

## GRASSLAND HABITATS NARRATIVE

### Habitat description

Open area dominated by grass species, for example, prairies or reclaimed minelands.

### Problems affecting species and habitats

#### Species threats

Respondents ranked the following threats to wildlife in grassland habitats in Indiana:

Rank	Threats to wildlife in grassland habitats
1	Habitat loss (feeding/foraging areas)
2	Habitat loss (breeding range)
3	Bioaccumulation of contaminants
4	Small native range (high endemism)
5 (tie)	Near limits of natural geographic range
5 (tie)	Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
6 (tie)	Invasive/non-native species
6 (tie)	Large home range requirements
7	Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
8 (tie)	High sensitivity to pollution
8 (tie)	Specialized reproductive behavior or low reproductive rates
9	Dependence on other species (mutualism, pollinators)
10 (tie)	Predators (native or domesticated)
10 (tie)	Viable reproductive population size or availability
11	Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by-catch, harvesting equipment, land preparation machinery)
12 (tie)	Diseases/parasites (of the species itself)
12 (tie)	Regulated hunting/fishing pressure (too much)
13	Unregulated collection pressure

A respondent offered an additional threat to wildlife in grassland habitats in Indiana:

- Crawfish frog

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- Changes in burrowing crawfish or rodent populations that would impact the availability of burrows
- Introduction of fish into formally fishless breeding waters
- Development of barriers between crawfish frog burrows and breeding waters

Respondents listed top threats to wildlife in grassland habitats in Indiana (not ranked):

- Crawfish frog
  - Land use changes or other factors that impact the availability and persistence of suitable burrows
  - Introduction of fish into formally fishless breeding waters
  - Development of barriers between crawfish frog burrows and breeding waters
- Habitat loss and fragmentation
  - Loss of habitat is probably the only threat to this species, plus people trying to remove them from lawns and gardens
  - Loss of grasslands
- Loss of grassland ground squirrel populations

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to wildlife in grasslands habitat. Their responses included:

- Loss of grassland
  - breeding sites for Mallards and Blue-winged Teal

### Habitat threats

Respondents ranked threats to grassland habitats in Indiana:

Rank	Threats to grassland habitats
1 (tie)	Commercial or residential development (sprawl)
1 (tie)	Habitat fragmentation
2	Agricultural/forestry practices
3	Habitat degradation
4	Successional change
5 (tie)	Counterproductive financial incentives or regulations
5 (tie)	Residual contamination (persistent toxins)
6	Mining/acidification
7	Invasive/non-native species
8 (tie)	Stream channelization
8 (tie)	Impoundment of water/flow regulation
8 (tie)	Point source pollution (continuing)
8 (tie)	Drainage practices (stormwater runoff)

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### 9 Nonpoint source pollution (sedimentation and nutrients)

Respondents noted additional threats to grassland habitats in Indiana:

- Mowing or burning for aesthetic purposes so that badger prey population or badger cover are diminished

Respondents listed top threats to grassland habitats in Indiana (not ranked):

- Crawfish frog habitat:
  - Cattle grazing, farming, and development activities that affect the persistence of burrows in formally flooded or moist grasslands
  - Draining of breeding ponds and ditches
  - Introduction of fish into breeding waters
- Loss of grasslands and grassland ground squirrel populations
- Fragmentation of habitat

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to grasslands habitat. Their responses included:

- Mowing and burning are essential parts of the grassland habitat. Burning of the grassland is a natural process.

## **Additional research and survey efforts**

### **Current body of research**

#### Species research

Twelve percent respondents stated that the current body of science is adequate for wildlife in grassland habitats in Indiana; eight-seven percent said that it is inadequate or nonexistent.

Respondents identified the following citations (title, author, date, publisher) that would give the best overview of wildlife in Grassland habitats in Indiana.

Title = Amphibians and reptiles of Indiana;

Author = Sherman A. Minton, Jr.;

Date = 2001;

Publisher = Indiana Academy of Sciences

Author = [www.natureserve.org/explorer](http://www.natureserve.org/explorer)

Title = Mamm. IN;

Author = M & W 1982

Title = Mammals of the Eastern United States;

Author = J.O. Whitaker, Jr. and W. J. Hamilton, Jr.;

Date = 1998;

Publisher = Cornell University Press

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Author = www.natureserve.org/explorer

Title = Mammals of Indiana;  
Author = Mumford;  
Date = ?;  
Publisher = ?

Title = Mammals of the Great Lake States;  
Author = ?;  
Date = ?;  
Publisher = ?

Title = Mammals of IN;  
Author = Russel Mumford & John Whitaker Jr;  
Date = 1982;  
Publisher = IN Universty Press

Title = Reduction in the Eastern Limit of the Range of the Franklin's Ground Squirrel;  
Author = Scott Johnson and Jane Choromanski-Norris;  
Date = 1992;  
Publisher = American Midland Naturalist 128:325-331.

Title = Franklin's Ground Squirrel in Illinois: A Declining Prairie Mammal?;  
Author = Jason Martin, Edward Heske, Joyce Hofman;  
Date = 2003;  
Publisher = American Midland Naturalist 150:130-138.

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the current body of science for wildlife in grasslands habitat. Their responses included:

- Ducks, Geese, and Swans of North America  
Bellrose, 1976

### Habitat research

Thirty-three percent respondents stated that the current body of science is adequate for grassland habitats in Indiana; sixty-seven percent said that it is inadequate or nonexistent.

Respondents identified the following citations (title, author, date, publisher) that would give the best overview of Grassland habitats in Indiana.

Title = Mammals of Indiana;  
Author = Mumford/Whitaker;  
Date = 1982;  
Publisher = IU Press

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the current body of science for grasslands habitat. There were no responses.

## Research needs

### Species research

Respondents ranked research needs for wildlife in grassland habitats in Indiana:

Rank	Research needs for wildlife in grassland habitats
1	Limiting factors (food, shelter, water, breeding sites)
2	Relationship/dependence on specific habitats
3 (tie)	Threats (predators/competition, contamination)
3 (tie)	Population health (genetic and physical)
4	Distribution and abundance
5	Life cycle

Respondents noted other research needs for wildlife in grassland habitats in Indiana (not ranked):

- The species is in great need of study on all aspects of its ecology
- We need more information on the reproduction of this species in various habitats
- Badgers: The relationship between badgers and land use/soil types that support burrows both for badgers and prey

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the research needs for wildlife in grasslands habitat. There were no responses.

### Habitat research

Respondents ranked research needs for grassland habitats in Indiana:

Rank	Research needs for grassland habitat
1	Threats (land use change/competition, contamination/global warming)
2	Distribution and abundance (fragmentation)
3	Relationship/dependence on specific site conditions
4	Successional changes
5	Growth and development of individual components of the habitat

Respondents noted additional research needs for grassland habitats in Indiana (not ranked):

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- Crawfish frog: Frog habitat needs to be adequately described
- Additional information on all phases of biology of this species would be helpful
- Badgers: The difference between native, warm-season grasses/native forbs grasslands; planned, non-native, cool-season grasslands; and CRP grasslands relative to suitability for badgers

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the research needs for grasslands habitat. There were no responses.

## Conservation actions necessary

### Species actions

Respondents ranked conservation efforts by how well they address threats to wildlife in grassland habitats in Indiana:

Rank	Conservation efforts for wildlife in grassland habitats
1	Population management (hunting, trapping)
2 (tie)	Habitat protection
2 (tie)	Regulation of collecting
2 (tie)	Exotic/invasive species control

Respondents noted other current conservation practices for wildlife in grassland habitats in Indiana (not ranked):

- Study burrow making crawfish and their burrows
- Saving grassland and woodland will help this animal

Respondents recommended these practices for more effective conservation of wildlife in grassland habitats in Indiana (not ranked):

- Crawfish frog
  - Promote non-disturbance in known crawfish frog habitat
  - Identification of breeding sites and protect sites from disturbance and introduction of fish
- Save natural habitats
- Conservation and restoration of ground squirrel and pocket gopher populations. Limit human access to all parts of large grasslands

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the practices for more effective conservation of wildlife in grasslands habitat. There were no responses.

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### Habitat actions

Respondents ranked conservation efforts by how well they address threats to grassland habitats in Indiana:

<b>Rank</b>	<b>Conservation efforts for grassland habitats</b>
1 (tie)	Succession control (fire, mowing)
1 (tie)	Habitat protection on public lands
2 (tie)	Habitat protection incentives (financial)
2 (tie)	Habitat restoration through regulation
2 (tie)	Habitat restoration on public lands
2 (tie)	Habitat restoration incentives (financial)
2 (tie)	Habitat protection through regulation
2 (tie)	Corridor development/protection
2 (tie)	Protection of adjacent buffer zone
2 (tie)	Restrict public access and disturbance
2 (tie)	Cooperative land management agreements (conservation easements)

Respondents listed no other current conservation practices for grassland habitats in Indiana.

Respondents recommended the following practices for more effective conservation of grassland habitats in Indiana:

- Crawfish frog
  - Public ownership (purchase) of known crawfish frog habitat
  - Maintenance of hydrology of sites and associated breeding waters
- Grasslands often have to be maintained by fire. Controlled burns are becoming more difficult due to lack of trained personnel, restricted burn windows and encroaching development. Grassland management difficulties need to be addressed

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the practices for more effective conservation of grasslands habitat. There were no responses.

### **Partner agencies/organizations**

**The following organizations indicated that they work in Grassland habitats.**

<b>Organization</b>	<b>Percent of time spent in Grassland habitats</b>
<b>Blue Heron Ministries, Inc.</b>	<b>40</b>
<b>Merry Lea Environmental Learning Center of Goshen College</b>	<b>35</b>
<b>Red-tail Conservancy, Inc.</b>	<b>33</b>

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<b>Big Oaks National Wildlife Refuge, USFWS</b>	<b>30</b>
<b>DNR Division of Nature Preserves</b>	<b>30</b>
<b>Dunes-Calumet Audubon Chapter</b>	<b>30</b>
<b>Indiana Grand Kankakee Marsh Restoration Project</b>	<b>30</b>
<b>Indiana Native Plant and Wildflower Society</b>	<b>30</b>
<b>Indiana Quail Unlimited</b>	<b>30</b>
<b>U.S. Fish and Wildlife Service - Indiana Private Lands Office</b>	<b>30</b>
<b>NICHES Land Trust</b>	<b>25</b>
<b>Northern Indiana Public Service Company (NIPSCO) a Subsidiary of NiSource</b>	<b>25</b>
<b>Pheasants Forever Inc.</b>	<b>25</b>
<b>Sassafras Audubon Society</b>	<b>25</b>
<b>Trillium Land Conservancy, Inc.</b>	<b>25</b>
<b>Indiana Dunes National Lakeshore</b>	<b>20</b>
<b>Lincoln Hills RC&amp;D</b>	<b>20</b>
<b>Patoka River National Wildlife Refuge &amp; Management Area</b>	<b>20</b>
<b>Summit Lake State Park</b>	<b>20</b>
<b>The Nature Conservancy</b>	<b>20</b>
<b>Cinergy Corp.</b>	<b>15</b>
<b>Ducks Unlimited, Inc.</b>	<b>15</b>
<b>Mason &amp; Hanger Corp. Newport Chemical Depot</b>	<b>15</b>
<b>South Bend-Elkhart Audubon Society</b>	<b>10-15</b>
<b>Earth Source, Inc.</b>	<b>10</b>
<b>Indiana Association of Soil and Water Conservation Districts</b>	<b>10</b>
<b>JFNew and Associates</b>	<b>10</b>
<b>MWH Americas, Inc.</b>	<b>10</b>
<b>Northwestern Indiana Regional Planning Commission (NIRPC)</b>	<b>10</b>
<b>Save the Dunes Conservation Fund</b>	<b>10</b>
<b>Sycamore Land Trust</b>	<b>10</b>
<b>The Indiana Audubon Society</b>	<b>10</b>
<b>U.S. Department of Agriculture, Forest Service Hoosier National Forest</b>	<b>10</b>
<b>Wawasee Area Conservancy Foundation, Inc.</b>	<b>10</b>
<b>Indian Deer Hunters Association</b>	<b>10</b>
<b>St. Joseph River Watershed Initiative</b>	<b>7</b>
<b>Division of Fish and Wildlife</b>	<b>6</b>
<b>ACRES, Inc.</b>	<b>5</b>
<b>Central Indiana Land Trust</b>	<b>5</b>
<b>Ducks Unlimited</b>	<b>5</b>
<b>Hoosier Environmental Council</b>	<b>5</b>
<b>IDNR- Division of Forestry- Cooperative Forest Management Section (Private Lands)</b>	<b>5</b>
<b>Indiana state trappers assoc</b>	<b>5</b>
<b>Lost River Conservation Association</b>	<b>5</b>

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<b>Robert Cooper Audubon Society</b>	<b>5</b>
<b>Sierra Club Hoosier Chapter</b>	<b>5</b>
<b>US Fish and Wildlife Service Ecological Services (does not include national wildlife refuges)</b>	<b>5</b>
<b>Veolia Water Indianapolis, LLC</b>	<b>5</b>
<b>Whitewater Valley Land Trust, Inc.</b>	<b>5</b>
<b>St. Joseph County Soil &amp; Water Conservation District (SWCD)</b>	<b>4</b>
<b>Indiana Division of the Izaak Walton League of America</b>	<b>3</b>
<b>Indiana Department of Natural Resources Division of Forestry, Properties Section (State Forests)</b>	<b>1</b>
<b>Federal Highway Administration (FHWA)</b>	<b>?</b>
<b>American Society of Landscape Architects, Indiana Chapter</b>	
<b>Central Hardwoods Joint Venture/American Bird Conservancy</b>	
<b>Crooked Creek Conservation &amp; Gun Club, Inc.</b>	
<b>Fur Takers of America</b>	
<b>Indiana Beef Cattle Association</b>	
<b>Law Enforcement Division, Indiana Department of Natural Resources</b>	
<b>National Audubon Society - Indiana Important Bird Areas Program (IBA)</b>	
<b>USDA Natural Resources Conservation Service</b>	

## Proposed plans for monitoring

### Current monitoring

#### Species monitoring

Respondents were aware of the following monitoring efforts by state agencies for wildlife in grassland habitats in Indiana:

- Statewide year-round monitoring
- Statewide once-a-year monitoring
- Regional or local year-round monitoring
- Regional or local once-a-year monitoring
- Occasional regional or local (less than once a year and not regularly scheduled) monitoring

Respondents were aware of no monitoring efforts by other organizations for wildlife in grassland habitats in Indiana.

Respondents ranked monitoring efforts by state agencies based on their importance for conservation of wildlife in grassland habitats in Indiana:

<b>Rank</b>	<b>Monitoring efforts by state agencies for conservation of wildlife in grassland habitats</b>	<b>Score</b>
1	Occasional regional or local (less than once a year and not regularly scheduled) monitoring	3.00

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2 (tie)	Statewide year-round monitoring	2.50
2 (tie)	Statewide once-a-year monitoring	2.50
2 (tie)	Regional or local year-round monitoring	2.50
2 (tie)	Occasional statewide (less than once a year and not regularly scheduled) monitoring	2.40
3	Periodic regional or local (less than once a year but still regularly scheduled) monitoring	2.20
4 (tie)	Periodic statewide (less than once a year but still regularly scheduled) monitoring	2.20
4 (tie)	Regional or local once-a-year monitoring	2.20

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Respondents listed no monitoring efforts by other organizations as crucial for conservation of wildlife in grassland habitats in Indiana. Respondents listed no organizations that monitor wildlife.

Respondents listed regional or local monitoring by state agencies for wildlife in grassland habitats in Indiana (not ranked):

- Crawfish frogs: Indiana Amphibian Monitoring Program (IAMP) -- part of the North American Amphibian Monitoring Program and Frog Watch -- conduct annual monitoring during crawfish frog breeding season. This happens statewide throughout the crawfish frog range. The data can be analyzed regionally
- Badgers: Indiana Division of Fish and Wildlife and Division of Nature Preserves maintain data on the occurrence location of road-kill, accidentally trapped or other verified human encounters with badgers

Respondents considered monitoring techniques for wildlife in grassland habitats in Indiana:

Monitoring techniques for wildlife in grassland habitats	Used	Not used but possible with existing technology and data	Not economically feasible
Radio telemetry and tracking	--	X	--
Modeling	--	X	X
Coverboard routes	--	X	--
Spot mapping	--	X	--
Driving a survey route	--	X	X
Reporting from harvest, depredation, or unintentional take (road kill, by-catch)	X	--	--
Mark and recapture	X	X	--
Professional survey/census	X	X	X
Volunteer survey/census	X	X	X
Trapping (by any technique)	--	X	--
Representative sites	--	X	X
Probabilistic sites	--	X	--

Respondents noted other monitoring techniques for wildlife in grassland habitats in Indiana (not ranked):

- Sampling for eggs or larva

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Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the monitoring techniques for wildlife in grasslands habitat. There were no responses.

### Habitat inventory and assessment

Respondents were aware of the following inventory and assessment efforts by state agencies for grassland habitats in Indiana (not ranked):

- Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment
- Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment

Respondents were aware of the following inventory and assessment efforts by other organizations for grassland habitats in Indiana:

- Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment

Respondents ranked inventory and assessment efforts by state agencies based on their importance for conservation of grassland habitats in Indiana:

<b>Rank</b>	<b>Inventory and assessment by state agencies for conservation of grassland habitats</b>
1 (tie)	Statewide annual inventory and assessment
1 (tie)	Regional or local year-round inventory and assessment
2	Statewide once-a-year inventory and assessment
3 (tie)	Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment
3 (tie)	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment
3 (tie)	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment
4 (tie)	Regional or local once-a-year inventory and assessment
4 (tie)	Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment

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Respondents ranked inventory and assessment efforts by other organizations based on their importance for conservation of grassland habitats in Indiana:

Rank	Inventory and assessment by other organizations for conservation of grassland habitats
1	Occasional statewide (less than once a year and not regularly scheduled) inventory and assessment
2 (tie)	Regional or local year-round inventory and assessment
2 (tie)	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment
2 (tie)	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment
3	Regional or local once-a-year inventory and assessment
4 (tie)	Statewide annual inventory and assessment
4 (tie)	Statewide once-a-year inventory and assessment
4 (tie)	Periodic statewide (less than once a year but still regularly scheduled) inventory and assessment

Respondents listed regional or local inventory and assessment by state agencies for grassland habitats in Indiana (not ranked):

- Crawfish frog habitat is not well understood and is not currently being inventoried. Grasslands may be monitored but not all grasslands are crawfish frog habitat
- Purdue University and NRCS keep track of grasslands created as part of Farm Bill programs. There are also occasional statewide assessments of grassland as part of remote sensing, GIS based studies such as GAP Analysis. Division of Nature Preserves also keeps track of good examples of remnant native grassland. I am not sure any of these agencies collect the grassland habitat data specifically for badgers but other agencies applied the information to badgers

Respondents listed no regional or local inventory and assessment by other organizations agencies for grassland habitats in Indiana. Respondents listed no organizations that monitor grassland habitats.

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Respondents considered inventory and assessment techniques for grassland habitats in Indiana:

<b>Inventory and assessment techniques for grassland habitats</b>	<b>Used</b>	<b>Not used but possible with existing technology and data</b>	<b>Not economically feasible</b>
GIS mapping	X	X	--
Aerial photography and analysis	X	X	--
Systematic sampling	--	X	--
Property tax estimates	--	X	--
State revenue data	--	X	--
Regulatory information	--	X	--
Participation in land use programs	--	X	--
Modeling	--	X	X
Voluntary landowner reporting	--	X	--

Respondents listed no additional inventory and assessment techniques for grassland habitats in Indiana.

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the inventory and assessment techniques for grasslands habitat. There were no responses.

### **Recommended monitoring**

#### Species monitoring

Respondents recommended the following monitoring techniques for effective conservation of wildlife in grassland habitats in Indiana (not ranked):

- Crawfish frogs: More intensive call surveys and larva surveys, especially to determine how far adults travel to deposit their eggs
- Develop a system counting hills
- Badgers: Continue to monitor road kills, accidental captures and other verified sightings. Review this data and if warranted (a number of verified sightings near grasslands habitat), attempt a telemetry and tracking study

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the monitoring techniques for effective conservation of wildlife in grasslands habitat. There were no responses.

#### Habitat inventory and assessment

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Respondents recommended the following inventory and assessment techniques for effective conservation of grassland habitats in Indiana (not ranked):

- Crawfish frog habitat includes a combination of hydrology, soil type, proximity to breeding waters and vegetation. These factors should be investigated to develop a model for crawfish frog habitat
- Monitoring larger grasslands in Indiana (native and man-made) such as the grasslands created by strip mining. Especially monitor the quality and quantity of these areas

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the monitoring techniques for effective conservation of grasslands habitat. There were no responses.

Technical experts and conservation organizations offered the following additional comments:

- Grasslands are important to many songbirds. Need more input about songbird use of grasslands.