

UNRAVELING SPECIES CONTRIBUTIONS TO ENVIRONMENTAL PATHOGEN RESERVOIRS

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Study Description

In our study, we examined environmental reservoir dynamics of *Pseudogymnoascus destructans*, the fungal pathogen causing white-nose syndrome in hibernating bats. We quantified changes in pathogen shedding, infection intensity, and species abundance during pathogen invasion and establishment within sites in the Midwestern US. We evaluated these effects together through the metric of propagule pressure which allowed us to capture which bat species within the community contributed to pathogen invasion success and ultimately the maintenance of indirect transmission, which is an important driver of infection and mortality. Broadly, our results demonstrated that multiple factors of species variability scale to influence environmental reservoir dynamics within communities.

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Photo 1. The ceiling of a cave in the Midwestern US. Hibernacula substrate is highly contaminated with the fungus that causes white-nose syndrome, *Pseudogymnoascus destructans*. Photo credit: Joseph R. Hoyt.



Photo 2. A hibernating tricolored bat (*Perimyotis subflavus*). Tricolored bats roost in low densities relative to other species found in hibernacula. Photo credit: Joseph R. Hoyt.



Photo 3. A little brown bat visibly infected with the fungus that causes white-nose syndrome. The epidermal fungal infection can be seen on the muzzle, ears, and wings. Photo credit: Joseph R. Hoyt.

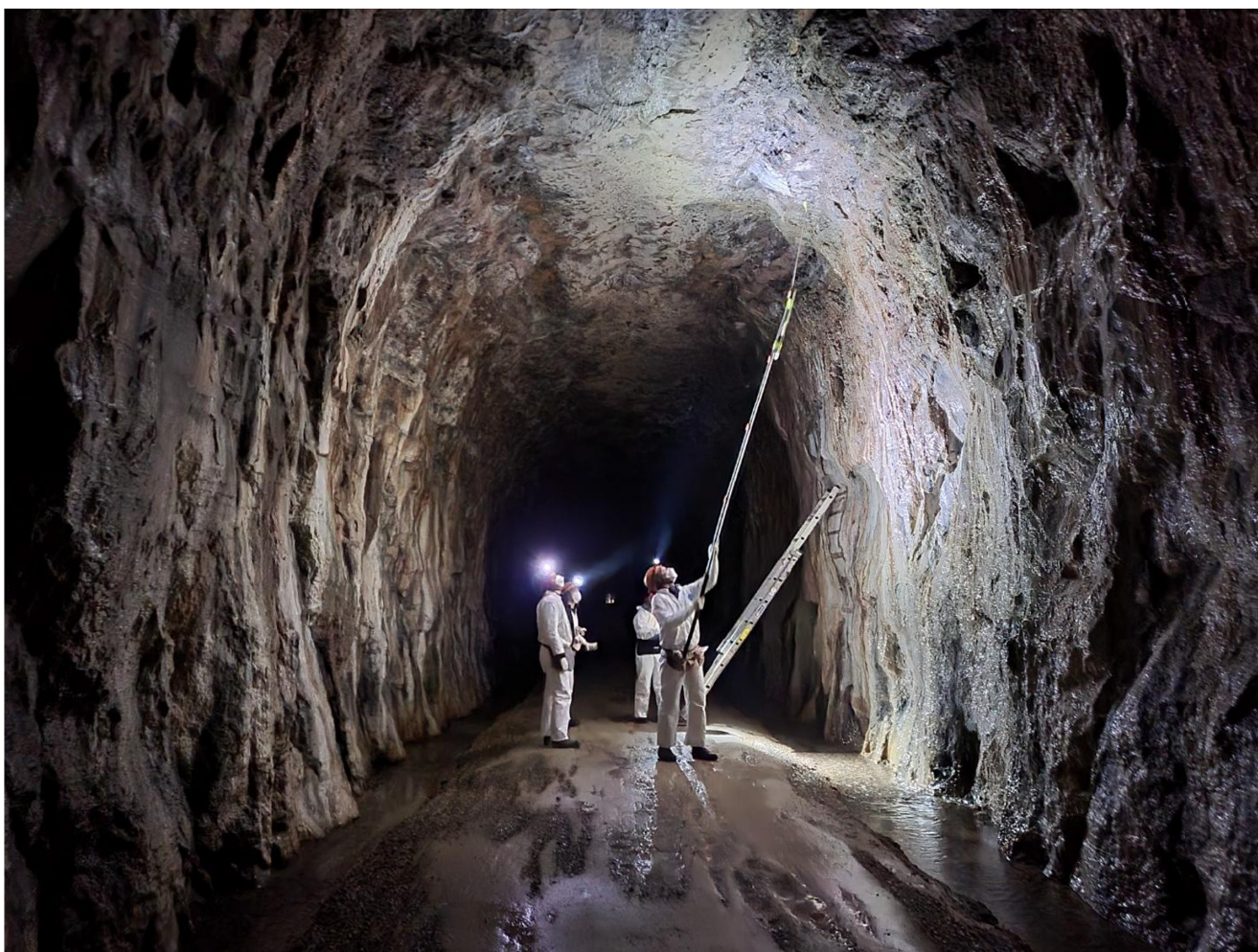


Photo 4. Researchers are retrieving a bat for sampling in an abandoned railroad tunnel that is used a hibernation site throughout winter. Photo credit: Joseph R. Hoyt.



Photo 5. A hibernating northern long-eared bat (*Myotis septentrionalis*). This species is federally endangered after suffering severe declines from white-nose syndrome. In our study, we found that this highly shedding species is important during pathogen invasion but contributed less over time to environmental contamination as they also suffer the greatest declines. Photo credit: Joseph R. Hoyt.



Photo 6. Three hibernating little brown bats (*Myotis lucifugus*) with white-nose syndrome. Little brown bats are a gregarious species that hibernate in high densities and have elevated levels of infection. We found that after pathogen invasion this species remains more abundant, resulting in equivalent or higher propagule pressure than other species within the community. Photo credit: Joseph R. Hoyt.

These photographs illustrate the article “Host infection and disease induced mortality modify species contributions to the environmental reservoir” by Nichole A. Laggan, Katy L. Parise, J. Paul White, Heather M. Kaarakka, Jennifer A. Redell, John E. DePue, William H. Scullon, Joseph Kath, Jeffrey T. Foster, A. Marm Kilpatrick, Kate E. Langwig, and Joseph R. Hoyt published in *Ecology*. <https://doi.org/10.1002/ecy.4147>.