

ALL BARREN LANDS HABITAT NARRATIVE

Habitat description

All barren lands habitats are characterized by bare rock, gravel, sand, silt, clay or other earthen material, with little or no "green" vegetation present, regardless of its inherent ability to support life. Vegetation, if present, is more widely spaced and scrubby than that in the "green" vegetated categories; lichen cover may be extensive. The habitat encompasses the following sub-types:

Bare rock/sand/clay habitats are perennially barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, beaches and other accumulations of earthen material.

Quarries/strip mines/gravel pits habitats are areas of extractive mining activities with significant surface expression.

Transitional habitats include areas of sparse vegetative cover (less than 25 percent) that are changing dynamically from one land cover to another, often because of land use activities. Examples include forest clearcuts; transition phases between forest and agricultural land; temporary clearing of vegetation; and changes due to natural causes (e.g. fire, flood).

Problems affecting species and habitats

Species threats

Respondents ranked the following threats to wildlife in all barren lands habitat in Indiana:

Rank	Threats to wildlife in all barren lands habitat
1	Viable reproductive population size or availability
2	Diseases/parasites (of the species itself)
3	Habitat loss (feeding/foraging areas)
4 (tie)	Habitat loss (breeding range)
4 (tie)	Near limits of natural geographic range
5 (tie)	Small native range (high endemism)
5 (tie)	Predators (native or domesticated)
5 (tie)	Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
6	Degradation of movement/migration routes (overwintering habitats, nesting and staging sites)
7	Invasive/non-native species
8 (tie)	Unintentional take/ direct mortality (e.g., vehicle collisions, power line collisions, by-

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catch, harvesting equipment, land preparation machinery)

- 8 (tie) Specialized reproductive behavior or low reproductive rates
- 9 Unregulated collection pressure
- 10 Large home range requirements

Respondents offered no additional threats to wildlife in all barren lands habitat in Indiana.

Respondents listed top threats to wildlife in all barren lands habitat in Indiana (not ranked):

- Quality of habitat
- Low population size/edge of range
- Green salamander threats:
 - Found only at two sites in Indiana
 - Are at edge of geographic range
 - Habitat specialists
- Allegheny woodrat threats (habitat fragmentation/loss of corridor/predators/disease)
 - The Allegheny woodrat occupies cliffs, caves and other rocky habitats in deciduous forests. When forests become fragmented, several negative impacts to woodrat populations can result
 - First, loss of mature mast-producing trees can occur; changes in forest composition can also result
 - Woodrats may have to cross non-forested areas to reach preferred feeding areas (i.e., hard mast or soft mass crops)
 - In crossing non-forested areas, they may become exposed to ubiquitous predators (great horned owls, raccoons)
 - Raccoon densities may be higher in non-forested settings (such as farmed areas on top of cliffs), which could expose woodrats to higher levels of raccoon roundworm
- Black kingsnake threats:
 - Human collection
 - Habitat loss

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to wildlife in all barren lands habitats. There were no responses.

Habitat threats

Respondents ranked threats to all barren lands habitat in Indiana:

Rank	Threats to all barren lands habitat
1	Habitat degradation
2 (tie)	Counterproductive financial incentives or regulations
2 (tie)	Habitat fragmentation

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- 3 Invasive/non-native species
- 4 Commercial or residential development (sprawl)
- 5 Agricultural/forestry practices
- 6 Successional change
- 7 (tie) Nonpoint source pollution (sedimentation and nutrients)
- 7 (tie) Point source pollution (continuing)
- 7 (tie) Drainage practices (storm water runoff)
- 8 Residual contamination (persistent toxins)

Respondents noted no other threats to all barren lands habitat in Indiana.

Respondents listed top threats to all barren lands habitat in Indiana (not ranked):

- Cliff and rocky outcrops threats
 - Habitat loss, degradation, deforestation, development and fragmentation
 - Cliff habitat is somewhat secure, except for quarrying operations along Ohio River. Forested communities in association with cliffs are vulnerable to development, fragmentation, loss of hard mast producing species, etc.
- Dunes threats (specific dune habitat configuration)
 - Threats by gulls
 - Human disturbance

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to all barren lands habitat. There were no responses.

Additional research and survey efforts

Current body of research

Species research

One quarter of respondents stated that the current body of science is adequate; seventy-five percent say that it is inadequate for wildlife in all barren lands habitat in Indiana.

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

Title = Amphibians and Reptiles of Indiana;
Author = Minton;
Date = 2001;
Publisher = Indiana Academy of Sciences.

Title = Snakes of the United States and Canada;
Author = Ernst and Ernst;
Date = 2003;
Publisher = Smithsonian Institution

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

Title = Discovery of green salamanders in Indiana and a distributional survey. In Status & Conservation of Midwestern Amphibians;
Author = Robert Madej;
Date = 1998;
Publisher = University of Iowa Press, Iowa City

Title = Green salamander: Family plethodontidae, Aneides aeneus Cope and Packard, 1881.;
Author = Pauley, T. K. and M.B. Watson;
Date = 2005;
Publisher = In: Amphibian Declines: The Conservation Status of United States Species. M. Lannoo, (ed.), University of

Title = Reassessment of the Allegheny woodrat in Indiana;
Author = Scott Johnson;
Date = 2002;
Publisher = Proceedings of the Indiana Academy of Science 111:56-66.

Title = 2002 Allegheny woodrat monitoring program;
Author = Scott Johnson, Heather Walker, Cassie Conrad, Aaron Holbrook;
Date = 2003;
Publisher = Indiana Department of Natural Resources (internal report)

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 all barren lands habitats. There were no responses.

Habitat research

Respondents stated that the current body of science is inadequate or nonexistent for all barren lands habitat in Indiana.

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

Title = Natural Features of Indiana?;
Author = Alton Lindsey (editor);
Date = 1966;
Publisher = Indiana Academy of Science

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 all barren lands habitat. There were no responses.

Research needs

Species research

Respondents ranked research needs for wildlife in all barren lands habitat in Indiana:

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

A respondent noted additional research needs for wildlife in all barren lands habitat in Indiana:

- Black kingsnakes: More information is needed for all topics concerning black kingsnakes in Indiana. However, this species is not endangered and this information is not urgently needed

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 all barren lands habitat. There were no responses.

Habitat research

Respondents ranked research needs for all barren lands habitat in Indiana:

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

Respondents noted no additional research needs for all barren lands habitat in Indiana.

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

Conservation actions necessary

Species actions

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Respondents ranked conservation efforts by how well they address threats to wildlife in all barren lands habitat in Indiana:

Rank	Conservation efforts for wildlife in all barren lands habitat
1	Habitat protection (use below for details)
2 (tie)	Regulation of collecting
2 (tie)	Reintroduction (restoration)
2 (tie)	Threats reduction
2 (tie)	Native predator control
2 (tie)	Exotic/invasive species control
2 (tie)	Translocation to new geographic range
2 (tie)	Protection of migration routes
2 (tie)	Limiting contact with pollutants/contaminants
2 (tie)	Public education to reduce human disturbance
2 (tie)	Population enhancement (captive breeding and release)

Respondents no additional current conservation practices for wildlife in all barren lands habitat in Indiana. A respondent commented, "There are no current conservation practices for woodrats in place in Indiana at this time. Monitoring population levels and trying to determine factors limiting woodrats have been focus of work in state."

Respondents recommended these practices for more effective conservation of wildlife in all barren lands habitat in Indiana (not ranked):

- Protection of habitat
- Collection regulation
- Green salamander:
 - The main threat to green salamander populations is deforestation resulting in habitat loss, degradation or fragmentation. Logging activities should be managed to keep at least 100 meters of buffered forest habitat around rock outcrops and barren lands cliffs
 - Little is known about the population biology, lifespan, mortality rates, dispersal, colonization of habitats, metapopulation dynamics, and the extent of arboreal activity
- Allegheny woodrats:
 - Research aimed to identify factors that limit woodrat populations is a high priority
 - Periodic monitoring of extant populations
 - Revisit previously occupied sites to assess recolonization potential
- Piping plover:
 - Limit disturbance by humans and predators if birds ever recolonize Indiana's Lake Michigan shoreline

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the conservation of wildlife in all barren lands habitat. There were no responses.

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Habitat actions

Respondents ranked conservation efforts by how well they address threats to all barren lands habitat in Indiana:

Rank	Conservation efforts for all barren lands habitat
1	Restrict public access and disturbance
2	Habitat protection on public lands
3 (tie)	Protection of adjacent buffer zone
3 (tie)	Habitat protection through regulation
3 (tie)	Habitat restoration on public lands
3 (tie)	Habitat restoration incentives (financial)
3 (tie)	Succession control (fire, mowing)
3 (tie)	Corridor development/protection
3 (tie)	Pollution reduction
3 (tie)	Land use planning
3 (tie)	Technical assistance
3 (tie)	Cooperative land management agreements (conservation easements)
3 (tie)	Habitat protection incentives (financial)

Respondents listed no other current conservation practices for all barren lands habitat in Indiana.

Respondents recommended the following conservation practices for all barren lands habitat in Indiana (not ranked):

- Green salamander:
 - The main threat to green salamander populations is deforestation resulting in habitat loss, degradation or fragmentation. Logging activities should be managed to keep at least 100 meters of buffered forest habitat around rock outcrops and barren lands cliffs
- Encourage retention and development of hard mast trees (oaks, hickories) in close proximity to woodrat cliffs
- Habitat protection and management

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

Proposed plans for monitoring

Current monitoring

Species monitoring

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Respondents were aware of the following monitoring efforts by state agencies for wildlife in all barren lands habitat in Indiana (not ranked):

- Periodic statewide (less than once a year but still regularly scheduled) monitoring
- Occasional statewide (less than once a year and not regularly scheduled) monitoring
- Periodic regional or local (less than once a year but still regularly scheduled) monitoring
- Occasional regional or local (less than once a year and not regularly scheduled) monitoring

Respondents were aware of the following monitoring efforts by other organizations for wildlife in all barren lands habitat in Indiana:

- Regional or local year-round monitoring

Respondents ranked monitoring efforts by state agencies based on their importance for conservation of wildlife in all barren lands habitat in Indiana:

Rank	Monitoring efforts by state agencies for conservation of wildlife in all barren lands habitat
1 (tie)	Occasional regional or local (less than once a year and not regularly scheduled) monitoring
1 (tie)	Occasional statewide (less than once a year and not regularly scheduled) monitoring
2 (tie)	Periodic regional or local (less than once a year but still regularly scheduled) monitoring
2 (tie)	Periodic statewide (less than once a year but still regularly scheduled) monitoring
3 (tie)	Statewide year-round monitoring
3 (tie)	Statewide once a year monitoring
3 (tie)	Regional or local year-round
3 (tie)	Regional or local once a year

Respondents ranked monitoring efforts by other organizations based on their importance for conservation of wildlife in all barren lands habitat in Indiana:

Rank	Monitoring efforts by other organizations for conservation of wildlife in all barren lands habitat
1	Regional or local once a year monitoring
2 (tie)	Occasional statewide (less than once a year and not regularly scheduled) monitoring
2 (tie)	Regional or local year-round monitoring
2 (tie)	Periodic regional or local (less than once a year but still regularly scheduled) monitoring
2 (tie)	Occasional regional or local (less than once a

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year and not regularly scheduled) monitoring

- 3 (tie) Statewide year-round monitoring
- 3 (tie) Statewide once a year monitoring

Respondents listed regional or local monitoring by state agencies for wildlife in all barren lands habitat in Indiana (not ranked):

- Harrison and Crawford counties
- Reports by bird watchers

Respondents listed regional or local monitoring by other organizations for wildlife in all barren lands habitat in Indiana:

- Indiana Dunes National Lakeshore biologists stay abreast of sightings along Lake Michigan

Respondents listed organizations that monitor wildlife in all barren lands habitat in Indiana (not ranked):

- Indiana DNR
- Bird watchers
- USGS biologists

Respondents considered monitoring techniques for wildlife in all barren lands habitat in Indiana:

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

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Trapping (by any technique)	X	X	--
Representative sites	X	X	--
Probabilistic sites	X	X	--

Respondents noted other monitoring techniques for wildlife in all barren lands habitat in Indiana:

- Allegheny woodrats: Presence/absence can be determined generally by searching cliff lines for fresh signs (latrines, food caches, maintained nests) usually in fall. Research is underway in other areas to determine if woodrats can be genotyped through scats

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 all barren lands habitat. There were no responses.

Habitat inventory and assessment

Respondents were aware of no inventory and assessment efforts by state agencies for all barren lands habitat in Indiana.

Respondents were aware of the following inventory and assessment efforts by other organizations for all barren lands habitat in Indiana:

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

Respondents ranked inventory and assessment efforts by state agencies based on their importance for conservation of all barren lands habitat in Indiana:

Rank	Inventory and assessment for conservation of all barren lands habitat
1	Occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment
2	Periodic regional or local (less than once a year but still regularly scheduled) inventory and assessment

A respondent listed the following inventory and assessment efforts by other organizations as "somewhat crucial" for conservation of all barren lands habitat in Indiana:

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

Respondents listed regional or local inventory and assessment by state agencies for all barren lands habitat in Indiana (not ranked):

- IDNR – Division of Nature Preserves might have a decent inventory of cliff habitat
- IDNR – Division of Fish and Wildlife has inventory of cliff habitat occupied by Allegheny woodrats
- Lake Michigan shoreline

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- Gibson Lake

Respondents listed regional or local inventory and assessment by other organizations agencies for all barren lands habitat in Indiana:

- Lake Michigan shoreline

Respondents were unaware of organizations that monitor all barren lands habitat in Indiana.

Respondents considered inventory and assessment techniques for all barren lands habitat in Indiana:

Inventory and assessment techniques for all barren lands habitat	Used	Not used but possible with existing technology and data	Not economically feasible
GIS mapping	X	X	--
Aerial photography and analysis	X	X	--
Systematic sampling	X	X	--
Property tax estimates	--	--	X
State revenue data	--	--	X
Regulatory information	--	--	X
Modeling	--	X	--

Respondents listed no additional inventory and assessment techniques for all barren lands habitat 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 all barren lands habitat. There were no responses.

Recommended monitoring

Species monitoring

Respondents recommended the following monitoring techniques for effective conservation of wildlife in all barren lands habitat in Indiana:

- Systematic surveys in and near rocky outcrops
- Standardized, live trapping for two nights is effective for determining distribution and relative abundance

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- Allegheny woodrat: Searches for sign at new sites or previously-occupied sites to assess recolonization potential
- Black kingsnakes: Monitoring black kingsnakes through professional or volunteer survey would be the best for Indiana. This could be done through representative sites or on volunteer chosen routes
- Piping plover: Because this species rarely occurs in Indiana, keep track of all reports by birders and have Indiana Dunes personnel systematically survey appropriate habitat along Lake Michigan

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 all barren lands habitat. There were no responses.

Habitat inventory and assessment

Respondents recommended the following inventory and assessment techniques for effective conservation of all barren lands habitat in Indiana (not ranked):

- Systematic sampling
- GIS
 - GIS is the best tool available to depict/inventory cliffs, outcrops, talus slopes, caves or other rocky habitats within the range of the Allegheny woodrat
- Aerial photography and ground visits to determine habitat suitability

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 effective conservation of all barren lands habitat. There were no responses.