

Appendix E-17: Rivers and Streams Ohio River Drainage Eastern Corn Belt/Interior Plateau
Ecoregions Wadeable/Large River

7. Please also rank these threats to the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

	Critical threat	Serious threat	Somewhat of a threat	Slight threat	No threat	Unknown	Response Total
Habitat loss (breeding range)	31% (4)	46% (6)	0% (0)	8% (1)	8% (1)	8% (1)	13
Habitat loss (feeding/foraging areas)	15% (2)	62% (8)	0% (0)	7% (1)	7% (1)	7% (1)	13
Small native range (high endemism)	7% (1)	15% (2)	7% (1)	0% (0)	69% (9)	0% (0)	13
Near limits of natural geographic range	0% (0)	7% (1)	7% (1)	7% (1)	77% (10)	0% (0)	13
Large home range requirements	0% (0)	0% (0)	0% (0)	18% (2)	73% (8)	9% (1)	11
Viable reproductive population size or availability	7% (1)	23% (3)	0% (0)	23% (3)	38% (5)	7% (1)	13
Specialized reproductive behavior or low reproductive rates	0% (0)	31% (4)	7% (1)	23% (3)	31% (4)	7% (1)	13
Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)	7% (1)	15% (2)	15% (2)	0% (0)	46% (6)	15% (2)	13
Genetic pollution (hybridization)	0% (0)	0% (0)	7% (1)	23% (3)	69% (9)	0% (0)	13
Unknown	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (6)	6
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
						Total Respondents	125

8. Other threats to the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

High stream flows for a few months following spawning can seriously reduce year class strength.

High stream flows following spawning can seriously reduce year class strength. This threat can be reduced by reducing ditching in headwaters, installing grass waterways and WASCOS, maintaining riparian corridors. All of these measures will slow stream flows and reduce siltation.

Total Respondents 2

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9. Please briefly describe the top two threats to the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana identified above.

Hellbenders has a small geographic range and population sizes in Indiana. In many locations there is concern about low reproductive rates, but this is unknown in Indiana populations.

1. Runoff
2. Habitat modification

1. Runoff introducing sediments, even if only temporary
2. In-stream modifications

1. Pollution within the Tippecanoe River system in Indiana.

2. Any factor which reduces the reproductive population size.

1. Pollution

2. (1) Habitat loss - siltation of spawning areas and pools, loss of instream cover, riparian destruction, channelization

(2) Point source pollution which triggers fish kills or repels rock bass from the area.

3. Habitat loss and degradation are serious threats to rock bass. They prefer silt free streams to reproduce and thrive. They also relate closely to structure/cover therefore any habitat loss is a threat.

Habitat Loss - The Eastern Sand darter requires sandy bottoms in fast flowing streams to bury eggs, hide from predators, ambush prey, conserve energy, and maintain position in unstable/shifting sandbars. Low reproductive rates/small populations - reach maturity at age 1, but only lives a few years.

Breeding and feeding/foraging habitat loss due to sedimentation from farm fields and stream banks as well as the removal of natural riparian vegetation; breeding and feeding/foraging habitat loss due to sedimentation from farm fields and stream banks as well as the removal of natural riparian vegetation

(1) Habitat loss - siltation which reduces spawning areas and fills pools, loss of instream cover (snagging and log removal), riparian destruction which allows water to warm and will reduce opportunity for logs and woody debris to enter stream, channelization.

(2) Pollution which triggers fish kills or repels smallmouth from the area.

Total Respondents

10

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10. Please rank the following threats to the HABITAT of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

	Critical threat	Serious threat	Somewhat of a threat	Slight threat	No threat	Unknown	Response Total
Commercial or residential development (sprawl)	0% (0)	67% (8)	25% (3)	8% (1)	0% (0)	0% (0)	12
Counterproductive financial incentives or regulations	0% (0)	16% (2)	16% (2)	0% (0)	0% (0)	67% (8)	12
Invasive/non-native species	0% (0)	0% (0)	20% (2)	50% (5)	10% (1)	20% (2)	10
Nonpoint source pollution (sedimentation and nutrients)	43% (6)	36% (5)	7% (1)	7% (1)	0% (0)	7% (1)	14
Habitat fragmentation	25% (3)	8% (1)	50% (6)	0% (0)	0% (0)	17% (2)	12
Successional change	0% (0)	18% (2)	0% (0)	0% (0)	36% (4)	45% (5)	11
Diseases (of plants that create habitat)	0% (0)	0% (0)	10% (1)	0% (0)	50% (5)	40% (4)	10
Habitat degradation	50% (7)	25% (3)	17% (2)	0% (0)	0% (0)	8% (1)	13
Climate change	0% (0)	0% (0)	8% (1)	17% (2)	33% (4)	42% (5)	12
Stream channelization	62% (8)	38% (5)	0% (0)	0% (0)	0% (0)	0% (0)	13
Impoundment of water/flow regulation	20% (2)	20% (2)	50% (5)	10% (1)	0% (0)	0% (0)	10
Agricultural/forestry practices	10% (1)	80% (8)	10% (1)	0% (0)	0% (0)	100% (1)	11
Residual contamination (persistent toxins)	8% (1)	17% (2)	42% (5)	8% (1)	0% (0)	25% (3)	12
Point source pollution (continuing)	42% (5)	50% (6)	0% (0)	8% (1)	0% (0)	0% (0)	12
Mining/acidification	0% (0)	42% (5)	8% (1)	17% (2)	8% (1)	25% (3)	12
Drainage practices (stormwater runoff)	8% (1)	75% (9)	17% (2)	0% (0)	0% (0)	0% (0)	12
Unknown	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
						Total Respondents	195

11. Other HABITAT threats to the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

No responses were entered for this question.

Total Respondents 0

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12. Please briefly describe the top two HABITAT threats to the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana identified above.

Habitat degradation of streams

1. Instream modifications
2. Runoff, both agricultural and residential

1. Agricultural runoff
2. Impoundment

1. Any significant sedimentation into the stream can become a major threat.

2. Any toxins or pollutants are a critical threat.

3. Any channelization which reduces the shallow (less than 1.5 feet) sand/gravel substrate can critically reduce or fragment habitat.

(1) (1) Habitat degradation - sedimentation, channelization, cover removal, riparian removal

(2) Point source pollution - waste water treatment plants and confined feeding operations.

Any practices that create more erosion/sediment deposition and eliminates instream cover is a serious threat.

Therefore, I'd have to say nonpoint source pollution and habitat degradation are the most serious threats.

Habitat Degradation and stream channelization because this will directly affect the sediment transfer within the stream and microhabitat of the Eastern Sand Darter.

Breeding and feeding/foraging habitat loss due to sedimentation from farm fields and stream banks as well as the removal of natural riparian vegetation especially thru drainage maintenance activities

(1) Habitat degradation by sedimentation, channelization, cover removal, riparian removal.

(2) Point source pollution - These ecoregions have major threats from large cities causing fish kills from waste water treatment plans. Also, confined feeding operations in the rural areas are a major threat to the stream fish communities.

Total Respondents

9

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13. What current monitoring efforts by state agencies are you aware of for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
Statewide year-round monitoring conducted by state agencies	17% (2)	83% (10)	12
Statewide once a year monitoring conducted by state agencies	9% (1)	91% (10)	11
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	36% (4)	64% (7)	11
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	64% (7)	36% (4)	11
Regional or local year-round monitoring conducted by state agencies	17% (2)	83% (10)	12
Regional or local once a year monitoring conducted by state agencies	18% (2)	82% (9)	11
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	73% (8)	27% (3)	11
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	100% (11)	0% (0)	11
		Total Respondents	90

14. What current monitoring efforts by other organizations are you aware of for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
Statewide year-round monitoring conducted by other organizations	0% (0)	100% (12)	12
Statewide once a year monitoring conducted by other organizations	0% (0)	100% (12)	12
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (12)	12
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (12)	12
Regional or local year-round monitoring conducted by other organizations	0% (0)	100% (12)	12
Regional or local once a year monitoring conducted by other organizations	25% (3)	75% (9)	12
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	17% (2)	83% (10)	12
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other	58% (7)	42% (5)	12

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organizations

Total Respondents 96

15. How crucial are these monitoring efforts by state agencies for the conservation of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Very crucial	Somewhat crucial	Slightly crucial	Not crucial	Unknown	Response Total
Statewide year-round monitoring conducted by state agencies	18% (2)	0% (0)	18% (2)	64% (7)	0% (0)	11
Statewide once a year monitoring conducted by state agencies	10% (1)	10% (1)	20% (2)	60% (6)	0% (0)	10
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	20% (2)	20% (2)	50% (5)	10% (1)	0% (0)	10
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	0% (0)	60% (6)	0% (0)	40% (4)	0% (0)	10
Regional or local year-round monitoring conducted by state agencies	9% (1)	27% (3)	18% (2)	45% (5)	0% (0)	11
Regional or local once a year monitoring conducted by state agencies	0% (0)	30% (3)	60% (6)	10% (1)	0% (0)	10
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	10% (1)	50% (5)	30% (3)	10% (1)	0% (0)	10
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	18% (2)	55% (6)	9% (1)	18% (2)	0% (0)	11
				Total Respondents		83

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17. Regional or local state agency monitoring for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

IDNR Fish & Wildlife Division

Wabash system

Tippecanoe River, Maumee system

Periodic (usually annual) monitoring in the Tippecanoe River by IDNR.

1. Blue River (Harrison County)

Sugar Creek (Shelby County)

Indian Creek (Greene County)

2. (1) IN early to mid 1990's, Division of Fish and Wildlife conducted fish community inventories on the major streams throughout the state.

(2) Game fish population estimates (including rock bass) have been conducted on 5 streams every other year from 1998 through 2004.

3. various streams throughout the region, some are sampled more regularly than others

IDEM Probabilistic sampling

Indiana DNR Special Studies on T&E species- IDNR, Brant Fisher, did a study on the population of Eastern Sand Darters in Indiana over the past five years. IDNR- regional fish collection surveys may have collected some specimens of the Eastern Sand Darter. Indiana Department of Environmental Management (IDEM) occasionally collected Eastern Sand Darters as part of their Surface Water Quality Monitoring Strategy evaluating fish community structure in certain watersheds every 5 years.

See IDEM OWQ's Surface Water Quality Monitoring Strategy and project work plans and IDNR Fisheries Section Work Plans

Blue River (Harrison County)

(1) In early to mid 1990's the Division of Fish and Wildlife conducted a smallmouth bass inventory.

(2) 5 streams have been sampled every other year from 1998 to 2004 to estimate smallmouth bass populations to determine the effect of smallmouth bass population changes due to the imposition of a 12 inch black bass size limit in 1998.

Total Respondents

12

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18. Regional or local monitoring by other organizations for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Wabash system

Tippecanoe River, Maumee system

Uncertain.

1. None known to occur that specifically target rock bass.

2. West Fork White River & tributaries(Muncie area)

Ball State University fish sampling

While collecting fish community samples to evaluate the community structure and ability of the stream to support a healthy fish community, these organizations may have collected Eastern Sand Darters: Soil and Water Conservation Districts within those Ecoregions, Purdue University, Wildcat Creek Watershed Alliance? I would check with the Scientific Collectors Permit office for a list of organizations collecting in those ecoregions and also check with the IDEM Section 319 webpage for project summaries where fish or habitat in those ecoregions were studied.

US Environmental Protection Agency; USGS Water Resources Division; Ohio River Valley Water Sanitation Commission; Midwest Biodiversity Institute, US Army Corps of Engineers; Muncie Bureau of Water Quality; City of Elkhart Water Quality; various universities; various consulting firms

None known to occur that specifically target smallmouth bass.

Total Respondents 9

19. Please list organizations that are monitoring the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

consultants

TNC

TNC, USFWS

Uncertain.

1. DNR/DFW

2. None known that specifically target rock bass.

3. Muncie Bureau of Water Quality

See 17 & 18

DNR/DFW

None known that are specifically targeting smallmouth bass.

Total Respondents 9

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20. What are the current monitoring techniques for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Frequently used	Occasionally used	Not used but possible with existing technology and data	Not used and not possible with existing technology and data	Not economically feasible	Unknown	Response Total
Radio telemetry and tracking	0% (0)	0% (0)	55% (6)	9% (1)	18% (2)	18% (2)	11
Modeling	0% (0)	7% (1)	67% (7)	7% (1)	0% (0)	18% (2)	11
Coverboard routes	0% (0)	0% (0)	0% (0)	10% (1)	0% (0)	90% (8)	9
Spot mapping	20% (2)	10% (1)	30% (3)	0% (0)	0% (0)	40% (4)	10
Driving a survey route	11% (1)	0% (0)	0% (0)	33% (3)	22% (2)	33% (3)	9
Reporting from harvest, depredation, or unintentional take (road kill, bycatch)	0% (0)	27% (3)	9% (1)	36% (4)	9% (1)	18% (2)	11
Mark and recapture	17% (2)	42% (5)	25% (3)	0% (0)	0% (0)	17% (2)	12
Professional survey/census	67% (8)	33% (4)	0% (0)	0% (0)	0% (0)	0% (0)	12
Volunteer survey/census	0% (0)	50% (5)	20% (2)	10% (1)	0% (0)	20% (2)	10
Trapping (by any technique)	0% (0)	0% (0)	25% (1)	12% (1)	25% (2)	38% (3)	7
Representative sites	67% (7)	27% (3)	9% (1)	0% (0)	0% (0)	0% (0)	11
Probabilistic sites	42% (5)	8% (1)	42% (5)	0% (0)	0% (0)	8% (1)	12
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (3)	3
						Total Respondents	129

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- 21.** Other monitoring techniques for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Unintentional take could be monitored from fish kill cadaver counts if the officers could be trained to identify northern hog suckers instead of not counting them or just lumping them into the generic class of "round bodied suckers"

Total Respondents 1

- 22.** What one or two monitoring techniques would you recommend for effective conservation of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

Professional Survey

1. Intensive quantitative sampling of known populations. Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogr. 8.

2. Less intensive qualitative sampling of new or not recently surveyed areas. Need to determine distribution and status of the clubshell. See same for protocols.

1. Intensive quantitative sampling of known populations. Need to understand demography of the clubshell. See Strayer & Smith, 2003. AFS Monogr. 8.

2. Less intensive qualitative sampling of new or not recently surveyed areas. Need to determine distribution and status of the clubshell. See same for protocols.

1. State DNR or professional census at representative or probabilistic sites.

2. Development of trained, select volunteer core to undertake surveys at probabilistic sites, particularly where the wildlife species should, or could occur and has not been documented in recent years.

1. Stream fish community surveys.
Rock bass population estimates.

2. electrofishing surveys

See where populations of the darter have been captured in the past and then with seines or electrofishing equipment mark and recapture the darter to document habitat characteristics, water quality information, and land use characterization where the darters occur. You will need to target the habitat and not the exact location since the sandbars will probably shift over time. Look on the web for mark and recapture surveys as well as other eastern sand darter publications. I found many by just searching the web for Eastern Sand Darter.

Electrofishing results from probabilistic and representative sites

Electrofishing catch rate data

Population estimates

Angler creel surveys

(1) Stream fish community surveys - To determine smallmouth bass distribution and abundance. There may be a correlation of smallmouth abundance to the species richness to the overall fish community.

(2) Smallmouth bass population estimates.

Total Respondents 10

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23. What current HABITAT inventory and assessment efforts or activities by state agencies are you aware of for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Yes, these efforts occur	No effort that I'm aware of	Response Total
Statewide annual inventory and assessment conducted by state agencies	9% (1)	91% (10)	11
Statewide once a year inventory and assessment conducted by state agencies	9% (1)	91% (10)	11
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	18% (2)	82% (9)	11
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	33% (4)	67% (7)	11
Regional or local year-round inventory and assessment conducted by state agencies	9% (1)	91% (10)	11
Regional or local once a year inventory and assessment conducted by state agencies	18% (2)	82% (9)	11
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	33% (4)	67% (7)	11
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	73% (8)	27% (3)	11
		Total Respondents	88

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24. What current HABITAT inventory and assessment efforts or activities by other organizations are you aware of for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Yes, these efforts occur	No effort that I'm aware of	Response Total
Statewide year-round inventory and assessment conducted by other organizations	0% (0)	100% (12)	12
Statewide once a year inventory and assessment conducted by other organizations	0% (0)	100% (12)	12
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	8% (1)	92% (11)	12
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	8% (1)	92% (11)	12
Regional or local year-round inventory and assessment conducted by other organizations	8% (1)	92% (11)	12
Regional or local once a year inventory and assessment conducted by other organizations	25% (3)	75% (9)	12
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	25% (3)	75% (9)	12
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	33% (4)	67% (8)	12
		Total Respondents	96

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26. How crucial are these HABITAT efforts by other organizations for the conservation of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?	These efforts are very crucial for this HABITAT	These efforts are somewhat crucial for this HABITAT	These efforts are slightly crucial for this HABITAT	These efforts are not crucial for this HABITAT	Unknown	Response Total
Statewide year-round inventory and assessment conducted by other organizations	0% (0)	9% (1)	27% (3)	36% (4)	27% (3)	11
Statewide once a year inventory and assessment conducted by other organizations	0% (0)	9% (1)	27% (3)	27% (3)	36% (4)	11
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	9% (1)	18% (2)	36% (4)	9% (1)	27% (3)	11
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	0% (0)	9% (1)	45% (5)	18% (2)	27% (3)	11
Regional or local year-round inventory and assessment conducted by other organizations	0% (0)	18% (2)	27% (3)	36% (4)	18% (2)	11
Regional or local once a year inventory and assessment conducted by other organizations	0% (0)	0% (0)	36% (4)	27% (3)	36% (4)	11
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	0% (0)	27% (3)	36% (4)	9% (1)	27% (3)	11
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	9% (1)	9% (1)	36% (4)	18% (2)	27% (3)	11
Total Respondents						88

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27. Regional or local state agency HABITAT inventory and assessment for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Wabash system

? Tippecanoe River and Maumee system

(Usually wildlife species inventories are made, with relevant habitat information)

1. Blue River (Harrison County)
Sugar Creek (Shelby County)
Indian Creek (Greene County)

2. Indiana Department of Natural Resources - Division of Fish and Wildlife
Indiana Department of Environmental Management

3. IDEM - statewide QHEI

I don't know of any Habitat Inventory or Assessment done specifically for the Eastern Sand Darter in the habitat you list; however, I do know that IDEM as well as IDNR and other organizations use the Qualitative Habitat Evaluation Index to document the habitat quality of the streams sampled for aquatic communities.

IDEM/OWQ/BSS; IDNR/FWD/FS; ORSANCO;

Blue River (Harrison County)

Indiana Dept of Natural Resources - Division of Fish and Wildlife
Indiana Department of Environmental Management

Total Respondents

10

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28. Regional or local HABITAT inventory and assessment by other organizations for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Wabash system

? Tippecanoe River and Maumee system

1. none known

2. Muncie BWQ - WFWR and and tributaries in the Muncie area

none

None known.

Total Respondents 6

29. Please list organizations that are monitoring this HABITAT for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Consultants

TNC

TNC, USFWS

1. DNR/DFW

2. none known

Muncie; Elkhart; USGS/WRD

DNR/DFW

None known.

Total Respondents 7

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30. What are the current HABITAT inventory and/or assessment techniques for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Frequently used	Occasionally used	Not used but possible with existing technology and data	Not used and not possible with existing technology and data	Not economically feasible	Unknown	Response Total
GIS mapping	9% (1)	18% (2)	45% (5)	0% (0)	0% (0)	27% (3)	11
Aerial photography and analysis	0% (0)	9% (1)	9% (1)	9% (1)	0% (0)	73% (8)	11
Systematic sampling	36% (4)	36% (4)	0% (0)	0% (0)	0% (0)	27% (3)	11
Property tax estimates	0% (0)	0% (0)	0% (0)	36% (4)	9% (1)	55% (6)	11
State revenue data	0% (0)	0% (0)	0% (0)	36% (4)	9% (1)	55% (6)	11
Regulatory information	0% (0)	9% (1)	0% (0)	18% (2)	0% (0)	73% (8)	11
Participation in landuse programs	0% (0)	27% (3)	27% (3)	10% (1)	0% (0)	36% (4)	11
Modeling	0% (0)	27% (3)	27% (3)	0% (0)	0% (0)	45% (5)	11
Voluntary landowner reporting	0% (0)	18% (2)	9% (1)	9% (1)	9% (1)	55% (6)	11
Other (please specify below)	20% (1)	0% (0)	0% (0)	0% (0)	0% (0)	80% (4)	5
Total Respondents							104

31. Other HABITAT inventory and assessment techniques for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Water quality monitoring

QHEI

Total Respondents 2

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32. What one or two HABITAT inventory and assessment techniques would you recommend for effective conservation of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

Systematic survey & GIS

1. Assess riparian corridor
 2. Water quality monitoring
1. CREP, farmer incentives for no-till, riparian corridors, etc.
 2. Strictly control instream modifications: mining, snagging, etc.
1. More extensive use of GIS- modeled habitat probabilities.

1. QHEI

2. QHEI

More habitat inventories and assessments

QHEI
GIS

Qualitative Habitat Evaluation Index (QHEI) in conjunction with a stream community survey or sampling specifically for smallmouth bass. This can show which habitat components most strongly correlate with smallmouth bass abundance and or size structure.

Total Respondents 9

33. What is the current body of science for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		0	0%
Adequate		5	50%
Inadequate		5	50%
Nonexistent		0	0%
Other (please explain below)		0	0%
		Total Respondents	10

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34. Please provide a citation (title, author, date, publisher) that would give the best overview of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana, if available. This resource may be used if further detail is needed.

Title = Amphibians and reptiles from 23 counties of Indiana.
Author = Robert Brodman
Date = 2003
Publisher = Proceedings of the Indiana Academy of Science, 112: 43-54.

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

Title = Federal Recovery Plan
Author = USFWS
Date = 1993
Publisher = USFWS

Title = 'Clubshell'
Author = USFW, Division of Endangered Species
Date = 12/1997
Publisher = Online

Title = A survey of fish communities and aquatic habitats at Indiana's major steams with emphasis on smallmouth bass distribution and abundance
Author = Stuart T. Shipman
Date = December 1997
Publisher = DNR fisheries section

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance.
Author = Stuart T. Shipman
Date = December 1997
Publisher = DNR fisheries section

**Response Response
Total Percent**

Title = The Fishes of Missouri
Author = William L. Plieger
Date = 1997
Publisher = Missouri Conservation Commission

Title = Handbook of freshwater fishery biology
Author = Kenneth D. Carlander
Date = 1997
Publisher = Iowa University Press

Title = Fishes of Ohio
Author = Milt Troutman
Date = 12/1997
Publisher = OSU Press

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 = December 1997
Publisher = DNR/Fisheries section

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance

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Author = Stuart Shipman
Date = December 1997
Publisher = IDNR

Total Respondents 11

35. If possible, please provide a second citation (title, author, date, publisher) that would give another good overview of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana. This resource may also be used if further detail is needed.

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

Title = Field guide to freshwater mussels of Midwest
Author = Cummings & Mayer
Date = 1992
Publisher = INHS

Title = Surveys of the fish communities and aquatic habitats in 16 small streams in Indiana from 1996 through 1997.
Author = Douglas C. Keller
Date = 1999
Publisher = IDNR

Title = fishes of Tennessee
Author = Etnire and Starnes
Date =
Publisher =

Title = FW fishes of Canada
Author = Scott & Crossman
Date =
Publisher =

Title = Surveys of the fish communities and aquatic habitats in 16 small streams in Indiana from 1996 through 1997.
Author = Douglas C. Keller
Date = 1999
Publisher = IDNR

Response Total Response Percent

Appendix E-17: Rivers and Streams Ohio River Drainage Eastern Corn Belt/Interior Plateau
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36. What is the current HABITAT body of science for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		0	0%
Adequate		6	50%
Inadequate		3	25%
Nonexistent		2	17%
Other (please explain below)		1	8%
Total Respondents		12	

Appendix E-17: Rivers and Streams Ohio River Drainage Eastern Corn Belt/Interior Plateau
Ecoregions Wadeable/Large River

37. Please provide a citation (title, author, date, publisher) that would give the best HABITAT overview of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana, if available. This resource may be used if further detail is needed.

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

Title = Federal Recovery Plan
Author = USFWS
Date = 1993
Publisher = USFWS

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance.
Author = Stuart T. Shipman
Date = December 1997
Publisher = IDNR

**Response Response
Total Percent**

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance
Author = Stuart T. Shipman
Date = 12/1997
Publisher = DNR/Fisheries section

Title = A survey of fish communities and aquatic habitats at Indiana's major streams with emphasis on smallmouth bass distribution and abundance
Author = Stuart T. Shipman
Date = December 1997
Publisher = IDNR

Appendix E-17: Rivers and Streams Ohio River Drainage Eastern Corn Belt/Interior Plateau
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38. If possible, please provide a second citation (title, author, date, publisher) that would give another good HABITAT overview of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana. This resource may also be used if further detail is needed.

Title = Freshwater Mollusca of WI
Author = Baker
Date = 1929
Publisher = WI Geol. Nat. Sci. Surv.

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

Title = Surveys of the fish communities and aquatic habitats in 16 small streams in Indiana from 1996 through 1997.
Author = Douglas C. Keller
Date = 1999
Publisher = IDNR

Response Total Response Percent

Title = Surveys of the fish communities and aquatic habitats in 16 small streams in Indiana from 1996 through 1997.
Author = Douglas C. Keller
Date = 1999
Publisher = IDNR

39. What are the research needs for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Urgently needed	Greatly needed	Needed	Slightly needed	Not needed	Unknown	Response Total											
Life cycle	25% (3)	8% (1)	25% (3)	8% (1)	33% (4)	0% (0)	12											
Distribution and abundance	17% (2)	33% (4)	17% (2)	8% (1)	25% (3)	0% (0)	12											
Limiting factors (food, shelter, water, breeding sites)	33% (4)	25% (3)	17% (2)	8% (1)	17% (2)	0% (0)	12											
Threats (predators/competition, contamination)	8% (1)	42% (5)	17% (2)	17% (2)	17% (2)	0% (0)	12											
Relationship/dependence on specific habitats	33% (4)	25% (3)	17% (2)	0% (0)	25% (3)	0% (0)	12											
Population health (genetic and physical)	17% (2)	17% (2)	33% (4)	0% (0)	33% (4)	0% (0)	12											
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	25% (1)	75% (3)	4											
					Total Respondents		80											

40. Other research needs for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

To find out why the Clubshell has depopulated most of its former distribution in Indiana. Developing some sort of timeline (late Pleistocene, Holocene (usually archaeological), or historic) for relic valve distribution might narrow the possibilities of critical limiting factors (post-settlement siltation, etc.).

Total Respondents 1

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43. How well do the following conservation efforts address the threats to the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection (use below for details)	27% (3)	45% (5)	10% (1)	0% (0)	18% (2)	11
Population management (hunting, trapping)	9% (1)	36% (4)	9% (1)	27% (3)	18% (2)	11
Population enhancement (captive breeding and release)	0% (0)	18% (2)	0% (0)	73% (8)	9% (1)	11
Reintroduction (restoration)	18% (2)	27% (3)	0% (0)	45% (5)	10% (1)	11
Food plots	0% (0)	0% (0)	0% (0)	73% (8)	27% (3)	11
Threats reduction	0% (0)	27% (3)	0% (0)	55% (6)	18% (2)	11
Native predator control	0% (0)	0% (0)	0% (0)	91% (10)	9% (1)	11
Exotic/invasive species control	0% (0)	10% (1)	27% (3)	27% (3)	36% (4)	11
Regulation of collecting	0% (0)	55% (6)	18% (2)	18% (2)	9% (1)	11
Disease/parasite management	0% (0)	18% (2)	0% (0)	45% (5)	36% (4)	11
Translocation to new geographic range	9% (1)	18% (2)	0% (0)	64% (7)	9% (1)	11
Protection of migration routes	0% (0)	0% (0)	0% (0)	67% (7)	36% (4)	11
Limiting contact with pollutants/contaminants	27% (3)	45% (5)	0% (0)	18% (2)	7% (1)	11
Public education to reduce human disturbance	0% (0)	27% (3)	0% (0)	45% (5)	27% (3)	11
Culling/selective removal	0% (0)	27% (3)	0% (0)	73% (8)	0% (0)	11
Stocking	18% (2)	18% (2)	0% (0)	64% (7)	0% (0)	11
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
	Total Respondents					180

44. Other current conservation practices for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

No responses were entered for this question.

Total Respondents 0

(skipped this question) 1

45. What one or two specific practices would you recommend for more effective conservation of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

Habitat protection

1. Eliminate instream modifications, including inpoundment
2. Restore riparian corridor

See Watters, 2000, Proc. 1st EMCS Symposium

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See Watters, 2000. Proc. 1st FMCS Symposium

1. Strict enforcement of laws regulating instream modification; incentives to farmers.
2. Propagation

Protect the shallow sand/gravel habitat from siltation and channelization, and keep the waters free of pollutants and toxins.

1. Pollution control.
Habitat protection or enhancement.

2. Rock bass appear to be doing very well with little to no intensive management in streams where there is ample instream cover and good water quality. Therefore, habitat protection and contaminant reduction would be my recommendations.

I am not sure what you are asking in this question. The best way to conserve the eastern sand darter would be to reduce sedimentation covering the sand substrate which the darter needs to survive and reproduce. Current efforts to reduce sedimentation in streams is somewhat effective, but I'm not sure if it is enough to keep the eastern sand darter from disappearing.

Declare moratorium on channel/drainage "improvement" projects that do not mitigate losses;

Pollution control - from waste water treatment plants and confined feeding operations.
Habitat protection and enhancement.

Total Respondents

9

Appendix E-17: Rivers and Streams Ohio River Drainage Eastern Corn Belt/Interior Plateau
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46. How well do the following conservation efforts address the HABITAT threats to the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection through regulation	18% (2)	45% (5)	10% (1)	0% (0)	27% (3)	11
Habitat protection on public lands	18% (2)	64% (7)	0% (0)	0% (0)	18% (2)	11
Habitat protection incentives (financial)	36% (4)	45% (5)	0% (0)	0% (0)	18% (2)	11
Habitat restoration through regulation	18% (2)	45% (5)	0% (0)	10% (1)	27% (3)	11
Habitat restoration on public lands	18% (2)	55% (6)	10% (1)	0% (0)	18% (2)	11
Habitat restoration incentives (financial)	36% (4)	36% (4)	10% (1)	0% (0)	18% (2)	11
Artificial habitat creation (artificial reefs, nesting platforms)	0% (0)	27% (3)	10% (1)	45% (5)	18% (2)	11
Selective use of functionally equivalent exotic species in place of extirpated natives	0% (0)	0% (0)	8% (1)	67% (8)	25% (3)	12
Succession control (fire, mowing)	0% (0)	0% (0)	8% (1)	92% (11)	0% (0)	12
Corridor development/protection	33% (4)	25% (3)	8% (1)	9% (1)	25% (3)	12
Managing water regimes	0% (0)	55% (6)	0% (0)	18% (2)	27% (3)	11
Pollution reduction	55% (6)	27% (3)	0% (0)	0% (0)	18% (2)	11
Protection of adjacent buffer zone	55% (6)	18% (2)	9% (1)	0% (0)	18% (2)	11
Restrict public access and disturbance	0% (0)	27% (3)	36% (4)	18% (2)	18% (2)	11
Land use planning	9% (1)	64% (7)	90% (1)	0% (0)	18% (2)	11
Technical assistance	0% (0)	73% (8)	0% (0)	9% (1)	18% (2)	11
Cooperative land management agreements (conservation easements)	36% (4)	36% (4)	10% (1)	0% (0)	18% (2)	11
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
				Total Respondents		194

47. Other current HABITAT conservation practices for the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Again, I don't know if these practices are working well in Indiana, but the best way to conserve the critical habitat for the eastern sand darter would be habitat protection on all lands through whatever means necessary, habitat restoration of the floodplain would also be critical to the amount of sedimentation reaching the stream bed, managing water regimes may also impact the settling of sediments in stream (thus dam removal may be appropriate), protection of adjacent buffer zone is key to stopping deleterious effects of erosion and sedimentation in the stream, land use planning and conservation easements would also keep the runoff to a minimum.

Total Respondents 1

48. What one or two specific HABITAT practices would you recommend for more effective conservation of the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana?

Habitat protection

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1. CREP and other incentives for BMP's
2. Restrict instream modifications
See Watters, 2000. Proc. 1st FMCS Symposium

1. No instream modifications.
2. Limit runoff through incentives or other means.
See Watters, 2000. Proc. 1st FMCS Symposium.

Manage pollutants and toxins, maintain available habitat through regulation and buffer zones, increase habitat through incentives, technical assistance and restoration.

1. Protection of adjacent buffer zones (riparian corridor).

2. 1) buffer/riparian zone protection - leads to improved water quality and more instream cover
2) pollution reduction - improved water quality and fewer fish kills

Habitat protection
Land use planning

Protection of adjacent buffer zones (riparian corridor). More participation would likely occur with financial incentives.

Total Respondents

8

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49. Do you have any additional comments or information on the Wildlife in Wadeable/Large Rivers in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat that you feel would be useful in the development of the Indiana Comprehensive Wildlife Strategy?

Too little is known about this wildlife species, especially Indiana populations.

N/A

N/A

1. To find out just why the Clubshell depopulated so much of its former range, which once included much of the interior of Indiana. Knowing this "why" should disclose a critical limiting factor, and could lead to its future preservation.

2. There is a great potential source for select avocational technical assistance (= volunteers) to undertake monitoring and survey where funding falls short.

I would definitely search the internet for more information on specific studies done on the Eastern Sand Darter; however, I could not find much on the habitat itself in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage. IDEM has a list of sites of where Eastern Sand Darters have been collected with water chemistry and habitat (QHEI) assessments if interested.

The length of this survey possibly destroys its usefulness as many/most experts will not have the time and or patience to do this for very many wildlife species; some may not even do it at all.

no

Total Respondents

7