Biological Threats and Invasive Species Research Program

U.S. Geological Survey Science Strategy To Address White-Nose Syndrome and Bat Health in 2025–2029

Circular 1560

U.S. Geological Survey Science Strategy To Address White-Nose Syndrome and Bat Health in 2025–2029

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U.S. Department of the Interior
U.S. Geological Survey

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Abbreviations

BLM	Bureau of Land Management
CRU	cooperative research unit
DOI	U.S. Department of the Interior
EESC	Eastern Ecological Science Center
EMA	Ecosystems Mission Area (USGS)
FORT	Fort Collins Science Center
FRESC	Forest and Rangeland Ecosystem Science Center
FY	fiscal year
NABat	North American Bat Monitoring Program
NOROCK	Northern Rocky Mountain Science Center
NPS	National Park Service
NWHC	National Wildlife Health Center
Pd	*Pseudogymnoascus destructans*
PIT	passive integrated transponder
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WARC	Wetland and Aquatic Research Center
WERC	Western Ecological Research Center
WHISPers	Wildlife Health Information Sharing Partnership – event reporting system
WNS	white-nose syndrome

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Abstract

Since its discovery in 2006, the fungal disease known as white-nose syndrome (WNS) has killed millions of bats. Of the 47 bat species native to the conterminous United States, Alaska, Hawaii, and Canada, 12 have been affected by WNS, including 3 endangered species and 1 proposed endangered species. WNS has also been detected in 40 States and 9 Canadian Provinces. U.S. Geological Survey (USGS) scientists have been critical in identifying the causal fungus for WNS (*Pseudogymnoascus destructans* [Pd]), characterizing the effects of WNS, and tracking the spread of Pd in many bat populations in North America.

The mission of the USGS WNS and Bat Health Science Team is to deliver integrated science in order to build resiliency into free-ranging bat populations through more effective WNS management, build capacity for bat health science, and enhance bat health information sharing across USGS science centers and cooperative research units as well as with stakeholders. The USGS can play an important role in supporting regional and national capacity building by providing resources and guidance to local, State, and Tribal management entities and by providing tools to enhance disease management. The USGS Ecosystems Mission Area's Biological Threats and Invasive Species Research Program is the lead Federal program for free-ranging wildlife disease research and surveillance.

As of 2024, guided by the science priorities set by the WNS Steering Committee, USGS scientists are engaged in a nationwide response to WNS. This work is done in close coordination with our partners at the U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, U.S. Forest Service of the U.S. Department of Agriculture, U.S. Department of Defense, as well as State and Tribal agencies. In addition to conducting WNS research, the USGS is mapping the spread of WNS and coordinating the North American Bat Monitoring Program (NABat) to understand how WNS and other stressors affect the status and trends of native bats across their range. The USGS is supporting the national WNS response through four science goals: (1) provide situational awareness on the health of bat populations; (2) conduct ecological studies of bats along the gradient of disease vulnerability; (3) contribute actionable science to enhance the resiliency of bat populations; and (4) implement an adaptive, holistic approach to bat health.

Introduction

Bats play essential roles in maintaining the health of ecosystems and reducing insect threats to agriculture and public health. Bats are the only mammal capable of true flight. Insectivorous bats eat large quantities of insects, including those that damage crops and forests (such as the corn earworm moth and emerald ash borer beetle) and those that carry diseases (mosquitoes) (Maine and Boyles, 2015; Münzer and others, 2016; Wray and others, 2018). U.S. Geological Survey (USGS) scientists and partners found that bats save U.S. farmers billions of dollars annually because they provide a natural alternative to chemical pesticides and indirectly promote human well-being (Boyles and others, 2011; Frank, 2024). Bats also disperse seeds and are pollinators. For example, in the southwestern United States, the lesser long-nosed bat picks up pollen while drinking nectar from cactus and agave flowers (Ober and others, 2005). Agave, which is historically used for beverage and food production, also has the potential to support biofuel production (Mielenz and others, 2015).

Since its discovery in 2006, the fungal disease known as white-nose syndrome (WNS) has been associated with mass mortality of hibernating bats and species declines (Cheng and others, 2021). Of the 47 bat species native to the conterminous United States, Alaska, Hawaii, and Canada, 12 have been affected by WNS across 40 States and 9 Canadian Provinces (White-nose Syndrome Response Team, 2024). Of these 12, 3 are endangered species: the gray bat (*Myotis grisescens*), the Indiana bat (*Myotis sodalis*), and the northern long-eared bat (*Myotis septentrionalis*). In addition, a proposed endangered species, the tricolored bat (*Perimyotis subflavus*), is also affected. USGS scientists were crucial in identifying *Pseudogymnoascus destructans* (Pd) as the causal fungus of WNS (Blehert and others, 2009). USGS scientists also characterized the effects of WNS on bats and tracked the spread of Pd in numerous populations of bats in North America (Hopkins and Soileau, 2018). Many of the studies by USGS scientists are listed in appendix 1. Early USGS research focused on understanding how WNS affects bats (Verant and others, 2014) and how the fungus persists in the environment (Verant and others, 2018).

As of 2024, USGS scientists are engaged in a nationwide response to WNS. These scientists work in close coordination with partners at the U.S. Fish and Wildlife Service (USFWS), National Park Service (NPS), Bureau of Land Management (BLM), U.S. Forest Service (USFS), U.S. Department of Defense, as well as State and Tribal agencies (Hopkins and Soileau, 2018). The national research direction is set by the USFWS-led WNS Steering Committee. In addition to WNS research, the USGS is mapping the spread of WNS and coordinating the North American Bat Monitoring Program (NABat; https://www.nabatmonitoring.org/) to understand how WNS and other stressors affect the status and trends of bats across their range. A map showing the distribution of WNS cases in bats in Canada and the conterminous United States is available at https://www.whitenosesyndrome.org/. NABat is an international, multiagency, coordinated monitoring plan for bats in North America that relies on standard procedures and a network of collaborators to track bat status and trends over time. USGS science on WNS and bats underpins evidence-based decisions including Administrative Procedure Act (5 U.S.C. 551–559) rulemaking processes, such as the final rule for reclassification of the northern long-eared bat as endangered (U.S. Fish and Wildlife Service, 2022) under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.).

This document describes the U.S. Geological Survey Science Strategy To Address White-Nose Syndrome and Bat Health in 2025–2029 (which will be informally referred to as "the science strategy"), which was developed by the U.S. Geological Survey White-Nose Syndrome and Bat Health Science Team (app. 2). This science strategy is based on priorities identified by the WNS Steering Committee and WNS working groups (https://www.whitenosesyndrome.org/static-page/working-groups). While the 2011 WNS national plan (U.S. Fish and Wildlife Service, 2011) and the 2014 WNS national implementation plan (White-nose Syndrome Recovery Team, 2014) priorities are the foundational guide to our efforts, the changing dynamics of the disease have shifted research priorities and this science strategy may be updated based on revised priorities of the WNS Steering Committee.

The purpose of this science strategy is to bolster evidence-based management actions and decisions aimed at cultivating a strong U.S. bat community that persists in spite of WNS and other stressors to bat health. This approach will potentially allow for downlisting or delisting of bat species affected by WNS. The science strategy is intended to support U.S. Department of the Interior (DOI) bureaus, other Federal natural resource management agencies, States, and Tribes in their response to WNS through (1) research, monitoring, and surveillance activities, as well as (2) the development of evidence-based decision-support tools and management strategies that aim to sustain a hardy U.S. bat community.

Terms related to the science strategy are defined in the "Glossary." While this strategy will provide a foundation to guide the science undertaken by the USGS and its partners, work will be subject to the availability of funds.

Congressional Direction

Appropriations language during fiscal year 2014 (FY14) included Congressional direction for the USGS Ecosystems Mission Area (EMA) to conduct research and monitoring of WNS in bats; Congressional appropriations for FY15–FY23 continued to mention WNS (app. 3). Reports of the Senate Appropriations Committee for FY17–FY20 directed the USGS to "…continue to help lead, and implement the North American Bat Monitoring Program in association with other Federal natural resource management agencies and offices, States, and non-governmental partners" (Senate Report 114–281, quoted in app. 3 of this document).

As directed by Congress, the USGS plays an important role in supporting regional and national capacity building by providing resources and guidance to local, State, and Tribal management entities and by providing tools to enhance disease management. The mission of the USGS WNS and Bat Health Science Team is to deliver integrated science in order to build resiliency into free-ranging bat populations through more effective WNS management, build capacity for bat health science, and enhance bat health information sharing across USGS science centers and cooperative research units as well as with stakeholders. The USGS Ecosystems Mission Area's Biological Threats and Invasive Species Research Program is the lead Federal program for native free-ranging wildlife disease research and surveillance.

Secretarial Priority

In 2019, the Secretary of the Interior signed a proclamation to establish National Bat Week at DOI (U.S. Department of the Interior, 2019). The proclamation highlighted the importance of bats, the negative effects of WNS, and the role of DOI bureaus, including the USGS, in the national response to this disease. This science strategy aligns with strategic objective 2.2 of the Department of the Interior's Strategic Plan for FY22–FY26, which states that "species, habitats, and ecosystems are protected, sustained, and healthy" (U.S. Department of the Interior, 2022, p. 31). The implementation strategy of this objective states that "The Department will protect and sustain the natural biodiversity both domestically and internationally and combat the spread of wildlife disease" (U.S. Department of the Interior, 2022, p. 31).

USGS Science Strategy To Address White-Nose Syndrome and Bat Health in 2025–2029

The USGS is supporting the national WNS response through four science goals. This science strategy expounds upon those goals, objectives, and proposed actions, and also highlights some of the current efforts to meet them.

The goals of the science strategy are to (1) provide situational awareness on the health of bat populations; (2) conduct ecological studies of bats along the gradient of disease vulnerability; (3) contribute actionable science that promotes bat resiliency; and (4) implement an adaptive, holistic approach to bat health (fig. 1). The centers and cooperative research units of the USGS are responsible for conducting these activities and are listed for each of the current efforts below.

Science Goal 1: Provide Situational Awareness on the Health of Bat Populations

Science Goal 2: Conduct Ecological Studies of Bats Along the Gradient of Disease Vulnerability

Science Goal 3: Contribute Actionable Science To Enhance the Resiliency of Bat Populations

Science Goal 4: Implement an Adaptive, Holistic Approach to Bat Health

Figure 1.   Diagram depicting the four science goals of this U.S. Geological Survey Science Strategy To Address White-Nose Syndrome and Bat Health in 2025–2029.

Science Goal 1: Provide Situational Awareness on the Health of Bat Populations

USGS scientists collect, curate, and maintain disease and bat distribution data to enhance situational awareness for managers, decision makers, and the public. A key step to understanding and mitigating the effects of WNS on U.S. bat populations is the creation and maintenance of products that summarize data on WNS and bat populations, which are collected by diverse partners throughout the Nation.

Objective 1.1: Curate data and maps of bat disease, distribution, and activity

Action 1.1.1: Provide WNS and bat health data visualization tools

Current effort: Maintaining maps that document the spread of WNS, which are available at https://www.whitenosesyndrome.org/ (Fort Collins Science Center [FORT])

Current effort: Maintaining Wildlife Health Information Sharing Partnership – event reporting system (WHISPers; available at https://whispers.usgs.gov/home), a curated database of wildlife mortality events across the Nation. WHISPers tracks bat mortality events, including those not attributed to WNS, for a more comprehensive picture of bat health stressors (National Wildlife Health Center [NWHC]).

Action 1.1.2: Provide data and maps on bat distribution and activity collected through NABat

Current effort: Maintaining the NABat Data Inventory Tool, which is available at https://sciencebase.usgs.gov/nabat/#/data/inventory (FORT)

Current effort: Developing data fusion or integrated species distribution models that incorporate all data sources to inform summertime status and temporal trend estimation. Model development can be extended to determine the effects of WNS on both occurrence and abundance for at-risk species. Data sources include capture records, acoustic data (USFWS regulatory clearance surveys, NABat mobile transect, and NABat stationary acoustic), and NABat summer maternity colony counts (Northern Rocky Mountain Science Center [NOROCK] and FORT).

Action 1.1.3: Link WNS surveillance data to NABat data on bat population status and trends to enhance understanding of the effects of WNS on bats

Current effort: Tracking bat species status and trends to understand the initial and ongoing responses to WNS and management actions via NABat (FORT)

Current effort: Developing a predictive model of Pd occurrence to future population dynamics (FORT and Colorado Cooperative Research Unit [CRU])

Current effort: Developing a framework to jointly model the spread of WNS in relation to bat relative activity. This work is a case study using acoustic NABat data and WNS surveillance data collected in Montana (NOROCK).

Objective 1.2: Engage with States and Tribal Nations to heighten awareness of bat health and improve the WNS response

Action 1.2.1: Engage with Tribal Nations

Current effort: Creating situational awareness with Native American Tribes to improve the WNS response via workshops with Tribal partners (FORT)

Current effort: Partnering with the Navajo Nation to assess bat communities and conduct WNS surveillance (Virginia CRU)

Action 1.2.2: Engage with State wildlife management agencies

Current effort: Regularly engaging with the Bat Working Group (https://www.fishwildlife.org/afwa-acts/afwa-committees/bat-working-group) and the Fish and Wildlife Health Committee (https://www.fishwildlife.org/afwa-acts/afwa-committees/fish-wildlife-health-committee) of the Association of Fish and Wildlife Agencies (EMA, FORT, NWHC)

Current effort: Collaborating with State agencies for bat field research, disease surveillance and monitoring, and structured decision making (all science centers represented on the USGS WNS and Bat Health Science Team)

Objective 1.3: Develop and use minimally invasive tools to detect Pd as an early detection surveillance tool

Action 1.3.1: Detect Pd in environmental samples

Current effort: Optimizing USGS-developed methods to enhance detection of Pd in pooled guano at summer roosts as a surveillance strategy and analyze detection data to understand implications for disease transmission (NWHC)

Action 1.3.2: Establish surveillance for the detection of Pd and WNS in bats

Current effort: Refining an adaptive sampling framework based on previous data for the early detection of Pd and spread of WNS in the western United States (NWHC)

Current effort: Developing a biotechnology-based method to detect Pd from bat guano and skin swabs as a surveillance strategy (Wetland and Aquatic Research Center [WARC])

Current effort: Establishing Pd surveillance in areas with new detections with the goal of determining how prevalence and pathogen load vary over time for bat species in the western United States. This work helps to target disease intervention and conservation efforts (NWHC).

Science Goal 2: Conduct Ecological Studies of Bats Along the Gradient of Disease Vulnerability

USGS scientists develop and maintain targeted monitoring programs to understand bat distribution, activity, and ecology along the gradient of areas where WNS is established to vulnerable areas where WNS is not established. Bat monitoring programs tie bat ecology and dynamics to disease gradients and other stressors to bat health from local to regional scales. Integration of acoustic monitoring (NABat as well as local efforts), roosting ecology, and other ecological studies with WNS surveillance efforts is critical to quantifying the effects of disease and other stressors on bat populations nationwide. Part of developing appropriate conservation and management strategies for bat health is understanding the ecology of persisting species and mechanisms for resistance to WNS.

Objective 2.1: Develop, test, and maintain methods and statistical tools for acoustic monitoring of bats in areas where WNS is established and areas where WNS is not established

Action 2.1.1: Develop appropriate methods for monitoring bat populations where WNS is established

Current effort: Developing and refining bat acoustic survey methods in field and controlled laboratory settings to inform USFWS on the necessary level of effort for effective acoustic monitoring and mist net monitoring for populations of the endangered Indiana bat, the endangered northern long-eared bat, the proposed endangered tricolored bat, and the under review little brown bat (*Myotis lucifugus*) that have been negatively affected by WNS (Virginia CRU)

Action 2.1.2: Develop statistical tools to support interagency bat monitoring efforts on the leading edge of where WNS has spread as well as in WNS-free areas

Current effort: Providing technical assistance for bat population monitoring efforts of DOI (BLM, NPS, USFWS) and other interagency partners within the Northwest Bat Hub (https://osucascades.edu/HERS/northwest-bat-hub) (NOROCK)

Current effort: Collaborating with Montana Fish, Wildlife & Parks; USFS; BLM; Montana Natural Heritage Program; and non-governmental organizations on conducting and analyzing summertime acoustic monitoring to assess the effects of WNS before and after its detection in Montana (NOROCK)

Current effort: Developing statistical models that reduce the cost of processing bat acoustic datasets and harness more of the information for assessing the effects of disease, wind energy development, and habitat alterations on relative activity and (or) abundance (NOROCK)

Objective 2.2: Conduct bat acoustic monitoring and ecological studies on the leading edge of where WNS has spread in the western United States

Action 2.2.1: Engage in research with cooperating agencies in the western United States to understand bat ecology in currently WNS-free areas or on the leading edge of where WNS has spread

Current effort: Examining seasonal roosting ecology of western bats at risk of WNS infection across habitat and elevational gradients in presumed WNS-free areas in parallel with WNS surveillance efforts (Western Ecological Research Center [WERC])

Current effort: Supporting NPS efforts to monitor western Washington bat populations by developing and helping to implement acoustic monitoring programs in and around Washington's national parks to understand patterns and drivers of bat distribution and activity (Forest and Rangeland Ecosystem Science Center [FRESC])

Current effort: Building on northeastern acoustic monitoring research to support USFWS efforts to expand monitoring at the necessary level of effort to the northern plains and Rocky Mountains (Virginia CRU)

Objective 2.3: Investigate mechanisms of bat resistance to WNS in concert with studies of the ecology of persisting bat species

Action 2.3.1: Understand the ecology of persisting bat populations and species

Current effort: Determining mechanisms for survival of northern long-eared bat populations in coastal, non-karst regions of the northeastern, mid-Atlantic and southeastern United States (Virginia CRU, NWHC)

Action 2.3.2: Investigate mechanisms of bat resistance to WNS

Current effort: Investigating the role of the bat fungal microbiome in resistance to WNS (NWHC)

Objective 2.4: Identify biologically relevant populations to assess the efficacy of management action and to improve monitoring of population responses to WNS

Action 2.4.1: Identify biologically relevant bat populations for species susceptible to WNS

Current effort: Developing an analytical framework based on passive integrated transponder (PIT) tag mark-recapture studies in order to assess connectivity and local demography across local populations of little brown bats in Colorado (FORT) and cave myotis (*Myotis velifer*) in Texas, Oklahoma, and Kansas (FORT and NWHC)

Current effort: Analyzing population genetics data to assess connectivity and local demography of the northern long-eared bat along the Atlantic Ocean coast and the little brown bat throughout the northeastern United States (Virginia CRU)

Science Goal 3: Contribute Actionable Science To Enhance the Resiliency of Bat Populations

USGS scientists develop direct management and decision-support tools to address bat conservation in the face of WNS and other threats to bat health. A critical component of working towards a resilient U.S. bat community is the development of tools that aid in prevention, treatment, and evidence-based management decision making related to the spread of WNS and the maintenance of hardy bat populations. This goal emphasizes both development of direct management tools to mitigate the spread of WNS as well as decision-support tools to determine appropriate management strategies for differing levels of disease prevalence.

Objective 3.1: Develop and test direct management tools to address WNS or enhance bat resiliency

Action 3.1.1: Develop and test a WNS vaccine

Current effort: Developing and testing potential vaccine delivery methods for bats (NWHC)

Current effort: Assessing the efficacy of the WNS vaccine in the field (NWHC)

Action 3.1.2: Utilize innovative approaches (for example, biotechnology) to reduce or inhibit the ability of Pd to infect and (or) cause disease in bats

Objective 3.2: Develop decision-support tools to relate management decisions to bat conservation

Action 3.2.1: Develop decision strategies for effective WNS response

Current effort: Utilizing decision analysis to understand how management decisions may vary based on the pathogen progression zone, which includes the presumed WNS-free area, leading edge of WNS spread, and established area (Eastern Ecological Science Center [EESC])

Action 3.2.2: Identify and address important data gaps to provide natural resource partners with the information required to make sound decisions

Science Goal 4: Implement an Adaptive, Holistic Approach to Bat Health

The USGS WNS and Bat Health Science Team engages in cross-disciplinary and collaborative lines of research to advance bat health, resiliency, and conservation. Increases in collaboration and communication across scientific disciplines and organizations allow researchers to leverage capacity and resources; conduct meta-analyses and syntheses to adapt evidence-based management strategies; and improve management outcomes.

Objective 4.1: Enhance coordination and collaboration within the USGS

Action 4.1.1: Engage in quarterly science calls and regular workshops to communicate science, make research connections, and advance shared goals within the USGS

Objective 4.2: Integrate data to help understand the effects of disease on bats and the ecosystem services they provide

Action 4.2.1: Facilitate workshops for collaborative analyses and synthesis of data on bats and other taxa with the aim of understanding if WNS or other stressors to bat health affect their ecosystem services (for example, insect control)

Objective 4.3: Contribute to actionable management outcomes that improve bat conservation efforts

Action 4.3.1: Develop collaborative regional or national evidence-based bat management workplans to connect and leverage the interdisciplinary efforts that overlap (for example, forest management and vaccine application) in relation to the disease status of an area (for example, the WNS-established area, presumed WNS-free area, and leading edge of where WNS has spread)

Objective 4.4: Understand the implications of co-infections (for example, coronaviruses, rabies, and WNS) for bat health

Action 4.4.1: Leverage NABat to conduct surveillance of pathogens in bats

Current effort: Assessing the prevalence of coronaviruses in little brown bats (Virginia CRU)

Current effort: Utilizing the NABat sampling framework to track bats and coronaviruses (https://www.usgs.gov/mission-areas/ecosystems/science/tracking-bats-and-coronaviruses) (FORT)

Current effort: Examining the virome and viral ecology of less-studied bats of the Western United States on the leading edge of where WNS has been detected (WERC)

Photograph of researchers testing acoustic microphones, which record bat calls and can help identify bat species and estimate their population sizes. This information is integral to the North American Bat Monitoring Program (NABat). Photograph by Frankie Tousley, U.S. Geological Survey.

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Glossary

biotechnology   The use of biology to solve problems by producing new tools or methods.

North America Bat Monitoring Program (NABat)   An international, multiagency coordinated monitoring plan for bats in North America that relies on standard procedures and a network of collaborators to track bat status.

***Pseudogymnoascus destructans* (Pd)**   The cold-loving fungus that causes white-nose syndrome in bats.

resiliency   The ability to cope with and bounce back from stressful situations.

white-nose syndrome (WNS)   A disease in bats that is caused by the fungus *Pseudogymnoascus destructans*.

Photograph of a hibernating bat in a mine in Massachusetts. Photograph by Kimberli Miller, U.S. Geological Survey.

Appendixes 1–3

Appendix 1. Selected Publications by U.S. Geological Survey Researchers on White-Nose Syndrome and Bat Health From 2009 to 2024

Appendix 2. Members of the U.S. Geological Survey White-Nose Syndrome and Bat Health Science Team

Appendix 3. Congressional Language Mandating U.S. Geological Survey Studies of White-Nose Syndrome for Fiscal Years 2014–2023

Appendix 1.   Selected Publications by U.S. Geological Survey Researchers on White-Nose Syndrome and Bat Health From 2009 to 2024

This list shows the breadth of work by U.S. Geological Survey authors on white-nose syndrome from 2009 to 2024.

2009

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Photograph of a healthy and banded little brown bat (*Myotis lucifugus*) hanging in a cave. Photograph by Paul Cryan, U.S. Geological Survey.

Appendix 2.   Members of the U.S. Geological Survey White-Nose Syndrome and Bat Health Science Team

U.S. Geological Survey (USGS) scientists from across the Nation have contributed to the USGS Science Strategy To Address White-Nose Syndrome and Bat Health in 2025–2029. The names of the members of the USGS White-Nose Syndrome and Bat Health Science Team are listed below along with their organizational affiliations in parentheses.

M. Camille Hopkins, Project Manager (USGS Headquarters, Ecosystems Mission Area)

Anne Ballmann (National Wildlife Health Center)

David Blehert (National Wildlife Health Center)

Paul Cryan (Fort Collins Science Center)

Mark Ford (Virginia Cooperative Fish and Wildlife Research Unit)

Evan Grant (Eastern Ecological Science Center)

Jeff Hall (National Wildlife Health Center)

Brian Halstead (Western Ecological Research Center)

Kathryn Irvine (Northern Rocky Mountain Science Center)

Ariel Leon (National Wildlife Health Center)

Jeff Lorch (National Wildlife Health Center)

Rebecca McCaffery (Forest and Rangeland Ecosystem Science Center)

Brian Reichert (Fort Collins Science Center)

Gabriel Reyes (Western Ecological Research Center)

Katherine Richgels (National Wildlife Health Center)

Tonie Rocke (National Wildlife Health Center)

Bethany Straw (Fort Collins Science Center)

Wayne Thogmartin (Upper Midwest Environmental Sciences Center)

Ernest Valdez (Fort Collins Science Center)

Daniel Walsh (Montana Cooperative Wildlife Research Unit)

David Wiens (Forest and Rangeland Ecosystem Science Center)

Photograph of a researcher collecting samples from a bat colony in a Vermont cave where white-nose syndrome is known to be present. Photograph modified from Kimberli Miller, U.S. Geological Survey.

Appendix 3.   Congressional Language Mandating U.S. Geological Survey Studies of White-Nose Syndrome for Fiscal Years 2014–2023

This appendix provides a summary of direction and funding from Congress to the U.S. Geological Survey for fiscal years 2014–2023 to support studies of white-nose syndrome.

Table 3.1 has quotations from Congressional reports and links to the sources.

Table 3.1.   List of House and Senate reports along with final appropriations legislation mentioning white-nose syndrome in bats for fiscal years 2014–2023.

[Terms: FY, fiscal year; WNS, white-nose syndrome]

Type of report	Quotation from Congressional report	Uniform resource locator (URL)
FY 2023		
House report 117–400, p. 41	Funding for research on Coral Disease, White Nose Syndrome, and Greater Everglades Invasive species is maintained at the enacted level.	https://www.congress.gov/congressional-report/117th-congress/house-report/400/1
Consolidated Appropriations Act 2023, Public Law 117–328	… funding is continued at the enacted level for white-nose syndrome (WNS) research and the direction found in Senate Report 116-123 is continued for WNS research.	https://www.govinfo.gov/content/pkg/CPRT-117HPRT50348/html/CPRT-117HPRT50348.htm
FY 2022		
House report 117–83, p. 41	Funding for research on Coral Disease, White Nose Syndrome, and Greater Everglades Invasive species is maintained at the enacted level …	https://www.congress.gov/committee-report/117th-congress/house-report/83/1
Consolidated Appropriations Act 2022, Public Law 117–103, p. 1436	Funding is continued at the enacted level for white-nose syndrome (WNS) research and the direction found in Senate Report 116–123 is continued for WNS research.	https://www.govinfo.gov/content/pkg/CPRT-117HPRT47048/pdf/CPRT-117HPRT47048.pdf
FY 2021		
House report 116–448, p. 44	Funding for research on Coral Disease, White Nose Syndrome, and Greater Everglades Invasive species is maintained at the enacted level.	https://www.congress.gov/116/crpt/hrpt448/CRPT-116hrpt448.pdf
Consolidated Appropriations Act 2021, Public Law 116–68, p. 50–51	Of the funds provided for the new Biological Threats and Invasive Species Research program, the Committee recommends maintaining funding at the fiscal year 2020 enacted level of $3,748,000 for White-nose syndrome [WNS] research. The Survey shall utilize best practices developed in response to WNS and apply such response to other new and emerging high-risk wildlife diseases.	https://www.appropriations.senate.gov/imo/media/doc/INTRept.pdf
FY 2020		
Senate report 116–123, p. 45	Funding for white nose syndrome is increased by $500,000 to assist the Survey in leading and implementing the North American Bat Monitoring Program in association with other Federal natural resource management agencies and offices, States, and non-governmental partners.	https://www.congress.gov/congressional-report/116th-congress/senate-report/123/1?outputFormat=pdf
Further Consolidated Appropriations Act 2020, p. 24–25	The agreement provides … $3,748,000 for White Nose Syndrome research …	https://docs.house.gov/billsthisweek/20191216/BILLS-116HR1865SA-JES-DIVISION-D.pdf

Table 3.1.   List of House and Senate reports along with final appropriations legislation mentioning white-nose syndrome in bats for fiscal years 2014–2023.—Continued

[Terms: FY, fiscal year; WNS, white-nose syndrome]

Type of report	Quotation from Congressional report	Uniform resource locator (URL)
FY 2019		
Senate report 115–276, p. 38	Within the wildlife program, $250,000 is included above the enacted level of $2,998,000 to continue White Nose Syndrome studies; funds appropriated shall continue to help lead and implement the North American Bat Monitoring Program in association with other Federal natural resource management agencies and offices, States, and nongovernmental partners.	https://www.congress.gov/congressional-report/115th-congress/senate-report/276/1?q=%7B%22search%22%3A%22senate+report+115-276%22%7D&s=5&r=1
Consolidated Appropriations Act 2019, report 116–9, p. 725	The agreement maintains the Senate funding level and direction on white nose syndrome …	https://www.congress.gov/116/crpt/hrpt9/CRPT-116hrpt9.pdf
FY 2018		
Consolidated Appropriations Act 2018, p. H2609 and p. H2616	p. H2609, White-Nose Syndrome.—The four Federal land management agencies and the U.S. Geological Survey are expected to continue to prioritize research on, and efforts to address, white-nose syndrome in bats and to work with other Federal, State, and non-governmental partners to implement the North American Bat Monitoring Program. p. H2616, The agreement also includes an increase of $500,000 from within available funds to address white-nose syndrome in bats.	https://www.congress.gov/crec/2018/03/22/CREC-2018-03-22-bk2.pdf
FY 2017		
Consolidated Appropriations Act 2017, p. 1109	*Ecosystems*.—The bill … includes an increase of $250,000 to address white-nose syndrome in bats …	https://www.govinfo.gov/content/pkg/CPRT-115HPRT25289/pdf/CPRT-115HPRT25289.pdf
FY 2016		
House report 114–170, p. 33	*White-Nose Syndrome in bats*.—The Committee provides requested funds to support efforts to understand and respond to white-nose syndrome.	https://www.govinfo.gov/content/pkg/CRPT-114hrpt170/pdf/CRPT-114hrpt170.pdf
Senate report 114–70, p. 30	Within the wildlife program an additional $500,000 is provided to continue White Nose Syndrome studies.	https://www.congress.gov/114/crpt/srpt70/CRPT-114srpt70.pdf
Consolidated Appropriations Act 2016, p. H10216	*Ecosystems*.—The bill … includes an increase of $500,000 to address white-nose syndrome in bats …	https://www.congress.gov/crec/2015/12/17/CREC-2015-12-17-bk3.pdf
FY 2015		
Consolidated and Further Continuing Appropriations Act 2015, p. H9764	*Ecosystems*.—Within the Ecosystems activity, $1,005,000 is provided to address white-nose syndrome in bats …	https://www.congress.gov/113/crec/2014/12/11/CREC-2014-12-11-bk2.pdf
FY 2014		
Consolidated Appropriations Act 2014, p. H974	*Ecosystems*.—Within the Ecosystems activity, an additional $505,000 is provided to address white-nose syndrome in bats …	https://www.congress.gov/113/crec/2014/01/15/160/9/CREC-2014-01-15-bk2.pdf

Photograph of a high-frequency radio-telemetry tracking tag on a migratory hoary bat (*Lasiurus cinereus*). These tags help researchers understand how this species moves along the Pacific Ocean coast. Photograph by U.S. Geological Survey.