

# OXBOWS/BACKWATERS/SLOUGHS/EMBAYMENTS HABITAT NARRATIVE

## Habitats description

Oxbows, backwaters, sloughs, and embayments are naturally occurring standing water bodies that were formed in association with flowing waters (rivers and streams).

## Problems affecting species and habitats

### Species threats

Respondents ranked threats to wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana:

Rank	Threats to wildlife in oxbows/backwaters/sloughs/embayments habitat
1	Near limits of natural geographic range
2	Invasive/non-native species
3 (tie)	Habitat loss (breeding range)
3 (tie)	Habitat loss (feeding/foraging areas)
4 (tie)	Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
4 (tie)	High sensitivity to pollution
4 (tie)	Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
5 (tie)	Small native range (high endemism)
5 (tie)	Bioaccumulation of contaminants
5 (tie)	Viable reproductive population size or availability

A respondent indicated that "stream channelization" is another specific threat to wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana.

Respondents noted top threats to wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana (not ranked):

- Habitats loss and habitats degradation
- Sediment deposition

## Appendix F-9: Oxbows/Backwaters/Sloughs/Embayments

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to wildlife in oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- Yes. However, the representative species should have included birds such as wood duck and prothonotary warbler.

### Habitats threats

Respondents ranked threats to oxbows/backwaters/sloughs/embayments habitat in Indiana:

Rank	Threats to oxbows/backwaters/sloughs/embayments habitat
1 (tie)	Habitat degradation
1 (tie)	Nonpoint source pollution (sedimentation and nutrients)
2	Agricultural/forestry practices
3	Stream channelization
4 (tie)	Habitat fragmentation
4 (tie)	Drainage practices (stormwater runoff)
4 (tie)	Invasive/non-native species
5 (tie)	Impoundment of water/flow regulation
5 (tie)	Mining/acidification
7 (tie)	Commercial or residential development (sprawl)

Respondents noted no other threats to oxbows/backwaters/sloughs/embayments habitat in Indiana.

A respondent noted that the top threat to oxbows/backwaters/sloughs/embayments habitat in Indiana is "habitat loss and degradation."

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- Yes

## **Additional research and survey efforts**

### **Current body of research**

#### Species research

Respondents indicated that research on wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana is inadequate.

Respondents identified the following citations (title, author, date, publisher) that would give the best overview of wildlife in oxbows/backwaters/sloughs/embayments habitats in Indiana.

## Appendix F-9: Oxbows/Backwaters/Sloughs/Embayments

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.

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the research on wildlife in oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- No. There must be study data available for specific river and stream systems related to mussel populations.

### Habitats research

Respondents indicated that research on oxbows/backwaters/sloughs/embayments habitat in Indiana is inadequate.

Respondents identified the following citations (title, author, date, publisher) that would give the best overview of oxbows/backwaters/sloughs/embayments 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.

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the research for oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- No, there must be more but without doing a search I cannot list others.

## **Research needs**

### Species research

Respondents ranked research needs for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana:

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

## Appendix F-9: Oxbows/Backwaters/Sloughs/Embayments

A respondent noted other research needs for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana: "Very little is known about the basic natural history, population ecology and abundance in Indiana of the lesser siren."

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 oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- Yes.

### Habitats research

Respondents ranked research needs for oxbows/backwaters/sloughs/embayments habitat in Indiana:

Rank	Research needs for oxbows/backwaters/sloughs/embayments habitat
1 (tie)	Distribution and abundance (fragmentation)
1 (tie)	Threats (land use change/competition, contamination/global warming)
2	Relationship/dependence on specific site conditions
3 (tie)	Growth and development of individual components of the habitat
3 (tie)	Successional changes

A respondent listed other research needs for oxbows/backwaters/sloughs/embayments habitat in Indiana:

- Factors that limit the distribution of sirens 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 oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- No, more research is needed to identify the rate of loss of this habitat through increased erosion and sedimentation from increased runoff and continual installation of new drainage tile in the watershed. Research studies are needed to monitor restoration of this habitat type.

## **Conservation actions necessary**

### Species actions

Respondents indicated that "habitat protection" is the only conservation effort to address threats to wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana.

## Appendix F-9: Oxbows/Backwaters/Sloughs/Embayments

Respondents noted no other conservation practices for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana.

Respondents recommended the following to enhance wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana:

- Habitat protection is the key, but it is also necessary to better understand factors that limit siren abundance and distribution

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the conservation effort to address threats to wildlife in oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- Absolutely not. Habitat restoration studies of techniques and monitoring of changes occurring from watershed influences is a must.

### Habitats actions

Respondents ranked conservation efforts by how well they address threats to oxbows/backwaters/sloughs/embayments habitat in Indiana:

Rank	Conservation efforts for oxbows/backwaters/sloughs/embayments habitat
1 (tie)	Habitat protection through regulation
1 (tie)	Habitat protection on public lands
2 (tie)	Habitat protection incentives (financial)
2 (tie)	Habitat restoration through regulation
2 (tie)	Habitat restoration on public lands
2 (tie)	Habitat restoration incentives (financial)
2 (tie)	Managing water regimes
2 (tie)	Pollution reduction
2 (tie)	Land use planning
2 (tie)	Cooperative land management agreements (conservation easements)

Respondents listed no other conservation practices for oxbows/backwaters/sloughs/embayments habitat in Indiana.

Respondents indicated that the following conservation actions are needed for oxbows/backwaters/sloughs/embayments habitat in Indiana (not ranked):

- Habitat protection -- More research is needed to address the effectiveness of habitat restoration on siren conservation
- Corridor protection

## Appendix F-9: Oxbows/Backwaters/Sloughs/Embayments

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the following conservation efforts to oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- Yes.

## Proposed plans for monitoring

### Current monitoring

#### Species monitoring

Respondents were aware of the following monitoring efforts by state agencies for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana:

- Occasional regional or local (less than once a year and not regularly scheduled) species monitoring

Respondents were aware of the following monitoring efforts by other organizations for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana (not ranked):

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

Respondents considered no monitoring efforts by state agencies to be “very crucial” for conservation of wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana. The following was considered “somewhat crucial:”

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

Respondents ranked monitoring efforts by other organizations for conservation of wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana:

Rank	Monitoring efforts for oxbows/backwaters/sloughs/embayments habitat
1	Regional or local year-round monitoring conducted by other organizations
2	Regional or local once-a-year monitoring conducted by other organizations
3 (tie)	Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations
3 (tie)	Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations

## Appendix F-9: Oxbows/Backwaters/Sloughs/Embayments

Respondents listed the following monitoring efforts by state agencies for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana

- Patoka River watershed

Respondents listed regional or local monitoring efforts by other organizations for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana:

- Newton, Jasper, Pulaski, Starke, Lake and Porter Counties

Respondents listed known organizations conducting regional or local monitoring efforts for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana (not ranked):

- Robert Brodman, Saint Joseph's College
- IDNR Division of Fish and Wildlife

Respondents considered monitoring techniques for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana as follows:

Monitoring techniques for wildlife in oxbows/backwaters/sloughs/embayments habitat	Used	Not used but possible with existing technology and data	Not economically feasible
Radio telemetry and tracking	--	X	X
Modeling	--	X	--
Spot mapping	--	X	--
Mark and recapture	--	X	X
Professional survey/census	X	--	--
Volunteer survey/census	--	X	--
Trapping (by any technique)	X	--	--
Representative sites	X	X	--
Probabilistic sites	X	--	--

Respondents listed no additional monitoring techniques for wildlife in oxbows/backwaters/sloughs/embayments 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 oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- Aerial photography to denote changes in acreage, water levels and vegetation cover every other year could provide important insight into habitat impacts such as the effects of beaver impoundments in regulating water levels and vegetation changes.

## Appendix F-9: Oxbows/Backwaters/Sloughs/Embayments

### Habitats inventory and assessment

Respondents were not aware of any habitats and inventory assessment efforts conducted by state agencies for oxbows/backwaters/sloughs/embayments habitat in Indiana.

Respondents were aware of inventory and assessment efforts by other organizations for oxbows/backwaters/sloughs/embayments habitat in Indiana (not ranked):

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

Respondents marked no inventory and assessment efforts conducted by state agencies as “very crucial” or “somewhat crucial” for oxbows/backwaters/sloughs/embayments habitat in Indiana. The following was called “slightly crucial:”

- Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations

Respondents ranked inventory and assessment efforts by other organizations by their importance to conservation of oxbows/backwaters/sloughs/embayments habitat in Indiana:

<b>Rank</b>	<b>Inventory and assessment efforts for oxbows/backwaters/sloughs/embayments habitat</b>
<b>1</b>	Regional or local year-round monitoring conducted by other organizations
<b>2</b>	Regional or local once-a-year monitoring conducted by other organizations
<b>3 (tie)</b>	Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations
<b>3 (tie)</b>	Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations

The respondents noted no regional or local inventory and assessment by state agencies for oxbows/backwaters/sloughs/embayments habitat in Indiana.

Respondents noted regional or local inventory and assessment by other organizations oxbows/backwaters/sloughs/embayments habitat in Indiana:

- Newton, Jasper, Starke, Pulaski, Lake and Porter counties

Respondents noted organizations that monitor oxbows/backwaters/sloughs/embayments habitat in Indiana:

- Robert Brodman, Saint Joseph's College

## Appendix F-9: Oxbows/Backwaters/Sloughs/Embayments

Respondents considered inventory and assessment techniques for oxbows/backwaters/sloughs/embayments habitat in Indiana as follows:

Inventory and assessment techniques for oxbows/backwaters/sloughs/embayments habitat	Used	Not used but possible with existing technology and data	Not economically feasible
GIS mapping	--	X	--
Aerial photography and analysis	X	X	--
Systematic sampling	X	--	--
Modeling	--	X	--

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 oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- Yes.

### **Recommended monitoring** Species monitoring

Respondents recommended the following monitoring techniques for wildlife in oxbows/backwaters/sloughs/embayments habitat in Indiana (not ranked):

- Minnow trapping and either mark recapture or telemetry
- Trap nets
- Electrofishing

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 oxbows/backwaters/sloughs/embayments habitats. Their responses included:

- Mussel surveys.

### Habitat inventory and assessment

Respondents recommended the following inventory and assessment techniques for oxbows/backwaters/sloughs/embayments habitat in Indiana (not ranked):

- Survey (intensive)
- GIS mapping (less intensive)

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 oxbows/backwaters/sloughs/embayments habitats. Their responses included:

## Appendix F-9: Oxbows/Backwaters/Sloughs/Embayments

- Aerial photography would be the most efficient way of monitoring changes in this habitat.