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# EARLY SPRINGS CAUSE POPULATION GROWTH IN NORTH TEMPERATE RESIDENT BIRDS, POPULATION DECLINES IN MIGRANTS

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Anthropogenic climate change is altering the seasonality of climate and driving changes in the seasonal timing of biological events of many species. The magnitude of such phenological changes can vary greatly among species, particularly if they respond to different environmental cues when making reproductive decisions. Phenological mismatch occurs when asymmetric phenological responses to climate change cause important species interactions to become asynchronous. Secondary consumers, such as birds, may be particularly vulnerable to such mismatch because they can respond to changing climatic cues differently than their food sources. Migratory birds are expected to face additional risk due to their limited ability to respond to the local climate conditions of their breeding grounds while they are in their wintering range. To determine the extent to which phenological mismatch is causing population changes in more than 1,000 north temperate birds, I generated a north temperate map of potential mismatch based on temporal changes in heat accumulation. Using ordinal regression analysis, I tested for a correlation between the degree of mismatch within each species' range and its conservation concern. I found that non-migratory species experiencing the severest degree of mismatch tended to show positive population growth and be of least conservation concern while migratory species experiencing severe mismatch tended to show negative population growth and be of greatest conservation concern. These results may be explained by the greater potential for resident species to adjust their breeding to an earlier spring, allowing residents a longer breeding season overall. Migrants may be unable to advance their phenology to match that of their breeding grounds, leading to disrupted species interactions and population declines. Understanding the complexity of the consequences of phenological mismatch on both resident and migratory birds will be important for informing and directing efforts to conserve these species in the future.