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# Caves and Subterranean Habitats Project Guidance



# Introduction

Natural caves are underground spaces formed by the weathering of rock. They are unique systems that have immense scientific, recreational and wildlife value. Natural caves can include karst systems, which are subterranean landscapes formed from the dissolution of soluble rocks such as limestone, dolomite and gypsum. Caves, karst systems and other subterranean habitats are fragile ecosystems and are particularly vulnerable to disturbance.

While most people think of bats when it comes to natural caves, there are many other species that use caves. Troglobites are creatures that have adapted to permanent life in a cave. Because they are so adapted to the special conditions of cave environments—darkness, low food availability, and moisture—troglobites are very vulnerable to outside influences. Other species known as troglaphiles and troglaxenes do not require caves, but use them for part of their life cycle such as hibernation. For example, caves serve as refuges during drought and winter for frogs, moths, bats, bears and raccoons. Fungi and many plant species also find homes deep in caves or around the entrances.

WHC Conservation Certification recognizes mine shafts (vertical mine passage) and adits (horizontal mine passages) as caves and subterranean habitats. In the U.S., abandoned underground mines provide important roosting habitat for more than half of the country's 45 bat species.

# Building Your Program

Projects are divided into four categories: **Habitat**, **Species Management**, **Education and Awareness** and **Other Options**. You can build a program with more than one of each category but you must associate your program with at least one habitat. This Caves and Subterranean Habitats Project Guidance is in the **Habitat** category. You will be able to associate your cave and subterranean habitat project with **Education and Awareness** projects, as well as with **Species Management** projects like those focused on bats.



**Habitat** – Projects that focus on conservation actions to protect, restore and manage different habitats.



**Species Management** – Projects addressing the conservation needs of targeted wildlife species or groups of species.



**Education and Awareness** – Projects to improve awareness, understanding and skills relating to conservation and the environment.



**Other Options** – Specialized projects that add value to your conservation efforts.

Browse the Project Guidance library at [wildlifehc.org/pg](https://wildlifehc.org/pg).

# What Do Cave and Subterranean Habitat Projects Look Like?

In caves and subterranean habitats that are minimally or not at all degraded, the soils, surface landforms, natural drainage and hydrological patterns, microclimates, and other ecosystem components should be protected. In caves that are heavily modified or degraded, realistic restoration goals should be established that include developing a sustainable plan for monitoring and maintenance, as well as cleaning and eliminating various pollutants that might be affecting the cave or subterranean habitat.

If a mine is abandoned, a project could focus on surveying the entrance and subterranean portions to determine if wildlife already exists in the mine, or if it is appropriate for wildlife. A plan could then be developed to protect or enhance the habitat. If a mine is closing, developing and implementing a biodiversity action plan as part of the mine reclamation plan could be appropriate.

Caves and mines can also provide educational and outreach opportunities, including on-site learning related to habitat and responsible visitation.

# Considerations for Corporate Lands

Projects implemented on corporate-owned lands have different circumstances and challenges to those on public lands, protected lands or wild lands.

## **Which types of corporate lands are best suited for cave and subterranean habitat projects?**

In appropriate locations, various types of caves and mines occurring on corporate lands can be considered as suitable for habitat projects, including naturally-occurring, operational, historic or non-operational.

## Addressing challenges

The corporate context presents certain challenges for implementing cave and subterranean habitat projects. Understanding these concerns and potential ways to overcome them can help your project succeed in the long term.

Concern	Response
Natural caves are highly susceptible to outside influences, making it hard to restore a degraded area.	<i>Teams should use available reference information or technical advice for their region, as well as local expertise to develop realistic goals for cave management and determine appropriate actions to take.</i>
Some abandoned mines and natural caves may not be safe for visitors or volunteers to manage and monitor the area.	<i>Teams should consult with local experts to determine the safety of the cave or mine and develop an appropriate subterranean monitoring method or procedures, such as remote sensing.</i> <i>Experienced cavers may also be willing to participate in monitoring and management.</i> <i>When access is not possible, experts could assist in determining indirect monitoring and maintenance actions that accomplish realistic goals.</i>

Concern	Response
<p>Volunteers will likely have knowledge gaps about cave habitat, cave-associated wildlife and appropriate activities for cave management and monitoring.</p>	<p><i>Knowledgeable staff or local experts from resource agencies could provide volunteers with training to equip them with knowledge needed for successful project implementation.</i></p>
<p>Invasive species and diseases such as white-nose syndrome can potentially be introduced to caves and mines, jeopardizing habitat quality and populations of cave-associated wildlife.</p>	<p><i>Education and implementation of proper cave protocols and a commitment to long-term monitoring and maintenance can help combat invasive species and diseases.</i></p>
<p>Increased access to caves and mines through project activities can damage these habitats.</p>	<p><i>Teams can work with local experts to design a monitoring and maintenance plan, with the goal of minimizing damage and maximizing desired outcomes.</i></p>

# Getting Started with Cave and Subterranean Habitat Projects

## **For a project to qualify toward Conservation Certification, you must be able to answer “yes” to five questions.**

1. Is the project locally appropriate?
2. Does it have a stated conservation or education objective?
3. Does it provide value or benefit to the natural community?
4. Have outcomes been measured and is there supporting documentation?
5. Does it exceed any pertinent regulatory requirements?

## **Conservation and education objectives**

It is a requirement of Conservation Certification that cave and subterranean habitat projects be designed to meet one or more conservation objectives.

Objectives can guide the direction of the project, help motivate others to participate and provide a basis for evaluation.

The following are suggested objectives for cave and subterranean habitat projects. Your team may choose one or more of these objectives, or develop your own relevant objectives.

- Protecting a pristine or lightly-degraded cave from negative impacts caused by human activities
- Restoring a degraded cave or mine to provide the same ecosystem functions as natural, undisturbed cave ecosystems
- Managing a cave or mine to benefit cave-associated species in general
- Managing a cave or mine to benefit a specific cave-associated species or suite of species
- Monitoring a cave or mine and appropriately controlling/managing factors to reduce the establishment and spread of invasive species and diseases
- Providing education courses or materials to employees and community members on certain features or functions of a cave habitat and its wildlife

**The following strategies are recommended to strengthen the conservation impact of your project:**

- Manage the cave or mine so that it contains or exceeds a minimum level of biodiversity appropriate to the region
- Connect to larger local, regional and landscape-scale initiatives for cave dwelling species
- Incorporate ongoing cooperation with an existing cave conservation initiative, either public or non-profit
- Meet the habitat needs for one or more species of concern
- Control invasive species by appropriately monitoring for invasive plant presence, and when necessary, safely and appropriately remove the invasive species from the cave or mine
- Implement a monitoring plan that provides for regular, credible monitoring of the cave or mine and its species
- Establish a baseline of plant and animal species in the cave or mine, as well as abiotic factors like

soils, hydrology and air quality, upon which desired outcomes can be based and evaluated

- Be located adjacent to or near an existing protected cave or mine and managed in alignment with that cave or mine
- Install locally-appropriate wildlife gates that protect caves from human impacts without hindering wildlife movement, air flow or water flow
- Plant or manage for native vegetation at the surface of and around the cave or mine entrance
- Establish a protective buffer zone around the cave or mine entrance
- If visitors are regularly allowed, work with experts to determine thresholds for visitation, such as the maximum number of people per cave entry and the maximum number of trips per year
- Record and establish visitation limits for sensitive times, such as the maternity cycles of bats, hibernation, etc., to lessen disturbances during these times

- Control photosynthetic organisms in more disturbed caves through selection of appropriate lighting technologies
- Use the habitat to educate local learners about cave-related topics, either through visits to the cave or through its use in off-site presentations or educational activities
- Provide opportunities for university students, professors and other scientific professionals to conduct research in the cave or mine that is used to inform the project
- Include credible monitoring that contributes to a citizen science program or the database of an established cave conservation organization and that is used to inform the project
- Provide multiple ecological functions
- Maintain or commit to maintain the project over the long term

## Partnerships

Cave and subterranean habitat projects implemented on corporate lands can benefit from partnerships with groups that have established cave conservation or education objectives. A team can use such a partnership to help design, create or monitor the project and provide educational opportunities for employees and community members. Partners may also be able to assist the team with leveraging funds for implementing and maintaining the project, and can help create links between the on-site project and other cave and subterranean habitat projects or conservation priorities in the region.

## Resources

Your project may benefit from online or printed resources available for your region to support the design, delivery, maintenance and monitoring of awareness and community engagement projects.

A search for “cave” and “mine” in the Conservation Registry returns 122 implemented through WHC’s certification program. This is a great place to find inspiration for your project and see what others are doing in and around your location.

The following terms, in any combination, may be useful when searching online for items related to this theme:

<b>cave</b>	<b>sinkhole</b>	<b>trogloxenes</b>
<b>subterranean</b>	<b>karst</b>	<b>speleotherms</b>
<b>mine</b>	<b>limestone</b>	<b>caving</b>
<b>adits</b>	<b>gypsum</b>	<b>spelunking</b>
<b>mine shafts</b>	<b>dolomite</b>	<b>potholing</b>
<b>mine closure</b>	<b>troglobites</b>	<b>speleology</b>
<b>abandoned mines</b>	<b>troglophiles</b>	

# Understanding the Application Process

## **Documentation**

When applying for Conservation Certification, you will provide documentation of the planning, implementation, maintenance and monitoring of your project. The following is required documentation for cave and subterranean habitat projects; however, you may also submit additional supporting materials.

**Map/image of the project area**, showing the relative size and approximate location of the project

**Photographs and videos** that depict the progress of the project implementation and management.

**Maintenance plans** that demonstrate activities that meet the needs of the habitat to support the target species and the conservation objectives.

**Monitoring logs** that show the frequency, type, and results of monitoring of the project, whether in an informal manner or a scientifically rigorous manner.

**Updated survey of plants** and/or animals that are currently known to occur in the cave or subterranean habitat, including common and scientific names and whether the species is native.

**Project design or plan** that shows how the project was designed for success and local appropriateness. This can include descriptions of:

- Appropriate siting of the project
- Site and regional appropriateness – what is the reference system, soil information, and/or local expertise used to choose the species list?
- Intended or actual planting list that includes information such as: the name of plant (genus and species), bloom time, which species it attracts and what habitat function it provides
- Technological intervention where appropriate for irrigation or other habitat improvements
- Educational features such as signage and trails
- Any additional steps taken such as soil tests, soil prep, plant list revision by a technical expert, etc.
- The mining or rehabilitation plan for mining operations that incorporates biodiversity targets for caves and subterranean habitats.

## Application questions

As you complete the application online, you will be asked the following questions about your cave and subterranean habitat project. These questions will help us understand and evaluate your project.

	Question	Why this question is important
<b>Overview</b>	What is the total size of the cave or subterranean habitat managed for this project?	<i>This provides us with a description of your project to allow us to assess it.</i>
	Describe the habitat in general including plants and structures.	
	Give a brief description of the vegetation types found in the habitat and list several of the common plant species.	
	Briefly summarize activities taking place to manage the targeted habitat.	
	Upload a map showing the location and photos showing the cave or subterranean habitat.	
	When did work on the ground begin?	
<b>Objective</b>	What are the project's conservation objectives?	<i>Having a conservation objective is a requirement for certification.</i>

	Question	Why this question is important
<b>Habitat Creation or Expansion</b>	Give a brief description of the vegetation types found in the habitat and list several of the common plant species.	<i>For cave and subterranean habitats, size, design considerations, and plant selection are all important factors that determine success and ecological benefit.</i>
	Upload a dated list of current plant and/or animal species in and around the habitat including common and scientific names and whether the species is native to the region.	
	Is this a new project not presented in previous applications?	
	Is the cave habitat pre-existing or habitat that was created as a part of the project?	
	Does it replace a habitat with less ecological value?	
	Describe the habitat prior to your project.	
	Describe any design or plant selection considerations that were part of this new project.	
	Upload documentation of the specific considerations.	
	Since the last application, have you expanded the size of your cave or subterranean habitat or the area being managed?	
	What is the size of the cave or subterranean habitat that has been added since the last application?	
	Does the habitat expansion replace a habitat with less ecological value?	
	Describe the habitat present prior to your project.	

	Question	Why this question is important
<b>Habitat Creation or Expansion (cont.)</b>	Describe any design or plant selection considerations that were part of this project expansion.	<i>For cave and subterranean habitats, size, design considerations, and plant selection are all important factors that determine success and ecological benefit.</i>
	Upload documentation of the specific considerations.	
	What is the size of the area that is being newly managed since the last application?	
<b>Management</b>	Describe the steps taken to maintain the cave or subterranean habitat.	<i>Appropriate management policies and practices are also important to the species that use caves and subterranean habitats.</i>
	Provide a timeline of maintenance and other completed activities.	
	Is access allowed for the general public, employees, surveyors or researchers?	
	Has a human carrying capacity limit been determined?	
	What other actions have been taken to minimize disturbance to the habitat and the species inside?	
	Upload documentation of these activities.	

	Question	Why this question is important
<b>Monitoring</b>	Was baseline data collected for this project?	<i>Monitoring is essential to understand the impact of the project and to be able to adapt the project develops.</i>
	Describe the types of baseline data collected.	
	Upload the baseline data.	
	Select each type of monitoring that is being carried out.	
	List each type of monitoring, including the frequency and list any plans or protocols used.	
	Upload the monitoring protocols, if applicable.	
	Upload the monitoring data and any analysis, if applicable.	
	Provide a brief summary of results from monitoring.	
	Evaluate the success of the project. If there were any concerns, what are the plans to address them in the future?	
<b>Employee Participation</b>	Do employees actively contribute to the project?	<i>Employee participation can strengthen a project and secure its future.</i>
	How many employees participate in the project on a regular basis?	
	Describe how employees are involved in this project.	
	How many employee hours were spent on the following activities each year?	

	Question	Why this question is important
<b>Other Participants</b>	Do any groups or individuals outside of your company actively contribute to the project on a regular basis?	<i>It is not always possible to recruit outside groups to a project. Conservation and education partners can strengthen a project and provide different audiences to use it for lessons or recreation, thus broadening its reach.</i>
	Select the types of groups.	
	List the names of the groups you work with.	
	Describe their involvement in this project.	
	How many hours were spent by the groups on the following activities each year?	
	If you work with a cave or subterranean specialist and have a current letter of support from them, upload it here.	
	List additional sources of technical advice (e.g. website, guidebook, etc.) and describe how they were used.	
<b>Regulatory Requirements</b>	Are any aspects of the project done in relation to regulatory requirements?	<i>Going beyond compliance is a requirement for certification.</i>
	Explain how the project exceeds requirements.	
<b>Connectivity</b>	Does the project connect with other cave or subterranean habitats, either above or below ground, on neighboring land?	<i>Connectivity on-site and across fence lines helps to decrease fragmentation, one of the leading causes of habitat loss.</i>
	Describe how the project connects with the other cave or subterranean habitats.	
	Describe any coordinated management efforts with other cave or subterranean habitats.	

	Question	Why this question is important
<b>Alignment</b>	Does the project align with any larger scale initiatives? (e.g. corporate strategy, regional conservation plan, migratory pathway, watershed plan, etc.)	<i>Aligning conservation efforts with large-scale conservation plans and other regional conservation initiatives allows a site-based activity to support a landscape-scale objective.</i>
	Is the project part of a corporate level commitment to cave or subterranean habitats?	
	Upload documentation of your corporate commitment to cave or subterranean habitats.	
	Does the project align with an existing conservation plan or other large-scale initiative?	
	List the conservation plans or other large-scale initiatives the project aligns with and provide website links, if available.	
	How does your project align with these large-scale initiatives?	
<b>Existing Certifications</b>	Does this project have third party cave or subterranean habitat related certification?	<i>Other certifications or recognitions illustrate strong efforts and commitments.</i>
	List the certifications and provide a website link if available.	

## Content development for Conservation Certification

To inform the development of Conservation Certification, WHC analyzed the projects it was recognizing through its certification program to assess whether they were aligned with contemporary conservation and education priorities.

Following this assessment and using information from it, WHC convened Advisory Committees around many of the conservation and education themes to develop the content that would guide practitioners and applicants in the future. Some themes, including cave and subterranean habitat projects, that have not yet been informed by external stakeholders, are presented to allow applicants to receive recognition. WHC plans to have all themes informed by stakeholders.

More information can be found about this process in the “Our Impact” section of [wildlifehc.org](http://wildlifehc.org) under “Commitment to Transparency.”



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The WHC Strategy and Planning team can help you build a successful project by identifying needs, making connections with partners and resources, and providing strategies that meet business and conservation goals. Contact us today.

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Every act of conservation matters.

