May 2009, Volume 7, Number 5

Bats Face Climate Change

Biologist Rick Adams and his students at the University of Northern Colorado have been conducting bat research for 13 years in a wondrously diverse region of the Rocky Mountains in Colorado. The underlying questions of all that work have centered around the impacts of limited water resources on the structure of bat communities, on roost selection and reproductive ecology. "Unfortunately," Adams reports, "our data strongly suggest a potentially devastating impact of climate change on these bats."

He says that increasing regional temperatures, declining precipitation and reduced stream flow, all predicted effects of climate change in the region, seem to exert a negative impact on the ability of female bats to reproduce.

Upon leaving hibernation sites at high elevations in late April or early May, bats descend into the food-rich lowlands of the Rockies. Females typically return year after year to the same rock-crevice roosts, usually located near small-stream water sources. Some of these pools are less than six feet (1.8 meters) in diameter, yet they buzz with activity after sunset, as hundreds of bats descend to the surface to drink.

Bats must replenish water lost during their daytime siestas within sun-baked rock crevices where higher roost temperatures help with gestation. Some bats have been shown to lose more than 30 percent of their body mass through evaporative water loss over a single 12-hour roosting cycle. The combination of hot, dry roosts, small body size and lactation suggests that reproduction in these female bats is a staggering effort that likely explains why we find maternity colonies of multiple species near reliable pools of water.

During the summer of 2006, the scientists marked 29 female fringed myotis from a maternity colony by inserting a passive integrated transponder – a PIT tag – just beneath the skin of both lactacting and nonreproductive females. The tiny tags do not require batteries and can be read by a scanner to identify the individual.

The team placed a scanner in a small pool near the roost site and documented that lactating females drank at the pool 13 times more often than nonreproductive females over an 11-day period. Then they plotted 13 years of data against annual weather conditions, including average monthly high temperatures, precipitation and stream-discharge rates. "What we found was disconcerting," Adams says.

In years with warmer, drier conditions, reproductive outcomes dropped precipitously. The long-term trend showed a steady increase in numbers of nonreproductive females captured during such years. Virtually all climate-change models predict warmer and drier summers in this region.

Analyzing the data showed that the availability of water and especially precipitation were most closely correlated to reproductive status. These data fit well with the PIT-tag study of female reproduction and visitation frequency to water sources.

We often think of bats as highly mobile mammals capable of travelling large distances to forage and find water. Maternity roost sites, however, provide well-established anchors that help support local bat populations over the long term. Females return to these sites year after year to give birth to and raise their young, and females in maternity colonies seem to resist abandoning such areas, even when water resources dwindle. Instead of leaving, females apparently are shutting down – or being forced physiologically to halt – reproductive output that the

environment can no longer support. The long-term risk to these populations appears substantial.

BCI Members can read the complete story of Rick Adamsâ€™ research in Colorado in the Spring 2009 issue of BATS magazine.

All articles in this issue:

- The Founder Passes the Baton

Merlin Tuttle, who founded Bat Conservation International in 1982 and spent the last 27 years building it into the leading ...

- Bats Face Climate Change

Biologist Rick Adams and his students at the University of Northern Colorado have been conducting bat research for 13 years in a ...

- Bats in the News

Twenty-five federal lawmakers are seeking emergency funding from the U.S. Department of Interior to help scientists seek ...