

## BARREN LANDS CLIFFS HABITAT NARRATIVE

### Habitat Description

Barren lands habitats are characterized by bare rock, gravel, sand, silt, clay or other earthen material, with little or no "green" vegetation present. Vegetation, if present, is more widely spaced and scrubby than that in the "green" vegetated categories; lichen cover may be extensive.

### Problems affecting species and habitats

#### Species threats

Respondents ranked threats to wildlife in barren lands cliffs habitat in Indiana:

Rank	Threats to wildlife in barren lands cliffs habitat
1	Small native range (high endemism)
2	Near limits of natural geographic range
3	Habitat loss (feeding/foraging areas)
4(tie)	Habitat loss (breeding range)
4(tie)	Degradation of movement/migration routes
5(tie)	Disease/parasites (of the species itself)
5(tie)	Viable reproductive population size or availability
6(tie)	Invasive/non-native species
6(tie)	Predators (native or domesticated)
6(tie)	Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)

Respondents described top threats to wildlife in barren lands cliffs habitat in Indiana (not ranked):

- The green salamander is found only at two sites in Indiana; they are at the edge of the geographic range and are habitat specialists
- 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
  - Woodrats may have to cross non-forested area to reach preferred feeding areas (i.e. hard mast crops of soft mass – berries, etc.). While doing so, they can become exposed to ubiquitous predators (great horned owls, raccoons)
  - Raccoon densities might be higher in non-forested settings such as farmed areas on top of cliffs, which could expose woodrats to higher levels of raccoon roundworm

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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 cliffs habitat. There were no responses.

### Habitat threats

Respondents ranked threats to barren lands cliffs habitat in Indiana:

Rank	Threats to barren lands cliffs habitat
1	Habitat fragmentation
2	Habitat degradation
3	Agricultural/forestry practices
4	Commercial or residential development (sprawl)
5	Invasive/non-native species

Respondents listed no additional threats to barren lands cliffs habitat in Indiana.

Respondents described top threats to barren lands cliffs habitat in Indiana (not ranked):

- Habitat loss, degradation and fragmentation due to deforestation around rocky outcrops
- Cliff habitat in general appears somewhat secure except for quarrying operations along the Ohio River. Forested communities in association with cliffs, however, are vulnerable to development, fragmentation, loss of hard mast producing species, etc.

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

## **Additional research and survey efforts**

### **Current body of research**

#### Species research

Respondents stated that the current body of science for wildlife in barren lands cliffs habitat in Indiana is inadequate.

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

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;

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Date = 2005;

Publisher = In: Amphibian Declines: The Conservation Status of United States Species. M. Lannoo, (ed.)

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 barren lands cliffs habitat. There were no responses.

### Habitat research

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

Respondents identified the following citations (title, author, date, publisher) that would give the best overview of barren lands cliffs 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 barren lands cliffs habitat. There were no responses.

## **Research needs**

### Species research

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

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

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- 3 Distribution and abundance
- 4 Life cycle

Respondents listed no other research needs for wildlife in barren lands cliffs 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 wildlife in barren lands cliffs habitat. There were no responses.

### Habitat research

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

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

Respondents listed no other research needs for barren lands cliffs 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 barren lands cliffs habitat. There were no responses.

## **Conservation actions necessary**

### Species actions

Half of respondents stated that "habitat protection" addresses threats to wildlife in barren lands cliffs habitat in Indiana "very well;" the other half indicated "somewhat." Respondents listed no other conservation efforts that address threats to wildlife in this habitat.

Respondents offered no other current conservation practices for wildlife in barren lands cliffs habitat in Indiana, however monitoring population levels and trying to determine factors limiting woodrats have been focus of work.

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

- Green salamander conservation
  - Logging activities should be managed to keep at least 100 meters of buffered forest habitat around rock outcrops and barren lands cliffs, since the main threat to green salamanders is deforestation resulting in loss, degradation or fragmentation of habitat

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- Research: Little is known about population biology, lifespan, mortality rates, dispersal, and colonization of habitats, metapopulation dynamics and extent of arboreal activity
- Allegheny woodrat conservation
  - Research to identify factors that limit woodrat populations
  - Periodic monitoring of extant populations
  - Revisit previously occupied sites to assess recolonization potential

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

### Habitat actions

One of two respondents stated that “habitat protection on public lands” addresses threats to barren lands cliffs habitat in Indiana “very well;” the other stated “somewhat.”

A respondent stated that the following address threats to barren lands cliffs habitat in Indiana “somewhat” (not ranked):

- Habitat protection through regulation
- Protection of adjacent buffer zone
- Restrict public access and disturbance.

Respondents offered no other current conservation practices for barren lands cliffs habitat in Indiana.

Respondents recommended the following practices for more effective conservation of barren lands cliffs habitat in Indiana (not ranked):

- Green salamander: Manage logging activities to keep at least 100 meters of buffered forest habitat around rock outcrops and barren lands cliffs
- Woodrat: Encourage retention and development of hard mast trees (oaks, hickories) in close proximity with woodrat cliffs

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

## **Proposed plans for monitoring**

### **Current monitoring**

#### Species monitoring

Respondents are aware of the following monitoring efforts conducted by state agencies for wildlife in barren cliffs habitat in Indiana (not ranked):

- 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
- Periodic statewide (less than once a year but still regularly scheduled) monitoring

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Respondents listed no monitoring efforts by other organizations for wildlife in barren lands cliffs habitat in Indiana.

Respondents listed the following monitoring efforts by state agencies as “very crucial” for conservation of wildlife in barren lands cliffs habitat in Indiana:

Rank	Monitoring by state agencies for wildlife in barren lands cliffs habitat
1 (tie)	Occasional statewide (less than once a year and not regularly scheduled) monitoring
1 (tie)	Occasional regional or local (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

Respondents listed no monitoring efforts by other organizations as crucial for conservation of wildlife in barren lands cliffs habitat in Indiana.

Respondents listed regional or local monitoring by state agencies for wildlife in barren lands cliffs habitat in Indiana as follows:

- Harrison and Crawford counties

Respondents were not aware or did not list regional or local monitoring by other organizations for wildlife in barren lands cliffs habitat in Indiana.

A respondent listed “Indiana DNR” as organizations that monitor wildlife in barren lands cliffs habitat in Indiana.

The following table reflects the opinions of multiple respondents, thus multiple check marks are possible. Additionally, some of these differences may reflect different taxonomic group bias.

Respondents considered these current monitoring techniques for wildlife in barren lands cliffs habitats in Indiana:

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Rank	Monitoring techniques for wildlife in barren lands cliffs habitat	Used	Not used but possible with existing technology or data
	Mark and recapture	X	X
	Trapping (by any technique)	X	X
	Modeling		X
	Professional survey/census	X	
	Representative sites	X	
	Probabilistic sites	X	

A respondent listed other monitoring techniques for wildlife in barren lands cliffs habitat in Indiana: "Presence/absence of woodrats can be generally determined by searching cliff lines for fresh sign (latrines, food caches, maintained nests) usually in fall. Research underway in other areas to determine if woodrats can be genotyped through scats [sentence fragment]."

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 barren lands cliffs habitat. There were no responses.

### Habitat inventory and assessment

Respondents were not aware of current inventory and assessment efforts by state agencies or other organizations for barren lands cliffs habitat in Indiana.

Respondents did not rate inventory and assessment efforts by state agencies or other organizations as "very crucial" for conservation of barren lands cliffs habitat in Indiana.

A respondent stated that the following inventory and assessment effort by state agencies was "somewhat crucial":

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

A respondent summarized regional or local inventory and assessment of barren lands cliffs habitat in Indiana: "The Division of Nature Preserves might have a decent inventory of cliff habitat in the state. Division of Fish and Wildlife has data for an inventory of cliff habitat occupied by woodrats."

Respondents were not aware of or did not list regional or local inventory and assessment by other organizations for barren lands cliffs habitat in Indiana.

## Appendix F-25: Cliffs

The following table reflects the opinions of multiple respondents, thus multiple check marks are possible. Additionally, some of these differences may reflect different taxonomic group bias.

Respondents considered current inventory and assessment techniques for barren lands cliffs habitat in Indiana as follows. No technique was listed as "frequently used."

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

Respondents offered no other inventory and assessment efforts for barren lands cliffs 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 barren lands cliffs habitat. There were no responses.

## Recommended monitoring

### Species monitoring

Respondents recommended the following monitoring techniques for more effective conservation of wildlife in barren lands cliffs habitat in Indiana (not ranked):

- Systematic surveys in and near rocky outcrops
- Standardized live trapping for two nights is effective to determine distribution and relative abundance
- Search for woodrats' sign at new sites or previously occupied sites to assess recolonization potential

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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 more effective conservation of wildlife in barren lands cliffs habitat. There were no responses.

### Habitat inventory and assessment

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

- GIS
- Systematic sampling

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 more effective conservation of barren lands cliffs habitat. There were no responses.