

WADEABLE/LARGE RIVERS OF GREAT LAKES DRAINAGE HABITAT NARRATIVE

Habitat description

The Great Lakes drainage of Indiana includes waters that flow into Lake Michigan and Lake Erie and are located in extreme northern Indiana and northeast Indiana. Wadeable/large rivers are those having a drainage area of $> 19 < 2,000 \text{ mi}^2$. Wadeable rivers and streams of the Great Lakes drainage of Indiana are of low to medium gradient, with sandy/rocky bottoms and are highly associated with the extensive natural lakes and wetlands of the region.

Problems affecting species and habitats

Species threats

Respondents ranked the following threats to wildlife in wadeable/large rivers of Great Lakes drainage habitat:

Rank	Threats to wildlife in wadeable/large rivers of Great Lakes drainage habitat
1	Habitat loss (feeding/foraging areas)
2 (tie)	High sensitivity to pollution
2 (tie)	Habitat loss (breeding range)
2 (tie)	Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
2 (tie)	Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
3 (tie)	Specialized reproductive behavior or low reproductive rates
3 (tie)	Bioaccumulation of contaminants
3 (tie)	Invasive/non-native species
4	Regulated hunting/fishing pressure (too much)
5 (tie)	Predators (native or domesticated)
5 (tie)	Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by-catch, harvesting equipment, land preparation machinery)
5 (tie)	Dependence on other species (mutualism, pollinators)
5 (tie)	Viable reproductive population size or availability

Respondents offered no other threats to wildlife in wadeable/large rivers of Great Lakes drainage habitat.

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Respondents listed top threats to wildlife in wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Acute effects of toxicants are recognized as a threat to organisms, but there is little knowledge on ecosystems or regional effects on chronic insults. Toxicants are more destructive to the embrolarva stages, but these are poorly documented. Pollution controls do not have definite focus on chronic effects
- Habitat loss and alteration (siltation, run-off, instream modifications, pollution)
 - Hornyhead chub are sight-feeders and mound builders for spawning; thus, muddy water will hamper their chances of survival. If the silt covers gravel and their nest, chances for successful reproduction are limited. Chub also suffer from competition from other species better adapted to muddy and silty stream conditions

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to wildlife in wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Habitat threats

Respondents ranked threats to wadeable/large rivers of Great Lakes drainage habitat:

Rank	Threats to wadeable/large rivers of Great Lakes drainage habitat
1	Stream channelization
2 (tie)	Nonpoint source pollution (sedimentation and nutrients)
2 (tie)	Agricultural/forestry practices
2 (tie)	Habitat degradation
3	Commercial or residential development (sprawl)
4	Drainage practices (stormwater runoff)
5	Habitat fragmentation
6	Point source pollution (continuing)
7 (tie)	Invasive/non-native species
7 (tie)	Mining/acidification
8	Impoundment of water/flow regulation
9	Residual contamination (persistent toxins)

Respondents noted additional threats to wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Riparian corridor destruction.
- Loss of shading
- Sedimentation

Respondents listed top threats to wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Habitat degradation

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- Nonpoint source pollution (sedimentation)
- Agricultural practices (sedimentation)
- Loss of riparian corridor
- Run-off

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Additional research and survey efforts

Current body of research

Species research

Respondents stated that the current body of science is inadequate for wildlife in wadeable/large rivers of Great Lakes drainage habitat.

Respondents identified the following citations (title, author, date, publisher) that would give the best overview of wildlife in wadeable/large rivers of Great Lakes drainage habitats in Indiana.

Title = Naiades of Pennsylvania;
Author = Ortmann;
Date = 1919;
Publisher = Carnegie Museum

Title = Freshwater mussels of the Midwest;
Author = Cummings & Mayer;
Date = 1992;
Publisher = INHS

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 wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Habitat research

Respondents stated that the current body of science is inadequate for wadeable/large rivers of Great Lakes drainage habitat.

Respondents identified the following citations (title, author, date, publisher) that would give the best overview of wadeable/large rivers of Great Lakes drainage habitats in Indiana.

Title = Naiades of Pennsylvania;
Author = Ortmann;
Date = 1919;
Publisher = Carnegie Museum

Title = Freshwater Mollusca of WI;
Author = Baker;
Date = 1928;
Publisher = WI Geol. Nat. Hist. Survey

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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 wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Research needs

Species research

Respondents ranked research needs for wildlife in wadeable/large rivers of Great Lakes drainage habitat:

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

Respondents noted no other research needs for wildlife in wadeable/large rivers of Great Lakes drainage habitat.

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 wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Habitat research

Respondents ranked research needs for wadeable/large rivers of Great Lakes drainage habitat:

Rank	Research needs for wadeable/large rivers of Great Lakes drainage habitat
1	Threats (land use change/competition, contamination/global warming)
2	Relationship/dependence on specific site conditions
3	Distribution and abundance (fragmentation)
4	Successional changes

A respondent noted no additional research needs for wadeable/large rivers of Great Lakes drainage 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 research needs for wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Conservation actions necessary

Species actions

Respondents ranked conservation efforts by how well they address threats to wildlife in wadeable/large rivers of Great Lakes drainage habitat:

Rank	Conservation efforts for wildlife in wadeable/large rivers of Great Lakes drainage habitat
1 (tie)	Habitat protection
1 (tie)	Limiting contact with pollutants/contaminants
1 (tie)	Public education to reduce human disturbance
2 (tie)	Population management (hunting, trapping)
2 (tie)	Regulation of collecting

A respondent noted additional conservation efforts for wildlife in wadeable/large rivers of Great Lakes drainage habitat, focusing on hornyhead chub (not ranked):

- Habitat protection to greatly reduce turbidity in streams for hornyhead chub feeding and breeding behaviors
- Exotic/invasive species control would help the hornyhead population
- Pollution control -- The hornyhead chub is sensitive to pollution so limiting contact with pollutants/contaminants would benefit the species
- Regulation of collecting -- The hornyhead chub is also a popular bait fish, so regulation of collecting would be beneficial

Respondents recommended these practices for more effective conservation of wildlife in wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Habitat protection (erosion controls)
- Public education
- Exotic species - Possession of exotic species should be illegal (must dispose of fish properly and not release back to stream)
- Intensive quantitative sampling of known populations. (Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogram 8)
- Less intensive qualitative sampling of new or not recently surveyed areas. (Need to determine distribution and status of the clubshell. See same for protocols)

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 wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Habitat actions

Respondents ranked conservation efforts by how well they address threats to wadeable/large rivers of Great Lakes drainage habitat:

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Rank	Conservation efforts for wadeable/large rivers of Great Lakes drainage habitat
1	Managing water regimes
2 (tie)	Pollution reduction
2 (tie)	Protection of adjacent buffer zone
3 (tie)	Habitat protection through regulation
3 (tie)	Habitat protection on public lands
3 (tie)	Habitat protection incentives (financial)
3 (tie)	Cooperative land management agreements (conservation easements)
3 (tie)	Habitat restoration on public lands
3 (tie)	Habitat restoration incentives (financial)
3 (tie)	Artificial habitat creation (artificial reefs, nesting platforms)
3 (tie)	Habitat restoration through regulation
3 (tie)	Corridor development/protection
3 (tie)	Land use planning
3 (tie)	Technical assistance

Respondents listed additional current conservation practices for wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Habitat protection and restoration on all lands by any means necessary would benefit all species (except those that are exotic and more tolerant than others), not just the hornyhead chub
- Pollution reduction, protection of adjacent buffer zone, land use planning, and conservation easements would all be beneficial to the hornyhead chub

Respondents recommended the following conservation practices for wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Protection and restoration of buffer zones/adjacent buffer zones
- Nonpoint source pollution reduction
- Assess riparian corridor
- Water quality monitoring (See Watters, 2000. Proc. 1st FMCS Symposium)

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the conservation practices for wadeable/large rivers of Great Lakes drainage habitat. 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 wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Regional or local once-a-year monitoring

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- 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 were aware of the following monitoring efforts by other organizations for wildlife in wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Regional or local once-a-year 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 wadeable/large rivers of Great Lakes drainage habitat.

Rank	Monitoring efforts by state agencies for conservation of wildlife in wadeable/large rivers of Great Lakes drainage 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 (tie)	Statewide year-round monitoring
4 (tie)	Statewide once-a-year monitoring
4 (tie)	Periodic statewide (less than once a year but still regularly scheduled) monitoring
4 (tie)	Regional or local year-round monitoring
4 (tie)	Occasional statewide (less than once a year and not regularly scheduled) monitoring

Respondents ranked monitoring efforts by other organizations based on their importance for conservation of wildlife in wadeable/large rivers of Great Lakes drainage habitat:

Rank	Monitoring efforts by other organizations for conservation of wildlife in wadeable/large rivers of Great Lakes drainage habitat
1	Occasional regional or local (less than once a year and not regularly scheduled) monitoring
2	Regional or local once a year monitoring
3	Periodic regional or local (less than once a year but still regularly scheduled) monitoring
4 (tie)	Statewide year-round monitoring
4 (tie)	Statewide once a year monitoring
4 (tie)	Periodic statewide (less than once a year but still regularly scheduled) monitoring

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- 4 (tie) Occasional statewide (less than once a year and not regularly scheduled) monitoring
- 4 (tie) Regional or local year-round monitoring

Respondents listed regional or local monitoring by state agencies for wildlife in wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- IDNR periodically conducts fish stream surveys
- IDEM conducts stream health surveys using fish and invertebrates
- IDEM monitors the Great Lakes Drainage once every five years; they may have data available for hornyhead chub captured in the basin as part of the fish community assessments.
- IDNR may also sample fish communities in Great Lakes Drainage and have data on the hornyhead chub
- Maumee system

Respondents listed regional or local monitoring by other organizations for wildlife in wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- In some cities stream health is also assessed by fish and invertebrate surveys
- Elkhart Public Works and Utilities has a fisheries biologist on staff that actively collects fish community samples from the Great Lakes Basin (1-2 times in the summer). He may have data on the hornyhead chub as well
- Maumee system

Respondents listed organizations that monitor wildlife in wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- IDNR
- IDEM
- City of Elkhart
- City of South Bend
- TNC

Respondents considered monitoring techniques for wildlife in wadeable/large rivers of Great Lakes drainage habitat:

Monitoring techniques for wildlife in wadeable/large rivers of Great Lakes drainage habitat	Used	Not used but possible with existing technology and data	Not economically feasible
Radio telemetry and tracking	--	X	X
Modeling	X	X	--
Spot mapping	X	--	--
Reporting from harvest, depredation, or	X	X	--

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unintentional take (road kill, by-catch)

Mark and recapture	X	X	--
Professional survey/census	X	--	--
Volunteer survey/census	X	--	--
Trapping (by any technique)	X	--	--
Representative sites	X	--	--
Probabilistic sites	X	X	--

Respondents noted no other monitoring techniques for wildlife in wadeable/large rivers of Great Lakes drainage habitat.

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 wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Habitat inventory and assessment

Respondents were aware of the following inventory and assessment efforts by state agencies for conservation of wadeable/large rivers of Great Lakes drainage habitat (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 were aware of the following inventory and assessment efforts by other organizations for conservation of wadeable/large rivers of Great Lakes drainage habitat (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 wadeable/large rivers of Great Lakes drainage habitat:

Rank	Inventory and assessment by state agencies for conservation of wadeable/large rivers of Great Lakes drainage habitat
1	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment
2 (tie)	Regional or local once-a-year inventory and assessment

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- 2 (tie) Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment
- 3 (tie) Statewide annual inventory and assessment
- 3 (tie) Statewide once-a-year inventory and assessment
- 3 (tie) Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment
- 3 (tie) Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment
- 3 (tie) Regional or local year-round inventory and assessment

Respondents ranked inventory and assessment efforts by other organizations based on their importance for conservation of wadeable/large rivers of Great Lakes drainage habitat:

Rank	Inventory and assessment by other organizations for conservation of wadeable/large rivers of Great Lakes drainage habitat
1	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment
2 (tie)	Regional or local once-a-year inventory and assessment
2 (tie)	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment
3 (tie)	Statewide annual inventory and assessment
3 (tie)	Statewide once-a-year inventory and assessment
3 (tie)	Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment
3 (tie)	Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment
3 (tie)	Regional or local year-round inventory and assessment

Respondents listed regional or local inventory and assessment by state agencies for wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- In all major tributaries of Lake Michigan
- IDEM, IDNR and Elkhart use Quality Habitat Evaluation Index (QHEI) to assess habitat in streams

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Respondents listed regional or local inventory and assessment by other organizations agencies for wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- St. Joseph River
- Maumee River

Respondents listed organizations that monitor wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- IDNR
- IDEM
- City of Elkhart
- City of South Bend
- TNC

Respondents considered inventory and assessment techniques for wadeable/large rivers of Great Lakes drainage habitat:

Inventory and assessment techniques for wadeable/large rivers of Great Lakes drainage 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	--	--
Regulatory information	X	--	--
Participation in land use programs	X	--	--
Modeling	X	--	--
Voluntary landowner reporting	X	--	--

Respondents listed no additional inventory and assessment techniques for wadeable/large rivers of Great Lakes drainage habitat.

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 wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Recommended monitoring Species monitoring

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Respondents recommended the following monitoring techniques for effective conservation of wildlife in wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Professional fish surveys and creel surveys
- IDEM, IDNR, and Elkhart use electrofishing equipment to sample fish communities; however, a seine could probably be used as well as tagging and radio telemetry to track the species movement
- Intensive quantitative sampling of known populations. (Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogram 8)
- Less intensive qualitative sampling of new or not recently surveyed areas. (Need to determine distribution and status of the clubshell. See same for protocols)

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 wadeable/large rivers of Great Lakes drainage habitat. There were no responses.

Habitat inventory and assessment

Respondents recommended the following inventory and assessment techniques for effective conservation of wadeable/large rivers of Great Lakes drainage habitat (not ranked):

- Assessment using Qualitative Habitat Evaluation Index
- Assess riparian corridor
- Water quality

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 wadeable/large rivers of Great Lakes drainage habitat. There were no responses.