

LAKE MICHIGAN HABITAT NARRATIVE

Habitat description

Lake Michigan is Indiana's largest natural lake, although Indiana can only lay claim to about 1% (224 mi²) of its area and only 45 miles of its shoreline. The southern tip of Lake Michigan forms Indiana's extreme northwest border. Ecology of the lake is ruled by the massive amount of offshore, deep, cold water, wind seiches, and newly introduced exotic species.

Problems affecting the species and habitats

Species threats

Respondents ranked threats to wildlife in Lake Michigan habitat in Indiana:

Rank	Threats to wildlife in Lake Michigan habitat
1	Invasive/non-native species
2 (tie)	Viable reproductive population size or availability
2 (tie)	Specialized reproductive behavior or low reproductive rates
3 (tie)	Predators (native or domesticated)
3 (tie)	Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
4 (tie)	Bioaccumulation of contaminants
4 (tie)	Diseases/parasites (of the species itself)
4 (tie)	Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by-catch, harvesting equipment, land preparation machinery)
4 (tie)	Habitat loss (breeding range)
4 (tie)	Habitat loss (feeding/foraging areas)
4 (tie)	Small native range (high endemism)
5 (tie)	High sensitivity to pollution
5 (tie)	Regulated hunting/fishing (too much)

Respondents listed additional threats to wildlife in Lake Michigan habitat in Indiana: (not ranked):

- Commercial over exploitation resulting in low spawner stock abundance
- Egg predators predation, nutritional requirements, early mortality syndrome

Respondents noted top threats to wildlife in Lake Michigan habitat in Indiana (not ranked):

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- Year class failure related to low spawner stock abundance
- Competition with non-native species for limited available food resources
- Lack of successful spawning, possibly related to bioenergetics
- Too much egg predation

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

Habitat threats

Respondents ranked the following habitat threats in Lake Michigan in Indiana:

Rank	Threats to Lake Michigan habitat
1	Invasive/non-native species
2	Residual contamination (persistent toxins)
3 (tie)	Nonpoint source pollution (sedimentation and nutrients)
3 (tie)	Habitat degradation
4 (tie)	Habitat fragmentation
4 (tie)	Point source pollution (continuing)
4 (tie)	Drainage practices (stormwater runoff)
5	Climate change

A respondent listed “competition with round goby for nearshore habitat” as an additional threat to Lake Michigan habitat in Indiana.

Respondents noted that the top threats to Lake Michigan habitat in Indiana are (not ranked):

- Identification of habitat along Indiana's nearshore area
- Competition with non-native species for habitat. Need a quality place to live that is not in competition with round goby

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

Additional research and survey efforts

Current body of research

Species research

The respondents were equally divided, indicating that research about wildlife in Lake Michigan habitat in Indiana is both adequate and inadequate.

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

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Title = Preliminary Results of 2004 Ball State University Yellow Perch Research in Indiana Waters of Lake Michigan;

Author = Paul Allen and Thomas Lauer;

Date = October 2004;

Publisher = Ball State University

Title = Yellow Perch Research and Management in Lake Michigan, Evaluating Progress in a Cooperative Effort, 1997-2001;

Author = David Clapp and John Dettmers;

Date = November 2004;

Publisher = American Fisheries Society, Fisheries

Title = Lake Trout Restoration Plan;

Date = In progress

Title = Lake Trout Impediments Document;

Author = Numerous,;

Date = 2003;

Publisher = Lake Trout Task group/LMTC

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 Lake Michigan habitats. There were no responses.

Habitat research

All respondents indicated that research on Lake Michigan habitat in Indiana is inadequate.

Respondents did not identify citations (title, author, date, publisher) that would give the best overview of Lake Michigan habitats in Indiana.

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

Research needs

Species research

Respondents ranked the following research needs for wildlife in Lake Michigan habitat in Indiana:

Rank	Research needs for wildlife in Lake Michigan habitat
1	Threats (predators/competition, contamination)
2 (tie)	Distribution and abundance
2 (tie)	Limiting factors (food, shelter, water, breeding sites)

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- 2 (tie) Relationship/dependence on specific habitats
- 2 (tie) Population health (genetic and physical)
 - 3 Life cycle

Respondents listed no other research needs for wildlife in Lake Michigan 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 wildlife in Lake Michigan habitats. There were no responses.

Habitat research

Respondents ranked the importance of research for Lake Michigan habitat in Indiana:

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

Respondents listed no research needs for Lake Michigan habitat in Indiana.

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

Conservation actions necessary

Species actions

Respondents listed no conservation efforts that address threats to wildlife in Lake Michigan habitat in Indiana “very well.” Respondents believe that these efforts protect wildlife in Lake Michigan habitat in Indiana “somewhat.”

Rank	Efforts to address threats to wildlife in Lake Michigan habitats
1 (tie)	Habitat protection
1 (tie)	Population management (hunting, trapping)
1 (tie)	Threats reduction
1 (tie)	Regulation of collecting
1 (tie)	Public education to reduce human disturbance
2 (tie)	Population enhancement (captive breeding and release)

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- 2 (tie) Disease/parasite management
- 2 (tie) Limiting contact with pollutants/contaminants
- 2 (tie) Stocking

A respondent listed this additional conservation practice for wildlife in Lake Michigan habitat in Indiana (not ranked):

- Regulation of sport harvest
- Closure of commercial fishery to allow spawning stock biomass to increase, thus allowing for the production of offspring that can eventually add to the spawning stock biomass

A respondent recommended the following practices to enhance wildlife in Lake Michigan habitat in Indiana:

- Completely eliminate commercial fishing. This appears to have reduced the spawning stock to a level that could not maintain a fishery

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the conservation practice for wildlife in Lake Michigan habitats. There were no responses.

Habitat actions

Respondents indicated that no conservation efforts address threats to Lake Michigan habitat in Indiana “very well,” but the following work addresses threats “somewhat well:”

Rank	Efforts to address threats to Lake Michigan habitats
1 (tie)	Artificial habitat creation (artificial reefs, nesting platforms)
1 (tie)	Habitat protection through regulation
1 (tie)	Technical assistance
2 (tie)	Habitat restoration through regulation
2 (tie)	Land use planning
2 (tie)	Pollution reduction

A respondent indicated that “limiting disturbance through the construction permit process administered by the IDNR Division of Water” would address threats to Lake Michigan habitat in Indiana.

A respondent recommended the following for more effective conservation of Lake Michigan habitat in Indiana:

- Habitat creation, such as placement of artificial structures during lake construction projects

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the conservation efforts for Lake Michigan habitats. There were no responses.

Proposed plans for monitoring

Current monitoring

Species monitoring

Respondents are aware of monitoring efforts conducted by state agencies for wildlife in Lake Michigan habitat in Indiana (not ranked):

- Regional or local year-round monitoring conducted by state agencies
- Regional or local once-a-year monitoring conducted by state agencies
- Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies

All respondents are aware of the following monitoring efforts by organizations for wildlife in Lake Michigan 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

Respondents ranked the importance of monitoring efforts by state agencies for conservation of wildlife in Lake Michigan habitat in Indiana:

Rank	Monitoring efforts by state agencies for wildlife in Lake Michigan habitat
1	Regional or local year-round monitoring conducted by state agencies
2 (tie)	Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies
2 (tie)	Regional or local once-a-year monitoring conducted by state agencies

Respondents ranked the importance of monitoring efforts by organizations for conservation of wildlife in Lake Michigan habitat in Indiana:

Rank	Monitoring efforts by organizations for wildlife in Lake Michigan habitat
1	Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations
2	Regional or local once a year monitoring conducted by other organizations

Respondents listed regional or local monitoring efforts for wildlife in Lake Michigan habitat in Indiana, conducted by a state agency (not ranked):

- IDNR Division of Fish and Wildlife
 - Lake Michigan proper out of Michigan City

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- Spring assessment out of Michigan City
- Fall spawning assessment, Indiana waters of Lake Michigan
- Nine-month creel survey for harvest information

Respondents listed the following regional or local monitoring efforts by other organizations for wildlife in Lake Michigan habitat in Indiana (not ranked):

- Out of Michigan City and near Gary by Ball State University
- USFWS and Illinois natural history survey egg and fry assessments at the Port of Indiana as part of a Fish and Wildlife Restoration Grant.

Respondents listed organizations that conduct regional or local species monitoring efforts for wildlife in Lake Michigan habitat in Indiana (not ranked):

- IDNR-Fish and Wildlife
- Ball State University
- University of Michigan through a coastal program grant
- USFWS
- Indiana DNR Division of Fish and Wildlife
- Illinois Natural History Survey, USFWS

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 considered current monitoring techniques for wildlife in Lake Michigan habitat in Indiana:

Rank	Monitoring techniques for wildlife in Lake Michigan habitat	Used	Not used but possible with existing technology or data	Not economically feasible
	Radio tracking and telemetry			X
	Modeling	X	X	
	Driving a survey route	X		
	Reporting from harvest, depredation, or unintentional take (road kill, by-catch)	X		
	Mark and recapture	X		
	Professional survey/census	X		
	Trapping (by any technique)	X		
	Representative sites	X		
	Volunteer survey/census	X		

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Respondents listed other monitoring techniques for wildlife in Lake Michigan habitat in Indiana (not ranked):

- Long-term monitoring through gillnets
- Trawling has been conducted at 3 sites along the Lake Michigan lakefront since the mid 1970s by Ball State University during the summer season
- Creel census has been conducted by IDNR Division of Fish and Wildlife for approximately 20 years
- Commercial monitoring was conducted until the halt of the commercial fishing industry in 1996

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 Lake Michigan habitats. There were no responses.

Habitat inventory and assessment

Respondents are aware of inventory and assessment conducted by state agencies for Lake Michigan 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 are aware of inventory and assessment conducted by other organizations for Lake Michigan habitat in Indiana:

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

Respondents considered no inventory and assessment conducted by state agencies as “very crucial” to monitor Lake Michigan habitat in Indiana. One of two of respondents considered “regional or local once-a-year inventory and assessment” as “somewhat crucial.” A sole respondent stated that “regional or local year-round inventory and assessment” was “slightly crucial” for Lake Michigan habitat in Indiana.

Respondents cited no inventory and assessment efforts conducted by organizations as “very crucial” for Lake Michigan habitat in Indiana. Fifty-percent respondents considered the following as “somewhat crucial” (not ranked):

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

The sole respondent believed these inventory and assessment efforts are “slightly crucial” for Lake Michigan habitat in Indiana (not ranked):

- Regional or local once-a-year inventory and assessment
- Regional or local year-round inventory and assessment

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Respondents indicated the following regional or local inventory and assessments are conducted by state agencies for Lake Michigan habitat in Indiana (not ranked):

- Lake Michigan proper along the shoreline in nearshore area less than 30 feet in depth
- Habitat mapping and shoreline aerial imagery

Respondents listed regional or local inventory and assessment by other organizations for Lake Michigan habitat in Indiana:

- Lake Michigan proper along the shoreline in nearshore area less than 30 feet in depth

Respondents listed organizations involved in monitoring Lake Michigan habitat in Indiana (not ranked):

- IDNR Division of Fish and Wildlife
- U.S. Fish and Wildlife Service
- Great Lakes Fishery Commission
- Ball State University
- University of Michigan

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 considered current inventory and assessment techniques for Lake Michigan habitat in Indiana:

	Used
GIS mapping	X
Aerial photography and analysis	X
Systematic sampling	X
Property tax estimates	
State revenue data	
Regulatory information	X
Participation in landuse programs	
Modeling	X
Voluntary landowner reporting	
Other (please specify below)	

Respondents noted that no techniques fit into categories of "not used but possible with existing technology and data" or "not economically feasible."

A respondent listed other habitat monitoring techniques for Lake Michigan habitat in Indiana:

- Bottom mapping of habitat

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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 Lake Michigan habitats. There were no responses.

Recommended monitoring

Species monitoring

Respondents recommended the following monitoring techniques for wildlife in Lake Michigan habitat in Indiana (not ranked):

- Fall trawl sampling for young of the year production
- Possible incorporation of hydroacoustic models for the near shore area
- Coded wire tags used on lake trout stocked in Lake Michigan to allow better understanding of survival after stocking and movement of the fish and of spawning site fidelity

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 Lake Michigan habitats. There were no responses.

Habitat inventory and assessment

Respondents recommended the following inventory and assessment techniques for Lake Michigan habitat in Indiana (not ranked):

- Lidar mapping would help identify spawning areas within the nearshore zone along Indiana's coastline
- Digital satellite imagery to conduct bottom contour mapping in nearshore spawning areas

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 Lake Michigan habitats. There were no responses.