

Monitoring Monday – Let's look at bats.

Join us each Monday as the Clean Water Team shares information and resources on water quality monitoring and watersheds. This Monday is all about bats as we celebrate [Bat Week](#).

Bats occupy just about every available terrestrial habitat type available in California. Many of these bats depend on riparian forests. Our riparian forests serve as flight corridors, are sources of flying insects prey on by bats, and provide roosts. Bats serve several hugely important functions, including pest management, pollination of rare plants, and seed dispersal. Without protection and management of our bats, these functions will be severely compromised or lost.

California is home to 27 species of bats. 17 of these species have declined to the point of warranting some level of state or federal protection. According to the California Department of Fish and Wildlife the threat to bat populations is only increasing. Current threats to California's bats include:

Habitat Destruction

Loss and fragmentation of habitat (cutting down trees, fire suppression, development of open spaces for roads or buildings, changes in hydrology, draining wetlands...). These losses can also lead to diminished food supplies and a reduction of available roosts.

White-nose Syndrome

In June 2019, the fungus that causes [White-nose Syndrome](#) was detected in low levels for the first time in Plumas County. The fungus – *Pseudogymnoascus destructans* – grows in and on bats' skin during winter hibernation and spreads quickly through bat colonies. WNS has killed more than six million bats elsewhere in the U.S. and minimizing its impacts on California's bats is a top priority for CDFW's Nongame Wildlife Program.

- [Fungal outbreak threatens tricolored bat with extinction, federal officials say](#)

Wind Energy

Dead bats are found beneath wind turbines all over the world. It is estimated that tens to hundreds of thousands die at wind turbines each year in North America alone. The rates of bats at wind energy facilities have the potential to cause rapid declines in bat populations and increase the risk of extinction.

Climate Change

Changes in temperature may affect hibernation periods and the availability of suitable hibernacula in the future.

Persecution

Traditional fears of bats are based on exaggerated negative portrayals of bats, such as vampires gorging on human blood and false information about bats such as them bats being blind or getting stuck in your hair.

Bats are a wonderful beneficial animal for us. By eating insects, bats save California and U.S. agriculture billions of dollars per year in pest control. Some studies have estimated that service to be worth over \$3.7 billion per year, and possibly as much as \$53 billion. This value does not however consider the volume of insects eaten by bats in forest ecosystems and the degree to which that benefits industries like lumber. It also does not take into account the critical importance of bats as plant and crop pollinators. So, the actual monetary worth of bats is far greater than \$3.7 billion per year.

It is not just plants and agriculture that benefit from bats. Biologists at the University of Michigan's were the first to conduct an experimental assessment of the [little brown bat](#) (a bat species that is also found in California) in flight in Wisconsin. They documented that bats can significantly reduce numbers of ovipositing mosquitoes and suggested that bat predation on mosquitoes could help regulate disease vectors.

During the COVID pandemic many were wondering about potential risks bats pose. Mammals (including bats and humans) and birds are known to have coronaviruses. Most do not move to humans. This virus is similar to a virus that has been found in horseshoe bats in China, but the true origin of the virus and how it first infected people is still unknown. Even if horseshoe bats are found to be the reservoir for the current coronavirus, there is no reason to fear bats. They are amazing mammals whose bodies have adapted to live with certain viruses. There is no evidence that suggests that the bats found in North America harbor these types of coronaviruses.

Monitoring bats can be as simple as making a visual id or as complicated as analyzing sounds produced by a bat. There are many bat recorders and detectors that collect or measure bat sounds. Some of these devices are handheld (there are even smartphone adapters with apps) while others can be deployed to make autonomous recordings for later analysis. An emerging tool for bat conservation is the use of environmental DNA which can be used to identify species using a roost or for detecting white-nose syndrome presence.

Unfortunately, the COVID pandemic added tension to bat conservation. Monitors and watershed stewards can help relieve this tension and play an active role in bat management. This can be accomplished by learning more about California's bats and informing others, promoting scientifically based management of California's forests and riparian areas and by monitoring bats. The Clean Water Team has compiled a list of resources which it has added to this email to help you get started.

RESOURCES

Bats As Bioindicators: An Introduction

<http://media.journals.elsevier.com/content/files/1-18084048.pdf>

Bats: Biological and Physical Resources

www.fs.fed.us/biology/wildlife/bats.html

To Find Clean Water, Follow the Bats

<https://undark.org/2018/05/03/drinking-water-bats-bioindicators/>

Effect of emergent aquatic insects on bat foraging in a riparian forest

www.researchgate.net/publication/6763575_Effect_of_emergent_aquatic_insects_on_bat_foraging_in_a_riparian_forest

A landscape perspective on bat foraging ecology along rivers: does channel confinement and insect availability influence the response of bats to aquatic resources in riverine landscapes?

www.jstor.org/stable/41499878

Bat Activity Along Intermittent Streams in Northwestern California

<https://academic.oup.com/jmammal/article/82/3/738/2372716>

Do riparian forest strips in modified forest landscapes aid in conserving bat diversity?

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6467860/>

The effects of wildfire severity and pyrodiversity on bat occupancy and diversity in fire-suppressed forests

www.nature.com/articles/s41598-019-52875-2

Merlin Tuttle's Bat Conservation

<https://www.merlintuttle.org/>

CALIFORNIA'S BATS

California Bat Working Group

The California Bat Working Group mission is to facilitate communication regarding bat ecology, distribution, and research techniques, and provide a forum to discuss conservation and management strategies, provide technical assistance, and encourage education.

<https://www.calbatwg.org/>

CDFW's Wildlife Life Histories

<https://wildlife.ca.gov/Data/CWHR/Life-History-and-Range>

- **Science Spotlight – Bat Week Begins! (2017)**
wildlife.ca.gov/Science-Institute/News/tag/bats
- **All for the Benefit of Bats: CDFW Celebrates “Bat Week” in California (2019)**
<https://cdfgnews.wordpress.com/2019/10/24/all-for-the-benefit-of-bats-cdfw-celebrates-bat-week-in-california/>

Bat Conservation International's Profiles of California Bat Species

www.batcon.org/about-bats/bat-profiles/?fwp_location=california

Northern California Bats, Sacramento Valley and Foothills

NorCalBats is dedicated to the rescue, rehabilitation and release of bats throughout Northern California. In addition, we are committed to public education regarding the environmental benefits of bats, and dispelling fears and myths that lead to the death of roosts and colonies. Located in the Sacramento Valley, trained volunteers care for injured and orphaned bats throughout the valley and surrounding foothills.

<https://norcalbats.org/>

Bat population declining in California. Here's why it matters

Bats are an important part of Northern California's ecosystem, but their population is declining. A local bat conservation expert says the number of bats in the region has dropped over the past 50 years, mainly because of habitat loss. That could lead to an increase in insects and other pests. <https://www.kcra.com/article/bats-important-part-northern-californias-ecosystem-population-declining/40669892#>

Everything you didn't know about bats in Los Angeles

A new research tool at the La Brea Tar Pits may soon shed light on one of the ancient animals whose fossils have been pulled from the pools' gooey depths. It's not a woolly mammoth that researchers are hoping to better understand, but another Pleistocene Era mammal: bats. "A couple of those bat species that were uncovered in the tar pits are still alive today and still live in the Southern California area," said Miguel Ordeñana, a wildlife biologist at the Natural History Museum of Los Angeles County. www.kpcc.org/2014-07-21/getting-to-know-the-secret-world-of-la-s-bats

Bats in California: Common Bat Species & 8 Great Places to Find Them!

If you are looking for something different to do in California, consider planning at least part of a day to go looking for bats. Yes, bats! California is a great place to see bats in their natural habitats, and many people in the state plan outings just to see large flocks of bats coming and going from their dens during the evening hours. <https://californiacrossroads.com/bats-in-california/>

BAT IDENTIFICATION

Field Identification Key and Guide for Bats of the United States of America

www.researchgate.net/publication/330542108_Field_Identification_Key_and_Guide_for_Bats_of_the_United_States_of_America

Western U.S. Bats ID Key (fee)

<https://batmanagement.com/products/western-u-s-bats-id-key>

A Guide to Processing Bat Acoustic Data for the North American Bat Monitoring Program (NABat)

<https://pubs.usgs.gov/of/2018/1068/ofr20181068.pdf>

NAU's Bat Ecology and Genetics Lab

<https://in.nau.edu/bat-ecology-genetics/>

MONITORING BATS

Report a Bat Colony

You can help CDFW track bat populations in California by reporting bat colonies or their roost sites. A bat colony is a group of bats roosting during the day or hibernating during winter. Bat roosts may be found in many kinds of structures, including attics, warehouses, outbuildings, barns, siding or roofs of houses and other buildings, bridges, parking garages, woodpiles, trees, bat houses, caves, mines, talus, and rock crevices.

- Do not pick up or touch live or dead bats with your bare hands
- If you are scratched or bitten by a bat, or are in contact with saliva of a dead or live bat, contact your [local public health department](#)
- Do not disturb roosting bats by entering their roost site, if possible. Avoiding roost sites also will help prevent the spread of diseases such as [White-nose Syndrome](#)

Please fill out the form found below, and someone from CDFW will be in touch to learn more about the colony you have found. Thank you for your help in protecting these beneficial animals! <https://wildlife.ca.gov/Conservation/Mammals/Bats/Report-Colony> If you have found a dead bat, please use the "[Report a Sick or Dead Bat](#)" form instead of this form.

North American Bat Monitoring Program

NABat is an international and interagency program that aims to conserve North American bat populations by providing standardized survey protocols and data from across the continent.

<https://www.nabatmonitoring.org/>

- [A Plan for the North American Bat Monitoring Program](#) (NABat)
- [Explore Public Data & NABat Projects](#)

North American Bat Tracker

Report bat sightings using the North American Bat Tracker, and help biologists document the location and health of existing bat colonies. Document your bat sightings! IMPORTANT!! Do not touch bats! Provide a picture of the bat and/or a picture of the habitat you see bats using. Provide the location and time Note the the weather conditions Note what the bats are doing, i.e., hunting over open meadow, flying under tree canopy, hanging on a window screen, drinking from a pond, etc. Note how many bats you see in one setting.

www.projectnoah.org/missions/18306114

Backyard Bat Survey

The Backyard Bat Survey is a project within a larger NHMLAC urban biodiversity study called the [SuperProject](#). Help the Natural History Museum of Los Angeles County Backyard Bat Survey

Team and our local bats by sharing locations that are bat hot spots and potential roost (where bats settle to rest during the day) locations. <https://nhm.org/community-science-nhm/backyard-bats>

ECHO METER TOUCH 2 FOR ANDROID (USB-C)

Flying at night, using ultrasonic vocalizations — bats can be hard for people to detect. But with the sophisticated technology inside the affordably priced [Echo Meter Touch 2](#), you can turn your smartphone or tablet into a professional-quality, interactive bat detector, allowing you to hear and record bats flying above you in real-time! (Not an endorsement, just for your information.)

FUN STUFF – Permission to go batty!!!

My Compliments to the Bat

- [A Cookbook of Goodies & Treats Made with Bat-Dependent Ingredients](#)
- [The Surprising Role Bats Play in Making Your Margarita](#)
 - [How to: Make a Bat-Friendly Margarita](#)
- [Bats and Chocolate Production](#)

Bat Cams & Video

- NOVA: Bat Superpowers www.pbs.org/video/bat-superpowers-nfuph6/
- Week <https://batweek.org/video/>
- Yolo Causeway Bats <https://www.youtube.com/watch?v=HBDIauwMWbE>
- Sacramento Bat Roost <https://www.youtube.com/watch?v=8ZC1jzuGCPC>
- <https://batworld.org/bat-cams/>
- <https://explore.org/livecams/bats/flying-fox-bat-cam>
- www.azgfd.com/wildlife/viewing/webcamlist/bats/bat-cam/

Bat Mythology

- [Native American Legends About Bats](#)
- [Bat Myths and Folktales from Around the World](#)

Bat Pollinator Activity Book

www.igb.illinois.edu/sites/default/files/uploads/Bat%20Pollinator%20Activity%20Book.pdf

Coloring Pages

- <https://blog.greatparks.org/wp-content/uploads/2020/06/National-Pollinators-Week-Coloring-Book.pdf>
- www.bestcoloringpagesforkids.com/wp-content/uploads/2013/08/Flying-Bats-Coloring-Page.gif
- www.bestcoloringpagesforkids.com/wp-content/uploads/2013/07/Flying-Bat-Coloring-Pages.jpg

Build a Bat House

It's important to know that bat boxes must meet certain criteria to be effective.

A bat house should be at least 24" high x 16" wide. Smaller bat houses do not offer adequate thermal stability.

A bat house should *not* contain fabric or mesh. Roosting boards and landing pads should consist of roughened wood.

- [Two-chamber Rocket Box](#)
- [Four-chamber Nursery Bat House](#)

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