

Appendix E-64: Aggregated Wetlands

(overwintering habitats, nesting and staging sites)

Genetic pollution (hybridization)	0% (0)	4% (1)	22% (5)	9% (2)	43% (10)	22% (5)	23
Unknown	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
Other (please specify below)	0% (0)	25% (1)	0% (0)	0% (0)	25% (1)	50% (2)	4
Total Respondents							215

8. Other threats to the wildlife in all Wetland Habitats in Indiana.

1. X
- 2.. Continued loss and degradation of emergent wetland habitat in portions of the state due to development and poor agricultural practices.
3. Unknown
4. Human interaction with species, trapping, relocation, scarring
Reproductive intervention by humans
5. Devaluing of species due to overpopulation
restricted management options.
6. Artificial manipulation of water levels in wetlands seems likely to increase mortality of over wintering snakes. Snakes hibernate underground at the groundwater interface. Raising water levels in the winter could drown snakes and lowering water table could expose them to extreme cold temperatures. Both activities are likely to kill over wintering snakes.
7. Loss of wetlands (muckland) would be the threat to this species
8. Although not habitat specific, the inability to responsibly and proactively manage muskrats according to the wildlife conservation model, as opposed to reactive measures through nuisance practices, is a concern regarding the conservation of muskrats. This concern applies across the landscape, not just in urban and suburban environments.

Total Respondents 8

9. Please briefly describe the top two threats to the wildlife in all Wetland Habitats in Indiana identified above.

1. loss of early successional habitat.
hybridization with blue-winged warbler.

Loss of shallow marshes due to drainage for development & farming.
2. Loss of winter feed due to fall tillage.
3. Habitat loss through annual cycle
predators
4. Loss of habitat due to development and poor agricultural practices.
Degradation of habitat by invasive plant species.

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5. Unknown
6. Water Quality
Human intervention during nesting process.
7. overpopulation
urbanization
8. continuing loss and/or degradation of emergent wetlands
possible disease outbreaks due to large concentrations of birds often in small areas
9. Habitat loss and degradation
10. Loss of ephemeral wetland habitat and increase in migration distance to breeding sites as a result of this loss are the biggest threats to the species.
11. Loss & degradation of ephemeral wetland and upland forested habitat
Loss of ephemeral wetlands is the top threat; unfortunately, most existing ephemeral wetlands have been destroyed in Indiana. Even more unfortunately, many of them were destroyed with the misguided notion that deep water was better for wildlife - landowners were advised to dredge out the ephemeral wetlands to provide duck habitat. These fish-infested deep waters have no habitat for Plains leopard frog.
12. -invasive species like reed canary grass are proliferating in the habitats that remain, decreasing plant diversity, cover, and the overall health of the wetland.
13. Extreme rarity & habitat loss
14. Habitat destruction and habitat degradation
Artificial manipulation of water levels in wetlands seems likely to increase mortality of over wintering snakes. Snakes hibernate underground at the groundwater interface. Raising water levels in the winter could drown snakes and lowering water table could expose them to extreme cold temperatures. Both activities are likely to kill over wintering snakes.
15. Inappropriate management of sandy fire breaks in managed areas that are disked at inappropriate times, or are managed in inappropriate cover types. I have seen dead massasauga that have been disked on DNR lands
16. Only a few locations are known to have green salamanders in Indiana and this is a habitat specialist needing rocky outcrops in forested areas.
17. Wetland loss & degradation
18. probably draining of wetlands for farming or development
19. 1) loss of permanent wetland areas that include huge open/prairie buffer zones for nesting.
2) overland movement for nesting invites road kill of otherwise longlived adults
suboptimal size nesting areas focuses nest depredation
Inappropriate management of nesting areas – sandy fire breaks in managed areas are disked at inappropriate times, or are managed in inappropriate cover types
20. Fragmentation of populations due to habitat loss. Wetlands are managed as landscape scale systems relative to this species, resulting in metapopulation disruption and potential metapopulation decline. Because of low densities and small population sizes, populations that have become isolated are likely not viable.

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21. habitat loss and fragmentation, loss of connectivity

Total Respondents

21

10. Please rank the following threats to the HABITAT of all Wetland Habitats in Indiana.

	Critical threat	Serious threat	Somewhat of a threat	Slight threat	No threat	Unknown	Response Total
Commercial or residential development (sprawl)	13% (3)	39% (9)	26% (6)	17% (4)	0% (0)	4% (1)	23
Counterproductive financial incentives or regulations	0% (0)	26% (6)	17% (4)	4% (1)	22% (5)	30% (7)	23
Invasive/non-native species	0% (0)	22% (5)	13% (3)	17% (4)	17% (4)	30% (7)	23
Nonpoint source pollution (sedimentation and nutrients)	0% (0)	18% (4)	32% (7)	18% (4)	0% (0)	32% (7)	22
Habitat fragmentation	27% (6)	41% (9)	18% (4)	9% (2)	5% (1)	0% (0)	22
Successional change	0% (0)	23% (5)	18% (4)	18% (4)	14% (3)	27% (6)	22
Diseases (of plants that create habitat)	0% (0)	0% (0)	9% (2)	17% (4)	30% (7)	43% (10)	23
Habitat degradation	27% (6)	45% (10)	23% (5)	5% (1)	0% (0)	0% (0)	22
Climate change	0% (0)	0% (0)	5% (1)	32% (7)	9% (2)	55% (12)	22
Stream channelization	0% (0)	26% (6)	13% (3)	13% (3)	35% (8)	13% (3)	23
Impoundment of water/flow regulation	9% (2)	9% (2)	35% (8)	17% (4)	26% (6)	4% (1)	23
Agricultural/forestry practices	9% (2)	50% (11)	27% (6)	5% (1)	5% (1)	5% (1)	22
Residual contamination (persistent toxins)	0% (0)	0% (0)	17% (4)	30% (7)	4% (1)	48% (11)	23
Point source pollution (continuing)	0% (0)	9% (2)	23% (5)	27% (6)	0% (0)	41% (9)	22
Mining/acidification	4% (1)	4% (1)	9% (2)	22% (5)	13% (3)	48% (11)	23
Drainage practices (stormwater runoff)	4% (1)	17% (4)	17% (4)	9% (2)	22% (5)	30% (7)	23
Unknown	0% (0)	0% (0)	0% (0)	0% (0)	14% (1)	86% (6)	7
Other (please specify below)	0% (0)	0% (0)	17% (1)	0% (0)	0% (0)	83% (5)	6
							Total Respondents
							374

11. Other HABITAT threats to the wildlife in all Wetland Habitats in Indiana.

1. X
2. None
3. Drainage of wetland areas.
4. Lega jurisdiction issues presently unclear, draft of state isolated wetland law out for comment.

- 12.** Please briefly describe the top two HABITAT threats to the wildlife in all Wetland Habitats in Indiana identified above.
1. loss of early successional woody habitat.
habitat loss to development
 1. Commercial or residential development by filling or draining wetlands.
 2. Stream and lake "renovation" have degraded habitat back to where it was when the original habitat destruction occurred.
 3. agricultural practices
drainage practices
 4. Loss of habitat due to development and poor agricultural practices.
Degradation of plant community by exotic plants invading wetland habitats.
 5. Development encroachment on some colonies
Destruction of nesting trees
 6. Canada Geese are their own worst enemy. Their concentrations by large numbers of geese on small wetlands have the capacity to pollute the water and cause increased erosion due to their feeding habits.
The destruction of natural wetland habitats by development, agriculture and continued road construction.
 7. Agriculture
urban sprawl
 8. presently little or no protection of isolated wetlands
- habitat degradation due to increased sediment/nutrient loads
 9. Habitat loss & degradation
 10. Habitat degradation or loss and fragmentation of habitat are the largest threats.
 11. Habitat loss & degradation
 12. Loss of ephemeral wetland habitat, invasion of wetlands by species like reed canary grass, cattails, purple loosestrife or other invasives that create monocultures, agricultural practices that destroy ephemeral wetlands.
 13. Habitat fragmentation & degradation
 14. Habitat destruction and degradation of ephemeral wetlands

Fire suppression in graminoid wetland habitat creates late successional wetlands that are not appropriate habitat. Conversely, late spring fire in these habitats is likely to cause direct adult mortality.
 15. Artificial manipulation of water levels in wetlands seems likely to increase mortality of over wintering snakes. Snakes hibernate underground at the groundwater interface. Raising water levels in the winter could drown snakes and lowering water table could expose them to extreme cold temperatures. Both activities are likely to kill over wintering snakes. IN addition, herbaceous wetland are lost under this management regime, replaced by open water wetlands.
 16. Habitat degradation and fragmentation due to deforestation.
 17. Habitat degradation & fragmentation
 18. loss of habitat due to farming or development

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19. the participant has to speculate about the meaning of successional change. Is a "change" an increase or decrease in early successional habitats? Climate change also is speculative. Agriculture/Forestry practices have different effects. Grouping these practices into a single category does not appropriately represent each individual practice. Point and non point pollution may have a positive or negative effect.
20. 1) Habitat loss through wetland drainage/ tiny stream ditching.
2) conversion of sand prairie nesting habitat to cropland or something else (e.g. forestation via fire prevention)
- Manipulation of natural wetlands for management of other species has a disruptive impact on natural wetland dynamics. This may include reduced survival of Blanding's or reduced productivity of the habitat.
21. Loss of adjacent uplands or inappropriate cover/management. Blanding's requires nesting habitats that are secure from disturbance and that are within a reasonable distance to wetland habitats. Loss of appropriate habitat (ether due to tradition conversion to agriculture or to conversion of inappropriate conservation cover types) is negatively impacting reproductive success in this species. Long-distance movements
22. coal mining, agriculture

Total Respondents 22

13. What current monitoring efforts by state agencies are you aware of for all Wetland Habitats in Indiana?

	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
Statewide year-round monitoring conducted by state agencies	23% (5)	77% (17)	22
Statewide once a year monitoring conducted by state agencies	20% (4)	80% (16)	20
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	15% (3)	85% (17)	20
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	25% (5)	75% (15)	20
Regional or local year-round monitoring conducted by state agencies	10% (2)	90% (18)	20
Regional or local once a year monitoring conducted by state agencies	5% (1)	95% (19)	20
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	5% (1)	5% (19)	20
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	35% (7)	65% (13)	20
	Total Respondents		162

14. What current monitoring efforts by other organizations are you aware of for the Wildlife in all Wetland Habitats 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% (22)	22
Statewide once a year monitoring conducted by other organizations	14% (3)	86% (19)	22

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Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	5% (1)	95% (21)	22
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	9% (2)	91% (20)	22
Regional or local year-round monitoring conducted by other organizations	0% (0)	100% (22)	22
Regional or local once a year monitoring conducted by other organizations	14% (3)	86% (19)	22
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	5% (1)	95% (21)	22
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	59% (13)	41% (9)	22
		Total Respondents	176

15. How crucial are these monitoring efforts by state agencies for the conservation of the Wildlife in all Wetland Habitats in Indiana?

	Very crucial	Somewhat crucial	Slightly crucial	Not crucial	Unknown	Response Total
Statewide year-round monitoring conducted by state agencies	20% (4)	10% (2)	10% (2)	35% (7)	25% (5)	20
Statewide once a year monitoring conducted by state agencies	16% (3)	16% (3)	11% (2)	32% (6)	26% (5)	19
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	11% (2)	17% (3)	17% (3)	39% (7)	17% (3)	18
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	11% (2)	11% (2)	11% (2)	39% (7)	28% (5)	18
Regional or local year-round monitoring conducted by state agencies	6% (1)	17% (3)	11% (2)	39% (7)	28% (5)	18
Regional or local once a year monitoring conducted by state agencies	5% (1)	11% (2)	16% (3)	37% (7)	32% (6)	19
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	6% (1)	6% (1)	24% (4)	35% (6)	29% (5)	17
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	11% (2)	21% (4)	0% (0)	42% (8)	26% (5)	19
						Total Respondents
						148

16. How crucial are these monitoring efforts by other organizations for the conservation of the Wildlife in all Wetland Habitats in Indiana?

	Very crucial	Somewhat crucial	Slightly crucial	Not crucial	Unknown	Response Total
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Total Respondents

12

18. Regional or local monitoring by other organizations for the Wildlife in all Habitats in Indiana.

1. federal Breeding Bird Survey statewide; May Day Bird Count, Summer Bird Count
2. Species is not monitored. Habitat changes requiring permits are checked by, IDNR, IDEM, ACOE (in some cases).
3. Not aware of any efforts.
4. unknown
5. Lake associations busineeses and anyone living around a emergent wetland with a yard with Canada Goose complaints will monitor populations in order to prove they have a problem so they can destroy nests or eggs.
6. christmas bird count
7. Spencer Cortwright, IUN
Robert Brodman, Saint Joseph's College
8. Robert Brodman, Saint Joseph's College in NW Indiana
9. Univerisity professors and members of the Herpetology TAC for the State of Indiana as part of their annual field season.
10. NW Indiana (Newton, Jasper, Pulaski, Lake, Porter counties).
11. Robert Brodman, Saint Joseph's College
"BioBlitz" in Lake Co.
12. Herp Center at IUPFW - I presume they've done something in Steuben and La Grange Cos.
13. Fish Creek, Patoka River, Pigeon Creek, Muscatatuck River

Total Respondents

13

19. Please list organizations that are monitoring the Wildlife in all Wetland Habitats in Indiana.

1. USGS, birding groups
2. To some extent: Waterfowl USA, Ducks Unlimited, The Nature Conservancy,
The Audubon Society.
3. Not aware of any organizations.
4. Indiana Department of Natural Resources, Division of Fish & Wildlife
Div of Fish and Wildlife
5. Div of Reservoirs.
6. Audubon
US Fish and Wildlife Service

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- US Fish and Wildlife Service

7. Spencer Cortwright, IUN
Robert Brodman, Saint Joseph's College
8. Robert Brodman, Saint Joseph's College
9. TNC- funded research at Cline Lake Fen
10. Ball State University; Tom Morrell.
11. Indiana Division of Fish and Wildlife. Population monitoring efforts at state, regional and local scales are to monitor annual trends. Monitoring programs used by IDF&W are not habitat specific for muskrat.
12. What I know is above.
13. TNC has funded some work at Cline Lake Fen to better understand population dynamics, habitat use, etc...
14. Bruce Kingsbury, IUPU Fort Wayne,

Total Respondents 14

20. What are the current monitoring techniques for the Wildlife in all Wetland Habitats 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	5% (1)	20% (4)	60% (12)	5% (1)	0% (0)	10% (2)	20
Modeling	11% (2)	21% (4)	26% (5)	0% (0)	0% (0)	42% (8)	19
Coverboard routes	0% (0)	7% (1)	20% (3)	27% (4)	0% (0)	47% (7)	15
Spot mapping	11% (2)	22% (4)	17% (3)	6% (1)	0% (0)	44% (8)	18
Driving a survey route	42% (8)	5% (1)	21% (4)	11% (2)	0% (0)	21% (4)	19
Reporting from harvest, depredation, or unintentional take (road kill, bycatch)	32% (6)	16% (3)	0% (0)	37% (7)	0% (0)	16% (3)	19
Mark and recapture	15% (3)	25% (5)	35% (7)	5% (1)	5% (1)	15% (3)	20
Professional survey/census	28% (5)	5% (10)	6% (1)	0% (0)	0% (0)	11% (2)	18
Volunteer survey/census	18% (3)	18% (3)	35% (6)	0% (0)	0% (0)	29% (5)	17
Trapping (by any)	21% (4)	32% (6)	21% (4)	0% (0)	0% (0)	26% (5)	19

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technique)							
Representative sites	17% (3)	56% (10)	6% (1)	0% (0)	0% (0)	22% (4)	18
Probabilistic sites	7% (1)	47% (7)	7% (1)	0% (0)	0% (0)	40% (6)	15
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)	4
						Total Respondents	221

21. Other monitoring techniques for the Wildlife in all Wetland Habitats in Indiana.

1. X
2. aerial surveys
3. unknown
4. aerial surveys
5. Look for burrows in muck

Total Respondents 5

22. What one or two monitoring techniques would you recommend for effective conservation of the Wildlife in all Wetland Habitats in Indiana?

1. spot-mapping in appropriate habitats
2. Nesting & brood counts state wide.
3. aerial survey
banding
4. Continue current state surveys every 5 years
5. Mark and recapture. Means to track species movement and association with non target species and times of interaction with non target spp.
Mark and harvest. Same as above but also eliminates and reduces concentrations in non desirable areas.
6. aerial surveys
banding and neck collaring
7. banding and/or neck collaring. Procedures in place, nationally accepted, good national data base maintained.
- weekly waterfowl counts at selected sites. Samples most of the major concentration areas. Very good historical data for trend analysis.
8. Professional survey and either mark recapture or telemetry
9. Pit-fall traps and cover board objects near ephemeral wetland breeding sites.
10. Fall surveys at breeding sites
11. Call surveys and systematic sampling

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12. Minnow trapping and possible either mark recapture or telemetry
13. Professional surveys
14. look for burrows in muck connected with trapping
15. IDF&W uses Harvest Reports and Professional Surveys. Here again, the assumption is that aquatic systems include all habitat types occupied by muskrat.
 - 1) radiotrack females to nesting sites.
 - 2) monitor nests for depredation
16. (Both somewhat labor-intensive for at least one person.)

Total Respondents 16

23. What current HABITAT inventory and assessment efforts or activities by state agencies are you aware of for the Wildlife in all Wetland Habitats 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% (22)	22
Statewide once a year inventory and assessment conducted by state agencies	0% (0)	100% (22)	22
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	5% (1)	95% (21)	22
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	18% (4)	82% (18)	22
Regional or local year-round inventory and assessment conducted by state agencies	0% (0)	100% (22)	22
Regional or local once a year inventory and assessment conducted by state agencies	0% (0)	100% (22)	22
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	0% (0)	100% (22)	22
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	14% (3)	86% (19)	22
	Total Respondents		176

24. What current HABITAT inventory and assessment efforts or activities by other organizations are you aware of for the Wildlife in all Wetland Habitats 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% (22)	22
Statewide once a year inventory and assessment conducted by other organizations	0% (0)	100% (22)	22
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other	5% (1)	95% (21)	22

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organizations			
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	18% (4)	82% (18)	22
Regional or local year-round inventory and assessment conducted by other organizations	5% (1)	95% (21)	22
Regional or local once a year inventory and assessment conducted by other organizations	9% (2)	91% (20)	22
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	5% (1)	95% (21)	22
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	50% (11)	50% (11)	22
		Total Respondents	176

25. How crucial are these HABITAT efforts by state agencies for the conservation of the Wildlife in All Wetland Habitats 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 annual inventory and assessment conducted by state agencies	16% (3)	6% (1)	11% (2)	32% (6)	37% (7)	19
Statewide once a year inventory and assessment conducted by state agencies	12% (2)	6% (1)	6% (1)	35% (6)	41% (7)	17
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	6% (1)	12% (2)	6% (1)	35% (6)	41% (7)	17
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	12% (2)	29% (5)	0% (0)	29% (5)	29% (5)	17
Regional or local year-round inventory and assessment conducted by state agencies	6% (1)	6% (1)	11% (2)	35% (6)	41% (7)	17
Regional or local once a year inventory and assessment conducted by state agencies	6% (1)	6% (1)	6% (1)	41% (7)	41% (7)	17
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	6% (1)	12% (2)	6% (1)	35% (6)	41% (7)	17
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	12% (2)	12% (2)	12% (2)	29% (5)	35% (6)	17
				Total Respondents		138

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5. isolated wetlands law
6. Northeast Indiana

Total Respondents 6

28. Regional or local HABITAT inventory and assessment by other organizations for the Wildlife in All Wetland Habitats in Indiana.

1. statewide aerial imagery
2. None that I am aware of.
3. Do not occur to my knowledge.
4. unknown
5. Indiana wetland inventory maps
county aerial photos for NRCS
soils mapping county maps
6. Cortwright monitors populations in Brown County & Porter County
Brodman monitors them in Owens County
7. Kankakee Sands and other Conservancy preserves - staff evaluate the restored/created habitat to judge its ability to support Plains leopard frog and other species of concern.
8. Robert Brodman, Saint Joseph's College in NW Indiana
9. NW Indiana (Newton, Jasper, Pulaski, Lake & Porter Counties)
10. IUPUI-FW faculty and students work in wetlands with this species in NE Indiana

Total Respondents 10

29. Please list organizations that are monitoring this HABITAT for the Wildlife in All Wetland Habitats in Indiana.

1. USDA?
2. None that I am aware of.
3. Do not occur to my knowledge
4. unknown
5. - US Fish and Wildlife Service
- Natural Resource Conservation Service
- Indiana Department of Environmental Management
6. IDNR, Non-game Herpetologist; University Professors, members of the Herpetology TAC Committee for the State of Indiana
7. TNC.
8. Robert Brodman, Saint Joseph's College

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9. Ball State University NE Ind.
Indiana State University NW
10. Because something is known about wetland loss in Indiana, I presume the state is keeping track of something.

Total Respondents 10

30. What are the current HABITAT inventory and/or assessment techniques for Wildlife in All Wetland Habitats 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% (2)	27% (6)	36% (8)	0% (0)	0% (0)	27% (6)	22
Aerial photography and analysis	14% (3)	23% (5)	27% (6)	5% (1)	0% (0)	32% (7)	22
Systematic sampling	9% (2)	23% (5)	18% (4)	9% (2)	0% (0)	41% (9)	22
Property tax estimates	0% (0)	0% (0)	0% (0)	22% (4)	0% (0)	78% (14)	18
State revenue data	0% (0)	0% (0)	0% (0)	22% (4)	0% (0)	78% (14)	18
Regulatory information	6% (1)	22% (4)	0% (0)	22% (4)	0% (0)	50% (9)	18
Participation in landuse programs	0% (0)	20% (4)	10% (2)	20% (4)	0% (0)	50% (10)	20
Modeling	0% (0)	14% (3)	29% (6)	5% (1)	0% (0)	52% (11)	21
Voluntary landowner reporting	0% (0)	10% (2)	14% (3)	14% (3)	0% (0)	62% (13)	21
Other (please specify below)	0% (0)	18% (2)	0% (0)	9% (1)	0% (0)	73% (8)	11
						Total Respondents	193

31. Other HABITAT inventory and assessment techniques for the Wildlife in All Wetland Habitats in Indiana.

1. X
2. unknown
3. I am not aware of any inventory or assessment techniques used specifically for Canada Goose Habitat in Indiana.; SurveyAnswerTextNull

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4. Pit-fall trapping and cover board objects adjacent to ephemeral wetlands; mark and recapture
5. Visual estimate of amount of appropriate habitat being provided in restored areas.
6. look for runways in muck and trap for them

Total Respondents 6

32. What one or two HABITAT inventory and assessment techniques would you recommend for effective conservation of the Wildlife in All Wetland Habitats in Indiana?

1. aerial/satellite imagery coupled with modeling
2. Wetlands should be monitored by overhead photo methods with ground truth checks. This should occur on a regular basis with aggressive enforcement against illegal wetlands destruction
3. spring aerial surveys
4. none
GIS mapping would be the most cost affective means for creating an inventory of emergent plant spp. that would support Canada Geese in emergent wetlands
5. Systemnatic water sampling of high use areas would determine nutrient loading and water quality. US Fish and Wildlife Service Draft Environmentalalo Impact Statement, Resident Canads Goose Management, Feb.2002.; SurveyAnswerTextNull
6. aerial surveys
reports from state fwass
7. analysis of county aerial photos as these are done on a somewhat regular basis
- updating and ground truthing Wetland Inventory maps
8. Surveys
9. Pit-fall traps and cover boards can be used to assess population size and use of ephemeral wetlands for breeding; Mark and recapture can be used to determine migration patterns and use of specific ephemeral wetlands for breeding
10. Systematic survey & GIS
11. Systematic sampling (intensive) and GIS (less intensive)
12. Sysematic sampling & GIS
1) High resolution aerial photography at normal marsh water levels - digitize for GIS.
13. 2) Monitor wetland vegetation - blandings prefer floating emergents (e.g. duck weed) and get crowded out by cattail expansion.

Total Respondents 13

33. What is the current body of science for the Wildlife in All Wetland Habitats in Indiana?

	Response Total	Response Percent
Complete, up to date and extensive	1	6%

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extensive				
Adequate			3	17%
Inadequate			11	61%
Nonexistent			2	11%
Other (please explain below)	Literature is not habitat specific for muskrats in Indiana		1	6%
			Total Respondents	18

34. Please provide a citation (title, author, date, publisher) that would give the best overview of the Wildlife in All Wetland Habitats in Indiana, if available. This resource may be used if further detail is needed.

		Response Total	Response Percent	
Title	BNA Account - Golden-winged Warbler Spring Breeding Duck Survey Amphibians and reptiles from 23 counties of Indiana. Amphibians and reptiles from 23 counties of Indiana. Unknown Fur animals of Indiana Unknown Status and Distribution of candidate endangered herpetofauna in the Fish Creek watershed	1	100%	
Author	JL Confer Kristen Chodacheck Robert Brodman Robert Brodman Mumford and Whitaker 1982 David Brooks review Minton's guide Bruce Kingsbury, Spencer Cortwright	1	100%	
Date	1992 2003 2003 2003 unknown 1959 2001 1994	1	100%	
Publisher	American Ornithologists' Union IDNR Proceedings of the Indiana Academy of Science, 112: 43-54. Proceedings of the Indiana Academy of Science, 112: 43-54. Unknown IDF&W Get BioBlitz & IUPFW reports from DNR IDNR Division of Fish and Wildlife	1	100%	
			Total Respondents	1

35. If possible, please provide a second citation (title, author, date, publisher) that would give another good overview of the Wildlife in All Wetland Habitats in Indiana. This resource may also be used if further detail is needed.

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		Response Total	Response Percent
Title	Birds of Indiana Waterfowl Ecology & Management Amphibians and reptiles from 23 counties of Indiana. ongoing background work in NE & MN	1	100%
Author	R Mumford and C. Keller Compiled by: Ratti, Flake, Wentz Robert Brodman unknown	1	100%
Date	1984 1982 2003 unknown	1	100%
Publisher	Indiana University Press The Wildlife Society Proceedings of the Indiana Academy of Science, 112: 43-54. unknown	1	100%
Total Respondents		1	

36. What is the current HABITAT body of science for the Wildlife in All Wetland Habitats in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		0	0%
Adequate		5	28%
Inadequate		11	61%
Nonexistent		1	6%
Other (please explain below)	unknown	1	6%
Total Respondents		18	

37. Please provide a citation (title, author, date, publisher) that would give the best HABITAT overview of the Wildlife in All Wetland Habitats in Indiana, if available. This resource may be used if further detail is needed.

		Response Total	Response Percent
Title	Waterfowl & Wetlands- Integrated Review Not my expertise	1	100%
Author	Edited : Bookhout contact JW Lang for NE & MN	0	0%
Date	1979 unknown	0	0%
Publisher	The Wildlife Society unknown	0	0%

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Total Respondents 1

38. If possible, please provide a second citation (title, author, date, publisher) that would give another good HABITAT overview of the Wildlife in All Wetland Habitats in Indiana. This resource may also be used if further detail is needed.

		Response Total	Response Percent
Title	Creating Freshwater Wetlands	1	100%
Author	Hammer	1	100%
Date	1997	1	100%
Publisher	CRC Press	1	100%
		Total Respondents	1

39. What are the research needs for the Wildlife in All Wetland Habitats in Indiana?

	Urgently needed	Greatly needed	Needed	Slightly needed	Not needed	Unknown	Response Total
Life cycle	5% (1)	14% (3)	36% (8)	18% (4)	27% (6)	0% (0)	22
Distribution and abundance	9% (2)	23% (5)	50% (11)	5% (1)	14% (3)	0% (0)	22
Limiting factors (food, shelter, water, breeding sites)	41% (9)	18% (4)	18% (4)	9% (2)	14% (3)	0% (0)	22
Threats (predators/competition, contamination)	27% (6)	14% (3)	36% (8)	14% (3)	9% (2)	0% (0)	22
Relationship/dependence on specific habitats	27% (6)	18% (4)	27% (6)	5% (1)	23% (5)	0% (0)	22
Population health (genetic and physical)	18% (4)	18% (4)	32% (7)	14% (3)	18% (4)	0% (0)	22
Other (please specify below)	0% (0)	33% (3)	0% (0)	0% (0)	11% (1)	56% (5)	9
Total Respondents							141

40. Other research needs for the Wildlife in All Wetland Habitats in Indiana.

1. X
2. unknown
3. Research is needed to justify extending or modifying the hunting seasons to eliminate the problem of the so called nuisance goose in urban areas, around lakes and golf courses.
4. food availability throughout annual cycle
ways to deter use
5. impact of high snow goose populations on Canada geese nesting sites

Appendix E-64: Aggregated Wetlands

- develop more effective dispersal, relocation or removal techniques for maxima geese

- Information on metapopulation dynamics and migration distances to and from ephemeral wetlands are needed.
6. Information on how many ephemeral wetland habitats within the landscape are needed to maintain healthy populations of the species is also needed. Information on buffer size and vegetation composition around ephemeral wetlands is needed.
 7. Quite little is known about much of the basic natural history of this species
 8. Research needs as related to muskrats are not habitat specific.
 - 1) Longterm fidelity to specific sites.
 9.
 - 2) Limits to sand prairie needs for nesting.
 - 3) Limits to recruitment when forced to nest in rowcrop areas.

Total Respondents 9

41. What are the HABITAT research needs for the Wildlife in All Wetland Habitats in Indiana?

	Urgently needed	Greatly needed	Needed	Slightly needed	Not needed	Unknown	Response Total
Successional changes	0% (0)	36% (8)	41% (9)	18% (4)	5% (1)	0% (0)	22
Distribution and abundance (fragmentation)	18% (4)	45% (10)	27% (6)	9% (2)	0% (0)	0% (0)	22
Threats (land use change/competition, contamination/global warming)	32% (7)	27% (6)	23% (5)	14% (3)	0% (0)	5% (1)	22
Relationship/dependence on specific site conditions	27% (6)	23% (5)	14% (3)	27% (6)	5% (1)	5% (1)	22
Growth and development of individual components of the habitat	0% (0)	33% (7)	29% (6)	24% (5)	0% (0)	14% (3)	21
Other (please specify below)	13% (1)	13% (1)	13% (1)	13% (1)	0% (0)	50% (4)	8
	Total Respondents						117

42. Other HABITAT research needs for the Wildlife in All Wetland Habitats in Indiana.

1. X
2. unknown
3. Habitat needs should be researched in an attempt to find and propagate habitats that are esthetically pleasing to humans for urban settings yet displeasing to geese.
4. availability throughout annual cycle
5. Information on metapopulation dynamics and migration distances to and from ephemeral wetlands are needed. Information on how many ephemeral wetland habitats within the landscape are needed to maintain healthy populations of the species is also needed. Information on buffer size and vegetation composition around ephemeral wetlands is needed.

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ephemeral wetlands is needed.

Spatial relationships between occupied wetlands relative to population dynamics

6.

Physical characteristics of over wintering sites

Total Respondents

6

43. How well do the following conservation efforts address the threats to all wildlife in all Wetland Habitats in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection (use below for details)	27% (6)	64% (14)	5% (1)	0% (0)	5% (1)	22
Population management (hunting, trapping)	18% (4)	18% (4)	9% (2)	45% (10)	9% (2)	22
Population enhancement (captive breeding and release)	0% (0)	0% (0)	0% (0)	86% (19)	14% (3)	22
Reintroduction (restoration)	5% (1)	0% (0)	0% (0)	86% (19)	9% (2)	22
Food plots	14% (3)	14% (3)	14% (3)	55% (12)	5% (1)	22
Threats reduction	5% (1)	36% (8)	0% (0)	27% (6)	32% (7)	22
Native predator control	0% (0)	18% (4)	9% (2)	50% (11)	23% (5)	22
Exotic/invasive species control	5% (1)	27% (6)	0% (0)	45% (10)	23% (5)	22
Regulation of collecting	14% (3)	43% (9)	5% (1)	29% (6)	10% (2)	21
Disease/parasite management	5% (1)	9% (2)	5% (1)	55% (12)	27% (6)	22
Translocation to new geographic range	0% (0)	10% (2)	0% (0)	81% (17)	10% (2)	21
Protection of migration routes	14% (3)	18% (4)	5% (1)	32% (7)	32% (7)	22
Limiting contact with pollutants/contaminants	0% (0)	27% (6)	5% (1)	32% (7)	36% (8)	22
Public education to reduce human disturbance	0% (0)	45% (10)	5% (1)	18% (4)	32% (7)	22
Culling/selective removal	0% (0)	18% (4)	0% (0)	73% (16)	9% (2)	22
Stocking	5% (1)	0% (0)	0% (0)	86% (19)	9% (2)	22
Other (please specify below)	25% (2)	0% (0)	13% (1)	0% (0)	63% (5)	8
						Total Respondents 358

44. Other current conservation practices for the Wildlife in All Wetland Habitats in Indiana.

1. 1. X
2. unknown
3. Wetland restoration
4. Too little is known

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5. Invasive species control (buckthorn, autumn olive, phargimtes) to keep open herbaceous habitat suitable for massasauga
6. Preserve wetlands

Total Respondents

6

45. What one or two specific practices would you recommend for more effective conservation of the Wildlife in All Wetland Habitats in Indiana?

1. Habitat protection and habitat manipulation.
2. Restoring wetlands & providing quality upland nesting cover adjoining these wetlands.
Reduce fall tillage near wetlands.
3. Habitat protection throughout annual cycle
4. continue 5 year surveys
5. Modification of hunting seasons and opening of urban areas to hunting to reduce numbers of so called nuisance geese populations in leu of nest destruction and egg shaking.; SurveyAnswerTextNull
6. Enhancement of migratory/staging habitat
enhancement of breeding habitat where populations do not conflict with landuse
7. develop practices and procedures to increase harvest of local birds
8. Ephermeral Wetland and forested upland habitat protection
9. 1.Habitat protection needs to be improved greatly. Ephemeral wetlands are not protected or valued as much as other wetlands via regulation.
2.Restoration of ephemeral wetlands and retention of these habitats within the landscape.
10. Protection & restoration of ephermeral wetlands within the historic range of this species.
Design and management of conservation areas that specifically incorporate life history requirements of the species across relatively large habitats (>1,000 acres). This species is too often subjected to management decisions that favor other species, and these often have a negative impact on available wetland and nesting habitat. In some cases (water level manipulations , late spring prescribed fire), these management decisions seem likely to result in direct mortality of adults.
11. Habitat protection
See #43. In addition, although not habitat specific, outreach programs are needed to effectively and accurately educate citizens about wildlife (game and non-game), the wildlife conservation model (for game and non-game), and the need for effective muskrat management programs.
12. 1) Restoration in new, very large natural areas in NW Indiana.
2) Raccoon reduction near constrained (small) areas of occupied habitat in NE Indiana.
Design and management of conservation areas that specifically incorporate life history requirements of the species across relatively large habitats (>1,000 acres). This species is too often subjected to management decisions that favor other species, and these often have a negative impact on available wetland and nesting habitat. In some cases, these management decisions seem likely to result in direct mortality of adults and eggs.
13. Habitat protection
See #43. In addition, although not habitat specific, outreach programs are needed to effectively and accurately educate citizens about wildlife (game and non-game), the wildlife conservation model (for game and non-game), and the need for effective muskrat management programs.
14. 1) Restoration in new, very large natural areas in NW Indiana.
2) Raccoon reduction near constrained (small) areas of occupied habitat in NE Indiana.
Design and management of conservation areas that specifically incorporate life history requirements of the species across relatively large habitats (>1,000 acres). This species is too often subjected to management decisions that favor other species, and these often have a negative impact on available wetland and nesting habitat. In some cases, these management decisions seem likely to result in direct mortality of adults and eggs.
15. Habitat protection
See #43. In addition, although not habitat specific, outreach programs are needed to effectively and accurately educate citizens about wildlife (game and non-game), the wildlife conservation model (for game and non-game), and the need for effective muskrat management programs.

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16 Restoration of habitat and connectivity

Total Respondents

16

46. How well do the following conservation efforts address the HABITAT threats to all wildlife in all Wetland Habitats in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection through regulation	24% (5)	67% (14)	5% (1)	0% (0)	5% (1)	21
Habitat protection on public lands	57% (12)	38% (8)	5% (1)	0% (0)	0% (0)	21
Habitat protection incentives (financial)	20% (4)	40% (8)	5% (1)	0% (0)	35% (7)	20
Habitat restoration through regulation	14% (3)	33% (7)	10% (2)	5% (1)	38% (8)	21
Habitat restoration on public lands	29% (6)	38% (8)	10% (2)	5% (1)	19% (4)	21
Habitat restoration incentives (financial)	14% (3)	38% (8)	5% (1)	5% (1)	38% (8)	21
Artificial habitat creation (artificial reefs, nesting platforms)	14% (3)	29% (6)	0% (0)	29% (6)	29% (6)	21
Selective use of functionally equivalent exotic species in place of extirpated natives	0% (0)	14% (3)	14% (3)	43% (9)	29% (6)	21
Succession control (fire, mowing)	29% (6)	24% (5)	10% (2)	14% (3)	24% (5)	21
Corridor development/protection	14% (3)	24% (5)	5% (1)	29% (6)	29% (6)	21
Managing water regimes	14% (3)	38% (8)	14% (3)	10% (2)	24% (5)	21
Pollution reduction	0% (0)	48% (10)	0% (0)	5% (1)	48% (10)	21
Protection of adjacent buffer zone	24% (5)	43% (9)	5% (1)	10% (2)	19% (4)	21
Restrict public access and disturbance	5% (1)	38% (8)	5% (1)	14% (3)	38% (8)	21
Land use planning	20% (4)	35% (7)	5% (1)	10% (2)	30% (6)	20
Technical assistance	5% (1)	43% (9)	10% (2)	10% (2)	33% (7)	21
Cooperative land management agreements (conservation easements)	19% (4)	24% (5)	0% (0)	5% (1)	52% (11)	21
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	100% (5)	5
						Total Respondents 360

47. Other current HABITAT conservation practices for the Wildlife in All Wetland Habitats in Indiana.

1. X
2. unknown
3. Many of the current 'conservation practices' and incentive programs promoted by biologists seem to be aimed at ducks and actually manage against this species.

Total Respondents

3

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48. What one or two specific HABITAT practices would you recommend for more effective conservation of the Wildlife in All Wetland Habitats in Indiana?

1. retard succession to desired habitat stage; incentives to conserve shrubby habitats.
2. Regulations are needed to protect small wetlands.
Habitat restoration programs for private land owners. (Financial help)
3. Habitat protection incentives
habitat protection regulations
4. continue efforts to protect and enhance wetland and riparian habitats.
5. Control of plant species that spread by vegetative means that from thick colonies such as cattail.
6. food plots
refuge areas
7. providing additional financial incentives on private lands for easements to protect existing wetlands or to restore wetlands
8. Forested ephemeral wetland protection and forest protection
9. Restoration and protection of ephemeral wetlands; protection of buffers needed for amphibians migrating to the ephemeral wetland for breeding;
10. When creating wetlands under a landowner incentive program, create ephemeral wetlands whenever possible rather than duck ponds.
11. Protection and restoration of ephemeral wetlands.
12. Habitat protection on private & public lands
13. Wetland protection
14. anything that helps to preserve wetlands could help this animal.
 - 1) Use fire to maintain large sand prairies near appropriate wetlands
 - 2) Acquire/purchase easements on additional blocks of land that have permanent wetlands associated with large sandy uplands.
15. Protection, restoration and appropriate management of adjacent uplands as nesting habitat around known populations
16. Protection, restoration and appropriate management of adjacent uplands as nesting habitat around known populations
17. restore habitat and connectivity, allow beaver activity

Total Respondents

17

49. Do you have any additional comments or information on the Wildlife in All Wetland Habitats that you feel would be useful in the development of the Indiana Comprehensive Wildlife Strategy?

- Indiana needs to take a more active role in protecting and restoring emergent wetlands. Probably the upward spiral of land value will insure the loss of our last quality habitat. To this date jobs and revenue are number one on our priorities. We will destroy any stream or wetland for a new residence, more agricultural production, or a factory. I fear we may be too late. As I see what has occurred during my 35 year as a land manager in Indiana I sometimes feel we have already lost the battle.
- 1.

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2. no

3. no

In Indiana we need to consider two distinct groups of Canada geese. I have tried to address both groups in the information provided above.

4. The geese migrating down from the traditional nesting grounds in Canada face high snow goose populations, degradation and destruction of existing wetlands, short stopping and a warming winter weather pattern. These have had a severe influence on traditional migration patterns and routes.

The Maxima geese being yearround residents are much more prone to goose - human conflicts. Also tend to gather in large numbers on small water bodies leading to possible disease outbreaks.

5. The distribution of spotted salamanders in Indiana is more spotty than one might expect.

6. It is not known if *Rana blairi* exists in Indiana. The only known specimen from Indiana were collected and deposited in museums prior to the species even being described. To the best of my knowledge, the most recently documented *Rana blairi* from Indiana was about 30 years ago.

7. Step one is the need for more information about this species and its abundance in Indiana

8. This species is too often taken for granted on managed lands. Management activities in wetlands and adjacent uplands (water level manipulations , late spring prescribed fire) contribute directly to increased mortality.

9. Four-toed salamanders have a very spotty distribution that is poorly understood. They are often not found in habitats that seem ideally suited but then found in what one might call an inferior site.

10. Contiguous blandings populations have 4000 >yearling turtles in Minnesota and 140000 >yearling turtles in Nebraska, among the largest for any turtle in the USA. Main habitat components include big shallow but permanent wetlands, and very large sand prairies for nesting - so large as to be non-economical for regular raccoon use (some foxes & others use). These places have excellent juvenile recruitment, evidently not seen in other habitat. Take it from here.

Total Respondents

10