefits as well!

### Quick Fix

If you've determined that you really need a "quick fix" for your mosquito problem, at least try to use the more environmentally friendly methods.

*Here are two:*

- *Bacillus thuringiensis israelensis (Bti)* is a bacterium that can be used in almost any aquatic habitat with no restrictions. It is fast acting and quickly biodegrades. The timing of its application is critical to its effectiveness.
- S-methoprene is a synthetic mimic of an insect hormone. It is safe for workers and degrades into simpler compounds.

Remember that these methods are not permanent or long lasting, but must be repeated for effective control.

### Smart Economics

It pays to control mosquitoes in an environmentally friendly way. New Jersey has been controlling mosquitoes "the natural way" by using a technique called Open Marsh Water Management (OMWM). This technique controls mosquito larvae by eliminating breeding depressions (low areas where water pools) and by increasing natural enemies of mosquitoes. Insecticides are not used. The Cape May County Mosquito Extermination Commission reported spending approximately \$16,000 to implement the OMWM method on a 548-acre marsh in 1969. This was a one-time expense because 25 years later, the marsh still had not needed maintenance, cleaning, or pesticides. The Commission estimated that the cost to use

traditional insecticide methods (repeatedly treating the area with chemicals) over the same period would have been \$685,000. OMWM resulted in a savings of \$669,000--over 97 percent! ([www.uma.org/ecomosco.htm](http://www.uma.org/ecomosco.htm))

In a separate economic study, The Commission compared a range of costs for OMWM with the cost of traditional larvicide methods for the estimated 20-year life of the OMWM method. The cost ranges for OMWM were \$5 to \$63 per acre. The cost of using larvicide was \$286 per acre. OMWM resulted in a savings of from \$222 to \$280 per acre or 78 to 98 percent! (*The Economics of Marsh Water Management- A New Jersey View*, Proceedings of the 63rd Annual Meeting, NJ Mosquito Extermination Association.)



### For More Information

To see if you have a restorable wetland on your property, contact the Indiana Department of Natural Resources:

IDNR Division of Fish and Wildlife  
Room W273 I.G.C.S.  
402 West Washington Street  
Indianapolis, IN 46204  
317-232-4080

Or contact your local Soil and Water Conservation District.  
Call 317-692-7325 to get the phone number of your local SWCD office.

### Other Materials

*BMPs for Mosquito Control and Freshwater Wetlands Management* (New Jersey Office of Mosquito Control Coordination, P.O. Box 400, Trenton, NJ 08625-0400, phone: 609-292-3649)

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