

Appendix E-16: Rivers and Streams Ohio River Drainage Eastern Corn Belt/Interior Plateau Ecoregions Headwater

7. Please also rank these threats to the Wildlife in Headwaters 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)	17% (1)	83% (5)	0% (0)	0% (0)	0% (0)	0% (0)	6
Habitat loss (feeding/foraging areas)	17% (1)	83% (5)	0% (0)	0% (0)	0% (0)	0% (0)	6
Small native range (high endemism)	0% (0)	0% (0)	17% (1)	0% (0)	83% (5)	0% (0)	6
Near limits of natural geographic range	0% (0)	0% (0)	17% (1)	0% (0)	83% (5)	0% (0)	6
Large home range requirements	0% (0)	0% (0)	0% (0)	0% (0)	83% (5)	17% (1)	6
Viable reproductive population size or availability	0% (0)	67% (4)	0% (0)	17% (1)	0% (0)	17% (1)	6
Specialized reproductive behavior or low reproductive rates	0% (0)	33% (2)	67% (4)	0% (0)	0% (0)	0% (0)	6
Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)	17% (1)	50% (3)	0% (0)	0% (0)	17% (1)	17% (1)	6
Genetic pollution (hybridization)	0% (0)	0% (0)	0% (0)	50% (3)	33% (2)	17% (1)	6
Unknown	0% (0)	0% (0)	75% (3)	0% (0)	0% (0)	25% (1)	4
Other (please specify below)	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	0% (0)	3
Total Respondents							61

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

Threats to the Orangethroat Darter are related to threats to the habitat. It prefers high-functioning, high quality riffle habitat in headwater streams. Headwater streams, are not always given as much protection or value as larger rivers downstream. Threats to the species colonization, such as aquatic passage problems through culverts are one threat. Threats to the species watersheds, such as pollution, clearing of the riparian vegetation, creek gravel mining, and channelization are also threats to the habitat of this species.; Threats to the Orangethroat Darter are related to threats to the habitat. It prefers high-functioning, high quality riffle habitat in headwater streams. Headwater streams, are not always given as much protection or value as larger rivers downstream. Threats to the species colonization, such as aquatic passage problems through culverts are one threat. Threats to the species watersheds, such as pollution, clearing of the riparian vegetation, creek gravel mining, and channelization are also threats to the habitat of this species.;

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Total Respondents 1

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

dredging of headwater streams
alterations of hydrology from land-use changes

1. Runoff
2. Habitat modification

The top two threats for the wildlife species are threats to migration (aquatic passage problems through stream crossing structures) and threats to the breeding habitat (high quality riffles). Threats to riffle habitat result from water quality degradation and loss of stream channel stability due to land management activities such as dredging, channelization, roads, and clearing of riparian vegetation.; The top two threats for the wildlife species are threats to migration (aquatic passage problems through stream crossing structures) and threats to the breeding habitat (high quality riffles). Threats to riffle habitat result from water quality degradation and loss of stream channel stability due to land management activities such as dredging, channelization, roads, and clearing of riparian vegetation.; The top two threats for the wildlife species are threats to migration (aquatic passage problems through stream crossing structures) and threats to the breeding habitat (high quality riffles). Threats to riffle habitat result from water quality degradation and loss of stream channel stability due to land management activities such as dredging, channelization, roads, and clearing of riparian vegetation.

Habitat loss (breeding and foraging/feeding areas): Siltation of small headwater streams is limiting the population of southern redbelly dace because the species spawn over gravel substrates. Also, the removal of vegetation could decrease food availability to the herbivorous species. They occupy streams that have a permanent flow of clear water; thus siltation or alterations in flow regimes could also affect the species.

Total Respondents 4

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10. Please rank the following threats to the HABITAT of the Wildlife in Headwaters 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)	25% (1)	75% (3)	0% (0)	0% (0)	0% (0)	0% (0)	4													
Counterproductive financial incentives or regulations	25% (1)	0% (0)	0% (0)	0% (0)	50% (2)	25% (1)	4													
Invasive/non-native species	0% (0)	0% (0)	0% (0)	100% (4)	0% (0)	0% (0)	4													
Nonpoint source pollution (sedimentation and nutrients)	25% (1)	50% (2)	25% (1)	0% (0)	0% (0)	0% (0)	4													
Habitat fragmentation	25% (1)	75% (3)	0% (0)	0% (0)	0% (0)	0% (0)	4													
Successional change	0% (0)	0% (0)	25% (1)	25% (1)	0% (0)	50% (2)	4													
Diseases (of plants that create habitat)	0% (0)	0% (0)	0% (0)	50% (2)	0% (0)	50% (2)	4													
Habitat degradation	50% (2)	50% (2)	0% (0)	0% (0)	0% (0)	0% (0)	4													
Climate change	0% (0)	0% (0)	25% (1)	25% (1)	50% (2)	0% (0)	4													
Stream channelization	50% (2)	50% (2)	0% (0)	0% (0)	0% (0)	0% (0)	4													
Impoundment of water/flow regulation	25% (1)	25% (1)	0% (0)	50% (2)	0% (0)	0% (0)	4													
Agricultural/forestry practices	25% (1)	50% (2)	25% (1)	0% (0)	0% (0)	0% (0)	4													
Residual contamination (persistent toxins)	0% (0)	0% (0)	25% (1)	25% (1)	0% (0)	50% (2)	4													
Point source pollution (continuing)	0% (0)	25% (1)	75% (3)	0% (0)	0% (0)	0% (0)	4													
Mining/acidification	0% (0)	0% (0)	25% (1)	50% (2)	0% (0)	25% (1)	4													
Drainage practices (stormwater runoff)	50% (2)	50% (2)	0% (0)	0% (0)	0% (0)	0% (0)	4													
Unknown	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)	1													
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0													
							Total Respondents	65												

11. Other HABITAT threats to the Wildlife in Headwaters 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 Headwaters in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana identified above.

Runoff, mostly agricultural
Channelization

Top two threats from the list up above are habitat degradation and stream channelization

Non-point source pollution in the form of sedimentation
Destruction of clear shaded waters by forestry/agricultural practices or stream channelization.

Total Respondents 3

13. What current monitoring efforts by state agencies are you aware of for the Wildlife in Headwaters 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	0% (0)	100% (5)	5
Statewide once a year monitoring conducted by state agencies	20% (1)	80% (4)	5
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	20% (1)	80% (4)	5
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	40% (2)	60% (3)	5
Regional or local year-round monitoring conducted by state agencies	0% (0)	100% (5)	5
Regional or local once a year monitoring conducted by state agencies	20% (1)	80% (4)	5
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	40% (2)	60% (3)	5
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	80% (4)	20% (1)	5
		Total Respondents	40

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14. What current monitoring efforts by other organizations are you aware of for the Wildlife in Headwaters 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% (5)	5
Statewide once a year monitoring conducted by other organizations	0% (0)	100% (5)	5
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (5)	5
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (5)	5
Regional or local year-round monitoring conducted by other organizations	0% (0)	100% (5)	5
Regional or local once a year monitoring conducted by other organizations	40% (2)	60% (3)	5
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	40% (2)	60% (3)	5
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	80% (4)	20% (1)	5
	Total Respondents		40

15. How crucial are these monitoring efforts by state agencies for the conservation of the Wildlife in Headwaters 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	0% (0)	40% (2)	0% (0)	40% (2)	20% (1)	5
Statewide once a year monitoring conducted by state agencies	40% (2)	20% (1)	0% (0)	20% (1)	20% (1)	5
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	40% (2)	40% (2)	0% (0)	0% (0)	20% (1)	5
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	40% (2)	40% (2)	0% (0)	0% (0)	20% (1)	5
Regional or local year-round monitoring conducted by state agencies	0% (0)	40% (2)	20% (1)	20% (1)	20% (1)	5
Regional or local once a year monitoring conducted by state agencies	40% (2)	20% (1)	0% (0)	20% (1)	20% (1)	5
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	60% (3)	40% (2)	0% (0)	0% (0)	0% (0)	5
Occasional regional or local (less than						

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once a year and not regularly scheduled)
monitoring conducted by state agencies

Total Respondents 40

16. How crucial are these monitoring efforts by other organizations for the conservation of the Wildlife in Headwaters 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 other organizations	0% (0)	40% (2)	20% (1)	20% (1)	20% (1)	5
Statewide once a year monitoring conducted by other organizations	40% (2)	0% (0)	20% (1)	20% (1)	20% (1)	5
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	40% (2)	0% (0)	20% (1)	20% (1)	20% (1)	5
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	40% (2)	0% (0)	20% (1)	20% (1)	20% (1)	5
Regional or local year-round monitoring conducted by other organizations	0% (0)	40% (2)	20% (1)	20% (1)	20% (1)	5
Regional or local once a year monitoring conducted by other organizations	40% (2)	0% (0)	20% (1)	20% (1)	20% (1)	5
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	40% (2)	20% (1)	0% (0)	20% (1)	20% (1)	5
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	40% (2)	40% (2)	0% (0)	0% (0)	20% (1)	5
						Total Respondents 40

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

IDNR non-game biologist does mussel surveys. But, he is only one person and there are thousands of miles of streams in state.

? Wabash system

IDEM and the DNR Nongame program also conduct monitoring during the field season, once a year for fish. These above fish surveys are not specific to the Orangethroat Darter, but would include the Orangethroat Darter.; IDEM and the DNR Nongame program also conduct fish monitoring during the field season. These above fish surveys are not specific to the Orangethroat Darter, but would include the Orangethroat Darter.

IDEM monitors the health of major river basins every 5 years by looking at chemical, physical, and biological data collected at random locations within the watershed. Southern redbelly dace have been captured in the Ohio River Drainage Habitat; however, specific monitoring for the species has not occurred to my knowledge by anyone state or other organization.

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Plateau Ecoregions Headwater

Total Respondents	4
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- 18.** Regional or local monitoring by other organizations for the Wildlife in Headwaters in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Commonwealth Biomonitoring frequently does habitat evaluations in small streams as part of watershed studies. If I happen to see a shell, I make a note of it in field notes. These are NOT official mussel surveys.

? Wabash system

The Hoosier National Forest conducts yearly fish surveys within two or more 5th level HUCs that encompass the Hoosier National Forest, which includes the Ohio River Drainage, Eastern Corn Belt/Interior Plateau Ecoregions. These above fish surveys are not specific to the Orangethroat Darter, but would include the Orangethroat Darter.; The Hoosier National Forest conducts yearly fish surveys within two or more 5th level HUCs that encompass the Hoosier National Forest, which includes the Ohio River Drainage, Eastern Corn Belt/Interior Plateau Ecoregions. These above fish surveys are not specific to the Orangethroat Darter, but would include the Orangethroat Darter.

Total Respondents 3

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

None than I know of. Most mussel surveys are on bigger rivers. I was contacted by a college prof. interested in taking a class out to a small stream to learn about mussels. I discouraged him from doing so unless he followed DNR regulations concerning collectors' permits. I haven't heard any more from him.

consultants, perhaps TNC

USDA Forest Service, Hoosier National Forest; USDI Fish and Wildlife Service; IDEM; IDNR; USDA Forest Service, Hoosier National Forest; USDI Fish and Wildlife Service; IDEM; IDNR

Total Respondents 3

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20. What are the current monitoring techniques for the Wildlife in Headwaters 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)	0% (0)	0% (0)	100% (2)	0% (0)	2
Modeling	0% (0)	0% (0)	50% (1)	50% (1)	0% (0)	0% (0)	2
Coverboard routes	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Spot mapping	0% (0)	50% (1)	0% (0)	0% (0)	0% (0)	50% (1)	2
Driving a survey route	0% (0)	0% (0)	0% (0)	50% (1)	0% (0)	50% (1)	2
Reporting from harvest, depredation, or unintentional take (road kill, bycatch)	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)	0% (0)	2
Mark and recapture	0% (0)	100% (2)	0% (0)	0% (0)	0% (0)	0% (0)	2
Professional survey/census	60% (3)	40% (2)	0% (0)	0% (0)	0% (0)	0% (0)	5
Volunteer survey/census	0% (0)	50% (1)	0% (0)	0% (0)	0% (0)	50% (1)	2
Trapping (by any technique)	0% (0)	0% (0)	0% (0)	50% (1)	0% (0)	50% (1)	2
Representative sites	0% (0)	100% (2)	0% (0)	0% (0)	0% (0)	0% (0)	2
Probabilistic sites	0% (0)	67% (2)	33% (1)	0% (0)	0% (0)	0% (0)	3
Other (please specify below)	75% (3)	0% (0)	0% (0)	0% (0)	0% (0)	25% (1)	4
							Total Respondents
							32

21. Other monitoring techniques for the Wildlife in Headwaters in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Electro-fishing and seining are appropriate methods for monitoring the Orangethroat darter.; Electro-fishing and seining are appropriate methods for monitoring the Orangethroat darter.; Electro-fishing and seining are appropriate monitoring techniques for the Orangethroat Darter.

Total Respondents 1

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

Intensive quantitative sampling of known populations. Need to understand demography of wildlife species. 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 wildlife species. See same for protocols.

Electro-fishing streams..take a random sampling of streams within a watershed (5th or 6th level HUC)and standardize the stream reach length for the survey...usually 15 times the stream width. Seining is also an appropriate method for sampling, especially in the riffle habitats.; Electro-fishing streams..take a random sampling of streams within a watershed (5th or 6th level HUC)and standardize the stream reach length for the survey...usually 15 times the stream width. Seining is also an appropriate method for sampling, especially in the riffle habitats.; Electro-fishing can be used to sample stream habitats. I suggest designing a random sample of all streams within a watershed (5th or 6th level HUC). The size of the stream reach sampled would be 15 times the stream width. Seining would also be an appropriate method for sampling.

Target the habitat with seining equipment or electrofishing.

Total Respondents 3

23. What current HABITAT inventory and assessment efforts or activities by state agencies are you aware of for the Wildlife in Headwaters 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	0% (0)	100% (4)	4
Statewide once a year inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	25% (1)	75% (3)	4
Regional or local year-round inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Regional or local once a year inventory and assessment conducted by state agencies	0% (0)	100% (4)	4
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	25% (1)	75% (3)	4
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	75% (3)	25% (1)	4
	Total Respondents		32

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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 Headwaters 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% (4)	4
Statewide once a year inventory and assessment conducted by other organizations	25% (1)	75% (3)	4
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	25% (1)	75% (3)	4
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	25% (1)	75% (3)	4
Regional or local year-round inventory and assessment conducted by other organizations	0% (0)	100% (4)	4
Regional or local once a year inventory and assessment conducted by other organizations	25% (1)	75% (3)	4
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	25% (1)	75% (3)	4
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	75% (3)	25% (1)	4
		Total Respondents	32

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26. How crucial are these HABITAT efforts by other organizations for the conservation of the Wildlife in Headwaters 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)	25% (1)	50% (2)	0% (0)	25% (1)	4	
Statewide once a year inventory and assessment conducted by other organizations	25% (1)	0% (0)	50% (2)	0% (0)	25% (1)	4	
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	25% (1)	0% (0)	50% (2)	0% (0)	25% (1)	4	
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	25% (1)	0% (0)	50% (2)	0% (0)	25% (1)	4	
Regional or local year-round inventory and assessment conducted by other organizations	0% (0)	25% (1)	50% (2)	0% (0)	25% (1)	4	
Regional or local once a year inventory and assessment conducted by other organizations	25% (1)	0% (0)	50% (2)	0% (0)	25% (1)	4	
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	50% (2)	0% (0)	25% (1)	0% (0)	25% (1)	4	
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	67% (2)	0% (0)	0% (0)	0% (0)	33% (1)	3	
						Total Respondents	31

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

? Wabash system

Total Respondents 1

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

We (Commonwealth Biomonitoring) do habitat evaluations on small streams as part of watershed studies. These evaluations are not specific to mussels, but are Ohio EPA QHEI methods.

? Wabash system

Two or more 5th level HUC watersheds a year that encompass the Hoosier National Forest are sampled; a random sampling of streams found within these 5th level HUCs occurs.

Total Respondents 3

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

consultants, perhaps TNC

IDEM, IDNR, USDA Forest Service, USDI Fish and Wildlife Service

IDEM- Qualitative Habitat Evaluations completed at sites where southern redbelly dace may have been captured as part of the fish community sampling program.

Total Respondents 3

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30. If a technique is not applicable to the Wildlife in Headwaters in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat do not select a response in that row.

	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	33% (1)	33% (1)	33% (1)	0% (0)	0% (0)	0% (0)	3
Aerial photography and analysis	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)	0% (0)	2
Systematic sampling	33% (1)	67% (2)	0% (0)	0% (0)	0% (0)	0% (0)	3
Property tax estimates	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
State revenue data	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Regulatory information	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)	2
Participation in landuse programs	0% (0)	50% (1)	50% (1)	0% (0)	0% (0)	0% (0)	2
Modeling	0% (0)	50% (1)	50% (1)	0% (0)	0% (0)	0% (0)	2
Voluntary landowner reporting	0% (0)	50% (1)	0% (0)	0% (0)	50% (1)	0% (0)	2
Other (please specify below)	50% (1)	0% (0)	0% (0)	0% (0)	0% (0)	50% (1)	2
Total Respondents							22

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

Qualitative Habitat Evaluation Index(QHEI); REMAP protocols for Northern Forested Streams; stream channel cross-sections and longitudinal profiles; substrate analysis; descriptions of riparian vegetation; water quality parameters are measured using probes and Hydro-labs

Total Respondents 1

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

Assess riparian corridor presence
Water quality

Two protocols that I recommend for reference include the following:

1. Harrelson, C.C., C.L. Rawlins, and J.P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. USDA Forest Service. General Technical Report RM-245.

The above reference offers useful guidance on measuring stream channel cross-sections and substrate within the stream. This information can be used to determine if a stream channel is stable and if the substrate is available within riffle habitats, which are the preferred habitat of the Orangethroat Darter.

2. Simon, T. P. and P.M. Stewart. 1998. Standard Operating Procedures For Development of Watershed Indicators In REMAP: Northern Lakes and Forest Streams.

The above reference is very useful for developing a watershed level sampling design and includes useful methods for measuring stream channel and stream habitat parameters.

3. The Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA is a useful qualitative field method that can be used to prioritize sites within a watershed for stream habitat or water quality improvement.

Total Respondents 2

33. What is the current body of science for the Wildlife in Headwaters 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		1	33%
Inadequate		2	67%
Nonexistent		0	0%
Other (please explain below)		0	0%
		Total Respondents	3

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34. Please provide a citation (title, author, date, publisher) that would give the best overview of the Wildlife in Headwaters 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 = Occurrence and distribution of freshwater mussels in the small streams of Tippecanoe County, Indiana
 Author = Myers-Kinzie, M., S. Wentz, & A. Spacie
 Date = 2001
 Publisher = Proc. Ind. Acad. Sci.

Response Total Response Percent

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

35. If possible, please provide a second citation (title, author, date, publisher) that would give another good overview of the Wildlife in Headwaters 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 = 1919
 Publisher = WI Geol. Nat. Hist. Surv.

Response Total Response Percent

36. What is the current HABITAT body of science for the Wildlife in Headwaters 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	0	0%
Inadequate	3	100%
Nonexistent	0	0%
Other (please explain below)	0	0%
Total Respondents	3	

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37. Please provide a citation (title, author, date, publisher) that would give the best HABITAT overview of the Wildlife in Headwaters 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

Response Total Response Percent

38. If possible, please provide a second citation (title, author, date, publisher) that would give another good HABITAT overview of the Wildlife in Headwaters 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 = 1919
 Publisher = WI Geol. Nat. Hist. Surv.

Response Total Response Percent

39. What are the research needs for the Wildlife in Headwaters 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% (1)	0% (0)	50% (2)	25% (1)	0% (0)	0% (0)	4											
Distribution and abundance	0% (0)	0% (0)	75% (3)	25% (1)	0% (0)	0% (0)	4											
Limiting factors (food, shelter, water, breeding sites)	0% (0)	50% (2)	50% (2)	0% (0)	0% (0)	0% (0)	4											
Threats (predators/competition, contamination)	25% (1)	25% (1)	50% (2)	0% (0)	0% (0)	0% (0)	4											
Relationship/dependence on specific habitats	25% (1)	25% (1)	50% (2)	0% (0)	0% (0)	0% (0)	4											
Population health (genetic and physical)	0% (0)	0% (0)	50% (2)	50% (2)	0% (0)	0% (0)	4											
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)	1											
Total Respondents							25											

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

- Habitat needs are not completely understood. I have seen fresh dead cylindrical papershell in channelized ag ditches. Other small streams with good habitat have only weathered dead fragments.

Total Respondents 1

Appendix E-16: Rivers and Streams Ohio River Drainage Eastern Corn Belt/Interior Plateau Ecoregions Headwater

41. What are the HABITAT research needs for the Wildlife in Headwaters 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
Successional changes	0% (0)	0% (0)	25% (1)	25% (1)	25% (1)	25% (1)	4
Distribution and abundance (fragmentation)	0% (0)	0% (0)	100% (4)	0% (0)	0% (0)	0% (0)	4
Threats (land use change/competition, contamination/global warming)	25% (1)	75% (3)	0% (0)	0% (0)	0% (0)	0% (0)	4
Relationship/dependence on specific site conditions	50% (2)	25% (1)	25% (1)	0% (0)	0% (0)	0% (0)	4
Growth and development of individual components of the habitat	25% (1)	0% (0)	75% (3)	0% (0)	0% (0)	0% (0)	4
Other (please specify below)	0% (0)	50% (1)	0% (0)	0% (0)	0% (0)	50% (1)	2
						Total Respondents	22

42. Other HABITAT research needs for the Wildlife in Headwaters in the Eastern Corn Belt/Interior Plateau Ecoregions of the Ohio River Drainage Habitat in Indiana.

Effects of roads and stream crossings on the wildlife species; Is aquatic passage through culverts and other stream crossing structures adequate or are these crossings causing aquatic habitat fragmentation?

Total Respondents 1

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43. How well do the following conservation efforts address the threats to the Wildlife in Headwaters 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)	0% (0)	67% (2)	33% (1)	0% (0)	0% (0)	3
Population management (hunting, trapping)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Population enhancement (captive breeding and release)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Reintroduction (restoration)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Food plots	0% (0)	0% (0)	0% (0)	67% (2)	33% (1)	3
Threats reduction	0% (0)	33% (1)	33% (1)	33% (1)	0% (0)	3
Native predator control	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Exotic/invasive species control	0% (0)	0% (0)	67% (2)	33% (1)	0% (0)	3
Regulation of collecting	33% (1)	33% (1)	33% (1)	0% (0)	0% (0)	3
Disease/parasite management	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Translocation to new geographic range	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Protection of migration routes	0% (0)	0% (0)	0% (0)	67% (2)	33% (1)	3
Limiting contact with pollutants/contaminants	0% (0)	67% (2)	33% (1)	0% (0)	0% (0)	3
Public education to reduce human disturbance	0% (0)	67% (2)	33% (1)	0% (0)	0% (0)	3
Culling/selective removal	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Stocking	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)	1
				Total Respondents		49

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

Habitat protection occurs in the form of the Clean Water Act, National Forest Management Act and other state and federal regulations that protect aquatic habitat and aquatic species. These regulations may or may not be enough for the sake of Orangethroat Darter conservation.

Total Respondents 1

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

The following applies to all mussel species. Educate anglers that it is ILLEGAL to use mussels as fishing bait.

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

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1. Restoration of stream channels..restoring or protecting stream channel function so that riffle habitats are enhanced or protected.
2. Restoration or enhancement of riparian vegetation to enhance or protect stream channels from runoff or impacts to the channel.
3. Maintenance of roads and stream crossings so that stream channel function and aquatic passage are maintained.

Habitat protection

Total Respondents 3

46. How well do the following conservation efforts address the HABITAT threats to the Wildlife in Headwaters 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	0% (0)	67% (2)	33% (1)	0% (0)	0% (0)	3
Habitat protection on public lands	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	3
Habitat protection incentives (financial)	0% (0)	67% (2)	0% (0)	33% (1)	0% (0)	3
Habitat restoration through regulation	0% (0)	67% (2)	0% (0)	33% (1)	0% (0)	3
Habitat restoration on public lands	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	3
Habitat restoration incentives (financial)	0% (0)	67% (2)	0% (0)	33% (1)	0% (0)	3
Artificial habitat creation (artificial reefs, nesting platforms)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Selective use of functionally equivalent exotic species in place of extirpated natives	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Succession control (fire, mowing)	0% (0)	0% (0)	0% (0)	100% (3)	0% (0)	3
Corridor development/protection	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	3
Managing water regimes	0% (0)	67% (2)	0% (0)	33% (1)	0% (0)	3
Pollution reduction	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	3
Protection of adjacent buffer zone	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	3
Restrict public access and disturbance	0% (0)	0% (0)	33% (1)	67% (2)	0% (0)	3
Land use planning	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	3
Technical assistance	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	3
Cooperative land management agreements (conservation easements)	0% (0)	67% (2)	0% (0)	33% (1)	0% (0)	3
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0
						Total Respondents 51

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

I am not aware of any of the above for which I marked "not used."

Total Respondents 1

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Plateau Ecoregions Headwater

Appendix E-16: Rivers and Streams Ohio River Drainage Eastern Corn Belt/Interior Plateau Ecoregions Headwater

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

Treat small streams as biological resources and not just drainage ditches. At the very least, require that a mussel survey be done before dredging.

1. Promote riparian corridor
2. Limit habitat modifications

1. Streambank stabilization or stream restoration (reconstructing the channel to reconnect it to its natural floodplain elevation).
2. Culvert or stream crossing structure improvement (replace non-functioning culverts or other crossing structures and replace with ones that function and are at the right elevation/location within the stream's longitudinal profile).
3. Restoration of riparian vegetative communities through tree planting, etc.

Habitat protection and Protection of adjacent buffer zone

Total Respondents 4

49. Do you have any additional comments or information on the Wildlife in Headwaters 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?

N/A

IDEM has captured many southern redbelly dace in their random fish sampling program. Most of these specimens came from the Whitewater Basin in headwater streams <20 sq. miles with high gradient and high biological integrity.

Total Respondents 2