Tracking an Emergent Pathogen in Boreal Toads across a Southern Rocky Mountain Watershed

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Abstract: *Bd* chytrid fungus (*Batrachochytrium dendrobatidis*) is an emergent pathogen with cosmopolitan prevalence. Its arrival in novel regions has led to the extirpation and extinction of various amphibian species worldwide and threatens many others. In this study, we follow *Bd* as it spreads through habitat of the boreal toad (*Anaxyrus boreas boreas*) in the Southern Rocky Mountains from 2014 to present. Contact with *Bd* has already extirpated the boreal toad from New Mexico and is driving population declines in Colorado, both states in which it has a state endangered species status. To quantify the spread of *Bd* across wild toad populations, we collected skin swabs from wild toads in a watershed of the Collegiate Peaks region of Colorado. During breeding seasons of 2014-2016, *Bd* prevalence the first year of detection ranged from 64-90% and average *Bd* zoospore load on individual toads was 1,073 to 25,064 ITS1 copies. In the breeding season following first detection of *Bd*, we observed dramatic declines in adults at historic breeding sites. We also tested for presence of a related pathogen, *B. salamandrivorans*, and report that it was absent on boreal toads in this watershed in 2016. In the interest of predicting future *Bd* movement, we also evaluated landscape features associated with known *Bd* spread since 2014. Understanding how this pathogen moves through the landscape will aid in management decisions to prevent its spread and support affected populations.

Keywords: *Batrachochytrium dendrobatidis*, boreal toad, endangered species, amphibian pathogen, landcover