

## Appendix E-33: Forests

### 6. Please rank the following threats to all wildlife in Forest Habitats in Indiana.

	<b>Critical threat</b>	<b>Serious threat</b>	<b>Somewhat of a threat</b>	<b>Slight threat</b>	<b>No threat</b>	<b>Unknown</b>	<b>Response Total</b>
Invasive/non-native species	0% (0)	11% (1)	22% (2)	22% (2)	44% (4)	0% (0)	<b>9</b>
High sensitivity to pollution	0% (0)	0% (0)	11% (1)	44% (4)	33% (3)	11% (1)	<b>9</b>
Bioaccumulation of contaminants	0% (0)	0% (0)	11% (1)	33% (3)	22% (2)	33% (3)	<b>9</b>
Predators (native or domesticated)	0% (0)	0% (0)	11% (1)	44% (4)	44% (4)	0% (0)	<b>9</b>
Dependence on other species (mutualism, pollinators)	0% (0)	0% (0)	0% (0)	44% (1)	66% (6)	22% (2)	<b>9</b>
Diseases/parasites (of the species itself)	11% (1)	22% (2)	22% (2)	0% (0)	33% (3)	11% (1)	<b>9</b>
Regulated hunting/fishing pressure (too much)	0% (0)	0% (0)	11% (1)	22% (2)	55% (5)	11% (1)	<b>9</b>
Species over population	0% (0)	22% (2)	11% (1)	11% (1)	55% (5)	0% (0)	<b>9</b>
Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by-catch, harvesting equipment, land preparation machinery)	11% (1)	22% (2)	22% (2)	11% (1)	22% (2)	11% (1)	<b>9</b>
Unregulated collection pressure	11% (1)	0% (0)	0% (0)	0% (0)	77% (7)	11% (1)	<b>9</b>
Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)	0% (0)	0% (0)	0% (0)	44% (4)	55% (5)	0% (0)	<b>9</b>
							<b>Total Respondents</b>
							<b>99</b>

### 7. Please also rank these threats to all wildlife in Forest Habitats in Indiana.

	<b>Critical threat</b>	<b>Serious threat</b>	<b>Somewhat of a threat</b>	<b>Slight threat</b>	<b>No threat</b>	<b>Unknown</b>	<b>Response Total</b>
Habitat loss (breeding range)	0% (0)	33% (3)	22% (2)	44% (4)	0% (0)	0% (0)	<b>9</b>
Habitat loss (feeding/foraging areas)	0% (0)	33% (3)	22% (2)	44% (4)	0% (0)	0% (0)	<b>9</b>
Small native range (high endemism)	0% (0)	0% (0)	0% (0)	22% (2)	77% (7)	0% (0)	<b>9</b>
Near limits of natural geographic range	0% (0)	0% (0)	0% (0)	11% (1)	77% (7)	11% (1)	<b>9</b>
Large home range requirements	0% (0)	0% (0)	11% (1)	33% (3)	55% (5)	0% (0)	<b>9</b>
Viable reproductive population size or availability	0% (0)	0% (0)	11% (1)	33% (3)	55% (5)	0% (0)	<b>9</b>
Specialized reproductive behavior or low reproductive rates	11% (1)	0% (0)	0% (0)	22% (2)	66% (6)	0% (0)	<b>9</b>
Degradation of movement/migration routes	11% (1)	11% (1)	11% (1)	37% (3)	25% (2)	0% (0)	<b>9</b>

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(overwintering habitats, nesting and staging sites)

Genetic pollution (hybridization)	0% (0)	11% (1)	0% (0)	33% (3)	55% (5)	0% (0)	<b>9</b>
Unknown	0% (0)	0% (0)	0% (0)	33% (2)	0% (0)	67% (4)	<b>6</b>
Other (please specify below)	0% (0)	25% (2)	25% (2)	0% (0)	13% (1)	38% (3)	<b>8</b>
<b>Total Respondents</b>							<b>94</b>

### 8. Other threats to all wildlife in Forest Habitats in Indiana.

1. Captive cervids
2. Genetic contamination from farmed white-tails
3. Fragmentation of forest habitat and loss of farmland habitat to housing.
4. The spread of BushHoneySuckles, construction, tree diseases, tree insects, and the removal of fence rows.
5. It might be possible to overharvest fox squirrels in small forest fragments in the northern part of the state but I believe that this too is unlikely.

**Total Respondents 5**

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

1. Overpopulation will lead to an unmanageable resource and severe habitat degradation.  
Captive cervids contaminate genetic integrity and increase chance of infection for wild deer
2. CWD will come to IN  
Trophy mgt & associated leasing will lead to overpopulation & fewer active hunters  
CWD, EHD & tuberculosis could be devastating to a deer herd of our density.
3. Loss of habitat to rural development.
4. Habitat loss- Land development  
Invasive species and its relation to habitat loss  
I seek to qualify my answer about loss of migration habitat. The large-scale mortality being reported from wind turbines and other sources is the most threatening issue for this species.
5. We also need information about how this species migrates to begin thinking about where not to place such structures.  
Loss of winter range is a slight concern since we really don't know where they are going.
6. Habitat fragmentation & habitat destruction.

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7. The 2 greatest threats to the fox squirrel are overall loss of habitat and fragmentation of the remaining forest tracts.
8. Threats to bobcat populations in Indiana are human-related factors such as direct mortality (incidental take, road-kills, persecution) and habitat loss. Conversion of native communities and habitats for human use cause direct loss of habitats for bobcats and their prey items.
9. The top two threats to the eastern box turtle are habitat loss, road mortality, and human collection.

**Total Respondents 9**

### 10. Please rank the following threats to the HABITAT of all wildlife in Forest Habitats in Indiana.

	<b>Critical threat</b>	<b>Serious threat</b>	<b>Somewhat of a threat</b>	<b>Slight threat</b>	<b>No threat</b>	<b>Unknown</b>	<b>Response Total</b>
Commercial or residential development (sprawl)	11% (1)	77% (7)	11% (1)	0% (0)	0% (0)	0% (0)	<b>9</b>
Counterproductive financial incentives or regulations	0% (0)	11% (1)	11% (1)	33% (3)	33% (3)	11% (1)	<b>9</b>
Invasive/non-native species	0% (0)	22% (2)	22% (2)	44% (4)	11% (1)	0% (0)	<b>9</b>
Nonpoint source pollution (sedimentation and nutrients)	0% (0)	0% (0)	0% (0)	44% (4)	33% (3)	22% (2)	<b>9</b>
Habitat fragmentation	11% (1)	44% (4)	33% (3)	11% (1)	0% (0)	0% (0)	<b>9</b>
Successional change	0% (0)	0% (0)	0% (0)	55% (5)	44% (4)	0% (0)	<b>9</b>
Diseases (of plants that create habitat)	0% (0)	0% (0)	22% (2)	55% (5)	22% (2)	0% (0)	<b>9</b>
Habitat degradation	0% (0)	11% (1)	44% (4)	44% (4)	0% (0)	0% (0)	<b>9</b>
Climate change	0% (0)	0% (0)	0% (0)	0% (0)	55% (5)	44% (4)	<b>9</b>
Stream channelization	0% (0)	0% (0)	0% (0)	0% (0)	77% (7)	22% (2)	<b>9</b>
Impoundment of water/flow regulation	0% (0)	0% (0)	0% (0)	11% (1)	66% (6)	22% (2)	<b>9</b>
Agricultural/forestry practices	0% (0)	11% (1)	33% (3)	22% (2)	33% (3)	0% (0)	<b>9</b>
Residual contamination (persistent toxins)	0% (0)	0% (0)	0% (0)	33% (3)	44% (4)	22% (2)	<b>9</b>
Point source pollution (continuing)	0% (0)	0% (0)	0% (0)	33% (3)	44% (4)	22% (2)	<b>9</b>
Mining/acidification	0% (0)	0% (0)	0% (0)	22% (2)	66% (6)	11% (1)	<b>9</b>
Drainage practices (stormwater runoff)	0% (0)	0% (0)	0% (0)	22% (2)	66% (6)	11% (1)	<b>9</b>
Unknown	0% (0)	0% (0)	0% (0)	0% (0)	20% (1)	80% (4)	<b>5</b>
Other (please specify below)	0% (0)	0% (0)	17% (1)	0% (0)	17% (1)	67% (4)	<b>6</b>
							<b>Total Respondents 155</b>

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### 11. Other HABITAT threats to all wildlife in Forest Habitats in Indiana.

1. Modern farm practices-the creation of large open, clean farm fields leaves no habitat for deer or many other mammals for that manner
2. Urban spread, construction, clearing for agriculture crops and fence row removal

**Total Respondents 2**

### 12. Please briefly describe the top two HABITAT threats to all wildlife in Forest Habitats in Indiana identified above.

1. Degredation by overpopulation  
Fragmentation in farmed/heavily populated regions prevents historical movements from summer to winter ranges
2. Urban sprawl is consuming significant amounts of our forest habitat  
Urban sprawl has started to interrupt movements and increased accidental mortality.
3. Fragmentation of habitat forces unnatural movement and increases accidental mortality as well as the opportunity to spread disease.
4. Development- this completely removes the habitat  
Habitat fragmentation- this also removes habitat  
Our unpublished work on eastern red bats suggest the critical habitat is a combination of forests for roosting and edge habitat for roosting. As such the main threats are
5. 1) loss of forest habitat  
2) loss of suitable foraging habitat to development  
Top threats to bobcat habitat are loss of forested habitats (or any native or non-developed habitats) to residential, commercial, industrial, etc. uses. Conversion of habitats to types dominated for human activity, on a cumulative scale, are problematic. Fragmentation, to a lesser extent, also negatively impacts bobcat habitats, but is probably less of a factor because the species is somewhat adaptable and highly mobile.
6. The largest threat to the box turtle habitat is fragmentation and urbanization.
7. Forest habitat fragmentation and loss of habitat.
8. The 2 greatest threats to fox squirrel habitat in Indiana are overall loss of habitat and fragmentation, both due primarily to agricultural practices of urban sprawl.

**Total Respondents 9**

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

	Yes, these efforts occur	Not aware of these efforts occurring	Response Total
Statewide year-round monitoring conducted by state agencies	44% (4)	55% (5)	9

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Statewide once a year monitoring conducted by state agencies	50% (4)	50% (4)	<b>8</b>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	25% (2)	75% (6)	<b>8</b>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	22% (1)	88% (7)	<b>8</b>
Regional or local year-round monitoring conducted by state agencies	37% (3)	63% (5)	<b>8</b>
Regional or local once a year monitoring conducted by state agencies	43% (3)	57% (4)	<b>7</b>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	25% (2)	75% (6)	<b>8</b>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	25% (2)	75% (6)	<b>8</b>
		<b>Total Respondents</b>	<b>65</b>

### 14. What current monitoring efforts by other organizations are you aware of for all wildlife in Forest Habitats in Indiana?

	<b>Yes, these efforts occur</b>	<b>Not aware of these efforts occurring</b>	<b>Response Total</b>
Statewide year-round monitoring conducted by other organizations	0% (0)	100% (9)	<b>9</b>
Statewide once a year monitoring conducted by other organizations	13% (1)	87% (7)	<b>8</b>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (9)	<b>9</b>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	100% (9)	<b>9</b>
Regional or local year-round monitoring conducted by other organizations	0% (0)	100% (9)	<b>9</b>
Regional or local once a year monitoring conducted by other organizations	11% (1)	88% (8)	<b>9</b>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	22% (2)	77% (7)	<b>9</b>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	33% (3)	66% (6)	<b>9</b>
		<b>Total Respondents</b>	<b>71</b>

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

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	<b>Very crucial</b>	<b>Somewhat crucial</b>	<b>Slightly crucial</b>	<b>Not crucial</b>	<b>Unknown</b>	<b>Response Total</b>
Statewide year-round monitoring conducted by state agencies	22% (2)	22% (2)	0% (0)	44% (4)	11% (1)	<b>9</b>
Statewide once a year monitoring conducted by state agencies	13% (1)	50% (4)	13% (1)	13% (1)	13% (1)	<b>8</b>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	0% (0)	29% (2)	29% (2)	47% (3)	0% (0)	<b>7</b>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	0% (0)	43% (3)	0% (0)	29% (2)	29% (2)	<b>7</b>
Regional or local year-round monitoring conducted by state agencies	13% (1)	13% (1)	13% (1)	50% (4)	13% (1)	<b>8</b>
Regional or local once a year monitoring conducted by state agencies	13% (1)	39% (3)	13% (1)	26% (2)	13% (1)	<b>8</b>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	0% (0)	14% (1)	14% (1)	57% (4)	14% (1)	<b>7</b>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	0% (0)	14% (1)	14% (1)	57% (4)	14% (1)	<b>7</b>
				<b>Total Respondents</b>		<b>61</b>

<b>16.</b>	How crucial are these monitoring efforts by other organizations for the conservation of all wildlife in Forest Habitats in Indiana?	<b>Very crucial</b>	<b>Somewhat crucial</b>	<b>Slightly crucial</b>	<b>Not crucial</b>	<b>Unknown</b>	<b>Response Total</b>
	Statewide year-round monitoring conducted by other organizations	0% (0)	0% (0)	11% (1)	55% (5)	33% (3)	<b>9</b>
	Statewide once a year monitoring conducted by other organizations	0% (0)	13% (1)	26% (2)	50% (4)	13% (1)	<b>8</b>
	Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	0% (0)	11% (1)	66% (6)	22% (2)	<b>9</b>
	Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	11% (1)	11% (1)	55% (5)	22% (2)	<b>9</b>
	Regional or local year-round monitoring conducted by other organizations	0% (0)	0% (0)	22% (2)	55% (5)	22% (2)	<b>9</b>
	Regional or local once a year monitoring conducted by other organizations	0% (0)	0% (0)	33% (3)	44% (4)	22% (2)	<b>9</b>
	Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	0% (0)	33% (3)	44% (4)	22% (2)	<b>9</b>

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Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	0% (0)	33% (3)	44% (4)	22% (2)	<b>9</b>
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**Total Respondents 71**

### 17. Regional or local state agency monitoring for all wildlife in Forest Habitats in Indiana.

1. On a statewide basis in the bloomington DNR office
2. St Parks, Nature Preserves
3. State Parks and selected urban areas.
4. State deer check stations
5. Red bats are monitored as part of the regular bat sampling that occurs at Indianapolis Airport, Camp Atterbury, Newport Chemical Depot.  
Also the population trends may be assess via animals submitted to the state rabies lab.
6. Ongoing ecological studies of bobcats in southwestern section of Indiana - primarily Greene, Lawrence, and Martin counties.
7. The state is monitoring box turtles in Martin, Brown, and Morgan counties.
8. Hunter harvest data on State Fish and Wildlife Properties.
9. The small game harvest questionnaire is the only survey the agency conducts to monitor the Indiana fox squirrel population. The survey is only conducted in odd years.

**Total Respondents 9**

### 18. Regional or local monitoring by other organizations for all wildlife in Forest Habitats in Indiana.

1. Some municipalites; University properties  
Purdue U
2. Beverly Shores  
US Nat'l Lkshore  
Wesselman woods (Evansville)
3. Private groups have helped with counts in some State Parks.
4. Unknown
5. I don't know of any official monitoring that is occurring
6. None that I am aware of.
7. I am not sure who else might be monitoring box turtle in Indiana
8. Unknown

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9. I am not aware of any other monitoring.

**Total Respondents**

**9**

**19.** Please list organizations that are monitoring all wildlife in Forest Habitats in Indiana.

1. state Universities
2. see # 18
3. unknown
4. Unknown
5. Indiana State University  
Wildlie Biologists at Military bases

I hesitate to use the term "monitoring" to describe this .... but IDNR does maintain records, databases, etc. regarding reports of bobcats throughout the state. These reports are, for the most part, unsolicited and obtained as they become available. It is not a regular, routine survey ... but more of a clearinghouse for information regarding bobcat sightings, road-kills, incidental captures, etc, which is one of the few means of "monitoring" low-density and wide-ranging species such as the bobcat.

- 6.
7. Unknown
8. Indiana Division of Fish and Wildlife

**Total Respondents**

**8**

**20.** What are the current monitoring techniques for all wildlife in Forest 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	11% (1)	22% (2)	55% (5)	0% (0)	0% (0)	11% (1)	<b>9</b>
Modeling	0% (0)	33% (3)	44% (4)	0% (0)	0% (0)	22% (2)	<b>9</b>
Coverboard routes	0% (0)	0% (0)	14% (1)	29% (2)	0% (0)	57% (4)	<b>7</b>
Spot mapping	13% (1)	0% (0)	25% (2)	13% (1)	0% (0)	50% (4)	<b>8</b>
Driving a survey route	0% (0)	25% (2)	38% (3)	0% (0)	13% (1)	25% (2)	<b>8</b>
Reporting from							



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1. Continued documentation of sightings, road-kills, and accidental captures. Obtain pertinent biological data from recovered specimens such as age and reproductive parameters (pregnancy rate, litter size). These data could be used to model populations or build life tables in future years.
  2. Some form of questionnaire or survey that is sent to trappers, hunters, professional resource managers could also be useful. The Indiana Bowhunter Survey is a good example although reporting rates for bobcats are so low they may not be effective to detect changes and monitor trends.
- I do not have a good, single reference that describes these techniques although they are commonly used by many state wildlife agencies.
7. I would recommend long term surveys and radio-telemetry of box turtle. Surveys would include mark recapture methods.
  8. This is a research question to be answered by research personnel.
- A hunter report card sent out to dedicated squirrel hunters would be a useful tool to provide an index to the fox squirrel population. I would also like to see a radio-telemetry project in northern Indiana to document fox squirrel dispersal between forest tracts. Another objective of this proposed radio-telemetry project would be to evaluate the possibility of overharvesting fox squirrel metapopulations.

**Total Respondents 9**

### 23. What current HABITAT inventory and assessment efforts or activities by state agencies are you aware of for all wildlife in Forest 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% (8)	8
Statewide once a year inventory and assessment conducted by state agencies	0% (0)	100% (8)	8
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	25% (2)	75% (6)	8
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	37% (3)	63% (5)	8
Regional or local year-round inventory and assessment conducted by state agencies	0% (0)	100% (8)	8
Regional or local once a year inventory and assessment conducted by state agencies	0% (0)	100% (8)	8
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	37% (3)	63% (5)	8
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	50% (4)	50% (4)	8





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once a year but still regularly scheduled) inventory and assessment conducted by other organizations

Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations

0% (0)      25% (2)      0% (0)      38% (3)      38% (3)

**8**

**Total Respondents      64**

### 27. Regional or local state agency HABITAT inventory and assessment for all wildlife in Forest Habitats in Indiana.

1. State Forests  
Nature Preserves
2. Unknown, possibly Division of Forestry.
3. IDNR
4. I know the forestry division keeps track of changes in forest cover.
5. I suspect that most, if not all, public properties in the state (Hoosier National Forest, Crane NSWC, State Forests, State Reservoirs, etc.) periodically inventory and assess forested habitats under their jurisdiction. Commercial timbered lands are probably also inventoried on a regular basis. The Nature Conservancy may also have access to data.
6. I am not aware of what efforts are being made to monitor these habitats
7. Unknown
8. I am not aware of any habitat assessment being done by a state agency.

**Total Respondents      8**

### 28. Regional or local HABITAT inventory and assessment by other organizations for all wildlife in Forest Habitats in Indiana.

1. Bev Shores  
Nat'l Lkshore  
Nat'l Forest  
Wesselman Woods
2. Unknown
3. Unknown
4. Local planning boards monitor land use in most localities
5. The Indiana GAP project categorizes land use cover types from landsat imagery. I assume that the change in cover types is being calculated over a specified period of time.
6. Unknown

**Total Respondents      6**

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**29.** Please list organizations that are monitoring this HABITAT for all wildlife in Forest Habitats in Indiana.

1. state Universities
2. PU  
Gov't careing for #28
3. Unknown
4. Unknown
5. See Above
6. In addition to state and federal agencies, I suspect Indiana Hardwoods Lumberman Association or other private groups may monitor forested lands, particularly those in private ownership.
7. I would assume the Nature Conservancy, IDNR, and other Federal Agencies monitor these habitats
8. Indiana GAP Project
9. Unknown

**Total Respondents**

**9**

**30.** What are the current monitoring techniques for all wildlife in the Forest Habitats in Indiana. If a technique is not applicable to all wildlife 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	13% (1)	50% (4)	0% (0)	0% (0)	0% (0)	37% (3)	<b>8</b>
Aerial photography and analysis	29% (2)	43% (3)	14% (1)	0% (0)	0% (0)	29% (2)	<b>8</b>
Systematic sampling	0% (0)	25% (2)	0% (0)	0% (0)	25% (2)	50% (4)	<b>8</b>
Property tax estimates	13% (1)	0% (0)	0% (0)	0% (0)	0% (0)	87% (7)	<b>8</b>
State revenue data	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (8)	<b>8</b>
Regulatory information	0% (0)	13% (1)	0% (0)	0% (0)	0% (0)	87% (7)	<b>8</b>
Participation in landuse programs	13% (1)	50% (4)	0% (0)	0% (0)	0% (0)	37% (3)	<b>8</b>
Modeling	0% (0)	13% (1)	25% (2)	0% (0)	0% (0)	63% (5)	<b>8</b>

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Voluntary landowner reporting	0% (0)	13% (1)	0% (0)	0% (0)	0% (0)	88% (7)	<b>8</b>	
Other (please specify below)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (8)	<b>8</b>	
<b>Total Respondents</b>							<b>80</b>	

### 31. Other HABITAT inventory and assessment techniques for all wildlife in Forest Habitats in Indiana.

1. unknown
2. Unknown
3. I am not sure of the techniques to monitor this habitat
4. Unknown

**Total Respondents 4**

### 32. What one or two HABITAT inventory and assessment techniques would you recommend for effective conservation of all wildlife in Forest Habitats in Indiana?

1. GIS Habitat Modeling
2. GIS mapping and aerial photo analysis
3. GIS Aerial Photography  
Statewide habitat mapping is needed (and mostly available if you know who to ask)
4. Property tax assessments can be used as a proxy as well  
GIS is a logical tool to inventory and assess all aspects of forested habitats in Indiana (species composition, age & size class, ownership, management regime, etc.). It would be nice to have a GIS coverage of rock outcrops in the state to supplement forest data.
5. To a lesser extent, interpretation of aerial photographs would also be useful.  
Collect hunter data from DNR Properties & Private Land hunters.
6. Universities keep record of habitat loss and habitat fragmentation.
7. I would recommend a GIS analysis that examines changes in land use over the last 30+ year period.

**Total Respondents 7**

### 33. What is the current body of science for all wildlife in Forest Habitats in Indiana?

**Response Response  
Total Percent**

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		Total	Percent
Complete, up to date and extensive		1	13%
Adequate		3	38%
Inadequate		3	38%
Nonexistent		0	0%
Other (please explain below)	The science in adequate in some aspects of the turtles life history, but inadequate in others	1	13%
<b>Total Respondents</b>		<b>8</b>	

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

		Response Total	Response Percent
Title	White-tailed Deer Ecology and Management IN Mammals White-tailed Deer Ecology & Management White-tailed Deer Ecology & Management Mammals of Indiana The bobcat in Illinois A long term study of a box turtle ( <i>Terrapene carolina</i> ) population at Allee Memorial Woods, Indiana, with emphasis on survivorship None known Gray and Fox Squirrel Management in Indiana	5	100%
Author	Halls, L. K. (editor) Whittaker Wildlife Management Institute Book Lowell K. Halls John Whitaker Alan Woolf and Clayton Nielsen Williams and Parker John M. Allen	5	100%
Date	1984 1984 1984 IN Press 2002 1987 1964	4	75%
Publisher	Stackpole Books Stackpole Books Stackpole Books IU Press Southern Illinois University Carbondale Herpetologica Indiana Department of Conservation	3	75%
<b>Total Respondents</b>		<b>11</b>	

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

		Response Total	Response Percent
Title	Mammals of Indiana Nocturnal Behavior of Eastern Red Bats Status and management of bobcas in the United States over three decades North American Box Turtles None known	1	100%
Author	Russell E. Mumford and John O. Whitaker, Jr. Brienne Everson Woolf, A. and G.F. Hubert, Jr. Dodd	1	100%
Date	1982 2005? 1998 2001	1	100%
Publisher	Indiana University Press MS Thesis, Indiana State University (not yet complete) Wildlife Society Bulletin 26:287-293. University of Oklahoma Press	1	100%
<b>Total Respondents</b>		<b>8</b>	

**36.** What is the current HABITAT body of science for all wildlife in Forest Habitats in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		1	11%
Adequate		3	33%
Inadequate		2	22%
Nonexistent		1	11%
Other (please explain below)	Unknown I am not sure on the habitat's body of science... I would assume complete and up to date	2	22%
1. unknown			
<b>Total Respondents</b>		<b>9</b>	

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

	Response Total	Response Percent
White-tailed Deer Ecology and Management White-tailed Deer Ecology and Management		

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	Natural Heritage of Indiana The bobcat in Illinois Unknown		
Author	Halls, L. K. (editor) Lowell K. Halls Marion Jackson Alan Woolf and Clayton Nielsen	2	100%
Date	1984 1984 1999 2002	2	100%
Publisher	Stackpole Books Stackpole Books IU Press Southern Illinois University Carbondale	2	100%
<b>Total Respondents</b>		<b>3</b>	

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

		Response Total	Response Percent
Title	Nocturnal Behavior of Eastern Red Bats Unknown	2	0%
Author	Brianne Everson	1	0%
Date	2005?	1	0%
Publisher	Unpublished MS Thesis (should be complete by may 2005)	1	0%
<b>Total Respondents</b>		<b>2</b>	

**39.** What are the research needs for all wildlife in Forest Habitats in Indiana?

	Urgently needed	Greatly needed	Needed	Slightly needed	Not needed	Unknown	Response Total	
Life cycle	0% (0)	33% (3)	11% (1)	33% (3)	22% (2)	0% (0)	9	
Distribution and abundance	11% (1)	0% (0)	33% (3)	22% (2)	33% (3)	0% (0)	9	
Limiting factors (food, shelter, water, breeding sites)	0% (0)	0% (0)	33% (3)	22% (2)	44% (4)	0% (0)	9	
Threats (predators/competition, contamination)	0% (0)	11% (1)	55% (5)	33% (3)	0% (0)	0% (0)	9	
Relationship/dependence on specific habitats	0% (0)	11% (1)	33% (3)	44% (4)	11% (1)	0% (0)	9	
Population health (genetic and physical)	13% (1)	38% (3)	13% (1)	13% (1)	25% (2)	0% (0)	8	
Other (please specify below)	29% (2)	29% (2)	29% (2)	0% (0)	0% (0)	14% (1)	7	
<b>Total Respondents</b>							<b>60</b>	

## Appendix E-33: Forests

### 40. Other research needs for all wildlife in Forest Habitats in Indiana.

1. A deer harvest analysis and modeling program  
Baseline life history data.
2. CWD all aspects
3. The aging techniques (tooth wear) biologists use were developed in New York and may not be accurate for deer of the midwest. My personal experience with deer of known ages indicates that wear is less than the aging charts we currently use. Additional local research needs to be done if we are interested in accurately aging deer over 2 1/2 years.
4. Research needs explore the role of age and social structure in deer herd health.
5. We desperately need to know how bats interact with each other in terms of competition.
6. WHY DOES THIS PAGE SAY I'M DOING THE OTTER QUESTIONNAIRE??? I ANSWERED #39 ABOVE FOR BOBCATS IN FORESTED HABITATS .... NOT OTTERS IN AQUATIC SYSTEMS!
7. Unknown
8. Due to the high fragmentation of forest tracts in Indiana (especially northern Indiana) I believe that dispersal distance is a critical area of research. I also would like to see a research project that evaluates the amount of harvest pressure can be sustained by isolated metapopulations of squirrels.

**Total Respondents 8**

### 41. What are the HABITAT research needs for all wildlife in Forest Habitats in Indiana?

	<b>Urgently needed</b>	<b>Greatly needed</b>	<b>Needed</b>	<b>Slightly needed</b>	<b>Not needed</b>	<b>Unknown</b>	<b>Response Total</b>
Successional changes	0% (0)	0% (0)	43% (3)	29% (2)	29% (2)	0% (0)	<b>7</b>
Distribution and abundance (fragmentation)	0% (0)	33% (3)	33% (3)	33% (2)	0% (0)	0% (0)	<b>8</b>
Threats (land use change/competition, contamination/global warming)	0% (0)	0% (0)	86% (6)	14% (1)	0% (0)	0% (0)	<b>7</b>
Relationship/dependence on specific site conditions	0% (0)	0% (0)	29% (2)	29% (2)	43% (3)	0% (0)	<b>7</b>
Growth and development of individual components of the habitat	0% (0)	0% (0)	14% (1)	29% (2)	43% (3)	14% (1)	<b>7</b>
Other (please specify below)	0% (0)	0% (0)	25% (1)	0% (0)	0% (0)	75% (3)	<b>4</b>
<b>Total Respondents</b>							<b>40</b>

### 42. Other HABITAT research needs for all wildlife in Forest Habitats in Indiana.

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1. unknown
2. Research needs explore the effects of land development.
3. Unknown

**Total Respondents 3**

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

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection (use below for details)	22% (2)	55% (5)	11% (1)	11% (1)	0% (0)	9
Population management (hunting, trapping)	22% (2)	44% (4)	0% (0)	22% (2)	11% (1)	9
Population enhancement (captive breeding and release)	0% (0)	0% (0)	0% (0)	100% (9)	0% (0)	9
Reintroduction (restoration)	0% (0)	0% (0)	0% (0)	100% (9)	0% (0)	9
Food plots	11% (1)	22% (2)	11% (1)	55% (5)	0% (0)	9
Threats reduction	0% (0)	11% (1)	11% (1)	55% (5)	22% (2)	9
Native predator control	0% (0)	0% (0)	44% (4)	55% (5)	0% (0)	9
Exotic/invasive species control	0% (0)	22% (2)	11% (1)	66% (6)	0% (0)	9
Regulation of collecting	11% (1)	22% (2)	11% (1)	44% (4)	11% (1)	9
Disease/parasite management	0% (0)	33% (3)	11% (1)	44% (4)	11% (1)	9
Translocation to new geographic range	0% (0)	0% (0)	22% (2)	77% (7)	0% (0)	9
Protection of migration routes	11% (1)	0% (0)	33% (3)	55% (5)	0% (0)	9
Limiting contact with pollutants/contaminants	0% (0)	11% (1)	22% (2)	44% (4)	22% (2)	9
Public education to reduce human disturbance	0% (0)	33% (3)	22% (2)	33% (3)	11% (1)	9
Culling/selective removal	0% (0)	11% (1)	22% (2)	66% (6)	0% (0)	9
Stocking	0% (0)	0% (0)	11% (1)	88% (8)	0% (0)	9
Other (please specify below)	0% (0)	0% (0)	0% (0)	50% (3)	50% (3)	6
				<b>Total Respondents</b>		<b>150</b>

### 44. Other current conservation practices for all wildlife in Forest Habitats in Indiana.

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1. Contraceptives; currently not used due to efficacy and economical reasons
2. unknown
3. Unknown

**Total Respondents 3**

### 45. What one or two specific practices would you recommend for more effective conservation of all wildlife in Forest Habitats in Indiana?

1. Population management via hunting
2. Ban cervid farming & canned hunting  
Woodland habitat protection
3. Control of forest habitat fragmentation
4. Habitat Protection  
Invasive species control  
  
Studies of migration routes are needed so these areas can be protected.
5. Care should be taken in approving wind turban power stations because of the large direct take associated with these structures. We also need some studies of these power stations in this section of the Midwest (Indiana, Ill, OH).  
  
I would recommend preserving large contionous blocks of forested habitat and prohibiting the collection of box turtles. If possible, I would attempt to lower meso predator numbers and protect nest cavaties.
6. Unknown
7. Unknown
8. Protecting existing forest tracts and maintaining or creating corridors between fragments would, in my opinion, be the 2 most effective conservation practices for fox squirrels in Indiana.

**Total Respondents 7**

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

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection through regulation	22% (2)	44% (4)	22% (2)	11% (1)	0% (0)	9
Habitat protection on public lands	33% (3)	66% (6)	0% (0)	0% (0)	0% (0)	9
Habitat protection incentives (financial)	33% (3)	55% (5)	11% (1)	0% (0)	0% (0)	9
Habitat restoration through regulation	0% (0)	66% (6)	11% (1)	22% (2)	0% (0)	9
Habitat restoration on public lands	11% (1)	77% (7)	0% (0)	11% (1)	0% (0)	9
Habitat restoration incentives (financial)	11% (1)	66% (6)	11% (1)	0% (0)	11% (1)	9

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Artificial habitat creation (artificial reefs, nesting platforms)	0% (0)	0% (0)	11% (1)	88% (8)	0% (0)	<b>9</b>
Selective use of functionally equivalent exotic species in place of extirpated natives	0% (0)	0% (0)	22% (2)	77% (7)	0% (0)	<b>9</b>
Succession control (fire, mowing)	0% (0)	33% (3)	22% (2)	33% (3)	11% (1)	<b>9</b>
Corridor development/protection	11% (1)	22% (2)	11% (1)	55% (5)	0% (0)	<b>9</b>
Managing water regimes	0% (0)	11% (1)	11% (1)	77% (7)	0% (0)	<b>9</b>
Pollution reduction	0% (0)	22% (2)	11% (1)	55% (5)	11% (1)	<b>9</b>
Protection of adjacent buffer zone	0% (0)	33% (3)	11% (1)	44% (4)	11% (1)	<b>9</b>
Restrict public access and disturbance	0% (0)	22% (2)	33% (3)	33% (3)	11% (1)	<b>9</b>
Land use planning	11% (1)	33% (3)	11% (1)	33% (3)	11% (1)	<b>9</b>
Technical assistance	0% (0)	66% (6)	0% (0)	11% (1)	22% (2)	<b>9</b>
Cooperative land management agreements (conservation easements)	0% (0)	88% (8)	0% (0)	0% (0)	11% (1)	<b>9</b>
Other (please specify below)	0% (0)	0% (0)	0% (0)	25% (1)	75% (3)	<b>4</b>
				<b>Total Respondents</b>		<b>157</b>

### 47. Other current HABITAT conservation practices for all wildlife in Forest Habitats in Indiana.

1. unknown
2. Restriction of motorized access into habitat
3. Unknown

**Total Respondents 3**

### 48. What one or two specific HABITAT practices would you recommend for more effective conservation of all wildlife in Forest Habitats in Indiana?

1. Restricting housing development in forested areas.  
Incentives for establishing new forested areas and protection of existing ones.
2. Habitat Protection  
Habitat Restoration  
  
Preservation of both forest and agricultural landscapes will protect some wildlife species habitat.
3. Most forest conservation practices (including corridors and greenways) are likely success stories for wildlife species.
4. Protection of large blocks of natural communities and habitats. Management of forested lands to provide early/mid successional stage habitats.
5. Preserve large tracts of forested habitat.
6. Legislation to protect habitat.

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7. The 2 specific habitat practices that I would recommend would be to create corridors between forest tracts and provide financial incentives to protect or create forest habitat.

**Total Respondents 7**

### **49.** Do you have any additional comments or information on all wildlife in Forest Habitats that you feel would be useful in the development of the Indiana Comprehensive Wildlife Strategy?

1. Evaluate current harvest and hunting strategies to determine if we need to better balance opportunity with harvest. Continue to monitor QDM practices (quality deer management) in other areas. I believe we already have quality deer in Indiana without getting involved in QDM restrictions or regulations.

2. Research into how the elimination of the older age classes of deer affects the health of the deer herd.

This is still a common bat, but threats to its migration routes are a critical issue.

3. Little is known about population dynamics for any bat--this one in particular.

A state-wide monitoring effort should be undertaken.

4. None

**Total Respondents 4**