Dissertations

Ecology and Conservation of the Montane Forest Avian Community in Northeastern North America

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Abstract
Montane forests provide habitat for unique assemblages of flora and fauna that contribute significantly to a region's biodiversity. Previous work indicates that montane forest ecosystems are exceedingly vulnerable to a host of anthropogenic stressors including climate change, atmospheric deposition, and recreation, to name a few. Montane forests and other high elevation ecosystems are considered to be among the first and most severely impacted by climate change. It is therefore, imperative to evaluate anthropogenic impacts on montane ecosystems and maintain reliable monitoring methods that are capable of tracking potential shifts in the distribution of species dependent on these systems. I surveyed birds at various distances from hiking trails in the White Mountain National Forest from 2006 - 2009 to determine whether existing monitoring programs, all of which are based on trail-centered surveys, are accurately reflecting bird abundance, abundance stability and recruitment. Contrary

to previous studies, I found that recreational trails generally did not alter estimates of abundance, recruitment, abundance stability, and detection probability for five species of birds considered to be indicators of montane forest ecosystem integrity in northeastern North America. Therefore, trail-based monitoring programs for montane birds appear to accurately reflect dynamics of bird communities undisturbed by hiking trails. These conclusions were supported by my finding that the daily nest survival of a montane spruce-fir indicator species, blackpoll warbler (*Steophaga striata*), did not vary as a function of distance from trail.

I then used data from the White Mountain National Forest's montane bird monitoring program from 1994 through 2009 to assess potential shifts in the elevational distribution of montane birds in conjunction with documented habitat shifts in the region. My results provide evidence that low elevation forest birds have expanded their upper elevational boundary while high elevation birds have expanded their lower elevation boundary. These results highlight the complicated relationship between habitat, climate, and other anthropogenic stressors such as atmospheric deposition and that even in the face of climate change other stressors may be playing a significant role in shifts of species distributions.

Understanding how climate affects the reproductive ecology of montane organisms is an important step toward unraveling the potential mechanisms by which climate change will alter the distribution of these species. I used blackpoll warbler breeding data from the Green Mountains, VT from 1994 to 2003 to determine if temporal variation in climate influenced blackpoll nesting initiation and found that years with warm Mays and typical precipitation lead to earlier nest initiation. I also examined the effect of spatial variation in climate on blackpoll reproductive ecology and demography. I found a gradient in habitat quality associated with the spatial variation in climate along an elevation gradient. Blackpolls were less abundant, younger, had lower pairing success, lower daily nest survival, higher nest predator occupancy, and lower fecundity at lower elevations. The climatic conditions at these lower elevations represent the climatic conditions predicted to encompass increasingly larger portions of montane areas. Collectively, these findings contribute to filling in a dearth of knowledge regarding management and an understanding of how species dependent on montane ecosystems are responding to climate change.