



Project Impacts

NSRC-FUNDED RESEARCH FINAL REPORT

Understanding the Impacts of Climate Change on Obligate Spruce-fir Birds



PROJECT AWARD YEAR AND TITLE:

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Understanding the Impacts of Climate Change on Obligate Spruce-fir Birds

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The stratification of organisms along elevational gradients is widely reported, with montane communities characterized by species occurring in relatively small and isolated populations; these species are of considerable interest to ecologists and conservationists. This stratification is generally attributed to climatic zonation. Evidence that species are shifting upward in elevation has fueled speculation that species are tracking their climatic niches in response to climate change. Uncertainty regarding the degree to which climate directly influences species abundance versus the degree to which climate has an indirect influence via vegetation represents a key impediment to understanding the ecology of montane species.

An analysis of 13 species in the Presidential region of the White Mountain National Forest in New Hampshire revealed that climate exerts direct influences on bird abundance and indirect influences mediated by vegetation composition and structure. All species exhibited indirect effects of climate via forest habitat, with 77% exhibiting both direct and indirect effects and 53% exhibiting stronger indirect effects.

NSRC researchers provide insight into the mechanistic pathways of how climate influences the distribution of species along elevational gradients, underscoring the complex vulnerability of species to climate change. The results reveal that the majority of species experience both direct and indirect effects of climate, implying that forests play a key role in mediating climate effects. For species that are primarily influenced by climate directly, typical climate envelope models may continue to be informative, but for the majority of the species included in this study, research shows that distribution models should also include measures of habitat.

