

PERMANENT WETLAND HABITATS NARRATIVE

Problems affecting species and habitats

Species threats

Respondents ranked the following threats to wildlife in permanent wetland habitats in Indiana:

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

Respondents offered additional threats to wildlife in permanent wetland habitats in Indiana (not ranked):

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- Loss of wetlands (muckland)
- Muskrat threats: Although not habitat specific, the inability to responsibly and proactively manage muskrats according to the wildlife conservation model, as opposed to reactive measures through nuisance practices, is a concern regarding the conservation of muskrats. This concern applies across the landscape, not just in urban and suburban environments

Respondents listed top threats to wildlife in permanent wetland habitats in Indiana (not ranked):

- Green salamanders: Only a few locations are known to have green salamanders in Indiana and this is a habitat specialist needing rocky outcrops in forested areas
- Habitat loss, fragmentation and degradation
 - Due to farming or development
 - Including loss of huge open/prairie buffer zones for nesting
 - Wetlands are managed as landscape scale systems relative to Blanding's turtle fragmentation results in metapopulation disruption and potential metapopulation decline. Because of low densities and small population sizes, populations that have become isolated are likely not viable
- Overland movement for nesting invites road kill of otherwise long-lived adults
- Suboptimal size nesting areas focuses nest depredation
- Inappropriate management of nesting areas: Sandy fire breaks in managed areas are disked at inappropriate times, or are managed in inappropriate cover types
- Loss of connectivity

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to wildlife in permanent wetland habitats. Their responses included:

- Loss of permanent wetlands affects waterfowl.
 - loss of nesting sites
 - loss of brood rearing sites
 - loss of staging areas for migrating waterfowl

Habitat threats

Respondents ranked threats to permanent wetland habitats in Indiana:

Rank	Threats to permanent wetland habitats
1 (tie)	Habitat fragmentation
1 (tie)	Habitat degradation
2	Agricultural/forestry practices
3 (tie)	Commercial or residential development (sprawl)
3 (tie)	Climate change
4 (tie)	Nonpoint source pollution (sedimentation and nutrients)
4 (tie)	Impoundment of water/flow regulation
5 (tie)	Successional change
5 (tie)	Point source pollution (continuing)

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- 6 Mining/acidification
- 7 (tie) Counterproductive financial incentives or regulations
- 7 (tie) Invasive/non-native species
- 8 (tie) Drainage practices (stormwater runoff)
- 8 (tie) Stream channelization
- 9 Residual contamination (persistent toxins)

Respondents noted no other threats to permanent wetland habitats in Indiana.

Respondents listed top threats to permanent wetland habitats in Indiana (not ranked):

- Habitat degradation, fragmentation, loss
 - Due to deforestation
 - Due to farming
 - Due to development
 - Due to coal mining
 - Due to wetland drainage/tiny stream ditching
 - Conversion of sand prairie nesting habitat to cropland (e.g., forestation via fire prevention)
- Blanding's turtle habitat:
 - Manipulation of natural wetlands for management of other species has a disruptive impact on natural wetland dynamics. This may include reduced survival of Blanding's turtles or reduced productivity of the habitat
 - Loss of adjacent uplands or inappropriate cover/management. Blanding's requires nesting habitats that are secure from disturbance and that are within a reasonable distance to wetland habitats.
 - Loss of appropriate habitat (ether due to tradition conversion to agriculture or to conversion of inappropriate conservation cover types) is negatively impacting reproductive success in this species
 - Long-distance movements

A respondent added, "The participant has to speculate about the meaning of successional change. Is a change an increase or decrease in early successional habitats? Climate change also is speculative. Agriculture/Forestry practices have different effects. Grouping these practices into a single category does not appropriately represent each individual practice. Point and nonpoint pollution may have a positive or negative effect."

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to permanent wetland habitats. There were no responses.

Additional research and survey efforts

Current body of research

Species research

Seventeen percent of respondents stated that the current body of science is adequate for wildlife in permanent wetland habitats in Indiana; sixty seven percent said that it is inadequate.

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A respondent noted, "Literature is not habitat specific for muskrats in Indiana."

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

Mumford and Whitaker 1982

Title = Fur animals of Indiana;
Author = David Brooks;
Date = 1959;
Publisher = IDF&W

Author = review Minton's guide;
Date = 2001;
Publisher = Get BioBlitz & IUPFW reports from DNR

Title = ongoing background work in NE & MN

Title = Status and Distribution of candidate endangered herpetofauna in the Fish Creek watershed;
Author = Bruce Kingsbury, Spencer Cortwright;
Date = 1994;
Publisher = IDNR Division of Fish and Wildlife

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the current body of science for wildlife in permanent wetland habitats. Their responses included:

- Indiana Breeding Bird Survey

Habitat research

Seventeen percent of respondents stated that the current body of science is adequate for permanent wetland habitats in Indiana; sixty seven percent said that it is inadequate.

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

Title = Not my expertise;
Author = contact JW Lang for NE & MN

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the current body of science for permanent wetland habitats. There were no responses.

Research needs

Species research

Respondents ranked research needs for wildlife in permanent wetland habitats in Indiana:

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

Respondents noted other research needs for permanent wetland habitats in Indiana (not ranked):

- Research as related to muskrats is not habitat specific
- Long-term fidelity to specific sites
- Limits to sand prairie needs for nesting
- Limits to recruitment when forced to nest in row crop areas

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 permanent wetland habitats. There were no responses.

Habitat research

Respondents ranked research needs for permanent wetland habitats in Indiana:

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

Respondents noted additional research needs for permanent wetland habitats in Indiana (not ranked):

- Prairie restoration and fire management to perpetuate small sand blowouts
- Relationship between upland nesting habitat, dispersal distance, barriers to dispersal, etc., might be critical information for conservation of the Blanding's turtle.

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

Conservation actions necessary

Species actions

Respondents ranked conservation efforts by how well they address threats to wildlife in permanent wetland habitats in Indiana:

Rank	Conservation efforts for wildlife in permanent wetland habitats
1	Population management (hunting, trapping)
2 (tie)	Regulation of collecting
2 (tie)	Public education to reduce human disturbance
2 (tie)	Threats reduction
2 (tie)	Limiting contact with pollutants/contaminants
2 (tie)	Habitat protection (use below for details)

Respondents noted other current conservation practices for wildlife in permanent wetland habitats in Indiana:

- Preserve wetlands

Respondents recommended these practices for more effective conservation of wildlife in permanent wetland habitats in Indiana (not ranked):

- Habitat protection
- Although not habitat specific, outreach programs are needed to effectively and accurately educate citizens about wildlife (game and nongame), the wildlife conservation model (for game and nongame), and the need for effective muskrat management programs
- Restoration in new, very large natural areas in Northwest Indiana
- Raccoon reduction near constrained small areas of occupied habitat in Northeast Indiana
- Design and management of conservation areas that specifically incorporate life history requirements of the species across relatively large habitats (>1,000 acres). Blanding's turtles are too often subjected to management decisions that favor other species, and these often have a negative impact on available wetland and nesting habitat. In some cases, these management decisions seem likely to result in direct mortality of adults and eggs
- Restoration of habitat and connectivity

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the practices for more effective conservation of wildlife in permanent wetland habitats. There were no responses.

Habitat actions

Respondents ranked conservation efforts by how well they address threats to permanent wetland habitats in Indiana:

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Rank	Conservation efforts for permanent wetland habitats
1	Protection of adjacent buffer zone
2 (tie)	Habitat protection on public lands
2 (tie)	Habitat restoration on public lands
2 (tie)	Succession control (fire, mowing)
3 (tie)	Habitat restoration through regulation
3 (tie)	Habitat restoration incentives (financial)
3 (tie)	Managing water regimes
3 (tie)	Cooperative land management agreements (conservation easements)
3 (tie)	Habitat protection incentives (financial)
3 (tie)	Pollution reduction
3 (tie)	Land use planning
3 (tie)	Artificial habitat creation (artificial reefs, nesting platforms)
3 (tie)	Habitat protection through regulation

Respondents listed no other current conservation practices for permanent wetland habitats in Indiana.

Respondents recommended the following practices for more effective conservation of permanent wetland habitats in Indiana (not ranked):

- Wetland protection
- Use fire to maintain large sand prairies near appropriate wetlands
- Acquire/purchase easements on additional blocks of land that have permanent wetlands associated with large, sandy uplands
- Protection, restoration and appropriate management of adjacent uplands as nesting habitat around known populations
- Restore habitat and connectivity; allow beaver activity

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the practices for more effective conservation of permanent wetland habitats. There were no responses.

Proposed plans for monitoring

Current monitoring

Species monitoring

Respondents were aware of the following monitoring efforts by state agencies for wildlife in permanent wetland habitats in Indiana (not ranked):

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

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Respondents were aware of the following monitoring efforts by other organizations for wildlife in permanent wetland habitats in Indiana (not ranked):

- Occasional statewide (less than once a year and not 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 permanent wetland habitats in Indiana:

Rank	Monitoring efforts by state agencies for conservation of wildlife in permanent wetland habitats
1	Occasional regional or local (less than once a year and not regularly scheduled) monitoring
2	Occasional statewide (less than once a year and not regularly scheduled) monitoring
3	Periodic statewide (less than once a year but still regularly scheduled) monitoring
4	Periodic regional or local (less than once a year but still regularly scheduled) monitoring
5	Statewide once-a-year monitoring
6 (tie)	Regional or local year-round monitoring
6 (tie)	Statewide year-round monitoring
6 (tie)	Regional or local once-a-year monitoring

Respondents ranked monitoring efforts by other organizations based on their importance for conservation of wildlife in permanent wetland habitats in Indiana:

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1	Occasional regional or local (less than once a year and not regularly scheduled) monitoring
2	Occasional statewide (less than once a year and not regularly scheduled) monitoring
4	Periodic regional or local (less than once a year but still regularly scheduled) monitoring
3	Periodic statewide (less than once a year but still regularly scheduled) monitoring

Respondents listed regional or local monitoring by state agencies for wildlife in permanent wetland habitats in Indiana (not ranked):

- IDNR – Division of Nature Preserves
- Agencies that issue drainage permits
- Fish Creek, Patoka River, Pigeon Creek

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Respondents listed regional or local monitoring by other organizations for wildlife in permanent wetland habitats in Indiana:

- Robert Brodman, St. Joseph's College
- "BioBlitz" in Lake County
- Herp Center at IUPFW in possibly Steuben and LaGrange counties
- Fish Creek, Patoka River, Pigeon Creek, Muscatatuck River

Respondents listed organizations that monitor wildlife in permanent wetland habitats in Indiana (not ranked):

- Ball State University; Tom Morrell
- Muskrat: Indiana Division of Fish and Wildlife: Population monitoring efforts at state, regional and local scales are to monitor annual trends. Monitoring programs used by the division are not habitat specific for muskrat
- TNC has funded some work at Cline Lake Fen to better understand population dynamics, habitat use, etc.
- Bruce Kingsbury, IUPU - Fort Wayne

Respondents considered monitoring techniques for wildlife in permanent wetland habitats in Indiana:

Monitoring techniques for wildlife in permanent wetland habitats	Used	Not used but possible with existing technology and data	Not economically feasible
Radio telemetry and tracking	X	X	--
Modeling	X	X	--
Coverboard routes	--	X	--
Spot mapping	X	--	--
Reporting from harvest, depredation, or unintentional take (road kill, by-catch)	X	--	--
Mark and recapture	X	X	--
Professional survey/census	X	X	--
Volunteer survey/census	X	X	--
Trapping (by any technique)	X	X	--
Representative sites	X	--	--
Probabilistic sites	X	--	--

Respondents noted other monitoring techniques for wildlife in permanent wetland habitats in Indiana:

- Look for burrows in muck

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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 permanent wetland habitats. There were no responses.

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Habitat inventory and assessment

Respondents were aware of the following inventory and assessment efforts by state agencies for permanent wetland habitats 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 permanent wetland habitats in Indiana:

- 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 permanent wetland habitats in Indiana:

Rank	Inventory and assessment by state agencies for conservation of permanent wetland habitats
1	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment
2	Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment
3	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment
4	Statewide once-a-year inventory and assessment
5 (tie)	Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment
5 (tie)	Statewide annual inventory and assessment
5 (tie)	Regional or local year-round inventory and assessment
5 (tie)	Regional or local once-a-year inventory and assessment

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Respondents ranked inventory and assessment efforts by other organizations based on their importance for conservation of permanent wetland habitats in Indiana:

Rank	Inventory and assessment by other organizations for conservation of permanent wetland habitats
1	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment
2	Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment
4	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment
4 (tie)	Statewide once-a-year inventory and assessment
4 (tie)	Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment
4 (tie)	Regional or local year-round inventory and assessment
4 (tie)	Regional or local once-a-year inventory and assessment
4 (tie)	Statewide year-round inventory and assessment

A respondent listed regional or local inventory and assessment by state agencies for permanent wetland habitats in Indiana (not ranked):

- Northwest Indiana
- Northeast Indiana

A respondent listed regional or local inventory and assessment by other organizations agencies for permanent wetland habitats in Indiana:

* IUPUI-FW faculty and students work in wetlands and this species in Northeast Indiana

A respondent listed organizations that monitor permanent wetland habitats in Indiana (not ranked):

- Ball State University, Northeast Indiana
- Indiana State University, Northwest Indiana

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Respondents considered inventory and assessment techniques for permanent wetland habitats in Indiana:

Inventory and assessment techniques for permanent wetland habitats	Used	Not used but possible with existing technology and data	Not economically feasible
GIS mapping	X	X	--
Aerial photography and analysis	X	X	--
Systematic sampling	X	--	--
Regulatory information	X	--	--
Participation in land use programs	X	--	--

A respondent listed additional inventory and assessment techniques for permanent wetland habitats in Indiana:

* Look for runways in muck and trap them

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 permanent wetland habitats. There were no responses.

Recommended monitoring Species monitoring

Respondents recommended the following monitoring techniques for effective conservation of wildlife in permanent wetland habitats in Indiana:

- Professional surveys
- Look for burrows in muck connected with trapping
- Muskrat: IDNR – Division of Fish and Wildlife uses harvest reports and professional surveys. The assumption is that aquatic systems include all habitat types occupied by muskrat
- Radio-track females to nesting sites; monitor nests for depredation (both are labor intensive for at least one person)

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 permanent wetland habitats. There were no responses.

Habitat inventory and assessment

Respondents recommended the following inventory and assessment techniques for effective conservation of permanent wetland habitats in Indiana (not ranked):

- Systematic sampling and GIS
- Blanding's turtle:

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- High resolution aerial photography
- Monitor wetlands vegetation: Blanding's turtles prefer floating emergents (e.g., duck weed) and get crowded out by cattail expansion)

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 permanent wetland habitats. There were no responses.

Technical experts and conservation organizations offered the following additional comments:

- The respondent is mostly concerned with Blanding's turtle. This is an important species but should also have input about other wildlife.