



BATS FOR THE FUTURE FUND **PROGRAM REPORT**



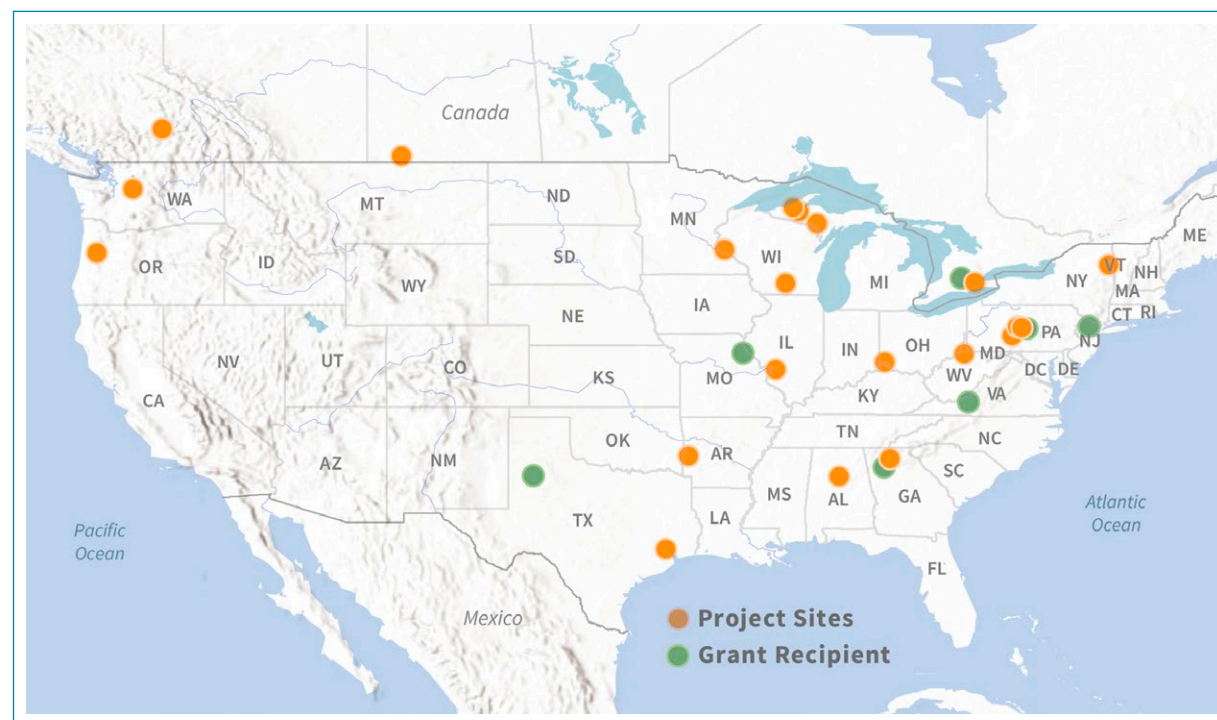
OUR PROGRAM

The Bats for the Future Fund provides funding for existing and novel treatments for white-nose syndrome, a disease that has killed millions of bats over the past 16 years.

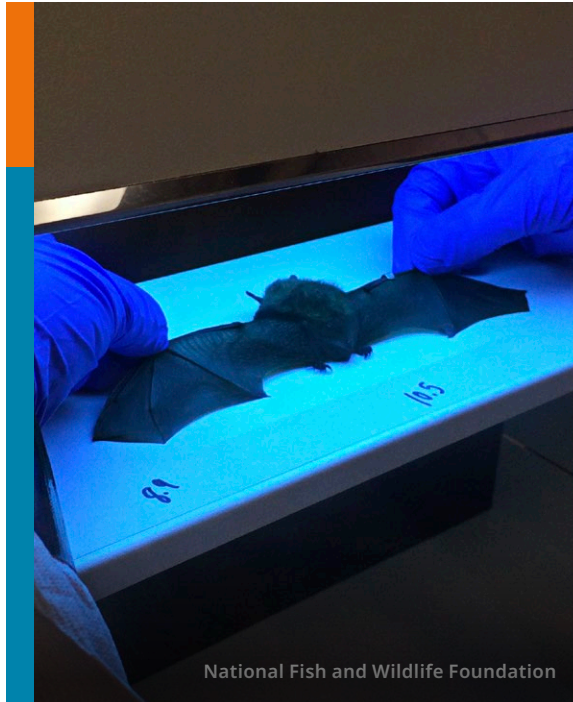
Bats play a crucial role in North America by controlling insect pests that can degrade agricultural operation, forest health, and quality of life. Recent studies estimate that bats eat enough pests to save United States agriculture more than \$3.7 billion per year in crop damage and pesticide costs. Their services are worth \$1 billion a year to the national corn industry alone.

FIGURE 1

Bats for the Future Fund 2017-2023 Project Locations



OUR PROGRAM



UV light treatment on little brown bat

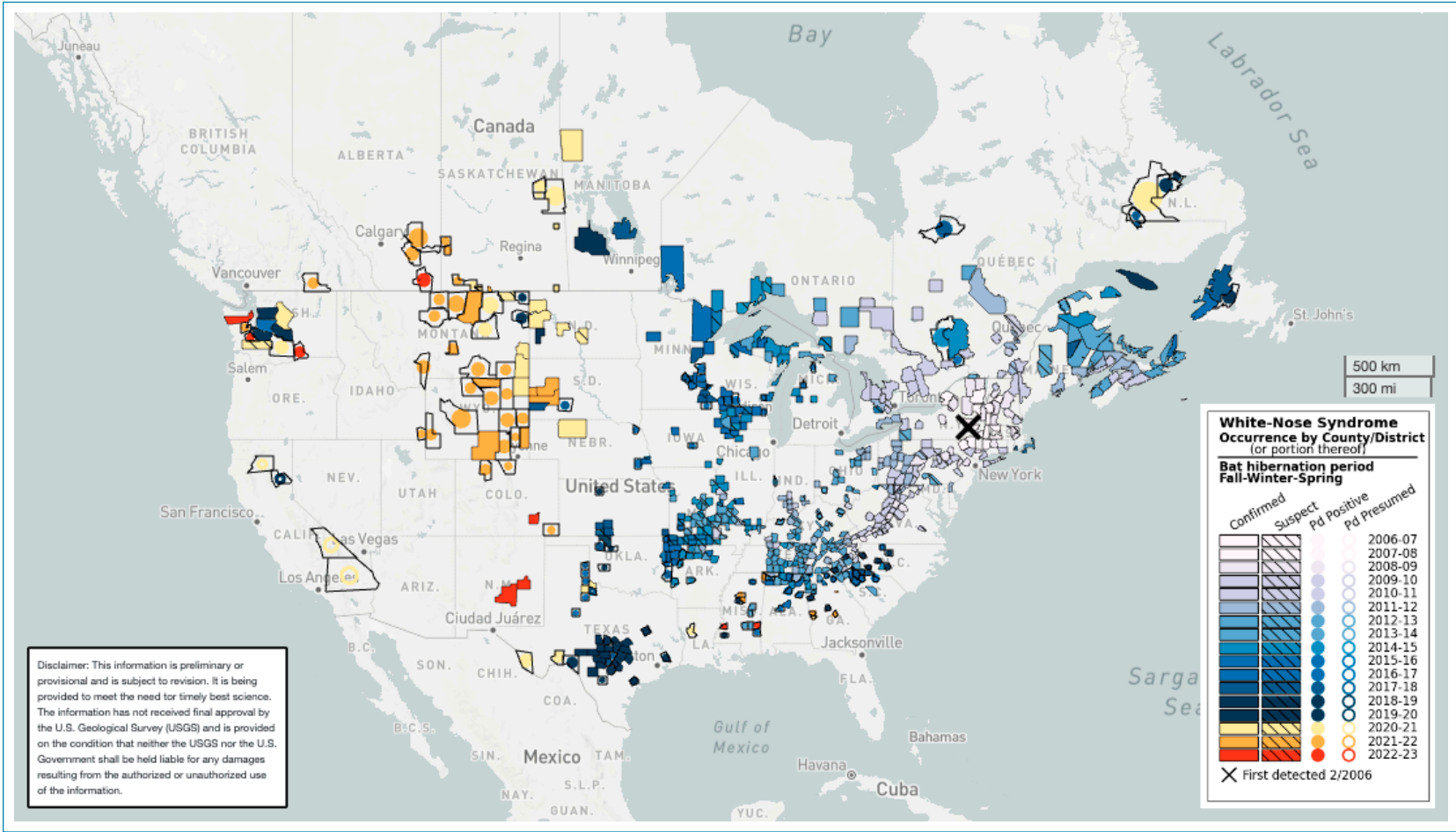
Millions of bats have died over the past 16 years. In some sites where white-nose syndrome (WNS) has been detected, up to 100% of bats have disappeared. Since signs of the disease were first documented in New York in 2006, WNS has spread rapidly to 40 states and eight Canadian provinces. Most recently, it was confirmed in New Mexico in 2023 and in Idaho and Colorado in 2022.

WNS is caused by a cold-loving fungus called *Pseudogymnoascus destructans* (Pd) that infects hibernating bats. More than half of the bat species in the United States and Canada hibernate to survive the winter and are potentially susceptible to this disease. Without a solution to this devastating problem, several bat species may be in danger of extinction.

The Bats for the Future Fund (BFF) was established in 2017 to pool public and private dollars and provide grant funding to slow or halt WNS's spread in North America and promote the survival and recovery of WNS-affected bats. BFF's objectives include implementing field treatments, management tools, and conservation strategies that promotes survival and recovery of WNS affected bats. BFF also supports innovative and collaborative research leading to development and deployment of treatments and management tools or strategies for WNS that will perpetuate viable bat populations.

FIGURE 2

White-Nose Syndrome Spread Map 2006-2023





OUR PROGRAM



The BFF program focuses on three areas:

1. Where Pd has not been detected and is unlikely to already be present.
2. On the leading edge of WNS and/or in the vicinity of where Pd fungal pathogen has been detected and bats may be affected.
3. In the established or endemic area, where Pd and WNS have caused significant mortality and all hibernacula are assumed to be impacted.

BFF has awarded over \$4.8 million to 25 projects, which generated some \$3.4 million

in matching funds for a total conservation impact of more than \$8.2 million. The projects support research, treatments, tools, and strategies to promote bat survival and recovery.

BFF has led to several exciting developments in reducing the impacts of WNS in North America. Projects successfully tested potential management tools to address WNS, including the use of ultraviolet light, vaccines, probiotics, volatile organic compounds, and synthetic compounds to reduce the impacts of Pd.

OUR
INVESTMENTS

The U.S. Fish and Wildlife Service provides significant funding for the Bats for the Future Fund, with additional funding from NextEra Energy, the U.S. Bureau of Land Management, Southern Company, and the Avangrid Foundation.

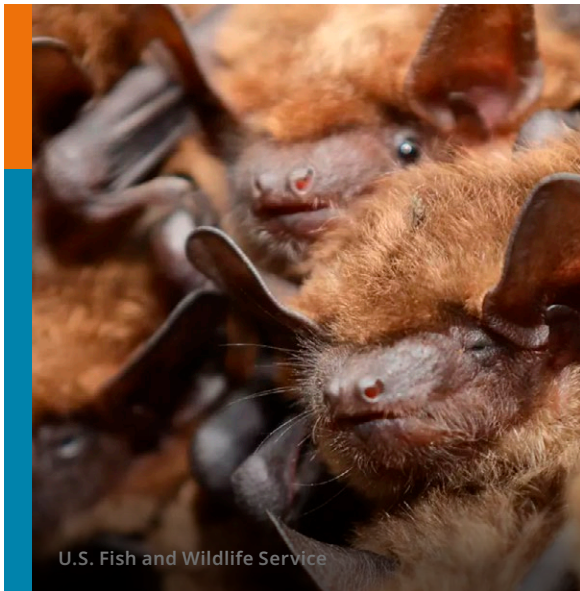


FIGURE 3

Bats for the Future Fund 2017-2023 Funding Snapshot

Organization	Amount
Federal Funding	\$3,600,000
Non-Federal Funding	\$1,200,000
Grantee Matching Contributions	\$3,400,000



OUR GRANTS

The following grants advance treatments and management tools that provide potential to improve bat survival by preventing exposure to Pd and/or enhancing bats' ability to withstand WNS.

CLOSED GRANTS: 57474, 57614, 57740, 57768, 61348, 61353

ACTIVE GRANTS: 61358, 66677, 66731

GRANT NUMBER: 57474-CLOSED

Grantee Organization:
Lock Haven University of Pennsylvania

Project Title: Testing Polyethylene Glycol in Inhibiting Growth of Pd (PA)

Project Summary: Lock Haven University tested polyethylene glycol to control Pd. The researchers, in Pennsylvania, evaluated these compounds' capacity to inhibit Pd growth in bat habitats. They also researched the effectiveness of applying these compounds in reducing fungus and infection in bats, and unintended effects of polyethylene glycol to learn whether it can be used to control Pd. Project results were consistent with the expected outcomes of a successful treatment and suggest limited unintended effects. The results warrant expanded field study, which the university has started as a follow-up study.

Funding Amount: \$74,424

GRANT NUMBER: 57614-CLOSED

Grantee Organization:
Thompson Rivers University

Project Title: Developing a Probiotic Approach to Reduce Severity of WNS in Bats (Canada)

Project Summary: Thompson Rivers University developed a probiotic cocktail using bacteria and fungi naturally found on healthy bat wings and applied it to bat roosts in Canada to prevent or minimize WNS infection. The researchers successfully tested this probiotic and concluded that it is safe for bats and effective at preventing fungal growth. The developed application method is inexpensive and is expected to be easy to replicate elsewhere.

Funding Amount: \$149,133

GRANT NUMBER: 57740-CLOSED

Grantee Organization:
U.S. Forest Service

Project Title: Development of Ultra-Violet Light as a Treatment for White-Nose Syndrome in Bats (PA, WI)

Project Summary: The U.S. Forest Service tested whether ultraviolet (UV) light could be used to kill Pd, while minimizing impacts to normal skin microbes found on bats in Wisconsin and Pennsylvania. The researchers assessed if this was a cost-effective control strategy for increasing survival of WNS-affected bats. The study found that UV treatments significantly reduced the amount of fungus on the bats. Overall, the results are promising.

Funding Amount: \$137,557

OUR GRANTS

GRANT NUMBER: 57768-CLOSED

Grantee Organization: Western Michigan University

Project Title: Field Application of Chitosan to Halt the Progression of WNS in Bats (MI,TX)

Project Summary: Western Michigan University tested the treatment chitosan (a naturally derived substance with antimicrobial, wound-healing, and anti-inflammatory properties) to determine if it could slow the progression of WNS on bats in Michigan and Texas. At sites where Pd had been found for the first time, the researchers aimed to determine whether the treatment improved bat survival and/or decreased Pd in sites where the fungus was already established.

Funding Amount: \$278,225

GRANT NUMBER: 61348-CLOSED

Grantee Organization: Bat Conservation International, Inc.

Project Title: Testing Ultraviolet Light and Polyethylene Glycol as a WNS Management Strategy (AL, AR, ON)

Project Summary: Bat Conservation International, Inc., evaluated the efficacy of using two nontoxic agents—UV light and polyethylene glycol—to treat mine walls and reduce Pd's prevalence on surfaces in bat habitats. The researchers tested the two environmental cleaning agents in three mines in Alabama, Arkansas, and Canada. Researchers have successfully conducted the experiment on the efficacy of using these nontoxic treatments to reduce the environmental load of Pd in bats.

Funding Amount: \$111,760

GRANT NUMBER: 61353-CLOSED

Grantee Organization: U.S. Geological Survey (USGS)

Project Title: Developing and Testing Delivery Methods for Vaccine Treatments to Reduce WNS in Bats (CA, WI)

Project Summary: The USGS National Wildlife Health Center designed and tested mass delivery methods for vaccines and other treatment options as a strategy to reduce the occurrence of WNS in bats. The project developed and tested an automatic spray technology device for delivering treatments to bats as they fly into habitats for fall swarm. It also assessed oral consumption of treatment and effectiveness of a topical delivery method using biomarkers. USGS has successfully developed a novel treatment delivery medium that maximizes vaccine and temperature stability, as well as adhesion to bat fur. A pilot study conducted last fall at one field site demonstrated that topical application of the treatment delivery medium combined with vaccines was safe and effective.

Funding Amount: \$399,996

OUR GRANTS

GRANT NUMBER: 61358-ACTIVE

Grantee Organization: Texas Parks and Wildlife Department

Project Title: Integrated Disease Management System Approach to Reduce WNS Mortality in Texas

Project Summary: The Texas Parks and Wildlife Department evaluated an integrated disease management approach aimed at minimizing WNS mortality among tricolored bats in Texas. The researchers use multiple mitigation approaches, including high-pressure steam cleaning, application of polyethylene glycol (PEG), and volatile organic compound (VOC) treatments to reduce the spread of and death caused by Pd fungus in bats. The results were encouraging but inconclusive due to a low prevalence and intensity of Pd in the testing sites. It was determined that PEG and VOC are both logistically feasible WNS treatment options. Work is ongoing, however, and to date the project has led to preliminary recommendations for deploying treatments in the field.

Funding Amount: \$365,642

GRANT NUMBER: 66677-ACTIVE

Grantee Organization: Temple University

Project Title: Using Polyethylene Glycol to Control the Fungus that Causes WNS in Bats (OH, PA)

Project Summary: Temple University is treating and monitoring hibernation sites used by little brown bats and other species to test polyethylene glycol's effectiveness in suppressing Pd. The researchers conducted field trials at three control sites and three treatment sites in Ohio and Pennsylvania to reduce Pd infection rate and evaluate the effects on nontarget flora and fauna. Preliminary data from the project suggests that bats have responded positively to treatment with little unintended harm to surrounding flora and fauna.

Funding Amount: \$178,724

GRANT NUMBER: 66731-ACTIVE

Grantee Organization: Kennesaw State University Research and Service Foundation

Project Title: Testing Volatile Organic Compounds to Combat WNS at Black Diamond Tunnel in Georgia

Project Summary: Kennesaw State University is implementing an integrated disease management system to increase survival of tricolored bat populations affected by WNS at Black Diamond Tunnel in Georgia. The researchers will fumigate Black Diamond Tunnel with volatile organic compounds to reduce the amount of Pd. It will compare fungus amounts and bat mortality with four other significant sites that are not receiving treatment, with the goal of reducing the fungal load to zero and reducing the mortality rate by 50%. The first rounds of treatment have shown a 25% increase in the hibernating bats population over the previous year, which is a tremendous shift in the population that had previously declined by 95% after the first detection of the fungus.

Funding Amount: \$117,422



OUR GRANTS

The following grants support innovative and collaborative research leading directly to development and deployment of treatments and management tools or strategies for WNS that will perpetuate viable populations of bats.

CLOSED GRANTS: 57472, 57737, 61166

ACTIVE GRANTS: 66724, 72572, 73256, 73296

GRANT NUMBER: 57472-CLOSED

Grantee Organization:
U.S. Geological Survey (USGS)

Project Title: Development and Testing of Vaccine Candidates to Reduce WNS in Bats (WI)

Project Summary: The USGS National Wildlife Health Center developed and evaluated several vaccines for WNS in affected bats in Wisconsin. Researchers developed a potential vaccine for affected species and tested methods for delivering a vaccine to bats to reduce Pd infection and resulting morbidity and mortality from WNS. USGS identified four potential protective antigens for Pd and constructed five separate vaccine candidates. Ultimately, two vaccines were registered with the USDA Center for Veterinary Biologics (required before field use), and researchers received authorization to conduct limited field trials.

Funding Amount: \$360,342

GRANT NUMBER: 57737-CLOSED

Grantee Organization:
Texas Tech University

Project Title: Manipulating Microclimates in Texas to Reduce Disease Severity of WNS in Bats

Project Summary: Texas Tech University investigated the feasibility of microclimate manipulation as a management tool to reduce WNS disease severity in bats. Microclimates are small, localized areas within a site where temperature and humidity differ from the surrounding area. The researchers provided information about the impact of microclimate on Pd growth, including the interacting effects of both temperature and humidity. Research showed:

1. Temperature and humidity affect both the host and pathogen in this disease system.
2. Temperature had a greater effect on fungal growth than humidity.
3. Temperature had a greater effect on bat energetics than humidity, but the most important factor was initial fat mass.

Funding Amount: \$275,302

GRANT NUMBER: 61166-CLOSED

Grantee Organization:
The Pennsylvania State University

Project Title: Understanding the Role of a Virus in the Virulence of the Fungus that Causes WNS (PA)

Project Summary: The Pennsylvania State University used Pd partitivirus (PdPV) and virus-free strains of Pd to assess the virus's role in damaging Pd genes and WNS spread. The recipients developed a virus-induced gene-silencing system using infectious clones of PdPV and developed virus-free or altered virus strains as a WNS treatment strategy.

Funding Amount: \$263,168

OUR GRANTS

GRANT NUMBER: 66724-ACTIVE

Grantee Organization:
Bat Conservation International, Inc.

Project Title: Enhancing Foraging Habitat for Bats Affected by WNS in Michigan and Canada

Project Summary: Bat Conservation International, Inc. is working to improve the survival of bats with WNS by enhancing their foraging efficiency in the fall, when bats accumulate critical fat reserves, and in spring, when bats are recovering from WNS. Over the course of the project, they deployed five seasonal insect prey patches—four in Michigan and one in Manitoba—using UV light lures outside of little brown bat habitat during fall swarm and spring emergence. The researchers hope to determine whether more insect prey improves survivability, with the goal of reducing the mortality rate from 71 percent to 30 percent. So far, researchers have found that prey patches have successfully increased local insect abundances during fall and spring and that bats are behaviorally responding to these prey patches by exhibiting increased foraging activity.

Funding Amount: \$249,995

GRANT NUMBER: 72572-ACTIVE

Grantee Organization:
Bat Conservation International, Inc.

Project Title: Creating Native Prairie in Right-of-Ways to Increase Insects for Declining Bat Populations (IL, WV)

Project Summary: Bat Conservation International, Inc. is testing improved foraging conditions for bats as a long-term and scalable strategy to improve the survival and aid recovery of bat populations impacted by WNS. The researchers will determine if restoring native plant communities on rights-of-way in Illinois and West Virginia can increase available insect prey for bats, particularly during fall and spring.

Funding Amount: \$224,999

GRANT NUMBER: 73256-ACTIVE

Grantee Organization: Rutgers,
The State University of New Jersey

Project Title: Using Whole-Room Ultraviolet Light in Mines to Reduce the Impact of WNS (MI, NJ, NY)

Project Summary: Rutgers University will test the efficacy of using UV light treatment on the fungus that causes WNS in 10 mines that host hibernating populations of little brown bats in Michigan, New Jersey, and New York. The grant recipients will test the ability of commercially available technology to benefit bats by killing or slowing growth of Pd in summer when bats are not present.

Funding Amount: \$268,661

OUR GRANTS

GRANT NUMBER: 73296-ACTIVE

Grantee Organization:
Kennesaw State University Research
and Service Foundation

Project Title: Testing the Efficacy of Aerosolized
Treatments in Reducing Prevalence of WNS (GA)

Project Summary: Kennesaw State University will
create artificial cave environments to mimic bat
hibernation conditions and evaluate the effectiveness
of aerosolized compounds in reducing Pd growth.
The funding recipients will test aerosolized versions
of existing experimental treatments like polyethylene
glycol and volatile organic compounds and evaluate
their use in future management.

Funding Amount: \$87,164





OUR GRANTS

The following grants will support innovative and collaborative research leading directly to development and deployment of treatments and management tools or strategies for WNS that will perpetuate viable populations of bats.

RECENTLY AWARDED GRANTS: 80376, 81221, 81228, 81298, 81322

GRANT NUMBER: 80376-CONTRACT PENDING

Grantee Organization:
Temple University

Project Title: Evaluate Targeted Implementation Strategies for Environmental Control of White-Nose Syndrome (OH, PA, WV)

Project Summary: Temple University will evaluate targeted implementation strategies for environmental control of Pd during the critical period of early winter and develop specific protocols for intervention. The researchers will implement treatment using polyethylene glycol in 40 habitats to protect 622 little brown bat, big brown bat, and tricolored bats within contaminated habitats and reduce or delay environmental transmission of the fungus.

Grant Amount: \$332,600

GRANT NUMBER: 81221-CONTRACT PENDING

Grantee Organization:
Bat Conservation International, Inc.

Project Title: Advancing Recovery of Two Bat Species through Comprehensive Foraging Habitat Management in Pennsylvania (PA)

Project Summary: Bat Conservation International, Inc. will collaborate with the Pennsylvania Game Commission to identify and incorporate key foraging habitats near summer and winter roosts as part of a state-wide management plan for recovering little brown and tri-colored bats, two species severely impacted by WNS. The researchers will identify sites by assessing the quality of insect prey during the summer and fall and monitor 12 sites when bats are active and building up fat reserves for hibernation.

Grant Amount: \$299,700

GRANT NUMBER: 81288-CONTRACT PENDING

Grantee Organization:
Missouri Conservation Heritage Foundation

Project Title: Protecting and Enhancing Hibernaculum for Indiana Bats in the Sodalis Nature Preserve (MO)

Project Summary: The Missouri Conservation Heritage Foundation will utilize their existing partnerships with U.S. Fish and Wildlife Service and others to enhance habitats through tree planting and various forest-management strategies to promote tree species important for roosting habitat in the Indiana bat lifecycle. The funding recipients will implement invasive species removal, carry out prescribed burns, engage dozens of private landowners in creating a buffer and enhance the conservation management plan for the Sodalis Nature Preserve.

Grant Amount: \$466,800

OUR GRANTS

GRANT NUMBER: 81298-CONTRACT PENDING

Grantee Organization:
Wildlife Conservation Society Canada

Project Title: Field Implementation of a Probiotic Treatment to Reduce Fungal Infection in Bats (BC, WA)

Project Summary: Wildlife Conservation Society Canada will implement a probiotic treatment cocktail in 11 bat maternity colony study sites in British Columbia and Washington state and refine protocols in preparation for potential upscaling of this disease management tool. The researchers will tag individual bats, spray substrates in colonies, and continue to refine and compare annual per-site survivorship rates to eventually quantify the disease management tool's efficacy to reduce deaths caused by WNS.

Grant Amount: \$231,100

GRANT NUMBER: 81322-CONTRACT PENDING

Grantee Organization:
University of Waterloo

Project Title: Assessing the Long-term Persistence in Hibernacula of the Fungus Causing White-Nose Syndrome (ON)

Project Summary: University of Waterloo will determine the long-term persistence of Pd in bat habitats in North America. University researchers will provide insight into whether bats are still being exposed to the fungus from environmental reservoirs in habitats in the WNS endemic zone, which will guide decision making on whether it is necessary to treat sites that have shown a decline in fungal presence since it was detected four years ago.

Grant Amount: \$132,200



For additional information about the Bats for the Future Fund, please call us at:
202-857-0166 or visit our website at: **nfwf.org/programs/bats-future-fund**

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