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Bird nesting trends in Massachusetts

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Bird Nesting Trends in MA

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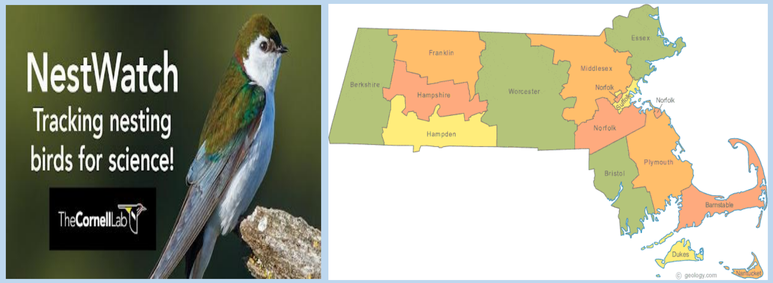
Data From: U.S. Climate Divisional Database,
Cornell Lab of Ornithology. NestWatch, [cited 20 April 2022]

Background

Bird nesting data has long been documented for various species across the United States(1,2,3). While trends between temperature changes or precipitation on bird nesting have been studied for particular species, studies done on the effects of temperature due to climate change on bird nesting on the broader state level are lacking(4). Using bird nesting data and average annual temperature data for Massachusetts collected over a ten-year period, I assessed the effects of temperature changes over time on bird nesting attempts and total eggs laid for all documented species within the state.



Provider of documented data and map of area (MA) studied. Courtesy of NestWatch.org and geology.com

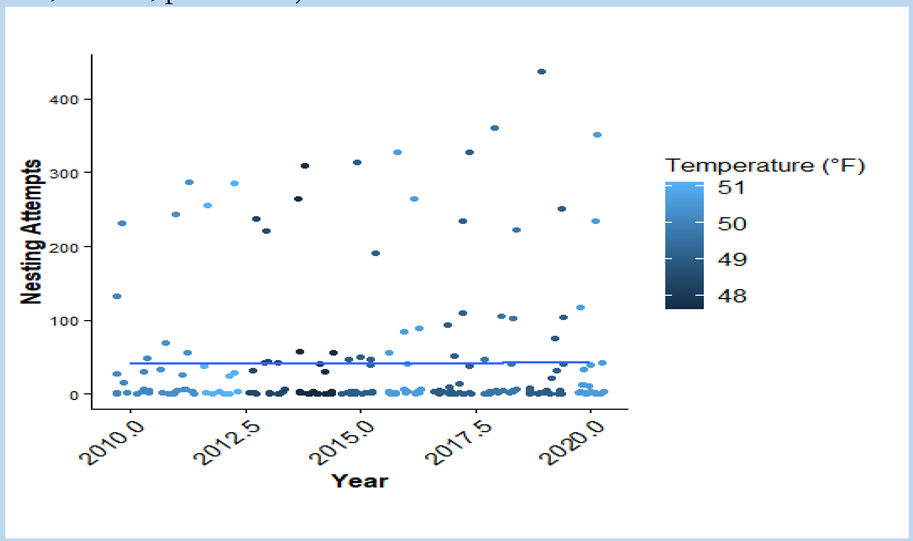
Methods

All bird nesting data were collected through the Cornell Lab of Ornithology's NestWatch program for all documented bird species from 2010-2020 in Massachusetts. This program relies on citizen science, with volunteers following an established methodology and certification process to ensure the accuracy of bird nesting data both for scientific value and to ensure the health of observed birds(5). There are studies that support the largely unrecognized significance of citizen science in global bird and climate change research, with this data being analyzed alongside Massachusetts average annual temperature data collected from the U.S. Climate Divisional Database(5).

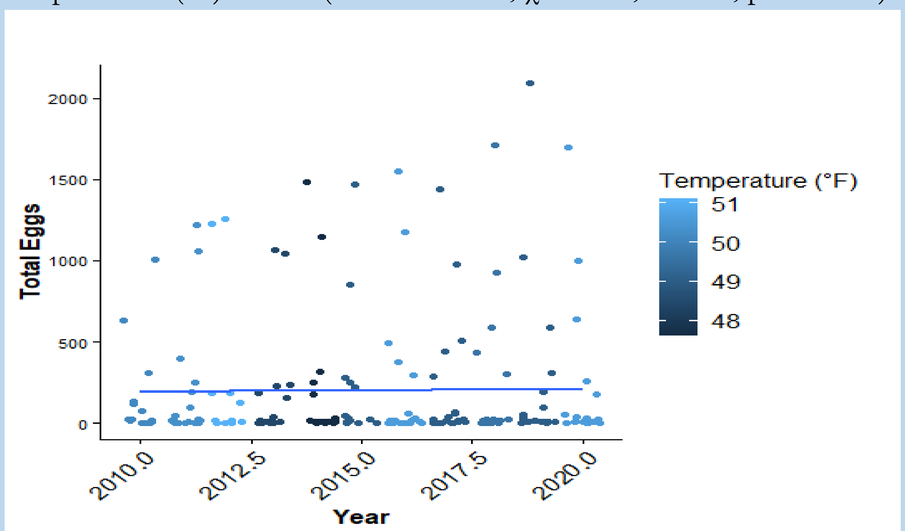
Results

Average annual temperature did not change significantly from 2010 to 2020 in Massachusetts. Nesting attempts were not significantly affected by average annual temperature over time. There was a significant difference in total eggs laid over time (Poisson GLM, $\chi 2 = 25.5$, $df = 1$, $p < 0.001$) but not due to temperature changes.

Nesting attempts did not change significantly from 2010-2020 or due to annual average temperature (°F) in MA.(Poisson GLM, $\chi 2 = .12$, $df = 1$, $p = 0.733$)



Total eggs laid increased from 2010-2020, but not due to average annual temperature (°F) in MA.(Poisson GLM, $\chi 2 = .36$, $df = 1$, $p = 0.551$)



Conclusions

This study suggests that temperature changes from 2010-2020 have not been large enough to affect bird nesting or total eggs laid across species in Massachusetts, a positive sign of bird reproductive success as climate continues to change. This does not mean that nothing else is affecting bird nesting, especially since total eggs laid increased over time, although the data is over dispersed. Further research on the state level is necessary to discover the reasons for this increase in documented eggs laid over recent years, as well to continue to monitor for any shifts in bird nesting trends. Possible areas of study include precipitation, changes in migration patterns, or food quality available to parent birds across Massachusetts.

Acknowledgements

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References

1. Skagen SK, Adams AAY. 2012. *Weather effects on avian breeding performance and implications of climate change. Ecological Applications.*
2. Sockman J, Courter J. 2018. *The Impacts of Temperature, Precipitation, and Growing Degree-Days on First Egg Dates of Eastern Bluebird (Sialia sialis) and Tree Swallow (Tachycineta bicolor) in Ohio. amid.*
3. Rushing CS, et al. 2020. *Migratory behavior and winter geography drive differential range shifts of eastern birds in response to recent climate change. Proc Natl Acad Sci USA.*
4. Carleton RE, et al. 2019. *Reproductive success of Eastern Bluebirds (Sialia sialis) varies with the timing and severity of drought. PLOS ONE.*
5. Cooper CB, et al. 2014. *The Invisible Prevalence of Citizen Science in Global Research: Migratory Birds and Climate Change. PLOS ONE.*