**Supplementary materials**

Materials and methods

Before beginning our paper review process, we designed a universal spreadsheet with columns relevant to the information we sought to collect from each paper (e.g., number of periods of annual cycle considered, threat layers included, migratory system of modeled species, etc.; Appendix 1). If a paper was deemed relevant, we gathered and entered all relevant information into our own copy of the universal spreadsheet. For papers that modeled more than one species but fewer than five species, we filled out a separate row for each additional species modeled in the paper. For papers that modeled more than five species, we only filled out one row but specified the species and order as “multiple.” We chose to use five species as the cut-off point because typically studies will either focus only on one species, a handful of species, or hundreds of species. For those papers that focused on a handful of species, we used a new row for each species to ensure that we captured the potentially different orders and migration systems of the different species.

Below, we cover gray areas associated with each of the data categories we collected from relevant studies, and how we dealt with those gray areas.

*Seasonal interactions*

At the end of reviewing each paper, we determined whether the authors included seasonal interactions (i.e., yes/no) in their SDM analysis. We defined seasonal interactions as the sublethal effects of occupying a certain habitat during one season that affect migratory birds in subsequent seasons of their annual cycles (Norris & Marra 2007). We accepted a study as an example of incorporating seasonal interactions if the authors made any mention of seasonal interactions and how they attempted to include those effects in their SDMs. Most studies focused on one period of the annual cycle throughout their analysis, so this section was generally straightforward. However, there were several studies that modeled multiple distributions for their model species (e.g., breeding and nonbreeding distributions). In these cases, we read the entire abstract, introduction, and methods to determine whether they included the effects of seasonal interactions in their SDM analysis, regardless of whether the authors explicitly mentioned seasonal interactions.

*Periods of the annual cycle considered and/or included*

For every paper, we recorded which (i.e., breeding, wintering, fall, spring) and how many (i.e.,1-4) periods of the annual cycle were included in the modeling framework. Importantly, we classified SDMs in these categories based on the covariates they included, not based on the occurrence data they modeled. In most cases, the authors explicitly defined the periods in which they were modeling and in such cases it was apparent how many periods were included. However, there were several instances in which the authors did not explicitly state or define what periods they modeled. Some papers referred to modeling "flyway use" so we inferred spring and fall migratory periods; in other instances authors discussed the months they modeled and so we used months of the year to correspond to the four periods (e.g., Nov-Feb = temperate winter; May-August = temperate summer, and so on). In another case the authors did not mention what period they were modeling and stated that they included all occurrences of a particular species - so we inferred periods of the annual cycle based on the study location and the species modeled (e.g., all 4 for resident species, 1 for migratory, etc.).

*Migration system of modeled species*

For each SDM, we recorded the primary migratory strategy (i.e., obligate, partial, altitudinal, irruptive, multiple, or not specified) of the model species to determine whether the authors adjusted their SDM analysis to account for some of the intricacies associated with different migratory strategies. We never inferred the migratory strategy of the model species – we only recorded the migratory strategy if the authors mentioned it in their introduction or methods text. In cases where authors modeled multiple species and highlighted the fact that they did not have a uniform migratory strategy, we recorded the migratory strategy as “multiple.”

*Threat layers included*

We recorded whether the authors of each SDM analysis included different threats (i.e., yes/no) with threat categories based on known drivers of mortality for migratory birds in North America (Loss et al. 2015; Fig. 5b). For each threat category in our dataset, we recorded “yes” if the authors included it in their analysis. We recorded “yes” regardless of whether we thought the authors incorporated the layer explicitly as a threat or whether they incorporated the layer appropriately in their analysis – they simply had to address the threat in the manuscript text. For example, most SDMs typically include temperature and/or precipitation as covariates. If the authors included those covariates and said they were addressing the threat of climate change in their analysis, we recorded “yes” for climate change in our dataset. However, if the authors included temperature and precipitation but made no mention of addressing climate change, we recorded “no” for climate change in our dataset. Furthermore, the threats could be included as direct measures (e.g., adding a layer of land-use categories to directly address the threat of habitat change) or via a proxy (e.g., adding a layer of night-time lights to indirectly address the threat of window collisions).