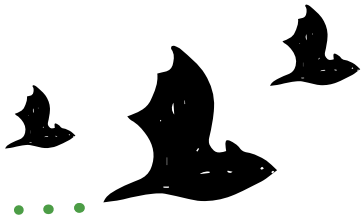
Threats to Bats:
White-nose Syndrome

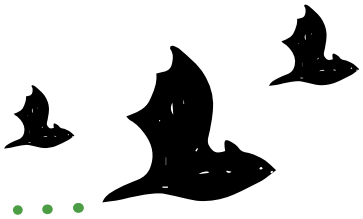
- **What is White-nose Syndrome?** White nose syndrome (WNS) is a disease affecting hibernating bats across the United States and Canada. It is caused by a cold-loving fungus, Pseudogymnoascus destructans (Pd) that collects and grows around the muzzle and wings of hibernating bats. WNS was first documented in a New York cave in 2006 but has spread as far as west as Washington state and as far south as Mississippi. It was most likely brought over from Europe and is spread primarily from bat-to-bat, but human transmission has also contributed to its spread.
- **What does WNS do to bats?** WNS irritates the bats' skin enough to wake them from hibernation too frequently. This depletes their stored energy leading them to wake from hibernation before their insect food source is available or when it is too cold for them to be out foraging. 90-100% mortality of bats has been observed in certain hibernacula. More than half of all the species in North America hibernate during the winter and are therefore at risk. To date, Pd has been reported in at least 30 states and 5 Canadian provinces and is still spreading.
- **What is the impact of WNS?** WNS has killed more 6 million bats thus far. There is a chance we will lose entire species of bats. Even losing a single species can cause unknown ramifications. Bats are important ecologically and economically. Insect populations will increase, other aerial insectivores could flourish with unknown impact, and we will be much more susceptible to insect-borne diseases. Many of the insects that bats feed on damage farm crops. With a decrease in their natural predators, either these insects will wipe out a huge portion of our food source or farmers will be forced to increase the use of harmful pesticides. This will cost us and our farmers billions of dollars every year.
- **What is being done to stop it?** Scientists around the world are studying this fungal infection and transmission while searching for ways to stop the spread and treatment for bats in their hibernacula. State, federal, and tribal wildlife management agencies along with NGO's have been collaborating on methods to reduce the spread of WNS, as well as actions to reduce human impact on the affected species. The United States and Canada have worked together to create a National Response Plan (available at www.whitenosesyndrome.org) that "details the elements that are critical to the investigation and management of WNS, identifies key action items to address stated goals, and outlines the role(s) of agencies and entities involved in this continental effort." They are meant to provide guidelines to reduce the spread of Pd while conserving species most at risk. Researchers at UC Santa Cruz may have found a bacterium that consumes the fungus and could possibly be a treatment for WNS in the future. For more information on this, visit www.ucsc.edu.
- **Additional resources.** Learn more about WNS and what you can do to help:
    - www.whitenosesyndrome.org
    - USGS National Wildlife Health Center: www.nwhc.usgs.gov/disease_information/white-nose_syndrome/
    - National Speleological Society: www.caves.org

Threats to Bats:
Wind Turbines



- **What are wind turbines?** Wind energy has become a sustainable alternative to fossil fuels because it can generate electricity without producing air pollutants or greenhouse gases. Wind energy facilities set up huge turbines (that look like giant, sleek windmills) that turn wind into electricity.
- **What do wind turbines do to bats?** Migrating bats (and birds) have collisions with the spinning blades of the turbines and are killed by the millions around the world. Wind energy facilities impact more than 50% of North American bat species. In addition to collision, some bats suffer from barotrauma, lung damage caused by the rapid and excessive pressure change in their thoracic cavity when flying close to a turbine. This impacts arboreal migrating bats particularly. Bats that rely on trees for roosts are most at risk during migration or mating seasons.
- **How do wind turbines impact bats?** Wind power is a growing industry in the United States and around the world. It is a great alternative to fossil fuels because it is a cleaner method, producing fewer pollutants and greenhouse gases. However, with its impact on wildlife, certain precautions need to be put in place to minimize its effect on bats and birds. Identifying ways to make wind turbines safer for bats will allow us to support one conservation effort without impacting another.
- **What is being done to mitigate the effect?** Many years of study have gone into analyzing bat behavior around turbines. Once there was understanding on the interaction between bats and the turbines, actions could be taken to reduce bat mortality around the sites. Wind Turbine-Installed Bat Deterrent systems that amplify ultrasonic output have been attached to turbines with promising results. The high-frequency generators are audible to bats and deter them from approaching the turbines. Research is also being conducted on possible ultraviolet lights to illuminate the turbines at night so that bats can see and avoid them. Additional research has shown that operating turbines at low wind speeds during peak migration season can have a positive effect. Further, a new turbine is in design that will predict high risk conditions for bats and be fashioned with an automatically turn off function. The Bats and Wind Energy Cooperative (BWEC) is a union of government agencies, private industry, academic institutions, and NGOs that work to help bats while supporting this sustainable energy industry. To learn more about their work, visit batsandwind.org.
- **Additional resources.** Learn more about wind turbines and wildlife:
    - Bats and Wind Energy Cooperative: www.batsandwind.org
    - USGS For Collins Science Center: www.fort.usgs.gov
    - Boston University: Center for Ecology & Conservation Biology - http://www.bu.edu/cecb/bat-lab-update/bats/wind/video/
    - Scientific American article: 3 Ways to Keep Bats Away from Wind Turbines: http://www.scientificamerican.com/article/3-ways-to-keep-bats-away-from-wind-turbines/

Threats to Bats: Habitat Loss



- **What is habitat loss?** Habitat loss is a leading threat to bat survival. Fragmentation of habitat, destruction of roosts, and mitigating human wildlife conflict are all causing a decline in bat populations. Clearing land for human consumption eliminates warm, dry, safe, and quiet roost spots used by bats. Commercialism, quarrying, vandalism, urban sprawl, agriculture, and industrial development are well-documented habitat loss contributors. Bats are being displaced from their cave or mine roosts on account of unsuitable guano collection used as a fertilizer source. Cave tourism is also disruptive to roost sites, stirring bats from hibernation causes a depletion of their stored fat energy.
- **What does habitat loss do to bats?** Even minor disturbances can cause a decrease in species survival, from death or abandonment of the roost site. When a roost is abandoned, especially maternal roosts, bats will disperse into smaller groups scattering to less ideal roosts where they are more susceptible to factors that decrease their survival rates. Some mothers will even drop their pups when frightened, not to have another until the next season. Fragmentation of land disrupts foraging especially for migrating bats that follow the same route year after year. Some habitats have been abandoned because of pesticides used in that area. Water pollution, particularly due to pesticide run off is also threatening bat and other wildlife's clean water sources.
- **What is the impact of habitat loss?** Many bats roost in buildings and are commonly excluded in ways that put their survival at risk. This especially affects maternal roosts when pups are the most vulnerable. Bats give birth to 1-2 pups only once a year, so disturbances to an entire maternal colony has a heavy impact on the continuation of that colony. Dispersing a maternal colony can impact the temperature they maintain when roosting together. High temperatures are necessary to successfully raise young.
- **What is being done to stop habitat loss?** Bat organizations have been encouraging the public through educational presentations for awareness accompanied by literature to replace lost habitat with bat houses and conducting surveys for threatened species. Listing caves for access or restricted use is being analyzed by the National Speleological Society. The US Fish and Wildlife Service, US Forest Service, National Park Service, state parks, regional and local park districts, are all working on changing policy to improve the chances for bat species survival. When large infrastructural projects are in their planning stages many of the above organizations encourage planning commissions to include a wildlife friendly green space upon completion as mitigation for lost habitat. To collect enough data to measure impact on species, many in the public have gotten involved in citizen science projects that contribute to bat research.
- **Additional resources.** Learn more about habitat loss and bats:
  - U.S. Forest Service: http://www.fs.fed.us/biology/wildlife/bats.html
  - Defenders of Wildlife: http://www.defenders.org/bats/threats
  - Bat Conservation Trust: http://www.bats.org.uk/pages/threats_to_bats.html
  - Bat Week: http://www.batweek.org/index.php/about/bats-in-buildings
  - Bat Conservation International: http://www.batcon.org/why-bats/bats-are/bats-are-threatened