



Heroes of the Night Sky

Background

EXPLORATION QUESTION

Why are bats valued by people around the world and what types of conservation organizations are working to conserve both bats and their habitats?

MATERIALS

- Heroes of the Night Sky Student Reading Pages and Questions
- K-W-L Chart
- Bat Champion Organization Profiles
- Design Your Own Bat Conservation Organization Worksheet and Rubric
- Pencils
- Library and Internet Access for Student Research

OVERVIEW

Students will gather information on various organizations dedicated to bat conservation based upon their own interests; explore the purposes of these organizations; research their successes; and design their own bat conservation organization. This will require students to work collaboratively to develop goals, a mission statement, logo, and strategy for achieving success for their newly created organization.

VOCABULARY

Ecosystem, guano, hibernation, invertebrates, keystone species, microorganisms, nectar, non-native invasive species, pollination

GROUP SIZE

6 - 100

AGE

14 and above

Background

Read the Heroes of the Night Sky Student Reading Pages included in this packet before handing them out to students.

Get Ready – Gather Materials

- Make a copy of the K-W-L Chart, Heroes of the Night Sky Student Reading Pages, and Student Reading Questions for each **student**.
- Make a copy of each of the Bat Champion Organization Profiles, the Design Your Own Bat Conservation Organization Worksheet, and the Rubric for Design Your Own Bat Conservation Organization Marketing Tool for each **student group**.

Get Set –Exploring Interests

1. Provide students with copies of the K-W-L Chart and have each of them list what they already know about bats, bat habitats, and bat behavior in the “K” column. Examples could be their ability to use echolocation, that they are nocturnal mammals, or that they eat insects.
2. Ask the students questions like, “Have you ever seen bats flying in your backyard or in the woods? Have you ever gone to see a bat flight?” Encourage them to write down additional information about bats based upon these experiences.
3. Ask students what types of things they would like to learn about bats. They should write down their answers in the “W” Section of the K-W-L Chart. These answers will help guide their research later in this activity.
4. Provide each student with a copy of the Student Reading Pages and Student Questions.
5. After they finish the reading, ask students to complete the reading comprehension questions.
6. Briefly discuss some of the reasons that bats are important such as ecological, scientific, economic, aesthetic, and cultural values.
7. Have the students record additional topics that they would like to learn about bats in the “W” section of the K-W-L Chart.
8. To extend this learning, have students watch the “I’m Batman” video lesson at <http://ed.ted.com/lessons/i-m-batman-amy-wray>. This short video can be followed up with the questions included under the “Think” lesson plan.

Get Even More Set –Research Existing Bat Conservation Organizations

1. Divide the class into research teams of 3-5 students. Provide a set

of the Bat Champions Organizational Profiles to each group. Each team will read the profiles and select one of the nine organizations to focus on. If possible, make sure that each organization is covered. If you have only a few groups of students make sure that several types of organizations are selected (e.g., non-profit, state, and federal).

2. Tell the students that they will be putting together a 2-3 page report on the conservation organization that they select. Students will use the information on the organizational profile as a starting point, but they will need to complete further research. Additional research topics are included at the end of each organizational profile. These can be used to stimulate discussion or to guide research. However, students should focus on the topics that they identified in the “W” Section of their K-W-L Chart. The following are also examples of different research approaches that students may consider:

- a. Research a bat species that is of interest to the conservation organization.
- b. Interview a member of the organization to learn more about the types of projects and activities the organization is involved in that are geared towards habitat protection or conservation.
- c. Find more information about the research conducted by the organization on bat ecology by researching the organization’s website and social media.
- d. Research the methods used by the organization to increase awareness and understanding about the importance of bats. Are there better techniques that could be used?
- e. Research how the organization is involved with the disease, White-Nose Syndrome.

Go! – Design Your Own Bat Conservation Organization

1. Give each team a copy of the Design Your Own Bat Conservation Organization Worksheet. They will use this sheet along with their K-W-L Chart to design their own bat conservation association. Each group will develop a marketing tool that fully describes the organization, such as a pamphlet, poster, PowerPoint presentation,

newsletter, or website.

2. Each student group should present their conservation organization and marketing tool to the class. The name, logo, mission, and plan of action should be included in the presentation. We encourage you to allow student groups to be creative and decide what type of marketing tool to design. However, the Rubric for Design Your Own Bat Conservation Organization Marketing Product will provide a framework to help students develop their products and will assist you in evaluating the final outcomes.

3. After students turn in their marketing tools, ask them what they learned during their research about bats, bat habitats, threats to bats, and the people that work to protect them. Students should write down their answers in the “L” Section of the K-W-L Chart.

4. Display each group’s marketing product in your classroom, hallway, or library. You might even work with your county library, a local art museum, or other facility to arrange to have them exhibited. This will allow you to highlight the students’ work and to reach others in your community. Depending on the space available, you could also include brochures, handouts, and posters from actual bat conservation organizations.

5. Encourage your students to post pictures of their final products on the Project Edubat Facebook page at: <https://www.facebook.com/ProjectEduBat>.

Reflect – Student Assessment

1. Completely record data in all columns of the K-W-L Chart.
2. All questions answered correctly and completely on the Student Questions Pages.
3. Students can persuasively describe multiple ways that bats are important.
4. Final score of 2.75 or higher on the Design Your Own Bat Conservation Organization Marketing Product.
5. Formalized research based on the information listed in the “W” Section of the K-W-L Section.

Students can answer the following questions:

6. Why do people start conservation groups? Give at least two reasons.
7. What are 3-4 different ways in which bat conservation organizations help protect bats?

8. What can you do through a conservation organization to help protect bat populations and habitat?
9. What are the similarities and differences between the bat conservation organizations?

Students can answer the following questions:

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Extension – Make Your Organization a Reality

Help the class to actually establish a student-led bat conservation organization at your school using the information created in this activity. Help them establish their identity and a plan for meeting their goals. The group should choose two or more bat conservation activities to focus on and one group member to take the lead in achieving the goals. The students may even elect officers.

The list below can assist the group in developing the priority conservation activities that the organization will focus on to meet the goals.

- Observe bats in a local park or open area at night.
- Improve neighborhood habitats for bats – see “Bat Champions” activity for ideas.
- Take a field trip to a nearby bat conservancy to see the work they are conducting.
- Take a field trip to a cave to view a bat emergence.
- Write about issues facing bats to local, state, and national elected representatives.
- Write to different businesses about conservation issues facing your community.
- Attend city council meetings that discuss issues affecting wildlife.
- Organize an event at your school that

will educate students and community members about the importance of bats. National Bat Week is hosted during the week of Halloween and provides a perfect time for hosting such an event.

- Organize a fundraiser and donate the proceeds to an organization that supports bat conservation.
- Develop a blog that features important information about bats and ways to get involved in their protection.
- Partner with another school to develop a sister-branch of your bat conservation organization.

Further Reading and Resources – Discover More

About White-Nose Syndrome:

Battle for Bats: Surviving White-Nose Syndrome -
<http://vimeo.com/76705033>

National White-Nose Syndrome (WNS) Website –
<http://whitenosesyndrome.org/>

National Wildlife Health Center -
http://www.nwhc.usgs.gov/disease_information/white-nose_syndrome/

About Bats and Culture

South America –
http://www.batcon.org/resources/media-education/bats-magazine/bat_article/466

About the Value of Bats

Pollinators - <http://www.fs.fed.us/wildflowers/pollinators/animals/bats.shtml> and

Ecological and Economic Value – <http://www.hindawi.com/journals/isrn/2013/187415/>

Economics - http://www.biologicaldiversity.org/campaigns/bat_crisis_white-nose_syndrome/pdfs/Boyles2011EconomicsofBats.pdf

Ecosystem Services – <https://caves.org/WNS/WNS%20Kunz%20April%205%20%202011.pdf>

About Bats and Caves

Webinar and PowerPoint Presentation –
<http://batlive.pwnet.org/resource/webinars.php>

Guano Mining Guidelines –
<http://www.batcon.org/pdfs/GuanoGuidelinesVersion1.pdf>

Heroes of the Night Sky – Student Reading Pages

“It’s not who I am underneath, but what I do that defines me,” Batman states before jumping off the top of a building and gliding into the night sky. He is off once again to help the citizens of Gotham City.

Known for his stealth, unwavering dedication to completing his mission, and of course, his bat mobile, Batman is one of the greatest superheroes of all time. Perhaps one of the reasons he is so well loved is because he has no special powers. He is just a man who is bent on a mission. Batman can’t fly and he doesn’t have incredible physical strength. He also didn’t gain superhuman abilities by being bit by a spider or bathing in chemicals or as a result of being born on another planet. He gained his incredibly capabilities and focus the old-fashioned way – through hard work and dedication. He earned them.

At the beginning of *The Dark Night Trilogy*, Bruce Wayne’s desire to become Batman is rooted in his desire to be a symbol of hope to those around him. He strives to be a beacon that will inspire others to become better. In the opening moments of *Batman Begins*, a young Bruce Wayne falls into a cave disturbing a colony of bats. This experience gives him a lasting fear of these animals that endures until he decides to confront his phobia as an adult. He allows the bats beneath his family mansion to swarm around him, channeling their nocturnal mystery to transform himself into Batman. Thus, he begins a nighttime crusade against the forces of evil.

While it is easy to get caught up in the mystery and fear that surround bats, the truth about bats is that they are fascinating animals that are vital for a healthy environment and economy. If we set superstitions and Hollywood notions aside, we’ll find that we need bats, and bats need us--now more than ever. Just as bats inspired Bruce Wayne, they can also inspire us.

Every day more people are becoming passionate about protecting bats; taking heroic actions to protect the places where they live and to share the importance of these amazing animals with others. Some people find bats fascinating and beautiful, while others consider bats to be an essential part of their culture. For example, bats are a powerful symbol of happiness and joy in Chinese culture and are a symbol of transformation in some South American cultures. For many cultures, bats were--and still are--a kind of liaison to the gods because of their uniqueness and the important role they play in the human environment.

Bats are our most important natural predators of night-flying insects consuming mosquitoes, moths, beetles, crickets, leafhoppers, chinch bugs, and much more! Many of these insects are serious agricultural or forests pests, and others spread disease to humans or livestock. Bats even help protect our forests by eating non-native invasive species such as gypsy moths and emerald ash borers. These insect pests can decimate our forests if they are left unchecked. Every year, bats save us billions of dollars in pest control simply by eating insects.

An article in Science, “The Economic Importance of Bats in Agriculture” estimates that bats provide between **3.7 and 53 billion** dollars each year in pest control services in North America. The article also mentions that a single colony of 150 big brown bats in Indiana can eat nearly 1.3 million insects in a single year that are agricultural pests. As the sun sets and darkness falls, bats come out and begin their important work.

In addition to insect control, bats serve other important ecological functions. From deserts to rainforests, nectar-feeding bats throughout the world are critical pollinators. Drawn to pale, night-blooming flowers, pollinating bats bury their furry faces in flowers to lap up the tasty

Heroes of the Night Sky – Student Reading Pages

nectar. When they pull their faces out, they are covered with pollen that they carry to the next flower they visit. Through this process, known as pollination, plants are able to produce full-bodied fruit and viable seeds. While many people know that birds and bees are important pollinators, few know that bats are too. In fact, over 500 plant species rely, at least partially, on bats to pollinate their flowers, including some plants of great economic and ecological value such as wild bananas, cloves, carob, balsa wood, and agave.

All but four of the 47 bat species found in the United States and Canada feed solely on insects. The remaining species feed on nectar, pollen, and the fruit of cacti and agaves in southwestern deserts. Two of these species, the lesser long-nosed bat and the Mexican long-tongued bat travel more than one thousand miles every spring from Mexico into Arizona, New Mexico, and Texas. Unlike Batman, bats are capable of true flight. This ability allows them to serve numerous roles across the world.

In the tropics, fruit-eating bats disperse seeds that are critical to restoring rainforests that have been cleared for agriculture, logging, ranching, or other uses. The recovery of these forests requires seed-scattering by birds, primates, bats, and other animals. Birds are often wary of crossing large, open spaces where flying predators can attack. They typically drop seeds directly beneath their perches. Yet, amazing, night-foraging fruit bats often cover large distances each night and are willing to travel across clearings. These bats defecate in flight, scattering seeds much farther across cleared areas than birds. Bats are so effective at dispersing seeds into these devastated forestlands that they've been called the "farmers of the tropics." Seeds dropped by bats can account for up to 95 percent of the first new growth of recovering forests. This makes bats key players in restoring rainforests around the world. Between their role as predators of night insects, pollinators of night blooming flowers, and spreading seeds across damaged landscapes, bats truly are heroes of the night skies.

Yet, there is still more to consider regarding the roles that bats play in our world. Even bat droppings (called guano) are important. Seriously, the poop of bats is important! Guano is a rich, natural fertilizer that is used throughout the world. Bat guano has such excellent properties that many producers say that it is "superior to all other natural fertilizers." When mined responsibly, with bats and other cave life in mind, guano can provide significant economic benefits for landowners and local communities.

Guano also provides vital nutrients for cave ecosystems and it can be the foundation of a cave's food web. This guano is used by microorganisms and invertebrates, which become food for fish, salamanders, frogs, and other larger animals. Bats are often considered "keystone species" that are essential to caves, forests, and desert ecosystems.

Bats also play a significant role in science and medicine. Research conducted on bats has led to advancements in sonar, vaccine development, blood anti-coagulation, and more. For example, scientists used enzymes taken from vampire bat saliva to develop a blood-clot dissolving drug called Draculin. Draculin is now being studied for the treatment of strokes and heart attacks! And, who knows what other important findings we will discover as we continue to study bats.

While bats have many amazing abilities, they do not have superpowers. And, they are not indestructible. In fact, bats are in decline nearly everywhere they are found. White-Nose

Heroes of the Night Sky – Student Reading Pages

Syndrome (WNS), one of the greatest threats to bats in North America, is killing bats as they hibernate in caves and mines. Many insect-eating bats survive winter by going into hibernation. During this process, their body temperatures are lowered and the bats depend entirely upon fat deposits that were built up during the summer and fall.

White Nose Syndrome is caused by a newly discovered fungus, *Pseudogymnoascus destructans*. *P. destructans* thrives in low temperatures (40–55° F) and high humidity – conditions that are commonly found in caves and mines where bats hibernate. While evidence supports that *P. destructans* causes the disease WNS, the exact process that leads to death is unknown. The fungus infects the skin of bats while they hibernate and scientists hypothesize that this causes bats to wake up more frequently and/or for longer periods than normal during hibernation. Bats quickly deplete their fat reserves and are unable to replenish them because insects are not available for food in the winter.

More than half of the bats that live in the United States hibernate in caves and mines to survive the winter. In the northeastern United States and Canada, WNS has killed more than six million bats and has caused population declines greater than 90% in some populations. There is great concern that WNS will continue to spread across North America. Scientists around the world are urgently studying WNS. Many field and laboratory projects are underway as scientists try to discover how WNS is killing our bats, what we can do to fight it, and how to protect surviving bats. The economic and environmental consequences of losing so many bats could be devastating. Bats need our help!

We can learn more about the value of bats by researching the individuals and groups that work to protect them. Many organizations are dedicated to the conservation of bats and to increasing awareness of the value of bats. Each organization may focus on a different aspect of conservation such as rehabilitation of bats, education, habitat protection, or research, but they all have the common goal of protecting bats and their habitats. Many people volunteer their time and money to these organizations which further supports bat conservation efforts. Bat conservation organizations consist of non-profit organizations, state and federal agencies, universities, and businesses. All of these organizations are passionate about the protection of bat populations and habitats.

As Bruce Wayne says at the end of *The Dark Night Trilogy*, “A hero can be anyone.” A hero can be a person who spends his or her career studying bats, a scientist working in a lab to find a treatment for WNS, a teacher sharing information about bats, or a courageous student who decides to take action. The protection of our bats requires the combined efforts of scientists and citizens. Anyone can become a hero to our bats and the night sky!

Student Reading Questions

Heroes of the Night Sky

Student Name: _____

LITERAL QUESTIONS:

1. Are there reasons why people today should care about bats? Use evidence from the text to support your answer.

2. Why are bats important to agriculture? Provide evidence for your conclusion.

3. What do bats in North America eat?

4. What is White-Nose Syndrome?

INTERPRETIVE QUESTIONS:

5. What might the continued spread of White-Nose Syndrome mean for bats, humans, and the environment?

Student Reading Questions

6. What future scientific discoveries might we make from bats as we continue to research and study them?

7. Do you agree that anyone can become a hero and help bats? What role could you play in helping bats? What if you worked with others?

8. What did you find most interesting or important about bats? Why?

9. Write a question about the story for your teacher or another student to answer.

Bat Conservation Organization Profiles

Bat Conservation International (BCI)



- **Founding:** Founded by Dr. Merlin Tuttle in 1982, BCI was created in response to concerns from scientists about worldwide declines in bat populations and the effect on ecosystem health and human economies. The organization emphasizes the need for sustainable natural resource use around the world for the continued protection of bat populations.
- **Membership/Employees:** Over 9,000 members
- **Mission:** Conserving the world's bats and their ecosystems to ensure a healthy planet. BCI is dedicated to the protection of the world's more than 1300 bat species and their habitats. Among other objectives, this organization works to educate the public on the importance of bats, uses the best possible science and conservation action to address the most serious threats to bats and their habitats around the world, and works to prevent the extinction of endangered bats.
- **How Bat Conservation International Works:** BCI is a non-profit organization that relies on its membership, foundations, and government grants to support its efforts to address the most pressing threats that are jeopardizing bat populations and habitats. Throughout the United States and Canada, BCI has worked to protect many bat colonies by protecting their roosts as well as their foraging and drinking habitats. BCI has also promoted responsible use of forest, mineral, and water resources as exploitation of these resources can affect bat populations without the implementation of proper bat conservation mitigation measures. This important organization has partnered with many governmental and private agencies and organizations to identify, develop, and implement successful conservation actions and policies.
- **A Success Story:** BCI efforts have resulted in the permanent protection of many bat caves throughout North America and have saved millions of bats from being accidentally buried in mine-safety closures. They work to educate government and private managers on the importance of abandoned mines for bat habitat by conducting internal and external mine evaluations.
- **Contact Information:**
Bat Conservation International
500 N. Capital of Texas Building 1 Suite 200, Austin, Texas 78746
512-327-9721
www.batcon.org
- **Ideas for Further Research:**
 - Research a species of bat that is found in your state and write a report. Use the BCI website to compile information (<http://www.batcon.org/>).
 - Research why caves are important for bats, especially Bracken Cave.
 - Sign up for the "Bat Chat" newsletter and write a report about a topic from the first newsletter you receive.
 - Research the importance of abandoned mines and why improper closure of these mines could impact bats.

Bat Conservation Organization Profiles



Organization for Bat Conservation (OBC)

- **Founding:** Founded in 1997, OBC is a national environmental-education nonprofit that specializes in teaching kids and adults about bats. The Organization for Bat Conservation inspires the public to get involved in protecting bats through the *Save the Bats* public action campaign.
- **Membership/Employees:** 10 employees
- **Mission:** To promote global participation in bat conservation through public education, wildlife management, conservation programs, and habitat protection.
- **How the Organization for the Conservation of Bats Works:** OBC offers many ways for people to learn about bats and to be active in conservation including:
 - Conducting live, in-person and distance learning educational programs featuring bats from around the world and other nocturnal animals to schools, museums, science centers, nature centers and libraries across the United States.
 - Presenting tours of the Bat Zone, a nocturnal wildlife sanctuary and OBC's homebase in Bloomfield Hills, Michigan.
 - Featuring the *Save the Bats* campaign which offers conservation activities and shareable content designed to activate the public to protect bats.
 - Appearing on national TV and working with media to raise awareness of bat conservation.
 - Hosting the annual Great Lakes Bat Festival, a large-scale, family-friendly educational community event.
 - Presenting its traveling live bat exhibit suitable for long-term festivals and events.
 - Leading regular eco-trips to learn about bats on guided tours through untouched places across the world.
 - Participating in research, scientific assemblies and grant-making.
 - Operating an online store with bat houses and other bat-related merchandise.
- **A Success Story:** There have been many success stories associated with the installation of OBC designed bat houses on private property. Bat houses provide a secure shelter for bats and assist in education and research. One Michigan homeowner successfully installed nine bat houses around her property which provided shelter for more than 200 bats.
- **Contact Information:**

Organization for the Bat Conservation
39221 Woodward Avenue, Bloomfield Hills, Michigan 48303
248-645-3232
www.batconservation.org
- **Ideas for Further Research:**
 - Become an Animal Keeper for a day at the Bat Zone to learn more about caring for different species of bats and the importance of bat conservation.
 - Explore the difference between bats that eat fruit and bats that eat insects.
 - Research what it takes to become licensed in your state to be an animal rehabilitator.
 - Explore the *Save the Bat* Campaign to learn how OBC is reaching people around the world including Hollywood!

Bat Conservation Organization Profiles



U.S. Forest Service (USFS)

- **Founding:** The Forest Service was established by an act of Congress in 1905, during Theodore Roosevelt’s presidency. Originally, the primary function for the national forests was to provide a continuous flow of quality water and timber for the Nation’s benefit, while also allowing other uses. Today, the USFS manages more than 193 million acres of public land, organized in 154 national forests and grasslands in 44 states and Puerto Rico. These national forests and grasslands are managed for the sustained yield of renewable resources such as water, forage, wildlife, wood, and recreation. The USFS is also the world’s largest forestry research organization and provides leadership in the management of all America’s forests.
- **Membership/Employees:** Almost 35,000 people are employed with the USFS across the country and tens of thousands of people volunteer with the USFS each year.
- **Mission:** The motto of the USFS is “caring for the land and serving people.” The mission of the USFS is to sustain the health, diversity, and productivity of the nation’s forests and grasslands to meet the needs of present and future generations. The USFS sustainably manages these lands for public use and national interests through various activities ranging from scientific research and development, wildland firefighting, recreation opportunities, fish and wildlife conservation, ecosystem management, and timber production.
- **How the Forest Service Works:** The USFS promotes the health, productivity, and diversity of forests, manages national forests and grasslands, provides assistance to private landowners to encourage responsible land practices, and develops scientific and technical knowledge to improve our capability to protect and manage forests and grasslands. Bats play a vital role in healthy forest ecosystems – and national forests and grasslands provide vitally important habitat for bats. The USFS is a leader in bat education, research, and habitat protection. They are also very active in the research of the fungus that causes White-Nose Syndrome and finding ways to control the spread of this disease.
- **A Success Story:** In 2012, the USFS brought together a coalition of partners to develop and implement “BatsLIVE! A Distance Learning Adventure.” BatsLIVE! is a comprehensive, integrated, and free distance-learning program that uses technological media to reach children in grades four through eight and their educators. The live webinars and webcast associated with the project reached more than 140,000 people during the 2011-2012 school year. All materials and archived webcasts and webinars are available through the project website.
- **Contact Information:**
USDA Forest Service
1400 Independence Ave. SW, Washington D.C. 20250
800-832-1355
www.fs.fed.us
- **Ideas for Further Research:**
 - Find a National Forest located near you and spend a day exploring your public land.
 - Volunteer for a weed pull, acoustical monitoring, or other activities on public lands that will help bats.
 - Research BatsLIVE! and watch one of the archived webinars at <http://batslive.pwnet.org/webcast/index.php>.

Bat Conservation Organization Profiles



U.S. Fish & Wildlife Service (USFWS)

- **Founding:** In 1940, the USFWS was formed under the Department of the Interior by combining two bureaus: the Bureau of Fisheries, established as the U.S. Commission of Fish and Fisheries in 1871 under the Department of Commerce; and the Bureau of Biological Survey, established as the Division of Economic Ornithology and Mammalogy in 1896 under the Department of Agriculture.
- **Membership/Employees:** The USFWS have approximately 9,000 employees.
- **Our Mission:** To work with others to conserve, protect, and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people.
- **How We Conserve Bats:** The USFWS protects rare and at-risk bats in the United States and other countries under wildlife laws such as the Endangered Species Act. Biologists from the USFWS develop measures to protect listed bats and their habitats from projects that might affect them; for example, wind farm operations. Biologists also do bat field work, especially at our national wildlife refuges across the country. The USFWS works with partners to research, promote, and fund bat conservation.
- **A Success Story:** In the winter of 2006/2007 White-Nose Syndrome (WNS) was first discovered and quickly spread, killing millions of bats. The U.S. Fish and Wildlife Service initiated and continues to lead the collaborative national response to this disease, including forming a national response framework with more than 100 partners. As a result, scientific findings have rapidly progressed from recognizing the severity of WNS, identifying impacts of the disease, isolating the cause, developing potential treatments and managing other threats to bats. The USFWS also funded and helped develop the North American Bat Monitoring Program which will begin a continental monitoring effort for native bat species.
- **Contact Information:**
Department of the Interior Fish and Wildlife Service
4401 N. Fairfax Dr., Arlington, VA 22203
703-358-1729
www.fws.gov
- **Ideas for Further Research:**
 - Visit www.WhiteNoseSyndrome.org to see the WNS national plan and grants we've awarded to researchers and states. Graph the awards by year. What research priorities do the grants address?
 - Research endangered or threatened bat species. How many are listed in the United States or internationally? Are there any in your state and are they also state-listed? What threats have been identified and how are the bats protected?
 - Locate the national wildlife refuges nearest your home. Ask if bats are on the refuge and how the refuge is working to conserve them. Participate in a bat-related program there!

U.S. Geological Survey (USGS) National Wildlife Health Center

- **Founding:** The USGS National Wildlife Health Center (NWHC) was the first federal program to specifically focus on wildlife disease research, prevention, and control. This program was established in 1975 and since has dealt with a variety of diseases such as chronic wasting disease, West Nile virus, and White-Nose Syndrome.
- **Membership/Employees:** 101 employees
- **Mission:** National leadership to safeguard wildlife and ecosystem health through dynamic partnerships and exceptional science.
- **How the NWHC works:** The NWHC provides information, technical assistance, and research on wildlife health issues. They monitor diseases, use technical approaches to prevent and control the spread of disease, and provide assistance when disease outbreaks occur. The NWHC was instrumental in the discovery and characterization of the fungus that causes White-Nose Syndrome (WNS) a disease that has killed millions of bats throughout northeastern and central United States and parts of Canada. Research continues on the ecological effects of the death of bats affected by this disease at the NWHC. The NWHC is also involved with conducting nationwide surveillance and understanding how the fungus that causes WNS persists in the environment.
- **A Success Story:** In 2011, the NWHC published a Wildlife Health Bulletin entitled, "Universal Precautions for the Management of WNS." This bulletin includes decontamination procedures, equipment restrictions, and limited access to contaminated environments that would serve to reduce and prevent movement of the disease by humans. By using these precautions it will help reduce the human-caused movement of the disease to areas that are not infected.
- **Contact Information:**
USGS National Wildlife Health
6006 Schroeder Road, Madison, Wisconsin 53711
608-270-2400
www.nwhc.usgs.gov
- **Ideas for Further Research:**
 - Research WNS and how it has been affecting bats. Learn as much as you can about this disease and tell your friends and family about the importance of bats for the environment and the economy.
 - Learn about decontamination procedures and why they are important in the fight against WNS.
 - Research the use of ultra-violet light as a tool for diagnosing WNS as well as any limitations in its use.

Bat Conservation Organization Profiles



National Park Service (NPS)

- **Founding:** The National Park Service (NPS) was created by the 1916 Organic Act signed by President Woodrow Wilson. The Organic Act placed the 38 existing national parks and monuments under NPS management.
- **Membership/Employees:** 22,000 employees and 246,000 volunteers (sign up at www.nps.gov/getinvolved/volunteer.htm)
- **Mission:** To preserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The park service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.
- **How the National Park Service Works:** National Park Service employees care for America's 405 national parks and administer more than a dozen programs that provide states and communities help to preserve local history and create close-to-home recreational opportunities. Visit us at www.nps.gov, on Facebook www.facebook.com/nationalparkservice, Twitter www.twitter.com/natl parkservice, and YouTube www.youtube.com/nationalparkservice.
- **A Success Story:** Carlsbad Cavern National Park drafted a plan to reduce contamination of cave pools from parking lot runoff and sewage overflow. This contamination harms natural resources and degrades bat habitat. This plan will also restore natural drainage and infiltration to Carlsbad Cavern which shelters a colony of migratory Brazilian free-tailed bats.
- **Contact Information:**
National Park Service
1849 C Street NW, Washington DC 20240
202-208-3818
www.nps.gov
- **Ideas for Further Research:**
 - Contact a national park near you and discover how they protect bat habitat.
 - Learn about the components of a healthy ecosystem for bats.
 - Find out how you can volunteer at your local parks to help wildlife thrive.
 - Research national parks, like Carlsbad Caverns, www.nps.gov/cave that have caves open for public tours. Write a report about why these places are important for people and bats.

Bat Conservation Organization Profiles



Wisconsin Department of Natural Resources (WDNR) Bat Program

- **Founding:** In 1968 the Wisconsin Conservation Department became the Wisconsin Department of Natural Resources (WDNR). The WDNR Bat Program was established in 2007.
- **Membership/Employees:** There are three people who work full time on bat conservation for the WDNR Bat Program. Hundreds of volunteers statewide help collect data for the WDNR Bat Program.
- **WDNR Bat Program Mission:** Prevent extinction, monitor bat health, status, and trends, while implementing adaptive management actions to sustain or recover one of Wisconsin's greatest natural resources for the benefit of future generations.
- **How the WDNR Works:** The WDNR Bat Program uses a comprehensive approach to monitors status, trends, and current threats to the health of Wisconsin's bat population. Wisconsin citizens participate heavily in the program by becoming trained citizen scientists and supplying monitoring data to WDNR scientists. The Bat Program coordinates closely with other agency, university, and NGO partners to come up with solutions for management of threats to bat health, such as White-Nose Syndrome.
- **A Success Story:** The WDNR Bat Program has trained hundreds of volunteers to collect bat acoustic data and has run over 2,600 acoustic survey routes. Volunteers monitor summer bat roosts at over 75 locations statewide. The Bat Program has catalogued and monitored 150 known cave and mine hibernation sites. Since 2007, critical baseline data has been established on healthy WI bat populations in advance of the arrival of the disease White-Nose Syndrome (which arrived in Wisconsin in 2014). This data will help the Bat Program focus future disease management and conservation efforts. Additionally, the Bat Program provides public outreach and education through their website, publications, and annual Bat Festival.
- **Contact Information:**
Wisconsin Department of Natural Resources
101 S. Webster St. PO Box 7921, Madison, Wisconsin 53707
608-266-5261
<http://dnr.wi.gov>
[WDNR Bat Program: http://wiatri.net/inventory/bats/](http://wiatri.net/inventory/bats/)
- **Ideas for Further Research:**
 - Get involved in the citizen monitoring of bats through the Wisconsin DNR.
 - Contact the WDNR Bat Program or the DNR in your state to find out how you can help the bat populations near you.

Bat Conservation Organization Profiles



Save Lucy Campaign

- **Founding:** Founded by Leslie Sturges to provide information on the importance of bats in our society and the current conservation efforts that are being used to protect them.
- **Membership/Employees:** all-volunteer—no paid employees
- **Mission:** To raise awareness of White-Nose Syndrome (WNS) by engaging young people to take action, empowering young people by providing information to effect change, providing accurate information for concerned citizens, providing conservation education, and supporting research and other projects to protect bat populations.
- **How the Save Lucy Campaign Works:** This organization provides educational programs on bats for people of all ages to enjoy. They travel to schools to educate students on bat ecology. Leslie Sturges, the Founder and President, leads various workshops on the natural history of bats, urban wildlife ecology, and bat rehabilitation. The organization also works with the surrounding community as a resource to solve problems when bats take up residence in houses, to calm fears about bats, and to help enhance local bat habitats. Each year, the organization takes in between 80 and 100 sick, injured, or orphaned bats, which they work to rehabilitate. They work closely with veterinarians and other experts and are able to release about 1/3 of these bats back into the wild. They also keep bats that cannot be released and use them to educate others about the importance of our North American bats.
- **A Success Story:** The Save Lucy Campaign published a successful book titled, “Lucy’s Story,” written by Leslie Sturges and illustrated by David Chapman. This book discusses the life cycle of bats and bat ecology. It tells the story of Lucy the bat growing up and learning to hunt and fly. The story includes information on WNS and how it is negatively impacting bat populations. This book is an excellent tool to teach people about bats and the damage of WNS.
- **Contact Information:**
The Save Lucy Campaign
4512 Starr Jordan Dr., Annandale, Virginia 22003
www.savethebat.org
- **Ideas for Further Research:**
 - Read Lucy’s story and write a poem or song about Lucy’s life. You can upload your artwork to the I Care Project at <http://savethebat.org/i-care-project/>.
 - Attend a bat workshop to learn more about the importance of bats.
 - Learn about the North American Bat Tracker and how to participate in this program.
 - Research little brown bats and write a blog about the importance of this bat species. Be sure to include information about how little brown bats are being affected by WNS.

Bat Conservation Organization Profiles



Lubee Bat Conservancy

- **Founding:** Founded in 1989 as a non-profit organization by Luis F. Bacardi. He was very passionate about endangered wildlife, especially bats. He worked his entire life to protect these animals and their habitats.
- **Membership/Employees:** 9 employees
- **Mission:** An international non-profit organization dedicated to saving fruit bats and their habitats through research, conservation, and education, with a focus on community engagement.
- **How Lubee Bat Conservancy Works:** Efforts are focused on working with global conservation partners to protect at-risk species of bats. By protecting these bats, Lubee works to conserve more than 145 genera of plants that depend on bats for pollination and seed dispersal, the countless organisms that depend on those plants for food and shelter, and ultimately all people that depend on healthy ecosystems. Lubee is certified by the Association of Zoos and Aquariums and currently houses over 200 bats representing 11 species.
- **A Success Story:** Since 1989, Lubee has funded and conducted field projects in 19 countries spanning Florida to the Solomon Islands, where we are currently working with researchers and local communities to save a critically endangered species, the New Georgian Monkey-faced bats, from extinction.
- **Contact Information:**
Lubee Bat Conservancy
1309 NW 192nd Ave, Gainesville, Florida 32609
352-485-1250
www.lubee.org
- **Ideas for Further Research:**
 - Research the differences between bats that eat fruit and bats that eat insects.
 - Learn about Lubee's "Adopt a Bat" program and consider participating.
 - Research the many threats that fruit bats face including overharvesting for meat and habitat destruction – especially mass logging associated with the demand for palm oil.
 - Attend an educational program or bat festival to find out how you can help protect bats and their habitat.



Design a Bat Conservation Organization Worksheet

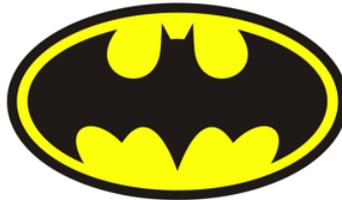


Begin by working with other students to brainstorm different types of bat conservation issues that you would like to have addressed locally, nationally, or even internationally. The following questions will help you with your discussion:

1. What species of bats do you find interesting (examples include tree bats, cave bats, vampire bats, and fruit bats)?
2. What species of bats are endangered in your state?
3. What articles can you find in the newspaper or online about bats? Do they discuss the benefits of bats or the disease White-Nose Syndrome?
4. What other threats are bats facing in the United States and other countries?
5. How can you contribute to bat conservation activities?

Next, answer these questions to help determine what type of bat conservation organization you would like to create.

1. As an organization, what do you want to accomplish?
2. What kind of bat conservation issues will the organization be focused on?
3. What is the name of your group?
4. What is the mission of your organization? Try to describe this in one to three sentences.
5. Design a logo. A logo is an image that can be used to identify your organization and what you do. Review the logos located on the “Bat Champions – Organizational Profile Pages” to see what existing groups have designed. Or, think of one of the most recognizable logos of all time, the Batman Logo.



6. What is the plan of action for your organization?
 - a. Where will the organization be located?
 - b. What types of projects will your organization conduct?
 - c. How will you fund these projects?
7. Why would someone want to join your organization? How do you plan to recruit them?
8. What role will each group member have in the organization?

Once you have answered these questions, you will create a marketing/promotional product that represents your organization’s goals and mission. This can be a newsletter, pamphlet, poster, PowerPoint presentation, website, or some other item that can teach people about your organization. You can be very creative when developing your final product; however, you should refer to the Design Your Own Bat Conservation Organization Rubric as a framework for its development.

Rubric for Design Your Own Bat Conservation Organization Marketing Product

Name of Group Members _____

Task Description: Design your own bat conservation organization based upon the ideas you generated in the “W” Section of your K-W-L Chart. You will develop a marketing tool that fully describes the organization, such as a pamphlet, poster, PowerPoint presentation, newsletter, or website. Your group will present its conservation organization and marketing tool to the class. The name, logo, and operating plan should be included in the presentation. You are encouraged to be creative and develop your own marketing tool. However, use this Rubric as a framework to develop your final products.

Criteria	weight	Exemplary - 4	Admirable - 3	Acceptable - 2	Attempted - 1
Research of Topic	20%	<input type="checkbox"/> Use of three or more sources, including at least two Internet and one print source; use of two search engines <input type="checkbox"/> Variety of domain name suffix (.com, .edu, .net) <input type="checkbox"/> Factual information is accurate <input type="checkbox"/> Narrow focus of topic	<input type="checkbox"/> Use of two sources, including at least one Internet source; use of one search engine <input type="checkbox"/> Most information can be confirmed <input type="checkbox"/> Topic could be more narrowly focused	<input type="checkbox"/> Use of one Internet source <input type="checkbox"/> Some errors in information <input type="checkbox"/> Topic somewhat broad	<input type="checkbox"/> Use of only one source <input type="checkbox"/> Numerous errors in information <input type="checkbox"/> Topic too general
Content/ Organization	25%	<input type="checkbox"/> Provides clear purpose, pertinent examples, facts, and/or statistics <input type="checkbox"/> Covers topic completely and in depth <input type="checkbox"/> Demonstrates full knowledge by answering all class questions with explanations and elaboration <input type="checkbox"/> Media used contributes to understanding of topic	<input type="checkbox"/> Has somewhat clear purpose, some examples, facts, and/or statistics that support the subject <input type="checkbox"/> Covers topic <input type="checkbox"/> Answers all questions basically, without elaboration <input type="checkbox"/> Media used mostly contributes to understanding of topic	<input type="checkbox"/> Attempts to define purpose, provides weak examples, facts, and/or statistics, which do not adequately support the subject <input type="checkbox"/> Barely covers topic <input type="checkbox"/> Uncomfortable with information and is able to answer rudimentary questions only <input type="checkbox"/> Media used somewhat contributes to understanding of topic	<input type="checkbox"/> Does not clearly define purpose, provides weak or no support of subject, and gives insufficient support for ideas or conclusions <input type="checkbox"/> Does not adequately cover topic <input type="checkbox"/> Does not have grasp of information and cannot answer questions about subject <input type="checkbox"/> Media used does not contributing to understanding of topic

Graphic Design	20%	<input type="checkbox"/> Eye-catching and well - constructed <input type="checkbox"/> Diagrams/images clearly labeled <input type="checkbox"/> Good balance of text and graphs or pictures <input type="checkbox"/> Engaging use of color <input type="checkbox"/> Graphics effectively entice audience; accurately convey message	<input type="checkbox"/> Well-constructed <input type="checkbox"/> Diagrams/images present <input type="checkbox"/> Fair balance of text and graphs or pictures <input type="checkbox"/> Some use of color <input type="checkbox"/> Visuals and images are attractive; adequately conveys message	<input type="checkbox"/> Bland <input type="checkbox"/> Diagrams absent or unclear <input type="checkbox"/> Mainly or all text <input type="checkbox"/> Use of visuals and images is limited; message is conveyed <input type="checkbox"/> Little or no color	<input type="checkbox"/> Bland/ boring <input type="checkbox"/> Diagrams/images absent <input type="checkbox"/> No variety in layout <input type="checkbox"/> Majority is text <input type="checkbox"/> Use of visuals and images is confusing or absent; message is confusing
Mechanics	10%	<input type="checkbox"/> Correct grammar, usage, mechanics, and spelling <input type="checkbox"/> All sources are correctly cited <input type="checkbox"/> Well -rehearsed	<input type="checkbox"/> Few grammar, usage, mechanics, or spelling errors <input type="checkbox"/> Most sources are correctly cited <input type="checkbox"/> Well-rehearsed with some pauses	<input type="checkbox"/> Several grammar, usage, mechanics, or spelling errors <input type="checkbox"/> Some sources are incorrectly cited <input type="checkbox"/> Obvious lack of rehearsal	<input type="checkbox"/> Obvious grammar, usage, mechanics, or spelling errors <input type="checkbox"/> Sources are not cited <input type="checkbox"/> Obvious lack of rehearsal
Delivery	15%	<input type="checkbox"/> Holds attention of entire audience with the use of direct eye contact, seldom looking at notes <input type="checkbox"/> Speaks with fluctuation in volume and inflection to maintain audience interest and emphasize key points	<input type="checkbox"/> Consistent use of direct eye contact with audience, but still returns to notes <input type="checkbox"/> Speaks with satisfactory variation of volume and inflection while reading mostly from the notes	<input type="checkbox"/> Displays minimal eye contact with audience, while reading mostly from the notes <input type="checkbox"/> Speaks in uneven volume with little or no inflection	<input type="checkbox"/> Holds no eye contact with audience, as entire report is read from notes <input type="checkbox"/> Speaks in low volume and/or monotonous tone, which causes audience to disengage
Teamwork (optional)	10%	<input type="checkbox"/> Work load is divided and shared equally <input type="checkbox"/> All students speak	<input type="checkbox"/> Some members contribute <input type="checkbox"/> All student speak	<input type="checkbox"/> Few members contribute <input type="checkbox"/> Most students speak	<input type="checkbox"/> One or two people do all of the work <input type="checkbox"/> Only one or two students speak
Comments:					

Final Score : _____

Curriculum/Standards Connections

Common Core State Standards: Literacy: High School

CCSS.ELA-LITERACY.W.9-10.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content. Research to Build and Present Knowledge.

CCSS.ELA-LITERACY.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

CCSS.ELA-LITERACY.W.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. Production and Distribution of Writing.

CCSS.ELA-LITERACY.W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience (Grade-specific expectations for writing types are defined in standards 1-3 above).

CCSS.ELA-LITERACY.W.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience (Editing for conventions should demonstrate command of Language standards 1-3 up to and including grades 9-10 here).

CCSS.ELA-LITERACY.W.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.