

NATURAL LAKES HABITAT NARRATIVE

Habitat description

Eighteen counties in northern Indiana contain natural lakes, although Kosciusko, Lagrange, Noble and Steuben counties contain nearly 70% of the total surface acreage. Natural lakes vary widely in habitat and eutrophication. Less fertile lakes tend to be deep and well oxygenated with marl or sandy substrates. More fertile lakes tend to be shallow with muck bottoms and dense stands of aquatic vegetation.

Problems affecting species and habitats

Species threats

Respondents ranked threats wildlife in natural lakes habitat in Indiana:

Rank	Threats to wildlife in natural lakes habitat
1	High sensitivity to pollution
2 (tie)	Habitat loss (feeding/foraging areas)
2 (tie)	Viable reproductive population size or availability
3	Specialized reproductive behavior or low reproductive rates
4 (tie)	Habitat loss (breeding range)
4 (tie)	Near limits of natural geographic range
5	Predators (native or domesticated)
6 (tie)	Small native range (high endemism)
6 (tie)	Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
6 Tie)	Dependence on irregular resources (cyclical annual variations (e.g. food, water, habitat limited due to annual variations in availability)
6 (tie)	Invasive/non-native species
7 (tie)	Bioaccumulation of contaminants
7 (tie)	Regulated hunting/fishing pressure (too much)
8 (tie)	Species over population
8 (tie)	Dependence on other species (mutualism, pollinators)
8 (tie)	Diseases/parasites (of the species itself)

Respondents listed no additional threats to wildlife in natural lakes habitat in Indiana.

Respondents noted top threats to wildlife in natural lake habitats in Indiana (not ranked):

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- Long-term declines in water quality associated with lake eutrophication
- Annual and seasonal variations in habitat availability
- Cold, clear water is critical for cisco survival; increased runoff and nutrient loading have degraded the habitat for this species in many of the 50+ lakes it once occurred in
- Few lakes still have ciscos, and there is apparently little to no reproduction
- The deliberate stocking of predator fish in cisco lakes has been a threat to this species for years; if this hasn't been stopped, it needs to
- Loss of habitat (reproductive/feeding) that is essential for northern pike survival
- Overharvest and illegal harvest (This doesn't seem to be a major threat as of now)
- Loss of undisturbed natural lake habitat

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

Habitat threats

Respondents ranked threats to natural lakes habitat in Indiana:

Rank	Threats to natural lakes habitat
1	Habitat degradation
2	Commercial or residential development (sprawl)
3 (tie)	Nonpoint source pollution (sedimentation and nutrients)
3 (tie)	Agricultural/forestry practices
4	Drainage practices (stormwater runoff)
5	Successional change
6	Stream channelization
7 (tie)	Habitat fragmentation
7 (tie)	Invasive/non-native species
8	Point source pollution (continuing)

Respondents listed no other threats to natural lakes habitat in Indiana.

Respondents noted top threats to natural lake habitat in Indiana (not ranked):

- Habitat degradation
- Successional change
- Water quality degradation that leads to cloudy water is the key threat.
- Emergent bulrush and wetland habitat loss. It has been well documented in northern states that northern pike prefer flooded vegetation for spawning during the spring. Loss of this habitat from boating and wildlife (waterfowl and muskrat feeding) may reduce reproductive habitat for northern pike in some natural lakes.
- Bulkhead seawall development reduces emergent vegetation used by northern pike for reproduction and for cover during feeding.
- Shoreline and lakebed alterations

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

Additional research and survey efforts

Current body of research

Species research

Twenty-five percent of respondents indicated that research on wildlife in natural lake habitats in Indiana is adequate; seventy-five percent said that research was inadequate.

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

Title = Cisco population status and management in Indiana;
Author = Jed Pearson;
Date = 2001;
Publisher = Division of Fish and Wildlife

Title = Northern Pike Spawning Habitat Investigations At Two Natural Lake In Indiana;
Author = Cwalinski, Tim A.;
Date = September 2001;
Publisher = Indiana Department of Natural Resources

Title = DFW largemouth bass database;
Author = Jed Pearson;
Date = unpublished;
Publisher = unpublished

Title = Largemouth bass size limits at Indiana natural lakes - a 30-year history;
Author = Jed Pearson;
Date = 2003;
Publisher = unpublished

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the research on wildlife in natural lakes habitat. There were no responses.

Habitat research

Respondents indicated that research on natural lake habitat in Indiana is inadequate (75%) or nonexistent (25%).

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

Title = Cisco population status and management in Indiana;
Author = Jed Pearson;
Date = 2001;
Publisher = Division of Fish and Wildlife

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Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the research on natural lakes habitat. There were no responses.

Research needs

Species research

Respondents ranked research needs for wildlife in natural lakes habitat in Indiana:

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

A respondent noted that additional research needs for wildlife in natural lakes habitat in Indiana include: "limiting factors and impacts of competition and predation."

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 natural lakes habitat. There were no responses.

Habitat research

Respondents ranked research needs for natural lake habitats in Indiana:

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

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A respondent noted that additional research for natural lakes habitats in Indiana is needed regarding “water quality variations and impacts of land use and shoreline alterations.”

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

Conservation actions necessary

Species actions

Respondents ranked how well conservation efforts address threats to wildlife in natural lake habitats in Indiana:

Rank	Conservation efforts for wildlife in natural lakes habitat
1	Habitat protection
2	Threats reduction
3	Exotic/invasive species control
4	Population management (hunting, trapping)
5	Public education to reduce human disturbance
6 (tie)	Population enhancement (captive breeding and release)
6 (tie)	Reintroduction (restoration)
6 (tie)	Regulation of collecting
6 (tie)	Disease/parasite management
6 (tie)	Translocation to new geographic range
6 (tie)	Protection of migration routes
6 (tie)	Limiting contact with pollutants/contaminants
6 (tie)	Culling/selective removal
6 (tie)	Stocking

Respondents noted no other conservation practices for wildlife in natural lakes habitat in Indiana.

Respondents recommended the following practices to enhance wildlife in natural lakes habitat in Indiana (not ranked):

- Habitat protection and education to reduce habitat disturbance
- Assure there is no stocking of predator fish in cisco lakes
- Greatly limit/mitigate any new development on cisco lakes, particularly addressing runoff from lawns and other water quality issues
- Work to get any farmlands adjacent to cisco lakes into no-till cropland management.
- Implementation of ecozones in undeveloped areas to conserve that vegetation present.
- Implement a catch and release only regulation in lakes with low densities.

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- Habitat management and harvest management

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Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the conservation practices for wildlife in natural lakes habitat. There were no responses.

Habitat actions

Respondents ranked how well conservation efforts address threats to natural lakes habitat in Indiana:

Rank	Conservation efforts for natural lakes habitat
1 (tie)	Habitat protection through regulation
1 (tie)	Pollution reduction
1 (tie)	Protection of adjacent buffer zone
1 (tie)	Land use planning
2	Habitat protection on public lands
3 (tie)	Habitat restoration through regulation
3 (tie)	Cooperative land management agreements (conservation easements)
4 (tie)	Habitat protection incentives (financial)
4 (tie)	Habitat restoration incentives (financial)
5 (tie)	Habitat restoration on public lands
5 (tie)	Succession control (fire, mowing)
5 (tie)	Corridor development/protection
5 (tie)	Managing water regimes
5 (tie)	Restrict public access and disturbance

Respondents listed no other current conservation practices for natural lakes habitat in Indiana.

Respondents recommended the following conservation actions for natural lakes habitat in Indiana (not ranked):

- Pollution reduction and land-use zoning
- Implementation of ecozones in undeveloped areas to conserve vegetation that is present
- Reduce inlet and upstream degradation
- Increase awareness and cooperation of landowners to create better shoreline and tributary habitat
- Habitat protection and restoration through regulation

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the conservation practices for natural lakes habitat. There were no responses.

Proposed plans for monitoring

Current monitoring

Species monitoring

Respondents are aware of the following monitoring by state agencies for wildlife in natural lakes habitat in Indiana (not ranked):

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

Twenty-five percent of respondents are aware of the following monitoring by organizations for wildlife in natural lakes 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 these regional or local monitoring efforts by state agencies for their importance for wildlife conservation in natural lakes habitat in Indiana:

Rank	Regional or local monitoring efforts by state agencies for wildlife in natural lakes habitat
1	Occasional regional or local (less than once a year and not regularly scheduled) monitoring
2	Periodic regional or local (less than once a year but still regularly scheduled) monitoring
3	Regional or local once-a-year monitoring
4	Regional or local year-round monitoring
5	Occasional statewide (less than once a year and not regularly scheduled) monitoring

Respondents listed regional or local monitoring efforts by state agencies for wildlife in natural lakes habitat in Indiana (not ranked):

- Northeast Indiana (DFW)
- Standardized largemouth bass sampling protocols (DFW)
- Tournament fishing (DFW)
- Cisco lakes (DFW)
- Northern Pike are monitored via general fish surveys conducted to update lake status. There is now monitoring of northern pike on a general schedule
- There was a tracking study conducted in two Indiana natural lakes in the late 1990's to better understand reproductive habitat of northern pike (DFW)
- Water quality monitoring (IDEM)

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Respondents noted no regional or local monitoring efforts by other organizations for wildlife in natural lakes habitat in Indiana.

A respondent listed the following organizations that conduct regional or local monitoring for wildlife in natural lakes habitat in Indiana:

- Bass fishing clubs who hold tournaments on Lake Wawasee and Syracuse Lake

The following table reflects the opinions of multiple respondents, thus multiple check marks are possible. Additionally, some of these differences may reflect different taxonomic group bias.

Respondents ranked current monitoring techniques for wildlife in natural lakes habitat in Indiana:

Rank	Monitoring techniques for wildlife in natural lakes habitat	Used	Not used but possible with existing technology and data
	Radio telemetry and tracking	X	X
	Modeling	X	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	
	Volunteer survey/census	X	X
	Trapping (by any technique)	X	X
	Representative sites	X	

Respondents recommended these monitoring techniques for wildlife in natural lakes habitat in Indiana (not ranked):

- Occasional gillnetting to verify presence followed by intensive netting to confirm low levels or absence
- Large fyke-nets are used in Lake Webster (Kosciusko County) to collect brood stock for muskellunge. These nets would be useful in capturing northern pike as well. This would allow biologist to capture enough fish to get a representative sample of adult fish. There is still no effective method of sampling young esocids without mortality
- Springtime dc electrofishing according to DFW standard protocol
- Standard DFW creel survey procedures
- Tournament monitoring by the DFW and bass clubs

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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 natural lakes habitat. There were no responses.

Habitat inventory and assessment

Respondents are aware of these inventory and assessment efforts by state agencies for natural lakes habitat in Indiana (not ranked):

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

Respondents are aware of these inventory and assessment efforts by other organizations for natural lakes habitat in Indiana (not ranked):

- 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 by state agencies by their level of importance to conserve natural lakes habitat in Indiana:

Rank	Inventory and assessment by state agencies for natural lakes habitat
1	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies
2	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies
3	Regional or local once a year inventory and assessment conducted by state agencies
4	Regional or local year-round inventory and assessment conducted by state agencies

Respondents listed no inventory and assessment conducted by other organizations as “very crucial” or “somewhat crucial” for natural lakes habitat in Indiana. Twenty-five percent of respondents listed the following effort as “slightly crucial:”

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

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Respondents listed regional or local inventory and assessment conducted by state agencies for natural lakes habitat in Indiana (not ranked):

- Northeast Indiana (DFW)
- Recently the IDNR began sampling/mapping emergent plant species in some Indiana natural lakes. These plants may be used as reproductive habitat for northern pike

Respondents listed no regional or local inventory and assessment conducted by other organizations for natural lakes habitat in Indiana, nor did they list organizations involved in these efforts.

The following table reflects the opinions of multiple respondents, thus multiple check marks are possible. Additionally, some of these differences may reflect different taxonomic group bias.

Respondents ranked inventory and assessment techniques for natural lakes habitat in Indiana. No techniques were listed as "frequently used."

Rank	Inventory and assessment techniques for natural lakes habitat	Occasionally Used	Not used but possible with existing technology and data	Not economically feasible
	GIS mapping	X	X	
	Aerial photography and analysis	X		
	Systematic sampling	X	X	
	Property tax estimates			X
	State revenue data			X
	Regulatory information			X
	Participation in landuse programs	X		X
	Modeling		X	
	Voluntary landowner reporting	X	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 natural lakes habitat. There were no responses.

Recommended monitoring

Species monitoring

Respondents recommended these monitoring techniques for effective conservation of the Wildlife in Natural Lakes Habitat in Indiana? (not ranked):

- Occasional gillnetting to verify presence followed by intensive netting to confirm low levels or absence

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- Large fyke-nets are used in Lake Webster (Kosciusko County) to collect brood stock for muskellunge. These nets would be useful in capturing northern pike as well. This would allow biologists to capture enough fish to get a representative sample of adult fish. There is still no effective method of sampling young esocids without mortality
- Springtime dc electrofishing according to DFW standard protocol
- Standard DFW creel survey procedures
- Tournament monitoring by the DFW and bass clubs

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 natural lakes habitat. There were no responses.

Habitat inventory and assessment

Respondents recommended these inventory and assessment techniques for natural lakes habitat in Indiana (not ranked):

- Emergent bulrush and wetland monitoring and protection via ecozones.
- Evaluate land and water use practices to reduce in lake and upstream degradation of vegetation and shoreline.
- Unknown

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 natural lakes habitat. There were no responses.