

## AQUATIC SYSTEMS HABITAT NARRATIVE

### Habitat description

This habitat is comprised of all water, both flowing and stationary, habitats in Indiana.

### Problems affecting species and habitats

#### Species threats

Respondents ranked the following threats to wildlife in aquatic systems habitat in Indiana:

Rank	Threats to wildlife in aquatic systems habitat
1	Habitat loss (feeding/foraging areas)
2 (tie)	High sensitivity to pollution
2 (tie)	Bioaccumulation of contaminants
3 (tie)	Habitat loss (breeding range)
3 (tie)	Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
4	Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
5	Small native range (high endemism)
6 (tie)	Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by-catch, harvesting equipment, land preparation machinery)
6 (tie)	Unregulated collection pressure
6 (tie)	Near limits of natural geographic range
6 (tie)	Species overpopulation
6 (tie)	Diseases/parasites (of the species itself)
6 (tie)	Invasive/non-native species
7 (tie)	Genetic pollution (hybridization)
7 (tie)	Predators (native or domesticated)
7 (tie)	Viable reproductive population size or availability
8 (tie)	Regulated hunting/fishing pressure (too much)
8 (tie)	Large home range requirements

## Appendix F-3: Aquatic Systems

Respondents offered no additional threats to wildlife in aquatic systems habitat in Indiana. One respondent commented, "As adjacent states initiate harvest seasons for otters, there might be added pressure to take otters accidentally trapped in Indiana across state lines to market fur. However, I wouldn't expect this to have a significant impact on a statewide or even regional scale."

Respondents listed top threats to wildlife in aquatic systems habitat in Indiana (not ranked):

- Wetland loss and degradation; degradation of migration routes
  - Due to urban sprawl and development
  - Due to pollution: Reproductive performance of otters can be compromised by high levels of PCBs, heavy metals, etc. that bioaccumulate in the aquatic food chain. Direct loss of aquatic habitats such as wetlands, marshes, etc. also impact otters, but not to the extent pollutants could

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to wildlife in aquatic systems habitat. There were no responses.

### Habitat threats

Respondents ranked threats to aquatic systems habitat in Indiana:

Rank	Threats to aquatic systems habitat
1 (tie)	Habitat degradation
1 (tie)	Counterproductive financial incentives or regulations
2	Commercial or residential development (sprawl)
3 (tie)	Point source pollution (continuing)
3 (tie)	Mining/acidification
4	Residual contamination (persistent toxins)
5 (tie)	Stream channelization
5 (tie)	Habitat fragmentation
6	Nonpoint source pollution (sedimentation and nutrients)
7 (tie)	Impoundment of water/flow regulation
7 (tie)	Invasive/non-native species
7 (tie)	Agricultural/forestry practices
7 (tie)	Drainage practices (stormwater runoff)

Respondents noted no additional threats to aquatic systems habitat in Indiana.

Respondents listed top threats to aquatic systems habitat in Indiana (not ranked):

- Habitat degradation and fragmentation
  - Due to regulations that allow loss of habitat

## Appendix F-3: Aquatic Systems

- Due to urban sprawl/development
- Due to water pollution: Pollution not only impacts otter reproduction, but also may impact the quantity/quality of aquatic prey for otters. Loss of wetland habitats reduces the amount of suitable habitat for otters

**Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to aquatic systems habitat. There were no responses.**

## Additional research and survey efforts

### Current body of research

#### Species research

Respondents identified the following citations (title, author, date, publisher) that would give the best overview of wildlife in aquatic systems habitats in Indiana.

Title = Amphibians and reptiles from 23 counties of Indiana.;  
Author = Robert Brodman;  
Date = 2003;  
Publisher = Proceedings of the Indiana Academy of Science, 112: 43-54.

Title = Ten- to eleven-year population trends of two pond-breeding amphibian species, red-spotted newts and green frogs. In Status & Conservation of Midwestern;  
Author = Spencer Cortwright;  
Date = 1998;  
Publisher = University of Iowa Press, Iowa City

Title = Mammals of Indiana;  
Author = Russell E. Mumford/ John Whitaker, Jr.;  
Date = 1982;  
Publisher = Bloomington Indiana University Press

Title = Indiana River Otter Reintroduction Program, 2000-2001;  
Author = Scott A. Johnson;  
Date = November 2001;  
Publisher = Internal report, Indiana Department of Natural Resources, Bloomington, IN

Title = Restoring river otters in Indiana;  
Author = Scott A. Johnson and Kim A. Berkley;  
Date = 1999;  
Publisher = Wildlife Society Bulletin 27:419-427.

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the body of science for wildlife in aquatic systems habitat. There were no responses.

#### Habitat research

(Q36) Fifty percent of respondents stated that the current body of science is adequate for aquatic systems habitat in Indiana; twenty-five percent say that it is inadequate.

## Appendix F-3: Aquatic Systems

Respondents identified the following citations (title, author, date, publisher) that would give the best overview of aquatic systems habitats in Indiana.

Title = Mammals of Indiana;

Author = Russell E. Mumford;

Date = 1982;

Publisher = Bloomington Indiana University Press

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the body of science for aquatic systems habitat. There were no responses.

### Research needs

#### Species research

Respondents ranked research needs for wildlife in aquatic systems habitat in Indiana:

Rank	Research needs for wildlife in aquatic systems habitat
1 (tie)	Distribution and abundance
1 (tie)	Threats (predators/competition, contamination)
2 (tie)	Relationship/dependence on specific habitats
2 (tie)	Population health (genetic and physical)
2 (tie)	Limiting factors (food, shelter, water, breeding sites)
3	Life cycle

Respondents noted additional research needs for wildlife in aquatic systems habitat in Indiana:

- Relationships between population levels and population indices

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the research needs for wildlife in aquatic systems habitat. There were no responses.

#### Habitat research

Respondents ranked research needs for aquatic systems habitat in Indiana:

Rank	Research needs for aquatic systems habitat
1	Threats (land use change/competition, contamination/global warming)

## Appendix F-3: Aquatic Systems

- 2 Distribution and abundance (fragmentation)
- 3 Relationship/dependence on specific site conditions
- 4 Growth and development of individual components of the habitat
- 5 Successional changes

Respondents noted no additional research needs for aquatic systems habitat in Indiana.

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the research needs for aquatic systems habitat. There were no responses.

## Conservation actions necessary

### Species actions

Respondents ranked conservation efforts by how well they address threats to wildlife in aquatic systems habitat in Indiana:

Rank	Conservation efforts for wildlife in aquatic systems habitat
1 (tie)	Reintroduction (restoration)
1 (tie)	Culling/selective removal
2	Population management (hunting, trapping)
3	Habitat protection
4 (tie)	Limiting contact with pollutants/contaminants
4 (tie)	Public education to reduce human disturbance
4 (tie)	Threats reduction
4 (tie)	Regulation of collecting
4 (tie)	Protection of migration routes

Respondents noted no additional conservation practices for wildlife in aquatic systems habitat in Indiana.

Respondents recommended these practices for more effective conservation of wildlife in aquatic systems habitat in Indiana (not ranked):

- Habitat protection (aquatic and riverine habitats)
  - Need programs to restore lost or degraded habitats
- Regulated trapping and nuisance control species policies
- Education programs
  - To reduce incidental take. This would also benefit otters, especially where population densities are lower

## Appendix F-3: Aquatic Systems

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the effective conservation of wildlife in aquatic systems habitat. There were no responses.

### Habitat actions

Respondents ranked conservation efforts by how well they address threats to aquatic systems habitat in Indiana:

Rank	Conservation efforts for aquatic systems habitat
1	Habitat protection on public lands
2 (tie)	Habitat restoration on public lands
2 (tie)	Protection of adjacent buffer zone
3 (tie)	Pollution reduction
3 (tie)	Habitat protection through regulation
3 (tie)	Habitat protection incentives (financial)
3 (tie)	Technical assistance
3 (tie)	Cooperative land management agreements (conservation easements)
3 (tie)	Habitat restoration incentives (financial)
3 (tie)	Managing water regimes
3 (tie)	Corridor development/protection
3 (tie)	Habitat restoration through regulation
3 (tie)	Land use planning

Respondents listed no other current conservation practices for aquatic systems habitat in Indiana.

Respondents recommended the following practices for more effective conservation of aquatic systems habitat in Indiana (not ranked):

- Habitat protection
- Proper land use planning: At a watershed scale, proper land use planning would not only benefit otters, but other aquatic and riparian species.
- Strict enforcement of existing pollution regulations; development of stricter laws, if needed

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the effective conservation of aquatic systems habitat. There were no responses.

### **Partner agencies/organizations**

Organization	Percent of time spent in Aquatic habitats
Great Lakes Commission	NA

### Appendix F-3: Aquatic Systems

South Bend-Elkhart Audubon Society	10-20?
Federal Highway Administration (FHWA)	?
fur takers of america chapter 7-E north west in.	?
Aquatic Weed Control	100
Central Indiana Trout Unlimited	100
Hamilton Lake Conservancy District	100
fish lake conservancy district	90
Lake Bruce Conservancy district	90
Indiana Bass Chapter Federation	80
Northeastern Indiana Trout Association	80
Lake Lemon Conservancy District	75
Steelheaders of Northwest Indiana (Northwest Indiana Steelheaders)	70
Cordry Sweetwater Conservancy District	50
Four Rivers Resource Conservation & Development Area	50
Lake Maxinkuckee Environmental Council (LMEC)	50
Indiana Chamber of Commerce	45
Veolia Water Indianapolis, LLC	45
EnviroScience Incorporated	40
Hoosier Environmental Council	40
Sierra Club Hoosier Chapter	40
Wabash River Heritage Corridor Commission	40
St. Joseph River Watershed Initiative	36
Save the Dunes Conservation Fund	35
ACRES, Inc.	30
Arrow Head Country Resource Conservation & Development Area, Inc.	30
MWH Americas, Inc.	30
Valparasio Chain of Lakes Watershed Group, Inc.	30
Division of Fish and Wildlife	28
Robert Cooper Audubon Society	28
Northwestern Indiana Regional Planning Commission (NIRPC)	25
Sassafras Audubon Society	25
Trillium Land Conservancy, Inc.	25
US Fish and Wildlife Service Ecological Services (does not include national wildlife refuges)	25
Valparaiso Lakes Area Conservancy District	25
Cinergy Corp.	20
Hoosier Heartland Resource Conservation and Education council	20
Indiana Division of the Izaak Walton League of America	20
Patoka River National Wildlife Refuge & Management Area	20
American Consulting, Inc.	15
Pheasants Forever Inc.	15
Clark's Valley Land Trust	10
DNR Division of Nature Preserves	10

### Appendix F-3: Aquatic Systems

Ducks Unlimited, Inc.	10
Earth Source, Inc.	10
Indiana Association of Cities and Towns	10
Indiana state trappers assoc	10
JFNew and Associates	10
Lost River Conservation Association	10
Midwest Peregrine Falcon Recovery Project	10
Summit Lake State Park	10
The Nature Conservancy	10
Wawasee Area Conservancy Foundation, Inc.	10
Big Oaks National Wildlife Refuge, USFWS	5
Blue Heron Ministries, Inc.	5
Ducks Unlimited	5
IDNR- Division of Forestry- Cooperative Forest Management Section (Private Lands)	5
Indiana Dunes National Lakeshore	5
Indianapolis Power & Light Co.	5
Naval Support Activity Crane	5
NICHES Land Trust	5
U.S. Department of Agriculture, Forest Service Hoosier National Forest	5
Merry Lea Environmental Learning Center of Goshen College	4
Indiana Department of Natural Resources Division of Forestry, Properties Section (State Forests)	3
St. Joseph County Soil & Water Conservation District (SWCD)	3
American Society of Landscape Architects, Indiana Chapter	
amos w butler audubon society	
Central Hardwoods Joint Venture/American Bird Conservancy	
Fur Takers of America	
Indiana Michigan Power and affiliate of American Electric Power; Land Management Department	
Indiana Watershed Leadership (new initiative)with Purdue University	
Indianapolis Flycasters	
Kankakee River Basin Commission	
LAKE MCCOY CONSERVANCY DISTRICT	
Law Enforcement Division, Indiana Department of Natural Resources	
National Audubon Society - Indiana Important Bird Areas Program (IBA)	
U.S. Army Corps of Engineers Regulatory Branch, Louisville District (Please note this is only a part of the larger organization and while the greater organization may be involved in areas not noted below, our answers are specific to the Regulatory program.)	
USDA Natural Resources Conservation Service	
IN DNR, Division of State Parks & Reservoirs, Interpretive Services	~5
Indiana Smallmouth Club (ISC)	80
Indiana Environmental Institute	30

## Appendix F-3: Aquatic Systems

Indian Deer Hunters Association	10
Indiana Association of Soil and Water Conservation Districts	10
Whitewater Valley Land Trust, Inc.	10
Muscatatuck National Wildlife Refuge US FWS	5

## Proposed plans for monitoring

### Current monitoring

#### Species monitoring

Respondents were aware of the following monitoring efforts by state agencies for wildlife in aquatic systems habitat in Indiana (not ranked):

- Statewide year-round monitoring
- Statewide once-a-year monitoring
- Periodic statewide (less than once a year but still regularly scheduled) monitoring

Respondents were aware of the following monitoring efforts by other organizations for wildlife in aquatic systems habitat in Indiana (not ranked):

- Regional or local once-a-year monitoring
- Periodic regional or local (less than once a year but still regularly scheduled) monitoring
- Occasional regional or local (less than once a year and not regularly scheduled) monitoring

Respondents ranked monitoring efforts by state agencies based on their importance for conservation of wildlife in aquatic systems habitat in Indiana:

Rank	Monitoring efforts by state agencies for conservation of wildlife in aquatic systems habitat
------	--

- |         |   |
|---------|---|
| 1 (tie) | Statewide year-round monitoring   |
| 1 (tie) | Statewide once-a-year monitoring  |
| 2       | Periodic statewide (less than once a year but still regularly scheduled) monitoring |

Respondents ranked monitoring efforts by other organizations based on their importance for conservation of wildlife in aquatic systems habitat in Indiana:

Rank	Monitoring efforts by other organizations for conservation of wildlife in aquatic systems habitat
------	---

- |   |   |
|---|---|
| 1 | Regional or local once-a-year monitoring  |
| 2 | Periodic regional or local (less than once a year but still regularly scheduled) monitoring |
| 3 | Occasional regional or local (less than once a  |

## Appendix F-3: Aquatic Systems

year and not regularly scheduled) monitoring

Respondents listed regional or local monitoring by state agencies for wildlife in aquatic systems habitat in Indiana (not ranked):

- Beavers
  - State and county highway departments monitor beaver activity only as flooding of roadways occur
  - IDNR properties monitor and attempt to eliminate problems associated with flooding of adjacent private property. State furbearer biologist tracks and monitors trapping harvest data
- Otters
  - IDNR personnel monitor otter mortality (road kills, trap related, etc.) at a statewide level
  - IDNR personnel conduct winter bridge/stream surveys for otter sign. These are conducted on a county basis at a statewide level

Respondents listed regional or local monitoring by other organizations for wildlife in aquatic systems habitat in Indiana (not ranked):

- Robert Brodman, St. Joseph's College
- Cortwright, IUN

Respondents listed organizations that monitor wildlife in aquatic systems habitat in Indiana (not ranked):

- Robert Brodman, St. Joseph's College
- Cortwright, IUN
- IDNR

Respondents considered monitoring techniques for wildlife in aquatic systems habitat in Indiana:

Monitoring techniques for wildlife in aquatic systems habitat	Used	Not used but possible with existing technology and data	Not economically feasible
Radio telemetry and tracking	--	X	--
Modeling	X	X	--
Coverboard routes	--	X	--
Spot mapping	--	X	--
Driving a survey route	X	X	--

## Appendix F-3: Aquatic Systems

Reporting from harvest, depredation, or unintentional take (road kill, by-catch)	X	--	--
Mark and recapture	--	X	--
Professional survey/census	X	X	--
Volunteer survey/census	X	X	--
Trapping (by any technique)	X	X	--
Representative sites	X	X	--
Probabilistic sites	X	X	--

Respondents noted no other monitoring techniques for wildlife in aquatic systems habitat in Indiana.

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the monitoring techniques for wildlife in aquatic systems habitat. There were no responses.

### Habitat inventory and assessment

Respondents were aware of the following inventory and assessment efforts by state agencies for aquatic systems habitat in Indiana:

- Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment

Respondents were aware of the following inventory and assessment efforts by other organizations for aquatic systems habitat in Indiana (not ranked):

- Regional or local once-a-year inventory and assessment
- Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment
- Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment

Respondents ranked inventory and assessment efforts by state agencies based on their importance for conservation of aquatic systems habitat in Indiana:

Rank	Inventory and assessment by state agencies for conservation of aquatic systems habitat
1 (tie)	Statewide once-a-year inventory and assessment
1 (tie)	Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment
2 (tie)	Periodic statewide (less than once a year but

## Appendix F-3: Aquatic Systems

still regularly scheduled) inventory and assessment

2 (tie) Statewide annual inventory and assessment

Respondents ranked inventory and assessment efforts by other organizations based on their importance for conservation of aquatic systems habitat in Indiana:

Rank	Inventory and assessment by other organizations for conservation of aquatic systems habitat
1	Regional or local once-a-year inventory and assessment
2 (tie)	Statewide annual inventory and assessment
2 (tie)	Statewide once-a-year inventory and assessment
2 (tie)	Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment
2 (tie)	Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment
2 (tie)	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment
2 (tie)	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment

A respondents listed regional or local inventory and assessment by state agencies for aquatic systems habitat in Indiana:

- Otters: I suspect some state agencies monitor and assess aquatic habitats at a statewide level, maybe not on an annual basis, but perhaps every few years. No agency comes to mind though that does it. Nonetheless, this is an important component of inventorying otter habitat in Indiana

Respondents listed regional or local inventory and assessment by other organizations agencies for aquatic systems habitat in Indiana (not ranked):

- Robert Brodman, St. Joseph's College
- Cortwright, IUN

Respondents listed no organizations that monitor aquatic systems habitat in Indiana (not ranked).

Respondents considered inventory and assessment techniques for aquatic systems habitat in Indiana:

## Appendix F-3: Aquatic Systems

Inventory and assessment techniques for aquatic systems habitat	Used	Not used but possible with existing technology and data	Not economically feasible
GIS mapping	--	X	--
Aerial photography and analysis	--	X	--
Systematic sampling	X	--	--
Property tax estimates	--	--	X
State revenue data	--	--	X
Participation in land use programs	--	X	--
Modeling	--	X	--

Respondents listed no additional inventory and assessment techniques for aquatic systems habitat in Indiana.

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the inventory and assessment techniques for aquatic systems habitat. There were no responses.

### Recommended monitoring

#### Species monitoring

Respondents recommended the following monitoring techniques for effective conservation of wildlife in aquatic systems habitat in Indiana (not ranked):

- Aquatic surveys and minnow traps
- Regulated trapping
- Otters
  - Stream surveys for otter sign
  - Reporting (number, location, etc.) of unintentional take and biological data obtained from recovered specimens (reproductive parameters)

(REFERENCE: Melquist, W.E., P.J. Polechla, Jr., and D. Toweill. 2003. River Otter. Pages 708-734 in Wild Mammals of North America: biology, management, and conservation. 2nd edition. G.A. Feldhamer, B.C. Thompson, and J.A. Chapman (eds.), John Hopkins University Press, Baltimore, MD, 1216 pages)

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the monitoring techniques for effective conservation of wildlife in aquatic systems habitat. There were no responses.

#### Habitat inventory and assessment

## Appendix F-3: Aquatic Systems

Respondents recommended the following inventory and assessment techniques for effective conservation of aquatic systems habitat in Indiana:

- Systematic sampling and GIS
  - GIS technology appears to be the most feasible means for inventory and assessment of otter habitat on a statewide scale. Analysis of aerial photos could be useful also, perhaps on a local scale

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the inventory and assessment techniques for effective conservation of aquatic systems habitat. There were no responses.