

# BATS AND MINES

MERLIN D. TUTTLE &  
DANIEL A.R. TAYLOR



Bat Conservation  
International, Inc.

RESOURCE PUBLICATION No. 3

REVISED EDITION

# BATS AND MINES

MERLIN D. TUTTLE  
DANIEL A.R. TAYLOR

Bat Conservation  
International, Inc.

RESOURCE PUBLICATION NO. 3

Copyright ©1998 Bat Conservation International, Inc.

Permission is granted to reproduce any pages from page 34 to page 50 of this book. For reproduction of any other contents, permission should be requested in writing from Bat Conservation International, Inc.

All rights reserved. No parts of this book, other than those listed above, may be reproduced, distributed, transcribed, or transmitted in any form by any means, electronic or mechanical, by photocopying or recording, or by any information storage or retrieval system, without the written permission of the publisher, Bat Conservation International, Inc., P.O. Box 162603, Austin, TX 78716.

# Acknowledgements

We especially thank the many individuals who generously provided information from their many years of research and experience. Their critical reviews and suggestions helped make this handbook possible.

In particular, we thank: J. Scott Altenbach, University of New Mexico; Patricia E. Brown, Brown-Berry Biological Consulting; Robert R. Currie, USDI Fish and Wildlife Service; Virginia M. Dalton; Sheryl Ducummon, Bat Conservation International; Laurie Fenwood, USDA United States Forest Service; Michael Goble, USDI Bureau of Mines; Kenneth J. Kingsley; Laura Mazanti, USDA Soil Conservation Service; Kirk W. Navo, Colorado Division of Wildlife; Debra C. Noel, Arizona Game and Fish Department; Mark Perkins; Elizabeth D. Pierson; Roy Powers, Jr. and David Foster, American Cave Conservation Association; Fred Stabler, USDI Bureau of Land Management; and Michael Washburn, Virginia Division of Mine Land Reclamation.



This publication was produced by the North American Bats and Mines Project, co-founded by Bat Conservation International and the Bureau of Land Management. We gratefully acknowledge a grant from the Asheville Field Office of the U.S. Fish and Wildlife Service and additional support from Verne and Marion Read, the National Fish and Wildlife Foundation, the U.S. Forest Service, and the Natural Resources Conservation Service.



Natural Resources  
Conservation Service

# Table of Contents

Importance of Mines for Bats .....	7
Environmental Consequences of Losing Bats .....	9
How and When Bats Use Mines .....	10
How Mine Structure, Location, and Human Disturbance Affect Bat Use .....	12
Assessing Mines for Bats .....	17
Protection of Bats in Mines .....	21
Appendix I. Helpful Literature .....	30
Appendix II. Available Resources .....	32
Appendix III. Plans for Bat Gates .....	34
Appendix IV. Mine Survey Forms .....	47

## **List of Illustrations**

Figure 1. Typical Mine Features .....	13
Figure 2. Mine Airflow Patterns. ....	15

## **List of Tables**

Table 1. Species List of Bats That Use Mines .....	28
--	----

## Introduction

MANY OF NORTH AMERICA'S largest remaining bat populations roost in mines. These include a majority of the 45 bat species living in the continental United States and some of the largest populations of endangered bats. More than half of U.S. bats are already listed as endangered or species of concern, and closure of abandoned mines without first conducting biological surveys could endanger even currently abundant species. Given the key ecological role of bats as primary predators of night-flying insects, which cost American farmers and foresters billions of dollars annually, additional threats to bat survival are cause for serious concern.

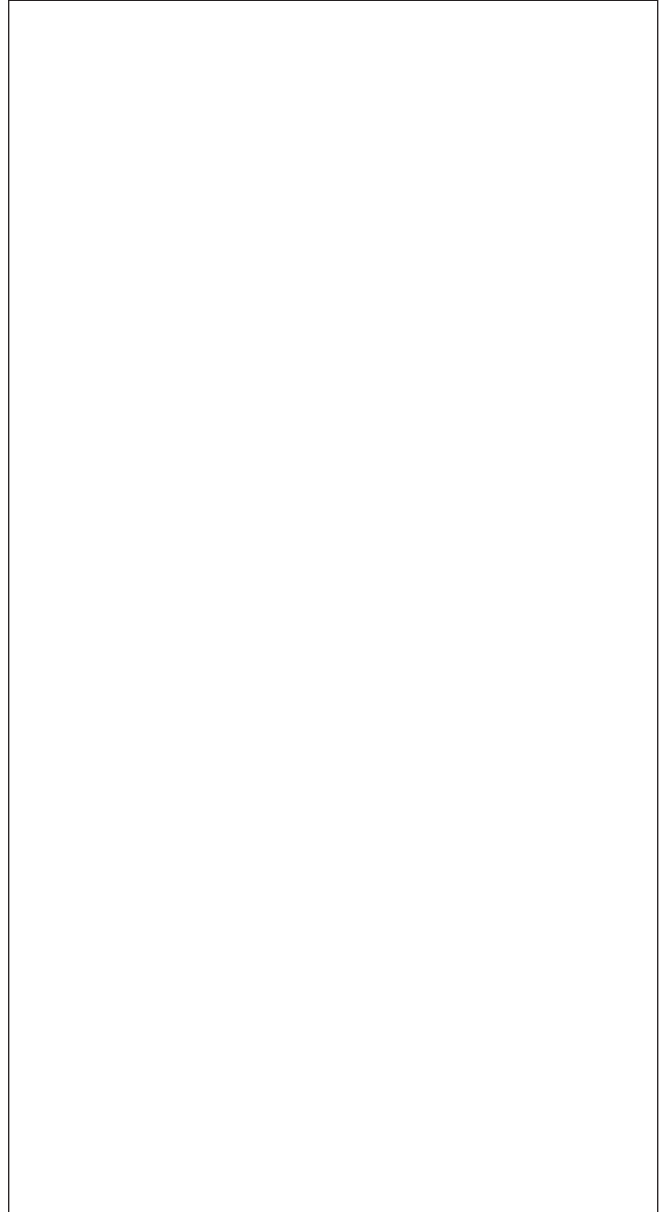
Closure or other alteration of old mines without biological assessment can, in single events, eliminate some of America's largest remaining bat populations. This publication will aid resource managers and others involved in decisions to close or reclaim abandoned or inactive subsurface mines, or to permit new mining in historic districts. It provides the basic information required to assess whether a mine is, or could serve as, an important bat roost, and it describes safe and responsible methods for protecting both humans and bats without total closure. Before surveying, closing, or gating mines, experts knowledgeable about bats and mine safety should be consulted. A list of resources is provided at the end of this publication.

## Importance of Mines for Bats

ABANDONED MINES SERVE AS important year-round sanctuaries for bats. Throughout the United States, human disturbance of caves, cave commercialization, deforestation, and urban and agricultural developments have forced many bats from their traditional roosts in search of new homes. Although caves are numerous in some regions, most are now too frequently disturbed by humans to permit bat use. Bats additionally have lost countless traditional roosts in old tree hollows due to logging of old-growth forests. Over the past 100 years or more, many displaced bats have gradually moved into abandoned mines, which often provide microclimates similar to caves. Even in areas where traditional roosting habitat has not been disturbed or altered by man, abandoned mines attract bats due to their often ideal environmental conditions. Bats may now have few alternatives or may be so instinctually committed to certain sites that they cannot change roosts in the time permitted by current rates of mine closure. Loss of a single mine hibernation site can affect a multistate region, eliminating many summer colonies of bats over thousands of square miles.

Of the more than 8,000 mines surveyed by researchers across North America, 30 to 80 percent showed signs of use by bats, with an average of 10 percent containing important colonies. From the Great Lakes region north and eastward in the United States and Canada, up to 70 percent of open, unflooded mines may be used by large bat populations. Moreover, because most mines have not been checked for bats, a large proportion of bats living in them remain undiscovered. For example, in December 1992, an estimated one million little and big brown bats (*Myotis lucifugus* and *Eptesicus fuscus*) were found in the Millie Hill Mine in Iron Mountain, Michigan. It was slated for closure the next spring. These bats constituted the second largest hibernating bat population ever discovered in North America.

In Wisconsin, more than 600,000 bats of four species were saved because just two mines were surveyed and protected from closure. The largest recorded hibernating population of western big-eared bats (*Corynorhinus townsendii pallescens*), another species in decline, was recently destroyed in a New Mexico mine shaft where vandals set old timbers on fire. In New Jersey, the state's largest population of hibernating bats was inadvertently trapped in the Hibernia Mine when it was capped. These bats also would have died had not biologists convinced state authorities to reopen the entrance immediately. Likewise, the



MERLIND TUTTLE

*Some of our largest remaining populations of endangered Indiana bats rely on abandoned mines for hibernation. These bats and many other species often have few alternatives as their traditional roosts in caves are lost to human disturbance.*

*California leaf-nosed bats are extremely dependent on abandoned mines. Most of their known winter roosts in the Southwest are in mines.*



MERLIN D. TUTTLE

Canoe Creek State Park limestone mine in Pennsylvania was reopened in time to save its bats and now shelters the largest bat hibernating population in the state.

Unfortunately, at the rate at which mines are being closed, such incidents are far more common than recognized. A local mine inspector reported that, of the 12 mines already closed prior to 1993 in Iron Mountain, Michigan, some contained large numbers of bats, perhaps more than were saved in the Millie Hill Mine.

Due to the colonial behavior of most bats, they are especially vulnerable to mine closures. Endangered Indiana bats (*Myotis sodalis*) and cave myotis (*M. velifer*) have each been found in mines in numbers up to 100,000. Similarly, the largest known hibernating populations of the southeastern big-eared bat (*Corynorhinus rafinesquii*), a species of concern, live in abandoned iron and copper mines in small groups ranging from a few dozen to over 500. A majority of the remaining nursery roosts of the endangered lesser long-nosed bat (*Leptonycteris curasoae*) in the United States are also in mines.

In the northern United States, little brown bats, among America's most successful and abundant bats, are now so reliant upon abandoned mines for hibernation that a majority of the entire species overwinters in mines. Closure of mines without first checking for bats could drastically reduce their numbers, needlessly endangering the species. The danger of killing extremely large numbers of these animals is probably greatest in old mines of the northern Midwest, from the Dakotas to Wisconsin and Michigan, as well as farther north into Canada, but it is certainly not restricted to these areas. Populations of over 100,000 bats are also known to live in mines of the northeastern United States and may be discovered wherever bats live near mines cool enough for hibernation.

Other bat species rely heavily on mines for hibernation, even though large proportions of their populations are not normally found in any one mine. These include the eastern small-footed myotis (*Myotis leibii*), western small-footed myotis (*M. ciliolabrum*), California myotis (*M. californicus*), eastern long-eared myotis (*M. septentrionalis*), eastern pipistrelle (*Pipistrellus subflavus*), and big brown bat.