

From: [McChesney, Gerry](#)
To: [Cassidy Teufel](#)
Subject: Salamander disease article
Date: Wednesday, December 1, 2021 2:23:09 PM

Hi Cassidy,

Don't want to inundate you but wanted to make you aware of this study that just came out. This study included the arboreal salamander, which has the endemic subspecies on the Farallones. Point Blue has been coordinating with one of the study coauthors and provided salamander skin swabs from Farallon salamanders for disease screening. You can see that Farallon salamanders were included in this study.

In our CD, we mentioned that removing mouse impacts from the Farallones could help provide a buffer to salamanders against the impacts of this disease and from climate change. The results of this study definitely raises the concern level for our Farallon salamanders.

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Deadly disease confirmed in 2 Calif. salamander species

BY:

VALERIE YURK

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Slender salamanders in California. Heidi Rockney

GREENWIRE | A fungal disease known for killing amphibians and blamed for the extinction of hundreds of species globally was found in two California salamander species, causing concern over the fatal infection spreading in the United States.

A [study](#) published earlier this week in *Frontiers in Veterinary Science* is one of the first to document the disease, *Batrachochytrium dendrobatidis* or Bd, among arboreal salamanders and Santa Lucia Mountains slender salamanders in the United States.

Across the globe, the extinction of more than 200 species of frogs and toads is attributed to Bd.

“There isn’t much that we know about Bd in salamanders,” said Tiffany Yap, co-author and scientist at the Center for Biological Diversity. “Bd is one of these deep, dark mysteries that we’re slowly learning more about as time passes.”

Bd is a chytrid fungus that’s passed through touch, Yap said. It thrives in wet or damp environments and eats the skin of salamanders or other amphibians, causing lesions, apathy, loss of appetite and, for some, death.

In the study of both wild and museum specimens, Yap tracked the progression of Bd in the two species throughout the 20th century. Of the studied specimens, 29 percent of the Santa Lucia Mountains slender salamanders and 17 percent of arboreal salamanders were Bd positive by the 1990s.

Through 2014 and 2015, 10 percent and 18 percent of Santa Lucia Mountains slender salamanders and arboreal salamanders, respectively, were infected. Although infection rates for the most part stabilized throughout the 2010s, by 2015, the mortality rate from Bd was 88 percent in Santa Lucia Mountain slender salamanders. For arboreal salamanders, it was 71 percent.

“We saw an increase in Bd in the museum specimens and then it stabilized, which is a somewhat typical disease curve as far as infections go over time,” Yap said. “But there’s no guarantee; we’re still not sure about the trajectory of this population.”

Other amphibians have fared worse. For example, hundreds of mountain yellow-legged frogs in the Sierra Nevada were lost to the disease throughout the 2000s. A small population survived, but the frog species remains endangered.

Bd’s sister disease, *Batrachochytrium salamandrivorans* or Bsal, has also wreaked havoc on global amphibian species. Studies have linked both fungi to Asia, where they were most likely spread through animal and commercial trade.

But researchers are still struggling to understand the full effects of Bd and Bsal on salamanders, Yap said, because they tend to be a “cryptic species.”

Salamanders “are nocturnal, so it’s hard to encounter them,” she said. “They also just disappear in the dry months, where we assume they burrow down and go deep enough in [where] the moisture level is good, and then they appear during the rainy season.”

Most people in the Bay Area won’t even know salamanders are there, Yap added.

But studies on salamanders show their populations are decreasing in the U.S., due to not only fungal diseases, but also habitat loss and increasing droughts, especially on the West Coast. More than 40 percent of U.S. species are estimated to be threatened, according to [recent estimates](#).

Scientists worry that Bd and Bsal could deal another devastating blow to salamander populations. But there’s hope that some might be resistant, Yap said.

For one, there might be different strains of Bd that are deadlier than others, which

can spare some lucky species. Some amphibians also might have particularly protective microbes on their skin, barring them from infection.

Some scientists have been looking into breeding programs, in which they inoculate at-risk species with Bd- and Bsal-resistant bacteria. The U.S. also banned some salamander imports after Bsal cropped up in amphibian hot spots across the globe. But to stop the spread, Yap said, the U.S. must take a deeper look at its trade protocols.

She advocates for the government to implement a clean trade program that ensures amphibians imported into or exported from the U.S. are certified as Bd- or Bsal-free. Another recommendation is to create a systematic database for all species being traded internationally, so there's a record of what species could be carrying diseases. "There's a level of biosecurity we need to be addressing," she added. "I'm holding my breath because there are other ways for these diseases to get in with other carriers that we don't even know about yet. When Bd first happened, it was going on in faraway places until it was shipped all over the world."