

## Appendix E-74: Birds

### 6. Please rank the following threats to ALL birds in ALL 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)	10% (5)	40% (20)	20% (10)	20% (10)	10% (5)	<b>50</b>
High sensitivity to pollution	0% (0)	2% (1)	22% (11)	35% (17)	16% (8)	24% (12)	<b>49</b>
Bioaccumulation of contaminants	0% (0)	6% (3)	22% (11)	32% (16)	12% (6)	28% (14)	<b>50</b>
Predators (native or domesticated)	0% (0)	22% (11)	34% (17)	30% (15)	10% (5)	4% (2)	<b>50</b>
Dependence on other species (mutualism, pollinators)	0% (0)	0% (0)	2% (1)	16% (8)	71% (35)	10% (5)	<b>49</b>
Diseases/parasites (of the species itself)	0% (0)	6% (3)	10% (5)	40% (20)	12% (6)	32% (16)	<b>50</b>
Regulated hunting/fishing pressure (too much)	0% (0)	2% (1)	4% (2)	14% (7)	76% (37)	4% (2)	<b>49</b>
Species over population	4% (2)	8% (4)	4% (2)	6% (3)	72% (36)	6% (3)	<b>50</b>
Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by-catch, harvesting equipment, land preparation machinery)	0% (0)	6% (3)	12% (6)	36% (18)	34% (17)	12% (6)	<b>50</b>
Unregulated collection pressure	0% (0)	0% (0)	0% (0)	4% (2)	88% (43)	8% (4)	<b>49</b>
Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)	0% (0)	14% (7)	30% (15)	20% (10)	18% (9)	18% (9)	<b>50</b>
							<b>Total Respondents</b>
							<b>546</b>

### 7. Please also rank these threats to ALL birds in ALL 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)	34% (17)	34% (17)	18% (9)	10% (5)	4% (2)	0% (0)	<b>50</b>
Habitat loss (feeding/foraging areas)	28% (14)	34% (17)	22% (11)	10% (5)	6% (3)	0% (0)	<b>50</b>
Small native range (high endemism)	2% (1)	6% (3)	12% (6)	10% (5)	67% (33)	2% (1)	<b>49</b>
Near limits of natural	0% (0)	2% (1)	10% (5)	24% (12)	62% (31)	2% (1)	<b>50</b>

## Appendix E-74: Birds

geographic range								
Large home range requirements	0% (0)	2% (1)	10% (5)	20% (10)	61% (30)	6% (3)	<b>49</b>	
Viable reproductive population size or availability	6% (3)	10% (5)	14% (7)	26% (13)	30% (15)	14% (7)	<b>50</b>	
Specialized reproductive behavior or low reproductive rates	2% (1)	4% (2)	14% (7)	12% (6)	60% (30)	8% (4)	<b>50</b>	
Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)	6% (3)	38% (19)	24% (12)	14% (7)	10% (5)	8% (4)	<b>50</b>	
Genetic pollution (hybridization)	2% (1)	2% (1)	16% (8)	8% (4)	56% (28)	16% (8)	<b>50</b>	
Unknown	0% (0)	5% (1)	5% (1)	11% (2)	11% (2)	68% (13)	<b>19</b>	
Other (please specify below)	0% (0)	24% (4)	6% (1)	6% (1)	0% (0)	65% (11)	<b>17</b>	
							<b>Total Respondents</b>	<b>484</b>

### 8. Other threats to ALL birds in ALL habitats in Indiana.

1. The impacts of herbicides and pesticides drifting over from nearby agricultural lands in unknown.
2. In addition to habitat loss another problem is natural succession in the remaining shrub/scrub habitats.
3. Disturbance by recreational boating.

4. Lack of periodic vegetative disturbance (Man-made or natural every 5-10 yrs) that adequately opens the forest canopy well distributed throughout predominately forested environments, especially in the large contiguous forested areas of the state in public ownership which form the core or heart of the residual and current grouse range. Potential habitat on private lands is fragmented in distribution due to small ownership and different ownership objectives that does not provide a consistent continuum of acceptable habitat for successful population dispersal. A recent population model analysis based on current habitat conditions and actual grouse population data for Indiana projects that ruffed grouse will potentially disappear as a viable species in much of their current range by 2007. Ruffed grouse population indices are now at the lowest levels recorded in over 40+ yrs.

5. "Urbanization and domestication of "wild" Mallards leading to the hybridization w/ domestic stock of ducks. The threat is one of unusual circumstance. As opposed to typical habitat loss or fragmentation, this threat constitutes displacement of Mallards into undesirable/"unnatural" areas creating nuisance problems and genetic integrity concerns. The "developed" land itself creates wild scale loss of "high quality" habitat for Mallards. However, Mallard ducks are adaptable creatures and have adapted to this "developed" environment. Nonetheless, their adaptiveness could also be their downfall in "developed" lands.

## Appendix E-74: Birds

6. Urban Canada Geese are a real problem in Indiana. I deal specifically with Ft. Wayne (Allen County). Canada geese have benefitted from the way humans have altered the landscape within Urban areas. Human-goose conflicts within the urban environment will increase.
7. Fire suppression
8. Human interaction with species, trapping, relocation, scarring  
Reproductive intervention by humans
9. Fire suppression is a major threat to many, many wildlife species in the state. Savanna habitats are seriously degraded because fire suppression has allowed shade tolerant species to dominate the understory, changing the open savanna structure into a dense forest with an impenetrable understory. Fire keeps the structure open and results in a varied mosaic of habitats, including fire killed trees which provide both food and shelter.
10. Devaluing of wildlife species due to overpopulation  
restricted management options
11. X
12. Unknown
13. Unknown
14. Continued loss and degradation of emergent wetland habitat in portions of the state due to development and poor agricultural practices.
15. Serious reduction in timber management and sales on public lands, consequently ES habitats are disappearing in the forests. Private timber sales and management is too haphazard to replace the severe losses of young forests on public lands..
16. The lack of public knowledge/information regarding the importance of disturbances and early successional habitat in forested areas is the main contributing factor to the near extirpation of the ruffed grouse. The lack of early successional habitats in forested areas is causing major declines in the ruffed grouse population.
17. Early harvesting of hay crops.
18. Brown-headed cowbird nest parasitism
19. Mowing in June, July and August.
20. We need to know how the Cerulean Warbler is affected by silviculture and other land management, and how these effect demography.
21. Brood parasitism by Brown-headed Cowbird likely has moderate to strong negative impact on population's success.
22. Brood parasitism by Brown-headed Cowbirds in some Cerulean Warbler populations due to fragmentation of forested habitat
23. Tolerance by building managers of nesting sites.

## Appendix E-74: Birds

24. unknown

25. unknown

<b>Total Respondents</b>	<b>25</b>
(skipped this question)	31

### 9. Please briefly describe the top two threats to ALL birds in ALL habitats in Indiana identified above.

1. The primary threat is the loss of these farm programs. An additional threat would be the loss or shortening of the primary nesting season dates established by the USDA. Mowing or haying during the quail nesting season would be allowed on enrolled acreage if these dates were eliminated or shortened.

2. Loss of the habitat in general would be the greatest threat and natural succession of the remaining habitat would be a secondary threat.

3. Loss or degradation of nesting habitat. Loss or degradation of brood-rearing and foraging areas.

4. 1) Lack of periodic vegetative disturbance (Man-made or natural every 5-10 yrs) that adequately opens the forest canopy well distributed throughout predominately forested environments, especially in the large contiguous forested areas of the state in public ownership which form the core or heart of the residual and current grouse range. 2) Potential habitat on private lands is fragmented in distribution due to small ownership and different ownership objectives (lack of active timber mgmt) that does not provide a consistent continuum of acceptable habitat for successful population dispersal. A recent population model analysis based on current habitat conditions and actual grouse population data for Indiana projects that ruffed grouse will potentially disappear as a viable species in much of their current range by 2007. Ruffed grouse population indices are now at the lowest levels recorded in over 40+ yrs.

5. 1) Genetic pollution  
2) Population explosions and accompanying diseases, nuisance concerns, etc.

6. The top two threats to Canada Geese in Developed Land habitats are: Overpopulation and aggressive behavior during courtship/nesting

7. Loss of Quality nesting and brood habitat. Habitat fragmentation.

8. Habitat loss (loss of large nesting trees)

9. Habitat Loss-Urbanization  
Habitat Loss-Breeding, feeding, foraging

10. 1. Loss of brood rearing habitat.  
2. Loss of high quality nesting habitat.

11. This species is more of an obligate to open areas with scattered dead trees than most Indiana species. Outright loss of this habitat configuration is probably the leading threat to the Red-headed Woodpecker. West Nile Virus is probably currently the second greatest threat.

## Appendix E-74: Birds

12. Habitat loss to development and farming (esp. brooding areas, foraging areas, and escape cover)  
Predators (esp. domesticated animals)
13. Habitat loss  
Degradation of movement/migration routes
14. Water Quality  
Human intervention during nesting process.
15. Over population  
Migratory habitat loss
16. Fire suppression. See above.
17. Habitat loss  
Degradation of movement/migration routes
18. overpopulation  
urbanization
19. Loss of shallow marshes due to drainage for development & farming.  
Loss of winter feed due to fall tillage.
20. Unknown
21. urbanization  
overpopulation
22. Habitat loss through annual cycle  
predators
23. Habitat loss due to human/economic growth factors.  
Lack of management to maintain/create these types of habitats.
24. 1. General habitat loss due to clean farming practices and residential development.  
2. Isolation of habitat or islands of habitat with no connecting travel lanes.
25. - continuing loss and/or degradation of emergent wetlands  
- possible disease outbreaks due to large concentrations of birds often in small areas
26. Loss of habitat due to development and poor agricultural practices.  
Degradation of habitat by invasive plant species.
27. 1. Loss of early successional forest age class.  
2. Preservationist (anti-management folks) and their influence on the politics of timber management and legal challenges to sound timber/wildlife management activities.
28. The lack of public knowledge/information regarding the importance of disturbances and early successional habitat in forested areas is the main contributing factor to the near extirpation of the ruffed grouse. The lack of early successional habitats in forested areas is causing major declines in the ruffed grouse population.

## Appendix E-74: Birds

29. The near daily loss of emergent type wetlands and the adjacent foraging areas of native vegetation is the greatest threats to some wildlife species. Despite the "no net loss" policies of state and federal government, we are still losing wetlands daily.
30. Loss of large blocks of mature forest and increases in forest fragmentation that causes and increase in cowbird nest parasitism and increases edge nest predators (e.g., bluejays). This causes a decrease in recruitment.
31. Lack of large areas in native grass and mowing during the breeding season.
32.
  1. Habitat loss due to wetland drainage.
  2. Habitat degradation due to sedimentation, pollution, and invasion by exotic species.
33.
  1. We still have very little information on Cerulean Warblers. We need to assess basic demography in Indiana and across the breeding range, learn how this species responds to land management, develop an understanding of post-fledging habitat use, and determine the effect of the brown-headed cowbird on this species.
  2. Because there are an area-sensitive species, a loss of large tracts of mature forest on both the breeding and wintering grounds is a critical threat.
34. Habitat loss and fragmentation create small, isolated patches where nest predation and brood parasitism tend to increase. The timing and frequency of haying, as well as the cover type (alfalfa) can negatively affect nest success and limit productivity.
35. House Sparrow preemption of nests.  
Vandalism potential at nesting colonies.
36. Brown-headed Cowbird brood parasitism is likely a significant negative impact.  
Nest predation may also be important.  
Habitat fragmentation may exacerbate both of these.
37. Eastern Towhee are considered a habitat generalist that uses early successional habitats within deciduous forests. With prevailing land management that does not generate early succession habitat (such as maturation of forest on former farm lands), habitat is reduced. A second top threat is probably loss of nest and nesting females to cats, chipmunks, snakes and other ground predators.
38. Loss of contiguous blocks of mature forest  
Low reproductive output - possibly 'sink' populations due to poor habitat quality
39. Availability of undisturbed nesting sites.  
Collisions with buildings, powerlines, other structures.
40. Human disturbance.  
Modification/degradation of habitats.
41. quality of habitat. Low population size/edge of range.
42. Adequate habitat (primarily American sycamores along riparian areas) in breeding areas.
43. availability and quality of suitable nesting/feeding habitat.





## Appendix E-74: Birds

10. - legal jurisdiction issues presently unclear, draft of state isolated wetland law out for comment.
11. Loss of wetlands due to off site changes in the water table, i.e. multiple well sites in suburban/rural areas.
- Eastern hardwood forests, including those in Indiana, are relatively young and even-aged with less wildlife species diversity, vertical structure, natural canopy gaps, large woody debris, and other structural features than pre-European settlement forests. The influence of Native Americans, and particularly the subsequent wave of European expansion across the Midwest, left permanent changes across the landscape of Indiana, changes reflected in the extirpated flora and fauna of the region. Furthermore, the suppression of natural disturbances such as fire has resulted in a shift in wildlife species composition, structural complexity, and landscape pattern across much of the region. Fire-intolerant species such as sugar maple and American beech have become established at the expense of fire-adapted oak and hickory species, especially after fire control measures were. Before European settlement, fires, beavers, floods, and windstorms created extensive openings. The restoration of natural landscapes requires the re-introduction or simulation of these disturbances.
12. Potential for pollution reducing productivity of aquatic habitats over which Cliff Swallows feed.
- Not clear what is causing decline of the Cerulean Warbler; regionally brood parasitism and forest fragmentation may be negative impacts. It may be possible some species geographic range is shifting (climate?). Exact habitat associations of some species are not known -- not clear what is optimal habitat in Indiana in my view.
14. Not clear what is causing decline of the Cerulean Warbler; regionally brood parasitism and forest fragmentation may be negative impacts. It may be possible some species geographic range is shifting (climate?). Exact habitat associations of some species are not known -- not clear what is optimal habitat in Indiana in my view.
15. unknown
16. unknown

<b>Total Respondents</b>	<b>16</b>
(skipped this question)	40

### 12. Please briefly describe the top two HABITAT threats to ALL birds in ALL habitats in Indiana identified above.

1. Succession of the grassland habitat is a major threat if mid-contract activities are not performed. Another threat is mowing or haying during the primary nesting season. These activities are not currently allowed until after July 15 but mowing during late July and early August still destroys some nests and young.
2. Successional change and fragmentation are the 2 greatest threats on the previous list.
3. Residential development around lake shorelines. Degradation of aquatic plants and wetlands around lake shorelines.
- This is somewhat repetitive of the previous questions but here we go again:
- 1) lack of active timber management that adequately opens or removes the overhead forest canopy and allows for natural regeneration back into a forest cover. 2) the lack of public understanding and acceptance of timber management, especially even-age timber management.
4. 2) the lack of public understanding and acceptance that vegetative disturbance whether natural or man-made

## Appendix E-74: Birds

- 1) Urban sprawl creating attractive areas for Mallards to become "more domesticated" (i.e. retention/detention ponds).
5. 2) Feeding of birds by people.  
3) Destruction of beneficial areas for Mallards (and other puddle ducks), i.e. wetlands, streams, small ponds, etc. These areas are converted to retention/detention ponds.
6. Commercial and residential development with lakes and ponds offer all the resources Canada Geese need to survive. With an overpopulation of Canada Geese in Urban areas; it's hard to say there is a habitat threat.
7. Habitat Fragmentation & Urban sprawl. Clean Farming.
8. Stream channelization removing nesting sites and destroying brood habitat. Soil runoff caused by poor agricultural practices and urban development.
9. Commercial and or residential development  
Habitat fragmentation
  1. Channelization removes and/or changes the vegetative and invertebrate communities.
  2. The loss of bottomland hardwoods continues to be a threat. These areas provide a high quality food source and nesting sites for woodies.
10. Channelization also alters the natural water flow which results in a much degraded habitat.
11. Conversion of savanna to agricultural and development uses.  
Loss of open structure in existing savannas due to loss of disturbances such as fire.
12. Any changes in farming practices that causes the loss of escape cover (including treeline, fence line, and wood's edge).  
Habitat loss to development.
13. Agricultural Practices  
Urban Development
14. 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.
15. Regulations  
urban development
16. Fire suppression is resulting in successional change to more shade-tolerant forests. Forestry practices are not emphasizing the need for fire in savanna areas enough.
17. Drainage Practices  
Stream Channelization
18. Agriculture  
urban sprawl
19. Commercial or residential development by filling or draining wetlands.  
Stream and lake "renovation" have degraded habitat back to where it was when the original habitat destruction occurred.

## Appendix E-74: Birds

the original habitat destruction occurred.

20. Development encroachment on some colonies  
Destruction of nesting trees
21. urban sprawl  
retention ponds
22. agricultural practices  
drainage practices
23. Ag/Forestry practices - Lack of active management to create/maintain these types of habitats.  
Successional change - Due to lack of mgt./disturbance of vegetation.
24. 1. Destruction of habitat by commercial and residential development.  
2. Habitat fragmentation that limits seasonal movements and population expansion.
25. - presently little or no protection of isolated wetlands  
- habitat degradation due to increased sediment/nutrient loads
26. Loss of habitat due to development and poor agricultural practices.  
Degradation of plant community by exotic plants invading wetland habitats.
27. loss of early successional forest habitats  
fragmentation resulting in islands of habitat too far removed from others for immigration or emmigration
28. The answers listed above indicate the absence of early successional habitat in forests, i.e. absence of clear-cutting, and other disturbance types in forested habitats is the major cause of ruffed grouse habitat declines. Forestry practices that do NOT lead to early successional habitat development are the problem. Grouse and many songbirds, need early forest successional stages and due to the current policies of the USFS and some state properties, the grouse is being "not-managed" to extirpation.
29. The loss of wetlands by draining to accomadate commercial and residential developement still occurs at an alarming rate. We are also losing our quality wetlands as native vegetation is being replaced by the uncontrolled spread of nonnative/invasive plant species.
30. Loss of high quality forest habitat (over mature uneven-aged forest) and forest fragmentation (lots of cowbirds and bluejays). This results in lower quality habitat available to ceruleans.
31. Loss of large areas of warm season grasses and early mowing/haying.
32. 1. Intensive agriculture and land use development have put a lot of pressure on remaining wetlands.  
2. Several invasive plant species have altered and degraded many wetlands throughout Indiana.
23. 1. We still do not know the specific habitat preferences for some species. The types of habitats where some species were especially abundant in the past (i.e. old-growth bottomland forest) no longer exist. This area needs more research.  
2. The cerulean's dependence on large tracts of mature deciduous forests, make the species especially sensitive to continuing forest fragmentation and isolation. The mechanism by which fragmentation affects populations in Indiana is unknown, but the response of this species to habitat

## Appendix E-74: Birds

fragmentation affects populations in Indiana is unknown, but the response of this species to habitat fragmentation may be related to other factors associated with fragment size. Brood parasitism by the Brown-headed Cowbird (*Molothrus ater*), and high rates of nest predation by generalist predators such as Blue Jay (*Cyanocitta cristata*) and raccoon (*Procyon lotor*) are likely factors. Fragmentation of forest in Indiana especially in predominately agricultural landscapes has resulted in small patches of forest surrounded by open habitat that cowbirds require for feeding and nest searching.

- Conversion of hayfields to row-crop or urban cover types
34. Frequent haying, mowing, or over-grazing (though some disturbance is necessary every 1-5 years to maintain the proper vegetation structure).
  35. Changes in design of bridges and causeways to make them less suitable for nest placement.
  36. Fragmentation of canopied forest habitats  
Brown-headed Cowbird brood parasitism.
  37. Primary sources of loss of young forest habitats in Indiana are urban development / sprawl into remaining forest areas, and maturation of existing forest out of young forest age classes.; Primary sources of loss of young forest habitats in Indiana are urban development / sprawl into remaining forest areas, and maturation of existing forest out of young forest age classes.
  38. Habitat fragmentation  
Agricultural/forestry practices
  39. Reduction in quantity and quality of prey populations.  
Design of buildings that do not provide nesting ledges.
  40. Factors that affect food availability  
Modification of stream shoreline habitats.
  41. Specific dune habitat configuration. Threats by gulls and human disturbance.
  42. Loss of floodplain sycamores and upland pine forests.
  43. Loss of cavity trees and harvest of older forests.
  44. Loss and habitat degradation of forested habitat along riparian areas and in uplands.
  45. Mowing during breeding season.  
Conversion of grasslands to row-crops or housing developments.
  46. loss of early successional woody habitat.  
habitat loss to development
  47. habitat fragmentation  
agriculture/forestry practices
  48. Conversion of habitat to other than pine forests  
Lack of active habitat management
  49. loss and fragmentation of forested wetlands.

Appendix E-74: Birds

(skipped this question)

6

**13.** What current monitoring efforts by state agencies are you aware of for ALL birds in ALL 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 state agencies	26% (13)	74% (37)	<b>50</b>
Statewide once a year monitoring conducted by state agencies	36% (16)	64% (28)	<b>44</b>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	30% (13)	70% (31)	<b>44</b>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	43% (19)	57% (25)	<b>44</b>
Regional or local year-round monitoring conducted by state agencies	16% (7)	84% (36)	<b>43</b>
Regional or local once a year monitoring conducted by state agencies	36% (16)	64% (28)	<b>44</b>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	16% (7)	84% (37)	<b>44</b>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	23% (10)	77% (33)	<b>43</b>
		<b>Total Respondents</b>	<b>356</b>

**14.** What current monitoring efforts by other organizations are you aware of for ALL birds in ALL 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	9% (4)	91% (43)	<b>47</b>
Statewide once a year monitoring conducted by other organizations	58% (29)	42% (21)	<b>50</b>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	13% (6)	87% (41)	<b>47</b>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	13% (6)	87% (40)	<b>46</b>

## Appendix E-74: Birds

Regional or local year-round monitoring conducted by other organizations	13% (6)	87% (41)	<b>47</b>
Regional or local once a year monitoring conducted by other organizations	28% (13)	72% (34)	<b>47</b>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	19% (9)	81% (38)	<b>47</b>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	23% (11)	77% (36)	<b>47</b>
		<b>Total Respondents</b>	<b>378</b>

15. How crucial are these monitoring efforts by state agencies for the conservation of ALL birds in ALL habitats in Indiana?						Response Total
	Very crucial	Somewhat crucial	Slightly crucial	Not crucial	Unknown	
Statewide year-round monitoring conducted by state agencies	18% (9)	10% (5)	8% (4)	40% (20)	24% (12)	<b>50</b>
Statewide once a year monitoring conducted by state agencies	30% (13)	9% (4)	14% (6)	25% (11)	23% (10)	<b>44</b>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by state agencies	0% (0)	16% (7)	21% (9)	33% (14)	30% (13)	<b>43</b>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by state agencies	5% (2)	19% (8)	19% (8)	35% (15)	23% (10)	<b>43</b>
Regional or local year-round monitoring conducted by state agencies	5% (2)	11% (5)	7% (3)	45% (20)	32% (14)	<b>44</b>
Regional or local once a year monitoring conducted by state agencies	11% (5)	16% (7)	20% (9)	30% (13)	23% (10)	<b>44</b>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by state agencies	5% (2)	7% (3)	17% (7)	38% (16)	33% (14)	<b>42</b>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by state agencies	2% (1)	5% (2)	20% (9)	39% (17)	34% (15)	<b>44</b>
				<b>Total Respondents</b>		<b>354</b>

## Appendix E-74: Birds

### 16. How crucial are these monitoring efforts by other organizations for the conservation of ALL birds in ALL 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	6% (3)	10% (5)	2% (1)	46% (22)	35% (17)	<b>48</b>
Statewide once a year monitoring conducted by other organizations	14% (7)	31% (15)	16% (8)	14% (7)	24% (12)	<b>49</b>
Periodic statewide (less than once a year but still regularly scheduled) monitoring conducted by other organizations	0% (0)	9% (4)	11% (5)	43% (20)	38% (18)	<b>47</b>
Occasional statewide (less than once a year and not regularly scheduled) monitoring conducted by other organizations	0% (0)	9% (4)	9% (4)	45% (21)	38% (18)	<b>47</b>
Regional or local year-round monitoring conducted by other organizations	2% (1)	11% (5)	9% (4)	40% (19)	38% (18)	<b>47</b>
Regional or local once a year monitoring conducted by other organizations	9% (4)	11% (5)	13% (6)	36% (17)	32% (15)	<b>47</b>
Periodic regional or local (less than once a year but still regularly scheduled) monitoring conducted by other organizations	4% (2)	9% (4)	15% (7)	36% (17)	36% (17)	<b>47</b>
Occasional regional or local (less than once a year and not regularly scheduled) monitoring conducted by other organizations	4% (2)	9% (4)	15% (7)	40% (19)	32% (15)	<b>47</b>
						<b>Total Respondents 379</b>

### 17. Regional or local state agency monitoring for ALL birds in ALL habitats in Indiana.

1. The Indiana Division of Fish and Wildlife conducts a biennial mailing survey to small game hunters to estimate harvest. Additionally, the division conducts annual spring whistle counts to provide an index to the spring breeding population. However, neither of these methods focus directly on farm bill habitats.

2. The Indiana Division of Fish and Wildlife (INDFW) conducts annual spring whistle counts on 77 established routes across the state. The INDFW also conducts biennial surveys of small game license holders to assess bobwhite harvest. However, neither of these surveys are focused directly towards shrub/scrub habitat.

3. Fish and Wildlife properties in northern Indiana

8 Roadside spring drumming survey (drumming indices) conducted in primarily in southern central Indiana

## Appendix E-74: Birds

Indiana.

Activity Center counts on the 900 acre Maumee Grouse Study Area in Jackson/Brown counties.

5. Regionally (throughout the state)-waterfowl breeding status surveys, population surveys  
Regionally (throughout the state)-Statewide trapping, banding, and recapture efforts
6. The division of Fish & Wildlife conducts Canada Goose banding yearly. This consists of neck collars and leg bands. Water fowl surveys are also conducted. Hunter harvest are reported.
7. Interlake Property, Division of Outdoor Recreation ownership.
8. State monitoring- banding and nest box surveys.
9. Tri-County Fish and Wildlife Area, Division of Fish and Wildlife.

Several Fish & Wildlife Areas across the state perform annual wood duck banding. These properties include Hovey Lake FWA, Glendale FWA, Minnehaha FWA, Willow Slough FWA, Jasper=Pulaski FWA, LaSalle FWA, Pigeon River FWA, Tri-County FWA, and there may be others.

10. Many of these properties also conduct nest box monitoring activities on an annual basis. Additionally, Indiana participates in the Harvest Information Program which can provide information about migration, population index and/or trends, as well as information about the amount of hunting pressure.
11. I am not aware of any concerted monitoring for the Red-headed Woodpecker by state agencies.
12. Routes ran throughout the state by Division of Fish and Wildlife biologists.
13. Fish and Wildlife areas and Reservoirs as part of the weekly Waterfowl survey from Aug to Jan.

Hovey Lake  
Tri county  
Jasper Pulaski  
14. Pigeon River  
Winamac  
Willow Slough  
LaSalle

15. At present only when a permit for work in a wetland is applied for.  
Smaller more numerous wetlands have little oversight.
16. State wide for existing and new colonies every 5 years  
  
Quail Whistling counts - in selected counties
17. Hunter/Harvest surveys - by geographic regions  
Bird Breeding survey - survey blocks
18. Winamac FWA conducts annual bobwhite whistle call survey on that property.  
  
- weekly waterfowl counts at selected sites
19. - neck collar observations statewide as encountered  
  
- mid winter waterfowl survey of selected sites

## Appendix E-74: Birds

20. Selected State Fish and Wildlife Areas and Reservoir properties operated by the Department of Natural Resources conduct counts during the fall migration period.
21. unknown
22. In southern Indiana in the unglaciated forested region.
23. All State Fish and Wildlife properties
24. Local breeding bird surveys done on State properties and private land. State cooperates in national breeding bird survey. State biologists also survey in local habitats (e.g., Patoka River)
25. Surveys on state properties, and thru efforts such as the Breeding Bird Atlas projects
26. State Fish & Wildlife properties conduct waterfowl inventories on their respective areas, generally from Aug 15 thru January. Additionally, other DNR reservoirs conduct counts over the same period.
27. IDNR's Nongame and Endangered Wildlife Program
28. None exist.  
  
Indiana Breeding Bird Atlas project through DNR determines statewide distribution periodically. Does not produce quantitative measure of population size. These are not tied to this habitat type, but frequency of the other Cerulean habitats in the BBS coverage is low so most data refer to this habitat.
30. State-wide breeding bird atlas efforts are coordinated by the state DNR. This atlas effort was done in the 1980s, and is being redone now. Also the state DNR nongame bird program coordinates publication of a summer bird count that generates some data on towhee numbers (along with all other summer birds. No analysis is done, however.
31. DNR monitors most nest sites in the state and obtains information from others.
32. Breeding Bird Atlas statewide every 20 years
33. Awareness of reports by bird watchers
34. periodic statewide Breeding Bird Atlas.
35. Breeding Bird Atlas - statewide
36. statewide Breeding Bird Atlas; periodic local studies in southern Indiana
37. none
38. none
39. None known
40. None known
41. statewide Breeding Bird Atlas

## Appendix E-74: Birds

<b>Total Respondents</b>	<b>41</b>
(skipped this question)	15

### 18. Regional or local monitoring by other organizations for ALL birds in ALL habitats in Indiana.

1. The breeding bird survey is conducted by the National Audubon Society and observers counts the number of bobwhites seen along with other bird species. Again this survey is not directly focuses on farm bill habitats.
2. F&W properties in northern Indiana, natural lakes, nature preserves.
3. Incidental observations on Christmas Bird Counts (extremely minor)  
Species occurrence noted during the Statewide Breeding Bird Atlas Project (only one ever done).
4. Breeding surveys, population surveys
5. I believe Ducks Unlimited conducts waterfowl surveys
6. Unknown
7. Muskatatuck NWR also perform wood duck banding operations.
8. The national Breeding Bird Survey includes routes in Indiana that incorporate sites occupied by the Red-headed Woodpecker. This annual survey will therefore potentially count Red-headed Woodpeckers at a few sites yearly.
9. Quail Unlimited chapters
10. Lake associations businessses 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.
11. Muscatatuck NWR
12. Some species are not monitored. Habitat changes requiring permits are checked by, IDNR, IDEM, ACOE (in some cases).
13. unknown
14. Not aware of any.
15. Unknown
16. - christmas bird count
17. Not aware of any efforts.

## Appendix E-74: Birds

18. unknown
19. On state properties or USFS land where populations have been known to exist.
20. The major state watersheds. Particularly the Kankakee and St Joseph river watersheds in the north, the Tippecanoe and Wabash river in central and the Wabash Ohio river watersheds in the south.
21. Audubon supports May Day count throughout state which detects cerulean warblers. TNC is working on developing a research project in the state for ceruleans.
22. BBS routes and work done on Strip mine lands in SW IN, and Big Oaks NWR  
  
Different Audubon members and clubs may be involved in Christmas Bird Counts and with an intensive Bird-a-Thon in the spring.
23. Various University personel may also be involved in surveying wetlands periodically throughout the year.
  1. BBS routes provide some information for this species. However, most routes are located along roads and do not adequately monitor interior forest species such as the cerulean.
  2. The Hoosier National Forest conducts breeding bird point counts each year along points located in interior forest blocks or varying fragment size. Although the cerulean is not the focus of this study, data is collected on its occurrence.
  24. 3. Cornell Lab of Ornithology collects data on the cerulean warbler for their program "Birds in Forested Landscapes." I am unsure whether data has been collected and submitted in Indiana.
  4. Ball State has been conducting studies on the Hoosier and Big Oaks for this species. Currently, students from this university are working in conjunction with the Hoosier.
25. Breeding Bird Survey routes are scattered throughout the state depending on volunteer participation.  
Local intensive surveys, nest monitoring, or mark-recapture studies.
26. USGS roadside Breeding Bird Survey. These are not tied to this habitat type, but frequency of the other Cerulean habitats in the BBS coverage is low so most data refer to this habitat.  
  
Other bird monitoring efforts that collect data nationwide generate information on eastern towhees.
27. These include the Breeding Bird Surveys, Christmas Bird Counts (towhees are rare in winter, though), Cornell nest record program. The Hoosier National Forest conducts breeding bird monitoring on the forest since 1991.
28. Building managers and volunteers report nesting activity at many nests.
29. federal Breeding Bird Survey, state May Day counts, Summer Bird Counts
30. Indiana Dunes National Lakeshore biologists stay abreast of sightings along Lake Michigan
31. federal Breeding Bird Survey statewide; statewide May Day Bird Counts, Summer Bird Counts.
32. federal Breeding Bird Surveys - statewide. Regional May Day Bird Counts, Summer Bird Counts, Christmas Bird Counts

## Appendix E-74: Birds

33. statewide Breeding Bird Survey. Periodic area surveys in the Hoosier National Forest.
34. statewide Breeding Bird Survey, May Day Bird Counts, Summer Bird Counts
35. federal Breeding Bird Survey statewide; May Day Bird Count, Summer Bird Count
36. None known
37. None known
38. statewide Breeding Bird Surveys, May Day Counts, Summer Bird Counts. Directed research (Hoosier National Forest, Big Oaks NWR).

<b>Total Respondents</b>	<b>38</b>
(skipped this question)	18

### 19. Please list organizations that are monitoring ALL birds in ALL habitats in Indiana.

1. I am only aware of the breeding bird survey conducted by the National Audubon Society.
2. The National Audubon Society conducts the annual breeding bird survey.
3. Audubon Society, Ducks Unlimited, Indiana Division of Fish and Wildlife
4. Audubon Christmas Bird Counts  
  
IDNR-Division of Fish and Wildlife  
IDNR-Division of Parks and Reservoirs
5. U.S. FWS  
Ducks Unlimited  
Waterfowl USA  
  
US Fish & Wildlife Service
6. Indiana Division of Fish & Wildlife  
Ducks Unlimited
7. Unknown
8. IDNR  
USFWS
9. The U.S. Geological Survey in Porter, Indiana has conducted studies of oak savanna birds, including the Red-headed Woodpecker.
10. Quail Unlimited
11. BBS
12. Div of Fish and Wildlife  
Div of Reservoirs

## Appendix E-74: Birds

Div of Reservoirs.

13. USFWS
14. To some extent: Waterfowl USA, Ducks Unlimited, The Nature Conservancy, The Audubon Society.
15. Indiana Department of Natural Resources, Division of Fish & Wildlife
16. IDNR/Division of Fish & Wildlife
17. Unknown
18. - Audubon  
- US Fish and Wildlife Service
19. Not aware of any organizations.
20. unknown
21. IDNR, Div. Fish and Wildlife
22. I believe that to some level, the Indiana Audubon Society, Ducks Unlimited and Waterfowl USA do some monitoring of the Canada goose.
23. USFWS, INDNR, TNC, Audubon, American Bird Conservancy, MAPS program (Point Reyes Bird Observatory), Local bird clubs, NRCS (thru WRP program monitoring)
24. INDNR, USFWS, TNC, USFS, Indiana State University
25. Various Audubon Chapters?  
University Staff?
  1. Hoosier National Forest
26.
  2. Ball State University
  3. USFWS - Big Oaks
27. Indiana Academy of Science, Indiana Audubon Society, an local chapters of NAS worked with IDNR to complete Breeding Bird Atlas (1985-1990)  
USGS Bird Banding Lab coordinates BBS  
Universities such as Purdue complete local-level research projects
28. Federal Breeding Bird Survey serves this function. But does not focus on suitable habitat; yet, occurrence on these surveys would be tied to nearby presence of this breeding habitat.
29. Indiana Department of Natural Resources (breeding bird atlas project)  
USGS roadside bird surveys
30. USGS coordinates the Breeding Bird Survey, National Audubon Society coordinates the Christmas Bird Counts, Cornell's Laboratory of Ornithology collects the nest records, federal agencies do monitoring on lands they manage within the state (e.g., Hoosier NF).

## Appendix E-74: Birds

31. Ball State University, Department of Biology has been monitoring Cerulean Warbler populations at Big Oaks National Wildlife Refuge, Hoosier National Forest, and Yellowwood and Morgan-Monroe state forests during the last 5 years
32. Private companies (NIPSCO, Ispat Inland, building managers).
33. USGS (Breeding Bird Survey) and volunteers with Indiana Audubon Society
34. Bird watchers. USGS biologists.
35. bird-watchers, USGS,volunteers
36. USGS, birding groups, National Audubon Society
37. USFS, universities
38. USGS, birding organizations
39. USGS, birding groups
40. DNR Division of Fish and Wildlife through the Breeding Bird Atlas  
U.S. Geological Survey's Breeding Bird Survey
41. DNR Division of Fish and Wildlife  
USGS Breeding Bird Survey
42. USFWS, USGS, USFS, Indiana Audubon Society

**Total Respondents 42**

(skipped this question) 14

### 20. What are the current monitoring techniques for ALL birds in ALL 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	0% (0)	5% (2)	67% (29)	5% (2)	12% (5)	12% (5)	<b>43</b>
Modeling	13% (6)	42% (19)	16% (7)	2% (1)	0% (0)	27% (12)	<b>45</b>
Coverboard routes	0% (0)	0% (0)	9% (2)	27% (6)	5% (1)	59% (13)	<b>22</b>
Spot mapping	15% (6)	22% (9)	27% (11)	2% (1)	5% (2)	29% (12)	<b>41</b>

## Appendix E-74: Birds

Driving a survey route	73% (36)	10% (5)	8% (4)	2% (1)	0% (0)	6% (3)	<b>49</b>
Reporting from harvest, depredation, or unintentional take (road kill, bycatch)	58% (22)	18% (7)	5% (2)	8% (3)	0% (0)	11% (4)	<b>38</b>
Mark and recapture	24% (11)	31% (14)	29% (13)	0% (0)	7% (3)	9% (4)	<b>45</b>
Professional survey/census	41% (18)	39% (17)	7% (3)	0% (0)	2% (1)	11% (5)	<b>44</b>
Volunteer survey/census	49% (20)	20% (8)	17% (7)	0% (0)	0% (0)	15% (6)	<b>41</b>
Trapping (by any technique)	16% (7)	30% (13)	34% (15)	0% (0)	7% (3)	14% (6)	<b>44</b>
Representative sites	18% (6)	32% (11)	18% (6)	0% (0)	0% (0)	32% (11)	<b>34</b>
Probabilistic sites	6% (2)	35% (11)	13% (4)	0% (0)	0% (0)	45% (14)	<b>31</b>
Other (please specify below)	8% (1)	17% (2)	0% (0)	0% (0)	0% (0)	75% (9)	<b>12</b>
<b>Total Respondents</b>							<b>489</b>

### 21. Other monitoring techniques for ALL birds in ALL habitats in Indiana.

1. I'm not aware of any bobwhite monitoring that focuses directly on populations in farm bill habitats.
2. N/A
3. nest box survey
4. Unknown
5. Distance sampling
6. aerial surveys
7. aerial surveys
8. Nest box surveys
9. aerial surveys
10. X

## Appendix E-74: Birds

11. unknown
12. aerial breeding survey
13. aerial surveys
14. Unknown
15. Nest monitoring, territory mapping, call playback, and color banding (same as mark recapture?)
16. Nest monitoring
17. Surveys for colonies and periodic censuses of nests/ populations.
18. Point count surveys.
19. Nest search and monitoring
20. None known
21. unknown
22. nest searches and monitoring.

<b>Total Respondents</b>	<b>22</b>
(skipped this question)	34

### 22. What one or two monitoring techniques would you recommend for effective conservation of ALL birds in ALL habitats in Indiana?

1. To monitor bobwhite populations specifically in farm bill habitats I would suggest selecting a random sample of contracts and conducting flushing transects. Another intensive method would be to have hunters complete "report cards" when hunting on farm bill acreage. A less intensive method would be to request that landowners conduct whistle counts on their enrolled lands each spring.
2. I would like to see a radio telemetry study of bobwhites in Indiana because we are lacking most of the baseline data for bobwhites in Indiana. Much of the information we use to manage quail populations comes from studies in other states. I think the whistle counts that are already conducted provide a less intensive (but important) method of tracking the statewide population.
3. Professional surveys or counts on F&W areas during migration periods (tracks annual migration trends and is index to population levels). Harvest surveys on F&W areas (tracks annual numbers taken) "Wildlife Investigational Techniques" by The Wildlife Society.
4. Roadside Drumming indices.
5. 1)Mark and Recapture  
2)Modelling-To determine population dynamics and evaluate genetic integrity of Mallards in developed lands versus "wild" Mallards (i.e Mallards in undeveloped areas).

## Appendix E-74: Birds

6. Neck collars and leg bands - Driving surveys
7. Fall Covey counts.
8. brood surveys
9. Mark/Recapture-Banding (intensive), Ducks, Geese & Swans of North America, Frank C. Bellrose  
Harvest data collection (less intensive) Wildlife Management Vol 2, Reuben Edwin Trippensee
10.
  1. Continued participation in HIP is perhaps the most cost effective method for monitoring the flyway population.
  2. Banding operations help in determining the status of populations on a local or statewide level

Point counts in potential habitats using distance sampling. This technique is relatively simple to implement and provides density information rather than an index. Observers count birds from points randomly located in the studied habitat and measure or estimate distance to observed birds. Calculation of density from the data, however, does require some technical expertise.
11. Buckland, S. T., D. R. Anderson, et al. (2001). Introduction to distance sampling. Oxford, UK, Oxford University Press.
12. Survey Routes
13. Banding  
Brood surveys
14. Mark and recapture. Means to track wildlife 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.
15. population surveys
16. Brood counts  
Increased banding efforts
17. aerial surveys  
banding and neck collaring
18. Nesting & brood counts state wide.
19. Continue current state surveys every 5 years
20. monitoring throughout annual cycle
21. aerial survey  
banding
22. Annual Quail Whistling Counts  
Annual Hunter/Harvest Surveys

## Appendix E-74: Birds

23.
  1. Harvest survey
  2. Whistle call survey

- banding and/or neck collaring. Procedures in place, nationally accepted, good national data base maintained.
24. 

- weekly waterfowl counts at selected sites. Samples most of the major concentration areas. Very good historical data for trend analysis.

Spring drumming routes - used nationally for spring breeding trend data.
25. 

On particular or "study areas", complete spring drumming counts for accurate breeding densities. Assumes a low # of non-drumming males and requires at least three opportunities, on good mornings, to hear a drumming bird in any portion of the study area
26. 

Driving routes, hunter bag surveys
27. 

point counts during breeding season
28. 

Mark (band) and recapture and/or harvest can provide the best means of monitoring. This is done at both the national and state levels. The bird banding lab in Maryland monitors all federal banded birds. The Wildlife Management Techniques Manual published by the Wildlife Society is a commonly used resource.
29. 

A study that experimentally tests how forest management influences demography and presence and absence. This species needs basic life history studied, too.
30. 

Professional and Volunteer survey and census
31.
  1. The use of GIS technology may be an economical and efficient method to monitor and classify wetlands throughout Indiana. Selective sampling within each geographical region may provide baseline data of mallard use and abundance.
  2. A more intensive approach may involve DNR staff, volunteers, and University staff that would conduct a statewide inventory of wetlands during one week in April.
32. 

We would benefit from obtaining basic demography data on this species. Mist-netting is not particularly feasible because the species stays so high in the canopy. Due to the difficulty of locating nests of ceruleans and of capturing adults, especially females, determination of reproductive success is problematic. Assessing survivorship of eggs, nestlings, and fledglings is also difficult. Until such reproductive success and survivorship information is available, the dynamics of populations will continue to be unknown.

Point counts, spot mapping, and territory mapping provide important information about ceruleans. Banding individual birds could supply information on site fidelity and survivorship.

Regular monitoring of migratory stopover and winter habitats will also be an important part of the conservation of the cerulean warbler.
33. 

Establish more Breeding Bird Survey routes <http://www.pwrc.usgs.gov/bbs/>  
Conduct point counts on private lands. If possible estimate nest success too.
34. 

Surveys for colonies and periodic censuses of nests/ populations.
35. 

Roadside bird surveys on selected routes maximizing forest habitats.  
Repeated point count surveys in representative forest sites

## Appendix E-74: Birds

Repeated point count surveys in representative forest sites.

- Primary technique used is point counts of singing birds in breeding season, either by roadside counts (BBS) or set survey points (e.g., Hoosier NF monitoring). Roadside surveys are probably most effective because towhees are edge/early successional species, using habitats found near roads. Long term banding programs (e.g., MAPS) provide demographic information not gained with other monitoring, but are more intensive.
36. Professional Survey/Census - To locate Cerulean Warblers  
Nest search and monitoring - To assess productivity to determine if Indiana has a 'source' or 'sink' population of Cerulean Warblers  
Hutto, R.L., S.M. Pletschett, and T.P. Hendricks. 1986. A fixed-radius point-count method for nonbreeding and breeding season use. Auk 103:593-602.
  37. Nest monitoring of all known nests (or representative sample) with 2-3 visits according to USFWS protocol.
  38. Directed surveys (canoe surveys, migration counts) most intensive.  
General breeding bird surveys less intensive
  39. Because the Piping Plover rarely occurs in Indiana, keep track of all reports by birders and have Indiana Dunes personnel systematically survey appropriate habitat along Lake Michigan.
  40. Roadside surveys, canoe surveys, local, more intensive studies
  41. federal Breeding Bird Surveys annually statewide.
  42. Road/streamside surveys in appropriate habitat.
  43. Roadside surveys; spot-mapping on smaller areas
  44. spot-mapping in appropriate habitats
  45. Sampling potential nesting areas for some bird species to obtain additional information on the species abundance and distribution.
  46. Sampling of mature pine forest habitat to better determine distribution
  47. point counts in large areas; spot mapping, nest monitoring.

**Total Respondents 48**

(skipped this question) 8

**23.** What current HABITAT inventory and assessment efforts or activities by state agencies are you aware of for ALL birds in ALL habitats in Indiana?

	<b>Yes, these efforts occur</b>	<b>No effort that I'm aware of</b>	<b>Response Total</b>
Statewide annual inventory and assessment conducted by state agencies	6% (3)	94% (47)	<b>50</b>

## Appendix E-74: Birds

Statewide once a year inventory and assessment conducted by state agencies	0% (0)	100% (50)	<b>50</b>
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	8% (4)	92% (46)	<b>50</b>
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	24% (12)	76% (38)	<b>50</b>
Regional or local year-round inventory and assessment conducted by state agencies	6% (3)	94% (47)	<b>50</b>
Regional or local once a year inventory and assessment conducted by state agencies	2% (1)	98% (49)	<b>50</b>
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	2% (1)	98% (49)	<b>50</b>
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	14% (7)	86% (43)	<b>50</b>
		<b>Total Respondents</b>	<b>400</b>

### 24. What current HABITAT inventory and assessment efforts or activities by other organizations are you aware of for ALL birds in ALL habitats in Indiana?

	<b>Yes, these efforts occur</b>	<b>No effort that I'm aware of</b>	<b>Response Total</b>
Statewide year-round inventory and assessment conducted by other organizations	8% (4)	92% (46)	<b>50</b>
Statewide once a year inventory and assessment conducted by other organizations	6% (3)	94% (47)	<b>50</b>
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	20% (10)	80% (40)	<b>50</b>
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	14% (7)	86% (43)	<b>50</b>
Regional or local year-round inventory and assessment conducted by other organizations	6% (3)	94% (47)	<b>50</b>
Regional or local once a year inventory and assessment conducted by other organizations	6% (3)	94% (46)	<b>49</b>
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	4% (2)	96% (48)	<b>50</b>

## Appendix E-74: Birds

Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	16% (8)	84% (42)	<b>50</b>
		<b>Total Respondents</b>	<b>399</b>

**25.** How crucial are these HABITAT efforts by state agencies for the conservation of ALL birds in ALL 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	20% (10)	4% (2)	8% (4)	39% (19)	29% (14)	<b>49</b>
Statewide once a year inventory and assessment conducted by state agencies	15% (7)	4% (2)	9% (4)	39% (18)	33% (15)	<b>46</b>
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	9% (4)	19% (8)	7% (3)	33% (14)	33% (14)	<b>43</b>
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	0% (0)	12% (5)	10% (4)	48% (20)	31% (13)	<b>42</b>
Regional or local year-round inventory and assessment conducted by state agencies	7% (3)	7% (3)	12% (5)	42% (18)	33% (14)	<b>43</b>
Regional or local once a year inventory and assessment conducted by state agencies	5% (2)	12% (5)	7% (3)	44% (19)	33% (14)	<b>43</b>
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by state agencies	5% (2)	12% (5)	7% (3)	42% (18)	35% (15)	<b>43</b>
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by state agencies	0% (0)	16% (7)	9% (4)	44% (19)	30% (13)	<b>43</b>
				<b>Total Respondents</b>		<b>352</b>

Appendix E-74: Birds

**26.** How crucial are these HABITAT efforts by other organizations for the conservation of ALL birds in ALL 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 year-round inventory and assessment conducted by other organizations	6% (3)	6% (3)	6% (3)	43% (20)	38% (18)	<b>47</b>
Statewide once a year inventory and assessment conducted by other organizations	6% (3)	4% (2)	6% (3)	43% (20)	40% (19)	<b>47</b>
Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	6% (3)	23% (11)	6% (3)	21% (10)	43% (20)	<b>47</b>
Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	2% (1)	9% (4)	6% (3)	43% (20)	40% (19)	<b>47</b>
Regional or local year-round inventory and assessment conducted by other organizations	4% (2)	4% (2)	9% (4)	41% (19)	41% (19)	<b>46</b>
Regional or local once a year inventory and assessment conducted by other organizations	7% (3)	2% (1)	9% (4)	41% (19)	41% (19)	<b>46</b>
Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment conducted by other organizations	2% (1)	11% (5)	4% (2)	40% (19)	43% (20)	<b>47</b>
Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment conducted by other organizations	2% (1)	13% (6)	9% (4)	38% (18)	38% (18)	<b>47</b>
				<b>Total Respondents</b>		<b>374</b>

**27.** Regional or local state agency HABITAT inventory and assessment for ALL birds in ALL habitats in Indiana.

1. I'm not aware of any regularly scheduled assessment of farm bill lands for northern bobwhites.
2. I am not aware of any agency monitoring this habitat type but I would like to see remotely sensed data used to track statewide and regional changes in acreage over the last 20+ years.

## Appendix E-74: Birds

data used to track statewide and regional changes in acreage over the last 30+ years.

3. Natural lakes in northern Indiana
4. The Continuous Statewide Forest Inventory jointly conducted by the US Forest Service and the Indiana Div. of Forestry, IDNR.
5. N/A
6. I'm not aware of any
7. Interlake Property
8. Unknown
9. Nearly all of the river and stream habitats in Indiana fall under state and/or federal jurisdiction, so obtaining and maintaining accurate and current information on these habitats is always occurring on a statewide basis.
10. Indiana DNR/DNP has inventoried habitats across the state over the past three decades. Savannas mainly occur in the northern third of the state.
11. Statewide
12. On state land.
13. unknown
14. Unknown
15. - isolated wetlands law
16. Do not occur to my knowledge.
17. On state and national forest. There is no need to do habitat evaluations at this point. As a specialist species and tied very closely to early successional forest habitats, we know the reason for the decline in grouse populations, and we know nothing is being done to provide habitat for the ruffed grouse and other early forest successional species.
18. I am not aware of any monitoring of emergent wetlands that occur at the state government level.
19. The state examines habitat on state properties periodically and uses GAP and other habitat modeling programs to assess forest habitats.
20. Habitats on State areas are occasionally surveyed for quality and quantity.
21. The Managers of public properties are responsible for maintenance and assessment of wetland habitat on their areas.
22. There are none that I know.
23. Annual and 5-year-census, county-level reports of acreage planted to various hay cover types and acreage harvested.

## Appendix E-74: Birds

24. None known to me.

25. Forest inventory plots in established forest management lands give some information on trends in early succession habitat. But I am unaware of any regular coordinated effort by state or other agencies to monitor young forest age classes. Analysis of remote sensing data can provide some trend information where young forest classes can be mapped.

26. Opportunistic statewide determination of potential nest sites in Indiana with the idea of erecting a nest box.

27. unknown

28. Lake Michigan shoreline/Gibson Lake

29. unknown

30. None

31. unknown

32. none

33. none

34. None known

35. None known

<b>Total Respondents</b>	<b>35</b>
(skipped this question)	21

### **28.** Regional or local HABITAT inventory and assessment by other organizations for ALL birds in ALL habitats in Indiana.

1. The Farm Service Agency keeps track of the location and acreage associated with each contract.

2. I'm not aware of any other agency monitoring this habitat type but it is likely that one of the state universities has remotely sensed data that could be used to monitor changes in acreage over a number of years.

3. none

4. N/A

5. I'm not aware of any

6. Unknown

7. Unknown

## Appendix E-74: Birds

8. Many local zoning boards, planning commissions and drainage boards also keep and maintain their own records in regard to land use patterns within these habitats.
9. In the northern third of the state.
10. Unknown
11. None that I am aware of.
12. unknown
13. Statewide by regions
14. Unknown
15. - Indiana wetland inventory maps  
- county aerial photos for NRCS  
- soils mapping county maps
16. Do not occur to my knowledge.
17. I am assuming that some monitoring of emergent wetlands occur in other organizations as some of them are involved in the restoration and/or purchasing of wetlands.
18. TNC and USFWS and Forest Service uses habitat models to examine forest habitat in Indiana (Hoosier NF and Big Oaks NWR).
19. USFWS, USFWS, TNC, Indiana State University have surveyed quality and quantity of habitats for HESP's.
20. NRCS and other Federal offices dealing with compliance review may be involved in inventory of habitat types as they pertain to the Farm Bill. However, these folks are not making habitat assessments as it relates specifically to mallards.
  1. Hoosier National Forest and Ball State University are collecting data on habitat use by cerulean warblers on the northern portion of the Forest.
  2. Cornell's "Birds in Forested Landscapes" collects some data on habitat use. I am not sure if data has been submitted from Indiana.
21.
  1. Hoosier National Forest and Ball State University are collecting data on habitat use by cerulean warblers on the northern portion of the Forest.
  2. Cornell's "Birds in Forested Landscapes" collects some data on habitat use. I am not sure if data has been submitted from Indiana.
22. None known to me.
23. see above
24. unknown
25. Lake Michigan shoreline
26. statewide aerial imagery of habitats in Indiana
27. Periodical aerial imagery

## Appendix E-74: Birds

28. USDA, USGS? statewide
29. statewide aerial imagery of habitats, land uses
30. statewide aerial imagery
31. None known
32. None known
33. satellite imagery of vegetation, land uses.

<b>Total Respondents</b>	<b>33</b>
(skipped this question)	23

### 29. Please list organizations that are monitoring this HABITAT for ALL birds in ALL habitats in Indiana.

- The Indiana Division of Fish and Wildlife will be initiated some type of bobwhite monitoring program to determine the success of the newest continuous CRP practice (CP33). The Farm Service Agency monitors acreage and location of tracts enrolled in each USDA program. The Natural Resource Conservation Service provides technical support or administers most farm programs and I believe they conduct regular inspections.
1. The Indiana Division of Fish and Wildlife
  2. N/A
  3. I'm not aware of any
  4. Unknown
  5. Unknown
  6. IDNR  
USFWS  
USDA
  7. IDEM  
USACE  
EPA  
local government entities (area plan commissions, zoning boards etc..)
  8. Indiana DNR/DNP, The Nature Conservancy, Chicago Wilderness, U.S. Geological Survey, National Park Service, U.S. Fish and Wildlife Service.
  9. Quail Unlimited
  10. None that I am aware of.
  11. unknown

## Appendix E-74: Birds

12. USDA/Forest Service/NC Research Station
13. Unknown
14. - US Fish and Wildlife Service  
- Natural Resource Conservation Service  
- Indiana Department of Environmental Management
15. Do not occur to my knowledge.
16. Ducks Unlimited and Waterfowl USA
17. INDNR, USFWS, USFS, TNC
18. INDNR, USDA, USFS, TNC, Indiana State University
19. None that I'm aware of.
20. 1. Hoosier National Forest  
2. Ball State University  
3. Cornell Lab of Ornithology
21. USDA National Agricultural Statistics Service for Indiana <http://www.nass.usda.gov/in/>
22. None known to me.
23. see above
24. Ball State University, Department of Biology has been monitoring Cerulean Warbler populations at Big Oaks National Wildlife refuge, Hoosier national Forest, and Yellowwood and Morgan-Monroe state forests during the last 5 years
25. None
26. unknown
27. Unknown.
28. unknown
29. USDA?, USGS?
30. USFS, USDA?
31. USDA?
32. USDA?
33. None known
34. None known

Appendix E-74: Birds

35. USDA?

**Total Respondents**      **35**  
(skipped this question)      21

**30.** What are the current HABITAT inventory and/or assessment techniques for ALL birds in ALL 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	19% (9)	33% (16)	21% (10)	2% (1)	0% (0)	25% (12)	<b>48</b>
Aerial photography and analysis	21% (10)	38% (18)	19% (9)	2% (1)	2% (1)	19% (9)	<b>48</b>
Systematic sampling	4% (2)	26% (12)	33% (15)	0% (0)	0% (0)	37% (17)	<b>46</b>
Property tax estimates	3% (1)	3% (1)	0% (0)	5% (2)	0% (0)	89% (33)	<b>37</b>
State revenue data	0% (0)	0% (0)	0% (0)	5% (2)	0% (0)	95% (36)	<b>38</b>
Regulatory information	5% (2)	16% (6)	3% (1)	5% (2)	0% (0)	70% (26)	<b>37</b>
Participation in landuse programs	9% (4)	23% (10)	16% (7)	2% (1)	0% (0)	50% (22)	<b>44</b>
Modeling	2% (1)	40% (18)	24% (11)	0% (0)	0% (0)	33% (15)	<b>45</b>
Voluntary landowner reporting	2% (1)	22% (9)	17% (7)	0% (0)	0% (0)	59% (24)	<b>41</b>
Other (please specify below)	0% (0)	18% (3)	0% (0)	0% (0)	0% (0)	82% (14)	<b>17</b>
<b>Total Respondents</b>							<b>401</b>

**31.** Other HABITAT inventory and assessment techniques for ALL birds in ALL habitats in Indiana.

- I recently correlated the number of acres enrolled in USDA programs with our annual bobwhite whistle indices on a statewide scale. I am planning on modeling regional bobwhite indices and USDA

## Appendix E-74: Birds

idled acreage.

2. N/A
3. Unknown
4. Remote sensing
5. I am not aware of any inventory or assessment techniques used specifically for Canada Goose Habitat in Indiana.
6. X
7. unknown
8. Unknown
- 9.
10. Visual driving surveys and soil surveys.
11. Samples at known nest sites are compared with random sites at Big Oaks NWR

There have been several Master's projects on habitat selection for the Cerulean Warbler in Indiana.

12. These studies have collected the following information on habitat use: diameter at breast height (DBH) and identification of tree species in a nested plot at the center of a territory, number of saplings (trees <3cm DBH), number and DBH of standing dead trees (snags), Canopy cover, ground cover, canopy height, percent canopy coverage and ground cover, canopy height, and vertical stratification of foliage
13. "Habitat" for some bird species is defined primarily by suitable nesting sites near water. Volunteer participation in building a database of known breeding colonies and volunteer periodic censusing of colony sizes.
14. unknown
15. Unknown

**Total Respondents** **15**

(skipped this question) 41

### 32. What one or two HABITAT inventory and assessment techniques would you recommend for effective conservation of ALL birds in ALL habitats in Indiana?

1. Flush counts or more intensive whistle counts on farm program lands would be a useful method of evaluating their quality when compared to the same indices on non-farmland lands.
2. I would like to see remotely sensed data used to monitor changes in statewide and regional acreage and distribution. It would be interesting and useful to see how trends in shrub/scrub habitat relate to the INDFW bobwhite whistle indices.

## Appendix E-74: Birds

3. GIS mapping(electronic data base of current habitat) Aerial photography and analysis (examine changes in habitat) "Wildlife Investigational Techniques" by The Wildlife Society.
4. Statewide Forest Inventory
5. N/A
6. Aerial Photography and modeling
7. Grassland mapping by major plant species type.
8. gis mapping  
aerial photo. and analysis
9. G.I.S. (intensive) Wildlife Management Techniques Manual, Fourth Edition, Sanford D. Schemnitz  
Aerial (less intensive) Same
10. Developing and maintaining accurate GIS data sets on the habitat is very important.  
  
Systematic aerial photography/remote sensing every 5-10 years.
11. Permanent plot monitoring to assess changes in canopy cover and woody species size and composition.
12. Participation in land use programs.
13. Spring counts- aerial  
  
GIS mapping would be the most cost effective means for creating an inventory of emergent plant spp. that would support Canada Geese in emergent wetlands
14. Systematic water sampling of high use areas would determine nutrient loading and water quality. US Fish and Wildlife Service Draft Environmental Impact Statement, Resident Canada Goose Management, Feb.2002.
15. spring, summer, fall and winter surveys
16. aerial surveys  
reports from state FWAs  
  
Wetlands should be monitored by overhead photo methods with ground truth checks.
17. This should occur on a regular basis with aggressive enforcement against illegal wetlands destruction.
18. none
19. aerial spring surveys
20. spring aerial surveys
21. GIS analysis of habitat types
22. Unknown

## Appendix E-74: Birds

23. - analysis of county aerial photos as these are done on a somewhat regular basis  
- updating and ground truthing Wetland Inventory maps
24. GIS and current aerial photos
25. Aerial photography and analysis and soil surveys are already being done and could provide a cheap way to monitor and assess emergent wetlands. Any of the USDA's soil surveys for the individual counties can be used as a resource.
26. GIS modeling, and intensive study to determine habitat quality (source vs. sink)
27. GIS mapping and participation in landuse programs (CRP)
28. GIS technology appears to be the system of choice. NRCS offices have statewide distribution and a close relationship with landowners so I would recommend utilizing their resources if possible.
  1. I think that a crucial piece of habitat data for the cerulean warbler is the size and distribution of canopy gaps within territories. At this point, researchers have not determined an effective means to quantify this data.
29.
  2. Another important habitat inventory would be looking at landscape characteristics of cerulean occurrence and distribution in relation to forest fragmentation. Monitoring should incorporate the occurrence of the species in relation to landscape characteristics such as proportion of agricultural use, tract size and shape, and amount of edge.
30. Survey of hay harvest dates and frequencies each year
31. "Habitat" for this species is defined primarily by suitable nesting sites near water. Volunteer participation in building a database of known breeding colonies and volunteer periodic censusing of colony sizes.
32. Habitat association studies to determine which habitat types used/ preferred in IN.  
GIS/aerial photo analysis to map these habitat types.
33. As stated before, I am unaware of efforts to monitor young age classes of forest. GIS mapping can certainly generate amounts and trends of habitat if forest type and age are mapped. Aerial photography can be used when young age classes appear distinct from other habitat classes.
34. Systematic sampling/survey techniques - To locate Cerulean Warblers  
Hutto et al. 1986. Auk 103:593-602
35. Only casual assessment needed.
36. aerial imagery to identify and quantify habitat.
37. aerial photography and ground visits to determine habitat suitability.
38. Aerial imagery of riparian and pine habitats coupled with habitat modeling.
39. Aerial imagery and modeling
40. Aerial imagery coupled with modeling.

## Appendix E-74: Birds

41. Aerial imagery couple with modeling.
42. aerial/satellite imagery coupled with modeling
43. unknown
44. Statewide inventory and mapping of mature pine forest communities to determine more accurate potential distribution of pine warbler. References suggested would be Flora of Indiana by Charles Deam 1940 and unpublished data/files from Division of Forestry.
45. satellite imagery coupled with modeling.

<b>Total Respondents</b>	<b>45</b>
(skipped this question)	11

### 33. What is the current body of science for ALL birds in ALL habitats in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		4	8%
Adequate		18	38%
Inadequate		14	29%
Nonexistent		7	15%
Other (please explain below)		5	10%

1. We know quite a bit about habitat use patterns of the Red-headed Woodpecker but much less about the effects of landscape fragmentation.
2. Inadequate - Most research not specific to Indiana
3. Questions 34 and 35 are blank as can find no references specific to Indiana. Information for Indiana is found in IDF&W Research notes
4. Atlas of Breeding Birds in Indiana and the USGS Breeding Bird Survey
5. Breeding Bird Atlas and Breeding Bird Survey data

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

## Appendix E-74: Birds

Title = Bobwhite Quail Investigation;  
Author = Maurice C. Reeves;  
Date = 1954;  
Publisher = Indiana Department of Conservation

Title = Ducks, Geese & Swans of North America;  
Author = Frank C. Bellrose;  
Date = 1976;  
Publisher = Stackpole Books

Title = Population status of ruffed grouse in Indiana;  
Author = Steven E. Backs;  
Date = Annual Progress Reports;  
Publisher = Indiana Div. Fish and Wildlife

Title = Managing Canada Geese in Urban Environments;  
Author = Arthur E. Smith, Scott R. Craven and Paul D. Curtis;  
Date = 1199;  
Publisher = Cornell Cooperative Extension

Title = Ducks, Geese & Swans of North America;  
Author = Frank C. Bellrose;  
Date = 1976;  
Publisher = Stack Pole Books

Title = Ecology and Management of the Wood Duck;  
Author = Bellrose and Holm;  
Date = 1994;  
Publisher = Stackpole Books

Title = Red-headed Woodpecker (*Melanerpes erythrocephalus*). In *The Birds of North America*, No. 518;  
Author = Smith, K. G., J. H. Withgott, and P. G. Rodewald.;  
Date = 2000;  
Publisher = The Birds of North America, Inc., Philadelphia, PA.

Title = 2003 Breeding Population Index of Northern Bobwhite Quail;  
Author = James C. Pitman;  
Date = July 16, 2004;  
Publisher = IDNR F&W

Title = Canada Goose Management;  
Author = Clarence Schoenfield/Ruth L. Hine;  
Date = 1977;  
Publisher = University of Wisconsin, Stevens Point

Title = Spring Breeding Duck Survey;  
Author = Kristen Chodacheck;  
Date = 2003;  
Publisher = IDNR

Title = *The Birds of Indiana*;  
Author = Russel E. Mumford, Charles E. Keller;  
Date = 1984;  
Publisher = Indiana University Press

## Appendix E-74: Birds

Title = Unknown/Quail Investigations;  
Author = Maurice Reeves;  
Date = Unknown/Old;  
Publisher = IDNR/Division of Fish & Wildlife

Title = Ruffed Grouse Restoration in IN;  
Author = Steve Backs;  
Date = 1984;  
Publisher = N. Central Section of the Wildlife Soc.

Title = Cerulean Warbler MS Thesis;  
Author = Kirk Roth;  
Date = 2004;  
Publisher = Ball State University

Title = HESPS in mine land MS Thesis;  
Author = Travis Devault;  
Date = 2000;  
Publisher = Indiana State Univ

Title = Habitat Selection and Territory Size of Cerulean Warblers in Southern Indiana;  
Author = Cynthia M. Basile;  
Date = 6/02;  
Publisher = N/A

Title = Eastern Towhee, Birds of North American account #262;  
Author = Greenlaw, J.S.;  
Date = 1996;  
Publisher = The Birds of North America, Inc.

Title = Habitat selection and reproductive success of Cerulean Warblers in Southern Indiana;  
Author = Kamal Islam and Kirk L.Roth;  
Date = December 2004;  
Publisher = Department of Biology Technical Report No. 4, Ball State University, submitted to U.S. Fish & Wildlife Service, Fort Snelling, MN

Title = Peregrine Falcon nesting and management in Indiana;  
Author = Castrale, J.S., and A. Parker;  
Date = 1999;  
Publisher = Indiana Audubon Quaterly 77:65-74.

Title = Atlas of Breeding Birds in Indiana;  
Author = Castrale, J.S., E. Hopkins, C.E. Keller;  
Date = 1998;  
Publisher = IDNR

Title = Piping Plover Recovery Plan;  
Author = USFWS;  
Date = unknown;  
Publisher = USFWS

Title = Breeding Bird Atlas of Indiana;  
Author = Castrale, J.S., E. Hopkins, C. Keller;  
Date = 1988;  
Publisher = IDNR

## Appendix E-74: Birds

Title = BNA Account - Golden-winged Warbler;  
Author = JL Confer;  
Date = 1992;  
Publisher = American Ornithologists' Union

Title = Cerulean Warbler Status Assessment;  
Author = Paul Hamel;  
Date = 2000;  
Publisher = US Fish & Wildlife Service

<b>Total Respondents</b>	<b>34</b>
(skipped this question)	22

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

Title = On the edge: a guide to managing for bobwhite quail;  
Author = T. Dailey and T. Hutton;  
Date = 2003;  
Publisher = Missouri Department of Conservation

Title = The historic and present distribution of ruffed grouse in Indiana;  
Author = Steven E. Backs;  
Date = 1984;  
Publisher = Ind. Acad. Sci. 93:161-166.

Title = Prevention and Control of Wildlife Damage;  
Date = 1994;  
Publisher = University of Nebraska

Title = Waterfowl & Wetlands an Intergarted review;  
Author = Theodore A. Bookout;  
Date = 1979;  
Publisher = LaCrosse Printing

Title = Ducks, Geese and Swans of North america;  
Author = Bellrose;  
Date = 1976;  
Publisher = Stackpole Books

Title = Population Ecology of the Bobwhite;  
Author = John L Roseberry;  
Date = 1984;  
Publisher = SIU Press

Title = Managing Canada Geese in Urban Environments;  
Author = Smith/Craven/Curtis;  
Date = 1999;  
Publisher = Jack Berryman Institute Publication #16/ Cornell University Cooperative Extension, Ithaca, NY

## Appendix E-74: Birds

Title = Waterfowl Ecology & Management;  
Author = Compiled by: Ratti, Flake, Wentz;  
Date = 1982;  
Publisher = The Wildlife Society

Title = Characteristics of Drumming Habitat of Grouse in IN;  
Author = Backs, Kelly, Major, Miller;  
Date = 1984;  
Publisher = Proceedings of Indiana Academy of Science: 94:227-230

Title = Birds of Indiana;  
Author = Mumford;  
Date = ?;  
Publisher = Indiana University Press?

Title = Cerulean Warbler MS Thesis;  
Author = Cindy Basile;  
Date = 2002;  
Publisher = Ball State University

Title = Forest and Grassland Bird Productivity;  
Author = Robb et. al.;  
Date = 1998;  
Publisher = USFWS internal report

Title = Master's Thesis (Title Unknown);  
Author = Kirk Roth;  
Date = 6/2004

Title = Effects of management practices on grassland birds: Bobolink;  
Author = Dechant, J.A., M.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldade, A.L. Zimmerman and B.R. Euliss;  
Date = 2001;  
Publisher = Northern Prairie Wildlife Research Center

Title = Decline of the Rufous-sided Towhee in the eastern United States;  
Author = Hagan, J.M.;  
Date = 1993;  
Publisher = Auk 110:863-874.

Title = Relative abundance and habitat selection of Cerulean Warblers in Southern Indiana;  
Author = Kamal Islam and Cynthia Basile;  
Date = December 2002;  
Publisher = Department of Biology Technical Report No. 1, Ball State university, final report submitted to U.S. Fish & Wildlife Service, Fort Snelling, MN

Title = Midwest Peregrine Falcon Restoration - 2004 Annual Report;  
Author = Tordoff, H.B., J.A. Goggin, J.S. Castrale;  
Date = 2004;  
Publisher = The Raptor Center at the Univ. of Minnesota

Title = BNA Account - Yellow-throated Warbler;  
Author = G.A. Hall;  
Date = 1996;  
Publisher = American Ornithologists' Union

## Appendix E-74: Birds

Title = BNA Account - Pileated Woodpecker;  
 Author = E.L. Bull and J.A. Jackson;  
 Date = 1995;  
 Publisher = American Ornithologists' Union

Title = BNA Account - Red-shouldered Hawk;  
 Author = ST Crocoll;  
 Date = 1994;  
 Publisher = American Ornithologists' Union

Title = BNA Account - Savannah;  
 Author = Wheelwright and Rising;  
 Date = 1993;  
 Publisher = American Ornithologists' Union

Title = Birds of Indiana;  
 Author = R Mumford and C. Keller;  
 Date = 1984;  
 Publisher = Indiana Univerisity Press

Title = BNA Species Account - Cerulean Warbler;  
 Author = Paul Hamel;  
 Date = 2000;  
 Publisher = American Ornithologists' Union

### 36. What is the current HABITAT body of science for ALL birds in ALL habitats in Indiana?

		Response Total	Response Percent
Complete, up to date and extensive		1	2%
Adequate		18	38%
Inadequate		16	33%
Nonexistent		9	19%
Other (please explain below)	■	4	8%
1.	Unknown-Developed land "IS NOT" quality habitat AT ALL for Mallards. Therefore, it should not be addressed or perceived as such.		
2.	The body of science is better than adequate, it is quite extensive and up to date, but by no means is it complete.		
3.	unknown		
4.	I am not aware of any current body of science for emergent wetlands as it applies to Canada geese.		

## Appendix E-74: Birds

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

Title = Vegetation management practices on conservation reserve program fields to improve northern bobwhite habitat quality;

Author = Greenfield, K. C.; W. B. Burger Jr.; M. J. Chamberlain, E. W. Kurzejeski;

Date = 2002;

Publisher = Wildlife Society Bulletin

Title = Statewide Forest Inventory;

Author = ?;

Date = periodic;

Publisher = US Forest Service/IDNR

Title = Managing Canada Geese in Urban Environments;

Author = Arthur E. Smith, Scott R. Craven and Paul D. Curtis;

Date = 1999;

Publisher = Cornell Cooperative Extension

Title = Soil Survey's of Indiana Counties;

Author = U.S. Dept. of Agriculture, SCS;

Date = 1990;

Publisher = U.S. Dept. of Agriculture

Title = Wetlands;

Author = Mitsch & Gosselink;

Date = 1993;

Publisher = Van Nostrand Reinhold

Title = Surviving where ecosystems meet: ecotonal animal communities of midwestern oak savannas and woodlands;

Author = Temple, Stanley A.;

Date = 1998;

Publisher = Transactions of the Wisconsin Academy of Sciences, Arts and Letters 86:206-222

Title = Some Aspects of the Relationship between Land and Utilization and Bobwhite Quail;

Author = John L. Roseberry;

Date = 1960;

Publisher = SIU Press

Title = Canada Gose Management;

Author = uk;

Date = uk;

Publisher = uk

Title = Waterfowl & Wetlands- Integrated Review;

Author = Edited : Bookhout;

Date = 1979;

Publisher = The Wildlife Society

Title = Cerulean Warbler MS Thesis;

Author = Kirk Roth;

Date = 2004;

Publisher = Ball State University

Title = Strip mine grassland birds;

## Appendix E-74: Birds

Author = Travis Devault;  
Date = 2000;  
Publisher = Indiana State Univ.

Title = The natural regions of Indiana;  
Author = Homoya, M.A., D.B. Abrell, J.R. Aldrich, and T.W. Post;  
Date = 1985;  
Publisher = Proceedings of the Indiana Academy of Science 94:245-268

Title = Indiana Natural Heritage Data Center Community Classifications;  
Publisher = Unpublished Data

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

Title = Management of Seasonally Flooded Impoundments;  
Author = Leigh H. Fredrickson, T. Scott Taylor;  
Date = 1982;  
Publisher = U.S. Fish and Wildlife Service

Title = Southern Forested Wetlands;  
Author = Messina & Conner;  
Date = 1998;  
Publisher = CRC Press LLC

Title = Savannas, barrens, and rock outcrop plant communities of North America;  
Author = Anderson, Roger C., Fralish, James S. , and Baskin, Jerry M.;  
Date = 1999;  
Publisher = Cambridge University Press

Title = The Bobwhite Quail - Its Life and Management;  
Author = Walter Rosene;  
Date = 1969;  
Publisher = Rutgers University Press

Title = Creating Freshwater Wetlands;  
Author = Hammer;  
Date = 1997;  
Publisher = CRC Press

Title = Cerulean Warbler MS Thesis;  
Author = Cindy Basile;  
Date = 2002;  
Publisher = Ball State University

Title = The Natural Regions of Indiana;  
Author = Homoyo, Abrell, Aldrich, and Post;  
Date = 1985;  
Publisher = Indiana Academy of Science

## Appendix E-74: Birds

### 39. What are the research needs for ALL birds in ALL 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>
Life cycle	8% (4)	10% (5)	29% (14)	14% (7)	39% (19)	0% (0)	<b>49</b>
Distribution and abundance	12% (6)	27% (13)	39% (19)	14% (7)	8% (4)	0% (0)	<b>49</b>
Limiting factors (food, shelter, water, breeding sites)	20% (10)	27% (13)	31% (15)	12% (6)	10% (5)	0% (0)	<b>49</b>
Threats (predators/competition, contamination)	16% (8)	18% (9)	45% (22)	12% (6)	8% (4)	0% (0)	<b>49</b>
Relationship/dependence on specific habitats	20% (10)	14% (7)	35% (17)	16% (8)	14% (7)	0% (0)	<b>49</b>
Population health (genetic and physical)	6% (3)	12% (6)	39% (19)	18% (9)	22% (11)	2% (1)	<b>49</b>
Other (please specify below)	12% (2)	25% (4)	0% (0)	0% (0)	19% (3)	44% (7)	<b>16</b>
					<b>Total Respondents</b>		<b>310</b>

### 40. Other research needs for ALL birds in ALL habitats in Indiana.

1. I would like to see some research to determine the extent to which mowing and haying negatively impact production following the end of the primary nesting season (as defined by the USDA). Following July 15 in Indiana landowners can mow or hay there enrolled lands. I believe a substantial proportion of bobwhites are still nesting at that time.
2. Whether the distribution of early successional habitat is now so poor and low (as are ruffed grouse populations) that the disappearance of ruffed grouse from local areas now expand into a more regional or complete extinction.
3. 1) To determine the genetic integrity of Mallards in Developed Areas.  
2) To determine effective management tools and a management plan of Mallards in Developed Lands.
4. Movement pattern of urban Canada Geese.  
Affinity for Canada Geese hatched in an urban environment to move or migrate back to a similar environment.
5. How to reduce clean farming and increasing field size.
6. Unknown
7. Detailed demographic data need to be gathered and the effects of habitat structure and fragmentation on those demographic parameters understood.

## Appendix E-74: Birds

8. harvest survival/nest success
9. 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.
10. Ways to reduce urban populations
11. food availability throughout annual cycle ways to deter use
12. X
13. unknown
14. Dispersal and repopulation methods of isolated habitats.
  - impact of high snow goose populations on Canada geese nesting sites
15.
  - develop more effective dispersal, relocation or removal techniques for maxima geese
16. We don't need more research. We need habitat management for early successional forest species, including but not limited to the ruffed grouse.
17. Effects of Forestry practices on demography and presence and absence of cerulean warblers (TNC) proposed study
18. Timing of agricultural practices in relation to the timing of breeding. Reproductive loss due to agricultural practices
19. The eastern towhee is a well-known, fairly common species. The general life-history literature is extensive. Population trends, habitat needs and threats are not well defined for Indiana. The documented population declines in databases such as the Breeding Bird Surveys are poorly explained.
20. unknown
21. unknown

**Total Respondents**                    **21**

(skipped this question)                    35

### 41. What are the HABITAT research needs for ALL birds in ALL 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	8% (4)	26% (13)	34% (17)	14% (7)	16% (8)	2% (1)	<b>50</b>
Distribution and abundance (fragmentation)	18% (9)	32% (16)	36% (18)	8% (4)	6% (3)	0% (0)	<b>50</b>

## Appendix E-74: Birds

Threats (land use change/competition, contamination/global warming)	20% (10)	28% (14)	32% (16)	14% (7)	6% (3)	0% (0)	<b>50</b>
Relationship/dependence on specific site conditions	14% (7)	16% (8)	41% (20)	16% (8)	12% (6)	0% (0)	<b>49</b>
Growth and development of individual components of the habitat	10% (5)	18% (9)	36% (18)	16% (8)	16% (8)	4% (2)	<b>50</b>
Other (please specify below)	6% (1)	25% (4)	6% (1)	0% (0)	12% (2)	50% (8)	<b>16</b>
						<b>Total Respondents</b>	<b>265</b>

### 42. Other HABITAT research needs for ALL birds in ALL habitats in Indiana.

1. Seeding mixtures and mid-contract management activities currently utilized on farm bill lands need to be evaluated to determine their value to bobwhite nesting and brood rearing.
  - 1) To determine the long term effects of Mallards in Developed Lands on the overall Mallard population
  - 2) To device management tools and concepts to help professionals manage better for Mallards in Developed Lands
3. How to create and maintain quality grassland habitat on a permanent basis.
4. Unknown
5. Affects of channelization on streambank communities and the affects on adjacent oxbows, bottomland hardwoods and other riparian areas
6. Relationship of fire to habitat structure needs to be better elucidated.
7. 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.
8. Ways to exclude geese
9. availability throughout annual cycle
10. X
11. unknown
12. Location and distribution of shrub/scrub habitat.
13. We do not need research on grouse habitat. We know what they need, it just needs to be provided before the ruffed grouse is extirpated.
14. We need to research how to keep emergent wetlands more attractive to Canada geese to reduce their use of manmade habitats in the urban community.

## Appendix E-74: Birds

15. Effects of forestry practices on cerulean warbler presence or absence and on demography
16. Timing and frequency of haying and other agricultural disturbances
17. Forest succession is well understood in Indiana. But the relationship between towhee occupancy and habitat age is not explicitly well studied here.
18. unknown
19. unknown

<b>Total Respondents</b>	<b>19</b>
(skipped this question)	37

### 43. How well do the following conservation efforts address the threats to ALL birds in ALL habitats in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection (use below for details)	42% (20)	54% (26)	2% (1)	0% (0)	2% (1)	<b>48</b>
Population management (hunting, trapping)	20% (10)	24% (12)	16% (8)	37% (18)	2% (1)	<b>49</b>
Population enhancement (captive breeding and release)	0% (0)	4% (2)	12% (6)	82% (40)	2% (1)	<b>49</b>
Reintroduction (restoration)	2% (1)	4% (2)	14% (7)	73% (36)	6% (3)	<b>49</b>
Food plots	12% (6)	27% (13)	16% (8)	39% (19)	6% (3)	<b>49</b>
Threats reduction	6% (3)	41% (20)	8% (4)	20% (10)	24% (12)	<b>49</b>
Native predator control	0% (0)	33% (16)	10% (5)	39% (19)	18% (9)	<b>49</b>
Exotic/invasive species control	2% (1)	41% (20)	10% (5)	22% (11)	24% (12)	<b>49</b>
Regulation of collecting	17% (8)	29% (14)	15% (7)	29% (14)	10% (5)	<b>48</b>
Disease/parasite management	2% (1)	14% (7)	16% (8)	39% (19)	29% (14)	<b>49</b>
Translocation to new geographic range	0% (0)	10% (5)	14% (7)	69% (34)	6% (3)	<b>49</b>
Protection of migration routes	22% (11)	31% (15)	10% (5)	20% (10)	16% (8)	<b>49</b>
Limiting contact with pollutants/contaminants	2% (1)	39% (19)	14% (7)	20% (10)	24% (12)	<b>49</b>
Public education to reduce human disturbance	10% (5)	55% (27)	6% (3)	16% (8)	12% (6)	<b>49</b>

## Appendix E-74: Birds

Culling/selective removal	2% (1)	16% (8)	8% (4)	73% (36)	0% (0)	<b>49</b>
Stocking	2% (1)	0% (0)	12% (6)	84% (41)	2% (1)	<b>49</b>
Other (please specify below)	8% (1)	8% (1)	8% (1)	17% (2)	58% (7)	<b>12</b>
<b>Total Respondents</b>						<b>794</b>

### 44. Other current conservation practices for ALL birds in ALL habitats in Indiana.

1. Instead of the word "protection" perhaps "enhancement" would be a better choice as the "protection" of habitat for ruffed grouse requires active vegetative management. While hunting is not responsible for the declining population trends and hunting pressure is self-limiting/regulated by diminishing returns, the question does eventually come to the point (with the continuous decline of habitat and subsequently low populations) where one must ask if there is an available surplus or are we shooting the last grouse in an area that was doomed anyway due to the lack of habitat.
2. Habitat Alteration
3. Unknown
4. Fire management in savannas  
(Water level management in swamp forests)
5. FIRE!!! How can this critical process not be listed as one of the standard conservation practices in your template?
6. X
7. unknown
8. Unknown
9. N/A
10. What is needed is habitat management in the form of producing early successional forest stages in large tracts throughout the forested regions of the state, especially on public lands. If this is not provided, the grouse will soon be extirpated.
11. Restoration of native grasslands, and increased enrollment in Conservation Reserve Program provide refuges from agricultural disturbances (provided the proper vegetation structure is maintained).
12. None known to me.
13. Education of public to reduce losses due to exotic predators such as cats is probably important to some local populations.
14. unknown
15. unknown

## Appendix E-74: Birds

<b>Total Respondents</b>	<b>15</b>
(skipped this question)	41

### 45. What one or two specific practices would you recommend for more effective conservation of ALL birds in ALL habitats in Indiana?

1. I would require mid-contract management (e.g. disking or burning) between 3-5 years after establishment on all farm bill acreage planted to grasses.
2. The most important practice that would benefit bobwhites in shrub/scrub habitat would be to spend more time educating the public about what constitutes suitable quail habitat.
3. Habitat protection (without habitat the Mallard won't do well) Population management (makes use of surplus numbers and regulates take) "The Mallard" by John Madson Olin Mathieson Chemical Corporation.
4. Active timber management, especially on the larger blocks of public forest lands, especially those timber management practices that remove at least 75% of the overhead canopy.
5. 1)HUNTING (first and foremost)  
2)Habitat Alteration
6. See question 49
7. Permanant protection of grassland habitat.
8. Habitat Protection (intensive) Reproduction and Protection, Ducks, Geese & Swans of North America, Bellrose  
Protection of Migrating Routes (intensive) Same
9. To best benefit the Wood Duck, one must first improve the habitat. This particular question seems redundant with #48. Therefore refer to my answer in box number 48.
10. Restoration of former savanna sites.  
Long-term fire management of existing savanna sites.
11. Restoration of Habitat
12. Hen houses  
habitat conservation  
buffer zones
13. 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.
14. Population reduction
15. Using prescribed fire to manage savanna habitats is crucial and is not happening on nearly enough acres in the state.

## Appendix E-74: Birds

16. Habitat protection  
nest boxes
17. Enhancement of migratory/staging habitat  
enhancement of breeding habitat where populations do not conflict with landuse
18. Restoring wetlands & providing quality upland nesting cover adjoining these wetlands.  
Reduce fall tillage near wetlands.
19. continue 5 year surveys
20. removal of habitat in urban zones
21. Habitat protection throughout annual cycle
22. Habitat protection, development and maintenance.
23.
  1. Establishment of more shrub/scrub habitat.
  2. Vegetative succession control to provide early successional plant species.
24. - develop practices and procedures to increase harvest of local birds
25. Habitat decline must be addressed - methods to initiate active timber/wildlife management on the landscape is necessary to stem the serious decline of ruffed grouse in the state.  
  
Immediate production of early successional stages of vegetation on public lands. Forstry practices such as clear-cutting and certain select cutting methods are needed to provide the habitat that is essential to returning ruffed grouse populations to earlier levels.
26. Habitat protection and exotic/invasive species control are both nationally and regionally accepted and funded. However, there has been limited success with these methods in Indiana. I do not know of any reference or resource discussing this.
27. Increasing the area of mature forest in the landscape and decreasing fragmentation. The conservation of existing forest land is also critical.
28. Protection of habitat and restoration of habitat  
  
  1. Nesting habitat needs to be improved in areas where possible, thereby reducing nest depredation.
29.
  1. The traditional migration corridors of Indiana should be improved and enhanced through water level management where possible.
30.
  1. We desperately need to learn how silvicultural activities and land management affect this species. Are there silvicultural activities (such as single-tree selection) that actually improve cerulean warbler habitat.
31.
  2. Increasing the size and reducing the fragmentation of forest blocks within the state will likely improve habitat for this wildlife species.
32. Time and haying and grazing around the breeding cycle - before May or after June.
33. Continued use of bridge architecture that favors nest placement.

## Appendix E-74: Birds

34. Maintenance of contiguous forest areas.

35. The major need is regional land management plans that retain young forest age classes and mixes of habitats within regional landscapes. Second practice may be exotic plant control. Garlic mustard and Amur honeysuckle have the ability to change vegetative structure of ground and understory layers. As ground nester and ground forager, towhees could be affected, but this is unstudied.

Habitat protection (maintenance of old-growth/mature forest components in Indiana)

Additional research (nest productivity, annual monitoring of populations to assess trends in population numbers)

Hamel, P.B. 2000. Cerulean Warbler (*Dendroica cerulea*). In *The Birds of North America*, no. 511 (A. Poole and F. Gill, Eds.). The Birds of North America, Inc., Philadelphia.

36. Islam, K. and K.L. Roth. 2004. Habitat Selection and Reproductive Success of Cerulean Warblers in Southern Indiana. Final report submitted to U.S. Fish and Wildlife Service, Fort Snelling, MN, December 2002. Department of Biology Technical Report No. 4, Ball State University, Muncie, Indiana 51pp.

Islam, K. and C. Basile. 2002. Relative abundance and habitat selection of Cerulean Warblers in Southern Indiana. Final report submitted to U.S. Fish and Wildlife Service, Fort Snelling, MN, December 2002. Department of Biology Technical Report No. 1, Ball State University, Muncie, Indiana 76pp.

37. Education/awareness of falcon needs for feeding and nesting.

38. Prevention of stream channelization and other (pollution) habitat factors.  
Limit disturbance in nesting/migration habitat.

39. Protection of potential habitat. Limiting disturbance by humans and predators if birds ever recolonize Indiana's Lake Michigan shoreline.

40. Conservation of habitats.

41. Conservation of forests and wise timber management emphasizing older forests.

42. Incentives to conserve wooded riparian corridors and responsible forestry practices.

43. Conservation and active management of grassland habitats.

44. Habitat protection and habitat manipulation.

45. Acquisition and protection of nesting habitat (mature floodplain forest)

46. Prescription burning to maintain sparse understory in mature pine forests may potentially help some species, for example on DNR lands. Suggested reference: Rodewald, P.G., J.H. Withgott, and K.G. Smith. 1999. Pine Warbler (*Dendroica pinus*). In *The Birds of North America*, No. 438 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

47. Protection and habitat restoration in forested wetlands.

**Total Respondents** **47**

(skipped this question) **9**

## Appendix E-74: Birds

### 46. How well do the following conservation efforts address the HABITAT threats to ALL birds in ALL habitats in Indiana?

	Very well	Somewhat	Not at all	Not used	Unknown	Response Total
Habitat protection through regulation	16% (8)	67% (33)	2% (1)	8% (4)	6% (3)	49
Habitat protection on public lands	37% (18)	47% (23)	6% (3)	6% (3)	4% (2)	49
Habitat protection incentives (financial)	22% (11)	53% (26)	4% (2)	10% (5)	10% (5)	49
Habitat restoration through regulation	22% (11)	35% (17)	8% (4)	22% (11)	12% (6)	49
Habitat restoration on public lands	41% (20)	43% (21)	4% (2)	6% (3)	6% (3)	49
Habitat restoration incentives (financial)	33% (16)	39% (19)	4% (2)	8% (4)	16% (8)	49
Artificial habitat creation (artificial reefs, nesting platforms)	19% (9)	21% (10)	6% (3)	52% (25)	2% (1)	48
Selective use of functionally equivalent exotic species in place of extirpated natives	4% (2)	22% (11)	8% (4)	53% (26)	12% (6)	49
Succession control (fire, mowing)	33% (16)	40% (19)	6% (3)	15% (7)	6% (3)	48
Corridor development/protection	20% (10)	45% (22)	4% (2)	20% (10)	10% (5)	49
Managing water regimes	19% (9)	25% (12)	6% (3)	35% (17)	15% (7)	48
Pollution reduction	2% (1)	48% (23)	2% (1)	19% (9)	29% (14)	48
Protection of adjacent buffer zone	21% (10)	56% (27)	4% (2)	8% (4)	10% (5)	48
Restrict public access and disturbance	14% (7)	45% (22)	16% (8)	14% (7)	10% (5)	49
Land use planning	32% (15)	40% (19)	9% (4)	9% (4)	11% (5)	47
Technical assistance	11% (5)	77% (36)	2% (1)	4% (2)	6% (3)	47
Cooperative land management agreements (conservation easements)	32% (15)	47% (22)	2% (1)	6% (3)	13% (6)	47
Other (please specify below)	9% (1)	0% (0)	0% (0)	9% (1)	82% (9)	11
				<b>Total Respondents</b>		<b>833</b>

### 47. Other current HABITAT conservation practices for ALL birds in ALL habitats in Indiana.

- Under the habitat through "protection and regulation", some states have "policies or regulations" that specifically mandate that a certain percentage of their public lands will be maintained in early successional and transitional forest types
- N/A

## Appendix E-74: Birds

3. Unknown
4. I apologize - I finally found fire in the list!
5. X
6. unknown
7. Unknown
8. There are very few if any "current habitat conservation practices" being implemented for the ruffed grouse. That is the major problem with the critically low population levels for this species.
9. preventing the early mowing/haying of CRP land or other habitat
10. unknown
11. unknown

<b>Total Respondents</b>	<b>11</b>
(skipped this question)	45

### 48. What one or two specific HABITAT practices would you recommend for more effective conservation of ALL birds in ALL habitats in Indiana?

1. Making mid-contract management mandatory on enrolled acreage.  
  
Setting back succession with burning or disking are the 2 most productive habitat practices. The INDFW already provides financial incentive to maintain or establish bobwhite habitat on private land. These incentives do help some to provide quality bobwhite habitat.
2. INDFW already provides financial incentive to maintain or establish bobwhite habitat on private land. These incentives do help some to provide quality bobwhite habitat.
3. Habitat protection through regulation (only sure way to protect habitat without public ownership)  
Purchase more public land.  
  
I thought I answered this already but here we go:
4. ACTIVE TIMBER MANAGEMENT THAT REMOVES AT LEAST 75% OF THE EXISTING FOREST CANOPY ON A PROPORTION OF THE FORESTED LANDSCAPE EVERY 5-10 YEARS ON A 80-120 YEAR ROTATION (DEPENDING SITECONSTRAINTS AND MGMT OBJECTIVES) USING PRIMARILY EVEN-AGE TIMBER MANAGEMENT TECHNIQUES.
5. Habitat Alteration
6. See question 49  
  
Habitat protection through regulation, (less intensive)cover a large geographic area. Ducks, Geese & Swans of North America, Bellrose
7. Habitat Protection through incentives, (intensive), best landowner cooperation, Same  
  
1. Elimination of, or at the very least, reducing, the amount of stream channelization that occurs.

## Appendix E-74: Birds

2. Restoration of bottomland hardwoods through the farmbill and other incentive type programs is also very good.
9. Purchase of remnant savannas, restoration of savannas that have undergone succession to forest or have been farmed.
10. More incentives to restore habitat.
  - Landowner programs
11. buffers  
habitat conservation regulations
12. Control of plant species that spread by vegetative means that from thick colonies such as cattail.
13. Landscaping to excluded geese
14. Burn more. And get rid of the invasive species degrading savanna habitats, including those invasive species deliberately plant by wildlife agencies.
15. Elimination of ditches and stream channelization
16. food plots  
refuge areas
17. Regulations are needed to protect small wetlands.  
Habitat restoration programs for private land owners. (Financial help)
18. continue efforts to protect and enhance wetland and riparian habitats.
19. Removal of habitat in urban zones
20. Habitat protection incentives  
habitat protection regulations
21. Woodland edge feathering  
Shrub corridor/hedgerow development
22. 1. Provide financial incentives to establish habitat.  
2. Technical assistance to maintain habitat in shrub/scrub type.
23. - providing additional financial incentives on private lands for easements to protect existing wetlands or to restore wetlands
24. TIMBER MANAGEMENT
  - Implement forestry practices that will benefit early successional species including grey fox, bobcat, and woodcock, as well as ruffed grouse.
25. Educate the public so they understand that "nature knows best" and that "letting things go back to nature" are ignorant and foolish concepts. Educate the public to understand that habitat management in this day and age is necessary if we are to provide habitat for specialist species whose populations are in peril.

## Appendix E-74: Birds

- Habitat protection and restoration through incentives are the best means to conserve the Canada Goose in emergent wetlands. However, it is difficult for the government to compete financially with developers. I know of no resource for further information.
26. Goose in emergent wetlands. However, it is difficult for the government to compete financially with developers. I know of no resource for further information.
  27. Land use planning and habitat protection and restoration on public and private land.
  28. Protection/restoration of habitat and preventing early mowing/haying
    1. Lobby for legislation that would protect any remaining wetlands.
  29.
    2. Actively manage the water levels if at all possible to insure ducklings will fledge and to encourage use by spring and fall migrants.

- Due to natural succession and the reduction of natural disturbance, sugar maple and American beech are increasing in stand density and basal area at the expense of the oak-hickory overstory throughout many of the forests in the state. A shift in forest composition from oak-hickory to maple-beech dominated forests has implications for many wildlife species. This shift could result in a reduction of species richness and abundance within forest bird communities and may negatively influence the cerulean warbler. Differences in foliage and bark structure may affect arthropod (spiders and related species) availability for this species. And, the short-petioled leaves and furrowed bark of oak trees compared to maples may provide better foraging opportunities for these birds.
30. reduction of species richness and abundance within forest bird communities and may negatively influence the cerulean warbler. Differences in foliage and bark structure may affect arthropod (spiders and related species) availability for this species. And, the short-petioled leaves and furrowed bark of oak trees compared to maples may provide better foraging opportunities for these birds.
  31. Provide incentives to prevent landowners from haying or grazing during the breeding season. Educate landowners about the importance of their land to the persistence of some species.
  32. Critical habitat for Cliff Swallows is nesting sites, most are on public (DOT) structures (bridges). Much less important is water quality, etc. for feeding areas.
  33. Promotion of older growth forest on public and private lands.
  34. Encouragement of forest management plans that retains / creates mix of young and older forest should retain towhees in regional avifaunas. Forest habitat restoration provides habitat in early stages.
- Habitat protection (maintenance of old growth/mature forest components in Indiana)  
Additional research (nest productivity, annual monitoring of populations to assess trends)
35. Hamel P.B. 2000. (see complete citation elsewhere)  
Islam and Roth. 2004. (see complete citation elsewhere)  
Islam and Basile. 2002. (see complete citation elsewhere)
  36. Education/awareness programs for building managers.
  37. Water regime management for migration habitat.  
Protection of nesting habitat along streams.
  38. Habitat protection and management.
  39. Incentives to conserve floodplain forests.
  40. Incentives to preserve forests and use good timber managements practices.
  41. Incentives to conserve wooded riparian corridors.

## Appendix E-74: Birds

42. Incentives for conserving and managing grasslands.
43. retard succession to desired habitat stage; incentives to conserve shrubby habitats.
44. Maintain mature floodplain forest  
Encourage tree plantings in floodplain areas where forest has been removed
45. Potentially prescribed burning on public lands to maintain mature forests with sparse understory.  
Rodewald et al. 1999. Pine Warbler in Birds of North America
46. incentives and restrictions to prevent forested wetland loss and encourage conservation.

<b>Total Respondents</b>	<b>46</b>
(skipped this question)	10

### 49. Do you have any additional comments or information on ALL birds in ALL habitats that you feel would be useful in the development of the Indiana Comprehensive Wildlife Strategy?

1. A substantial proportion of Indiana's non-farm program early successional habitat has been lost over the last 30 years and the farm bill grasslands now constitute a substantial proportion of the bobwhites habitat in the state.

2. No

3. Ruffed grouse should be viewed as an interior forest dependent species requiring early successional forests. While their populations will also benefit to some degree from the transitional habitats that develop from abandoned fields going into forested cover, they are primarily dependent on the larger tracts of contiguous forests. They are not an "edge" species even though that is commonly found in the popular literature and some older technical publications. Grouse are often found on forest edges because that is the only early successional habitat they can find. they are also more vulnerable to natural and man-induced (hunting) predation when forced up to the edge or limit of good or marginal habitat.

4. The information and comments that I have provided are true and accurate to the best of my knowledge. However, I don't feel that this was the best platform to have conveyed information on Mallards in Developed Habitats. Mallards in developed lands is a topic unlike that of most species threatened by habitat loss and it's accompanying problems. Rather, Mallards in Developed Lands is a situation which must be dealt with in a responsible manner if we are to maintain the integrity of Mallards in a "natural" or less developed setting in Indiana. As the size and distribution of developed lands in Indiana grows, this situation becomes more and more complex for a multitude of reasons (genetic pollution, fecal contamination, habitat loss or destruction, nuisance animal complaints, nutrient loading, etc.) I tried to convey that message in the format provided in this survey. However, Mallards in Developed Lands is not always a positive situation (which I tried to convey throughout this survey). Nonetheless, it is a crucial issue which must be addressed by the DFW. Proper planning and management now on the part of the DFW may result in "quality" Mallard habitat in Developed lands (in the future), better understanding of current Mallard and Developed Land dynamics, and a reduction of problems and conflicts in this current genre. This is my hope as well as justification for the answers and comments I provided on this topic.

This survey was hard to complete for Canada Geese in Developed land Habitats. What is effective conservation? I consider the large numbers of Canada Geese in urban environments (developed lands) a real problem. So do many residents of Fort Wayne. Urban goose-human conflicts are on the rise. Each year the Division of Fish & Wildlife issues more and more egg/nest destruction and

## Appendix E-74: Birds

rise. Each year the Division of Fish & Wildlife issues more and more egg/nest destruction and trap/transport permits. Urban areas attract geese by offering lakes and ponds, short lush lawns, protection and even those individuals that intentionally feed geese. Effective conservation for urban geese should deal with how to limit numbers through education and habitat modifications. I.e.: if a retention pond must be constructed, install habitats around the pond that help limit geese. Urban geese can nest in inappropriate sites, demonstrate aggressive behavior, cause damage to lawns, beaches, sidewalks, parking lots, etc. In my opinion, the best conservation practice would be to limit Canada Goose numbers in developed land habitats.

6. I think we know what needs to be completed but the question is how to get the Private landownership to practice what is needed on a large scale.

7. Kettle Lakes are limited in number, although habitat surrounding them can be manipulated. No new Kettle Lakes can be created so it is critical to provide protection through, regulations, incentives and management.

8. In many ways, savanna is a mixture of forest and grassland habitats so conserving those habitat types will aid savanna species. However, there are species, such as the Red-headed Woodpecker, that specifically benefit from oak savanna. Understanding the conservation value, for different species, of habitats along the grassland-forest gradient can help guide our allocation of resources to produce different landscape compositions.

9. Provide information on habitat creation and farming techniques.  
Provide incentives to create/maintain such habitat

10. no

11. There is currently an overpopulation of Canada geese in developed lands. State, municipal, and federal governments and private landowners need to work together to reduce the population of nuisance geese.

This is the last one I'll have time to do and I'd like to add some general comments.

12. The unfortunate reality is that the biggest legacy of wildlife biologists in Indiana is the list of invasive species they have unleashed on this state. Asian bush honeysuckle, Japanese honeysuckle, multiflora rose, autumn olive - this list goes on and on. Where is the accountability for the incredible damage these species are now causing to wildlife in the state? Where is the effort to undo this damage? For those of us spending hundreds of thousands of dollars each year to control these species so that we can provide wildlife habitat in Indiana it is very disheartening to have no wildlife biologists step up and admit those species were a mistake and work alongside us to control these problems. And the phrase "Selective use of functionally equivalent exotic species in place of extirpated natives" may be the most insulting statement I've ever read. That is the whole problem with wildlife biology in this state - they think that statement makes sense!! It is time for biologists to join all the other natural resource managers on this issue.

13. 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.

14. no

15. Shrub/scrub habitats alone will not support a viable Northern Bobwhite population. Other essential habitats would include: wildlife friendly clump grasses/legumes/forbs, annual crops and/or moderately disturbed ground. All of these habitat types must be in close proximity to shrub/scrub

## Appendix E-74: Birds

moderately disturbed ground. All of these habitat types must be in close proximity to shrub/scrub habitats to meet the birds living requirements.

16. None.

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

17. 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.

18. Indiana mirrors other states, especially on the southern periphery of the ruffed grouse range in the severe reduction of suitable habitats and consequently, populations. As land abandonment and reverting farmlands are a thing of the past, only timber management on public (especially) and private lands can rebalance successional age classes in forest lands to benefit grouse and a host of other early successional species.

19. No additional comments.

20. There is still a lot unknown about cerulean warblers. We need to improve our knowledge and to see what is limiting population growth (could be wintering area habitat loss or poor survival in addition to breeding habitat problems). We need to encourage a forest landscape wherever possible (that includes actively managed forest lands) to increase the amount of forest in the landscape and actively encourage a percentage of that landscape to be in mature forests.

21. CRP has been beneficial for HESP's in Indiana. We need to continue to encourage incentives to private landowners to keep land in grassland habitat that is beneficial to HESP's.

22. By some estimates, Indiana has lost up to 90% of it's original wetlands. This habitat loss has resulted in a dramatic decline of resident mallards. Of more importance to Indiana should be the development/maintenance of waterfowl marshes that might be used by spring and fall migrants. Development of this plan should go beyond state boundaries. Currently, migrants are more important than residents.

23. Recently The Nature Conservancy has held meetings with many agencies and universities to determine the feasibility of conducting a landscape ecology project for the cerulean warbler. This project would focus on the response of this species to silvicultural practices and could yield very useful information. Basic demography data could also be collected. With proper funding, many other species that use this habitat type could be studied as well. A key issue to cerulean warbler conservation is research. Before effective conservation strategies can be developed, a lot of questions will need to be answered.

24. Bobolinks may disperse from breeding sites in response to nest failure. Two spatially separated populations may be demographically linked by dispersal, so what happens on one field may affect birds on another field. Although the dispersal ability of the species has not been well-quantified, its at least on the scale of a county, if not multiple counties. Management and conservation should occur at these larger spatial scales. Managing a network of different grassland types using different disturbance regimes so that some populations nest successfully every year could provide a balance between agricultural production and Bobolink production.

Eastern towhee is a non-endangered but declining species across much of the United States. It is not the focus of specific monitoring efforts (because it is not on threatened lists) but it has shown

## Appendix E-74: Birds

not the focus of specific monitoring efforts (because it is not on threatened lists), but it has shown sharp declines. Indiana populations on the Breeding Bird Survey show a negative (-1%/year) but nonsignificant decline. The species is best used as an indicator on young forest age-classes within a management district or region.

26. In terms of breeding habitat, this species appears to be closely tied to native Virginia pine in southern Indiana and in some mature pine plantations at scattered locations around the state. At some point in the future, many of the pine plantations that were established since the 1930's will undoubtedly be replaced by native deciduous forest. Thus, it may be prudent to conduct more intensive inventories of native Virginia pine and its distribution as well as assessing the habitat and potential management strategies for pine warbler.

<b>Total Respondents</b>	<b>26</b>
(skipped this question)	30