

## SUBTERRANEAN SYSTEM CAVE ENTRANCE NARRATIVE

### Habitat description

Subterranean Systems Cave Entrances: Surface openings of subterranean features reaching as far as natural light can penetrate (i.e., twilight zone).

### Problems affecting species and habitats

#### Species threats

The respondent listed no "critical threat" to wildlife in cave entrances habitat in Indiana however, Invasive/non-native species was identified as a "serious threat". The respondent listed as "somewhat of a threat" (not ranked):

- High sensitivity to pollution
- Dependence on irregular resources (cyclical annual variations) (e.g., food, water, habitat limited due to annual variations in availability)
- Habitat loss (breeding range)
- Habitat loss (feeding/foraging areas)

The respondent listed "small native range (high endemism)" as "slight threat" for wildlife in cave entrances habitat in Indiana.

The respondent listed no additional threats to wildlife in cave entrances habitat in Indiana.

The respondent listed the top threat to wildlife in cave entrances habitat: "*Oxidus gracilis* is a non-native millipede that invades caves in the East. It is now in several Indiana caves and is preying on the food base for cave salamanders. Further east, reports of greatly decreased insect diversity in caves invaded by this millipede have been reported. Potential impact is unknown but could be significant."

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

#### Habitat threats

The respondent listed no "critical threat" or "serious threat" for cave entrances habitat in Indiana.

The respondent listed as "somewhat of a threat" (not ranked):

- Commercial or residential development (sprawl)
- Invasive/non-native species
- Nonpoint source pollution (sedimentation and nutrients)
- Habitat degradation
- Agricultural/forestry practices
- Residual contamination (persistent toxins)
- Point source pollution (continuing)
- Mining acidification
- Drainage practices (stormwater runoff)

The respondent listed the following as "slight threat" for cave entrances habitat in Indiana (not ranked):

- Counterproductive financial incentives or regulations
- Habitat fragmentation

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- Successional change

The respondent listed no additional threats to cave entrances habitat in Indiana.

The respondent listed as top threat to cave entrances habitat in Indiana: "Forestry practices that open the forest canopy around cave entrances can greatly impact the habitat for this species, drying out the entrance to the point that it is not usable habitat by the salamanders."

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the threats to cave entrances habitats. There were no responses.

## **Additional research and survey efforts**

### **Current body of research**

#### Species research

The respondent stated that the current body of science for wildlife in cave entrances habitat in Indiana is inadequate.

The respondent did not identify citations (title, author, date, publisher) that would give the best overview of wildlife in cave entrances habitats in Indiana.

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 cave entrances habitats. There were no responses.

#### Habitat research

The respondent stated that the current body of science for cave entrances habitat in Indiana is inadequate.

The respondent did not identify citations (title, author, date, publisher) that would give the best overview of cave entrances habitats in Indiana.

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 cave entrances habitats. There were no responses.

### **Research needs**

#### Species research

The respondent listed no "urgently needed" or "greatly needed" research needs for wildlife in cave entrances habitat in Indiana. The respondent stated that the following research is "needed" on the following topics (not ranked):

- Limiting factors (food, shelter, water, breeding sites)
- Threats (predators/competition, contamination)

The respondent listed the following as "slightly needed" for wildlife in cave entrances habitat in Indiana (not ranked)"

- Life cycle
- Distribution and abundance
- Relationship/dependence on specific habitats

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The respondent listed no other research needs for wildlife in cave entrances 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 cave entrances habitats. There were no responses.

### Habitat research

The respondent listed no “urgently needed” or “greatly needed” research needs for cave entrances habitat in Indiana. The respondent stated that the following research is “needed” on the following topics:

- Successional changes
- Distribution and abundance (fragmentation)]
- Threats (land use change/competition, contamination/global warming)

The respondent listed no additional research needs for cave entrances 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 cave entrances habitats. There were no responses.

## **Conservation actions necessary**

### Species actions

The respondent listed no conservation efforts that address threats “very well” to wildlife in cave entrances habitat in Indiana. Conservation efforts that address threats “somewhat” include (not ranked):

- Habitat protection
- Threats reduction
- Public education to reduce human disturbance

The respondent listed no other current conservation practices for wildlife in cave entrances habitat in Indiana.

The respondent recommended the following practice for more effective conservation of wildlife in cave entrances habitat in Indiana:

- Protect cave entrances from inappropriate management activities

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the practice for more effective conservation of wildlife in cave entrances habitats. There were no responses.

### Habitat actions

The respondent listed “protection of adjacent buffer zone” as the best conservation effort to address threats to cave entrances habitat in Indiana. Conservation efforts that address threats “somewhat” include (not ranked):

- Habitat protection through regulation
- Habitat protection on public lands

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- Restrict public access and disturbance
- Cooperative land management agreements (conservation easements)

The respondent listed no other current conservation practices for cave entrances habitat in Indiana.

The respondent listed the need to “protect cave entrances from disturbance” as a specific practice for more effective conservation of cave entrances habitat in Indiana.

Technical experts and conservation organizations reviewed the above results and were asked if these were a reasonable representation of the conservation practices for cave entrances habitats. There were no responses.

## Proposed plans for monitoring

### Current monitoring

#### Species monitoring

The respondent was not aware of monitoring efforts by state agencies or other organizations for wildlife in cave entrances habitat in Indiana.

The respondent rated no monitoring efforts by state agencies or other organizations as “very crucial” or “somewhat crucial” for conservation of wildlife in cave entrances habitat in Indiana. Listed as “slightly crucial” is

- Periodic statewide (less than once a year but still regularly scheduled) monitoring by agencies and organizations

The respondent cited no regional or local monitoring by state agencies, or organizations that conduct such monitoring for wildlife, in cave entrances habitat in Indiana.

The respondent listed no monitoring techniques for wildlife in cave entrances habitat in Indiana, and cited no recommendations for conducting such monitoring.

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 cave entrances habitats. There were no responses.

#### Habitat inventory and assessment

The respondent was not aware of inventory and assessment efforts by state agencies or other organizations for cave entrances habitat in Indiana.

The respondent listed no “very crucial” inventory and assessment efforts by state agencies or other organizations for conservation of entrances habitat in Indiana. Listed as “somewhat crucial” efforts by agencies and organizations include: “occasional regional or local (less than once a year and not regularly scheduled) inventory and assessment.”

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The respondent listed Indiana Davison of Fish and Wildlife, Nongame Section as the state agency that inventories and assesses cave entrances habitat in Indiana.

The respondent listed the following regional or local inventory or assessment efforts by other organizations for cave entrances habitat in Indiana:

- Indiana Karst Conservancy and local grottos

The respondent listed the following organization that monitors cave entrances habitat in Indiana:

- Indiana Karst Conservancy and local grottos

The respondent cited no current or possible inventory and assessment techniques for cave entrances habitat in Indiana.

The respondent listed the following inventory and assessment technique for cave entrances habitat in Indiana:

- Visual estimation – Has the entrance been changed in any way from its historic configuration (forest canopy opened up, entrance enlarged or blocked, etc.)

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 cave entrances habitats. There were no responses.

## **Recommended monitoring**

### Species monitoring

The respondent recommended no monitoring techniques for wildlife in cave entrances habitat in Indiana.

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 cave entrances habitats. There were no responses.

### Habitat inventory and assessment

The respondent listed no recommendations for inventory and assessment techniques for cave entrances 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 cave entrances habitats. There were no responses.