



Final report to the Arctic Landscape Conservation Cooperative from the
Boreal Avian Modelling Project (www.borealbirds.ca)

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Modeling avifaunal responses to climate change across North America's boreal-arctic transition zone

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Executive summary.—Climate models project the rapid warming of boreal and arctic regions of North America. This has led to predictions that boreal forest vegetation and fauna will track these changes and shift northward into the arctic over the next century. We used a comprehensive dataset of avian point-count surveys from across boreal Canada and Alaska, combined with the best-available interpolated climate data, to develop bioclimatic niche models of current avian distribution and density for 102 native species of forest songbirds. We then used a downscaling of projected climates in future periods (2011–2040, 2041–2070, 2071–2100) to assess the potential for these species to shift their ranges and increase their abundance across North America’s boreal-arctic transitions zone in response to climate change.

For 40 species that currently breed in Alaska, we used our models to project changes in potential abundance, map projected shifts in distribution and density, and identify potential climate “refugia”—areas that are projected to maintain suitable climates for breeding in both current and future periods. For three species of conservation concern—Olive-sided Flycatcher, Blackpoll Warbler, and Rusty Blackbird—our models projected that suitable climatic conditions for breeding will become more restricted and fragmented in the future, and that only a small portion of the current ranges of these species will exist in refugia by the end of the century. This has the potential to exacerbate the already steep population declines of these birds. Overall 26 of the 40 boreal songbird species currently breeding in Alaska are projected to decline in population size based on current projections of future climate change across the boreal and southern arctic region.

For 62 species of boreal songbirds not currently breeding in Alaska, we identified current suitable climate space in the southern boreal and then assessed the potential for future range expansion from boreal Canada into Alaska and the southern arctic region. We showed that many of these species already have suitable climates for breeding in Alaska, but these unoccupied climates are disjunct from suitable climates occupied by these species in their current breeding ranges in boreal Canada. With time, our models project that suitable climates for these species will become continuous between Alaska and boreal Canada, potentially allowing northwestward range expansion by these species into Alaska by the end of the century.