WADEABLE/LARGE RIVERS IN INTERIOR LOWLAND OF OHIO RIVER DRAINAGE HABITAT NARRATIVE

Habitat description

Streams of the Ohio River drainage, Interior River Lowland ecoregion are found in southwestern Indiana. Wadeable/large rivers are those having a drainage area of > 19 < 2,000 mi^2. Streams of the Interior River Lowland ecoregion are heavily impacted by the low, nearly level flood plains associated with the great rivers of the region.

Problems affecting species and habitats

Species threats

Respondents ranked the following threats to wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Rank	Threats to wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat
1	Specialized reproductive behavior or low reproductive rates
2	Viable reproductive population size or availability
3	Habitat loss (feeding/foraging areas)
4 (tie)	Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
4 (tie)	Predators (native or domesticated)
4 (tie)	Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
4 (tie)	Habitat loss (breeding range)
5 (tie)	Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by-catch, harvesting equipment, land preparation machinery)
5 (tie)	High sensitivity to pollution
6	Near limits of natural geographic range
7	Small native range (high endemism)
8 (tie)	Bioaccumulation of contaminants
8 (tie)	Invasive/non-native species
9	Regulated hunting/fishing pressure (too much)
10	Large home range requirements
11	Species overpopulation

12 (tie) Diseases/parasites (of the species itself)

12 (tie) Unregulated collection pressure

Respondents offered no additional threats to wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat.

Respondents listed top threats to wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- Predation by raccoons (and possibly by coyotes)
  - Predation on nests and eggs
  - Predation on adults
- Nest/embryo/hatchling loss associated with attraction to row crop land for nesting
- Loss of adults to road kill
- Extant population (if any) far below level for unassisted recovery
- Commercial type fishing devices: trot lines, branch lines, big nets, other passive fishing
- Ensuring that populations maintain critical larva-host connections
- Habitat loss for breeding, feeding and foraging areas:
  - Slough darter: It prefers a mud or silt bottom with little current velocity and vegetation to deposit eggs. They spawn few eggs, so reproduction is lower in places where vegetation is lacking. They compete with other darters for insects and have a high mortality due to stagnation and freezing in pools

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- Yes, for those representative species listed but I don't think the list of species is adequate. Paddlefish depend on flooded bottomland habitat for heavy spring feeding to build body fats for successful egg production. Blue suckers. Louisiana waterthrush, crayfish are just a few to be considered. Habitat loss and degradation should be the highest ranked threats.

Habitat threats

Respondents ranked threats to wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Rank	Threats to wadeable/large rivers in interior lowland of Ohio River drainage habitat
1	Stream channelization
2	Habitat degradation
3	Point source pollution (continuing)
4	Residual contamination (persistent toxins)
5 (tie)	Agricultural/forestry practices
5 (tie)	Nonpoint source pollution (sedimentation and nutrients)
6 (tie)	Commercial or residential development (sprawl)

6 (tie)	Drainage practices (stormwater runoff)
7 (tie)	Mining/acidification
7 (tie)	Habitat fragmentation
8	Impoundment of water/flow regulation
9	Successional change
10	Invasive/non-native species
11	Climate change
12 (tie)	Diseases (of plants that create habitat)
12 (tie)	Counterproductive financial incentives or regulations

Respondents noted no additional threats for wadeable/large rivers in interior lowland of Ohio River drainage habitat.

Respondents listed top threats to wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- Habitat degradation
  - Channelization
  - Development
  - Drain/cut off oxbow pond
  - Trampling sandbars or removing nesting areas along banks
  - Eliminating flows that create point bars on rivers
  - Row crop practices: Crushing nests during ground insect/weed control; crushing overwinter hatchlings during harvest and early spring plowing
  - There are large expanses in the Wabash and East Fork White River where relic valves were common, but the living species is absent
- Pollutants and toxins

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- Yes.

Additional research and survey efforts

Current body of research

Species research

Forty percent of respondents stated that the current body of science is adequate, and sixty percent said it is inadequate for wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat.

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

Author = Minton;
Date = 2001

Author = reviewed in Minton;
Date = 2001
Title = (Numerous internet sites, including USF&W)

Title = Freshwater Mussels of the Midwest;
Author = Cummings & Mayer;
Date = 1992;
Publisher = Illinois Natural History Survey

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance;
Author = Stuart Shipman;
Date = 12/1997;
Publisher = DNR/Fisheries section

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- No. The fisheries dynamics are poorly understood as it relates to impacts on populations from on-going water quality degradation and flow rate changes from agricultural drainage efforts.

Habitat research

Forty percent of respondents stated that the current body of science is adequate, forty percent said it is inadequate and twenty percent indicated “other” – that it was not their area of expertise for wadeable/large rivers in interior lowland of Ohio River drainage habitat.

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

Title = ??? Sugar Creek???;
Author = ?;
Date = late 1970s/early 1980s;
Publisher = PhD thesis IU Bloomington

Title = Not my expertise. Looks for historical;
Author = accounts of river geography &;
Date = physiography + hydrology

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- No.

Research needs

Species research

Respondents ranked research needs for wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat:

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

Respondents noted additional research needs for wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- Cost effectiveness and periodic effective duration of local raccoon elimination
- Socio-economic impacts of terminating commercial fishing use of commercial equipment in the lower West Fork and Middle East Fork White River
- Whether genetic stock from northern Arkansas will suffice for reintroduction. Will farmed stock from Arkansas or Louisiana suffice

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- Yes.

Habitat research

Respondents ranked research needs for wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Rank	Research needs for wadeable/large rivers in interior lowland of Ohio River drainage habitat
1	Threats (land use change/competition, contamination/global warming)
2 (tie)	Distribution and abundance (fragmentation)
2 (tie)	Growth and development of individual components of the habitat

3	Successional changes
4	Relationship/dependence on specific site conditions

A respondent noted additional research need for wadeable/large rivers in interior lowland of Ohio River drainage habitat:

- Cost effectiveness and periodic effective duration of local raccoon elimination
- Socio-economic impacts of terminating commercial fishing use of commercial equipment in the lower West Fork and Middle East Fork White River
- Whether genetic stock from northern Arkansas will suffice for reintroduction. Will farmed stock from Arkansas or Louisiana suffice

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 in interior lowland of Ohio River drainage habitat. Their responses:

- Yes

Conservation actions necessary

Species actions

Respondents ranked conservation efforts by how well they address threats to wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Rank	Conservation efforts for wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat
1 (tie)	Reintroduction (restoration)
1 (tie)	Translocation to new geographic range
1 (tie)	Limiting contact with pollutants/contaminants
1 (tie)	Stocking
1 (tie)	Threats reduction
1 (tie)	Native predator control
1 (tie)	Population enhancement (captive breeding and release)
2 (tie)	Population management (hunting, trapping)
2 (tie)	Public education to reduce human disturbance
3	Habitat protection (use below for details)
4 (tie)	Regulation of collecting
4 (tie)	Protection of migration routes

Respondents noted other current conservation practices for wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat:

- Some wildlife species are listed as endangered and illegal to take/collect. People need to be reminded of this

Respondents recommended these practices for more effective conservation of wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- Raccoon management:
  - Expand and liberalize the taking of raccoons so as to greatly reduce numbers associated with river cooter habitat. (Raccoon reduction is used regarding sea turtles in Florida and endangered Illinois mud turtle in IA; it is proposed for alligators in Louisiana)
- Restocking
  - Too few if any turtles remain
  - Local restocking where raccoons reduced numbers should hasten delisting criteria
- End use of commercial fishing equipment
- Protect habitat against pollutants and toxins
- Habitat protection
  - Cease any future channelization plans and restore existing oxbow ponds -- provide landowner financial incentives
- Threats reduction

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- Without a change in the fur market,controlling raccoons by volunteer trapping efforts is not a viable alternative and it is never ending.Let's look at how the coon and cooters coexisted prior to the impacts of man and determine what habitat changes are needed such as contaminant reduction from farmland, sewer systems and mine runoff.

Habitat actions

Respondents ranked conservation efforts by how well they address threats to wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Rank	Conservation efforts for wadeable/large rivers in interior lowland of Ohio River drainage habitat
1 (tie)	Habitat restoration incentives (financial)
1 (tie)	Protection of adjacent buffer zone
1 (tie)	Cooperative land management agreements (conservation easements)
2 (tie)	Habitat protection incentives (financial)
2 (tie)	Habitat restoration on public lands
2 (tie)	Land use planning
3 (tie)	Corridor development/protection
3 (tie)	Restrict public access and disturbance
4 (tie)	Habitat restoration through regulation

4 (tie) Pollution reduction

5 (tie) Habitat protection through regulation

5 (tie) Habitat protection on public lands

5 (tie) Artificial habitat creation (artificial reefs, nesting platforms)

5 (tie) Managing water regimes

5 (tie) Technical assistance

Respondents listed no additional conservation practices for wadeable/large rivers in interior lowland of Ohio River drainage habitat.

Respondents recommended the following conservation practices for wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- Habitat protection and restoration
  - Provide oxbow pond conservation easements and restoration (prime feeding habitat)
  - Encourage return to natural meander channel (within flood control)
  - Let dead trees in river stay; perhaps add some
  - Enhance natural river channel evolution including point bar development and snags (downed trees in the water); provides basking sites and nesting habitat away from row crop agriculture
  - Protection of adjacent buffer zones
- Manage water quality and pollutants

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- No. Increased funding for sewage systems enhancements and additional abandoned mineland reclamation is critical to enhancing river habitat and water quality to benefit wildlife in this geographic region.

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 in interior lowland of Ohio River drainage habitat (not ranked):

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

Respondents were aware of no monitoring efforts by other organizations for wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat.

Respondents ranked monitoring efforts by state agencies based on their importance for conservation of wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Rank	Monitoring efforts by state agencies for conservation of wildlife in wadeable/large rivers in interior lowland of Ohio River 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	Periodic statewide (less than once a year but still regularly scheduled) monitoring

Respondents listed the following monitoring effort by other organizations as "somewhat crucial" for conservation of wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat:

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

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

- IDNR nongame biologists continually monitor fishes and mussels throughout the state, including Yellow Sandshell habitat. Two surveys have been done -- ten years apart, completed last year -- by IDNR biologists in the Wabash and Tippecanoe rivers, and East Fork of White River; results are pending. This is prime Yellow Sandshell habitat
- Blue River (Harrison County)
- East Fork, White River
- West Fork, White River

Respondents listed no regional or local monitoring by other organizations for wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat.

Respondents listed organizations that monitor wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- IDEM monitors fish communities, not particular species; however, the slough darter has been captured by electrofishing in Ohio River drainage habitat
- IDNR – Division of Fish and Wildlife

Respondents considered monitoring techniques for wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Monitoring techniques for wildlife in wadeable/large rivers in interior lowland of Ohio River drainage	Used	Not used but possible with existing	Not economically feasible

habitat		technology and data	
Radio telemetry and tracking	--	X	--
Modeling	--	X	--
Coverboard routes	--	X	--
Driving a survey route	--	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	--
Representative sites	X	--	--
Probabilistic sites	X	X	--

Respondents noted no other monitoring techniques for wildlife in wadeable/large rivers in interior lowland of Ohio River 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 in interior lowland of Ohio River drainage habitat. Their responses included:

- No. Contaminant surveys by the Bloomington Ecological Services Office has been on-going in the Patoka River since the early 1990's. Detailed information has been collected and printed in regards to contaminants and wildlife species present. Mussel survey has also been contracted by the Patoka River NWR and published report is available. Water quality monitoring on a regular recurring basis is required to know what is happening in regards to wildlife populations. The base of the food chain needs the most monitoring as a barometer of impacts up the chain.

Habitat inventory and assessment

Respondents were aware of the following inventory and assessment efforts by state agencies for wadeable/large rivers in interior lowland of Ohio River 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 no inventory and assessment efforts by other organizations for wadeable/large rivers in interior lowland of Ohio River drainage habitat.

Appendix F-20: Rivers and Streams Ohio River Drainage Interior River Lowland Wadeable/Large River

Respondents ranked inventory and assessment efforts by state agencies based on their importance for conservation of wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Rank	Inventory and assessment for conservation of wadeable/large rivers in interior lowland of Ohio River drainage habitat
1 (tie)	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment
1 (tie)	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment
1 (tie)	Regional or local once-a-year inventory and assessment
2	Regional or local year-round inventory and assessment
3 (tie)	Statewide annual inventory and assessment conducted by state agencies
3 (tie)	Statewide once a year inventory and assessment conducted by state agencies
3 (tie)	Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment

Respondents listed no inventory and assessment efforts by other organizations that are crucial for conservation of wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Respondents listed regional or local inventory and assessment by state agencies for wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- If any inventory is occurring, it's for water quality or fish contamination
- I am assuming that the governmental division responsible for water pollution control conducts some sampling regarding organic and heavy metal toxins in the water
- IDNR primarily monitors mussel species, making habitat notations. No real habit monitors made.
- Indiana Department of Environmental Management, IDNR Division of Water do monitor water quality (as a component of habitat)
- Blue River (Harrison County)

Respondents listed regional or local inventory and assessment by other organizations agencies for wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- If any inventory is occurring, it’s for water quality or fish contamination
- Occasional grants to universities

Respondents listed organizations that monitor wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- IDEM makes assessments of habitat while doing fish community surveys in Ohio River drainage habitat

- IDNR – Division of Fish and Wildlife
- Whoever samples for state water pollution control

Respondents considered inventory and assessment techniques for wadeable/large rivers in interior lowland of Ohio River drainage habitat:

Inventory and assessment techniques for wadeable/large rivers in interior lowland of Ohio River drainage habitat	Used	Not used but possible with existing technology and data	Not economically feasible
GIS mapping	X	X	--
Aerial photography and analysis	X	--	--

A respondent listed additional inventory and assessment techniques for wadeable/large rivers in interior lowland of Ohio River drainage habitat:

- QHEI

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- No. The Contaminant Monitoring Surveys conducted by Bloomington Ecological Services need to be recognized and repeated on other river systems with important wildlife resource values. These need to be scheduled for repetition over a period of years to monitor real change in the base habitat.

Recommended monitoring

Species monitoring

Respondents recommended the following monitoring techniques for effective conservation of wildlife in wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- Occasional censusing with very large, heavily baited hoop nets left out overnight
  - Do not set during rising waters
  - Check within 12 hours
- Search for nests in June (after determining any adults present). See methods used in Florida and Louisiana for nests, in Arkansas and Louisiana for capturing adults
- Looking for basking individuals with a spotting scope
- Perhaps use of fyke nets with big leads, or basking traps to estimate numbers after visual spotting determines presence
- Systematic monitoring of probabilistic sites (professional)
- Use of volunteer census/monitoring
- Seining or electrofishing representative sites using professionals
- Electrofishing catch rates
- Population estimates

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- Yes but monitoring of the base of the food chain is perhaps more important since the base affects everything up the food chain. You have to understand impacts to the system to understand the population dynamics of higher elements.

Habitat inventory and assessment

Respondents recommended the following inventory and assessment techniques for effective conservation of wadeable/large rivers in interior lowland of Ohio River drainage habitat (not ranked):

- GIS/high resolution aerial photography during low water -- digitized for GIS to locate:
  - Deep river holes with woody debris (favored by adults)
  - Health/permanence of oxbow ponds/how lasting are oxbow ponds during droughts
  - Nesting habitat
  - Occasional site visits to assess vegetation quality for this herbivorous turtle
  - To look at saturation of potential habitat: With GIS construction of existing potential habitat (based upon known factors) and overlaying the current distribution of the Yellow Sandshell
- QHEI

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 in interior lowland of Ohio River drainage habitat. Their responses included:

- Yes, with the inclusion of water quality monitoring program.