WhiteBlight

Biologists estimate that several hundred thousand bats in several eastern states have died, or will soon die because of white-nose syndrome. This is a major concern because bats are an important part of our ecosystem. Bats are pollinators and natural pest controllers, eating as many as 3,000 flying insects a night. And because farmers depend on bats to keep the moth and beetle populations in check, losing a significant number of bats will put their crops at risk. Given that female bats only produce one off-spring a year, this rapid rate of die-off translates into an ecological disaster in the making.

Bats in peril

by David Sublette

The North American Symposium on Bat Research was held in late October, 2008, in Scranton, PA. Over two hundred abstracts were presented and research topics represented a large range of bat research with international implications. Of particular interest were the issues of White-Nose Syndrome (WNS) and the threat presented to bats by wind turbines.

WNS was first recorded in Feb. 2006 in Howe Cave near Albany, New York and subsequently was discovered in five sites, all within 15 km of Albany. By March of 2008, WNS was observed in hibernacula from at least four states (New York, Vermont, Massachusetts, and Connecticut). Early evidence indicates that several hundred thousand bats may have already died in this north east region.

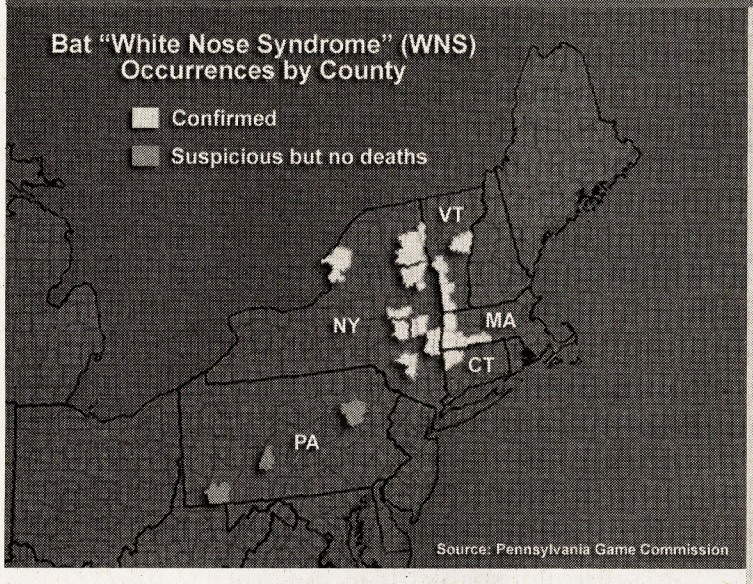
Although several species of bats are affected in New York, it appears that about 85% are little brown bats (myotis lucifugus). If the current trend continues, the little brown bat will eventually be extinct in the north east. Observations have shown that bats affected by WNS have a white fungus that grows on the nose (sebaceous glands and hair follicles), ears, and wing membranes. In addition, the wing membranes are ulcerated, necrotic, and scarred. The disease causes a depletion of white and brown fat reserves by mid-winter, and a reduced capacity to arouse from deep torpor. However in some cases, the opposite occurs—some of the emaciated bats wake frequently and emerge prematurely from hibernation, leaving their caves during the cold of winter in search of insect food, an effort which is of course, futile. All the affected hibernating bats are emaciated and dehydrated with depleted fat reserves creating energy deficits. In short, the bats appear to be starving to death.

The initial meeting of concerned scientists investigating WNS was held in Albany in June, 2008. This meeting of about 100 experts from a variety of disciplines created a list of questions, observations, hypothesis, predictions, and research needs or addressing effects of WNS in hibernating bats. The meeting was organized by Bat Conservation International, Boston University's Center for Ecology and Conservation Biology, Cornell University College of Veterinary Medicine, the New York Department of Environmental Conservation, the U.S. Geological Survey, and the U.S. Fish and Wildlife Service. The hypotheses to be examined were: WNS is caused by a transmissible pathogenic fungus; the fungus associated with WNS grows on the skin surfaces of healthy bats and only becomes evident in areas affected by some unknown agent; bats arriving at hibernacula have insufficient fat reserves to survive until spring; bats with sufficient fat upon arrival at hibernacula suffer premature depletion of white adipose tissue and/or brown adipose tissue during hibernation; pathogens are a direct cause of mortality; WNS can cause mortality and/or reproductive failure in bats that survive the winter season and form maternity colonies. For details of this report from the June meeting, see www.batcon.org.

COURTESY RYAN VON LINDEN/NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Little brown bat with fungus on nose.

David Blehert of the National Wildlife Health Center, USGF, states that "histopathological analysis conducted in multiple laboratories confirmed that 90% of necropsied bats exhibited an associated cutaneous fungal infection. Direct microscopy and culture analysis



demonstrated that the skin of WNS affected bats is colonized by a psychrophylic (cold-loving) fungus that is phylogenetically related to Geomyces spp, but with conidial morphology distinct from characterized member of this fungus. There is currently a growing body of circumstantial evidence supporting an association between WNS and cutaneous infection by Geomyces-like fungus".

Researchers are now monitoring the arousal activities of hibernating bats; investigating the body condition and the use of body fat of bats entering hibernation at both affected and unaffected sites; and working to determine the nature and physiological impact of the fungus associated with WNS.

Although tree roosting bats may escape some of the ravages of WNS, they are the species most threatened by wind turbines. The Eastern Red Bat, Hoary Bat, and Silver Haired Bat are most vulnerable during the migration period of August and September. In studies in Alberta, Canada, it has been established that different species migrate at different times with adult males migrating first followed by females then juveniles. It was also discovered that turbines placed in a north-south configuration appear to be less dangerous.

Underlying causes of high rates of bat mortality at wind turbine sites remain a mystery, but some hypotheses are under consideration including noise attraction, random collisions, roosting site, insect availability, and mating location. Other considerations are wind speed (slower is better), temperature, moonlight, and barometric pressure. Barotrauma may cause internal bleeding leading to fatalities.

Erin Baerwald, scientist with the Alberta wind turbine project, suggests that there is evidence that barotrauma is the result of a drop in air pressure near the blades that causes fatal damage to bats' lungs. "We compare if to divers—they are pretty much dying of the bends." 90% of the bat corpses showed signs of internal hemorrhaging.

BAT BIOLOGY 101

HIBERNACULA: the shelter of a hibernating animal.

TORPOR: a reduced body temperature and rate of metabolism that allows a hibernating animal to survive during periods of colder temperatures.

BROWN FAT: present in many hibernating mammals; its primary function is to generate body heat.

WHITE FAT: is used as a store of energy.

NECROTIC: dead tissue.

PATHOGENIC FUNGUS: fungi that cause disease in humans or other organisms.

BROWN AND WHITE ADIPOSE TISSUE: brown and white fat tissue, defined above.

PATHOGEN: a biological agent that causes disease or illness to its host.

HISTOPATHOLOGICAL: microscopic examination of tissue in order to study the manifestations of disease.

NECROPSIED: the examination of a body after death.

CUTANEOUS: pertaining to, or affecting the skin.

MICROSCOPY: the technical field of using microscopes to view samples or objects.

PSYCHROPHYLIC: organisms capable of growth and reproduction in cold temperatures.

PHYLOGENETICALLY: the study of evolutionary relatedness among various groups of organisms (e.g., species).

GEOMYCES: fungi that can survive refrigerator-level temperatures, which are typical of many caves where bats hibernate.

SPP: an abbreviation for species.

BAROTRAUMA: damage to body tissues caused by a difference in pressure between an air space inside or beside the body. Damage occurs in the tissues around the body's air spaces because gases are compressible and the tissues are not.

Bat expert Dan Boone predicts east coast fatality rates, including the Appalachian highlands, to be about 28 bats annually for each mega watt of power. Existing and under construction sites with 2,362 MW would create 67,000 kills and it is estimated by the year 2030 on the east coast with 35,000 MW, the kill would exceed one million bats annually.

David Sublette chairs the Chapter's Public Lands committee and serves as vice-chair of the Lake Erie Group.