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10th Research Symposium 2013

Feb 14th, 2:50 PM

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Recommended Citation

Rick Toomey, Steven Thomas, Joel Gillespie, Vickie Carson, and Shannon R. Trimboli, "White-nose Syndrome at Mammoth Cave National Park: Actions Before and After Its Detection" (February 14, 2013). *Mammoth Cave Research Symposia*. Paper 13. http://digitalcommons.wku.edu/mc_reserch_symp/10th_Research_Symposium_2013/Research_Posters/13

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White-nose Syndrome at Mammoth Cave National Park: Actions Before and After Its Detection

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Abstract

Since it was identified in the United States in 2006, white-nose syndrome (WNS) in bats has become an important issue in the management of caves and bats at Mammoth Cave National Park (MACA). The threat of its arrival has led to more intense monitoring of bat populations, increased studies, and interventions with both the visiting public and researchers. The timeline of MACA's WNS response is shown in Table 1.

On January 4, 2013, at the entrance to Long Cave, Steve Thomas and Rick Toomey euthanized and collected a northern long-eared bat (*Myotis septentrionalis*) that showed signs of WNS (white growth on ears, forearms, and wings) (Figure 1). The bat was submitted to the Southeastern Cooperative Wildlife Disease Study where it tested positive for WNS via histopathology and PCR. Eleven other bats were found in the same area as the affected bat (six tri-colored bats, four big brown bats, and one gray bat), but none of them

showed any signs of infections. Bats are regularly seen in this entrance area in the winter, so the presence of these bats is not indicative of unusual behavior.

Long Cave is the park's largest hibernaculum. At the 2011 count, it housed approximately 12,000 gray bats, approximately 1,000 Indiana bats, and a few little brown bats, tri-colored bats, and big brown bats. It is a 1.3-mile long cave that is separate from the Mammoth Cave system. It is about 4.5 miles from the Historic

Table 1: MACA's WNS response timeline.

May 2009	Colonial bat roosts closed year-round (except approved WNS and bat research) Decontamination required of incoming gear for researchers
June 2009	Screening of incoming tour visitors and intervention (decontamination, disallowing items, etc).
Feb-Jun 2010	Caves closed signs posted at entrances to 10 park colonial bat roosts
August 2010	Decontamination required between and after cave trips for researchers
January 2011	Park releases WNS Response Plan (plan currently under revision)
April 2011	Tours began post- visit decontamination with walk-over mats containing Lysol solution
Sept 2012	Post tour walk-over mats changed to carpet due to restrictions on Lysol use
Jan 2013	WNS found at Long Cave in MACA

Entrance of Mammoth Cave and about 1.75 miles from the large gray bat hibernacula of Coach and James caves (which house approx. 300,000 gray bats). Gray bats and Indiana bats are federally endangered species.

When WNS arrived in the northeast United States, agencies lacked significant baseline data on healthy bat populations. Beginning in 2009, MACA increased surveillance and monitoring of its bat roosts (both hibernacula and summer roosts) to gather baseline data, detect the arrival of WNS, and to document potential population changes. This monitoring includes biennial hibernation counts, summer emergence counts, and summer acoustic mobile transects. Disease surveillance includes regular entrance checks of bat roosts, targeted winter visits to bat roosts to check for signs of WNS, and cave entrance acoustic monitoring.

MACA's 400,000 visitors a year provide both a great opportunity for education about bats/ WNS and a potential vector for bringing the fungus that causes the disease to the park. To reduce the potential for a visitor to introduce the fungus into the cave, park staff have screened cave visitors since summer 2009. Screening methods include public announcements, pre-tour briefings by guides, and printed posters in the Visitor Center. Visitors are asked if they have been in a cave since 2005. If so, they are asked about whether they are wearing or carrying things that have been in a cave. If they have things that have been in a cave, park staff works with them to reduce the potential for bringing in fungal spores. Measures that can be taken include decontamination, bagging items, or disallowing items from the cave.

Starting in April 2011, when WNS was first identified in Kentucky, MACA began requiring visitors to walk over a decontamination mat after taking walking tours of the cave. This measure was taken to reduce the possibility that MACA

visitors could take the fungus away from the cave with them, even if it had not been detected in Mammoth Cave yet. Originally, six-foot-long walkover mats with a Lysol solution were used for decontamination. In September 2012, the park stopped using Lysol solution mats, because their use was deemed to be off-label use. From September 2012 through February 2013, the park has been using twelve-foot lengths of plastic AstroTurf-like carpet to physically remove spores from the soles of shoes. The carpet is periodically decontaminated to kill spores that might accumulate on it. MACA is currently working with NPS, EPA, FWS, USDA-FS, and the PHS to identify a decontamination fluid that can be used in the walk-over mats.

All 400+ caves in Mammoth Cave National Park are closed to human access except via ranger-led tours, research permit, or special use permit. People entering caves under research and special use permits are required to decontaminate all gear using current approved national decontamination protocols. They are required to decontaminate gear before going into a park cave, between caves (if they are visiting multiple ones), and before entering any other cave.



Figure 1: Northern long-eared bat from Long Cave that showed signs of WNS.